



**Orphan Well  
Association**

# **Remediation of Wellsites in an Alberta Historical Oilfield undergoing Urban Development**

**Remediation Technologies Symposium 2010**

**Pat Payne and Wanda Sakura**

# ***Orphan Well Association***

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## Presentation Overview

- Brief History of Turner Valley Area
- Remediation of Miracle #3 Well site
- Remediation of Okalta #22 Well site
- Urban Development near Historical Wells

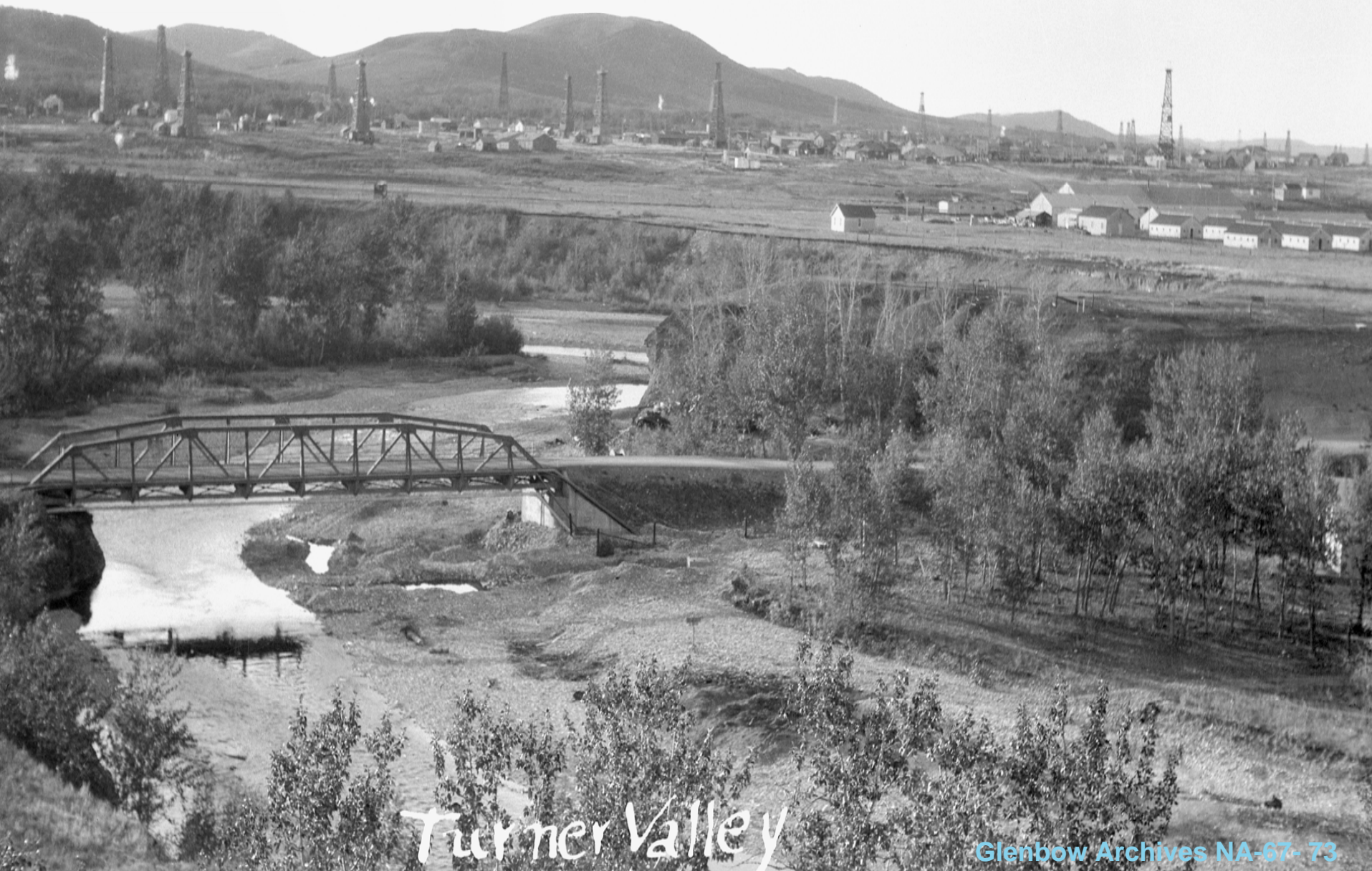
# ***Brief History of Turner Valley Area***

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Turner Valley Area, Alberta

History of oilfield development  
1910's to 1940's

1930's



Turner Valley



1929



1930's



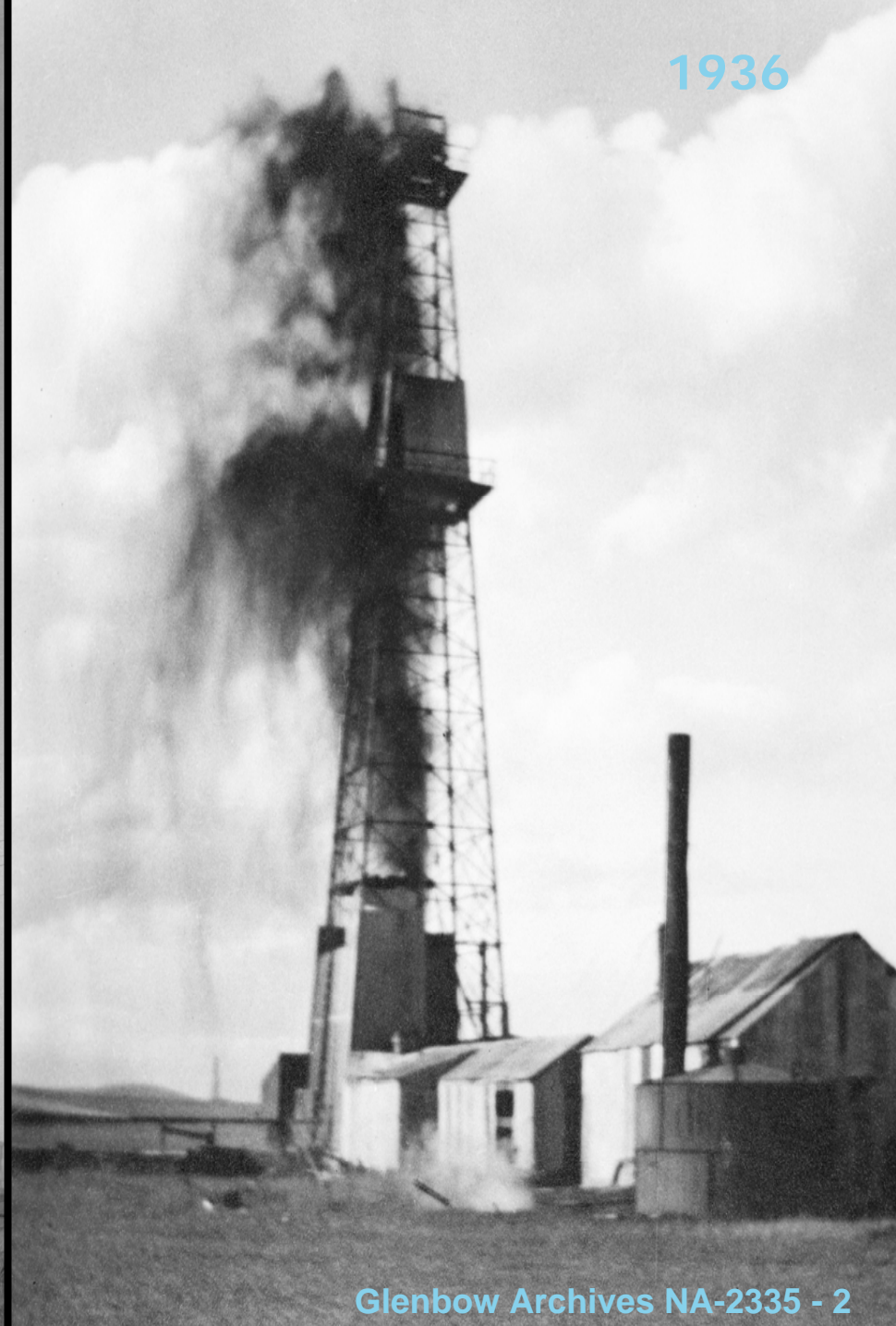


1930's



Glenbow Archives NA-67- 150

1936



Glenbow Archives NA-2335 - 2





1926





## ***REMEDIATION OF MIRACLE #3***

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Defunct Licensee: Katana Resources Limited  
License No: 0014282  
Location: 019-02 W5M

Initial Spud Date: 1931 Jan 31  
Final Drill Date: 1932 Feb 25 (13 months)  
Total Depth (TD): 1,874.50 m (6,150 ft)

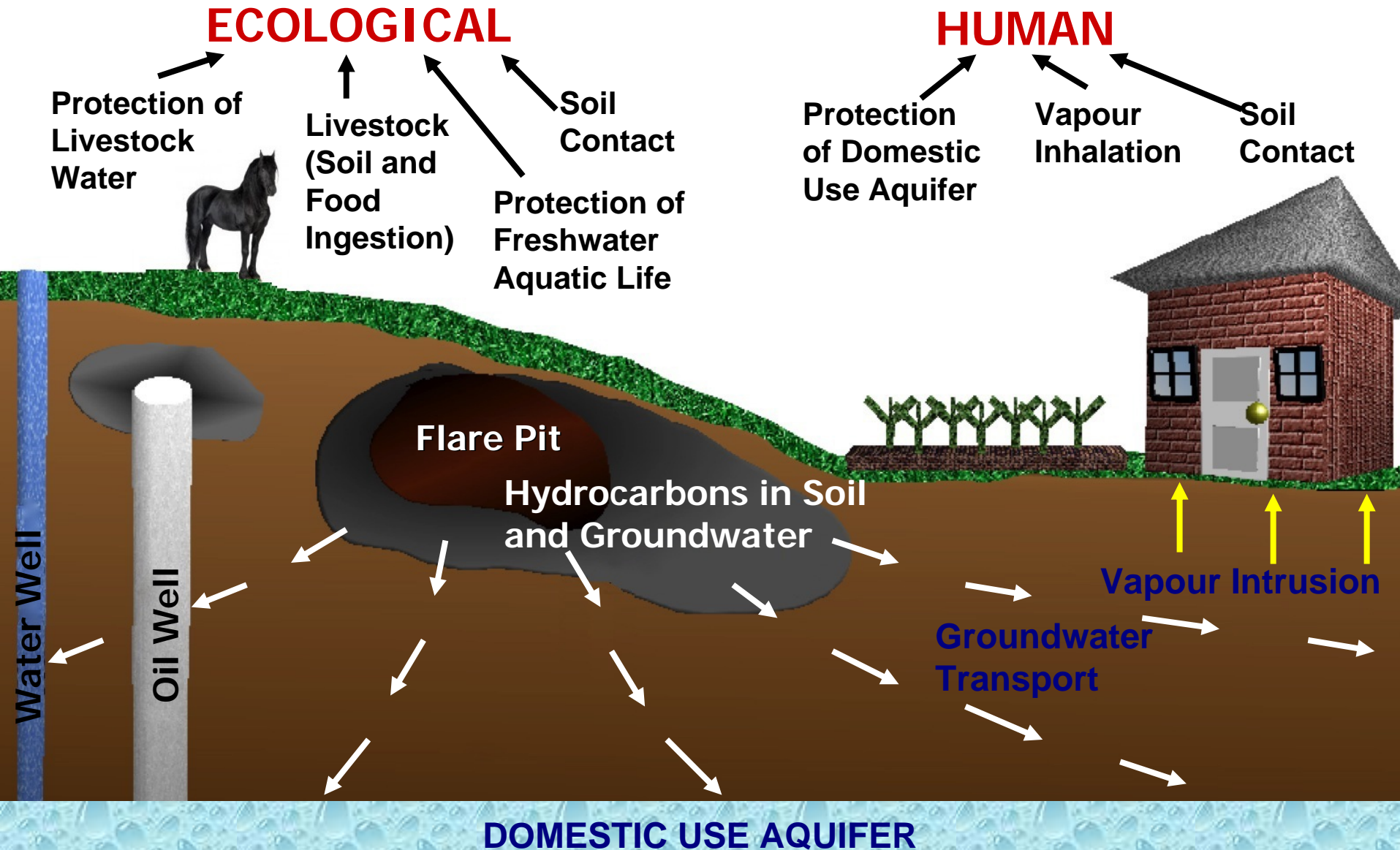
Production Fluid: Crude Oil and Gas  
(ERCB records incomplete)  
Abandoned: 1996 Oct 29

# ***Environmental Site Assessments***

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- Agricultural Land Use
- Soil, Groundwater and Vapour Assessments
- Collection of Soil Samples (Auger and Direct Push Drilling)
- Installation of Groundwater Monitoring Wells
- Installation of Soil Gas Monitoring Wells

# CONCEPTUAL SITE MODEL



## ***Soil Gas Testing***

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- Soil gas monitoring surrounding the house foundation
- Allowable soil gas guidelines developed
- Soil gas concentrations suggested low risk of vapour inhalation from subsurface impacts

# *Remediation*

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- Excavation and removal to a landfill of hydrocarbon impacted soil from the wellbore and flare pit areas
- Insitu treatment of hydrocarbon impacted soil in the garden area and treed area at landowner request



# *Remedial Excavation*





# ***Remedial Excavation***

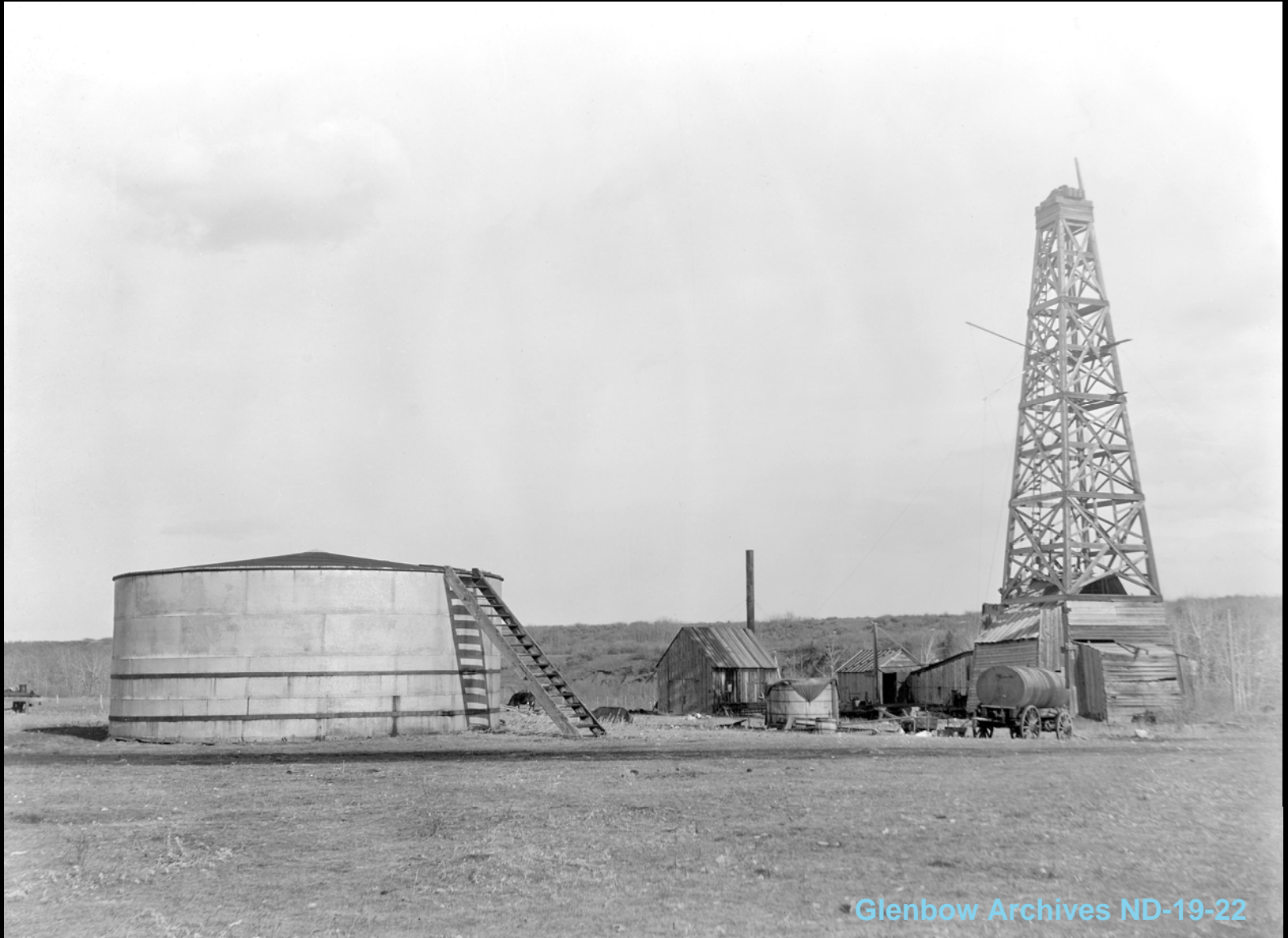




# *Insitu Remediation*



# ***REMEDIATION OF OKALTA #22***





## ***REMEDIATION OF OKALTA #22***

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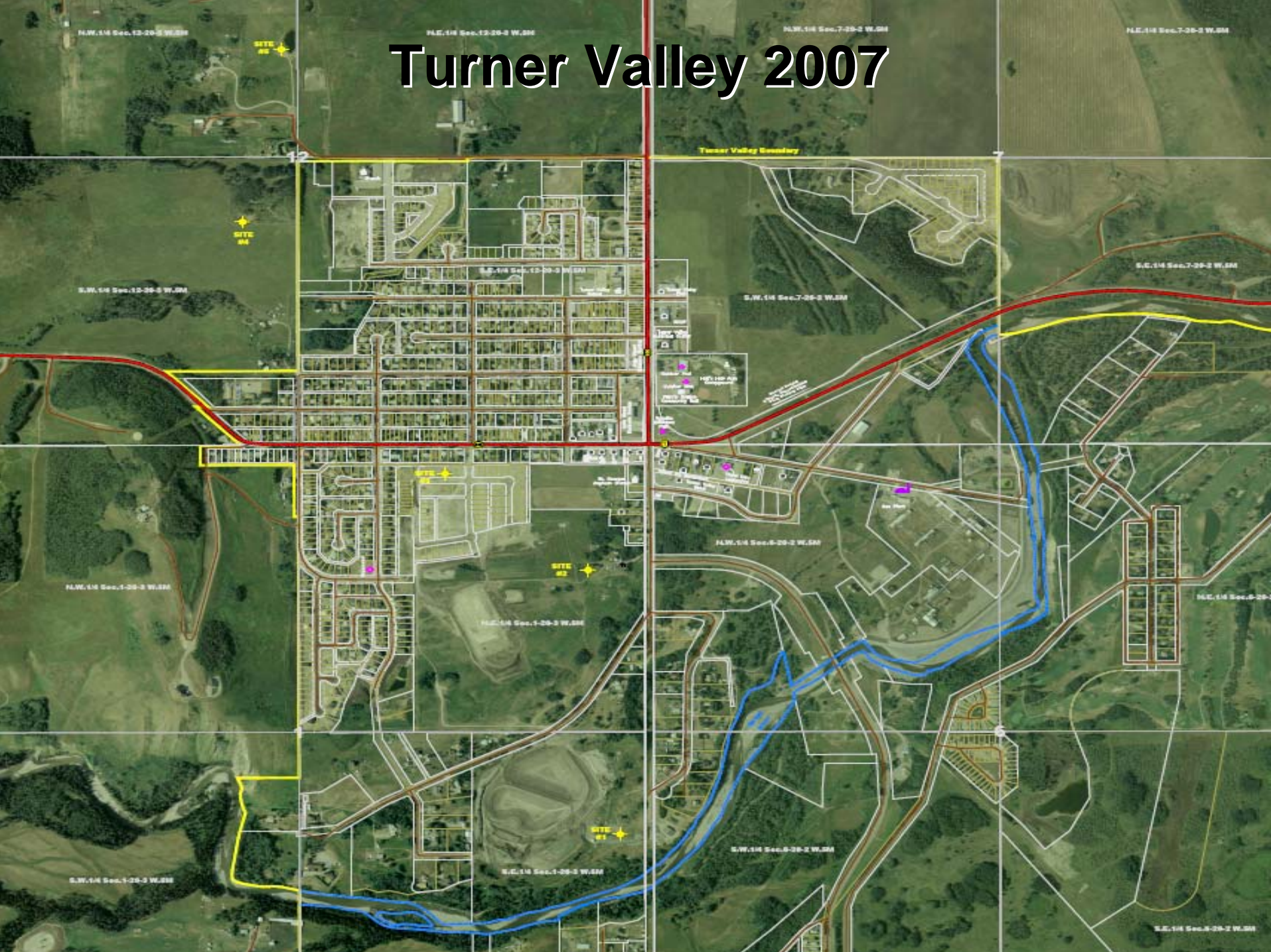
Defunct Licensee: Katana Resources Limited  
License No.: B0000993  
Location: 020-03 W5M

Initial Spud Date: 1945 Jul 26 Rotary Rig  
Final Drill Date: 1945 Oct 10 ( 2 ½ months)  
Total Depth (TD): 1374.0 m (4,508 ft)

Production Fluid: Crude Oil and Gas  
(ERCB records incomplete)  
Abandonment Date: 1996 Oct 04



# Turner Valley 2007



## ***Surrounding Land Use***

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### Land Use – Urban Reserve

- Raw Water Reservoir to the west
- Residential properties 275 m to the northeast
- Town water treatment plant 100 m to the east
- Sheep River 200 m to the east and south
- Operating sour gas well to the south



Okalta Road

◆ 3/08-01

◆ 2/08-01

RAW WATER  
RESERVOIR

TOWN OF TURNER VALLEY

**Okalta #22**

◆ 5/08-01

◆ 08-01

◆ 4/08-01

◆ 05-06

◆ 01-01

2007

# ***Environmental Site Assessments***

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- Soil, Bedrock and Groundwater Assessments
- Collection of Soil Samples and Bedrock Cores
- Downhole Geophysics (gamma and conductivity)
- Installation of Groundwater Monitoring Wells



# Geology

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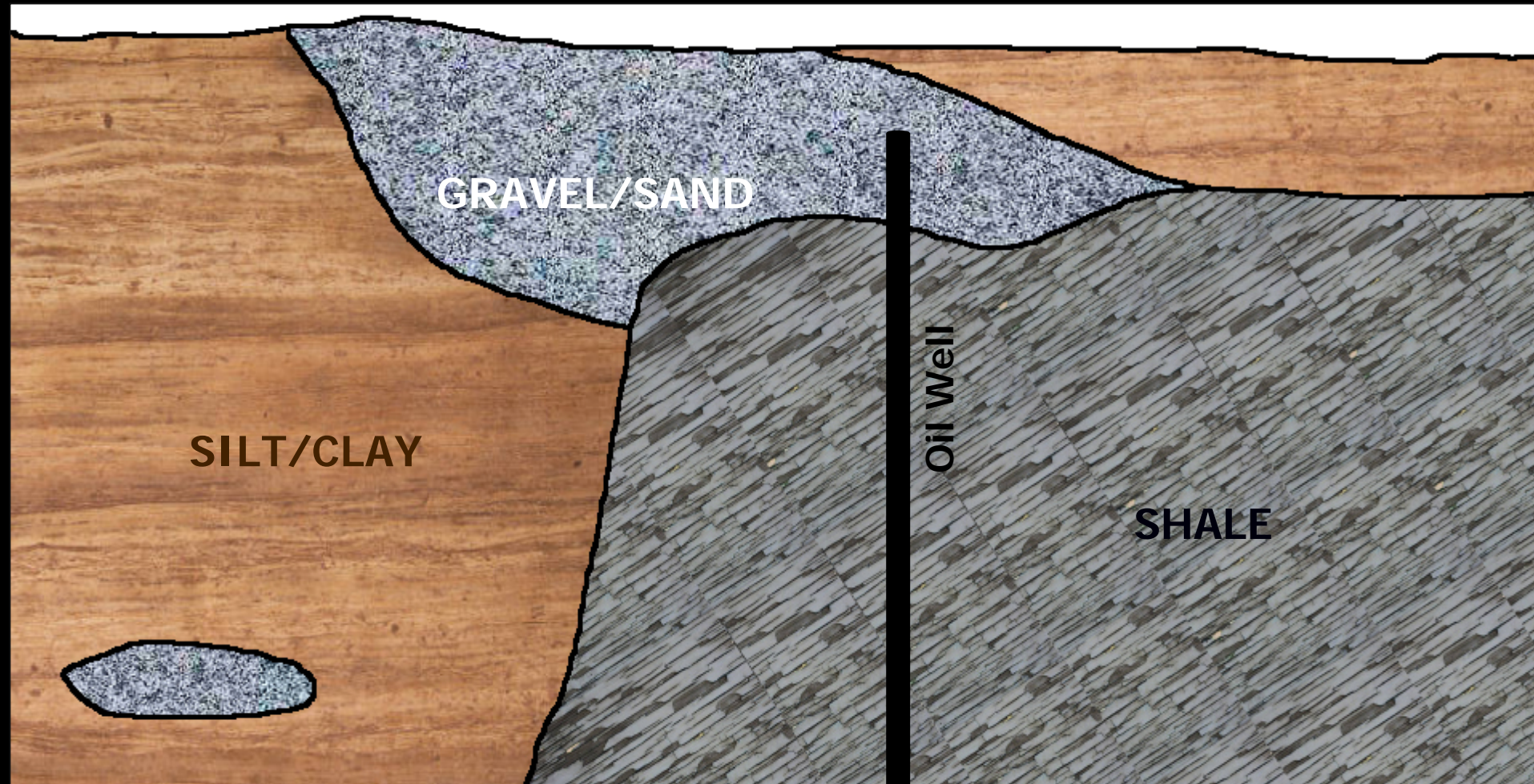
- Alluvial terrace sediments from Sheep River consisting of gravel, sand and silt deposited on shale and glaciolacustrine soils
- Bedrock folded and faulted - Foothills of Rocky Mountains.



# ***Bedrock Geology***

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- Bedrock at 1 m below grade at south end of the site.
- Bedrock greater than 9 m deep at north end of the site.



# CONCEPTUAL SITE MODEL

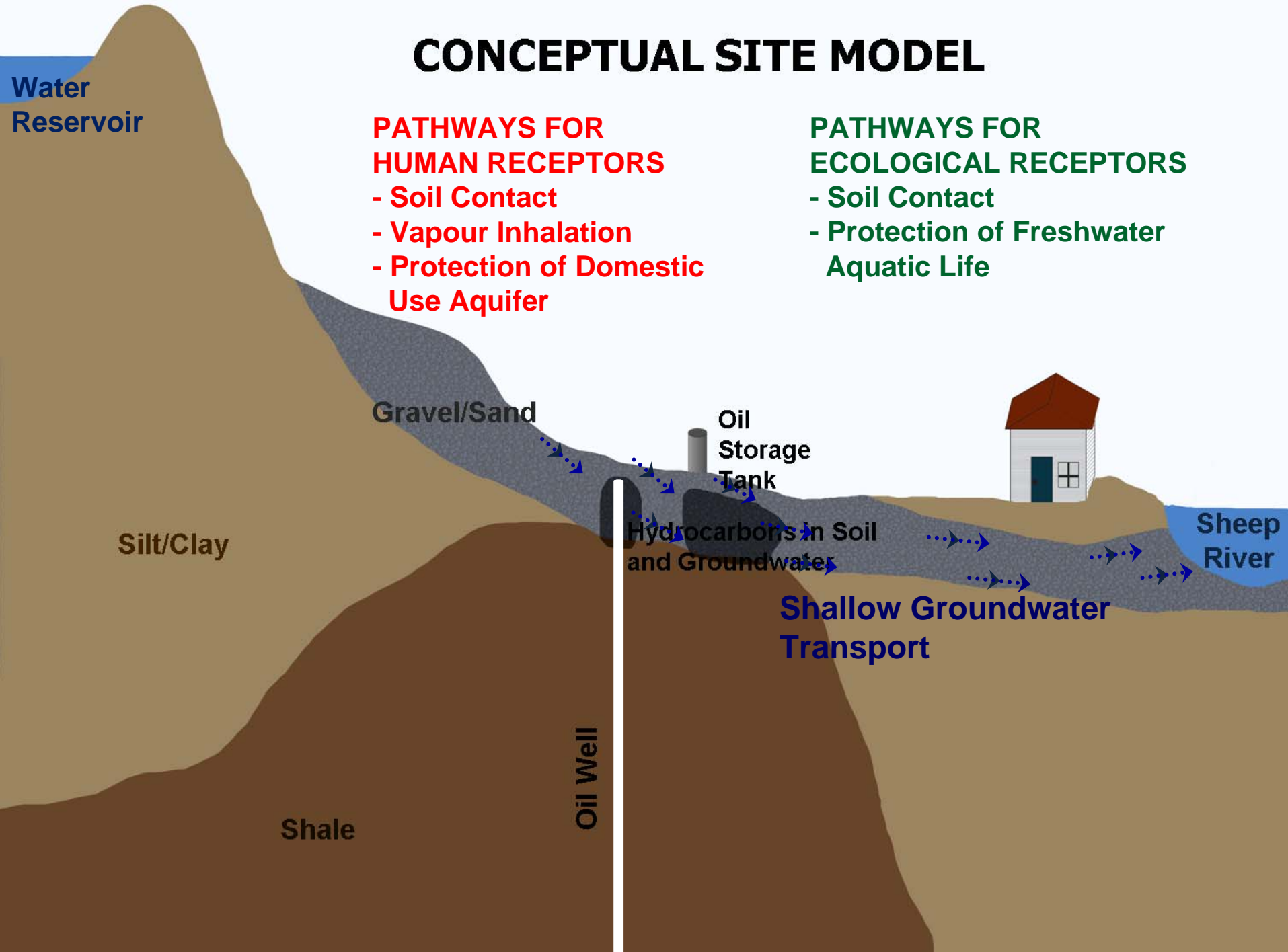
Water  
Reservoir

## PATHWAYS FOR HUMAN RECEPTORS

- Soil Contact
- Vapour Inhalation
- Protection of Domestic  
Use Aquifer

## PATHWAYS FOR ECOLOGICAL RECEPTORS

- Soil Contact
- Protection of Freshwater  
Aquatic Life



## ***Results of Environmental Site Assessments***

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- Primary contaminant was hydrocarbons at well center and in the vicinity of the above ground storage tanks.
- Downhole geophysics determined that there was no evidence of highly transmissive fractures in the bedrock.
- Site specific Tier 2 Guidelines developed for soil, bedrock and groundwater.
- Domestic use aquifer pathway excluded.



# *Remediation*

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- Total excavation and removal to a landfill of 2,500 m<sup>3</sup> hydrocarbon impacted soil.
- Onsite treatment of about 8,500 m<sup>3</sup> of hydrocarbon impacted soil.

# ***Treatment of Hydrocarbon Impacted Soils***





# ***Treatment of Hydrocarbon Impacted Soils***



# ***Urban Development near Historical Wells***

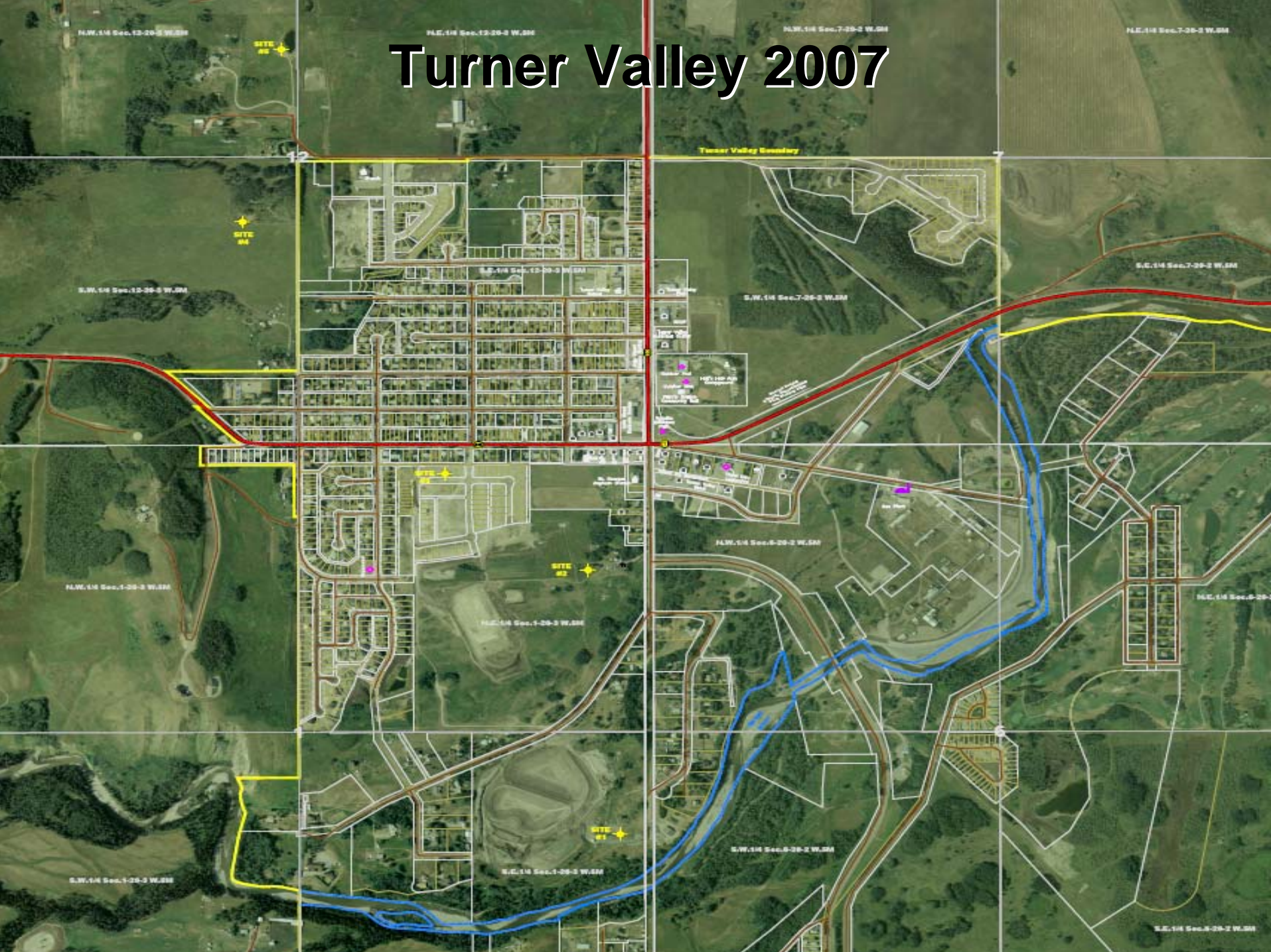
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There are unique challenges and constraints when dealing with historical wells and sites located in growing urban areas.

- Location Location Location
- Extensive stakeholder consultation is required
- Timing driven by future land use
- Potential for adverse media coverage

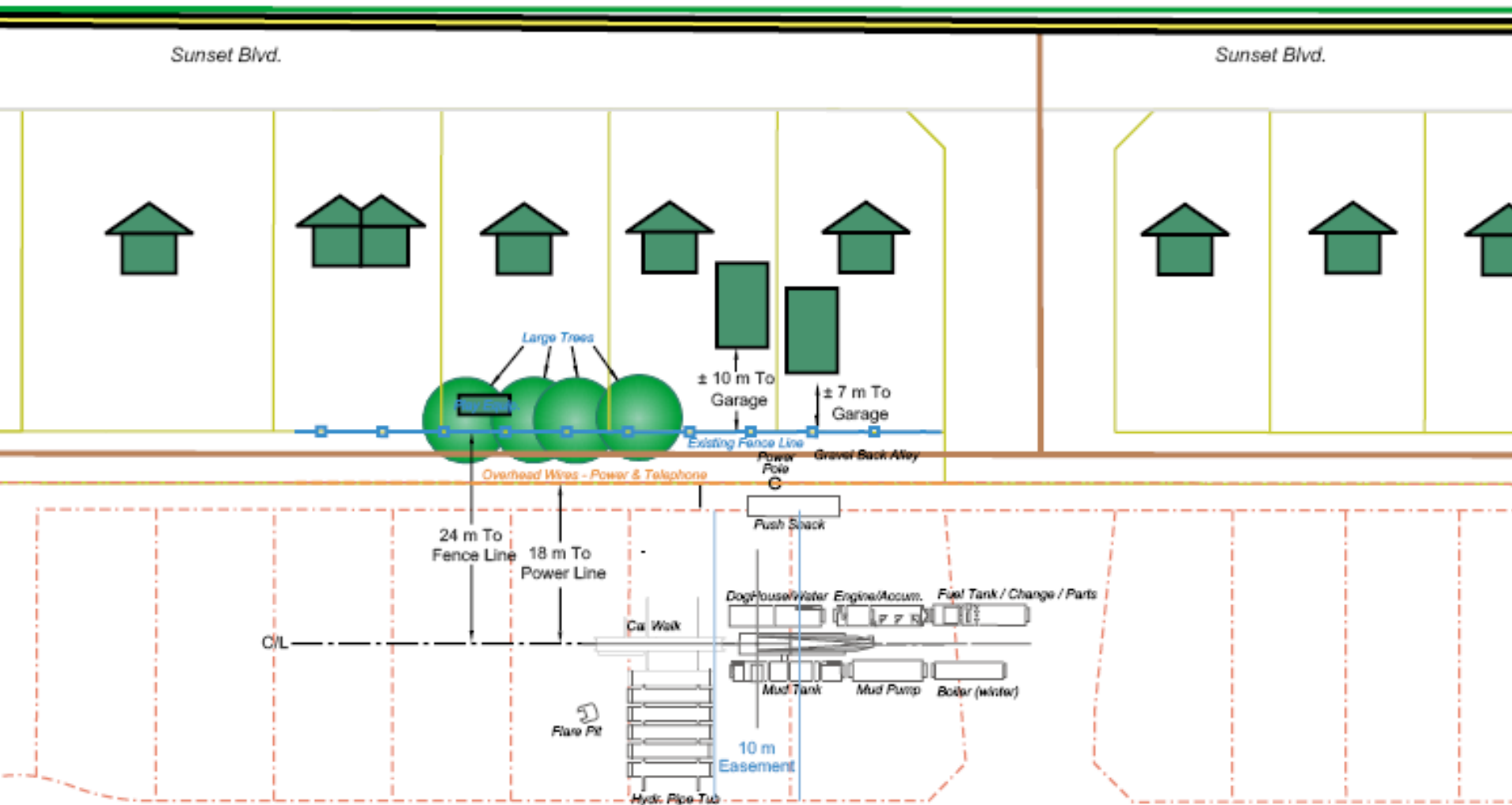


# Turner Valley 2007



# Other Challenges

## *Putting a Drilling Rig in someone's backyard*





# *Show Home Location*



## *Conclusions*

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- The upstream oil and gas industry can be proud of the accomplishments made by the industry funded orphan program in Alberta.
- We (industry) need to be prepared to address the expansion of urban areas onto the historical oil and gas industry footprints in Alberta.





**1930's**

**Glenbow Archives NA-67- 83**

**2007**



# ***Acknowledgements***

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- *O'Connor Associates Environmental Ltd.*
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# Thank you

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