



MICHIGAN DEPARTMENT OF
ENVIRONMENT, GREAT LAKES, AND ENERGY

Groundwater across EGLE

Andrew Gelderloos, Geology Specialist

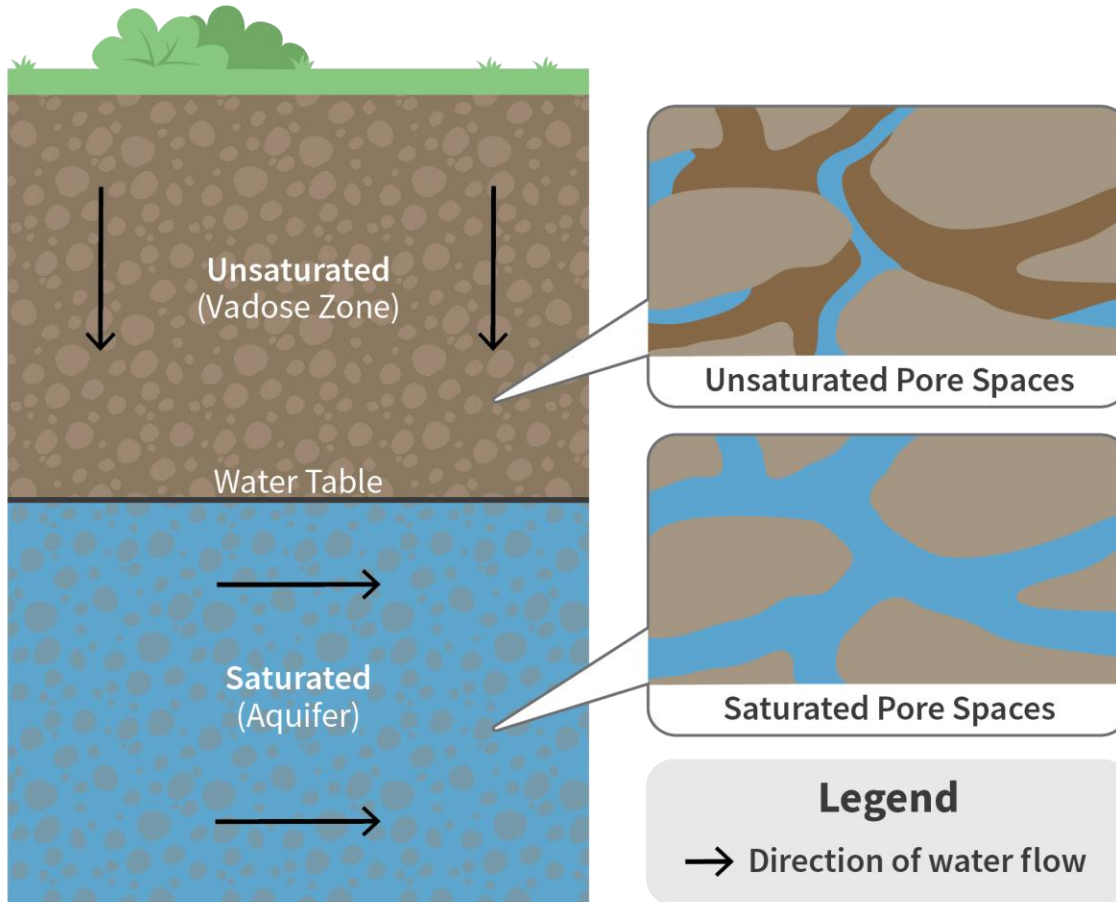
Water Resources Division

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Overview/Agenda

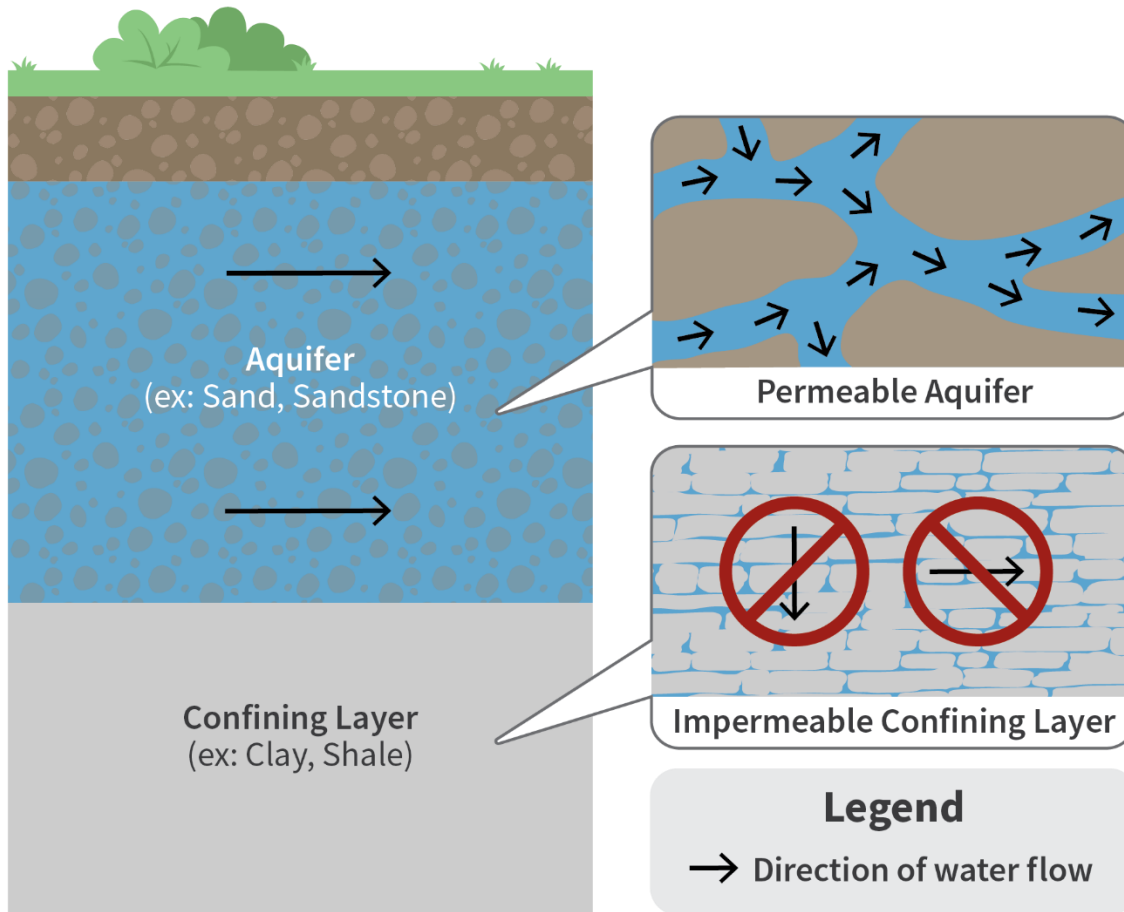
- Groundwater:
 - What is it?
 - Why does it matter?
- EGLE's Groundwater Programs
- Dataset and Tools for Groundwater in Michigan

Underground Saturated and Unsaturated Zones



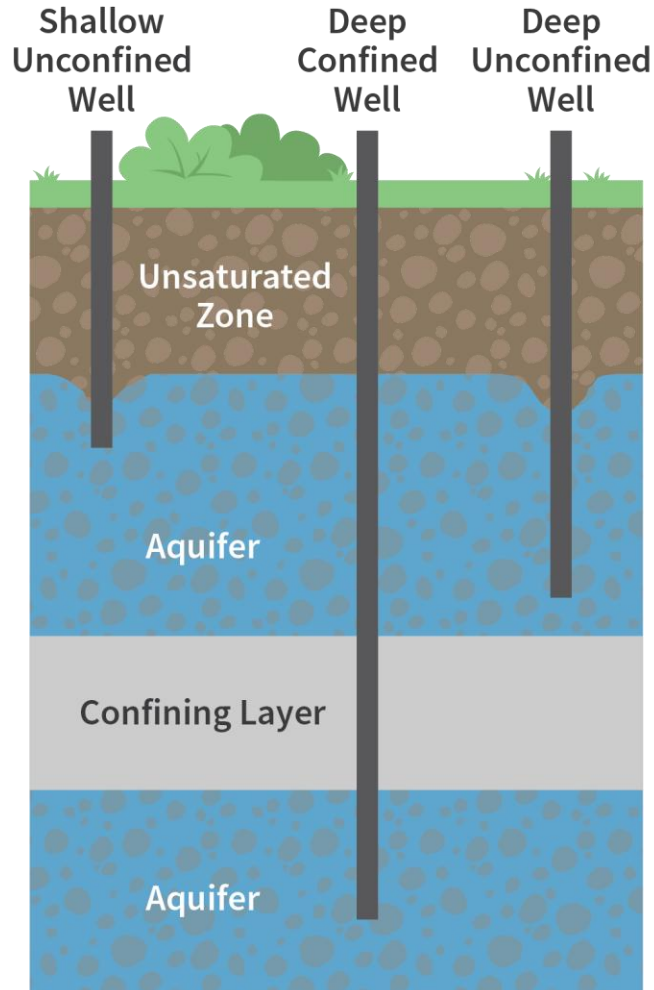
- Groundwater is water below the land surface in a zone of saturation
- The depth to the water table varies

Aquifers and Confining Layers



- Groundwater moves through pore spaces between sediments or cracks in rocks
- Groundwater moves slower than surface water
- Movement is constrained when pore spaces and cracks are small or not connected

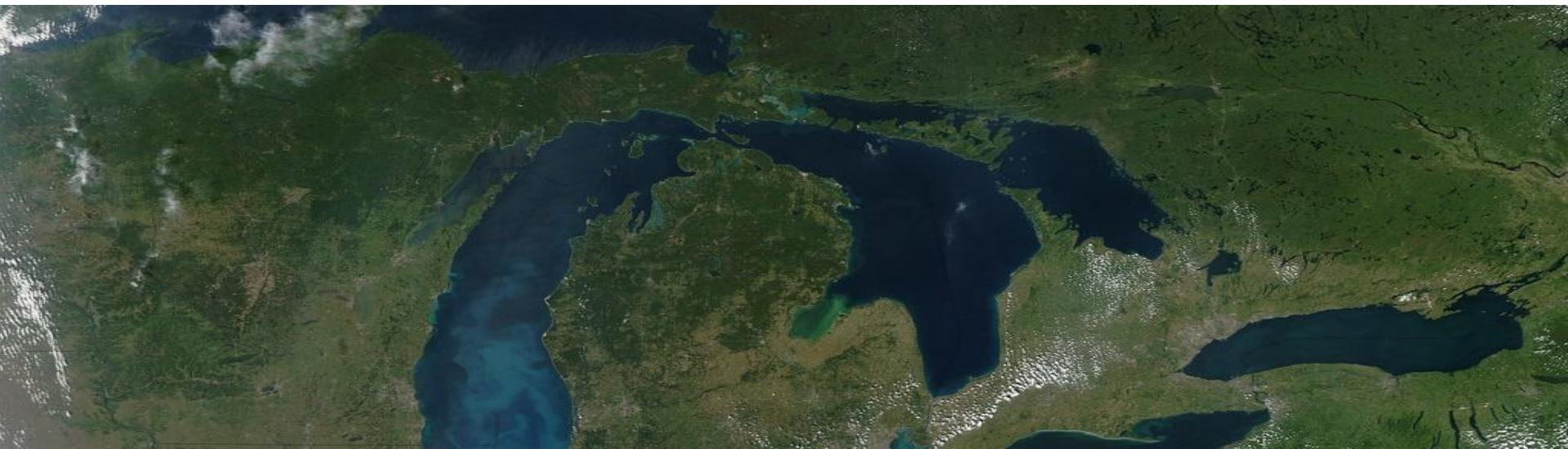
Shallow and Deep Wells



- Wells pump groundwater from aquifers
- Wells drilled to different depths at the same surface location pump groundwater that may come from:
 - Different parts of the same aquifer
 - Different, unconnected, aquifers

Importance of Groundwater

- 45% of Michiganders are serviced by groundwater
- Over 1 million drinking water wells
- Surface water is connected to groundwater
- Groundwater movement connects places



Groundwater Regulatory Programs

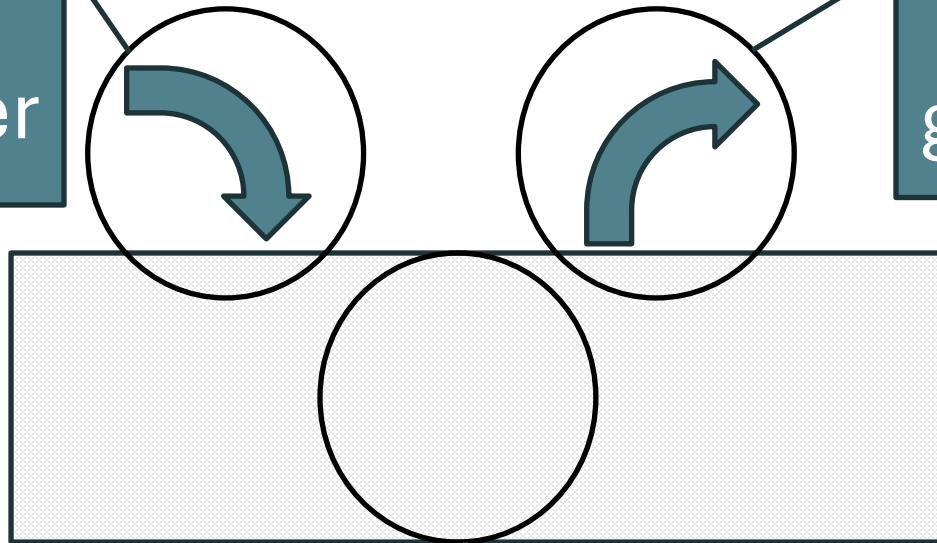
- Biosolids
- Concentrated Animal Feeding Operations
- Drinking Water
- Environmental Remediation
- Groundwater Discharge
- Leaking Underground Storage Tanks
- Materials Management
- National Pollutant Discharge Elimination System
- Onsite Wastewater Management
- Septage
- Source Water Protection
- Superfund
- Water Well Construction
- Water Use

Program Categories

(Unofficial, for overview purposes only)

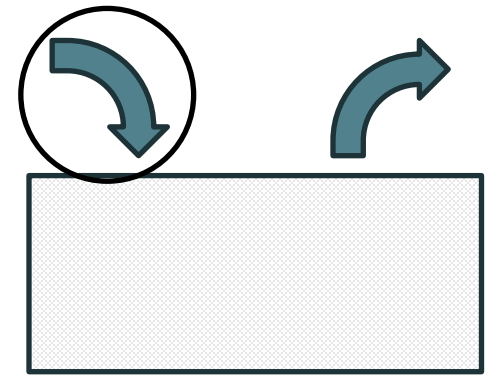
Managing
what goes
into
groundwater

Managing
what comes
out of
groundwater



Managing what may be
in groundwater already

Groundwater Discharge Program



Authority: Part 22, promulgated under
Part 31 of Act 451 of 1994 (NREPA)

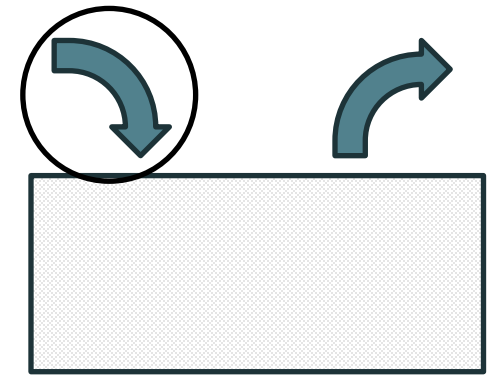
EGLE Division: Water Resources

Regulates the
discharge of treated
wastewater to ground
or groundwaters of the
state.

Webpage: [Groundwater
Discharge](#)



Materials Management Program



Authority: Parts 111, 115, 121 of Act 451 of 1994 (NREPA)

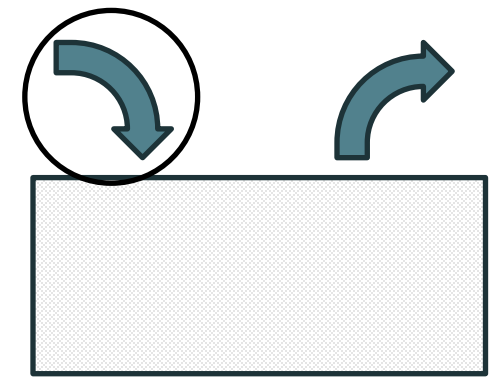
EGLE Division: Materials Management

When waste is improperly handled and disposed, groundwater quality can be impacted.

Webpage: [Materials Management](#)



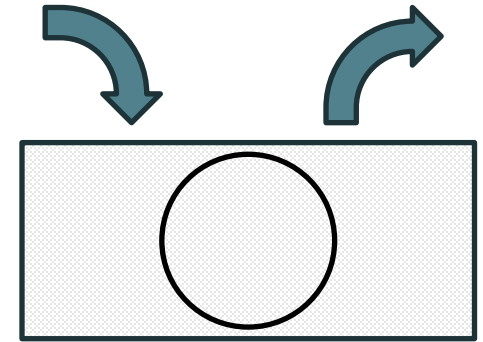
Other Programs To Manage What Goes Into Groundwater



Program	EGLE Division
National Pollutant Discharge Elimination System (NPDES)	Water Resources
Onsite Wastewater Management	Drinking Water and Environmental Health
Septage	Drinking Water and Environmental Health
Biosolids	Water Resources
Concentrated Animal Feeding Operations (CAFO)	Water Resources



Environmental Remediation Program



Authority: Parts 201 of Act 451 of 1994
(NREPA)

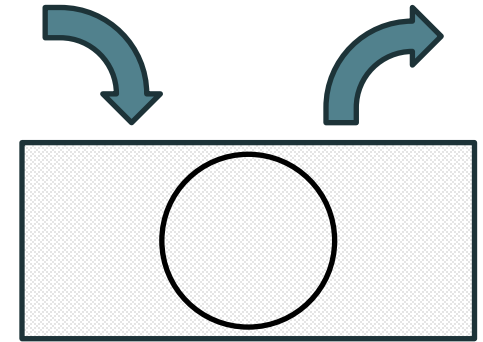
EGLE Division: Remediation and
Redevelopment

Oversees remediation of
contaminated properties,
including sites with
existing or threatened
impacts to groundwater.

Webpage: [Remediation
and Redevelopment](#)



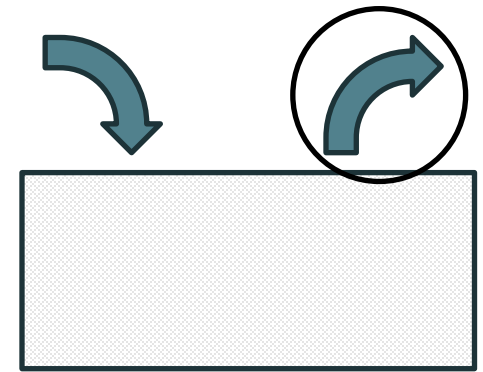
Other Programs To Manage What May Already Be In Groundwater



Program	EGLE Division
<u>Leaking Underground Storage Tank</u>	Remediation and Redevelopment
<u>Superfund</u>	Remediation and Redevelopment



Water Well Construction Program



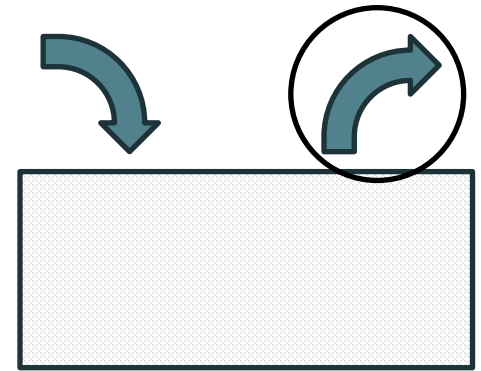
Authority: Part 127, Act 368 of 1978
(Public Health Code)

EGLE Division: Drinking Water and
Environmental Health

Regulates drinking
water well
construction,
operation, and
decommissioning
Webpage: [Water well
construction](#)



Drinking Water Program



Authority: Act 399 of 1976 (Safe Drinking Water Act)

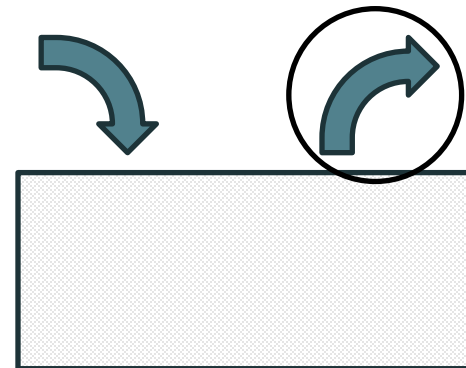
EGLE Division: Drinking Water and Environmental Health

Regulates the public water supplies to ensure that they are complying with state and federal requirements to provide clean water to Michigan residents.

Webpage: [Drinking Water](#)



Source Water Protection Program



Authority: Voluntary program with guidelines developed in response to 1986 amendments to the federal Safe Drinking Water Act

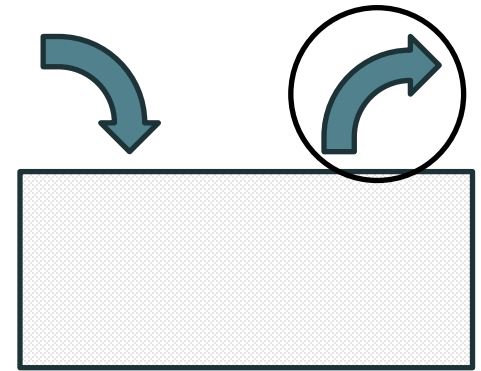
EGLE Division: Drinking Water and Environmental Health

Assists local communities in protecting their water source, including identifying areas where groundwater is used to supply drinking water to communities.

Webpage: [Source Water Protection](#)



Water Use Program



Authority: Part 317 of Act 451 of 1994
(NREPA)

EGLE Division: Geologic Resources
Management

Regulates water
withdrawals to manage
the groundwater and
surface water resources
within Michigan's
jurisdiction of the Great
Lakes Basin.

Webpage: [Water Use](#)



Groundwater Support

- Wellogic
- Laboratory Analysis for Groundwater Quality
- Remediation Information Data Exchange (RIDE)
- MiEnviro
- EGLE's ArcGIS Online Environment
- Web Maps
- Groundwater Data Management System
- Hydrologic Enhancements for Michigan
- Michigan Hydrologic Framework

Wellogic

- Water well and pump record required by the Water Well Construction and Pump Installation Code in Part 127.
- Over 1 million records
- Publicly accessible
- Website: [Wellogic Home](#)
- Informational website: [Wellogic](#)

EGLE
MICHIGAN DEPARTMENT OF ENVIRONMENT, GREAT LAKES, AND ENERGY
DRINKING WATER AND ENVIRONMENTAL HEALTH DIVISION
WATER WELL AND PUMP RECORD
Completion is required under authority of Part 127 of 1978 PA 368, as amended.

Failure to comply is a misdemeanor.

TAX NUMBER		PERMIT NUMBER	
LATITUDE		LONGITUDE	
COUNTY		TOWNSHIP	
DISTANCE & DIRECTION FROM ROAD INTERSECTION		WELL STREET ADDRESS, CITY/ZIP	
WELL OWNER NAME		ADDRESS	
CITY/ZIP		Owner Address Same As Well Address? ☐ Yes ☐ No	
PUMP ☐ Not Installed ☐ Pump Installation Only		PUMP TYPE ☐ Submersible ☐ Jet ☐ Other	
PUMP MANUFACTURER		PUMP MODEL NUMBER	
PUMP CAPACITY _____ G.P.M.		PUMP VOLTAGE _____ Volts	
LENGTH OF DROP PIPE _____ ft.		DIA. OF DROP PIPE _____ in.	
PRESSURE TANK ☐ Not Installed ☐ Installed		PRESSURE TANK TYPE ☐ Diaphragm/Bladder ☐ Galvanized	
PRESSURE TANK MANUFACTURER		PRESSURE TANK MODEL	
TOTAL TANK CAPACITY _____ gal.		PRESSURE RELIEF VALVE INSTALLED ☐ Yes ☐ No	
FORMATION DESCRIPTION		THICKNESS OF STRATUM	
DEPTH TO BOTTOM OF STRATUM			
WELL YIELD TEST		PUMPING LEVEL _____ ft. after _____ hrs. pumping at _____ G.P.M.	
PUMPING METHOD ☐ Bailor ☐ Plunger ☐ Test Pump			
SCREEN ☐ Not Installed ☐ Filter-Packed ☐ Diameter _____ in.			
MATERIAL ☐ Stainless Steel ☐ Plastic ☐ Other			
SLOT _____ in. Length _____ ft. From _____ ft. To _____ ft.			
INSTALLATION METHOD ☐ Telescoped ☐ Attached ☐ Neoprene Packer ☐ Brenner Check ☐ Other			
WELL GROUTED ☐ Bentonite Slurry ☐ Bentonite Dry Granular ☐ Neat Cement ☐ Neat Cement with Bentonite ☐ Concrete			
ADDITIVE ☐ Lost Circulation Material ☐ Accelerator ☐ Retarder ☐ GROUT PIPE OUTSIDE CASING ☐ Driven dry grout ☐ GROUT PIPE INSIDE CASING ☐ Displacement plug			
WELLHEAD COMPLETION ☐ Pileless Adapter ☐ 12 in. Above Grade ☐ Basement Offset ☐ Well House			
NEAREST SOURCE OF POSSIBLE CONTAMINATION		Type _____ Distance _____ ft. Direction _____	
ABANDONED WELL PLUGGED ☐ Yes ☐ No		Latitude _____ Longitude _____	
PLUGGING MATERIAL ☐ Neat Cement ☐ Bentonite Slurry ☐ Cement/Bentonite Slurry ☐ Concrete Grout ☐ Bentonite Chips			
NO. OF BAGS _____ Casing Removed? ☐ Yes ☐ No			
REMARKS			
ATTENTION WELL OWNER: FILE WITH DEED			
DRILLING MACHINE OPERATOR ☐ Employee ☐ Subcontractor		Name _____	
PUMP INSTALLER (if different from drilling machine operator)		Name _____	
WATER WELL CONTRACTOR'S CERTIFICATION:		This well and/or pump installation was performed under my registration.	
Registered Business Name _____		Registration No. _____	
Address _____		City/State/Zip _____	
Signature of Registered Contractor _____		Date _____	

Laboratory Analysis

- Drinking Water
 - EGLE Drinking Water Laboratory offers services for the analysis of drinking water quality
 - EGLE Laboratory Certification Program certifies laboratories for the analysis of drinking water
- Environmental Laboratory
 - State-run environmental laboratory for analyzing environmental samples
- Website: [Laboratory Services](#)
- Groundwater quality results are
 - Incorporated into project documents and available in program-specific databases or
 - Restricted when containing sensitive information



Remediation Information Data Exchange



- Platform to exchange data and information for the Environmental Remediation and Leaking Underground Storage Tank Programs
- Groundwater information and data is available in site-specific reports
- Website: [Remediation Information and Data Exchange](#)
- Informational Website: [Remediation Information Data Exchange \(RIDE\) - About](#)



MiEnviro Portal

- Platform to exchange data and information for the Groundwater Discharge, NPDES, and Water Use Programs
- Groundwater information and data is available in site-specific reports
- Website: [MiEnviro Portal](#)
- Informational Website: [MiEnviro Portal - About](#)

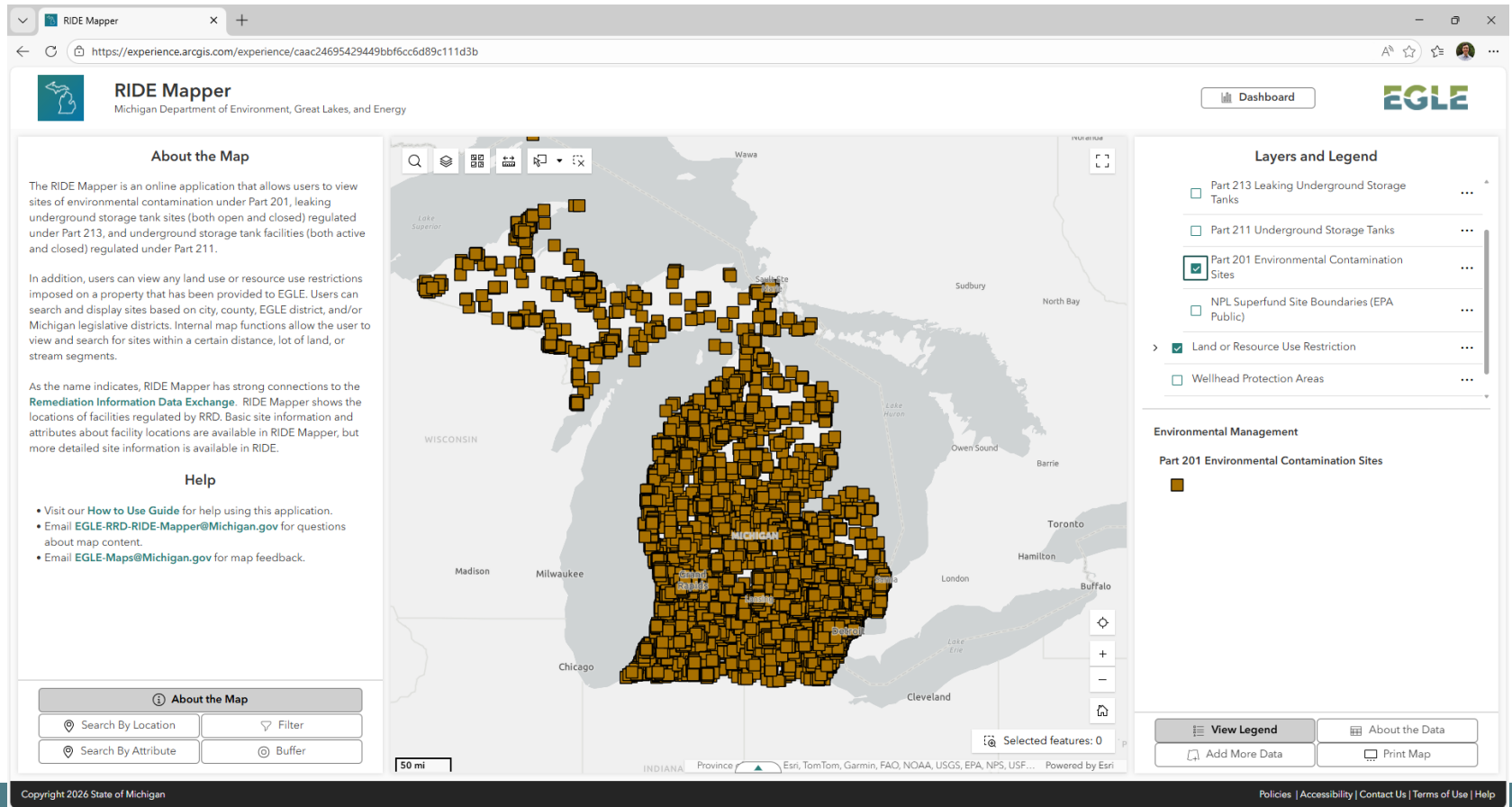


EGLE's ArcGIS Online Environment

- Access to EGGLE's spatial information, including:
 - Spatial datasets
 - Maps
 - Apps
 - Stories
- Website: [EGLE's ArcGIS Online Environment](#)

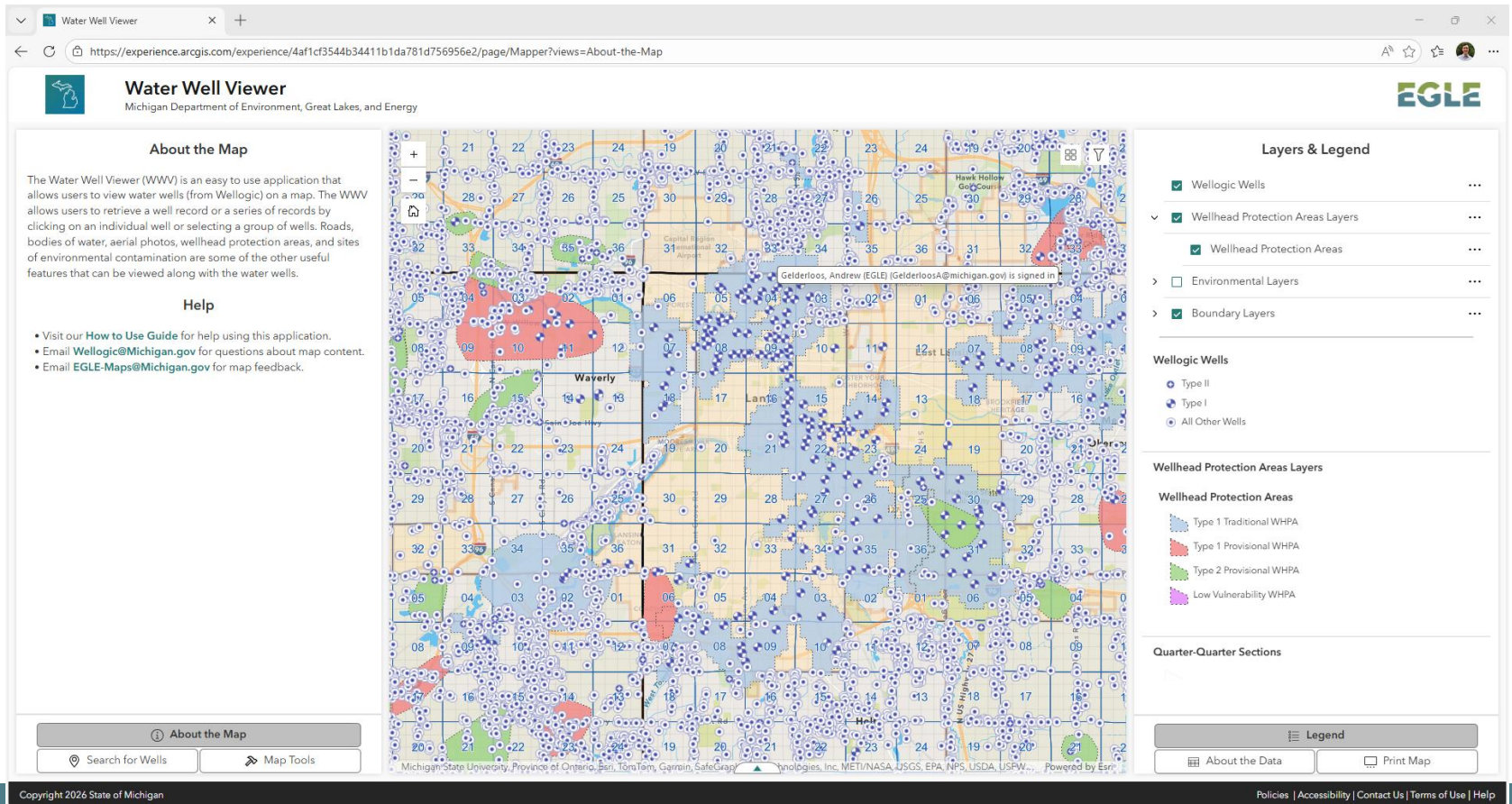
Web Map for Groundwater: RIDE Mapper

Website: [RIDE Mapper](https://experience.arcgis.com/experience/caac24695429449bbf6cc6d89c111d3b)



Web Map for Groundwater: Water Well Viewer

Website: [Water Well Viewer](https://experience.arcgis.com/experience/4af1cf3544b34411b1da781d756956e2/page/Map?views=About-the-Map)



Website: [GeoWebFace](#)



Web Maps for Groundwater: Dataset Comparison

Water Well Viewer	RIDE Mapper	GeoWebFace
Wellogic wells	Wellogic wells	Wellogic wells
Wellhead Protection Areas	Wellhead Protection Areas	
		Statewide groundwater monitoring network
Environmental Remediation Sites; Underground Storage Tank Sites	Environmental Remediation Sites; Underground Storage Tank Sites; Superfund Sites	
	Brownfield Redevelopment Sites	
	Land or Resource Use Restriction	
Solid Waste Disposal Sites (Part 115 Landfills)	Solid Waste Disposal Sites (Part 115 Landfills)	
	Geology and geologic features	Geology and geologic features
		Wetlands (Part 303)
		Sand dune areas
		Sand and gravel operations; Mining; Oil, gas, and mineral wells
	Users can upload datasets	Users can upload datasets

Groundwater Data Management System

- Central data warehouse
 - House all of EGLE's groundwater data
 - Accept new data from EGLE staff and others
 - Be queried by internal and external customers
 - Communicate with other external databases
- Easier access to standardized data to enable:
 - More-informed decision making
 - Better data quality
 - Greater transparency and confidence in EGLE data and decisions

Hydrologic Enhancements for Michigan

- Review and Enhance:
 - Surface water monitoring networks
 - Groundwater monitoring networks
- Airborne electromagnetic surveys
 - To better understand the structure of aquifers
- Groundwater Modeling
 - To simulate how the environment responds to different impacts
- Website: [Hydrologic Enhancement for Michigan \(HEMI\)](#)
- Michigan Hydrologic Framework
 - Centralized access to groundwater models
 - (MSU) Website: [Michigan Hydrologic Framework](#)



Michigan Department of
**Environment, Great Lakes, and
Energy**

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