

Sand Mine Life Cycle Seminar

Eau Claire, Wisconsin

May 12, 2017



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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

- Borehole Filling and Sealing
- High Capacity Wells
- Public System Determination



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)



Applicability

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](#).



Applicability

In other words, NR 812 applies to everything **except:**

ch. [NR 132](#) – Nonferrous Metallic Mining

subch. [III of ch. 295](#), Stats. – Ferrous Metallic Mining

s. [NR 141.25](#). – GW Monitoring Wells



Applicability

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](#), [281](#), [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 fulfillment 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. [NR 141.25](#). All other wells and boreholes shall be abandoned according to the provisions of ch. [NR 812](#).



Applicability

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, 281, 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 fulfillment 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. NR 141.25. All other wells and boreholes shall be abandoned according to the provisions of ch. NR 812.



Applicability

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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

Print... Close Window

State of Wisconsin
Department of Natural Resources
PO Box 7921, Madison WI 53707-7921
DNR.WI.gov

Well / Drillhole / Borehole Abandonment
Form 3300-005 (R 12/04) Page 1 of 2

Notice: Completion of this report is required by chs. 160, 281, 283, 289, 291-293, 295, and 299, Wis. Stats., and ch. NR 141, Wis. Adm. Code. In accordance with chs. 281, 289, 291-293, 295, and 299, Wis. Stats., failure to file this form may result in a forfeiture of between \$10-25,000, or imprisonment for up to one year, depending on the program and conduct involved. Personally identifiable information on this form is not intended to be used for any other purpose. Return form to the appropriate DNR office and bureau. See instructions on reverse for more information.

Route to: Drinking Water Watershed/Wastewater Waste Management Remediation/Redevelopment Other

1. General Information **2. Facility / Owner Information**

WI Unique Well No. _____ DNR Well ID No. _____ County _____ Facility Name _____
Common Well Name _____ Svc/Lot # (if applicable) _____ Facility ID _____ License/Permit/Monitoring No. _____

N 1/4 Section Township Range E Street Address of Well _____
Well Location (Local Grid) Datum _____ City, Village or Town _____
Local Grid Origin Present Well Owner _____ Original Well Owner _____
WTH- UTM- Latitude/Longitude- State Plane- Datum _____ Street Address or Route of Present Owner _____
City _____ State _____ ZIP Code _____

3. Well / Drillhole / Borehole Information **4. Pump, Liner, Screen, Casing & Sealing Material**

Reason For Abandonment _____ WI Unique Well No. of Replacement Well _____

Monitoring Well Original Construction Date _____
 Water Well
 Borehole / Drillhole If a Well Construction Report is available, please attach.

Construction Type: Drilled Driven (Sandpoint) Dug
Other (specify): _____

Formation Type: Unconsolidated Formation Bedrock
Total Well Depth From Groundsurface (ft.) _____ Casing Diameter (in.) _____

Lower Drillhole Diameter (in.) _____ Casing Depth (ft.) _____

Was well annular space grouted? Yes No Unknown
If yes, to what depth (feet)? _____ Depth to Water (feet) _____

Sealing Material: Neat Cement Grout Clay-Sand Slurry (11 lb./gal. wt.)
 Sand-Cement (Concrete) Grout Bentonite-Sand Slurry
 Concrete Bentonite Chips
 Screened & Poured (Bentonite Chips) Other (Explain): _____

For Monitoring Wells and Monitoring Well Boreholes Only:
 Bentonite Chips Bentonite - Cement Grout
 Granular Bentonite Bentonite - Sand Slurry

5. Material Used To Fill Well / Drillhole

From (ft.)	To (ft.)	No. Yards, Bags, Seals or Volume (above one)	Mix Ratio or Mud Weight
Surface			

6. Comments

7. Supervision of Work **DNR Use Only**

Name of Person or Firm Doing Sealing Work _____ Date of Abandonment _____ Date Received _____ Noted By _____
Street or Route _____ Telephone Number _____ Comments _____
City _____ State _____ ZIP Code _____ Signature of Person Doing Work _____ Date Signed _____

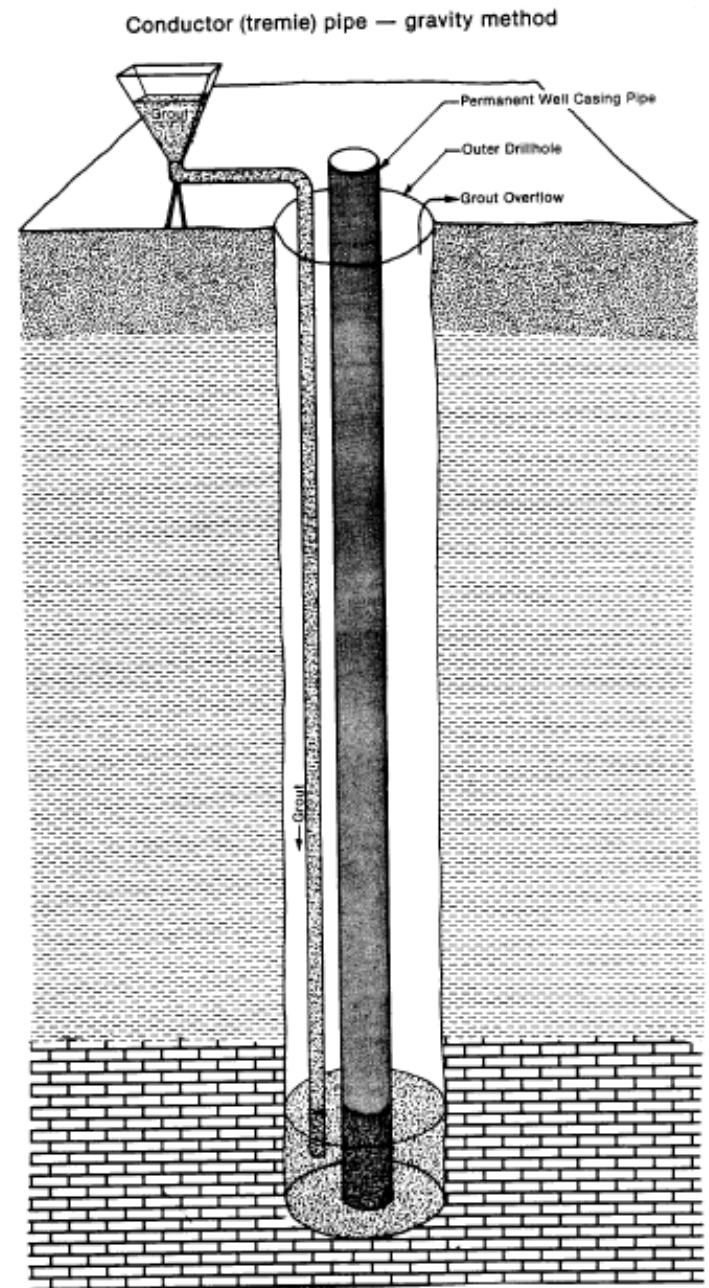


NR 812 - Methods

- 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



<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

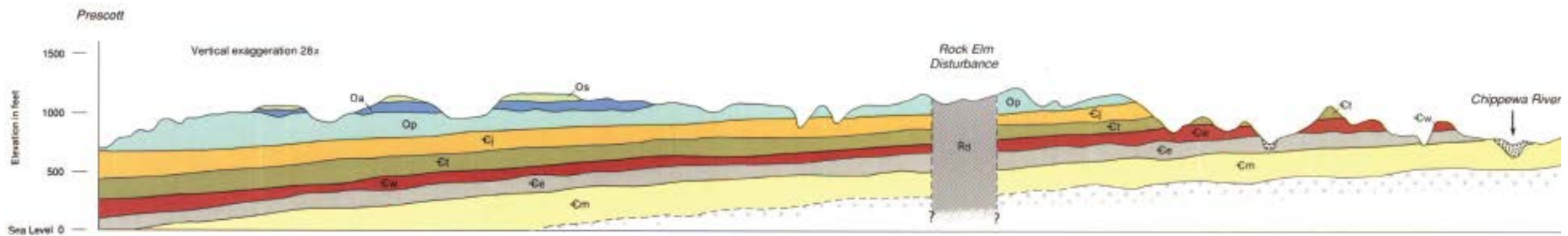


Figure Modified from: WGNHS Bedrock Geology West-Central Sheet
B. Brown 1988

Contaminant Pathway

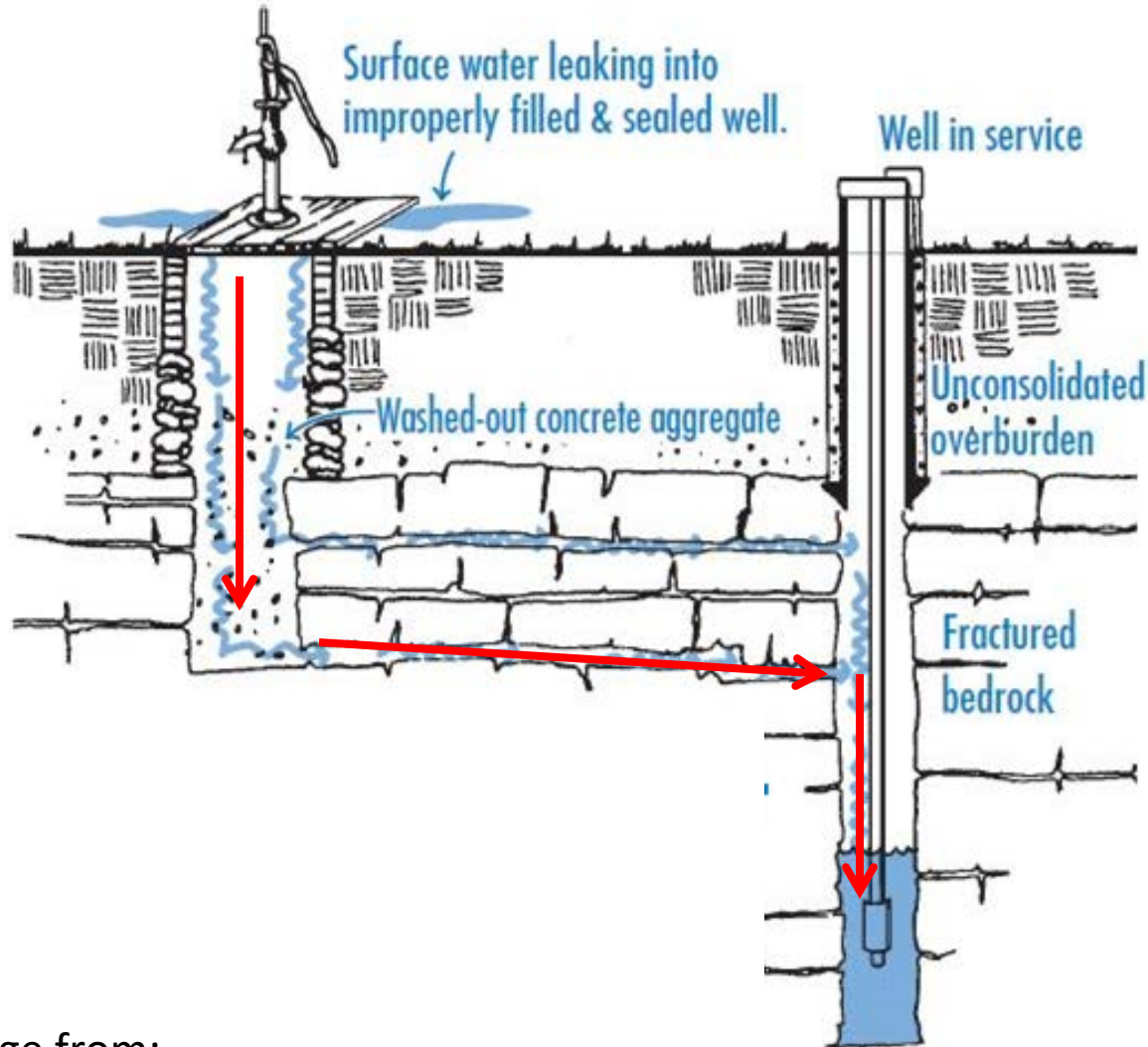


Image from:

<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



07/25/2014

Examples



Improper Filling and Sealing



Proper filling and sealing



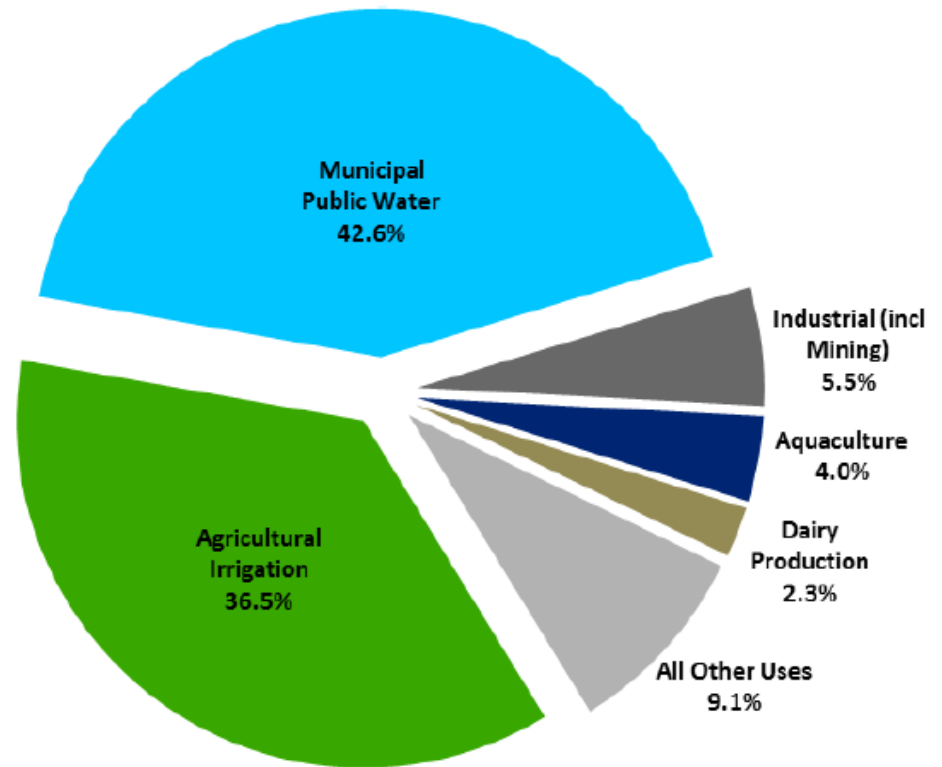
Presentation Outline

- Borehole Filling and Sealing
- High Capacity Wells
- Public System Determination



High Capacity Wells – Fun Facts

2015 Total Groundwater Withdrawals by Water Use
223 billion gallons statewide



- “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

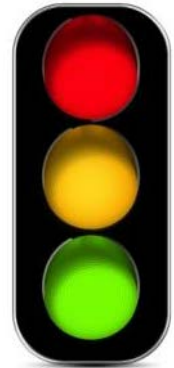
* Combined IN62 and IN65

- 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.



The Wisconsin DNR's High Capacity Well Approval Process



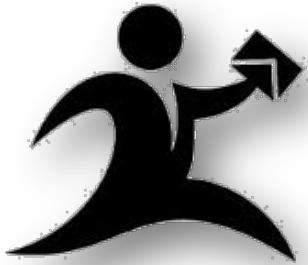
- Denied
- Approved with Modifications
- Approved

High Capacity Well Application Submitted to WI DNR

WI DNR conducts review of high capacity well application

WI DNR determines outcome of high capacity well application

The Wisconsin DNR's High Capacity Well Approval Process



Denied

Approved with
Modifications

Approved

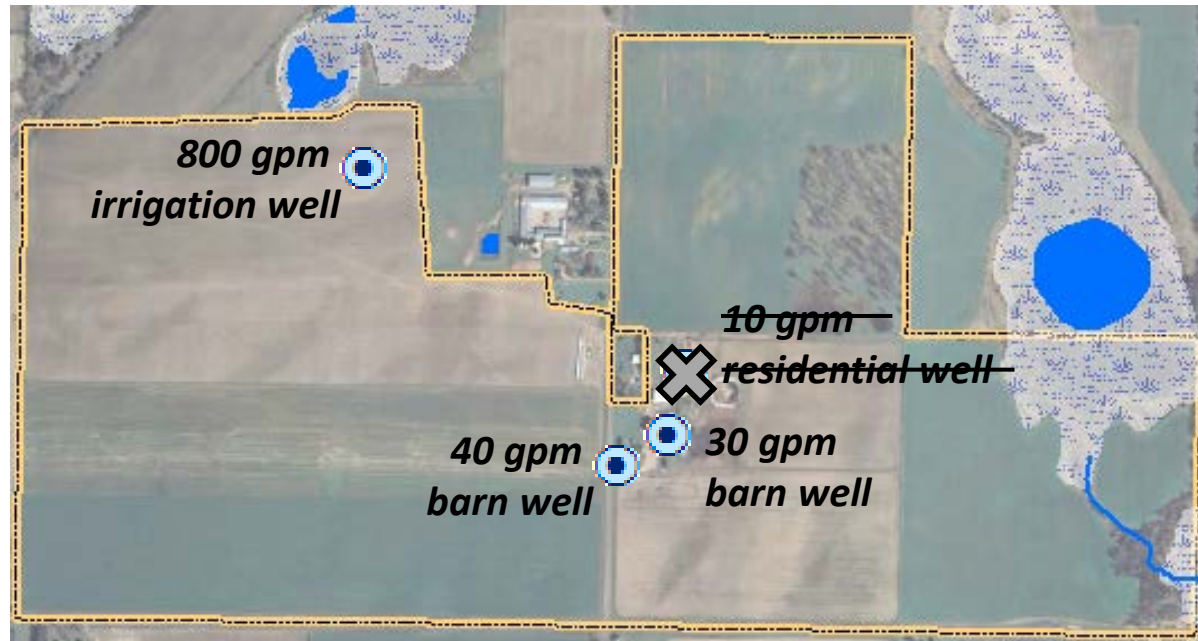
**High Capacity Well
Application Submitted to
WI DNR**

WI DNR conducts
review of high
capacity well
application

WI DNR determines
outcome of high
capacity well
application

What is a High Capacity Well?

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



High capacity well at land surface



Submitting the Application

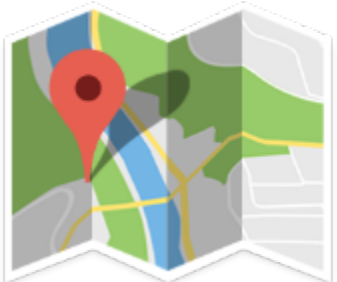
Non-Potable High Cap Well Application
WDNR Form 3300-295
4 page application
Submit application and \$500 fee

Potable High Cap Well Application
WDNR Form 3300-256
6 page application
Submit application and \$500 fee

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

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

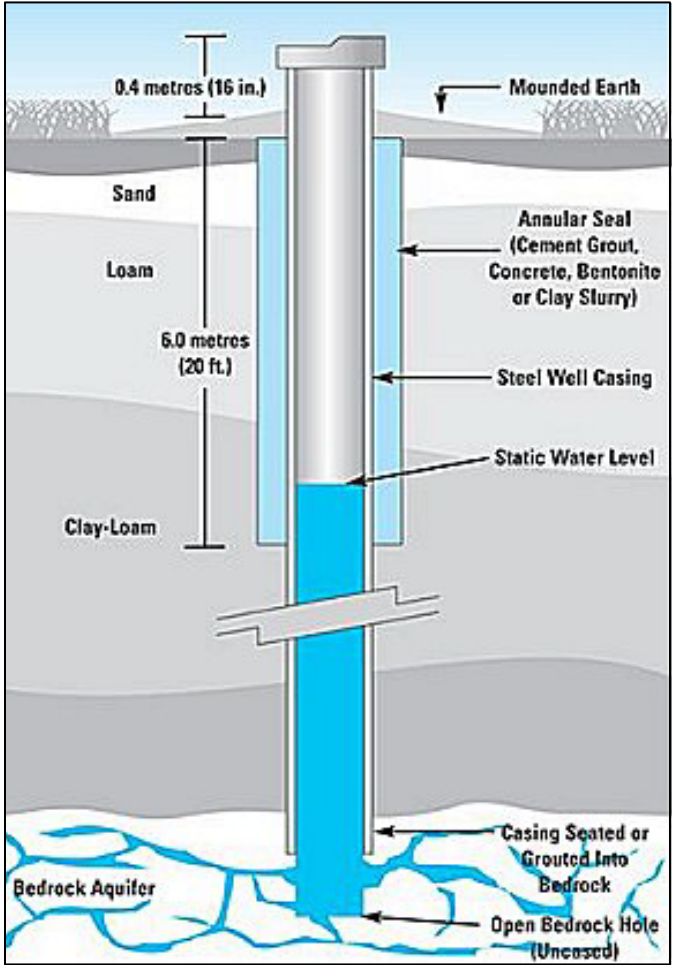
Submitting the Application



Location



**Water Use Type,
Frequency, & Volume**



www.bcgroundwater.ca

Well Construction

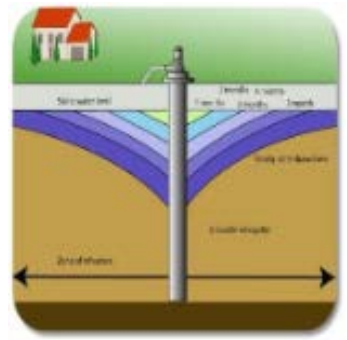
DNR's Processing of High Capacity Well Application



Application Received by DNR



App registered into Water Use System



Groundwater Quantity Review



Non-Potable Approval Issued
Water Use Program



Potable Engineering Review



Potable Approval Issued
Public Water Engineering Program

The Wisconsin DNR's High Capacity Well Approval Process



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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

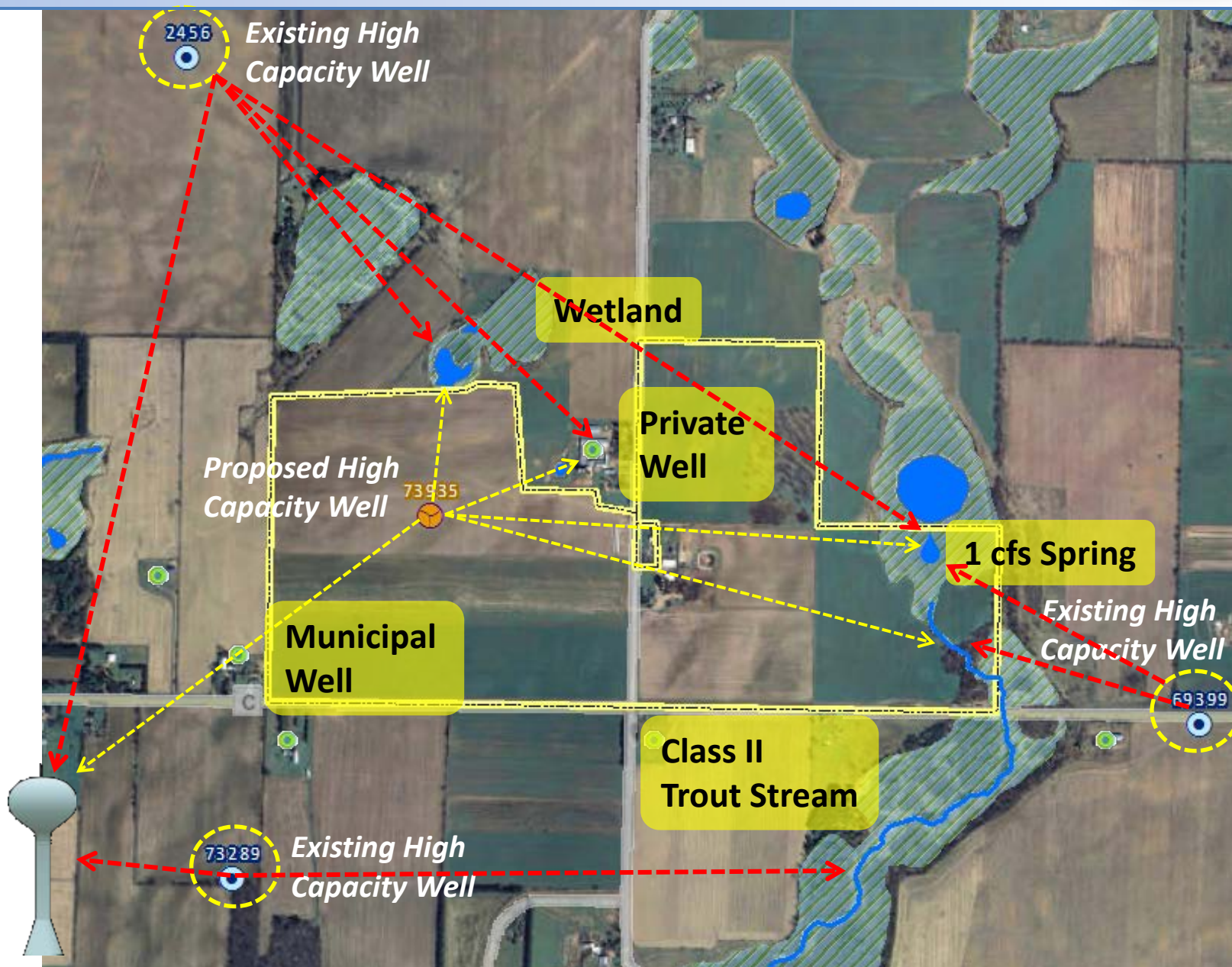
May 10, 2016 - Present

Within 1,200-feet of designated waters

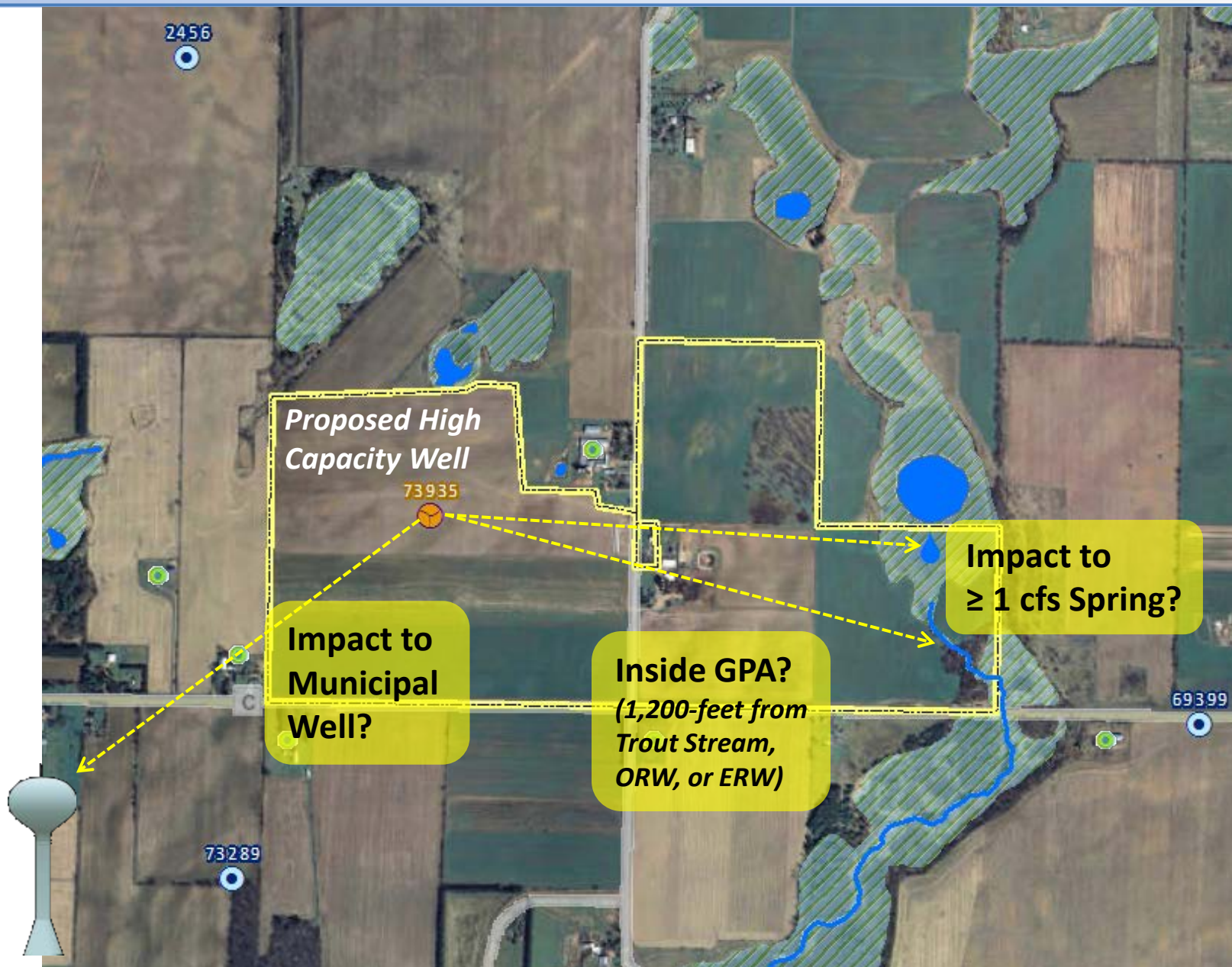
1 cfs springs

>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



Proposed High Capacity Well

73935

Impact to Municipal Well?

Inside GPA?
(1,200-feet from Trout Stream, ORW, or ERW)

Impact to ≥ 1 cfs Spring?

2456

73289

69399

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

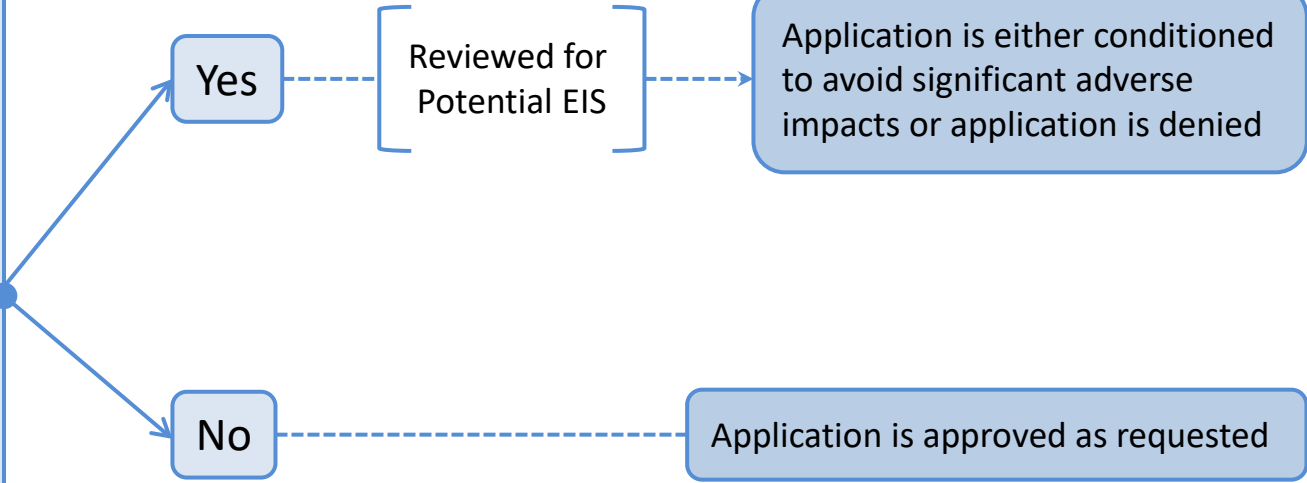
High Capacity Well Application Received by DNR



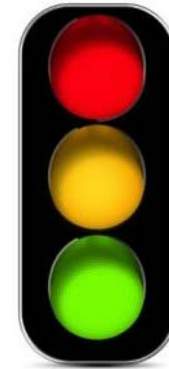
Screen Process
Does the Proposed High Capacity Well:

- ✓ fall within a Groundwater Protection Area?
(Within 1,200 feet to trout stream, outstanding or exceptional resource water body)
- ✓ impact to spring (> 1 cfs)?
- ✓ result in 95% Water Loss?
- ✓ impact a municipal well?
- ✓ impact groundwater quality?

Wis. Stat. 281.34, Admin. Code NR 812.09



The Wisconsin DNR's High Capacity Well Approval Process



Denied

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High Capacity Well Approval Document

APPROVAL TO CONSTRUCT A HIGH CAPACITY WELL

Approval Date: **10/21/2016**

County: **Pepin**

High Cap File Number: **47-01-0058**

Property Number: **13669**

Property/Water Use: **IR10 - Agricultural irrigation**

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 Approval Document

HIGH CAPACITY WELL WITHDRAWAL APPROVAL

Approval Date: **10/21/2016**

County: **Pepin**

High Cap File Number: **47-01-0058**

Property Number: **13669**

Property Water Use: **IR10 - Agricultural irrigation**

New Wells

Well Name	Water Use Code(s)	High Capacity Well Number	Pump Capacity (gpm)	Latitude - Decimal Degrees (e.g. 45.12345)	Longitude - Decimal Degrees (e.g. -89.12345)
Irrigation 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.g. -89.12345)
Residential	DS11	AJ163	74042	10	44.6672	-91.822
Barn Well #3	LV10	XU835	74532	60	44.6676	-91.8188
Barn Well 1	LV10	TY138	74539	50	44.6674	-91.8201

Approved Withdrawals 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	DS11	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
Irrigation Well	IR10	74043	800	1152000	0	0	0	34.6	35.7	34.6	35.7	35.7	34.6	35.7	0	0
Barn 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
Barn 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

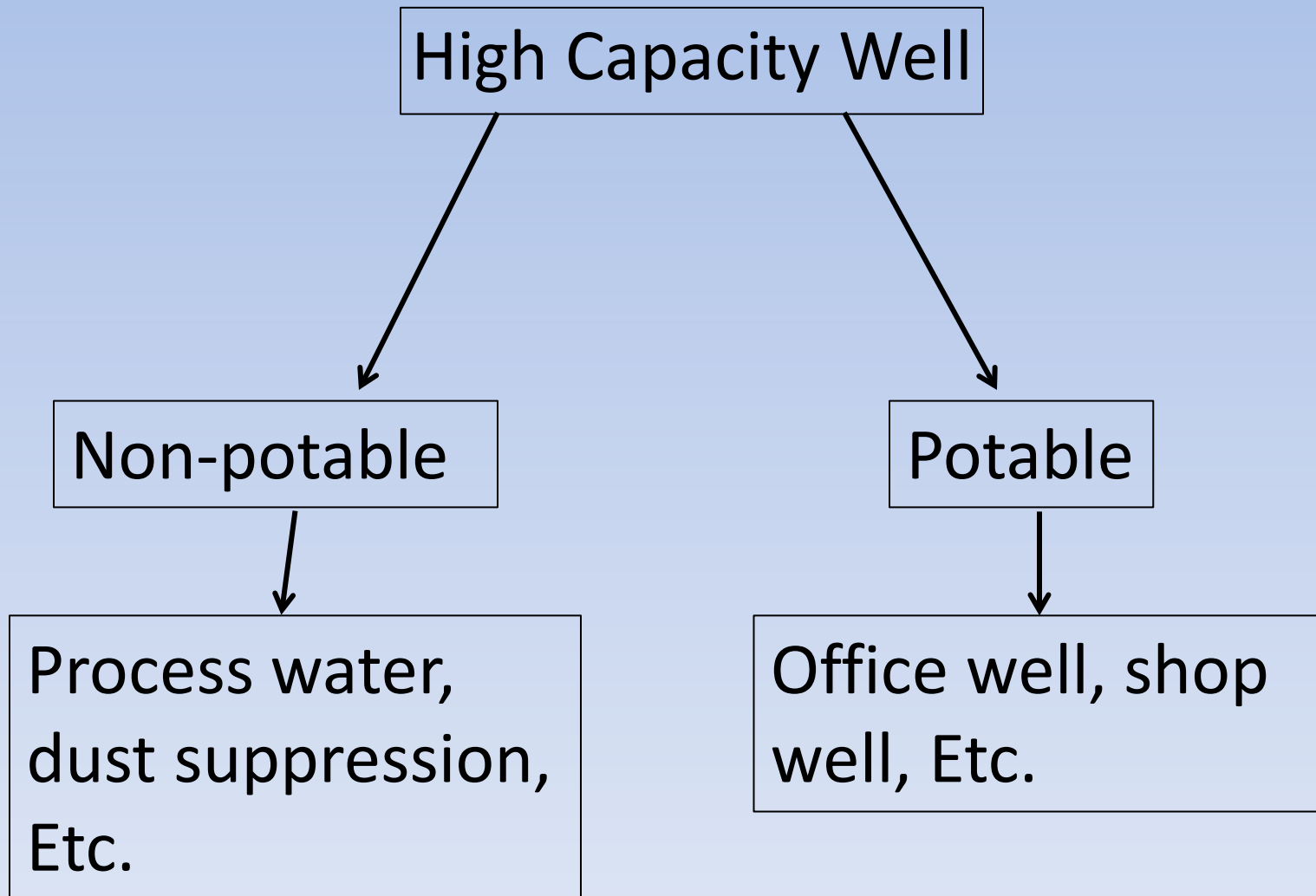
Please note that your property approval is equal to the sum of the approved withdrawal amounts for each source.

Presentation Outline

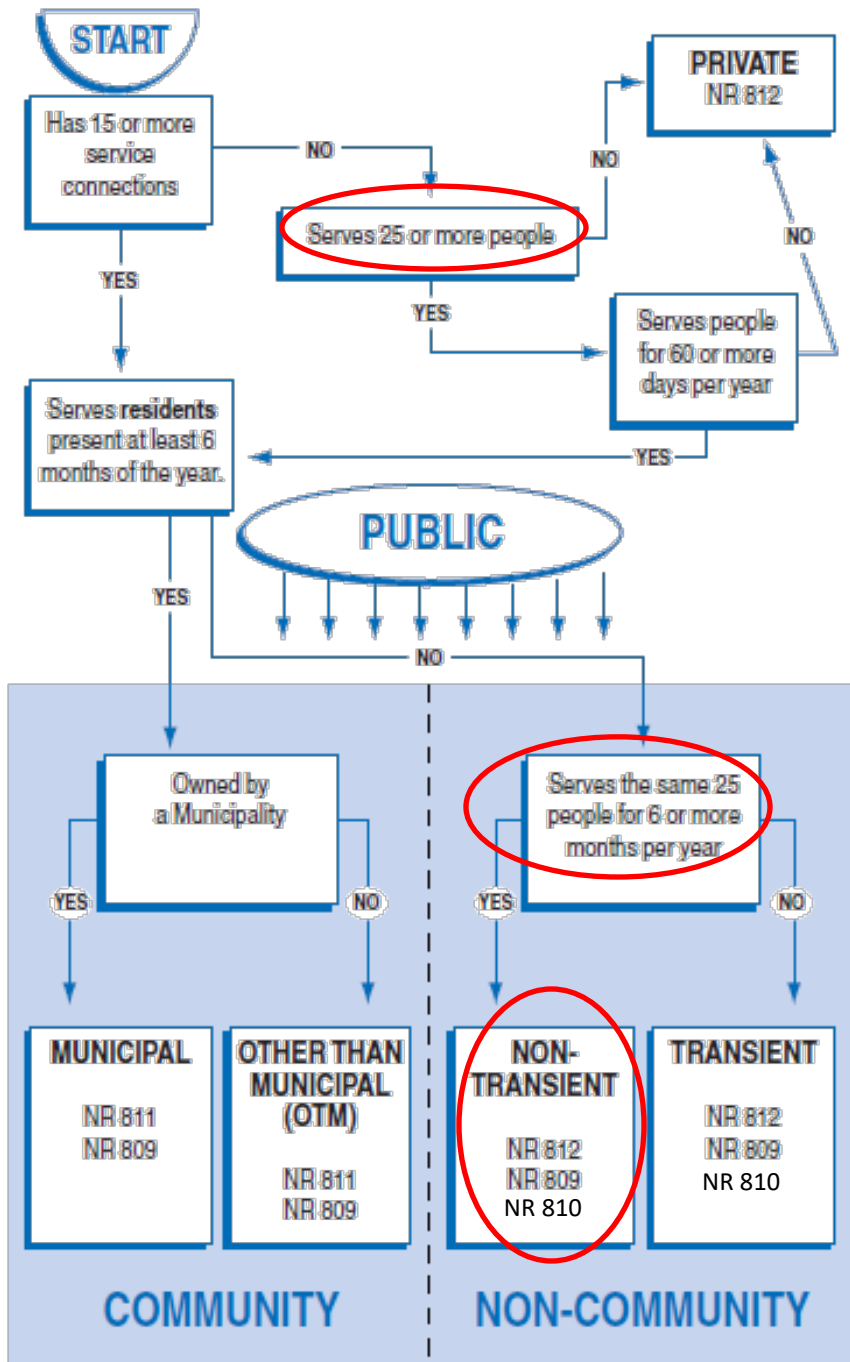
- Borehole Filling and Sealing
- High Capacity Well Approval
- **Public System Determination**



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, non-community 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 [NR 810.24](#)
- 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

DNRWATERUSEREGISTRATION@wisconsin.gov

More information:

[Filling and Sealing](http://dnr.wi.gov/topic/wells/fillingsealing.html) –

<http://dnr.wi.gov/topic/wells/fillingsealing.html>

[High Capacity wells](http://dnr.wi.gov/topic/wells/HighCapacity.html) –

<http://dnr.wi.gov/topic/wells/HighCapacity.html>

[Public System Operator](http://dnr.wi.gov/topic/drinkingwater/owneroperator.html) –

<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