

Aquifer and Wellhead Protection Plan

Liard First Nation - 2, 2.4 and 2.5 Mile Communities, Watson Lake, YT



Our Water Supply...

...Comes From Groundwater...

Our groundwater flows from the wetlands and mountains to the southeast of the 2 Mile Communities (2, 2.4 and 2.5 Mile) towards Watson Lake. Groundwater is recharged from rain and snowmelt that seeps down into the soils.

...Up Through Wells...

Two community wells (TW05-02 and TW05-03) will provide water to be delivered by truck to many of our homes. Some homes will continue to use their own private wells. The focus of this Aquifer and Wellhead Protection Plan is on the community wells; however, much of the information provided here would also apply to private wells.

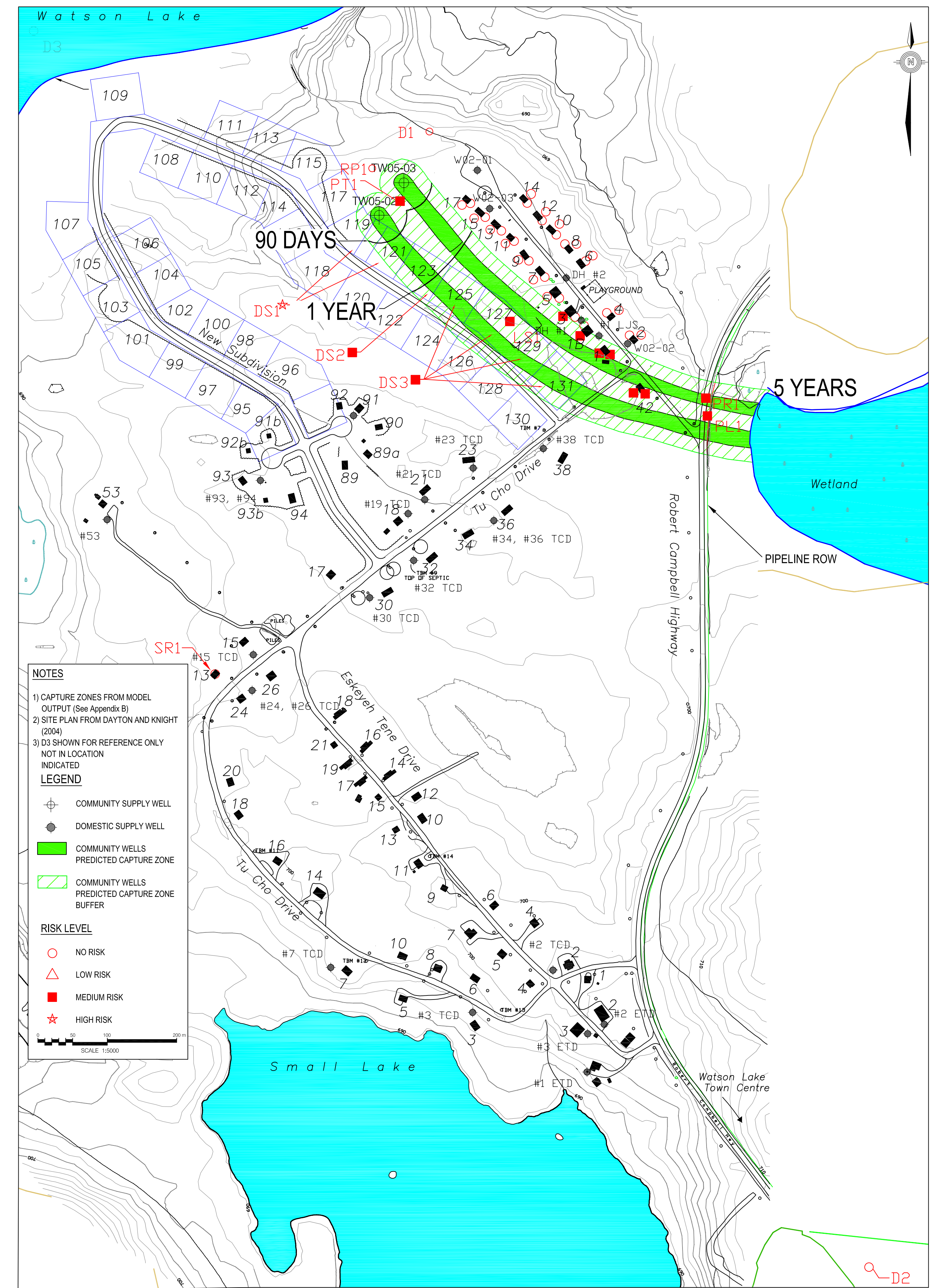
...Is Treated...

The water from the community wells will be treated to remove iron and manganese, and then it will have chlorine added to disinfect the water by destroying any bacteria or viruses that may be in the water, or may get into the water during delivery.

...And Delivered to Our Homes...

Treated drinking water from the community wells will then be delivered to many homes by a water delivery truck. The community water system that is currently under construction, may be used in the future to serve our whole community via a piped distribution system.

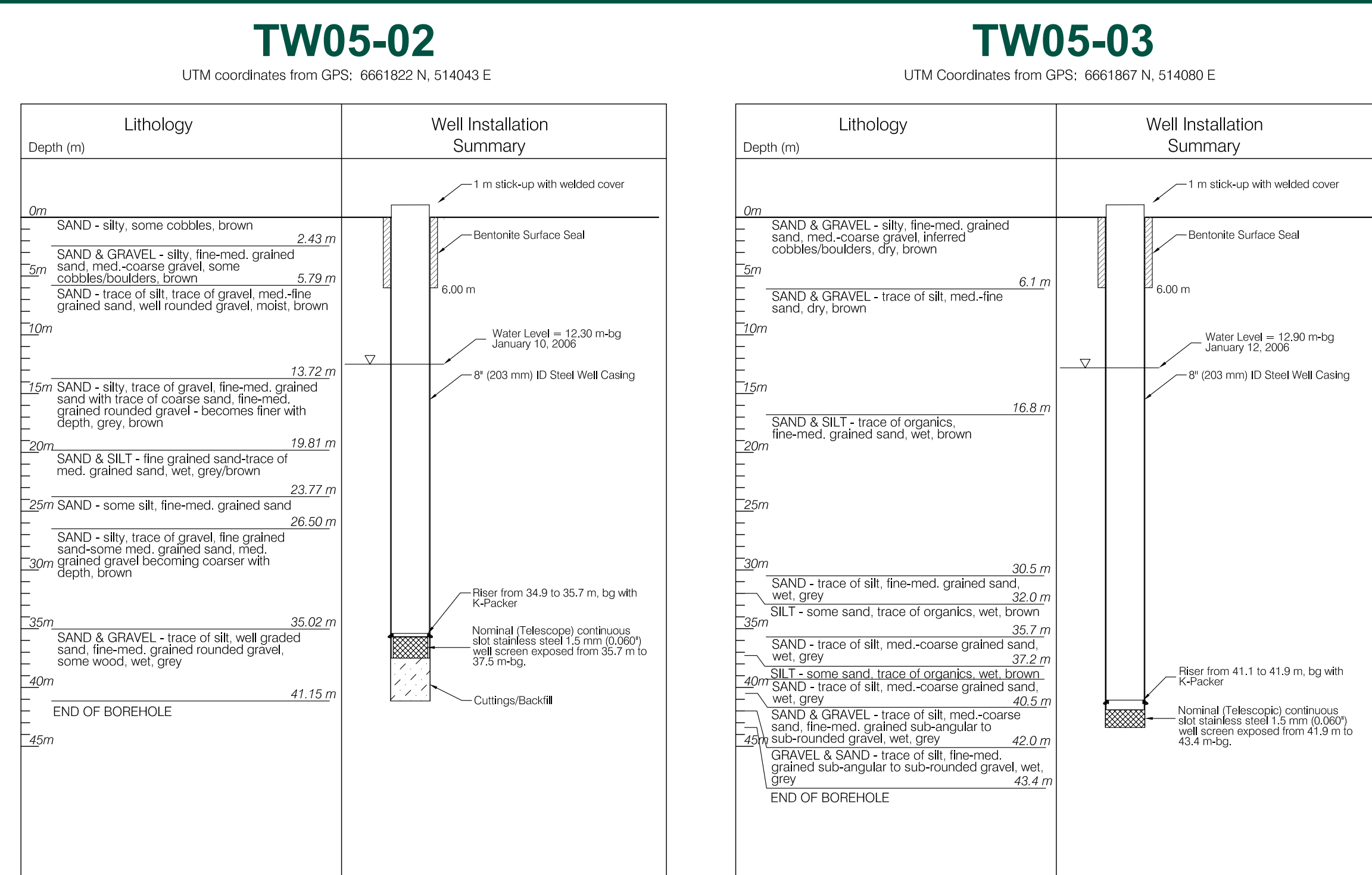
Liard First Nation Community Well Capture Zones and Risk Map



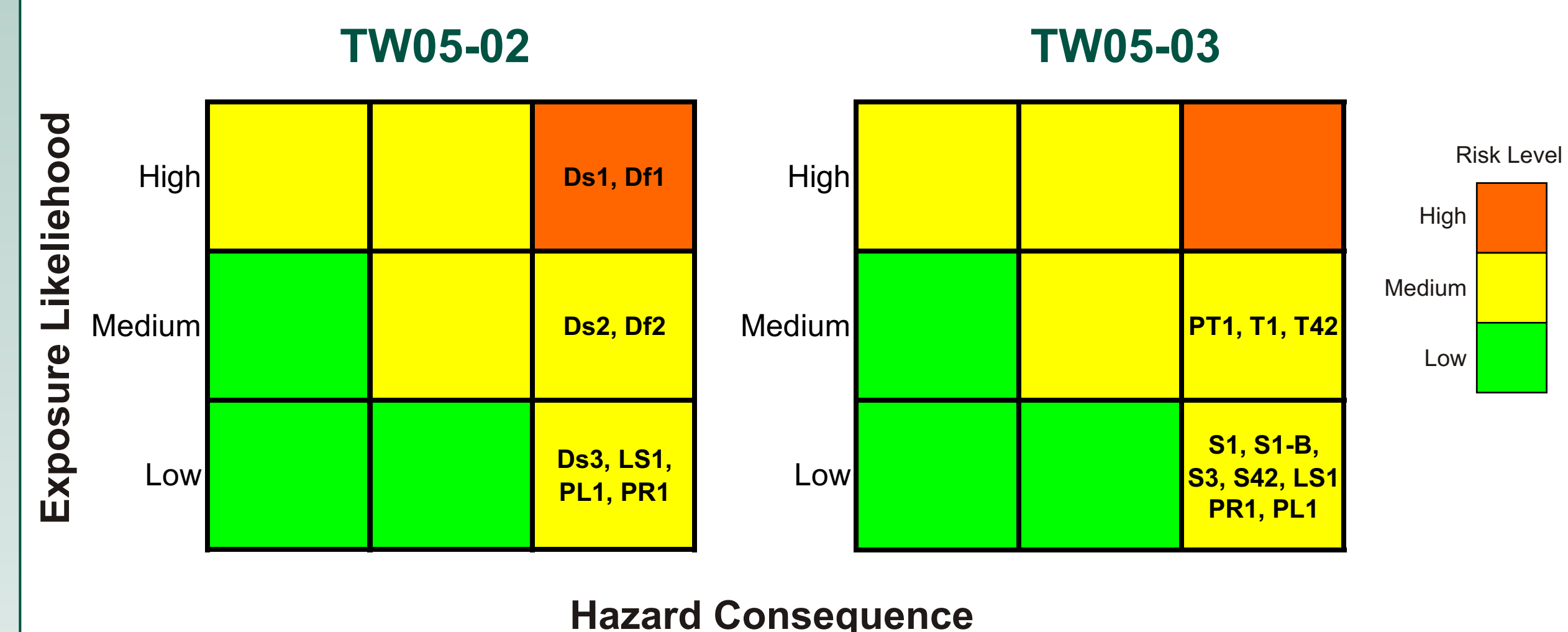
...Our Groundwater Comes from...

a semi-confined aquifer. This means that the soil in this area consists of sands and gravels under pockets of fine grained deposits like silt and clay. There is a potential for surface sources of contamination to impact our community water supply wells. We can all do our part to help reduce this risk.

HYDROGEOLOGIC LOGS FOR LIARD FIRST NATION COMMUNITY WELLS



RISK MATRICIES



SUMMARY OF RISKS WITHIN CAPTURE ZONES

I.D.	Hazard Description	Exposure Likelihood*	Hazard Consequence	Risk Rank
TW05-02				
LS1	Livestock Corral	Low	High	Medium
PL1	Former pipeline / pipeline ROW	Low	High	Medium
Ds1	Development of New Subdivision Septic (Lots 119, 121)	High	High	High
Ds2	Development of New Subdivision Septic (Lot 123)	Medium	High	Medium
Ds3	Development of Subdivision Septic (Lots 125, 127, 129, 131)	Low	High	Medium
Df1	Development of New Subdivision Heating Fuel (Lots 119, 121, 123)	High	High	High
Df2	Development of New Subdivision Heating Fuel (Lots 125, 127, 129, 131)	Medium	High	Medium
Pr1	Potential spill from Highway	Low	High	Medium
TW05-03				
LS1	Livestock Corral	Low	High	Medium
PL1	Former pipeline / pipeline ROW	Low	High	Medium
S1	Septic System	Low	High	Medium
S1B	Septic System	Low	High	Medium
S3	Septic System	Low	High	Medium
T1	Heating Fuel Above Ground Storage Tank	Medium	High	Medium
PT1	Potential Tank Location for Water Treatment Facility	Medium	High	Medium
T42	Heating Fuel Above Ground Storage Tank	Medium	High	Medium
S42	Septic System	Low	High	Medium
Pr1	Potential Chemical Spill on Highway	Low	High	Medium

...We Can Reduce the Risk by...

Pre-planning actions to reduce risks from the hazards identified within the capture zones for our community wells. Table 5 below summarizes the potential actions to be considered in order to reduce and/or eliminate the risks.

RISK REDUCTION / ELIMINATION STRATEGIES TO BE CONSIDERED

I.D.	Hazard Description	Current Risk Rank	Risk Reduction Option to Consider	Risk Elimination Option to Consider
LS1	Livestock Corral	Medium	Ensure that corral is used only periodically, and/or manure does not accumulate, and that surface drainage is routed away from the corral.	Relocate corral
PL1	Contaminant migration from Former pipeline / Leak from future pipeline ROW	Medium	Implement spill contingency plan	Do not allow/support pipeline development.
Ds1, Ds2, Ds3, Df1, Df2	Development of new residential lots: improperly operating septic systems and heating fuel (Lots 119, 121, 123, 127, 129, 131)	Medium to High	Allow residential development only. Develop residential lots with conditions such as: septic holding tank only (no field), tank monitoring program, fuel tank to be double walled, flex hose, inspect tanks bi-annually. Ensure that fuel delivery personnel exercise extreme caution when refilling of ASTs. An LFN representative should act as a spotter during filling.	Designate lots as "Green space" or Park. Do not develop.
S2	Development of new subdivision lots: potential leaks, spills from heating fuel tanks (Lots 125, 127, 129, 131)	Medium	Allow residential development only. Develop lots with conditions: Septic holding tank only (no field), tank monitoring program, fuel tank to be double walled, flex hose, inspect bi-annually. * Ensure that fuel delivery personnel exercise extreme caution when refilling of ASTs. An LFN representative should act as a spotter during filling of all ASTs.	Allow heating with systems that do not require fuel storage (propane, electricity, other)
S1, S3, S1B, S42	Existing Septic Systems	Medium	Educate and train owners how to properly maintain these systems. Implement a monitoring program to ensure proper operation.	Remove systems and relocate.
PT1	Proposed Oil Tank for Water Treatment Building (assuming tank is double walled with flex hose)	Medium	Implement spill contingency plan. Ensure that fuel delivery personnel exercise extreme caution when refilling of ASTs. An LFN representative should act as a spotter during filling of all ASTs.	Replace with propane system.
T42	Heating Oil Fuel Tank at House # 42	Medium	Replace fuel line with flex hose, and/or put in secondary containment. Implement spill contingency plan.	Replace heating oil tank and furnace with alternate system such as propane, electric etc.
PR1	Potential Chemical Spill on Highway	Medium	Implement spill contingency plan	N/A

...We Can Monitor the Risk by...

Risk monitoring will involve periodic review, auditing and updating of the Risk Maps and the Risk Database. Once the aquifer and wellhead protection plan is in place, a periodic updating of the risk maps and database should be completed.



Solid Waste Disposal - Current and former dump areas can be potential sources of organic and inorganic contaminants.



Spills and Leaks - Spills or leaks from vehicles, highway accidents, above ground storage tanks (ASTs), underground storage tanks (USTs), are common sources of hydrocarbon contamination.



Pipelines - Spills and/or leaks from pipelines and defoliants/herbicides used formerly to keep the pipeline right of way clear of vegetation are sources of hydrocarbons and possible dioxins and 2,3,7,8-tetrachlorodibenzo-para-dioxin (TCDD).



Septic Systems - Improperly constructed or failing septic systems can potentially contaminate groundwater with bacteria, viruses, nitrates, phosphorous, hazardous cleaning materials and other household chemicals.



Future Development - New development within the capture zone may add additional potential sources of contamination.



Livestock - Fecal matter from animals are sources of bacteria, viruses and protozoa.