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Thinking beyond.

December 16th, 2015
Project: 1234-01

Al Richmond - Cariboo Regional District Chair and Area G Director
Cariboo Regional District
Suite D, 180 North 3rd Avenue
Williams Lake, BC
V2G 2A4

Walt Cobb – City of Williams Lake Mayor
City Hall
450 Mart St
Williams Lake, BC
V2G 1N3

Re: Hodgson Road Landslide

Dear Mr. Richmond and Mr. Cobb:

Scouten Engineering has been working closely with Pioneer Family Land Partnership on the structural remediation of their facility at 351 Hodgson Road in Williams Lake, BC. That remediation work has most recently included the installation of a large cast-in-place concrete buttress and heavy structural steel struts to provide support to the significantly deformed exterior load-bearing wall on the north elevation of the facility. That exterior wall, consisting of precast, pre-stressed concrete panels, supports the heavy roof of the facility, also consisting of precast, pre-stressed concrete panels.

Photographs illustrating the most recent structural remediation efforts are attached. Those photographs include an illustration of some of the interior and exterior structural damage recorded to date at the facility and previous efforts to stabilize the structure internally. Previous remediation efforts included significant work to ensure that the heavy roof structure remained firmly coupled to the exterior load bearing walls.

The most recent structural remediation efforts have a commercial value of approximately $250,000. Previously completed structural remediation efforts have been valued by the Owner as 3 to 4 times this amount. Additional structural remediation work will be done at the Pioneer Family Land Partnership facility in 2016, and likely beyond, with as yet undetermined cost implications. Upon completion of the remediation work planned for 2016 the total cost of the work will well exceed $1 million.

The deformation of the north exterior wall, and a number of other serious structural deficiencies in the facility, has been directly attributed to ground movements associated with the larger instability of the natural slope in the area of Hodgson Road, Dog Creek Road and provincial Highway No. 20. Collectively we refer to that area of instability as the Hodgson Road Landslide.

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To our knowledge this area has been identified as being chronically unstable for at least 20 years, and perhaps longer, pending our detailed review of the historical correspondence accumulated on this file. A number of technical reports, primarily geotechnical but also structural, have been prepared and distributed amongst a number of stakeholders in this time period.

Scouten Engineering prepared correspondence to Pioneer Family Land Partnership confirming the scope of our involvement with the most recent structural remediation in particular and the broader issues of the potential structural and building services implications in the area of the Hodgson Road landslide in general. A copy of that correspondence, dated September 18th, 2015, is attached.

Similar correspondence was prepared by a local geotechnical consultant involved with this file (Evergreen Geotechnical Inc. of 150 Mile House, BC). That correspondence, also dated September 18th, 2015, is also attached. Our collective understanding is that both pieces of correspondence were circulated, at least informally, at the recent Union of BC Municipalities (UBCM) meeting in September of this year.

This current correspondence is intended to bring forward a sense of urgency to the need to understand the underlying causes of the geotechnical instability in the area of the Hodgson Road landslide and to take appropriate short, medium and long-term measures to control that instability. These measures, including but not limited to additional geotechnical investigations and analysis and the development of targeted works to control or mitigate the effects of the chronic slope instability, are required to protect the public and the economic value of current and projected future development in the area.

Our concerns have been elevated above those expressed in our September 18th correspondence because we are now considering the implications of chronic slope instability on the Terra Ridge residential development, immediately to the south and west of the Pioneer Family Land Partnership facility. We now have a better understanding of the extent and scale of the slope movements and recognize that it's not only the Pioneer facility that's affected.

The City of Quesnel has had similar experience with widespread, chronic geotechnical instability in the west part of that city. As quoted by the Vancouver Sun on May 23rd, 2013, *'the land-slippage issue came to public attention in 1997 when a natural gas explosion demolished two businesses, killed six people and injured 20.'*

The City of Quesnel has undertaken an extensive program of targeted works to control or mitigate the effects of the chronic slope instability under the West Quesnel Land Stability Program. Those targeted works have included extensive geotechnical investigation and analysis and the design and installation of a full-scale dewatering scheme and stormwater drainage system improvements. A public-domain backgrounder and Frequently Asked Questions document, both dated May, 2013, is attached.

There are a number of direct parallels between the situation in West Quesnel and the Hodgson Road landslide in Williams Lake. In particular both involve developed land that includes built structures and underground utilities and services, including natural gas distribution. The potential hazards to the public and property include structural failures and the

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rupture of both small and larger natural gas lines in the area. The rupture of other buried utilities, and in particular water mains and service connections, would potentially lead to additional slope instability by saturating the already wet soils in the area of the Hodgson Road landslide.

We urge you to recognize the seriousness of the issue of geotechnical instability in the area of Hodgson Road, Dog Creek Road and provincial Highway No. 20 in Williams Lake, BC. Additional correspondence from Evergreen Geotechnical Inc. and Golder Associates (the lead consultant on previous geotechnical investigations) addressing their concerns with the issue is being prepared, and will be submitted to both of you under separate cover in the near future.

Sincerely:

16 Dec 2015

PROFESSIONAL ENGINEER D. J. SCOUTEN

SCOUTEN ENGINEERING
Dave Scouten P. Eng. – Principal Engineer
dscouten@scoutenengineering.com

Concurred by:

SCOUTEN ENGINEERING
Tomas Horalek P. Eng. – Structural
thoralek@scoutenengineering.com

Attach: Photographs
Copy of Scouten Engineering correspondence dated September 18th, 2015
Copy of Evergreen Geotechnical Inc. correspondence dated September 18th, 2015
West Quesnel Land Stability Program Backgrounder and FAQ's

cc: Pioneer Family Land Partnership – Mr. André Chevigny

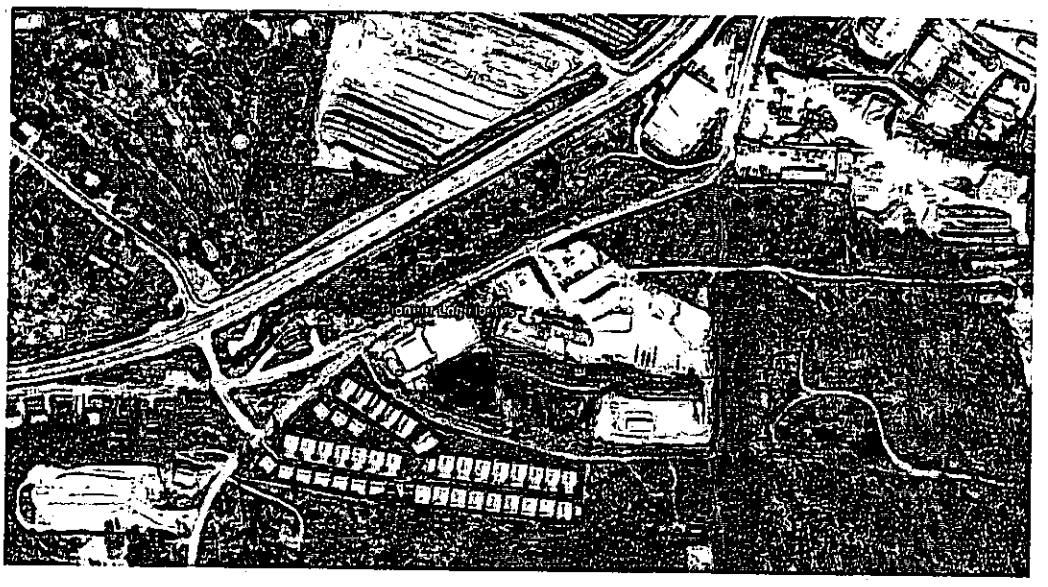

Photo 1: Site location - 351 Hodgson Road Williams Lake, BC

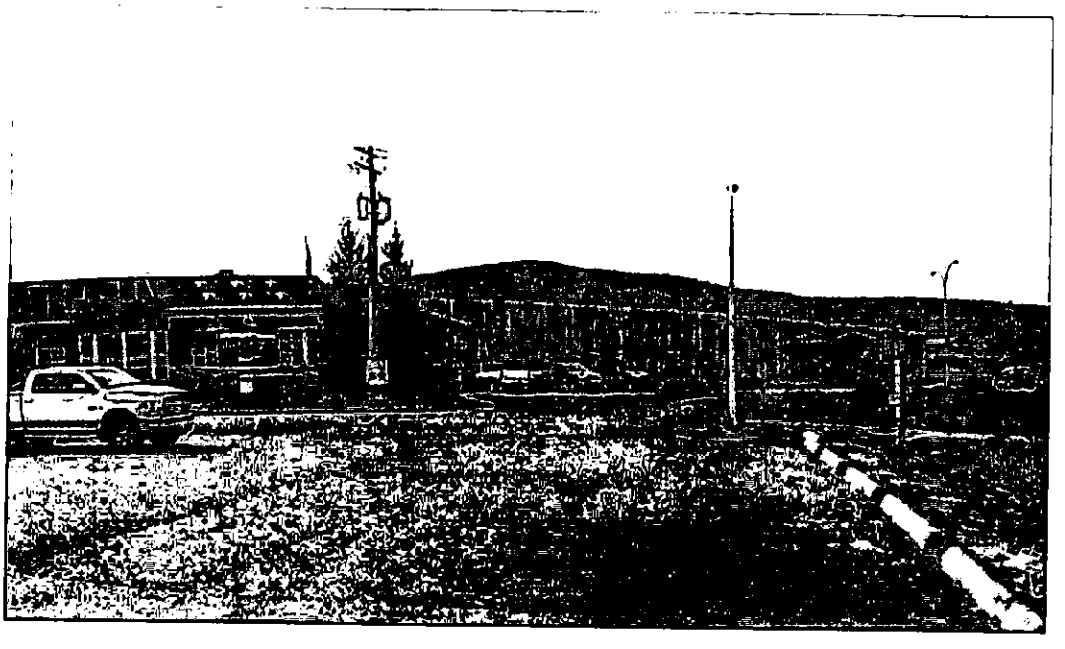

Photo 2: Exterior view looking south before structural remediation work

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PROJECT :	1234-01	NAME:	Hodgson Road Landslide – Structural Remediation Work		
LOCATION:	Williams Lake, BC				
CLIENT:	Pioneer Family Land Partnership			BY:	DS
DATE:	December, 2015	PAGE:	1	OF	10

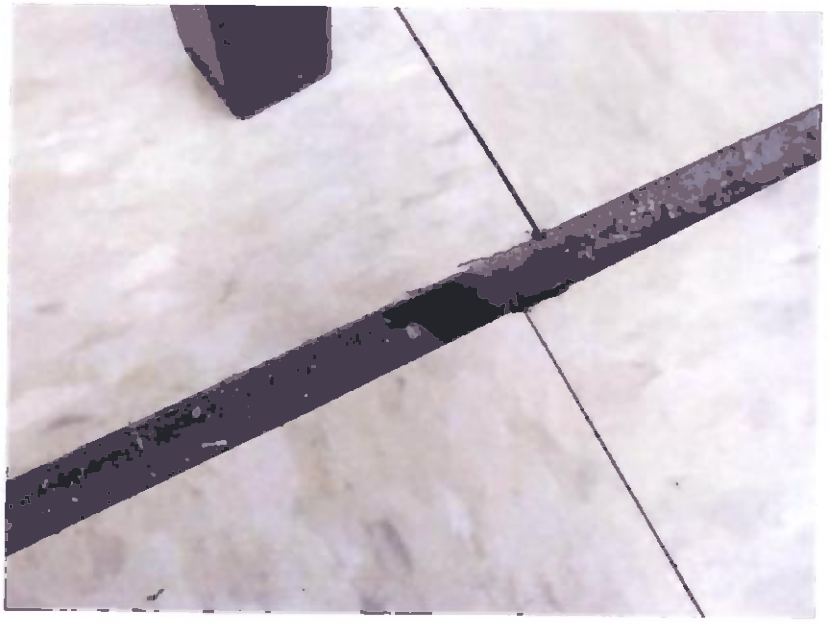

Photo 3: Extensive cracking in cast-in-place slab-on-grade, largely concealed by floor coverings

Photo 4: Extensive cracking in cast-in-place slab-on-grade throughout building plan

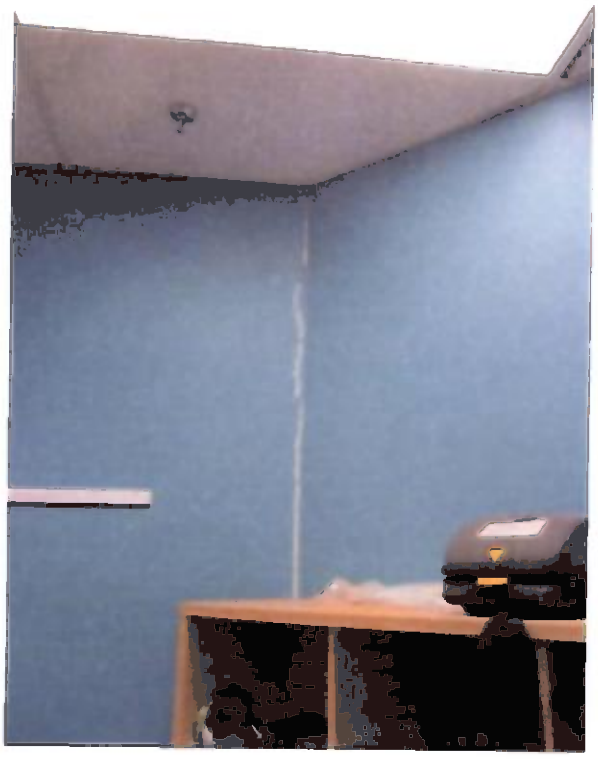

Photo 5: Extensive interior cracking, largely concealed by wall finishes

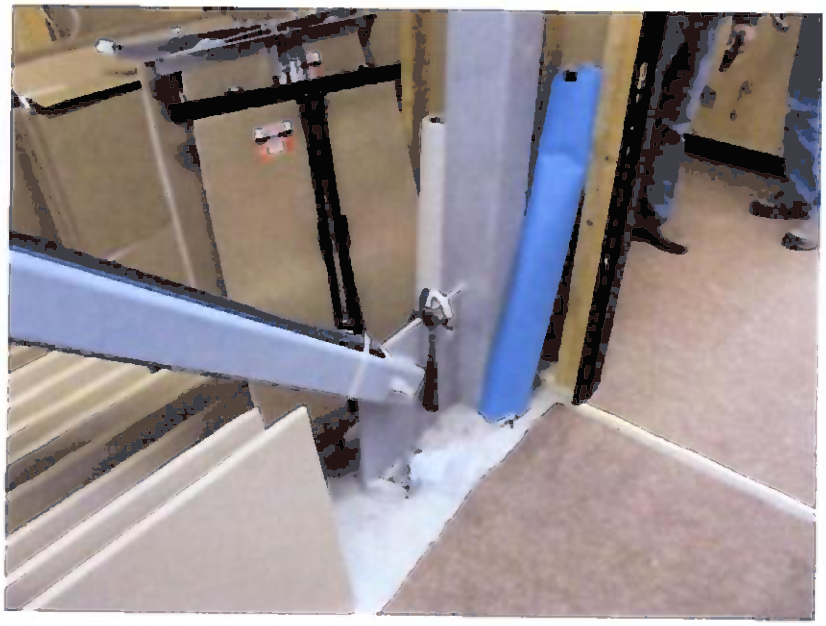

Photo 6: Extensive interior remedial structural work previously done (2006)

Photo 7: Extensive interior remedial structural work previously done (2006)

Photo 8: Extensive remedial structural work previously done to stabilize roof structure (2006 and 2014)

Photo 9: Extensive displacement and cracking of precast, pre-stressed exterior wall panels

Photo 10: Extensive displacement and cracking of precast, pre-stressed exterior wall panels

Photo 11: Existing retaining wall removed and new structural buttress constructed (fall, 2015)

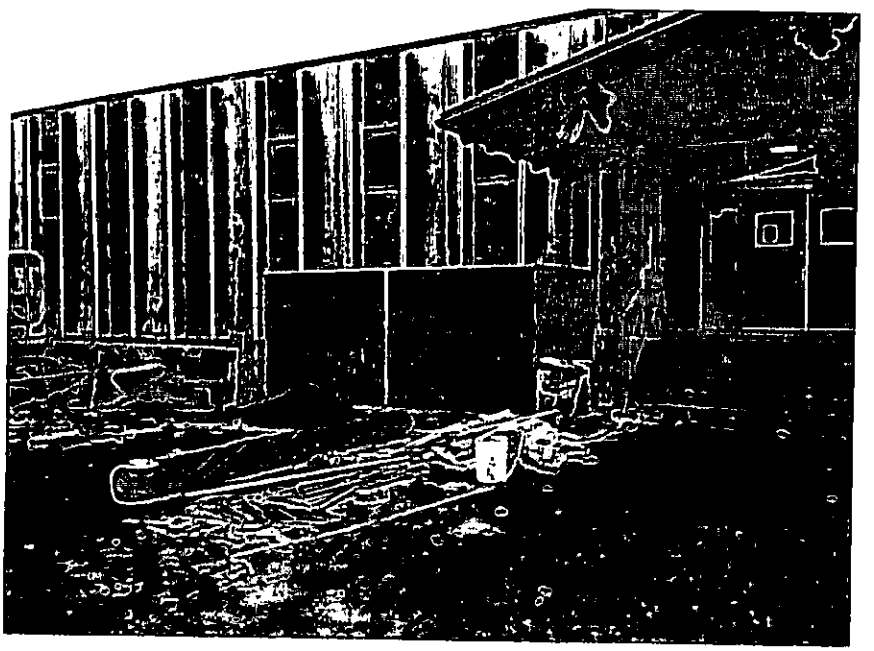

Photo 12: Existing retaining wall removed and new structural buttress constructed (fall, 2015)

Photo 13: Existing retaining wall removed and new structural buttress constructed (fall, 2015)

Photo 14: Existing retaining wall removed and new structural buttress constructed (fall, 2015)

Photo 15: Custom-fabricated structural steel struts installed to brace precast, pre-stressed exterior wall panels

Photo 16: Custom-fabricated structural steel struts installed to brace precast, pre-stressed exterior wall panels

Photo 17: Custom-fabricated structural steel struts installed to brace precast, pre-stressed exterior wall panels

Photo 18: 50 ton capacity hydraulic rams (x2) used to introduce buttressing load into precast pre-stressed exterior wall panels

Photo 19: Jacking forces controlled by monitoring pressure in hydraulic hand pump

Photo 20: Permanent load introduced into precast, pre-stressed exterior wall panels

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September 18th, 2015
Project: 1234-01

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André Chevigny
Pioneer Family Land Partnership
351 Hodgson Road
Williams Lake, BC
V2G 3P7

Re: Hodgson Road Landslide – Structural and Building Services Implications

Dear André:

This correspondence confirms that Scouten Engineering (Scouten) has been retained by Pioneer Family Land Partnership (Pioneer) to provide structural and civil engineering assistance in the context of the Hodgson Road Landslide in Williams Lake, BC. Specifically, Scouten will provide engineering services to identify potential physical hazards at the Pioneer Family Land Partnership Complex (formerly a college facility) including buried and overhead structural hazards and other hazards associated with the movement of buried building services.

Scouten will assist Pioneer with the development of both short and long-term engineering solutions to ensure the future stability of the complex. These may include the installation of structural buttresses or tie-backs, sheet pile diaphragm walls and movement relief (expansion) joints in the building superstructure or substructure. We've already completed the majority of the design necessary to stabilize the north wall of the complex through the use of structural struts, waler assemblies and hydraulic jacks.

Scouten intends to work closely with your geotechnical consultant (Evergreen Geotechnical Inc.) in the development of those short and long-term solutions. Our involvement will be limited to the structural and civil infrastructure components affected by the Hodgson Road Landslide. The broader issues of geomorphology, slope stability / instability and groundwater hydrology will be solely addressed by Evergreen.

Our review of your file to date suggests that there have been a number of instances of slope instability and ground movement affecting the Pioneer complex. We understand that those instances of instability and movement have generally been correlated with conditions of high groundwater and/or surface water in the area. In our experience the movement of built structures and the civil services connected to them (potable and fire water supply, sanitary sewage disposal, natural gas supply, etc.) is very often associated with unfavourable drainage and the build-up of unforeseen hydraulic pressures.

A number of potential physical hazards were previously identified in the Pioneer complex by other consultants. These include significant movement of the primary structure (consisting of precast, pre-stressed wall and roof elements) and the significant movement and cracking of the interior slab-on-grade. Some, but not all of these hazards were mitigated by the installation of drag struts and shear tabs on the interior of the building envelope sometime

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in the past. The structural analysis and specific calculations used to design those mitigation measures are not currently available to us so we can't comment on their short and long-term effectiveness.

We understand that a relatively recent instance of instability and ground movement occurred in the spring of 2015. This gives us considerable concern that the structural mitigation measures installed in the past may not be adequate for the structural forces currently acting on the building. In no way trying to sound alarmist we advise that we have been involved with the forensic assessment of many collapsed structures in the past and that at least some of those collapses were associated with instability or 'loss of ground' around and under the building foundations.

We intend to re-assess the structural strength and stability of the Pioneer complex moving forward. Depending on the measures deployed to reduce or eliminate future movement of the broader Hodgson Road Landslide area we may need to recommend more aggressive structural remediation measures. Those measures could conceivably include the demolition and removal of the Pioneer complex, especially if the slope movements cannot be effectively controlled in the long-term.

If requested to do so we can extend our terms of service to include the structural assessment of the Terra Ridge strata development to the south of the Pioneer complex. We understand that that facility has also experienced ground movements and may have similar issues of structural distress. We'd be happy to meet with a representative of the Terra Ridge strata council to discuss those engineering services in the near future.

In the meantime we'll focus our attention on the assessment of the Pioneer complex and the development of practical structural remediation solutions.

Sincerely:

SCOUTEN ENGINEERING
Dave Scouten P. Eng. – Principal
dscouten@scoutenengineering.com

PROFESSIONAL ENGINEER
D. J. SCOUTEN
10 Sept 2015

EVERGREEN
GEOTECHNICAL INC.

3217 Evergreen Place, P.O. Box 1396 150 Mile House, V0K 2G0
Phone, (250) 296-3132, Fax, (250) 296-3535
E-mail, Evergreen_Geotech@telus.net

September 18th, 2015

Pioneer Log Homes
Attn: Mr. Andre Chevigny
351 Hodgson Road
Williams Lake, BC
V2G 3P7

Re: Status of Hodgson Road Landslide Williams Lake

Dear Mr. Chevigny,

The Hodgson Road landslide in Williams Lake has a recorded history of movement and structural damage as a result of that landslide movement over the past 25 years. It is located in an area identified in the Williams Lake Fringe Area as "Ancient Landslide" by Golder Associates, 2006[1], (Golder 2006). Furthermore, Golder 2006 identified it as an "Active Landslide", with recommendations that "active landslide areas are generally unsuitable for development due to the risk to persons, building and infrastructure." However, prior to recognizing the ancient and active landslide hazards there was considerable development on the Hodgson Road Landslide area, starting with construction of both the City's West Side Reservoir and a water bed factory. The water bed factory was not a successful business, it was transformed with significant additions into a Community College, which was later subject to landslide activity and a catalyst for recognizing the active landslide hazard. Furthermore, the Terra Ridge Village, made up of 41 duplex structures as an "Adult Community", was constructed in the early 1990's with the vast majority of the construction completed prior to recognizing the landslide issue. Recent landslide movement upslope in the Dog Creek Road area has ruptured natural gas pipe lines and it is believed that the landslide has regressed into the Cariboo Regional District lands and now involves many additional private residential properties and at least one trailer park, all of which are on well water and septic disposal systems.

Upon initial recognition of the landslide issue in the 1990's, geotechnical investigations were done for the City of Williams Lake, University College of the Cariboo and the Ministry of Transportation and Highways with several well instrumented drill holes completed in 1997 and 1998. Highway 20 is located at the toe of the landslide and the

[1] Bosdet, B. & Thibeault, M., Golder Associates, 2006, Geotechnical Hazard Mapping For the Williams Lake Fringe Area Official Community Plan

1970 construction involved a large earth cut that has since experienced heaving and break-up of the surface. The results of these investigations, were given in a series of reports and technical memorandum by Golder Associates[2][3][4][5][6], (Golders 1997 – 1999).

In essence, the landslide involves a deep seated, slow moving earth mass sliding on a flat to very gently sloping bedrock surface. The slide is at least 600 meters in length, possibly twice that or more if the active portion of the slide has regressed to the south, and is known to be up to 500 meters in width. It is 30 meters deep at the Pioneer Complex (old College Building site). The western side has been identified to the west of Wotzke Drive above Terra Ridge Road with steep sides leading into the "basin". A drill hole into the bedrock at the Pioneer Complex found groundwater which could be drawn down by pumping to help stabilize a very small portion of the slide surface. Surface water drainage has also been an issue with elevated water levels causing localized movement within the landslide mass. Elevated groundwater levels have been observed at the southern cut-slope face behind the Pioneer Complex and along Hutchinson Road at the City water main.

Repair work has been done to Dog Creek Road at Roberts Drive where the gas line ruptured and extensive asphalt cuts, regrading and paving work has been done on Highway 20 in each of the last several years. There has been structural damage to at least one duplex in the Terra Ridge Village and the common drives and sidewalks are showing movement. The northern wall of the Pioneer building has had significant pressure exerted recently that may be attributed to higher than normal near-surface water, in addition to poor foundation drainage. This has resulted in structural damage that Scouten Engineering is currently attempting to quantify and resolve. Finally, there has been several water main breaks in the last two years including at least one on Hutchinson Road immediately below Terra Ridge Village and also on Hodgson Road near the known edge of the active landslide area.

These issues require both deep seated drainage and control of the surface drainage to ultimately stabilize this landslide. Further detailed geotechnical investigations need to be done in association with active measures to control the groundwater driving the instability. A series of pumping wells, located upslope and/or downslope of Terra Ridge Village are a viable starting point in the opinion of this writer. Another viable measure that would provide immediate results is the installation of a French drain along Hutchinson to collect and dispose of groundwater that is known to be flowing in that area as evidenced in the water main bedding at that location.

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[2] Bosdet, B. Golder Associates, May, 1997, Report on Hodgson Road Slide, Williams Lake B.C.
[3] Bosdet, B. Golder Associates, July 1997, Status Report to July 1997 Hodgson Road Slide, Williams Lake, B.C.

[4] Seargant, N., & Bosdet, B. Golder Associates, July 1998, Technical Memorandum 1, Data Sysopsis, Hodgson Road Slide, Williams Lake B.C.
[5] Seargant, N., & Bosdet, B. Golder Associates, October 1999, Technical Memorandum 2, Hydrogeological Analaysis, Hodgson Road Slide, Williams Lake B.C.
[6] Bosdet, B. Golder Associates, October 1999, Technical Memorandum 3, Slope Stability Analysis, Hodgson Road Slide, Williams Lake B.C.

If you have any questions regarding the history of, past studies done, and current issues regarding the Hodgson Road Landslide in Williams Lake as discussed herein, please do not hesitate to contact me.

Sincerely.

Robert G. Wilson. P.Eng., P.Geo.

Backgrounder – May 2013

West Quesnel
LAND STABILITY PROGRAM

Overview

A large, ancient landslide underlies a significant part of West Quesnel. Land movement in the West Quesnel Land Stability Study Area has been occurring over a long period, but the rate of movement is slow (less than 75 mm (three inches) per year). This movement is highly dependent on annual precipitation and snowmelt conditions. The impacts on buildings and infrastructure are significant.

The area is an attractive, established residential community, including 940 parcels of land, 750 homes, an elementary school and several businesses. The total value of the land, improvements, services and infrastructure in the study area exceeds $100 million; the area is important to the economic and social viability of the City of Quesnel and is home to more than 20% of the City's population.

The science behind the West Quesnel Land Stability Program

A number of geotechnical and hydrogeological technologies have been used to:

- Gain an understanding of what is happening.
- Determine the cause.
- Establish what needs to be done to manage the movement.

The engineering work to date has provided the following key findings:

- The area affected by movement and the boundaries of the area have been mapped.
- Movement is occurring very slowly, about two to seven centimetres (one to three inches) per year with some variation within the identified area.
- The movement is very deep, from 28 to 68 metres (100 to 300 feet) below the surface.
- Unless remedial measures are taken, movement will continue to occur.
- Reducing groundwater pressures is key to reducing movement to manageable levels.

West Quesnel Land Stability Program – work completed in 2012

The City implemented a full-scale dewatering program in the study area in 2012. The program included:

- Installation of 14 pumping wells at sites along the top of the WQLS Study Area (near Dixon and Dawson Sts).
- Building six horizontal drain sites that consist of about 60 horizontal drains located across the bottom of the study area (along Lewis Dr and near Avery Av).
- Installation of new storm water drainage systems in various locations to reduce the amount of water entering the ground.

A map showing the full-scale dewatering program, including well, drain and storm system locations, is available at **www.quesnel.ca/WQLS.**

Next Steps for the West Quesnel Land Stability Program in 2013

- Continue the annual monitoring program which will now include the pumping wells and horizontal drains installed in 2012 to measure the effect of the dewatering on the slide movement.
- Continue with the environmental monitoring to ascertain the effect the dewatering may or may not have on the ponds and wetlands in the area and an extensive water quality sampling program to measure the effects of the well water that enters Baker Creek.

Funding the West Quesnel Land Stability Program

The Government of Canada, Province of British Columbia and City of Quesnel are each contributed $1.57 million through the Building Canada Fund – Communities Component program, part of Canada's Economic Action Plan, to pay for the full-scale dewatering program budget of $4.731 million. This funding was used for:

- The full-scale dewatering program.
- Storm water drainage system improvements and connections.
- Environmental Assessment costs.
- Engineering and consulting costs.

In addition to the Building Canada funding, the City of Quesnel has invested approximately $2.14 million on the West Quesnel Land Stability Program since 2000. The provincial government added $1.2 million in 2006. This funding supported more than 10 years of work, including significant data collection and analysis, a trial dewatering program, and ongoing project administration.

Impacts of Land Movement:

Physical Impacts:

The impacts on homes and other structures vary. Some buildings have not been impacted because the slide is very deep and the ground around them moves uniformly. Structures in other locations have sustained significant damage, including ongoing deformation resulting in structural cracks.

Ongoing ground movement has caused slow deformation resulting in broken pipes and damage to roadways. FortisBC (then BC Gas), the principal underground utility in West Quesnel, replaced its steel piping system with a flexible polyethylene piping system at a cost of $2 million in 2000.

Economic and Social Impacts:

Impacts on property values have not been quantified, but anecdotal information indicates substantial reduction in saleability and resale values. In 2001 the City placed restrictions on development in the study area. Building permits for new buildings, or repairs or renovations that exceed 25% of assessed value, require a supporting geotechnical report and a covenant on title.

These building restrictions have resulted in a freeze on development of the more than 160 vacant parcels within the study area. Reduced homeowner equity, and little prospect for property value appreciation are disincentives for owners to improve or even maintain their properties.

In response to poor prospects for sale, a considerable number of owners have chosen to rent homes. Greater numbers of rental units have resulted in a higher turnover rate in the Uplands neighbourhood.

There are also unknown health and social impacts that may be directly or indirectly caused by the unresolved ground movement problem.

History of the Development of West Quesnel:

The initial development of the area occurred under provincial jurisdiction with subdivision approvals granted by the Ministry of Transportation and Highways.

The area was amalgamated into the Town of Quesnel and later the City of Quesnel starting with a small area in 1955. Additional areas were incorporated into the municipality in several increments. The most substantial amalgamations occurred in 1970 and 1975.

A large portion of the residential development occurred in a sustained growth period during the 1970s. Voyageur Elementary School was built in 1974.

West Quesnel has been the subject of a number of engineering investigations. Initial work done by the Ministry of Transportation and Highways in 1973 did not specifically address the area nor indicate a ground movement concern. Subsequent studies in the 1990s were inconclusive. Ground movement in West Quesnel was first conclusively proven in engineering work commissioned by the City in 2000-2002.

Between 2003 and 2011 the City commissioned additional geotechnical and hydrogeology work to outline the boundaries of the area impacted, the extent of movement, and to provide guidance on remediation strategies.

Frequently Asked Questions – May 2013

West Quesnel
LAND STABILITY PROGRAM

Overview

A large, ancient landslide underlies a significant part of West Quesnel. Land movement in the West Quesnel Land Stability Study Area has been occurring over a long period, but the rate of movement is slow (less than 75 mm (three inches) per year). This movement is highly dependent on annual precipitation and snowmelt conditions. The impacts on buildings and infrastructure are significant.

The area is an attractive, established residential community, including 940 parcels of land, 750 homes, an elementary school and several businesses. The total value of the land, improvements, services and infrastructure in the study area exceeds $100 million; the area is important to the economic and social viability of the City of Quesnel and is home to more than 20% of the City's population.

What's new with respect to the West Quesnel Land Stability Program?

The City has begun a full-scale dewatering program after recently completing a rigorous, 18-month Environmental Assessment process.

What is the full-scale dewatering program?

Groundwater levels are usually reduced by a combination of surface water diversion (reducing the surface water entering the ground) and sub-surface drainage measures (e.g. water extraction from underground using pumped wells and horizontal drains). The City installed 14 pumping wells at sites along the top of the WQLS Study Area (near Dixon and Dawson Sts). Six horizontal drain sites were created, consisting of about 60 horizontal drains located across the bottom of the study area (along Lewis Dr and near Avery Av). These methods were chosen based on the results of the trial dewatering program.

In addition, new storm water drainage systems were installed in various locations to reduce the amount of water entering the ground. A map showing the full-scale dewatering program, including well, drain and storm system locations, is available at **www.quesnel.ca/WQLS.html.**

How much will the full-scale dewatering project cost?

The Government of Canada, Province of British Columbia and City of Quesnel have each contributed $1.57 million through the Building Canada Fund – Communities Component program, part of Canada's Economic Action Plan, to pay for the full-scale dewatering program budget of $4.731 million. This funding was used for:

- The full-scale dewatering program.
- Storm water drainage system improvements and connections.
- Environmental Assessment costs.
- Engineering and consulting costs.

How much has been spent on the West Quesnel Land Stability Program?

In addition to the Building Canada funding, the City of Quesnel has invested approximately $2.14 million on the West Quesnel Land Stability Program since 2000. The Province of British Columbia added $1.2

million in 2006. This funding supported more than 10 years of work, including significant data collection and analysis, a trial dewatering program, and ongoing project administration.

How can we be sure that reducing groundwater will bring the ground movement to manageable levels?

Groundwater pressure (water trapped in the ground) adds weight to the ground and reduces its strength, allowing ground movement to occur more easily. This principle is well established through the study of ground conditions similar to those underlying West Quesnel.

Reducing the high groundwater pressures under the study area will decrease the forces driving land slippage and increase ground strength resisting the movement. This approach has been used successfully to address ground movement in many other situations. The City of Kamloops employed an effective dewatering program which has successfully arrested land movement in the Aberdeen residential area. Similar programs have run successfully in Edmonton, Los Angeles, Anaheim and Malibu.

How long will it take for the City to know if the dewatering program is working?

The infrastructure associated with the full-scale dewatering program (wells, horizontal drains, storm water drainage improvements etc.) were installed over the spring and summer of 2012. That work is completed, the system is "turned on" and dewatering has begun. The City will dewater and monitor the dewatering results until June 2014. At that time, the City will be able to properly evaluate the program and determine next steps. As land movement is highly dependent upon precipitation, it would be good to have at least two spring run-off cycles included in the data.

What is meant when the City speaks of a "solution" to the ground movement problem?

The solution will be achieved when ground movement has been stopped or reduced to manageable levels such that further damage to buildings and infrastructure is eliminated or sustainable.

Why can't we use the water removed from the study area to supply the City's drinking water system?

The City has considered this possibility; unfortunately it is not practical economically or operationally. The City's drinking water wells have a much higher water output than what is expected from the West Quesnel wells. For example, the City's newest drinking water well produces 75 litres per second. The highest yield well in West Quesnel to date provides less than 4 litres per second. Each City drinking water well must undergo a high degree of inspection and water quality testing. These investments should be made on wells that are high producers. The City would also need additional infrastructure (new pipes and controls) to get the water from the West Quesnel wells to the drinking water system.

This decision may be revisited once the new West Quesnel wells are operating and there is a clearer picture of the quantity and quality of the water being extracted.

Will the City ever remove the building restrictions that are in place?

Unfortunately the City is never in a position to be able to provide guarantees regarding future land movements, anywhere in the City. In this case, receiving the results of the Phase 1 dewatering program is critical and must happen before any discussions around removing the building restrictions can take place. The timeline for this phase is:

October 2012 – Installation and connection of all wells, drains and storm drain improvements.

October 2012 – June 2014 – Dewatering and monitoring the effects of the dewatering (finding out if Phase 1 is working).

July – August 2014 – Compiling data and preparing reports.

September 2014 – Report the results of Phase 1 to the community. At this point, the City will also decide on the appropriate next steps, including evaluating the building restrictions and determining the need for more dewatering infrastructure.

The City has embarked on a comprehensive program to reduce ground movement in West Quesnel to manageable levels. It may take some time for success to be achieved, and all areas of West Quesnel may not achieve the same success at the same time. The City's objective is to be able to relax the building restrictions.

Will financial assistance be available to assist residents to repair damage to their homes?

The City views and documents damage to buildings in West Quesnel by invitation. This will be the first step towards developing a program to carry out rehabilitation work and to lobby senior governments for funding to assist homeowners to repair damage caused by the ground movement.

I see no damage to my home or surrounding neighbourhood. Is there really a ground movement problem?

Not all locations within the study area will show signs of ground movement. Imagine you are standing in the middle of a cruise ship – nothing seems to be moving and all is calm immediately where you are standing. Now consider how it looks when you look overboard – the movement can only be detected at the boundaries of that movement.

It is important to note that the boundaries of movement include not only the outside edge of the moving land mass. Separate areas within the area are also moving at slightly different rates and in slightly different directions. Properties near the edges of these separate areas tend to experience the most damage.

What can residents do to assist in reducing groundwater levels?

The City is moving forward with the development of a surface drainage strategy, which will include a new storm sewer system in West Quesnel. Residents in the area can assist efforts to limit the amount of water entering the ground by a number of means:

- Limit lawn sprinkling to reasonable levels. Use a rain gauge to measure the amount of water you are applying and avoid over-watering of lawns and shrubs.
- Direct surface runoff and downspout discharge to the street where possible.
- Observe and report any leaks or drainage problems to the City.
- Report any springs, abandoned wells, or other water sources in the neighbourhood.