

CITY SIMULATOR: RESILIENCY IN THE US 74 CORRIDOR

June 26, 2024

SAME SE Tri-Regional JETS

Ben Hefner PE, AtkinsRéalis
Scott Tezak PE, AtkinsRéalis



Slide 1

HBO

[@White, Holly] Can you go through and make sure transitions are consistent? Also all other formatting should be consistent. I have tried to call out specifics, but I likely have missed some things.

Hefner, Ben, 2024-06-06T15:26:43.446

Common Resiliency Themes

- What does it *really* mean to be resilient?
- Which specific assets face the greatest risk? How vulnerable are transportation systems to forecasted hazard events?
- What are the potential actions and steps that can improve resiliency? Why (quantitatively) are these the best actions?
- What are the trade-offs of taking one course of action versus another?
- What level of investment would be required to achieve a desired result? How much resiliency can be obtained for a specific price?
- What actions are most cost-effective to achieve desired levels of resiliency?

Disruption: Causes and Simulation



Riverine and pluvial flooding

Can cause single day to months-long disruption.



Nuisance flooding from rising sea level

Can cause chronic daily disruption.



Flushing from maintained high temperatures and excess traffic volumes causing unsafe conditions.

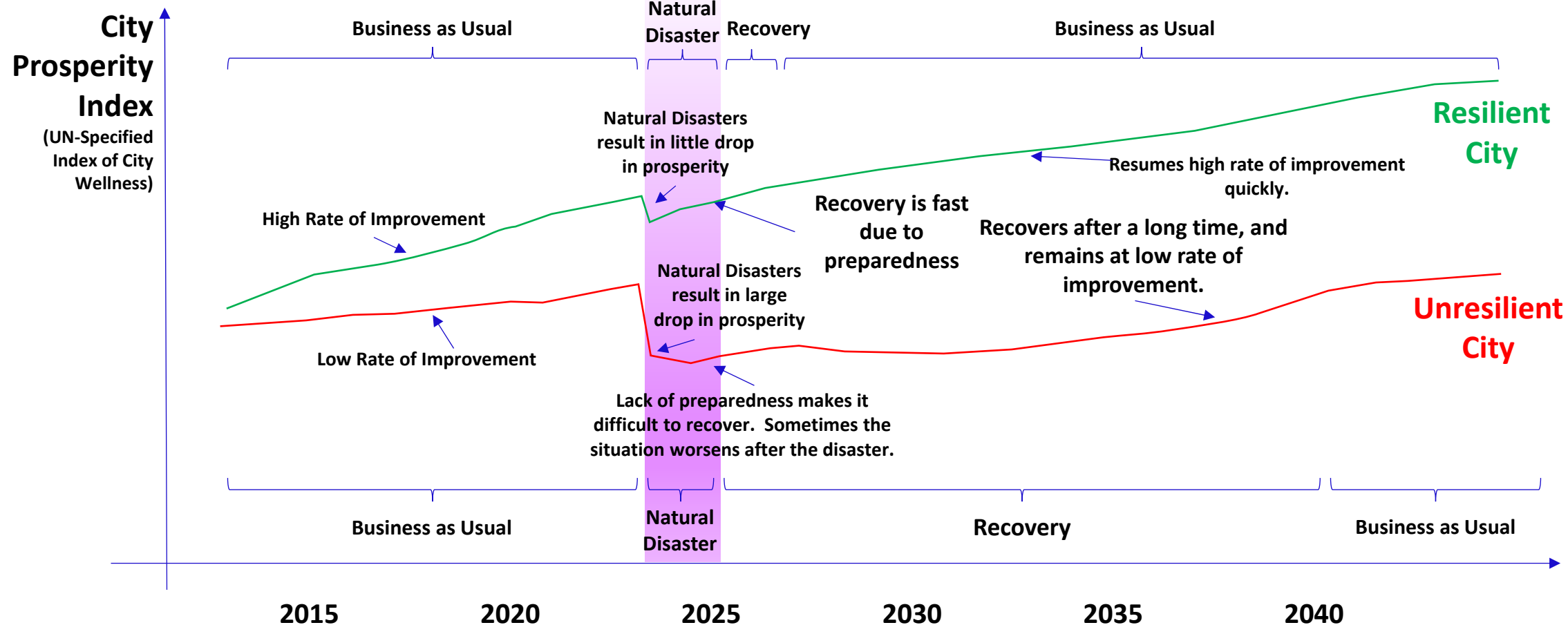
Can cause slowdown in traffic speeds.

City Simulator



Building a new Tool for Forecasting Resilience

Natural disasters are simulated at the size and frequency resulting from climate change.



Slide 5

ZLA0

[@Hefner, Ben] - Holly can make the text larger and easier to read. Are there any items you would like her to make more obvious in the slide. I feel like the recovery phase is the big differentiator between the two scenarios.

Zuzak, Lara A, 2024-05-30T19:05:23.467

HB0 0

Hmm good thought, the key is the difference in the two lines during the recovery phase. We could bold the "recovery is fast due to preparedness" maybe. then focus on how the unresilient city "recovers after a long time, and remains at a low rate of improvement"

Hefner, Ben, 2024-05-31T21:28:30.525

Requirements for Forecasting Resilience

- Capture interacting systems (Economy, People, Infrastructure, Natural)
- Include business-as-usual as well as disasters
- Include disasters that are representative of climate change effects
- Allow for addition of proposed strategies and measures their effect
- Include a long enough timeline to measure return on investment
- Be conductible in a planning context (12 months, Planning Budgets)

Slide 6

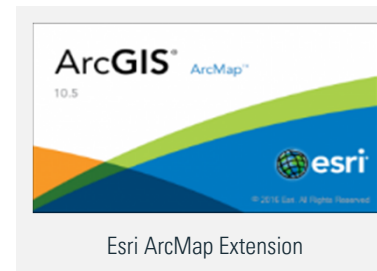
HBO [@White, Holly] can you help fix this footer? Date is showing up for some reason.
Hefner, Ben, 2024-06-06T14:17:22.922

WHO 0 [@Hefner, Ben] Done!
White, Holly, 2024-06-06T19:51:37.909

City Simulator Defined

“A map-based decision support tool that helps communities understand their vulnerabilities to future disasters and find the most effective mitigation and adaptation actions.”

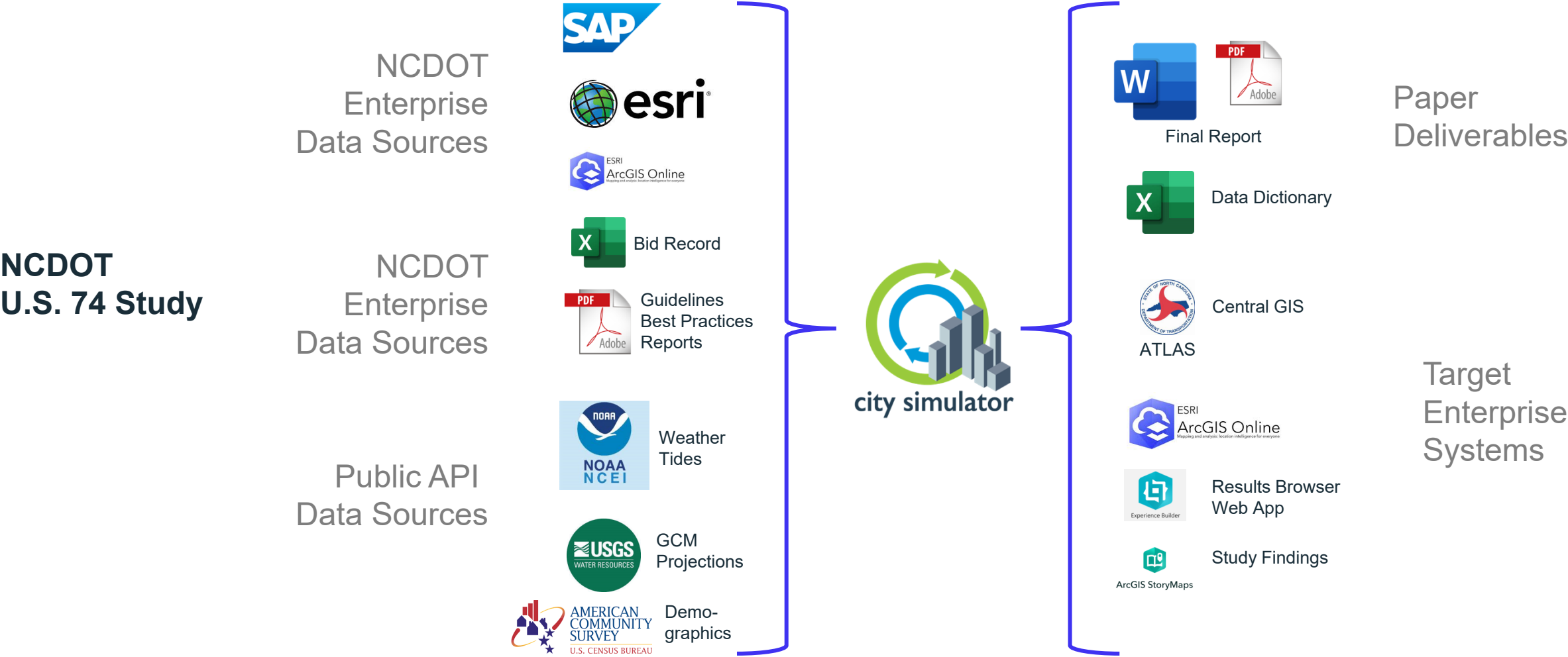
V 1.0 (desktop)



V 2.0 (online)

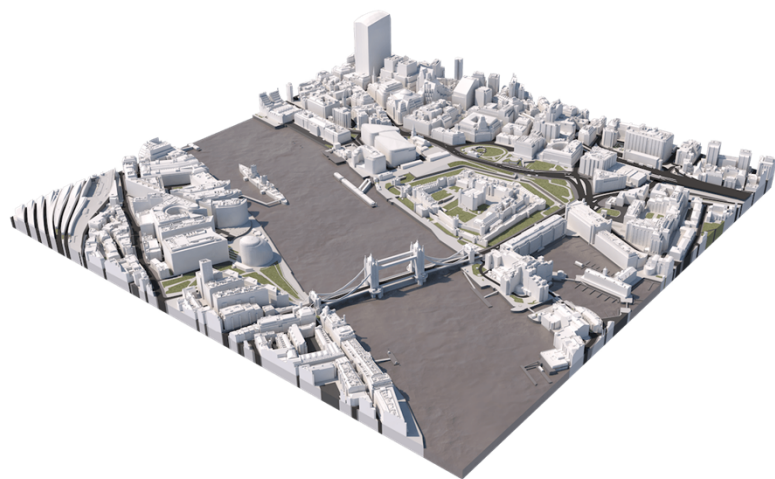


Integrating with other systems and tools



What is City Simulator? How Does it Work?

Digital Twin → Simulate → Measure



System Users
System Infrastructure
System Control



Economy
Productivity
Storm damage
Energy Consumed

People
Trips disrupted
Freight disrupted
Heat days disrupted

Environment
Carbon Footprint
Water Quality



Slide 9

HBO

[@White, Holly] can you make the word "Annual" and "Daily" stand out a little more? Maybe Bold?
Hefner, Ben, 2024-06-06T14:18:57.268

WHO 0

[@Hefner, Ben] Done!
White, Holly, 2024-06-06T19:52:30.426

US74 Resiliency Study



Study Corridors



Study Questions

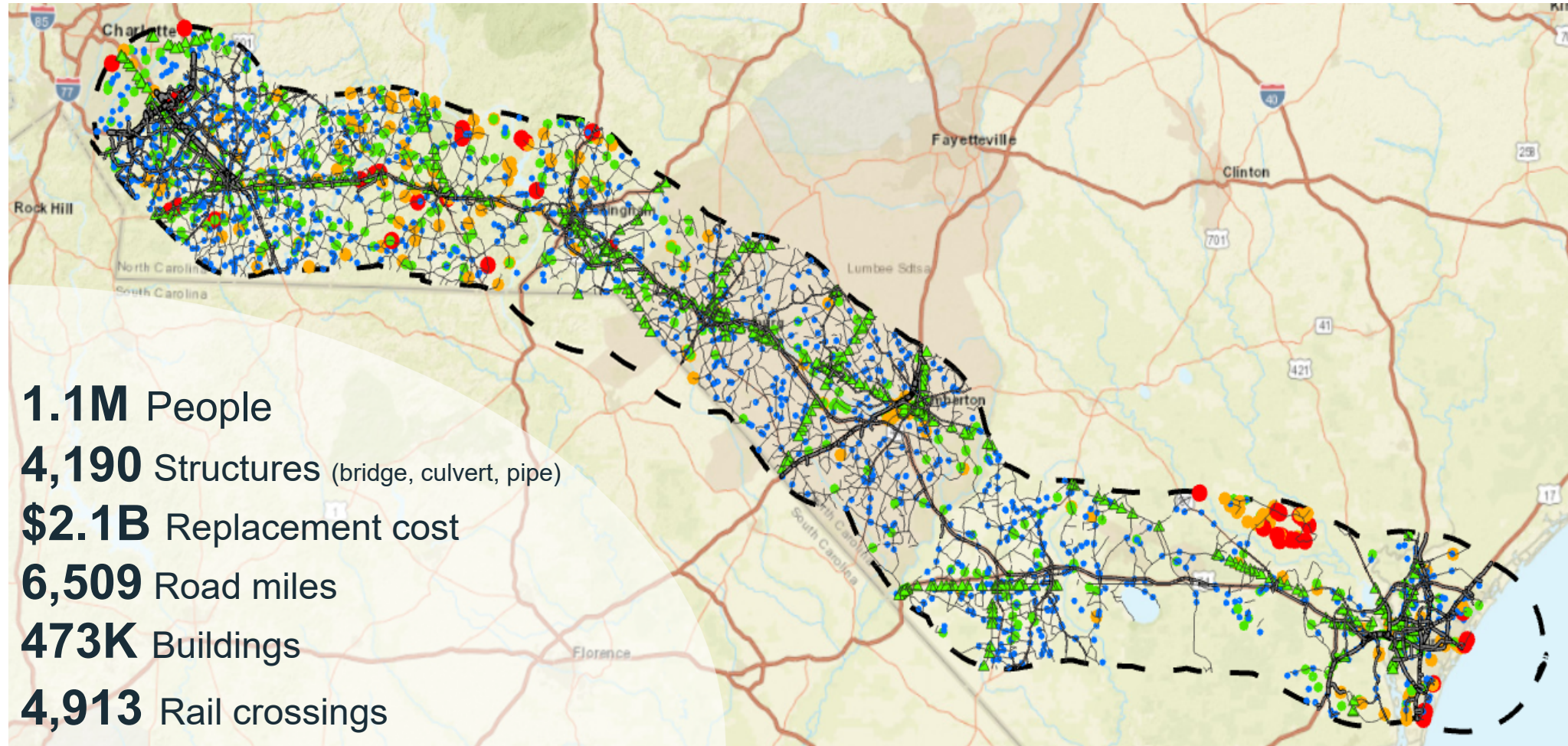
1. Climate change **impact on future traffic flows?**
2. Which assets will cause the **most disruption?**
3. Which assets are **most important for people and freight?**
4. What will it **cost to operate** and maintain the corridor?
5. What cost will be **caused by climate** change-influenced disasters?
6. Climate change **impact on disadvantaged populations?**



Working Together



Digital Twin of the US74 Corridor



Slide 14

ZLA0

[@Hefner, Ben] - does this demonstrated just one of the two corridors? If so, how can we make that more obvious for the reviewer?

Zuzak, Lara A, 2024-05-30T19:06:39.376

HB0 0

I will discuss that the results we are talking about today will focus on the US74 corridor during slide 9 and again when I get to this slide

Hefner, Ben, 2024-05-31T21:25:55.734

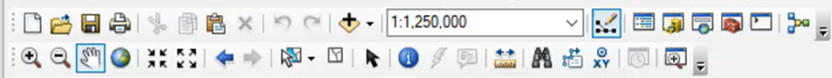
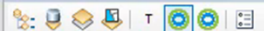


Table Of Contents

Get Started Goals and Objectives Screening Driver Forecasts Scenario Builder **Simulation** Scenario ComparisonBase Scenario
75th Percentile
12:00:02Load Model
LoadedRun Scenario
Simulation

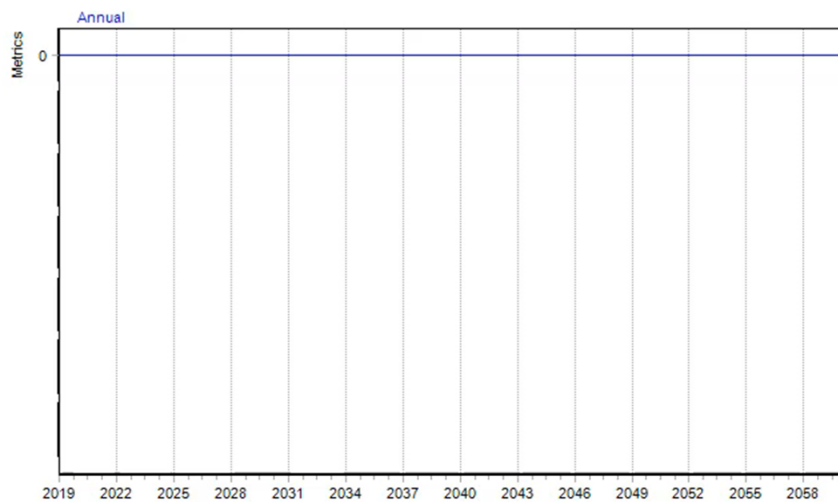
Stop Run

☒ Visualize on Map
☒ Visualize in ChartsPost Process
Options

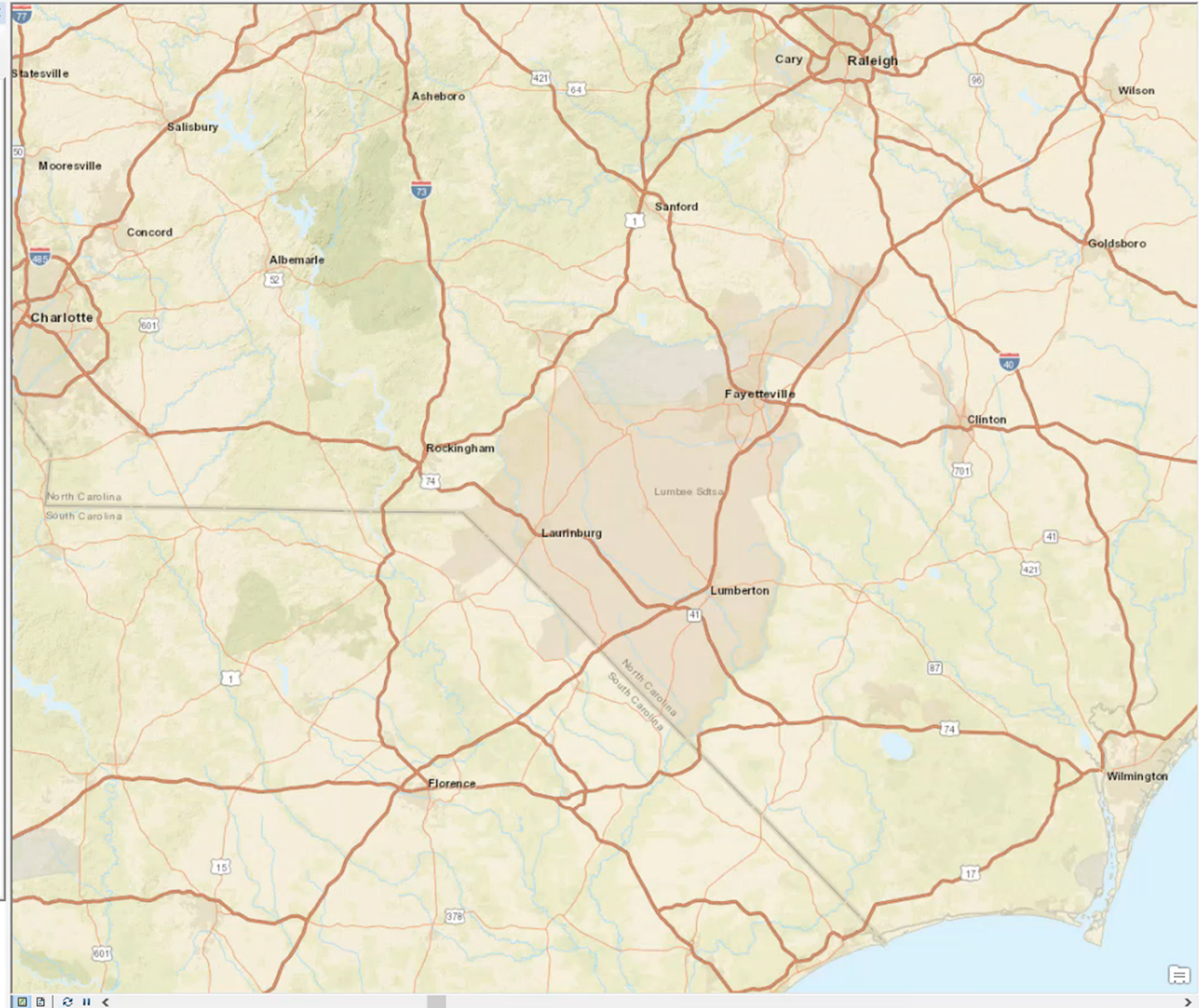
Model Loading Simulation Dashboard Results ...

Status: Disabled | Buildings: 0 | Stormwater Nodes: 0 | People Impacted: 0

Daily - 2030



2020



Slide 15

ZLA0

[@Hefner, Ben] - are we running a video? If so, I believe that file needs to be linked to this.

Zuzak, Lara A, 2024-05-30T19:07:56.203

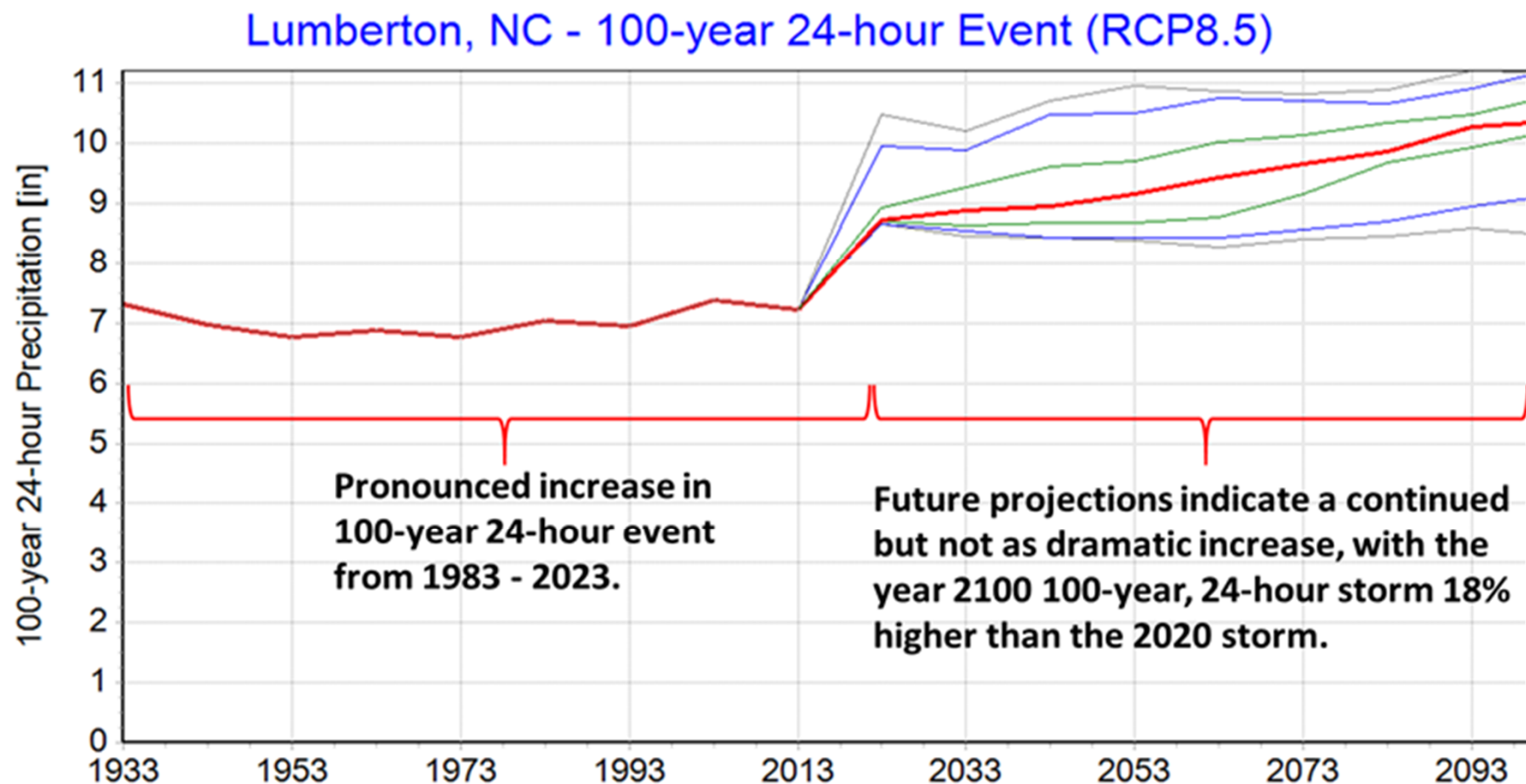
HB0 0

the video usually runs fine embedded in the powerpoint. I will make sure and have a copy backed up and ready to go if it does not work during testing on site.

Hefner, Ben, 2024-05-31T21:24:58.715

Findings: Large storms are projected to increase in severity

- Extreme storms in the last two decades increased the estimate of the 100-year 24-hour rain depth by 24%.
- Future storms projected to become even larger.

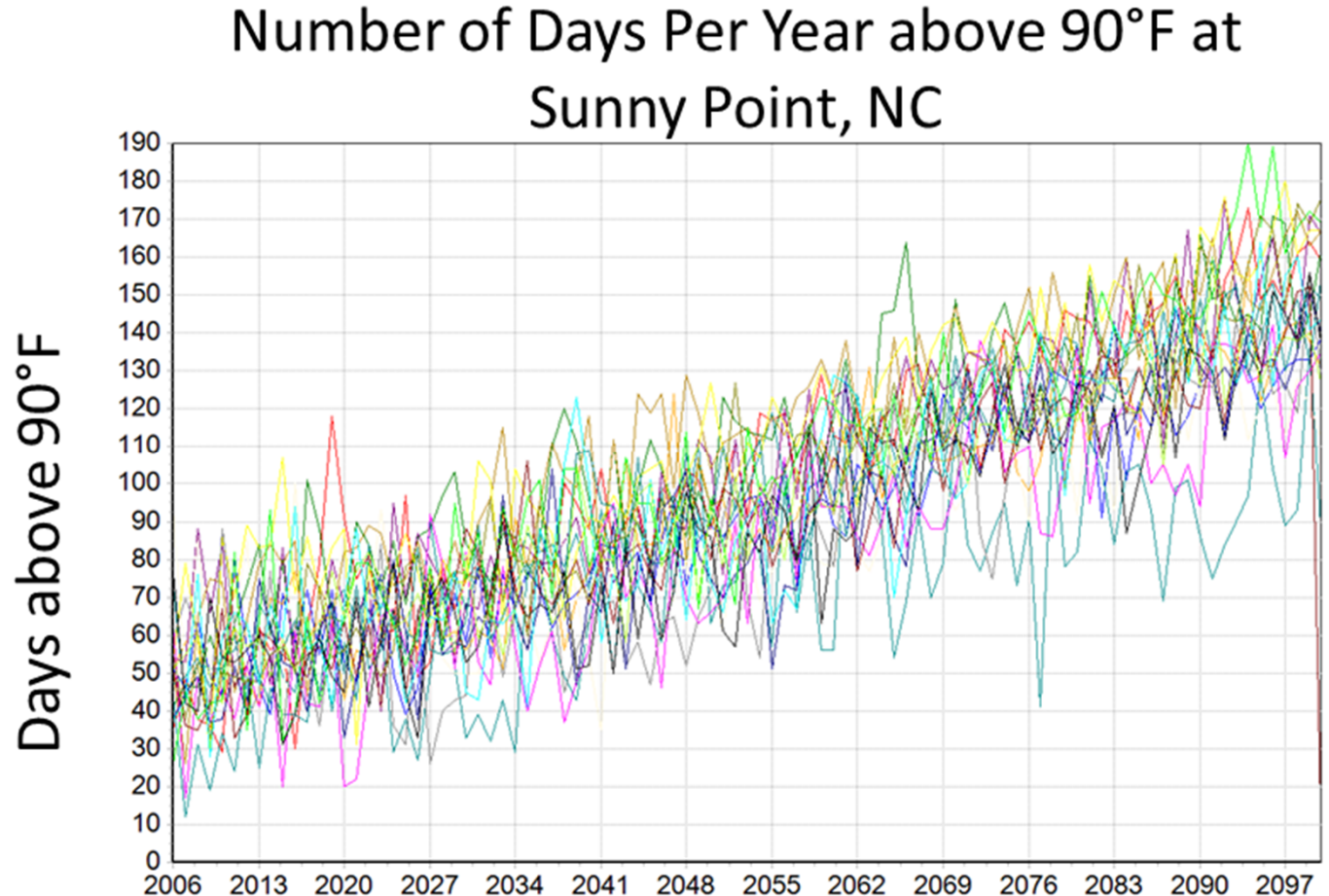


Slide 16

- ZLA0** [@Hefner, Ben] and [@White, Holly] - Recommend we try to make the text larger. If there is an Excel file, Holly can more easily make the text and lines bigger.
Zuzak, Lara A, 2024-05-30T19:08:48.369
- HB0 0** I think this is an output from Citysim/Arcmap. I am not sure if [@Bourne, Stephen F] has the original graphic or not. This will be thoroughly described during the presentation of course.
Hefner, Ben, 2024-05-31T21:24:06.883
- ZLA0 1** [@Hefner, Ben] - Ben, I didn't share this file with Stephen. If you want him to work in in directly, we'll need to share the file with him. Please advise. Thx.
Zuzak, Lara A, 2024-06-03T13:02:45.532
- HB0 2** I believe I shared it with him. I will confirm that he has access and discuss a few of these comments
Hefner, Ben, 2024-06-03T14:12:42.734
- ZA0 3** Thank you. I asked Holly to check with you the middle of the week to see if you would like her to start formatting. Thx.
Zuzak, Lara A, 2024-06-03T14:42:56.114
- HB0 4** Confirmed with Steve, we do not have access to the original file (at least not without taking some significant time to recreate some of the date), We can either leave it as is, or let [@White, Holly] make the changes you suggested graphically.
Hefner, Ben, 2024-06-04T11:29:18.788
- ZA0 5** Let's please improve the legend. Maybe remove the underscores and include any descriptions that we think will be easier for the reader to understand. Thx.
Zuzak, Lara A, 2024-06-04T12:24:59.476
- HB1** [@White, Holly] From here down there are some slides without slide numbers. Can you add them so that it is consistent at the footer throughout?
Hefner, Ben, 2024-06-06T14:58:42.965
- HB1 0** Can you also try improving the legend here as Lara suggests above?
Hefner, Ben, 2024-06-06T14:59:43.357
- WH1 1** [@Hefner, Ben] Added page numbers throughout - Are we keeping the pages 48 and 49? If not remove and I will continue accurate numbering
- How can I improve upon the graphic? Looking at it now, it looks readable
White, Holly, 2024-06-06T17:09:47.335
- HB1 2** I think we can just hide the existing legend. I can explain everything else verbally
Hefner, Ben, 2024-06-06T19:24:23.460
- WH1 3** [@Hefner, Ben] Done!
White, Holly, 2024-06-06T19:54:16.130

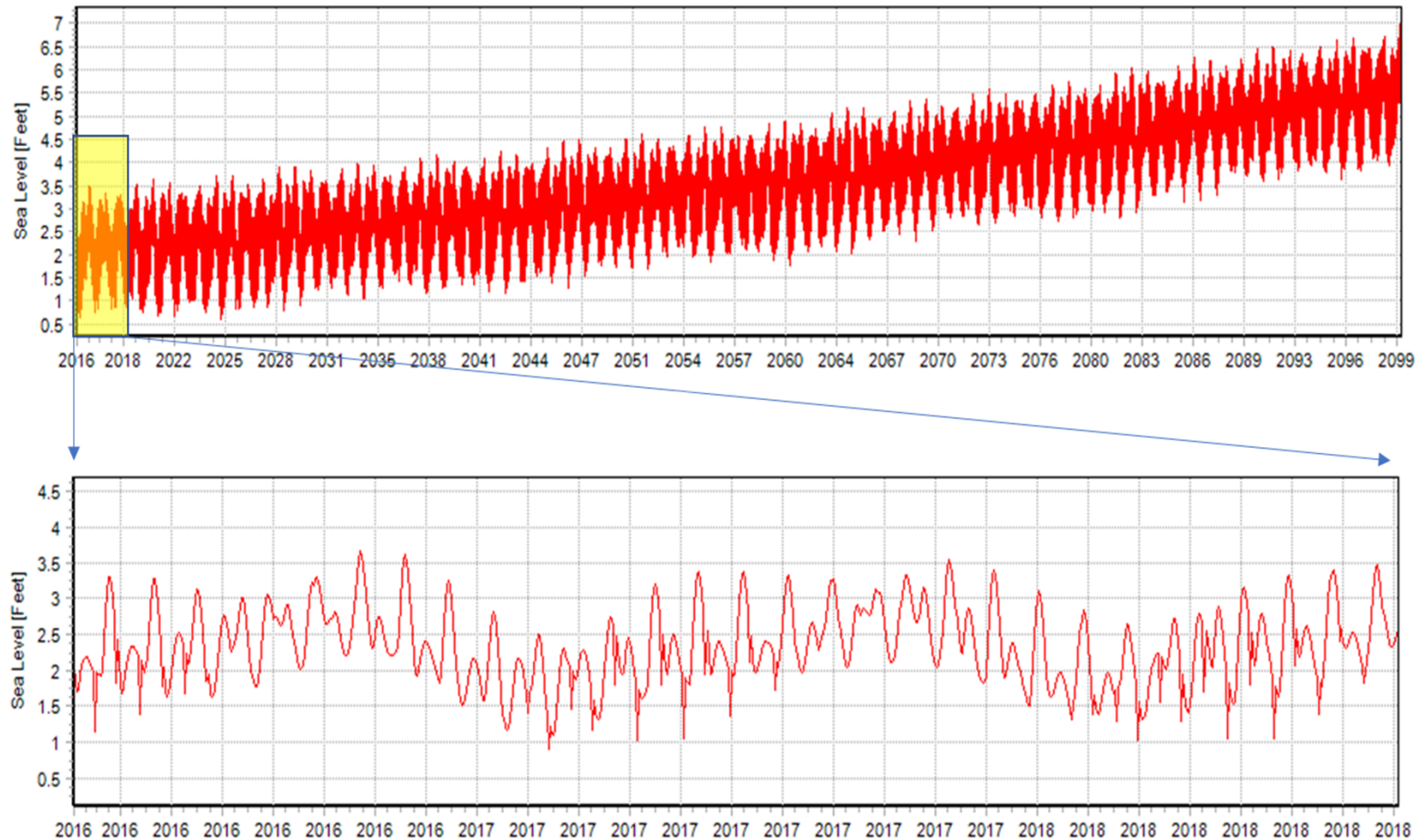
Findings: Heat is projected to be an increasingly disruptive problem

- Rise in temperatures is projected to increase disruption to road and rail traffic through phenomena like flushing, where the bitumen in asphalt becomes viscous in high heat events and the aggregate is pulled out by vehicle tires



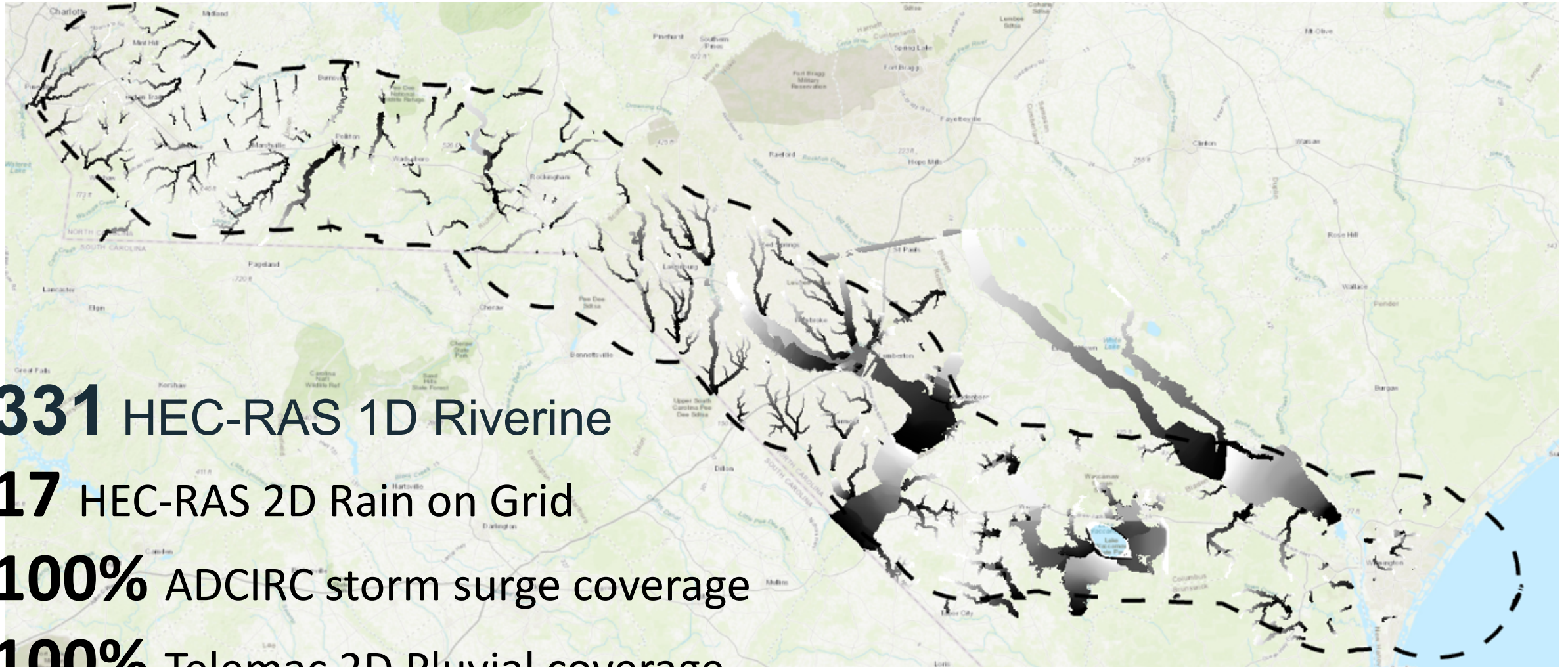
Findings: Sea Level Rise

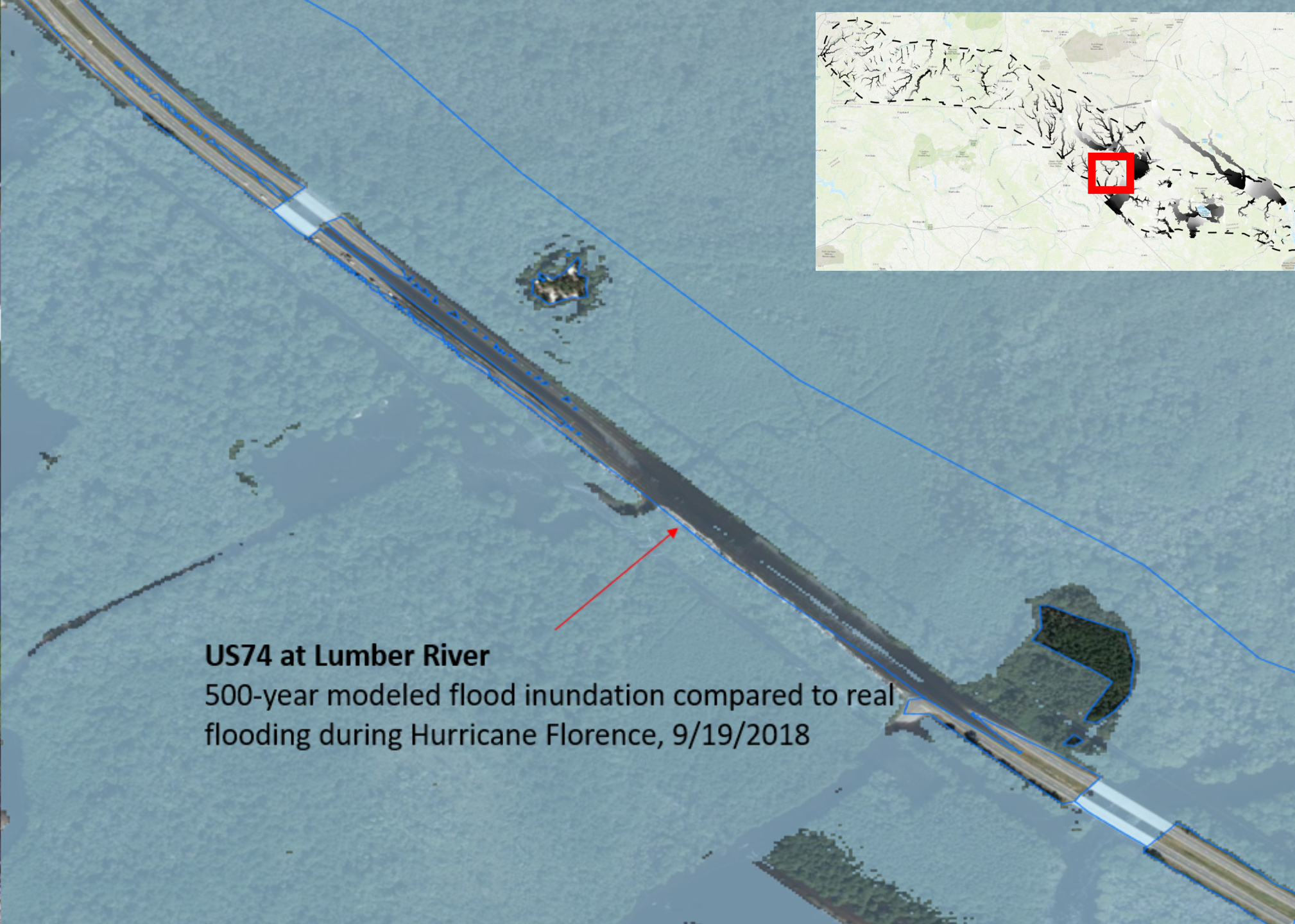
Sea Level Projection using NOAA Intermediate Scenario, Wilmington NC



Modeling Innovations: Flood Modeling

331 HEC-RAS 1D Riverine
17 HEC-RAS 2D Rain on Grid
100% ADCIRC storm surge coverage
100% Telemac 2D Pluvial coverage



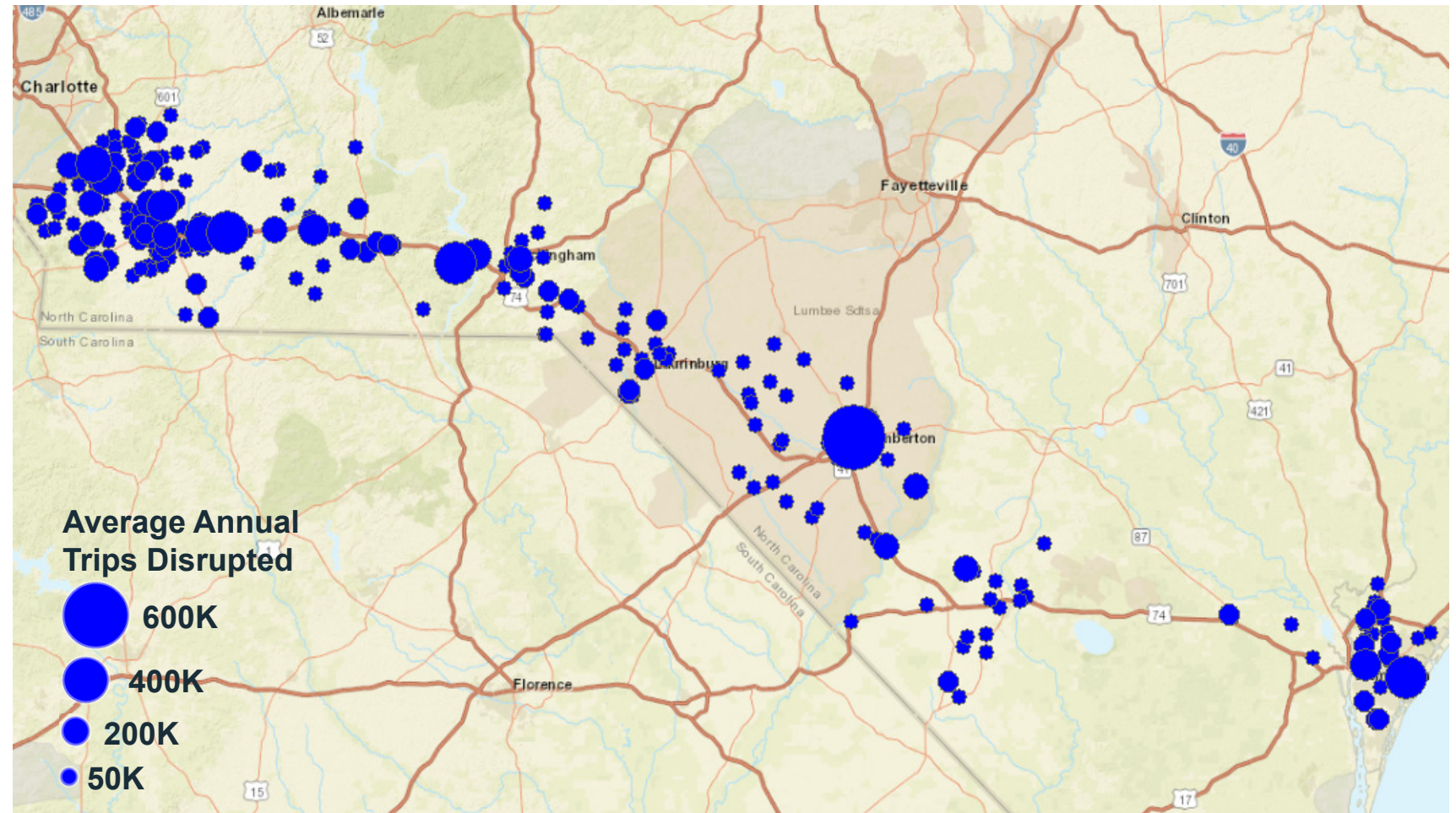


US74 at Lumber River

500-year modeled flood inundation compared to real flooding during Hurricane Florence, 9/19/2018

Findings: Impacts to Corridor Users

- US74 has several flood-vulnerable locations.
- Focused in Charlotte suburbs and exurbs, Wilmington, I-95.
- Highest vulnerability is in the road network connecting to US74.

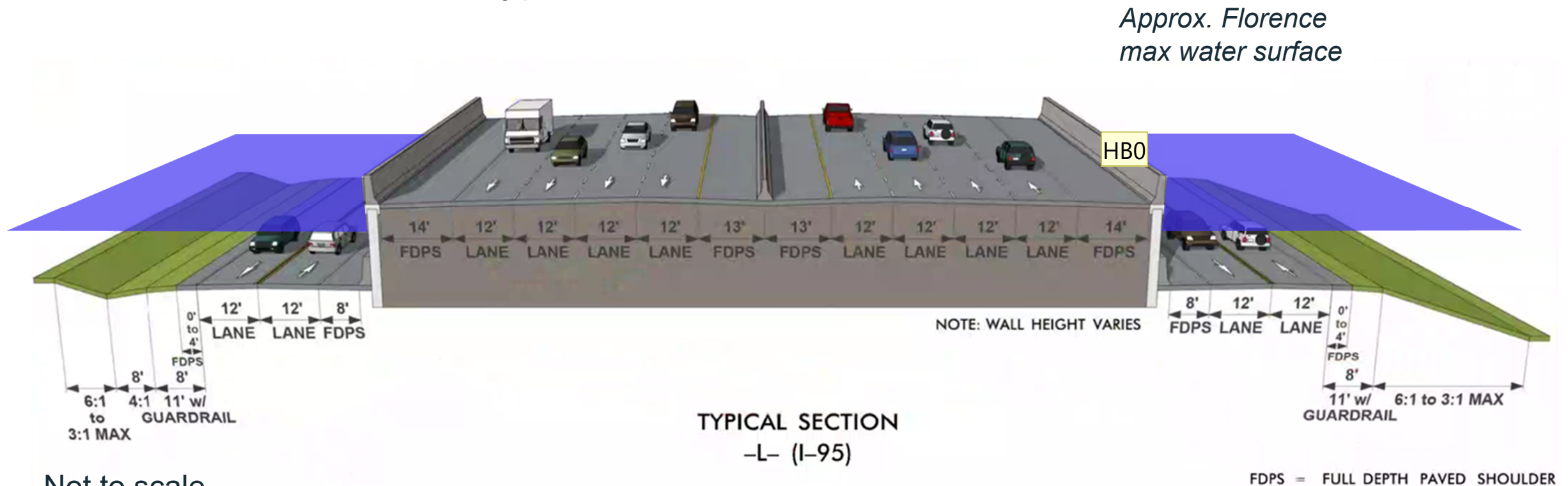


Slide 21

- ZLA0** [@Hefner, Ben] - Do the dots represent the Average Annual Trips Disrupted? I'd like to try to spell out that acronym. Thx.
Zuzak, Lara A, 2024-05-30T19:09:52.087
- HB0 0** Is what is written above the legend acceptable? This will be discussed verbally during the presentation.
Hefner, Ben, 2024-05-31T21:22:52.550
- ZLA0 1** I would recommend we ask [@White, Holly] to update the legend and spell it out completely. Thx.
Zuzak, Lara A, 2024-06-03T13:03:25.225
- HB0 2** If she is able to do that, sounds good to me
Hefner, Ben, 2024-06-03T14:12:12.343

Findings: I-95 is prone to flood disruption

- Planned work on I-95 will elevate the deck above Hurricane Florence and Matthew Flood Levels – typical section.



Not to scale

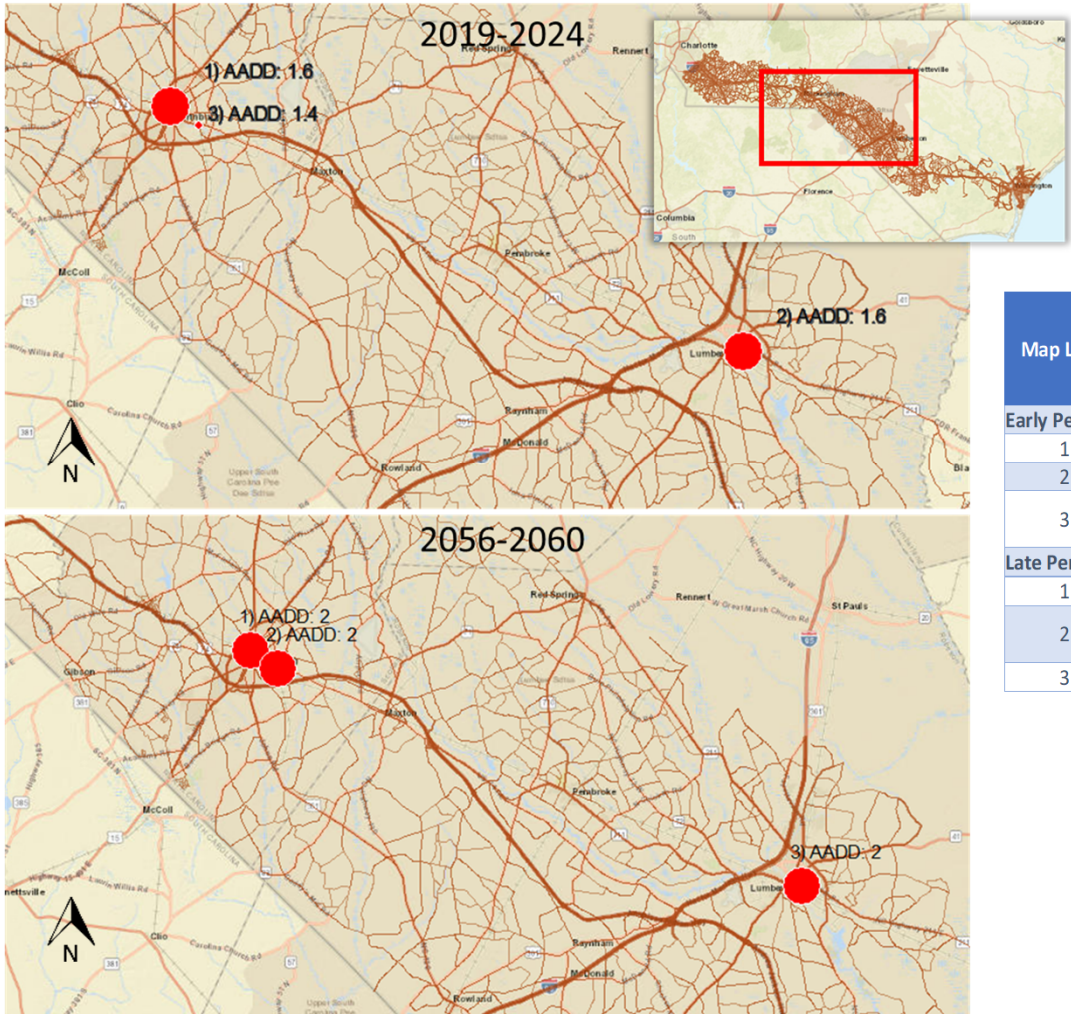
HB0 **Make water semi transparent**
Hefner, Ben, 2024-06-11T13:52:53.712

HB0 0 **Resolved**
Hefner, Ben, 2024-06-11T15:07:59.767

Findings: Rail crossings are generally resilient

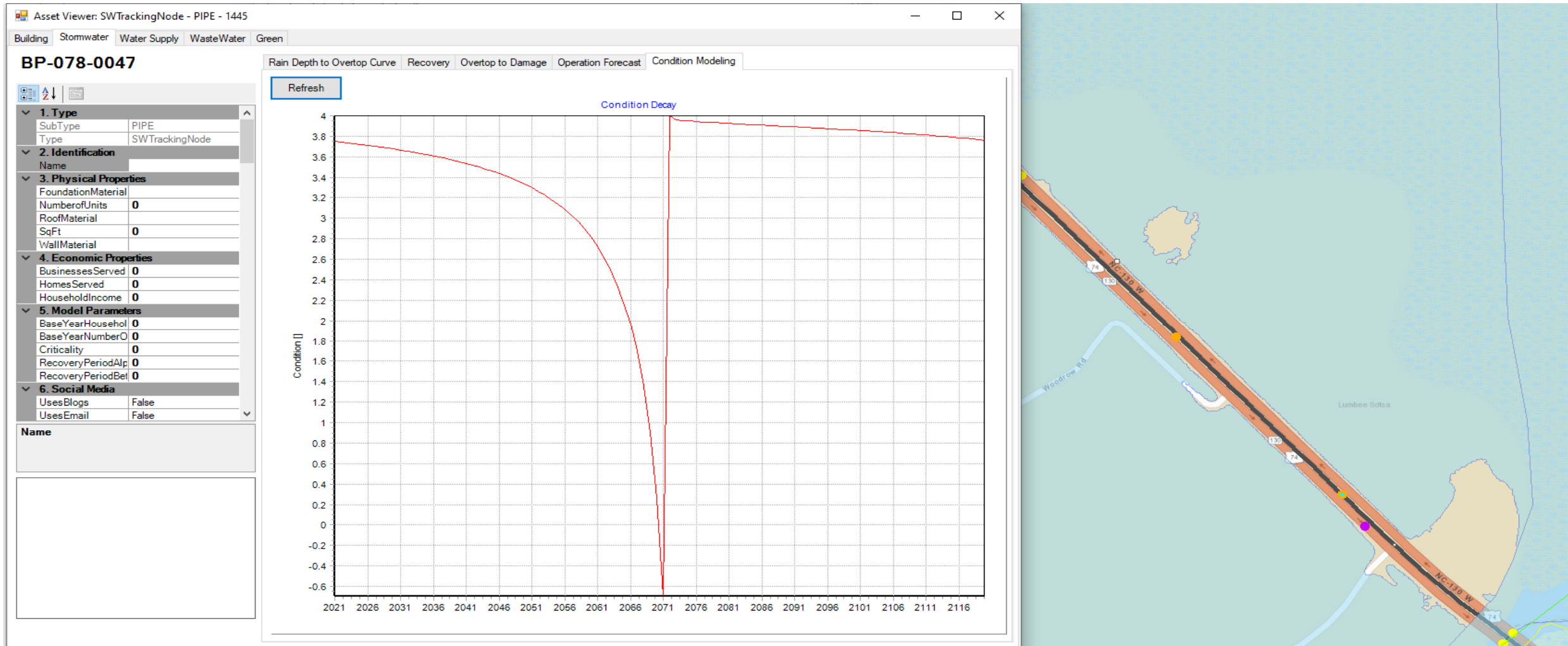
Average Annual Days Disrupted at Rail Crossings

- Inventory of flood models projected that only three out of the 528 rail crossings in the corridor will potentially be impacted by flooding, and this flooding occurred with very large storms.



Map Label	CitySimID	Type	SourceID	Street	Days Disrupted (Avg Annual 2019-2024)	Longest Period Disrupted (days)
Early Period (2019-2024)						
1	4303	RailCrossing	852657F	N Gill St	1.6	5
2	4655	RailCrossing	631438G	E 2nd St	1.6	5
3	4344	RailCrossing	852562X	Dixie Guano Rd	1.4	5
Late Period (2056-2060)						
1	4303	RailCrossing	852657F	N Gill St	2	5
2	4344	RailCrossing	852562X	Dixie Guano Rd	2	5
3	4655	RailCrossing	631438G	E 2nd St	2	5

Findings: Asset Lifecycle Cost Modeling

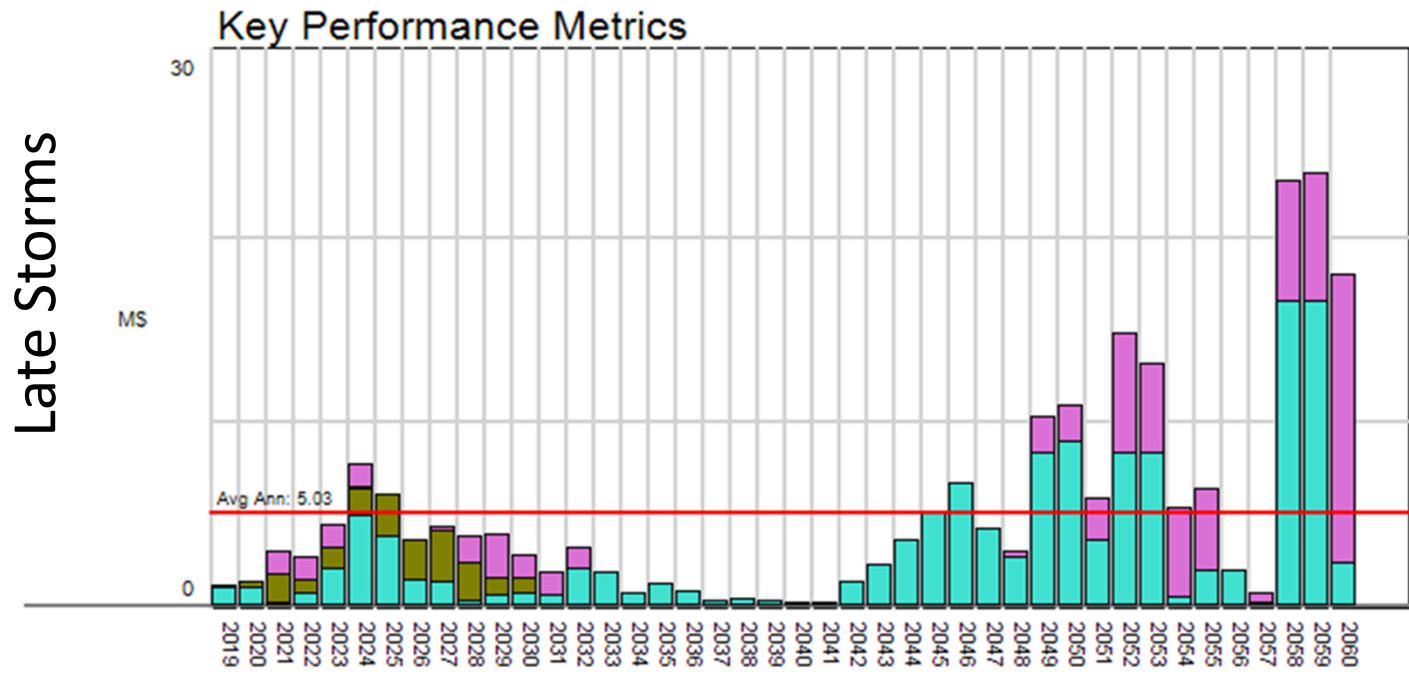
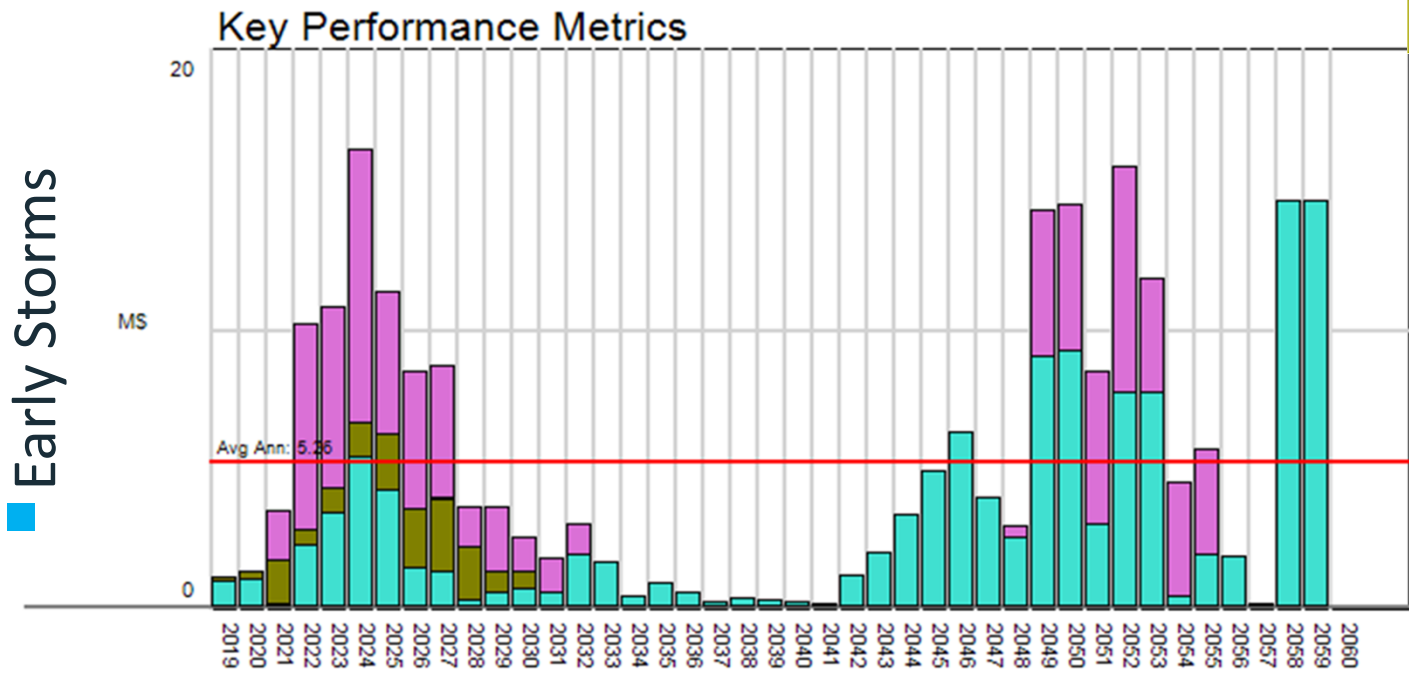


HBO

[@Hefner, Ben] Add version with description on graph, good, bad failing, etc.
Hefner, Ben, 2024-06-11T13:56:53.203

Findings: Increasing cost of storms

- Storm Repair Cost
- Master Planned Spending
- Modeled Maintenance



Slide 25

- EYNB0

What is the difference between the two graphs? It should be added to this slide.
Earle-Young, Nastasha B, 2022-11-17T13:54:01.402
- ZLA0 0

@Hefner, Ben

 - can you please address Natasha's earlier question? Also, for the legend, can you please provide some simplified names so Holly can generate a larger legend in the bottom left.
Zuzak, Lara A, 2024-05-30T19:12:09.413
- HB0 1

I will need to discuss this with @Bourne, Stephen F] he generated this graphic for the deliverable on US-74
Hefner, Ben, 2024-05-31T21:19:14.052
- ZLA0 2

OK thx.
Zuzak, Lara A, 2024-06-03T13:04:13.596
- HB1

@White, Holly

 can we update the legends here as well? Blue is "Storm Repair Cost", Red is (Master Planned Spending", and Grey is (Modeled Maintenance).
Hefner, Ben, 2024-06-06T15:23:32.049
- WH1 0

@Hefner, Ben

 See updated key in the left hand corner
White, Holly, 2024-06-06T17:00:12.188
- HB1 1

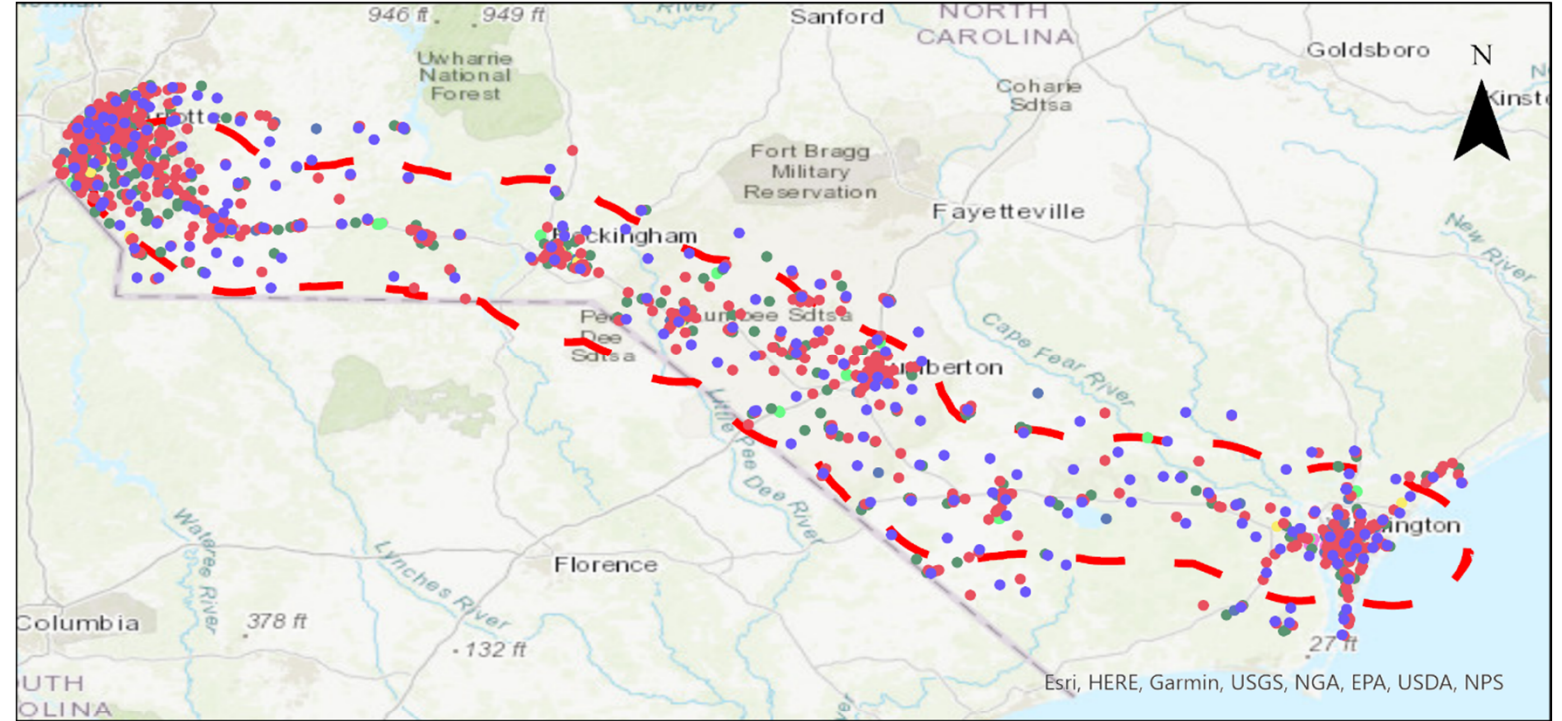
Looks good, can we hide the old key?
Hefner, Ben, 2024-06-06T17:01:39.032
- WH1 2

@Hefner, Ben

 Done!
White, Holly, 2024-06-06T19:56:58.291

Findings: Some critical facilities were in low accessibility locations

- Emergency Shelter
- Fire Station
- Gas Station
- Hospital
- Law Enforcement
- NCDOT Building
- NCDOT Land



Critical Facility Type

- Emergency Shelter
- Fire Station
- GeoStation
- Hospital
- Law Enforcement
- NCDOT Building
- NCDOT Land
- <all other values>

*All facilities within analysis domain + 300ft buffer assessed

Slide 26

- ZLA0

A larger legend would be helpful. [Hefner, Ben] - is the <all other values> needed in the legend? Thx.

Zuzak, Lara A, 2024-05-30T19:13:02.621
- HB0 0

This is a recycled graphic from another presentation. Can we just edit the jpeg? maybe just format a new legend? Or leave as is? [Bourne, Stephen F] may have the original graphic

Hefner, Ben, 2024-05-31T21:18:19.986
- ZLA0 1

[Hefner, Ben] - I think [White, Holly] can generate a better legend for you and put that over the current legend. Do we need to change the <all other values> to Other? Thx.

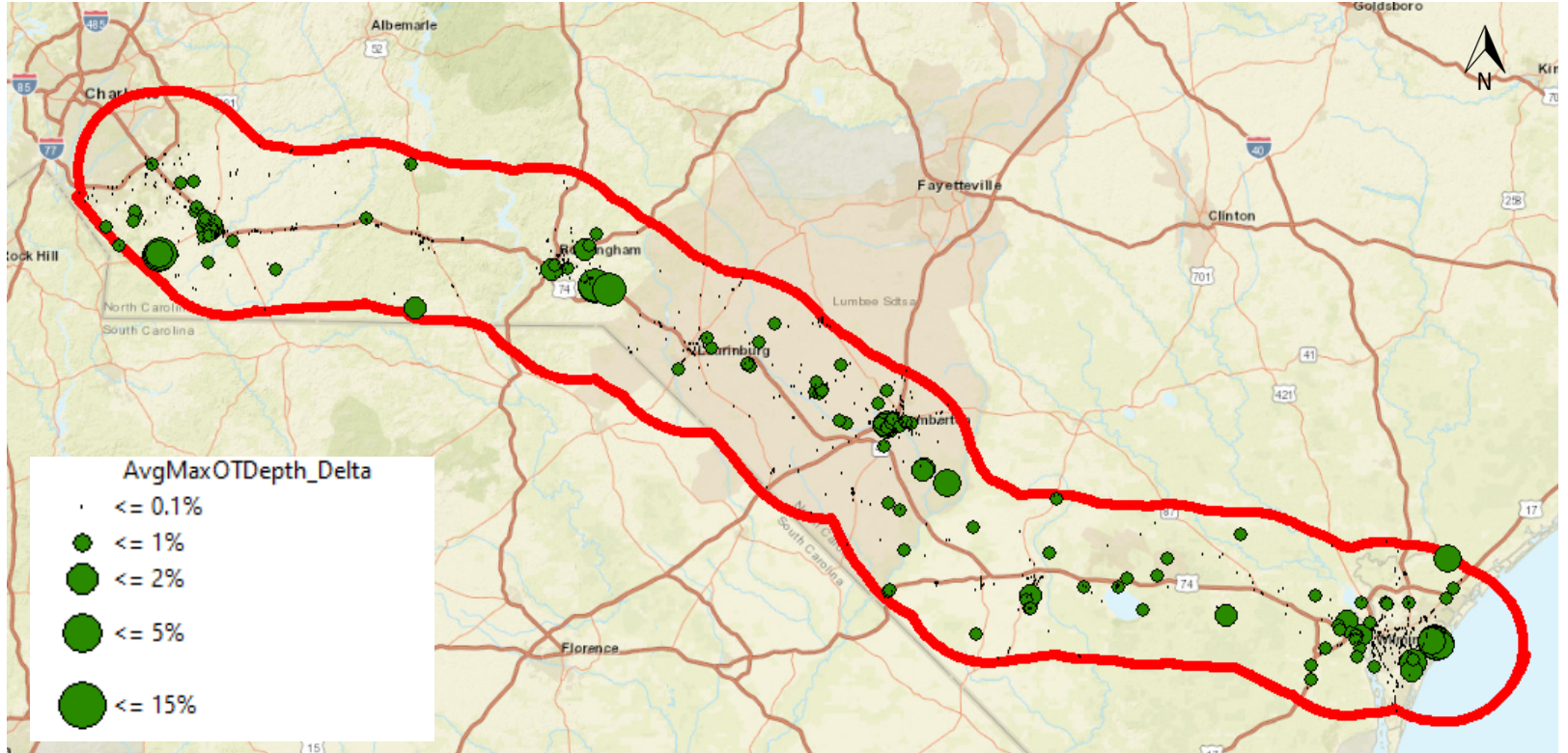
Zuzak, Lara A, 2024-06-03T13:05:06.121
- HB0 2

Yes, I think that makes good sense

Hefner, Ben, 2024-06-03T14:09:36.120

BSF0

- Already challenged by limited accessibility, some critical facilities are expected to face increasingly limited access with future climate change.



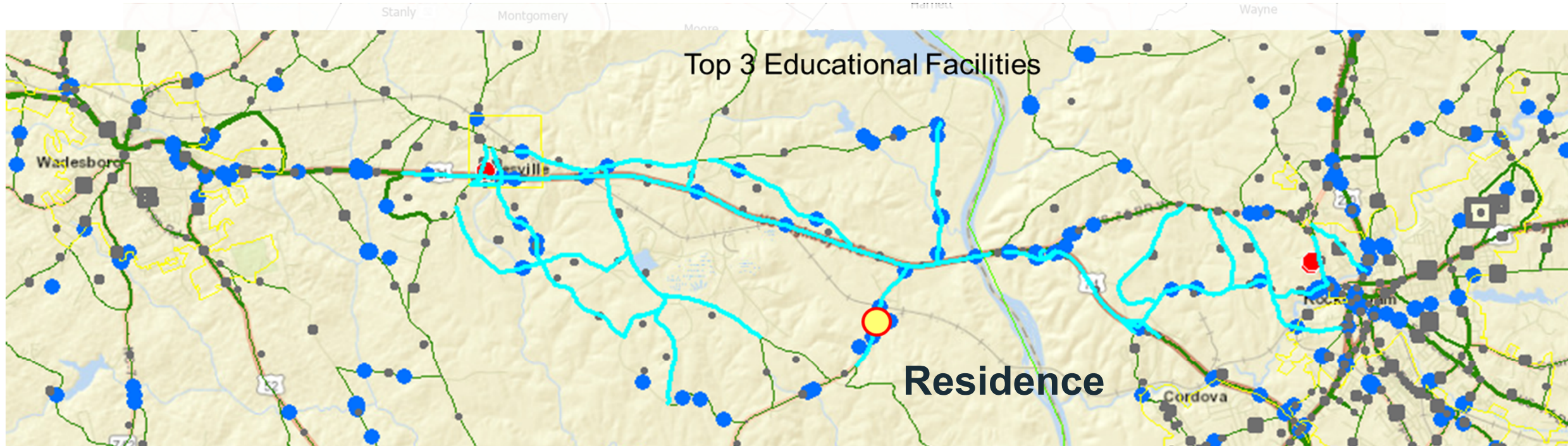
Slide 27

BSF0

Producing map of growth in inaccessibility with climate change. Will be added this pm.

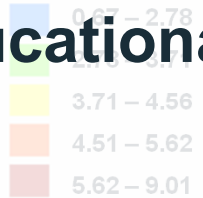
Bourne, Stephen F, 2022-11-16T14:21:18.193

Findings: Disadvantaged Population Impact



Educational, Medical, Gas Station, Grocery Store, Restaurant, Bank

Sustenance Inaccessibility Index



Slide 28

- HB0**

[@White, Holly] Can you do anything on this legend to use less digits?

Hefner, Ben, 2024-06-06T17:29:00.291
- WHO 0**

[@Hefner, Ben] The legend behind the photo? Do we want to bring it forward? How do we want this slide to present?

White, Holly, 2024-06-10T14:19:30.345
- HB0 1**

Yes the legend behind the photo. This foreground image pops up after I discuss the image behind. No need to bring the legend through to the foreground image

Hefner, Ben, 2024-06-10T14:34:20.322

Adaptation and Mitigation



Adaptation and Mitigation Scenarios

Base Run

- Ground-truthed Maintenance
- Current Plans (2020-2030)
- No Adaptation
- No Mitigation

Resilience-focus

- Same as Base Run
- Add resilience actions at each opportunity (resiliency focused spending)
- Elevate Bridges/Culverts to 2020 500-year WSEL
- Harden Rail Crossings
- Increase Route Redundancy

Timing

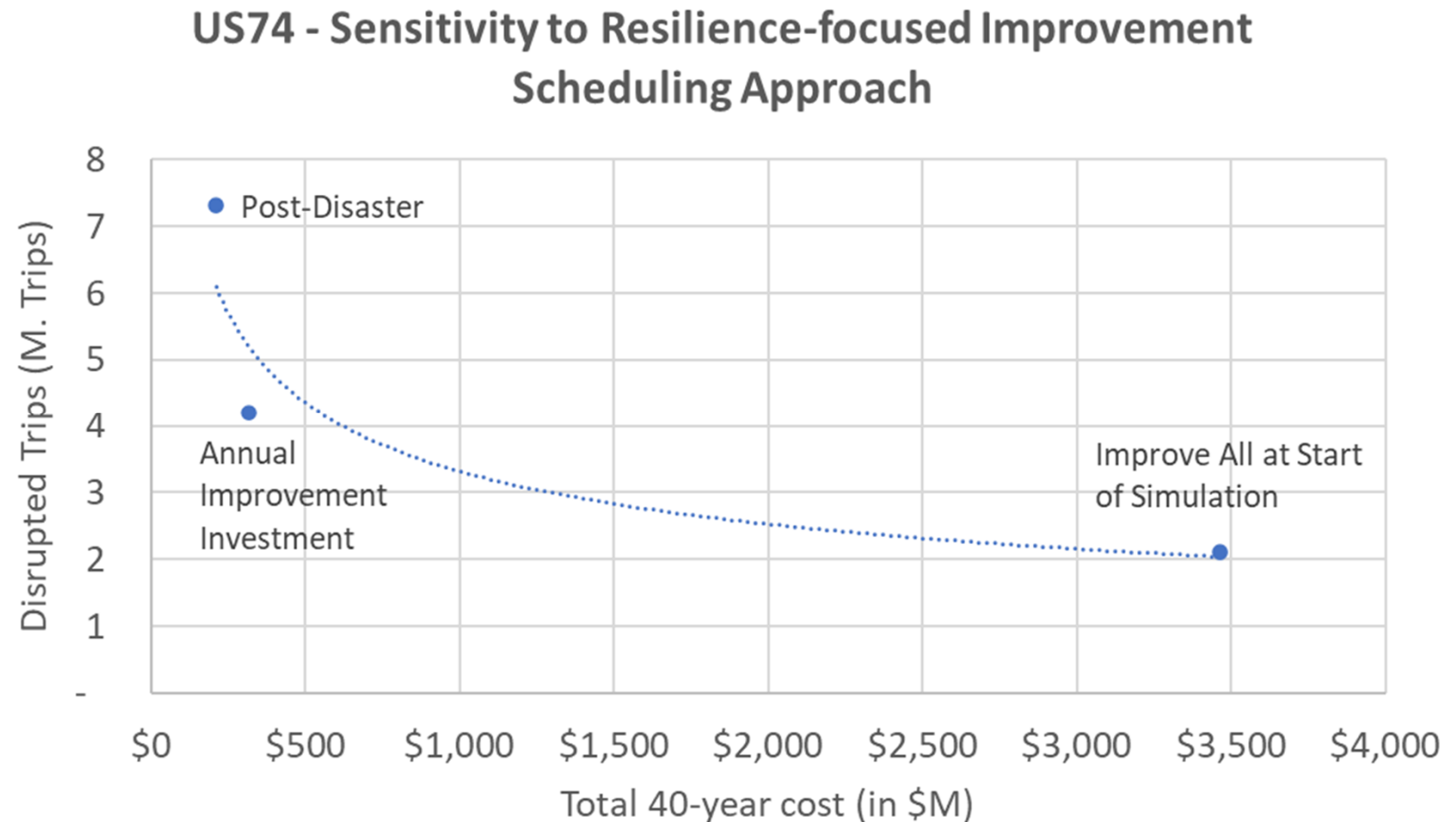
- All at start
- Annual Steady Improvement
- Post-Disaster

Highest ROI

- Limitless Spend
- Current Spend + 10%
- Current Spend + 25%

Results – Varying Schedule of Improvements

- All at start gives highest reduction in disruption but unattainable cost.
- Post-disaster has highest disruption.
- Annual improvement is proactive, resulting in substantial reduction in disruption with moderate increase in cost.



Slide 31

HB0 **[@White, Holly] Bigger text?**
Hefner, Ben, 2024-06-11T14:17:39.345

HB0 0 **on graph**
Hefner, Ben, 2024-06-11T14:17:46.970

US-74 Closing

U.S.74 comprehensive and wholistic study

Leveraged new resilience concepts and integrated data to provide novel insight

Supported recent PROTECT grant and NCDOT statewide resilience plan

Keep people moving following extreme weather events.

Provides a template for corridor-wide resilience studies in the future

Including the I-87 study currently underway.

US-74 Closing

AtkinsRéalis continues to innovate

New City Simulator Online is in rich prototype and is beginning to roll out on real projects

Many improvements

Historical storm under new climate simulations, enhanced redundancy tracking, ROI-based adaptation and mitigation metrics, many more.

Continued focus in North Carolina

Currently conducting a river-basin scale assessment of the Tar-Pamlico to stress-test City Simulator online; 40+ communities, AI-based community sentiment research, full transportation system, flood, drought, heat wave.

Implementation in the Atlanta Area



Atlanta Regional Commission Studies

Sandy Springs

Team: ARC, Sandy Springs Govt., Atkins
*Focus on stormwater control with
Stormwater parks, permeable pavers*

Sweetwater Creek

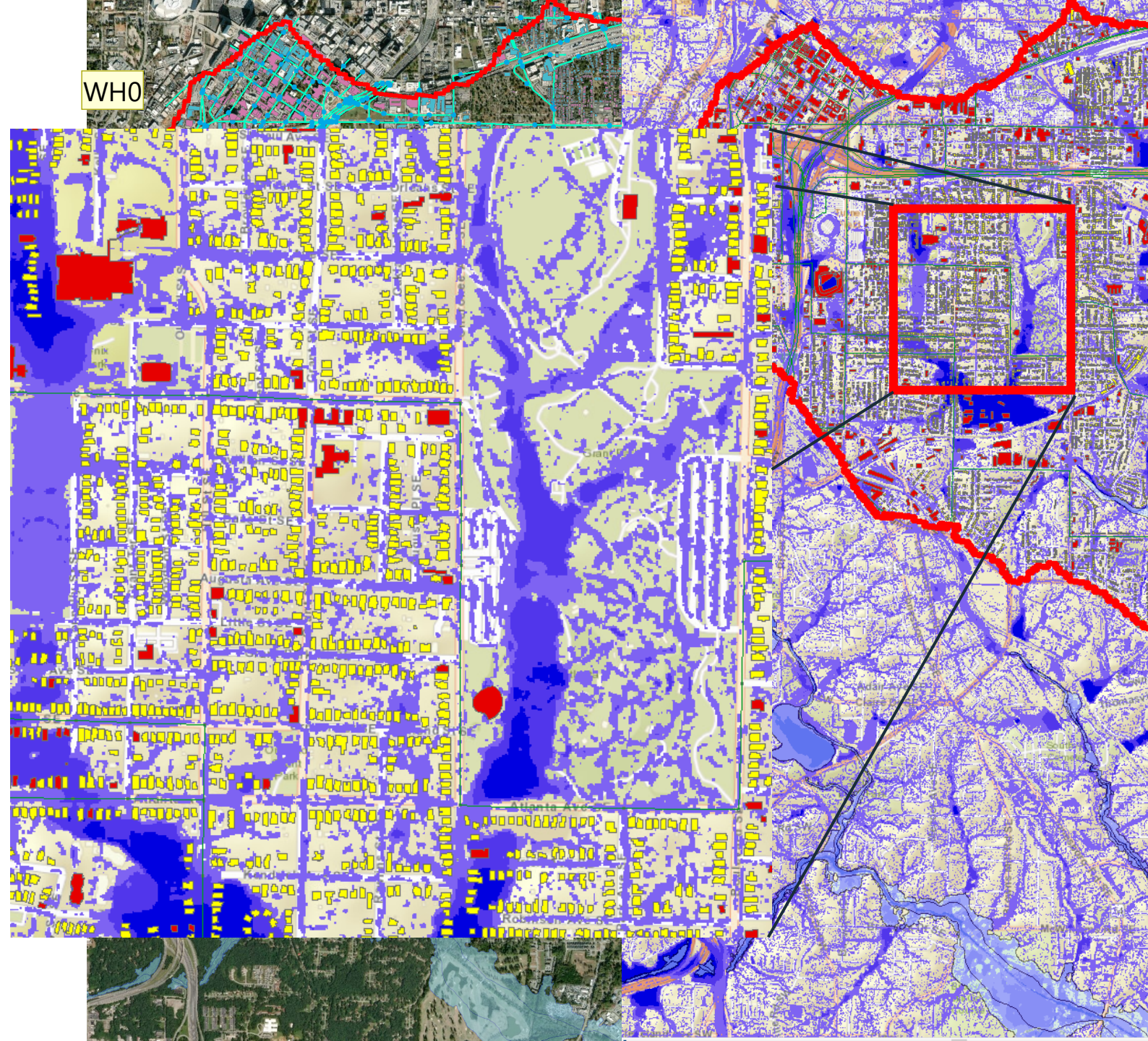
Team: ARC, Gwinnett County Govt., Atkins
*Joint exercise to test City Simulator in the
Atlanta Region*

Intrenchment Creek

Team: ARC, Atkins
*Initial City Simulator pilot project
under FHWA-funded durability study*

Pilot Area Flood Models

- NFHL – available from FEMA Map Service Center
- ~ 50 at-risk households in NFHL
- Pluvial Model from AtkinsRéalis
- Many more at-risk in Pluvial Floodplain
- Limitation to modeling caused by lack of stormwater control system data.



Slide 36

WHO

Do we want both images on this slide? If so, they will need to be resized. If we want to represent them at the size they are currently, we will need to add a slide
White, Holly, 2024-06-04T19:53:38.067

ZA0 0

I believe the answer is less but we should also draw a stronger border about the inset. Thx.
Zuzak, Lara A, 2024-06-04T20:30:01.280

ZA0 1

The inset is the picture to the left. Thx.
Zuzak, Lara A, 2024-06-04T20:30:39.172

WHO 2

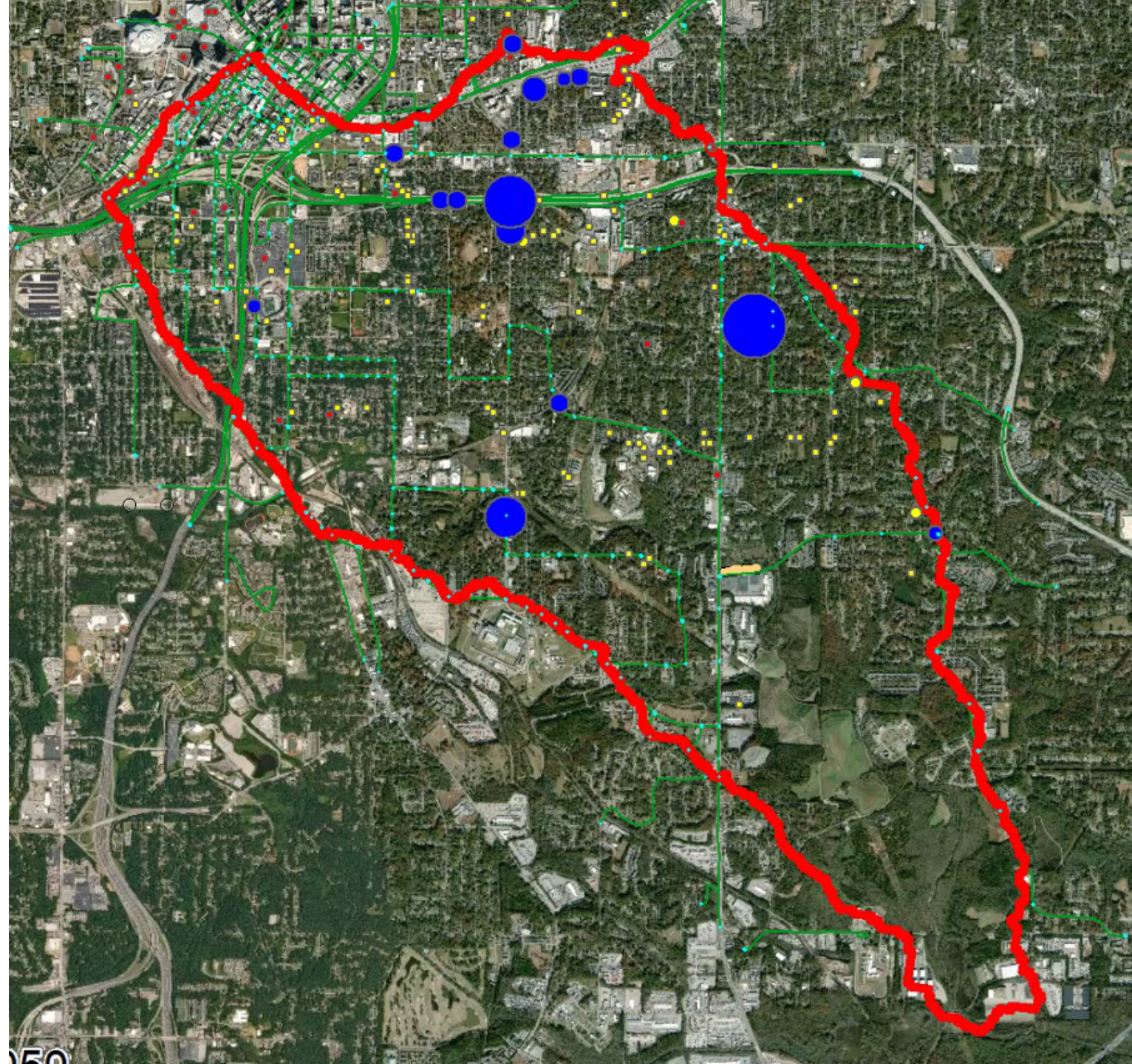
[@Hefner, Ben] Please clarify which images we want on this page and how we want to present them, thank you!
White, Holly, 2024-06-10T14:18:11.090

HB0 3

I think we keep the size, and make it more clear that the left image is a zoom in on the square in the right image. Perhaps some lines tangent to both squares?
Hefner, Ben, 2024-06-10T14:32:41.897

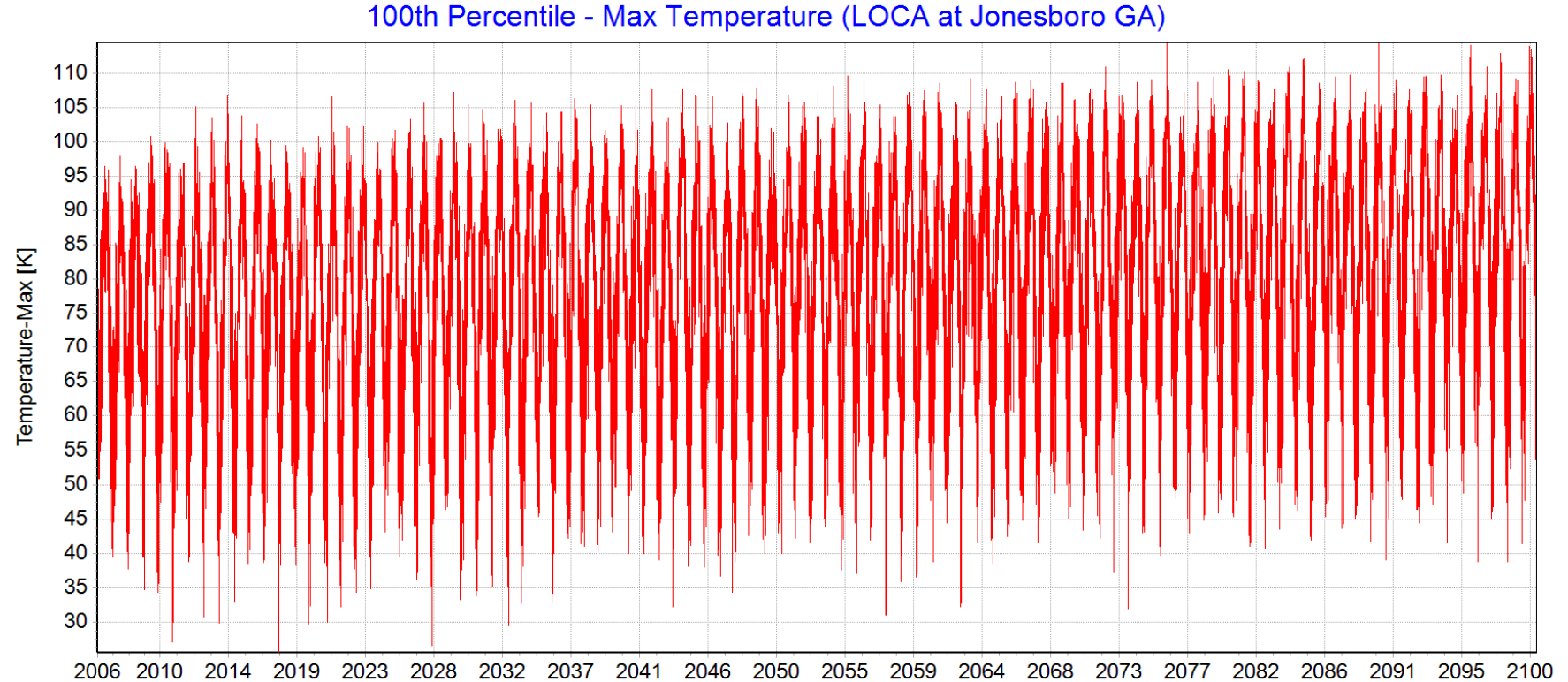
Pilot Area Stormwater Hotspots

- Culvert/Bridges sized by level of future disruption.
- Largest disruptors results in 15K disrupted trips per year on average.
- Results are potentially over-estimating given detailed stormwater control system is not modeled.

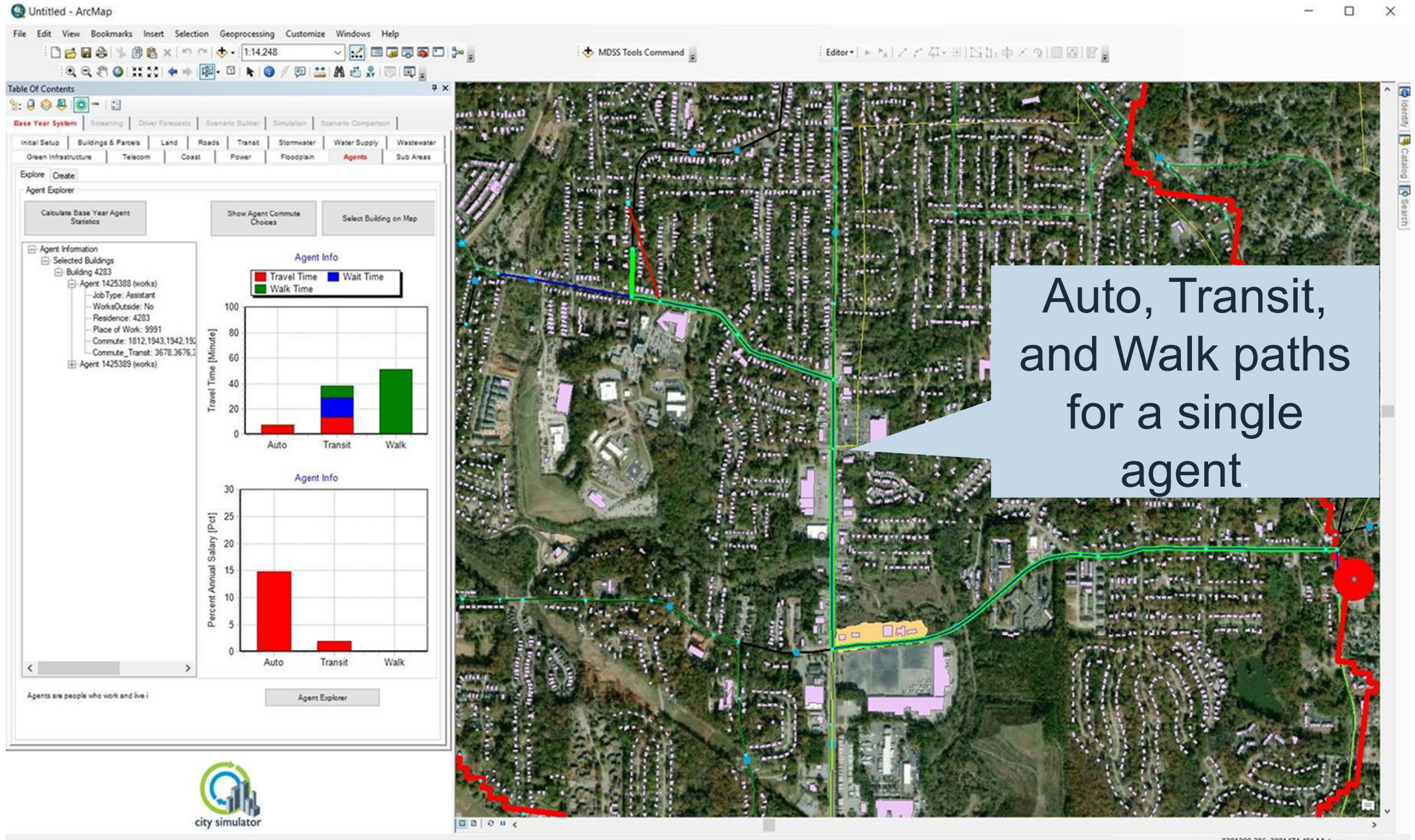


Heat Impacts

- Global Climate Model Projections for the area generally forecast upward trend.
- Summer-time temperatures maximums increasing ~ 10F by 2100

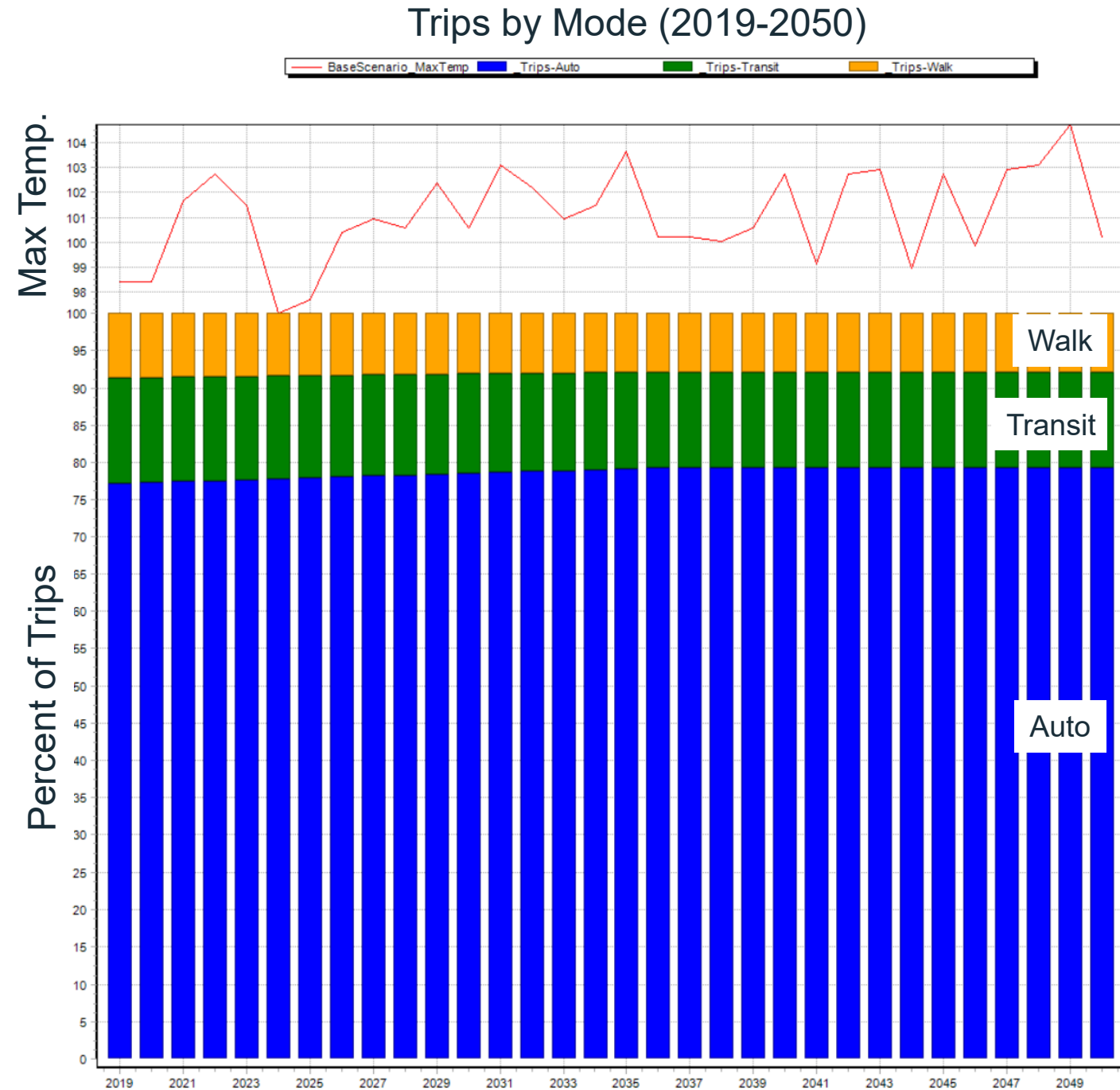


Heat Impact on Getting to Work



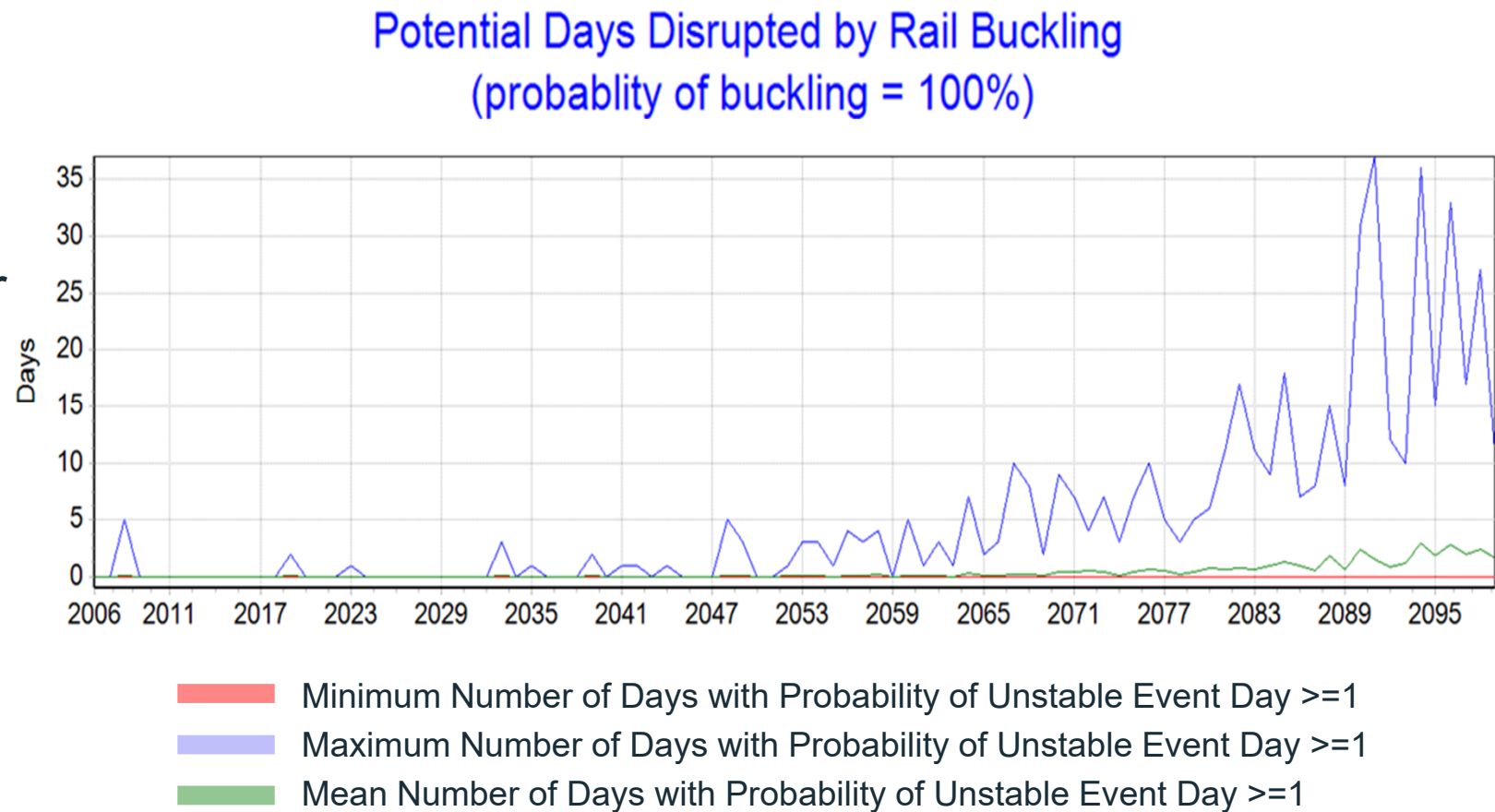
Heat Impact on Getting to Work

- Increasing heat makes agents weigh mode choice.
- Tradeoff of percent of salary spent vs. travel time.
- Additional heat during exposure times (walk, bus stop weight time) increases probability of taking auto.
- Show shift to Auto over simulation time frame.



Pilot Area Heat Impact on Rail

- At 108F, rail expands to the point where it starts to be unstable and susceptible to buckling.
- Causes delays in commuter and freight rail systems (trains have to run slower).
- Potential Days impacted worst case is ~ 35 days.
- Next step is to translate to number of commuters, and volume of freight impacted.



Slide 41

- HB0**

[@White, Holly] can you work your magic on this legend as well?

Hefner, Ben, 2024-06-06T17:40:03.608
- WH0 0**

[@Hefner, Ben] Do you want me to recreate or remove completely?

White, Holly, 2024-06-06T19:58:36.435
- HB0 1**

I think this one needs to be recreated

Hefner, Ben, 2024-06-06T20:03:20.084

Armory Commission of Alabama - Readiness Center Master Plan



Slide 42

- ZLA0

If we didn't commit to covering the AL project example in our abstract, perhaps it's removed to streamline the presentation? [@Hefner, Ben]
Zuzak, Lara A, 2024-05-30T19:15:18.162
- HB0 0

In general I agree, but we did mention the National Guard work that we are doing. This is the only content we have that touches on that
Hefner, Ben, 2024-05-31T21:15:31.772
- ZA0 1

OK understood
Zuzak, Lara A, 2024-05-31T21:22:22.638

Simulate Future Events to Quantify Risk at Multiple Potential Sites

1. Identify potential sites

- Existing Armed Forces Site
- Potential Future Sites

2. Identify Site-to-Landscape Connection

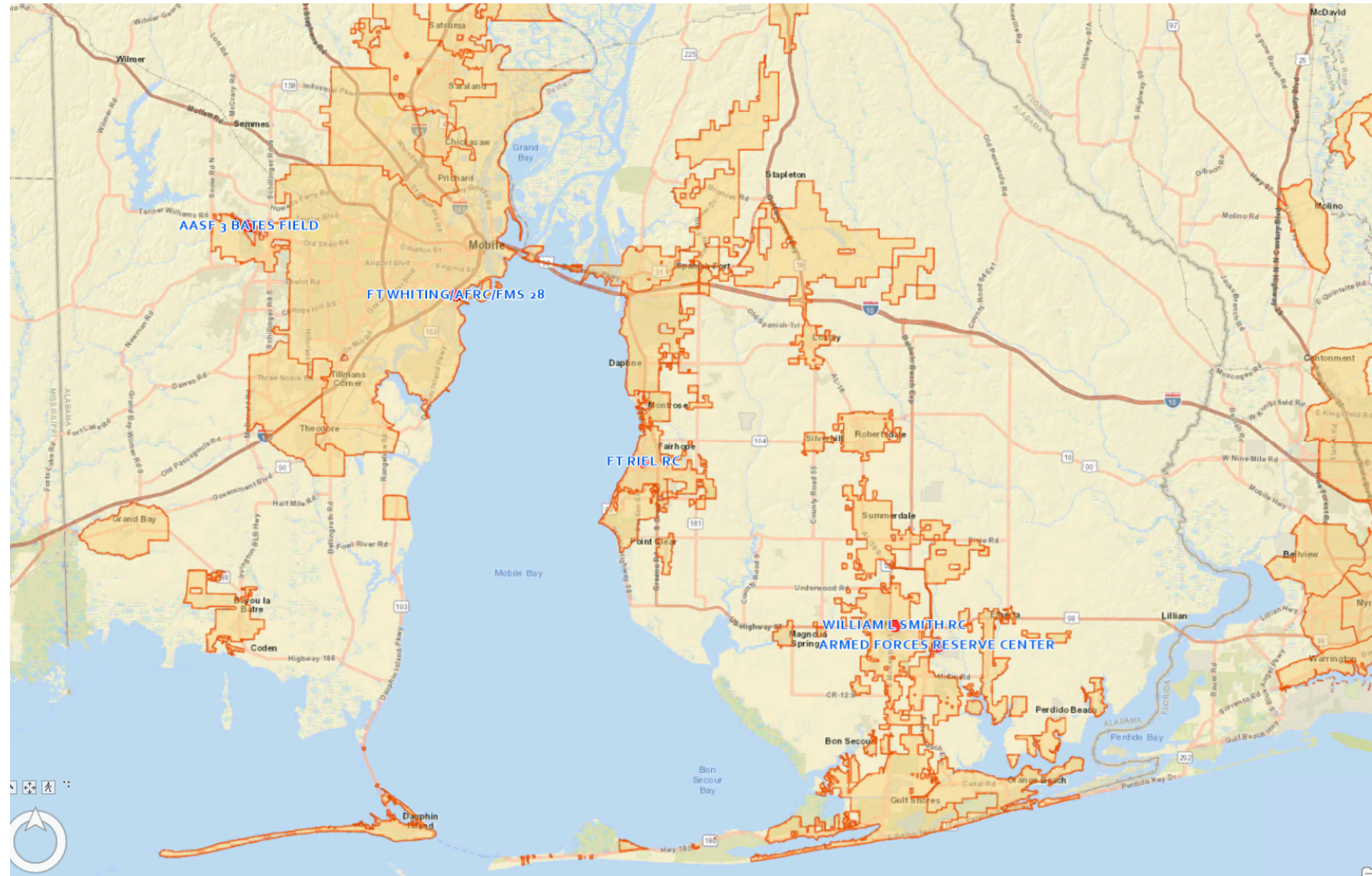
- Supporting Community Population, Buildings, and Infrastructure
- Ingress-Egress Routes
- Aid Routes

3. Evaluate Multi-Hazard Risks

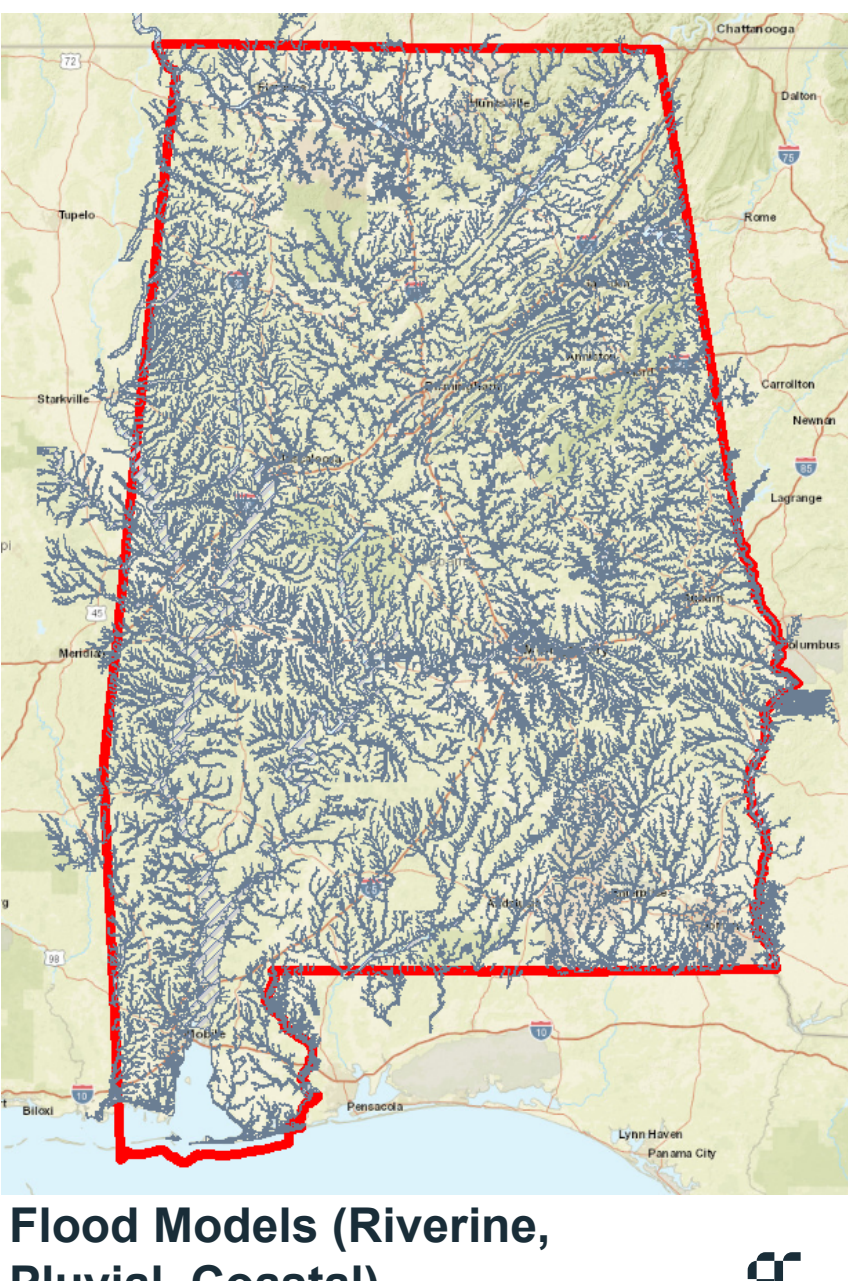
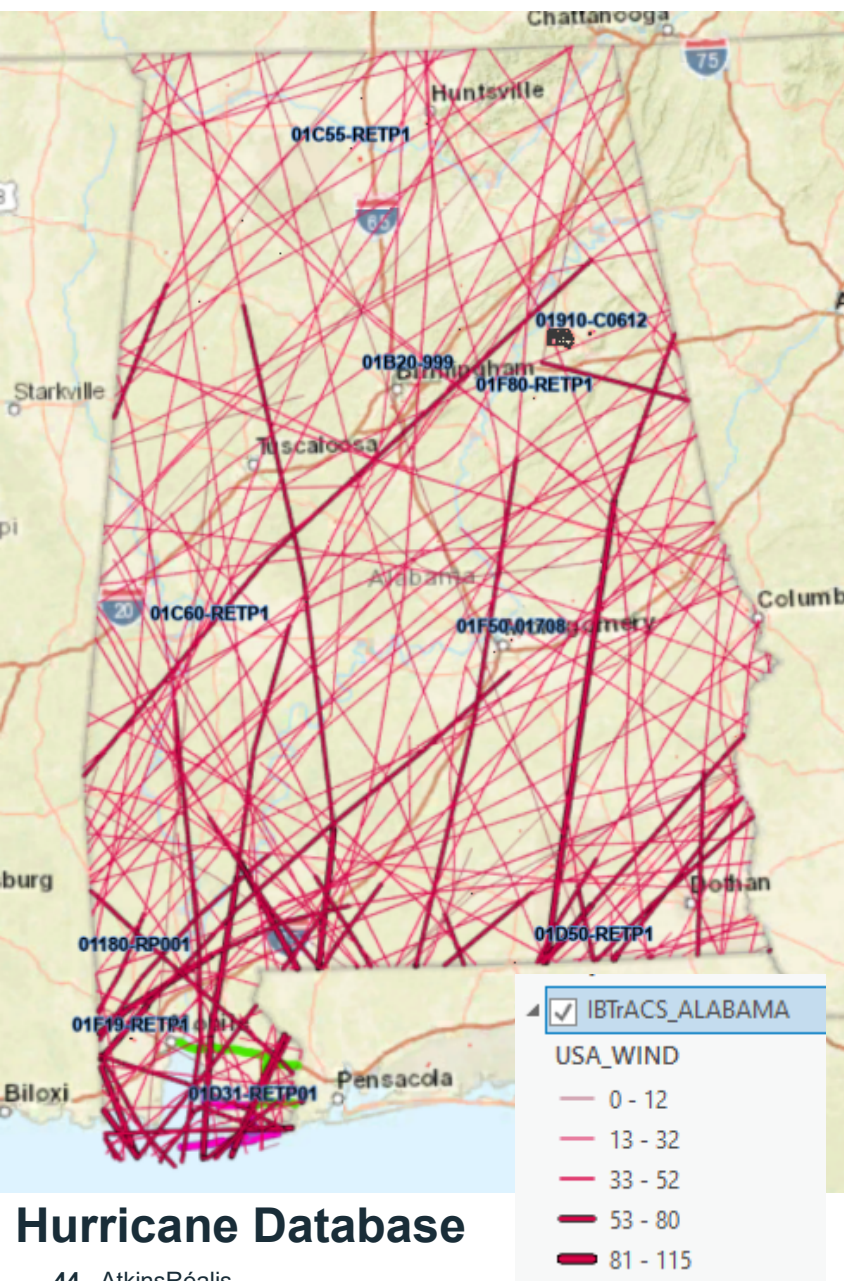
- Site itself
- Ingress-Egress Routes
- Aid Routes

4. Simulation of Multi-Hazard Exposure

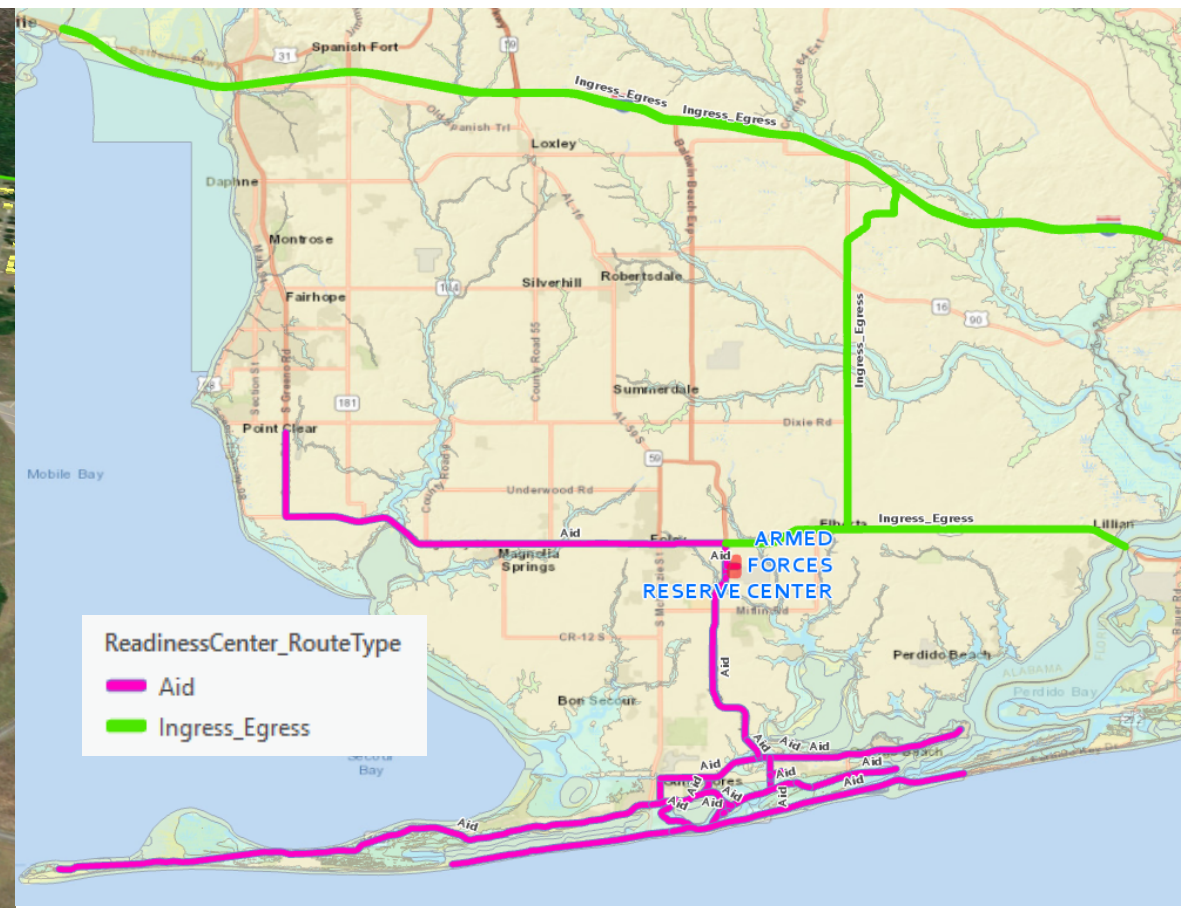
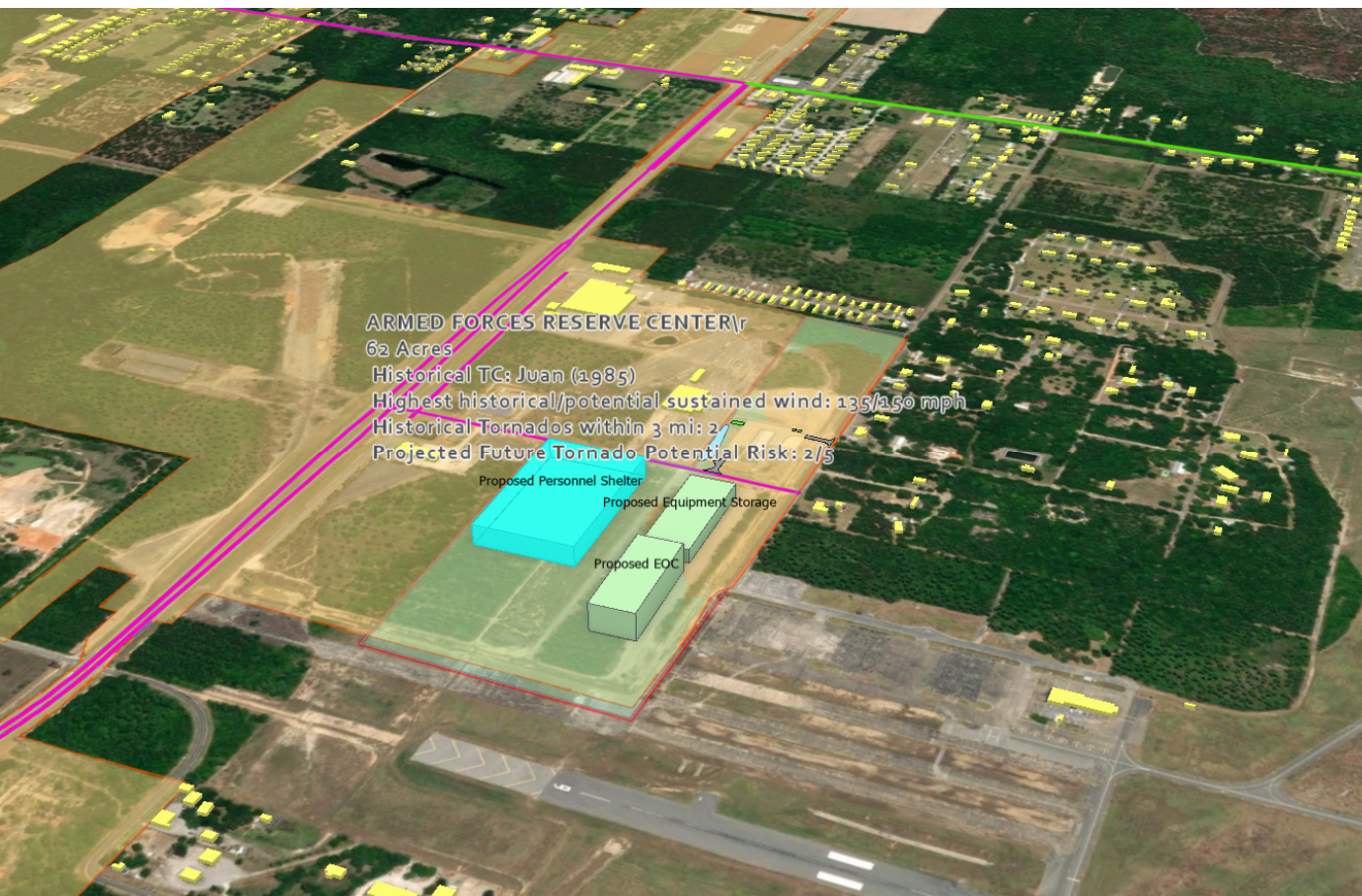
- 2020-2100
- Simulate year-by-year population growth around sites
- Simulate realistic future climate impacts
 - Driven by global climate model-based temperature, rain, wind projection
 - Realistic virtual events with joint hazards
 - E.g. – land-falling hurricane with surge, high wind, and tornado.
 - Hazards included:
 - Flood (riverine, pluvial, storm surge)
 - Wind
 - Tornado
 - Ice Storm



Inputs: Historical + Climate Change Influenced Future Hazard Data



Deep Dive on Selected Site and Evaluate Multi-Hazard Risk



ARMED FORCES RESERVED CENTER

62 Acres

Historical TC: Juan (1985)

Highest historical/potential sustained wind: 135/150 mph

Historical Tornadoes within 3 mi: 2

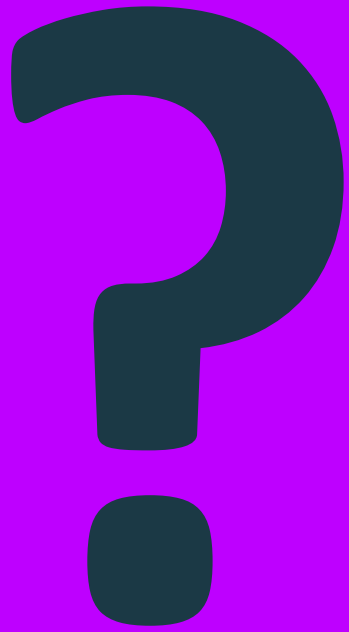
Projected Future Tornado Potential Risk: 2/5

Slide 45

HBO

Add text from graphic in black at bottom.

Hefner, Ben, 2024-06-11T14:37:24.595



Questions?

Contact

Scott Tezak, PE – Scott.Tezak@atkinsrealis.com

Stephen Bourne, PE – Stephen.Bourne@atkinsrealis.com

Ben Hefner, PE – Ben.Hefner@atkinsrealis.com

Slide 46

- HB0** **[@White, Holly]** Want to merge this slide with the questions slide. Bright color to attract attention, include branding and contact information.
Hefner, Ben, 2024-06-06T14:08:32.986
- WH0 0** **[@Hefner, Ben]** Let me know your thoughts on the next slide - Do we want to remove the "thank you" graphic?
White, Holly, 2024-06-06T16:38:12.220
- HB0 1** **We** can take or leave it. **Whatever** you think looks best. We definitely want something to prompt questions though.
Hefner, Ben, 2024-06-06T16:54:51.010
- WH0 2** **[@Hefner, Ben]** See next slide - Focuses more on questions
White, Holly, 2024-06-06T17:22:31.459
- HB0 3** **Honestly** I think we can just say "Questions?" Also I think Lara wanted the whole slide to be bright if that matches our color branding
Hefner, Ben, 2024-06-06T19:23:04.739
- WH0 4** **[@Hefner, Ben]** See updated slide
White, Holly, 2024-06-06T19:50:50.346
- HB0 5** **Looks good to me!**
Hefner, Ben, 2024-06-06T19:54:20.155

Findings: Coastal roads are predicted to be increasingly impacted by tidal overtopping

- Two segments of road were found to experience nuisance flooding in 2022.
- This was projected to increase to seven road segments by 2060.

Nuisance Flooding within 2ft of Overtopping



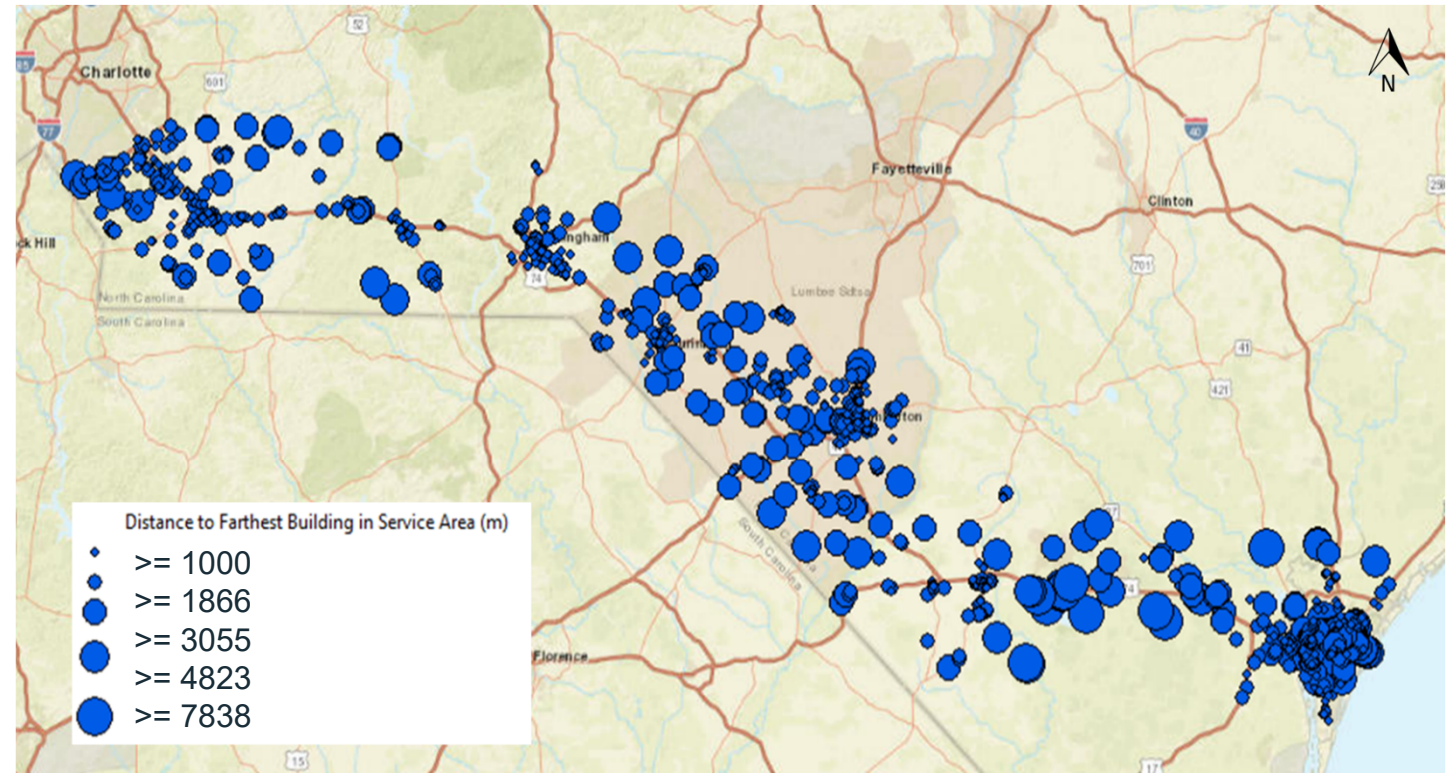
2019-2024



2056-2060

Findings: Some critical facilities were in low accessibility locations

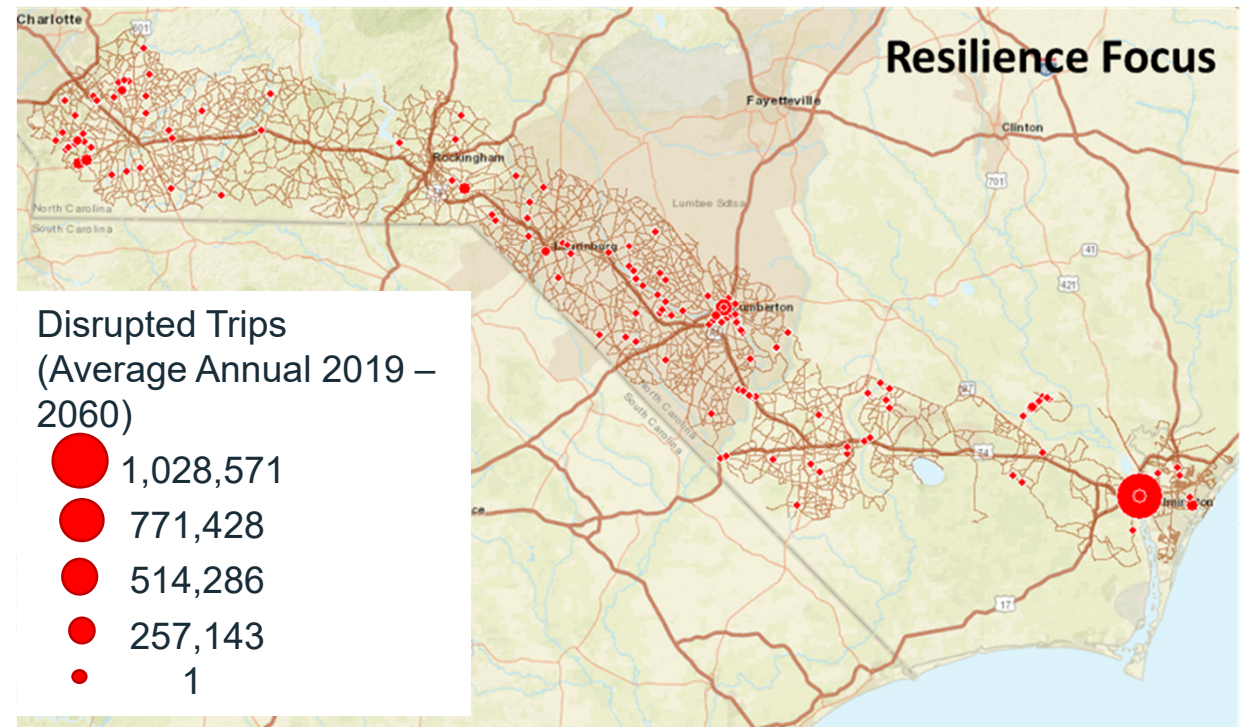
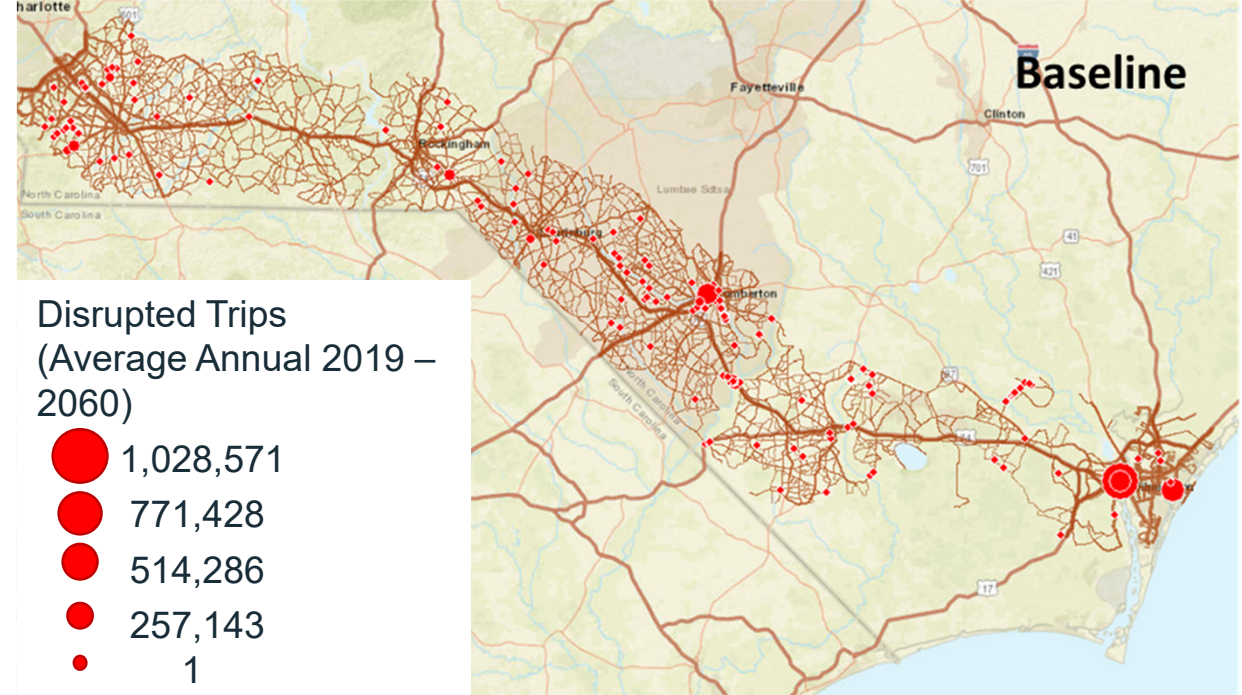
- Critical facilities ranged from highly accessible through redundant routes to having single-access flood-prone paths.
- Increasing redundancy of routes to the most inaccessible facilities and focusing on making them less flood prone will help in ensuring level of service.



0 15 30 60 Miles

Results

- See reduction in disruption in majority of corridor.
- Some locations (e.g. Wilmington) still see high flooding because:
 - Projected future storms are larger than new design standard.
 - Improvement happens after storms occur.



Slide 49

- ZLA0

Legends are lost on both figures.
Zuzak, Lara A, 2024-05-30T19:13:41.185
- HB0 0

Do not understand this comment? Legends can be found in bottom left of these figures. In either case, graphic will be discussed verbally to avoid confusion.
Hefner, Ben, 2024-05-31T21:16:37.807
- ZLA0 1

It's very difficult to read the legends. We can ask [@White, Holly] to make them larger. 😊
Zuzak, Lara A, 2024-06-03T13:05:35.508
- HB0 2

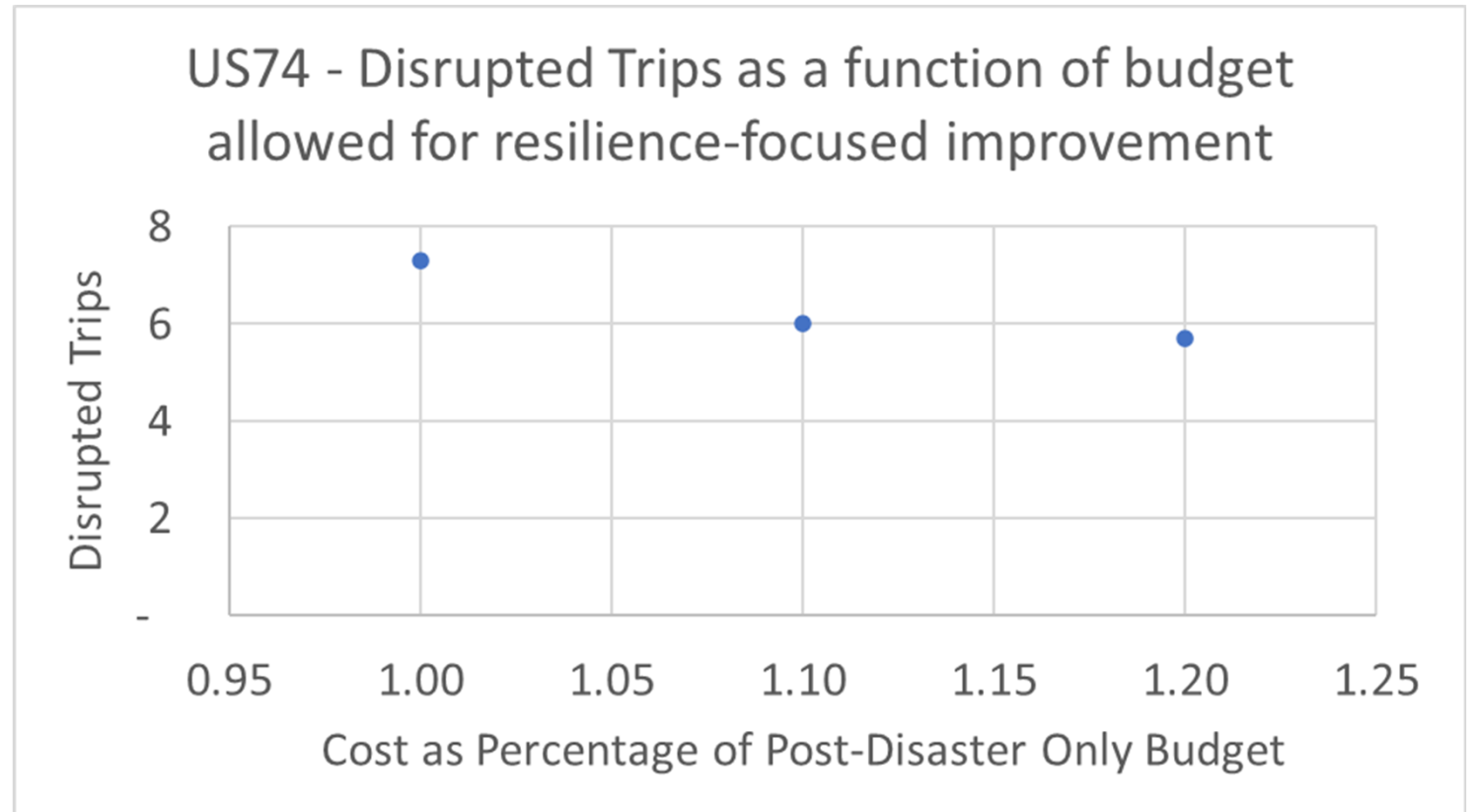
If we can, that would be good. The main point is just that larger circles mean higher values. So I will discuss this during the presentation anyway
Hefner, Ben, 2024-06-03T14:10:35.528
- WH0 3

[@Hefner, Ben] [@Zuzak, Lara A] Please let me know if you like the updated legends
White, Holly, 2024-06-04T20:15:18.904
- ZA0 4

Yes, can we please write out Average Annual
Zuzak, Lara A, 2024-06-04T20:29:18.901

Results – Varying Spending Controls

- Spending 20% more gives a 29% reduction in disrupted trips.
- Spending 10% more gives an 18% reduction in disrupted trips.
- Relationship is relatively linear.
- Decision for TAC and board.



Pilot Area

- Intrenchment Creek Watershed
- 12K Buildings
- 72K Agents
- 29K Households
- 40K Jobs
- \$6.7B real estate value
- I 75/85, I-20
- Moreland Ave, Boulevard

