

JetShear™ Processing Plant Pilot

2025 Annual Scheme 12346F Report

Submitted to the Alberta Energy Regulator

February 2026



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1. Project Introduction

1.1 Background

The Project is located 14.7 km north of the Hamlet of Hayter, Alberta, within the Municipal District of Provost No. 52 (Figure 1) at 08-35-040-01W4M on private farmland within a lease (8-35) held by Harvest Operations Corp. (Figure 2).

The Project was first constructed in 2011 as a commercial demonstration unit to process dilbit from a conventional heavy oil battery. In July 2014, the owner of the Project (Fractal Systems Inc.) applied for Experimental Scheme Approval under the *Oil Sands Conservation Act* (OSCA). At that time, approval under the *Environmental Protection and Enhancement Act* (EPEA) was not required. In 2017 Cenovus acquired the facility from Fractal Systems and in 2021 were advised by the AER that Scheme and EPEA approvals would now be required to continue to operate the pilot facility. These were applied for and in 2022 Cenovus submitted these applications and received Scheme approval 12346E and EPEA Approval 00483474-00-00. In February, 2023 the EPEA was amended to increase the stack height of the thermal oxidizer.

The Project is a pilot plant to test the HDR™ technology capabilities of reducing the viscosity of bitumen with a production capacity of up to 159 m³/day (1,000 barrels per day (bpd)) of diluted bitumen (dilbit). The pilot plant consists of a:

- tank farm with two inlet tanks (TK-81101 and TK-81201) and an outlet tank (TK-81271);
- a thermal oxidizer;
- heat exchangers;
- several pumps and JetShear™ nozzles;
- glycol air cooler;
- several stripping columns, as well as a heater and pop tank (TK-81275- hydrotreated gas oil tank).

A plot plan is shown as Figure 3.

1.2 Plant Design and Operation

The purpose of the pilot plant is to optimize and validate the partial upgrading technologies such as Jetshear™ and HDR technologies, determine maintenance cycles and cleaning frequencies of various equipment, and to demonstrate its benefits of displacing diluent through partial upgrading of diluted bitumen. The process is best described as a light upgrading or treating process comprised of both thermal and mechanical (e.g., cavitational) upgrading components with or without adding Synthetic Crude Oil (SCO). Heavy oil or bitumen treated in the process realizes significant transport property transformation characterized through reductions in viscosity and density. These property transformations facilitate the reduction of total net diluent addition required to meet pipeline specifications for transportation. The facility was modified to accommodate the testing of the HDR (Hydrogen-donor Diluent Reduction)

process, which involves running at lower pressure with the addition of Synthetic Crude Oil (SCO) to the feed. The key processing units for the Project include:

- tankage area;
- main process area;
- H₂S stripping;
- cooling loop; and
- off gas treatment.

Produced dilbit is introduced to the processing facilities via a pre-charge feed pump from the tankage area. Dilbit is then transferred by pump through the tube side of four heat recovery heat exchangers installed in series by the hot product. It is then pumped through another set of heat exchangers where it is further heated. The feed is then heated to its final temperature (410°C) in a dilbit heater. The high pressure / temperature dilbit is then sent through proprietary nozzles which subject the oil to cavitation. The treated oil is then cooled to an intermediate temperature to strip off any unwanted gases that are solubilized in the liquid. After stripping, the liquid is cooled and ready to be shipped, while gases are oxidized in a thermal oxidizer.

The Project processes clean dilbit. There are no water or solids byproducts generated. Emissions (*e.g.*, nitrogen, oxygen, water vapour, carbon dioxide, carbon monoxide, hydrocarbons, nitrogen oxides and sulphur dioxide) are generated from the combustion of natural gas and air in the process. The thermal oxidizer combusts all off gases generated by the pilot plant.

2. 2025 Operations and Activities

There were no tests of the HDRTM or JetShearTM technologies completed at the Project in 2025. The last test was completed in December 2023. Table 1 provides a summary of 2025 Project activities.

3. Waste Management

The Project processes clean dilbit. There are no water or solids byproducts generated. Emissions (*e.g.*, nitrogen, oxygen, water vapour, carbon dioxide, carbon monoxide, hydrocarbons, nitrogen oxides and sulphur dioxide) are generated from the combustion of natural gas and air in the process. The thermal oxidizer combusts all off gases generated by the pilot plant.

Typical wastes generated at the facility include:

- rags, leak pads, domestic waste which are stored in dedicated waste bins;
- process liquid waste (samples, oil, solvents) stored in a dedicated drum and recycled back in the feed tank and processed;
- process tank bottoms which are removed by vacuum truck and disposed off-site; and,
- soil waste (contaminated/spills) stored in dedicated drums and disposed off-site.

No waste was generated in 2025.

4. Technical Interpretation of Pilot Data

The technical interpretation of pilot data was completed in 2023. There were no pilot tests completed in 2025.

5. 2026 Project Activities

Cenovus has no plans for further testing at the site. Environmental monitoring as required in the EPEA approval will continue in 2026. Cenovus will submit a decommissioning plan by March 31, 2026 and the Final Scheme Approval Report by May 31, 2026.

6. Closure

We trust the content of this letter report adequately summarizes the activity at the pilot facility in 2025. Please contact the undersigned at andy.taylor@cenovus.com should you require additional information.

Regards,



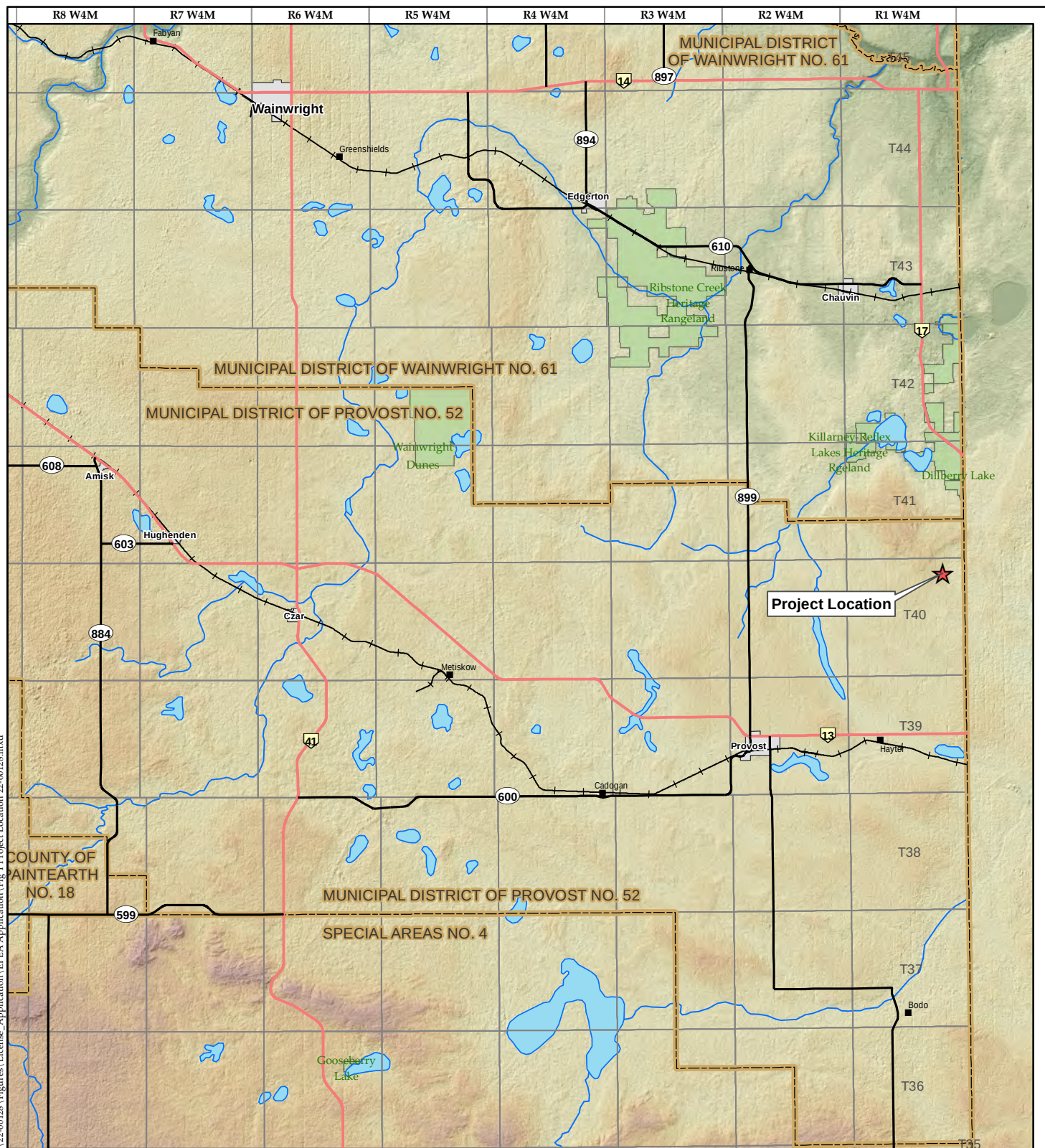
Andy Taylor, P.Eng
Senior Environmental Engineer
Environment & Regulatory
Cenovus Energy

Table 1 - Operational Activities Summary

Date Range	Activity
January 1 to December 31	Complete weekly site inspections
February	Isolate tanks and other equipment
June	First groundwater sampling event
October	Second groundwater sampling event

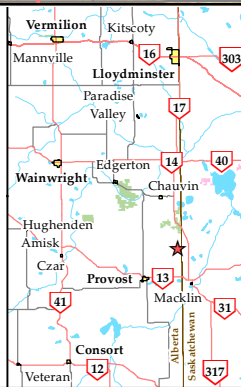
FIGURES

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- ★ Project Location
 - Primary Highway
 - Secondary Highway
 - Railway
 - Park/Protected Area
- Topography (m asl)**
- High : 920
 - Low : 483

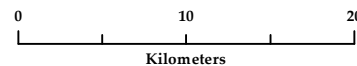


CENOVUS ENERGY INC.
JETSHEAR™ PROCESSING PLANT

PILOT PLANT PROJECT LOCATION

AltaLIS, 2021; MEMS, 2022;
ASTER GDEM v2, 2022 (Image Date: 2018)

Coordinate System: NAD 1983 UTM Zone 12N



PROJECT: 22-00128

DRAWN BY: EPITTMAN

CHECKED BY: KK

DATE: APRIL 7, 2022

FIGURE

1

Disclaimer: This figure was derived from multiple data sources and while we make every effort to assure its accuracy, Millennium EMS Solutions Ltd. disclaims any representation or warranty and assumes no liability either for any errors, omission or inaccuracies that may occur.

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CENOVUS ENERGY INC.
JETSHEAR™ PROCESSING PLANT

PILOT PLANT PROJECT FOOTPRINT

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- Harvest 8-35 Battery Site
- Project Footprint

8-35

5-36

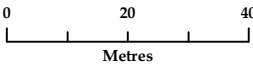
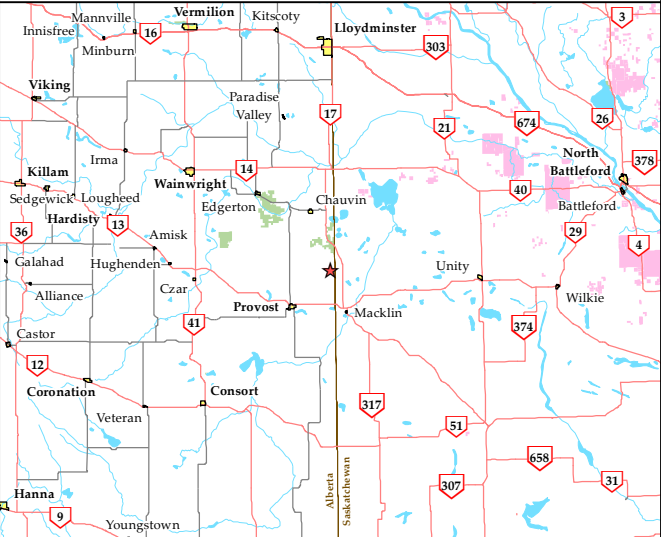
Range Road 11

T40

1-35

Project Footprint

4-36



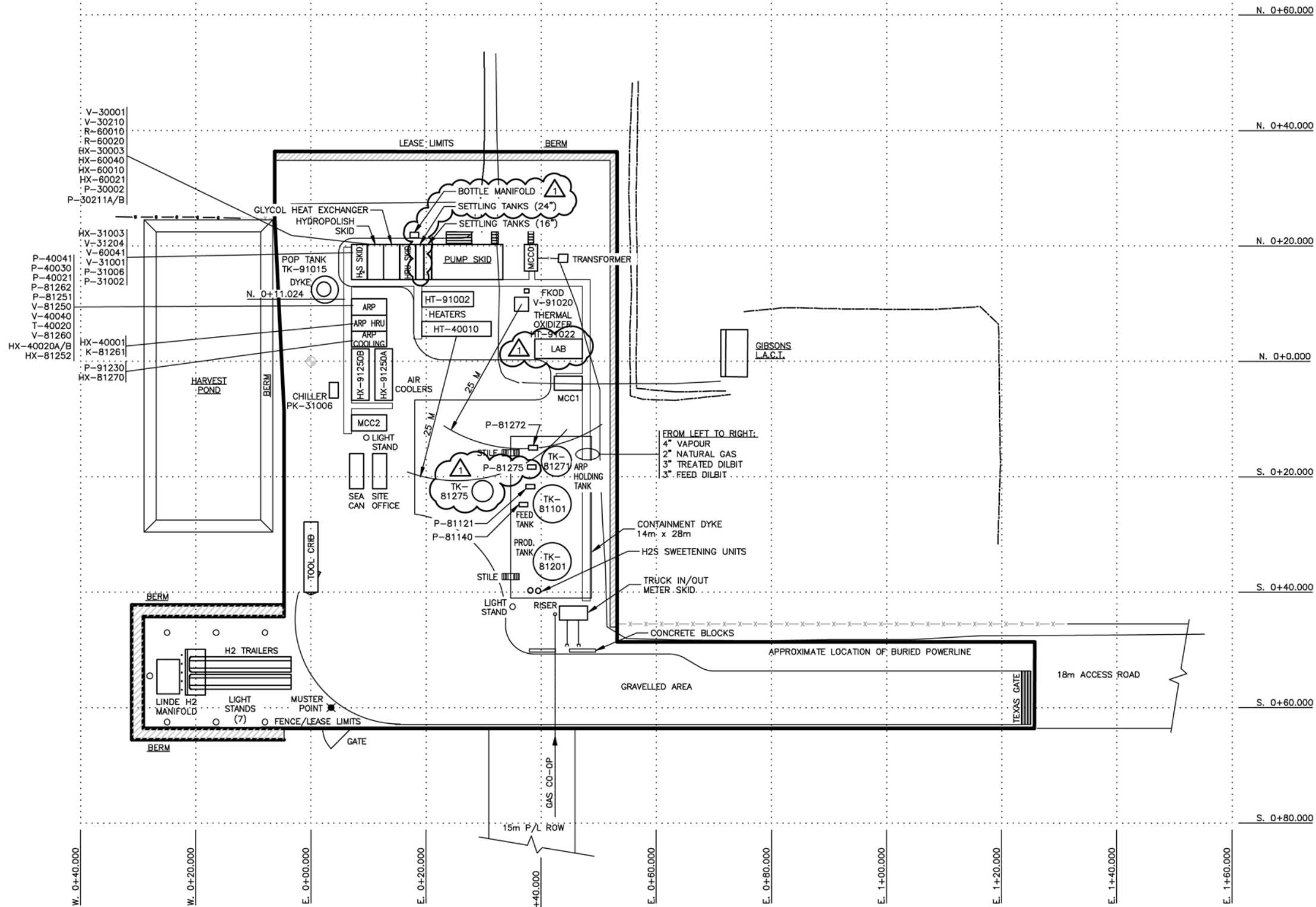
Coordinate System: NAD 1983 UTM Zone 12N
AltaLIS, 2021; Fractal Systems, 2014; MEMS, 2022;
ESRI Imagery, 2022 (Image Date: July 2020)

PROJECT: 22-00128
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DATE: APRIL 7, 2022

FIGURE

2

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JETSHEAR™ PROCESSING PLANT

PLOT PLAN

MEMS, 2022; TNT Engineering Ltd., 2012;



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PROJECT: 22-00128
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FIGURE
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