Sand Mine Life Cycle Seminar Eau Claire, Wisconsin May 12, 2017



Ian Anderson Hydrogeologist – DNR Water Use Section Bureau of Drinking Water and Groundwater

Life Cycle of a Sand Mine

Exploration

Development

Operation

Reclamation



Presentation Outline

Borehole Filling and Sealing

High Capacity Wells

Public System Determination



Presentation Outline



Drillhole Defined

Chap. NR 812

Well construction and Pump Installation

"Drillhole" means an excavation, opening or driven point well deeper than it is wide that extends more than 10 feet below the ground surface. NR 812.07(33)



For the purposes of filling and sealing, the provisions of NR 812 apply to all drillholes and wells including elevator shaft drillholes, unsuccessful or noncomplying heat exchange drillholes, mining exploration drillholes not regulated by ch. NR 132 or subch. III of ch. 295, Stats., and wells and drillholes not regulated by s. NR 141.25.



In other words, NR 812 applies to everything <u>except</u>:

ch. NR 132 – Nonferrous Metallic Mining

subch. III of ch. 295, Stats. - Ferrous Metallic Mining

s. NR 141.25. – GW Monitoring Wells



There has been confusion...

NR 141.03 Applicability. This chapter applies to all persons installing and abandoning groundwater monitoring wells and boreholes for purposes regulated by the department under ch. <u>160</u>, <u>281</u>, <u>283</u>, <u>289</u>, <u>291</u>, <u>292</u>, <u>293</u> or <u>299</u>, Stats., or in permits, plan approvals, licenses or orders issued under those chapters. In addition, this chapter applies to all persons installing groundwater monitoring wells and boreholes in fulfillment of terms of a contract with the department.

to s. <u>NR 141.25</u>. All other wells and boreholes shall be abandoned according to the provisions of ch. <u>NR 812</u>.



There has been confusion...

NR 141.03 Applicability. This chapter applies to all persons installing and abandoning groundwater monitoring wells and boreholes for purposes regulated by the department under ch. 160, 261, 283, 289, 291, 292, 293 or 299. Stats, or in permits, plan approvals, licenses or orders issued under those chapters. In addition, this chapter applies to all persons installing groundwater monitoring wells and boreholes in fulfilment of terms of a contract with the department. All

wells and boreholes installed for purposes regulated by the department under this chapter shall be abandoned according to s. <u>NR 141.25</u>. All other wells and boreholes abandoned according to the provisions of ch. NR 812!



There has been confusion...

NR 141.03 Applicability. This chapter applies to all persons installing and abardoning groundwater monitoring wells and boreholes for purposes regulated by the department under ch. 160, 281 283 289 291 292 293 or 299 Stats. or in chapters. In a installing groundwater monitoring ms bt a contract with the departm eholes installed for purposes regulate er this chapter shall be abandoned All other wells and boreholes shall be abandoned according to the provisions of ch. NR 812.



NR 812 - Requirements

- WHEN No later than 90 days after removal from service (minimum requirement)
- WHY Poses a hazard to health or safety, or to groundwater
- WHO Licensed well driller / Pump Installer
 If it's a well



NR 812 - Requirements

- All drillhole locations must be GPS located
 - This includes failed sites
- Submit paperwork
 - Every drillhole needs a report
 - Well construction report or
 - Filling and sealing report
 - Form 3300-005
 - Electronic submittal (wells)
 - » As of 7/1/2016

Well / Drillhole / Barneta Well / Drillhole / Barneta Description Obs. 272: 1000000000000000000000000000000000000	Print Close Window State of Wisconsin							
with days 1, 281, 282, 382, 382, 382, 382, 382, 382, 382	Department of Natural Resources PO Box 7921, Madison WI 53707-7921		Well / Drillhole / Borehole Abandonment Form 3300-005 (R 12/04) Page 1 of 2					
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City State ZIP Code Signature of Person Doing Work Date Signed	Street or Route Telephone N		lumber	Imber Comments				
	City State ZIP	Code	Signature of Per	rson Doing	Work	Date	Signed	



NR 812 - Methods

- Neat cement grout
 Must use tremie pipe
- bentonite chips
 Must use screen
 - No cuttings
 - No granular bentonite

See NR 812.26 for details

https://docs.legis.wisconsin.gov/code/admin_code/nr/800/812/II/26

manent Well Casing Pipe

Conductor (tremie) pipe - gravity method



http://dnr.wi.gov/topic/wells/documents/drillabandonproducts.pdf

Filling and Sealing: Why is it important?

Open boreholes are direct conduits for contaminants to reach aquifer below

Cambrian Sandstones are primary water supply aquifers in western WI

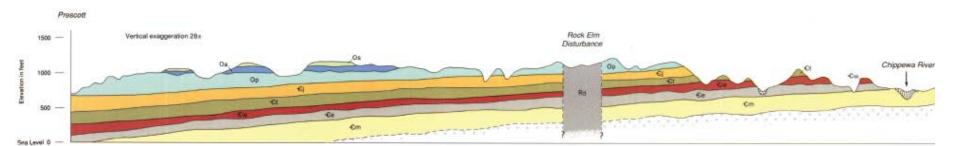
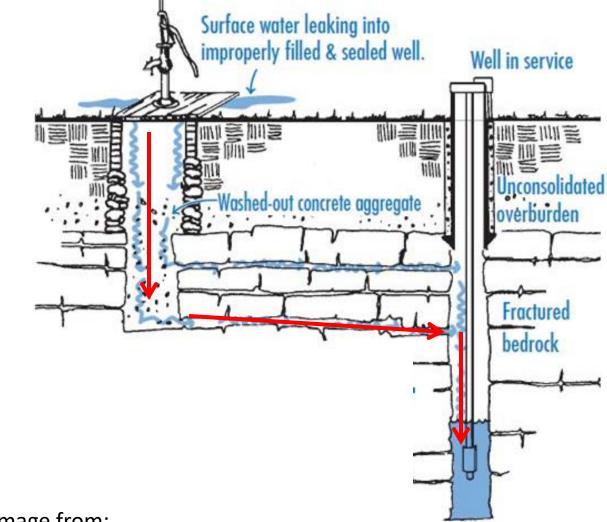


Figure Modified from: WGNHS Bedrock Geology West-Central Sheet B. Brown 1988



Contaminant Pathway



WISCONSIN DEPT. OF NATURAL RESOURCES

Image from:

http://dnr.wi.gov/files/PDF/pubs/DG/DG0016.pdf

Filling and Sealing: Why is it Important?

Beyond the risk to drinking water supplies

Safety hazard children falling into dug wells animals can be injured

Liability – this applies to all of the above



Examples



Examples



Improper Filling and Sealing





Proper filling and sealing



WISCONSIN DEPT. OF NATURAL RESOURCES

http://dnr.wi.gov/files/PDF/pubs/DG/DG0016.pdf

Presentation Outline

Borehole Filling and Sealing

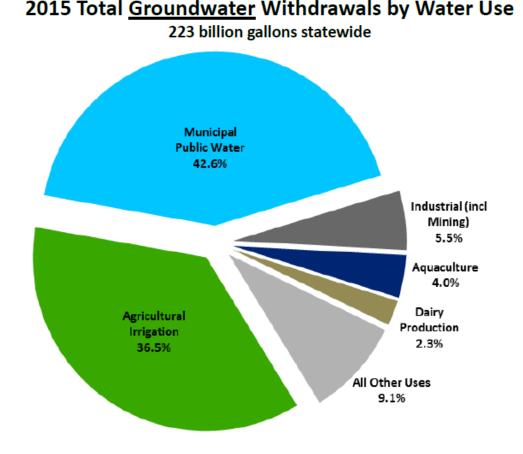
High Capacity Wells



Image: Parratt Wolff Inc.

High Capacity Wells – Fun Facts

- "High Capacity" total pumping capacity of property is 100,000 gpd (~70 gpm) or greater
- Uses for High Caps Irrigation, livestock, manufacturing, aquaculture, mining, bottling, fire suppression, some homes, public water supply





High Capacity Wells – Fun Facts



Year	IN62: Non-Metallic Mining Processing (Bgal)	IN65:Industrial Sand Mining (Bgal)	Sector Rank*
2011	1.22	1.47	9
2012	1.97	0.79	8
2013	1.20	1.21	9
2014	1.30	1.59	8
2015	1.55	1.42	8
2016	1.44	0.83	10

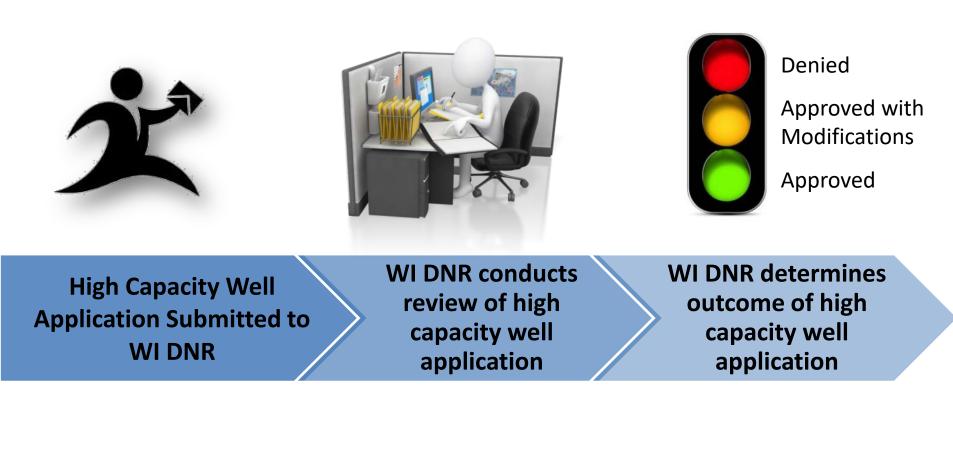
* Combined IN62 and IN65

- In 2015, non-metallic mining ranked 8th with 2.97 billion gallons of groundwater withdrawn or 1.3% of Wisconsin's groundwater withdrawal
- Average withdrawal (2011-2016) for ISM well = 33.4 MG/yr
- Compare this with Avg Irrigation withdrawal (2010-2016) of 24.3 MG/yr and Avg Municipal well withdrawal (2010-2016) of 61.9MG/yr

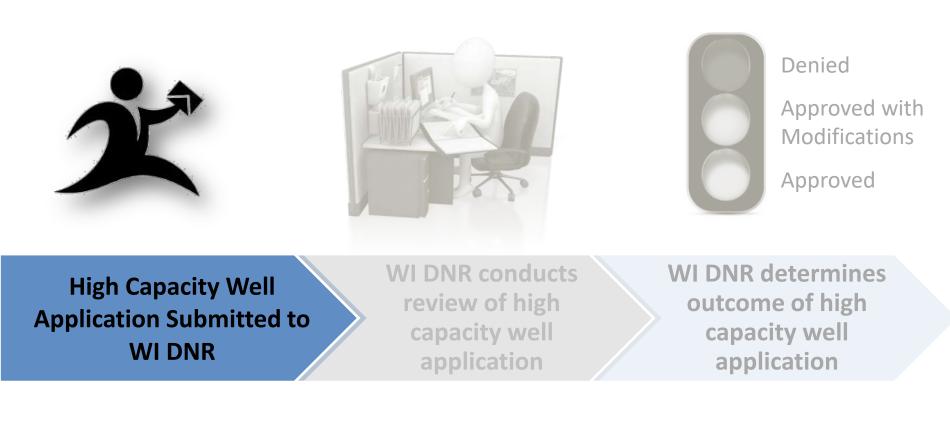


This presentation reflects the Wisconsin DNR's high capacity well application and review process as of today (05/12/2017) but may not reflect the process in the future due to changes in law, policy and court decisions.



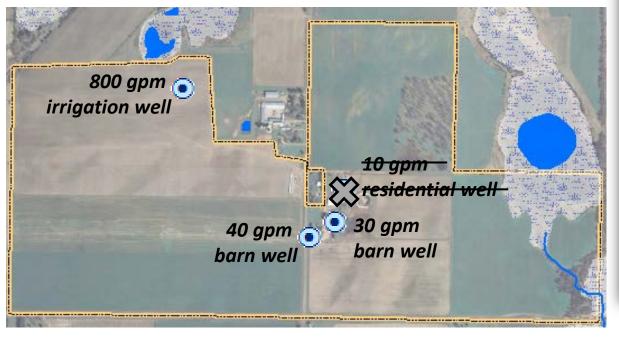






High capacity means a well, <u>except for a residential</u> <u>well or fire protection well</u>, that, together with all other wells on the same **property**, <u>except for residential wells</u> <u>and fire protection wells</u>, has a capacity of more than 100,000 gallons per day (70 gpm). s. 281.34 Wis. Stats.

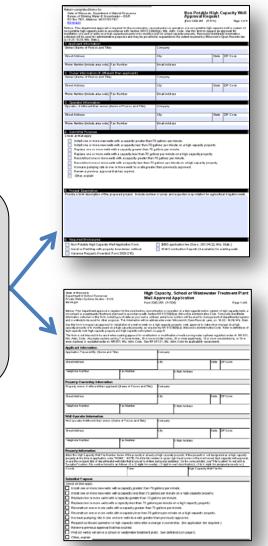
High capacity well at land surface











Non-Potable High Cap Well Application WDNR Form 3300-295 4 page application Submit application and \$500 fee

Potable High Cap Well ApplicationWDNR Form 3300-2566 page applicationSubmit application and \$500 fee

Instructions to complete the high capacity application can be found @ <u>http://dnr.wi.gov/topic/wells/documents/HighCapacity/NonPotableAppInstructions.pdf</u>

Any new or replacement well on a high capacity property requires one of two types of applications

Submitting the Application

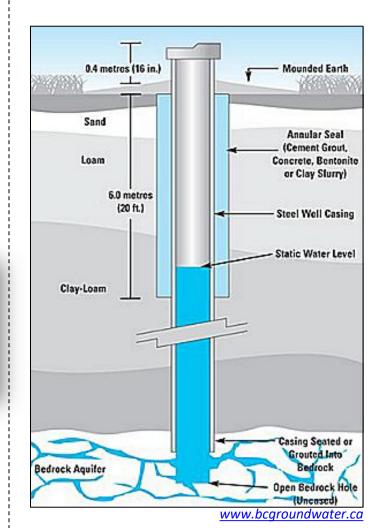




Location



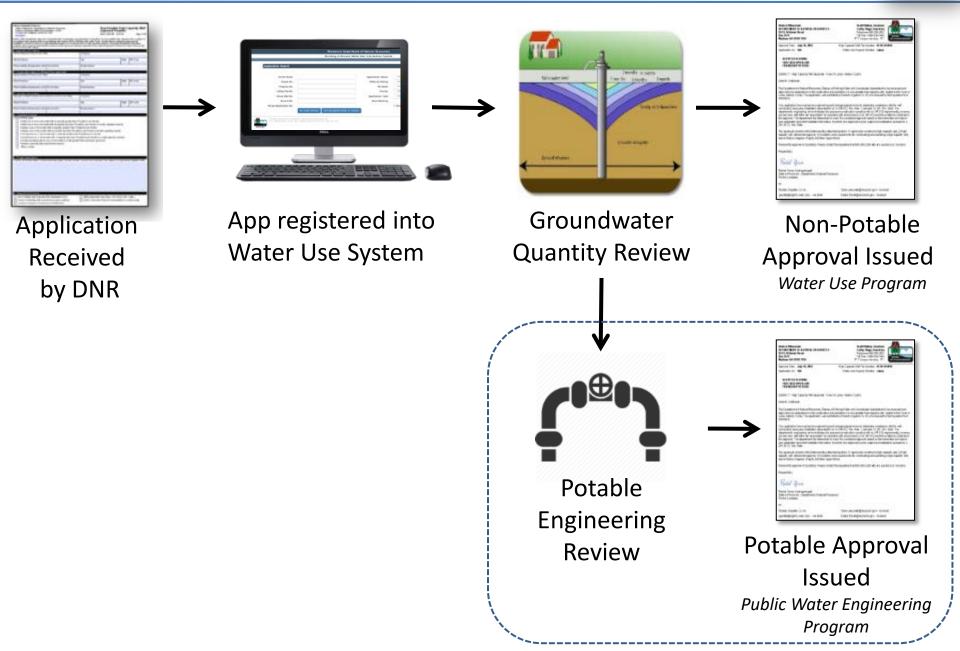
Water Use Type, Frequency, & Volume



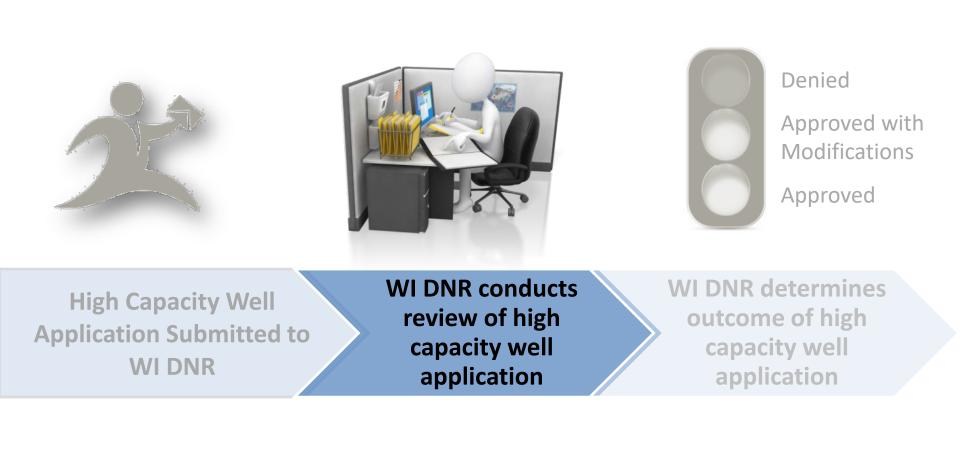
Well Construction

DNR's Processing of High Capacity Well Application









Evolution of High Capacity Well Review in Wisconsin: A Primer of Wisconsin's High Capacity Well Legal Authority

1945 - 2004

Municipal well impacts only

2004 - 2011

Within 1,200-feet of designated waters 1 cfs springs >95% water loss

2011 - 2014

Any significant impacts to waters of the State from wells from a high capacity property

2014 - May 9, 2016

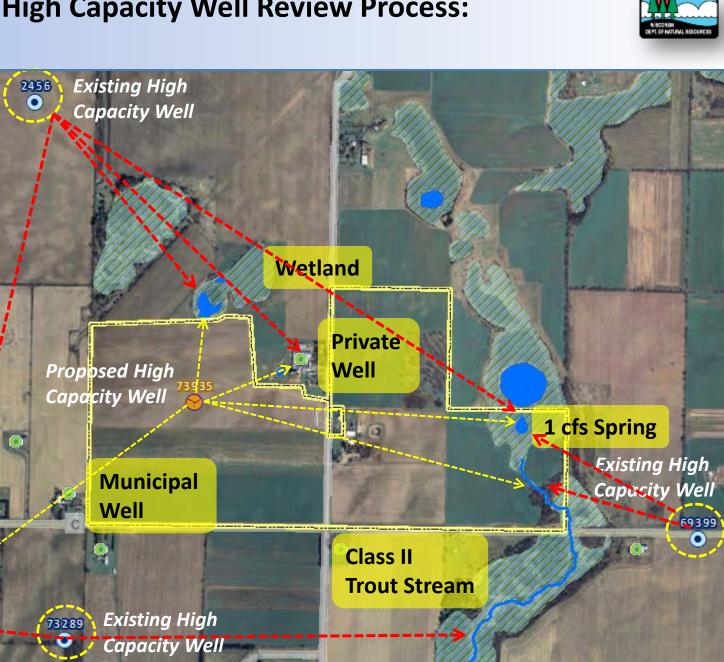
Cumulative Impacts

May 10, 2016 - Present

Within 1,200-feet of designated waters 1 cfs springs >95% water loss

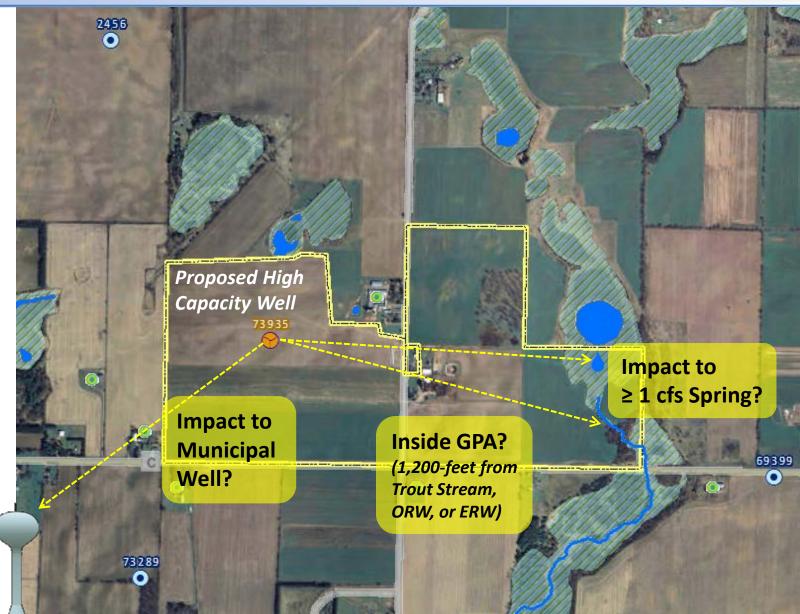


Wisconsin DNR's High Capacity Well Review Process: Pre-May 2016



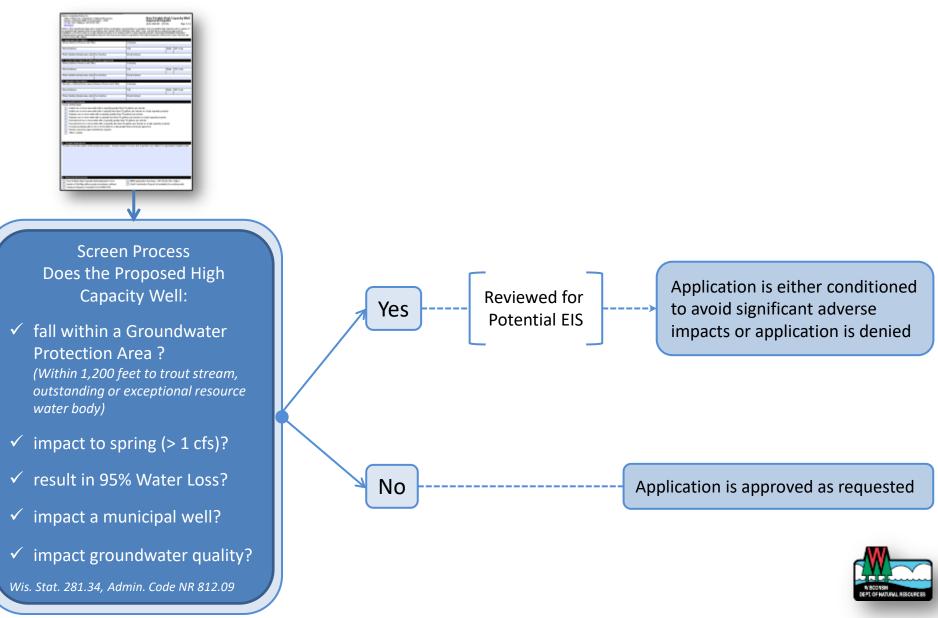
Wisconsin DNR's High Capacity Well Review Process: Post-May 2016





Wisconsin DNR's High Capacity Well Review Process: Post May 2016

High Capacity Well Application Received by DNR







High Capacity Well Application Submitted to WI DNR **NI DNR conducts** review of high capacity well application WI DNR determines outcome of high capacity well application



APPROVAL TO CONSTRUCT A HIGH CAPACITY WELL

Property Water Use: IR10 - Agricultural irrigation

Approval Date: 10/21/2016

County: **Pepin**

High Cap File Number: 47-01-0058

Property Number: 13669

Well Location

High Capacity Well Number:	74043
Well Name Assigned by Well Owner:	Irrigation Well
PLSS Description:	NW/SE Sec03 T25N R12W
Latitude (Decimal Degrees):	44.6748
Longitude (Decimal Degrees):	-91.8186
Approved Pump Type:	Lineshaft turbine
Approved Pump Capacity (gpm):	800
Approved Discharge Type (Over Top of Casing Seal,Pitless Adapter or Unit):	Overtop of casing
Approved Discharge Location (Building Pressure Tank, Pond, etc.):	Center Pivot

Well Construction

Drilling Method(s):	Mud Rotary	
Total Well Depth:	400'	
Approved Finished Aquifer:	Sandstone	
Enlarged Drillhole Diameter / Depth Interval:	22" / 0' to 60'	
Lower Drillhole Diameter / Depth Interval:	15" / 60' to 400'	
Casing Diameter / Wall Thickness:	16" / 0.25"	
Casing Material / Joint Type:	Stainless Steel / Welded	
Depth of Grouted Casing:	60'	
Screen Material / Slot Size in Inches / Depth Interval:		
Annular Space Seal Type:	Neat Cement Grout	
Annular Space Seal Length:	60'	

Standard Considerations and Requirements:

- You or your well driller must contact Stacy J Steinke at 715-839-3773 at least one work day prior to starting construction in accordance with s. NR 812.03 (1), Wis. Adm. Code.
- The pump installation will discharge through a Department-approved pump and the entire discharge piping arrangement system shall be installed in a manner to meet the applicable requirements of Ch. NR 812, Wis. Adm. Code.
- Unless otherwise stated in explicit conditions specified in this approval, the approved high capacity well shall be constructed within a distance of 660 feet around the approved coordinates; this allowance is subject to setbacks defined in Ch. NR 812, Wis. Adm. Code.



HIGH CAPACITY WELL WITHDRAWAL APPROVAL

Property Water Use: IR10 - Agricultural irrigation

Approval Date: 10/21/2016

County: Pepin

High Cap File Number: 47-01-0058

Property Number: 13669

NewWells

Well Name	Water Use Code(s)	High Capacity Well Number	Pump Capacity (gpm)	Latitude - Decimal Degrees (e.g. 45.12345)	Longitude - Decimal Degrees (e.g89.12345)
Frigation Well	IR10	74043	800	44.6748	-91.8186

Existing Wells

Well Name	Water Use Code(s)	WUWN or Image File #(if known)	High Capacity Well Number	Pump Capacity(gpm)	Latitude - Decimal Degrees (e.g. 45.12345)	Longitude - Decimal Degrees (e.g89.12345)
Residential	DS11	AJ163	74042	10	44.6672	-91.822
Barn Well #3	L\/10	XU835	74532	60	44.6676	-91.8188
Bam Well 1	L\/10	TY138	74539	50	44.6674	-91.8201

Approved Withdra wals by Source

Well Name	Water Use Code	High Cap Well #	Pump Capacity (gpm)	Approved Daily Withdrawal (gallons)	Maximum Approved Monthly Withdrawal Amount (millions of gallons)											
					Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Residential	DS 11	74042	10	14400	0.45	0.40	0.45	0.43	0.45	0.43	0.45	0.45	0.43	0.45	0.43	0.45
Imigation Well	IR10	74043	800	1152000	D	D	D	34.6	35.7	34.6	35.7	35.7	34.6	35.7	D	0
Ban Well#3	LV10	74532	60	86400	2.68	2.42	2.68	2.59	2.68	2.59	2.68	2.68	2.59	2.68	2.59	2.68
Ban Well 1	LV10	74539	50	72000	2.23	2.02	2.23	2.16	2.23	2.16	2.23	2 23	2.16	2.23	2.16	2.23

Maximum Property Monthly Withdrawal Amounts (millions of gallons)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
5.36	4.84	5.36	39.7	41.1	39.7	41.1	41.1	39.7	41.1	5.18	5.36

Please note that your property approval is equal to the sum of the approved with drawal amounts for each source.

Presentation Outline

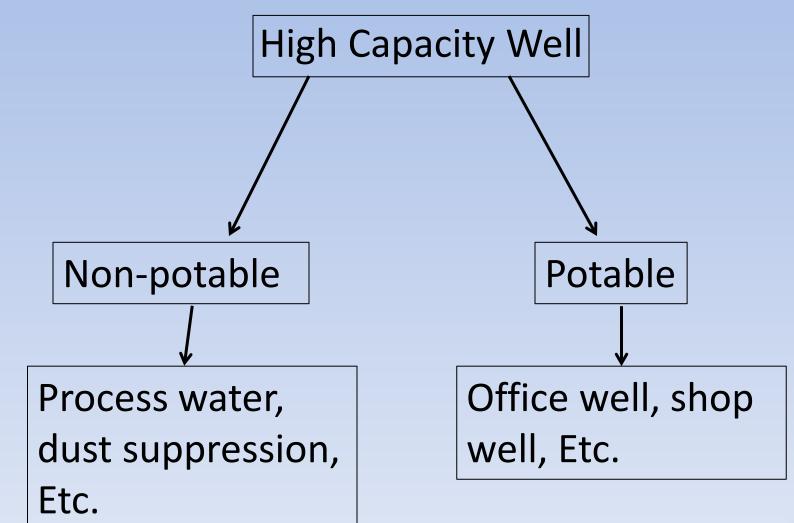
Borehole Filling and Sealing

High Capacity Well Approval

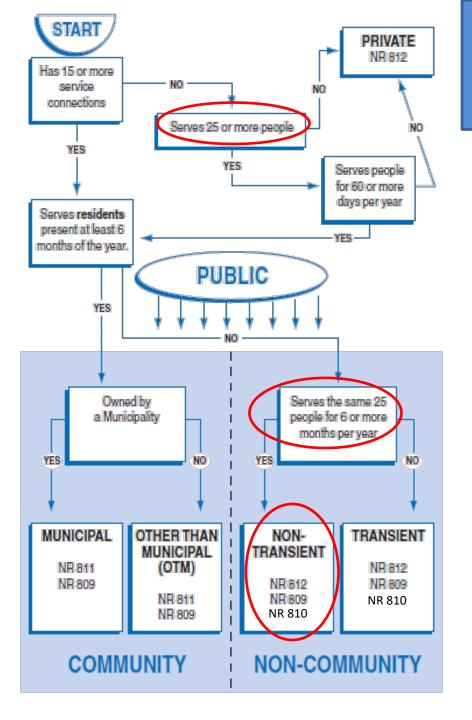
Public System Determination



Well Types and Uses







Is Your Facility a Public System?

- Serves 25 or more 60 days/year
- Serves the same 25 people 6 months/yr

If yes to both, you are a Non-transient, noncommunity system (NN)



So I'm a Public System. Now What?

Non-community Non-transient (NN)

- Certified Operator required
- Must sample for bacteria and Nitrate annually
- Sampling for other parameters including: Lead, copper, inorganics and VOC's as specified in NR 809 Safe Drinking Water https://docs.legis.wisconsin.gov/code/admin_code/nr/800/809/Title



So I'm a Public System. Now What?

Non-community Non-transient (NN)

Inspection every 5 years

Sanitary survey

- New Systems Capacity Development
 - Demonstrate ability to provide safe drinking water



Capacity Development Strategy

- New public water systems
 - capacity evaluation performed & approvals issued as part of review process
 - requirement appears in <u>NR 810.24</u>
- Existing water systems
 - sanitary survey is primary tool for evaluating capacity
 - Continuing Ed for Certified Operator



Public Water System Operation

- Status may change
 - If employees are added or cut
 - Certified operator must be aware of status
 - Communicate with DNR
 - Public Drinking Water staff
- This is especially relevant to Industrial Sand facilities
 - Affected by market fluctuations



Questions?

Wisconsin DNR Water Use Section 608-266-2299 <u>DNRWATERUSEREGISTRATION@wisconsin.gov</u>

More information:

Filling and Sealinghttp://dnr.wi.gov/topic/wells/fillingsealing.html

High Capacity wells – http://dnr.wi.gov/topic/wells/HighCapacity.html

Public System Operator –

http://dnr.wi.gov/topic/drinkingwater/owneroperator.html



Capacity Development

Capacity development is the process of water systems acquiring and maintaining adequate technical, managerial, and financial capabilities to enable them to consistently provide safe drinking water.

— US EPA



Also subject to NR 810

Requires (TMF):

- Technical—includes physical infrastructure, source water adequacy, treatment adequacy, operational capability of system personnel
- Managerial—includes ownership, organization structure, staffing, interactions with customers & regulators
- Financial—includes revenue adequacy, access to capital, fiscal management & record keeping, budgeting, financial planning, financial management

