

INFLUENCE OF RESTORATION ON SHALLOW GROUNDWATER IN URBAN FOREST STREAMS

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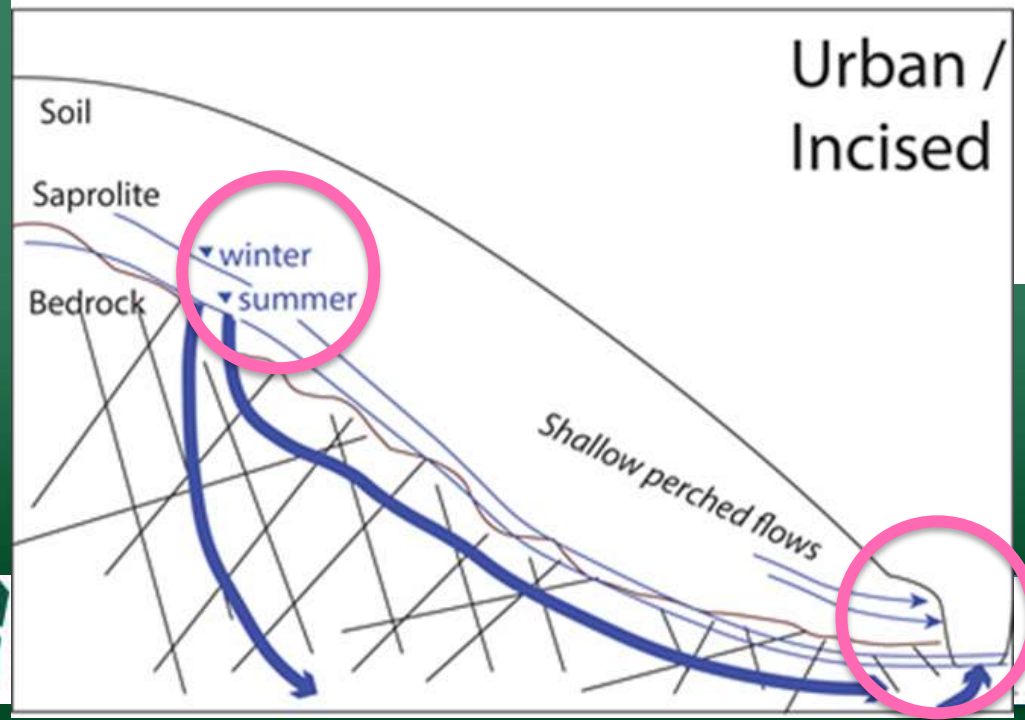
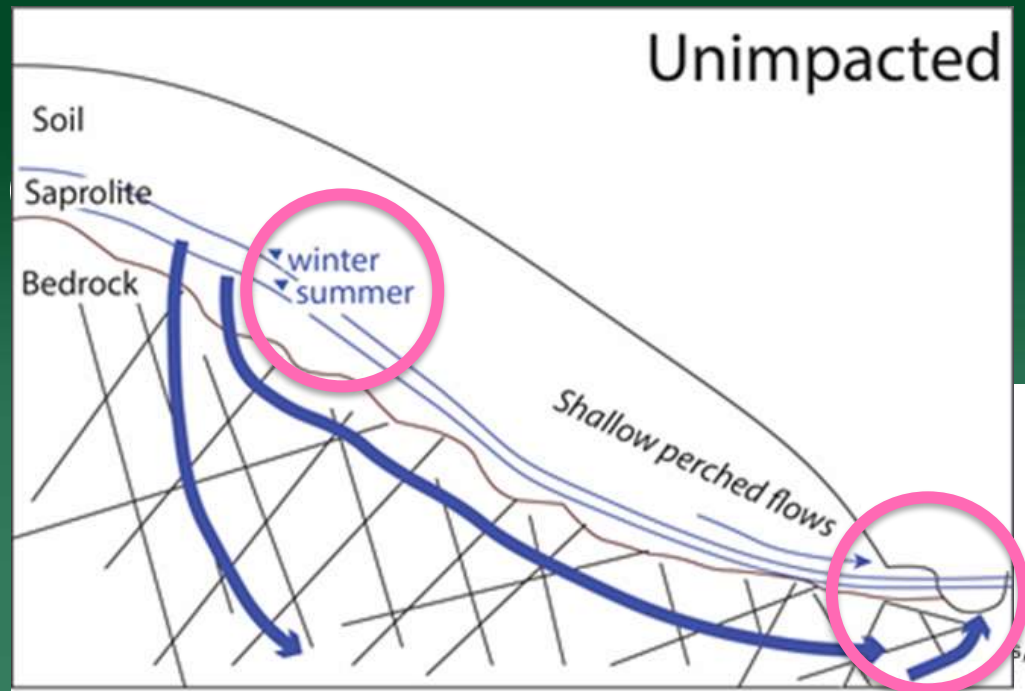


Piedmont Urban Forested Watershed Characteristics

- Altered hydrology
- Increased overland flow
- Physical and morphological characteristics
- Disconnected groundwater and surface water networks
- Reduced biogeochemical processing
- Restoration to restore ecosystem functioning (Rosgen Natural Channel Design)

The importance

- Ecosystem Services
 - Maintaining baseflow
 - Hyporheic exchange
 - Transformation and retention of nutrients/waters
 - Flood buffering
 - Hydrologic retention
- Above become impaired when incision of streams occurs...



Study Location

Reedy Creek Park - Development Site

Reedy Creek Park is located within Charlotte, NC.

Legend



Pre-Restoration Photos



Post-Restoration Photos



Research Objective

- Quantify:
 - How groundwater levels have changed from pre- to post-restoration
- Hypothesized:
 - Increased water table depths in the near stream zone

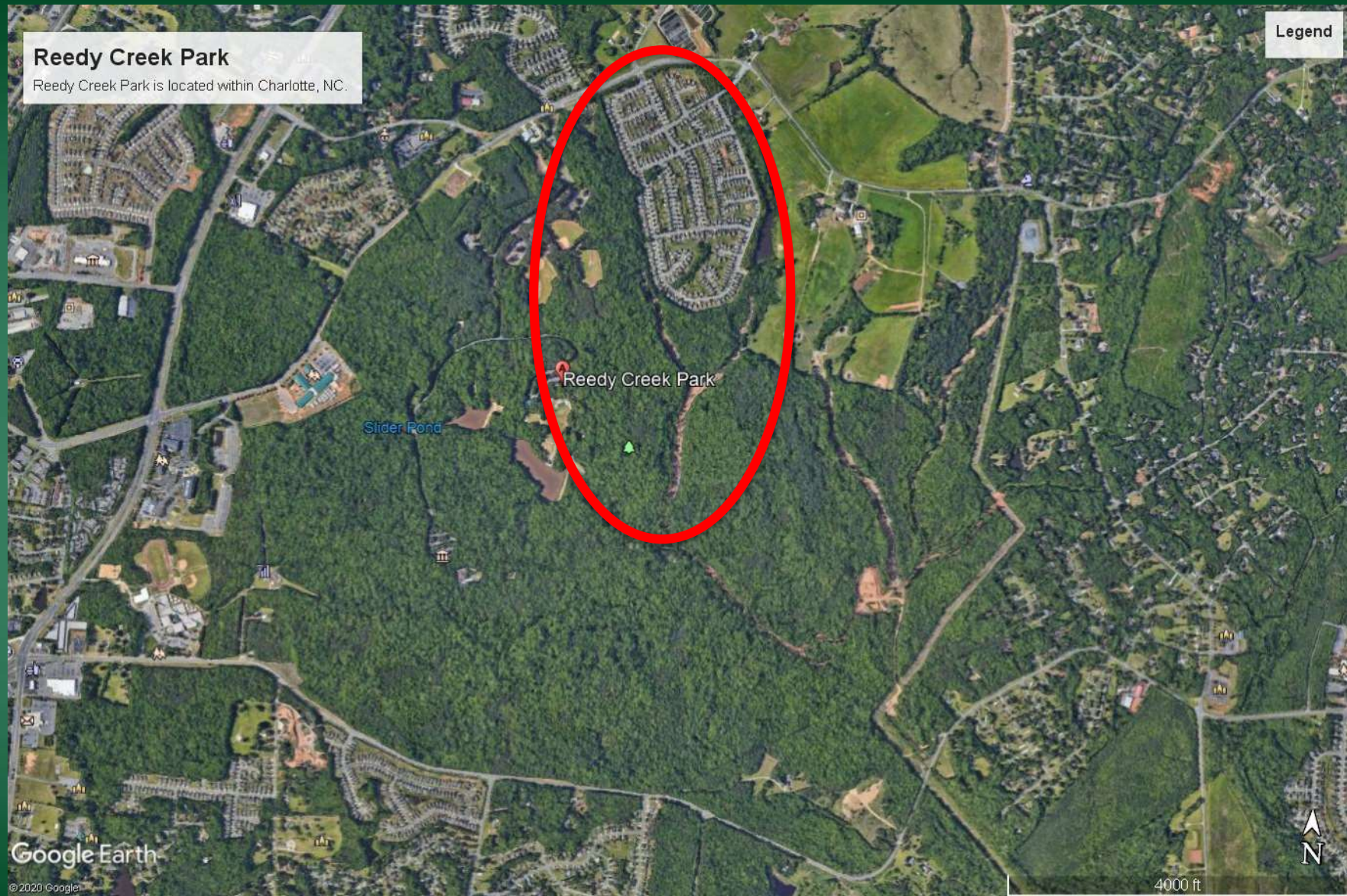


Methods

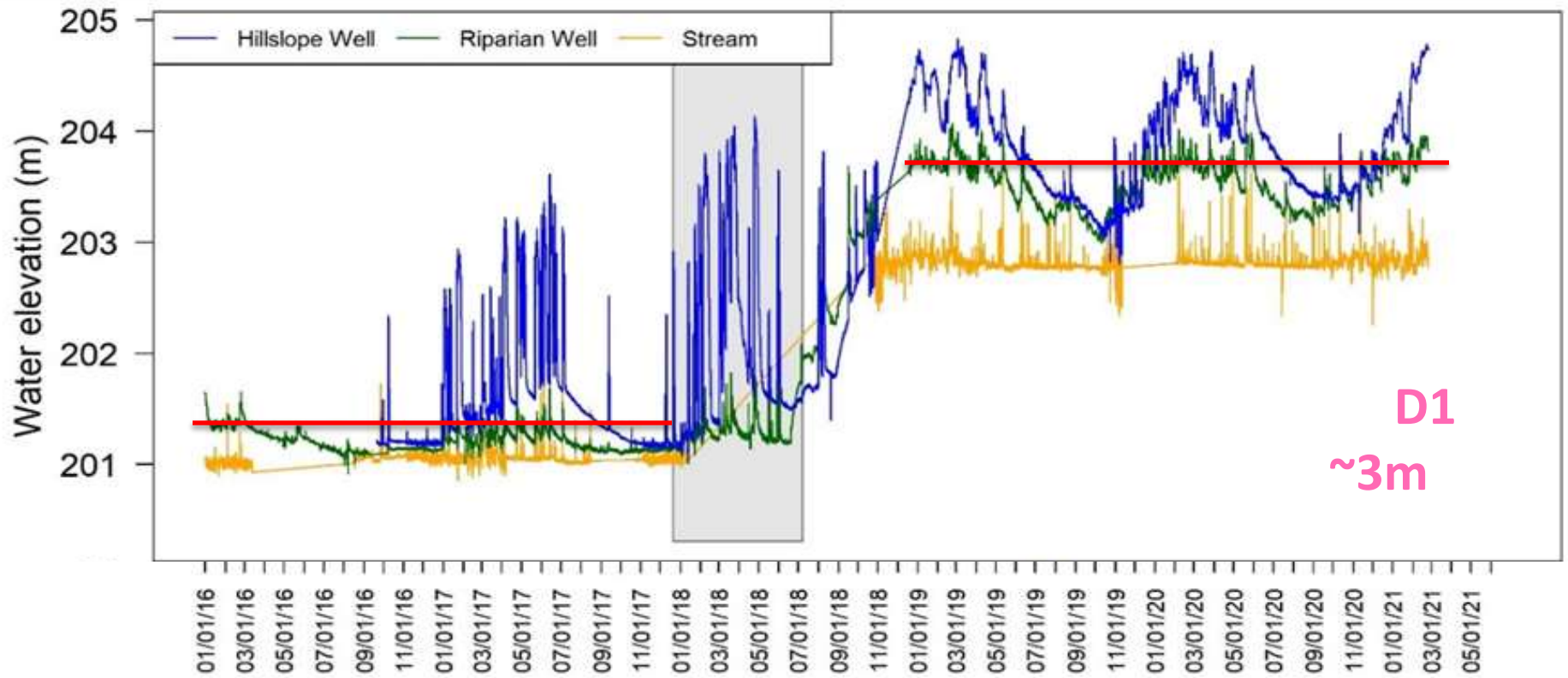
- Riparian groundwater levels measured in 5 well transects
- Measurements taken with ONSET pressure transducers
- Barometrically compensated water levels
- Measurements have been continuous since 2013



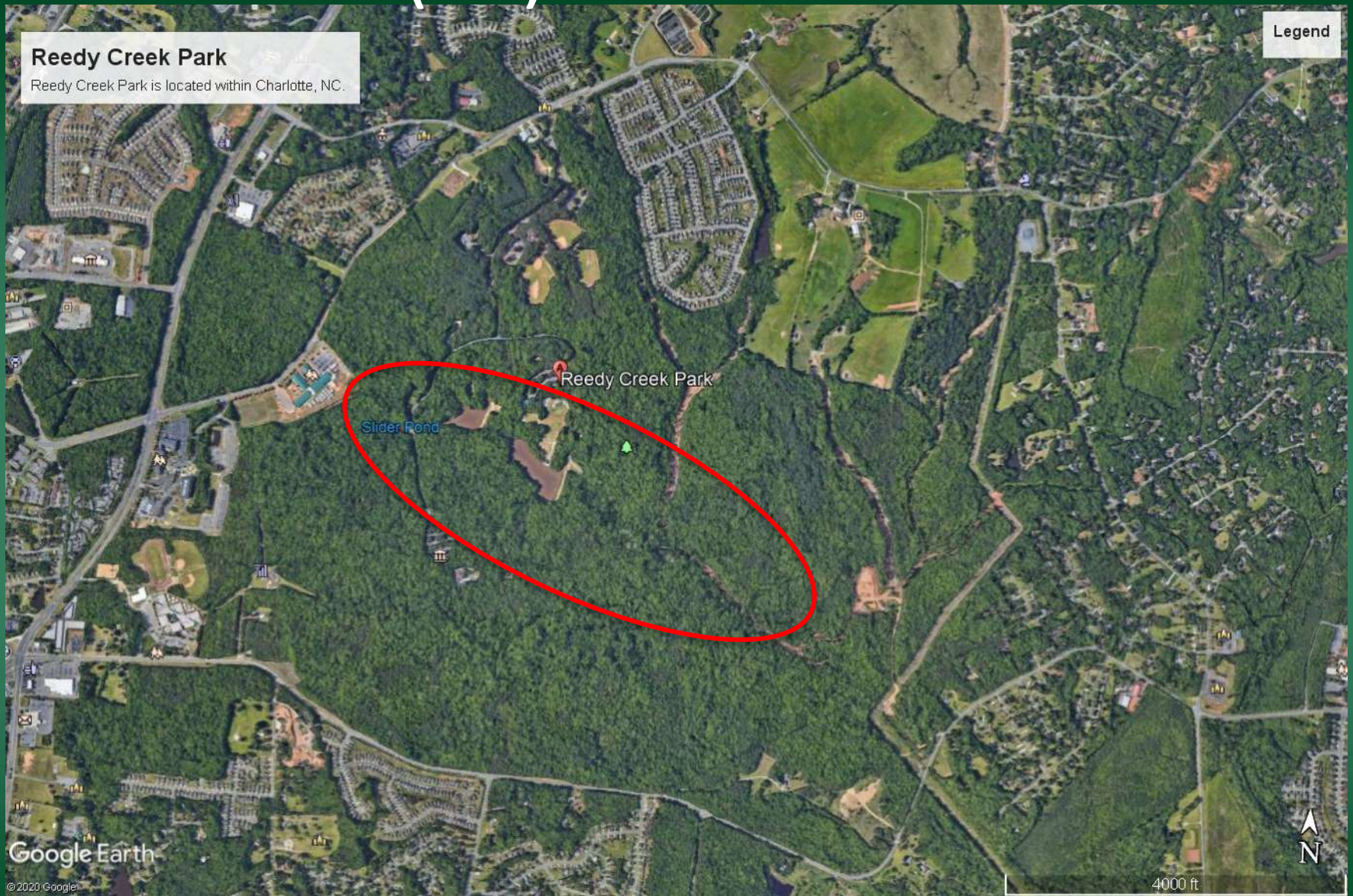
Residential Sub-Watershed (D1)



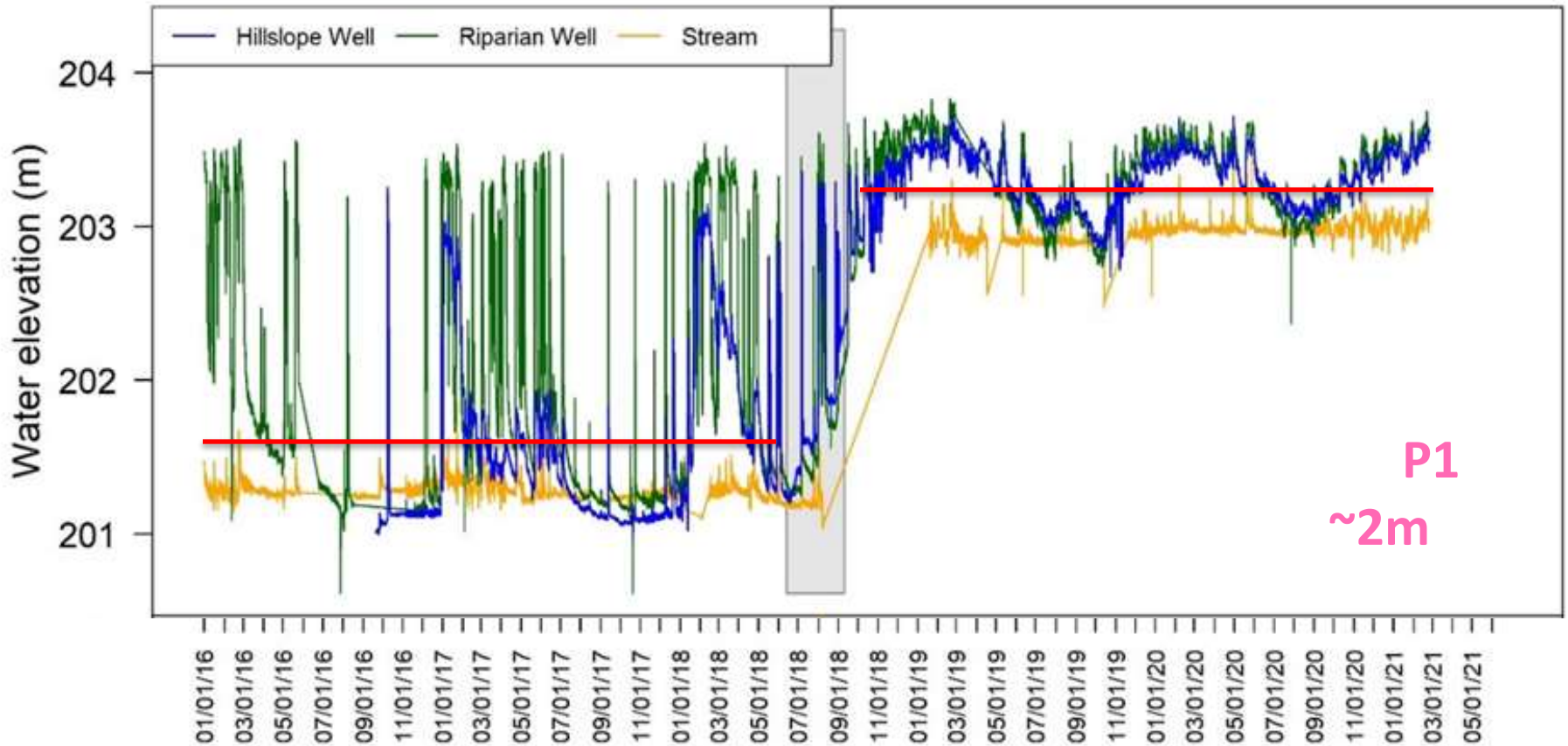
Residential Sub-Watershed (D1)



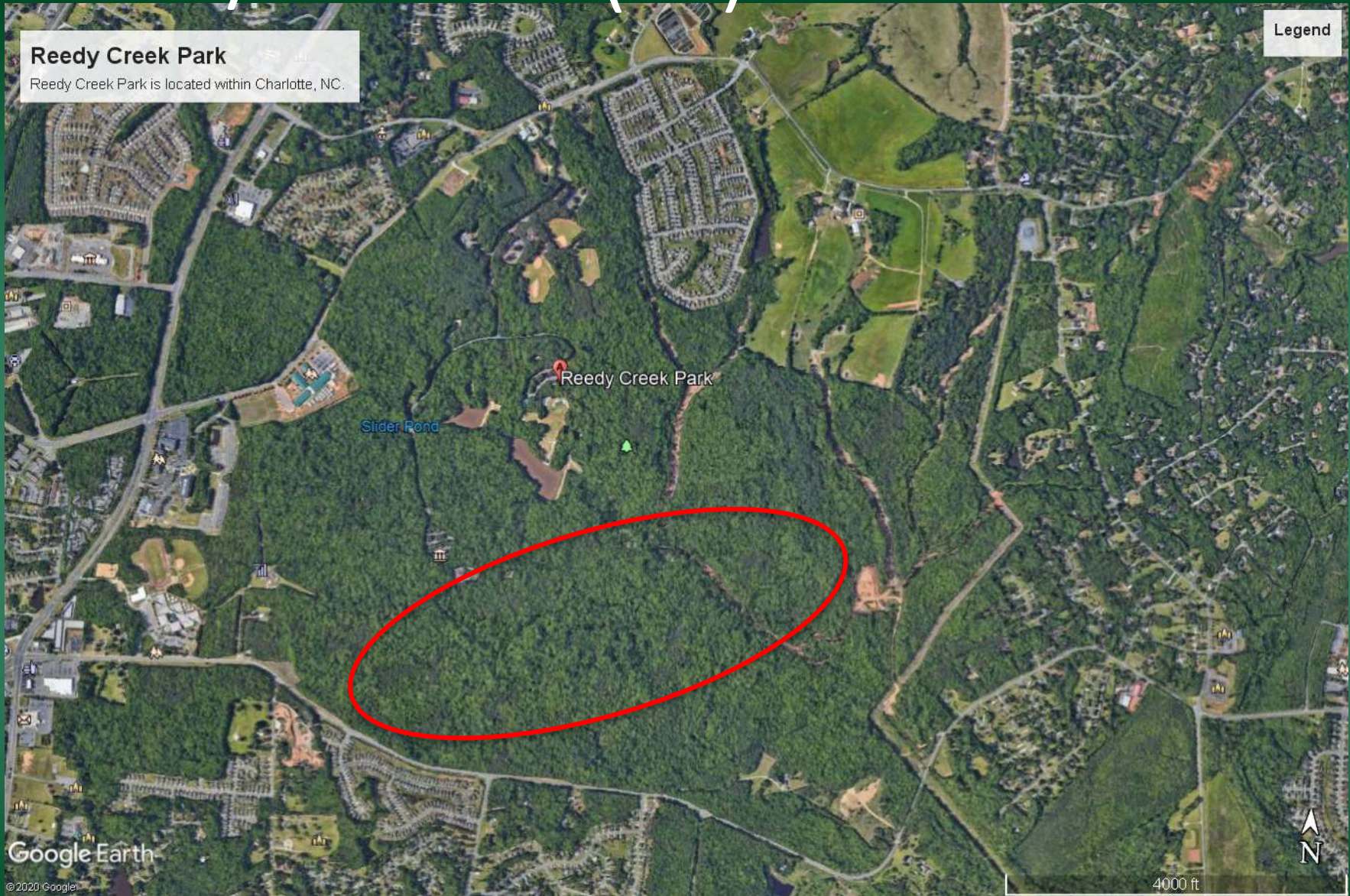
Park & Pond (P1)



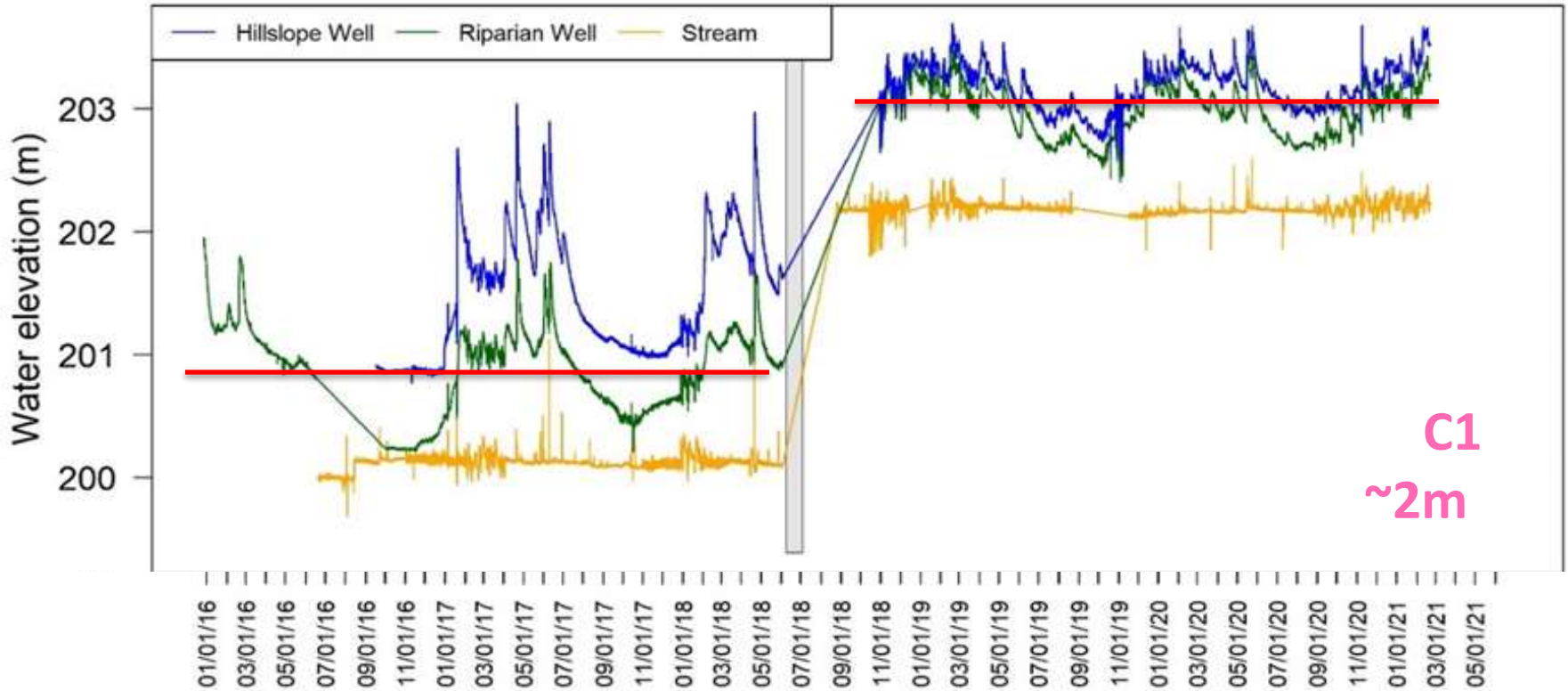
P1 – Park/Pond



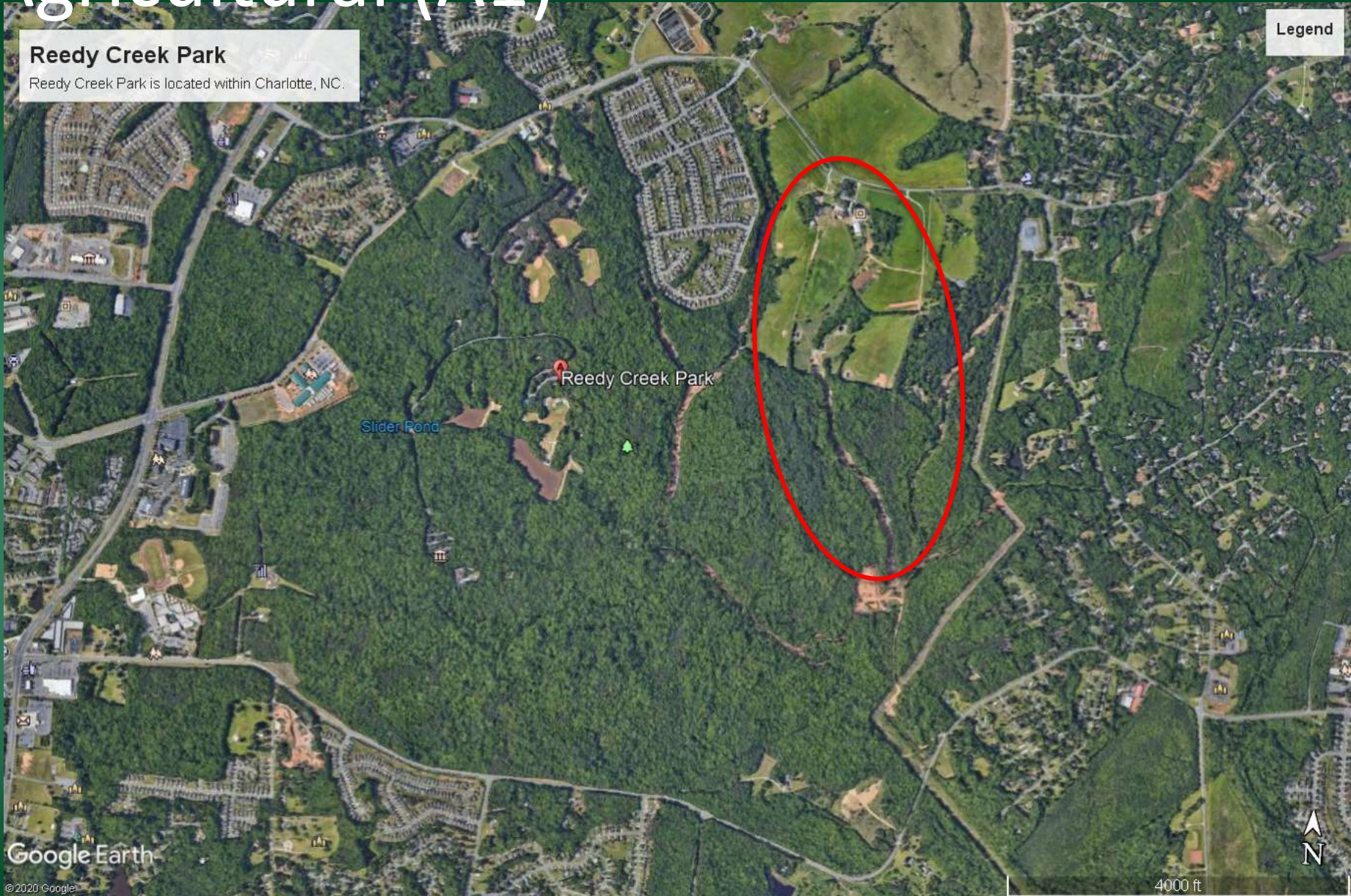
Control/Forested (C1)



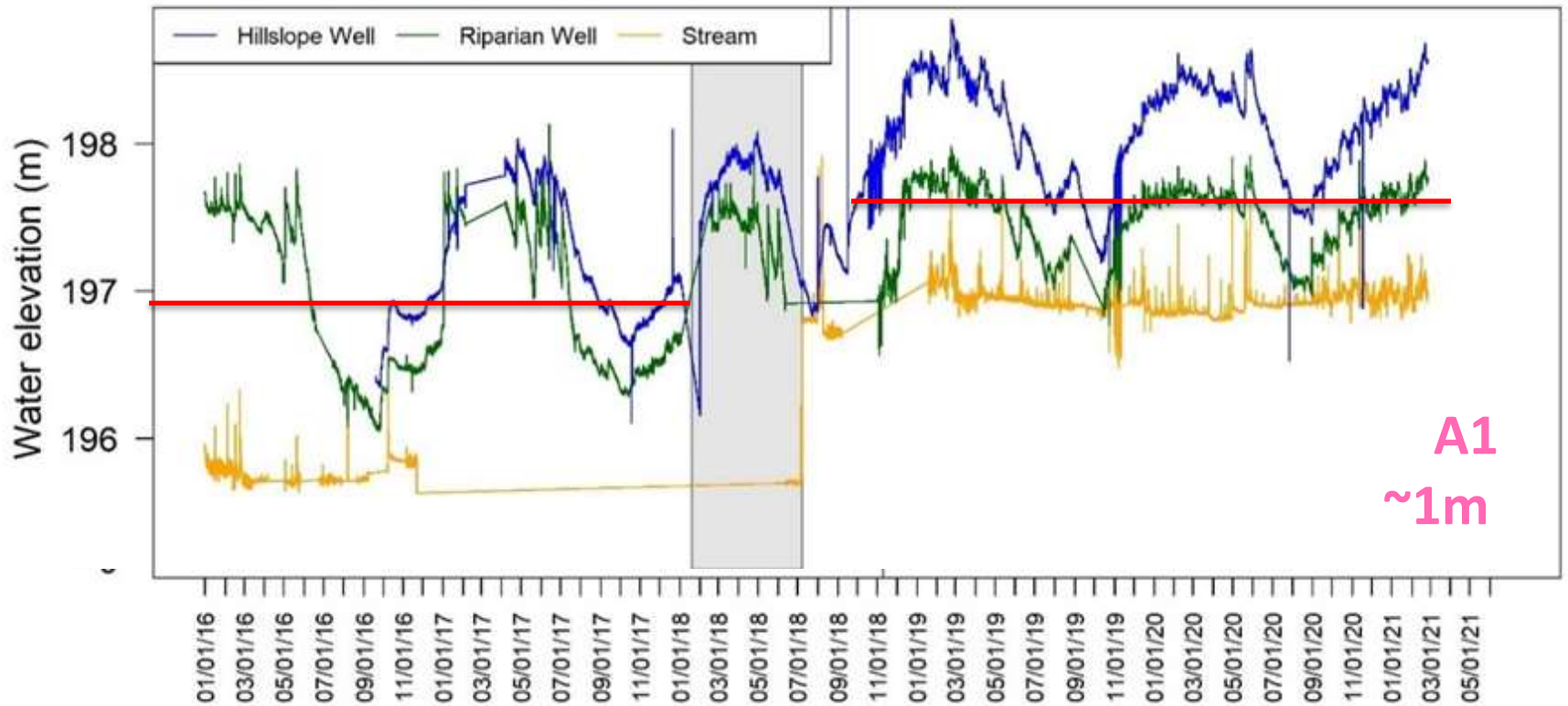
C1 – Control/Forested



Agricultural (A1)



A1 – Agricultural

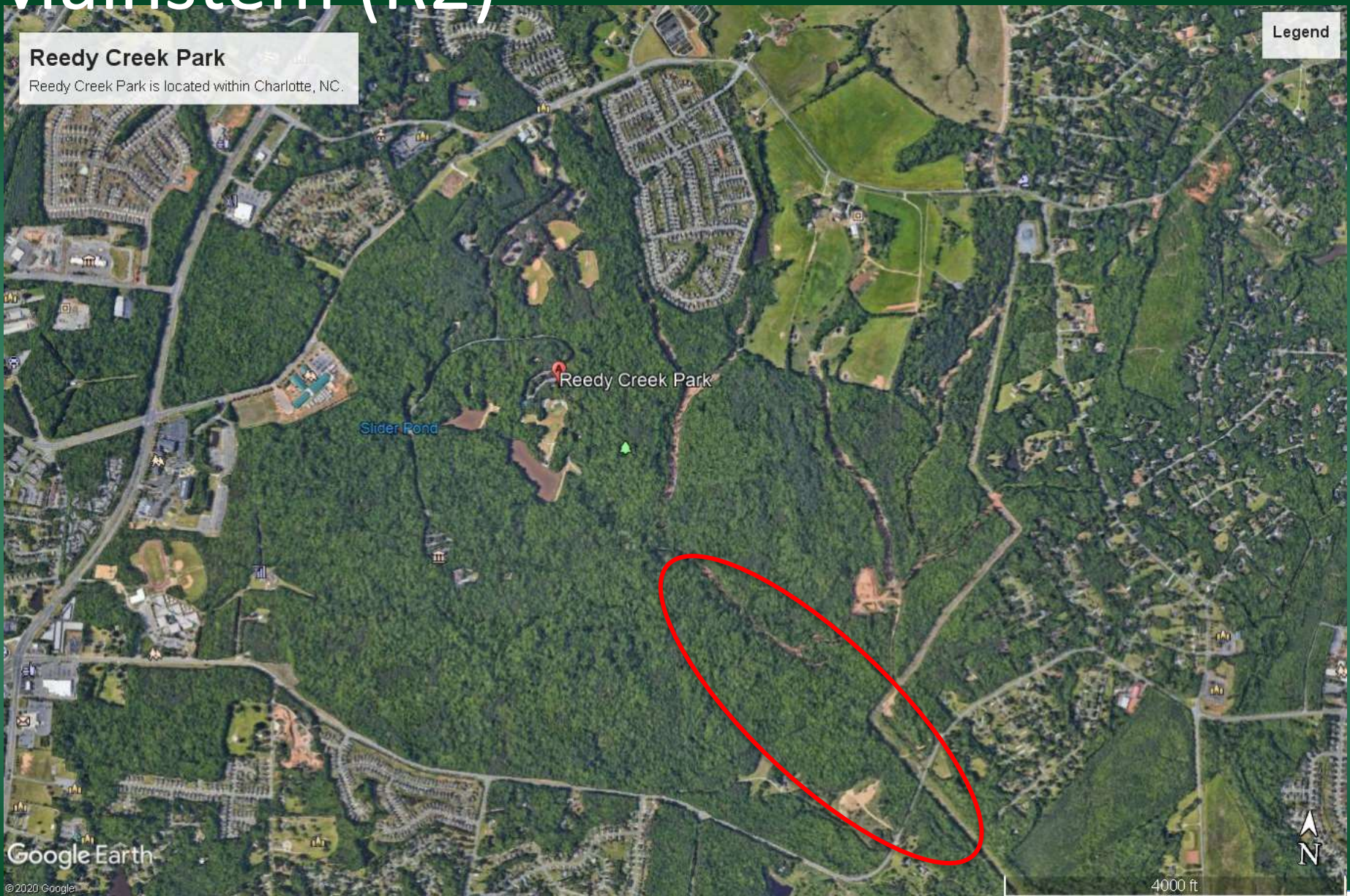


Mainstem (R2)

Reedy Creek Park

Reedy Creek Park is located within Charlotte, NC.

Legend

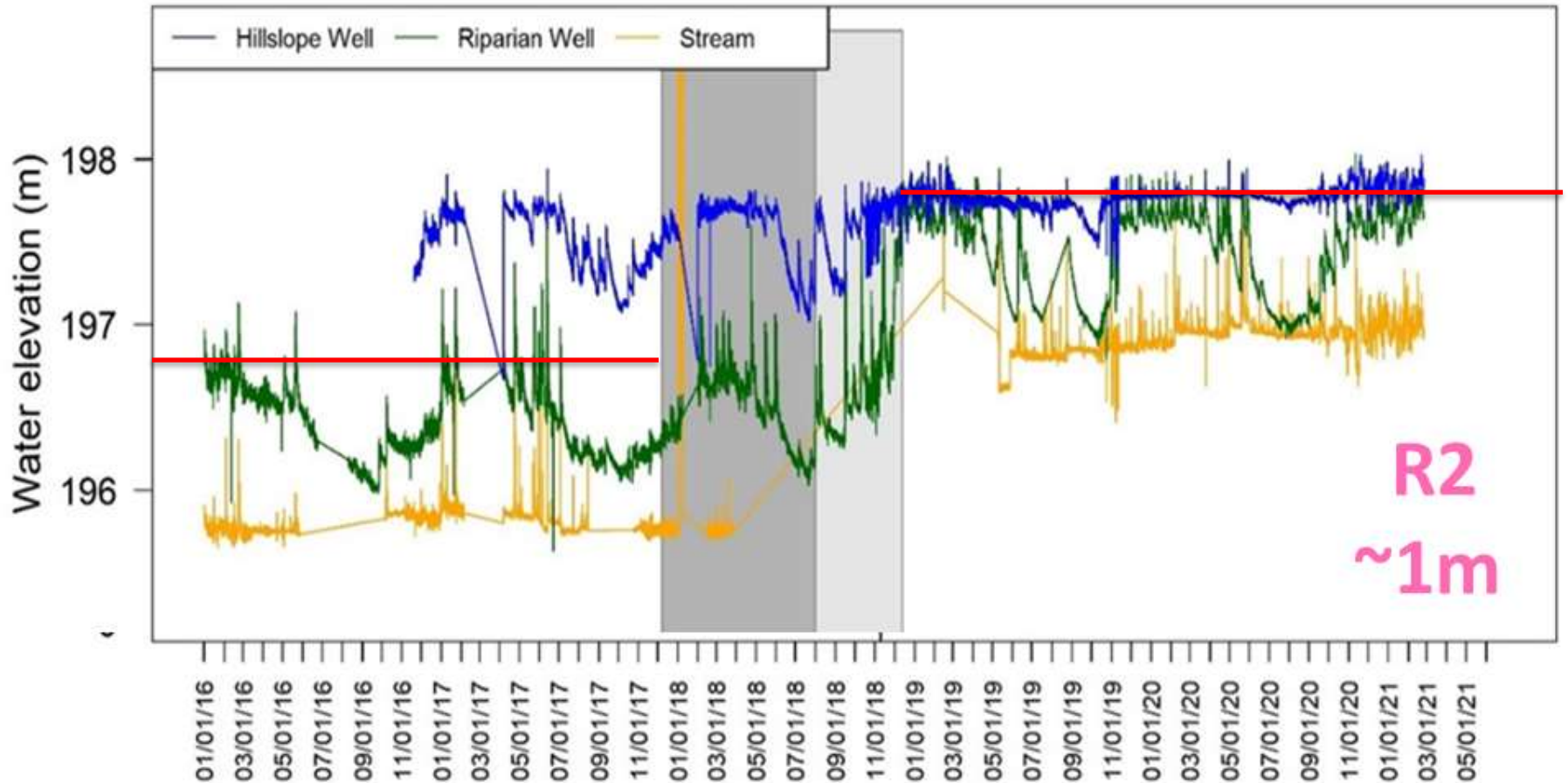


Google Earth

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R2 - Mainstem



Watershed Overall Snapshot

- Significant increases in groundwater
 - All well transects
 - Increase maintained over time



Site	Change	Significance
D1U	Increased	*
D1R	Increased	*
P1U	Increased	*
P1R	Increased	*
C1U	Increased	*
C1R	Increased	*
A1U	Increased	*
A1R	Increased	*
R2U	Increased	*
R2R	Increased	*

Conclusions

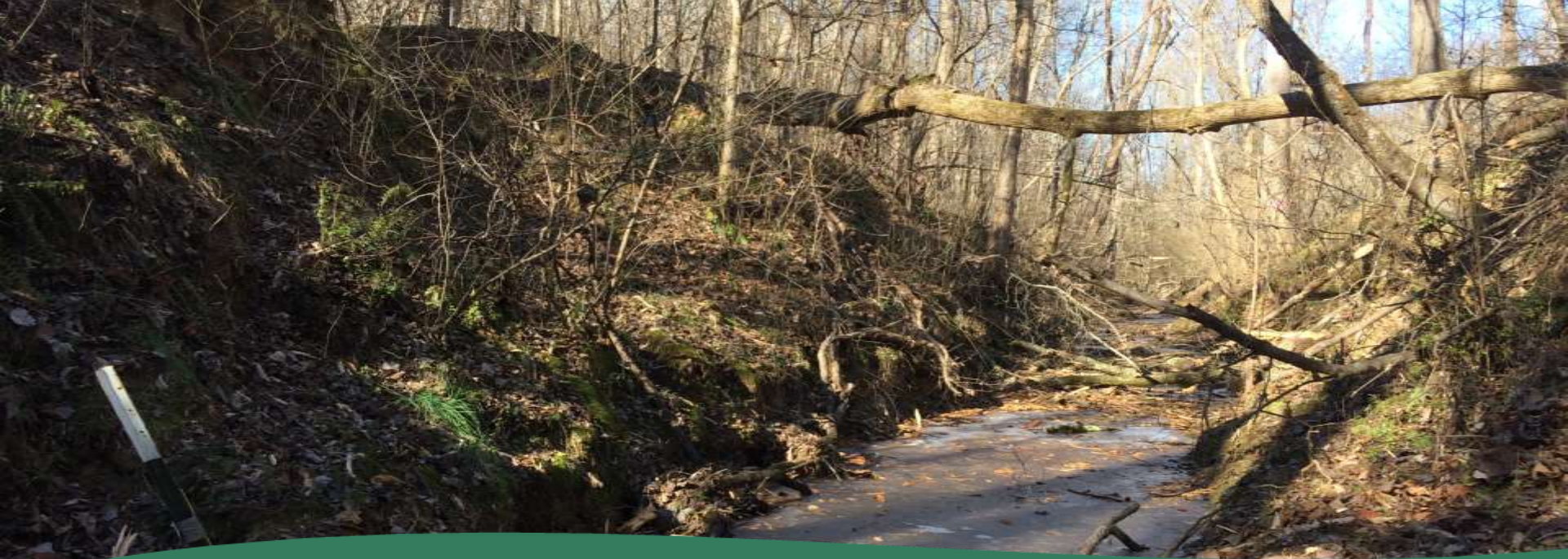
- Restoration of streams at the watershed level has the potential to increase groundwater storage
- Idea of connectedness – stream and floodplain connections
 - Stormwaters attenuated and slowly dissipated
 - More GW available to maintain steady baseflow
 - Hydrologic retention increased hyporheic exchange



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Thank you!

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