Imperial
Cold Lake Operations
ELP

Directive 054 Annual Submission 2025

June 30, 2026

Enhanced Late-Life Process (ELP) Experimental Pilot

Approval 12912

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Background of Scheme

Proprietary

ELP Process Background

Process Description:

- Late-life follow-up to thermal recovery processes (CSS, Steamflood, SAGD, etc.)
- Continuous, low-pressure injection of butane
- Butane condenses and mixes with bitumen, reducing its viscosity
- Mobilized bitumen and condensed butane drains to production wells
- Up to 70% reduction in GHGi over steamflood

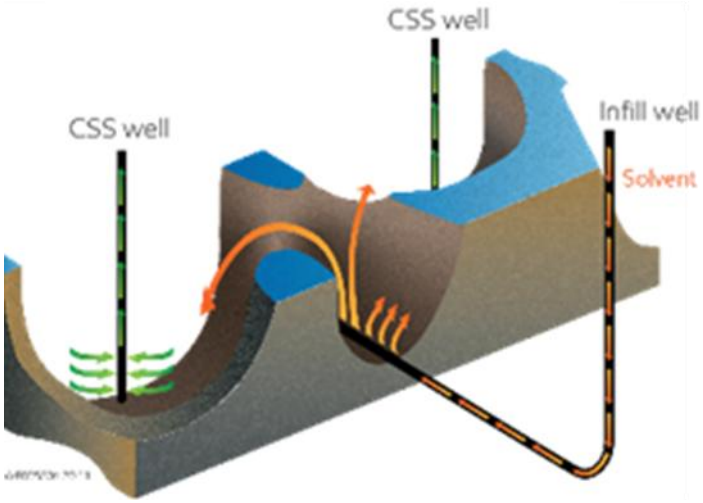
Mobilizing Agent: Dilution

Mobilizing Agent Delivery System: Solvent

Drive Mechanisms: Gravity Drainage, Gas Drive

Target Resource:

- Requires strong communication pathways between injectors and producers
- Sensitive to thief zones and/or adjacent depletion
- High vertical permeability



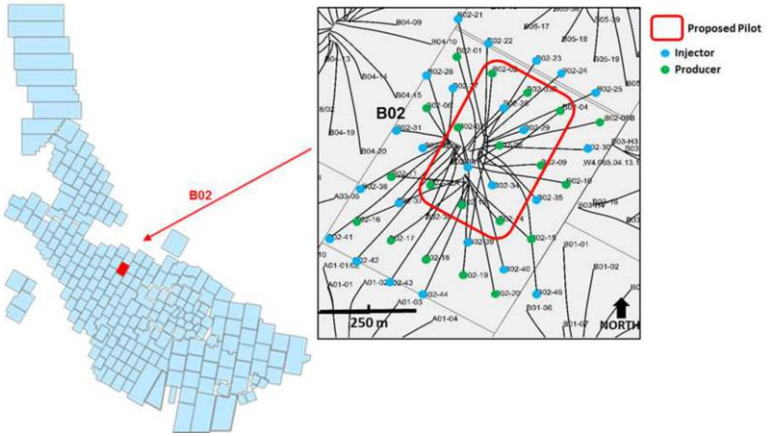
ELP Pilot Background

Background:

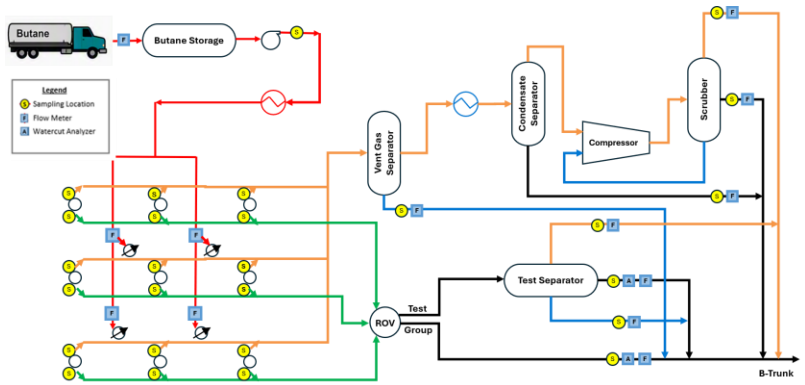
- B02 pad selected primarily due to the deviated injector-only-infill wells
- 4 injectors, 9 primary producers
- Butane selected as the solvent

Specifications:

- Injection system:
  - Storage bullet and loading station
  - Two injection pumps (n + 1 redundancy)
  - Vaporizer and superheater
- Enhanced measurement:
  - Replaced turbine meters with Coriolis meters on 3 phase separator
  - Added Coriolis meters to capture flow in the vent gas system
  - Installed sample points to collect pressurized samples
  - Added a Coriolis meter on the group line
  - Vent gas meter on well B02-08



ELP Pilot Location



ELP Process Flow Diagram

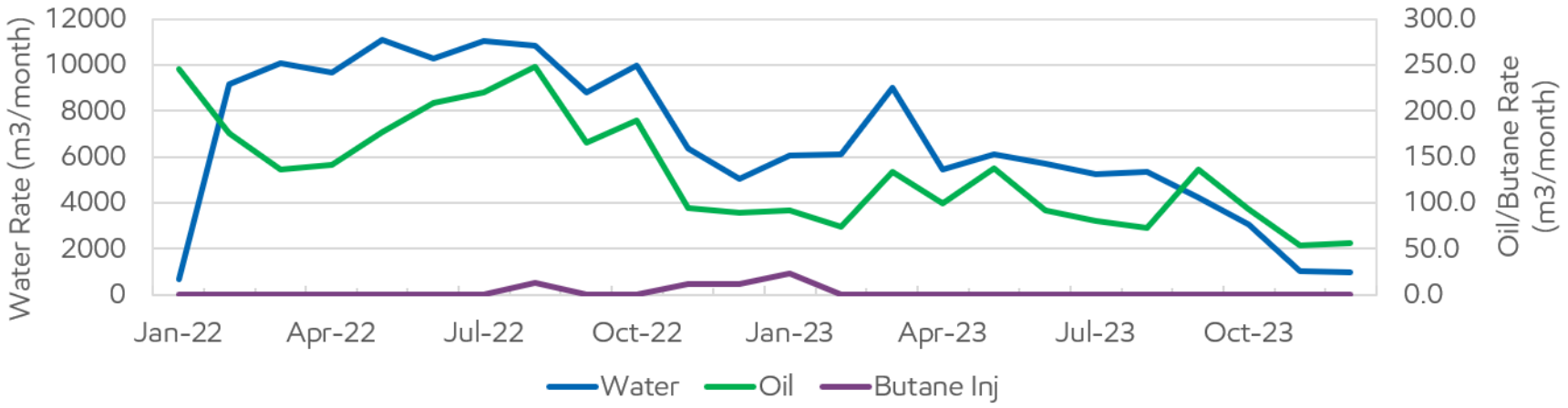
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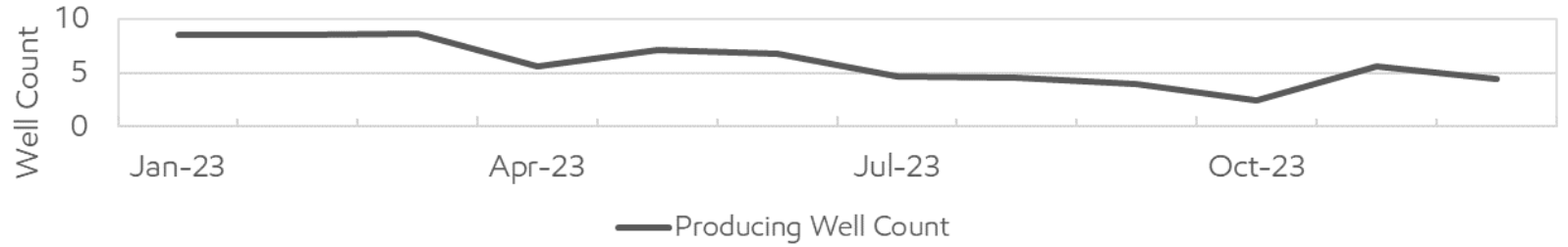
Subsurface

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ELP Brownfield Production Performance

- Production wells continued to produce mostly water ahead of butane injection
- Only a small volume of butane was injected in 2023 to commission the butane injection pumps





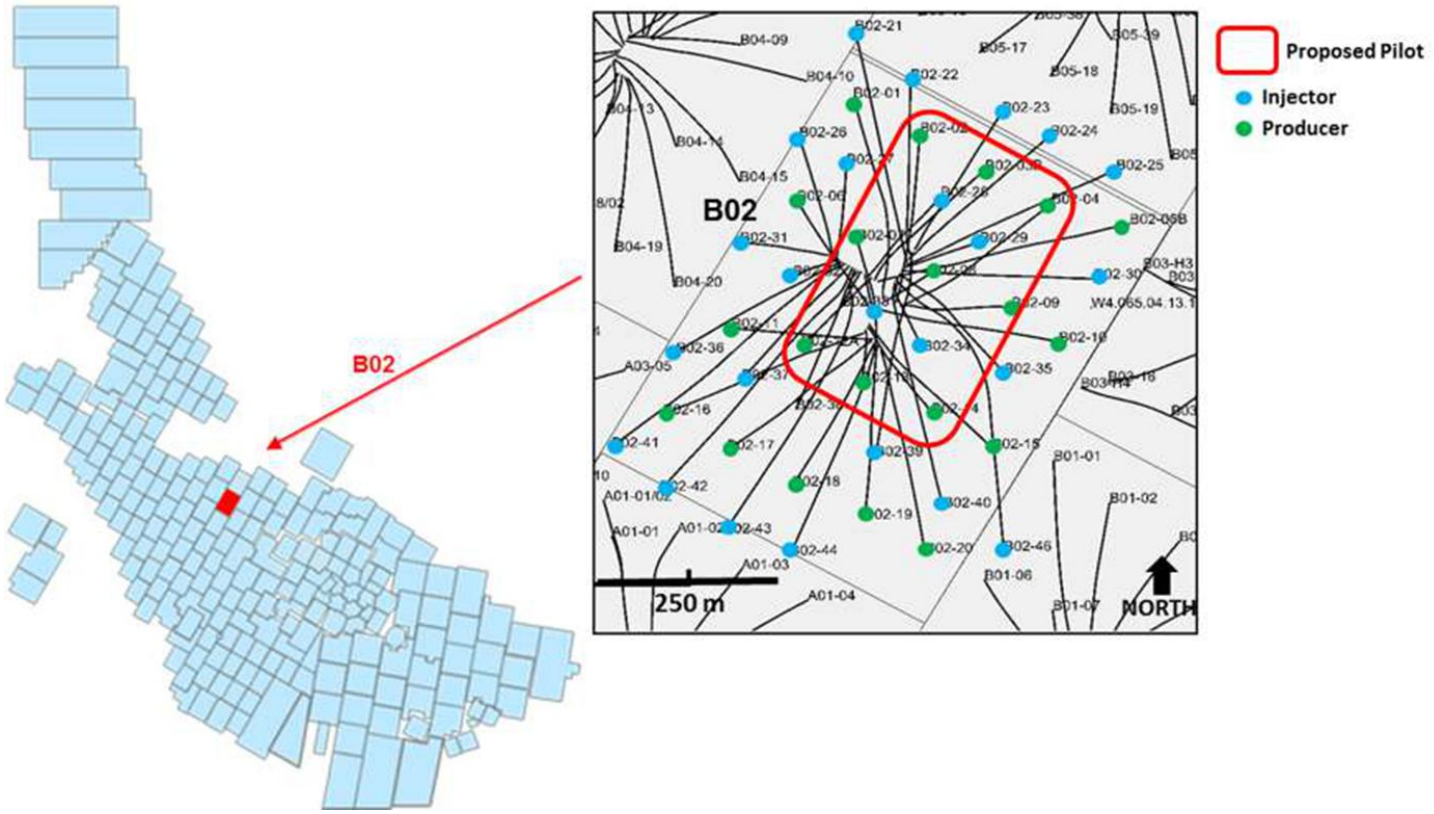
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Major Events

Time	Events
January 2022 – August 2025	Brownfield data collection phase. Production facilities were restarted after facility upgrades were completed. Baseline production rates were established.
August 2025	Production suspended due to economic considerations and facility modifications required.

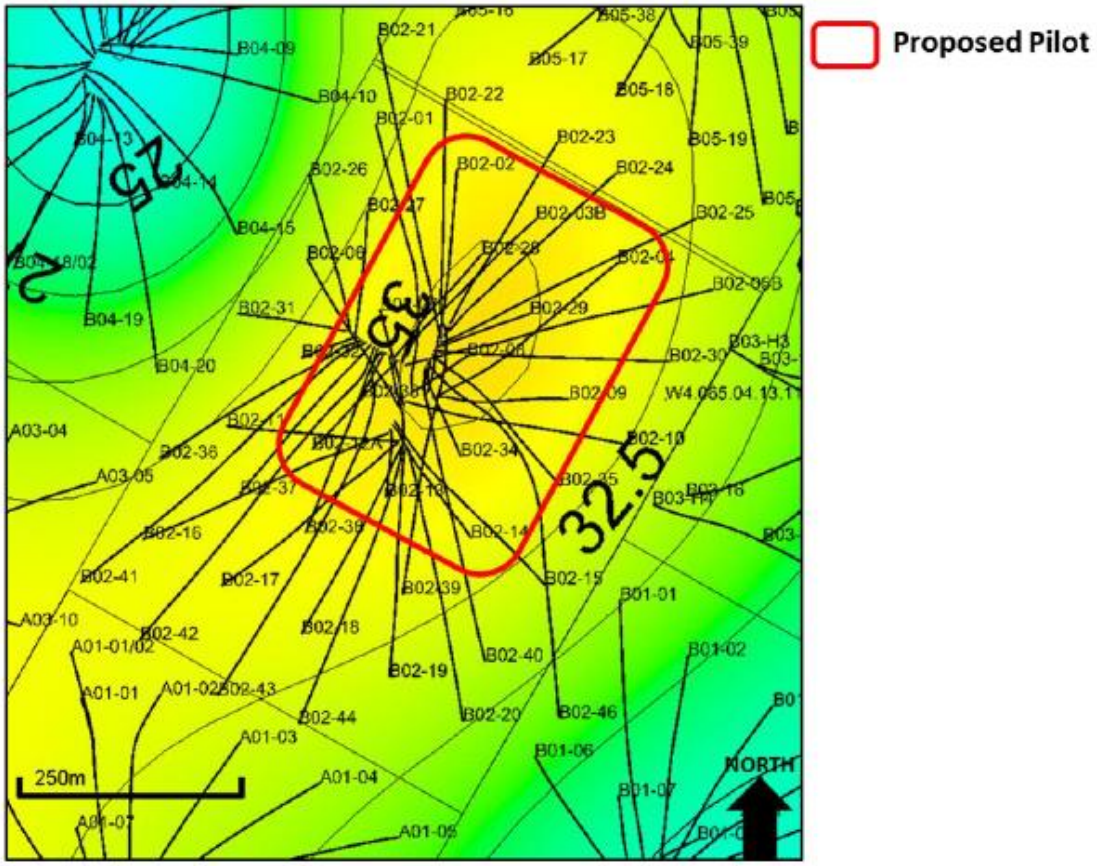
Drilled/Approved Map

- Existing wells at B02 Pad at Cold Lake were repurposed for the ELP pilot
- Wells 28, 29, 33 and 34 are dedicated butane injectors
- Wells 02, 03, 04, 07, 08, 09, 12, 13 and 14 are production wells



Isopach of Net Pay

- Net pay is defined as top of effective pay to the base of the Clearwater reservoir
- Pay zones with less than 8 weight percent bitumen are excluded



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Gas / Water Intervals

- Geological interpretation shows no bottom water or top gas is in contact with the resource in the ELP pilot area

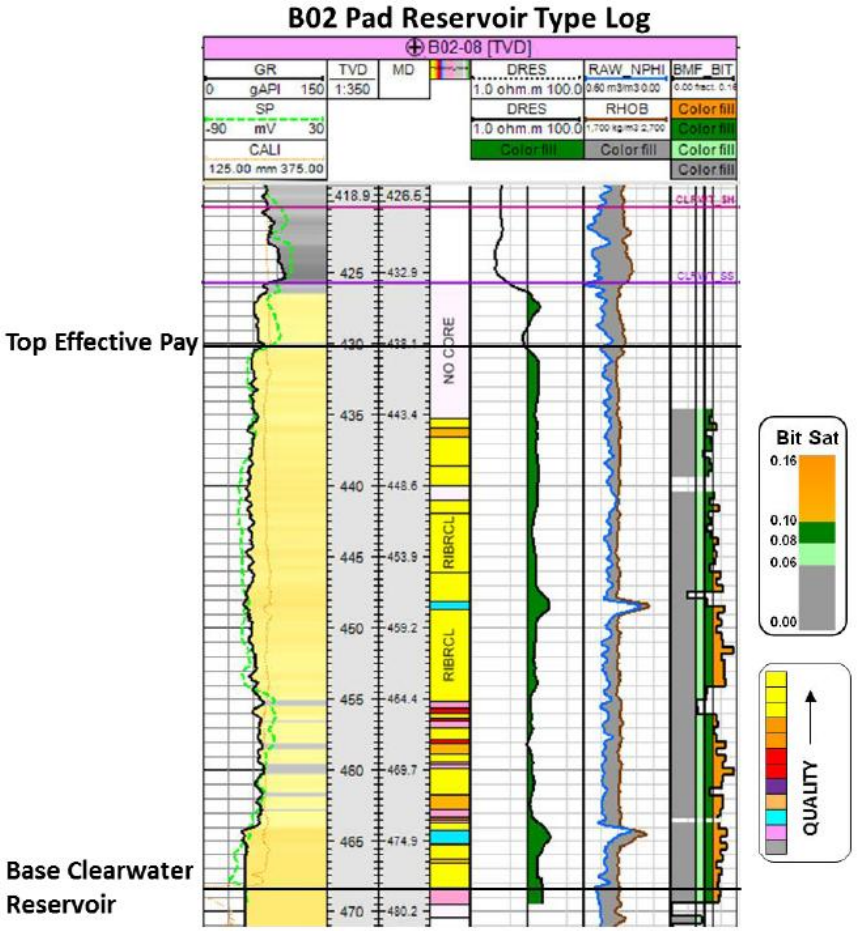
Geomechanical Anomalies

- No observed geomechanical anomalies within pilot area

Seismic Acquisition

- A 4D seismic survey was acquired over B02 pad in 1995
- No additional seismic data was collected as part of the ELP pilot

Representative Type Log



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Average Reservoir Properties and Original Bitumen in Place (OBIP)

Reservoir Properties	Value
Depth	Clearwater @ 425 m
Environment of Deposition (EOD)	Fluvial
Reservoir characterization	High quality reservoir with few or rare interbeds and/or clasts (RIBRCL)
Gross thickness	~43 m
Average net pay thickness	~27 m
Average porosity	~0.34
Average bitumen wt%	~11%
Average permeability	~1.8 D
Bitumen viscosity	~100,000 cp
Effective OBIP	930 e^3m^3
Recovery to YE 2022	50% of Effective EBIP
Ultimate Recovery	50 – 55% of Effective EBIP

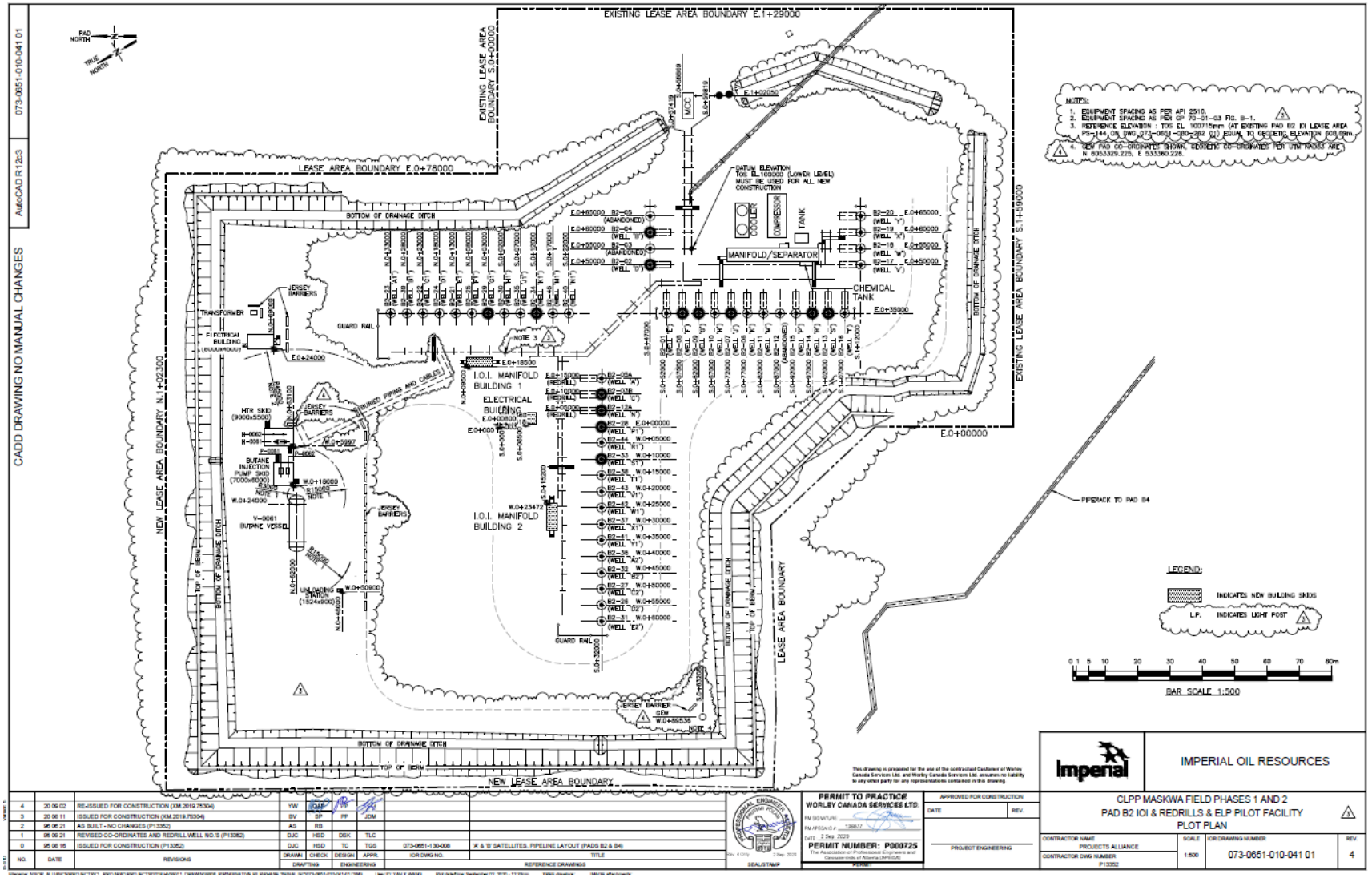
Co-injection

- Only 100% heated butane vapor will be injected into the 4 dedicated injection wells

Surface

Proprietary

Built and Planned Surface Infrastructure



4	20 09 02	RE-ISSUED FOR CONSTRUCTION (XM.2019.75304)	YW	RAMP					
3	20 06 11	ISSUED FOR CONSTRUCTION (XM.2019.75304)	BV	SP	PP	JDM			
2	96 06 21	AS BUILT - NO CHANGES (P13352)	AS	RB					
1	95 09 21	REVISED CO-ORDINATES AND REDRILL WELL NO.'S (P13352)	DJC	HSD	DSK	TLC			
0	95 06 16	ISSUED FOR CONSTRUCTION (P13352)	DJC	HSD	TC	TGS	073-0651-130-006	'A' & 'B' SATELLITES, PIPELINE LAYOUT (PADS B2 & B4)	
NO.	DATE	REVISIONS	DRAWN	CHECK	DESIGN	APPR.	IOR DWG NO.	TITLE	
			DRAFTING		ENGINEERING		REFERENCE DRAWINGS		

PERMIT TO PRACTICE
WORLEY CANADA SERVICES LTD.
PERMIT NUMBER: P000725
The Association of Professional Engineers and Geoscientists of Alberta (APEGA)
SEAL/STAMP
APPROVED FOR CONSTRUCTION
DATE
REV.
PROJECT ENGINEERING

Imperial
IMPERIAL OIL RESOURCES

CLPP MASKWA FIELD PHASES 1 AND 2
PAD B2 IOI & REDRILLS & ELP PILOT FACILITY
PLOT PLAN

CONTRACTOR NAME	SCALE	IOR DRAWING NUMBER	REV.
PROJECTS ALLIANCE	1:500	073-0651-010-041 01	4
CONTRACTOR DWG NUMBER P13352			

CADD DRAWING NO MANUAL CHANGES | AutoCAD R12c3 | 073-0651-010-041 01

Facility Modifications

- No modifications implemented at the ELP pilot in 2025 that require AER approval

Historical and Upcoming Activity

Proprietary

Summary of Suspension and Abandonment Activity

- No suspension and abandonment activities at the ELP pilot in 2025

Regulatory and Operational Changes

- The producer wells were temporarily removed from the experimental scheme on October 27, 2023 and returned to the Cold Lake Operations 8558 scheme
- An application may be made in the future to return these wells to the experimental scheme if butane injection commences

Account Compliance History

- No reportable incidents, voluntary self-disclosures, contraventions and associated remediation occurred at the ELP pilot in 2025

Scheme's Future Plans

- No amendments to the scheme are planned for 2025
- Project paused and on hold while re-evaluating competitiveness of technology in our portfolio