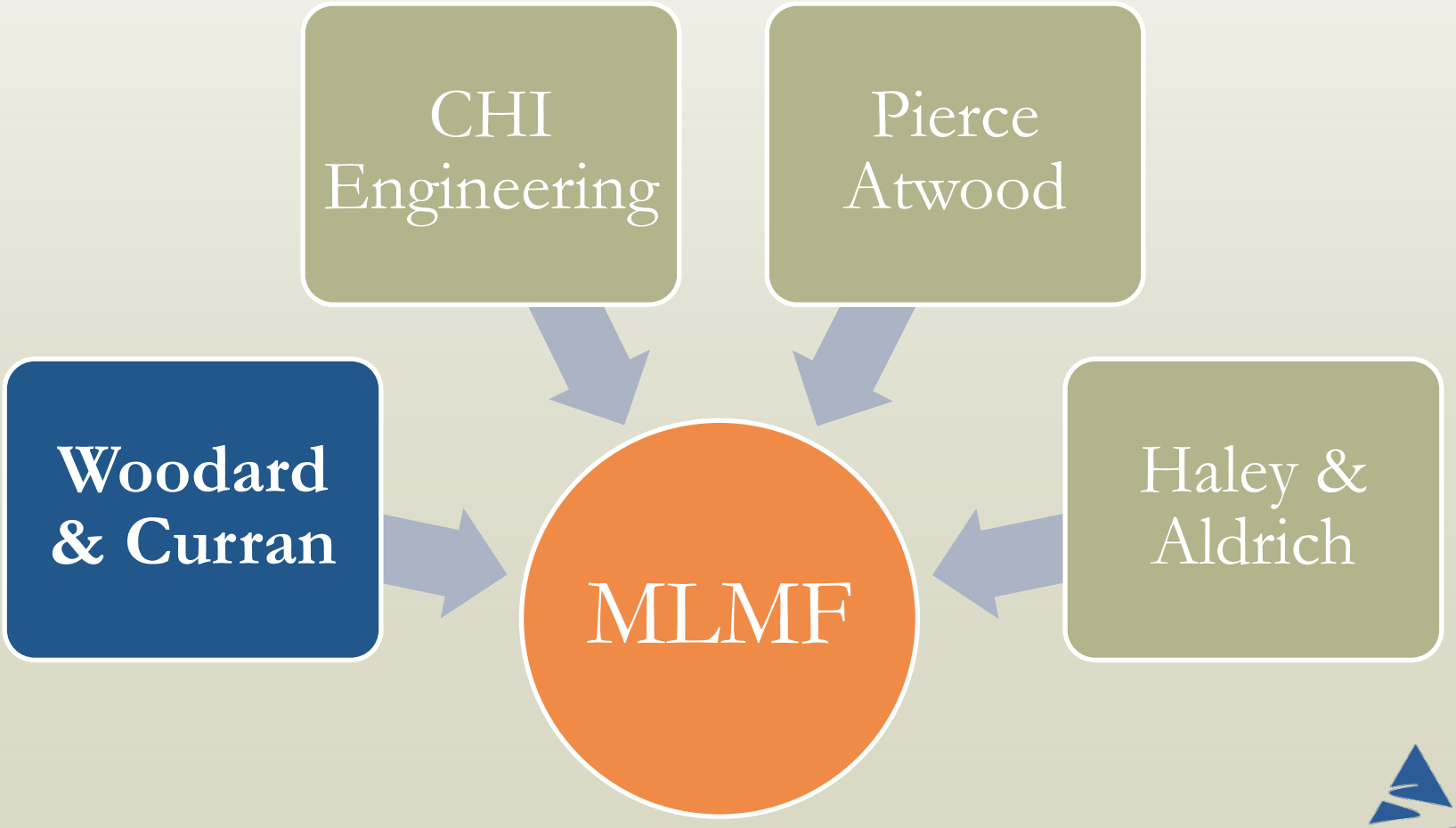
Woodard & Curran Success Story:

Maine Liquid Methane Fuels

Maggie Connolly, PE, LEED AP

WOODARD & CURRAN

Key Team Members



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WOODARD & CURRAN'S ROLE

- Environmental & Local Permitting
- Site Design
- Support CHI Engineering

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PROJECT GOAL

Introduce Alternative Energy & Fuels to the Interior of Maine

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PROJECT GOALS

- Leverage existing transit infrastructure
  - Maritime Northeast Pipeline
  - State and Interstate highway network
- Deliver a cleaner & currently unavailable fuel source to Maine
- Diversity Maine's existing fuel supply pool
- Reduce Maine's dependency on Petroleum
- Provide a less expensive fuel source

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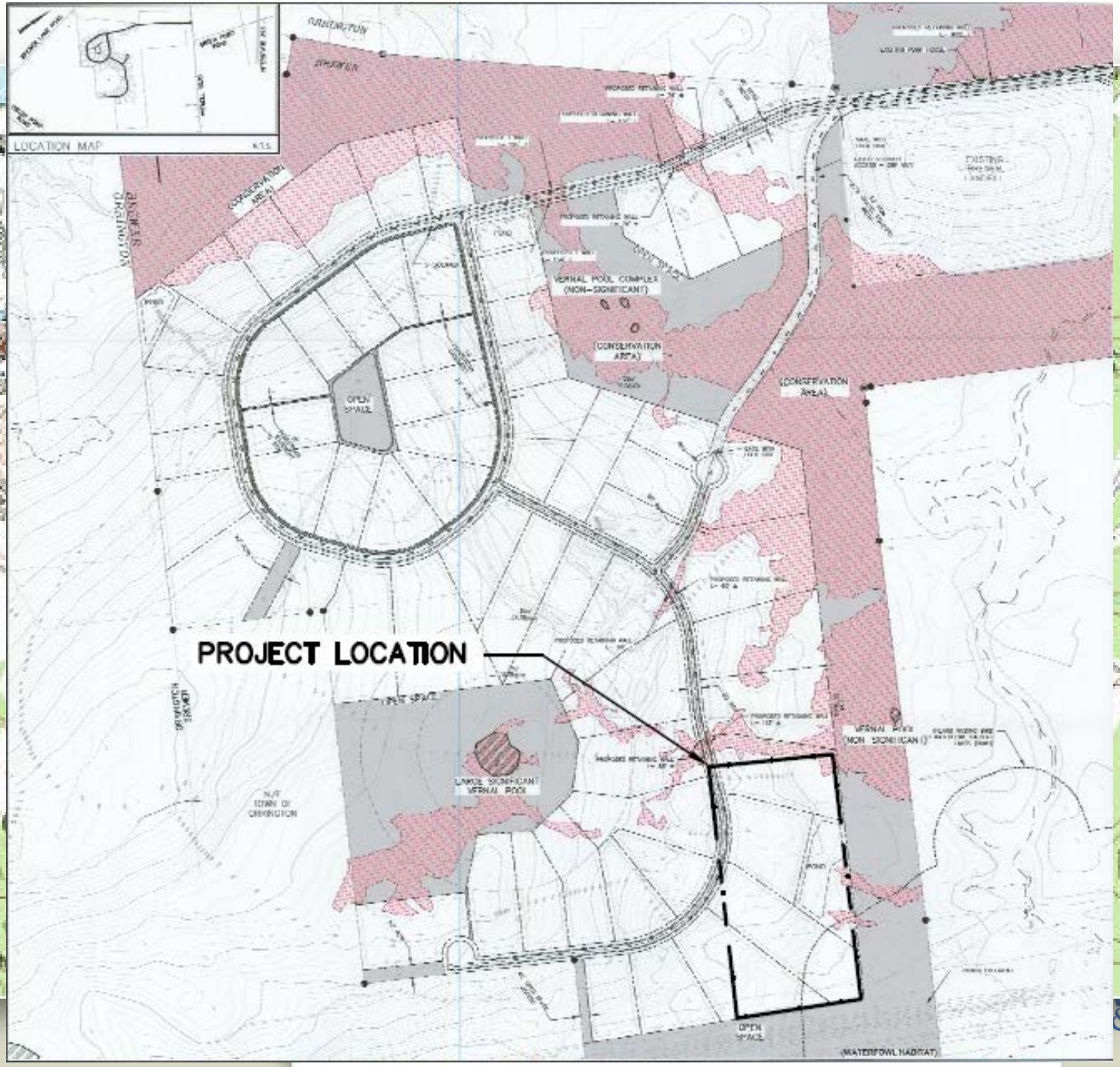

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PROJECT LOCATION

- Brewer, Maine -- Greater Bangor area
- Brewer Business & Commerce Park
- Adjacent to the Maritime Northeast Pipeline
- 10- acre site with a purchase option from the City
- Easy access to I-395 and I-95

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WHAT IS LMF?

- Liquid Methane Fuel
- Natural Gas
  - Purified, Fractionated and Stored/Transported as a liquid
  - 97% Methane
  - <1% Ethane
  - Balance = Nitrogen & Other Hydrocarbons

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PROCESS

1. RECEIVE GAS FROM MARITIMES NORTHEAST PIPELINE

2. PURIFY GAS
   - A. REMOVE CO_2, SULFUR COMPOUNDS AND OTHER HEAVY HYDROCARBONS
   - B. REMOVE MOISTURE

3. COOL TO -265 F

4. FRACTIONATE TO PRODUCE A CONSISTENT ENERGY VALUE

5. STORE TWO FUEL GRADES
   - A. HEATING FUEL
   - B. MOTOR FUEL (97% C1, <1% C2)

6. TRANSPORT TO CUSTOMERS

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PROCESS WASTES

- Purification Process
  - ENVIROSCRUB Solvent
- Spent solvent & removed sulfur = Byproducts
  - Sold to Farmers as Fertilizer
- Non LMF gases from Fractionation
  - Fuel Production

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WHY LMF?

- NG has varying Methane contents: 78% to 94%
  - Conversion process provides consistently graded LMF
- Produces fewer emissions than burning Diesel
- Occupies 1/600TH of the equivalent volume of gas
- Can be derived from many sources:
  - Natural Gas
  - Landfill Gas
  - Biogas

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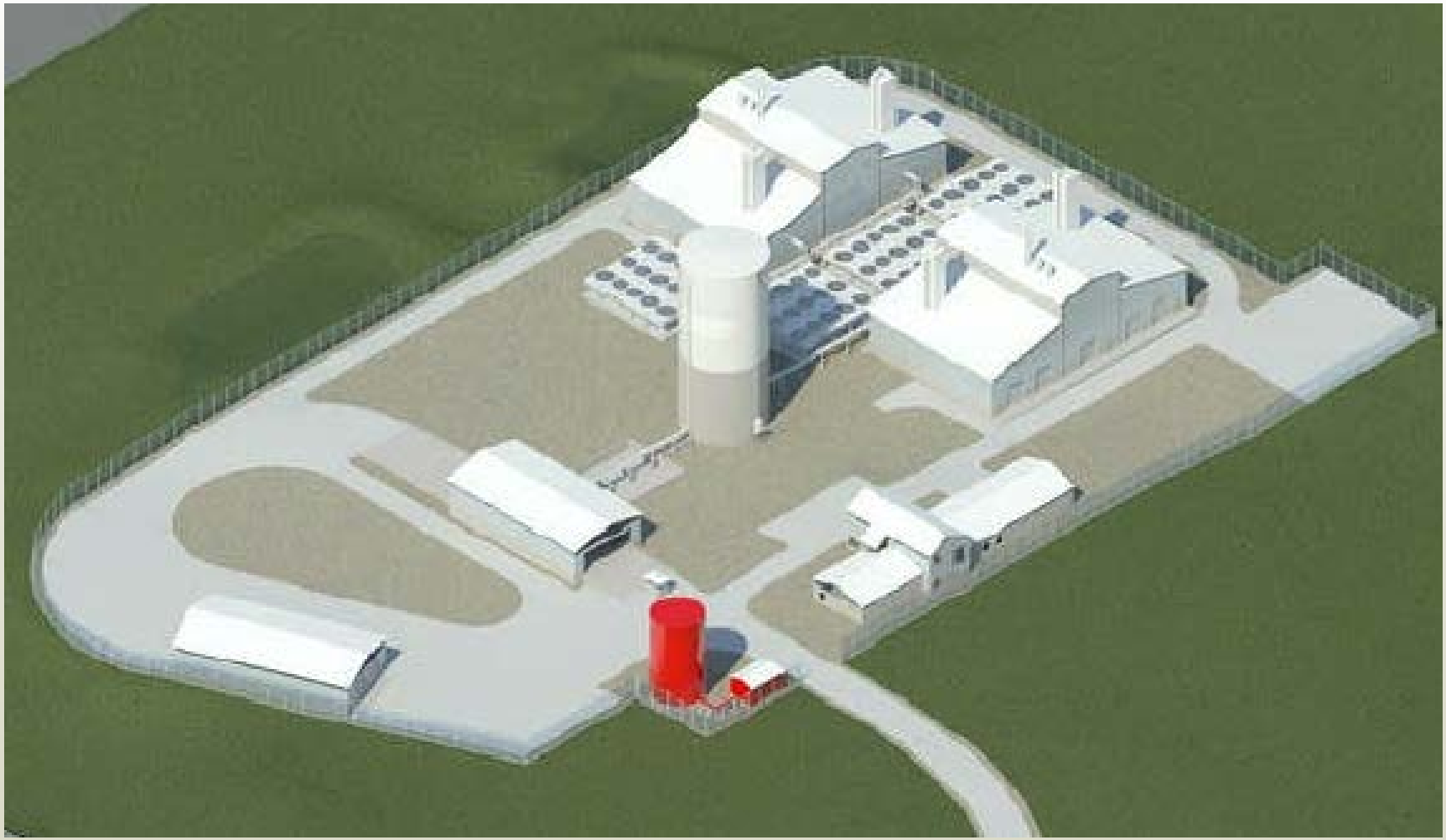

SITE PERSPECTIVE

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SITE DESCRIPTION

- 10 Acre Site
- NFPA 59A
  - Standard for the Production, Storage, and Handling of Liquefied Natural Gas
- Meets Homeland Security Standards
- ~ $50M in Construction Costs

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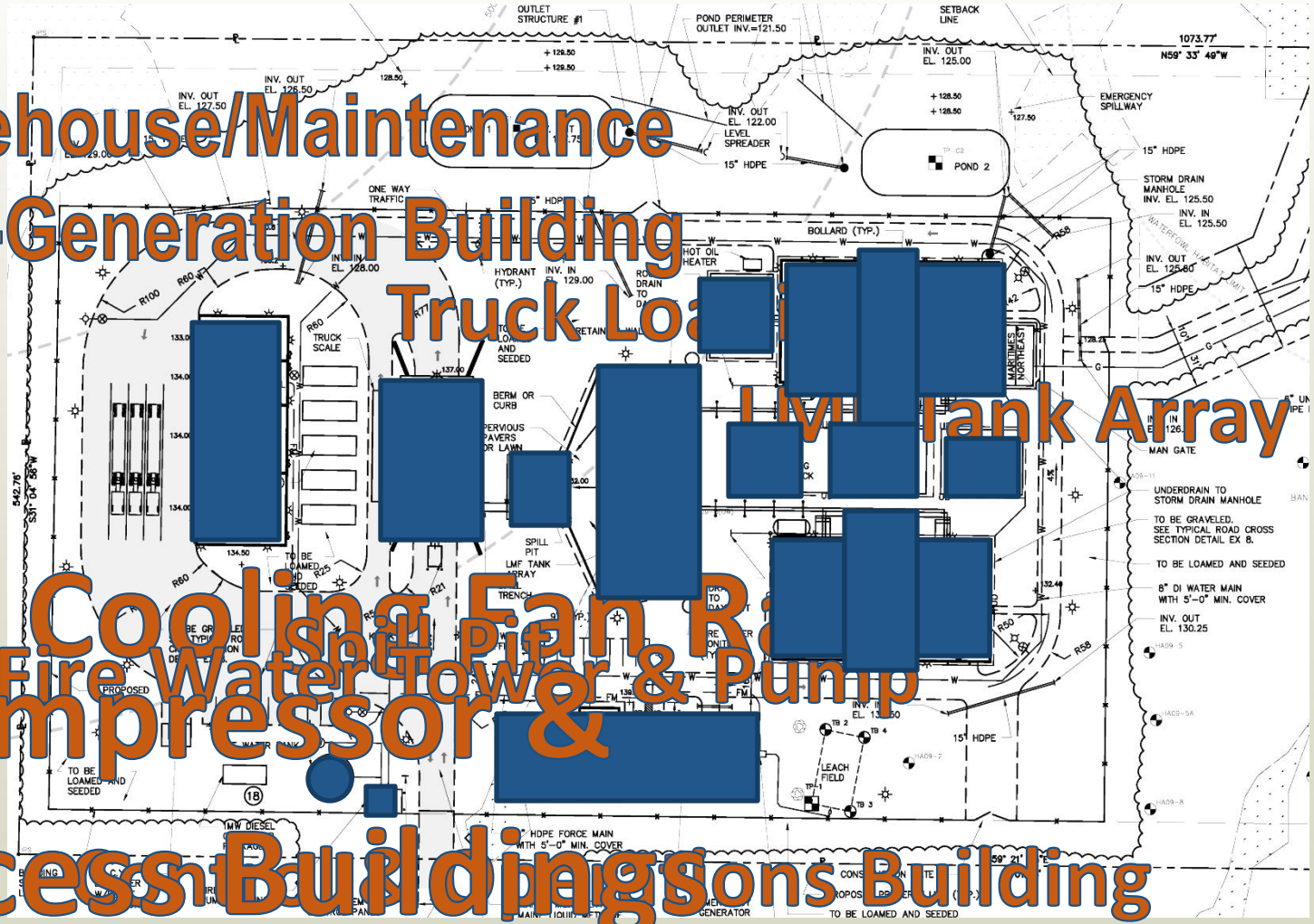

SITE PLAN

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PERMITTING

- ACOE – MAINE GENERAL PERMIT
- MDEP – SITE LOCATION OF DEVELOPMENT PERMIT
- MDEP – NATURAL RESOURCES PROTECTION ACT PERMIT
- MDEP – MAINE CONSTRUCTION GENERAL PERMIT
- CITY OF BREWER SITE PLAN APPROVAL
- MDEP – AIR EMISSION LICENSE
- DWP – WATER SUPPLY WELL APPROVAL

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COMMUNITY IMPACT

↑ ACCESS TO LESS EXPENSIVE FUEL SOURCE

- Increase cost competiveness of Maine businesses
- Preserves Maine jobs in the interior
- Increases State's fuel mix – reduce petroleum dependency

JOB CREATION

- 12-20 Plant Production jobs created
- 6-10 transportation related jobs created
- Will multiply as additional phases come online
- Average Annual Wage ~142% above average for Greater Bangor area

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POTENTIAL MAINE CUSTOMERS

- PULP AND PAPER MILLS
- UNIVERSITY SYSTEM
- TRUCKING/TRANSPORT FLEETS
- RAILROADS
- AGRICULTURE
- SKI AREAS
- ASPHALT PLANTS
- MUNICIPALITIES
- MARINE FLEET – FERRIES AND FISHING VESSELS

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KEY FACTORS TO SUCCESS

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OTHER W&C PROJECTS

LNG

SOLAR

WIND

BIOMASS

WOODARD &CURRAN

THANK YOU

Woodard & Curran

Maggie Connolly, PE, LEED AP

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