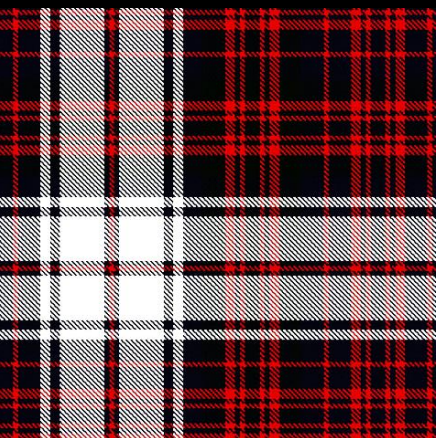


*Understanding the Past & Reducing your Risk  
to Successful Brownfields Redevelopment  
through Geospatial Forensics*


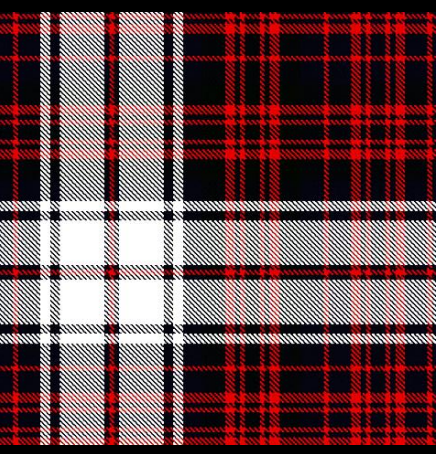


Bruce McDonald, Principal  
McDonald & Bruce, LLC  
bruce@mcdonaldbruce.llc  
540-454-8485





# *Today's Presentation*

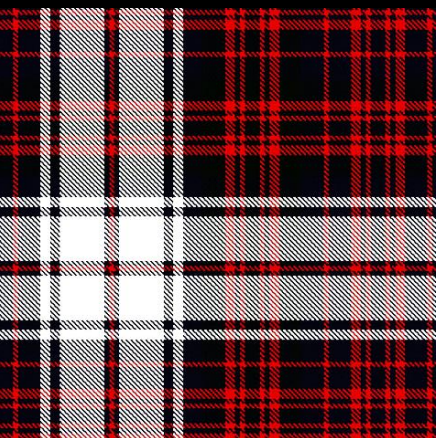
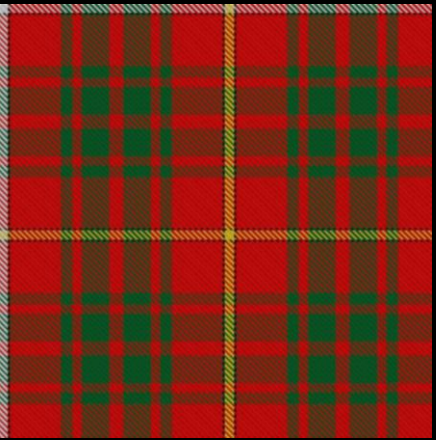
- 
- *Today we'll highlight:*
  - *What is Geospatial Forensics?*
  - *How does it reduce my risk to successful brownfield redevelopment?*
  - *What value does Geospatial Forensics provide and to whom?*
  - *Illustrative examples from Florida and elsewhere*
  - *Complementary legal practices benefiting from Geospatial Forensics*
  - *How to move forward with employing this capability for your clients' success*
- 





## *Speaker's Bio*

- *35 years professional experience as geospatial scientist*
- *Create customer focused solutions to real world problems integrating geospatial and complementary data sets*
- *Twenty years service with National Reconnaissance Office, Chantilly, VA*
- *TS/SCI/CI prior clearance - 30 years cleared*
- *BS Earth Science Geography; MS (partial) GIS/Digital Image Processing*
- *EPA EPIC, Warrenton, VA: Performed dozens of CERCLA & RCRA aerial photographic site assessments and GIS services*
- *AMLAW 20 → Boutique advising*
- *Support conducted without a trace when necessary*
- *McDonald & Bruce, LLC founded Spring 2022 to provide tailorable personalized support to legal, environmental, and government clients*



# *What is Geospatial Forensics?*

## *How does it reduce my risk?*

- *Capability and value of finding, evaluating, then spatially and temporally integrating materially valuable data that can reveal otherwise unassessed site history & characteristics*
- *Strongly recommended to be factored into your brownfield redevelopment requirements and objectives*
- *Not a “normal” Phase 1 ESA as defined by ASTM specs; greater timeframe, techniques, and range of materials incorporated that enable greater risk reduction for developer, lender, community stakeholders*
- *You are buying down risk from unknown activities not necessarily covered via Phase 1 & 2 assessments and are supporting a wider range of site redevelopment objectives beyond identifying recognized environmental conditions due to petroleum or hazardous materials*
- *Strategy and approach supports wide range of legal practices beyond brownfields*





# Value?

- **Value accrues to your legal clients:** *Geospatial Forensics provides for more precise understanding of past site activity; enables more tailored and thorough advising of brownfield redevelopment design and implementation; enables executing your project with the best possible outcome against your set of requirements and objectives; which reduces potential for litigation from potential historical site conditions*
- **Value accrues to your developer:** *Greater likelihood of regulatory approval through tighter scope of risk exposure; greater likelihood of correctly scoped design and build and reduced construction delays*
- **Value accrues to your legal firm:** *Helps you distinguish your offerings and expand your level of service to your client set; Geospatial Forensics highly applicable to multiple additional practices*
- **Value accrues to your neighboring community:** *Enables demonstrating past negative or positive site activity which can be enhanced or mitigated as part of your redevelopment plans*
- **Value accrues to your project financier:** *Reduced likelihood of environmental claims and schedule delays*
- **Value accrues to your environmental risk insurer:** *Reduced likelihood of being tapped for damages*
- **Value accrues to the natural environment:** *Design and build can incorporate environmental sustainability and enhancement features identified through geospatial forensics; Green Goodwill*

# Compare and Contrast: *Isn't this just another Phase 1?*

- *No: Widely tailorable focus depending on client requirements rather than identifying only recognized environmental conditions related to hazardous materials and petroleum products*
- *Geospatial Forensics employs a longer historical timeline, additional spatial and non-spatial data, digital processing, and spatial and temporal fusion to capture site history and integrate into a much more tailorable product*
- *Geospatial Forensics enables a more tailored Phase 2 ESA when required and enables much more environmentally sustainable redevelopment through incorporating knowledge of pre-build site conditions which is not a focus of Phase 1 ESA*
- *While the docs for all appropriate inquiries can be very useful, they can often be made more valuable when interpreted using Geospatial Forensics*
- *No ASTM practice requirement to interpret aerial photography using digital or physical aerial photo interpretation aids such as light tables, mirror stereoscopes, digital image processing, or to spatially fuse data*
- *No ASTM requirement to view in 3D or to georegister data.. Am I seeing a pit or a pile? Shadow or petroleum spill?*
- *Geospatial Forensics supports a wider range of legal client environmental requirements*



# Constraints...then...Options

- *Your big four ASTM practice ESA resources are: (1) aerial photographs, (2) fire insurance maps, (3) local street directories, and (4) historical topographic maps*
- *HOWEVER:*
- *Only ~15% of Florida mapped with 1: 63K topographic maps and nearly 0% mapped with 1:24K topographic maps by 1940*
- *County level aerial photography generally not collected until after 1940*
- *Fire insurance maps produced only in some built-up but not rural areas*
- *Local street directories are not a cartographic or photographic record for fusing data, though they can be made much more valuable with spatial integration*



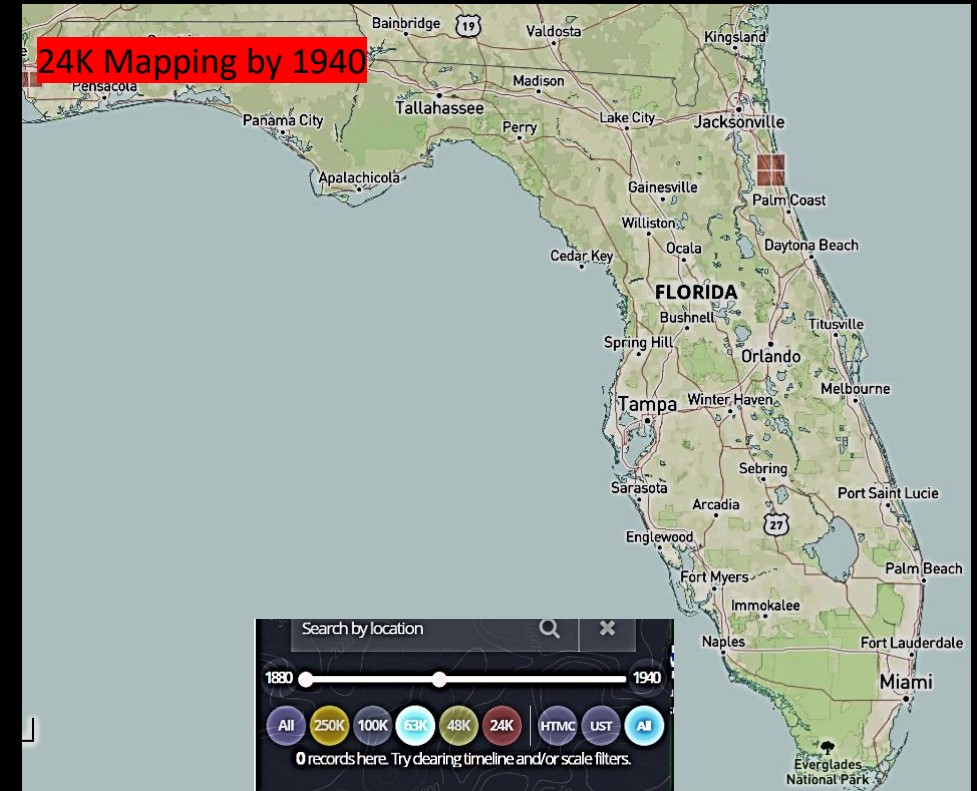
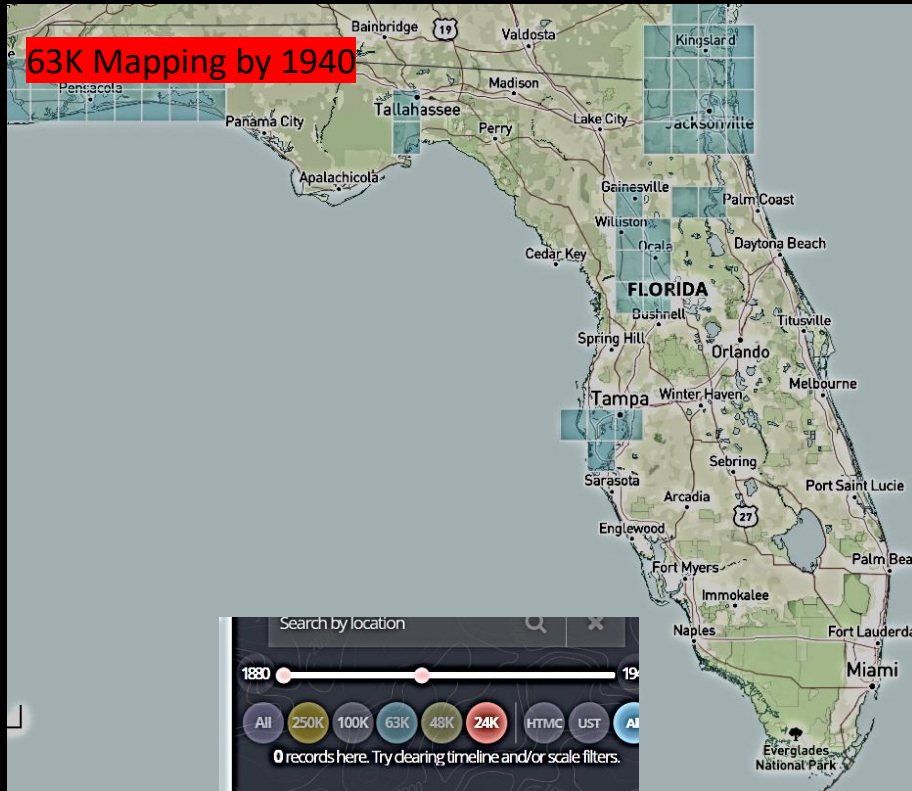
# Constraints...then..Options

- *With Geospatial Forensics, incorporating wider base materials means we can integrate good quality maps from back to mid 1800s with aerial photography resources beginning in the 1920s to understand the past and reduce the risk for Florida Brownfields site redevelopment*





## *Little Historical Topographic Mapping by 1940*



*Options? Yes*



## Little Historical Aerial Photography by 1940

County/Area	Symbol	Year	Scale
Jackson County	IU	1937	1:20,000
Suwannee County	IV	1937	1:20,000
Alachua County	IT	1938	1:20,000
Gadsden County	AUR	1938	1:20,000
Hamilton County	AKT	1938	1:20,000
Hillsborough County	BQF	1938	1:20,000
Holmes County	AKU	1938	1:20,000
Union County	AUI	1938	1:20,000
Bradford County	BPX	1939	1:20,000
St. Johns River		1939	
St. Petersburg		1939	
Broward County	CJF	1940	1:40,000 *
Dade County	CJF	1940	1:40,000 *
Gilchrist County	CDN	1940	1:20,000
Jackson County	IU	1940	1:20,000
Manatee County	CDO	1940	1:20,000
Martin County	CJF	1940	1:40,000 *
Monroe County	CJF	1940	1:40,000 *
Palm Beach County	CJF	1940	1:40,000 *
Seminole County	CDQ	1940	1:20,000



*Options? Yes*

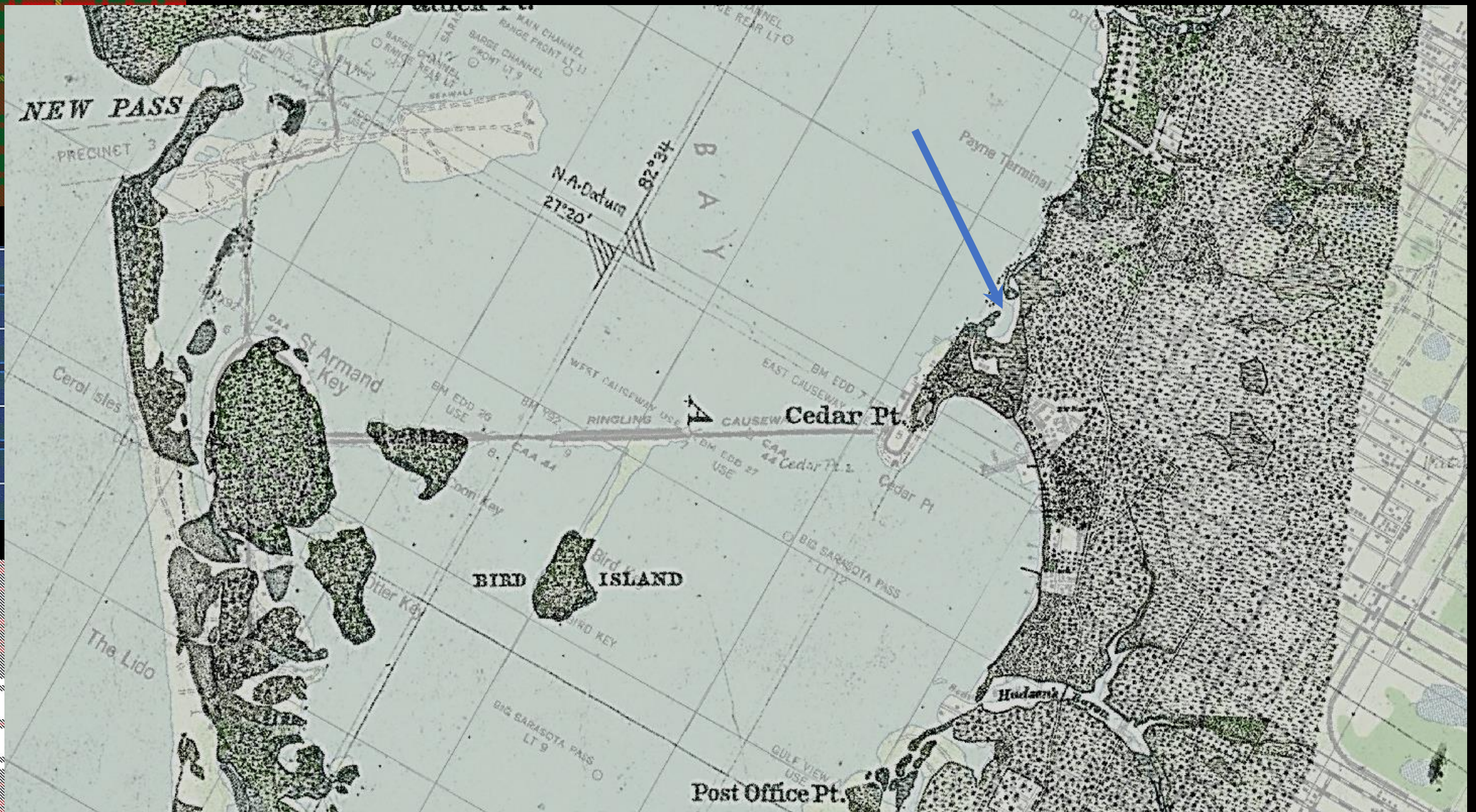


*Enough background..show me some examples of Geospatial Forensics..*



*Lake Mabel, FL before Port Everglades constructed  
1925 aerial photography and 2022 cruise ship locations*







# Sarasota, FL 1883 map and FDEP 2022 Brownfield sites

Proprietary Information: McDonald & Bruce, LLC

**Layers**

- ☒ Lakeland Florida Aerial Photograph
- ☐ 1
- ☐ 255
- ☐ Florida coal ash sites
- ☐ Florida Superfund Waste Cleanup
- ☐ Florida State Funded Cleanup Sites
- ☐ Hazardous Waste Treaters Storers
- ☒ FL\_Ruskin\_348357\_1944\_31680\_geo
- ☐ FL\_Balm\_345059\_1944\_31680\_geo
- ☐ FL\_Dover\_345873\_1955\_24000\_geo
- ☐ FL\_Wimauma\_349136\_1944\_31680\_geo

**Identify Results**

Feature	Value
Florida DEP Brownfield_Areas ...	
USERNAME	HORTON_L
(Derived)	
(Actions)	
OBJECTID	103
USERNAME	HORTON_L
DATESTAMP	2005-06-28T00:00:00.000
SOURCE	City of Sarasota
METHOD	paper
AREA_ID	BF580402000
AREA_NAME	Wireman Property, aka Sarasota Dreamb...
CITY	SARASOTA
COUNTY	SARASOTA
DISTRICT	Southwest
ACREAGE	1.88159
RESOLUTION_NUMBER	04R-1699
RESOLUTION_DATE	2004-04-19T00:00:00.000
XCOORD	543923.52513713
YCOORD	373651.29671762
LATITUDE	27.36069227
LONGITUDE	-82.54219678
LAT_DD	27
LAT_MM	21
LAT_SS	38.49217848
LONG_DD	-82
LONG_MM	32
LONG_SS	31.90842168
DOCUMENTS	<a href="https://prodenv.dep.state.fl.us/DepNexus/p/">https://prodenv.dep.state.fl.us/DepNexus/p/</a>
SHAPEAREA	7614.560131735
SHAPELEN	350.78682040424405

Coordinate: 484205,1097283 Scale: 1:25288 Magnifier: 100% Rotation: 0.0 ° Render EPSG:2882





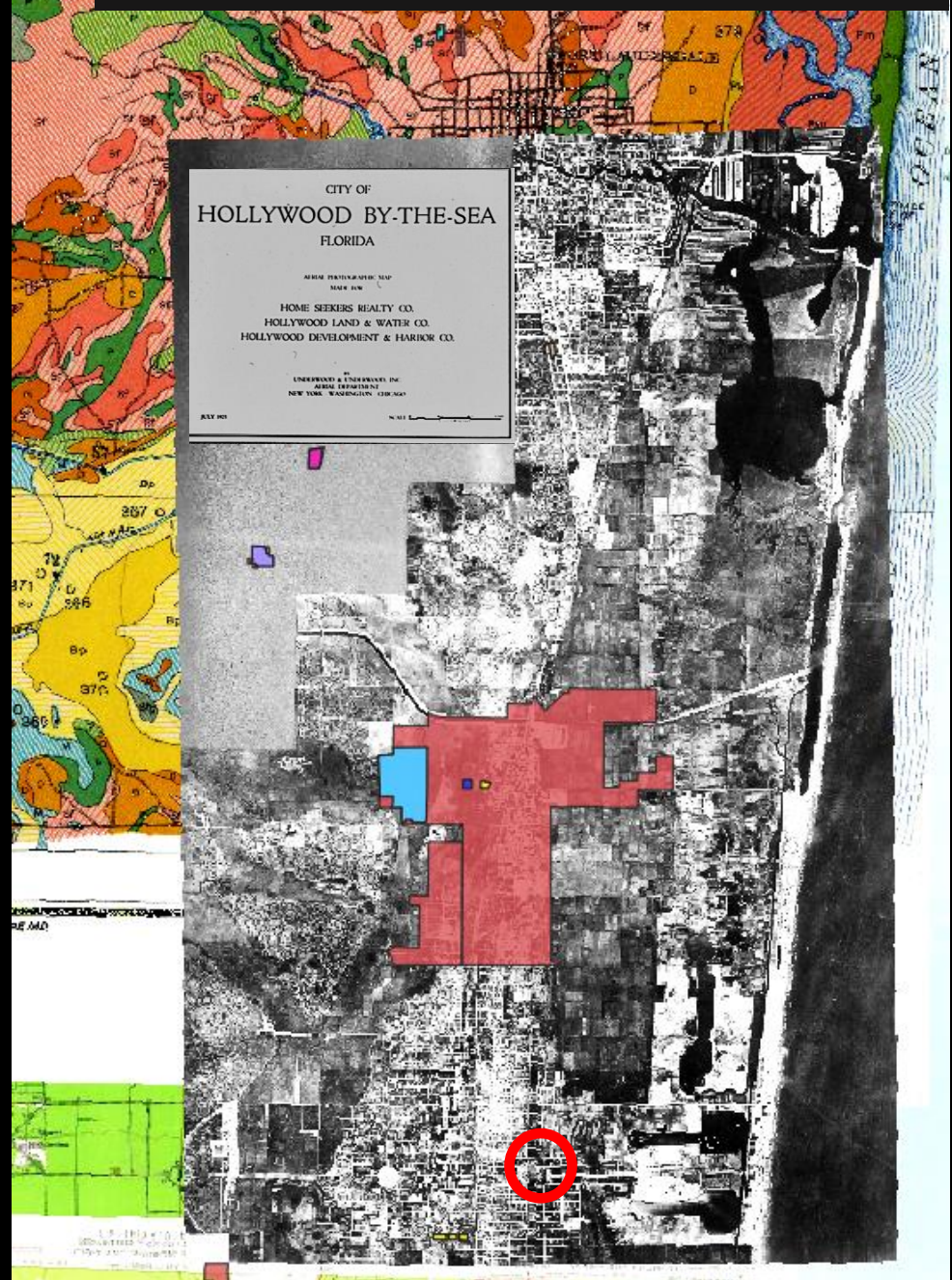
*Proprietary Information: McDonald & Bruce, LLC*



*Hollywood, FL February 1925 oblique aerial photo*  
*July 1925 aerial photo mosaic*



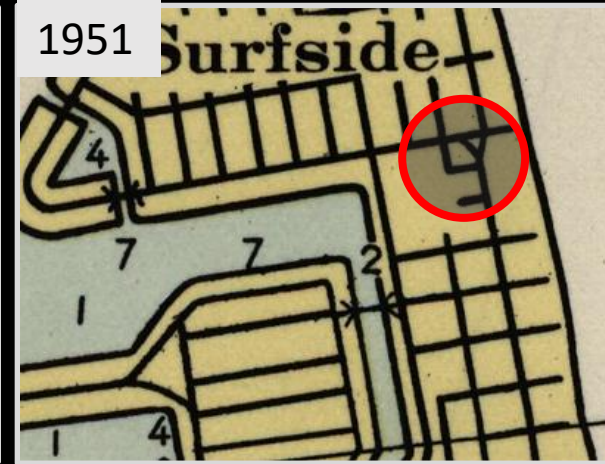
Proprietary Information: McDonald & Bruce, LLC





# Geospatial Forensics Condominium Collapse: Surfside, Florida 2021

- **1895 Bathymetric Map:**
  - Biscayne Bay un-dredged; Mangrove & scrub cover site
- **1932 Aerial Photographs:**
  - Property undeveloped; sand & scrub cover site
- **1951 Bathymetric Map:**
  - Biscayne Bay now shows manmade/deepened channel
- **1961 Aerial Photographs:**
  - Multi-story building now present
- **1981 Building Records:**
  - New construction; reportedly built on top of sand, organic fill, and reclaimed wetland
- **2021 Media Sources:**
  - Building collapses; likely exacerbated by decomposing organic fill and sea level rise



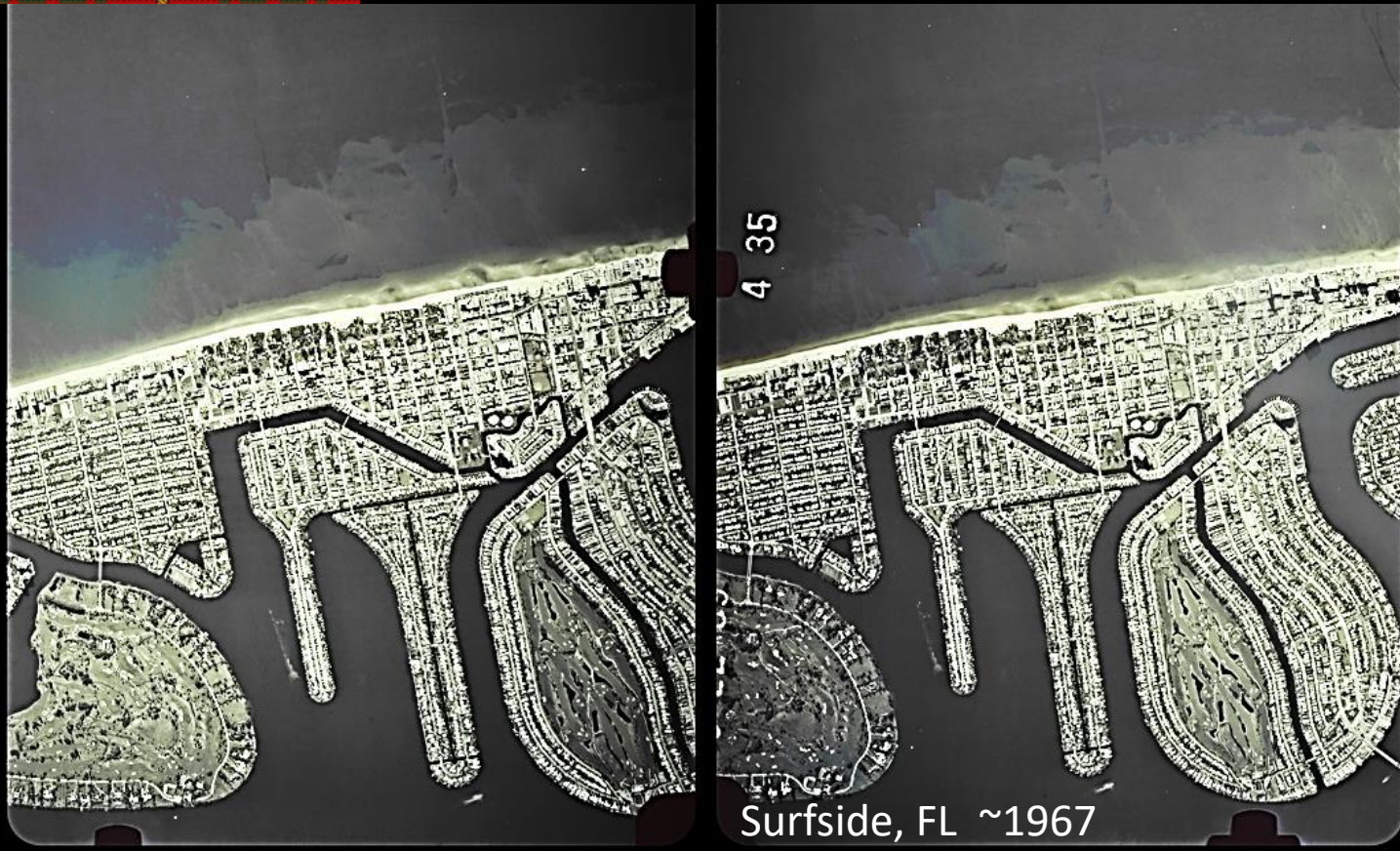
1932

Proprietary Information: McDonald & Bruce, LLC

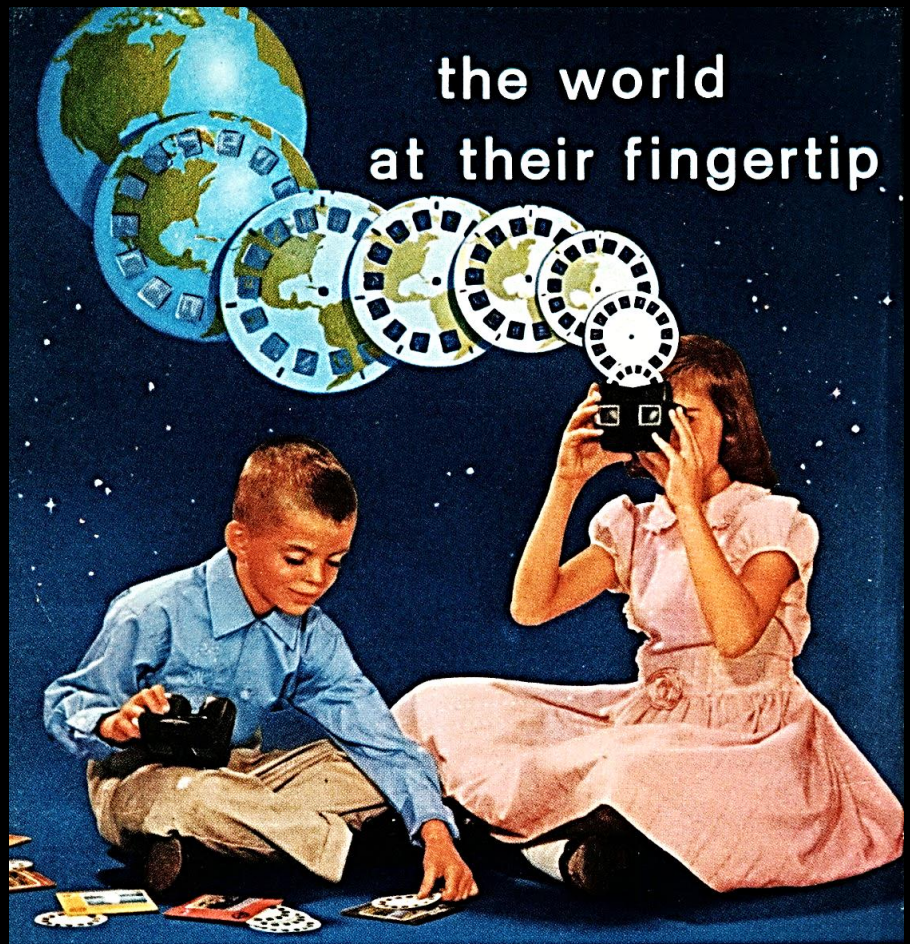
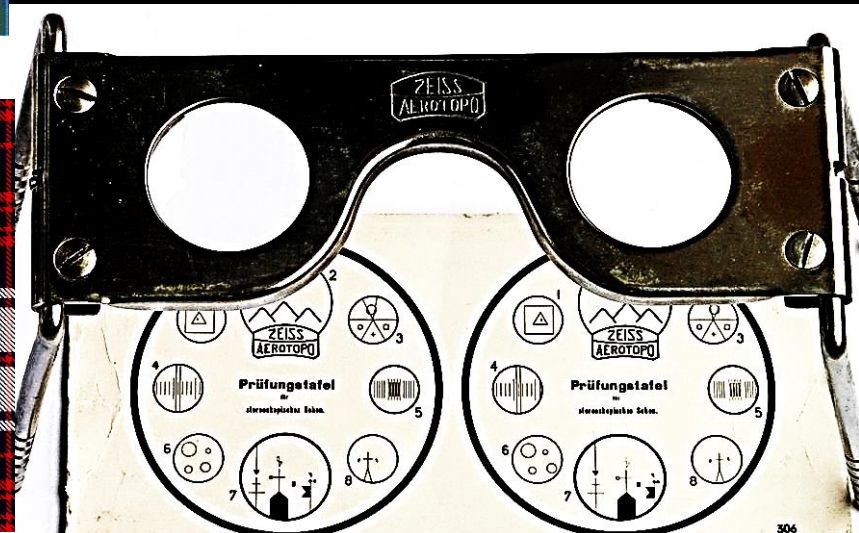


2021





Surfside, FL ~1967



the world  
at their fingertip

● **IN LIVING STEREO COLOR** — the gift that's wonderfully different. View-Master opens a new world of exciting educational adventure. Through the magic dimensions of living stereo color, your youngsters visit far-away lands, see wild animals, thrill to true-life adventures, laugh with cartoon favorites, re-live the stories of childhood, see fairy tale characters that seem almost real. This Christmas give your children the world in living stereo color. Give them VIEW-MASTER! At photo, gift, drug, department stores everywhere.

**VIEW-MASTER**

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slightly higher in Canada



"So lifelike you feel  
you're right there  
with 3 dimension pictures!"



The sensational Revere 3 Dimension Camera enables you to take amazingly lifelike pictures as easy as pie! Just press the button as you do with any ordinary camera. What you see, you catch in thrilling 3 dimensions. Everything has shape, form, depth! Full color scenes seem to spring to life with breath-taking 3 dimensional realism. So truly lifelike, viewers exclaim it's like being right there!



See the two lenses? They act like your eyes. Press button and they take two views of each scene. When viewed, scenes blend into 3 dimensions. Inexpensive—get 29 stereos from regular 35mm. roll; 20 from special stereo film.



Even beginners get fine results from their first roll, so simple is Revere to operate! Guesswork is eliminated. Even focusing is automatic. Too, stereos are now mounted by your film processor and are returned to you ready to show!



Every picture's a thrill when viewed through the new Revere Viewer! It brings out the best in every shot! Ask your dealer to show you the new Revere Stereo Camera and Viewer. REVERE CAMERA CO., CHICAGO 16, ILL.



For a new adventure in photography . . .

**Revere<sup>33</sup>**  
STEREO CAMERA

**CAMERA**—2 matched, coated 35mm f/3.5 REVERE WOLLENBERG AMAZON lenses with REVERE WOLLENBERG RAPID shutters (speeds 1/50 to 1/200); coupled focusing; internal synchro flash; superimposed image range-finder and viewer in camera head; double exposing preventive; single frame provision; level gauge. Incl. Fed. tax \$174.50

**VIEWER**—fine achromatic lenses; both focusing and interocular adjustments; built-in light; 3-color plastic case. \$18.50

Proprietary Information: McDonald & Bruce, LLC



Surfside, Florida Stereo View February 1925

Stereo Provides Critical Site Characteristics

What happened where and when, how much and where else might it have happened?

Am I seeing shadows or spills? Pits or piles? Where is surface runoff heading?



# Miami, FL 1925 Aerial Photography

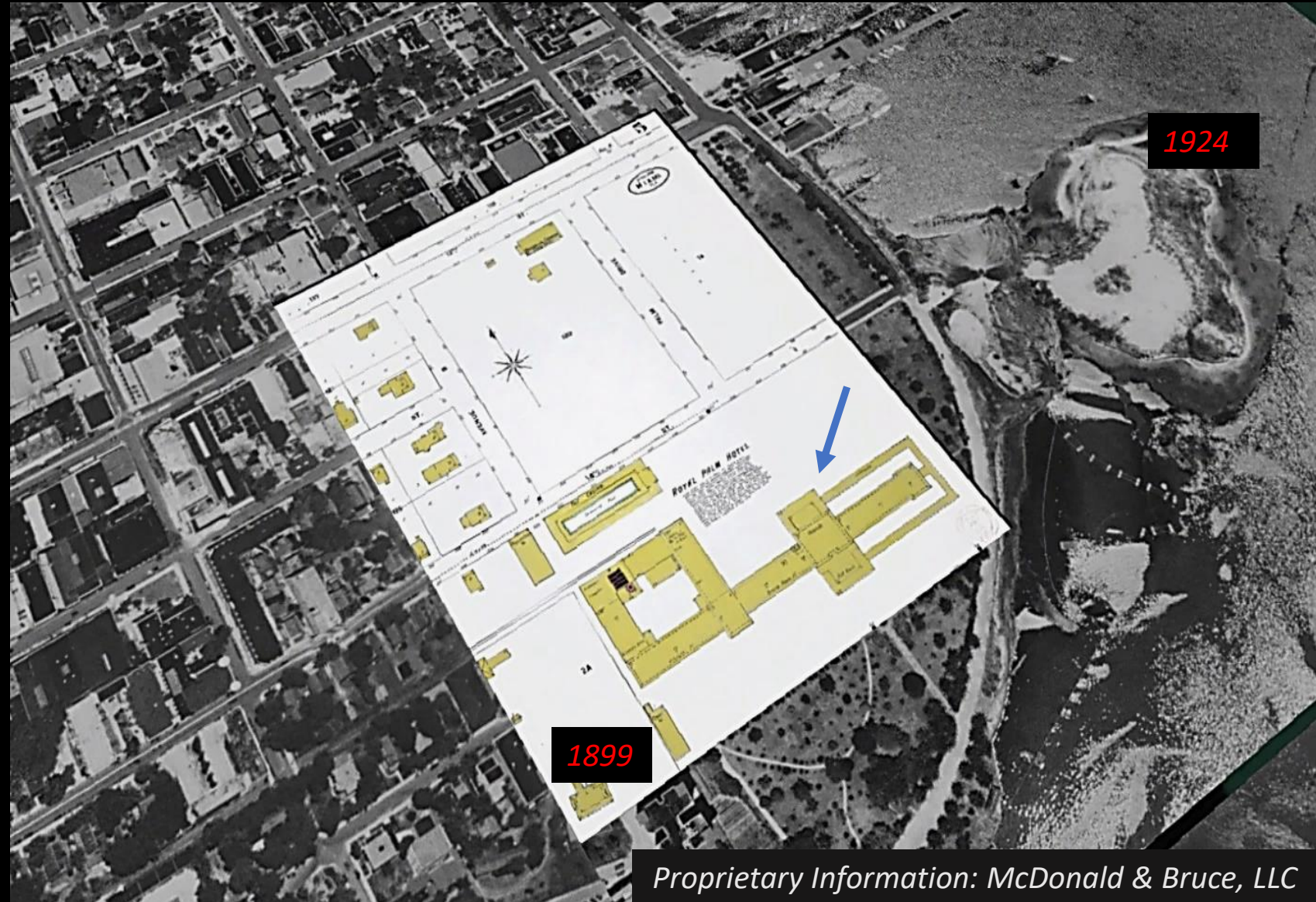


Proprietary Information: McDonald & Bruce, LLC



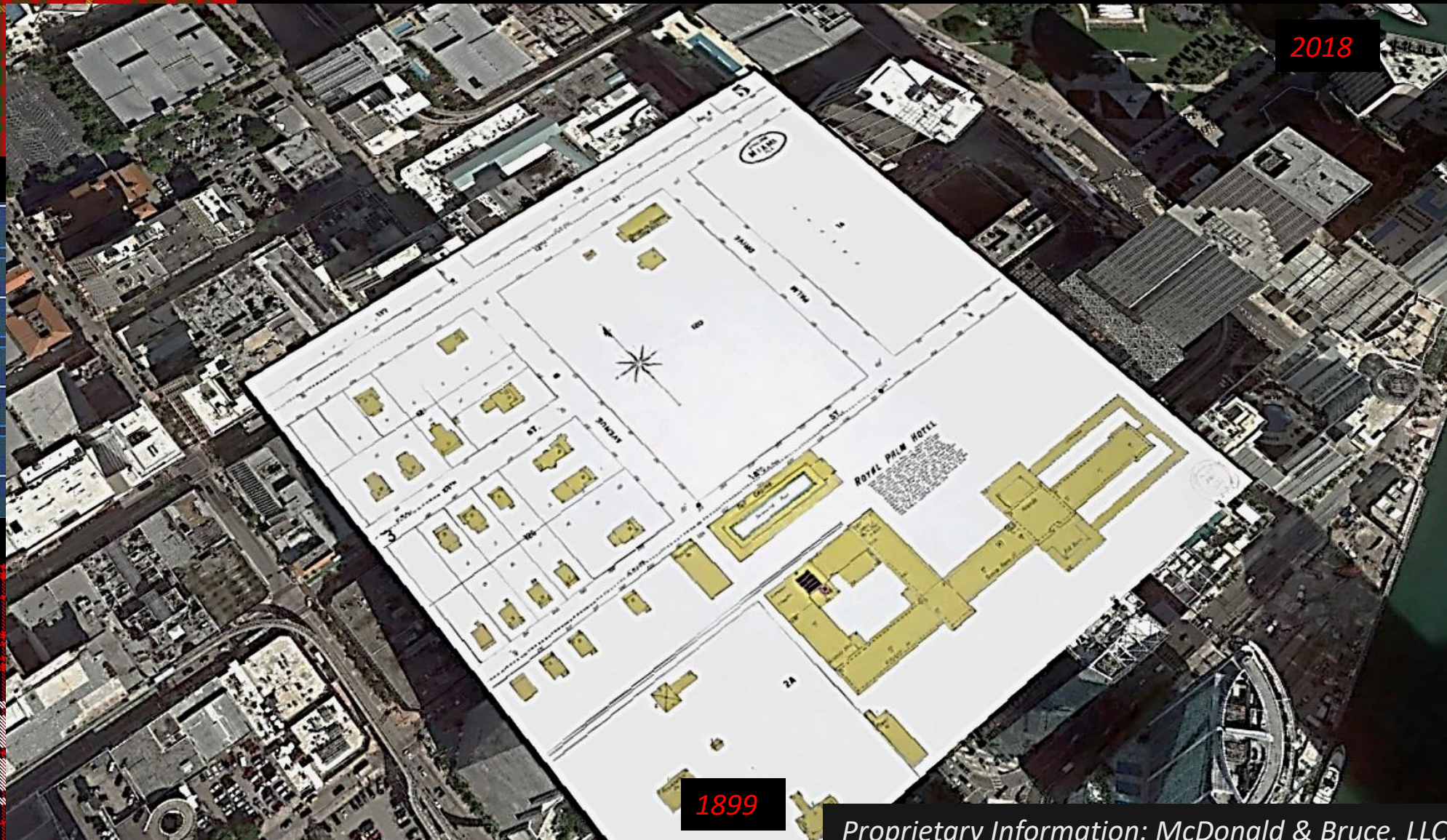
# Miami River at Biscayne Bay, Miami, Florida 1899-1924

The representative location shows historical land use near the beginning of Miami's incorporation. The Royal Palm Hotel had recently been opened by Henry Flagler.





# *Miami River at Biscayne Bay, Miami, Florida 1899-2018*



*This geospatial  
forensics  
technique  
preserves the  
historical record  
of building  
footprints,  
enables precise  
identification of  
past locations of  
environmental  
concern, and  
provides a  
current visual  
frame of  
reference.*



# *Miami River at Biscayne Bay 1899-2018*

## *120 Years of Change w/ Intuitive Graphic*

Proprietary Information: McDonald & Bruce, LLC



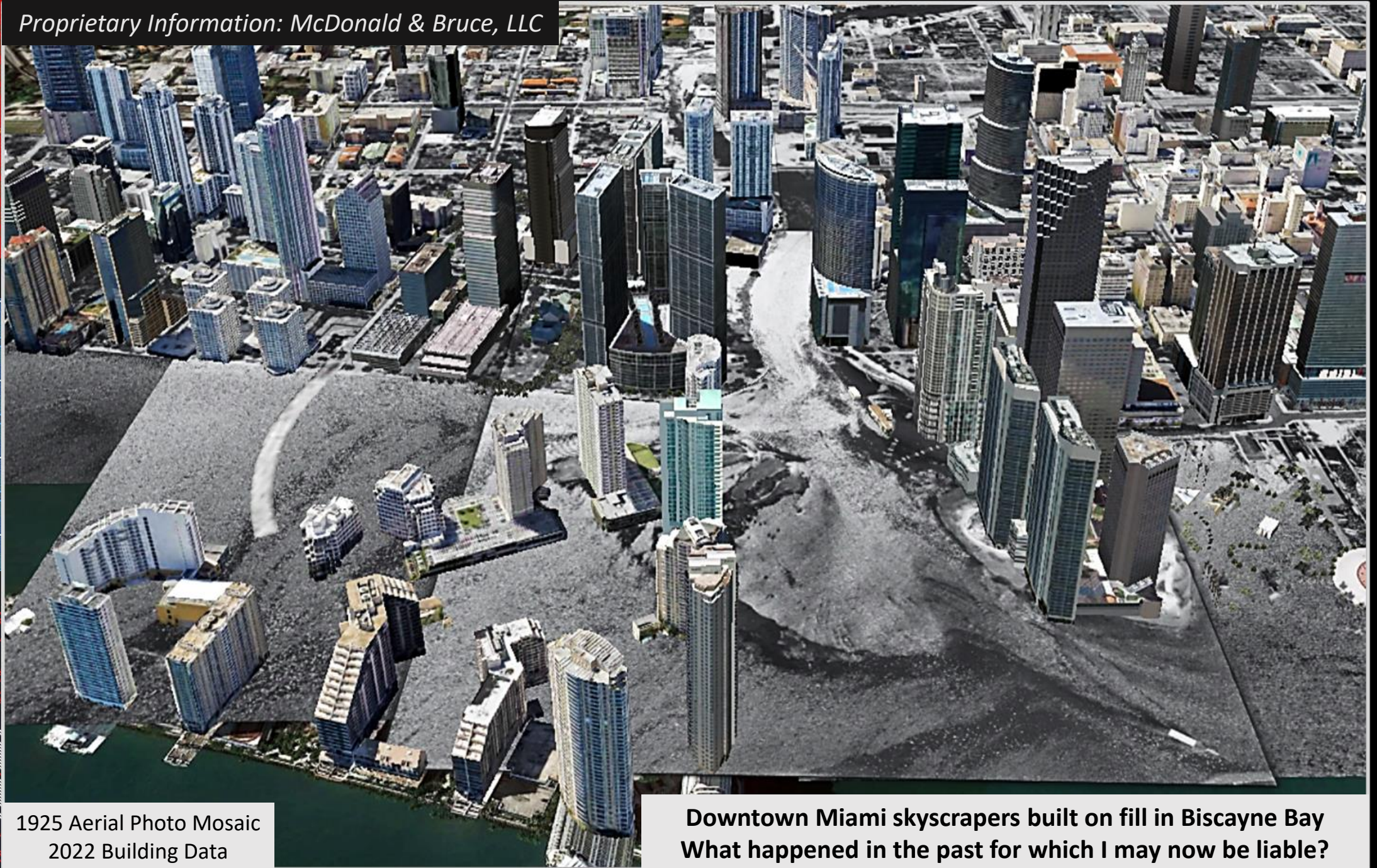
2018 3D Building Data

1899 Sanborn Fire Insurance Map

1924 Aerial Photography



*Proprietary Information: McDonald & Bruce, LLC*

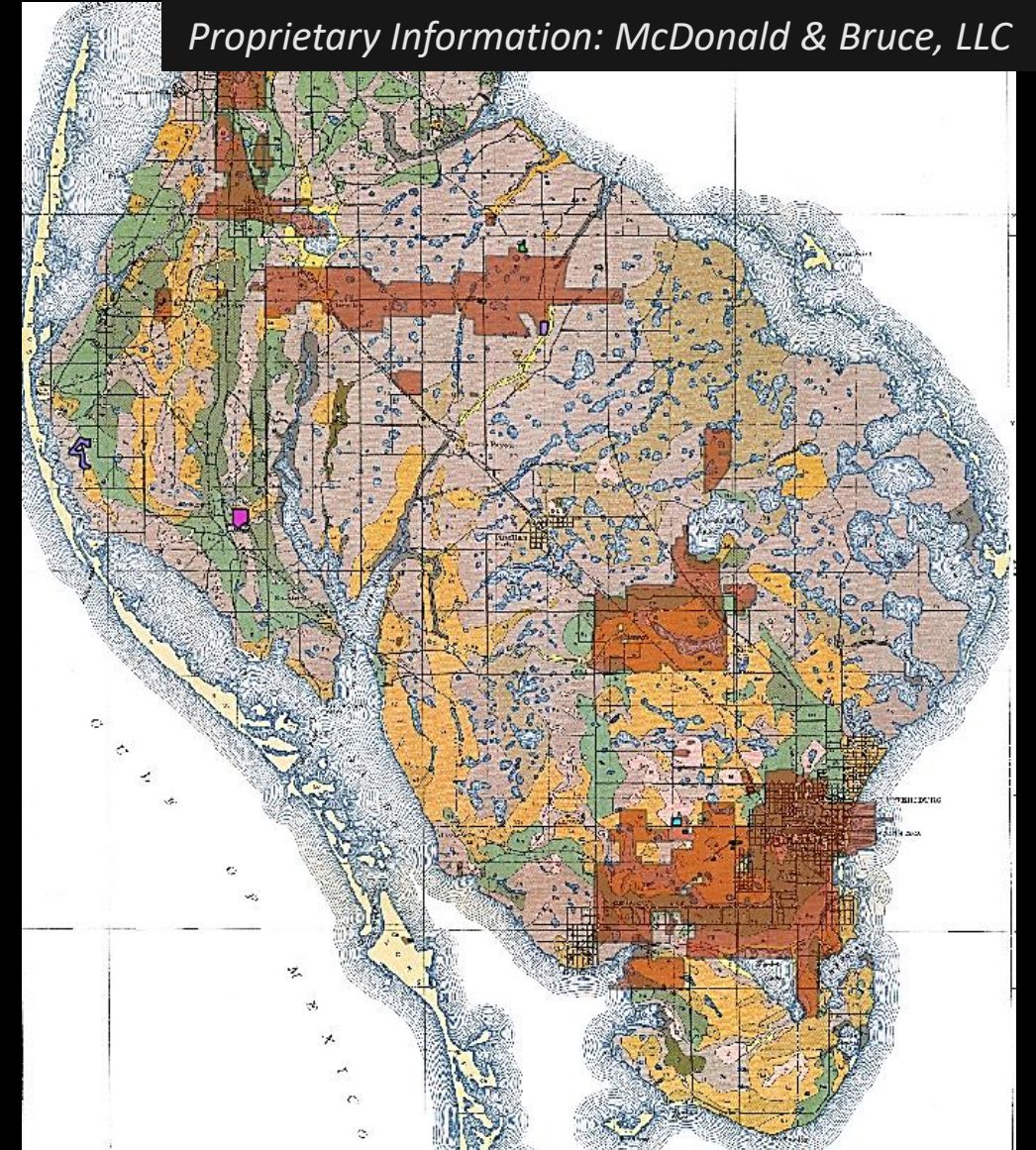
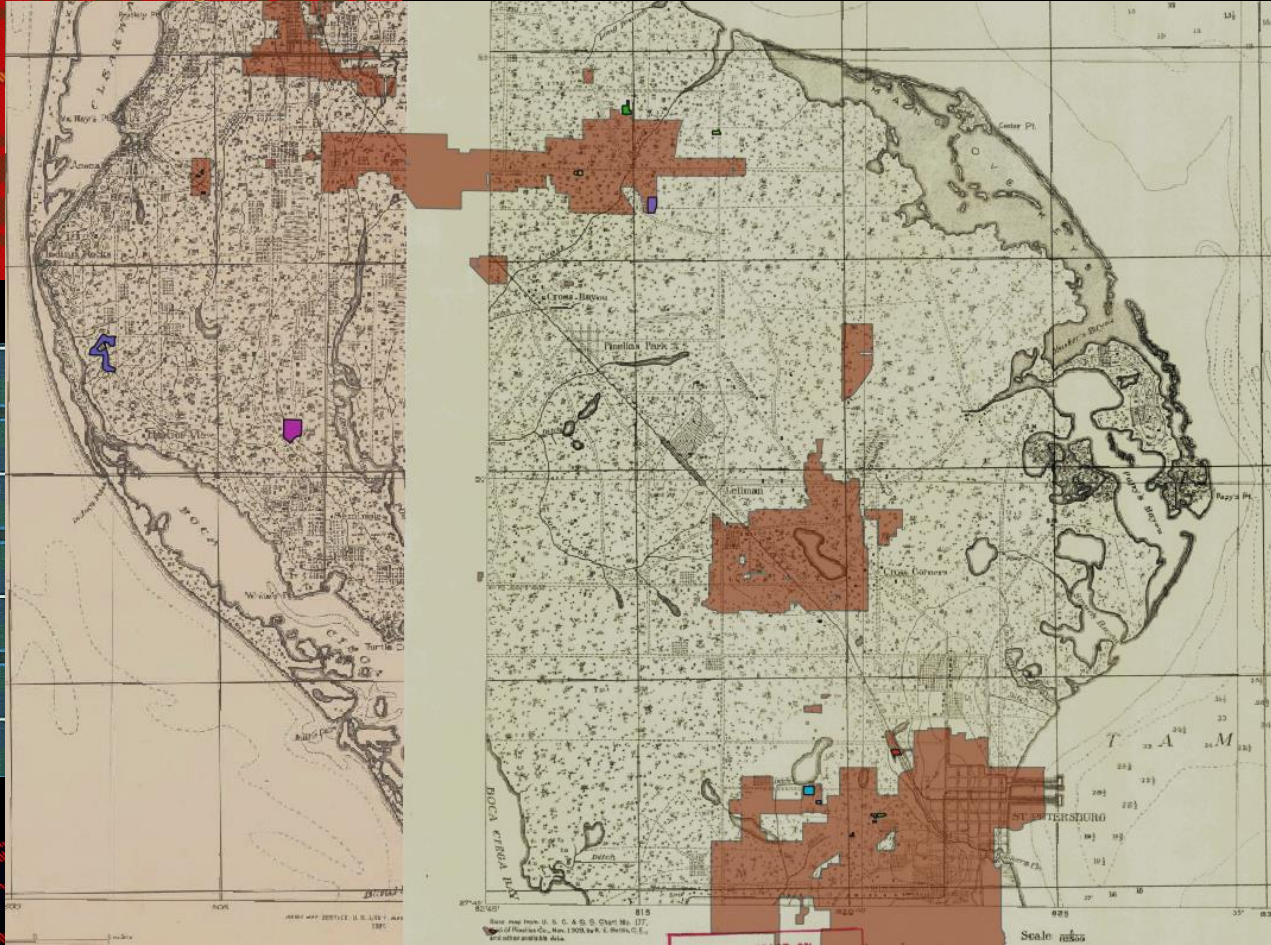


1925 Aerial Photo Mosaic  
2022 Building Data

**Downtown Miami skyscrapers built on fill in Biscayne Bay  
What happened in the past for which I may now be liable?**



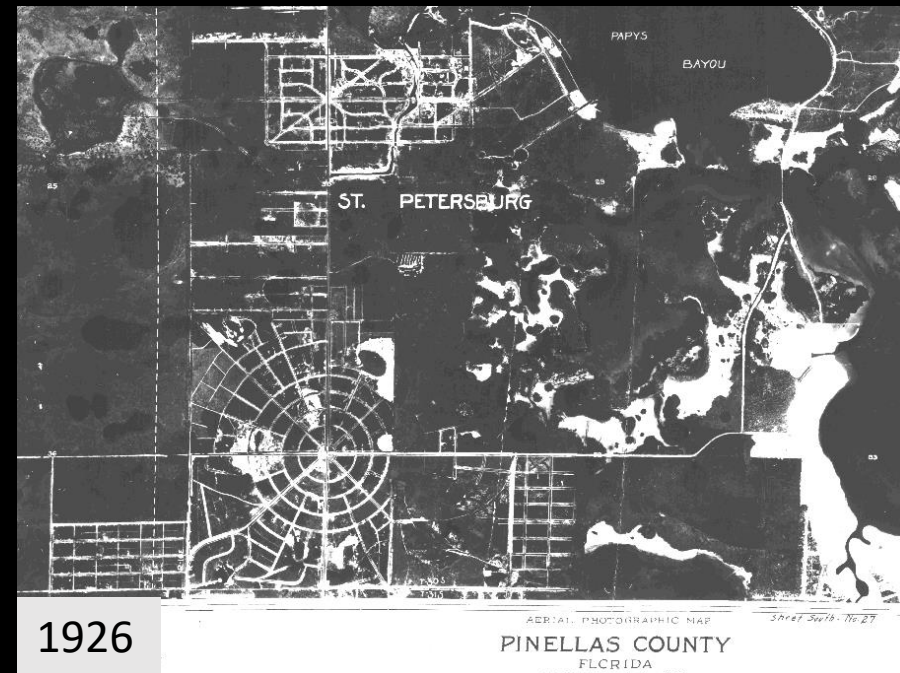
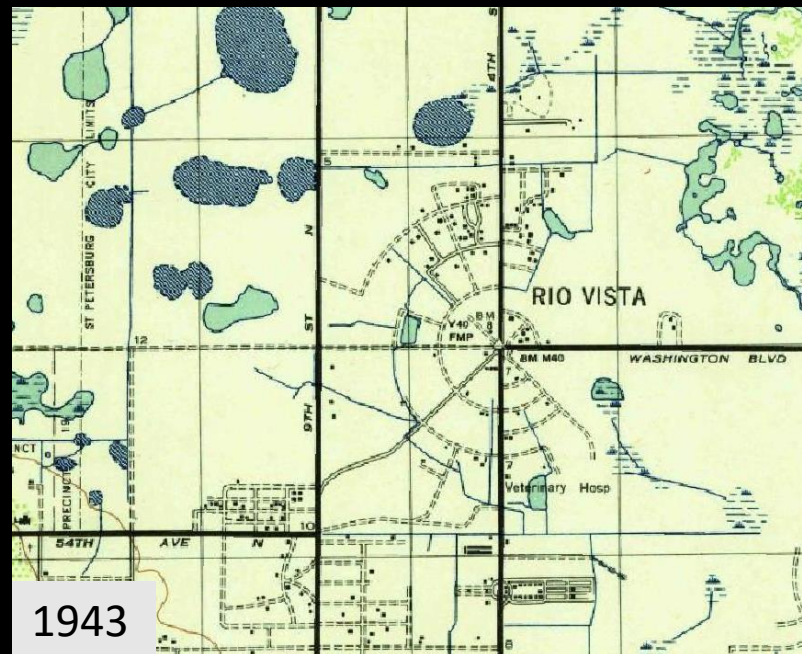
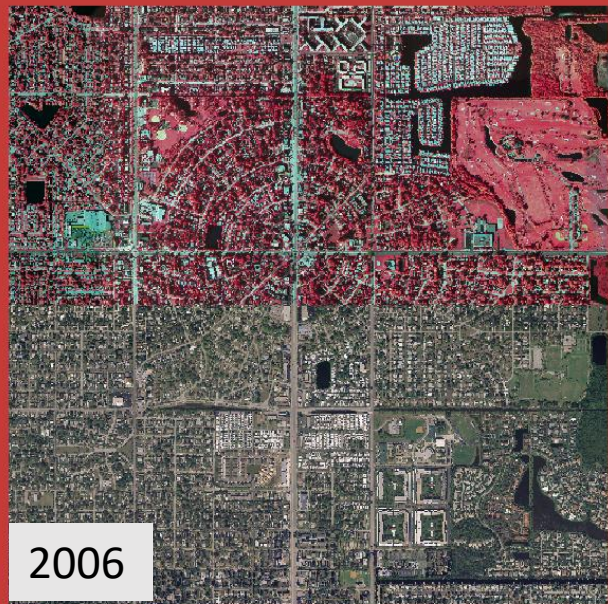
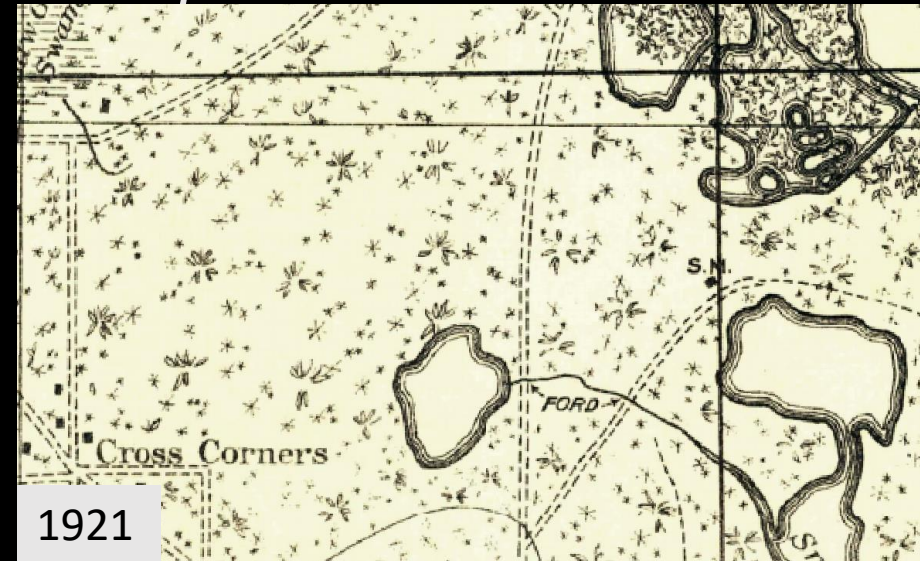
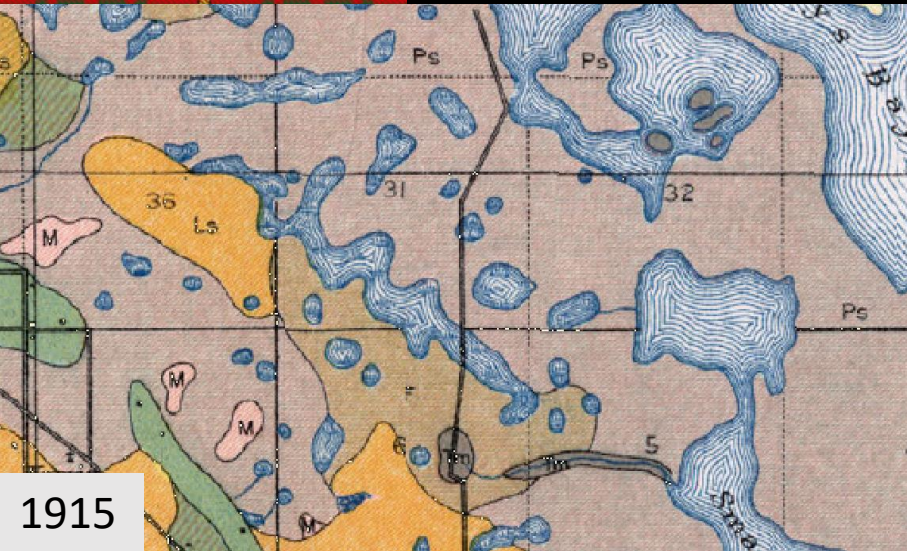
# St. Petersburg & Pinellas County, FL



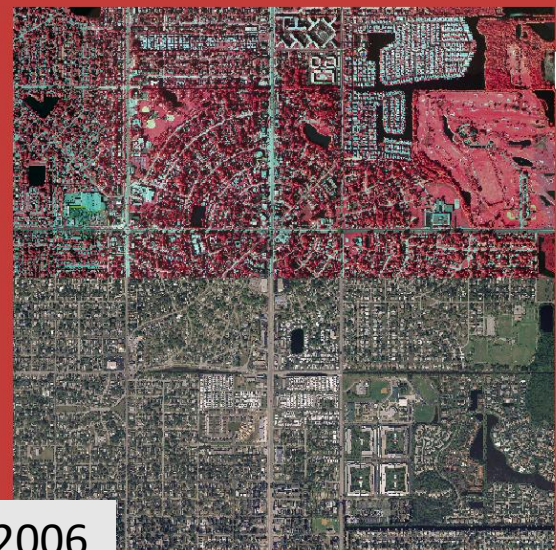
1921 63K topo and 1915 soil survey w/ FDEP brownfields zones and parcels



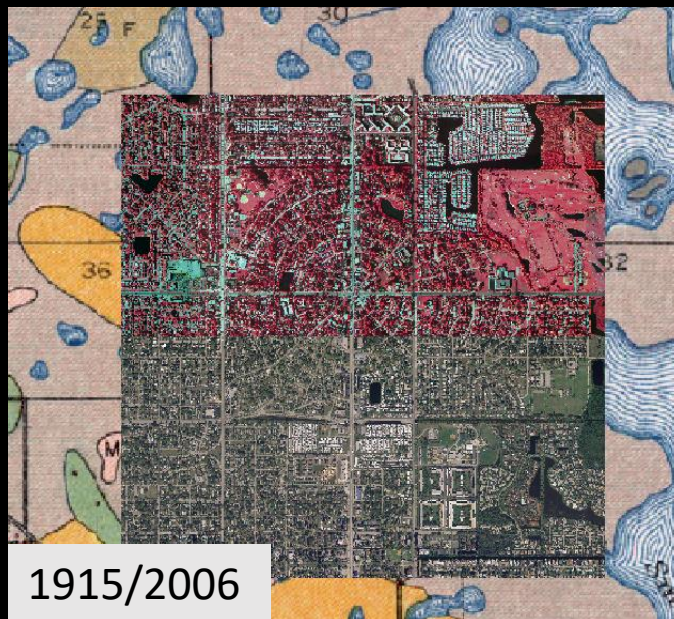
# St. Petersburg & Pinellas County, FL Options



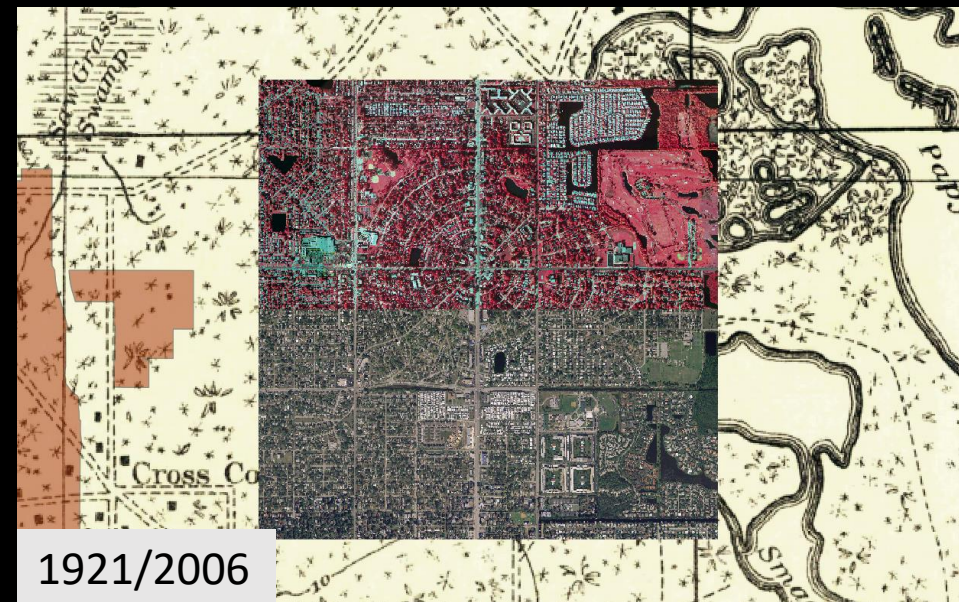




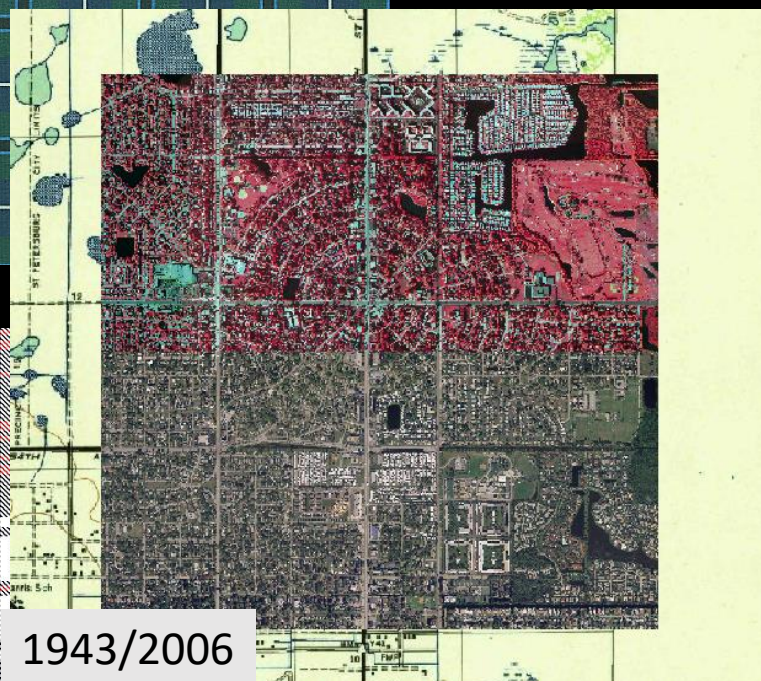
2006



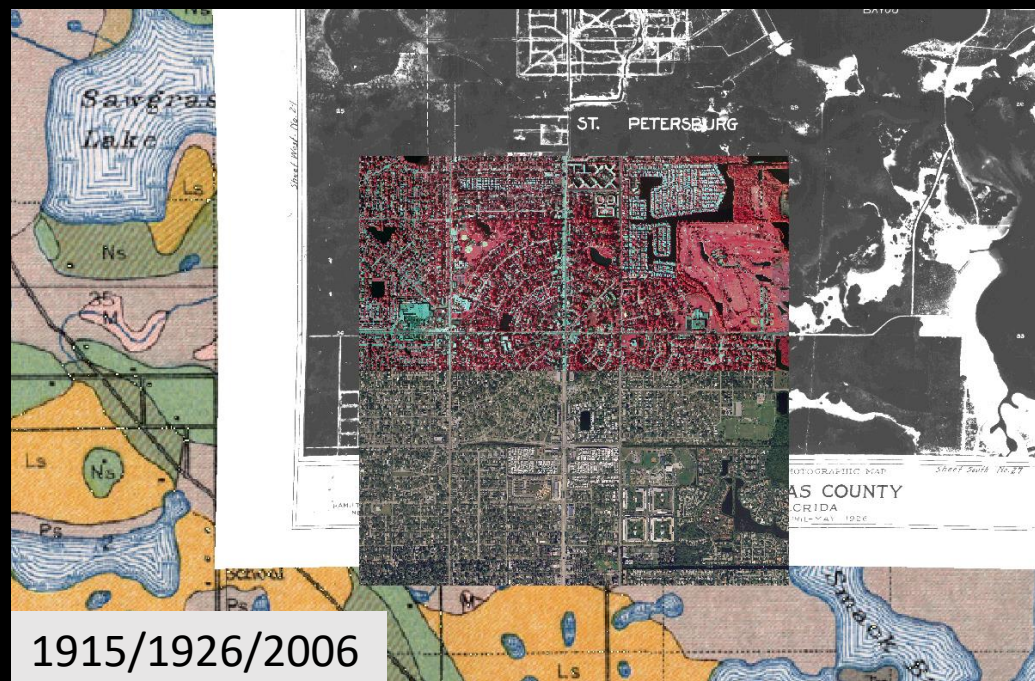
1915/2006



1921/2006



1943/2006



1915/1926/2006

*St. Petersburg &  
Pinellas County, FL*

*Options for data  
and data fusion*





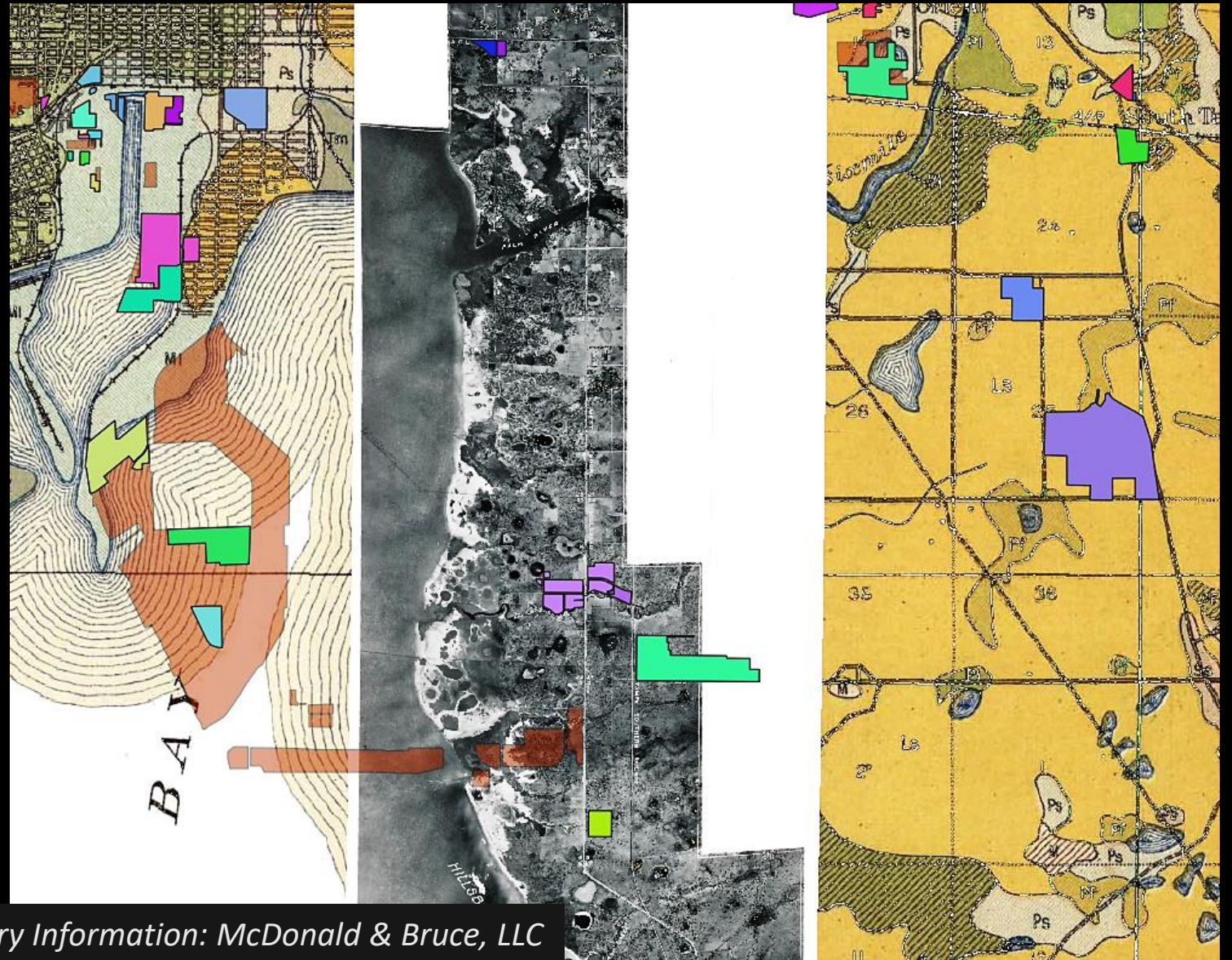
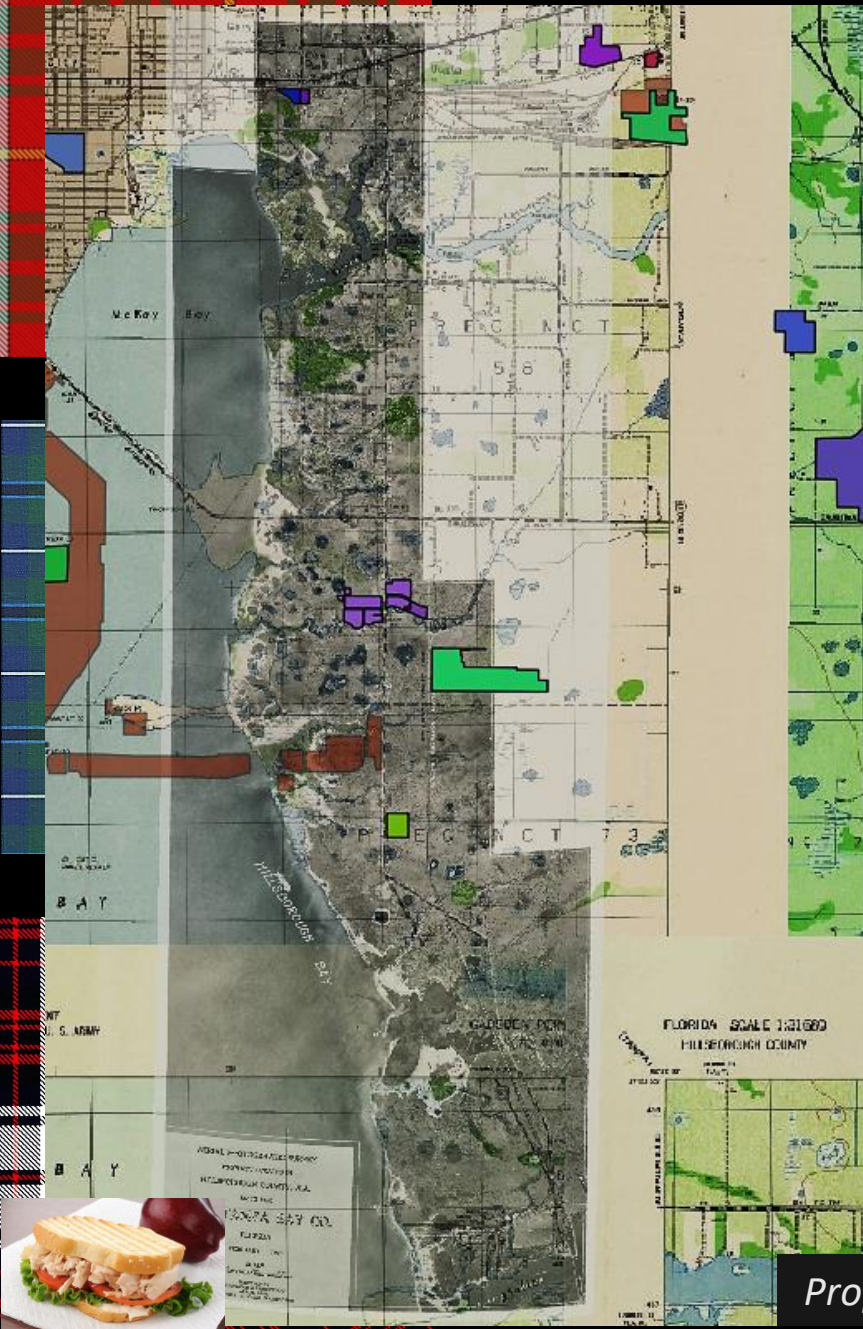
AERIAL PHOTOGRAPHIC SURVEY  
PROPERTY LOCATED IN  
HILLSBOROUGH COUNTY, FLA.  
MADE FOR  
EAST TAMPA BAY CO.  
FLORIDA  
FEBRUARY 1925  
SCALE  
1:100,000  
PREPARED BY  
U.S. ARMY AIR CORPS  
WASHINGTON, D.C.

## Tampa, FL 1924 and 1925 aerial photography





*Tampa & Hillsborough County, FL*  
*1918 soil survey, 1925 aerial mosaic, 1940s Army Map Service 1:31K maps*



Proprietary Information: McDonald & Bruce, LLC



*Jacksonville, FL  
1864 map &  
2021 3D  
building data*



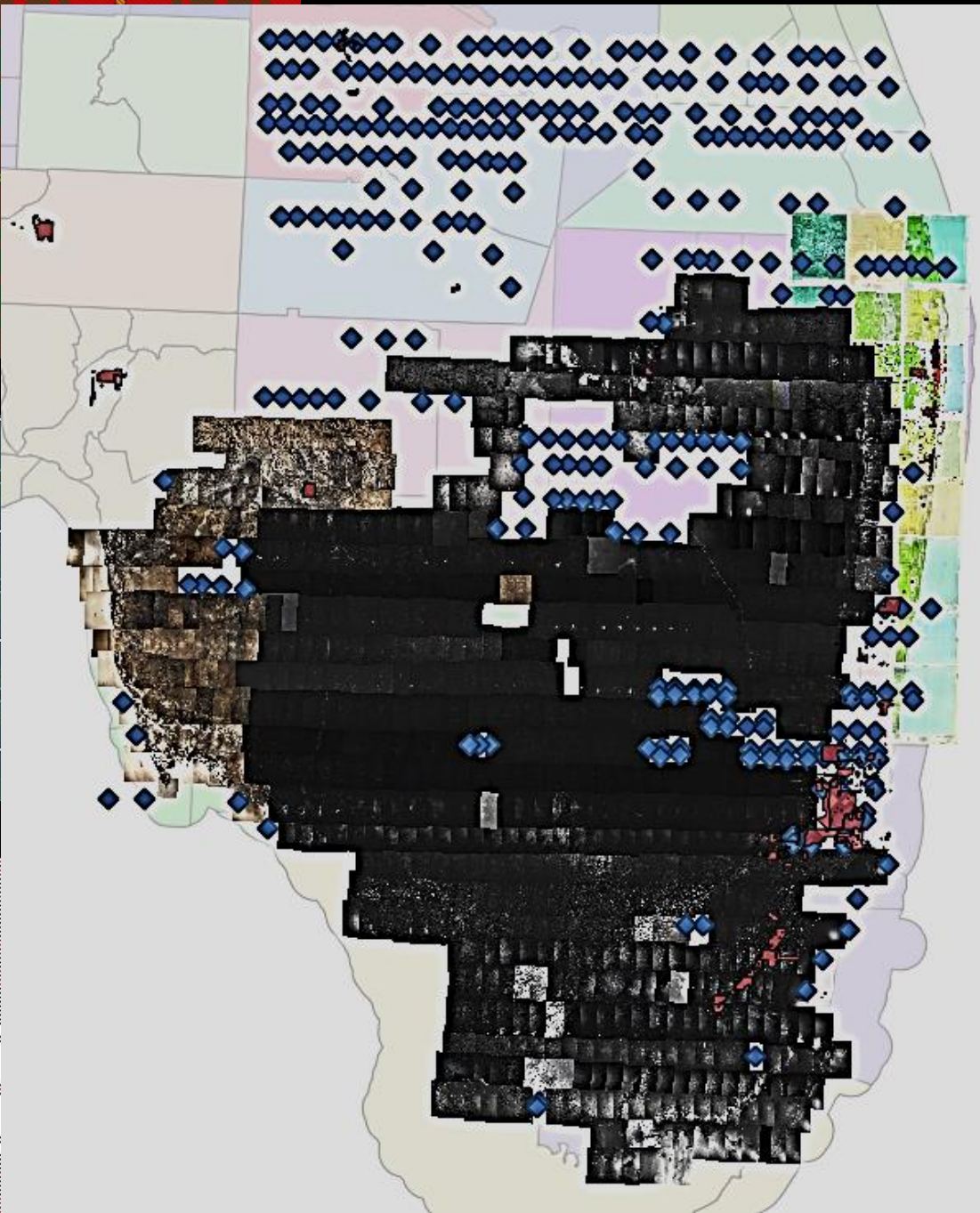
*Proprietary Information: McDonald & Bruce, LLC*





# *Everglades 1940 aerials*

- More aerial photograph and map resources available to apply against Everglades wetlands restoration needs
- Graphic shows current georeferenced aerials and to be georeferenced aerials (blue diamonds)
- Much higher resolution than georegistered aerial photo index
- Enables stereo viewing and therefore a more precise ecological baseline for restoration and monitoring
- Additional pre 1940 maps, charts, and aerial photograph can be incorporated





# *Environmental Restoration, Resilience, and Reduced Operational Costs*



- *Geospatial Forensics can provide predevelopment baseline of environmental site conditions*
- *Prior development has altered this landscape, so what resilience components might a company integrate proactively for both green neighborhood focal points and reduced operations and maintenance costs?*
- *Integrate environmental features in concert with adjacent properties to create or maintain natural corridors*
- ***Green good will***






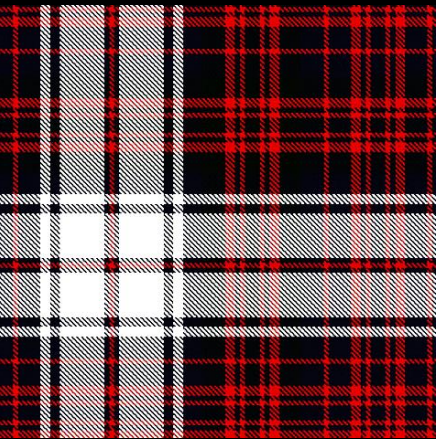
## *How can neighboring communities help you with the process of brownfields redevelopment?*

- *Collective knowledge to help reduce your risk*
- *Can they help augment the historical documentation of site activities both positive and negative? Collective or individual memory*
- *Would they have photographs that captured site conditions as part of background of daily activities? Photographs can be georeferenced to refine what happened where and when and to what extent*
- *Knowledge of natural resource or environmental quality of the site? Any noteworthy environmental values that could be beneficially incorporated into redevelopment plan*
- *Conversely, being able to show the plans you have and get the community's input helps with a shared vision of future site; shared journey –good or bad*
- *Tying community support and environmental restoration together, consider incorporating changes to the site that could serve as an environmental focal point or point of pride as part of your redevelopment*






## *Where else could Geospatial Forensics help my clients?*

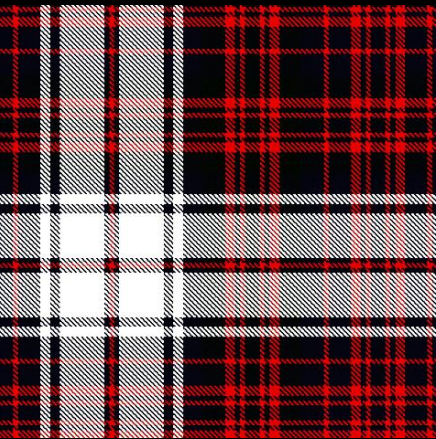
- 
- *Real estate transaction due diligence beyond brownfields*
  - *Environmental litigation over past practices*
  - *Environmental compliance documentation*
  - *ESG self assessment*
  - *Mining reclamation*
  - *Pipeline monitoring*
  - *Permit applications new and renewal*
  - *Environmental insurance compliance or documentation*
  - *Habitat restoration not affiliated with Brownfields*
  - *Sustainability or Climate resilience programs in urban areas*
  - *Transportation and Urban planning*
  - *CH4 and CO2 monitoring*
- 





## *Time's Almost Up...Let's recap*

- 
- *Geospatial Forensics reduces your risk by incorporating additional data, processing techniques and timelines that generally are beyond the scope of Phase 1 ESA*
  - *Value accrues to clients, law firms, neighborhoods, developers, financiers, and the environment*
  - *Geospatial Forensics supports multiple legal practices beyond brownfield redevelopment*
  - *Products and data can readily be tailored to suit specific requirements and objectives*
  - *We only scratched the surface*

- 
- *How do we get started using Geospatial Forensics?*
  - *Call me and we make it happen*

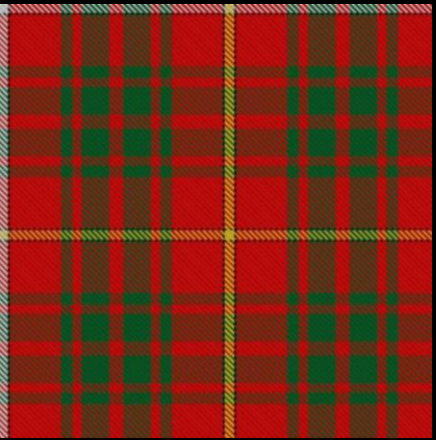


Thanks!



Proprietary Information: McDonald & Bruce, LLC



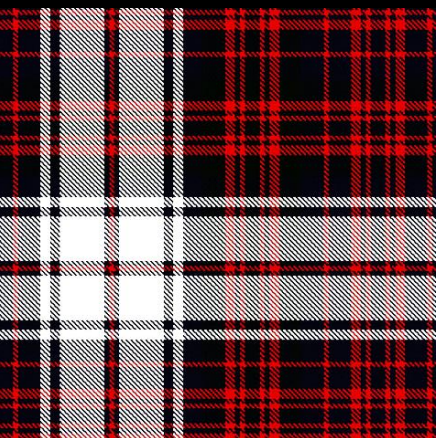


# McDonald & Bruce, LLC

## Geospatial Forensics

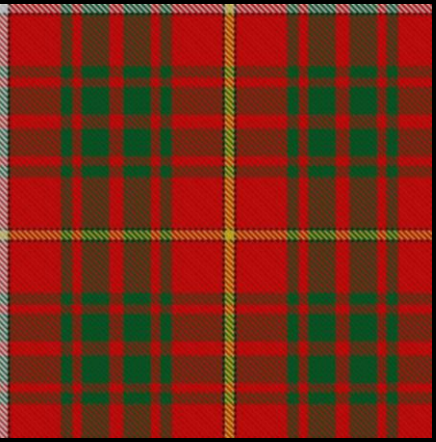


*We look forward to discussing your needs and providing outstanding service to enhance both your firm's and client's success.*



bruce@mcdonaldbruce.llc  
540-454-8485



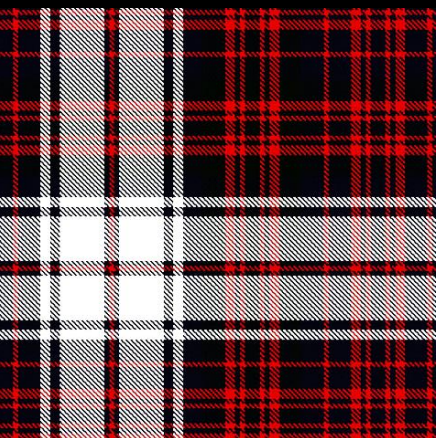


# McDonald & Bruce, LLC

## Geospatial Forensics

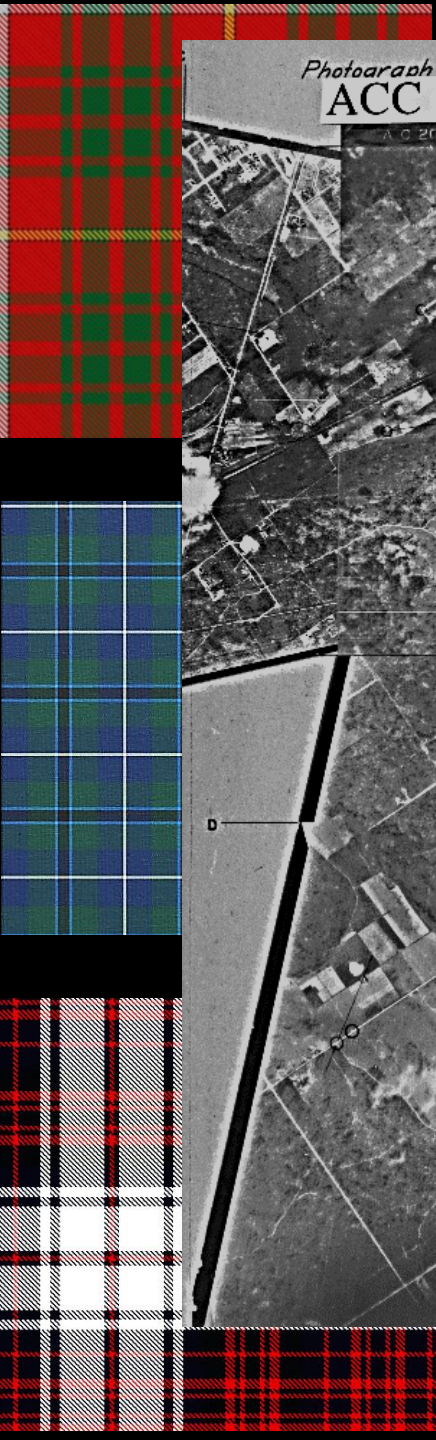


*Additional Examples*



bruce@mcdonaldbruce.llc  
540-454-8485





## Kendall, FL 1928 aerial & 1940s topo

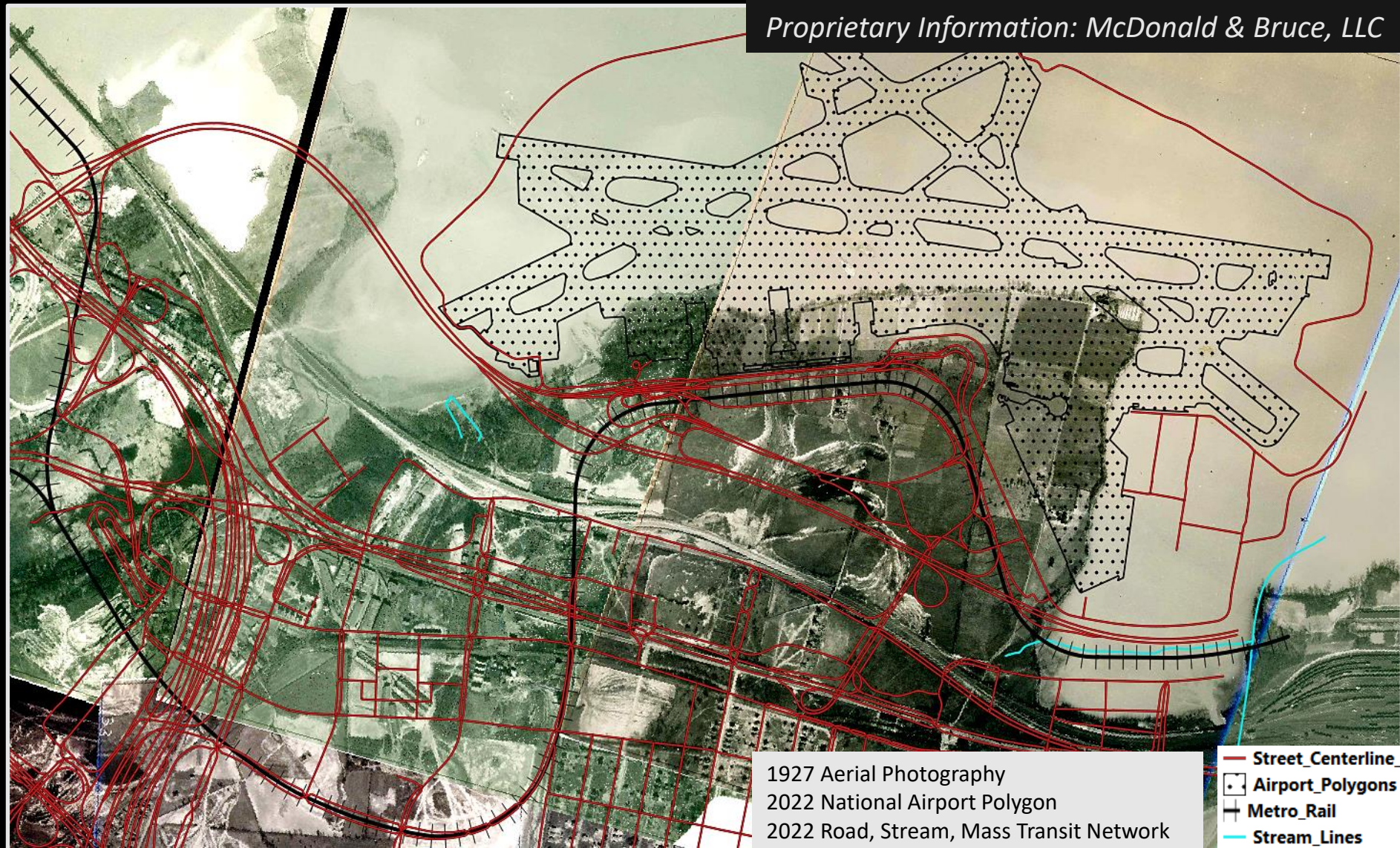


All photography isn't square



## Product Suite:

- **Highly tailorable in concert with client requirements**
- Representative examples:
- Client proprietary GIS, plats, maps, photographs, etc., integrated with historical & current geospatial & open-source data
- Historical property activity timelines
- Historical 2D/3D property visualization
- Temporal property visualization
- Cumulative change
- Natural disaster response
- Public relations proactive messaging/damage minimization



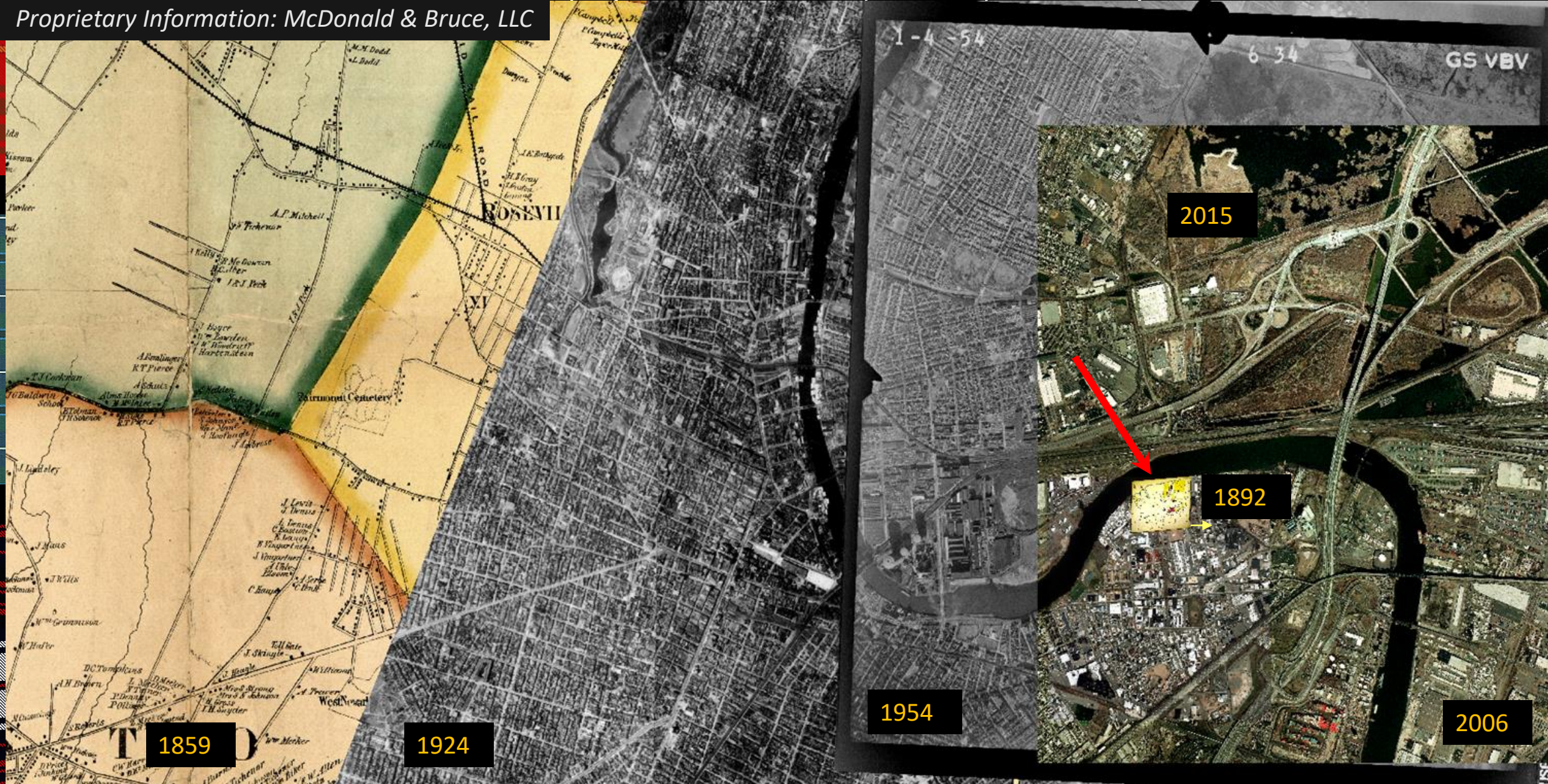
**Washington National Airport Infrastructure Change 1927-2022**  
**Subsidence Risk, Sea Level Rise Risk? Clean Fill of Potomac River?**



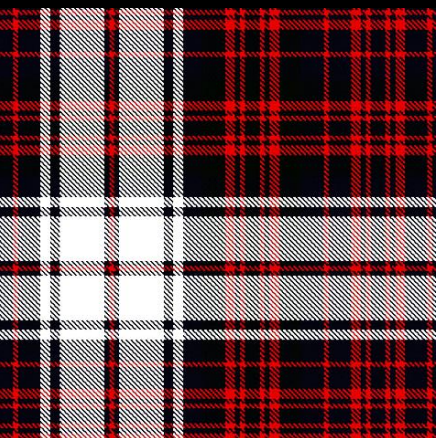
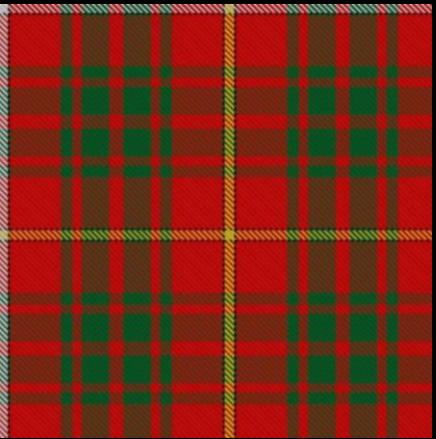
# Geospatial Forensics Example

## Lister Avenue Superfund Industrial Site, Newark, New Jersey 1859-2015

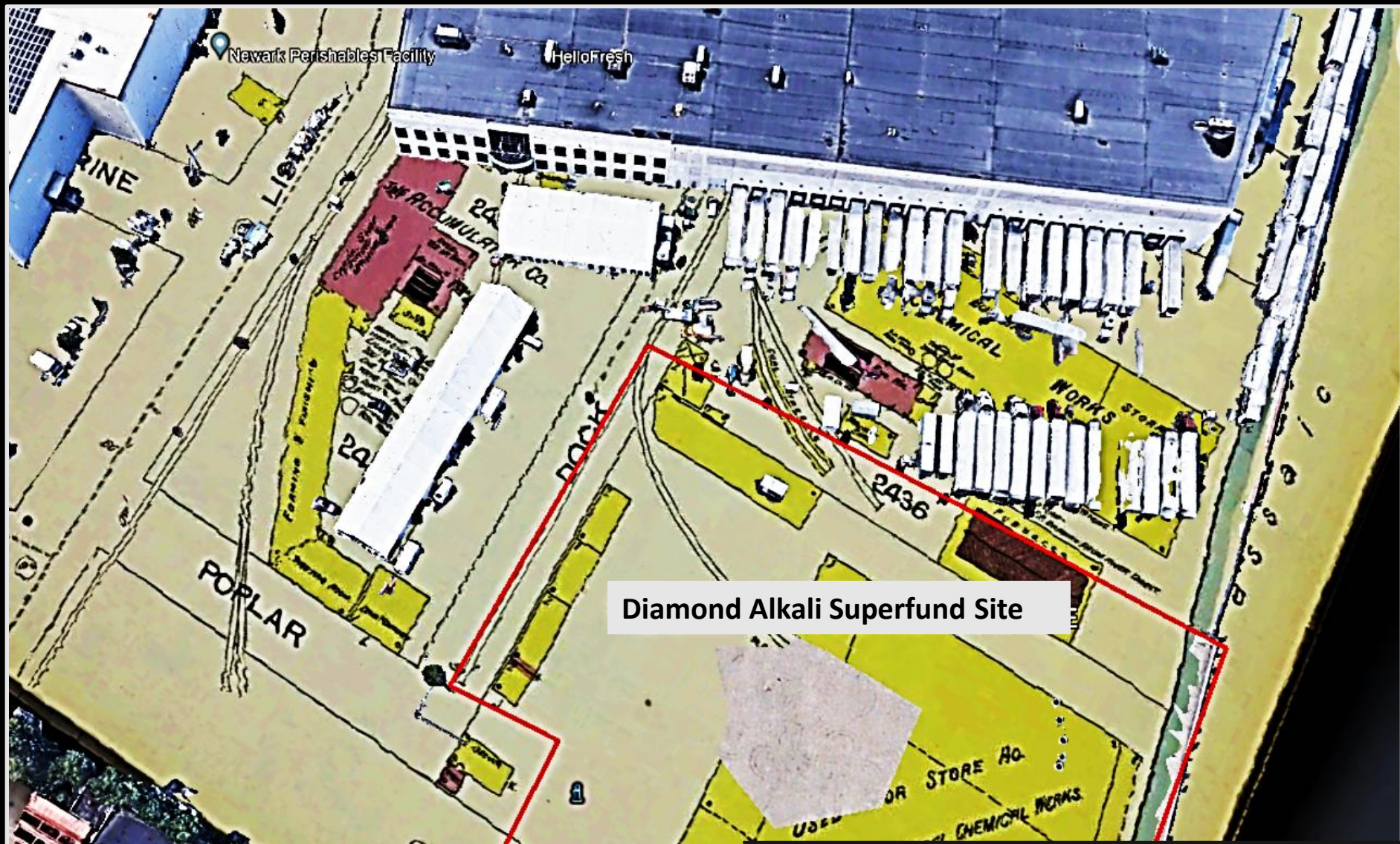
Proprietary Information: McDonald & Bruce, LLC







*Acceptable Risk?*  
*HelloFresh Distribution Center adjoins Diamond Alkali Superfund site, Newark, NJ*  
*What happened in the past for which I may now be liable?*



1899 Fire Insurance Risk Map & 2022 3D Building Data

Proprietary Information: McDonald & Bruce, LLC