



# Groundwater and Alberta's Oil and Gas Sector

**Michael Bevan**, *Advisor, Industry Operations*

NSWA Groundwater Forum, February 27, 2019

# *One Province, One Regulator*

## **Our Mandate**

The AER's mandate is to ensure the safe, efficient, orderly, and environmentally responsible development of hydrocarbon resources over their entire life cycle. This includes allocating and conserving water resources, managing public lands, and protecting the environment while providing economic benefits for all Albertans.



# What We Regulate

OVER  
**60**  
thermal/enhanced  
in situ projects

**2**  
coal processing  
plants

**8<sup>†</sup>**  
oil sands  
mines



**7**  
producing  
coal mines

**4**  
bitumen  
upgraders

OVER **210** AND **16**  
primary/enhanced  
recovery projects  
(in situ) experimental  
projects



OVER **426 000<sup>†</sup>**  
kilometres of pipelines

**700**  
gas processing plants



OVER **167 000**  
operating natural gas and oil wells

OVER **30 000**  
oil facilities

AND  
CLOSE  
TO  
**21 000**  
gas facilities

<sup>†</sup> In addition to inspection and incident response support for 12 000 kilometres of pipelines regulated by the Alberta Utilities Commission.

<sup>‡</sup> April 2018

## Water Use in Oil and Gas

- » Well drilling
- » Well completion
- » Pipelining and testing
- » Processing
- » Other – dust control, ice roads/bridges, office/sanitary use

**AER  
Groundwater  
Protection  
Responsibility**

» *Oil and Gas Conservation Act*

- Protecting fresh water supplies is an AER responsibility

» *Environmental Protection and Enhancement Act - EPEA*

- Protect environment, including water

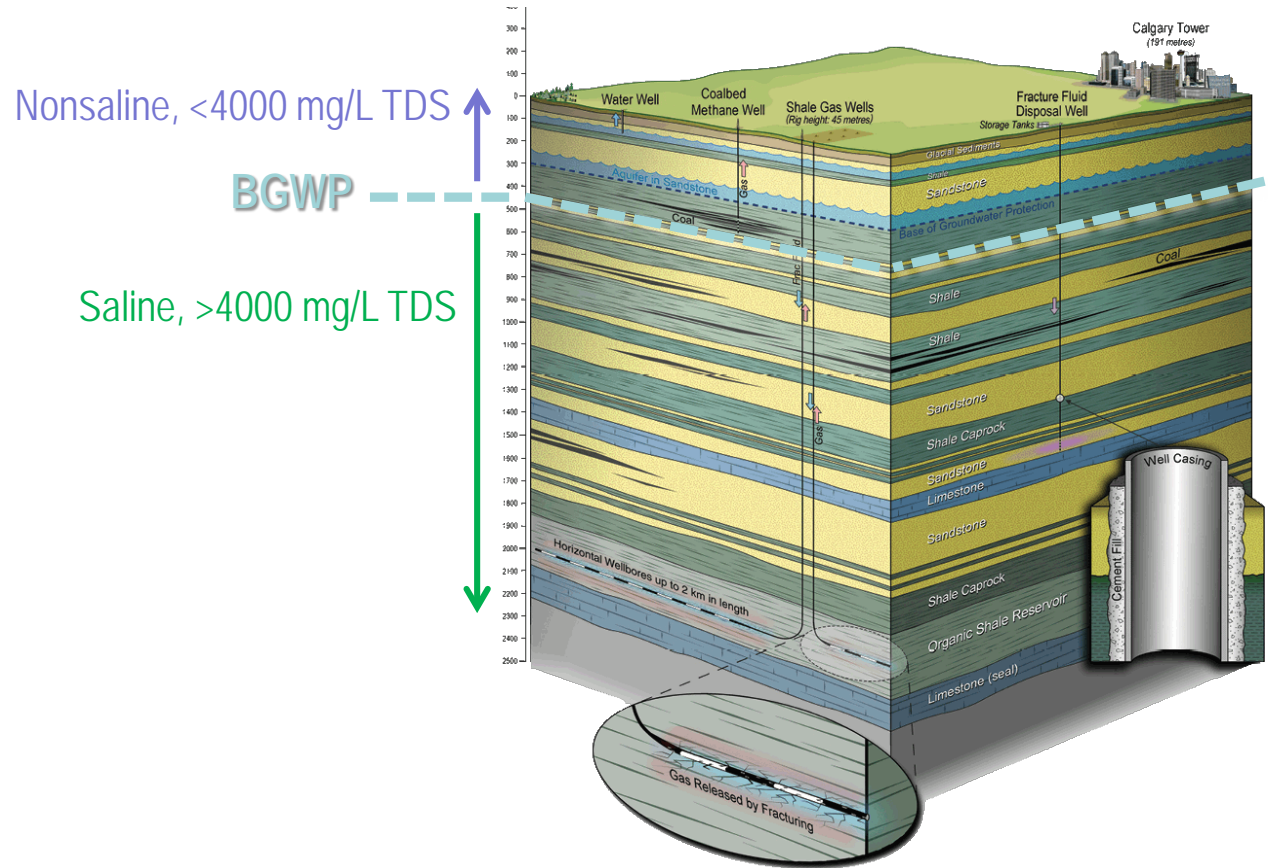
» *Water Act*

- Nonsaline groundwater should be preserved

» **BGWP:** approximate depth where groundwater transitions from nonsaline to saline

- Enhanced requirements above BGWP

## Base of Groundwater Protection



## Groundwater Protection: Drilling

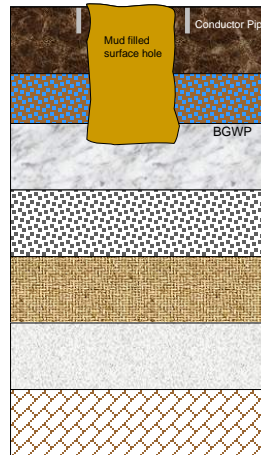


### » *Directive 035*

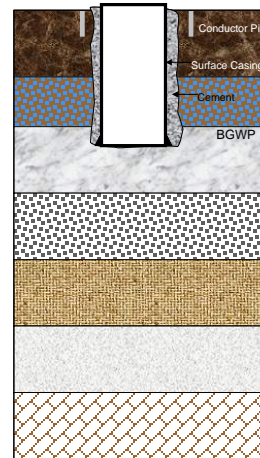
- Baseline water well data collection (for CBM)



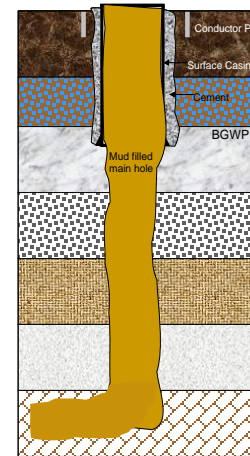
# Groundwater Protection: Drilling



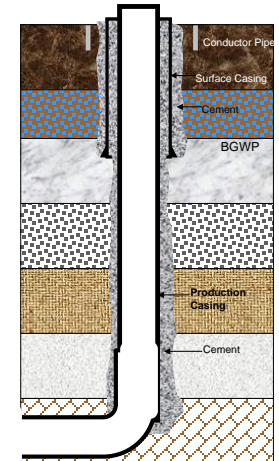
Drill surface  
hole



Install/cement  
surface casing



Drill main /  
production  
hole



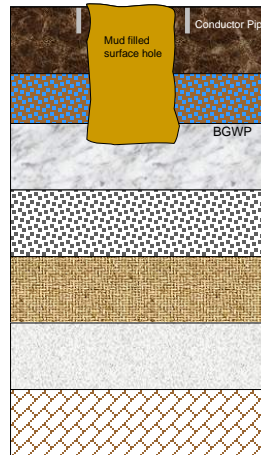
Install/cement  
production  
casing

## » Directive 036

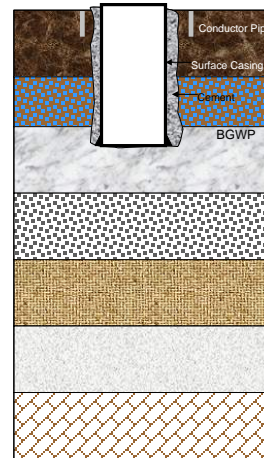
- No toxic fluids above BGWP
- Maintain control of well



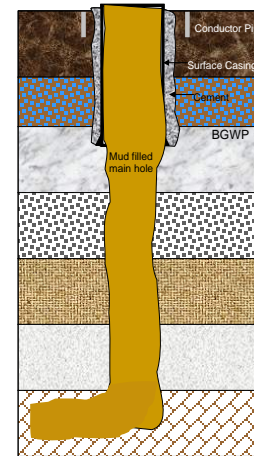
# Groundwater Protection: Drilling



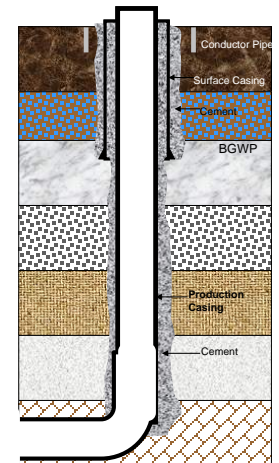
Drill surface  
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Install/cement  
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Drill main /  
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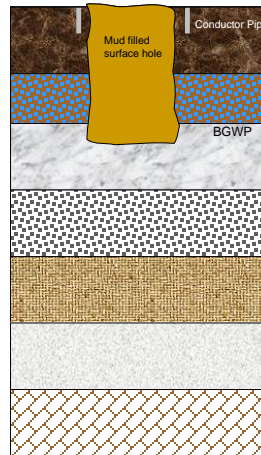


Install/cement  
production  
casing

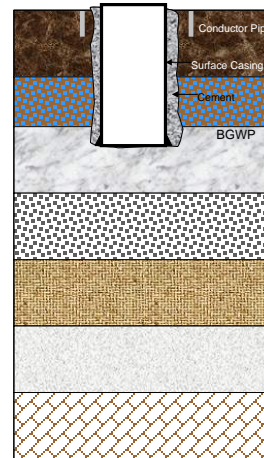
## » Directive 008

- Minimum depths, shallow vs deep, water flows

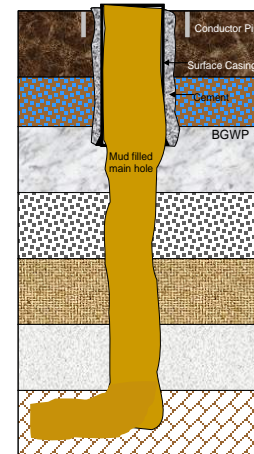
# Groundwater Protection: Drilling



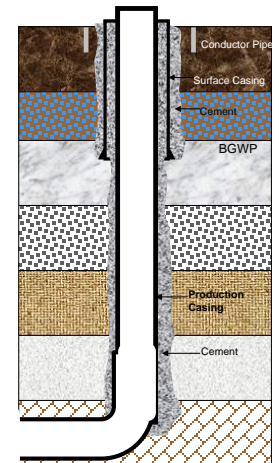
Drill surface  
hole



Install/cement  
surface casing



Drill main /  
production  
hole



Install/cement  
production  
casing

## » Directive 009

- Surface casing cemented to surface

## Groundwater Protection: Completion



### » *Directive 083*

- Restrictions near water wells, aquifers, at shallow depths
- Risk assessment, well control plans
- Well integrity testing/ monitoring

## Groundwater Protection: Completion

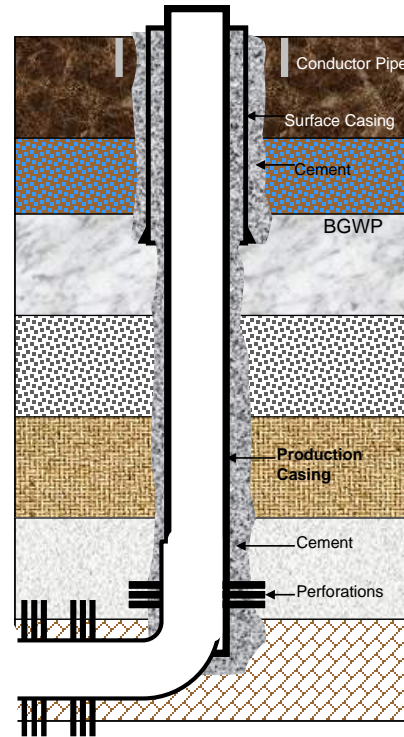


### » *Directive 059*

- Fracture fluid and water source info
  - ***FracFocus.ca***
  - ***AER Water Report***



## Groundwater Protection: Completion



Completions –  
perforating,  
fracturing

### » *Subsurface Order #2*

- Seismic monitoring

## Groundwater Protection: Operations



### » Water Production

- *Directive 044*
  - Water produced from above BGWP: measured, analysed, reported
    - » No cross-flow, no nonsaline water production without authorization

## Groundwater Protection: Operations



### » Fluid Handling and Spills

- *Directive 036* (again)
  - Properly contained; immediate containment / clean-up of all fluid spills; spill reporting
- *Directive 055*
  - Requirements to prevent leaks; remediate and investigate

## Groundwater Protection: Operations

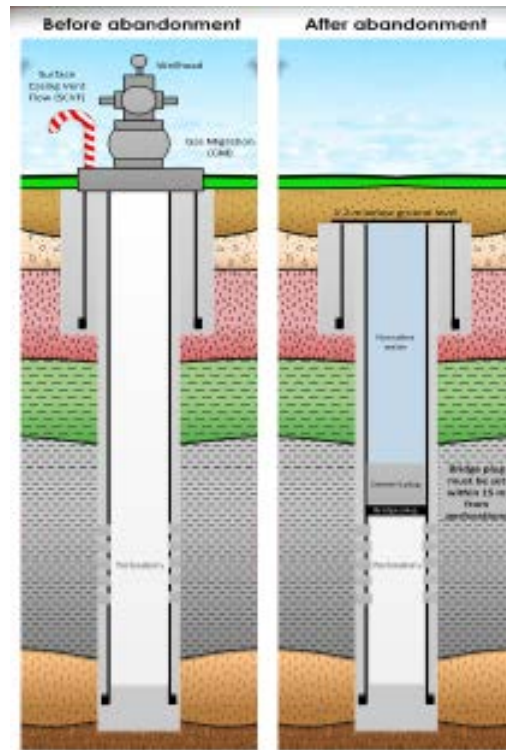


### » Waste Disposal

- *Directive 050*
  - Proper handling of drilling waste
- *Directive 051*
  - Well construction and monitoring
- *Directive 058*
  - Site assessment, groundwater monitoring requirements



## Regulations: Closure & Abandonment



### » Directive 020

- Oil and gas zones must be isolated
- Nonsaline groundwater zones above the BGWP must be isolated

## Water Allocation & Use




### » *Water Act*

- All nonsaline water use, incl. oil and gas
- Protect environment, prevent impact to other users
- *AEP Water Conservation and Allocation Guideline for Oilfield Injection (2006)*
  - Conservation, consistency, technical evaluation, adaptability, improvements
  - Alternative source assessment
- *AEP Directive for water licensing of hydraulic fracturing projects - area of use approach (2018)*
  - Long-term planning
  - Flexibility

## Water Allocation & Use

### » *Water Act License*

- First in time, first in right
- Conditions, monitoring and reporting
- Term license
  - 5 to 10 years
  - Based on long-term yield assessment
- TDL
  - Up to 1 year
  - Short-term yield assessment
- Notification – 30 days on AER's Notice of Application Tool
- Available – AEP Authorizations Viewer



LICENCE TO DIVERT WATER  
ALBERTA ENERGY REGULATOR  
WATER ACT, R.S.A. 2000, c.W-3, as amended

LICENCE NO.: 0042106-00-10

APPLICATION NO.: 001-0042106

FILE NO.: 0042106

PRIORITY NO.: 2018-09-18-001

EFFECTIVE DATE: February 11, 2018

EXPIRY DATE: February 10, 2024

SOURCE OF WATER: Petroleum Formation Aquifer

POINT OF DIVERSION: 08-05-007-06-W4M

POINT OF USE: As shown in Schedule 2

LICENSEE: Yamagata Resources Ltd.

Pursuant to the Water Act, R.S.A. 2000, c.W-3, as amended, a licence is issued to the Licensee to:

operate a works and to divert up to 100,000 cubic metres of water annually from the source of water for the purposes of drilling and hydraulic fracturing and associated operations

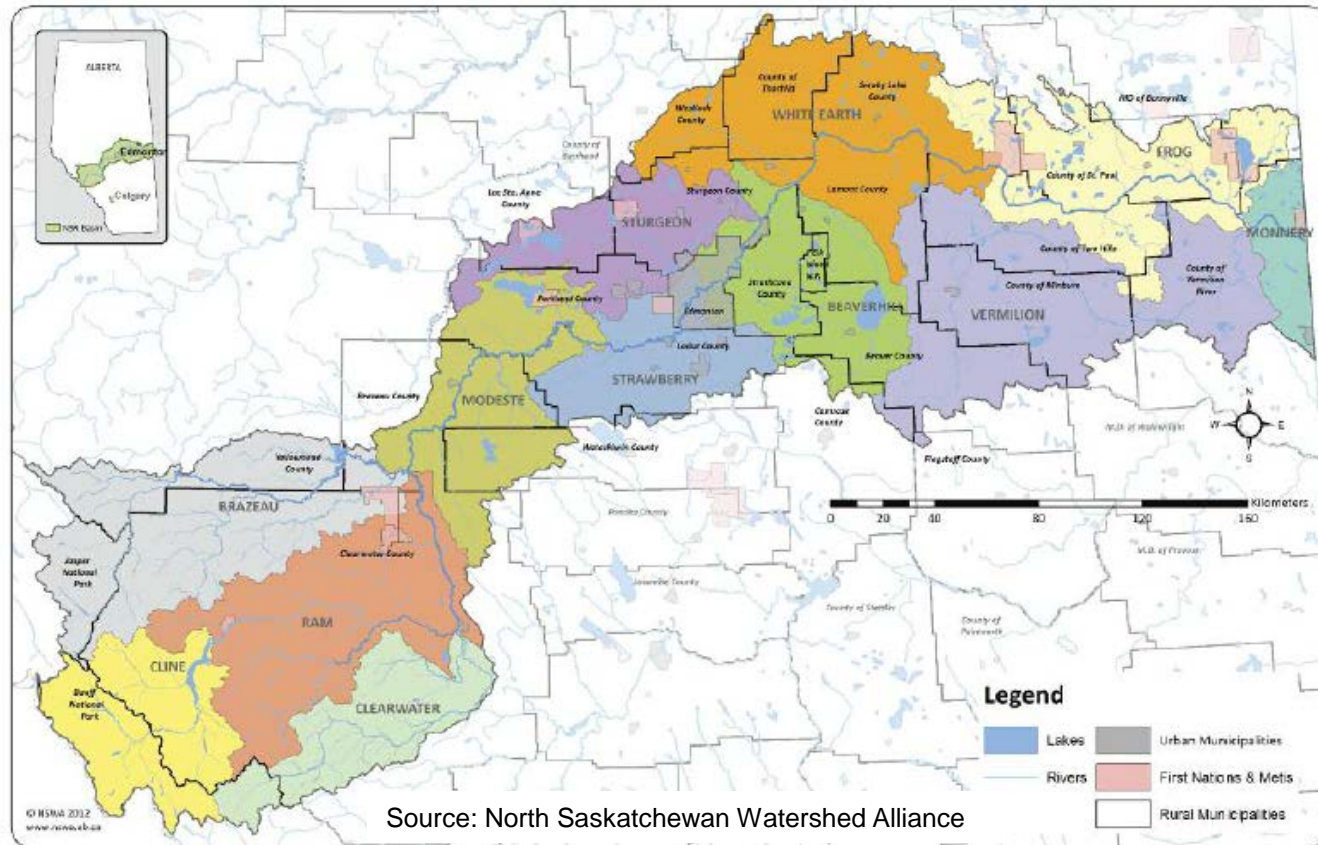
subject to the attached terms and conditions.

*Denney Carson*

Den Carson  
Acting Manager, Oil and Gas Southwest  
Authorizations Branch  
Alberta Energy Regulator

February 11, 2018

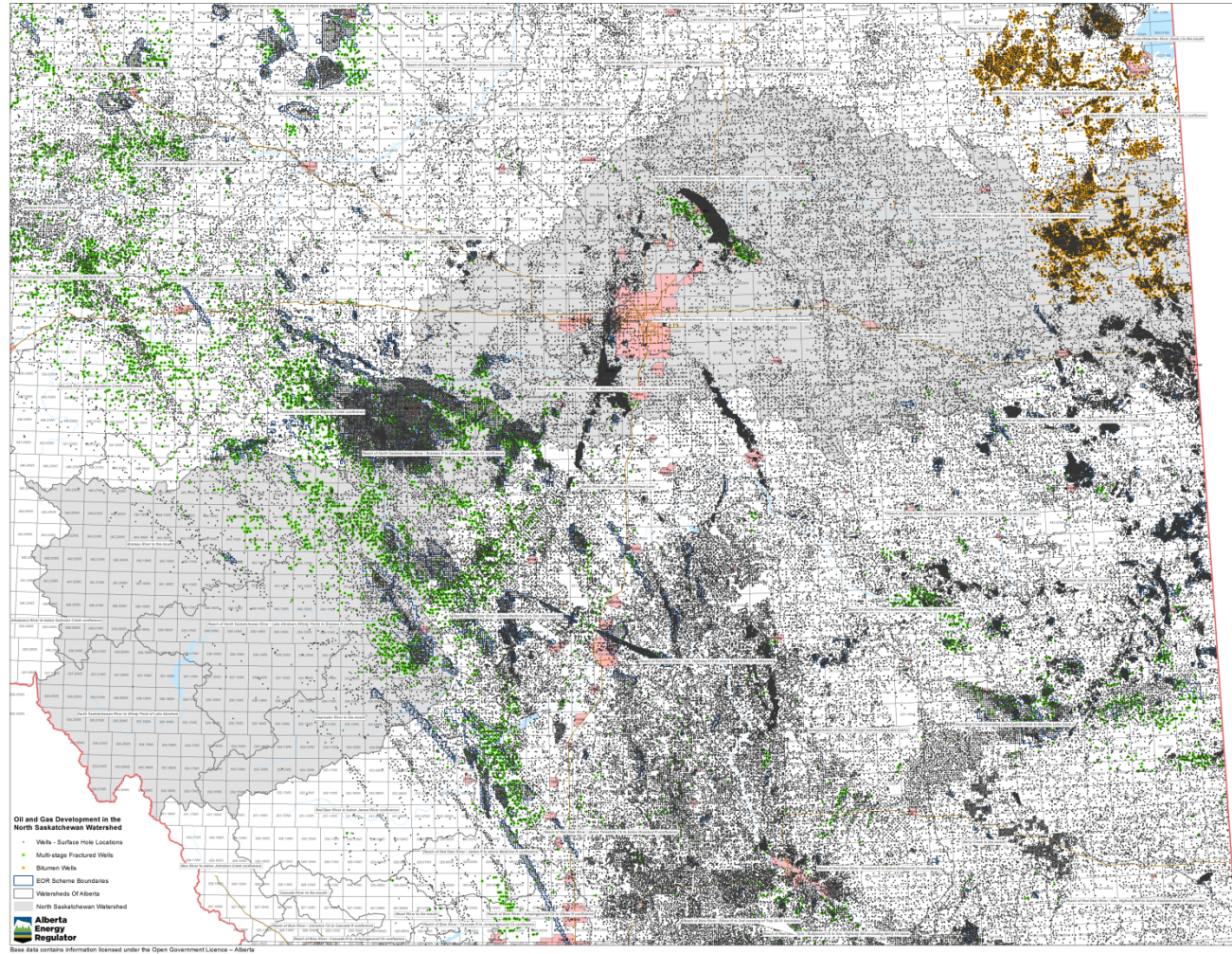
## North Saskatchewan Watershed



- » Water available: ~ 8.5 billion m<sup>3</sup> (est.)
- » 2017 nonsaline allocation: ~ 2.1 billion m<sup>3</sup>
  - Energy sector: ~ 86 million m<sup>3</sup> (~4%)

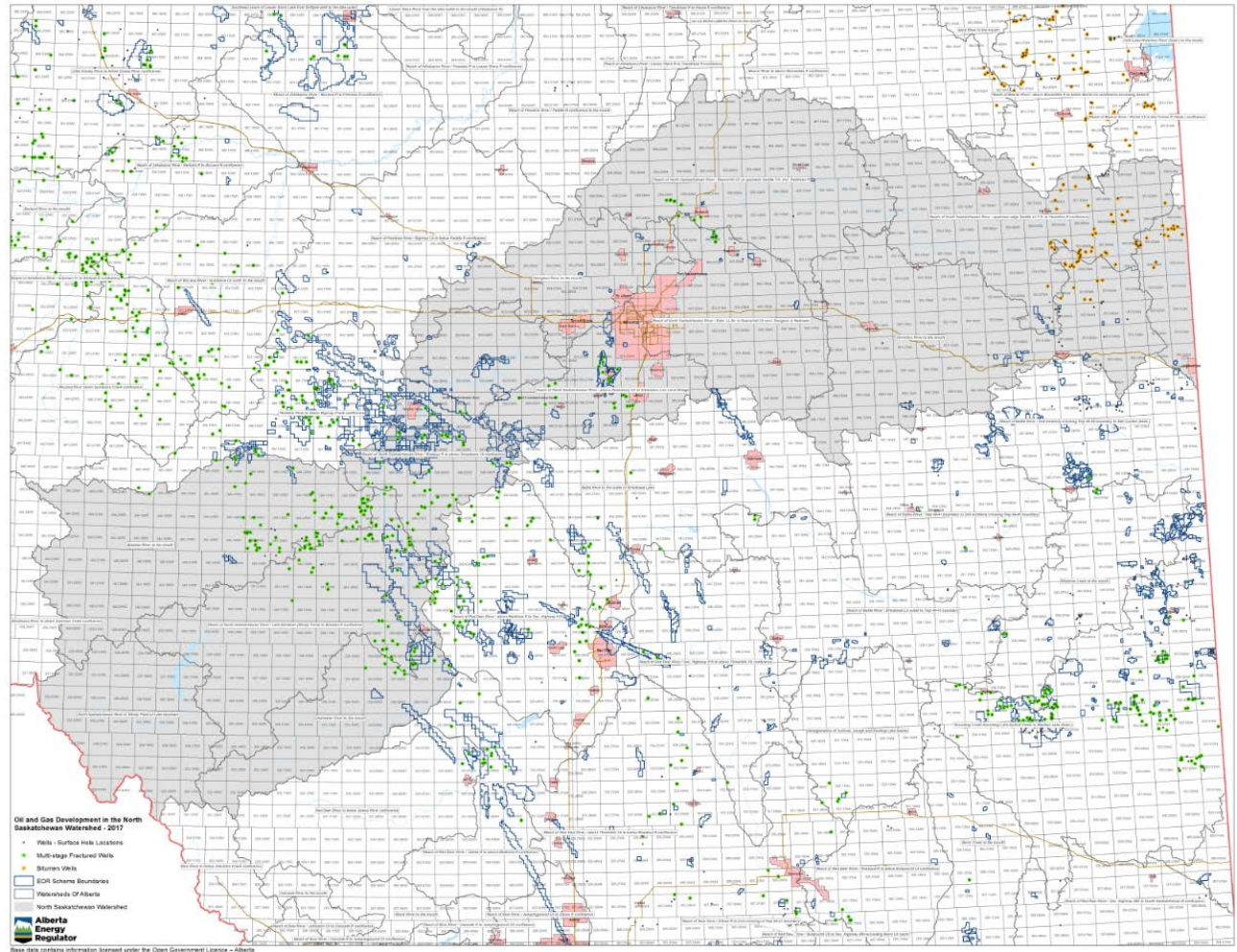


# NSW Energy Development





## 2017 NSW Energy Development



### » Hydrocarbon production

- 7 million m<sup>3</sup> oil
- 16 million m<sup>3</sup> gas

## 2017 NSW Energy Water Use

### » EOR

- Nonsaline allocation: ~ 21 million m<sup>3</sup>
- Water used: ~ 12.5 million m<sup>3</sup>
  - ~ 12% nonsaline (11% groundwater)
  - < 1% saline groundwater
  - ~ 85% recycled water

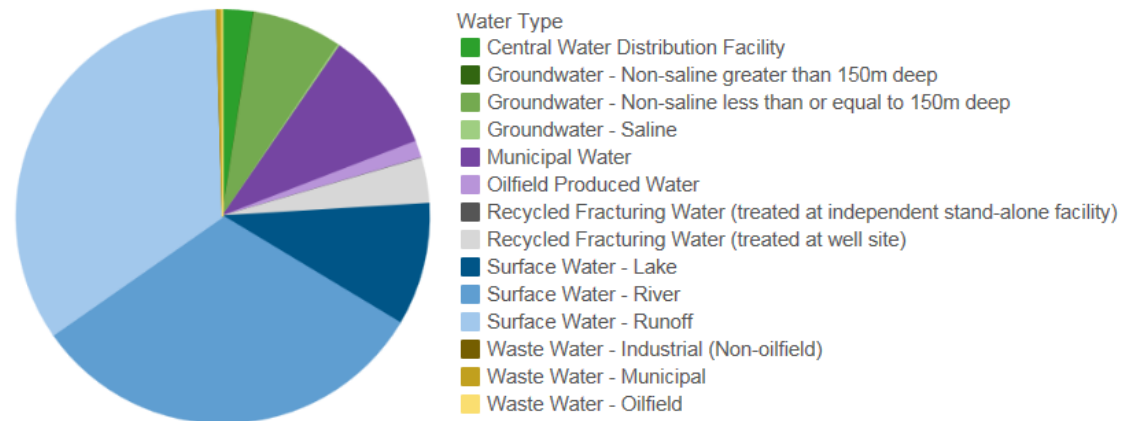
### » InSitu

- Nonsaline allocation: ~ 8 million m<sup>3</sup>
- Water used: ~ 2.3 million m<sup>3</sup>
  - ~ 7% nonsaline (no groundwater)
  - ~ 93% recycled water

## 2017 NSW Energy Water Use

### » Hydraulic fracturing

- Nonsaline allocation: ~ 7 million m<sup>3</sup>
- Water used: ~ 1.4 million m<sup>3</sup>
  - ~ 95% nonsaline (13% groundwater)
  - ~ 1% saline groundwater
  - ~ 4% recycled water

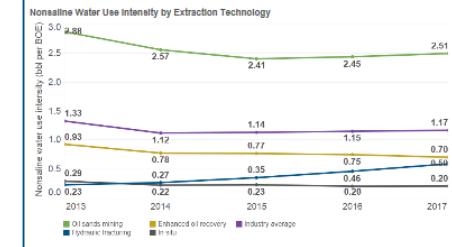
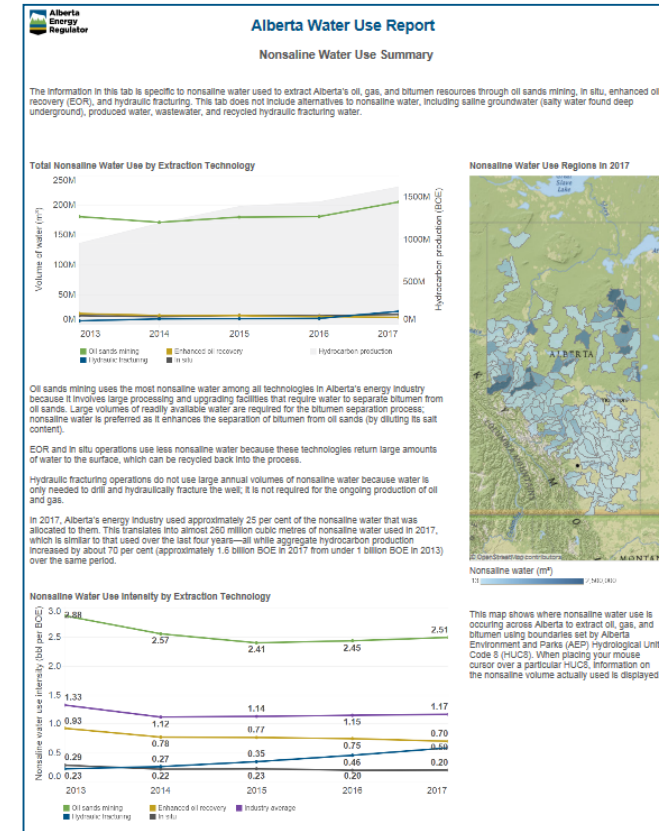
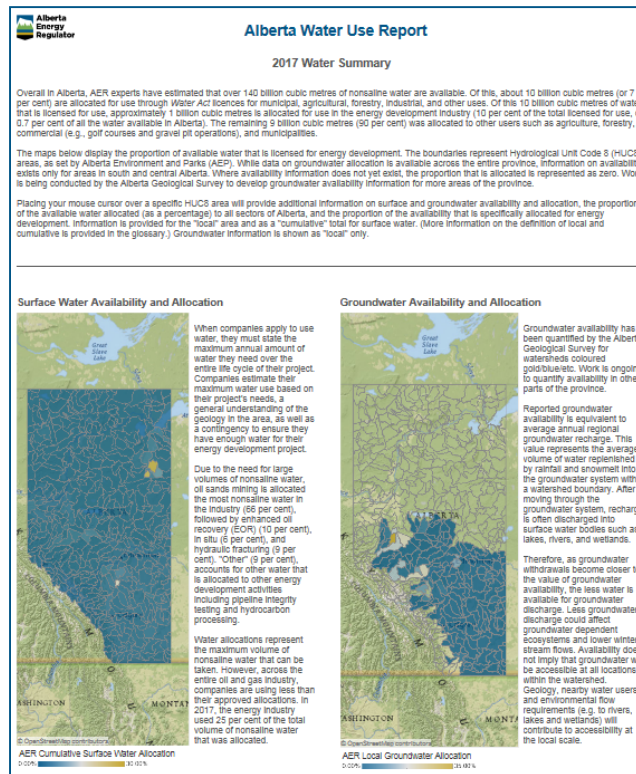




## Provincial overview information

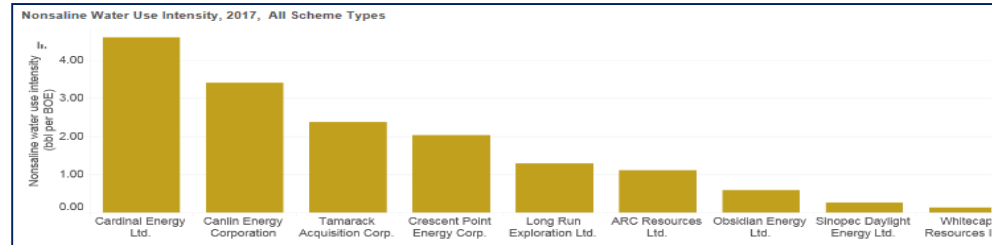
- EOR, hydraulic fracturing, oilsands insitu & mining

# Alberta Energy Industry Water Use Report - 2017

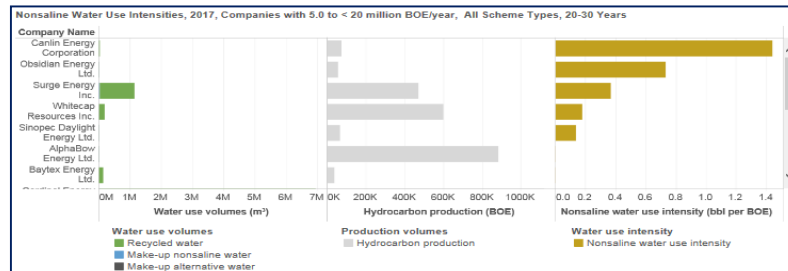


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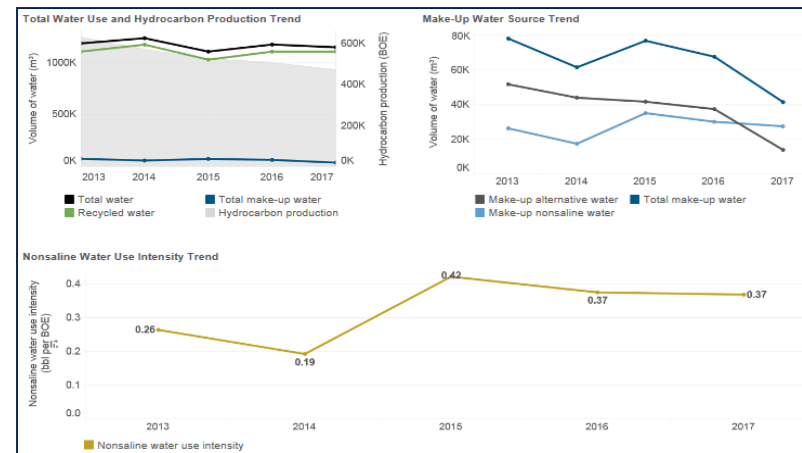
## Company specific nonsaline water use performance by sector



## Compare companies



## See trends



## Complaint Process

- » Emergency & Operational  
Complaint number:
  - 1-800-222-6514
- » General information and  
inquiries
  - 1-855-297-8311
- » AER.ca



AER

# Protecting what matters

**www.aer.ca**



**www.youtube.com/user/  
ABEnergyRegulator**



**resource.aer.ca**



**www.linkedin.com/company/  
alberta-energy-regulator**



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