AGENDA

Eau Claire County

• Groundwater Advisory Committee •

Date: Thursday, May 5, 2022

Time: 4:00 P.M.

Location: *Eau Claire County Court House, Room 302*

721 Oxford Avenue Eau Claire, WI 54703

For those wishing to make public comment, you must e-mail Greg Leonard at Greg.Leonard@co.eau-claire.wi.us at least 30 minutes prior to the start of the meeting.

AGENDA

The Committee will discuss and may act on any of the following items:

1. Call to order by Chair pro-tempore
2. Roll call of members present
3. Confirmation of Compliance with Open Meeting Law
4. Public Comment Period (15 minute maximum)
5. Introductions
6. Notice of County Supervisors appointed to Groundwater Advisory Committee: James Dunning (Chair pro tempore), Nancy Coffey, Jodi Lepsch
7. Election of Committee Chair
8. Election of Committee Vice Chair
9. Appointment of Committee Clerk
10. Review/approval of March 17, 2022, meeting minutes – **Pages 2-3**
11. Update on Groundwater Resolution approved by voters – **Pages 4-6**
12. PFAS / Testing update
13. Groundwater and Septic – **Pages 7-18**
14. Groundwater Quality and Quantity studies/ARPA funding opportunities
15. Members, Staff and Agency Updates
    a. Committee Members
    b. Regional Planning Commission
    c. Planning and Development
    d. Land Conservation
    e. Health Department
16. Set next meeting date
17. Adjourn

Prepared by: Holly Kuhl

PLEASE NOTE: Upon reasonable notice, efforts will be made to accommodate the needs of individuals with disabilities through sign language, interpreters, remote access, or other auxiliary aids. Contact the clerk of the committee or Administration for assistance (715-839-5106). For additional information on ADA requests, contact the County ADA Coordinator at 839-6945, (FAX) 839-1669 or 839-4735, TTY: use Relay (711) or by writing to the ADA Coordinator, Human Resources, Eau Claire County Courthouse, 721 Oxford Avenue, Eau Claire, WI 54703.

COUNTY OF EAU CLAIRE

EAU CLAIRE, WISCONSIN
GROUNDWATER ADVISORY COMMITTEE

MEETING MINUTES – March 17, 2022, 4:00 pm, Rm 1277, 721 Oxford Ave, Eau Claire, WI 54703

MEMBERS PRESENT: James Dunning, Nancy Coffey, Sham Anderson, Glory Adams, Mark Kaeding, Anna Mares, Nathan Anderson, Mary Kenosian

MEMBERS ABSENT: Sarah Vitale

STAFF PRESENT: Greg Leonard (Land Conservation Division), Audrey Boerner (Eau Claire City/County Health Department)

OTHERS PRESENT: (none)

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1. **Call to order by Chair**
   The meeting was called to order by Chair Dunning at 4:02 pm.

2. **Roll call of members present**
   A roll call was taken. A quorum was present.

3. **Confirmation of Compliance with Open Meeting Law**
   Dunning confirmed compliance with the open meetings law.

4. **Public Comment Period**
   None.

5. **Review/approval of December 16, 2021, meeting minutes – Discussion/Action**
   ACTION: Motion by Coffey/Kaeding to approve the minutes of the December 16, 2021, meetings as presented. Motion carried on a voice vote with none in opposition, 8-0-0.

6. **Staff updates**
   Leonard announced that Jared Grande, former Land Use Manager, has taken employment elsewhere. Ben Bublitz has taken the Land Use Manager position. Leonard also announced that Liz Fagen, former Environmental Engineer, has take employment elsewhere. Recruitment for this position is ongoing. Finally, Leonard announced his planned retirement in July.

7. **PFAS update**
   Mares reported that the DNR suggested PFAS action levels to the Wisconsin Natural Resources Board, but the recommendation was not well received. The Natural Resources Board desires to follow the EPA levels. The City of Eau Claire's high testing wells are being pumped to waste. The primary concern for the City is to provide safe drinking water and not groundwater protection. Private well owners in that area of Eau Claire can contact the DNR for further information.

8. **Groundwater Quality and Quantity Studies**
   The groundwater quality and quantity studies suggested in the State of the Groundwater Report are still in need of

action. The American Rescue Plan Act (ARPA) funds could be requested to assist with these studies. Boerner reported the Health Department is currently developing an application for enhancing the lab which would allow additional water testing. Leonard will contact Vitale to discuss additional application options.

9. Members, Staff and Agency Updates-Discussion/Action

- **a. Committee Members** – no further report.
- **b. Regional Planning Commission** – no report.
- **c. Planning and Development**– no report.
- **d. Land Conservation**– no further report.
- **e. Health Department** – no further report.

10. Set next Meeting Date

The next regular meeting date was set for Thursday, May 5, 2022, at 4:00 p.m.

11. Adjourn

Dunning adjourned the meeting at 4:50 p.m.

Respectfully Submitted,

Greg Leonard, Land Conservation Manager
Groundwater Advisory Clerk

Eau Claire County Clean Water Referendum

"Should the State of Wisconsin establish a right to clean water to protect human health, the environment, and the diverse cultural and natural heritage of Wisconsin?"

EAU CLAIRE COUNTY

2022 Spring Election

4/5/2022

Municipality	Reporting Unit	YES	NO
Town of BRIDGE CREEK	Wards 1-3	145	51
Town of BRUNSWICK	Wards 1-2	328	161
Town of CLEAR CREEK	Wards 1-2	42	44
Town of DRAMMEN	Ward 1	89	38
Town of FAIRCHILD	Ward 1	37	14
Town of LINCOLN	Wards 1-2	95	58
Town of LUDINGTON	Wards 1-2	77	66
Town of OTTER CREEK	Ward 1	30	20
Town of PLEASANT VALLEY	Wards 1-5	554	267
Town of SEYMOUR	Wards 1-5	475	238
Town of UNION	Wards 1-5	359	146
Town of WASHINGTON	Wards 1-16	1,205	440
Town of WILSON	Ward 1	18	16
Village of FAIRCHILD	Ward 1	37	7
Village of FALL CREEK	Wards 1-2	240	91
VILLAGE OF LAKE HALLIE	Ward 11	0	0
City of ALTOONA	Wards 1-13	655	127
City of AUGUSTA	Wards 1-5	89	25
City of EAU CLAIRE	Ward 1	92	22
City of EAU CLAIRE	Ward 2	114	11
City of EAU CLAIRE	Ward 3	312	32
City of EAU CLAIRE	Ward 4	56	17
City of EAU CLAIRE	Ward 5	73	7
City of EAU CLAIRE	Ward 6	46	7
City of EAU CLAIRE	Ward 7	107	24
City of EAU CLAIRE	Ward 8	249	46
City of EAU CLAIRE	Ward 9	125	18
City of EAU CLAIRE	Ward 10	122	26
City of EAU CLAIRE	Ward 11	242	65
City of EAU CLAIRE	Ward 12	242	60
City of EAU CLAIRE	Ward 13	202	45
City of EAU CLAIRE	Ward 14	229	41
City of EAU CLAIRE	Ward 15	153	38
City of EAU CLAIRE	Ward 17	207	62
City of EAU CLAIRE	Ward 18	182	53

Municipality	Reporting Unit	YES	NO
City of EAU CLAIRE	Ward 19	132	22
City of EAU CLAIRE	Ward 20	81	4
City of EAU CLAIRE	Ward 21	130	29
City of EAU CLAIRE	Ward 22	152	23
City of EAU CLAIRE	Ward 23	165	47
City of EAU CLAIRE	Ward 24	270	26
City of EAU CLAIRE	Ward 25	272	62
City of EAU CLAIRE	Ward 26	244	58
City of EAU CLAIRE	Ward 27	221	61
City of EAU CLAIRE	Ward 28	191	39
City of EAU CLAIRE	Ward 29	175	31
City of EAU CLAIRE	Ward 30	164	33
City of EAU CLAIRE	Ward 31	124	10
City of EAU CLAIRE	Ward 32	223	25
City of EAU CLAIRE	Ward 33	146	58
City of EAU CLAIRE	Ward 34	89	14
City of EAU CLAIRE	Ward 35	167	29
City of EAU CLAIRE	Ward 36	107	34
City of EAU CLAIRE	Ward 37	181	54
City of EAU CLAIRE	Ward 38	114	17
City of EAU CLAIRE	Ward 39	159	34
City of EAU CLAIRE	Ward 42	145	41
City of EAU CLAIRE	Ward 43	131	26
City of EAU CLAIRE	Ward 44	0	0
City of EAU CLAIRE	Ward 45	155	44
City of EAU CLAIRE	Ward 46	116	14
City of EAU CLAIRE	Ward 47	155	51
City of EAU CLAIRE	Ward 48	37	9
City of EAU CLAIRE	Ward 49	181	37
City of EAU CLAIRE	Ward 50	124	7
City of EAU CLAIRE	Ward 51	270	27
City of EAU CLAIRE	Ward 52	72	10
City of EAU CLAIRE	Ward 53	231	74
City of EAU CLAIRE	Ward 54	79	27
City of EAU CLAIRE	Ward 55	200	30
City of EAU CLAIRE	Ward 56	148	40
City of EAU CLAIRE	Ward 57	113	21
City of EAU CLAIRE	Ward 58	189	38
City of EAU CLAIRE	Ward 59	229	36
City of EAU CLAIRE	Ward 60	192	32
City of EAU CLAIRE	Ward 61	75	16
City of EAU CLAIRE	Ward 62	126	33
City of EAU CLAIRE	Ward 63	0	0

Municipality Reporting Unit	YES	NO
Total	13,703	3,706

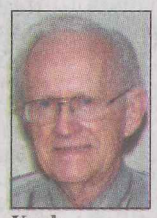
Hydrologist warns of statewide water contamination from septic systems

By Gabe Lagarde
The Country Today

MENOMONIE — As the old saying goes, it must be something in the water.

That's what people in Wisconsin should be thinking, said Neil Koch, a Menomonie resident and retired hydrologist from the U.S. Geological Survey. Koch said signs indicate there could be at least 7,000 septic land spreaders are leaking human waste into aquifers.

Based on a study Koch began decades ago in Dunn County, 150 of the county's 400 septic land spreaders do not pass the Wisconsin Department of Natural Resources' standards for percolation. Despite promises from officials, Koch said these sites have not been addressed.


Koch

"For 18 years, I've been trying to get some action by our elected people to actually contact the DNR and have them shut those 150 sites down," Koch said. "When I contacted the DNR, they sent me letters and emails and phone calls. I can't even count the number of times they contacted me, telling me they were going to work on the problem. I don't know if they'll listen to me as an individual, so I'm bringing it to the media."

The issue is how quickly septic systems release contents into the ground. State standards dictate that a septic land spreading site can't percolate more than 6 inches per hour. Back in the mid-2000s, Koch compiled a map of Dunn County, identifying the region in terms of 91 soil types and cross-referencing it with a map of 400 land spreading sites provided to him by the DNR.

Using this information, he concluded 150 of these sites had septic land spreaders percolating at a rate of 20-22 inches per hour.

Those rates, Koch said, raise questions about whether the aquifers can dilute the waste to safe levels. For example, nitrates in human waste can be a carcinogen tied to colorectal cancer, as well as thyroid ailments. For those who rely on private wells, that's concerning.

Koch noted that local county agencies have found contamination in the watershed, particularly in unregulated private wells. A 2018 study, conducted in three subdivisions in Eau Claire County and two subdivisions in La Crosse County, found nitrate levels at more than 10 million parts per liter in private wells.

If septic land spreaders in Dunn County are compromised in this manner, then it's more than likely a similar problem can be found across the state, Koch said.

By taking what he's observed in Dunn County and extrapolating it across the state's 71 counties and their geographies, Koch estimates there could be more than 7,000 septic land spreaders actively polluting Wisconsin aquifers.

"As a result, the neighbor is going to be drinking somebody's septic drainfield water," Koch said. "It has gotten worse, because we're having more and more subdivisions out in the rural areas which have a well on the septic system and these are good septic systems, but the septic system can immediately contaminate the groundwater."

Contact: gabe.lagarde@ecpc.com

Police: Duo tried taking

Lip-smacking duty

Local BBQ aficionado to judge world championship

Page 7

Cadott man gets prison for cycle

Geological Observations Regarding the proposed Orchards Hills Rezone Request.

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Analytical and Environmental Geochemistry
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Eau Claire, WI 54701

February 22, 2022.

Introduction: These comments on the geology of the proposed Orchard Hills RH Rezoning Request are based on building more than 100 homes on the 238-acre property with lots ranging from ~1 acre to ~10 acres in size. The conceptual layout submitted with the rezoning request shows that most of the lots are just over 1 acre in size, with lot widths of as little as 100 feet. **The outstanding features of this proposed zoning request are both the scale of the development (> 100 homes) and the planned minimum lot sizes approaching 1 acre.**

Figure 1. is a stratigraphic section that was developed to show the nomenclature of bedrock rocks units that occur in and near the proposed Orchard Hills development in the Town of Washington, Eau Claire County, WI. The comments about the local geology assume each house would have private wells supplying water and a private septic system for waste disposal as stipulated in the rezoning request. This extended outline covers the basic components of a summary report of the geology of the area and some concerns for future development activities. These concerns are based only on the geology. The following description is a scientific opinion and was developed to help guide sound planning for the Town of Washington and Eau Claire County, WI. This abbreviated summary is not a complete report on the geology of the area. **This report is not to be used for engineering site development.** A complete geological report would require considerably more work than time allowed.

1. **Regional Stratigraphy:**

Eau Claire's foundation is old (~ 2 billion years) Precambrian (PC) bedrock composed of igneous and metamorphic rocks eroded to a relatively flat surface. At the Orchard Hills location the elevation of this flat subsurface feature is at about 740 feet above mean sea level (msl), 200 - 280 feet below the present land surface. In a few local areas, the PC surface has been more deeply eroded by pre-glacial streams but that is not expected in a future Orchard Hills development area due to the extensive siliciclastic sedimentary rock cover in this immediate area. Cambrian age (~535 million years ago) sedimentary rocks were deposited on this PC surface and exist today with a total thickness near the proposed development of up to 280 feet. The boundary between the Cambrian sedimentary rocks and the Precambrian is a zone of younger (younger than Cambrian) hydrothermal alteration consisting of unconsolidated clay which forms an impermeable layer between the PC and Cambrian sands (Hooper, 1998). The Cambrian sedimentary rocks are divided by geologist into three formations each with unique rock properties (lithology). The three units are the lower most Mt Simon Formation (Fm.), the middle Eau Claire Fm., and the Upper Wonewoc Fm. each named after the locality where the

rock units were first described in Wisconsin. The Wonewoc is unlikely to be found within the confines of the Orchard Hills Future Development area but does exist on Hills to the north and west of the future development area and at the high point on Cater Road. The same formation names are used across the upper- Midwest for these lithologic units whenever encountered in the subsurface. Most private supply wells in the area surrounding the proposed rezone area, draw their water primarily from the Mt Simon Fm. It is assumed that the wells in a future Orchard Hills development would also use the Mt Simon Fm aquifer.

A. Mt. Simon Formation: The Mt Simon Fm. is approximately 190 +/- 10 feet thick in the City of Eau Claire (At Mt Simon Park). The elevation at the top of the Mt. Simon is very predictable across Eau Claire implying a rather uniform thickness across the city. The thickness of the Mt. Simon in a future Orchard Hills development is expected to be very similar. The Mt Simon Fm. is generally fairly clean quartz sand with moderate cementation. Where exposed in the city of Eau Claire, horizontal, sub-horizontal and vertical fractures are all commonly encountered (Figure 2). Lots in the lowest part of a future development may have the Mt Simon Formation immediately below the thin alluvium.

B. Eau Claire Formation: The Eau Claire Fm. is less well exposed in Eau Claire but is always < 90 feet thick. The thickness near the Orchard Hills rezone request area is projected to be 50-60 feet. The estimated thickness of Eau Claire Fm. is based on regional thickness of the Mt. Simon Fm. and the contact between the Eau Claire Fm. and the overlying Wonewoc Fm. which is exposed on Chokecherry Hill 1 mile W of the rezone request area. The contact between the Mt Simon Fm. and the Eau Claire Fm. is currently better exposed at locations such as Oakwood Hills, the North Crossing and US-53 bypass. Locally, in outcrop the Eau Claire Fm. has numerous fractures parallel to bedding typically on the order of 1-2 cm, and closely spaced (a few cm apart) vertical fractures. In southern WI, where the Eau Claire Fm. contains more shale, the Eau Claire Fm. sometimes serves as an aquiclude, limiting vertical groundwater flow with the exception of flow along fractures. Most of the lots in any future Orchard Hills Development would have the Eau Claire Formation as the bedrock immediately below the thin soils. Excavations for basements and on-site septic systems are likely to be excavated into the Eau Claire Formation as they have been in surrounding developments.

C. Wonewoc Formation: The top part of the Eau Claire Fm. has a transitional boundary with Wonewoc Fm. in N. Wisconsin and Minnesota (There is an erosional unconformity in the Wonewoc about 15 feet above base; Runkel et al., 1998, Havholm et al., 1998). The Wonewoc Fm. lower boundary for this outline report was made at the last significant clay/shale layers in this study area. Therefore, I have included all of the significant clay and shale layers as part of the Eau Claire Fm. in this report. Changing the formation boundary by a few feet would have no impact on my conclusions regarding the overall suitability of a future development.

A very brief lithologic description of each of these sedimentary units is given in figure 1 which also shows their relative thickness, approximate vertical position, and grain sizes present within the different units. The transitional nature of the contacts is not visible at the vertical scale used in figure 1.

2. Groundwater Flow Considerations:

A. In the upper Mississippi Valley water flow in the upper ~90 feet of the Cambrian Sandstones (Mt Simon, Eau Claire and Wonewoc) occurs primarily along fractures in the sedimentary rocks (Runkel et al., 2006) resulting in high transmission speed for contaminants. Similar results were found in other Cambrian units with similar lithology in central Wisconsin (Swanson et al., 2006). Contaminants that would be expected to be problematical would include: nitrate, viruses (Gellasch et al., 2014), bacteria and pharmaceuticals from septic systems or leaking sewers (Gellasch et al., 2013,) as well as any other contaminants (incl. fertilizers and herbicides) applied to the land surface or disposed of in private septic systems.

B. Of the three Cambrian sedimentary units, the thickest unit, the Mt. Simon Fm. has the fewest fractures, but fractures are still a dominant flow path (figure 3) if intersected by a well. A recent study of fractures in the Mt Simon Fm. (Gellasch et al., 2013), demonstrates that even if the well intersects a small number of fractures that the fractures can account for most of the flow in the well. In one borehole in the city of Madison, **five (5) fractures in the Cambrian rocks accounted for more than 80% of the total flow of groundwater into the borehole** (Gellasch et al., 2013). Leaking **urban sewer pipes in the city of Madison, WI have locally contaminated the Mt Simon Fm. aquifer even though the Mt. Simon Fm. aquifer is over 200 feet below the present land surface** in Madison, WI. In Madison, the Mt. Simon Aquifer is also over 200 feet below the leaking sewer pipes and it **was predicted during engineering studies that the Mt. Simon Fm. aquifer would be protected from contamination by the overlying Eau Claire Fm.** The Eau Claire Fm. which contains significantly more shale in southern WI than in city of Eau Claire, was expected to locally serve as an aquiclude (impermeable layer). **There is conclusive evidence that the Eau Claire Fm. did not function as an effective aquiclude because of incipient fractures** (Gellasch, 2013). **Similar fracture dominated flow has been observed in all of the other Cambrian siliciclastic bedrock units that occur in the upper- Midwest** (Swanson 2006; and Runkel, 2006). The Orchard Hills future Subdivision is being planned in an area with fractured Cambrian sandstone bedrock within a few feet of the surface. There is little to no unconsolidated alluvium on these hills that would act to filter wastewater prior to infiltration into the fractured bedrock

C. Recent research has also demonstrated that the travel time between the leaking sewer in Madison, WI and the Mt Simon aquifer is less than two years and is associated with rapid subsurface water along discrete fractures in the overlying bedrock. In Madison, the Mt. Simon Fm. is overlain by the Wonewoc Fm., the Eau Claire Fm., and an additional 60 feet of younger rocks and 30 feet of unconsolidated glacial sediments which should behave as a porous media, filtering contaminants from the surface (Gellasch et al., 2013). The proposed future development area lacks the overlying unconsolidated sediments and therefore, lacks this initial barrier to infiltration directly into the fractured bedrock.

D. In the area of the proposed rezone south of Deerfield Rd., the Mt Simon Fm. water wells that could potentially yield higher water flows rates would be more susceptible to contamination because high-flows likely result from intersecting more bedrock fractures or other secondary porosity.

E. By “luck”, some wells screened only in the Mt. Simon might represent local flow systems that are actually dominated by behavior as porous media (more capacity for filtering bacteria and with slower flow-rates). Low well flow-rates in some nearby residential homes probably represent more of a porous flow component. It is probable that these lower flow conditions would correlate with a higher probability that viruses could become inactive over time. Low flow rates are not likely to have any long-term impact on predicted nitrate and bacteria levels in private wells.

F. Regional groundwater flow is north-northwest toward the Chippewa River. The rezone request area sits on a local groundwater divide (Muldoon, 1992) and flow in the eastern ½ of a future development should be directed to the northeast toward Lowes Creek. Flow in the western half of a future subdivision is directed more to the west towards Taylor Creek. Local groundwater flow especially along transient and/or perched aquifers is probably strongly dominated by fracture orientations and bedding plane secondary porosity.

4. Implications of Proposed High Density Residential Subdivision:

A. Rural housing with private septic systems negatively impact the local groundwater quality and contaminants typically include bacteria, viruses, pharmaceuticals, and nitrate. The extent to which this contamination is a problem, and a health issue is largely dependent on the local geology and the housing density. Contamination from a development will naturally disperse with increasing distances from the development. The density of the housing is going to determine the extent to which local groundwater supplies are impacted. Since most of the lots in this proposed rezone area are approaching the minimum of 1 acre for rural housing the impact of a future subdivision on groundwater quality could be substantial.

B. The extent of the contamination to be expected from a high-density housing development is difficult to quantify without additional data that does not currently exist. However, it is my professional judgement based on research in western Wisconsin on nitrate contamination in unconsolidated alluvium that a high-density housing development is likely to lead to GW contamination exceeding Wisconsin Drinking Water Standards for nitrates (Tinker, 1991), and the same result would be expected for coliform bacteria especially in fractured bedrock. In addition, residents should be just as concerned about un-regulated (emerging) contaminants that may show up in private wells. The areas that would be most impacted are the lots in the N, NE and W of a future development and the adjacent developed properties along Rainetta Rd. and Cater Rd. as these areas are down gradient from a future development.

C. A future development has the potential to be an **Excellent research project for geology students if the developers move ahead with the subdivision as shown in the conceptual layout** (1 acre lots)– The Wisconsin Geological and Natural History Survey is increasingly interested in fractured clastic aquifers because of the implications for ground-water contamination and its public health implications. Recent research results suggest that there would be a high probability that a future development would result in contaminated bedrock water supply wells both within the future subdivision and in nearby private water supply wells adjacent to the subdivision. **5. Complicating factors (factors that could influence the outcomes)**

A. Lithologic formation boundaries may or may not represent hydrogeologic units. There can be considerable variation even within a single geological formation. No actual subsurface data is available for the rezone request area.

B. Presence of fractures are poorly constrained and hard to determine without direct subsurface examination in either borings or excavations. Fracture size and density will greatly influence both local and potentially even regional groundwater flow. Recent evidence suggests modeling groundwater flow using a porous media model will not accurately account for the movement of groundwater at the proposed Orchard Hills location. Any groundwater flow velocities modeled on porous media flow will underestimate flow velocities because of the high transmissivity (flow-rate) along zones of secondary porosity (fractures or bedding planes). This means contaminants are likely to flow much faster between residential septic systems and wells in this area of shallow fractured sedimentary bedrock (see figure 3).

C. Due to elevation differences in the proposed rezone area, hydrogeologic conditions are likely to vary across a proposed development. The northern and western side of a future development are more prone to contamination due to bedrock at or very near the surface (Within 24"). One would also expect greater impacts on neighbors to the north and west of the subdivision as well as within a future subdivision itself.

D. This outline does not even attempt to address whether or not suitable sites for the placement of the private septic systems required for a future development could be located within each individual lot in the conceptual layout. Even if septic systems could be permitted within each lot, the project developer should also consider the locations within the proposed lots where they could possibly place a water supply well without being in very close proximity to either the septic system on the same lot or the proximity of the well to the septic systems on neighboring properties.

6. Summary Findings

Planning for rural housing developments should consider both the scale and the density of rural homes. In addition, development plans should consider the local geology and hydrogeology of the proposed subdivision. Higher housing densities may be appropriate where the developments are of smaller scale, where there are multiple aquifers and/or effective aquitards (or aquicludes) protecting available aquifers from groundwater contamination. The presence of thicker soils or unconsolidated sediments would help filter effluent from on-site septic systems.

In an ideal situation, a small-scale rural housing development with the most ideal geology could probably rely on private septic systems for each house and private water supply wells without exceeding drinking water standards. This does not mean that every rural housing development should appropriately be planned with the minimum allowed lot sizes.

A proposed development on this land represents a grand experiment of planning a large (>100homes) rural development on top of fractured bedrock with little to soil. The bedrock hills south of the City of Eau Claire represent a kind of worse case scenario. The proposed site

lacks almost all the characteristics that would help to minimize the impact of rural housing development on water quality.

A future subdivision on this rezone request area is planned on a land surface where there are multiple challenges:

a. There will be **no appreciable cleansing of wastewater by passage through a porous media. There is little to no unconsolidated sediment and only thin soils within this proposed development.**
b. **The shallow fractured bedrock within just inches of the current land surface means that wastewater, fertilizers and herbicides will quickly enter the bedrock where fracture dominated flow will control its eventual contamination of the Mt Simon Fm. aquifer.**
c. **The Mt Simon Fm is the only unit that is expected to be a viable water source (aquifer) for the proposed development.**
d. **There is no option in rezone request area to drill deeper wells to avoid the contamination and neighboring developments also have no option of drilling deeper wells in response to contamination of the Mt Simon Aquifer.**

The eventual impact on the groundwater quality is going to be highly dependent on both the scale of the development and on the housing (septic tank) density of the final approved plat. The higher the density the more impact there will be on groundwater quality. The larger the proposed development, the more substantial will be the impact both within the proposed development and the surrounding properties.

With the planned individual private wells and septic systems, the potential for groundwater impact is substantial. The area being proposed for rezoning is not an ideal area for a plat that is seeking to push the limits for allowed rural housing density. **A housing density that works under ideal geological conditions cannot be expected to work under more challenging conditions. The proposed future development site has several geological challenges that are not adequately addressed** and I would recommend against rezoning until receiving a plat design that addresses building a large-scale subdivision in such a geologically challenged site.

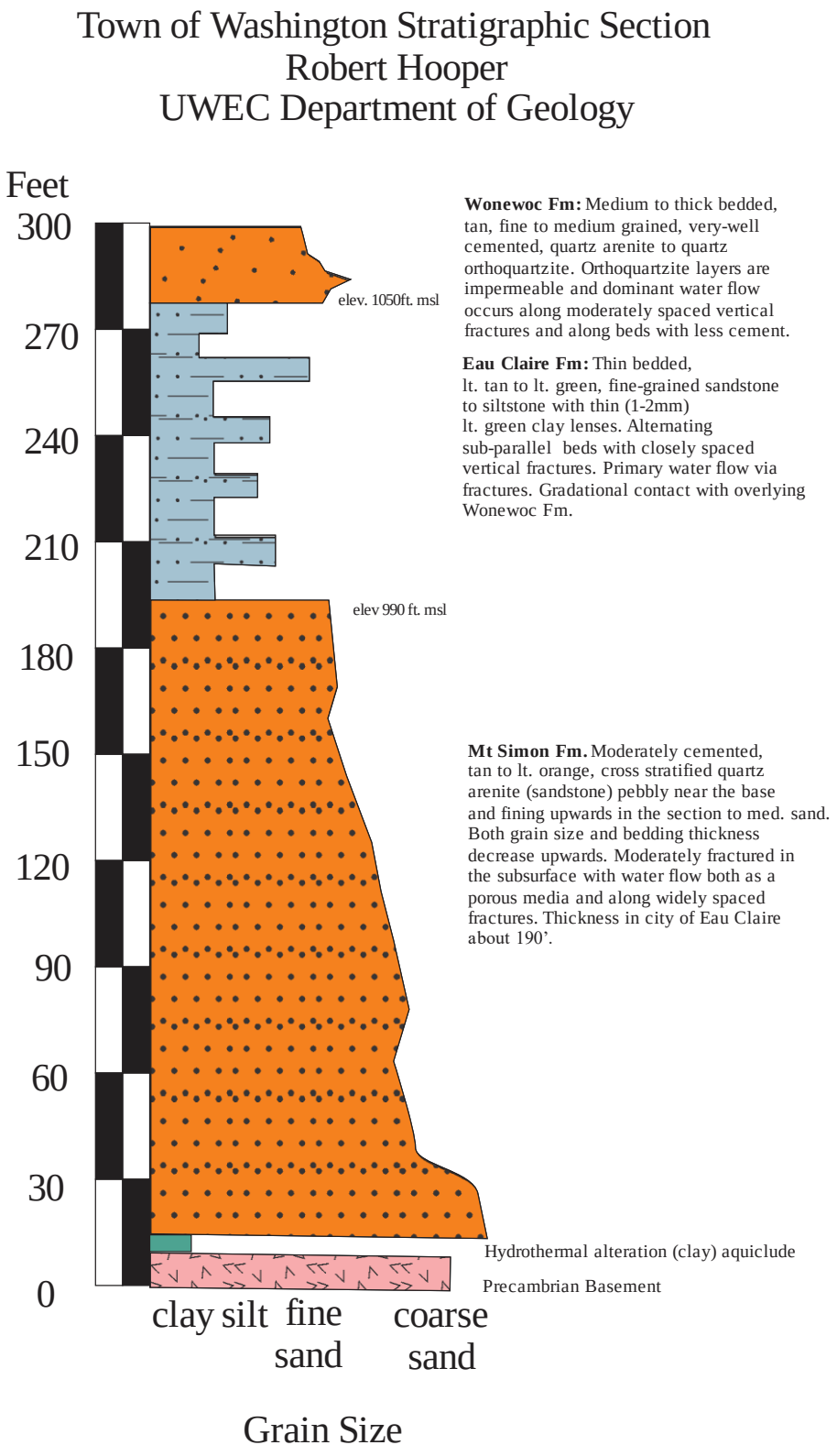

Figure 1. Stratigraphic column for the Town of Washington, Eau Claire County, W

Figure 2. Fracture measurements in the Mt Simon Formation south of the city of Eau Claire. Fractures in the sandstone have a strong WNW-ESE orientation(figure 4) and can dramatically impact local groundwater flow directions and velocity. (Photo by Robert Hooper UWEC Geology Department)

Figure 3. Ice formations along fractures and bedding in the Mt Simon Fm. along Lowes Creek indicate the extent of fracture flow dominant in the Mt Simon Fm.

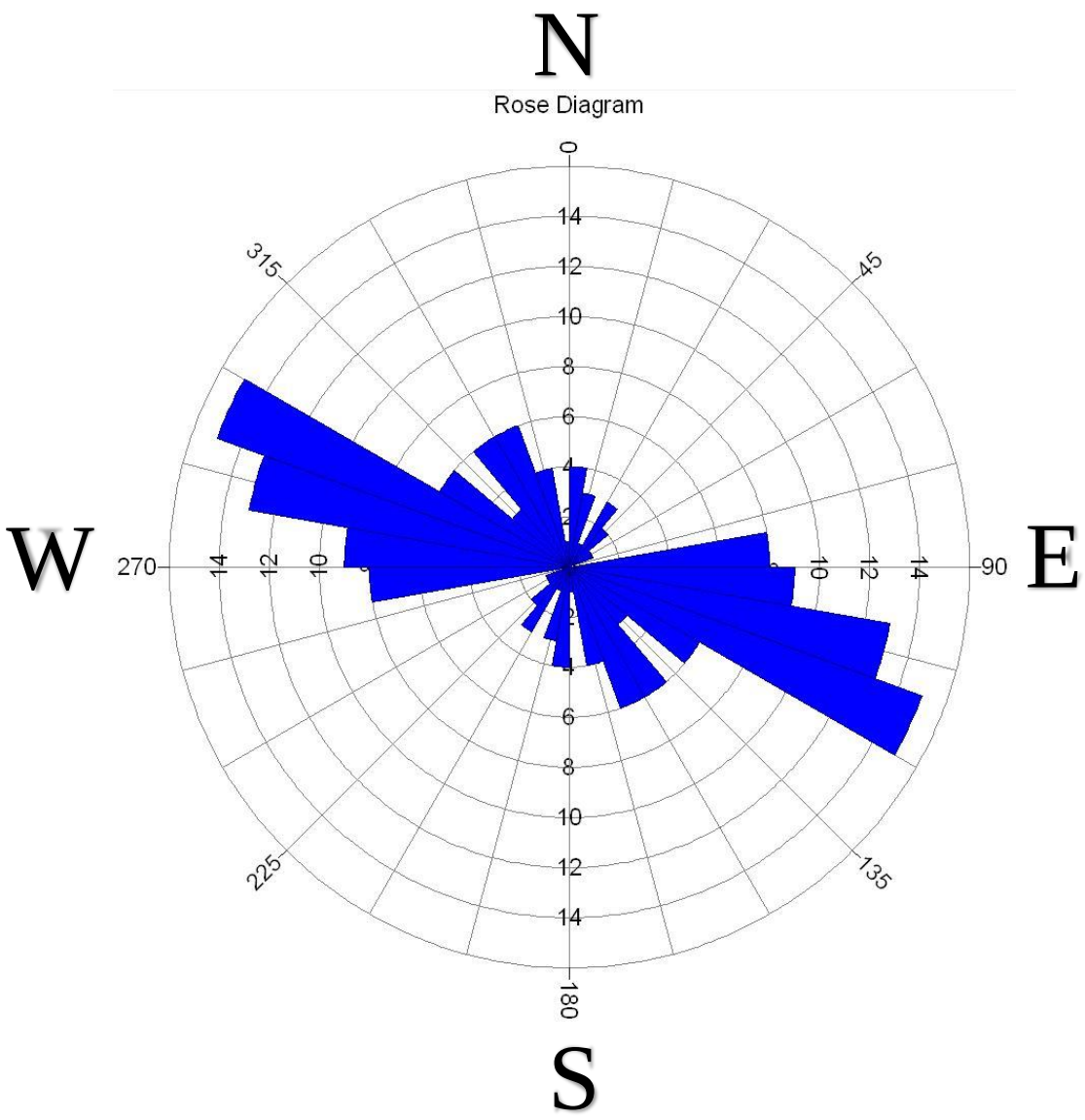

Figure 4. Rose diagram for fracture measurements in the Mt Simon Fm. south of the city of Eau Claire. The number of measured fractures in any direction is shown by the distance of the blue shaded area from the center of the diagram. This diagram illustrates that the Mt Simon has a prominent fracture density with a WNW-ESE orientation.

References:

Havholm, K.G., Mahoney, J.B., Hooper, R.L., Golding, H., Jenson, S., and Paddock, J., 1998, Wonewoc and Lone Rock Formations, Colfax, WI. Tri-State Geological Field Conference, 61st annual field conference. P. 73-79.

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