

A Geospatial Smart Growth Analysis of the West Essex Highlands Project



John Hasse, Ph.D. A.I.C.P.
Rowan University



Applied Geospatial Research

www.NJ-MAP.org - open source mapping resource

NJ Conservation Blueprint

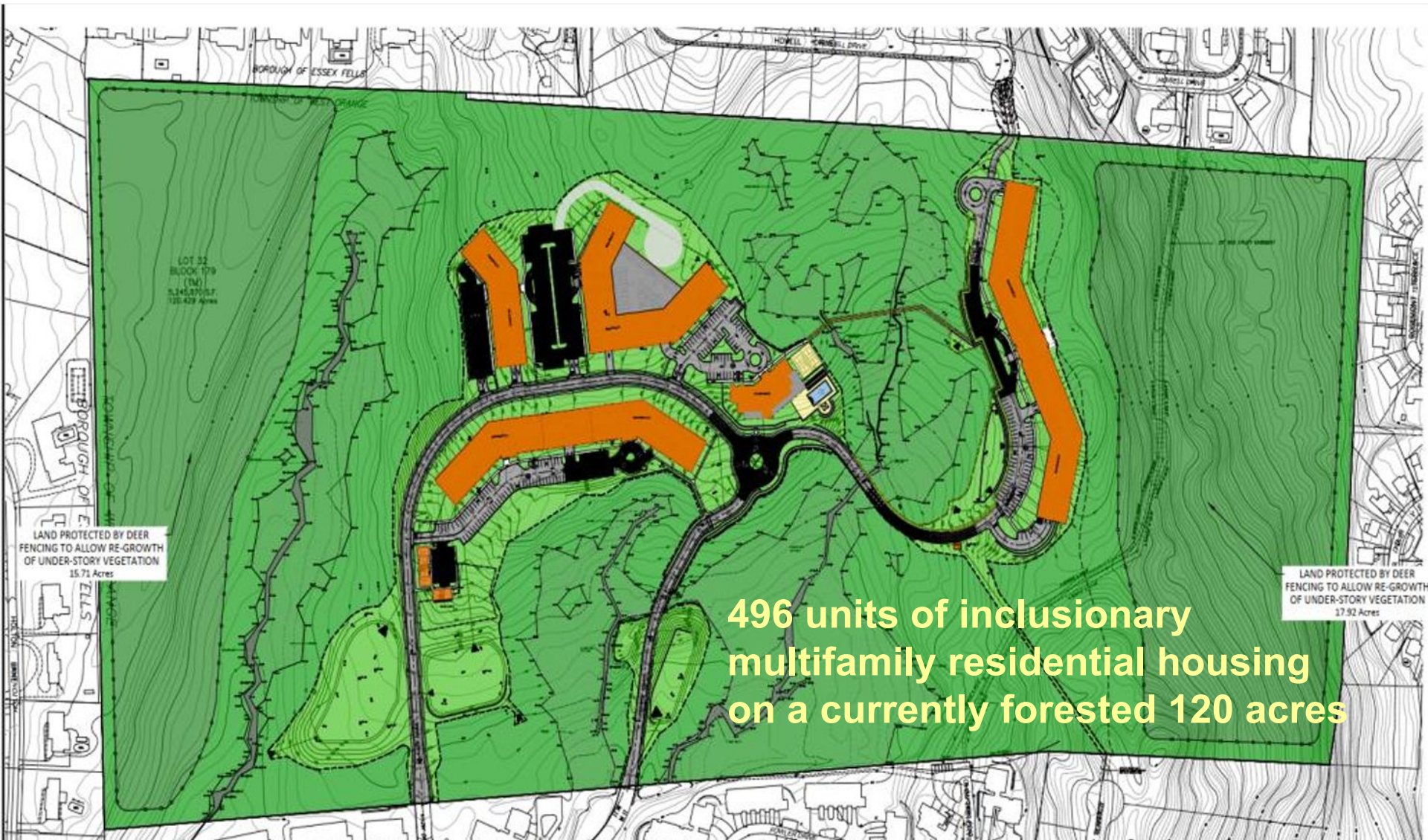
NJ Smart Growth Explorer



NJ landscape change analysis 1986-2020

smart growth geospatial analysis

West Essex Highlands Project



LOT 32
BLOCK 179
(TM)
51.4570157
135.629 Acres

LAND PROTECTED BY DEER
FENCING TO ALLOW RE-GROWTH
OF UNDER-STORY VEGETATION
15.71 Acres

Is this the most appropriate use
of this land?

What are the costs to West
Orange

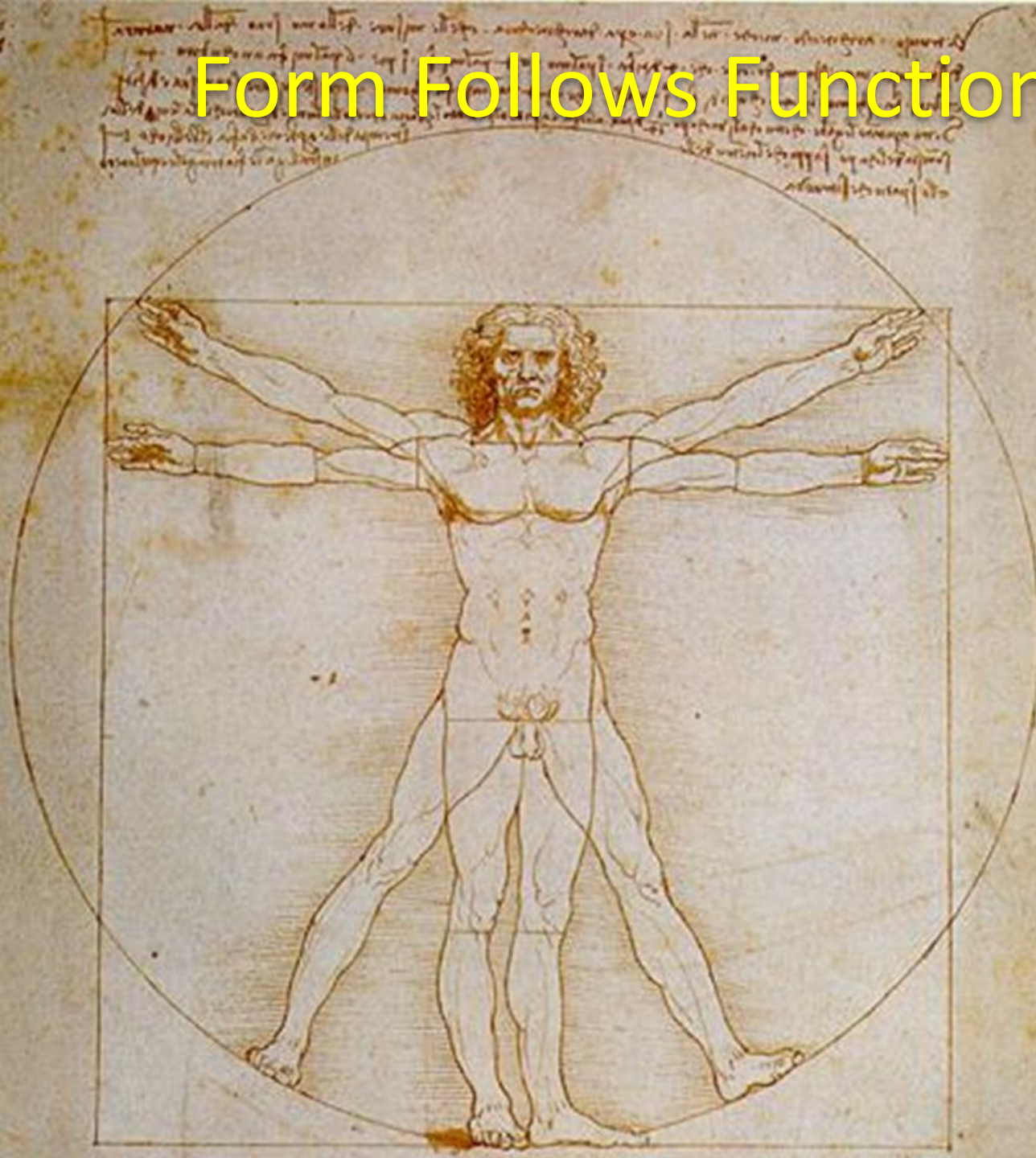
LAND PROTECTED BY DEER
FENCING TO ALLOW RE-GROWTH
OF UNDER-STORY VEGETATION
17.92 Acres

What are the costs to West Orange

What is Smart Growth Anyway?

“I may not be able to define it but I know it when I see it” Justice Potter Stewart 1964 supreme court decision

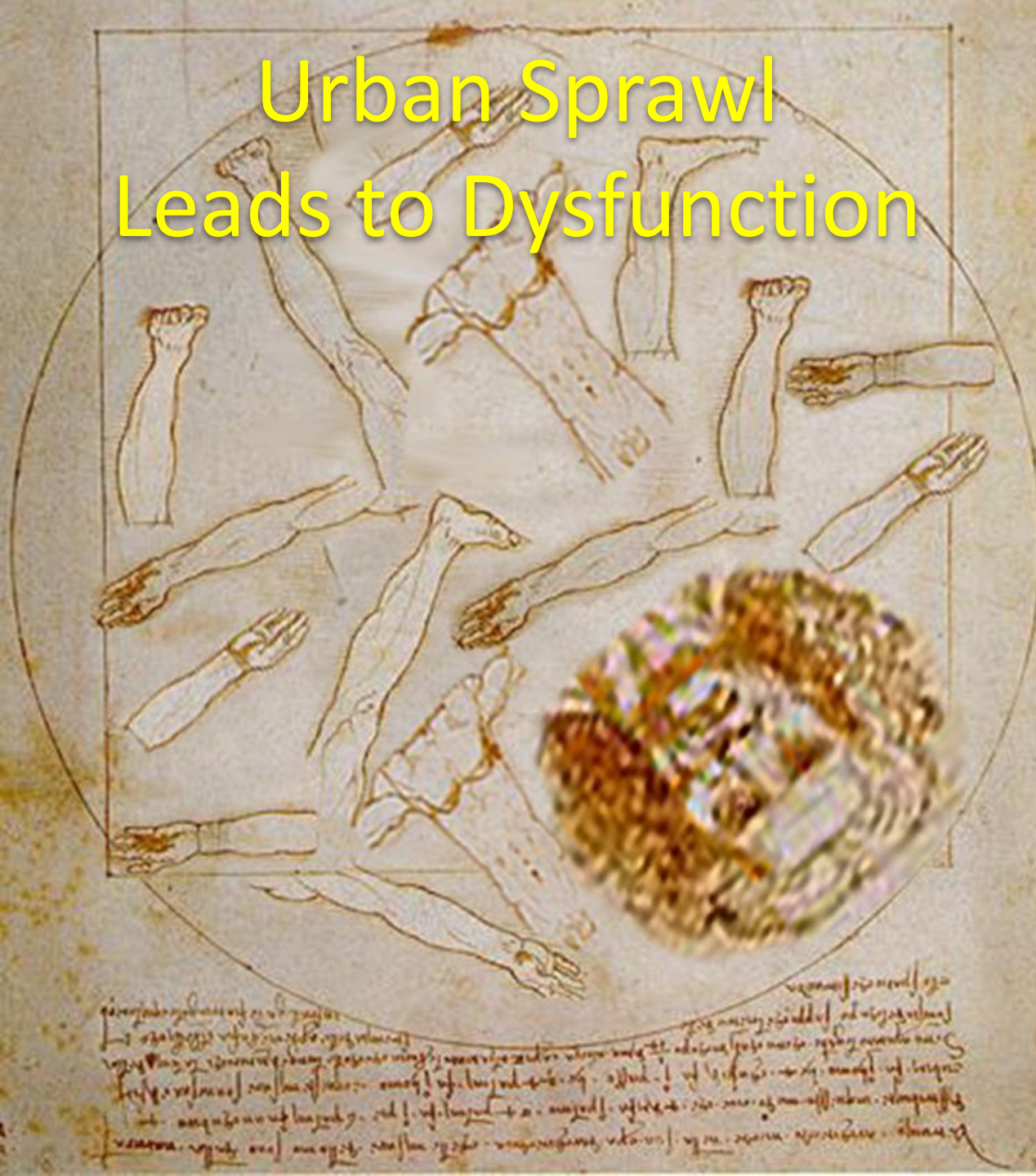
Form Follows Function



Components are

- In the right place
- At the right scale
- Efficient
- Connected
- Flowing
- Integrated
- Allows bodily systems to properly function

Urban Sprawl Leads to Dysfunction



Things are:

- Scattered
(i.e. in the wrong place)
- At the wrong scale
- Inefficient
- Poorly connected
- Congested
- Segregated
- wasteful



Smart Growth
designing spaces that make
great community places



Sprawl
anything goes everywhere
inefficient, costly

Quantifying Patterns of Smart Growth

Can Smart Growth development be
distinguished from Sprawl development?

GIS mapping technology makes it possible.

Geospatial Smart Growth Metrics

- 10 spatial measurements derived from the literature on smart growth and sprawl
- empirical indicators – non-subjective
- focus on spatial patterns
- provide a report card on growth impacts

Smart Growth Principles

NJ Office of Planning Advocacy

- mixed land uses
- compact, clustered community design
- range of housing choice and opportunity
- walkable neighborhoods
- distinctive, attractive communities offering a sense of place
- open space, farmland, and scenic resource preservation
- future development strengthened and directed to existing communities using existing infrastructure
- transportation option variety
- predictable, fair and cost-effective development decisions
- community and stakeholder collaboration in development decision-making

Measuring Characteristics of Smart Growth with GIS

Part I

Smart Growth
Report Card

10 Smart Growth Spatial Metrics -

Smart Growth ***Report Card***

How smart is the proposed growth?

Part II

Smart Conservation
Report Card

10 Conservation Blueprint Map Analytics

Smart Conservation ***Report Card***

how smart would it be if the land were preserved?

1) High Density - Land Efficient versus Land Consumptive

© 2002 John Hasse



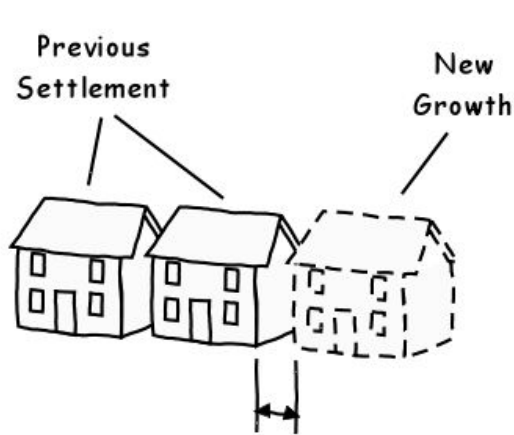
Smart Growth



Sprawl

Land consumed per unit of new development.

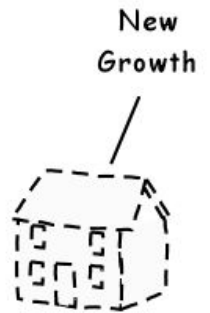
2) Infill versus Leapfrog



Smart Growth



© 2002 John Hasse



Sprawl

Distance of new development from
nearest previous settlement.

3) Mixed Use versus Segregated Land Use

© 2002 John Hasse



Smart Growth

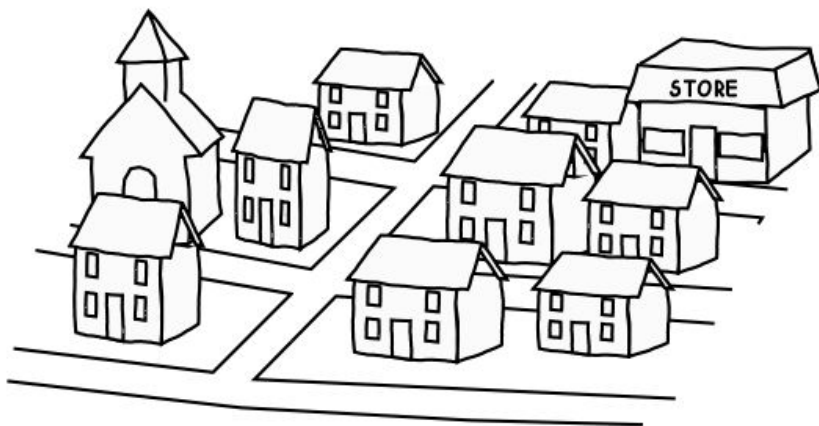


Sprawl

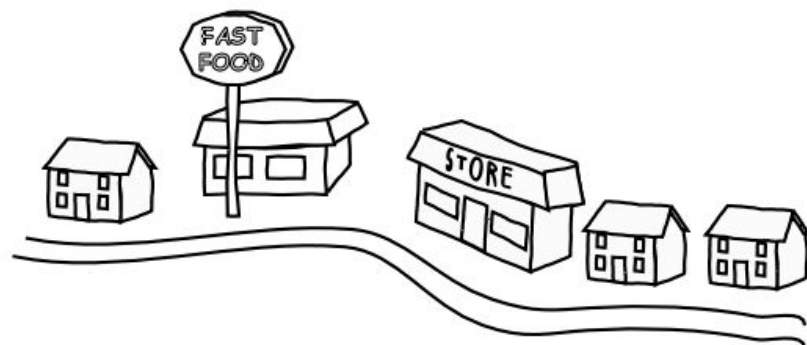
Number of different land uses within walking
distance of new development.

4) Community Streetscapes versus Highway Strip

© 2002 John Hasse



Smart Growth

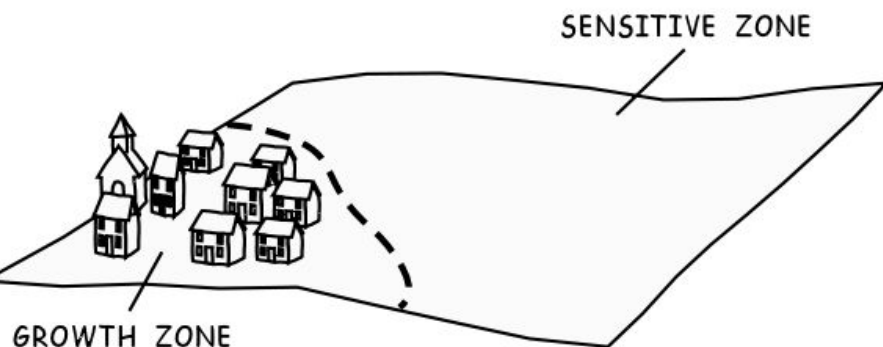


Sprawl

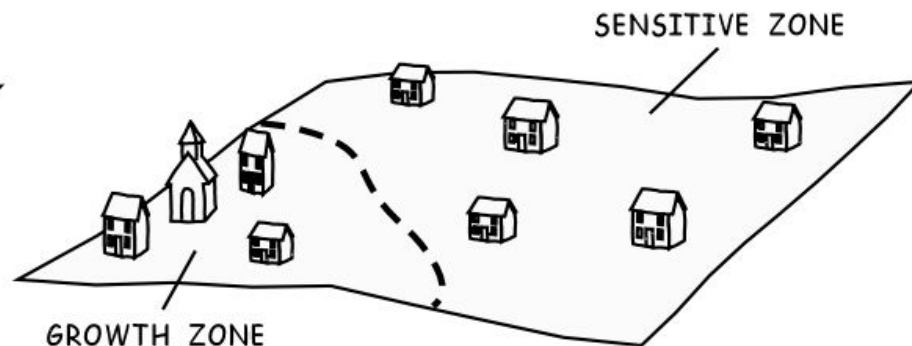
New development that contributes to community streetscapes versus development that lines highways with "ribbon" growth.

5) Regional Planning Consistency versus Conflict

© 2002 John Hasse



Smart Growth

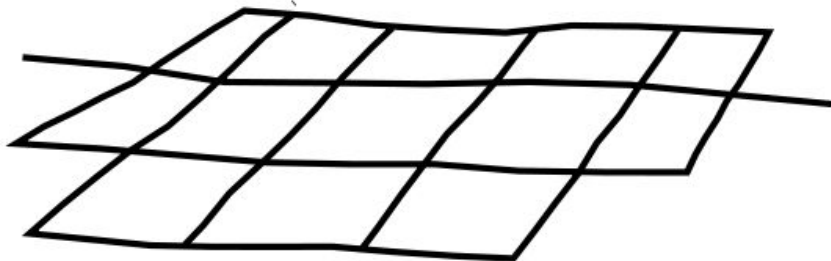


Sprawl

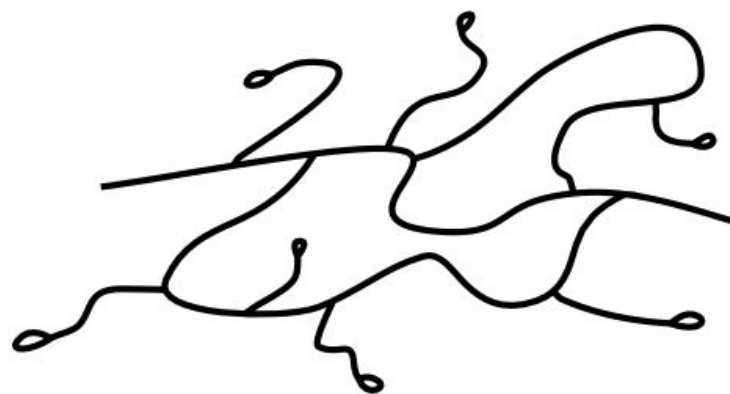
The degree to which new development is
consistent with regional planning.

6) Connected Road Infrastructure Community Blocks versus Loops and Lollipops

© 2002 John Hasse



Smart Growth

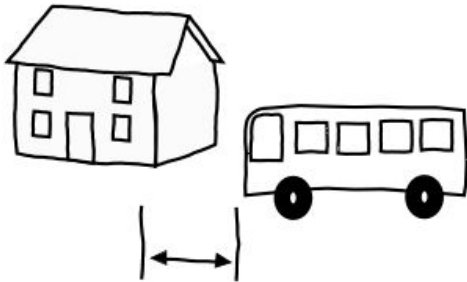


Sprawl

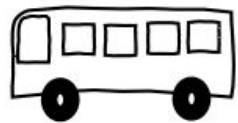
New lane-miles, cul-de-sacs & intersections
created per new unit of development.

7) Transit Accessibility

© 2002 John Hasse



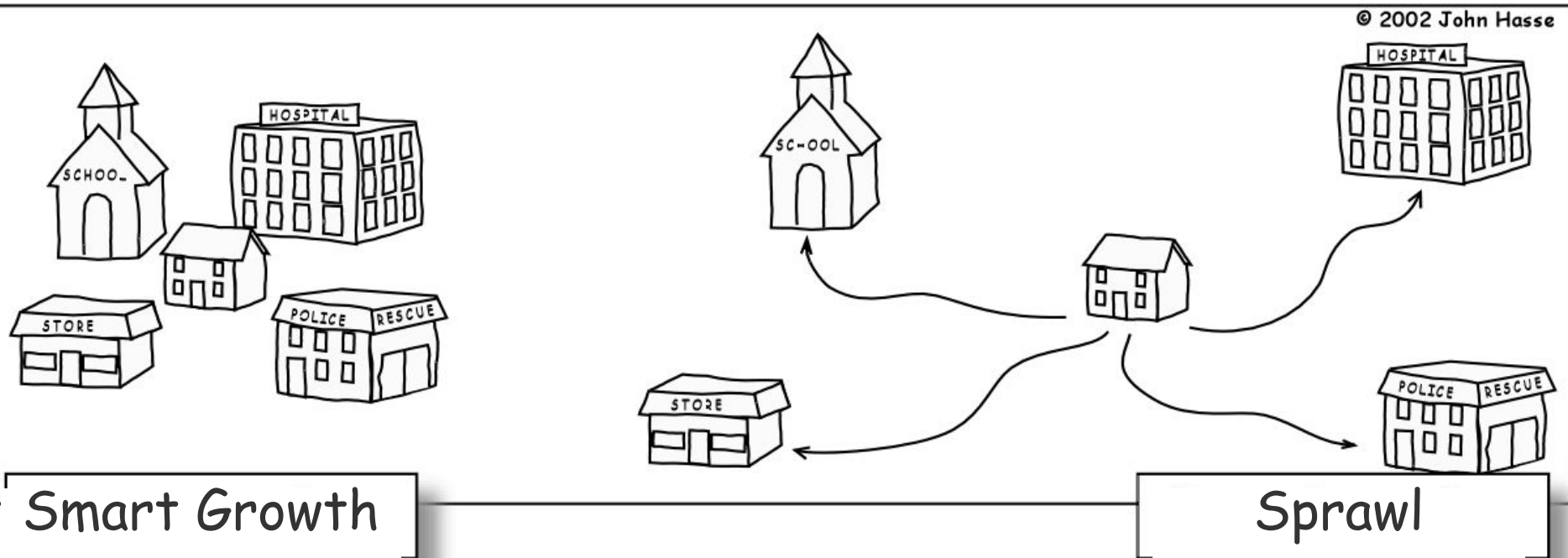
Smart Growth



Sprawl

Road distance to nearest non-auto transportation.

8) Community Node Accessibility



Average road distance from new development to important community nodes.

9) Land Resource Integrity

© 2002 John Hasse

DEVELOPMENT
ON
LESS-SENSITIVE
LAND



INTACT
WETLANDS



INTACT
PRIME
FARMLAND



INTACT
HABITAT

HAPHAZARD
DEVELOPMENT



HABITAT
LOSS



WETLANDS
LOSS



PRIME
FARMLAND
LOSS

Smart Growth

Sprawl

Protection of wetlands, prime farmlands and endangered habitat per unit of new development.

10) Growth Trajectory

© 2002 John Hasse

CONTROLLED GROWTH



EXPLOSIVE GROWTH



Smart Growth

Sprawl

Rate of development relative to:

- 1) Previous settlement
- 2) Size of locality
- 3) Remaining open space

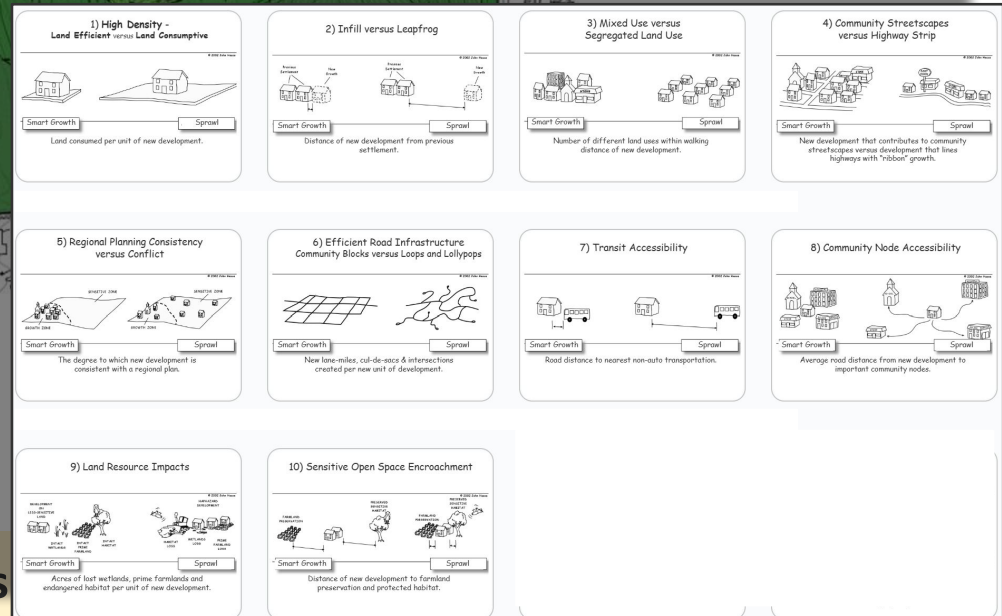
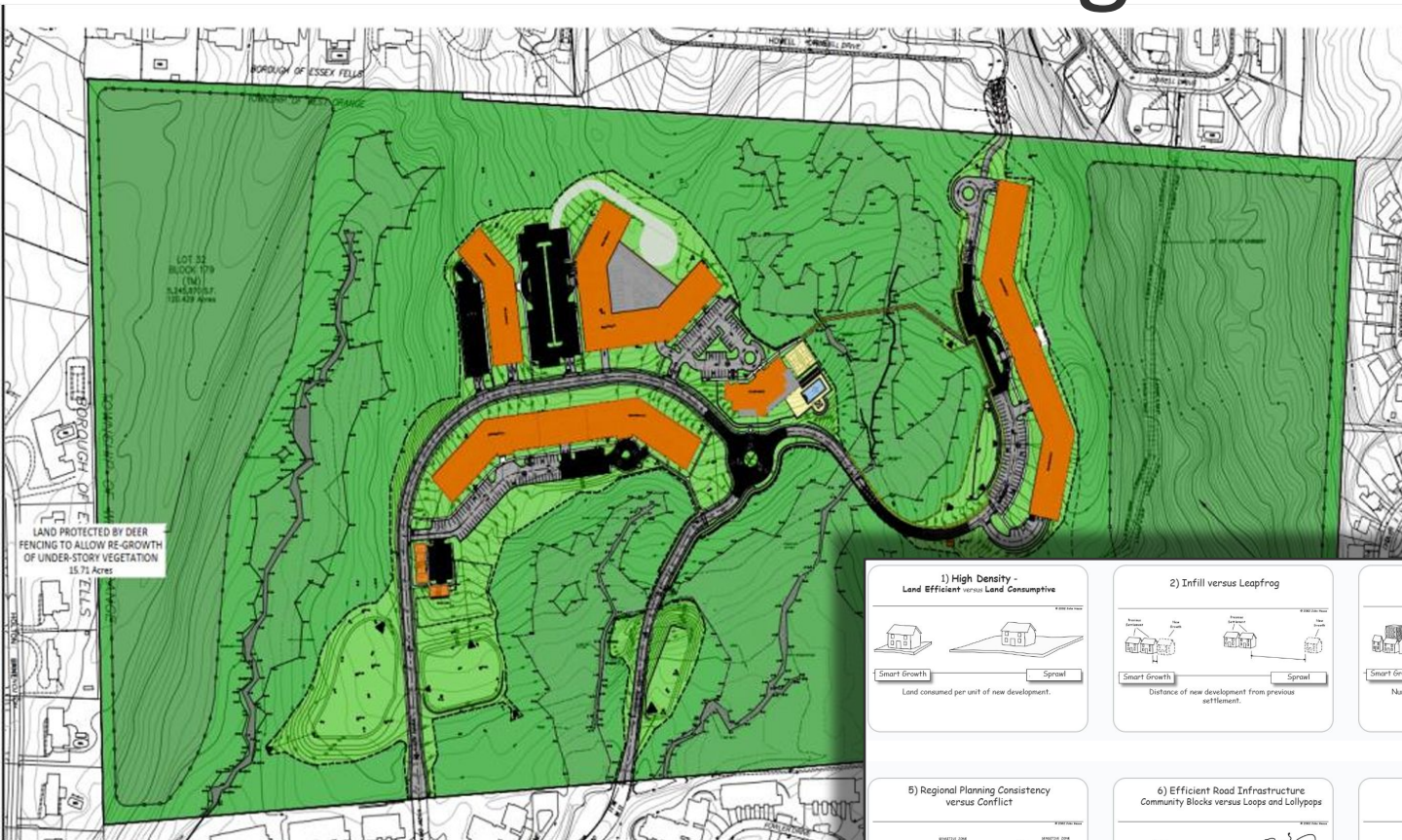
Part I

Smart Growth

Report Card

Smart Growth Report Card

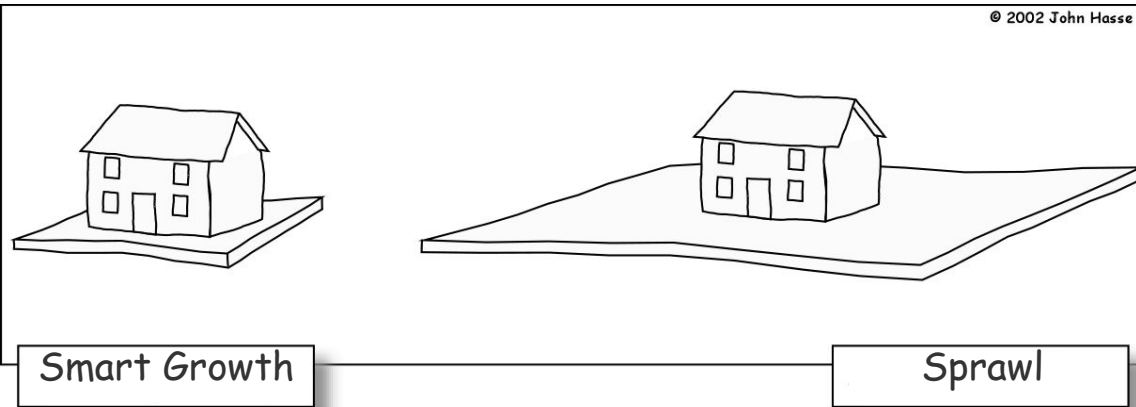
West Essex Highlands Project



Part I

Smart Growth
Report Card

1) High Density - Land Efficient versus Land Consumptive



GRADE

A=smartest growth

B

C

D

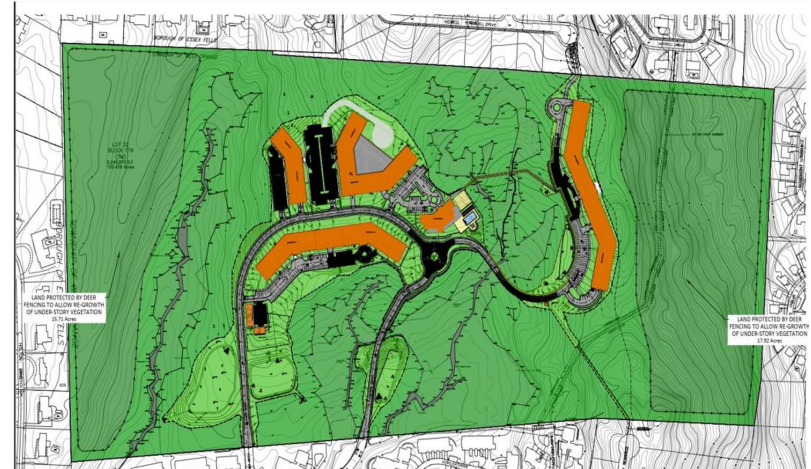
F=Most Sprawling

120 acres

/

496 units

= 0.24 acres per unit

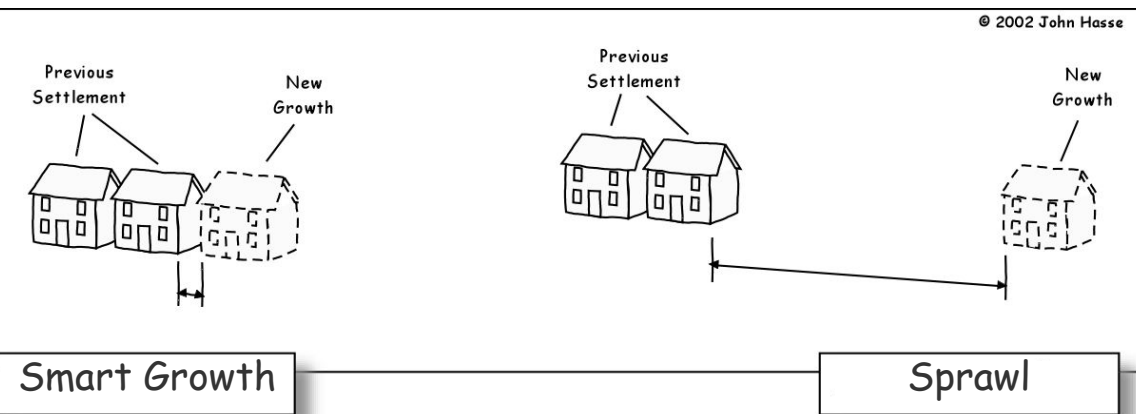


Land consumed per unit of new development.

Part I

Smart Growth Report Card

2) Infill versus Leapfrog



GRADE

A=smartest growth

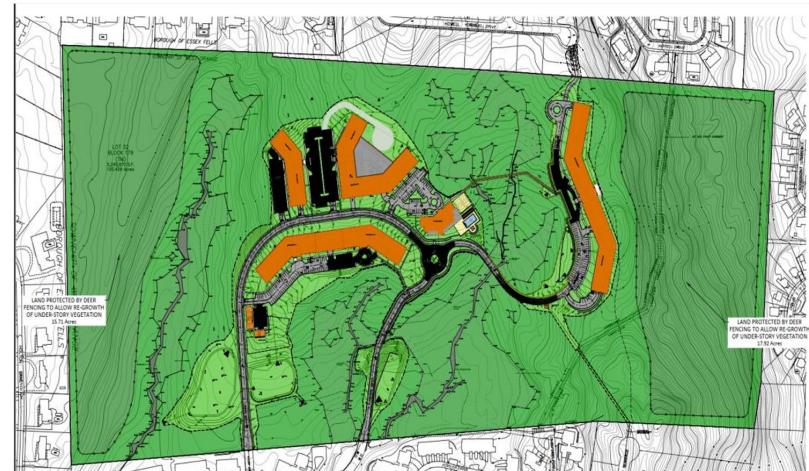
B

C

D

F=Most Sprawling

North ~ 300'
East ~ 840'
South ~ 604'
West ~ 885'



Estimated distance of new development from
nearest previous settlement.

Part I

Smart Growth Report Card

3) Mixed Use versus Segregated Land Use

GRADE

A=smartest growth

B

C

D

F=Most Sprawling



Smart Growth



Sprawl

© 2002 John Hasse

5 min walk = $\frac{1}{4}$ mi

= Single use - multi-family
residential

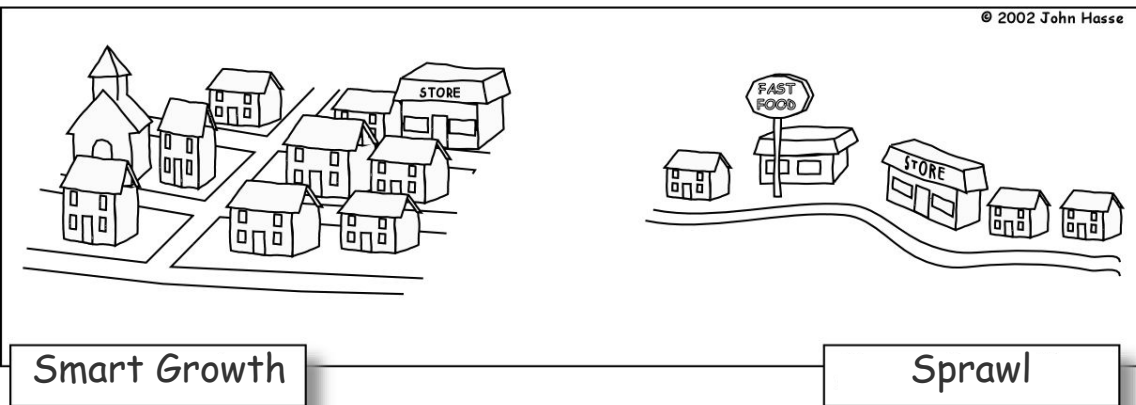


Number of different land uses within walking
distance of new development.

Part I

Smart Growth
Report Card

4) Community Streetscapes versus Highway Strip



GRADE

A=smartest growth

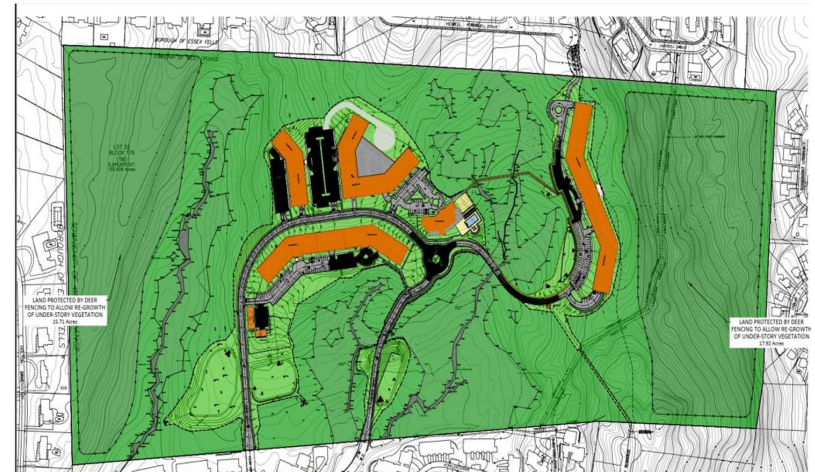
B

C

D

F=Most Sprawling

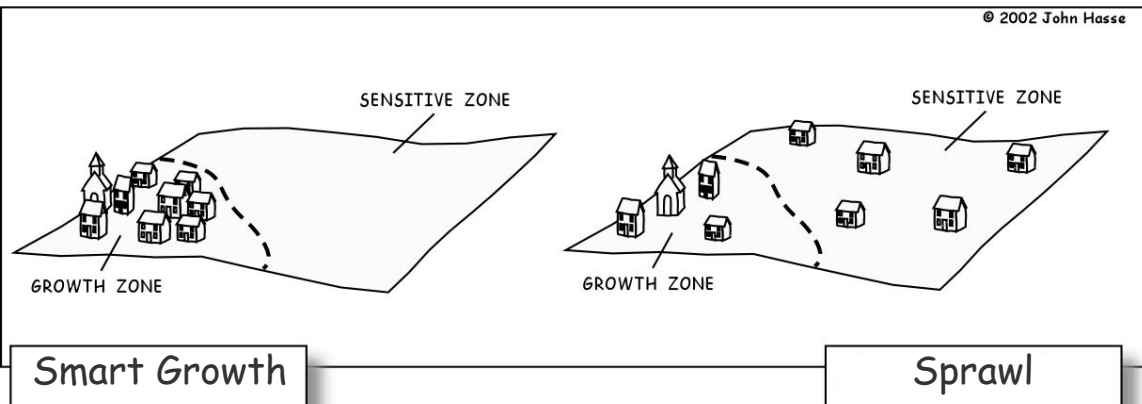
How well does the
development contribute
to the community
streetscape?



Part I

Smart Growth Report Card

5) Regional Planning Consistency versus Conflict



GRADE

A=smartest growth

B

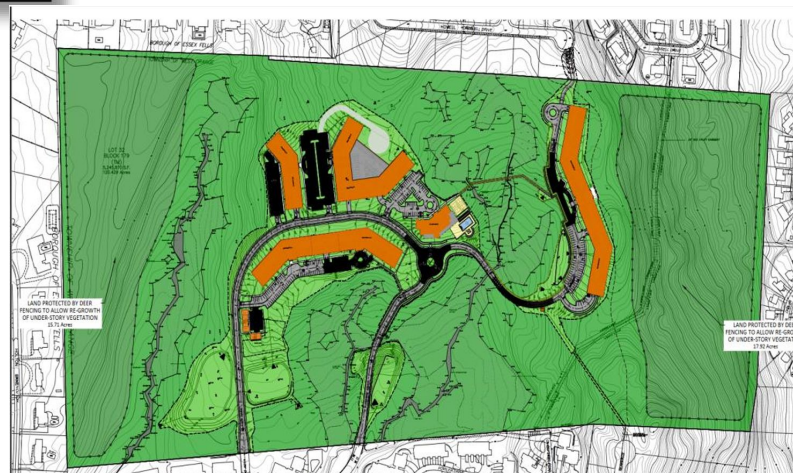
C

D

F=Most Sprawling

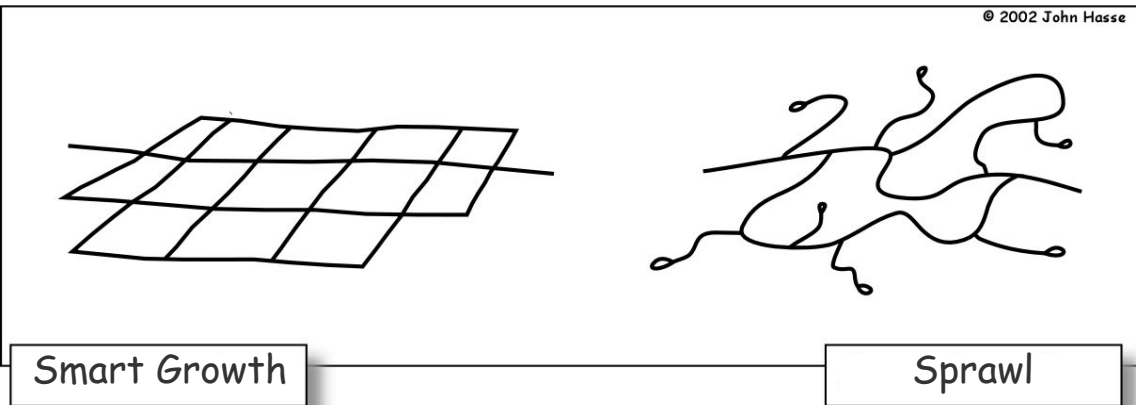
SDRP = PA 1

Planning Area 1 (Metropolitan) is a primary area for growth, but it does not preclude open space protection. This parcel can be characterized as an “Environs” versus “Center” in PA 1



The degree to which new development is consistent with a regional plan.

6) Connected Road Infrastructure Community Blocks versus Loops and Lollipops



GRADE

A=smartest growth

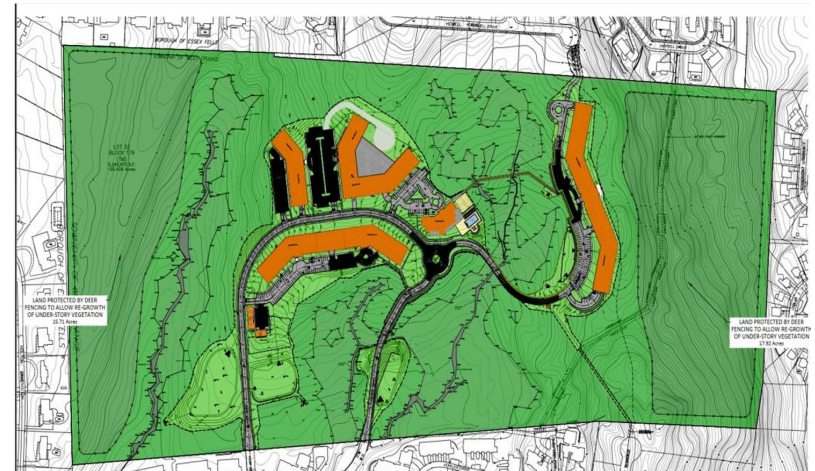
B

C

D

F=Most Sprawling

poor connections to
surrounding street
network



Part I

Smart Growth Report Card

7) Transit Accessibility

GRADE

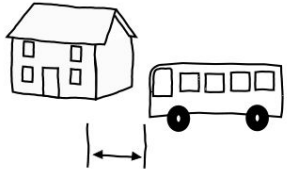
A=smartest growth

B

C

D

F=Most Sprawling



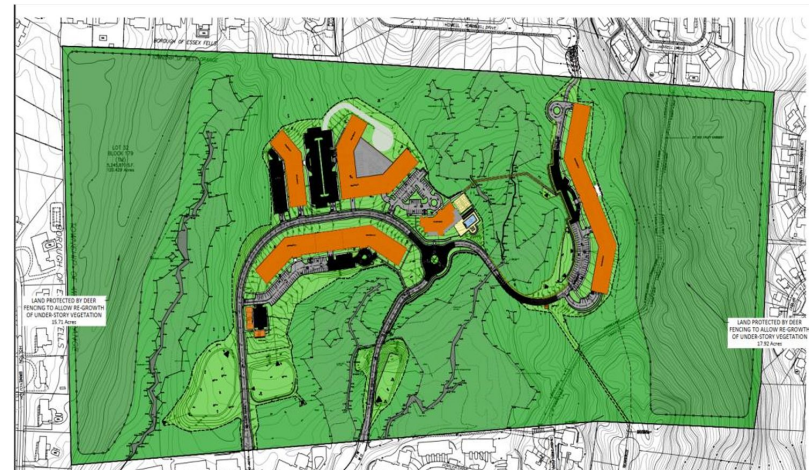
Smart Growth



Sprawl

Nearest bus = 1.45 miles
Nearest train = 5.1 miles
No sidewalks in proposal?

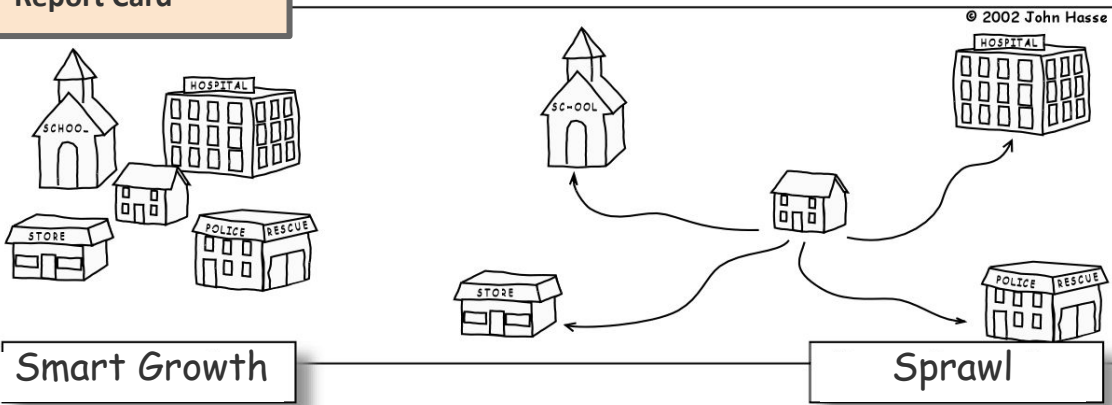
Road distance to nearest
non-auto transportation option.



Part I

Smart Growth Report Card

8) Community Node Accessibility



GRADE

A=smartest growth

B

C

D

F=Most Sprawling

Distance to Nearest Node

school = 1.7 miles

grocery = 1.5 miles

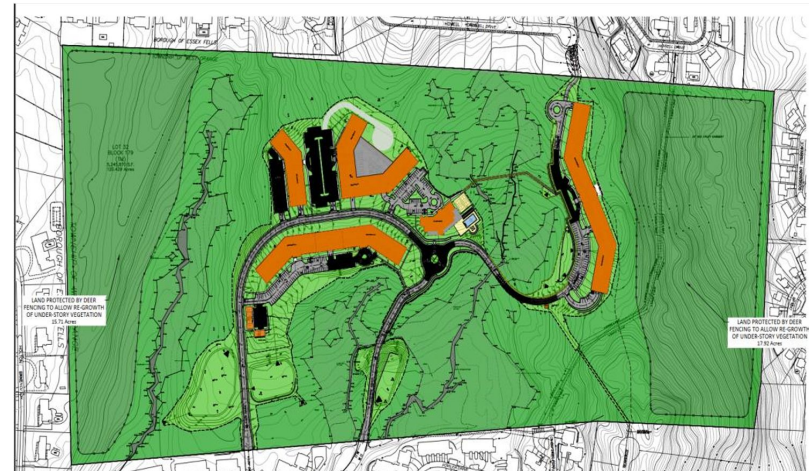
park = 2.1 miles

police = 3.7 miles

fire = 1.4 miles

library = 3.3 miles

post office = 1.7



Average road distance from new development to important community nodes.

Part I

Smart Growth Report Card

9) Land Resource Impacts

DEVELOPMENT
ON
LESS-SENSITIVE
LAND



INTACT
WETLANDS



INTACT
PRIME
FARMLAND



INTACT
HABITAT

Smart Growth

© 2002 John Hasse

HAPHAZARD
DEVELOPMENT



HABITAT
LOSS



WETLANDS
LOSS



PRIME
FARMLAND
LOSS



Sprawl

GRADE

A=smartest growth

B

C

D

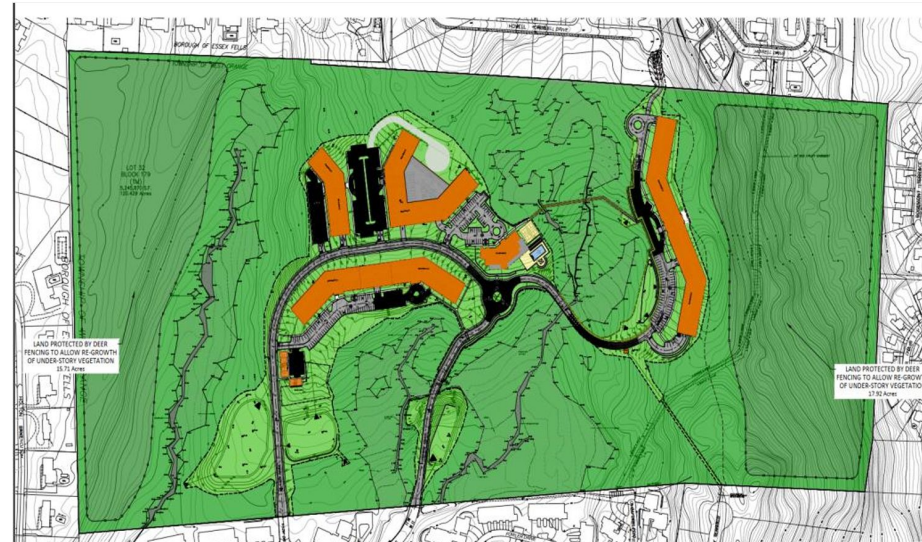
F=Most Sprawling

Land Resource Impacts

Core Forest Loss = 49 acres

Impervious Surface created =

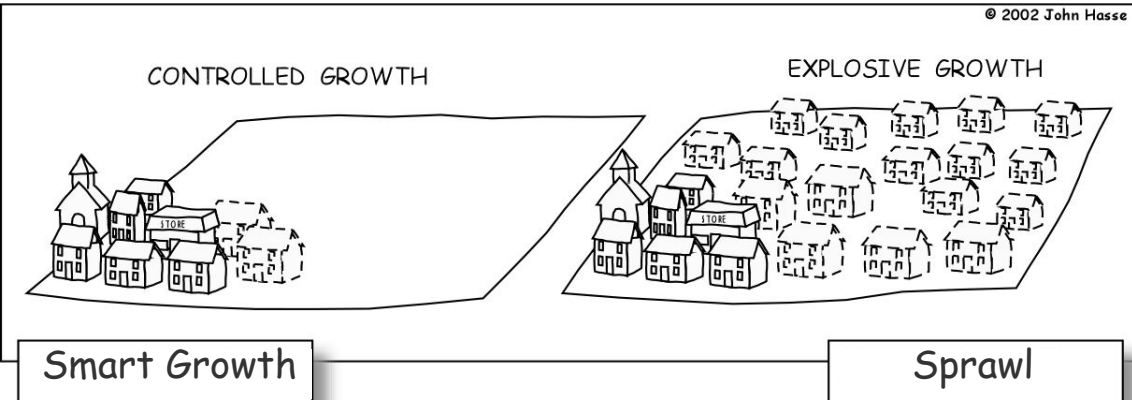
Headwaters = Canoe Brook



Part I

Smart Growth Report Card

10) Growth Trajectory



GRADE

A=smartest growth

B

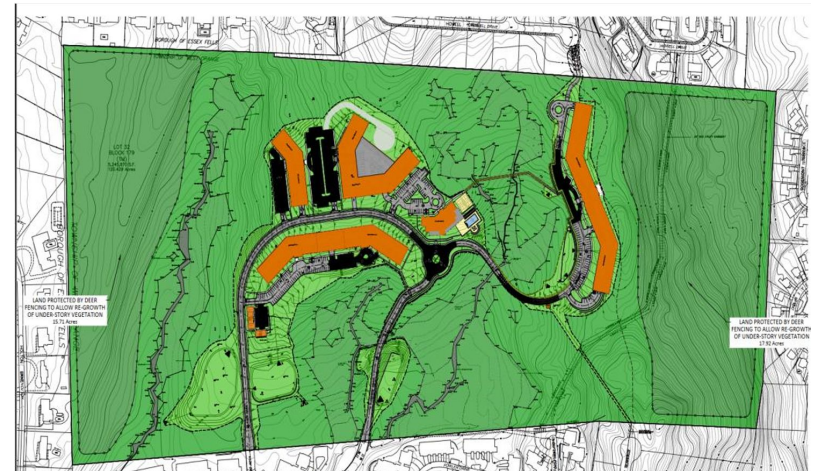
C

D

F=Most Sprawling

Project Consumes the last large (100+ ac) tract of remaining undeveloped land in Essex County adding:

- 496 housing units
- x 2.7 people/unit = 1,339 new people
- auto trips = 2,728 autos/day



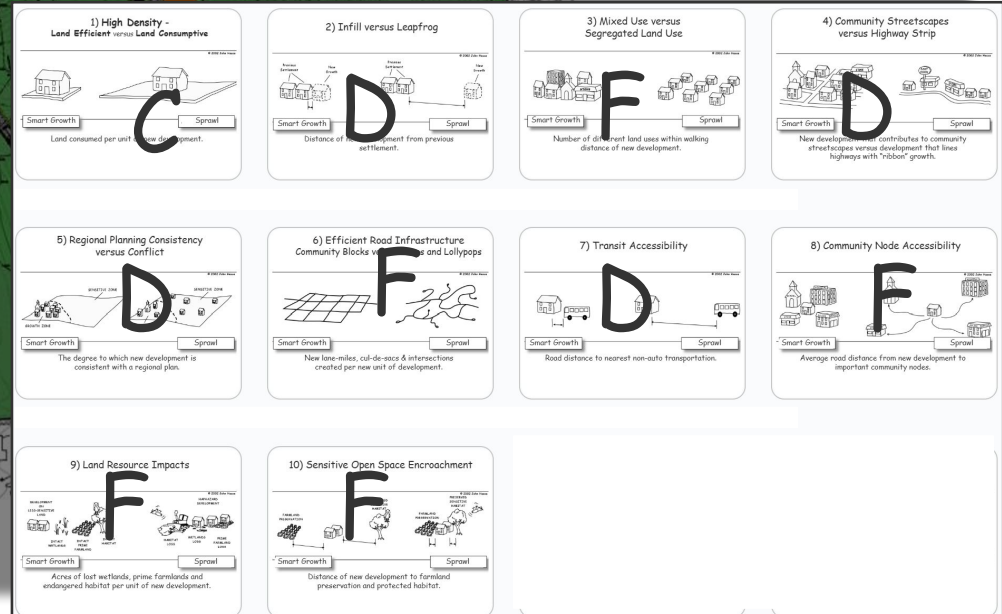
Part I

Smart Growth Report Card

Smart Growth Report Card

Final Tally

West Essex Highlands Project



Part II

Smart Conservation
Report Card

What if the land were put
into conservation?



Part II - Geospatial Metrics for Smart Conservation

which lands are most important to preserve





ANIMATING New Jersey's Changing Landscapes

→ Using NJDEP Land Use Land Cover data to evaluate impacts over time

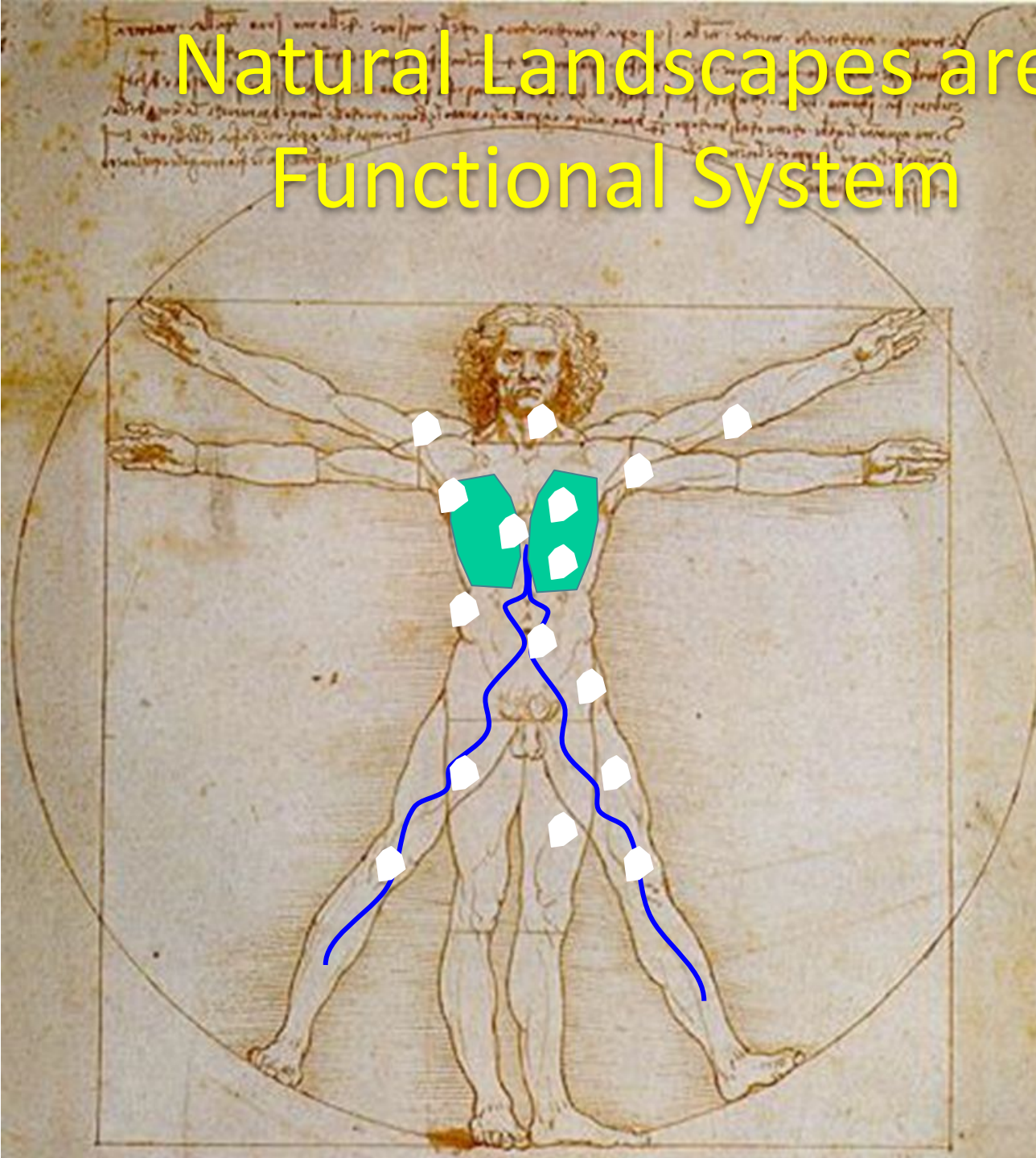
**Urban Growth
1986-2020**

377,777 Acres

**11,111 Acres Per Year over
36 years**

Natural Landscapes are Functional System

- Components are
- In the right place
 - At the right scale
 - Efficient
 - Connected
 - Flowing
 - Integrated





NEW JERSEY CONSERVATION BLUEPRINT

engage. protect. restore.

Mission: *Accelerate preservation* of the most important remaining natural and cultural land resources that support healthy and vibrant communities in **New Jersey**.



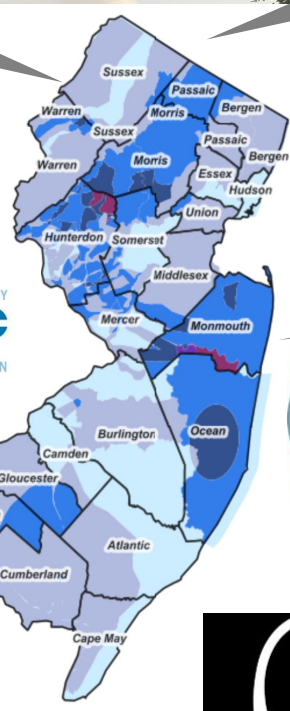
RowanUniversity
SCHOOL OF EARTH
& ENVIRONMENT



New Jersey Conservation Blueprint Steering Committee

NJ & REGIONAL GOVERNMENT, COMMISSIONS

NJC CONSERVATION GROUP



US GOVERNMENT



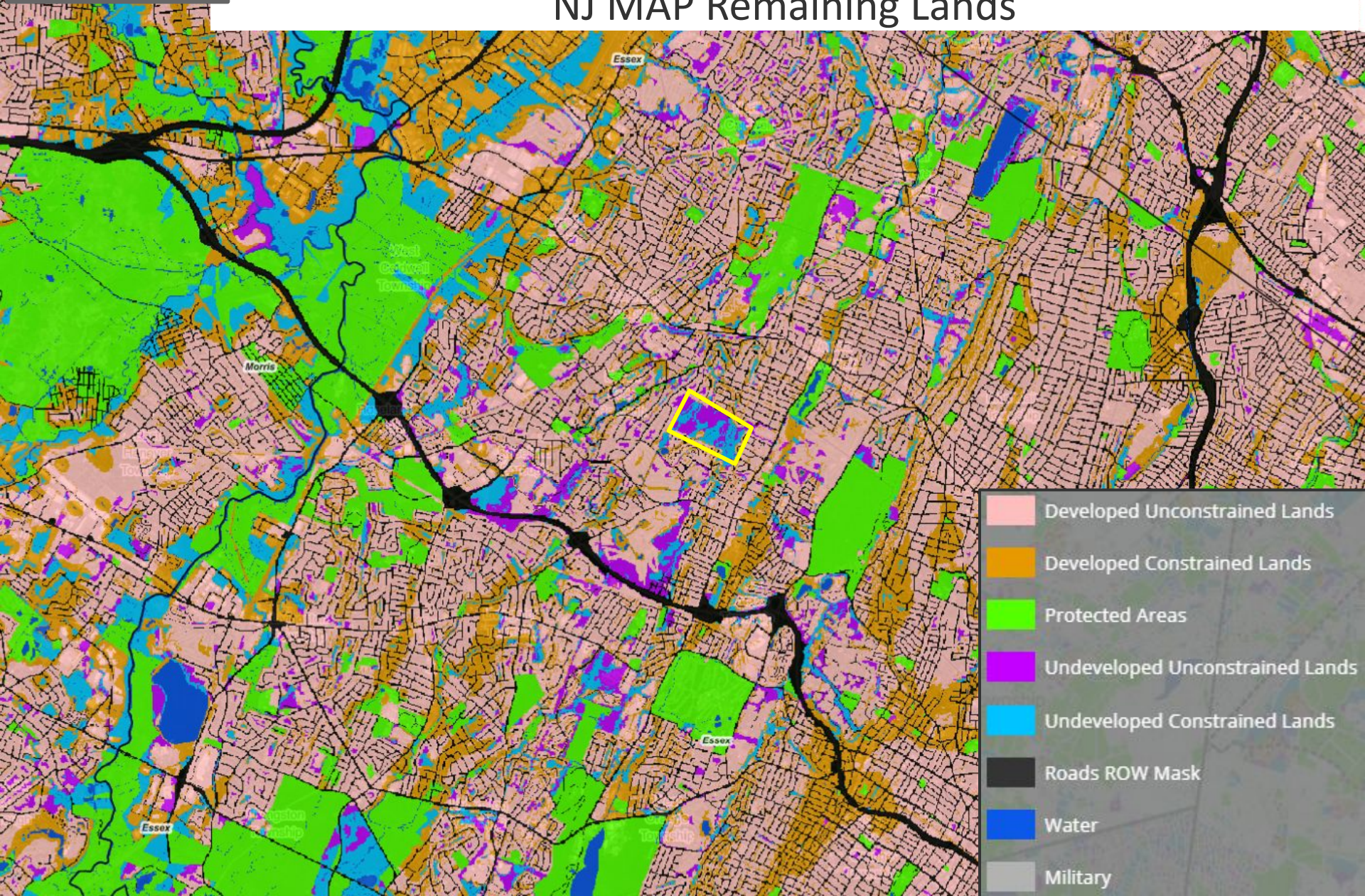
Geospatial Metrics for **Smart Conservation**

Goals for Prioritizing Open Space Acquisition

- 1. Prioritize Larger Tracts**
- 2. Near other Open Space**
- 3. Protect Habitats**
- 4. Promote Connectivity**
- 5. Protect Forest Core**
- 6. Protect Water Quality**
- 7. Mitigate Flood Risk**
- 8. Protect Steep Slopes**
- 9. Protect Important Soils**
- 10. Create Community Greenspace**

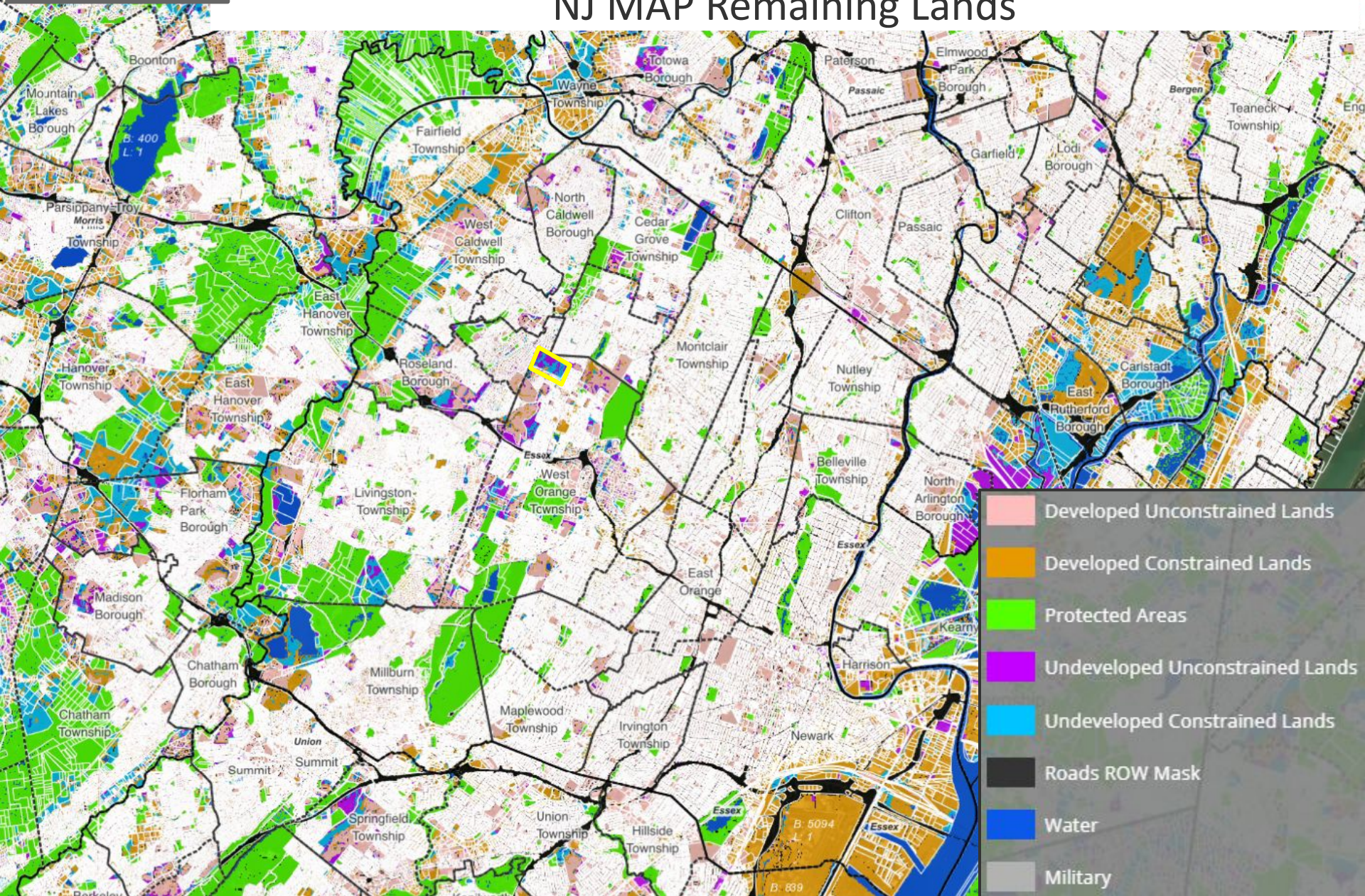
1. Prioritize Larger Tracts

NJ MAP Remaining Lands

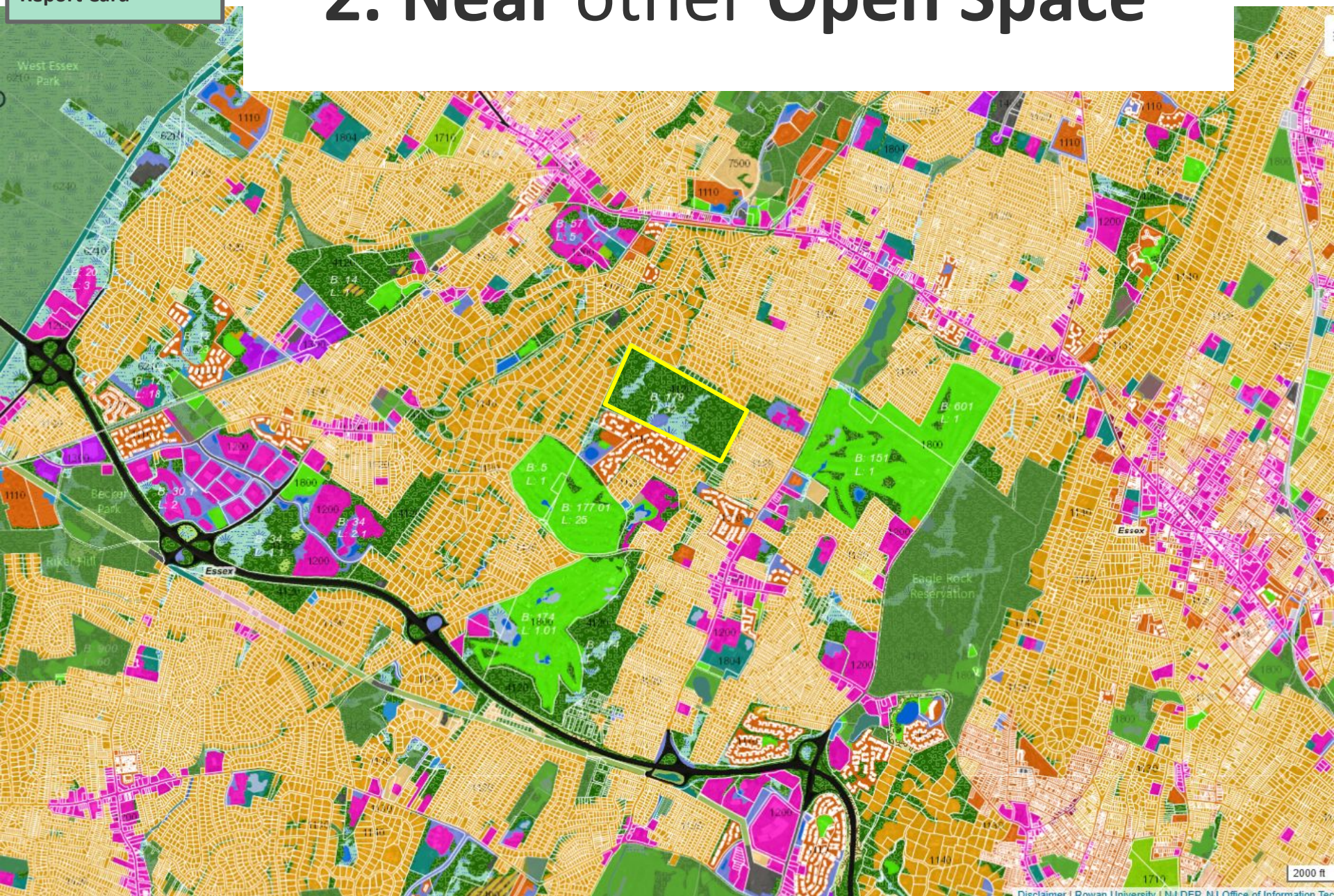


1. Prioritize Larger Tracts

NJ MAP Remaining Lands



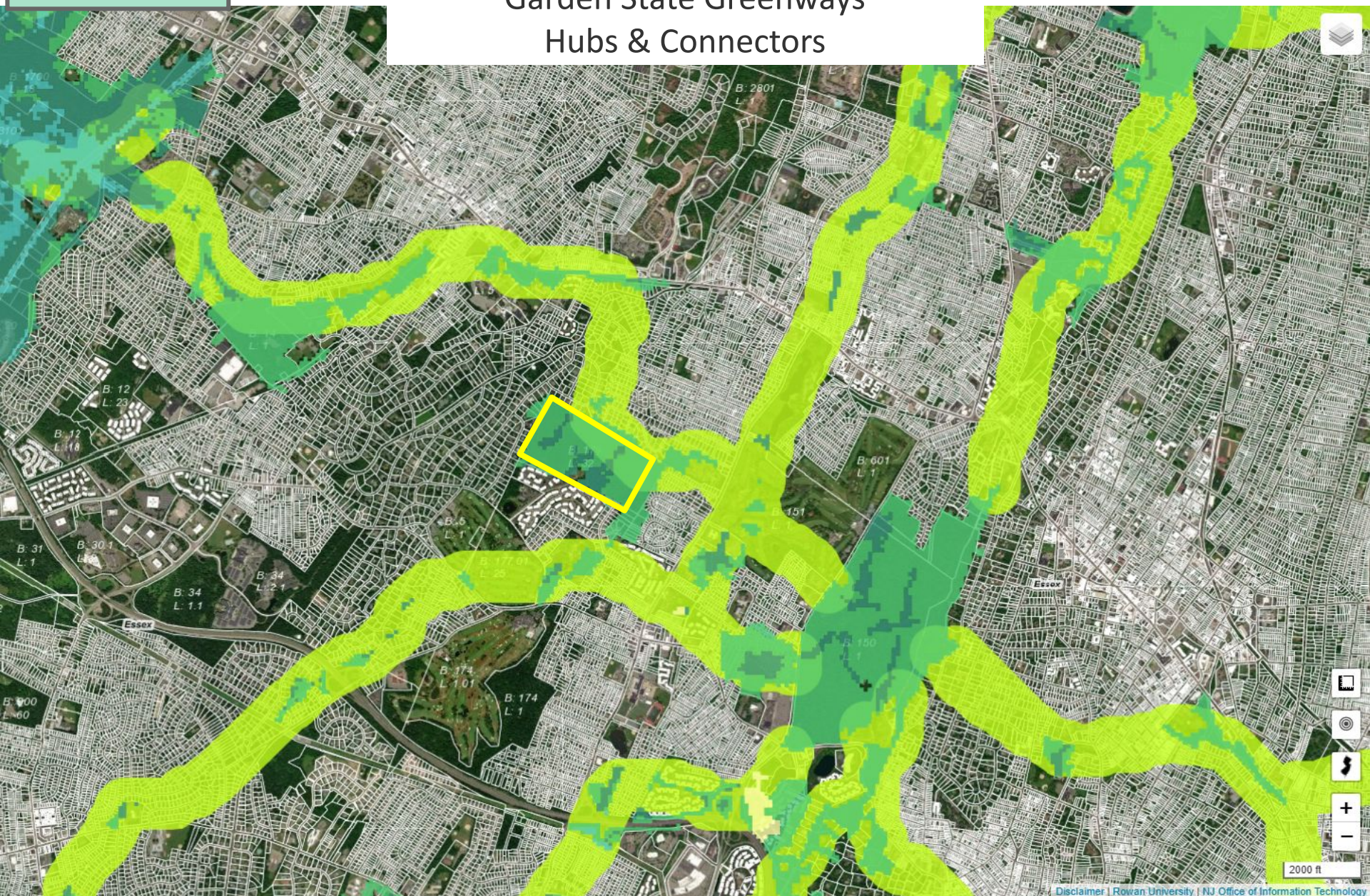
2. Near other Open Space



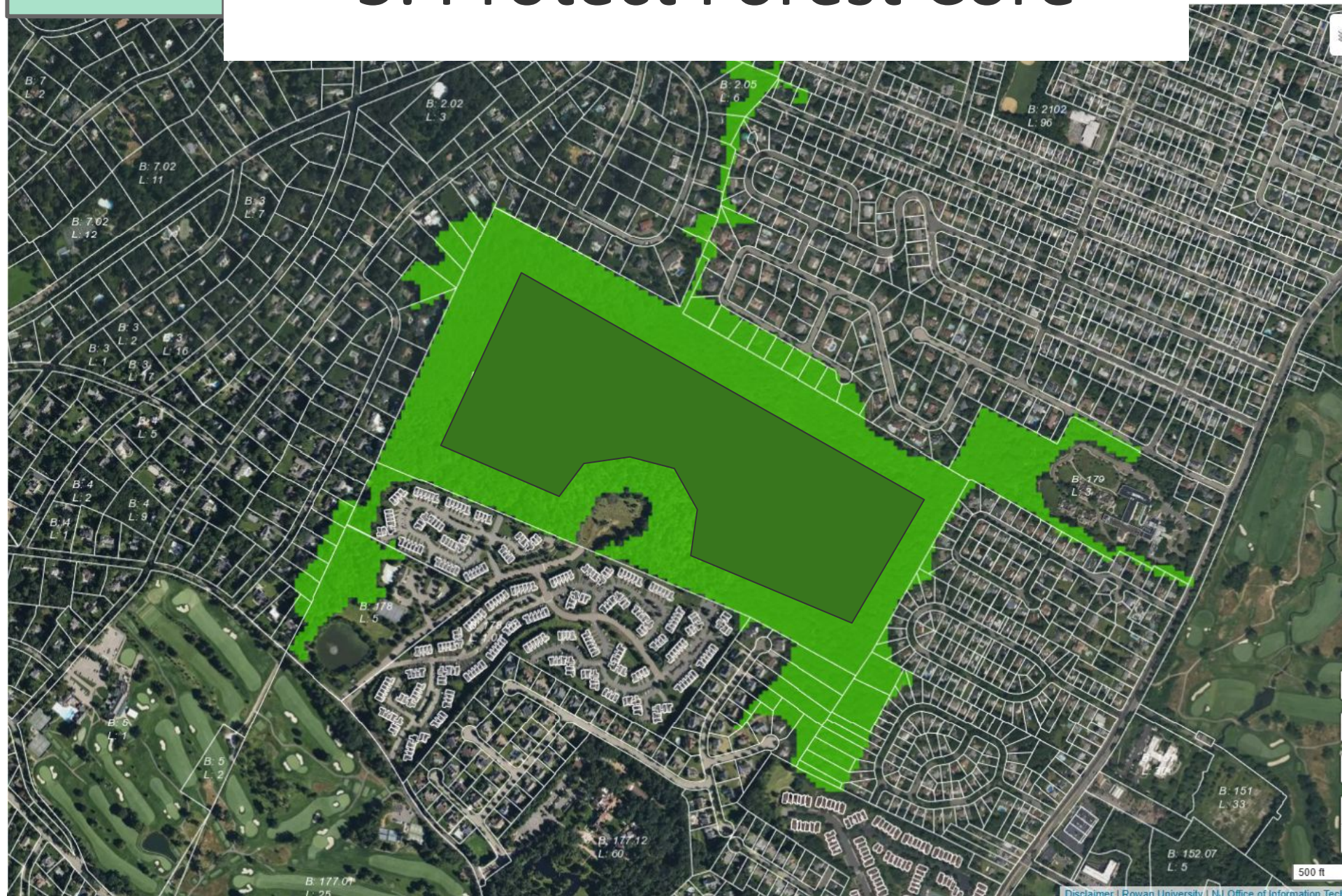


4. Promote Connectivity

Garden State Greenways
Hubs & Connectors

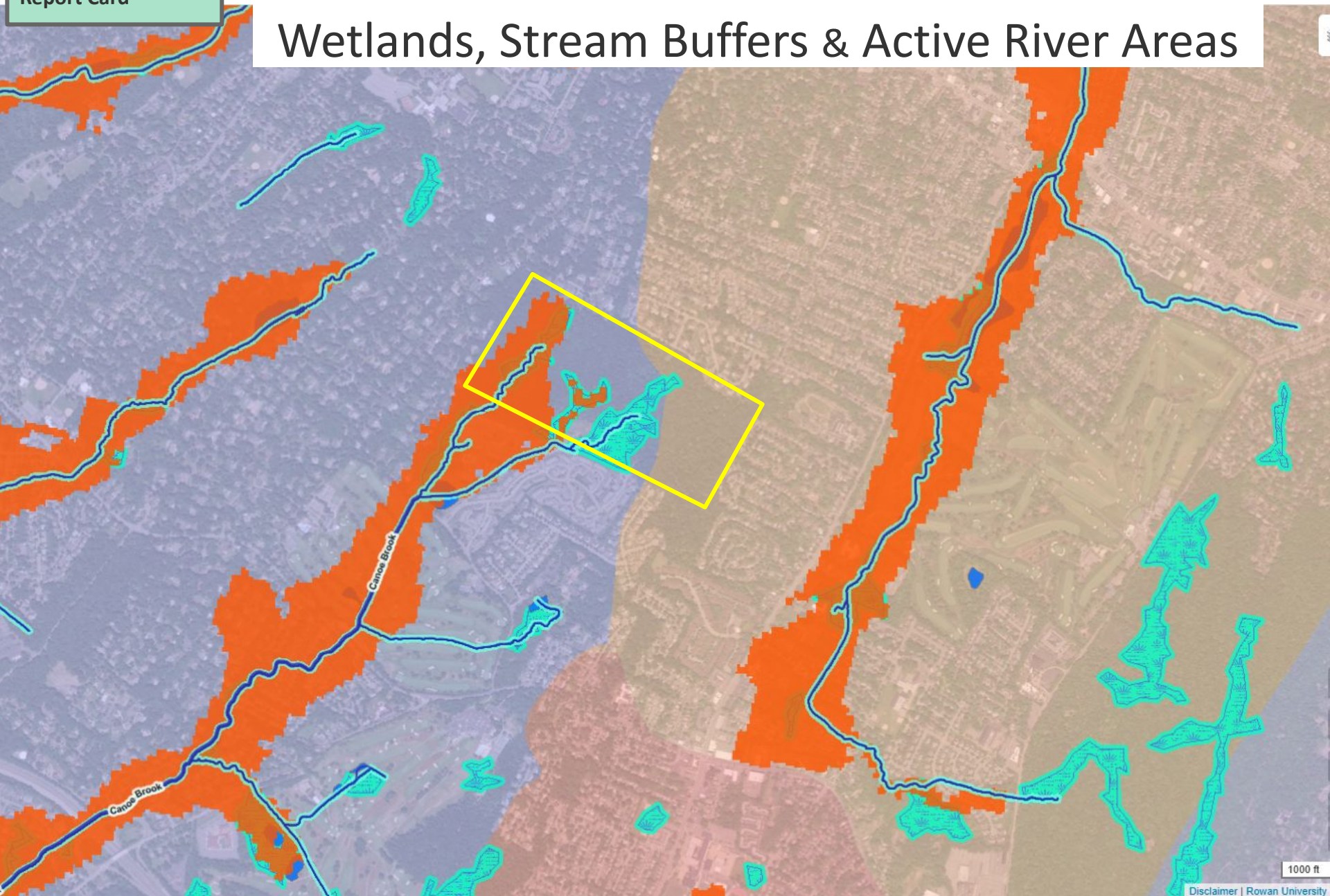


5. Protect Forest Core



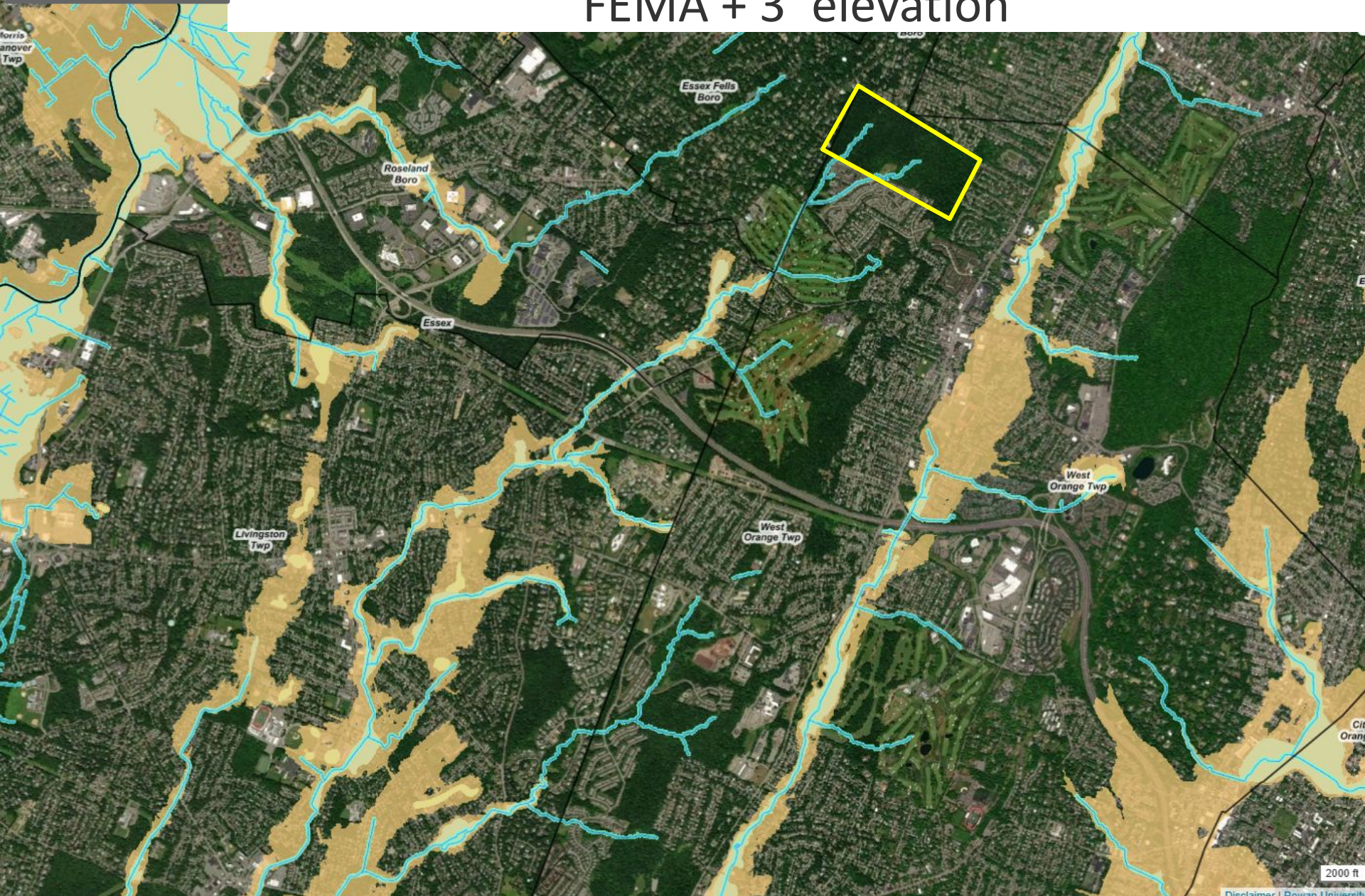
6. Protect Water Quality

Wetlands, Stream Buffers & Active River Areas



7. Mitigate Flood Risk

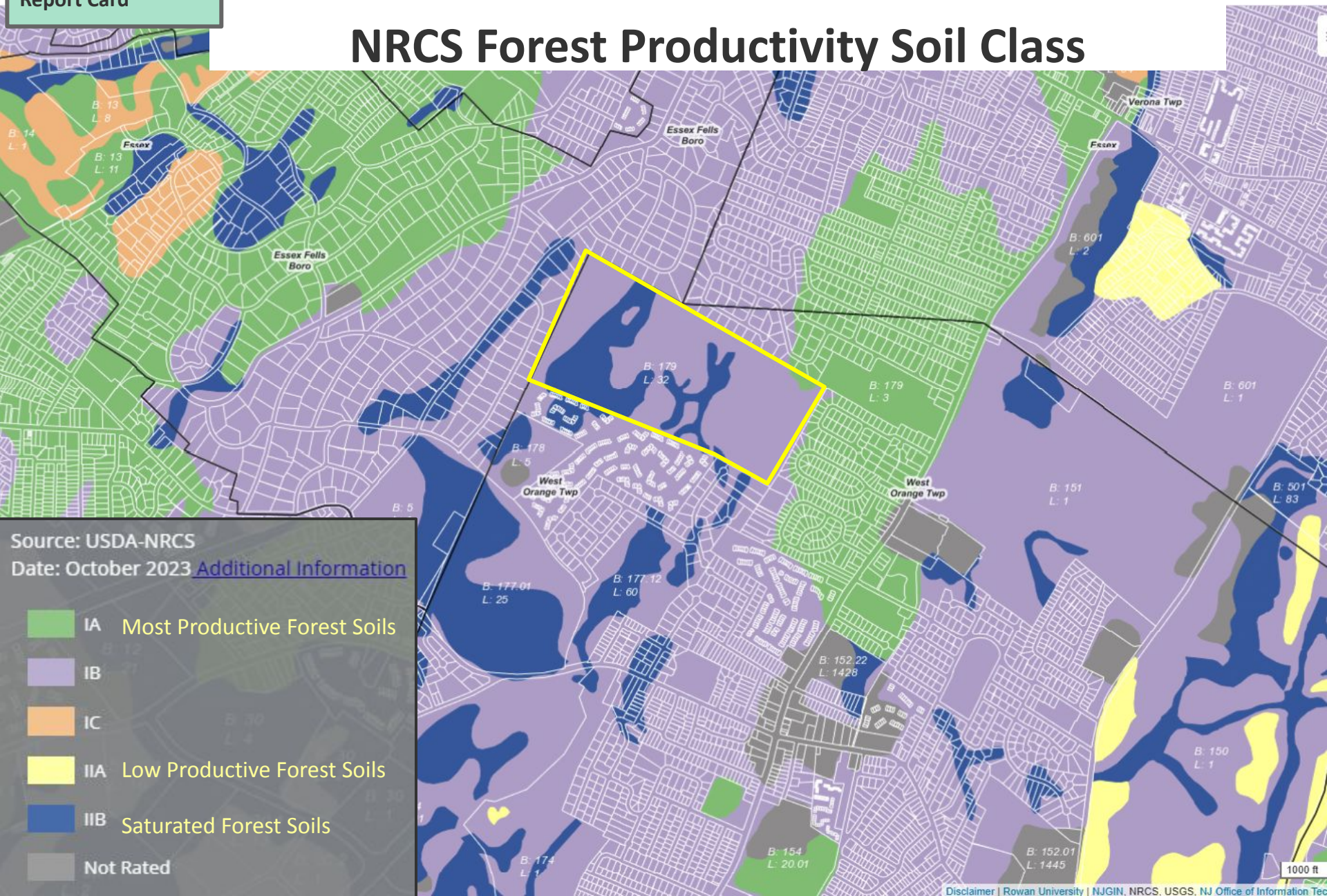
FEMA + 3' elevation



Disclaimer | Rowan University | NJ Office of Information Tec

9. Protect Important Soils

NRCS Forest Productivity Soil Class



Source: USDA-NRCS
Date: October 2023 [Additional Information](#)

10. Create Community Green Space

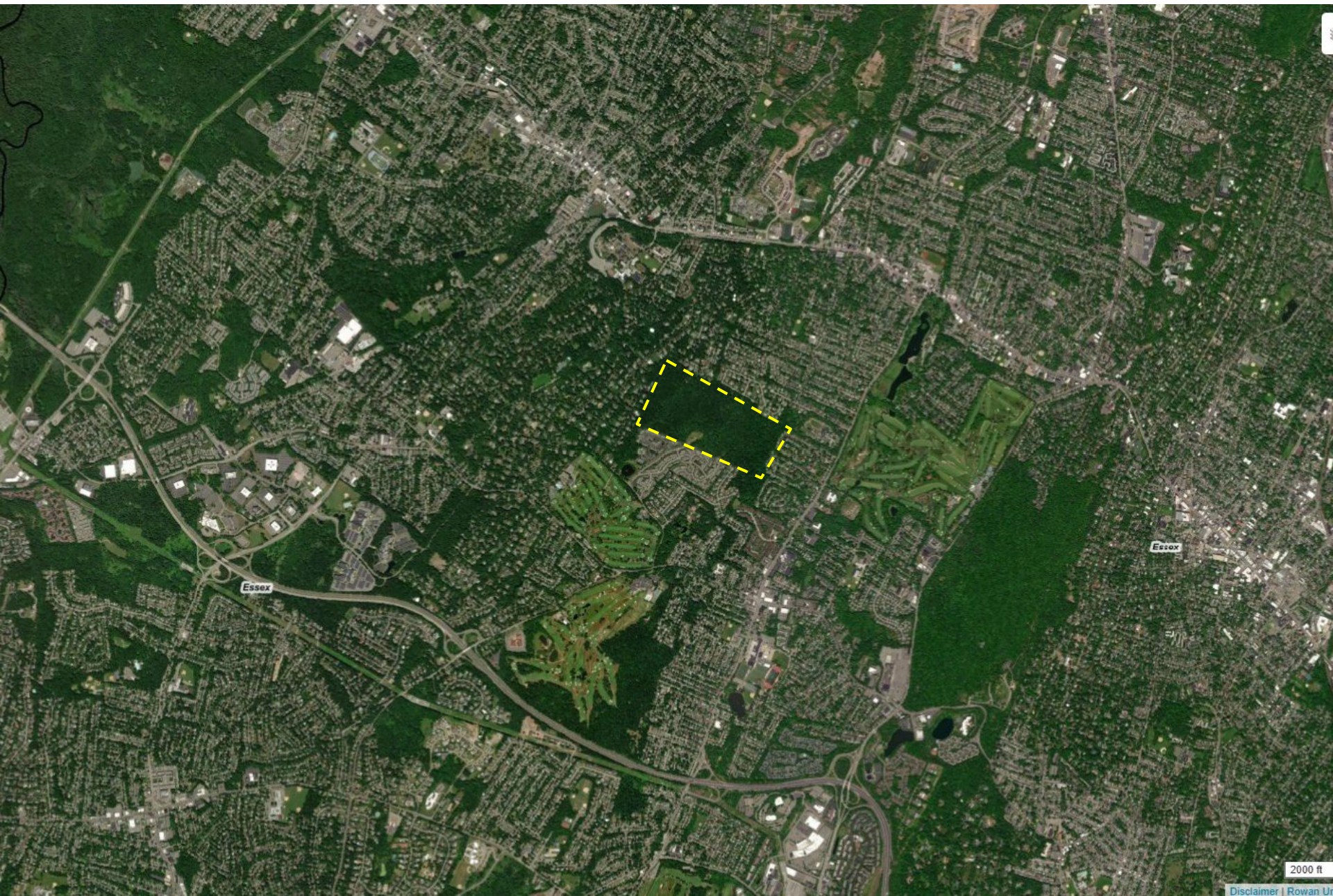
Outdoor Habitat for People



Geospatial Metric Smart Conservation Report Card

1. Prioritize Larger Tracks		6. Protect Water Quality	
2. Near other Open Spaces		7. Mitigate Flood Risk	
3. Protect Habitats		8. Protect Steep Slopes	
4. Promote Connectivity		9. Protect Important Soils	
5. Protect Forest Cores		10. Create Community Green Space	

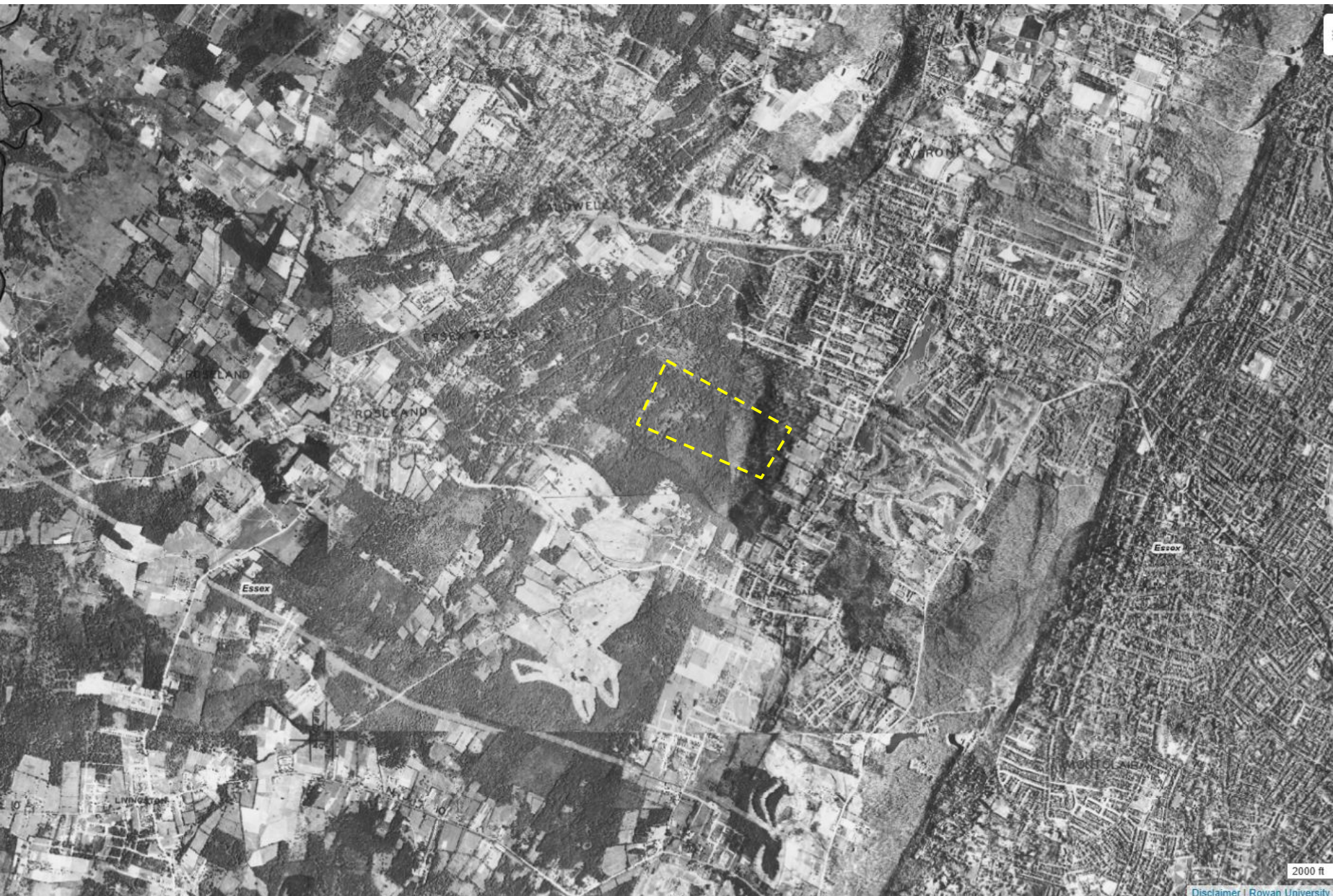
2024 Satellite



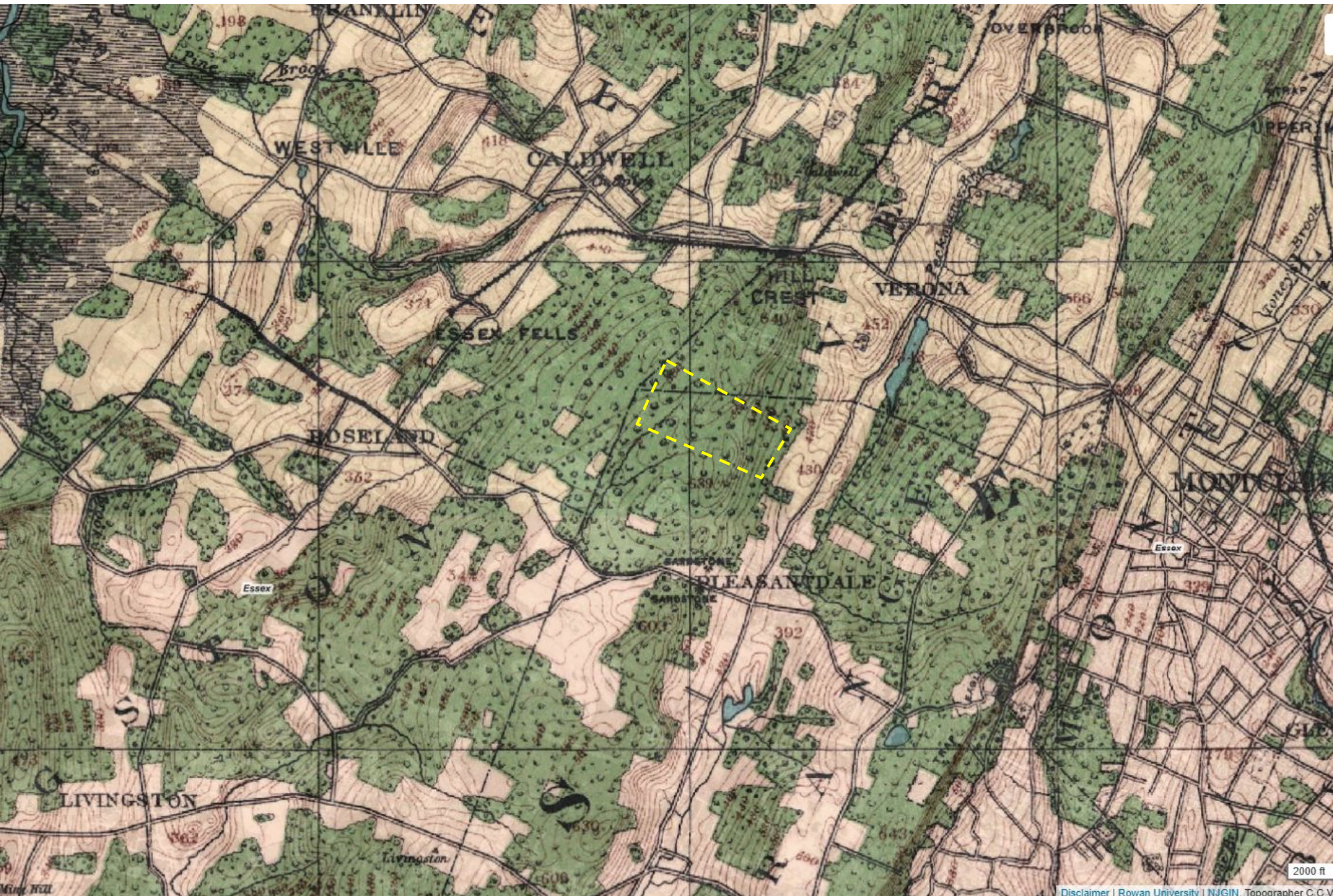
1997 Infrared Orthophotos



1930 Aerials

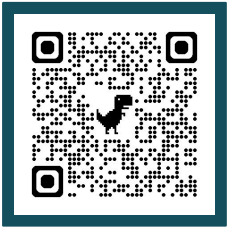


1880's Vermuele Survey



Recap Summary & Conclusion

Rowan Geolab Resources



NJ MAP - <https://www.nj-map.com/>

Smart Growth Explorer -
<https://www.nj-map.com/sdrp/model>



Conservation Blueprint -
<https://www.nj-map.com/blueprint/>

Contact Information

John Hasse Ph.D., AICP
Department of Geography, Planning, and
Sustainability
Rowan University
hasse@rowan.edu