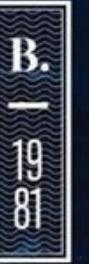


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THE SKINNY ON FILL PLACEMENT CHOOSING SEVEN FILL AREAS FROM SEVENTY AND 45M C.Y. OF BORROW AMONGST 200M



WEDA 2021 Virtual Summit – Session 3A-3

June 16th 2021

Acknowledgements

- Gordon Thomson – Associate Principal at Baird, Engineer of Record
- Brad Miller – Coastal Protection and Restoration Authority (CPRA) Project Manager
- Dain Gillen – CPRA Engineer
- Travis Byland – CPRA Engineer

Project Background

The Barataria Basin Ridge and Marsh Creation Project is a large-scale restoration strategy for the Barataria Basin. Spanish Pass is the first increment, with initial goals to:

- Create/nourish approximately 1,134 acres of marsh
- Create 120 acres of marsh ridge
- Concept was to restore habit and distributary spoil bank of Spanish Pass

Funded by NRDA with money (\$112M initial budget) from DWH Oil Spill. DOI is the lead federal agency for the Trustee Implementation Group (TIG).

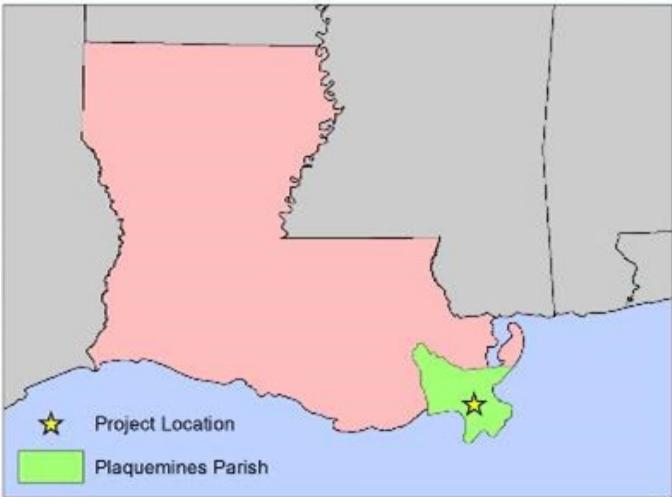
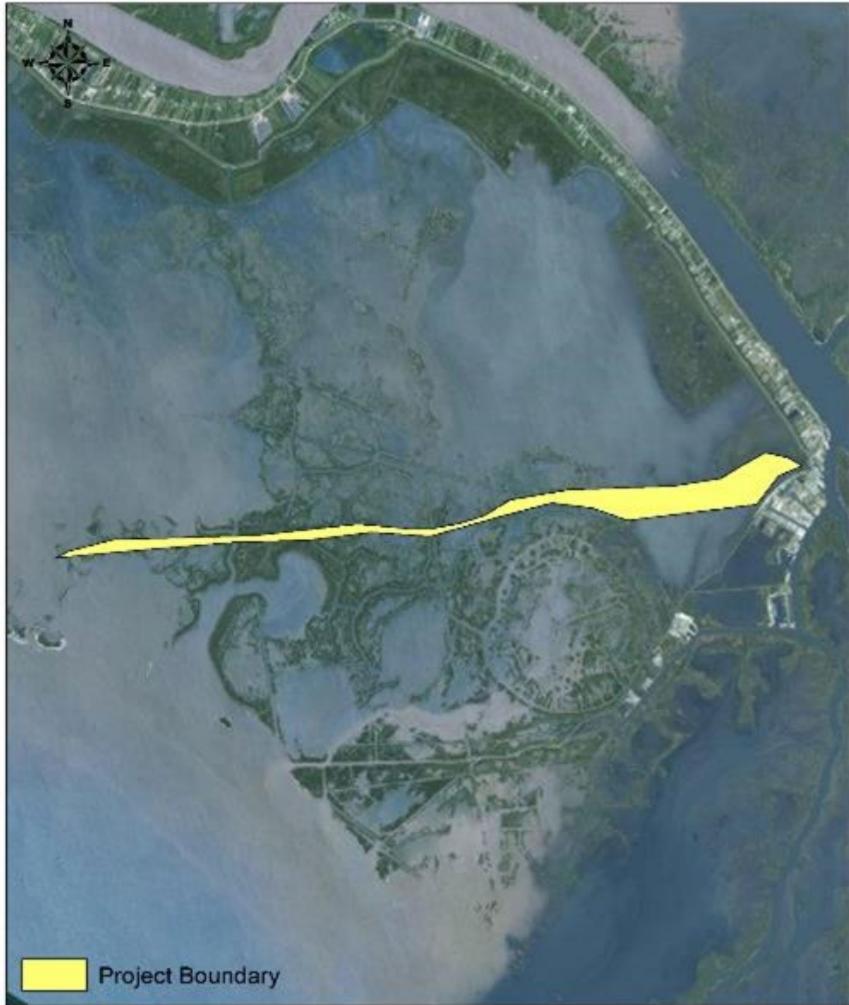
Presentation Focus / Outline

Purpose – discuss the screening and optimization of fill placement (70->7) and borrow sources (200M->45M) for the project.

Outline:

- Conceptual Project Footprint
- Initial Fill Boundary & Borrow Areas
- Borrow Area Screening
- Fill Area Data Collection & Conceptual Layout
- Cost Estimating Introduction
- Fill Area Optimization
- Final Project Layout – Borrow Area, Fill Area

Pre-Scoping Conceptual Project Footprint



- Project Located in Venice, LA where the Mississippi River Ends
- Heavily utilized area for oil & gas extraction + recreational fishing



Project Site Location
BA-203 Spanish Pass Increment
Plaquemines Parish, Louisiana, USA

Imagery: Esri World Imagery
Spatial Reference:
NAD 1983 2011 StatePlane Louisiana South FIPS 1702 F1 US

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Initial Project Layout



- Fill areas must be within boundary
- Seeking 1,134 acres of marsh, 120 acres of ridge
- Minimize \$/acre while reaching target acreage
- Fill shallow areas, utilize remaining fringe marsh as containment

Initial Borrow Area Screening



- Proposed fill from seven borrow areas
- Grand Liard, only offshore source, used for previous project
- DDDD/BBBB are anchorages
- B2 previously permitted
- HDDA is hopper disposal area

Borrow Area Summary

Borrow Source	Neat Volume (CY)	Effective Volume (CY)	Est. Sediment Classification	Est. Sand Fraction (%)	Borrow Centroid to Adjacent Fill. (ft)
B2	7,800,000	5,200,000	Mostly sand	>92 to 43%	30,000
DDDD	17,036,000	11,357,000	Mostly Sand	87%	19,500
BBBB	20,250,000	13,500,000	Mostly Sand	87%	36,000
HDDA	8,000,000	5,333,000	Sand w/ silt	45%-85%	65,500
GLE	4,182,000	2,788,000	Clay / silt and sand	0%-50%	21,500
GLW	2,494,000	1,663,000	Clay w/ silt and sand	0%-50%	29,000
Tiger Pass	1,524,000	1,016,000	Sand w/ silt	50%	45,000
Baptiste Collette	975,000	650,000	Clay w/ silt and sand	0%-50%	62,500

- DDDD (40M cy) and BBBB (125M) originally far greater volumes, dredge template revised to address needs
- Still capable of building whole project singlehandedly
- HDDA, Tiger Pass, Baptiste Collette are too far or small

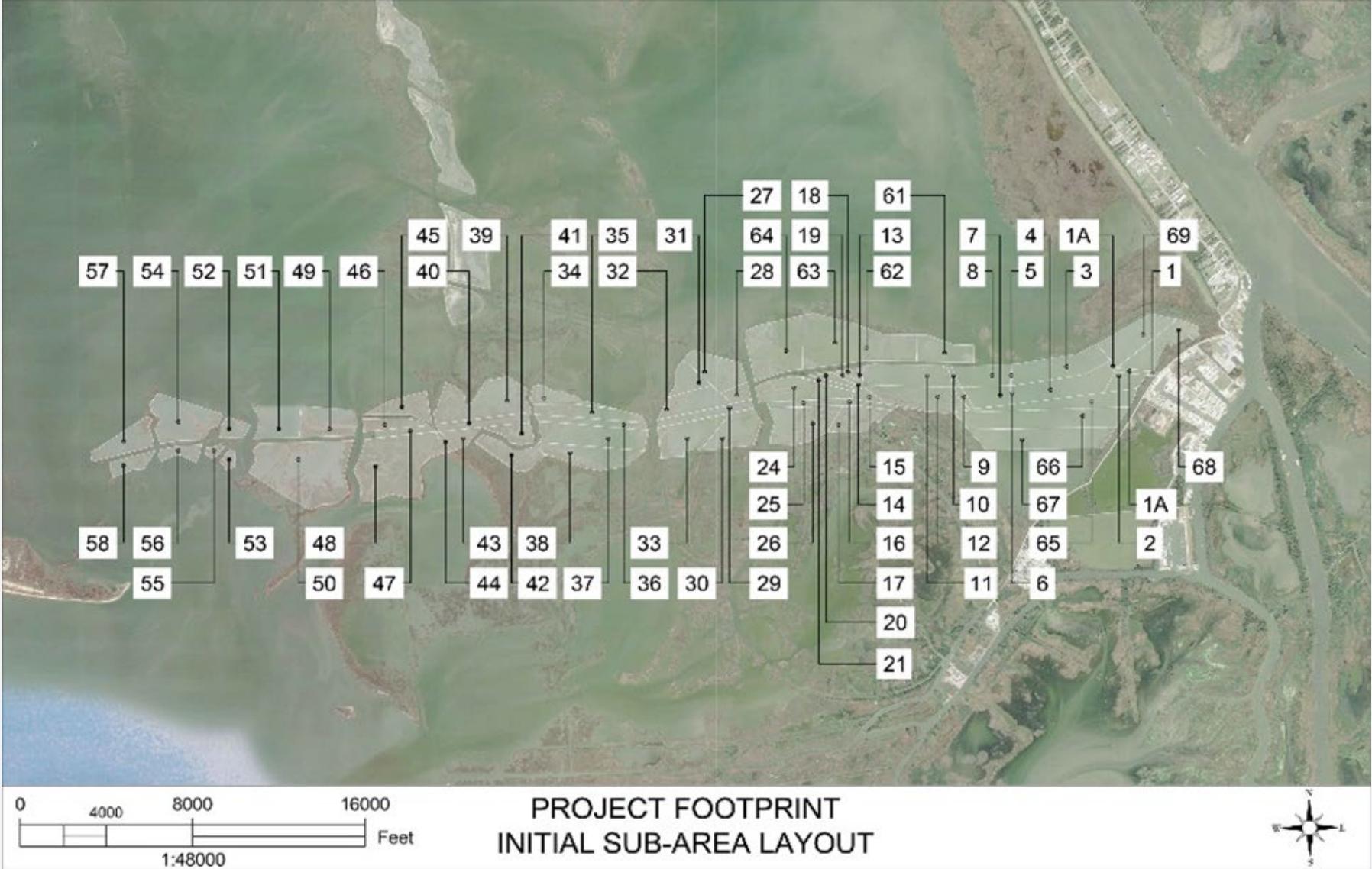
Conceptual Project Layout + Preliminary Design



- Topo, Bathy, Mag Surveys
- Pre-design collected surveys spaced 2500'
- Informed rough water depth & volumes
- 30% design collected data on 250' intervals to accurately compute volume

Conceptual Project Layout and Preliminary Design

- Reconnaissance surveys used to develop 70 individual fill subareas
- Combined subareas to form alternatives to meet acreage and budget goals



Cost Engineering Dredge Estimating Program (CEDEP)

ESTIMATED DREDGING QUANTITY: PG 3 of 9

Non-Pay Computation Method: **3**
 (1) Surface Area, (2) % of Pay O.D., (3) % of Net Pay, (4) % of Gross

BANK HEIGHT: **30** FT.

DREDGING PRISM:

Required....	5,949,654	C.Y.
+1.00-ft Pay O.D.	0	C.Y.
Bid Quantity	5,949,654	C.Y.
-0.45-ft Not Dug	0	C.Y.
Net Pay	5,949,654	C.Y.
+ Non-Pay	1,308,900	C.Y.
Gross Volume	7,258,554	C.Y.

1.22 Diq-to-Pay Ratio

LOSSES: **22.00** % of Net Pay @ **30.0** FT. BANK HT.

MATERIAL FACTORS: PG 4 of 9

DESCRIPTION	FACTOR	PERCENTAGE	Additional Information
MUD & SILT	3	6.5 %	
MUD & SILT	2.5	0 %	
MUD & SILT	2	6.5 %	DIRECT ENTRY
LOOSE SAND	1.1	87 %	FACTOR= 0.00
LOOSE SAND	1	0 %	
COMP. SAND	0.9	0 %	
STIFF CLAY	0.6	0 %	
COMP. SHELL	0.5	0 %	RESULTANT MATERIAL
SOFT ROCK	0.4	0 %	FACTOR= 1.18
BLAST. ROCK	0.25	0 %	

- Plug in project specific information
- Calibrate to bids and project completion reports for similar projects
- Inputs include most obvious factors: material type, dredge prism, pump distance, boosters, economic factors
- Output placed into master spreadsheet with volume & acreage estimates to screen subareas

Cost Screening

CEDEP



Subarea	Source	Acres	Avg. Base El.	Avg. Thickness (FT)	Vol. (CY)	\$/CY	T. Cost (\$)	\$/acre
2	DDDD	34	-4.5	7.5	411,400	4.16	\$1.7M	\$ 51,572
3	DDDD	101	-3.8	6.8	1,153,815	4.34	\$4.8M	\$ 50,809
4	B2-S	105	-4.1	7.1	1,206,696	4.43	\$5.3M	\$ 52,136

Also included:

- \$/CY based from every source
- survey cost/acre
- Perimeter/containment considerations/cost (bucket vs marsh buggy)
- Developed cost per subarea, combined into alternatives

Alt. 1 & 2, North / South of Spanish Pass



Alt 1:

- Subareas north of historic Spanish Pass canal

Alt 2:

- Subareas south of historic Spanish Pass canal

Color coded based on borrow source

Alts 1 – 5 used B2 & Grand Liard only

Alt. 3 & 4 - Initial Cost Optimization



Alt 3:

- Initially most cost effective marsh cells

Alt 4:

- Decreased total cost by removing subareas

Alt. 5 - Continued Cost Optimization



Alt 5:

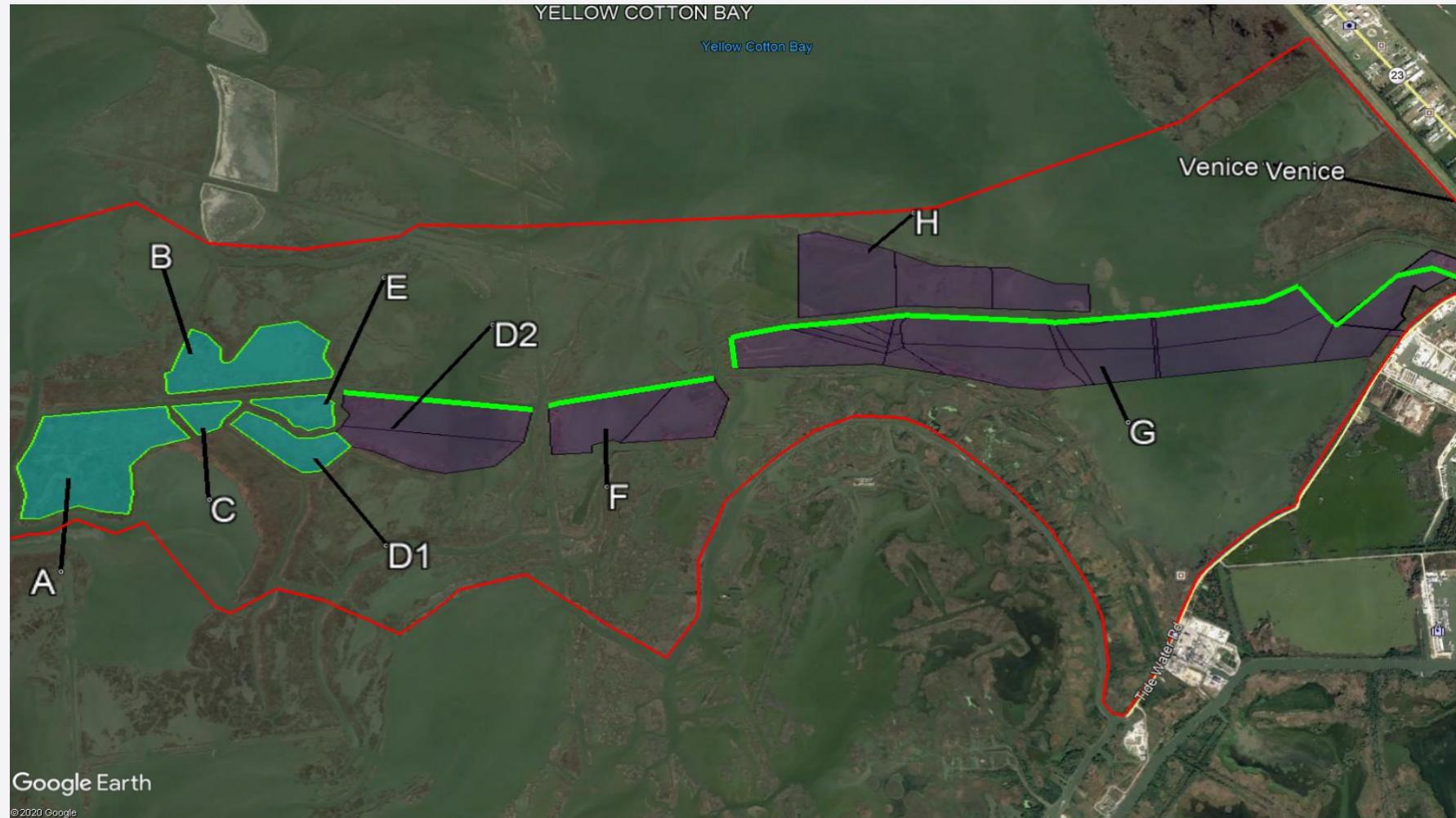
- Further reduced cost by eliminating northern subareas
- Replaced some subareas western subareas

Alternative Screening

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
Marsh Area (ac)	946	1,191	2,167	1,727	1,240
Ridge Area (ac)	49	64	69	69	109
Total Acreage (ac)	995	1,255	2,236	1,796	1,349
Total Volume (cy)	10.5M	11.3M	20.8M	16.3M	12.2M
Cost	\$92.6M	\$101.4M	\$176.3M	\$144.6M	\$108.6M

- Alt 5 is the first iteration to meet goals for cost and acreages
- Future revisions improved the design and included more subareas as DDDD and BBBB became viable sources of sand, leading to alternative 6.

Alt. 6 - Continued Cost Optimization



Alt 6:

- DDDD and BBBB become preferred borrow sources
- Add in more eastern subareas, remove western subareas (wave exposure)
- Combined subareas into larger, continuous MCAs A-F
- Final cost optimization came from comparing Grand Liard vs DDDD

Optimizing Borrow Sources – Grand Liard vs DDDD

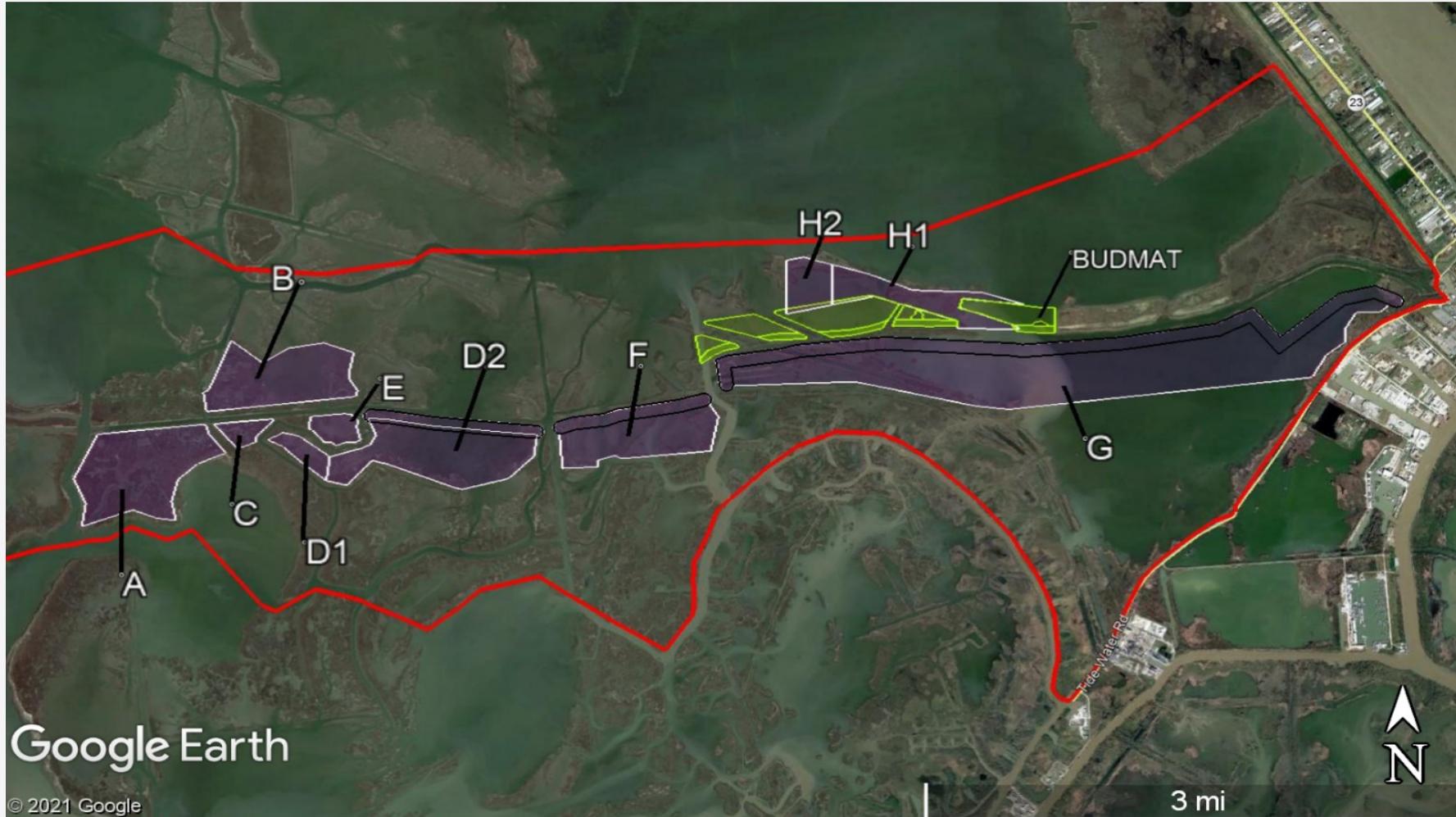
- Ongoing geotechnical analysis revealed varying in-situ soil types & strengths
- Indicated MCAs required varying fill elevations for identical fill material
- Further dictated that fill elevations within same MCA varied based on fill material
- Project team had to reevaluate utilizing two separate borrow sources
- Grand Liard requires 2nd mobilization, containment dikes for clay material, higher fill elevations = larger dredge prism
- DDDD to west half is a longer pump, but requires less volume and no containment

Optimizing Borrow Sources – Grand Liard vs DDDD

	Grand Liard (+3.0' NAVD88)			DDDD (1.6' NAVD88)		
MCA	Volume (CY)	Unit Price (\$/CY)	Amount	Volume (CY)	Unit Price (\$/CY)	Amount
A	1,640,000	\$3.75	\$5,722,500	457,000	\$7.50	\$3,427,500
C	230,000	\$4.00	\$5,000,000	49,000	\$7.50	\$367,500
D1	471,000	\$4.25	\$2,418,250	141,000	\$7.00	\$987,000
	Total Cost		\$9,071,750	Total Cost		\$4,782,000

- \$4.3M in savings
- Grand Liard also requires mobilization cost ~\$5.5M and \$2.2M in containment.
- Pumping from DDDD estimated to save ~\$12M.

Final Marsh and Ridge Creation Layout



Base Bid MCAs:

- A, C, E, D1, D2, F, G (9.75M CY in place)

Additive Alt. MCAs:

- B, H1, H2 (1.95M CY in place)

Marsh elevation varies

Ridge along north edge of G, F, D2

Optimizing Borrow Sources – Permit Revisions & Final Layout



Grand Liard:

- Left in permit, not included in bid plans
- B2:
- Left in project to renew existing permit, slightly revised for levee stability

DDDD:

- Omitting northern 1/3 of borrow source

BBBB:

- Reduced longitudinal extents and cut depth to reach 20M cy (vs 125M)

Conclusion

- Project was broken into subareas with individual costs based on borrow source
- Subareas were combined to reach goals
- Borrow was screened based on volume (need 10.7M CY in place), cost, and material type
- The opinion of cost ranged from \$76M to \$91M, low bid for base bid was ~\$80.8
- Goals of project (1,134 marsh & 120 acres ridge, \$112M budget) were met - low bid for 1,538 marsh & 132 acres ridge was \$86.8M.

Where is the project now?



- In construction
- Contractor to place pipeline across Miss. River nav channel
- Dredging tentatively begins July 9th.
- Will pump continuously for ~11-13 months

QUESTIONS?

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June 16th 2021

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