



# Project ACCESS (DE-FE0032447)

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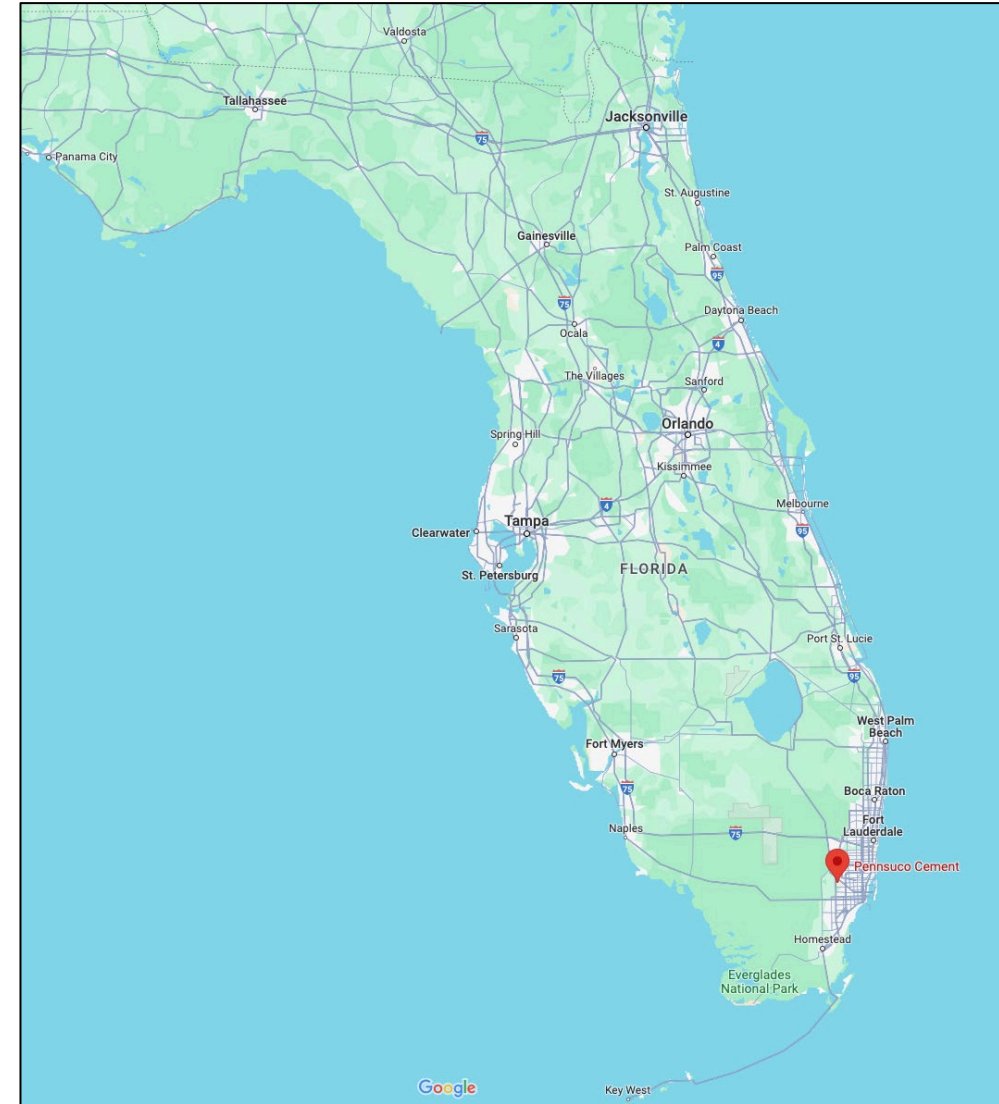
# Standard Disclaimer

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# Background

- Engagement between **SSEB, Virginia Tech** and **Titan America** emerged through the SECARB-USA program.
- Initial efforts involved desk study to assess CCS potential at Titan America's **Pennsuco Cement Plant**, Miami, Florida.
- USGS CCS Framework reports favorable characteristics for CCS in region.
- VT Undergraduate and graduate student research built the pre-feasibility case for the Project Readiness effort.



# Project Motivation

- Motivated commercial partner in Titan America
  - Ongoing decarbonization initiatives in Europe
  - Opportunity to de-risk early development stages in an area with little historical research
- Establish the foundation for a commercial-scale geologic storage complex for CO<sub>2</sub> captured from Titan America's Pennsuco Cement Plant

**Project Duration:** 24 months

**Period of Performance:** July 19, 2024 to July 18, 2026

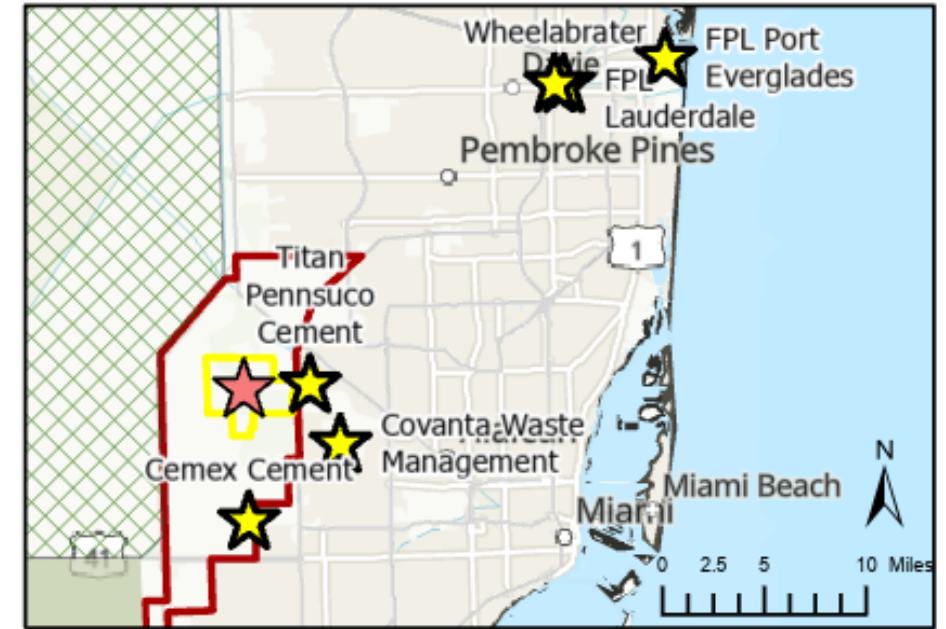
**Funding:** \$12,472,398 (\$3,472,398 cost-share)



*Transcending Boundaries*

# Location

- Lake Belt Mining District is an industrial corridor in western Miami-Dade County
- Currently, no viable option for local industrial facilities looking to decarbonize in South FL Basin
- Initial scenario focused on the Titan Pennsuco facility and the neighboring Covanta Waste facility
  - 1.9 MMt CO<sub>2</sub> emitted annually
  - Opportunity to expand based on CarbonSAFE results

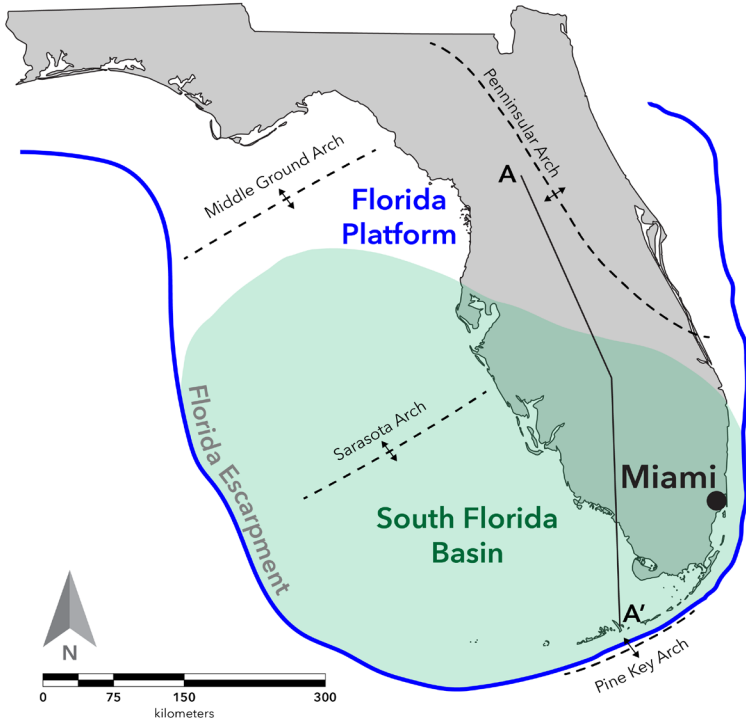


## Project ACCESS

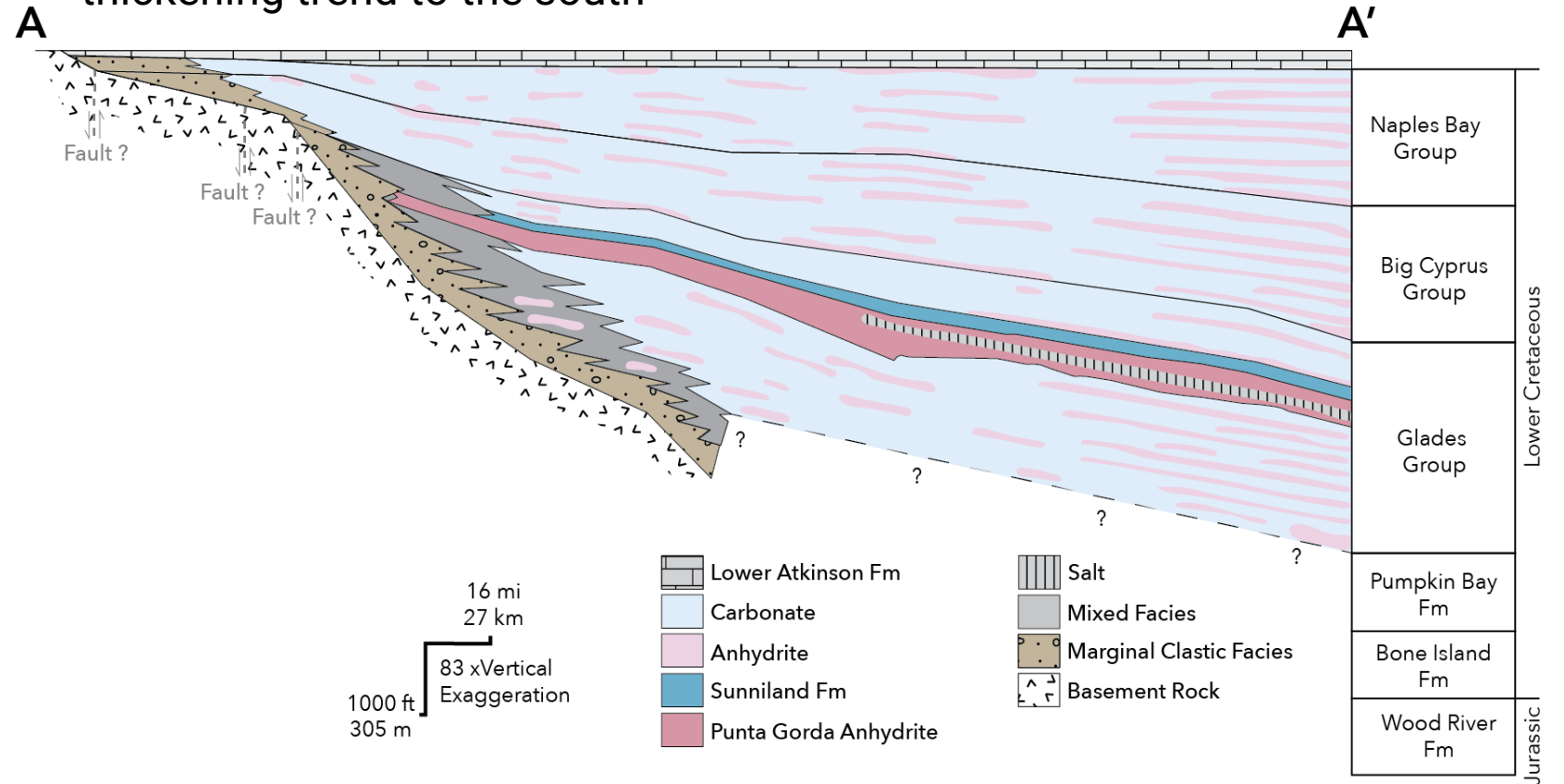


# Geology: South Florida Basin

## Carbonate Platform

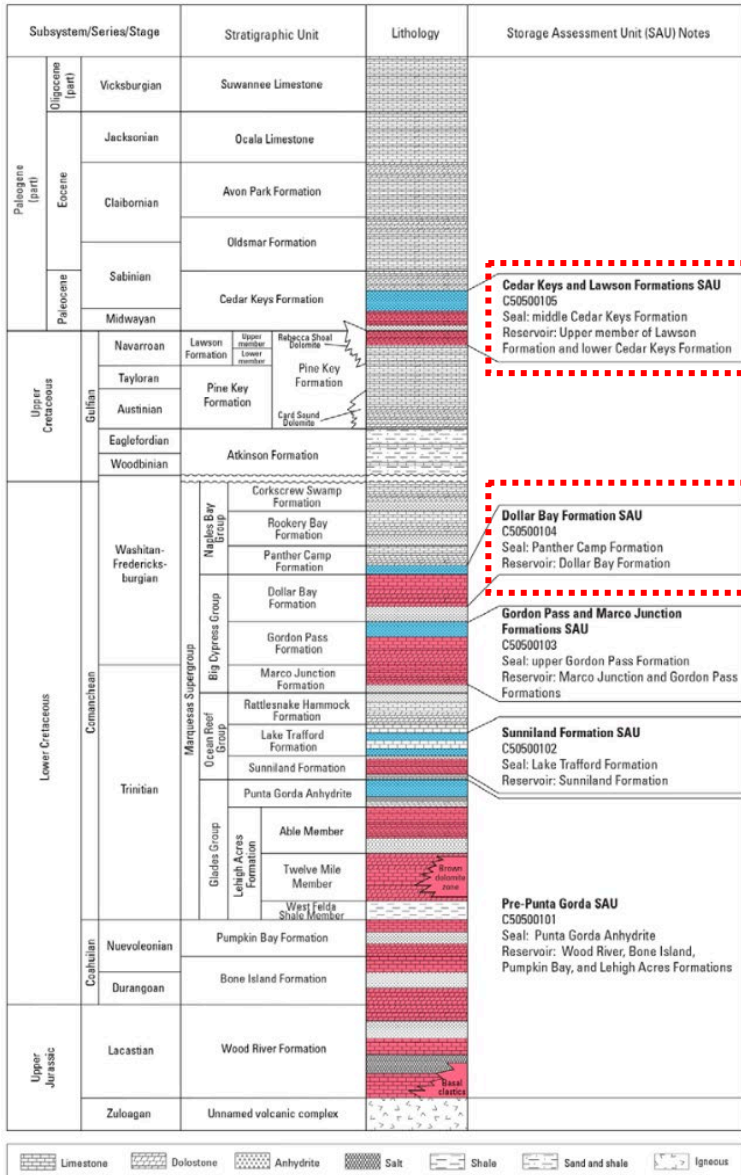


Alternating layers of carbonate (reservoir) and anhydrite (seal) with thickening trend to the south





# Geology: Storage Assessment Units



USGS identifies five Storage Assessment Units comprising carbonate reservoirs with anhydrite seals

Target SAUs for Project ACCESS

## 1. Cedar Keys & Lawson SAU

- Reservoir: Lower Cedar Keys Fm & Upper Lawson Fm
  - Diagenetically altered reef deposits & crystalline dolostone
  - Depth to top ~1,400 m (4,620 ft) bgs
  - Total thickness ~230 m (760 ft) at site
  - Porosity estimates: 0.14 - 0.23
- Seal: Middle Cedar Keys Fm
  - Anhydrite rich-dolostone
  - Thickness ~200 - 400 m throughout South Florida Basin

## 2. Dollar Bay SAU

- Reservoir: Dollar Bay Fm
  - Carbonate & dolostone
  - Depth to top ~2,600 m (8,580 ft) bgs
  - Total thickness ~200 m (6,600 ft)
- Seal: Panther Camp & Rookery Bay Fms
  - Anhydrite & gypsum deposits



# CO<sub>2</sub> Storage Scenarios

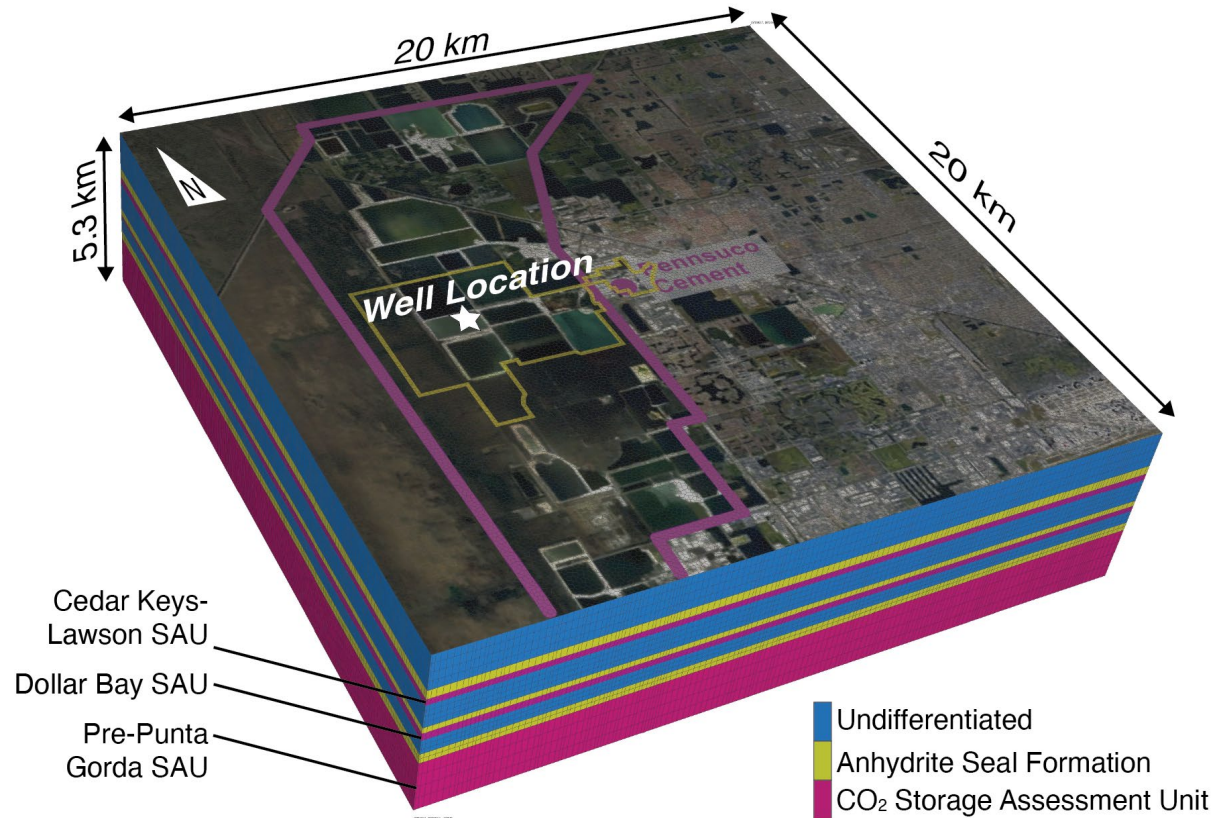
## Volumetric Storage Estimates

	P <sub>10</sub> (MMt CO <sub>2</sub> per km <sup>2</sup> )	P <sub>50</sub> (MMt CO <sub>2</sub> per km <sup>2</sup> )	P <sub>90</sub> (MMt CO <sub>2</sub> per km <sup>2</sup> )
Cedar Keys-Lawson SAU	1.7	2.6	4.0
Dollar Bay SAU	1.0	1.6	2.4
<b>TOTAL</b>	<b>2.7</b>	<b>4.2</b>	<b>6.4</b>

Additional CO<sub>2</sub> storage potential in deeper Pre-Punta Gorda Fm:  
7.3M Mt CO<sub>2</sub>/km<sup>2</sup> (P<sub>10</sub>) to 13.6M CO<sub>2</sub>/km<sup>2</sup> (P<sub>90</sub>)

## Dynamic CO<sub>2</sub> Storage Simulations

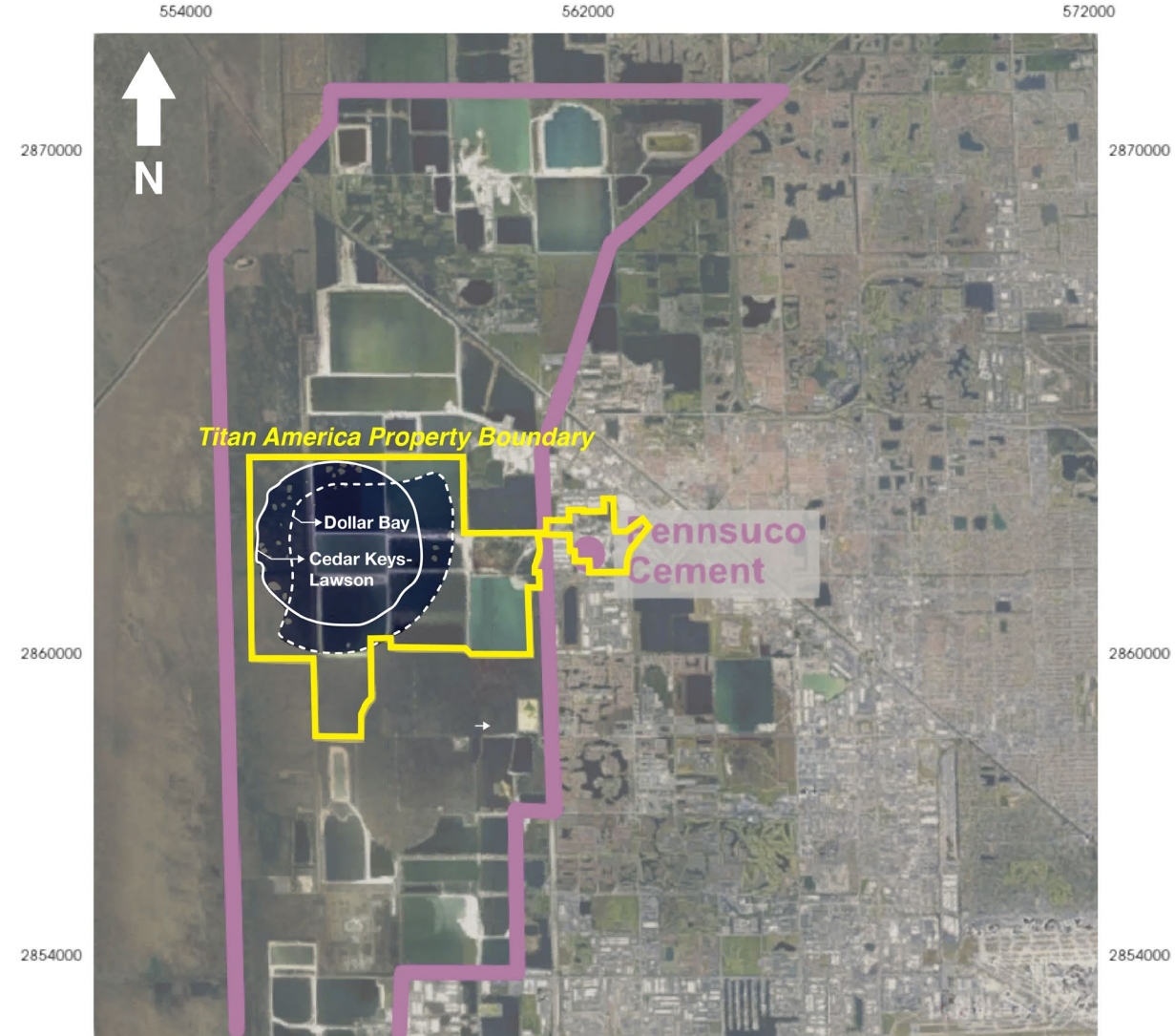
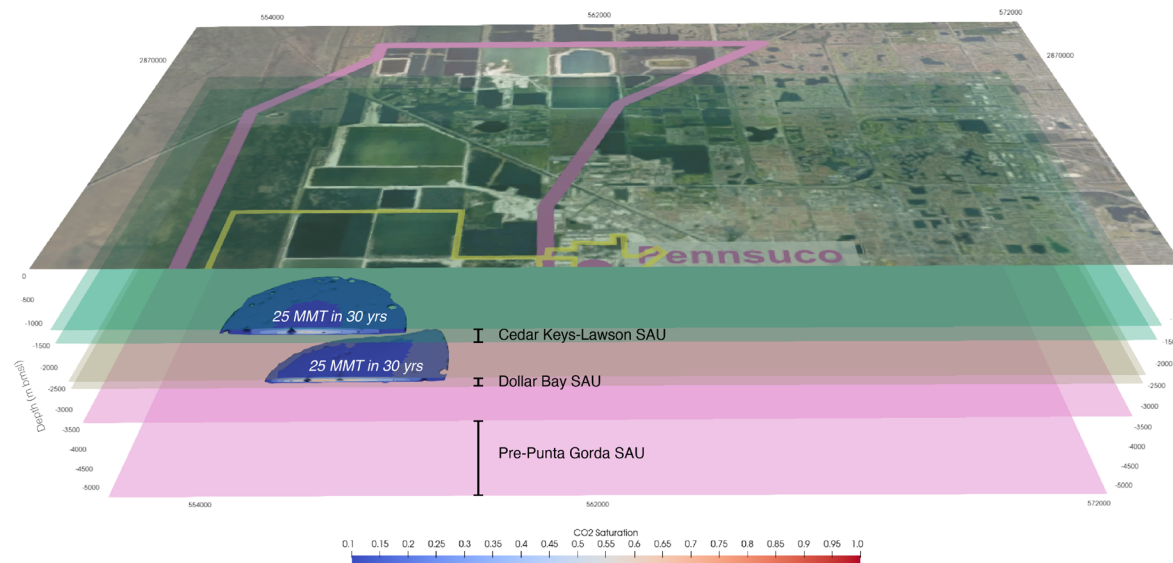
- 50M metric tons CO<sub>2</sub> in 30 years (1.7M Mt/yr)
  - 25M Mt CO<sub>2</sub> into Cedar Keys-Lawson SAU (850k Mt/yr)
  - 25M Mt CO<sub>2</sub> into Dollar Bay SAU (850k Mt/yr)
  - Pre-Punta Gorda not included in dynamic scenario





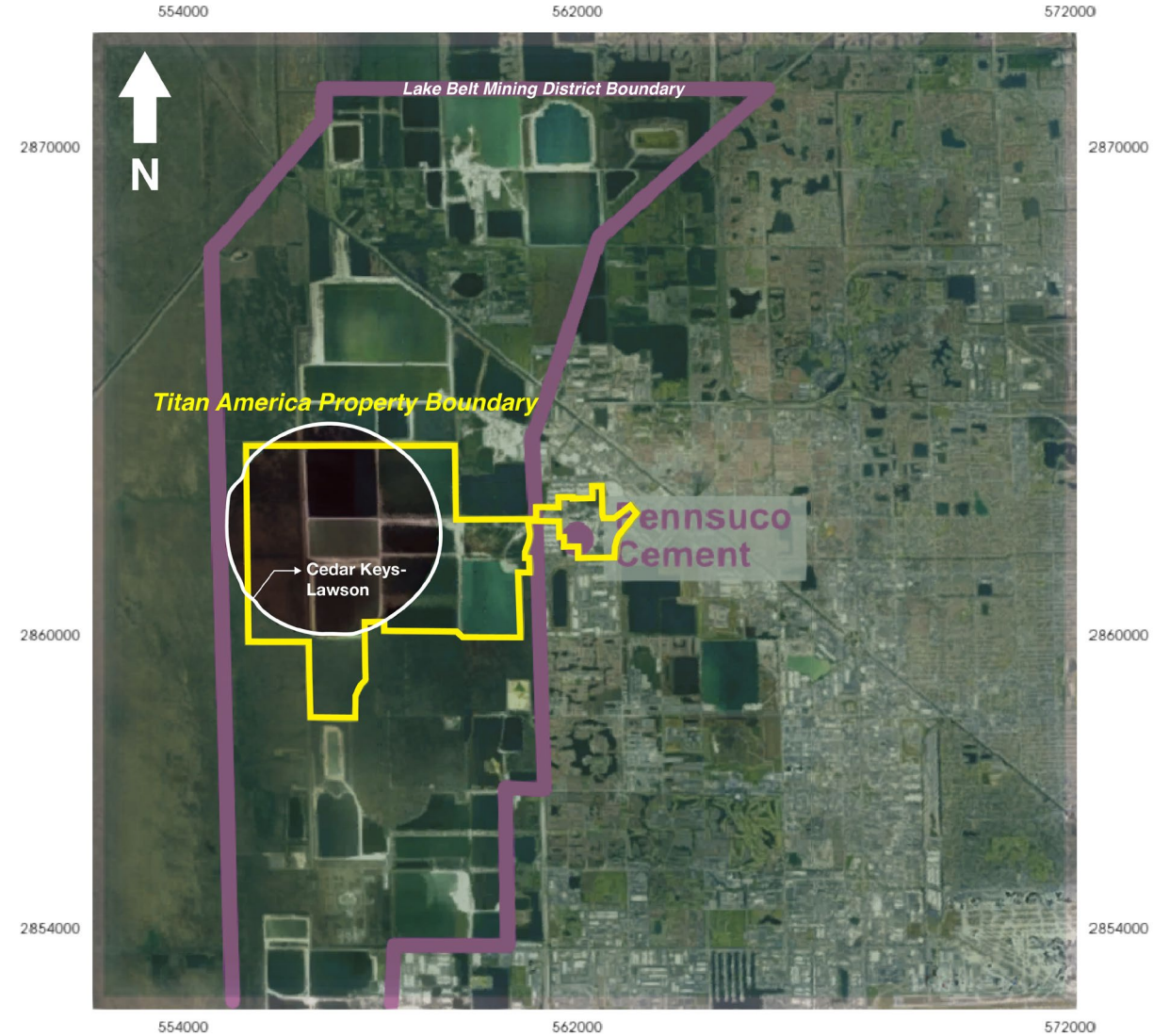
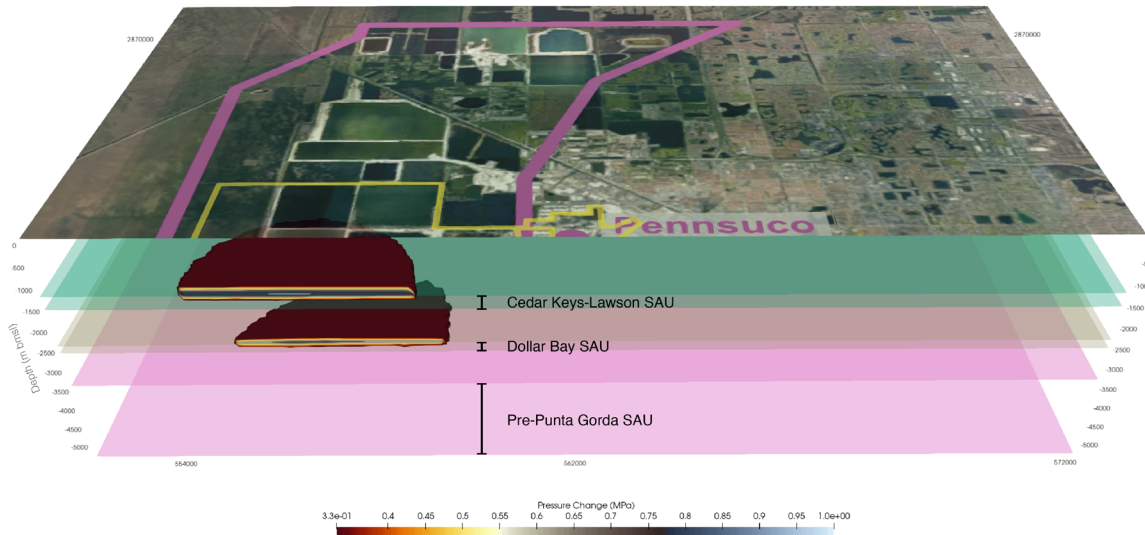
# Dynamic Modeling Results after 30 yrs

- Stacked configuration may allow CO<sub>2</sub> plume to remain within Titan Americal property boundary (yellow outline)
- Critical pressure front (330 kPa) within Cedar Keys-Lawson SAU migrates beyond property boundary, but remains within Lake Belt Mining District (pink outline)



# Dynamic Modeling Results

- Stacked configuration may allow CO<sub>2</sub> plume to remain within Titan Americal property boundary (yellow outline)
- Critical pressure front (330 kPa) within Cedar Keys-Lawson SAU migrates beyond property boundary, but remains within Lake Belt Mining District (pink outline)





# Community Dynamics

- Site host Titan has a long history of working in the area and engaging with community groups
- Community support all levels
  - Expand as part of CarbonSAFE Phase II
  - Utilize Titan's network and local partner Florida International University
- Extensive ground water monitoring program in place, with data reported on a regular basis

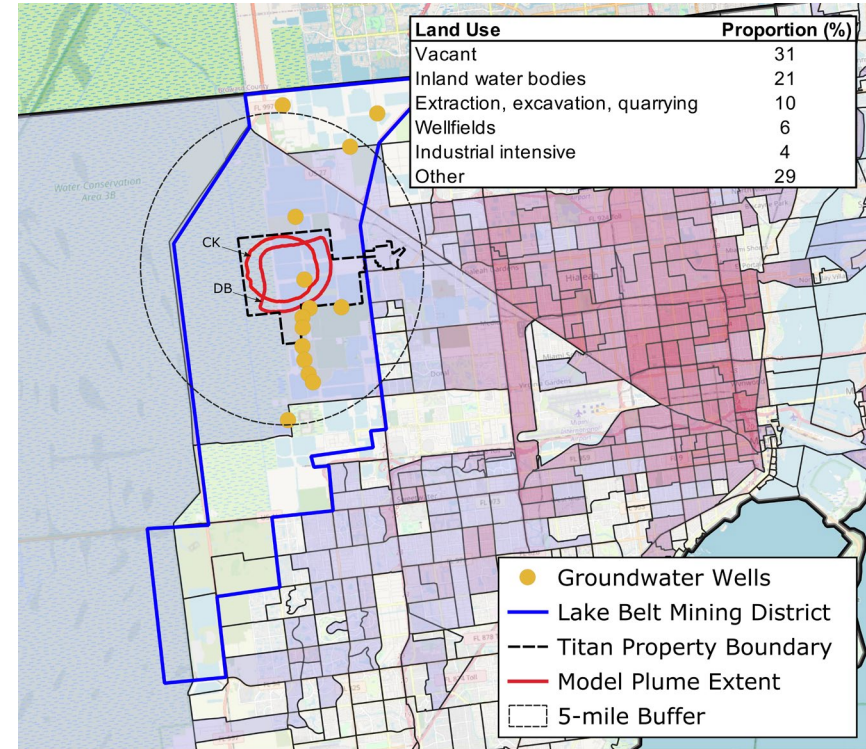
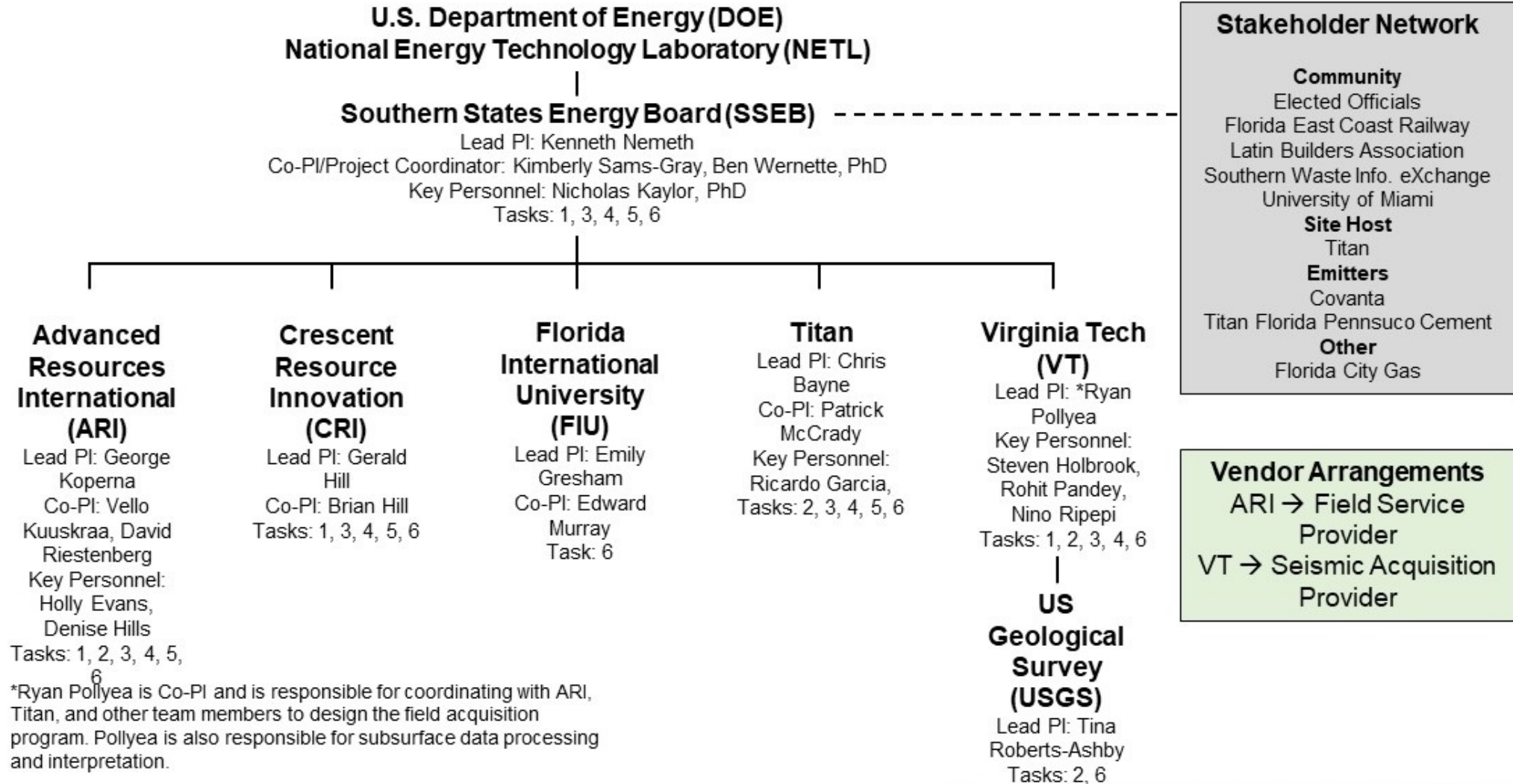


Illustration of the Lake Belt Mining District of north central Miami-Dade County, Florida, and Disadvantaged Communities as reported by the Climate and Economic Justice Screening Tool. Disadvantaged Communities are shaded according to number of criteria in 90<sup>th</sup> percentile nationally (cool colors equal fewer criteria; warm colors equal more criteria). Also shown is Titan's property boundary, the modeled extent of the CO<sub>2</sub> plume for the Cedar Keys Lawson (CK) and Dollar Bay (DB) storage assessment units, and existing groundwater monitoring wells. Inset shows land use classification (as a percentage) of all land within 5 miles of the storage area of interest.





# Project ACCESS Team



# Project Objectives

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Demonstrate that the subsurface saline formations at the storage complex can store commercial volumes of CO<sub>2</sub> safely and permanently

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Develop a comprehensive Community Benefits Plan

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Develop the infrastructure framework for a CO<sub>2</sub> storage hub

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Establish a rigorous risk registry and conduct a comprehensive risk assessment

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Create a monitoring plan

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Execute a comprehensive site characterization plan to support the Underground Injection Control (UIC) Class VI Permit in Phase III

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Evaluate project commerciality.



# Tasks

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Task 1 – Project Management and Planning

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Task 2 – Site Specific Characterization & Assessment of the CO<sub>2</sub> Storage Complex

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Task 3 – Preliminary Project Risk Assessment with Mitigation & Management Plan

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Task 4 – Plan for Subsequent Detailed Site Characterization & UIC Class VI Permitting

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Task 5 – Project Technical & Economic Feasibility Assessment, Including Conceptual-Level Design Study for CO<sub>2</sub> Transport

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Task 6 – Community Benefits Plan





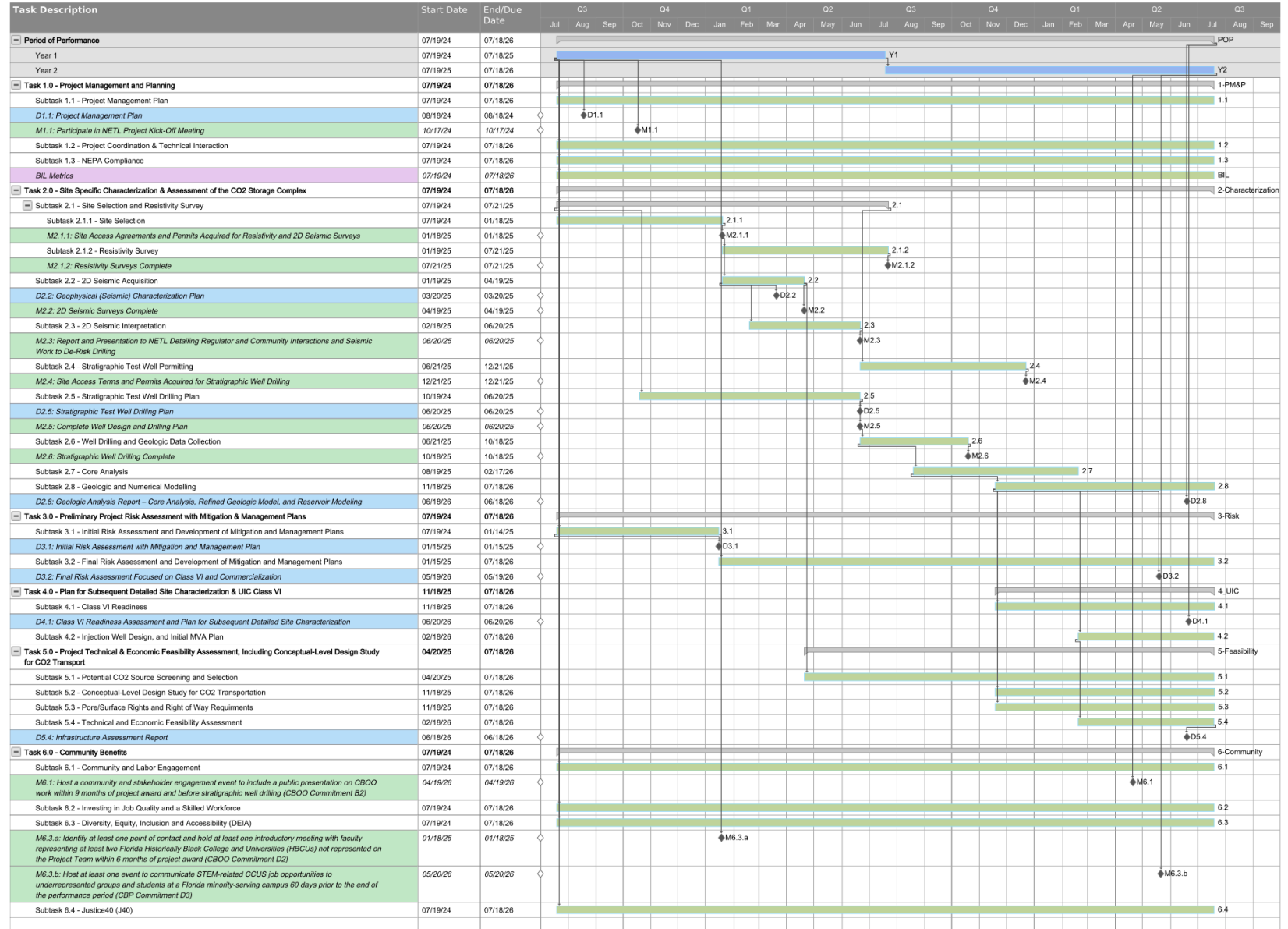
# Deliverables

Task/ Subtask Number	Deliverable Title	Due Date
1.0	Project Management Plan	Update due 30 days after award. Revisions to the PMP shall be submitted as requested by the NETL Project Manager.
2.2	Geophysical (Seismic) Characterization Plan	60 Days After Site Selection.
2.5	Stratigraphic Test Well Drilling Design Plan	120 Days After Site Selection.
2.8	Geologic Analysis Report – Core Analysis, Refined Geologic Model, and Reservoir Modeling	30 Days Prior to End of Performance Period.
3.1	Initial Risk Assessment with Mitigation and Management Plan	90 Days Following Initial Risk Assessment Meeting.
3.2	Final Risk Assessment Focused on Class VI and Commercialization	90 Days Prior to End of Performance Period.
4.1	Class VI Readiness Assessment and Plan for Subsequent Detailed Site Characterization	30 Days Prior to End of Performance Period.
5.4	Infrastructure Assessment Report	30 Days Prior to End of Performance Period.



# Schedule

- Awarded on July 19, 2024
- Updated the PMP on July 30, 2024
- Initial discussion held with Florida DEP focused on permitting regime for boreholes
  - 62-528.603 Exploratory Well Construction and Testing Permit Guidelines within FL DEP UIC program (Class V)
  - Working through permit application expectations
- Establishing sub awards
- Project kickoff meeting planned for late August 2024



# Thanks!

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