



11 March 2019

Reference No. 1114930112-005-TM-Rev3

Suki Sekhon

c/o CRS Group of Companies
Re: Twin Lakes Golf Resort
Unit 920-475 West Georgia
Vancouver, BC
V6B 4M9

**TERMS OF REFERENCE FOR PROPOSED PHASE 2 DEVELOPMENT
TWIN LAKES GOLF RESORT LTD., REGIONAL DISTRICT OF OKANAGAN SIMILKAMEEN, BC**

Dear Mr. Sekhon:

At the request of the Regional District of Okanagan Similkameen (RDOS), and on behalf of Twin Lakes Golf Resort Ltd. (TLGR), Golder Associates Ltd. (Golder) has created a Terms of Reference to support Phase 2 of the proposed TLGR development. As TLGR moves forward with the implementation of Phase 1, and in order to consider proceeding with Phase 2 of the development, the Terms of Reference will support the collection of data to confirm that there will be a sufficient supply of groundwater through calibration of the numerical model. It is understood that the Terms of Reference will be attached to the Twin Lakes Golf Resort property covenant; the Terms of Reference are included as Attachment A. The Terms of Reference should be reviewed in conjunction with the Limitations (Attachment B).

In January 2016 Golder completed a hydrogeological assessment that included development and calibration of a numerical model to assess groundwater availability within the Twin Lakes watershed; the results were presented in our report titled "*Groundwater Availability Study, Proposed Residential Development (Phase 1), Twin Lakes, BC*". Based on the assumptions and limitations set out therein, Golder's report concluded that there was sufficient groundwater available to support the proposed development of 50 lots (Phase 1) and Golder recommended progressing the development in a phased approach to further assess and confirm water availability. The executive summary from Golder (2016) is provided as Attachment C.

Since that time, TLGR has decreased the number of units associated with Phase 1 to 46 units and has continued implementation of the groundwater and surface water monitoring program. As part of the monitoring program Golder collects and analyzes data from key surface water locations (Horn Lake, Twin Lake and Trout Lake) and wells (TLGR monitoring wells, Ministry of Forests, Lands, Natural Resource Operations and Rural Development (FLNRORD) observation wells, and select private wells). A review of the most recent groundwater and surface water level data (i.e., 2018) continues to show slight overall increases in water levels at the monitored locations between 2010 and the present.

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In early 2019 RDOS approached TLGR to request that RDOS oversee the monitoring program. RDOS provided a draft scope of work regarding the Terms of Reference to Golder on 31 January 2019 that outlined some of the Terms of Reference requirements. Key items of note are as follows, and have been included in this current Terms of Reference document:

- It is understood that TLRG has agreed (in principal) to continue funding the ongoing monitoring program through RDOS, with RDOS overseeing the program.
- RDOS will create a technical committee to provide oversight during future works. The technical committee will consist of members from RDOS, TLGR, Golder and Don Dobson (private consultant).
- It is required that the most applicable model (steady state versus transient model) be identified and used to assess water sustainability within the Twin Lakes watershed. The applicability of the model will be dependant on the quality and quantity of data available, and should be agreed on by the technical committee.
- Confirmation of data values (types, length of record, reliability) is required to assess drought, normal and wet conditions within the model.

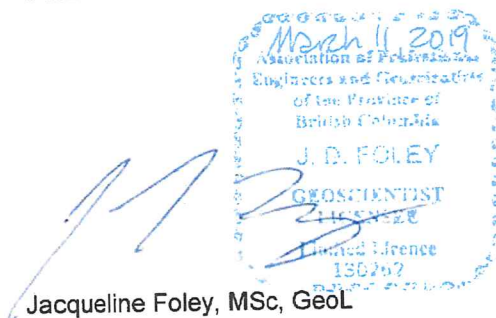
Several of the items listed in RDOS 2019 may not be specifically listed within the Terms of Reference, but will be confirmed and agreed upon by the Technical Committee.

We trust that this provides you with the information you require at this time. Should you have any questions please contact the undersigned at your convenience.

Should you have any questions or concerns, please feel free to call the undersigned at your convenience.

Yours very truly,

Golder Associates Ltd.



Jacqueline Foley, MSc, Geol
Associate, Senior Hydrogeologist



Mark Bolton, MSc, PGeo
Associate, Senior Hydrogeologist

JF/PA/MB/kh

Attachments: Attachment 1 – Terms of Reference
Attachment 2 – Limitations
Attachment 3 – Golder 2016 Executive Summary

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REFERENCES

- Golder Associates Ltd. 2016. *Groundwater Availability Study, Proposed Residential Development (Phase 1), Twin Lakes, BC*. 26 January 2016. Reference No 1114930112.
- MSR Solutions Inc. 2012. Twin Lakes Golf Resort Development Water Use Plan. Plan prepared by MSR Solutions Inc. for Twin Lakes Golf Resort. MSR Project #: 10-048.
- Regional District of Okanagan Similkameen. 2019. Draft Twin Lakes Sustainable Water Supply Terms of Reference. 31 January 2019.

ATTACHMENT 1

Terms of Reference

Terms of Reference

Based on the results of the Phase 1 Groundwater Availability Study (Golder 2016), and conversations with the Regional District of Okanagan Similkameen (RDOS), Golder Associates Ltd. (Golder) provides the following Terms of Reference for ongoing monitoring and hydrogeological assessment to confirm a sustainable water supply for TLGR's proposed development. The Terms of Reference provides a framework of requirements to ascertain the feasibility of Phase 2 of TLGR's development, and outlines funding and oversight, monitoring and modelling requirements, and water management.

Funding and Oversight

- TLGR has agreed (in principal) to continue funding the ongoing monitoring program through RDOS, with RDOS overseeing the program.
- RDOS will create a Technical Committee, the purpose of which is to provide input and oversight during future works, specifically regarding the question of a sustainable water supply for the Twin Lakes watershed. The Technical Committee will consist of members recommended by the RDOS, and should include members knowledgeable in hydrogeology. They will confirm the project area within the Twin Lakes watershed and reach a consensus regarding the suitability of the numerical model to conduct the water balance analyses. The Technical Committee will apply reasonable and fair assumptions regarding the suitability of the numerical model and its fit for purpose, in its application of information, and in its decision making processes.
- On completion of the model, and provided the results indicate what a sustainable withdrawal for TLGR's Phase 2 development is, the Technical Committee will provide recommendations to the RDOS that are consistent with the technical report regarding the Phase 2 development.

Monitoring

- Ongoing, long-term monitoring of surface water levels at Horn Lake, Twin Lake and Trout Lake and groundwater levels within FLNRORD observation wells and private wells (TLGR and others if possible) should be conducted (currently, TLGR has collected approximately nine years of water level information as part of the ongoing monitoring program). Specifically:
 - Water levels should be measured continuously using pressure transducers, with data corrected for barometric pressure.
 - Manually recorded water levels to be collected at a minimum of once a month using a water level meter (for groundwater) and a staff gauge (for surface water) for calibration of the transducer data.
 - Data loggers should be downloaded, at a minimum, two times per year and reviewed by a Qualified Professional (i.e. a hydrogeologist registered and in good standing with Engineers and Geoscientists BC).
- A geodetic survey of surface water elevations, reference bench marks and/or staff gauges should be conducted annually to account for possible data logger/ staff gauge movement within the surface water body and to be used to correct water level data.
- It is understood that a climate station has been established by the Okanagan Basin Water Board (OBWB) within the Twin Lakes watershed; however, due to poor communications services in the area, the station is not active. The collection of data from the climate station should be re-established as soon as possible. The

OBWB, FLNRORD and/or RDOS will be approached by the Technical Committee regarding the re-establishment of the climate station. Dependant upon the location of the climate station, the need for additional climate stations will be evaluated. Ideally, a climate station would be present within each of the upper and lower reaches of the Twin Lakes watershed so that precipitation, temperature, evaporation and wind data can be collected, and used to support refinement of model parameters, as well as additional studies associated with the watershed.

- Metering of irrigation water that is used at the TLGR will continue, with weekly irrigation volumes pumped out of the TLGR irrigation wells reported to RDOS quarterly. Flow meters are to be calibrated annually, or as recommended by the manufacturer.

Modelling

- Confirmation of data (types [surface water, groundwater, climate, water use], length of record, reliability) is required to assess drought, normal and wet conditions within the model.
- Following collection of a minimum of ten years of reliable and approved monitoring data, agreement within the Technical Committee regarding conditions representative of drought, average and flood conditions and, prior to the Phase 2 development, the numerical model recommended by the Technical Committee should be recalibrated with the approved data to confirm/refine analytical results. Consensus regarding the suitability of the model will be reached by the Technical Committee.
- Revisiting of the model used by Golder for Phase 1 to determine whether or not it is suitable will include:
 - reasonable and agreed upon assumptions regarding drought years, peak uses and summer conditions
 - annual average water usage rates of 2,200 litres per unit per day (Golder, 2016)
- The following minimum design flows for domestic demand per unit shall be:
 - Average Daily Flow to 2,200 L / day
 - Maximum Daily Domestic Flow from 5,500 L / day
 - Peak hour domestic flow from 10,000 L / day

It is further understood that additional information may be available in the next year regarding the watershed (RDOS proposed future watershed studies); this information would be included in the model, and may include reconciliation of the surface water licenses and volumes with the BC Ministry of Environment and Climate Change Strategy (see below).

Water Management

- TLGR should adhere to their water management plan and irrigation best management practices, as outlined in MSR (2012).
- Water conservation measures (i.e., xeriscaping, low-flow appliances) and irrigation watering restrictions during periods of drought will be implemented for all phases of the development.
- Water metering of the Phase 1 development will be implemented.
- Future bylaws adopted by the RDOS Board will regulate domestic and irrigation water use and conservation within the Twin Lakes community water service areas. These bylaws will be consistent with, and based on, current water use and management practices.

- Possible Actions of the Technical Committee:
 - Approach the Ministry of Environment and Climate Change Strategy (and/or other appropriate regulatory agencies) to address the overallocation of historical surface water licenses in the Twin Lakes watershed area.
 - Request and obtain all and any water information from regulated water users within the Twin Lakes watershed (e.g. Lower Nipit Improvement District) regarding pumping rates, frequencies and water use. If feasible, this information may be accounted for in the numerical model.
 - Approach the FLNRORD and/or RDOS regarding the re-establishment of the hydrometric stations on Horn Creek (Horn Creek near Olalla; 08NM147) and Twin Lakes (Twin Lakes Near Olalla; 08NM148), such that surface water flows at these locations can be measured, and to confirm surface water runoff values for the upper watershed for Horn Creek.

ATTACHMENT 2

Limitations

LIMITATIONS

This Terms of Reference was prepared for the use of Twin Lakes Golf Resort (Client) and the Regional District of Okanagan Similkameen (RDOS). The Terms of Reference was developed according to professional standards and practices in the groundwater field and has been made using historical and technical data obtained from the sources noted within Golder 2016, as well as on conversations with RDOS and the Client. Golder has relied in good faith on this information and does not accept responsibility of any deficiency, misstatements or inaccuracies contained in the report as a result of omissions, misinterpretation and/or fraudulent acts of the persons interviewed or contacted, or errors or omissions in the reviewed documentation. We accept no responsibility for any deficiency, misstatement or inaccuracy contained in this report as a result of omissions, misinterpretations or fraudulent acts of persons interviewed or contacted.

The services performed as described in this report were conducted in a manner consistent with the level of care and skill normally exercised by other members of the engineering and science professions currently practicing under similar conditions, subject to the time limits and financial and physical constraints applicable to the services. The information, recommendations and opinions expressed in this report are for the sole benefit of the Client.

No other party may use or rely on this letter or any portion thereof without Golder's express written consent. Golder will consent to any reasonable request by the RDOS and Client to approve the use of this letter by other parties. The letter, all plans, data, drawings and other documents as well as all electronic media prepared by Golder are considered its professional work product and shall remain the copyright property of Golder, who authorizes only the Client to make copies of the report, and only in such quantities as are reasonably necessary for the use of the report by those parties. The Client may not give, lend, sell, or otherwise make available the letter or any portion thereof to any other party without the express written permission of Golder, except as required by law. The Client acknowledges that electronic media is susceptible to unauthorized modification, deterioration and incompatibility and therefore the Client cannot rely upon the electronic media versions of Golder's report or other work products.

ATTACHMENT 3

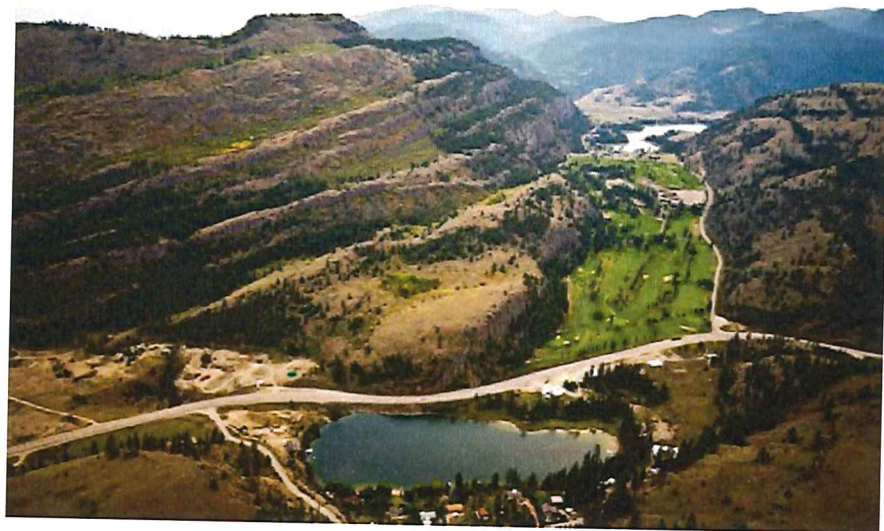
Golder 2016 Executive Summary

January 26, 2016

HYDROGEOLOGICAL ASSESSMENT

Groundwater Availability Study, Proposed Residential Development (Phase I), Twin Lakes, BC

Submitted to:
Mr. Suki Sekhon
CRS Group of Companies
730 - 475 West Georgia Street
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Report Number: 1114930112-R-Rev0

Distribution:

2 copies - CRS Group of Companies
2 copies - Golder Associates Ltd.

REPORT





Executive Summary

This report summarizes the results of a hydrogeological assessment conducted for Twin Lakes Golf Resort in Twin Lakes (Twin Lakes Valley), BC. Development of the scope of work for this project was initiated in 2011, with refinement of the scope occurring iteratively over the next several years (2012 through 2015). Twin Lakes Golf Resort is proposing a 50 unit residential development (Phase I) to be constructed in the area of the golf resort at Twin Lakes (TLGR¹). As part of the development approval process, Twin Lakes Golf Resort has submitted an application to the Ministry of Transportation and Infrastructure (MOTI). Prior to MOTI approval and to address concerns regarding the availability of water in the Twin Lakes Valley, the Regional District of Okanagan-Similkameen (RDOS) has stipulated that a sustainable groundwater source be identified to supply the proposed Phase I development. As outlined in a Water Use Plan prepared for the Twin Lakes Valley by MSR Solutions Inc. (MSR, 2012; and MSR, 2015), and as approved in principal by RDOS, Twin Lakes Golf Resort is proposing an average day demand of 2,200 L/unit/d for Phase I of the development. This assessment is for the 50 units of Phase 1, plus the existing and future irrigation demand at the TLGR, and existing and future water demand outside of the TLGR.

It is estimated that currently the TLGR accounts for approximately 75% of water used in the Twin Lakes Valley for domestic and irrigation purposes (excluding return to ground and surface water licenses). It is Golder's opinion that it is acceptable to assume that the water use values used in the assessment are appropriate and are unlikely to be changed dramatically by users outside of their control.

The hydrogeological assessment was conducted to: i) develop an improved understanding of the hydrogeological regime of the Twin Lakes watershed (catchment), by gathering additional, and refining existing, hydrogeological information to allow a reasonable evaluation to be made of the groundwater flows through the Twin Lakes Valley; and ii) evaluate the sustainable groundwater use for the aquifer in the Twin Lakes Valley for various climate scenarios, including dry periods, with the proposed Phase I development at TLGR, using a calibrated numerical groundwater flow model developed as part of the work.

We understand that MOTI and RDOS will be seeking the technical assistance of the Ministry of Environment (MoE) and the Ministry of Forest, Lands and Natural Resource Operations (MoFLNRO) to: make a decision on whether a sustainable supply of groundwater is available for the proposed residential development at TLGR; and to review the methodologies and results of this Groundwater Availability Study. Where applicable, this Study attempts to address questions and comments provided by MoE and MoFLNRO on behalf of RDOS based on their review of a previous draft report.

The Study Area defined for this assessment included the entire Twin Lakes catchment (watershed) and the western portion of the Marama Creek catchment in the area of Trout Lake, and is considered to be of sufficient area for this assessment. The Study Area Aquifer was defined for the numerical model, and included the unconsolidated sand and gravel aquifer within the Twin Lakes Valley bottom, and to a distance of approximately 400 m east of Trout Lake within the Marama Creek Valley bottom. For the purposes of this report, and given

¹ Where the reference is to the physical location of the Twin Lakes Golf Resort, the acronym TLGR is used. Where the reference is to the Twin Lakes Golf Resort ownership, the name has been spelled out in entirety.



HYDROGEOLOGICAL ASSESSMENT

that the portion of the aquifer within the Marama Creek Valley bottom is small and close to the aquifer within the Twin Lakes Valley bottom, the Study Area Aquifer is hereafter described as being located within the Twin Lakes Valley.

Numerical Model

A coupled groundwater-surface water steady-state numerical model was developed for the Study Area based on the conceptual model of assessed hydrological and hydrogeological conditions. The numerical model was developed to estimate groundwater flux through the Study Area Aquifer; to assess whether the projected future groundwater use at the proposed Phase I development at the TLGR would be sustainable over the long term (an infinite period of time); and to evaluate the potential future impacts of the projected groundwater use on the Study Area Aquifer and the lakes. Using the numerical hydrogeological model, various climate scenarios were assessed based on current and proposed water uses.

Results

The numerical model developed for the Study Area provided estimates of groundwater flux through the Study Area Aquifer, with respect to normal and drier climate conditions, and resultant changes in saturated thicknesses of the Study Area Aquifer under projected future groundwater usage. While not included in the Executive Summary, a synopsis of the predicted groundwater and surface water flow budgets for each scenario, with the inferred resulting saturated aquifer thicknesses and lake stage levels for each scenario, is provided in tabular format as an attachment to this report and is discussed in Section 7.4 of this report.

The following provides the key points based on the results of the numerical modelling:

- Based on the future withdrawals at the rates specified in the MSR Water Use Plan (i.e., total of 600 m³/d within the Study Area), the groundwater requirements for the proposed Phase I development at the TLGR will result in impacts, that are assessed to be small, to the groundwater and lake system within the Study Area.
- Projected future groundwater usage at the proposed Phase I development at the TLGR, within the range of climate and other physical parameters evaluated, should be sustainable at the proposed net withdrawal rate of 600 m³/d within the Study Area.
- Surface water licenses within the Study Area, specifically those associated with Twin Lake and Horn Creek, are inferred to be over allocated. Application of the larger surface water licenses (i.e. Nature Trust and Lower Nipit Improvement District) resulted in significant decreases (26.6 m) to water levels within Twin Lake, but did not significantly affect aquifer levels or groundwater availability.



Conclusions

Based on the assumptions provided, and the results of the Study, which assume implementation of water conservation strategies, return of irrigation and wastewater to ground, and limited agricultural groundwater usage, and subject to:

- 1) The projected groundwater withdrawal rates proposed by Twin Lake Golf Resort and MSR being controlled by bylaws, variance permits and/or regulations promulgated by the appropriate regional, provincial or federal authority; and,
- 2) Groundwater withdrawals for the Phase I development at the proposed reduced rate (2,200 L/unit/d) and surface water withdrawals being adequately enforced and monitored.

Golder is of the opinion that projected future groundwater usage at the proposed Phase I development at the TLGR, within the range of climate and other physical parameters evaluated, should be sustainable at the proposed rate of 600 m³/d. At all times, TLGR should adhere to their water management plan and irrigation best management practices, as outlined in MSR (2012). In terms of Twin Lake Golf Resort's proposed Phase I development at the TLGR, if approved, the development should be completed as stipulated in 2) above.

Recommendations

Recommendations made by Golder for Twin Lakes Golf Resort, and which support the RDOS Draft Official Community Plan (OCP), consist of the following:

- Continue implementing best water management practices in the overall Twin Lakes catchment, including the ongoing long term monitoring (surface water, groundwater), and enhance aquifer recharge where possible.
- Implement water conservation and best management practices related to the proposed Phase I development at the TLGR.

Recommendations made by Golder for RDOS or the appropriate regulatory authority (MoE, MoFLNRO), consist of the following:

- Implement practices and policies that are outlined within the Draft OCP, in support of water resource protection and management., including enacting appropriate bylaws or regulations for the Twin Lakes catchment that would allow both monitoring and regulation of all water use in the catchment.

Review and revise surface water licensing and allocation within the Twin Lakes Study Area, specifically the larger licenses that have not been used in the last several years. It is our understanding that MSR requested the RDOS, on behalf of Twin Lakes Golf Resort, to support community water and sewer systems through the creation of a Utility Service Area, which would be owned and operated by the RDOS (MSR, 2012); it is Golder's opinion that the creation of a Utility Service Area would allow for the easier regulation of water use. Future expansion of the community water and sewer systems might add existing properties outside of the TLGR (within the Twin Lakes Valley) as they elect to abandon their private water and sewer systems.



HYDROGEOLOGICAL ASSESSMENT

Implementation of Water Use Bylaws

For the findings of this report to be relied on, regulatory authorities at the necessary levels of government should promulgate, enforce and monitor water use by-laws and regulations that will maintain withdrawal rates both within the proposed development, as well as outside water users (i.e. those users outside the proposed TLGR development) at or below those outlined in MSR, 2012; Furthermore, those regulatory authorities should review this report and agree with its findings before enacting the necessary bylaws or regulations.

