

Memo



To: Jade Krueger, Planning Administrator, Teton County Idaho
From: Ted Van Holland, P.E. & Jennifer Zung, P.E.
CC: Sharon Fox, Planner I, Teton County, Idaho
Date: 12/21/2023
Re: 9/25/2023-Revised Irish Acres Subdivision Level I Nutrient-Pathogen Evaluation Review

On 7/26/2023 Harmony Design & Engineering provided comments on the Irish Acres subdivision Nutrient Pathogen Evaluation prepared by Y2 Consultants. In response to those comments and also to comments provided by the Idaho Department of Environmental Quality, Y2 Consultants made revisions to the N-P Evaluation dated 9/25/2023. Harmony has reviewed this revised evaluation, and the following comments are sequenced for direct comparison to the comments provided in the 7/26/23 review.

1. Compliance Boundaries

Compliance boundaries in the evaluation have been expanded to include relevant combinations of proposed subdivision lots, consistent with DEQ guidance. The corresponding Level 1 spreadsheet model results are reported in Table 3 of the evaluation report. The table indicates that while several of the compliance boundaries considered are predicted to have an insignificant impact on nitrate concentrations, three of the compliance boundaries considered will have greater than 1mg/l increase in modeled nitrate. An increase of greater than 1mg/l of nitrate is considered to be a significant impact and a degradation to ambient groundwater quality by the DEQ.

2. Design Flow

This comment has been addressed.

3. Hydraulic Conductivity Estimate Above Reference Range

This comment has been addressed.

4. Modeled Hydraulic Gradient Inconsistent with References

The revised report utilizes the mapping from Kilburn (1964) to determine hydraulic gradient. However, it appears that a mistake has been made in interpreting the mapped groundwater elevation contours. Where the Kilburn map shows 10-foot interval contours, the report identifies these as 50-foot contours. The resulting hydraulic gradient magnitude is therefore believed in this review to be erroneous, creating a significant error in all modeled results. If this error were corrected to the 0.006ft/ft gradient that the mapping indicates, most of the modeled results would increase the predicted nitrate impacts to be above the 1mg/l significant impact threshold.

5. Phosphorus and Pathogen Impacts to Groundwater and Surface Water Not Addressed

This comment has been addressed.

For the reasons discussed in items 1 and 4 above, the conclusions of the Y2 Consultants NP evaluation are considered unsupported by the Level 1 analysis.

Memo



To: Jade Krueger, Planning Administrator, Teton County
Idaho

From: Ted Van Holland, P.E. & Jennifer Zung, P.E.

CC: Sharon Fox, Planner I, Teton County, Idaho

Date: 7/26/2023

Re: Irish Acres Subdivision Level I Nutrient-Pathogen Evaluation Review

Per request from the Teton County Planning and Zoning Department, Harmony Design & Engineering has reviewed the Level I Nutrient Pathogen Evaluation for the Irish Acres Subdivision dated September 9, 2022 prepared by Y2 Consulting. The report is sealed by an Idaho-licensed professional engineer, and follows the basic steps outlined in DEQ guidance (Howarth, et al., 2002). The following items are noted as deserving clarification or reconsideration by the author in conducting the spreadsheet model simulations.

1. Compliance Boundaries

The evaluation considered several potential compliance boundaries, including the subdivision in its entirety, and also each lot individually. The analyses do not examine the effects of certain combinations of adjacent lots aligned with the modeled gradient. An example would be a grouping of Lots 7, 2, and 1 as a unit, and apply the corresponding unit parameters in the spreadsheet model.

2. Design Flow

The subdivision proposes 10 lots and 10 homes were included in the evaluation. Each home was assigned the 300 gallon-per-day default parameter value of the model spreadsheet. This equates to a 4-bedroom house. The NP evaluation does not consider a guest house or greater bedroom count, or why the presumed 4-bedrooms per lot is representative of anticipated future development. If guest houses are expected and allowed, or the number bedrooms anticipated may be greater than 4, there should be discussion of how that would affect the evaluation conclusions.

3. Hydraulic Conductivity Estimate Above Reference Range

The hydraulic conductivity used in all model simulations is 100 ft/day. Selection of this hydraulic conductivity value is not well supported. The author describes the 100ft/day value as “conservative” for this use, noting that it is on the lower end of typical values for sand and gravel aquifers. The drilling logs cited and provided in the appendix make frequent mention of significant clay, which can greatly retard flow in porous media. There are several logs that have included pumping test data that could be used to infer a more supported hydraulic conductivity value. Evaluating this kind of existing data seems consistent with the Level 1 Nutrient-Pathogen criteria. Many of these rudimentary tests report production of 1 gallon per minute flow per foot of drawdown. While they lack rigorous description of

methods or results, they should at least be compared with the assumed conductivity rate selected. The two best published estimates of conductivity covering this vicinity are from Nicklin (2003) and Cosgrove and Taylor (2007). Both of these assign values close to 25ft/day for this location.

4. Modeled Hydraulic Gradient Inconsistent with References

The author assumes that the hydraulic gradient reflects the slope of the ground surface: 0.01 ft/ft. This generalized approximation seems a poor substitute for more specific references provided in mapping by Kilburn (1964), Nicklin (2003), and Cosgrove & Taylor (2007), which indicate that 0.006 is a representative value for this location. These maps do generally agree with this author's assertion that the direction of groundwater flow is east to west.

5. Phosphorus and Pathogen Impacts to Groundwater and Surface Water Not Addressed

The report leaves out any meaningful discussion on the impacts of phosphorus and pathogens released in the on-site systems, as DEQ guidance recommends.



Jade Krueger <jkrueger@tetoncountyidaho.gov>

Irish Acres - Potentiometric Surface

Ted VanHolland <ted.vanholland@harmonydesigninc.com>

Mon, Mar 4, 2024 at 12:02 PM

To: Adrienne Lemmers <adrienne@y2consultants.com>, Jade Krueger <jkrueger@tetoncountyidaho.gov>, Jen Zung <jen.zung@harmonydesigninc.com>

Cc: Zia Yasrobi <Zia@y2consultants.com>, Megan Nelms <Megan@y2consultants.com>

Adrienne,

I think the additional information you sent is pretty compelling in establishing an estimated gradient. You have used ample data points and a method that is consistent with sound practice. The magnitude of the gradient is very different from the Kilburn study, so it obviously has a dramatic difference in the model results. I did not take the time to exhaustively replicate your work as a means to verify it, but it all appears reasonable. I do also factor in that you are an experienced professional in this field, and see no reason to question your technical and ethical competence.

Based on that, I believe you have now supported the conclusion of no significant impacts from this proposed subdivision. We should be able to prepare a more formal review memo that reflects this in the next few days.

Thanks,

**Ted VanHolland, PE**
Environmental/ Civil Engineer

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From: Adrienne Lemmers <adrienne@y2consultants.com>**Sent:** Wednesday, February 28, 2024 1:00 PM**To:** Ted VanHolland <ted.vanholland@harmonydesigninc.com>; Jade Krueger <jkrueger@tetoncountyidaho.gov>; Jen Zung <jen.zung@harmonydesigninc.com>**Cc:** Zia Yasrobi <Zia@y2consultants.com>; Megan Nelms <Megan@y2consultants.com>**Subject:** RE: Irish Acres - Potentiometric Surface

You don't often get email from adrienne@y2consultants.com. [Learn why this is important](#)

Hello Ted,

I appreciate the prompt response and being open to the proposed approach. I have attached additional information so you can see the data I used to develop the potentiometric map and the methodology behind it.

I have also attached the mass balance spreadsheets. The worst case scenario is when the entire subdivision is analyzed as one unit, showing an increase in Nitrates of 0.9 mg/L.

Let me know if you need additional information or have any questions.

Thanks again,



Adrienne Lemmers, P.E.

Senior Civil Engineer

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