

Summary of Environmental Studies Occurring in Hullcar Valley

					2016					2017		
Task name	Resource	Start	Finish	July	August	September	October	November	December	January	February	March
1	Integrated Monitoring Study	Inter-Min WG	28-07-2016	31-03-2017								
	Phase I - Desktop Assessment	Golder	28-07-2016	30-09-2016								
	Phase II - Field Assessment	Golder	30-09-2016	28-02-2017								
2	Ambient Hydrogeological Network Sampling	FLNRO	15-08-2016	15-10-2016								
3	Post-Harvest Nitrate Study	AGRI	15-09-2016	07-31-2017								
4	Environmental Impact Assessments											
	Grace-Mar Farm	Kampman	5-08-2016	17-11-2016								
	H.S. Jansen & Sons Farm Ltd.	Jansen	5-08-2016	17-11-2016								
	Ken Regehr Farm	Regehr										
	Curtis Farm	Curtis										



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1. Integrated Monitoring Study

A primary purpose of the proposed study is to synthesize available information to characterize and map the hydrogeology of the unconsolidated Hullcar Aquifers and further understand the water quality of these aquifers. The main study objectives are to:

- Provide a robust understanding of the hydrogeologic regime in the Hullcar area, including sources of recharge, horizontal and vertical flow directions within the aquifers, interaction with surface water,
- Determine sources and sinks of nitrogen relevant to the study area, and the fate and transport processes such as biogeochemical transformation/attenuation that occur within the study area; and,
- Identify data gaps in monitoring activities for improved estimates related to the above two objectives.

The study will be conducted in two phases:

Phase I – is a desktop assessment to be completed by September 30. The assessment will:

- Compile publicly available literature
- Develop a conceptual model of groundwater movement in the study area,
- Compile and review available data and reports relevant to understanding the water chemistry of the aquifers and surface water.
- Define extraction rates and well capture zones for community water supply wells, springs and irrigation supply wells;
- Develop a water budget (i.e., to understand the main factors controlling water availability to wells and springs used for water supply)
- Assess and describe the nature of groundwater connectivity to surface waters
- Provide an assessment on the degree of hydraulic communication between adjacent aquifers; and
- Develop a conceptual contaminant flow model

Phase II – Field assessment to be completed by February 28, 2017. The assessment will:

- Field reconnaissance of potential organic and inorganic nitrate sources informed by Phase I
- Field reconnaissance, surveying and possible sampling of spring discharge locations and other areas of groundwater/surface water interactions;
- Conduct additional fieldwork to characterize groundwater quality, geology, hydraulic conductivities and water level elevations;
- Confirm and further describe the nature of groundwater connectivity to surface waters through field assessment, and document the rationale supporting the characterization of connectivity between surface and groundwater;
- To further characterize the relationship between depth and nitrogen concentrations, perform up to five deep soil samples (up to 3 m depth) at locations identified by Ministry staff;

- Determine a mass balance of nitrate as nitrogen loading onto the aquifer;
- Identify data gaps for monitoring and future contaminant flow modelling;
- Provide recommendations for options for managing groundwater quality issues of concern to help inform a management plan;

2. Ambient Hydrogeological Network Sampling

The Ambient Groundwater Quality Monitoring and Assessment Program (AGQMAP) has been carried out by the Government of British Columbia since 1985. Ambient groundwater quality monitoring is useful for establishing baseline groundwater characteristics and for investigating long-term trends or impacts to groundwater quality from human activities. This program has been sampling private wells in the Hullcar Valley since 2009. Traditionally, local wells were sampled in September of each year; however for the 2016 sampling, the time period has been shifted to mid-August. As well, the samples will be analysed for additional parameters. The results will be incorporated into the integrated monitoring study.

3. Tracking Post-Harvest Soil Nitrate in Agricultural Fields over the Hullcar Aquifer

Short title: Post-Harvest Nitrate Study

The purpose of the study is to better understand the distribution of fields with high levels of residual nitrate, and whether the residual nitrate is expected to be lost from agricultural fields over the winter. Secondary objectives are to provide soil test results that would be suitable to be used for nutrient management planning. This study will be completed in three phases:

Part 1: Preparation – August 2 to September 7, 2016

Part 2: Soil sampling and testing, collection of application records – September 2016 to May 2017 (contractor)

Part 3: Data analyses and report writing – December 2016 to July 2017

Out of scope

- Describing the nitrate leaching from non-cropped areas such as outdoor confinement areas, manure storages, and grazing or riparian areas that are not cropped.
- Describing nitrate leaching (due to over-irrigation) during the growing season
- Describing nitrogen transformations (e.g., mineralization and denitrification) that influence soil nitrate concentrations

4. Environmental Impact Assessments

Environmental impact assessments (EIA) are to be undertaken as part of the Pollution Abatement/Prevention Orders issued to Curtis Farm, Grace-Mar Farm, H.S. Janson & Sons Farm

August 17, 2016

Ltd., and Ken Regehr Feedlot. The EIA must, at a minimum, assess the impact the following operations have on nitrates and other nitrogen compounds entering surface or groundwater. The EIA for the Grace-Mar Farms and H.S. Janson & Sons Farm Ltd. is currently underway and includes drilling and installing monitoring wells; conducting groundwater sampling and aquifer parameter tests; analysis of hydrogeological and groundwater data; and soil sampling. Deep soil samples will be collected in the unsaturated zone from the boreholes dug for several monitoring wells.