GUIDE TO UNDERSTANDING VULNERABILITY

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It's estimated that 83% of Americans live within urban areas (regions in and around cities). Throughout our history, catastrophes have proven capable of significantly impacting these areas — from the Great Chicago Fire to the San Francisco earthquake of 1989. With more than 273 million residents inhabiting our nation's cities, making these locations resilient to potential disasters is of utmost importance.

Extreme climate change has brought record-breaking fires, destructive floods, unseasonable tornadoes, and more ruinous events to communities nationwide in recent years. Preparing for these disasters is the responsibility of local governments. This requires the anticipation, management, and risk reduction of catastrophes. Further, local governments need to have the capability to identify and counteract early warning systems. No local government can handle these responsibilities without leveraging geographic information systems (GIS).

Disaster resilience is key to building a sustainable city. Increasing resiliency means decreasing risk — whether that's building green infrastructure to absorb more rainwater or removing fire-inducing foliage. Whatever calamity your community is susceptible to, reducing the risk from that event is principal to creating a durable city.

IS YOUR COMMUNITY VULNERABLE TO DISASTER?

In this e-book, we'll be discussing what makes a city at risk and how to improve overall resilience.

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IS YOUR CITY VULNERABLE?

Urban areas are perpetually planning how to accommodate the influx of inhabitants. However, growth has a limit. Eventually, new development is needed, which brings new potential for risk. Strategies and policies are available to mitigate this risk, but those require the buy-in of local governance to execute successfully.

Some of the major risk drivers of new development derive from where the structures are built. Has growth pushed construction to the more hazard-prone areas?

Are the available water, drainage, and waste management systems capable of handling the additional buildings and residences? Understanding limits is key to avoiding risk.

Weak local governance is a serious risk factor, leading to inadequate resource management. This diminishes the ability of the city to deliver essential services to residents during a disaster. A strong local government maps out its emergency response and plans the most effective way to assist the community when needed.

Other vulnerabilities include the decline of ecosystems as development creates pollution, reclaims wetlands,

and more. Climate change can cause significant temperature shifts that notably impact the intensity of weather events and augment the risk level for floods, fires, etc,.

Lastly, old infrastructure shouldn't be overlooked as your city grows. Decaying foundations may result in costly collapses.

Now that you know some of the risks involved with managing an urban area, how can you combat them? Let's talk about building a resilient city.

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HOW TO IMPROVE RESILIENCE

Prioritizing resilience can augment the prosperity and security of your city. Proactive action against risk helps improve social, economic, and environmental conditions by hampering the hazards capable of crippling the community. How can you create a dynamic strategy for combating risk?

Simply put, the most resilient cities are those that plan ahead. Smartly organize services and develop processes to handle disasters before, during, and after they occur. Ensure infrastructure adheres to building codes (e.g., commercial and residential buildings aren't placed on hazardous land because other areas are unavailable). Create communication funnels to disseminate information to those in the community. There's no overthinking disaster preparedness.

One of the most effective tools for emergency preparation is GIS. Incorporating geospatial technologies enables government entities to monitor and detect early disaster warning signs — allowing them to act before an event occurs. Early detection is possible using the advanced capabilities derived from GIS, including spatial awareness, real-time monitoring, data integration, and public education tools.

The following offers a sample of why GIS is inherent to creating a resilient city:

Accurately map fault lines, flood zones, and fire-prone areas

Predict tornado, hurricane, and other disaster paths using historical data

Use previous event data to create future analytics and predictions

Identify vulnerable communities and reorganize resources accordingly

As you can see, it takes work to build a resilient city. The result is worth the effort, with benefits ranging from risk reduction to economic growth.

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BENEFITS OF RESILIENCE

Failure to dedicate efforts toward risk reduction can lead to severe economic deterioration due to a loss of trust by existing businesses and potential investors. After all, nobody wants to finance a sinking ship. Creating a holistic risk management strategy incorporates residents' and businesses' needs to develop confidence in the city's future. Once proven to be resilient, your city can start to see the benefits being realized in other sustainable urban areas, including:

TRUST IN LOCAL LEADERSHIP

ACTIVE RESIDENT PARTICIPATION IN CITY GROWTH

INCREASED CAPITAL INVESTMENT IN COMMERCIAL DEVELOPMENT

**BETTER INFORMED CITIZENS CAPABLE OF ASSISTING IN DISASTER MANAGEMENT**

> ❝ Maps are like campfires – everyone gathers around them, because they allow people to understand complex issues at a glance, and find agreement about how to help the land.
>
> – Sonoma Ecology Center

GIS FOR EMERGENCY PREPARATION

Geospatial technology improves how local governments respond to disasters. GIS provides an invaluable framework to gather, manage, and analyze city data. Incorporating GIS into your emergency preparation creates a powerful tool for exhibiting information in a spatial capacity.

Seeing the data creates identifiable insights for decision makers by transforming complex information into easy-to-interpret visuals. GIS, combined with aerial mapping technologies, delivers a firm understanding of risk for modern cities. Understanding this risk creates a path toward fortifying your city town against the impact of a disaster.
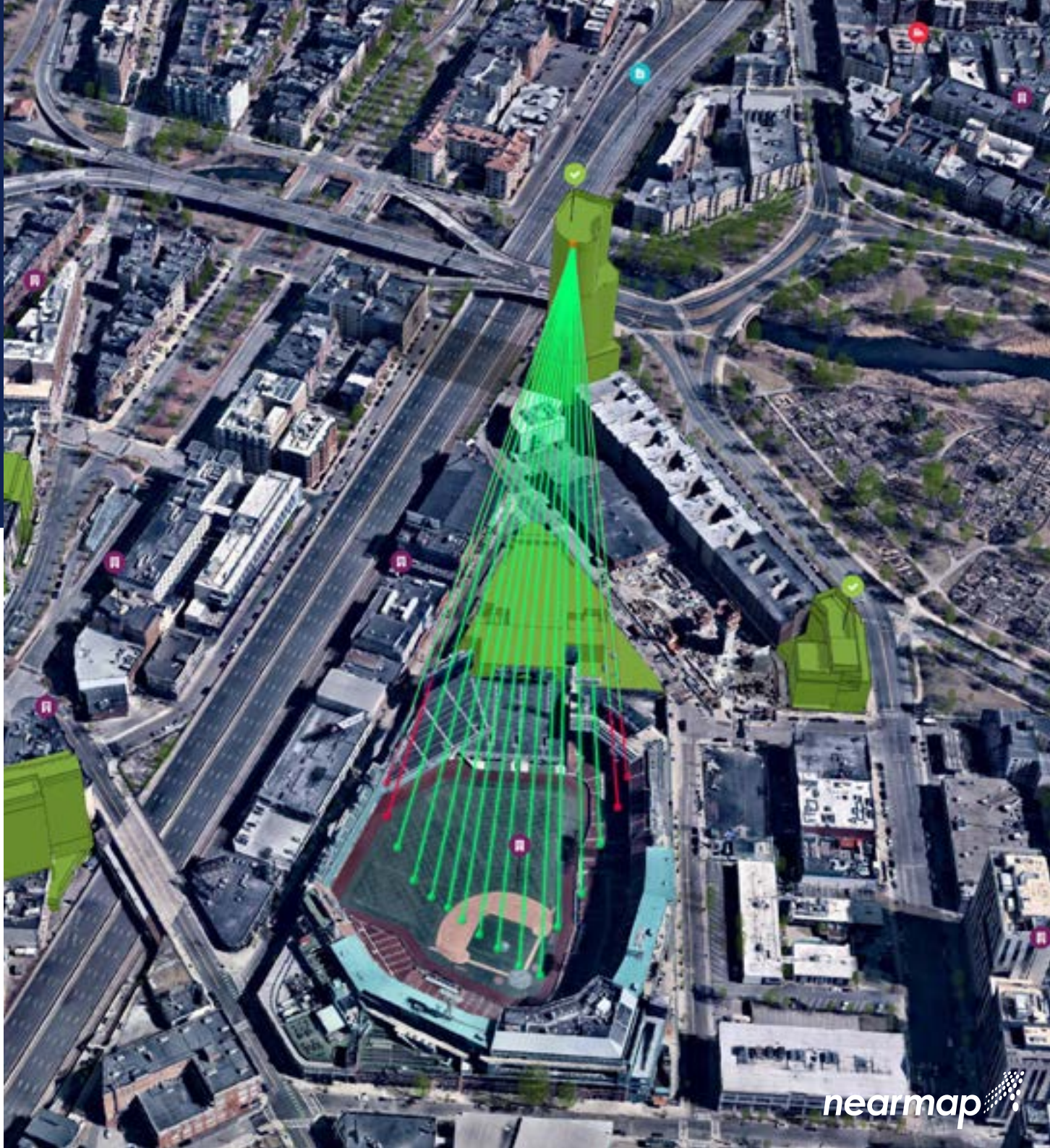
MAP A RESILIENT FUTURE WITH AERIAL IMAGERY

Leading local governments augment their risk management with aerial imagery technologies. The insights collected from the cartographic data provided by this imagery unlocks advanced mitigation, preparation, and response measures.


MITIGATION

Mitigation strategies are vital to reducing a disaster's impact. Aerial imagery enables flood hazard mapping functionality, allowing local governments to identify flood risks and communicate them to their stakeholders and partners. Because the data relies on visuals, information is dynamic and adaptable to environmental changes.

PREPARATION

Actions taken in advance of an event define the preparation of a city for disasters. The U.S. National Oceanic and Atmospheric Administration leverages GIS for their SLOSH model, which combines wind speed, distance, and direction with predicted precipitation and topography to identify possible flood risks during storms. Local governments use this model to plan evacuation strategies effectively.
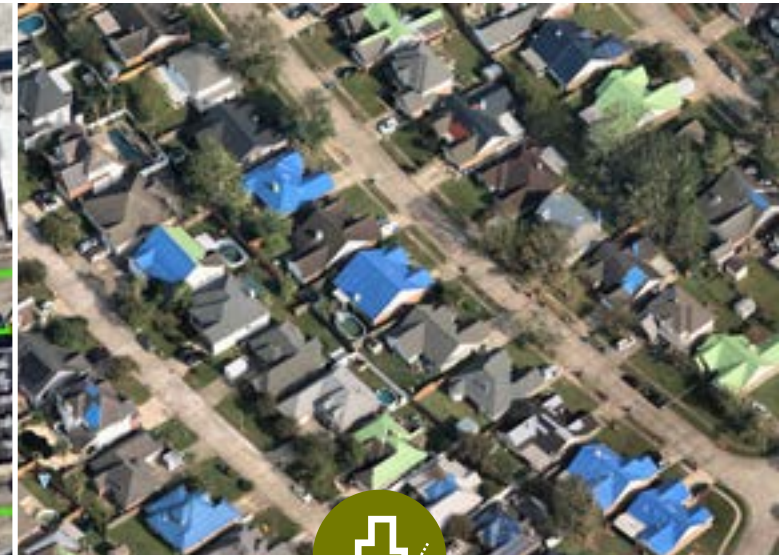
RESPONSE

The U.S. Army Corps of Engineers (USACE) digitally overlays aerial imagery with consequence models, flood inundation mapping, and more to demonstrate catastrophic possibilities. Their efforts were proven effective during Hurricane Florence, where their models were used in conjunction with the National Response Framework and National Weather Service to simulate the operational release of water from dams and impacts on levees within the impacted zone.

From public safety to urban planning to property assessment and transportation, access to up-to-date aerial imagery is growing more critical for governmental departments. With Nearmap, you not only have access to current truth on the ground, but historical imagery, 3D datasets, AI layers, and more — all in leading resolution and capable of being integrated with your preferred GIS, CAD, 3D visualization, or asset management software.

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NEARMAP FOR RESILIENCE

Nearmap works with cities nationwide and abroad to help them better understand and manage their local environment. A customer of ours recently leveraged Nearmap aerial imagery to power their Project Resilience initiative, which aims to educate communities and reduce future disasters' potential impact. To achieve this goal, Project Resilience conducted vulnerability assessments and engaged with communities to identify their historical issues. Vulnerability assessments are used to highlight potential hazards and gather buy-in from local governments who welcomed the help of improving their resiliency.

Let's see how one such city partnered with Project Resilience to be a step ahead of potential disasters.

Our customer used Nearmap imagery to identify two choke points that were susceptible to flood risk: one a culvert over a residential street, the other a bridge atop a creek.

This customer found multiple fallen trees upstream of the bridge, mainly from the cause of recent fires that resulted in a lot of green waste debris. With significant rain, these trees could float downstream and become trapped within the choke point — creating a dam that causes water to flood into nearby homes and businesses. (One of the trees measured with Nearmap was found to be over 32 feet long.)

Below highlights are the vulnerable bridge chokepoint. The left side of the image was built using a digital terrain model (DEM) to remove the vegetation and provide a clearer view of the land contours. DEM magnified the two berms that were brought together to decrease the span of the bridge. While the artificial nature of these berms helped reduce the spend of the bridge by narrowing its span, the modification of the creek's natural watercourse lessened the space for floating debris to pass through.

Using the Nearmap flood modeling tool, our customer was able to simulate water build up in the event of a dam at the bridge choke point. This model allowed them to identify major risk to the community's business district. If this district is impacted by flooding, recovery will be severely prolonged due to the loss of employment for residents working at those affected businesses.


After this assessment, our customer was able to mobilize this community to conduct service projects aimed at mitigating the flood risk by clearing the water course and removing the debris upstream.

Being prepared for any emergency with a well-conceived plan benefits both the residential and commercial resilience of a community. Boosting preparation efforts with early warning systems powered by today's technologies helps to build a reactive community capable of adapting to an event — even before it occurs. This level of response only happens if local governments understand the importance of emergency planning.

Committing to risk aversion is more than making goals; it's about leveraging all the tools available. GIS and mapping capabilities are vital to every stage of the emergency management process. By harnessing the data collated through these informational systems, it's possible to attain a heightened level of analysis and planning for your city's situation. Once achieved, your community can reap the benefits of being resilient, including economic savings, increased community collaboration, and a more secure population. Those are results we can all strive for.
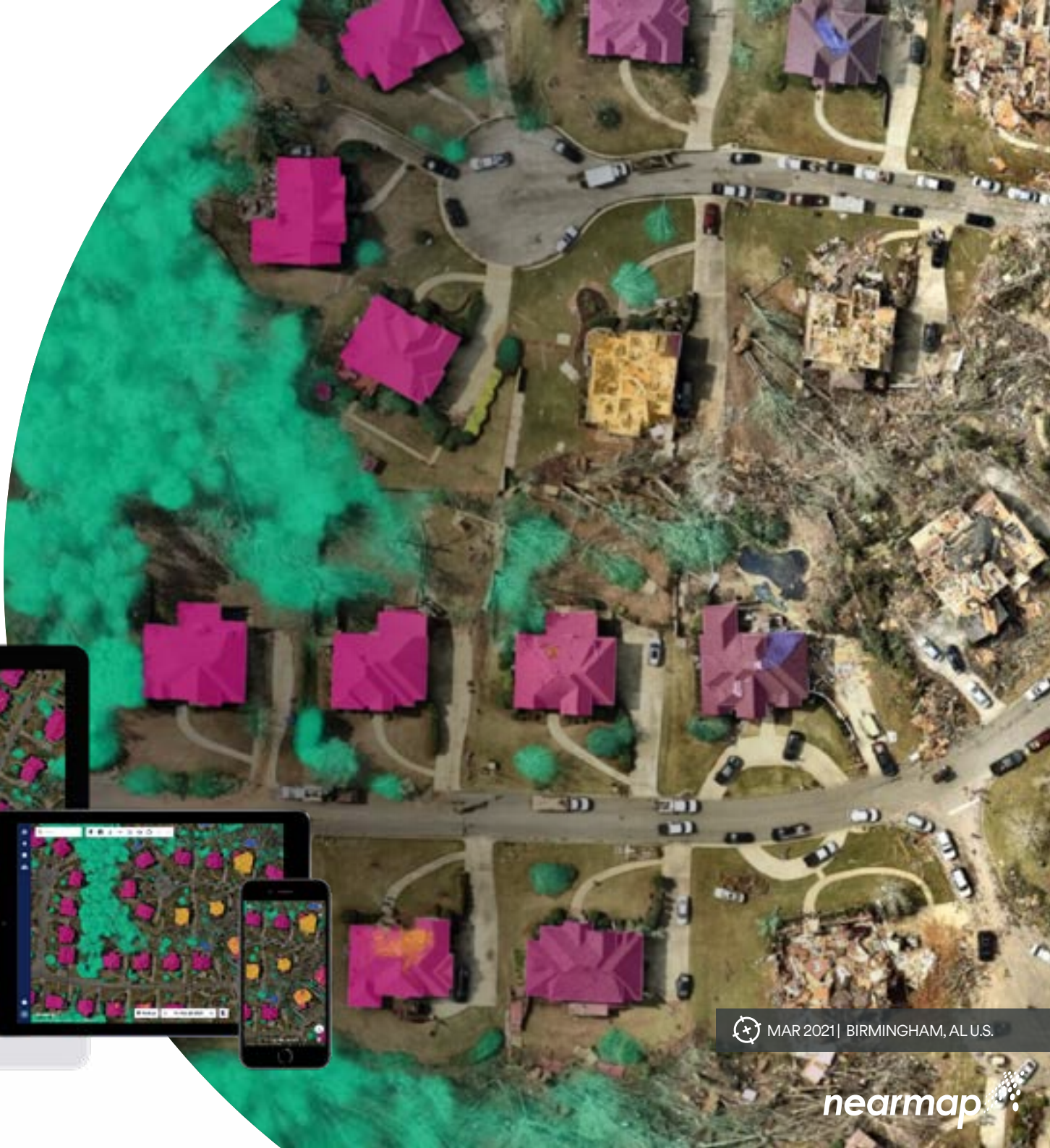
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ABOUT US

Founded in 2007, Nearmap is a leading aerial imagery and geospatial technology provider, delivering content at scale and covering large urban areas throughout the United States, Australia, New Zealand, and Canada. Combining patented plane-mounted camera systems, world-class survey operations capabilities, and an automated photogrammetry pipeline to provide imagery within days of capture, Nearmap offers a complete source of truth on the ground — empowering government entities to perform property assessments, urban planning, and more with speed and certainty.

Government users leverage Nearmap location intelligence to better understand their livable world. From high-resolution details to accurate 3D models and data-rich AI layers, our mapping technology gives you access to the information needed to move confidently towards a more resilient city. **Can your map do that?**

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