WAKE FOREST UNIVERSITY





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Community Resilience Building

Summary of Participant Responses

June 2025

Wake Forest University, North Carolina
Community Resilience Building Workshop
Summary of Participant Responses

Overview

The need for academic institutions, municipalities, regional planning organizations, states, and federal agencies to increase resilience to extreme weather events and a changing climate is strikingly evident amongst the communities across the state of North Carolina. Recent events such as severe thunderstorms, hurricanes, tornados, flooding, and more intense and extended heat waves have reinforced this urgency and compelled leading communities and institutions like Wake Forest University to proactively collaborate on planning and develop actions that mitigate risk and enhance resilience. Ultimately, this type of leadership is to be commended because it will reduce the vulnerability and reinforce the strengths of people, infrastructure, and ecosystems and serve as a model for other communities in North Carolina and across the Nation.

Recently, Wake Forest University partnered with The Nature Conservancy (TNC) and Second Nature to collaboratively launch a community-based process to assess extreme weather and climate change impacts and to generate and prioritize solutions that improve resiliency, sustainability, and equity within their community. In June 2025, the Wake Forest University Core Team hosted a workshop as part of their Community Resilience Building process that was facilitated by TNC and Second Nature. The core directive of this effort was the engagement with and between community members (i.e., students, staff, faculty, and municipality/county staff) to define strengths and vulnerabilities and develop priority resilience actions for the greater campus community at Wake Forest University and for consideration in the University's comprehensive campus space planning.

Wake Forest University Community Resilience Building Workshop's central objectives were:

- Define top local, natural, and climate-related hazards of concern.
- Identify existing and future strengths and vulnerabilities.
- Identify and prioritize actions for the Wake Forest University community.
- Identify opportunities to collaboratively advance actions to increase resilience across the community, and beyond.

The Wake Forest University community benefited from a unique "anywhere at any scale", community-driven process called Community Resilience Building (CRB) (www.CommunityResilienceBuilding.org). The CRB's tools, reports, other relevant planning documents, and local maps were integrated into the workshop process to provide both decision-support and visualization around shared issues and existing priorities across the Wake Forest University' campuses including the Wake Forest University Campus Master Plan (2009, updated in 2019).

The CRB workshop took place during the discovery and analysis phase of the Bicentennial Comprehensive Campus Space Plan (BCCSP) process, led by campus planning firm Ayers Saint Gross, which will result in a new holistic plan for Wake Forest University that will replace the 2009 Campus Master Plan and the 2019 update. The responses summarized herein will be incorporated into the planning and will serve as a sustainability infrastructure "listening session" for the BCCSP process to help inform strategies for the long-term climate resilience of the campus and inclusion of the resulting plan.

Participants were carefully elected to participate in this small online workshop based on their professional experience and expertise. Using the CRB process - rich with information, experience, and dialogue, the participants shared their perspectives on hazards, strengths, and actions for building resilience. The responses included in this report may have been informed by historical occurrences and data, but independently gathered data is not included.

This report includes workshop participants' perspectives on the top hazards, current concerns and challenges, existing strengths, and proposed actions to improve resilience to hazards and climate change on campus, today and in the future. The focus of this CRB was on Wake Forest University's Main Campus in the city of Winston-Salem.

The summary of findings transcribed in this report, like any that concern the evolving nature of risk assessment and associated action, is proffered for comments, corrections, and updates from workshop attendees and other stakeholders alike. The leadership displayed by Wake Forest University on community resilience building will benefit from the continuous and expanding participation of all those concerned.

Summary of Findings

Top Hazards and Vulnerable Areas for the Community

Prior to the CRB Workshop, the Core Team identified the top hazards for Wake Forest University based on their experience and institutional knowledge. The hazards of greatest concern included heavy precipitation events resulting in flooding due to stormwater runoff, high wind events, winter storms, and extreme heat. Additional hazards highlighted by participants during the CRB Workshop included occasional extreme winter cold snaps. These hazards have direct and increasing impacts on the infrastructure, community members (students, staff, and faculty) and the environment including within the campuses, surrounding neighborhoods, open space/park areas, cultural resources, student housing facilities, transportation, campus facilities and operations (e.g., dining), supportive municipal facilities, social support services, and other critical infrastructure and community assets at Wake Forest University.

Current Concerns and Challenges Presented by Hazards

The Wake Forest University community has several concerns and faces multiple challenges related to the impacts of natural hazards and climate change. Recently, Wake Forest University has experienced a series of highly disruptive and damaging weather events including winter storms (2014 – "Snowpocalypse"), Hurricane Florence (Sept. 2018 – Cat 4), Hurricane Michael (Oct. 2018 – Cat 5), severe thunderstorms (Sept. 2019), Tropical Storm Zeta (Oct. 2020), polar vortex (Dec. 2022), Hurricane Helene (Sept. 2024) and periods of extended heat waves each year. Impacts from these events have included localized flooding from stormwater runoff due to intense precipitation, high winds causing tree damage, and extreme heat and cold events. The magnitude and intensity of these events and others in the greater Winston-Salem area and across North Carolina have increased awareness of natural hazards and climate change, while motivating communities such as Wake Forest University to proactively improve their resilience.

This recent series of extreme weather events highlights that the impacts from hazards are diverse. In the city of Winston-Salem and to some extent on Wake Forest University's campuses this included riverine and urban flooding (due to stormwater runoff from intense storms and heavy precipitation) of critical infrastructure, buildings, facilities; and property

damage and utility outages (lasting several days or more) from extreme winds. Longer periods of elevated heat, particularly in July and August, have raised concerns about vulnerable segments of the campus community and adjoining neighborhoods. The combination of these issues presents a challenge to preparedness and mitigation priorities and requires comprehensive, yet tailored actions for specific locations and/or areas at Wake Forest University.

The workshop participants were generally in agreement that Wake Forest University is experiencing more intense and frequent weather events that are being amplified by ongoing changes in the climate. Additionally, there was a general concern about the increasing challenges of being prepared for the worst-case scenarios at any time of year (e.g., major thunderstorms, tornados, and hurricanes (Cat-3 or above)) particularly in the late summer and in the fall/winter months when more intense storms coincide or overlap with colder weather. The complications and complexity presented to the campus community from infectious disease outbreaks such as the COVID-19 pandemic in the context of simultaneous hazards as mentioned above were raised by workshop participants as a significant concern for Wake Forest University.

Credit: Wake Forest University

Specific Categories of Concerns and Challenges

As in any community, Wake Forest University is not uniformly vulnerable to hazards and climate change. Certain locations, assets, and groups have been and will be affected to a greater degree than others. Workshop participants identified the following items as their community's key areas of concern and challenges across several broad categories.

Infrastructure, Societal, & Environmental Concerns and Challenges

University Functions, Operations & Growth:

- Aging workforce of facility experts on campus without a clear succession plan or apprenticeship program to ensure institutional knowledge is transferred to other employees.
- Limited awareness across departments of how intricate various systems within the University are, such as dining which requires sourcing, preparing, and providing food to the campus community. Without greater awareness it becomes harder to comprehensively plan for major events that require a sequencing and integration of key processes such as food/dining and shelter, among others.
- Difficult to find people to fill employment opportunities on campus involving working with the water and waste systems as well as other trades such as electricians and landscapers.
- Rising prices for materials due to external factors such as increased tariffs are having immediate impacts on operating budgets and cost forecasting for upcoming and future projects on campus. Limited availability of equipment and materials results in long waiting times for arrival to complete projects. Quoted prices only have a 10-day guarantee which creates a continuously shifting variable when forecasting project costs.
- Growing concerns surrounding the potential impacts of drought on campus life and operations and what contingency steps can be taken to prepare for this eventual situation.
- Impacts to campus from winter storms with snow and ice are variable with some lasting less than a day up to 72 hours, which can interrupt shuttle service from the main campus to and from the downtown campus.
- City equipment for snow and ice control can become overtaxed during major winter storms resulting in longer waiting times for conditions to return to normal in the areas surrounding campus.

Specific Categories of Concerns and Challenges (cont'd)

- Residents in the greater Winston-Salem region are less resilient than in previous decades and view situations such as loss of internet connectivity as a crisis. People less tolerant of the time needed to restore power and clear roadways by university, city, and county staff ("expectations are unrealistic about pace of recovery after big storms"; "we all need a little more grace").
- Limited partnership with neighborhoods on the south and east sides of campus. Wake Forest University may not have "earned" the respect and trust of these communities, to date ("need to build up some social goodwill through more connections").
- Limited cross department long-term strategic and resource planning events or workshops currently with collaboration on determining collective priorities.
- Lack of sufficient funds to advance agreed upon priorities, which can create vulnerabilities.

Emergency Management and Preparedness:

- Concerns about the procedures and process needed to be in place in the event of a campus-wide evacuation as was almost the case with the Weaver Fertilizer Plant fire (January 2022) ("how do we move 5,000 students' safety and quickly").
- Increasing likelihood of tornados across the greater Winston-Salem area including Wake Forest University's Winston-Salem campuses. Areas with mature and extensive urban tree canopies (such as main campus) are of particular concern during tornados.
- Lack of awareness as to what to do and where to go in the event of a tornado warning for campus.
- Concerns around increased potential of multiple consecutive intense precipitation events after recent events in western North Carolina in 2024 and 2025 ("had three 10-year storms right in a row last year").
- Students arrive from diverse parts of the country and the world where they may not have experienced major hazards such as hurricanes and therefore are not aware of proper procedures and steps to help minimize their risk.
- Transient student populations lead to short-term engagement, and limited familiarity with emergency procedures and support.
- Disabled, lower income, and international students remain vulnerable during emergencies and require special consideration and assistance.

Specific Categories of Concerns and Challenges (cont'd)

- Off-campus students (<25% of undergraduate student body) are more vulnerable without the support from the campus's police force and emergency management professionals.
- Off-campus electrical power supply infrastructure is less resilient than on-campus which can place off-campus students and employees in campus-adjacent properties in jeopardy.
- Challenging to access emergency services and first responders from the city and county during major disasters due to staff shortages.

Campus Buildings & Facilities:

- Lawrence Joel Veterans Memorial Coliseum (LJVM) has back-up power generation for "life safety" (not to support sheltering) which creates challenges for use as a shelter despite having enough facilities (space, seats, bathrooms) to accommodate large numbers of people during major disasters.
- Previous campus building design and landscaping have rarely factored in way to increase social interaction amongst students in outdoor spaces.
- Real Estate footprint of the University is substantial, coupled with over 345 acres of grounds that need to be maintained.
- Limited number of back-up power generator systems on campus with no buildings having full back-up power capabilities, to date.
- Fuel supply for on-campus generators (diesel with some natural gas) may be an issue in the event of long-term outages across the greater Winston-Salem region. Current longevity for a generator with a full tank is between 24-36 hours to support life safety needs.

Stormwater, Waste Systems, Drinking Water Supply & Power Systems:

- Increases in the need to manage stormwater including additional and more extensive use of green stormwater infrastructure (i.e., bioswales, rain gardens, etc.) on campus.
- Stormwater management system has relatively minor issues with minor flooding of a few parking lots after heavy rainfall events.

Specific Categories of Concerns and Challenges (cont'd)

- Stormwater management interventions have been conducted successfully in major building renovations and new construction but not at the whole system/watershed scale.
- Underground municipal and stormwater infrastructure installed in the 1950s has largely reached the end of the system's life cycle. Older stormwater pipes and water mains are vulnerable to break due age coupled with weather events such as extreme heat and cold that would create localized disturbances and interrupt service across campus.
- Interruptions in water supply from the city of Winston-Salem to campus have the potential to damage the two chilled water generation plants on campus.
- Wake Forest University has no ability to support the Winston-Salem water and sewer systems if it were to be temporarily unavailable. A loss of water supply from the city to campus has the potential for damaging the two chilled water generation plants.
- Electrical power infrastructure outside and separate from the Cherry Street Substation is vulnerable to high winds, downed trees, and other risks common to above-ground electrical lines.

Open Space, Natural Systems, Watersheds, & Trees:

- Large number of mature trees on campus presents a potential challenge with high wind events coupled with rainstorms that can saturate the ground and make trees more susceptible to blowing down.
- Concerns with leaf litter from a heavily treed campus blocking storm drains if not properly cleared during the autumn months in advance of major storms.
- Riparian system on campus has been largely built over placing it underground without a comprehensive understanding of the long-term impacts on the ecosystem and the implications of flooding due to these modifications throughout the watershed – particularly as precipitation events become more intense with greater magnitude.

Current Strengths and Assets

Just as certain locations, facilities, and groups at Wake Forest University stand out as particularly vulnerable to the effects of hazards and climate change, other features are notable assets for resilience building. Workshop participants identified the following items as their community's key strengths and expressed interest in centering them as the core of future resilience building actions.

University Functions, Operations & Growth:

- Clearly, the responsive and committed engagement exhibited by leadership, staff, faculty, and students is a very appreciated strength within and across Wake Forest University. Ongoing collaboration between leadership, facilities, and departments, among other entities on campus as well as with the city of Winston-Salem on priorities identified herein will help advance comprehensive, cost-effective, community resilience building actions.
- Staff (including essential employees) possess deep institutional knowledge and technical understanding of how to manage major events and therefore represent a crucial form of resiliency at Wake Forest University.
- Campus staff and faculty care about the students' wellbeing and the overall welfare, safety, and sustainability of the Wake Forest University community.
- Staff and faculty at Wake Forest University lean into issues with a tendency to collaborate, which results in cohesive leadership on opportunities and challenges ("leadership leads at Wake Forest").
- Enthusiasm for open engagement and sharing a diverse and wide-ranging suite of ideas and topics is a strength at Wake Forest University.
- Dedicated staff that are always ready to participate and ensure the community on campus and surrounding campus are safe and provided for during major events ("willing to go the extra mile for each other").
- Executive leadership and finance department understand that when major events occur there is a need for quick decisions that require signoff on projects and associated expenses.

Current Strengths and Assets (cont'd)

- Three year on-campus "live-on" residency requirement helps to provide support for students throughout most of their academic tenure at Wake Forest University.
- Geographically, the campus is in a relatively favorable location as it relates to impacts from a changing climate by not being located along a major river that floods (i.e., Ashville, NC) or along a coastline that experiences storm surge and sea level rise (i.e., Outer Banks).
- Reliable and supportive campus police presence that are responsive to immediate on-campus issues as they unfold and opportunities to improve operations longer-term.
- Strength of career professionals present and working on campus adds to the depth of historical knowledge and expertise needed to manage routine and extreme situations that affect the campus community.
- Non-academic departments are willing to work directly with academic departments like the Engineering Department to allow students to conduct projects that help solve issues on campus. This provides students with real world experiences during their academic career at Wake Forest University (e.g., "Shuttle Hub" project included the engagement of students to help design and install green stormwater infrastructure such as bioswales to reduce localized stormwater runoff issues).
- Internet connectivity infrastructure and system on campus is designed to be resilient with built-in redundancies coupled with on-campus power generators to ensure students, faculty, and staff remain in touch with each other and external developments in real time.
- Wireless cell tower is located on campus.
- Monitoring systems for staff who work outside help them avoid the health risk associated with extreme heat.
- Outdoor special events on campus are reviewed to ensure extreme heat risks are avoided coupled with real time monitoring and the identification of alternate indoor venue options.

Current Strengths and Assets (cont'd)

- Recent establishment and expansion of the Environment and Sustainability Studies Program with six full-time faculty and dedicated building which resulted in 25 students graduating from the Program in 2025.
- Office of Sustainability is very transparent with assessment and analysis on campus and responsive to immediate and long-term needs of the community.

Emergency Management and Preparedness:

- In advance of and during emergencies the facilities and infrastructure staff teams are in constant contact with one another to ensure quick and effective response ("everyone has each other's phone numbers on speed dial").
- Open and productive communication between on-campus emergency management staff and their counterparts at the city, county, and state level help to coordinate and share resources for dealing with extreme weather events such as heat waves.
- Wake Forest University has a robust and strong working relationship with emergency management professionals in the city and county that includes coordination on crises management workshops at the campus and collaborating on big events (i.e., concerts, protests, etc.).
- On-campus emergency management professionals are alert to requests from city and county to open campus cooling centers for residents of Winston-Salem during extreme heat waves.
- Lawrence Joel Veterans Memorial Coliseum has been opened by the University as a temporary shelter during significant events such as the recent Weaver Fertilizer Plant fire as well as during Tropical Storm Michael where people were evacuated from coastal North Carolina.
- Well respected and effective emergency communication infrastructure and alert system that reaches across the entire campus ("everyone knows about alerts no matter where they are"). "Wake Safe" app helps to ensure emergency alerts are more broadly distributed in a timely fashion across the campus community.

Current Strengths and Assets (cont'd)

- Relatively recent tornado response drill for campus has prompted the development of approaches to help ensure the community knows what to do and where to go including such options as identifying building captains to provide leadership to inform and guide safe responses.
- Wake Forest University has contributed to and collaborated on the recent Regional Hazard Mitigation Plan that covers a nine-county area.

Campus Buildings & Facilities:

- Carefully selected list of vendors and contractors that are familiar with the campus infrastructure systems that can isolate and solve issues quickly.
- Two chilled water generation plants on the north and south sides of campus. Plants connected to approximately 85% of buildings on campus are connected to the chiller loops. Improvements in 2024 allow for one plant to supply much of campus in the event one of two plants becomes non-functional. Adequate funding is available to maintain these two plants, currently.
- Large indoor spaces on campus can be used to accommodate and increase safety for the Wake Forest University community during emergencies including the Wellbeing Center and the McCreary Football Field House.
- Recent renovations ($3M) to the LJVM Coliseum have helped to improve options for use as a temporary safe space during major disasters.
- Currently developing a campus growth project that co-locates commercial real estate, retail, and academic offices alongside the Athletic Complex with a focus on walkability and integration into the city's neighborhoods and infrastructure.
- New development plans and construction are factoring in the positive use of outside space that can facilitate communication and connections of students, faculty, and staff ("holistic planning and design for environment, social, and economic benefits").
- Wake Forest University maintains a facilities condition index with regular assessments that allows for more informed investments in the renewal of the physical plant.

Current Strengths and Assets (cont'd)

Stormwater, Waste Systems, Drinking Water Supply & Power Systems:

- Campus stormwater management system is effective and reduces localized flooding issues for most of campus after routine and heavy precipitation events.
- Drinking water system on campus is well maintained with responsive and knowledgeable staff that can restore supply with little or no outages during major events and can manage in situations involving reduction in service from the city of Winston-Salem's water system for short periods of time.
- Wake Forest University maintains an on-campus, underground distribution network that supplies electricity to most buildings on campus. The shift from a combination of underground and overhead wires in the 1990s to fully underground currently has increased the reliability and resilience of the system by minimizing the impacts on the system from downed trees and limbs, ice storms, and high wind events (i.e., tornados). The system has a single meter for most of campus which also helps with efficiency and usage monitoring.
- Cherry Street substation is a very dependable source of power for most of campus and is more resilient than the electrical system in the surrounding neighborhoods of Winston-Salem. Substation is supplied by a few dedicated, medium voltage transmission lines directly from a major utility supplier versus from local distribution.
- Main electrical power transmission lines are underground and can regulate and "turn off" if required to solve issues related to power supply across campus.
- City staff are working with faculty from the Engineering Department to develop solar battery options on campus to use during power outages.

Open Space, Natural Systems, Watersheds & Trees:

- Campus community has a strong cultural connection to trees with many mature specimens and extensive canopy coverage. Wake Forest University has a campus arborist team that cares for and monitors the trees' health as well as taking down trees deemed dangerous to the community.

Current Strengths and Assets (cont'd)

- Communities and neighborhoods across the city of Winston-Salem are receptive to volunteering on projects that increase the viability of the City's shared environment.
- Strong partnerships between campus, city, and county with participation on various groups critical for sustainability and resilience such as the Yadkin/Pee Dee River Association, which is dedicated to preserving and improving water quality, so this River Basin remains a viable water supply source for the greater Winston-Salem region.

Credit: Wake Forest University

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Recommendations to Improve Resilience

A common theme among workshop participants was the need to continue community-based planning efforts focused on developing adaptive measures to reduce Wake Forest University's vulnerability to extreme weather, climate change and other common concerns raised. To that end, the workshop participants helped to identify several priority topics requiring more immediate and/or ongoing attention including:

- **Long-term vision and growth** (i.e. responsible/sustainable/resilient growth, environment/conservation, safety & wellbeing, students, staff, and faculty, communication systems, campus/city/counties community building);
- **Infrastructure improvements** (i.e., buildings/facilities/clinics/laboratories, electric grid & power supply, sanitary systems, stormwater management systems, green stormwater infrastructure, intersections/roads, drinking water pipes);
- **Quality of life improvements** (i.e., housing/dorms, safety, open space & tree canopy, accessibility/transportation, sustainability, mental health);
- **Emergency management** (i.e. communications, tabletop exercises, education, evacuation, coordination (campus, city, counties)).

In direct response, the Community Resilience Building workshop participants developed the following actions and identified, but not ranked, them as priority or as additional considerations for planning. Maps from various campus, city, and county sources that were provided during the workshop are provided in Appendix A for cross reference with considerations presented herein.

Priority Considerations for Planning

- Wake Forest University to work towards being well connected and even more proactive with the city, county, and state in advance of emergencies by drafting and circulating potential partnership arrangements focused on resource sharing and responding to requests (i.e., shelter/food/water/medical aid, transportation, etc.). Set up a bi-annual meeting to help move this action item forward, including the initial sharing of contact

information and lists of resources various partners have available to provide during emergencies.

- Continue to build relationships with and between North Carolina Colleges and Universities to help with expertise and resource sharing and exchanges (i.e., sheltering, student relocation/housing, best practices for building design, power generation continuity, etc.).

- Work to increase cross-training, redundancies, and organization of staff to ensure multiple personnel are qualified to manage issues that may arise with systems on campus in the event one or more staff are not available (i.e., on PTO, etc.). Flatten the organizational chart with more shared responsibilities and critical roles and responsibilities identified for a back-up staff member(s).

- Develop a focused funding strategy to support proactive resilience priorities in addition to the routine maintenance funding by adding a "resilience category" to the annual capital planning process ("Proactive Resilience Strategy").

- Craft a checklist or decision-making tree for involving Facilities alongside relevant sustainability professionals in planning for new or modifications to the physical infrastructure on campus.

- Create a utility master plan that prioritizes stormwater management and domestic water supply with estimated risk reductions and costs and integrate all utilities into the forthcoming Bicentennial Comprehensive Campus Space Plan for Wake Forest University. Review the county-level utility master plan as a potential model or template as well as the county's five-year update process using an engineering consulting firm.

- Explore opportunities to combine and coalesce data on the probability of potential impacts over various timeframes ("informed risk analysis") and create a risk portfolio that can be displayed and made widely available to the campus community via a referrable and visual "dashboard". Utilize risk portfolio and dashboard to better inform decisions about expenditures, programs, and projects on campus as well as

opportunities generated via partnerships with city, county, state, and other academic institutions ("clarity and collaboration is the key here").

- Conduct an analysis of back-up power generation systems on campus and assess the ability of the current system to provide necessities for the community (food, water, power, showers, etc.) over various timeframes. Consider the potential for alternative energy supply options such as microgrids and battery storage to fill current gaps or shortfalls in current system given likely future scenarios. Explore potential off-site back-up generation for storage and distribution of supplies, like food and potable water.

- Expand the current distribution of generators on campus to increase the number of spaces able to serve as short-term shelters and "life safety zones" during major events. Offer sheltering facilities to off-campus students as well as faculty and staff.

- Select and equip certain buildings as evacuation centers with back-up power generators and access to essential supplies.

- Explore the process, options, and cost to include natural gas as a fuel source for generators on campus during power outages (versus diesel fuel) given that the campus is already set up for natural gas delivery. Switching to natural gas would extend the capacity and ability of the generators to run longer during power outages (i.e., greater campus resiliency). Natural gas supplies are also interruptible, so multiple back-up fuel sources are ideal.

- Initiate dialogue with the city of Winston-Salem's water department to plan for the increasing impact of climate change on water supply and delivery to campus.

- Examine the possibility of and cost associated with establishing satellite internet service (i.e., Starlink) on campus as back-up communications redundancy in addition to the existing internet connection service.

Additional Considerations for Planning

- Continue assessment to better understand existing connections and networks between the campus community, alumni, and the city neighborhoods that adjoin the main campus in hopes of providing engagement opportunities and strengthening partnerships.

- Define investments that would help to reduce or mitigate the health and safety risks associated with more extreme heat (i.e., outside sporting events, staff working outside, students walking between buildings, etc.).

- Develop a risk-based assessment of campus assets so there is a clear focus on priority needs and costs as well as aligning risk with work-order management.

- Continue dialogue with state and county emergency professionals regarding supplemental sources of power given that Wake Forest University has at any time approximately 24-36 hours' worth of diesel to run generators during power outages.

- Work towards installing generators at all residence halls on campus.

- Work to increase the amount and distribution of renewable energy sources across campus including rooftop solar coupled with battery storage back-up facilities.

- Continue to strengthen relationships and partnerships between Wake Forest University and the city of Winston-Salem on issues from renewable energy approaches to emergency management.

- Determine whether the cell tower on campus has a back-up power source to help maintain communications across the campus community and the outside world during power outages.

- Ensure Wake Forest University continues to be in alignment with and contributes to (where possible and feasible) the Regional Hazard Mitigation Plan (i.e., sheltering, emergency management, intellectual capital (engineering, finance, social science, etc.)).

- Concentrate infrastructure maintenance and updates on preventative measures that increase the longevity and resilience of systems ("future proofing").

- Establish an apprenticeship training effort to help ensure institutional knowledge is transferred to other staff on campus as well as attracting new employees in the trades (i.e., water, waste, electricity, landscaping, etc.).

Additional Educational and Awareness Considerations

- Create broader partnerships between multiple departments to help generate a more diverse array of opportunities for a greater number of students to get directly involved with projects on campus as well as projects in the neighborhoods surrounding campus (particularly the neighborhoods on the south and east side of campus). In addition, look to connect with the new staff member tasked with coordinating community partnerships and civic engagement with surrounding neighborhoods ("community engaged learning").

- Bridge awareness gap amongst students through a capstone course that gets students working with campus departments on resilience and sustainability. Capstones could involve site visits to off-campus locations to gain a broader understanding of larger community issues involving resilience and sustainability needs ("get students thinking past the imaginary borders of campus with the city of Winston-Salem").

- Identify ways that faculty and students can conduct analysis and projects that add value to the overall resilience and sustainability of the city of Winston-Salem such as the recent work through a "city/student collaborative" to generate extreme heat maps of the City to better understand neighborhoods with the greatest vulnerabilities. Additional examples include analysis conducted by students with the City of maps of electric vehicle charging station gaps or underserved areas.

- Secure topics on the environment and sustainability within the required curriculum that all students must take prior to graduation ("21st Century Stewardship requirement").

CRB Workshop Participants: Department/Organization

Wake Forest University – Office of Sustainability
Wake Forest University – Office of the Provost
Wake Forest University – Emergency Services
Wake Forest University – Risk Management
Wake Forest University – Hospitality and Auxiliary Services
Wake Forest University – Facilities, Real Estate, and Planning
Wake Forest University – Information Systems - Networking and Collaboration
Wake Forest University – Wake Forest Athletics
Wake Forest University – Utilities Operations
Wake Forest University – Utilities and Building Systems
Wake Forest University – Utilities Systems
Wake Forest University – Environmental Health and Safety
Wake Forest University – Campus Planning
Wake Forest University – School of Medicine
Wake Forest University – Environmental Law and Policy Clinic
Wake Forest University – Department of Engineering
Wake Forest University – Environment and Sustainability Studies Program
City of Winston Salem Office of Sustainability
City of Winston-Salem/Forsyth County Utilities
City of Winston-Salem/Forsyth County Office of Emergency Management
Forsyth County Department of Environmental Assistance and Protection
North Carolina Department of Environmental Quality

Wake Forest University CRB Core Team

Dedee DeLongpré Johnston – VP, Institutional Sustainability & Chief Sustainability Officer

Chris Kiwus – Vice President of Facilities, Real Estate, & Planning

Chauncey Bowers – Emergency Services Manager

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Wake Forest University CRB Workshop Facilitation Team

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Second Nature – Steve Muzzy (Small Group Facilitator)

The Nature Conservancy – Kai Lo Muscio (CRB IT Manager & Scribe)

Second Nature – Meredith Leigh (Small Group Facilitator)

Second Nature – David Vasquez (Scribe)

Sustainable Solano – Willa Gruver (Scribe)

The Nature Conservancy – Anjali Khanna (Scribe)

The Nature Conservancy – Reina Jo (Scribe)

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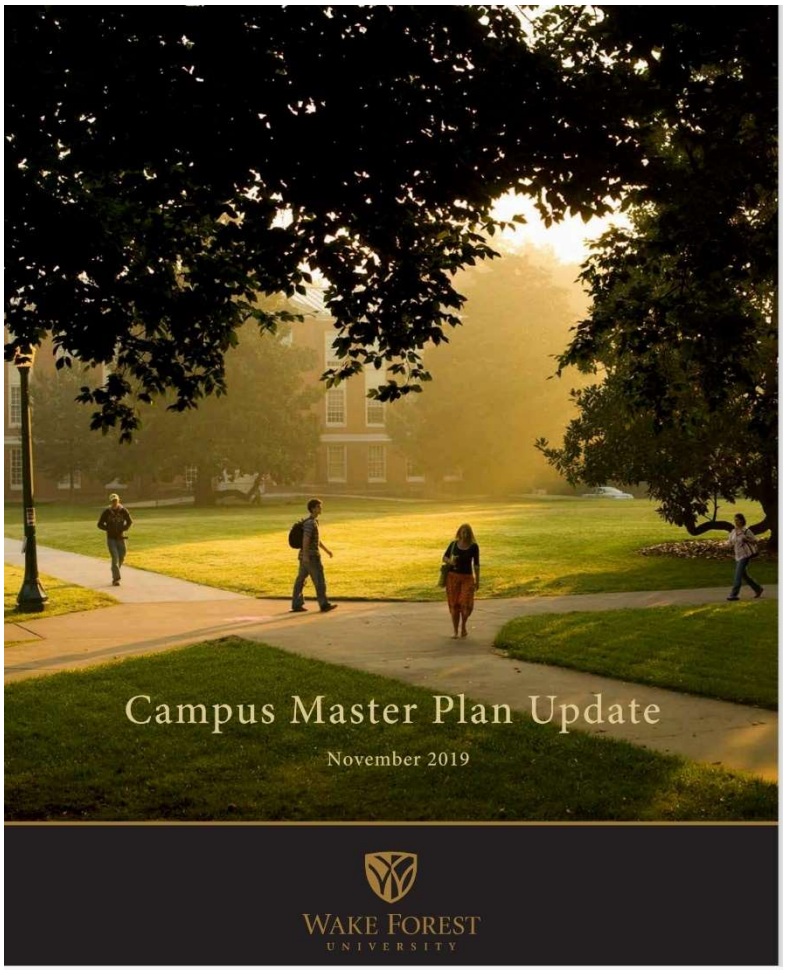
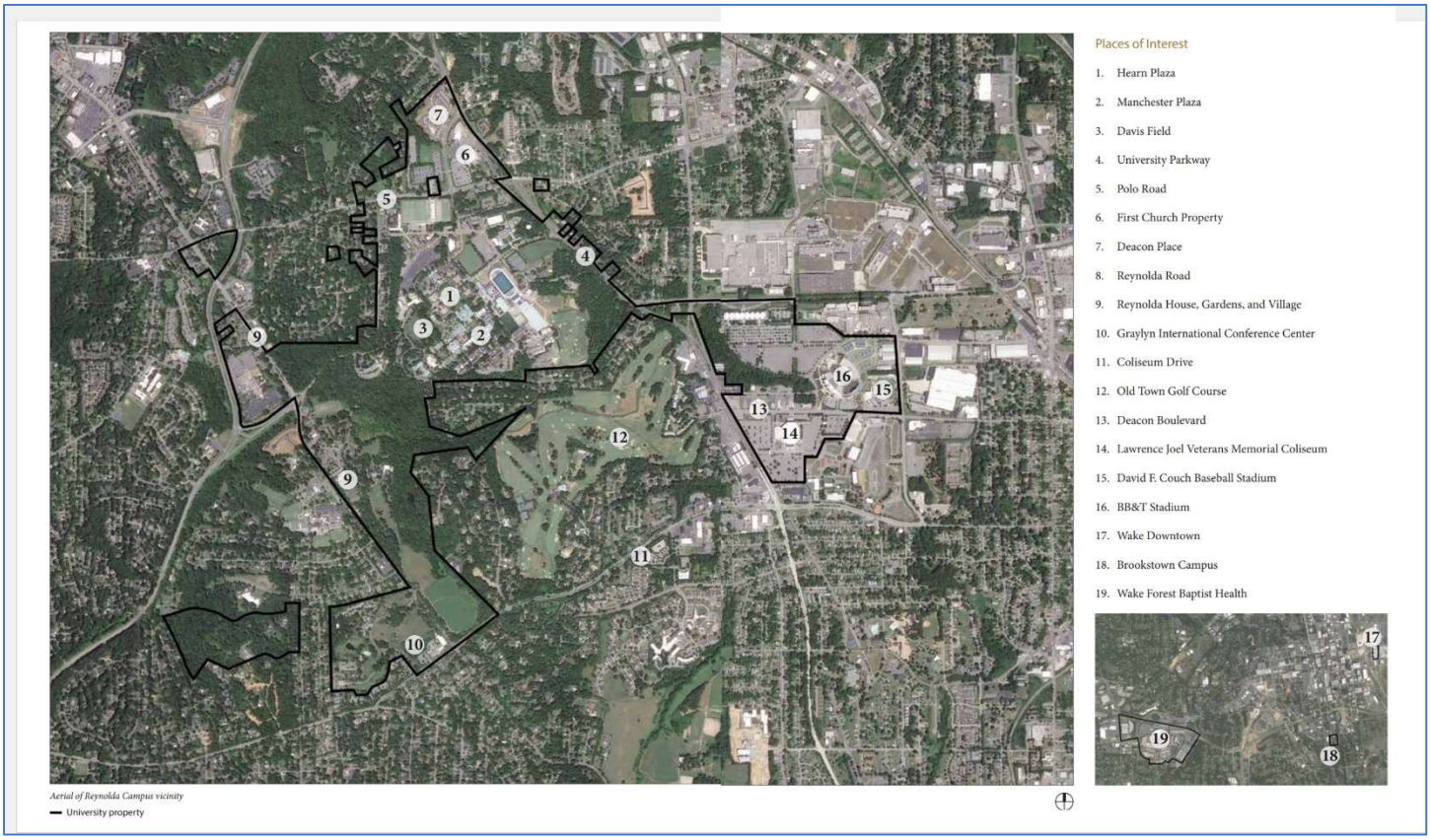
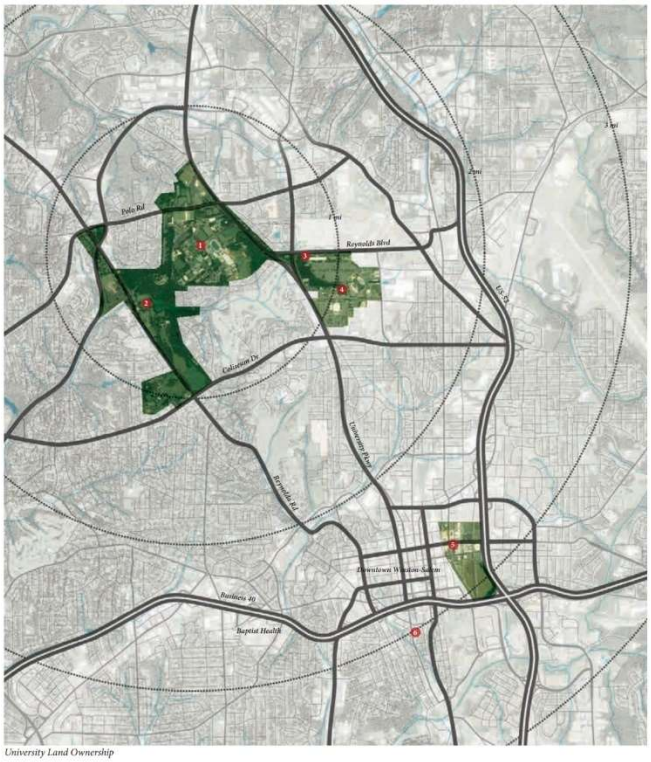
Appendix A

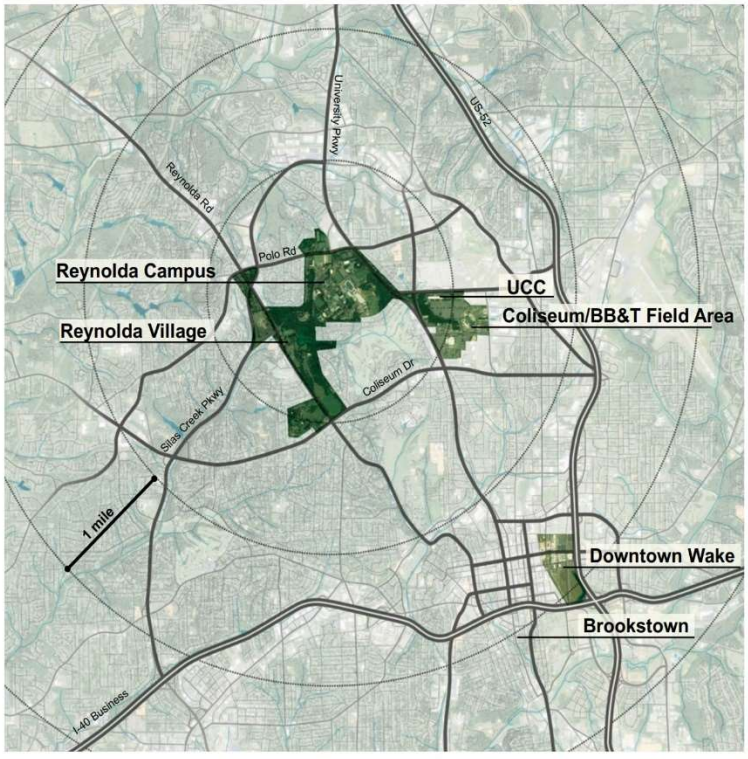
Wake Forest University
Map Resource Packet*
Used During
Workshop



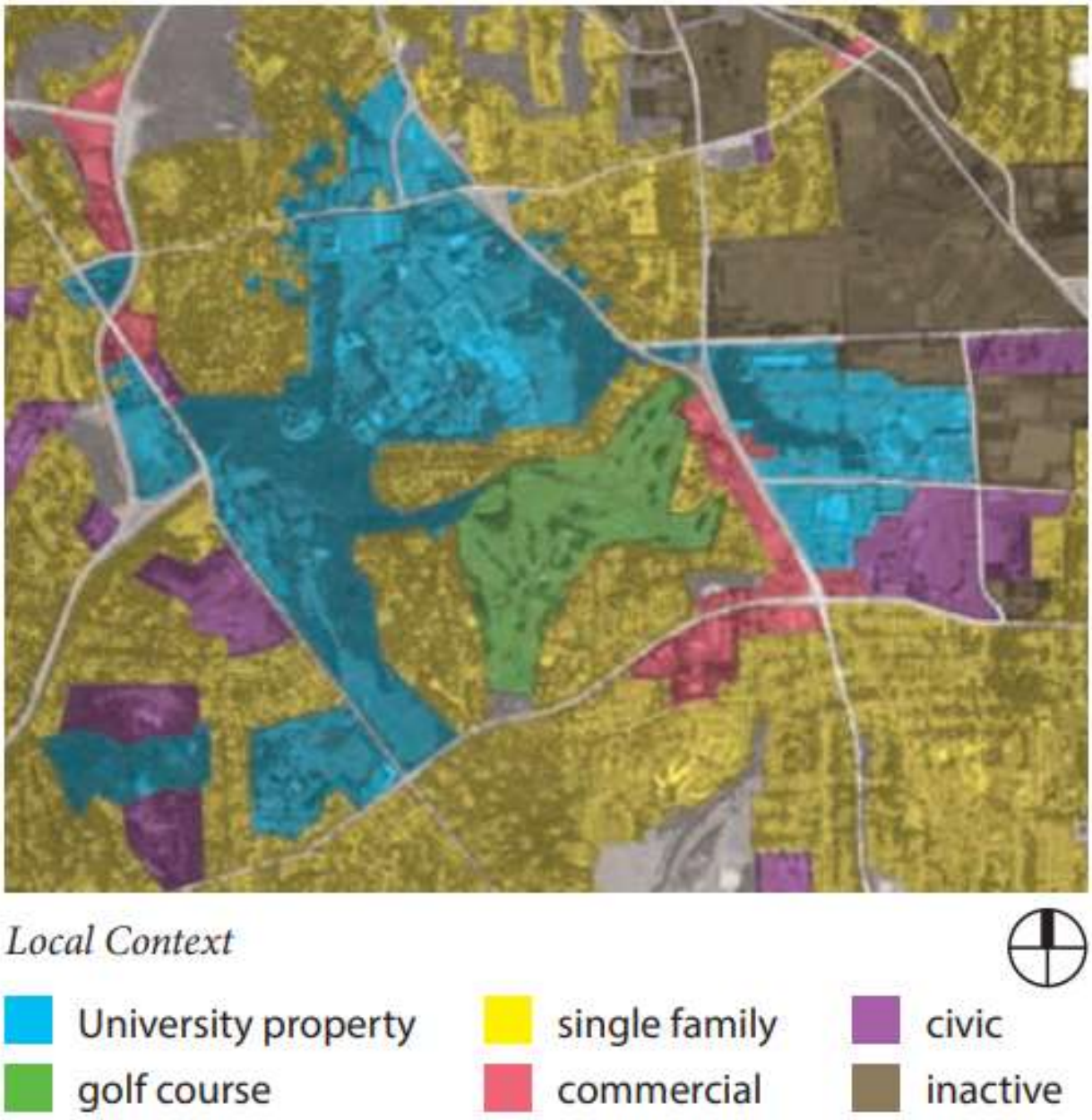
*Maps gathered from the Wake Forest Campus Master Plan (2019).



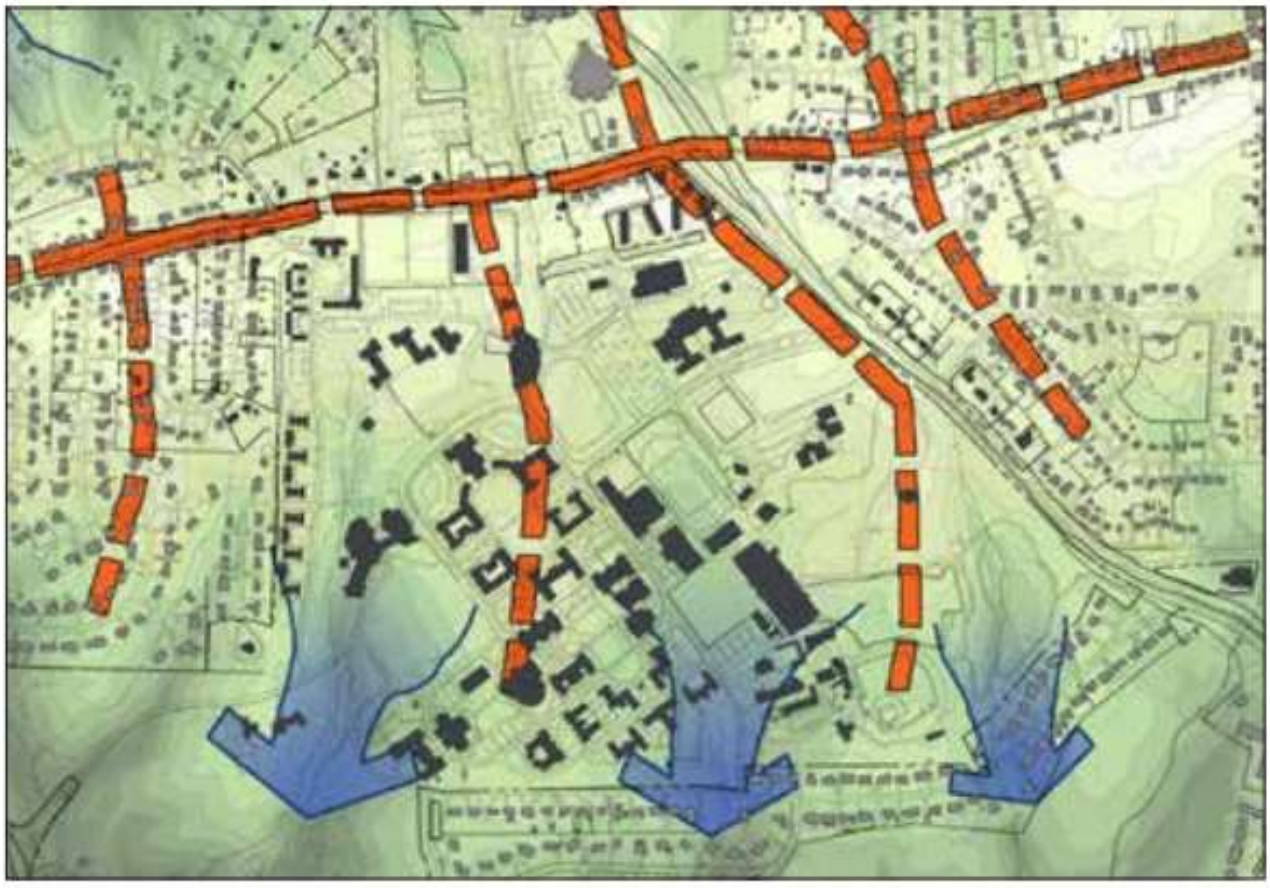




Source: Wake Forest University Campus Master Plan (2019)



Source: Wake Forest University Campus Master Plan (2019)



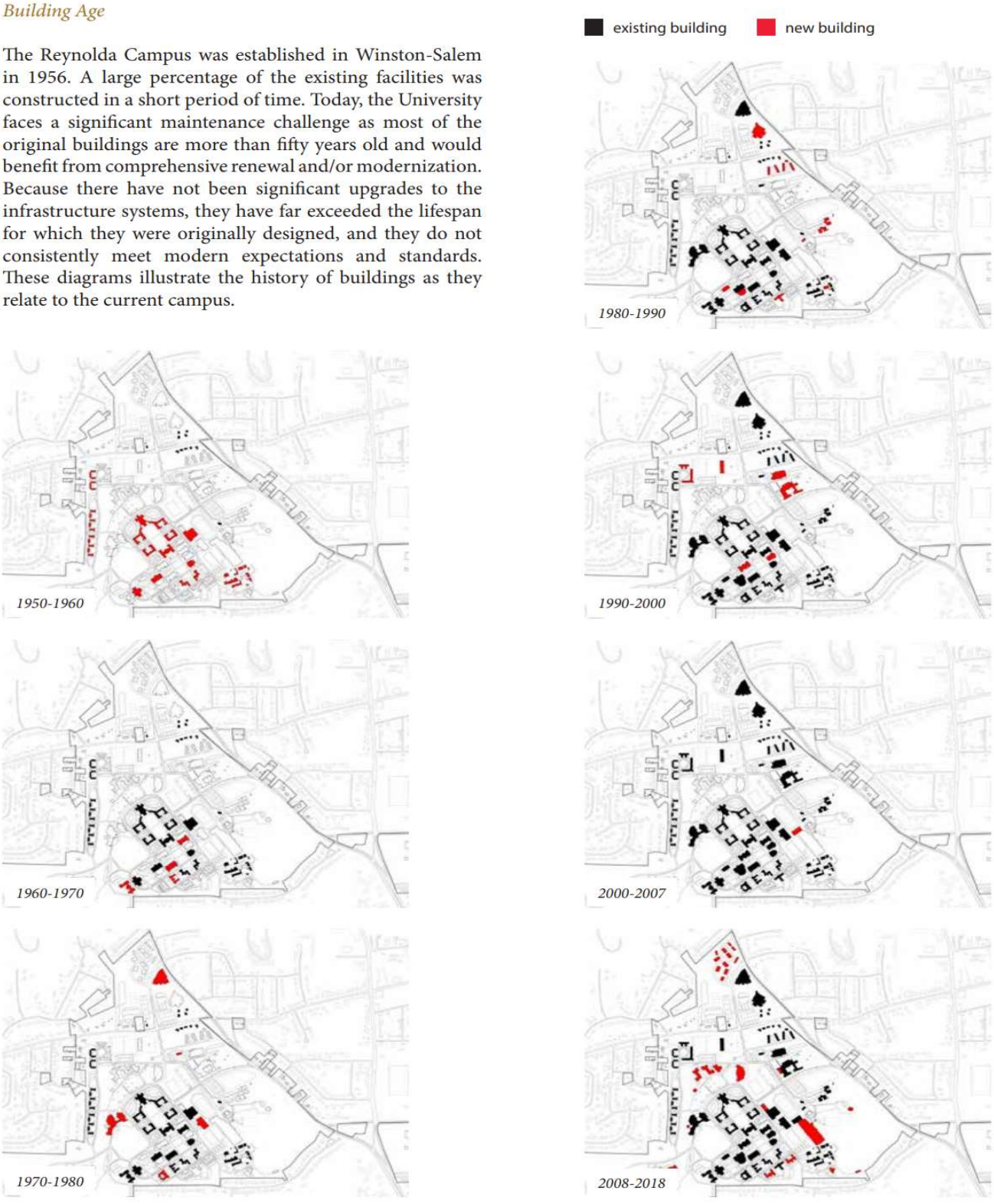
Campus Land Form

ridge line
flow direction
higher ground
lower ground

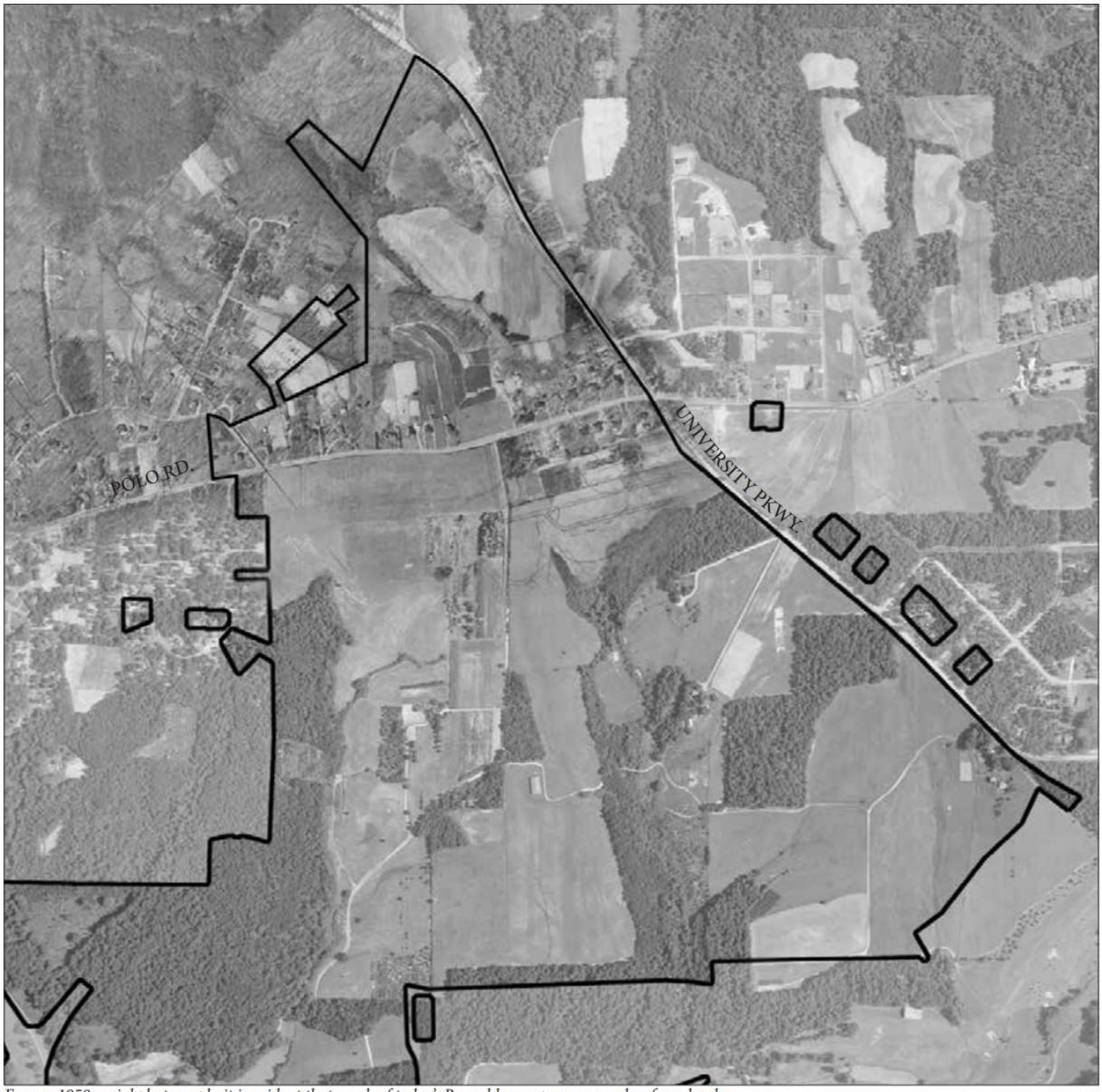
Source: Wake Forest University Campus Master Plan (2019)

Building Age

The Reynolda Campus was established in Winston-Salem in 1956. A large percentage of the existing facilities was constructed in a short period of time. Today, the University faces a significant maintenance challenge as most of the original buildings are more than fifty years old and would benefit from comprehensive renewal and/or modernization. Because there have not been significant upgrades to the infrastructure systems, they have far exceeded the lifespan for which they were originally designed, and they do not consistently meet modern expectations and standards. These diagrams illustrate the history of buildings as they relate to the current campus.



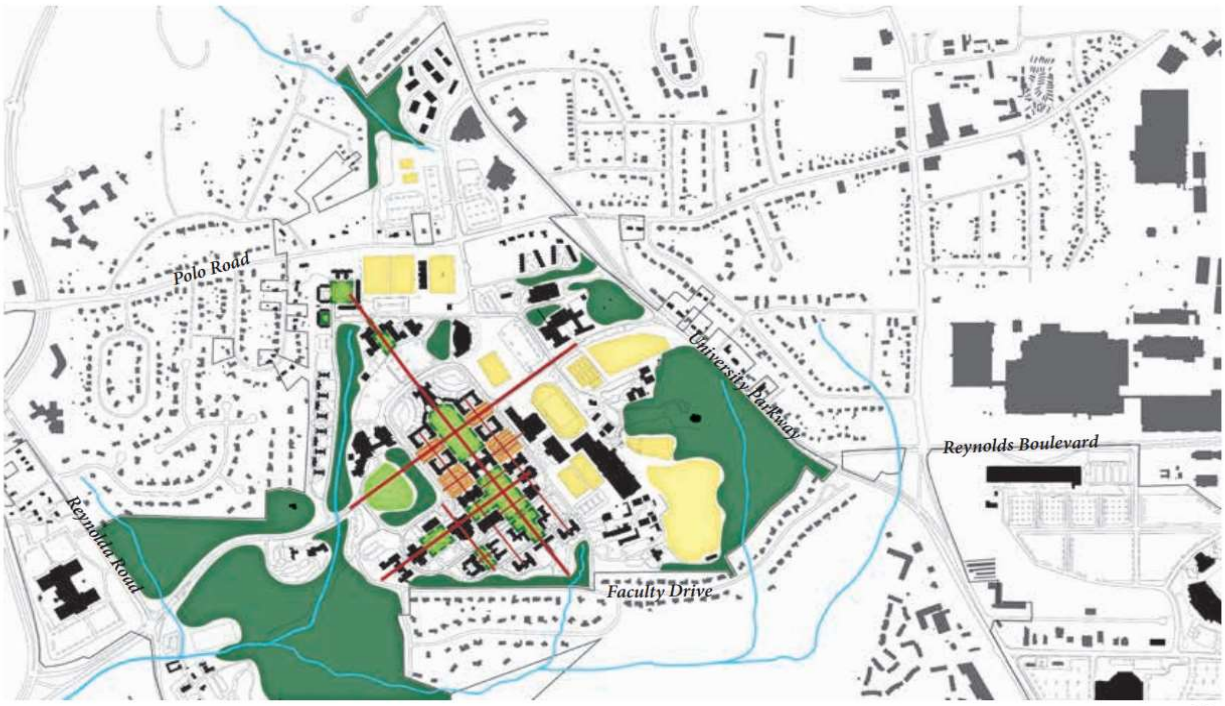
Source: Wake Forest University Campus Master Plan (2019)



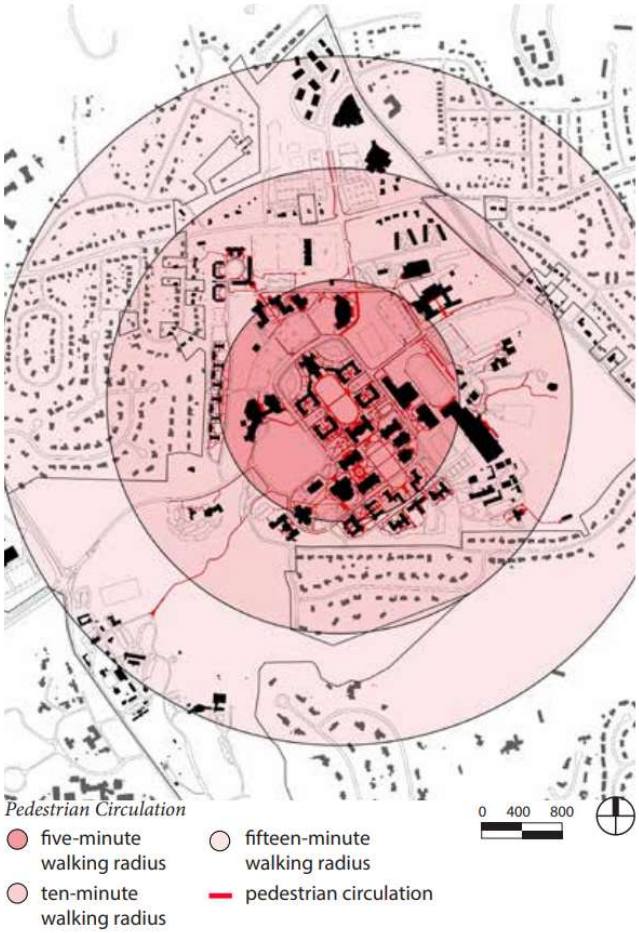
From a 1950 aerial photograph, it is evident that much of today's Reynolda campus was used as farm land.

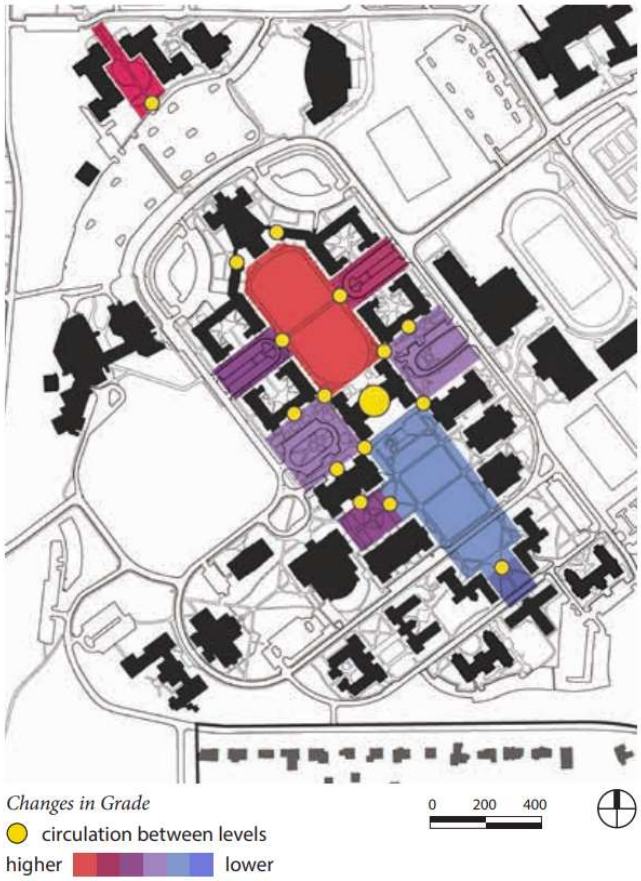
University property

Source: Wake Forest University Campus Master Plan (2019)



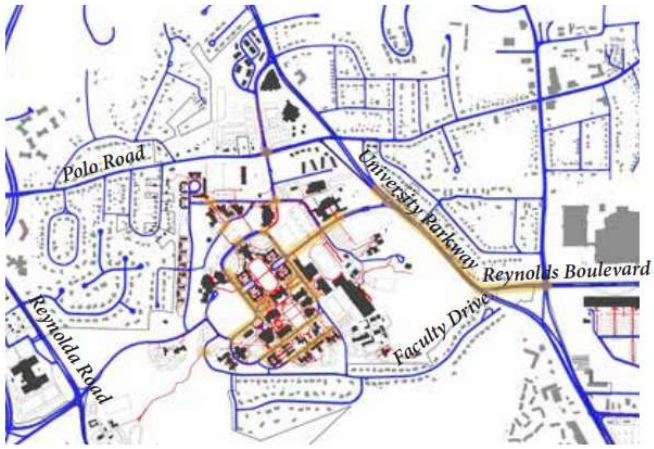
Source: Wake Forest University Campus Master Plan (2019)





Campus Circulation

street
shuttle stop
campus gateway
neighborhood access



Pedestrian and Vehicular Conflicts

streets
pedestrian volume
conflict areas

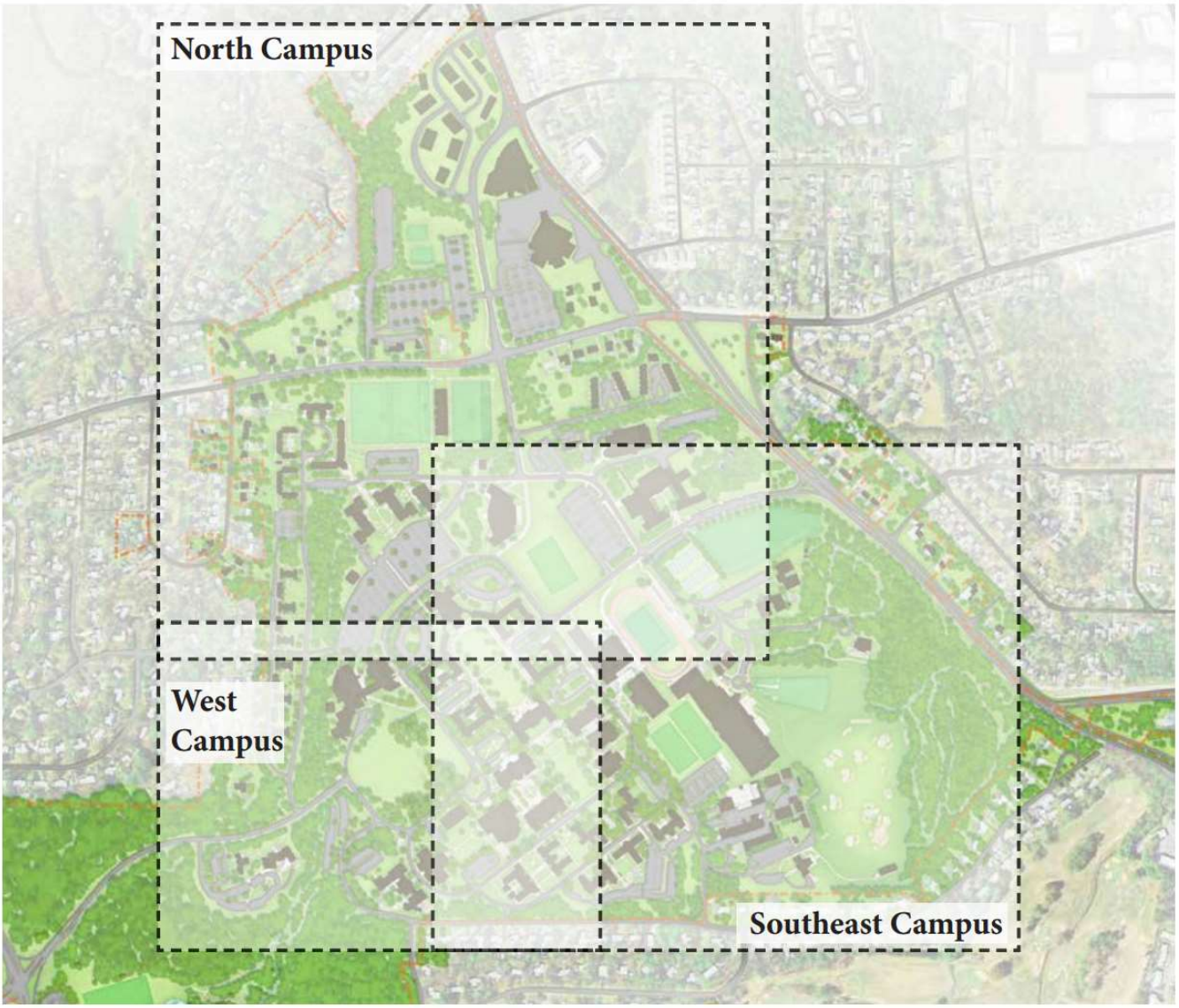
Source: Wake Forest University Campus Master Plan (2019)

Existing Conditions

Source: Wake Forest University Campus Master Plan (2019)

Source: Wake Forest University Campus Master Plan (2019)

Source: Wake Forest University Campus Master Plan (2019)



Source: Wake Forest University Campus Master Plan (2019)

Southeast Campus

University building
Proposed renovation
near-term building site
long-term building site

0 200 400

Southeast Campus

West Campus

University building
Proposed renovation
near-term building site
long-term building site

0 200 400

West Campus

North Campus

existing building
proposed near-term building
proposed long-term building

0 200 400

North Campus

Source: Wake Forest University Campus Master Plan (2019)

Source: Wake Forest University Campus Master Plan (2019)

www.CommunityResilienceBuilding.org

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