

**From:** [Thomson, David A FLNR:EX](#)  
**To:** [Bilawchuk, Maureen ENV:EX](#)  
**Cc:** [Hill, Douglas J ENV:EX](#)  
**Subject:** RE: DAVID: Question re: Hullcar - follow up?  
**Date:** Tuesday, September 5, 2017 8:50:33 AM  
**Attachments:** [image001.jpg](#)  
[image002.jpg](#)

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Hello - this is in regards to Figure 3-1 in the Jansen EIS, *Timeline of land uses and nitrate-N concentrations in Steele Springs*. That timeline takes into account two things: the rate of movement of groundwater and nitrate through the unsaturated zone, and the rate of movement of groundwater and nitrate within the aquifer.

Rate of movement through the unsaturated zone (Section 3.5.1.3) was estimated by assuming H.S. Jansen and Sons is the sole source of nitrate contamination, and correlating their land use activities to a rise in nitrate concentrations at Steele Springs. This analysis was also performed for a feedlot that existed on the Field of Concern from 1981 – 1988, which also was assumed to be solely responsible for a rise in nitrate concentrations at Steele Springs. This isn't a groundwater equation, but just something based on the stated assumptions, and observations over time. Analysis of soil samples was also done to try to determine nitrate movement through the unsaturated zone. I do notice that the table of data presented does not seem to indicate much variation of nitrate with depth; however I am not a soil scientist so not qualified to comment in detail.

Rate movement of groundwater in the aquifer appears to have been calculated based on Darcy's Law, although it is not referenced. This is a common equation used to estimate groundwater movement. The range of time provided is related to the shortest and longest distances across the field of concern, assuming that field is the sole source of nitrogen.

I hope this answers the question

Thanks,

Dave



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**From:** Bilawchuk, Maureen ENV:EX  
**Sent:** Thursday, August 31, 2017 3:37 PM  
**To:** Thomson, David A FLNR:EX  
**Cc:** Hill, Douglas J ENV:EX  
**Subject:** DAVID: Question re: Hullcar - follow up?  
Hi Dave –

Further to your presentation last week, there is one outstanding question that Oliver had asked.

- **David Thomson** to clarify if standard equations were used in determining the timelines for impacts in the Jansen EIS.

It still shows up as an outstanding action item. Can you clarify?

Thank you. (It was an informative presentation.)

Maureen