SUBSURFACE TO SURFACE
FRACKING NECESSITATES LANDSCAPE ARCHITECTURAL PRACTICE

NOVEMBER 23, 2014
SUBSURFACE TO SURFACE

FRACKING NECESSITATES LANDSCAPE ARCHITECTURAL PRACTICE

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MODERATED BY:
DESIGNWORKSHOP
Learning Objectives

1. Learn basic technologies and terminology of oil and gas development.

2. Examine impacts to land use patterns, landscapes and communities.

3. Understand policy approaches.

4. Look at ways landscape architects can work to avoid, minimize and mitigate impacts.
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A FRACKING NEEDED LANDSCAPE ARCHITECTURE

NOVEMBER 23, 2014
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N ECESSI TA TES
L A ND SC A P E A R CH I TE C TUR A
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NO VEMBE R 23,
2 0 1 4
October 22-25, 2014

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A FRACKING NEEDED LANDSCAPE ARCHITECTURAL PRACTICE

November 23, 2014
Oil & Gas 101

Why Land Concerns Aren’t Heard

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Atmosphere
(to 10,000 feet)

Biosphere
300 feet deep (terrestrial part)

Petroleum-bearing rocks
7.7 miles / 40,000 feet
(deepest known today)

90% of all life

Journey to the Center of the Earth
3,958 miles / 21 million feet

CONFLICT ZONE

Line represents the Biosphere to scale
0.007% of Earth’s radius
Surface vs Petroleum:
Annexation without Representation

• What silences land-focused input in land-vs.-oil conflicts?

• Where do landscape impacts happen in the drilling process?

• How can landscape architects (and their communities) exert leverage when landscape impacts threaten?
OIL & GAS 101: “Split Estate” Ownership Rights

SURFACE RIGHTS
- Home
- Business or institution
- Vegetation & soils
- Surface & groundwater

SUBSURFACE RIGHTS
Ownership of minerals
“Reasonable work access” to SURFACE
- drilling pads
- access roads
- on-site waste burial
- ‘man-camps’ for workers

Usually no water rights
Absentee owners; often corporate
Ownership not publicly recorded (states vary)

Mineral rights are “Dominant” (take priority over surface rights)

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OIL & GAS 101: Oilfield Financing

Roi = Return on investment ($) 
eRoi = Energy return on (energy) invested. Decreasing efficiency of energy operations for decades.

Governments may own mineral rights and commonly lease below market value: a form of subsidy.
Extractive economy

Local economy

Chaotic growth

Decline & loss of infrastructure

Boom

Bust

time

$
What CAN Communities Do?

• protect surface from direct damage

• focus on surface and community impacts of fracking

• require safe standards for O&G transportation
OIL & GAS 101:
Conventional Reservoirs, Straight-Down Drilling

Well spacing rigidly determined by “drainage radii” of pumps
No flexibility to protect aquifers or surface features

Surface plan view
OIL & GAS 101: Unconventional Reservoirs, Directional Drilling

Geological cross section

Steerable directional drilling avoids aquifers, surface features. Multi-well pads reduce roads & other impacts.

Surface plan view
Idealist, Realist, Cadaver Cosmetician?

Brian Orland
WARNING
DO NOT LEASE YOUR
GAS & OIL RIGHTS
TO A SL EAZY CO.
CALLED PENNVIEW
EXPLORATION INC.

BRAD LITTLE OWNER

175 McKnight Road Blairsville
OWNER BRAD LITTLE IS CHEEZY
LAND MANAGER MARVIN D.
HOGUE, WILL LIE TO YOUR
FACE
Sullivan County, Pennsylvania

- 6,428 people, 15/square mile
- Projected gas wells in Sullivan County—6,000
- Lifetime estimated royalty per well—$1.6m
- $1.6m x 6,000/6428 = $1.5m/person

Pennsylvania population density
Gas activity and income projections: marcellusgas.org, 10/23/14
What people face

• Too much new information
• Too many hidden and moving parts
• The business advantage in obscuring information

...and what they are asked to do

• Regular people...
  – Are forced to make irrevocable choices about complex issues in the face of impatient big industry
  – They don’t know what to expect
  – They need to be informed and empowered to minimize the risks they face
What prevents us from planning well?

- Industry is exempt from key environmental laws
- Zoning is absent in most rural areas
- Landowners are often ill-informed, or absent
- Split estate privileges sub-surface owners
- The oil and gas market is volatile

- Landscape architects are ill-equipped to respond
- Few citizens know how a landscape architect could help
The landscape architect’s toolkit
Our imperatives

• Contain and repair what has already happened
• Shape what is yet to happen
• Design landscapes resilient to the unexpected
• Plan to create long-lasting benefits
Our strategy

- Story telling
- Explore relationships
- Provide many examples
- Design
Take pipelines and water, for example...
Projecting the impacts of wells+pipelines

- Existing vs. future well locations projected based on characteristics of current wells

Geodesign analyses: Tim Murtha, Rick Hammond, Penn State
Hills Creek State Park, Colton Point State Park and Leonard Harrison State park are all destinations enjoyed by many people in Tioga County, PA. The lake, creek, picnic areas, and campsites provide recreational opportunities for the visitors and community, and the landscapes within and surrounding the parks offer great aesthetic value to the region. This offers significant economic value to the community. But with the Marcellus Shale Gas Industry moving in, these valuable sites and the benefits they provide to their patrons and the economy are being threatened.
Loss of forest cover due to pipelines

- Run-off, flood impacts at Montoursville, effects of alternate pipeline corridor treatments

TR-55 projections

Montoursville, PA
Tropical Storm Lee, Fall 2011

Reduced land cover, full gas build-out

Pipeline corridor BMP mitigation

Analysis and images: Emily Carlson, Elliott Shibley
Pipeline routing strategies

- Alternate location choices and their impacts
  Shortest-distance, Fewest leases, Conservation

- Geodesign analysis and images: Megan Prikockis, Danielle Sette

158 Stream crossings
18 Homes impacted
84 Wetlands impacted
0.56 Miles per well

148 Stream crossings
3 Homes impacted
49 Wetlands impacted
0.63 Miles per well

124 Stream crossings
10 Homes impacted
19 Wetlands impacted
0.66 Miles per well
Habitats & Corridors

Implications and Strategies of Landscape Alterations related to Marcellus Shale and Non-Marcellus Shale Activities
Forest fragmentation...

- Interrupts core habitat, creates pathway for invasive species
- Diminishes core habitat and reduces scenic amenity
- Interrupts water access and shade, threatens water quality

Images: Nick Monroe
Minimizes access road, avoids bisecting core habitat

Consolidates with other disturbances

Maintains core and shaded silt-free streamside habitat.

Images: Nick Monroe
Tioga County Route 6 - Story of A Pleasant Day Trip in Tioga County

A hypothetical trip along Route 6 in Tioga County, PA. This hypothetical trip is made to explore Route 6’s tourism potential in Tioga County where Marcellus shale gas drilling is affecting the local communities. A successful road trip planning not only helps the community in economy, but also in maintaining sense of place. This day trip story starts at Mansfield and ends at Galeton. The visitor is at the age of 25, driving along Route 6 with...
Illustrate planning issues...

- Choices in pipeline location can have impacts on scenic values

Images: Nick Monroe
...to clarify the opportunities available

- Change pipeline routes, hide and disguise industry infrastructure
Explore the questions that can be asked and the solutions that are possible.
Cadaver cosmetician, green-washing?

“Mr. Penn State LANDSCAPE ARCHITECT - how are you qualified to address forest sustainability issues? Or is your job just to "greenwash" i.e. throw green paint on a building riddled with termites?"

“What (are you) going to do for Jenny Skinner? What are (you) prepared to do to fix the muddy brown strip [that's] the telltale sign of a buried pipeline right through her land?”
What **should** we do for Jenny Skinner?

- Her family deserves job opportunities, income for education and health care
- They deserve an environment free from pollution, flooding, excess traffic and forest fragmentation

- Help Jenny understand the changes coming
- Help her understand what she can demand
- Help her make informed choices
- Help her influence her future
Acknowledgements

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Prof Timothy Murtha + a bunch of patient students, Penn State Landscape Architecture
Policy Implications

Gail Schwartz
October 22 - 25, 2014

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Work to be Done
Panel Discussion
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A FRACKING Necessitates Landscape Architectural Practice

November 23, 2014
QUESTIONS FROM THE AUDIENCE?
CLOSING REMARKS

If you had to identify one strategy or role in which a landscape architect could best plan for oil and gas development; what would it be?
Santa Fe County Oil & Gas Ordinance, 2008

Lessons & Strategies

- Check whether local government has authority in your state
  (no state pre-emption of O&G regulations)
- EDUCATE the players – elected officials, public
  (and oil company management, if possible)
- Emphasize Health, Safety & Welfare, and local right to control surface development
- Require impact fees to maintain infrastructure (emergency, roads, etc)
  as upfront condition of permit
- Applicant pays for all required impact studies
- Acreage limits on surface disturbance (pads, roads, ponds) per well
  AND per square mile. Require phased development to meet these limits
- Best Practices (noise, light, hours of operation, buffers from homes, etc)
- Mandatory process of remedies must be exhausted before any claim of ‘takings’
- Mapped analysis of suitability for surface O&G facilities as basis of permit evaluation
## Resources

**Online.**

  Full text of the Santa Fe County ordinance

- [www.earthworksaction.org/reform_governments/oil_gas_accountability_project](http://www.earthworksaction.org/reform_governments/oil_gas_accountability_project)  
  OGAP is a leading drilling-regulation activist group

- [http://headwaterseconomics.org/energy](http://headwaterseconomics.org/energy)  
  Research disputes claims of huge economic/ tax benefits

- [http://environment.yale.edu/envy/stories/fracking-outpaces-science-on-its-impact](http://environment.yale.edu/envy/stories/fracking-outpaces-science-on-its-impact)  
  A collaboration between Yale and Pace Law School

- [www.propublica.org/series/fracking](http://www.propublica.org/series/fracking)  
  In-depth reports on fracking and "fraccidents" nationwide

- [www.fractracker.org](http://www.fractracker.org)  
  Foundation for Pennsylvania Watersheds

**In print.**


- K. Sorvig "What to Do When the Drillers Come to Town"  *Planning*, Aug/Sep 2014 (special issue on energy)

- R. Freilich & N. Popowitz, "Oil and Gas Fracking: Examining the Santa Fe Oil and Gas Plan as a Model"  *The Urban Lawyer*, Summer 2012 (vol 44 No 3)  
  Detailed explanation of Santa Fe ordinance, with case law, context


APPLICATION FOR PERMIT TO:

TYPE OF WELL
- Oil
- Gas
- Coalbed
- Other

ZONE TYPE
- Single Zone
- Multiple Zones
- Common Pool Zones

Date Received:

Number:

Wall Name:

Name of Operator:

Address:

City:

State:

Zip:

Contact Name:

Phone

Fax:

Email:

RECLAMATION FINANCIAL ASSURANCE

Plugging and Abandonment Bond Surety ID:

WELL LOCATION INFORMATION

Qtr/Sec:

Township:

Range:

Meridian:

Latitude:

Longitude:

Footage at Surface:

Field Name:

Field Number:

G rounds:

County:

GPS Data:

PDOP Reading:

Instruments Operator’s Name:

If well is:

Directional

Horizontal (highly deviated)

Submit deviated drilling plan:

Footage at Top of Prod Zone:

Location Surface & Minerals & Right to Construct

Surface Ownership:

Check all that apply:

Fee

State

Federal

Indian

The Surface Owner is:

The Minerals Owner beneath the location is:

The Minerals beneath this Oil and Gas Location are:

The right to construct the Oil and Gas Location is granted by:

Surface damage assurance if no agreement is in place:

Surface Surety ID:

LEASE INFORMATION

Using standard Qtr/St/Sec/Double format, describe one entire mineral lease that will be produced from this well (Describe lease beneath surface location if produced. Attach separate description page or map if necessary).

Total Acres in Described Lease:

Described Mineral Lease is:

Fee

State

Federal

Indian

Federal or State Lease #:

Distance from Completed Portion of Wellbore to Nearest Lease Line of described lease:

CULTURAL DISTANCE INFORMATION

Distance to nearest:

Building

Feet

Building Unit

Feet

High Occupancy Building Unit

Feet

Designated Outside Activity Area

Feet

Public Road

Feet

Above Grade Utility

Feet

Railroad

Feet

Property Line

Feet

INSTRUCTIONS:

- All measurements shall be provided from center of nearest well to nearest of each cultural feature as described in Rule 305 a.(5).
- Enter 0.00 for distance greater than 3 mile.
- Building - nearest building of any type. If nearest building is a Building Unit, enter same distance for both.
- Building Unit, High Occupancy Building Unit, and Designated Outside Activity Area - as defined in 100 Series Rules.

DESIGNED SETBACK LOCATION INFORMATION

Check all that apply. This location is within a:

Buffer Zone

Exception Zone

Urban Mitigation Area

Pre-application Notifications (required if location is within 1,000 feet of a building unit):

Date of Rule 305 a.(1) Urban Mitigation Area Notification to Local Government:

Date of Rule 305 a.(2) Buffer Zone Notification to Building Unit Owners:

SPACING and UNIT INFORMATION

Distance from Completed Portion of Wellbore to Nearest Wellbore Permitted or Completed in the same formation:

Feet

Distance from Completed Portion of Wellbore to Nearest Unit Boundary

Feet (Enter 0.00 for distance greater than 1 mile.)

Federal or State Unit Name (if appl):

Unit Number:

SPACING & FORMATION COMMENTS

OBJECTIVE FORMATIONS

Objective Formations:

Formation Code

Spacing Order No.

Unit Average Assigned to Well

Unit Configuration (N2, E4, etc.):

DRILLING PROGRAM

Proposed Total Measured Depth:

Feet

Distance to nearest permitted or existing wellbore penetrating objective formation:

Feet (including plugged wells)

Will a closed-loop drilling system be used?

TO SURFACE

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SUBSURFACE TO SURFACE: A LANDSCAPE ARCHITECTURAL PRACTICE

N O V E M B E R 2 3 , 2 0 1 4
Brian can you provide a picture/diagram which connects the audience to “Marcellus by Design”?
Slide(s) or imagery to answer question?
Slide(s) or imagery to answer follow up question?