

Roads to Nowhere in Four States: State and Local Governments in the Atlantic Southeast Facing Sea-Level Rise

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INTRODUCTION

Coastal communities are becoming increasingly aware of the risks to local infrastructure from more frequent and severe flooding, more extreme storm surges, and sea-level rise. As local governments are responsible for the lion's share of land use decision-making and infrastructure development in coastal communities in the United States, local governments in the coastal

zone will play a key role in adapting to the changing climate.¹ Local decision-makers are facing hard questions about whether to build new infrastructure, adapt existing infrastructure to new standards, continue maintaining existing infrastructure as is, or abandon infrastructure altogether. Monroe County, Florida, for example, has begun to factor sea-level rise considerations into decisions related to road improvement projects, creating specific design standards addressing elevation and working to weigh the benefits and costs of different adaptation options such as elevating roads.² Local governments are making these decisions in the context of increasingly unreliable and aging road systems, all while meeting current stormwater criteria which may require drainage improvements.³ Local decision-makers also are recognizing that crucial infrastructure decisions that directly affect their adaptation success are sometimes out of their control. In the case of the City of Tybee Island, Georgia, for example, tidal flooding restricts access to U.S. Highway 80 on an ever-increasing basis⁴—yet the highway, the only road leading to the island, is not under the city’s jurisdiction but that of the Georgia Department of Transportation.⁵ To further complicate matters for local governments, both taking action and failing to act could result in either tort or “takings” liability in cases where a poorly maintained road results in harm to

1. Maxine Burkett, *Duty and Breach in an Era of Uncertainty: Local Government Liability for Failure to Adapt to Climate Change*, 20 GEO. MASON L. REV. 775, 777 (2013).

2. See ERIN L. DEADY ET AL., MONROE COUNTY PILOT ROADS PROJECT: THE SANDS AND TWIN LAKES COMMUNITIES (2017).

3. See AM. SOC’Y OF CIVIL ENG’RS, 2017 INFRASTRUCTURE REPORT CARD: ROADS 4 (2017), <https://www.infrastructurereportcard.org/wp-content/uploads/2017/01/Roads-Final.pdf> [<https://perma.cc/354D-M7HW>]. See also, e.g., Daniel C. Vock, *How Long Can a State Go Without Repairing Roads and Bridges?*, GOVERNING MAG., June 2018, at 34, 34–40, https://archives.erepublic.com/GOV/GOV_Mag_Jun2018.pdf [<https://perma.cc/45E8-XMCM>].

4. Kelly Quimby, *Tybee Island Mayor Renews Request for U.S. 80 Fix*, SAVANNAH MORNING NEWS: SAVANNAH NOW (Aug. 9, 2017, 5:27 PM), <https://www.savannahnow.com/politics/news/2017-08-09/tybee-island-mayor-renews-request-us-80-fix> [<https://perma.cc/M3Q5-DH4M>]; Dan Chapman, *Tybee Island Acts Against Rising Seas and a Warming Climate*, ATLANTA JOURNAL-CONSTITUTION (Apr. 15, 2016), <https://www.ajc.com/news/state—regional-govt—politics/tybee-island-acts-against-rising-seas-and-warming-climate/9RSm0YO0u0JKog4LzT1OtK/> [<https://perma.cc/4P2R-HEJY>]; Justin Gillis, *Flooding of Coast, Caused by Global Warming, Has Already Begun*, N.Y. TIMES (Sept. 3, 2016), <https://www.nytimes.com/2016/09/04/science/flooding-of-coast-caused-by-global-warming-has-already-begun.html> [<https://perma.cc/A82F-VYQN>].

5. JASON M. EVANS ET AL., NAT’L SEA GRANT PROGRAM, TYBEE ISLAND SEA LEVEL RISE ADAPTATION PLAN 33–34, 45 (2016).

life or loss of property value from diminished access. Using the duty of state and local governments to maintain roads as a focus, this Article explores the complexity of adaptation at the local level as the impacts of climate change become more pronounced.

Specifically, this Article presents an analysis of coastal communities in four South Atlantic states—Florida, Georgia, South Carolina, and North Carolina—that are currently facing questions about how to protect property and infrastructure as sea levels rise and flooding increases. This Article distills the findings of an interdisciplinary research project funded by the National Oceanic and Atmospheric Administration (“NOAA”), Florida Sea Grant, Georgia Sea Grant, South Carolina Sea Grant Consortium, and North Carolina Sea Grant. It also consists of a regional analysis comparing how tort and local government law can both further and hinder climate change resilience planning and climate adaptation efforts across these four states. Given that the federal government has offered little in terms of legislation, policy, or funding to direct or support climate adaptation activities, local efforts—and the litigation that inevitably results—are on the forefront of establishing the framework for defining adaptation policy more broadly and influencing the contours of tort and land use law. This Article, therefore, fills an important research gap in existing climate change literature, as it discusses how increased flooding at the local level is putting pressure on traditional conceptions of government duties, immunities, and authorities. This Article also uses roads as a case study to explore how sea-level rise is altering planning, maintenance, and funding for public infrastructure.

This discussion focuses on local duties and responsibilities to build, rebuild, modify, or maintain existing roads for two primary reasons: (1) it is a widely shared function among jurisdictions and is the most obvious and visible type of infrastructure to the public, and (2) roads and highways, which are crucial to trade, defense, and nation-building, have long been under the purview of government regulation and funding in the United States.⁶ Recently, roads have also become a focal point in local government

6. See Paul Stephen Dempsey, *Transportation: A Legal History*, 30 *TRANSP. L.J.* 235, 243–44 (2003) (noting that when the U.S. Constitution was adopted, Congress was given the responsibility “to establish Post Offices and post roads” (quoting PAUL STEPHEN DEMPSEY & LAURENCE GESELL, *AIR TRANSPORTATION: FOUNDATIONS FOR THE 21ST CENTURY* 5 (1997))).

efforts to address rising sea levels and increased flooding.⁷ While sea-level rise may seem like a distant threat, many of its effects are being felt now, as low-lying coastal areas such as Norfolk, Virginia; Brunswick, Georgia; and Monroe County, Florida are experiencing increased nuisance or “sunny day” flooding occurring during seasonal or average high tides.⁸ Such flooding typically affects roads, temporarily closing them and increasing maintenance and repair costs. Residents who rely on these roads, often find themselves cut off from their homes, businesses, workplaces, schools, and local hospitals.⁹ In this way, sea-level rise and the flooding associated with it have become increasingly familiar and imminent, making roads the “climate change canary in the coal mine” for local governments.

Part I of this Article briefly discusses recent sea-level rise issues and coastal science most relevant to the South Atlantic states—North Carolina, South Carolina, Georgia, and Florida. Part II analyzes and compares each state’s road ownership and maintenance duties, first by addressing the threshold question of ownership and jurisdiction, and then by explaining the multi-step analysis that governments must take to evaluate their duties to maintain roads in order to avoid liability. Part II also outlines the wide differences among the four states in our study area and observes a common thread, namely, that in almost each instance, local governments are faced with conflicting pressures that are likely to reward inaction over action and favor short-term political compromises over strategic investments in adaptation. This Part then details how counties and municipalities can discontinue their duties to maintain roads through the process of abandonment and how abandonment can lead to takings liability. Part III offers three proposals for encouraging coordinated adaptation action and protecting local governments that take action to address climate impacts: (1) redefining the scope of the duties that define

7. See, e.g., EVANS ET AL., *supra* note 5; *Public Infrastructure*, MIAMI BEACH RISING ABOVE, www.mbrisingabove.com/climate-adaptation/public-infrastructure [https://perma.cc/HNS3-H35F] (last visited Dec. 25, 2018) (noting that the city seeks “to have all roads reach 3.7’ NAVD88 to deal with flooding issues”).

8. Trip Pollard, *Damage Control: Adapting Transportation to a Changing Climate*, 39 WM. & MARY ENVTL. L. & POL’Y REV. 365, 375–76 (2015). See also DEADY ET AL., *supra* note 2, at 4, 40.

9. See generally ECOLOGICAL PLANNING GRP., CITY OF TYBEE ISLAND CARRYING CAPACITY STUDY (2016), <http://www.cityoftybee.org/DocumentCenter/View/709/Carrying-Capacity-Study> [https://perma.cc/U8H3-S597].

reasonable conduct for governments in making decisions about public infrastructure in an era of rising sea levels; (2) defining the scope of sovereign immunity protections in a way that encourages innovative and creative decision-making in an era of climate uncertainty; and (3) calling for consistent adaptation duties and authorities at the state level as a crucial first step in mending the regulatory patchwork that currently exists at the state, county, and city levels in our four-state study area. Part IV concludes with a summary of observations and recommended next steps.

I. BACKGROUND ON SEA-LEVEL RISE, COASTAL SCIENCE, AND TRANSPORTATION INFRASTRUCTURE

A. Four Southeastern States Facing Sea-Level Rise

The beaches, estuaries, and other coastal ecosystems along the southeastern United States are not only among the most picturesque in the country, but also the most vulnerable to sea-level rise, extreme heat events, hurricanes, and storms.¹⁰ Despite these environmental threats, people are drawn to the coast. The southeastern states include two of the most populous metropolitan areas in the country, Miami, Florida and Atlanta, Georgia, and some of the fastest growing coastal metropolitan areas, such as Palm Coast and Cape Coral-Fort Myers in Florida and Myrtle Beach in South Carolina.¹¹ The coastal regions of Florida, Georgia, North Carolina, and South Carolina are all home to populations disproportionate to their land area. In Florida alone, more than 75 percent of the population lives in coastal or coastal-adjacent counties.¹² Together, the coastal areas in these four states contributed more than \$1.8 trillion to the gross domestic product

10. 1 DONALD J. WUEBBLES ET AL., U.S. GLOB. CHANGE RESEARCH PROGRAM, CLIMATE SCIENCE SPECIAL REPORT: FOURTH NATIONAL CLIMATE ASSESSMENT 164, 167, 222, 294 (2017), https://science2017.globalchange.gov/downloads/CSSR2017_FullReport.pdf [<https://perma.cc/MPT6-8P4W>] [hereinafter NATIONAL CLIMATE ASSESSMENT].

11. *Id.*

12. STEVEN G. WILSON & THOMAS R. FISCHETTI, U.S. CENSUS BUREAU, COASTLINE POPULATION TRENDS IN THE UNITED STATES: 1960 TO 2008 4 tbl.2 (2010), <https://www.census.gov/prod/2010pubs/p25-1139.pdf> [<https://perma.cc/T263-KL2B>]. For the other states examined in this Article, the population percentages are as follows: Georgia: 4.9 percent; South Carolina: 19.6 percent; and North Carolina: 9.9 percent. *Id.*

in 2009.¹³ One recent study concluded that the southern United States will suffer more economic damage from climate change than the northern half of the country.¹⁴ Additionally, inland cities will see the effects of sea-level rise in indirect ways. Orlando and Atlanta, for example, are predicted to be top destinations for those displaced by rising water and forced to relocate.¹⁵

Given the importance of coastal areas to the southeastern United States, as well as the likelihood that inland cities within the region will see population increases due to relocation patterns, addressing sea-level rise and its impacts on the infrastructure of coastal and low-lying areas is particularly important. Roads are among the most critical infrastructure in coastal areas, connecting people, towns, and economies along their routes. In low-lying areas, roads may also serve as drainage pathways for land-based stormwater and as emergency evacuation routes when severe weather approaches. The combination of sea-level rise, stronger storm surges, and more frequent, severe, and longer-lasting flooding, all of which can be exacerbated by wind, inevitably damages roads due to water infiltrating the subbase, base, and asphalt layers of the pavement system. This results in greater damage and the potential washing away of bridges, culverts, and other critical support structures. Thus, coastal roads subject to sea-level rise have shorter functional lifespans and require more frequent and costly repairs and maintenance.¹⁶

Globally, sea-level rise is a combination of increased water volume in the world's oceans, driven by melting land-based ice, and the thermal expansion of water, by hotter ocean temperatures. In the past century, the rate of global sea level rise has averaged around 1.7 millimeters per year ("mm/yr"), but since 1993, that

13. JUDITH T. KILDOW ET AL., NAT'L OCEAN ECON. PROGRAM, STATE OF THE U.S. OCEAN AND COASTAL ECONOMIES 3, 6 tbl.2 (2016), http://midatlanticocean.org/wp-content/uploads/2016/03/NOEP_National_Report_2016.pdf [<https://perma.cc/E9G2-KSUD>].

14. Solomon Hsiang et al., *Estimating Economic Damage from Climate Change in the United States*, 356 SCI. 1362, 1362–69 (2018). See also Brad Plumer & Nadja Popovich, *As Climate Changes, Southern States Will Suffer More Than Others*, N.Y. TIMES (June 29, 2017), <https://www.nytimes.com/interactive/2017/06/29/climate/southern-states-worse-climate-effects.html> [<https://perma.cc/7D7X-TE9N>].

15. Mathew E. Hauer, *Migration Induced by Sea-Level Rise Could Reshape the US Population Landscape*, 7 NATURE CLIMATE CHANGE 321, 323–24 tbl.1 (2017).

16. See, e.g., Cullen Browder, *Rebuilding NC 12: Saving a Vital Link or Throwing Money in the Ocean?*, WRAL INVESTIGATES (Nov. 19, 2012), <https://www.wral.com/rebuilding-nc-12-saving-a-vital-link-or-throwing-money-in-the-ocean-/11784177/> [<https://perma.cc/HFW9-S77G>].

rate has doubled to 3.4 mm/yr.¹⁷ The entire southeastern United States has experienced sea-level rise comparable to, or in some areas exceeding, the global rate of rise.¹⁸ Florida and North Carolina, along with Texas and Louisiana, include some of the lowest-lying and most vulnerable coastal areas in the United States.¹⁹ Many of these highly vulnerable areas have large populations and high property values. States along the east coast and the Gulf of Mexico are also vulnerable to hurricanes, which are very likely increasing in size and intensity due to climate change.²⁰

Scientists and climatologists use various types of data to project future climate change impacts such as sea-level rise. For example, a comprehensive set of projections from the U.S. National Climate Assessment predicts that sea-level rise by the year 2100 could range from as little as eight inches to as much as eighty inches above a 1992 benchmark.²¹ This wide estimate window makes the implementation of adaptation planning measures difficult. While adapting to an eight-inch rise in sea level would likely be manageable for many communities, adapting to an eighty-inch rise in sea level would be physically and economically infeasible virtually everywhere in the coastal zone. However, a broader view of the scientific literature provides some basis for narrowing this window. The lower estimate of eight inches is based solely upon a straight continuation of sea-level rise trends observed in tide gauges over

17. Rebecca Lindsey, *Climate Change: Global Sea Level*, NAT'L OCEANIC & ATMOSPHERIC ADMIN. (Aug. 1, 2018), <https://www.climate.gov/news-features/understanding-climate/climate-change-global-sea-level> [<https://perma.cc/9LC3-LJ83>].

18. See Jim Morrison, *Flooding Hot Spots: Why Seas Are Rising Faster on the U.S. East Coast*, YALE ENV'T 360 (Apr. 24, 2018), <https://e360.yale.edu/features/flooding-hot-spots-why-seas-are-rising-faster-on-the-u.s.-east-coast> [<https://perma.cc/Y6US-ZPA9>].

19. Jim Titus, *Does Sea Level Rise Matter to Transportation Along the Atlantic Coast?*, in U.S. DEP'T OF TRANSP. CTR. FOR CLIMATE CHANGE & ENVTL. FORECASTING ET AL., *THE POTENTIAL IMPACTS OF CLIMATE CHANGE ON TRANSPORTATION* 135, 136 fig.1 (2002), <http://www.bv.transports.gouv.qc.ca/mono/1083088.pdf> [<https://perma.cc/W23D-F7UA>].

20. Greg Holland & Cindy L. Bruyère, *Recent Intense Hurricane Response to Global Climate Change*, 42 CLIMATE DYNAMICS 617, 617–27 (2014).

21. ADAM PARRIS ET AL., NAT'L OCEANIC & ATMOSPHERIC ADMIN., OAR CPO-1, *GLOBAL SEA LEVEL RISE SCENARIOS FOR THE UNITED STATES NATIONAL CLIMATE ASSESSMENT 2 tbl.ES-1* (2012). The year 1992 is typically used as the base year for sea-level rise assessments in the United States, as 1992 is the mid-point of the 1983–2001 National Tidal Datum Epoch (“NTDE”), an 18.6 year period over which all available tide gauge data from NOAA were collected to develop standardized reference points for mean sea level and other tidal metrics (e.g., mean high water, mean low water, etc.) at tide gauge stations. *Tidal Datums*, NAT'L OCEANIC & ATMOSPHERIC ADMIN., https://tidesandcurrents.noaa.gov/datum_options.html [<https://perma.cc/YWG4-BX6C>] (last visited Dec. 26, 2018).

the twentieth century, which, due to increasing greenhouse gas emissions and satellite observations already indicating a recent acceleration of sea-level rise, very few scientists believe is likely to occur.²² At the same time, the more extreme high-end projections of sea-level rise for the 21st century are also a source of substantial debate and controversy within scientific literature. This is primarily due to unresolved geophysical questions about the maximum rate of polar ice sheet melt, particularly from Antarctica, that may occur over the 21st century.²³

A more recent summary document by the U.S. National Climate Assessment narrows the likely range of sea-level rise by the year 2100 to between one foot (described as “probably a realistic low”) and four feet (described as “plausible”),²⁴ which is similar to the range of sea level rise projections (approximately 11 inches to 3.2 feet) published by the Intergovernmental Panel on Climate Change in its Fifth Assessment Report in 2013.²⁵ Much of the remaining uncertainty about future sea-level rise relates directly to the trajectory of future global greenhouse gas emissions, with are driven by socio-economic factors such as economic growth, population growth, lifestyle changes, technological responses, and policy choices that are difficult to predict.²⁶ Socio-economic factors that model higher emissions result in a higher likelihood of more extreme rising sea levels, while factors that model lower emissions result in lower rates of sea-level rise. Although the exact changes in sea level experienced at any location are affected by multiple factors that include land subsidence (sinking), land uplift (rising), and regional shifts in ocean current, it is generally expected that communities in the southeastern United States will continue to

22. See, e.g., Xianyao Chen et al., *The Increasing Rate of Global Mean Sea-Level Rise During 1993–2014*, 7 NATURE CLIMATE CHANGE 492 (2017).

23. Catherine Ritz et al., Letter, *Potential Sea-Level Rise from Antarctic Ice-Sheet Instability Constrained by Observations*, 528 NATURE 115, 115–18 (2015).

24. John Walsh et al., *Chapter 2: Our Changing Climate*, in U.S. GLOB. CHANGE RESEARCH PROGRAM, CLIMATE CHANGE IMPACTS IN THE UNITED STATES: THE THIRD NATIONAL CLIMATE ASSESSMENT 45 (Jerry M. Melillo et al. eds., 2014), http://s3.amazonaws.com/nca2014/low/NCA3_Full_Report_02_Our_Changing_Climate_LowRes.pdf [<https://perma.cc/W4WL-Z92V>].

25. INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, CLIMATE CHANGE 2013: THE PHYSICAL SCIENCE BASIS 24 (Thomas F. Stocker et al. eds., 2013).

26. INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, CLIMATE CHANGE 2014: SYNTHESIS REPORT 56–59 (Rajendra K. Pachauri & Leo Meyer eds., 2014).

experience sea-level rise at rates that are comparable to or exceed the global average.²⁷

B. State and Local Government Adaptation—Roads Are Ground Zero

Climate change will affect the entirety of our transportation infrastructure, requiring changes in its design, construction, and maintenance. Alternative transportation mechanisms—walking and biking paths—may also become increasingly necessary to reduce transportation-related greenhouse gas emissions. According to the U.S. Department of Transportation’s (“USDOT’s”) Climate Adaptation Plan, likely climate impacts include more frequent and severe flooding that will necessitate additional drainage and pumping; shortened infrastructure life due to storm surge and sea-level rise; increased thermal expansion of paved surfaces and bridge joints due to higher temperatures; higher maintenance costs; asphalt degradation that will lead to shorter replacement cycles, limited access, and congestion; culvert and drainage damage; decreased driver performance; and increased risk of accidents from improperly maintained vehicles due to adverse weather.²⁸ As part of its Climate Adaptation Plan, USDOT also identified three over-arching infrastructure vulnerabilities that require three types of “resiliencies” to climate change:

(1) Existing Infrastructure Resilience: Existing transportation infrastructure is owned and operated by various public agencies and private firms and varies in age, predicted service life, and levels of sophistication. Existing infrastructure has also been built to many different design standards, and its current and future environmental risk is similarly varied. As environmental risks change, the probability of unexpected failures may increase. Further, as existing infrastructure approaches the end of its service

27. See, e.g., WILLIAM V. SWEET ET AL., NAT’L OCEANIC & ATMOSPHERIC ADMIN., NOS CO-OPS 083, GLOBAL AND REGIONAL SEA LEVEL RISE SCENARIOS FOR THE UNITED STATES (2017), https://tidesandcurrents.noaa.gov/publications/techrpt83_Global_and_Regional_SLR_Scenarios_for_the_US_final.pdf [<https://perma.cc/KB7S-7VT6>].

28. U.S. DEP’T OF TRANSP., CLIMATE CHANGE ADAPTATION PLAN: ENSURING TRANSPORTATION INFRASTRUCTURE AND SYSTEM RESILIENCE 3 (2014), <https://www.transportation.gov/sites/dot.dev/files/docs/DOT%20Adaptation%20Plan.pdf> [<https://perma.cc/KEP4-5S7K>].

life, decisions about replacement or abandonment should, but may not currently, take into account changing future risks.

(2) New Infrastructure Resilience: Similarly, newly constructed infrastructure should be designed and built in recognition of the best current understanding of future environmental risks. In order for this to happen, the various public and private entities in control of transportation infrastructure would need to incorporate an understanding of projected climate changes into their infrastructure planning and design processes.

(3) System Resilience: Transportation systems are more than just the sum of their individual parts. Some elements are of particular importance because of their vital economic role, absence of alternatives, heavy use, or critical function. For example, the National Airspace System plays a critical economic role, whereas hurricane evacuation routes perform a critical safety function. Selectively adding redundant infrastructure for key elements may be necessary to increase system resilience.²⁹

The U.S. Department of Transportation's vulnerability focus is on the overall resilience of the larger transportation system, and 3.9 million miles of this system are specifically public roads. While the overarching vulnerabilities identified by USDOT are closely intertwined with state and local transportation responsibilities—and action at the state and local levels will directly affect our nation's overall transportation system resilience—in the case of public roads, these vulnerabilities are compounded by the fact that our existing road infrastructure is aging and falling into disrepair. In its 2017 annual Infrastructure Report, the American Society of Civil Engineers gave the United States a “D” in roads infrastructure, concluding that “America’s roads are often crowded, frequently in poor condition, chronically underfunded, and are becoming more dangerous.”³⁰ The four states in our study area received the following “grades” for the state of their roads infrastructure:

- North Carolina: “Grade C.” The report observes that the North Carolina Department of Transportation (“NCDOT”) manages approximately 75% of North

29. *Id.* at 6.

30. AM. SOC'Y OF CIVIL ENG'RS, *supra* note 3, at 1.

Carolina's roads and "has invested significantly into the state's roads over the past four years."³¹

- South Carolina: No Grade Given. The report states that 16% of South Carolina's roads are in "poor condition" and that poor maintenance costs drivers an average of \$502 annually in repairs.³²
- Georgia: "Grade C-." The report observes that while Georgia's grade has improved since the last report and road surface conditions in Georgia are better than the national average, Georgia's overall road conditions are declining.
- Florida: "Grade C." The report states that the Florida Department of Transportation ("FDOT") has seen a significant increase in daily vehicle miles traveled over the past 35 years and has had difficulty keeping up with the increase in road use. It also concludes that "[s]ome smaller rural counties have only been spending about 10% of what would be required for a good pavement maintenance program, and even the larger urban counties have been under-funding their resurfacing programs."³³

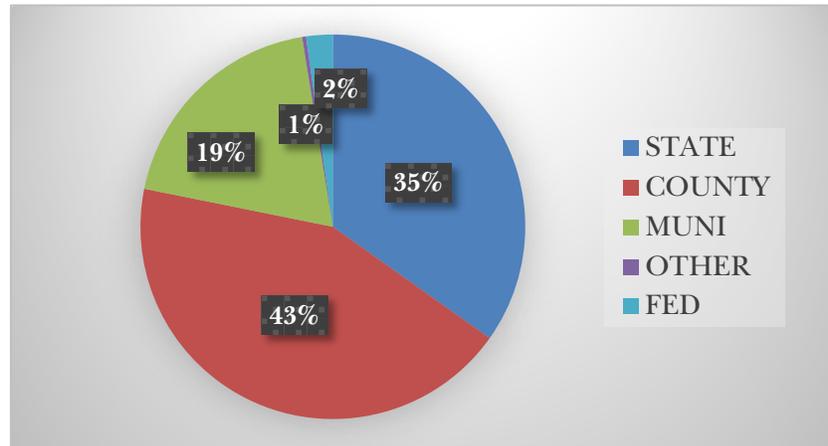
In our four-state study, the vast majority of roads are either state or locally owned. Within the 187,776 "road miles," or miles of road owned by a government entity, counties own the largest number of road miles and 43% of all total miles. States come in second at 150,984, with 34% of total miles. Municipalities own 83,525 miles, 19% of the total. The federal government owns only 1% of miles in the four-state area at 9,651 miles.

31. AM. SOC'Y OF CIVIL ENG'RS, 2013 REPORT CARD FOR NORTH CAROLINA'S INFRASTRUCTURE 80 (2013), <https://www.infrastructurereportcard.org/wp-content/uploads/2016/10/2013-Report-Card-for-North-Carolina-Infrastructure-Lo-Res.pdf> [https://perma.cc/43G2-64L4].

32. *Infrastructure in South Carolina*, 2017 INFRASTRUCTURE REPORT CARD, <https://www.infrastructurereportcard.org/state-item/south-carolina/> [https://perma.cc/FD8P-CW8V] (last visited Dec. 26, 2018).

33. AM. SOC'Y OF CIVIL ENG'RS, 2016 REPORT CARD FOR FLORIDA'S INFRASTRUCTURE 2 (2016), https://www.infrastructurereportcard.org/wp-content/uploads/2017/01/2016_RC_Final_screen.pdf [https://perma.cc/2YM5-U2K2].

Figure 1. Total Percentages of Public Road Ownership Across the Four-State Study Area



Therefore, for purposes of adaptation planning in the road context, counties would appear to be the most logical jurisdiction to examine first. Generally, we would agree that counties deserve more attention than they have received to date, as we perceive that they have a heavier burden than appreciated for adaptation planning. However, a closer examination of the four states in our study reveals wide differences with respect to road ownership and authority when it comes to rural and urban roads. North Carolina, for example, has no county road miles, while 68% of road miles in Georgia are county road miles.³⁴ The following charts list each state and its road miles by ownership, dividing the states between rural and urban road miles.³⁵ Florida is the only state in our study area with more urban than rural road miles, with twice as many urban road miles as rural. South Carolina, on the other hand, has almost three times as many rural road miles as urban.

34. *Highway Statistics 2015: Public Road Length—2015 Miles by Ownership*, FED. HIGHWAY ADMIN. (Dec. 7, 2016), <https://www.fhwa.dot.gov/policyinformation/statistics/2015/hm10.cfm> [<https://perma.cc/84ML-9ED4>].

35. *Id.*

Table 1. Public Road Miles by Ownership (2015)

		State	County	Municipality	Other	Federal	Total Rural/Urban Mileage	Total Mileage
FL	Rural	5,643	26,454	2,578	81	1,733	36,489	122,659
	Urban	6,473	43,981	35,251	5	459	86,170	
GA	Rural	12,588	58,257	4,078	90	2,775	77,788	128,134
	Urban	5,361	29,156	15,757	31	41	50,346	
NC	Rural	59,229	-	2,375	1,017	2,881	65,502	106,334
	Urban	20,330	-	20,310	22	170	40,832	
SC	Rural	29,792	25,583	523	194	1,589	57,681	76,250
	Urban	11,567	4,345	2,654	1	3	18,569	

Of course, while understanding road ownership will be essential to determining which jurisdiction has authority to act (or has a duty to act), road miles “owned” does not necessarily translate into vehicle miles traveled, as large numbers of people often travel on a concentrated number of roads. As the table below indicates, urban roadways in all of the states in our study area carry a larger percentage of vehicle traffic, with Florida and Georgia having significantly higher percentages of vehicle miles in urban areas than North Carolina and South Carolina.³⁶ As the Infrastructure Report Card for Florida observes, “[a]lthough the highway system consists of only 10% of the road miles in Florida, it carries more than half of Florida’s total traffic.”³⁷ Inventorying high traffic areas and essential transportation infrastructure therefore will be critical for addressing climate impacts on road infrastructure.³⁸

Table 2. Annual Vehicle Miles by Functional System (in Millions)

	Rural	Urban	Total
Florida	20,289	88,856	109,145
Georgia	14,816	45,608	60,424
North Carolina	15,258	38,935	54,193
South Carolina	12,782	16,733	29,515

36. *Id.*37. AM. SOC’Y OF CIVIL ENG’RS, *supra* note 33, at 2.38. TRANSP. RESEARCH BD., NAT’L RESEARCH COUNCIL OF THE NAT’L ACADS., POTENTIAL IMPACTS OF CLIMATE CHANGE ON U.S. TRANSPORTATION 8–9 (2008), <http://onlinepubs.trb.org/onlinepubs/sr/sr290.pdf> [<https://perma.cc/X6JF-PU3E>].

II. REPAIR, UPGRADE, OR ABANDON THE ROADWAY: HARD CHOICES FOR GOVERNMENTS

Adaptation planning to address sea-level rise is often described in three different categories: protect/defend, accommodate/adapt, or relocate. Indeed, sometimes it seems as if these categories are described as plausible options, which implies both that proactive planning is occurring and that the authority exists to implement such options. However, rising sea levels present new issues and difficult challenges. These issues not only pressure “traditional understandings of property rights in land,” but also pressure governmental duties and immunities with respect to the public welfare of the entire community and individual property owners. Our analysis of how roads are managed in our four-state study leads us to conclude that, even if a governmental entity wanted to make an adaptive choice—say repair, upgrade, or abandon a road—the laws as they currently exist make such choices difficult. State and local governments have a duty to maintain roads. When they fail to do so, they can be liable in tort for negligence. Road abandonment procedures also exist, but abandonment can lead to takings claims, as property owners abutting public roads lose access to their property as a result. In this way, local governments are often caught between a rock and hard place. One choice compromises an existing duty, while another can raise takings claims.

Before articulating solutions to this dilemma, we first decided to understand road maintenance and abandonment laws in the four states of our study. In this Part, we provide an overview of each of the states, counties, and municipalities in our study area and discuss their laws related to duties to maintain roads and sovereign immunity. We also discuss how governments can be compelled to maintain roads through mandamus and nuisance actions. Given that some local governments may find that the most prudent option is to abandon a road altogether, we also discuss each state’s laws related to abandonment as well as some of the “takings” issues that may arise. This Article paints a complex and, at times, contradictory landscape for government entities as they consider how to adapt to sea-level rise. It is also designed to set the stage for potential solutions, which we discuss in Part III.

A. Roads and Duties in Four States: A Doctrinal Stew

States, counties, and municipalities have primary responsibility for design, construction, and maintenance over most roads in the United States. When they fail to maintain or design these roads adequately, they may face tort liability if harm to human life or property results. This liability is often brought as a negligence claim.³⁹ Negligence is defined as “conduct which falls below the standard established by law for the protection of others against unreasonable risk of harm.”⁴⁰ As discussed in more detail below, each state may define this duty somewhat differently, and the scope of the duty may differ depending on whether the entity is a state, county, or municipality. This complexity in government tort liability arises due to the various sources that inform it, whether it be state constitutions, state common law, federal statutes, federal common law, or administrative law. Indeed, public tort law has been described as “a jerry-built structure, a patchwork, a doctrinal stew.”⁴¹ Such diversity and complexity, we contend, make coordinated and consistent climate adaptation responses difficult, complicating arguments that public tort law is an appropriate driver for such efforts.⁴²

Four elements must be satisfied to prove negligence: duty, breach, causation, and damages. For the purposes of our analysis, we focused on the question of duty.

Generally, the duty owed to users of local roads focuses on road maintenance. The duty of care reflects a reasonableness standard in the design, construction, maintenance, and repair of public ways.⁴³ Factors informing claims against government entities include: (1) whether the road is public; (2) whether a third party, such as an abutting owner, shares responsibility for the defect with

39. JON A. KUSLER & EDWARD A. THOMAS, MINN. ASS'N OF FLOOD PLAIN MANAGERS, NO ADVERSE IMPACT AND THE COURTS: PROTECTING THE PROPERTY RIGHTS OF ALL 14–15 (2007), www.floods.org/PDF/ASFPM_NAI_Legal_Paper_1107.pdf [<https://perma.cc/R3XS-CMXD>] (“[L]ocal governments are most vulnerable to liability suits based upon natural hazards because . . . [i]t is at the local level that most of the active management of hazardous lands occurs (road building and maintenance; operation of public buildings such as schools, libraries, town halls, sewer and water plants; parks).”).

40. RESTATEMENT (SECOND) OF TORTS § 282 (AM. LAW INST. 1965).

41. 4 JOHN MARTINEZ, LOCAL GOVERNMENT LAW § 27:2 (2018) (quoting PETER H. SCHUCK, *SUING GOVERNMENT* 51 (1983)).

42. See, e.g., Burkett, *supra* note 1, at 777.

43. MARTINEZ, *supra* note 41, § 27:7.

the government; (3) whether the government has shifted responsibility to a third party; (4) whether there is a duty to discover and guard against the defect, or if actual or constructive notice of the defect is necessary; and (5) whether the defect could have been revealed by reasonable inspection or whether it was hidden (“patent” versus “latent” defects).⁴⁴ The application of these factors is highly varied, with conflicting results across jurisdictions, often resting on each case’s facts and circumstances. Further, jurisdictional overlap often complicates matters, as roads maintained by various public entities are jointly controlled or closely connected.

Depending on the state or circumstance, the government may owe a duty to provide roads either to the users of local roads or the community at large. Comparing the four states, and the counties and municipalities within those states, reveals a range of duties imposed on governments for maintaining and designing roads, as well as immunities shielding these governments from liability. In addition, the different states vary greatly in the ability of localities to “get out” of their duty to provide roads and abandon existing roads.

However, even when negligence by a government entity is demonstrated, sovereign immunity may bar such claims. While the history of sovereign immunity rests in the idea that the “king can do no wrong,” today it is understood as a policy tool to protect government entities from significant financial strain, although the general trend is to restrict the extent of its application.⁴⁵ When and how sovereign immunity applies is also complicated by the muddled distinctions between “discretionary” and “ministerial,” or “operational” and “legislative” functions.⁴⁶ In short, discerning whether sovereign immunity applies is often difficult and depends on the facts and circumstances of each case.

In this section, we describe the duties of care owed to users of roads and the immunities that may protect government entities when they breach the duties owed across our four-state area. Detailed analyses of each state’s duties and immunities can be found in a series of white papers we produced as part of our overall

44. *Id.*

45. Steven Frederic Lachman, *Should Municipalities Be Liable for Development-Related Flooding?*, 41 NAT. RESOURCES J. 945, 952–53 (2001).

46. *Id.* at 953.

project.⁴⁷ Instead of marching through each of those analyses in detail, we distill them in order to draw attention to their differences and commonalities. Notably, not only are there different standards among the four states, but there also are different standards for different jurisdictions *within* each state. While the standards are often similar and generally reflect a “reasonableness” standard, they are nevertheless distinct, oftentimes in subtle, but potentially important ways. We discuss these distinctions in the conclusion to this section.

Our overall premise is that, in the context of infrastructure, and particularly with regard to roads, these traditional conceptions of duties and immunities are under increasing pressure as sea levels rise and flooding increases. Some commentators maintain that this pressure is and will continue to be necessary to spur local governments to take adaptive action.⁴⁸ Without the threat of a lawsuit, the argument goes, many local governments turn a blind eye to taking appropriate action or planning properly for the future. This is not always the case, and some local governments are tackling these issues because they are responding proactively to constituent impacts. As we discuss in more detail in Part III, we intend for our analysis to consider and complicate this view as well as to reveal potential areas for necessary change and reform.

1. The South Atlantic States: Comparing Duties

The following chart distills the duties to maintain roads across the four jurisdictions by state, county, and municipality (city or town).

47. See THOMAS RUPPERT, ERIN DEADY & JULIA SHELBURNE, LEGAL ISSUES WHEN MANAGING PUBLIC ROADS AFFECTED BY SEA-LEVEL RISE: FLORIDA (forthcoming 2019); IAN BROWN & HEATHER PAYNE, LEGAL ISSUES WHEN MANAGING PUBLIC ROADS AFFECTED BY SEA-LEVEL RISE: NORTH CAROLINA (forthcoming 2019); REBECCA NEUBAUER & HEATHER PAYNE, LEGAL ISSUES WHEN MANAGING PUBLIC ROADS AFFECTED BY SEA-LEVEL RISE: SOUTH CAROLINA (forthcoming 2019); PAUL WILDES, SHANA JONES & J. SCOTT PIPPIN, LEGAL ISSUES WHEN MANAGING PUBLIC ROADS AFFECTED BY SEA-LEVEL RISE: GEORGIA (forthcoming 2019).

48. See, e.g., Burkett, *supra* note 1; Jenna Schweitzer, *Climate Change Legal Remedies: Hurricane Sandy and New York City Coastal Adaptation*, 16 VT. J. ENVTL. L. 243, 267–68 (2014); Lachman, *supra* note 45, at 952–53. Other commentators have argued that the Fifth Amendment of the U.S. Constitution on the protection of private property should be expanded to compel the government to take action to protect people and property or risk liability. See Serkin, *infra* note 155; Pappas, *infra* note 155.

Table 3. Comparing Duties to Maintain Roads

	State	County	Municipality
Florida	The Florida Department of Transportation (“FDOT”) has a duty to maintain roads under its control.	A county has a duty to keep roads in good order and provide a reasonable level of maintenance that affords meaningful access.	A municipality has a duty to maintain roads in a reasonably safe condition.
Georgia	The Georgia Department of Transportation (“GDOT”) has a duty to improve, manage, and maintain the state highway system.	A county has a duty to maintain county roads in a condition such that they can be continuously used for ordinary loads with ordinary ease and faculty.	A municipality has a duty to keep roads in repair and reasonably safe from dangerous conditions.
North Carolina	The North Carolina Department of Transportation (“NCDOT”) has a duty to establish, construct, and maintain a statewide system of hard-surfaced and other dependable highways running to all county seats and to all principal towns.	Counties do not have maintenance duties. A county may enter into an agreement with NCDOT to repair, maintain, or improve a road.	A municipality has an affirmative duty to keep roads in proper repair and open for travel and free from unnecessary obstructions.
South Carolina	The South Carolina Department of Transportation (“SCDOT”) has a duty to maintain the state highway system in a safe and serviceable condition.	A county has a duty to repair roads in unincorporated areas of the county.	A municipality with a population greater than 1,000 has a duty to keep streets open, in good repair, and in reasonably safe condition for public travel. Towns with populations less than 1,000 must keep open and in good repair all streets and ways which may be necessary for public use within the limits of the town.

After comparing the duties across jurisdictions, several points relevant to adaptation planning in the face of rising sea levels and extreme weather events arise. First, duties of care appear to be the most consistent at the state level, although there is arguably an important distinction; the duty of care of Florida,⁴⁹ South Carolina,⁵⁰ and North Carolina⁵¹ for their state roads are more focused squarely on the “duty to maintain” or “repair,” but in Georgia, at least at the state level, the duty to “improve” is included alongside the duties to “repair” and “maintain.”⁵²

49. In Florida, public roads are divided into four systems: the State Highway System, the State Park Road System, the county road system, and the city street system. FLA. STAT. §§ 335.01, 334.03, 335.0415(3) (2018). FDOT has the authority to designate, construct, and maintain transportation facilities for the State Highway System. *Id.* § 334.044. In addition, the agency is authorized to adopt uniform minimum standards and criteria for design, construction, and maintenance of all public roads. *Id.* §§ 336.045, 334.044(10)(a). These standards and criteria are found in FDOT’s publication, commonly referred to as the “Florida Greenbook.” *Florida Greenbook*, FLA. DEP’T OF TRANSP., <http://www.fdot.gov/roadway/floridagreenbook/fgb.shtm> [<https://perma.cc/6Q3Q-BNH3>] (last visited Dec. 27, 2018). FDOT may contract with counties and municipalities to perform routine maintenance work on the State Highway System. FLA. STAT. § 335.055(1). Florida courts have consistently found that a public entity that owns, operates, or controls a roadway owes a general duty to maintain that roadway and a corresponding duty to warn of and correct a dangerous road condition. *See Pollock v. Fla. Dep’t of Highway Patrol*, 882 So. 2d 928, 933–34 (Fla. 2004). FDOT, which is responsible for the State Highway System, owes a duty to maintain the roads under its control, as well as a corresponding duty to warn of and correct dangerous conditions. *Id.*

50. Generally, in South Carolina, a public road will be owned or established by the State (under the jurisdiction of SCDOT), a county, or a city or town. S.C. CODE ANN. §§ 57-5-10, 57-17-10, 5-27-120 (2018). Under South Carolina law, “[t]he city or town council of any city or town of over one thousand inhabitants shall keep in good repair all the streets, ways and bridges within the limits of the city or town” *Id.* § 5-27-120. The majority—roughly 54 percent—of South Carolina’s roads are state-owned. *See FED. HIGHWAY ADMIN.*, *supra* note 34. In the 1950s, in order to ensure maximum access to federal highway funding, lawmakers created a process for allowing local roads to be placed into the state system with consent from SCDOT, and state law imposes a duty on the SCDOT to maintain the state highway system in a safe and serviceable condition. S.C. CODE ANN. § 57-5-10 (2018).

51. North Carolina is similar to South Carolina, in that the state is predominantly responsible for constructing and maintaining roads. Specifically, NCDOT is authorized to establish, construct, and maintain a statewide system of roads and to repair and maintain them in good condition. N.C. GEN. STAT. §§ 136-45, 136-64 (2018). An individual citizen may petition the local county board of commissioners concerning road improvements, which must forward the petition to NCDOT with recommendations. *Id.* § 136-62. A local board may also file an independent complaint with NCDOT for failing to maintain state highways or any county road system in good condition. *Id.* § 136-64.

52. In Georgia, public roads are divided into three systems: the state highway system, the county road system, which includes county roads extending into any municipality within the county, and the municipal street system, which consists of the public roads within a municipality that are not classified as county roads or state roads. GA. CODE ANN. §§ 32-2-2,

The duties vary more widely at the county level. In Florida, each county's board of commissioners is authorized to build, repair, and keep public roads in good order and has a duty to provide a reasonable level of maintenance that affords meaningful access.⁵³ Georgia counties have a duty to maintain county roads in a condition so that "ordinary loads, with ordinary ease and facility, can be continuously hauled over" them.⁵⁴ Counties in South Carolina have a duty to repair roads in unincorporated areas of the county, but the extent of that duty is not described.⁵⁵ Counties in North Carolina do not have a duty to maintain roads or alleys.⁵⁶ State law vests exclusive control, management, and responsibility for all public roads in counties in NCDOT.⁵⁷

Duties continue to vary at the city level. Florida municipalities have a duty to maintain roads, sidewalks, and right-of-ways in a reasonably safe condition.⁵⁸ In Georgia, municipalities have a

32-4-1, 32-4-1(1), 32-4-1(3), 32-4-91(a) (2018). GDOT has a statutory duty to improve, manage, and otherwise maintain the state highway system. *Id.* § 32-2-2.

53. *Hillsborough Cty. v. Highway Eng'g & Constr. Co.*, 199 So. 499, 503 (Fla. 1941). The duty to "provide reasonable maintenance that results in meaningful access" stems from *Jordan v. St. Johns County*, 63 So. 3d 835 (Fla. Dist. Ct. App. 2011), wherein the court held that a county has a duty to reasonably maintain a road as long as the road remains public and has not been officially abandoned. In *Jordan*, the court held that a county has a duty to reasonably maintain a road as long as the road remains public and has not been officially abandoned. The county rerouted a coastal road that was subject to repeated damage from erosion and coastal flooding, and thus, was difficult to maintain. Homeowners on the coastal road sued the county for intentionally failing to maintain the road in a useable condition. The court found that the county did not have unlimited and sole discretion to determine the level of maintenance and was required to provide a reasonable level of maintenance that affords meaningful access. Recent federal case law offers a different analysis when considering governmental maintenance liabilities beyond the scope of just roads. *See infra* notes 156, 213 (discussing *St. Bernard Parish Gov't v. U.S.*, 887 F.3d 1354 (Fed. Cir. 2018)).

54. GA. CODE ANN. § 9-6-21 (2018).

55. S.C. CODE ANN. § 57-17-10 (2018). The South Carolina Office of the Attorney General has advised that municipalities are responsible for the maintenance and repair of the roads located inside corporate limits and that county councils are only responsible for repairing the roads that are located in the unincorporated areas of the county. *See Op. S.C. Att'y Gen.*, 2016 WL 7031993 (Nov. 15, 2016).

56. A county, however, may enter into an agreement with NCDOT to maintain, repair, or improve a road. N.C. GEN. STAT. § 136-51 (2016). Presumably, some duty of care is owed.

57. *Id.* *See also Road Maintenance*, HENDERSON COUNTY N.C., <https://www.hendersoncountync.gov/planning/page/road-maintenance> [<https://perma.cc/5ZYE-7CNR>] (last visited Dec. 27, 2018).

58. *Jauma v. City of Hialeah*, 758 So. 2d 696 (Fla. Dist. Ct. App. 2000) (finding that the open and obvious nature of the flooding hazard is not a defense for failure to maintain when the city fails to act after being notified of flooding, after city employees observed flooding on multiple occasions, and where residents had no other means of entry and egress); *Dep't of Transp. v. Stevens*, 630 So. 2d 1160 (Fla. Dist. Ct. App. 1993).

general duty to keep the roads in their street systems reasonably safe, and they are liable for injuries resulting from defects after actual notice, or after the defect has existed long enough for notice to be inferred.⁵⁹ South Carolina's duties for municipalities vary by size. In South Carolina, cities and towns having a population greater than 1,000 have a statutory duty to "keep in good repair all the streets, ways and bridges within the limits of the city or town"⁶⁰ For town councils of towns with less than 1,000 inhabitants, the governing body must keep "all streets and ways which may be necessary for public use within the limits of the town open and in good repair,"⁶¹ thus limiting the geographic scope of the duty to "necessary" areas. In North Carolina, a municipality has "general authority and control over all public streets, sidewalks, alleys, and bridges" within its limits, except those already under control of the state Board of Transportation.⁶² A municipality has the affirmative duty to keep these public thoroughfares "in proper repair" and "open for travel and free from unnecessary obstructions."⁶³

South Carolina is the only state in our study where officials can be fined for neglecting to repair highways and bridges. County officials and officials in a town of less than 1,000 residents may be found guilty of a misdemeanor and fined up to \$500 for neglecting to make repairs to highways and bridges.⁶⁴ However, there is no case law referencing this statute or interpreting its contours. Therefore, it is unclear what level and types of damage must be repaired in order to avoid a fine for neglect. It is also unclear how long the town or county council has to fix the issue after notice or

59. *Roquemore v. City of Forsyth*, 617 S.E.2d 644 (2005). A municipality may also be liable for portions of the state highway system that lie within a municipality's corporate limits where the municipality agreed to perform the necessary maintenance. *City of Fairburn v. Cook*, 372 S.E.2d 245, 251 (1988). Municipalities' duty to keep streets safe applies to dangerous conditions brought about both by the forces of nature and by persons and extends to conditions adjacent to or suspended over the street. *Roquemore*, 617 S.E.2d at 647. *See also* *City of Fitzgerald v. Caruthers*, 774 S.E.2d 777, 780 (2015) (holding that the duty applies to a rotting tree beside street).

60. S.C. CODE ANN. § 5-27-120 (2018).

61. *Id.* § 5-27-110.

62. N.C. GEN. STAT. § 160A-296(a) (2016). The Board of Transportation is a sub-entity within the state Department of Transportation that is comprised of nineteen men and women appointed by the governor.

63. *Id.* § 160A-296(a)(1)-(2).

64. S.C. CODE ANN. §§ 57-17-80, 5-27-110 (2018).

discovery of the damage. To our knowledge, a provision fining officials in this way is unique to South Carolina.

The question is, do these distinctions matter, and should they? Certainly, cohesive climate adaptation planning may be hindered because states, and political divisions within states, have differing duties and immunities, resulting in a confusing “patchwork” of obligations and protections. When it comes to roads, these patchworks do not operate in isolation, but often overlap. What looks like an ordinary interchange may in actuality connect ramps, roads, and bridges under the jurisdiction of the municipality, county, or state. Thus, what happens when a road length involving several jurisdictions is repeatedly flooded because of increasingly higher tides, especially when cities and counties have differing levels of immunity protections?⁶⁵ In Georgia, the county would have a duty to maintain its portion of the road length so that it “can be used continuously,” while the municipality would have a duty to keep its roadway “in repair” and “reasonably safe from dangerous conditions.” If the road was flooded for three hours because of a high tide, would it be considered unable to be used “continuously,” putting the county in breach of its duty? Will the municipality be held to a different standard because its obligation is only to keep the road “reasonably safe” and because it lacks a “continuous” element?

65. *See generally* EVANS ET AL., *supra* note 5. In Georgia, because counties have a greater ability to claim sovereign immunity than municipalities, issues for larger-scale adaptation and resilience planning efforts may arise as city and county governments have different liability standards. Georgia counties are not liable for injuries arising from a failure to maintain roads because state law provides counties with generous sovereign immunity: a county is not liable for suit unless specified by statute. GA. CODE ANN. § 36-1-4 (2018). County officials sued in their individual capacity may also claim official immunity from liability for discretionary actions done without willfulness, malice, or corruption. *See* GA. CONST. art. I, § 2, para. IX(d). State law waives municipalities’ immunity from liability for injuries caused by their “neglect to perform or for improper or unskillful performance of their ministerial duties” GA. CODE ANN. § 36-33-1 (2018). A municipality’s function of improving or maintaining its roads in a safe condition has long been held to be ministerial in nature. *Bush v. City of Gainesville*, 124 S.E.2d 667, 669 (Ga. Ct. App. 1962). Furthermore, state law explicitly waives immunity for a municipality’s failure to keep streets free from defects after notice. GA. CODE ANN. § 32-4-93 (2010). Thus, municipalities cannot claim sovereign immunity for injuries resulting from their failure to keep street reasonably safe or their failure to remove defects after flooding has damaged a road. In effect, sovereign immunity protects municipalities and municipal officers sued in their official capacity to a much lesser extent than it protects counties.

In Florida, counties may have a duty to “provide a reasonable level of maintenance that affords meaningful access.”⁶⁶ However, Florida municipalities lack the element of providing access and are required more simply to maintain roads “in a reasonably safe condition.” When portions of a road in Florida repeatedly flood in a way that deprives some residents of access, even if it was only for a few hours at a time, could the county be held to a different, more burdensome standard than the municipality? If the same scenario happened in North Carolina, would the municipality’s duty to keep a road “free from unnecessary obstructions” include keeping the road free from occasional tidal flooding? When does water on the road become an “obstruction”? How long must the road be flooded, and how deep does the water have to get? These questions are intellectually interesting, of course, but asking them reveals the underlying question: What should be the scope of a government’s duty to maintain when faced with rising sea levels and increased flooding? We seek to answer that question in Part III.

A close look at state-level duties also raises the question of whether we should think seriously about the differences between road repairs and improvements to road infrastructure. Florida courts have held that maintaining a road means doing so “as it exists.”⁶⁷ A governmental entity does not have a duty to upgrade roadways to prevent obsolescence, even if newer designs or features would make the road safer.⁶⁸ Unlike Florida, Georgia includes as part of its duty to repair, a duty to improve. This duty applies if GDOT has altered a highway’s original design or construction, or if the highway was not in substantial compliance with generally accepted engineering and design standards in effect at the time of the original design.⁶⁹ In this way, while it appears that Georgia’s duty to improve is fairly limited in scope, it does contemplate the need, at times, for alterations from a highway’s original design. However, it is not a forward-looking duty requiring “upgrades” or

66. We caveat that counties “may” have this duty, because recent federal case law may or may not be persuasive authority in Florida’s courts of appeals. *See, e.g.,* *Jordan v. St. Johns County*, 63 So. 3d 835 (Fla. Dist. Ct. App. 2011).

67. *Fla. Dep’t of Transp. v. Neilson*, 419 So. 2d 1071, 1078 (Fla. 1982).

68. *Id.*

69. *Georgia Dep’t of Transp. v. Crooms*, 729 S.E.2d 660, 662 (Ga. Ct. App. 2012) (*overruled on different grounds by* *Rivera v. Washington*, 784 S.E.2d 775 (Ga. 2016)); *Georgia Dep’t of Transp. v. Balamo*, 806 S.E.2d 622, 624 (2017), *cert. denied* (May 7, 2018).

innovation, but rather a duty that turns on changes to or deviations from the original road design when such changes occur. In addition, the maintenance duties for Georgia counties are stated more broadly than any of the other maintenance standards reviewed. Instead of focusing solely on keeping roads in a reasonably safe condition, Georgia counties are required to maintain roads “so that ordinary loads, with ordinary ease and facility, can be continuously hauled over such public roads.” This is a performance standard that could be read to require a level of service that exceeds the safety standards required by governments in other states, and even for cities in Georgia.

These approaches have several implications that have both potentially positive and negative outcomes for government entities facing increased erosion, sea-level rise, or recurrent tidal flooding. First, and most apparent, if a local government declines to undertake “upgrades” that would make a road better able to withstand sea-level rise, it has not breached its duty to repair under Florida law, and local governments do not seem to have similar obligations under Georgia, South Carolina, or North Carolina law. Given that such upgrades are likely to be expensive and increasingly frequent, governmental entities are protected from possible tort liability if they determine they cannot afford “upgrades” that would increase a road’s resilience to sea-level rise. Arguably, limiting a government’s duty in this way could allow for more prudent infrastructure investments, and abandoning roads, instead of upgrading them, may be the most appropriate adaptation response in some areas. On the other hand, without a duty to repair that includes improvements with upgrades, government entities may not be inclined to attempt innovative responses, such as implementing cutting-edge engineering, to resist flooding caused by sea-level rise. Notably, however, despite the lack of government incentive, some local governments are undertaking innovative responses to sea-level rise, flooding, and inundation due to political pressure and/or the desire to directly address the impacts to protect their communities.⁷⁰ Finally, as sea level rises, flooding will require government entities to make what are arguably considered “upgrades” simply to keep a road open, thereby blurring the traditional conceptions of what it means to

70. See, e.g., EVANS ET AL., *supra* note 5; DEADY ET AL., *supra* note 2.

“maintain” the road. Blurring these distinctions has implications for whether sovereign immunity applies, as described in more detail below.

2. The South Atlantic States: Comparing Immunities

Distinctions in sovereign immunity protections also raise significant challenges for adaptation at the local level, as these differences can create a confusing patchwork of protections and discourage the adoption of road maintenance policies incorporating sea-level rise adaptation responses. The first challenge relates to the distinction between ministerial, operational, or proprietary actions and discretionary or planning actions, a distinction that has been confusing enough to apply in ordinary situations and will likely be muddled further in situations involving sea-level rise. In both Florida and North Carolina, immunity does not apply to road maintenance, which is classified as an operational or proprietary function.⁷¹ Georgia counties and municipalities are distinct in their levels of protection: counties are protected by sovereign immunity for failing to maintain roads, but municipalities are not.⁷² In South Carolina, however, immunity

71. *Commercial Carrier Corp. v. Indian River Cty.*, 371 So. 2d 1010 (Fla. 1979); *Trianon Park Condominium Assoc. v. City of Hialeah*, 468 So. 2d 912 (Fla. 1985). *See also* *Millar v. Town of Wilson*, 23 S.E.2d 42, 44 (1942) (finding that a proprietary function is an act performed by a municipality that is “commercial or chiefly for the private advantage of the compact community . . .”).

72. Georgia counties are not liable for injuries arising from a failure to maintain roads because state law provides counties with generous sovereign immunity: a county is not liable for suit unless specified by statute. GA. CONST. Art. I, § 2, para. IX(d). County officials sued in their individual capacity may also claim official immunity from liability for discretionary actions done without willfulness, malice, or corruption. GA. CODE ANN. § 36-1-4 (2018). However, a county official may be liable for negligently performing a *ministerial* duty. If a county official acts outside of a policy, this is often determinative. In *Norris v. Emanuel Cty.*, 561 S.E.2d 240 (Ga. Ct. App. 2002), the court held that county employees’ decision of when and how to repair a road that was damaged by heavy rainfall was discretionary. 561 S.E.2d at 243–44. Even though the county officials knew the road was washed out, there were “no guidelines or procedures in place” for determining how exactly to repair the damage, nor did the county officials receive a specific directive. *Id.* at 244. Where a decision is left to the personal judgment of government officials, the court reasoned, such decisions are properly characterized as discretionary. *Id.* In *Brown v. Taylor*, 596 S.E.2d 403 (Ga. Ct. App. 2004), the court held that county employees were immune from liability because their duty to repair a six-inch drop off at a road shoulder due to broken pavement was discretionary. 596 S.E.2d at 404–05. In reaching its decision, the court noted that there was no formal or written policy regarding road maintenance, no evidence that county officials were on notice of the defect, and that no employee had been instructed to inspect or repair the shoulder. *Id.* at 405. *But see* *Joyce v. Van Arsdale*, 395 S.E.2d 275 (Ga. Ct. App. 1990) (holding that

applies to road maintenance precisely because it is *not* considered an operational function but is rather considered discretionary. Florida and North Carolina also provide immunity for discretionary actions but, unlike South Carolina, consider planning, not maintenance, a discretionary action.

In Florida, the doctrine of sovereign immunity protects state, county, and municipal governments from tort liability for discretionary planning- or policy-level decisions or functions.⁷³ North Carolina draws a similar line for “governmental functions,”⁷⁴ which are defined as activities that are “discretionary, political, legislative or public in nature and performed for the public good in behalf of the State, rather than for itself”⁷⁵ In short, while the activity may be relatively straightforward, i.e. maintaining a road, the question of whether immunity applies is not, as it often depends on how the state characterizes the activity and, in Georgia, whether the county or the city is performing the maintenance.

There are also additional wrinkles to consider. For example, Florida courts have considered whether immunity applies to road upgrades and improvements and has concluded that such actions on an existing roadway are discretionary, planning-level decisions. Florida courts have reached similar conclusions regarding the decision to build a road in a particular manner and the failure to upgrade an existing road.⁷⁶ At some point, however, sea-level rise

DOT’s directive to the county to repair a bridge gave rise to a ministerial duty). Municipalities cannot claim sovereign immunity from liability for injuries caused by their failure to maintain roads in a reasonably safe condition and by their failure to remove defects after notice, which are considered ministerial duties. GA. CODE ANN. § 36-33-1 (2018). State law waives municipalities’ immunity from liability for injuries caused by their “neglect to perform or for improper or unskillful performance of their ministerial duties” *City of Fitzgerald v. Caruthers*, 774 S.E.2d 777, 779 (Ga. Ct. App. 2015).

73. See, e.g., *Commercial Carrier Corp.*, 371 So. 2d 1010; *Trianon Park Condominium Assoc.*, 468 So. 2d 912.

74. For example, municipal corporations are “immune from suit for the negligence of its employees in the exercise of governmental functions absent waiver of immunity.” *Moffit v. City of Asheville*, 9 S.E. 695, 697 (N.C. 1889).

75. *Millar*, 23 S.E.2d at 44. In addition, a governmental function occurs “[w]hen a municipality is acting in behalf of the State in promoting or protecting the health, safety, security or general welfare of its citizens, it is an agency of the sovereign.” *Britt v. City of Wilmington*, 73 S.E.2d 289, 293 (N.C. 1952) (internal quotation marks omitted).

76. See *Dep’t of Transp. v. Neilson*, 419 So. 2d 1071, 1077 (Fla. 1982). The *Neilson* court asserted that the Florida Supreme Court has repeatedly held that the decision to upgrade infrastructure is considered a “planning-level function[] and absolute immunity attaches.” *Id.* at 1073. Likewise, the court found that a government duty applies only to a road “as it exists” and “does not contemplate maintenance as the term may sometimes be used to

and increased flooding will push government entities to take actions that are arguably upgrades and not mere repairs. This change could mean that maintenance failures that were once actionable may become barred by sovereign immunity, depending on how the “repairs” are implemented.⁷⁷ Major capital expenditures for road maintenance will likely rise from operational-level decisions to planning-level decisions, as they will typically involve policymaking and planning stages.⁷⁸ The economics, scale, and multitude of road expenditures could all be factors in this distinction.

How sovereign immunity functions for cities and counties can also lead to the problematic discouragement of policies designed to promote adaptation planning. For example, when determining whether sovereign immunity applies, Georgia distinguishes between discretionary actions, where immunity applies, and ministerial duties, where no immunity applies.⁷⁹ In Georgia, courts have generally held that a duty related to roads is ministerial if it is

indicate obsolescence and the need to upgrade a road.” *Id.* at 1078. The duty to reasonably maintain roadways does not obligate the local government to upgrade a road through measures like road widening or changing the means of traffic control, as these measures have been deemed discretionary functions and cannot be compelled by the courts. *Tucker v. Gadsden Cty.*, 670 So. 2d 1053, 1054 (Fla. Dist. Ct. App. 1996); *Perez v. Dep’t of Transp.*, 435 So. 2d 830, 831 (Fla. 1983). See generally DEADY ET AL., *supra* note 2.

77. See Thomas Ruppert, *Castles—and Roads—in the Sand: Do All Roads Lead to a “Taking”?*, 48 ENVTL. L. REP. 10914 (2018) (arguing that extending the ministerial/operational-level duty of maintenance to include inordinately difficult, expensive, or unique or unusual work would undermine the core distinction in tort law between ministerial/operational-level maintenance and discretionary/planning-level work that enjoys sovereign immunity, as such discretionary/planning-level decisions are the exclusive realm of the legislative branch of government and should not be interfered with by courts). See also Thomas Ruppert & Carly Grimm, *Drowning in Place: Local Government Costs and Liabilities for Flooding Due to Sea-Level Rise*, 87 Fla. B.J., Nov. 2013, at 29 (arguing that modifications to stormwater systems to provide the same level of drainage despite higher sea-levels causing the system to drain less efficiently constitutes a discretionary decision to upgrade rather than a mere “operational” maintenance decision).

78. See *Neilson*, 419 So. 2d at 1077 (holding that decisions such as the installation of traffic control devices, alignment of roads, and improvement or upgrading of roads are “basic capital improvements” and are judgmental, planning level decisions). See also DEADY ET AL., *supra* note 2, at 33 (finding that the duty to reasonably maintain roadways does not obligate the local government to upgrade a road through measures like road widening or changing the means of traffic control, since these measures are deemed discretionary functions and cannot be compelled by the courts). See also Ruppert, *supra* note 77, at 10914–15 (arguing that abnormally high costs or difficulty in preserving a road or other infrastructure automatically elevates such work beyond mere “maintenance” as an operational duty to policy level, discretionary decision-making).

79. *Banks v. Happoldt*, 608 S.E.2d 741, 744–45 (Ga. Ct. App. 2004).

mandatory or becomes necessary after a discretionary decision-making body delegates the duty to a county official by enacting a policy.⁸⁰ In other words, if a policy is in place, the duty is considered ministerial, sovereign immunity is waived, and a potential lawsuit may go forward.⁸¹ Arguably, the presence of this policy creates a perverse incentive for counties to decline to adopt policies related to road maintenance and sea-level rise for fear that they will expose themselves to liability.

North Carolina, South Carolina, and Florida have case law illustrating how governments may not be shielded by immunity defenses when improper maintenance causes flood hazards, a situation that is likely to increase due to sea-level rise. In Florida, a governmental entity can be liable for injuries and damages resulting from conditions created by sea-level rise and coastal flooding if that hazard can, at least partially, be traced to a failure to maintain the existing infrastructure. For instance, a Florida District Court of Appeals found that, to establish liability, it is not necessary to demonstrate that the government created the hazard

80. *Lincoln Cty. v. Edmond*, 501 S.E.2d 38, 41 (Ga. Ct. App. 1998) (“Such ‘discretion,’ however, did not change the fact that the tree *must* be removed.” (citing *Joyce v. Van Arsdale*, 395 S.E.2d 275, 275–77 (Ga. Ct. App. 1990) (emphasis in original))).

81. County officials sued in their individual capacity may also claim official immunity from liability for discretionary actions done without willfulness, malice, or corruption. GA. CONST. Art. I, § 2, para. IX(d). A county official may be liable, however, for negligently performing a *ministerial* duty. As discussed above, the presence of a policy is often determinative. For example, in *Norris v. Emanuel County*, 561 S.E.2d 240 (Ga. Ct. App. 2002), the court held that county employees’ decision when and how to repair a road that was damaged by heavy rainfall was discretionary. Even though the county officials knew the road was washed out, there were “no guidelines or procedures in place” for determining how exactly to repair the damage, nor did the county officials receive a specific directive. 561 S.E.2d at 244. Where a decision is left to the personal judgment of government officials, such decisions are properly characterized as discretionary. *Brown v. Taylor*, 596 S.E.2d 403, 404–05 (Ga. Ct. App. 2004) (citing *Hennessy v. Webb*, 264 S.E.2d 878, 880 (Ga. 1980)). In contrast, another Georgia court held that a county official’s duty to take remedial action after being put on notice that a road was flooding was ministerial because a policy was in place to direct the official to act. *Barnard v. Turner Cty.*, 701 S.E.2d 859, 862–63 (Ga. Ct. App. 2010). Even though the policy granted the official discretion for how to act, the court concluded that because the official had actual notice of the defect, and because a county policy required the official to report and fix this type of defect upon notice, the duty was ministerial. *Id.* State law, on the other hand, waives municipalities’ immunity from liability for injuries caused by their “neglect to perform or improper or unskillful performance of their ministerial duties.” GA. CODE ANN. § 36-33-1(b) (2018). A municipality’s function of improving or maintaining its roads in a safe condition has long been held to be ministerial in nature. *City of Fitzgerald v. Caruthers*, 774 S.E.2d 777, 779 (Ga. Ct. App. 2015) (citing *City of Atlanta v. Atlantic Realty Co.*, 421 S.E.2d 113, 116 (Ga. Ct. App. 1992)).

that caused an injury, so long as “the hazard could be attributed in part to the government’s failure to maintain an existing improvement.”⁸² However, a government entity may not be liable in Florida if it performs whatever maintenance deemed reasonably possible, or if it took steps to warn of the road hazard. A court could find that the government “act[ed] responsibly and reasonably under the existing circumstances, and in accordance with acceptable standards of care and common sense . . . [took] steps either to avert the danger or to warn those at risk that the danger exists.”⁸³

South Carolina and North Carolina appear to provide more immunity protection than Florida, although government liability for failure to maintain a road is still possible. In South Carolina, a governmental entity could argue generally that an injury was caused by a discretionary act, and thus, immunity applies.⁸⁴ More specifically, a South Carolina governmental entity is not liable for injuries caused by road design and other public ways, or for losses from a defect or condition caused by a third party unless the governmental entity had notice and failed to act in a reasonable time.⁸⁵ Indeed, knowing of the hazard makes a difference. For example, in a South Carolina case, where improper maintenance created a flood hazard in the same location where numerous accidents had already occurred over an eight-year period, and where highway patrol officials had previously reported the dangerous condition to SCDOT on numerous occasions, the South

82. *Robinson v. Fla. Dep’t of Transp.*, 465 So. 2d 1301, 1305 (Fla. Dist. Ct. App. 1985).

83. *Savignac v. Fla. Dep’t of Transp.*, 406 So. 2d 1143, 1147 (Fla. Dist. Ct. App. 1981).

84. In South Carolina, a governmental entity often has the ability to assert statutory immunity as a defense in a negligence case. The South Carolina Torts Claim Act (“SCTCA”), which governs all tort claims against government entities, eliminated sovereign immunity and makes the state and governmental entities and agencies liable for torts to the same extent as private individuals. S.C. CODE ANN. §§ 15-78-40–15-78-220 (2018). *See Shaw v. City of Charleston*, 567 S.E.2d 530 (S.C. Ct. App. 2002), *reh’g denied*; *Repko v. Cty. of Georgetown*, 785 S.E.2d 376 (S.C. Ct. App. 2016), *reh’g denied*. The SCTCA, however, lists forty exemptions to the waiver of immunity, meaning that a governmental entity is not liable for injuries caused by negligence in the exemptions. S.C. CODE ANN. § 15-78-60 (2018). The SCTCA includes an exemption from liability for loss resulting from “the exercise of discretion or judgment . . . [or] the performance or failure to perform” any discretionary act by the governmental entity. *Id.* § 15-78-60(5). To establish this discretionary immunity, the governmental entity must show that when faced with alternatives, it weighed competing considerations, used accepted professional standards, and made a conscious choice. *See Foster v. S.C. Dep’t of Highways & Pub. Transp.*, 413 S.E.2d 31, 34 (S.C. 1992); *Strange v. S.C. Dep’t of Highways & Pub. Transp.*, 445 S.E.2d 439, 440–41 (S.C. 1994).

85. S.C. CODE ANN. § 15-78-60(15) (2018).

Carolina Supreme Court found that a jury could reasonably conclude that SCDOT knew of the hazard and was liable.⁸⁶ A North Carolina case reached a similar result, concluding that immunity under the “doctrine of public duty” did not apply where the defective road conditions that killed the plaintiff had existed for a substantial period of time, giving rise to the inference that NCDOT deliberately avoided knowledge of the conditions and did not inspect or repair the road.⁸⁷

3. Governmental Inaction When Failing to Maintain a Road: Economic Damages

One state in our study—North Carolina—has considered whether discontinuing maintenance and closing roads results in a breach of duty for failure to maintain. In *Kirkpatrick v. Town of Nags Head*, 713 S.E.2d 151 (N.C. Ct. App. 2011), a North Carolina appellate court upheld the town’s decision to stop repairing and

86. *Elam v. S.C. Dep’t of Transp.*, 602 S.E.2d 772 (S.C. 2004).

87. *Ray v. N.C. Dep’t of Transp.*, 727 S.E.2d 675, 678–79 (N.C. 2012). In North Carolina, the doctrine of public duty is a common law negligence doctrine that is separate from sovereign immunity and may limit tort liability even if the state has waived sovereign immunity; the doctrine was codified in 2008 as part of the State Tort Claims Act. N.C. GEN. STAT. § 143-299.1A (2008). The doctrine states that a governmental entity acts to protect the public in general and not specific individuals, and thus, the first element of a negligence lawsuit—a legal duty—cannot be established. *Ray*, 727 S.E.2d at 678–79. For the purposes of road duties, the doctrine of public duty is an affirmative defense only if an injury is caused by the negligent failure of a state agent to perform a health or safety inspection required by statute. However, the doctrine does not apply when the failure to act amounts to gross negligence that displays a conscious disregard for the safety of others. In *Ray*, the court found that the doctrine of public duty did not apply where the defective road conditions that killed the plaintiff had existed for a substantial period of time, giving rise to the inference that NCDOT deliberately avoided knowledge of the conditions and did not inspect or repair them. *Id.* at 684. This inference, plus the general knowledge that an uninspected road can be dangerous for travelers, amounted to gross negligence. *Id.* Additionally, in North Carolina, injuries or damages caused by an “act of God” may relieve a party of liability, depending on whether the act was reasonably foreseeable. *Safeguard Ins. Co. v. Wilmington Cold Storage Co.*, 149 S.E.2d 27, 34 (N.C. 1966); *Lea Co. v. N.C. Bd. of Transp.*, 304 S.E.2d 164, 173–74 (N.C. 1983). An act of God is an act that “results from natural causes and is in no sense attributable to human agency.” *Id.* at 173–74 (quoting *Act of God*, BLACK’S LAW DICTIONARY (5th ed. 1979)). In *Lea Co.*, the court held that the one-hundred-year flood that damaged the plaintiff’s property was statistically reasonably foreseeable and did not relieve the Board of Transportation of liability. *Id.* at 174–76. The Court explained that a one-hundred-year flood can be anticipated, even though the interval of occurrence was uncertain. *Id.* at 174. This interpretation suggests that a court may find impacts from climate change, including sea-level rise and greater storm surges, foreseeable because of the numerous scientific projections of coastal impacts.

rebuilding a road that was repeatedly washed away by storms.⁸⁸ A property owner adjacent to the road argued that the town had a duty to repair the road and that the town was liable for economic injuries for breaching its duty.⁸⁹ The court disagreed, concluding that, if it imposed a duty, the court “would effectively be depriving a municipality . . . of its discretion to determine the identity of the streets upon which travel should be allowed at all.”⁹⁰ Further, “accepting Plaintiffs’ argument would effectively require a municipality to compensate a landowner or other person adversely affected by a street or roadway closure decision for economic losses arising from the closure of the road in question,” a proposition the court squarely rejected.⁹¹ Consequently, at least one court has been sympathetic to the dilemma in which local governments can find themselves: an unsafe road raises safety and liability concerns, but closing such a road could adversely affect landowners. Such an outcome may be a harbinger of things to come, as extreme weather events caused by climate change may force courts to reconsider whether the state has a duty under such circumstances to provide a road at all.

B. Nuisance and Mandamus Actions: Compelling Governments to Repair and Maintain Roads in the Four Southeastern Atlantic States

When a local government fails to maintain a road adequately, it may also face a nuisance and/or mandamus action seeking to compel the local government to fulfill its duty to maintain a road. In Florida, Georgia, and North Carolina, if a governmental entity fails to maintain or repair a road damaged by sea-level rise, storms, flooding, or erosion, a plaintiff could allege that the entity is maintaining a nuisance and seek an injunction.⁹² Governmental

88. Kirkpatrick v. Town of Nags Head, 713 S.E.2d 151, 153 (N.C. Ct. App. 2011).

89. *Id.* at 154.

90. *Id.* at 158.

91. *Id.* Plaintiffs included an inverse condemnation claim as part of their lawsuit as well. The appellate court affirmed the lower court’s decision in favor of the town on the inverse condemnation claim without further discussion.

92. Florida courts define a nuisance as, in part, omitting to perform a duty that injures or endangers the safety of a person or that interferes with or otherwise renders unsafe another’s use of his property. *Prior v. White*, 180 So. 347, 355 (Fla. 1938). Georgia law defines nuisance as “anything that causes hurt, inconvenience, or damage to another . . .” GA. CODE ANN. § 41-1-1 (2018). State law also treats municipalities differently than the state or counties. For a municipality to be liable for a nuisance, the act complained of must last

entities in South Carolina, however, are not liable for nuisances.⁹³ Nuisance claims are commonly brought to remedy environmental harms and damage, including impounded water from a highway bypass or other road structure that can cause flooding or the overflow of water onto private property.⁹⁴ However, to our knowledge, this approach has not been used in Florida, Georgia, or North Carolina in the context of failure to maintain a road or in the context of governmental responsibility for repairing damage caused by flooding or other natural causes.

In all four states, a citizen may petition the court for a writ of mandamus to compel a governmental entity to fulfill its duty to repair and maintain a road.⁹⁵ However, mandamus actions are generally reserved for extraordinary circumstances and are not readily issued by courts. In North Carolina, for example, there are several required elements: the plaintiff must have a clear legal right to the act requested; the governmental official must have a legal duty to perform the act requested; the duty must be clear and not reasonably debatable; the duty must be ministerial in nature

for some time and be continuous or regularly repetitious; a failure to act must be in violation of a duty to act; and the municipality must fail to act within a reasonable time after knowledge of the defect or dangerous condition. *Mayor of Savannah v. Palmerio*, 249 S.E.2d 224, 229–30 (Ga. 1978). *See also* *Roquemore v. City of Forsyth*, 617 S.E.2d 644, 647 (Ga. Ct. App. 2005). In contrast, for the state or a county to be found liable, the nuisance must cause damage that arises to the level of a constitutional taking. *See DeKalb Cty. v. Orwig*, 402 S.E.2d 513 (Ga. 1991); *Duffield v. DeKalb Cty.*, 249 S.E.2d 235 (Ga. 1978).

93. S.C. CODE ANN. § 15-78-60(7) (2018). North Carolina courts have held that a governmental entity is liable for maintaining a nuisance and for damages caused by that nuisance. *Glance v. Town of Pilot Mountain*, 143 S.E.2d 78 (N.C. 1965). The North Carolina Supreme Court has stated that the line between negligence and nuisance “is often indistinct and difficult to define.” The primary difference is that a nuisance is a *condition*—rather than an act or omission as in negligence—that causes injury by reason of the manner of its maintenance or management. *Midgett v. N.C. State Highway Comm’n*, 144 S.E.2d 121, 126 (N.C. 1965).

94. *See Flo-Sun, Inc. v. Kirk*, 783 So. 2d 1029 (Fla. 2001) (alleging a public nuisance from sugar processing operation); *Town of Surfside v. Cty. Line Land Co.*, 340 So. 2d 1287 (Fla. Dist. Ct. App. 1977) (alleging nuisance from town’s operation of a dump that affected health, safety, and welfare of surrounding residential neighborhood); *Fla. Wildlife Fed’n v. State Dep’t of Envtl. Regulation*, 390 So. 2d 64, 65 (Fla. 1980) (alleging nuisance to enjoin water pollution); *Orwig*, 402 S.E.2d 513; *Duffield*, 249 S.E.2d 235; *Morris v. Douglas Cty. Bd. of Health*, 561 S.E.2d 393 (Ga. 2002); *Goode v. City of Atlanta*, 617 S.E.2d 210 (Ga. Ct. App. 2005); *City of Columbus v. Myszka*, 272 S.E.2d 302 (Ga. 1980); *Midgett*, 144 S.E.2d 121; *Glance*, 143 S.E.2d 78. *See also* Ronald G. Aronovsky, *Back from the Margins: An Environmental Nuisance Paradigm for Private Cleanup Cost Disputes*, 84 DENV. U. L. REV. 395 (2006).

95. S.C. CODE ANN. §§ 14-8-290, 14-3-310 (2018); FLA. CONST. art. V, § 3; GA. CODE ANN. §§ 9-6-20, 9-6-21(b) (2018); N.C. GEN. STAT. § 7A-32 (2018).

and not discretionary; the governmental official must have neglected or refused to perform the act; and the time for performing the act has expired.⁹⁶ Florida, Georgia, and South Carolina have similar requirements, although distinctions arise with respect to ministerial and discretionary duties.⁹⁷

Specifically, while mandamus actions are universally available for failing to perform a ministerial duty, the standard for and the results of mandamus actions for discretionary duties vary.⁹⁸ In Georgia, a mandamus suit may be brought to compel performance of a discretionary duty if the exercise of discretion is arbitrary and capricious or a *gross* abuse of discretion.⁹⁹ In North Carolina and Florida, a mandamus suit can compel a governmental official to make a discretionary decision but cannot compel the outcome of that decision.¹⁰⁰ In *Orange County v. NCDOT*, 265 S.E.2d 890 (N.C. Ct. App. 1980), the court noted that the duties to hear the appellants, to provide notice, and to prepare an environmental impact statement for the decision to locate a highway could be

96. *In re T.H.T.*, 665 S.E.2d 54 (N.C. 2008); *Town of Williamston v. Atlantic Coast Line R.R. Co.*, 72 S.E.2d 609, 612 (N.C. 1952); *Orange Cty. v. N.C. Dep't of Transp.*, 265 S.E.2d 890, 913 (N.C. Ct. App. 1980); *Parker v. State Highway Comm'n*, 143 S.E. 871, 874 (N.C. 1928). See also N.C. GEN. STAT. § 7A-32 (2018).

97. GA. CODE ANN. §§ 9-6-20, 9-6-21(b) (2018); *Burke Cty. v. Askin*, 732 S.E.2d 416, 419–20 (Ga. 2012); *Scarborough v. Hunter*, 746 S.E.2d 119, 123–24 (Ga. 2013) [hereinafter *Scarborough II*]. See also GA. CODE ANN. § 9-6-21(a) (2018) (“[M]andamus shall not be confined to the enforcement of mere ministerial duties.”); FLA. CONST. art. V, § 3(b)(8); *Somlyo v. Schott*, 45 So. 2d 502, 504 (Fla. 1950); *Ecological Dev., Inc. v. Walton Cty.*, 558 So. 2d 1069 (Fla. Dist. Ct. App. 1990); *Gilmer v. Hunnicutt*, 35 S.E. 521, 521, 524 (S.C. 1900).

98. In all four states, if the governmental entity has followed the statutory procedures for abandoning a road, then it no longer has a duty to repair and maintain that road and a mandamus action will not be issued. For example, one South Carolina case has directly dealt with a writ of mandamus to compel road maintenance after abandonment. The South Carolina Supreme Court set forth the following rule: “[I]f abandoned according to the method prescribed in such cases, no duty devolves upon the defendant commissioners to keep it in repair.” *Gilmer*, 35 S.E. at 521, 524. In Florida, one case touched briefly on mandamus but did not grant relief based on it. Here, a county voted to place certain roads on a “no maintenance” status while retaining easements and rights-of-way for control and use as public roads. *Ecological Dev., Inc.*, 558 So. 2d at 1069. The district court held that the county did not have authority to disclaim maintenance duties except by following statutory abandonment procedures. *Id.* at 1072.

99. Georgia cases have yet to articulate what constitutes “gross abuse” of discretion regarding discretionary decisions to repair and maintain roads. However, the distinction is important: In one case, the Georgia Supreme Court remanded a lower court’s grant of mandamus because it relied on the wrong legal standard. *Askin*, 732 S.E.2d at 419 (2012). The lower court found an abuse of discretion rather than a gross abuse of discretion in granting mandamus relief. *Id.*

100. *In re T.H.T.*, 665 S.E.2d at 49–60; *State ex rel. Allen v. Rose*, 167 So. 21 (Fla. 1936).

enforced by a writ of mandamus, but the duty to decide where to locate the highway was discretionary and not subject to mandamus.¹⁰¹ In South Carolina, a mandamus suit is limited to ministerial duties.¹⁰²

While, at the writing of this Article, there are no reported cases in our study area involving mandamus actions to compel a local government to repair or maintain a road degraded by increased flooding likely caused by sea-level rise, such suits are certainly possible in the future as roads become more frequently inundated and degraded.

C. Relocation Comes at a Cost: Road Abandonment and Takings Claims in Four South Atlantic States

While relocation is a relatively recent term used widely in adaptation planning, “abandonment” is the term of art utilized in our four-state study area to describe the government process of deserting roads. Sea-level rise and coastal flooding are causing, and will continue to cause, repeated damage to roadways and other coastal infrastructure. These damages are often costly to repair, and because they are likely to occur more frequently, will result in expenses that will inevitably become unaffordable for state and local governments.¹⁰³ This section discusses how these entities might abandon public roads, terminating the duty to repair and maintain them. While each of the four states in our study area have abandonment procedures, abandonment is likely to come at a price, as “takings” claims often successfully maintain that property owners abutting abandoned roads are owed compensation. These

101. *Orange Cty.*, 265 S.E.2d at 913.

102. *Sanford v. S.C. State Ethics Comm’n*, 685 S.E.2d 600, 606, *opinion clarified*, 688 S.E.2d 120 (2009) (finding that “[m]andamus is based on the theory that an officer charged with a purely ministerial duty can be compelled to perform that duty in case of refusal”); *Willimon v. City of Greenville*, 132 S.E.2d 169, 170 (1963) (holding that “when the performance of the duty rests in discretion . . . a writ of mandamus cannot rightfully issue”).

103. See DEADY ET AL., *supra* note 2, which analyzes alternatives for two pilot projects in Monroe County, FL with elevation options ranging from 6 inches to 28 inches. The cost analysis demonstrates the relationship between road length and alternative elevations with costs for design features to address sea-level rise-related flooding for the useful life of the road through 2040 including stormwater features to meet local, state and federal regulatory requirements. *Id.* at 20. See also Nicholas Kusnetz, *In the Outer Banks, Officials and Property Owners Battle to Keep the Ocean at Bay*, INSIDE CLIMATE NEWS (Nov. 28, 2017), <https://insideclimatenews.org/news/28112017/nags-head-north-carolina-beach-erosion-climate-change-sea-level-rise> [<https://perma.cc/P6DC-95WM>].

distinctions need to factor into the difference between legal exposure or causes of action and political pressure to respond to changing environmental conditions with regard to impacts on infrastructure.

1. The South Atlantic States: Comparing Abandonment Authority

The following chart distills the authority to abandon roads across the four jurisdictions by state, county, and municipality (city or town).

Table 4. Comparing the Authority to Abandon Roads.

	State	County	Municipality
Florida	FDOT may redesignate or relocate a road or undertake a project that closes or modifies existing access to a road.	A county may vacate, abandon, discontinue, or close a road but may not act to harm the public welfare.	A municipality may abandon or vacate a public road under its powers to perform municipal functions but may not act to harm the public welfare.
Georgia	GDOT may abandon a road if the agency determines that the road no longer serves a substantial public purpose or abandoning the road is in the best public interest.	A county may abandon a road if the county board of commissioners determines that the road no longer serves a substantial public purpose or abandoning the road is in the best public interest.	A municipality may abandon a road if the governing board determines that the road no longer serves a substantial public purpose or abandoning the road is in the best public interest.
North Carolina	NCDOT may abandon a road when the agency determines that the public good requires the road to be abandoned.	A county may permanently close any public road if it is not contrary to public interest and if no adjacent landowner would be deprived of reasonable means of access.	A municipality may close a public road if closing the road is not contrary to public interest and if no adjacent landowner would be deprived of reasonable means of access.
South Carolina	SCDOT may abandon a public road if it is in the best interest of all parties.	A county governing body may discontinue a public road found to be useless and if it is in the best interest of all parties.	A municipal council may close a street when, in its judgment, it may be necessary for the improvement of the municipality and if it is in the best interest of all parties.

Again, comparing the authorities and standards of abandonment across jurisdictions reveals several insights. Indeed, compared to duties, abandonment authority appears to fall along a wider spectrum, reflecting a range of values. Georgia jurisdictions, for example, must weigh whether the road serves a “substantial public purpose” and if abandonment is in the “public interest.” This rule reflects a strong viewpoint that emphasizes the overall benefit to the public.¹⁰⁴ An individual can challenge an entity’s decision to abandon a road, but the decision is discretionary and difficult for a court to reverse.¹⁰⁵ However, Georgia courts have found that if a road’s lack of maintenance is the reason for its disuse, subsequent attempts to abandon it may be an abuse of this discretion.¹⁰⁶ When deciding whether abandonment is proper, courts and public boards consider a variety of factors, including the financial burden of the maintaining the road, the public’s dependence on the road, and what caused a decrease in the public’s use of the road.¹⁰⁷ Relevant evidence could include the fact that no houses or businesses were located on the road and the fact that the public was not using the road.¹⁰⁸ Abandonment has been held to be proper in

104. In Georgia, GDOT is authorized by statute to dispose of any property or rights or interests in public roads “to the extent necessary in the public interest.” GA. CODE ANN. § 32-2-2(10) (2018). Counties can abandon a road if the county board of commissioners determines that the road has ceased to be used by the public to the extent that no substantial public purpose is served by it or is otherwise in the public best interest. *Id.* § 32-7-1; *Scarborough v. Hunter*, 706 S.E.2d 650, 652 (Ga. 2011) [hereinafter *Scarborough I*]. Municipalities are authorized to abandon any public road that is under their respective jurisdictional control when abandonment is deemed in the public’s best interest or the street ceases to be used by the public to the extent that no substantial purpose is served by it. GA. CODE ANN. § 32-7-1 (2018).

105. Individuals wishing to challenge the decision to abandon a road may seek a writ of mandamus that, if granted by the court, could compel these cases. The only question before the trial court is whether the governing board’s decision to abandon the road was so arbitrary and capricious that it amounted to a “gross abuse of . . . discretion.” *Scarborough II*, 746 S.E.2d 119, 124 (2013).

106. *Cherokee Cty. v. McBride*, 421 S.E.2d 530 (Ga. 1992) (*overruled on different grounds by Scarborough I*, 706 S.E.2d 650).

107. In *Scarborough II*, the court held that evidence that the county would need to rebuild the road at a cost of \$600,000 to \$800,000, and that plaintiff’s less expensive proposal would not make the road stable, supported the board’s decision. 746 S.E.2d at 125. *See also* *Torbett v. Butts Cty.*, 520 S.E.2d 684, 685 (Ga. 1999) (holding that evidence that the County’s road budget would not support reconstruction was sufficient).

108. *Scarborough II*, 746 S.E.2d at 125. Similarly, the county board in *Torbett v. Butts County* considered evidence that no residents lived on the portion of road the county wanted to abandon, and trial court upheld the board’s decision, in part, because “there were no

certain situations even if the road abuts private property.¹⁰⁹ Having the authority to abandon roads even when they abut private property is likely to be a critical tool for adaptation planning. As we discuss in Part III, adaptation planning decisions that further the functionality of the overall road-system should be a priority.

In Florida, counties and municipalities similarly have wide authority to abandon roads, but must not harm the public welfare¹¹⁰ and should consider the public interest when doing so. Public places and rights-of-way are held in trust for the benefit of the public, but this trust concept does not preclude abandoning or otherwise discontinuing those streets “when done in the interest of the general welfare.”¹¹¹ In *City of Naples v. Miller*, 243 So. 2d 608 (Fla. Dist. Ct. App. 1971), the court upheld a municipal ordinance to vacate and abandon a street after consulting with public officers, considering the general welfare of the citizens, and determining that abandoning the street was in the best interest of the city.¹¹²

North Carolina, on the other hand, more directly inserts individualistic concerns about access for adjacent landowners,

improved structures on it and no homeowners or businesses would be left without public road frontage if it were closed” 520 S.E.2d at 685.

109. For example, the *Smith* court, while affirming the trial court’s decision that the Athens-Clarke County Board’s decision to abandon a road was not arbitrary and capricious, held that sufficient evidence supported the finding that the road served no substantial public purpose, even though plaintiff owned property, but did not live, along the road. *Smith v. Bd. of Comm’rs of Athens-Clarke Cty.*, 444 S.E.2d 775, 776 (Ga. 1994).

110. FLA. STAT. §§ 335.02, 335.199 (2018). FDOT may abandon a road or highway under one of two provisions in state law: FDOT may re-designate or relocate any highway or public road under its jurisdiction, and it may undertake a project that closes or modifies existing access to a state highway. The agency must provide public notice and a public hearing prior to acting, depending upon the abandonment action. *Id.* § 335.199. A Florida county must provide a reasonable level of maintenance that affords meaningful access, unless or until the county formally abandons the road. County commissioners maintain the discretion to “vacate, abandon, discontinue and close” any existing roads used for travel other than a state or federal highway. *Id.* § 336.09(a). Florida courts have indicated that a county should consider the public benefit; if the general public is using the road, then the county should not harm the public welfare by abandoning the road. *Bouldin v. Okaloosa Cty.*, 580 So. 2d 205, 210–11 (Fla. Dist. Ct. App. 1991). *See also* FLA. STAT. § 336.10 (2018) (regarding notice requirements); *id.* § 336.12 (regarding ownership outcomes after abandonment). A Florida municipality may abandon or vacate a public road by passing an ordinance. FLA. CONST. ART. VIII, § 2; FLA. STAT. § 166.021 (2018). For notice requirements, see *id.* § 166.041 and *City of Naples v. Miller*, 243 So. 2d 608, 610 (Fla. Dist. Ct. App. 1971). After a city street is vacated, title to the area vests in abutting property owners. *Hurt v. Lenchuk*, 223 So. 2d 350, 352 (Fla. Dist. Ct. App. 1969).

111. *Sun Oil Co. v. Gerstein*, 206 So. 2d 439, 441 (Fla. Dist. Ct. App. 1968).

112. *Miller*, 243 So. 2d at 611.

although several cases support abandonment decisions in spite of such landowners. In North Carolina, closing the street may not be “contrary to the public interest” and no adjacent landowner should be “deprived of reasonable means of ingress and egress” to her property.¹¹³ Although a county does not have a legal duty to maintain and repair roads, a county may close roads when they are realigned or no longer needed.¹¹⁴ However, they must consider “whether the closing would be detrimental to the public interest or to any individual property rights.”¹¹⁵

North Carolina also allows any “person aggrieved” to appeal a municipal council’s or board of commissioners’ order to the General Court of Justice within thirty days of the decision or adoption of the order.¹¹⁶ Courts have defined such an “aggrieved person” as someone who “can either show an interest in the property affected, or if the party is a nearby property owner, some special damage, distinct from the rest of the community that amounts to a reduction in the value of his property.”¹¹⁷ In *Cox v. Town of Oriental*, 759 S.E.2d 388 (N.C. App. 2014), the court found that the plaintiff could not challenge a road closure because his property was not adjacent to the road; he could not show a special connection distinct from the general public; and his status as a taxpayer was wholly irrelevant to the outcome of the decision.¹¹⁸ On the other hand, in *Ocean Hill Joint Venture v. Currituck County Board of Commissioners*, 630 S.E.2d 714 (N.C. Ct. App. 2006), after the Currituck County Board of Commissioners approved a

113. N.C. GEN. STAT. § 160A-299(a) (2018). After closing a street or alley, the former right-of-way automatically vests in the abutting landowners. Each landowner receives a parcel the width of the land abutting the road up to the center line of the right-of-way. *Id.* § 160A-299(c).

114. *Id.* § 153A-241 (A county may also permanently close “any public road or any easement within the county and not within a city, except public roads or easements for public roads under the control and supervision of [NCDOT].”).

115. *Id.* In order to close a road, the board of commissioners must “adopt a resolution declaring its intent to close the public road or easement” and meet a series of notice and public hearing requirements. *Id.* When a public road has been properly closed in accordance with the statutory protocol, all “right, title, and interest in the right-of-way is vested in those persons owning lots or parcels of land adjacent to the road or easement, and the title of each adjoining landowner, for the width of his abutting land, extends to the center line of the public road or easement.” *Id.*

116. *Id.* § 160A-299(b) (regarding municipalities); *id.* § 153A-241 (regarding counties).

117. In the Matter of the Granting of a Variance by the Town of Franklin, 508 S.E.2d 841, 843–44 (N.C. Ct. App. 1998) (importing the meaning of “person aggrieved” from decisions about the same phrase in the context of zoning ordinances).

118. *Cox v. Town of Oriental*, 759 S.E.2d 388 (N.C. App. 2014).

resolution to close residential subdivision roads to the public, a jury found that decision to be contrary to the public interest.¹¹⁹ One witness testified that she was concerned about safely getting to and from the beach if the roads were closed to the general public, while another witness testified that the road was always meant to be and remain public.¹²⁰

South Carolina, on the other hand, seems to embody a more utilitarian perspective combined with a “best interest of all parties” standard. While state statute outlines the procedural steps for abandonment of streets, roads, or highways,¹²¹ no statutory standard for road abandonment is articulated at the state-level for SDOT. Counties, on the other hand, must determine, more bluntly and more broadly, that a road is “useless,”¹²² while cities and towns have a more positive task of weighing whether abandonment is “necessary” for the municipality’s “improvement.”¹²³ In all cases, once the procedural requirements are met, a court will determine whether abandoning or closing the street is in the best interest of all concerned parties and will issue an order stating who will have title.¹²⁴

First Baptist Church of Mauldin v. City of Mauldin, 417 S.E.2d 592 (S.C. 1992) illustrates the types of factors considered when deciding whether a road closure is in the “best interest” of all parties involved. In this case, the church owned two plots of land on either side of an unpaved public road and sought to close the road to expand its on-site daycare facilities. In determining whether the road closure would be in the public interest, the court considered various factors including the value of the church to the community, the danger posed by the road due to its narrow and curvy nature, and the danger posed to children at the daycare by drivers who used the road exclusively to avoid the traffic lights on the major road. The court held that the lower court properly considered the public interest in determining whether the road may be abandoned, and that even though there are incidental

119. *Ocean Hill Joint Venture v. Currituck Cty. Bd. Of Comm’rs*, 630 S.E.2d 714 (N.C. Ct. App. 2006).

120. *Id.* at 716–17.

121. S.C. CODE ANN. § 57-9-10 (2018).

122. *Id.* § 57-17-10. There are no reported cases defining “useless.”

123. *Id.* § 5-27-150. However, the municipality’s jurisdiction to close the road is not exclusive; it remains concurrent with that of the court.

124. *Id.* § 57-9-20.

benefits to private parties from its decision, the court did not abuse its discretion.¹²⁵

Abandoning a road is not the end of the story, however. A legal claim for a taking could arise when a local government closes or abandons a public road, as well as when it undertakes a construction project that temporarily blocks access to a public road from a private property. As we compared takings cases across the four-state study area, we saw indications of the following trends that could have significant implications for adaptation planning involving abandonment: (1) a complete loss of access to the property is not necessary for property owners to recover, and (2) while failure to maintain generally does not constitute abandonment, it may, as indicated by at least one court, support a takings claim.

2. Eliminating a Property Owner's Access to a Road: Issues and Distinctions

In takings cases involving a property owner's access to a road, often a complete loss of access to the property is not necessary for the property owner to recover. If an entity abandons a public road that abuts a landowner's property, and such abandonment substantially interferes with the landowner's ability to enter and exit his property via that public road, a compensable taking of private property may have occurred.

In Florida, eliminating or interfering with the right to access constitutes a taking if the property owner's right of access was *substantially diminished*.¹²⁶ If the government cuts off access

125. *First Baptist Church of Mauldin v. City of Mauldin*, 417 S.E.2d 592, 594 (S.C. 1992). The court said while a public street may not be vacated for the sole purpose of benefitting the abutting property owner, "the mere fact that the vacation was at the instigation of an individual who owns abutting property does not invalidate the vacation or constitute abuse of discretion, nor does the fact that some private interest may be served incidentally. . . . [I]t must appear clearly that no consideration other than that of public interest could have prompted the action." *Id.*

126. *Palm Beach Cty. v. Tessler*, 538 So. 2d 846, 849 (Fla. 1989). To establish a successful takings claim, property owners must prove that their damages are special. If the damages are the same as those suffered by owners of land similarly situated, the damages are not compensable even if they are more severe in degree. If damages are special and therefore compensable, courts must determine whether the owner's access was substantially diminished by considering whether alternative means of access remains. *Pinellas Cty. v. Austin*, 323 So. 2d 6, 7–8 (Fla. Dist. Ct. App. 1975). In Florida, a judge determines as a matter of law whether access has been substantially diminished. *Fla. Dep't of Transp. v. Fisher*, 958 So. 2d 586, 590 (Fla. Dist. Ct. App. 2007).

completely with no alternative means of access, the court will likely hold that access was substantially diminished.¹²⁷ However, an impact that is less severe than complete loss of access may also amount to a taking in Florida, and the *quality* of access is often a factor. In one case, the county abandoned a road that the property owners used to access their property. The only remaining access points were an old wooden bridge that could not support heavy vehicular traffic and a platted street that did not connect to a usable road. The court found the loss of access to be compensable, even though the property owners technically had remaining ways to access their land.¹²⁸ In another case, the court held that a winding road through a neighborhood was an unsuitable alternative to direct access. Further, service roads that are overly long may not be suitable substitutes for the previously abutting road,¹²⁹ and while the loss of the most convenient route of access is not necessarily compensable, the remaining access routes should be usable. For example, a frontage road could provide suitable alternative access to property that abuts a vacated road.¹³⁰

In Georgia and South Carolina, the right to enter and exit one's property by using a public road is usually referred to by courts as an "easement of access."¹³¹ In Georgia, it is a special property right

127. *Anhoco Corp. v. Dade Cty.*, 144 So. 2d 793, 794–95 (Fla. 1962).

128. *Pinellas Cty.* 323 So. 2d at 8.

129. *Fla. Dep't of Transp. v. Kreider*, 658 So. 2d 548 (1995), *reh'g denied*, 669 So. 2d 250 (1996).

130. *Fisher*, 958 So. 2d 586; *Rubano v. Fla. Dep't of Transp.*, 656 So. 2d 1264 (Fla. 1995). Florida courts have also held that the construction of a curb does not necessarily substantially diminish access as long as another entrance exists. *Compare Fla. Dep't of Transp. v. Landman*, 664 So. 2d 1141 (Fla. Dist. Ct. App. 1995) (holding that construction of a curb did not constitute a takings when a driveway entrance remained), *and City of N. Miami Beach v. Reed*, 749 So. 2d 1275 (Fla. Dist. Ct. App. 2000) (holding that construction of a curb in front of landowner's property did amount to a takings). Certain types of damages are not compensable, such as damages resulting from the regulation of traffic and safety control. *Fla. Dep't of Transp. v. Suit City of Aventura*, 774 So. 2d 9, 12–14 (Fla. Dist. Ct. App. 2000). Damages resulting from limiting access to one side of the road or eliminating the connection of the abutting road with a major highway are also not compensable. *Id.* If other owners were located on the previously abutting road, the court may hold that plaintiff's damages are general if other means of access are available, even if the government eliminated or interfered with access to the property from one particular road. *Rubano*, 656 So. 2d at 1267–68.

131. *Dougherty Cty. v. Hornsby*, 97 S.E.2d 300 (Ga. 1957). *See also Frampton v. S.C. Dep't of Transp.*, 752 S.E.2d 269, 275 (S.C. Ct. App. 2013).

held by owners of property abutting the road.¹³² If the easement of access is substantially interfered with due to abandonment or other reasons, the property owner that possesses the easement is entitled to compensation, even if an alternative route to and from his or her property exists.¹³³ If abandonment only results in an inconvenience of access, that inconvenience is not compensable, unless the inconvenience is special to the landowner. This issue arises most commonly when an entity abandons or dead ends only a portion of a public road, resulting in an inconvenience of travel, but not a direct interference with the landowner's ability to access his property via the road.¹³⁴

In South Carolina, if a governmental action materially injures the easement of ingress and egress to a public road, such that the property owner no longer enjoys the reasonable means of access to which he or she is entitled, a compensable taking has occurred.¹³⁵

132. *Dougherty Cty.*, 97 S.E.2d at 302. In addition to the "easement of access," abutting property owners have a general right "to use and enjoy the highway" that they share with the public, elimination of which is not compensable under the Constitution. *Id.*

133. *Circle K General, Inc. v. Ga. Dep't of Transp.*, 396 S.E.2d 522, 524–25 (1990). In *Circle K*, the court applied this rule in a case involving a DOT construction project. As a result of the project, Circle K no longer had direct access to a public highway that once abutted its property, but instead only had access to a new service road. The court held that Circle K's easement of access had been impaired. It was up to the jury, the court explained, to determine whether Circle K's access was "substantially interfered with," and if so, the decrease in property value that DOT would be obliged to pay. *Id.* at 524. Importantly, the court held that access to the service road was not automatically a sufficient substitute for access to the highway. *Id.*

134. In *Tift Cty. v. Smith*, 131 S.E.2d 527 (Ga. 1963), a property owner brought an action for an alleged taking or private property due to Tift County dead-ending the public road on which the owner lived. *Id.* at 527–28. The property owner claimed that because of the county's act, his commute to a nearby town became longer and required him to take an occasionally hazardous road, a burden that affected the value of his property in an extent peculiar to his property. The court disagreed, explaining that the property owner had the same access to the road abutting his property, as the county did not alter this part of the road. *Id.* at 530.

135. *See, e.g.*, *S.C. State Highway Dep't v. Allison*, 143 S.E.2d 800, 802 (S.C. 1965) ("[A]n obstruction that materially injures or deprives the abutting property owner of ingress or egress to and from his property is a 'taking' of the property, for which recovery may be had."); *Sease v. City of Spartanburg*, 131 S.E.2d 683, 685 (S.C. 1963) ("The protection of [the South Carolina takings clause] extends to all cases in which any of the essential elements of ownership has been destroyed or impaired as the result of the construction or maintenance of a public street."); *Brown v. Hendricks*, 45 S.E.2d 603, 606 (S.C. 1947) ("The accessibility of one's property may in some instances constitute a great part of its value, and to permit a material impairment of his access would result in the destruction of a great part of the value . . . and his property is therefore as effectually taken as if a physical invasion was made thereon and a physical injury done thereto.") (quoting *Foster Lumber Co. v. Ark. Valley & W. Ry. Co.*, 20 Okla. 583, 95 P. 224, 227 (1908), *aff'd on reh'g*, 20 Okla. 583 (1909)).

Prior to a South Carolina Supreme Court decision that was issued in August 2018, all reasonable means of ingress and egress from the property must have been exhausted before an injury could amount to a taking and, if only one point of access had been eliminated or the government had provided an alternative access easement, the landowner would not be compensated for a taking.¹³⁶ However, in *SCDOT v. Powell*, 818 S.E.2d 433 (S.C. 2018), a case involving a property owner's indirect loss of access to a bypass, the South Carolina Supreme Court held that if access has been substantially restricted *related* to a physical appropriation of land, then the landowner may be compensated for a taking.¹³⁷ The court further held that, after a physical taking for a road project has occurred, any diminution in property value related to traffic control or road access may be considered in the compensation calculation.¹³⁸ In our view, it is hard not to agree with the dissenting opinion in *Powell*, which argues that the majority significantly changed South Carolina eminent domain law, as a property owner's "increased remoteness" and "increased complexity" in accessing his property can now support a takings claim.¹³⁹

In North Carolina, eliminating *direct access* to property can trigger a takings claim, but such claims may be mitigated or negated by providing reasonable alternative access. Reasonable alternative access is not, in North Carolina, an indirect, 1.5-mile detour through residential streets.¹⁴⁰ Nor is it having to drive along a number of local streets that were part of the city street system.¹⁴¹ Access to a service or frontage road, on the other hand, would likely be considered reasonable alternative access and not rise to a compensable taking. For example, in *N.C. State Highway Commission v. Rankin*, 163 S.E.2d 302 (N.C. Ct. App. 1968), when a property owner's direct access was eliminated and replaced with a paved service road that connected the property to a highway seven-tenths of a mile from the property, that service road was found to constitute reasonable access.¹⁴²

136. S.C. Dep't of Transp. v. Powell, 818 S.E.2d 433 (S.C. Ct. App. 2015), *rev'd by* S.C. Dep't of Transp. v. Powell, 818 S.E.2d 433 (S.C. 2018).

137. *Powell*, 818 S.E.2d 433.

138. *Id.* at 438.

139. *Id.* at 437, 440 (James, J., dissenting).

140. Dr. T.C. Smith Co. v. N.C. State Highway Comm'n, 182 S.E.2d 383, 387 (N.C. 1962).

141. N.C. Dep't of Transp. v. Harkey, 301 S.E.2d 64, 66 (1983).

142. N.C. State Highway Comm'n v. Rankin, 163 S.E.2d 302, 304 (N.C. Ct. App. 1968).

3. Governmental Inaction When Failing to Maintain a Road: Takings

Two states in our study area—South Carolina and Florida— have considered issues involving whether discontinuing maintenance results in abandonment. In both states, simply discontinuing maintenance was insufficient to constitute abandonment.¹⁴³ They differ, however, in whether such inaction might result in a taking of private property. Importantly, federal case law has recently made it clear that an identified, authorized government action represents a prerequisite to stating a valid claim for a taking.¹⁴⁴

Governmental inaction when failing to maintain a road, as opposed to intentional abandonment pursuant to statutory procedures, might be sufficient to support a compensable taking in Florida, the only state in our study to have reached a specific decision on this issue. Granted, this has only occurred in the District Court of Appeals of one jurisdiction.¹⁴⁵ Therefore, whether it will be persuasive in other decisions remains to be seen. In *Jordan v. St. Johns County*, 63 So. 3d 835 (Fla. Dist. Ct. App. 2011), property owners alleged that the county failed to reasonably maintain the road they used to access their property, and the failure to maintain the road deprived the owners of access. The coastal road was subject to repeated damage from storms and erosion, which made maintenance difficult and costly. Remediation costs were estimated at \$13 million up front, with an additional \$5.7 to \$8.5 million required for maintenance every three to five years.¹⁴⁶ The county chose not to spend such a high amount on about 1.6 miles of road, as the high cost of maintaining such a small segment could deplete more than half of their road and maintenance budget. Indeed, their entire annual road and bridge maintenance budget for 2009—the year the lawsuit was filed—was \$9.6 million for more than 1,000 miles of road and 47 bridges.¹⁴⁷ However, the county had not officially abandoned the road when it made its decision not to maintain it. The court found that the county’s “failure” to

143. Erin L. Deady, *Why the Law of Climate Change Matters: From Paris to a Local Government Near You*, FLA. B.J., Nov. 2017, at 54, 56; *Hawkins v. City of Greenville*, 594 S.E.2d 557, 562–63 (S.C. Ct. App. 2004).

144. Deady, *supra* note 143, at 56; *St. Bernard Parish Gov’t v. U.S.*, 887 F.3d 1354, 1357 (Fed. Cir. 2018).

145. *Id.* *Jordan v. St. Johns Cty.*, 63 So. 3d 835, 839 (Fla. Dist. Ct. App. 2011).

146. Deady, *supra* note 143, at 56.

147. Ruppert, *supra* note 77, at 10919, 10919 n.64.

maintain the road could support a claim for compensation and remanded the case for further proceedings.¹⁴⁸

Even though the parties ultimately settled, the holding of *Jordan*—that government inaction, rather than active abandonment, could support a takings claim—entered into Florida law. *Jordan* remains binding on all trial courts in Florida on the question of when inaction regarding maintenance can support a takings claim, although we emphasize that it may be an outlier.¹⁴⁹ In large part to the *Jordan* case, the county also passed an ordinance relating to levels of service for environmentally challenging locations, an option we discuss in Part III.

The *Jordan* case is likely an outlier in our four-state study area, as some states require a higher standard for inaction to qualify as a taking. For example, in a case involving failure to maintain a stormwater drain, the South Carolina Court of Appeals made it clear that only an “*affirmative, positive, aggressive act*” on the part of a government agency can serve as the basis for an inverse condemnation claim.¹⁵⁰ In this way, under South Carolina law, it appears that a government entity could not be held liable under a takings claim for failure to maintain a road.

4. Abandonment and Takings: Conclusions

In sum, although the rules differ in each state in our study area, government authority to abandon roads is increasingly complicated by takings claims. Florida is the leading example of this trend, as a series of cases have found compensable takings not only when access to property was limited, but also when the quality of access to property was overly compromised. South Carolina, while it once drew a sharper line than its neighboring states, seems to be following Florida’s direction, allowing what was essentially a property owner’s concern about “increased remoteness” and

148. *Jordan*, 63 So. 3d at 837, 839.

149. We are persuaded that subsequent federal case law offers a better approach by to determining takings in the context of failure to maintain. See *St. Bernard Parish Gov’t*, 887 F.3d at 1360 (noting that, “[o]n a takings theory, the government cannot be liable for failure to act, but only for affirmative acts by the government.”). The court also observed that “takings liability arises from an ‘authorized activity.’” (quoting *Moden v. United States*, 404 F.3d 1335, 1339 (Fed. Cir. 2005)).

150. *Hawkins v. City of Greenville*, 594 S.E.2d 557, 562–63 (S.C. Ct. App. 2004) (emphasis added) (concluding that mere failures to act are insufficient to support a takings claim where plaintiff alleged he was deprived of his full rights as a property owner because of city’s design of and failure to maintain its storm water drainage system).

“increased complexity” in accessing his property, to support a takings claim.¹⁵¹ Georgia and North Carolina courts seem to share this view to an extent, although the North Carolina *Kirkpatrick* court was utterly unpersuaded by a property owner’s economic losses (primarily, rental losses) after the town abandoned a road that was repeatedly washed away by storms, and a beach house owner could only access his property on foot.

For better or worse, Florida, with the largest population and longest coastline in our study area, probably represents the future on this issue, unless takings jurisprudence changes drastically. Sea-level rise illuminates “some of the absurdities of much of the regulatory takings doctrine,” as an ideal of unchangeable property rights clashes with very real and drastic coastal transformation.¹⁵² Indeed, in at least one District Court of Appeals, sea-level rise appears to mean that government failure to maintain a road, without undertaking proper abandonment procedures, could result in a takings claim, even if the costs of proper procedures are prohibitive. The potential for that theory to evolve more prolifically within state law, however, is presently unknown.

An in-depth discussion of takings jurisprudence is beyond the scope of this Article, but we wish to sound an alarm of concern. Government inaction, while not necessarily desirable, is more akin to traditional negligence than a taking. Government inaction should be treated as a point to consider when determining the adequacy of a government’s response to flooding due to sea-level rise, and whether it rises to gross negligence—it should not be treated as a taking.¹⁵³ We agree with the assessment that this trend

151. S.C. Dep’t of Transp. v. Powell, 818 S.E.2d 433, 440 (S.C. 2018) (James. J., dissenting).

152. J. Peter Byrne, *The Cathedral Engulfed: Sea-Level Rise, Property Rights, and Time*, 73 LA. L. REV. 69, 72 (2012).

153. Recently, in cases where the facts are particularly sympathetic to plaintiffs that have been injured by flooding, but where sovereign immunity bars the claim, courts have been open to inverse condemnation claims. See, e.g., Ark. Game & Fish Comm’n v. U.S., 568 U.S. 23, 38–40 (2012) (holding that any temporary flooding event that damages private property can result in a compensable taking); *In re Katrina Canal Breaches Litig.* v. U.S., 696 F.3d 436 (5th Cir. 2012) (finding that the U.S. Army Corps of Engineers had an affirmative duty to maintain a channel and its failure to do so could support a takings claim); *Litz v. Md. Dep’t of the Env’t*, 131 A.3d 923 (Md. 2016) (government failure to address the pollution and sewage problems led to devaluing her property and supported an inverse condemnation claim); *Livingston v. Va. Dep’t of Transp.*, 726 S.E.2d 264 (Va. 2012) (holding that, if a government entity has a duty to maintain a flood control structure but fails to do so, damaged landowners have standing to bring a takings claim).

of transforming negligence claims into takings claims is likely to “produce a chilling effect, making officials less likely to restrict improvident floodplain and coastal development for fear of takings claims.”¹⁵⁴ Even worse, such cases could hinder innovative, nature-based approaches to flood control projects, as local governments may see such projects, perhaps wrongly, as less protective of private property.¹⁵⁵ However, we are heartened by a recent decision in the Federal Court of Claims, squarely asserting that “the government cannot be liable on a takings theory for inaction” in cases involving flooding caused by lack of maintenance.¹⁵⁶

Local governments are in a tremendous bind in the face of uncertainty surrounding sea-level rise, and inaction may be one of many options for governments to consider. Clearly, local government budgets are limited. For roads affected by sea-level rise and coastal flooding, constant repair of certain roads could deplete the resources necessary to keep the remainder of the road network in safe and navigable condition. Indeed, all of these factors need to be considered when evaluating potential risk and liability associated with sea-level response.

154. Sandra B. Zellmer, *Takings, Torts, and Background Principles*, 52 WAKE FOREST L. REV. 193, 194 (2017).

155. *Id.* But see Christopher Serkin, *Passive Takings: The State's Affirmative Duty to Protect Property*, 113 MICH. L. REV. 345 (2014). Cf. Michael Pappas, *A Right to Be Regulated?*, 24 GEO. MASON L. REV. 99 (2016).

156. *St. Bernard Parish Gov't v. U.S.*, 887 F.3d 1354, 1357 (Fed. Cir. 2018). The Court of Appeals overturned takings liability of the U.S. Army Corps of Engineers for flooding caused by the Mississippi River Gulf Outlet and Army Corps' lack of maintenance on the Outlet for multiple reasons. As part of that case, the appellate court asserted that the lower court had asked the wrong legal question, namely whether “the [takings] causation analysis requires the plaintiff to establish what damage would have occurred without government action.” *Id.* at 1363. The lower court, in the appellate court's view, mistakenly asked whether the Mississippi River Gulf Outlet had made flooding worse instead of conducting a comparison of “the flood damage that actually occurred to the flood damage that would have occurred if there had been no government action at all.” *Id.* In other words, the plaintiffs needed to prove that *all* government action related to flooding combined had caused them to flood; only looking at the contribution of the Mississippi River Gulf Outlet without also considering other flood-control works, such as the extensive levees built by the Army Corps, was not the correct approach. “Causation requires a showing of ‘what would have occurred’ if the government had not acted.” *Id.* at 1362 (citing *United States v. Archer*, 241 U.S. 119, 132 (1916)).

III. ROADS LESS TRAVELED: TOWARDS ADAPTIVE DUTIES AND ABANDONMENT AUTHORITIES FOR STATE AND LOCAL GOVERNMENTS FACING SEA-LEVEL RISE

As flooding increases due to sea-level rise, state and local governments will be pressed to act. Yet, as the discussion in Part II reveals, traditional conceptions of duties and immunities will need to change. In this Part, we propose the following: an adaptive duty to maintain that reflects a resilience standard and includes sovereign immunity protection except in instances of gross negligence; an adaptive authority to abandon; and statewide duties and authorities to improve state, county, and local adaptation planning and coordination.

A. Towards an Adaptive Duty to Maintain Road Systems: Adopting a Resilience Standard

In this section, we propose expanding the scope of the duty to maintain roadways to incorporate an “adaptive” component that involves viewing the road network as an interconnected system rather than as individual segments that serve specific property parcels. While detailed analyses of when and how sea-level rise and flooding will affect individual communities are inherently uncertain, the science is conclusive—it is well understood that increased flooding is readily foreseeable in many coastal communities.¹⁵⁷ Uncertainty about the timing and severity of local impacts, while very real, is not the same as low probability,¹⁵⁸ and more frequent and higher levels of flooding are already happening in many low-lying coastal areas. As sea levels rise, impacts will only continue to increase. We support expanding the duty to maintain in response to these very foreseeable developments, while simultaneously using sovereign immunity to protect government entities that will have to make risky planning-level decisions unless they act with gross negligence. This approach reemphasizes the Western legal tradition of holding roadways in the public trust;

157. Foreseeability of the harm often plays a role, although the extent of risk usually depends on the specific facts of the case. RESTATEMENT (THIRD) OF TORTS: PHYSICAL AND EMOTIONAL HARM § 7 (AM. LAW INST. 2010).

158. R. Henry Weaver & Douglas A. Kysar, *Courting Disaster: Climate Change and the Adjudication of Catastrophe*, 93 NOTRE DAME L. REV. 295, 307 (2017) (“A fundamental lesson of chaos and complexity theory is that uncertainty does not imply low probability despite our cognitive tendency to associate the two.”).

maintains the historical focus in U.S. constitutional law on negative rights;¹⁵⁹ highlights roadways as *systems* to be maintained instead of simply transportation routes for individuals; builds upon existing duties to maintain roadways; reflects principles of adaptation; and, importantly, allows for governments to continue to plan for and provide local services in a financially responsible way by providing them with sovereign immunity.

In the United States, governments hold public ways as a public trust.¹⁶⁰ Indeed, Roman law characterized travel lanes such as roads and waterways as “*res publicae*,” resources that were “inherently public.”¹⁶¹ This foundational Western conception of roads as public property runs through many of the duties to maintain discussed in our study area. While it may seem obvious that roadways in the United States have been, for the most part, designed for the public and its use, increased flooding puts new pressures on local governments. We contend that it is time to emphasize the public trust nature of government road ownership so that the public’s collective interests inform the scope of government’s duty to maintain a roadway. This serves to mitigate the view that the quality of public road access is a property right connected to individual parcels or developments. Reaffirming the public good promoted by the public road system, rather than its value only to specific properties, will be crucial in an era when adaptation efforts that promote comprehensive community resilience—and allow governments to set priorities and make hard decisions—are sorely needed.

A public interest conception of the general duty to maintain a roadway threads its way through several of the cases discussed in this Article. Keeping roads safe, serviceable, able to carry “ordinary loads,” and free from obstruction reflect a broader concern for the public welfare. Importantly, many of these duties are described in

159. See, e.g., Thomas T. Ankersen & Thomas Ruppert, *Tierra y Libertad: The Social Function Doctrine and Land Reform in Latin America*, 19 TULANE ENVTL. L.J. 69, 108 n.238, 108–09, 116 (2006) (discussing distinctions between countries and their views of positive versus negative rights).

160. 3 JOHN MARTINEZ, LOCAL GOVERNMENT LAW § 17:1 (2018).

161. See Carol M. Rose, *Romans, Roads, and Romantic Creators: Traditions of Public Property in the Information Age*, LAW & CONTEMP. PROBS., Winter/Spring 2003, at 89, 96–97; Carol M. Rose, *Big Roads, Big Rights: Varieties of Public Infrastructure and Their Impact on Environmental Resources*, 50 ARIZ. L. REV. 409, 417 (2008) (“Transportation infrastructure is such a quintessentially public function that for millennia, roads and waterways have been at the core of western legal conceptions of public property.”).

the context of the government's obligation to maintain a road or highway *system*.¹⁶² As coastal communities are facing rising sea levels, system-wide planning, targeted investment, and road closures will be crucial for the entire system to function safely and efficiently. To that end, an adaptive duty to maintain would take into account interests and demands facing the wider road system, especially those systems burdened by increased flooding and sea-level rise. As holders of the public trust in roads, governments have an obligation to consider the broader implications of their decision-making. For example, some roads may be more critical than others, while some roads may be too vulnerable to save.

An adaptive duty to maintain would allow for an alteration of the concept of "reasonable means of access," a standard that runs through several jurisdictions in our case study with respect to abandonment authority.¹⁶³ Indeed, in an attempt to do just that, St. Johns County, Florida developed an ordinance regarding "natural degradation" of roads in delineated areas where the county's minimum design criteria may not be feasible. In these areas, drivers may at times encounter unpaved surfaces, single lanes of varying widths, and periods where the roads are submerged, among other possibilities. In other words, St. Johns County makes it clear that certain problematic roads may be in substandard conditions on a regular basis.¹⁶⁴ This reflects a significant change in how we have often thought about infrastructure, as generally there is the sense that we can rebuild or restore engineered systems to their previous states.¹⁶⁵

Another case study is Monroe County, Florida, which in 2017, adopted a resolution requiring road elevation design criteria that

162. FLA. DEP'T OF TRANSP., MANUAL OF UNIFORM MINIMUM STANDARDS FOR DESIGN, CONSTRUCTION AND MAINTENANCE FOR STREETS AND HIGHWAYS v-vi (2016), https://fdotwww.blob.core.windows.net/sitefinity/docs/default-source/roadway/florida-greenbook/2016floridagreenbookfinal-982972170.pdf?sfvrsn=946ed802_2 [<https://perma.cc/L9S4-6G6M>] [hereinafter *Florida Greenbook*] (noting objectives that include "[d]evelop[ing] and maintain[ing] a highway *system* that provides the safest practicable environment for motorists, cyclists, pedestrians, and workers" and "[p]rovid[ing] for satisfactory resolution of conflicts between the surface transportation *system* and social and environmental considerations to aid neighborhood integrity") (emphasis added).

163. See, e.g., *Tift Cty. v. Smith*, 131 S.E.2d 527, 528-530 (Ga. 1963); *Dr. T.C. Smith Co. v. N.C. State Highway Comm'n*, 182 S.E.2d 383, 387 (N.C. 1962).

164. St. Johns County, Fla., Ordinance No. 2012-35 (Dec. 11, 2012), <https://stjohnsclerk.com/minrec/OrdinanceBooks/2012/ORD2012-35.pdf> [<https://perma.cc/CM4L-Q6E8>].

165. See Jonathan Rosenbloom, *Fifty Shades of Gray Infrastructure: Land Use and the Failure to Create Resilient Cities*, 93 WASH. L. REV. 317, 343 (2018).

account for resilience standards, including a “not to exceed” level of flooding, and incorporate sea-level rise projections for the useful life of that road facility. The resolution establishes an interim standard that the county can use for road elevation determinations until the county fully assesses the vulnerability of its roads infrastructure in forthcoming countywide analyses.¹⁶⁶ These changes are necessary as local governments realize the need to emphasize genuinely resilient infrastructure. A resilient transportation system can accommodate change and also acknowledge, when appropriate, that returning to the status quo is not possible or advisable if the goal is to maximize the entire system’s functionality.

Such an approach is already in line with some of the cases in our study area. Florida courts have emphasized how streets are held in trust for the benefit of the public, and abandoning such streets is allowable “when done in the interest of the general welfare”¹⁶⁷ and “in the best interest of the City.”¹⁶⁸ In a case where a town decided to stop repairing and rebuilding a road that was repeatedly flooded, a North Carolina court acknowledged the important ability of a local government, for public safety reasons, to determine whether travel on a street “should be allowed at all.”¹⁶⁹ Another example to draw from is South Carolina, which, for towns of less than one thousand residents, limits the scope of the duty to maintain to “necessary” areas, and the court must determine whether the abandonment action is in the “best interest of all parties.”¹⁷⁰

166. See Monroe County, Fla., Resolution No. 028-2017 (Feb. 16, 2017), <http://minutes.monroe-clerk.com/WebLink/DocView.aspx?id=243183&dbid=0&cr=1> [<https://perma.cc/8DGR-KLFT>] (adopting a “methodology for development of flood level estimates for the two communities [that] identifies water elevations that represent[] values for an allowable annual flooding return period (not to exceed 7 days) and also includes sea-level rise projections (IPCC AR5 Median from the Southeast Regional Climate Compact’s Unified Sea-level Rise Projection, 2015) in determining desired final roadway elevations for road improvement projects” as an interim standard until the County fully assesses its road vulnerability).

167. Sun Oil Co. v. Gerstein, 206 So. 2d 439, 441 (Fla. Dist. Ct. App. 1968).

168. City of Naples v. Miller, 243 So. 2d 608, 611 (Fla. Dist. Ct. App. 1971).

169. Kirkpatrick v. Town of Nags Head, 713 S.E.2d 151, 158 (N.C. 2011).

170. First Baptist Church of Mauldin v. City of Mauldin, S.E.2d 592, 593 (S.C. 1992).

1. Minimum Maintenance Standard

The challenge of how to deal with changing and deteriorating road conditions, coupled with maintenance costs that are higher than most local governments can bear, may be relatively new to many local governments, but it has long been an issue for many rural areas and states in the United States. Many rural areas have seen dramatic decreases in population from their heyday when extensive road networks were developed. Now, many of these roads receive little use. Moreover, these early roads were not designed for modern transportation systems.¹⁷¹ Several states have statutes that allow special designation of roads as “low volume” or “minimum maintenance” as a way of acknowledging the design, construction, and maintenance standards appropriate for a rural road.¹⁷² Such tools offer a way to both decrease maintenance costs and reduce legal liability for local governments.¹⁷³ We may look to states utilizing such designations to see what we can learn, and whether or how their policies can be applied to the challenges of coastal communities facing increased flooding and erosion of roads.

A review of some states utilizing “minimum maintenance” standards¹⁷⁴ demonstrates some common themes, including traffic

171. N.Y. STATE TUG HILL COMM’N, THE ROADS LESS TRAVELED: MINIMUM MAINTENANCE ROADS 4–6 (2017), <http://www.tughill.org/wp-content/uploads/2017/04/Final-Minimum-Maintenance-Roads-Paper-April-2017.pdf> [https://perma.cc/ED5K-JN5A].

172. *See, e.g.*, N.Y. STATE TUG HILL COMM’N, TECHNICAL PAPER: QUESTIONS AND ANSWERS ABOUT LOW-VOLUME ROAD DESIGNATION (2014), <http://www.tughill.org/wp-content/uploads/2011/09/Questions-and-Ans.-Low-Volume-Road-Design-03-14.pdf> [https://perma.cc/MHQ3-MNMG]. In New York, however, local governments designated “minimum maintenance” roads under their home-rule authority and faced challenges from landowners. Thus, a push ensued during the 2017–2018 legislative session for a state law authorizing and standardizing “minimum maintenance” designation. N.Y. STATE TUG HILL COMM’N, *supra* note 171.

173. N.Y. STATE TUG HILL COMM’N, *supra* note 172, at 1. *See also* PETER D. WELTE, JILL A. HOUGH & AYMAN G. SMADI, UPPER GREAT PLAINS TRANSP. INST., LEGAL IMPLICATIONS TO CLOSING OR REDUCING MAINTENANCE ON LOW VOLUME ROADS IN NORTH DAKOTA (1997), <https://www.ugpti.org/resources/reports/downloads/mpc97-69.pdf> [https://perma.cc/4LCN-CWD6].

174. While states use varying language such as “low-volume” or “minimum maintenance” roads, we will use the general term “minimum maintenance” to refer to all states reviewed regardless of their specific language. States with relevant statutes reviewed as part of this analysis include: North Dakota, South Dakota, Minnesota, Kansas, and Nebraska.

volume,¹⁷⁵ type of road usage,¹⁷⁶ and signage requirements.¹⁷⁷ Florida has adopted the concept of levels of service for drainage, which can be used as a template for establishing levels of service on roadways not based on traditional transportation factors.¹⁷⁸ Most statutes focus on the traffic volume as the number one indicator of whether or not a road segment should be eligible for lower maintenance standards.¹⁷⁹ Often this is reasonable in light of the drastic depopulation that has occurred in many rural areas. However, while extremely low traffic volume may sometimes be the case for small coastal roads serving residential communities, the issue really driving designation of minimum maintenance roads is the increasing costs of maintenance versus the stable or decreasing funding available for maintenance.¹⁸⁰ This is the situation many local coastal governments are currently facing and will face in the future. Just as rural states have created “minimum maintenance” statutes as a way to allow communities to attempt this challenging balancing act of costs and available resources at the local level, coastal states should offer their communities the same ability. The difference in coastal communities may be that maintenance costs vary dramatically from one road segment to the next depending on local factors such as flooding or erosion.¹⁸¹

175. N.D. CENT. CODE § 24-07-35 (2018); S.D. CODIFIED LAWS § 31-13-1.1 (2018); MINN. STAT. § 160.095 (2018); KAN. STAT. ANN. § 68-5,102(a) (2018); NEB. REV. STAT. § 39-2103(1) (2018).

176. MINN. STAT. § 160.095 (2018); NEB. REV. STAT. § 39-2103 (2018); S.D. CODIFIED LAWS § 31-13-1.3 (2018); N.D. CENT. CODE § 24-07-35 (2018).

177. N.D. CENT. CODE § 24-07-36 (2018); S.D. CODIFIED LAWS § 31-13-1.2 (2018); KAN. STAT. ANN. § 68-5,102(d) (2018); MINN. STAT. § 160.095(2) (2018); NEB. REV. STAT. § 39-2113(3) (2018).

178. See ERIN L. DEADY ET AL., *supra* note 2, at 41–44 (discussing different levels of service established across varying drainage districts by the South Florida Water Management District).

179. See MINN. STAT. § 160.095 (2018) (providing that a road may be designated minimum-maintenance if the road authority “determines that the road or road segment is used only occasionally or intermittently for passenger and commercial travel”); KAN. STAT. ANN. § 68-5,102(a) (providing that a road may be designated minimum-maintenance if “any road within the county or on the county line is used only occasionally or is used only by a few individuals”); NEB. REV. STAT. § 39-2113(3) (2018) (providing that the “standards developed for a minimum maintenance road and highway classification shall provide for a level of minimum maintenance sufficient to serve farm machinery and the occasional or intermittent use by passenger and commercial vehicles.”).

180. See *infra* notes 204–12.

181. See, e.g., *Jordan v. St. Johns County*, No. 05-694, slip op. at 4 (Fla. Cir. Ct. May 21, 2009) (noting that from 2000 to 2005, the average cost per mile per year for maintenance of

2. Vulnerability Assessments

Of course, how a government decides which areas to prioritize or designate as “degraded” or, conversely, “necessary,” is fraught with political, social, and ethical peril. An area physically vulnerable to increased flooding may also be home to socially vulnerable people.¹⁸² Many transportation decisions, unfortunately, have had a history of disproportionately benefiting white and high-income people over low-income people of color.¹⁸³ Meanwhile, as we have noted, while climate impacts are highly probable in coastal communities, how, where, and when they will happen often remains uncertain.

Therefore, an adaptive duty to maintain should reflect both short- and long-term vulnerability assessments that include short- and long-term thresholds and targets. A vulnerability assessment characterizes the potential impacts to a government entity from conditions stemming from climate change, such as nuisance flooding or extreme weather patterns. Vulnerability assessments can be used to characterize the projected impacts of climate change or sea-level rise on a government in regard to the vulnerability of infrastructure or capital assets such as roads. For example, the assessment can show where roads and stormwater features serving roads need retrofits by identifying road segments expected to have future flood risks due to elevation or geographic location. A vulnerability assessment is a data-driven process that compares existing elevation data, flood plain maps, and stormwater plans to sea-level rise projections, anticipated groundwater table levels (if appropriate), and storm surge models to create a detailed understanding of a government entity’s current and future vulnerability. The GreenKeys Climate and Sustainability Plan for Monroe County is an example of such a vulnerability assessment.¹⁸⁴

a county road being attacked by erosion was over 25 times as high as the county average), *aff’d in part, rev’d in part*, Jordan v. St. Johns County, 63 So. 3d 835 (Fla. Dist. Ct. App. 2011).

182. See Robert R.M. Verchick, *Disaster Justice: The Geography of Human Capability*, 23 DUKE ENVTL. L. & POL’Y F. 23, 40 (2012).

183. See Richard A. Marcantonio et al., *Confronting Inequality in Metropolitan Regions: Realizing the Promise of Civil Rights and Environmental Justice in Metropolitan Transportation Planning*, 44 FORDHAM URB. L.J. 1017, 1019–21 (2017).

184. See JASON M. EVANS & CHRIS BERGH, MONROE COUNTY, FLORIDA, SEA LEVEL RISE VULNERABILITY ASSESSMENT FOR MONROE COUNTY, FLORIDA: TECHNICAL APPENDIX IN SUPPORT OF THE GREENKEYS! SUSTAINABILITY AND CLIMATE ACTION PLAN (2016), http://www.templatemodifiers.com/monroe-wp/wp-content/uploads/2016/12/Appendix-C-Monroe_TechnicalAppendix_Infrastructure_Habitat_12_27_15.pdf [https://perma.cc/

In addition to conducting vulnerability assessments, an adaptive duty to maintain should also be fulfilled by executing a formal process with community-defined timelines and risk thresholds to ensure that decision-making occurs as democratically, objectively, transparently, and equitably as possible.¹⁸⁵ Using community participation and input to mitigate some of the uncertainty inherent in the prediction of future conditions allows for the necessary degree of uncertainty to be incorporated into planning design and maintenance decisions regarding roads.¹⁸⁶ Such plans could include “triggers” that prompt specific actions based on what

5855-DT23] (discussing a full vulnerability analysis on all of Monroe County’s habitat and infrastructure, including roads).

185. A good number of communities are already conducting adaptation planning with many of these elements. See N.C. SEA GRANT & TOWN OF NAGS HEAD, ADAPTATION PLANNING IN THE TOWN OF NAGS HEAD: VULNERABILITY, CONSEQUENCES, ADAPTATION, PLANNING SCENARIOS (VCAPS) REPORT (2017), [https://www.nagsheadnc.gov/vertical/sites/%7BB2CB0823-BC26-47E7-B6B6-37D19957B4E1%7D/uploads/FINAL_ADOPTED-_Nags_Head_VCAPS_Report\(1\).pdf](https://www.nagsheadnc.gov/vertical/sites/%7BB2CB0823-BC26-47E7-B6B6-37D19957B4E1%7D/uploads/FINAL_ADOPTED-_Nags_Head_VCAPS_Report(1).pdf) [<https://perma.cc/WG7G-AP4R>]; S.C. SEA GRANT CONSORTIUM, SCSGC-T-15-02, SEA LEVEL RISE ADAPTATION REPORT: BEAUFORT COUNTY, SOUTH CAROLINA (2015), http://www.scseagrant.org/pdf_files/beaufort-co-slr-adaptation-report-digital.pdf [<https://perma.cc/68MG-5FX4>]; EVANS ET AL., *supra* note 5; EVANS & BERGH, *supra* note 184; JASON M. EVANS ET AL., SITE FLOOD VULNERABILITY ASSESSMENT FOR THE SATELLITE BEACH FIRE DEPARTMENT (2017), https://www.researchgate.net/profile/Jason_Evans4/project/Sea-Level-Rise-and-Future-Flood-Mitigation-Planning-in-Satellite-Beach-FL-funded-by-FL-Sea-Grant/attachment/59b160d6b53d2ff30bdeb94b/AS:535971143458816@1504796886226/download/Narrative_Fire_Station_08_28.pdf?context=ProjectUpdatesLog [<https://perma.cc/5E6F-C6EN>]; Maxine Burkett, *Litigating Climate Change Adaptation: Theory, Practice, and Corrective (Climate) Justice*, 42 ENVTL. L. REP. NEWS & ANALYSIS 1114, 1115 (2012). Florida’s recent law, entitled “An Act Relating to the Peril of Flood,” may point the way to what a statutory adaptive duty might look like, although it currently imposes no ongoing duty to adapt. FLA. STAT. § 163.3178(2)(f) (2015). The 2015 law requires Coastal Management Elements of Comprehensive Plans (for those required to complete such an element) to include a “redevelopment component that outlines the principles that must be used to eliminate inappropriate and unsafe development in the coastal areas when opportunities arise.” *Id.* Some of the new requirements include: development and redevelopment principles, strategies, and engineering solutions that reduce the flood risk in coastal areas that results from high-tide events, storm surge, flash floods, stormwater runoff, and the related impacts of sea-level rise; encouraging the use of best practices development and redevelopment principles, strategies, and engineering solutions that will result in the removal of coastal real property from flood zone designations established by FEMA; and identifying site development techniques and best practices that may reduce losses due to flooding and claims made under flood insurance policies issued in this state. *Id.* § 163.3178(2)(f)(1)–(3).

186. See Weaver & Kysar, *supra* note 158; CHAD J. MCGUIRE, ADAPTING TO SEA LEVEL RISE IN THE COASTAL ZONE: LAW AND POLICY CONSIDERATIONS 74–75 (2013).

the climate future might bring.¹⁸⁷ In other words, an adaptive duty to maintain would reflect principles of adaptive management through a community planning process that calls for a “structured, iterative approach” that reduces uncertainty over time by incorporating learning into management.¹⁸⁸ It would include explicit goals and measurable indicators of progress towards these goals.¹⁸⁹ Feedback loops would allow new information to inform, and even change, plans and decision-making through broad and inclusive community outreach and engagement.¹⁹⁰

3. Evaluating the Adaptive Duty to Maintain: Resilience Standard

How should an adaptive duty to maintain be evaluated? Ultimately, the aim of tort law is to govern behavior and identify norms. Traditionally, the courts have used the legal fiction of a “reasonable person” or “reasonableness” to “iron out individual idiosyncrasies and impose a shared expectation of appropriate behavior.”¹⁹¹ Similarly, we propose “resilience” as a legal standard to judge local government actions; we believe it is a norm that must be identified and adopted if our coastal communities are to thrive.

Resilience has been defined in many ways, but generally the term describes “the capacity of a system to withstand or adapt to disturbance while maintaining the same basic structures and

187. See Douglas A. Kysar, *What Climate Change Can Do About Tort Law*, 41 ENVTL. L. 1, 4 (2011); J.B. Ruhl, *Climate Change Adaptation and the Structural Transformation of Environmental Law*, 40 ENVTL. L. 363, 401 (2010).

188. HOLLY DOREMUS ET AL., CTR. FOR PROGRESSIVE REFORM, MAKING GOOD USE OF ADAPTIVE MANAGEMENT (2011), http://www.progressivereform.org/articles/Adaptive_Management_1104.pdf [<https://perma.cc/C5MJ-ZAWG>].

189. Craig Anthony (Tony) Arnold, *Resilient Cities and Adaptive Law*, 50 IDAHO L. REV. 245, 261–62 (2014); Robin Kundis Craig & J.B. Ruhl, *Designing Administrative Law for Adaptive Management*, 67 VAND. L. REV. 1, 16–26 (2014); Robert L. Glicksman, *Ecosystem Resilience to Disruptions Linked to Global Climate Change: An Adaptive Approach to Federal Land Management*, 87 NEB. L. REV. 833, 865–91 (2009); Alejandro E. Camacho, *Adapting Governance to Climate Change: Managing Uncertainty Through a Learning Infrastructure*, 59 EMORY L.J. 1, 16–24 (2009); Holly Doremus, Essay, *Precaution, Science, and Learning While Doing in Natural Resource Management*, 82 WASH. L. REV. 547 (2007); Bradley C. Karkkainen, *Adaptive Ecosystem Management and Regulatory Penalty Defaults: Toward a Bounded Pragmatism*, 87 MINN. L. REV. 943, 946–56 (2003).

190. See Alice Kaswan, *Domestic Climate Change Adaptation and Equity*, 42 ENVTL. L. REP. NEWS & ANALYSIS 11125, 11127 (2012).

191. Weaver & Kysar, *supra* note 158, at 313 (quoting Justice Holmes, who observed, “[W]hen men live in society, a certain average of conduct, a sacrifice of individual peculiarities going beyond a certain point, is necessary to the general welfare.” (OLIVER WENDELL HOLMES, *THE COMMON LAW* 108 (1881))).

functions.”¹⁹² It is not the focus of this Article to delineate the meaning of the term definitively, and, indeed, how a local community defines resilience should be determined at the local level through the adaptation planning process. As many commentators have noted, given that climate impacts will vary widely depending on a community’s location, population, and exposure, adaptation is a highly local enterprise.¹⁹³

Generally, a resilience standard would evaluate government action in light of whether it is likely to promote or compromise community resilience and whether the community’s adaptation goals, targets, and timelines are reasonable under the circumstances.¹⁹⁴ Those actions that promote resilience would be understood as promoting the public interest, even where some private interests are adversely affected. Thus, such actions should be protected from government liability under sovereign immunity, and not be subject to takings liability where they do not result in the physical appropriation of property. Management practices that best illustrate resilience goals include: incorporating best available science into decision-making; assessing vulnerabilities; using adaptive planning that sets targets or thresholds for action; and evaluating the effectiveness of actions taken in order to adjust practices as needed.¹⁹⁵ Factors pointing to community resilience could include environmental, social, cultural, and economic conditions.¹⁹⁶ At some point, however, a system’s resilience can

192. Arnold, *supra* note 189. For an excellent overview of different ways to define resilience, see Rosenbloom, *supra* note 165.

193. Burkett, *supra* note 1; Robin Kundis Craig, “Stationarity Is Dead”—*Long Live Transformation: Five Principles for Climate Change Adaptation Law*, 34 HARV. ENVTL. L. REV. 9, 9, 21, 23 (2010) (arguing that “American environmental law and policy are not keeping up with the need for adaptation” and that the “global legal response is insufficient to deal with the localized details of climate change impacts, which will require legal reforms at the national, state, and local levels”).

194. Burkett, *supra* note 1, at 790 (observing that “[a]ll local governments will not have the ability to move as rapidly, and perhaps different adaptation milestones will be reasonable in some cases”).

195. *See id.* at 791–92.

196. Indeed, an entire scholarly literature is devoted to identifying and measuring community resilience. *See, e.g.*, Shannon Van Zandt et al., *Mapping Social Vulnerability to Enhance Housing and Neighborhood Resilience*, HOUSING POL’Y DEBATE, Jan. 2012, at 29; 6 CLIMATE AND DISASTER RESILIENCE IN CITIES (Rajib Shaw & Anshu Sharma eds., 2011); David R. Godschalk, *Urban Hazard Mitigation: Creating Resilient Cities*, 4 NAT. HAZARDS REV. 136, 136–38 (2003); D. Serre & B. Barroca, *Natural Hazard Resilient Cities*, 13 NAT. HAZARDS EARTH SYS. SCI. 2675, 2675 (2013); Marina Alberti & John M. Marzluff, *Ecological Resilience in Urban Ecosystems: Linking Urban Patterns to Human and Ecological Functions*, 7 URB. ECOSYSTEMS 241,

degrade or even collapse, crossing a “threshold that represents the limits of the system.”¹⁹⁷ When this occurs in a community, a reasonable resilience standard would allow for the system limit to be acknowledged, setting the stage for actions such as road closures or abandonment.¹⁹⁸

4. Sovereign Immunity

While we agree with some commentators who call for expanding a local government’s duty, we differ with respect to relaxing sovereign immunity.¹⁹⁹ Expanding a duty while simultaneously weakening immunity protections will have compounding impacts that will paralyze most local governments. Our experience working with local governments leads us to conclude that, if we want to encourage local leaders and staff to take the time, make the financial investment, and adequately assess their communities’ risks and vulnerabilities to climate impacts, such as increased flooding and sea level rise, they need protection for planning and discretionary decisions that are inherently uncertain. This does not mean a local government could never be liable for its adaptation planning. Immunity for an adaptive duty to maintain can and should include exceptions for gross negligence. Indeed, it would reflect existing exceptions to immunity in the jurisdictions we analyzed, as immunities do not currently apply when government action amounts to gross negligence that displays a conscious disregard for public safety or welfare. In the resilience context, this could include allowing the development of roadways in repeatedly

241–42 (2004); Johan Colding, ‘*Ecological Land-Use Complementation*’ for Building Resilience in Urban Ecosystems, 81 *LANDSCAPE & URB. PLAN.* 46, 46 (2007); MARK PELLING, *THE VULNERABILITY OF CITIES: NATURAL DISASTERS AND SOCIAL RESILIENCE* (2003); Carl Folke, *Resilience: The Emergence of a Perspective for Social-Ecological Systems Analyses*, 16 *GLOBAL ENVTL. CHANGE* 253, 253 (2006); Ahjond S. Garmestani et al., *Social-Ecological Resilience and Law*, in *SOCIAL-ECOLOGICAL RESILIENCE AND LAW* 1, 1–14 (Ahjond S. Garmestani & Craig R. Allen eds., 2014).

197. *Id.*

198. See, e.g., DEADY ET AL., *supra* note 2, at 50–58; THOMAS RUPPERT, JOHN FERGUS & ALEX STEWART, *ENVIRONMENTALLY COMPROMISED ROAD SEGMENTS—A MODEL ORDINANCE* 8–9 (2015), https://www.flseagrant.org/wp-content/uploads/Envirtly-Comp-Rds-FINAL_10.20.15.pdf [<https://perma.cc/8S6A-Z7NM>] (providing, for example, limitations on amounts that may be spent on roads designated as “environmentally challenged” after certain cost thresholds are met).

199. See Burkett, *supra* note 1, at 800. See also Erwin Chemerinsky, *Against Sovereign Immunity*, 53 *STAN. L. REV.* 1201 (2001).

flooded areas or ignoring or discounting the best available science, including sea-level rise projections.

Adaptation planning by its nature will necessitate hard choices—setting thresholds for relocation or withdrawal of maintenance or services will be profoundly difficult economically, socially, and politically. Without immunity, local government officials will have a good reason to avoid hard conversations and difficult decisions; they may well be advised to do so in order to avoid liability. Given that there has been little federal or state funding to assist local governments with adaptation planning to date, the incentive to do nothing will continue to be very strong, especially if immunity protections are non-existent or weakened.

5. Adaptive Duty to Maintain: Our Four-State Area

How would such an adaptive duty to maintain play out in the jurisdictions we examined? In contending that the clarification of such a duty is necessary, our goal, in part, is to address some of the contradictions and disincentives embedded in the duties to maintain and the immunities we examined. In Florida, for example, sovereign immunity does not apply to road maintenance because it is an operational decision, but sovereign immunity does apply to upgrades and road improvements, which are considered discretionary, planning-level decisions.²⁰⁰ Yet, in an era of rising sea levels, distinguishing between a repair and an upgrade will become increasingly difficult, as repairs may inherently include upgrades in order to keep roads functioning. Consequently, local governments may decline to implement innovative upgrades, which may be more expensive, if those upgrades could be construed as repairs and thus increase government liability. On the other hand, given that under current Florida law, local governments are protected from liability when undertaking upgrades, this could encourage Florida governments to invest in expensive (but foolish in the long term) upgrades, again, to avoid liability. Put simply, sovereign immunity should not turn on whether a government's action is a "repair" or "upgrade." An adaptive duty to maintain would include both repairs and upgrades as long as the reasonable resilience standard is met. Similarly, it would address current

200. *Dep't of Transp. v. Neilson*, 419 So. 2d 1071, 1077 (Fla. 1982). *See also* *Tucker v. Gadsen Cty.*, 670 So. 2d 1053, 1054 (Fla. Dist. Ct. App. 1996); *Perez v. Dep't of Transp.*, 435 So. 2d 830, 831 (Fla. 1983).

Florida law which holds that the duty to maintain a road means returning it to the status quo or “as it exist[ed.]”²⁰¹ An adaptive duty to maintain, in contrast, would allow for more appropriate maintenance actions such as road elevation, innovative paving, rerouting, or abandonment.

An adaptive duty to maintain would also encourage and allow for jurisdictions to set priorities, limit maintenance in certain areas, put property owners on notice about the likely future conditions of roads, and acknowledge economic realities. Specific examples of these approaches may be found in two Florida counties, St. Johns and Monroe, as well as the model ordinance developed by one of the co-authors of this Article. In response to the *Jordan* lawsuit, discussed *supra*,²⁰² St. Johns County passed an ordinance to address “natural forces degradation,” creating “design criteria” for roads in “environmentally challenging locations” where “typical road design criteria and standards are infeasible due to the economic implications of naturally occurring conditions.”²⁰³ In these areas, standards of maintenance “shall differ from the County’s general maintenance standards” and allow for the following to be present in providing meaningful access: unpaved surfaces and sub-surfaces composed of muck, sand, clay or organic material; sub-standard lane widths, single lanes, and varying maintained widths; vehicle type, size, and weight limitations; periods of time when the roads may be submerged, buried by soil, covered by sand, or blocked by vegetative debris; no assurance that emergency vehicles can use or routinely use the road for access; paved surfaces with intermittent pavement, potholes, cracks, loose material; and other conditions that cause the roads to be in substandard condition.²⁰⁴ In the ordinance, the county also puts future buyers of property on such roads on notice that it is under no obligation to improve or maintain any portion of a road in an environmentally challenged

201. *Neilson*, 419 So. 2d at 1078.

202. *Jordan v. St. Johns Cty.*, 63 So. 3d 835, 839 (Fla. Dist. Ct. App. 2011). See discussion *supra* Part II.C.3.

203. St. Johns County, Fla., Ordinance No. 2012-35, *supra* note 164.

204. *Id.* Monroe County, Florida, offers a different approach. It has developed a “level of service” method to manage the county’s financial responsibilities and the community’s expectations with respect to road maintenance, although the current levels of service do not take rising sea levels into account. DEADY ET AL., *supra* note 2.

area adjacent to property owners who purchased property after the ordinance existed or after the county designated the location.²⁰⁵

Monroe County, Florida recently undertook a Pilot Road Project, which was a more targeted vulnerability assessment to identify and characterize tidal and storm impacts on county-owned roadways in two neighborhoods that have suffered sea-level rise and related flooding in Big Pine Key and Key Largo.²⁰⁶ The neighborhoods were repeatedly flooded in the King Tides of 2015 and 2016, which were exacerbated by seasonal winds.²⁰⁷ For this island community, sea-level rise will only worsen such conditions. The project provided a technical basis for harmonizing future sea-level rise impacts with necessary current and future county capital expenditures, and involved the study of past events and flood recurrence; the characterization of sea level rise impacts on select neighborhoods; the development of engineered response strategies for high risk road segments; and the identification of desirable design alternatives for each community.²⁰⁸ The project used a three-pronged approach for developing potential road improvement projects in the two selected neighborhoods: (1) define a target “design criteria” for future road updates, (2) evaluate alternatives to various road elevations to determine the costs, benefits, and detriments of each alternative, and (3) explore a policy approach for developing a flood-risk-based level of service

205. Arguably, advance notice of sea-level rise and increased recurrent flooding should affect the reasonableness of a property owner’s expected future use of the property. See Thomas Ruppert, *Reasonable Investment-Backed Expectations: Should Notice of Rising Seas Lead to Falling Expectations for Coastal Property Purchasers?*, 26 J. LAND USE & ENVTL. L. 239, 266–68 (2011).

206. DEADY ET AL., *supra* note 2.

207. A “King Tide” is a lay term often use to describe exceptionally high tides. See *What is a King Tide?*, NAT’L OCEAN SERV. (June 25, 2018), <https://oceanservice.noaa.gov/facts/kingtide.html> [<https://perma.cc/4467-XAD9>] (explaining that “Higher than normal tides typically occur during a new or full moon and when the Moon is at its perigee, or during specific seasons around the country”).

208. See DEADY ET AL., *supra* note 2. The tidal baseline outlined the average number of hours of flooding at various elevations to identify flood probabilities. Then the baseline was modeled against three scenarios of sea level rise over time to 2040. The tidal baseline and sea level rise models were used to determine part of the design criteria for the project, a 25-year design life expectancy. Next, the project team identified ranges of annual flooding days or “days of impact” for road segments in the project areas based on four proposed road elevations and the costs associated with a selected design. Average days of impact reflects the length of time roads could be inundated, this analysis created the design standard of 7-days of flooding per year of the project.

determinations for roads in Monroe County.²⁰⁹ The project also included a draft ordinance, which could be used to establish future design criteria and standards for existing county roads, provide for the designation of “environmentally challenging locations” for repeatedly damaged roads, and determine what should be considered “meaningful access” in the environmentally challenged locations.²¹⁰

Another approach is found in a model ordinance developed by one of the co-authors of this Article, which contains elements of and similarities to the St. Johns County, Florida ordinance discussed above.²¹¹ Additional elements of note include:

1. Specific signage requirements to address potential tort liability for “failure to warn” and in accordance with states utilizing “minimum maintenance standards;”
2. A focus on due process by providing detailed notice to potentially affected property owners;
3. Examples of a possible policy to delineate a level of service based on the level of maintenance possible with a situationally determined maximum budget to protect local government finances;
4. Specific procedures for affected property owners to request assistance in self-generating additional maintenance funding; and
5. Abandonment procedures in harmony with state laws.²¹²

Overall, the additions in the model ordinance seek to ensure that a local government, if subject to a lawsuit, can demonstrate to a court that it has made careful legislative determinations seeking to balance the challenging conflicts between private property rights of access and the need to responsibly manage the community’s road

209. *Id.* at 2.

210. *Id.* at 38. In 2018, Monroe County let a contract to expand its roads analysis countywide to include a vulnerability analysis of all County roads as well as development of long-term capital plan with alternatives and cost analysis to evaluate future options. Future road improvements will currently consider the design standard on an interim basis until the County completes its work to review the issue countywide.

211. St. Johns County, Fla., Ordinance No. 2012-35, *supra* note 164; RUPPERT, FERGUS & STEWART, *supra* note 198.

212. *Id.*

maintenance funds for the larger benefit of the community.²¹³ Demonstrating that any asserted lack of maintenance is actually a legislative, policy decision rather than a ministerial one should make courts much less likely to impose liability for a lowered level of maintenance or for road abandonment. All of these examples reflect an adaptive duty to maintain, encompassing iterative and practical actions that seek to avoid a continual obligation to throw good money after bad in areas that flood frequently and are highly likely to continue doing so because of sea-level rise.

In Georgia, an adaptive duty to maintain with associated sovereign immunity would address the current conundrum regarding discretionary and ministerial duties: that the presence of a policy that directs a government to repair or maintain results in a waiver of sovereign immunity.²¹⁴ We strongly believe that local governments should develop adaptation plans that include policies that trigger direct action when appropriate and when certain thresholds are met, but we also are cognizant of the fact that flexibility may be necessary. Circumstances may change from when a policy is made, and a better decision may be one not formulated exactly in a policy. Additionally, resources may not be immediately available to implement every policy direction as quickly as one might hope. Discretion will inevitably be necessary. Current law, however, suggests that a local government would be advised against putting an adaptation policy in place, lest they irretrievably commit to implementing it, warranted or not. Finally, a statutory standard that applies across all levels of government in Georgia would eliminate the distinction between county and municipal immunity protections.²¹⁵

213. See, e.g. Ruppert, *supra* note 77. While the model ordinance may have still left local governments open to a takings lawsuit under the precedent of the *Jordan v. St. Johns County* case, the appearance of the *St. Bernard Parish* case in the spring of 2018 provides persuasive authority arguing against allowing a lack of maintenance to proceed as a takings claim instead of a tort claim. *St. Bernard Parish* clearly states that “[w]hile the theory that the government failed to maintain or modify a government-constructed project may state a tort claim, it does not state a takings claim.” *St. Bernard Parish Gov’t v. U.S.*, 887 F.3d 1354, 1360 (Fed. Cir. 2018). Plaintiffs often seek to plead cases as takings rather than torts as sovereign immunity does not apply to a takings claim as it might in the case of a tort claim. Zellmer, *supra* note 154, at 194–95.

214. See *supra* notes 69, 72.

215. Counties currently have a greater level of immunity than municipalities in Georgia. See discussion *supra* note 72.

In South Carolina, an adaptive duty of care might incorporate the already-existing tiers of duties that are based on population size. This approach recognizes, in our view, the fiscal limits of some communities, particularly smaller ones, with respect to infrastructure maintenance. We also observe that South Carolina, based on its Infrastructure Report Card from the American Society of Civil Engineers, appears to be falling behind in road maintenance.²¹⁶ An adaptive duty to maintain could spur the state and local governments to take more proactive approaches to maintaining South Carolina's overall roadway system.

In North Carolina, much of what we envision in an adaptive duty to maintain falls within the current definition of governmental functions and would result in sovereign immunity. However, road maintenance is considered a proprietary function, for which sovereign immunity is not available. With rising sea levels, road maintenance will no longer be routine. It will require planning, flexibility, and discretion, placing it more squarely within the traditional conception of a governmental function.

In sum, if we want governments to take action to make their communities more resilient, then it is time to clarify the scope of their duty to do so. As a leading treatise observes, "the underlying question is whether a governmental entity is to be treated differently from any other litigant in a court of law."²¹⁷ In the context of rising sea levels, we respond to this question with a resounding yes. Many local governments are leading the way with adaptation planning because their streets are flooding more often, their storm drains are full, and they are hearing complaints from their residents. We want them to continue their efforts. Unlike private entities, local governments hold infrastructure such as roads in the public trust and they have an overarching obligation to protect the public welfare. From socially vulnerable residents to economic realities, local governments will have to take multiple, at times conflicting, factors into account when making decisions. They must be allowed to take creative risks. Meanwhile, adaptation decisions will cost a lot of money, create controversy, and affect the tax base. While the science is very good, adaptation decisions nonetheless will be made with some degree of uncertainty. There

216. *Infrastructure in South Carolina*, *supra* note 32.

217. MARTINEZ, *supra* note 41, § 27:3.

will be failures and surprises and there will be innovations. If we look carefully into apprehensions about governments having too much liability, we see, rightly so, concerns with past decision-making that allowed for bad development in dangerous places.²¹⁸ We acknowledge those concerns and stress that our conception of this duty is designed precisely to avoid such outcomes, potentially putting them into the category of gross negligence. Ultimately, anticipating future risks is, and will continue to be, very different from managing risks based on lessons from the past. An adaptive duty of care begins to draw a framework around how to manage this new reality.

B. Towards an Adaptive Authority to Abandon: Property Rights and Roads

In addition to proposing an adaptive duty to maintain, we recognize that there will be situations where a road system's resilience has degraded to the point of collapse and road abandonment is the most prudent course of action. We propose that an adaptive authority to abandon is necessary to best further adaptation planning. This authority should reflect many of the values we discussed in the previous section, such as reasserting the tradition of holding roadways in the public trust and emphasizing that roadway decision-making should occur with the overall system's functionality as a priority. It should also reflect principles of adaptive management, meaning that adaptive abandonment decisions should be made in the context of a plan that has identified short and long-term thresholds for road abandonment as well as overall public safety and public interest considerations.

We specifically advocate for an abandonment standard that better reflects what generally is authorized at the state level across our four-state study: an authority that allows for road abandonment when a road no longer serves "a substantial public purpose" or abandoning the road is in "the best public interest,"²¹⁹ and explicitly incorporates the concept of resilience into the determination of the public interest. When deciding whether abandonment is proper in the adaptation context, courts should build upon factors that are already considered in other

218. Burkett, *supra* note 1, at 777–78.

219. *See, e.g.*, GA. CODE ANN. § 32-2-2 (2018).

abandonment cases, such as the financial burden of maintaining the road, the public's dependence on the road, and what caused a decrease in the public's use of the road. Additional factors should be evaluated to determine the impact of the decision on community resilience and the long-term resilience of the road network as a whole. These factors could include whether vulnerability assessments and adaptation planning have occurred; whether a step-by-step policy for managing road maintenance and abandonment in the context of recurrent flooding caused by sea-level rise has been established; and whether public notice has been provided to residents regarding road management and abandonment policies.

While takings claims are likely to remain a concern, developing an adaptive authority to abandon presents an opportunity to mitigate such claims because it would reflect a gradual and flexible regulation that shapes expectations as time passes and circumstances change.²²⁰ As a leading property scholar has observed, “[a] characteristic of our property law is its accommodation of changes in ownership and ownership rights over time.”²²¹ Relocation measures are likely to raise opposition from property owners, but regulations shaping their future expectations should allow them to adapt economically and, in turn, mitigate takings claims.²²² Certainly, climate change will drive such disputes, and the accumulation of scientific data on climate impacts will likely require courts to consider this information more carefully.²²³

How would an adaptive authority to abandon look in the jurisdictions we examined? Georgia's current jurisprudence, which asks whether the road serves a “substantial public purpose” and if abandonment is in the “public interest,” would be affirmed, even in situations where a road abuts private property.²²⁴ In Florida, where counties and municipalities have wide authority to abandon roads but must not harm the public welfare,²²⁵ consideration of the

220. Byrne, *supra* note 152, at 72–73.

221. *Id.* at 104.

222. *Id.* at 106.

223. See, e.g., Zellmer, *supra* note 154, at 194; Ruhl, *supra* note 187, at 400.

224. See *supra* note 104.

225. See FLA. STAT. §§ 335.02, 335.199 (2018). See also *Bouldin v. Okaloosa Cty.*, 580 So. 2d 205, 210 (Fla. Dist. Ct. App. 1991); *City of Naples v. Miller*, 243 So. 2d 608, 608–10 (Fla. Dist. Ct. App. 1971).

public interest when abandoning a road would allow the entire road system in the community to be taken into account.²²⁶ North Carolina, on the other hand, would be directed away from individualistic concerns and towards broader community concerns, allowing it to embrace what at least one court has described as “its discretion to determine the identity of the streets upon which travel should be allowed at all.”²²⁷ South Carolina’s more utilitarian approach of allowing abandonment at the county level when roads are “useless” would pivot more toward its approach at the city level, where jurisdictions are directed more towards considering the necessity of a road as well as the overall “improvement” of the city.

C. Mending the Patchwork: States Must Lead

When describing the key principles that should undergird climate adaptation law, commentators regularly call for increased planning and coordination across all levels of government.²²⁸ We certainly agree that more coordination is necessary. Given, however, that state legislatures and state courts are “the principal architects in the reconstruction of state public tort law,” establishing consistent adaptation duties and authorities at the state level is a crucial first step in mending the patchwork that exists throughout the state, county, and city levels in our study area.²²⁹

Our strong preference would be for an adaptive duty to maintain to be adopted by statute and applied consistently across state, county, and municipal jurisdictions. Instead of expensive, piecemeal litigation analyzing differing standards depending on the jurisdiction, this would provide a better and more consistent approach. It would send a clear and consistent policy signal that adaptation planning is valued and expected—and that governments will be protected from liability. While states will and probably should differ in their road maintenance standard given that climate impacts vary geographically, a state-wide statutory standard that applies to state, county, and municipal governments would provide some consistency to the “doctrinal stew” that currently exists. For example, there is no good policy reason we can discern as to why Georgia counties and cities should have different

226. *Miller*, 243 So. 2d at 611.

227. *Kirkpatrick v. Town of Nags Head*, 713 S.E.2d 151 (N.C. Ct. App. 2011).

228. *Craig*, *supra* note 193, at 54.

229. MARTINEZ, *supra* note 41, § 27:2.

duties of care and immunity protections for maintaining roadways. Moreover, sea-level rise and flooding will not follow jurisdictional boundaries, and although many roadways appear seamless to the driver, they actually consist of lengths, ramps, and bridges that may be under the jurisdictional control of multiple state, local, and private actors. Therefore, an adaptive duty to maintain that applies across all jurisdictions, affirms a holistic approach to road maintenance, and emphasizes a government's duty to maintain a roadway in the public trust is ultimately what is necessary.

A state-wide adaptive authority to abandon that is consistent at the state, county, and municipal levels would also lead to improved coordination and consistency in adaptation planning. As we observed in our comparison of abandonment authority, the standards for abandonment differ widely among the four states in our study area, including at the county and municipal levels. A consistent abandonment standard that explicitly incorporates the concept of resilience into the determination of whether abandoning a road is in the public interest, should align with a statewide adaptive duty to maintain, sending a clear policy signal that adaptation planning is expected as well as engendering more comprehensive planning. While takings claims will remain a concern under current case law, an adaptive authority to abandon would arguably mitigate takings liability by putting property owners on notice. At some point, property owners purchasing property in areas that flood repeatedly will have a difficult time arguing that their "investment-backed expectations" included a future sans sea-level rise.²³⁰

CONCLUSION

As coastal communities strive to adapt to sea-level rise, decisions regarding land use and infrastructure development are and will continue to be critical to successful climate adaptation. Anticipating future risks will require more robust and science-informed planning. Uncertainty and change will also have to be considered. Community resilience will necessitate a system-wide

230. See Zellmer, *supra* note 154, at 232; Byrne, *supra* note 152. See also Ruppert, *supra* note 77 (arguing that abnormally high cost or difficulty in preserving a road or other infrastructure automatically elevates such work beyond mere "maintenance" as an operational duty to policy level, discretionary decision-making).

viewpoint that rises above narrow and segmented interests. Local governments are on the frontline of adaptation action, yet they have limited resources to do so. Moreover, we are entering an era when determining duties and obligations based on a static environment is increasingly untenable.

As our analysis reveals, traditional concepts of government duties, immunities, and authorities are straining under the pressure of increased flooding and sea-level rise. Conflicting standards already exist between and among jurisdictions. Local governments may find themselves liable for action in one instance but immune in another, even though there is no discernable difference in the action taken. Sea-level rise will exacerbate these tensions and, due to fear of liability, will likely reward government inaction and short-term compromises over comprehensive and strategic adaptation planning involving priority setting and hard choices.

Our proposals are designed to address these growing tensions and inform how duties and authorities should be understood in the context of local planning for climate change impacts. An adaptive duty to maintain that includes sovereign immunity protection furthers the kind of planning and action that is necessary, while also acknowledging the risks and uncertainty inherent in such planning. An adaptive authority to abandon supports local efforts to make decisions about the resilience of the entire road system rather than one segment at a time. Statewide standards would acknowledge how roadways connect across jurisdictional boundaries and facilitate much-needed state, county, and local adaptation planning and coordination. If community resilience is our goal, then we must develop new duties and authorities to facilitate forward-looking, creative, and difficult decision-making. While the Talking Head's song *The Road to Nowhere* is an absolute classic, it cannot be our anthem for local adaptation. We are not on a road to paradise, and time is not on our side.