

# Shale Gas Monitoring Update: Infrastructure

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## Purpose

This document provides updated information on shale-gas infrastructure and associated acreages in the core shale gas state forest districts through December 2014. For more information, please refer to Infrastructure chapter of the Shale Gas Monitoring Report, which provides background and summarizes data 2007-2012: [http://www.dcnr.state.pa.us/cs/groups/public/documents/document/dcnr\\_20029147.pdf](http://www.dcnr.state.pa.us/cs/groups/public/documents/document/dcnr_20029147.pdf)

## Key Points

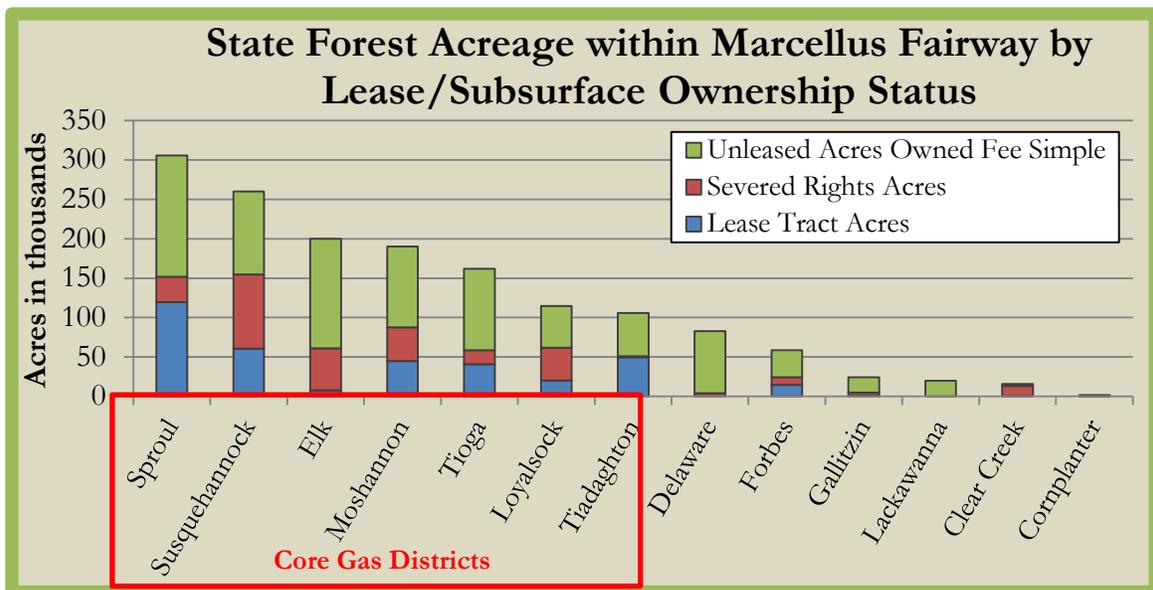
- In 2013, 79 new wells were approved for drilling on state forest land and 47 in 2014. Through the end of 2014, a total of 1020 wells have been approved. To date, 608 well have been drilled on state forest land.
- In 2013, 19 new infrastructure pads (encompassing 73 acres) were constructed in the core gas districts. Eight new infrastructure pads (32 acres) were constructed in 2014. Since the onset of gas development, 755 acres have been converted for infrastructure pads.
- Overall, 4 miles of new road were constructed in 2013 in the core gas districts. In 2014, less than 1 mile of new road was constructed, bringing the total miles of new road to 36 since 2007. Acreage converted for new roads and road modifications in 2013 was 22 acres and 16 acres in 2014. A total of 259 acres have been converted for new road construction and road modification to accommodate gas development in the core gas districts.
- There were 49 acres converted for pipeline rights-of-way in the core gas districts in 2013, and 66 acres in 2014. Since 2007, 661 acres have been converted to pipeline ROW in these districts.
- Total acreage converted to non-forest in the core gas districts in 2013 was 144 acres. For 2014, 114 acres were converted. The total acreage of conversion for all types of development in the core gas districts since the onset of shale gas development is 1674 acres.

# Ownership

**Table 1.** State forest acreage in Marcellus fairway. Severed acreage totals include any portion of subsurface rights where the Commonwealth owns less than 100% interest.

Note: Spatial data are continually revised as information regarding the status of historic and current leases is updated, as precision and accuracy of GIS information is refined, and as the condition of the acreage changes. For example, leases terminate, feature boundaries are redrawn to be more precise, the acreage of individual pads is reduced, and new state forest land is acquired.

State Forest	Total Acreage in Marcellus Shale Fairway	Leased Tract Acres	Severed Rights Acres
Forbes	58,518	14,591	9,601
Gallitzin	24,264	1,376	3,376
Clear Creek	15,967	463	12,843
Moshannon	190,032	44,986	42,883
Sproul	305,439	119,390	32,613
Tiadaughton	105,667	49,667	1,387
Elk	199,952	7,801	53,056
Cornplanter	1,491	0	1,362
Susquehannock	260,113	60,801	93,846
Tioga	161,890	40,704	17,809
Delaware	82,792	0	4,321
Loyalsock	114,550	20,129	41,865
Lackawanna	19,872	0	0
<b>Total</b>	<b>1,540,547</b>	<b>359,908</b>	<b>314,962</b>

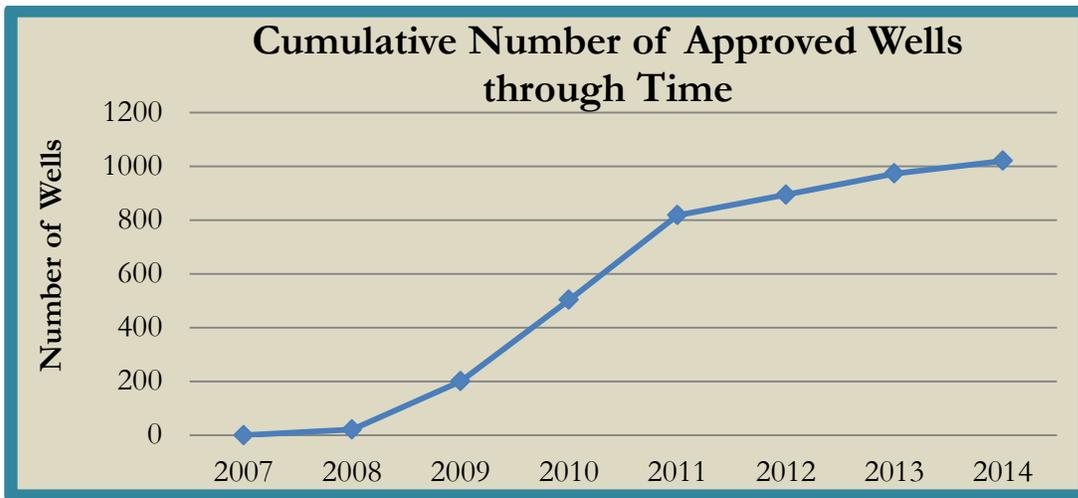


**Figure 1.** State forest acreage within the Marcellus fairway by lease/subsurface ownership status for each state forest district.

# Wells

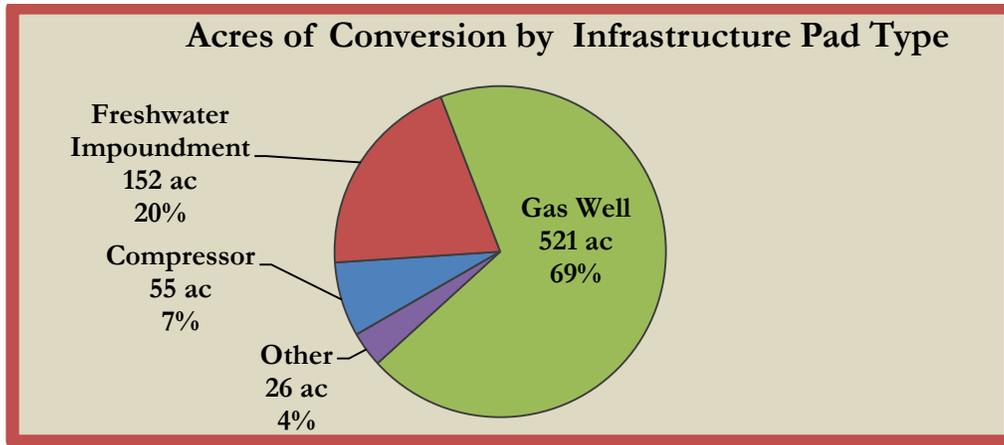
**Table 2.** Shale-gas wells approved by the Bureau of Forestry by ownership type, 2007-2014. Severed land is where any portion of subsurface rights are privately owned.

Year	Wells Approved on State Forest Leases	Wells Approved on Severed Lands	Total Wells Approved
2007	0	0	0
2008	10	11	21
2009	136	43	179
2010	244	59	303
2011	264	51	315
2012	64	12	76
2013	59	20	79
2014	37	10	47
<b>Total</b>	<b>814</b>	<b>206</b>	<b>1020</b>
<b>Total Number of Shale-Gas Wells Drilled on SF Lands: 608 (Wells Spud by DEP definition)</b>			
<b>Total DEP Well Permits issued for State Forest Lands: 1,004</b>			



**Figure 2.** Cumulative number of wells approved on state forest land through time, 2007-2014.

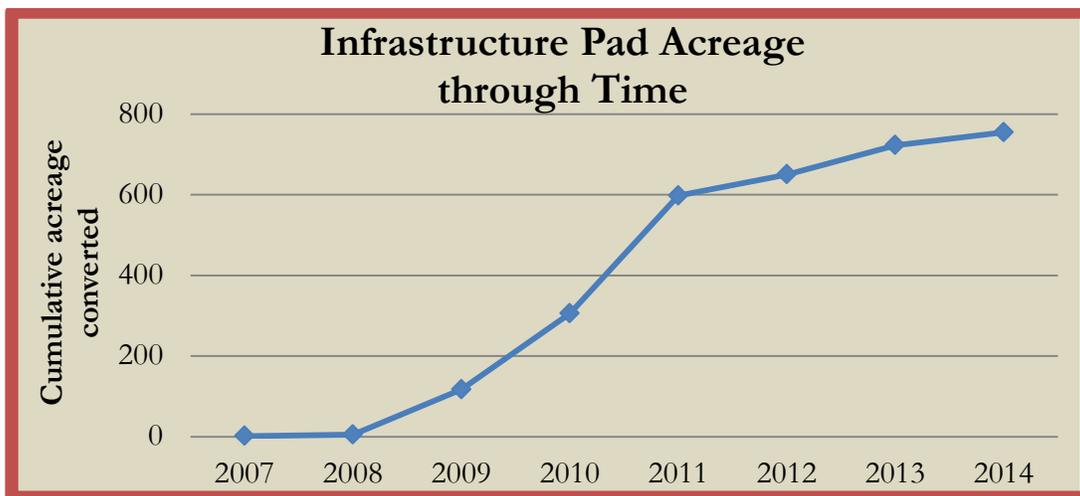
# Infrastructure Pads



**Figure 3.** Total acreage converted to non-forest for infrastructure pads within core gas forest districts, by type of pad (through 2014).

**Table 3.** Number and acreage of infrastructure pads added each year within core gas forest districts, 2007-2014. Temporary disturbance acres are cleared to accommodate construction but are not retained in a converted state.

Year	Number of New Infrastructure Pads	Acres Converted (Infrastructure pads only)	Cleared acres (includes pad + temporary disturbance)
2007	2	1.6	2.0
2008	4	3.6	12.6
2009	41	112.2	176.4
2010	62	188.4	338.6
2011	86	291.9	426.7
2012	15	52.3	129.7
2013	19	72.7	130.2
2014	8	31.9	55.3
<b>Total through 2014</b>	<b>237</b>	<b>754.6</b>	<b>1,271.4</b>



**Figure 4.** Cumulative acreage converted to non-forest for infrastructure pads, 2007-2014.

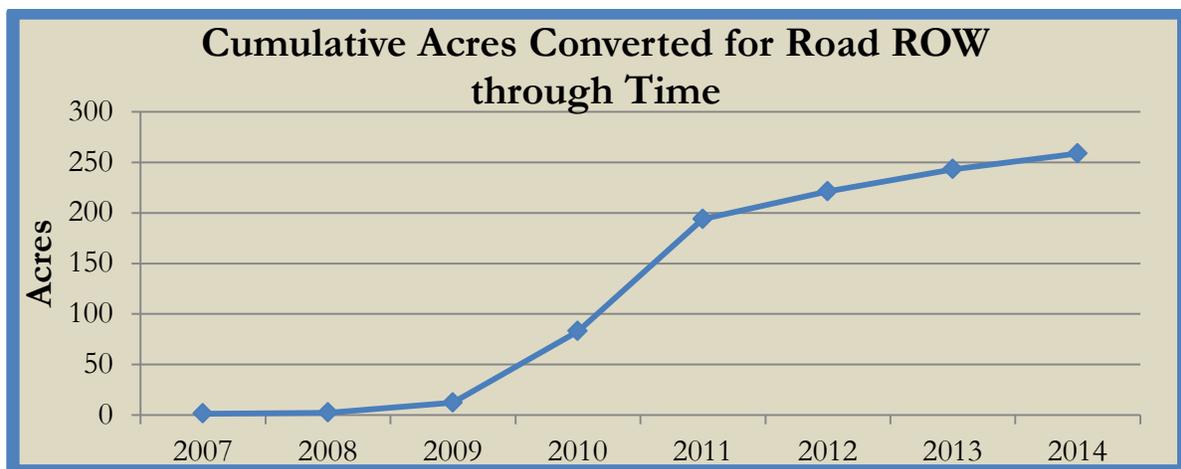
# Roads

**Table 4.** Miles of new road constructed and acreage converted to non-forest for road rights-of-way (includes new roads and modified roads) within developed tracts of core gas districts each year, 2007-2014.

Year	Miles of new road	Acreage converted for road ROW (new roads and modified roads)
2007	<0.1	1.4
2008	0.1	0.9
2009	2.7	9.9
2010	9.2	70.7
2011	14.8	111.0
2012	5.1	27.4
2013	4.1	21.9
2014	0.4	15.5
<b>Total through 2014</b>	<b>36.4</b>	<b>258.7</b>



**Figure 5.** Total miles of road within tracts with shale-gas development in core gas forest districts with percentage change from each year to the next, 2007-2014.

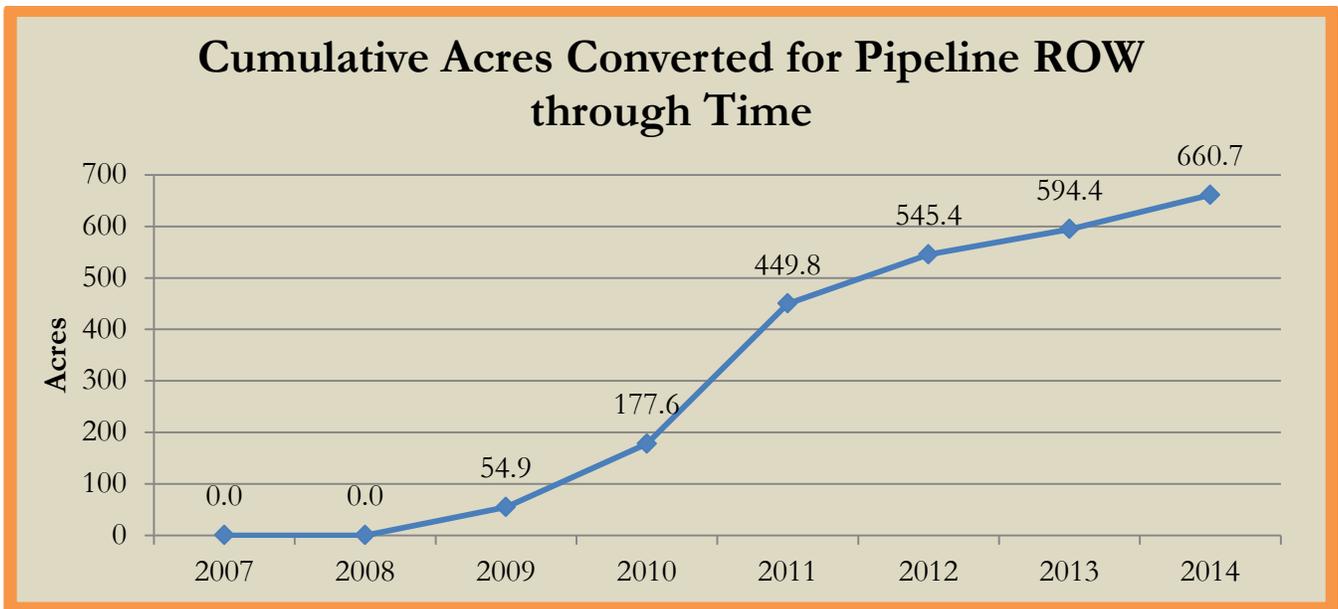


**Figure 6.** Cumulative acreage converted to non-forest for road rights-of-way (includes new roads and modified roads) in developed tracts of core gas districts through time, 2007-2014.

# Pipelines

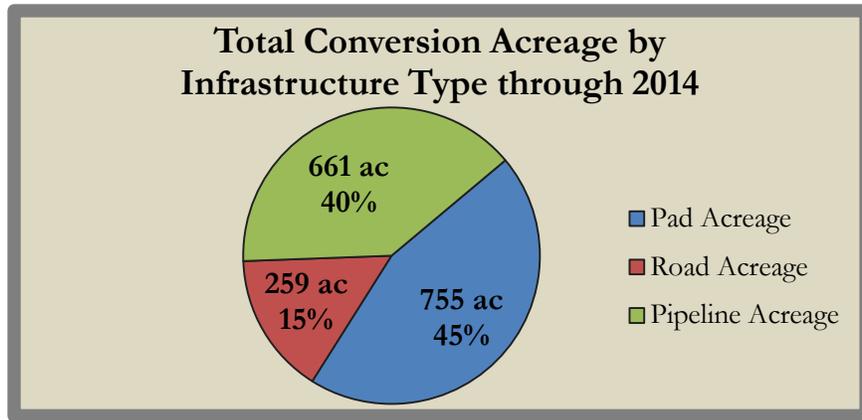
**Table 5.** Acreage converted to non-forest for pipeline rights-of-way within the core gas forest districts each year, 2007-2014.

Year	Acreage converted for pipeline ROW
2007	0.0
2008	0.0
2009	54.9
2010	122.7
2011	272.2
2012	95.6
2013	49.0
2014	66.3
<b>Total through 2014</b>	<b>660.7</b>



**Figure 7.** Cumulative acreage converted to non-forest for pipeline rights-of-way within the core gas forest districts through time, 2007-2014.

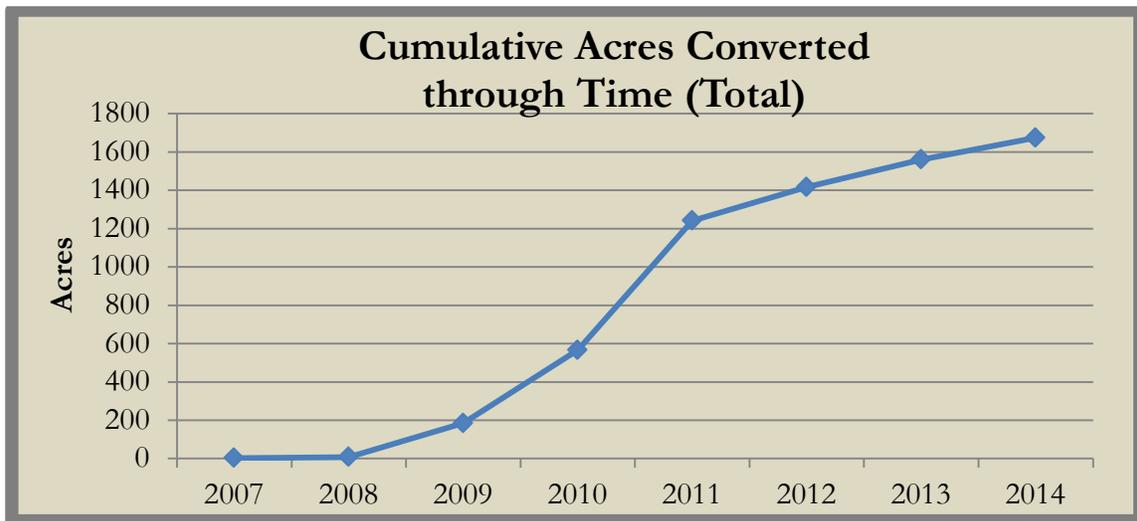
# Total Conversion Acreages



**Figure 8.** Total acreage converted to non-forest within the core gas districts through 2014, by infrastructure type.

**Table 6.** Acreage converted to non-forest each year by infrastructure type and overall within the core gas forest districts, 2007-2014.

Year	Pad Acreage	Road Acreage	Pipeline Acreage	Total Acreage
2007	1.6	1.4	0.0	3.0
2008	3.6	0.9	0.0	4.5
2009	112.2	9.9	54.9	177.0
2010	188.4	70.7	122.7	381.8
2011	291.9	111.0	272.2	675.1
2012	52.3	27.4	95.6	175.3
2013	72.7	21.9	49.0	143.6
2014	31.9	15.5	66.3	113.7
<b>Total through 2014</b>	<b>754.6</b>	<b>258.7</b>	<b>660.7</b>	<b>1674.0</b>



**Figure 9.** Cumulative acreage converted to non-forest for all infrastructure types within the core gas forest districts through time, 2007-2014.