

Lao Buddhist Temple

Master Site Development Plan

SW-19-23-27-W4M, being Plan 0714198; Block 1; Lot 22,
municipally known as 233104 – Highway 791 (Range Road 280)



Interior of Religious Assembly



Groundwater Information
Technologies Ltd.

Carswell Planning



Submitted, October 2018

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- Project:** Buddhist Temple Master Site Development Plan in support of Redesignation
- Location:** 233104 – Highway 791 (Range Rd 280) in Rocky View County (RVC)
- Proposal:** Amendment to the Land Use Bylaw to redesignate lands from Residential District to Public Service District in recognition of the existing Buddhist Temple.
-

Introduction

This report is to satisfy Rocky View County's (RVC's) County Plan, Bylaw C-7280-2013 Section 29 and Appendix C, Section 3 that deals with Master Site Development Plans (MSDP). The County Plan requests an MSDP for a Public Service District redesignation.

Scope of MSDP

Discussions with RVC administration, specifically Senior Planner Mathew Wilson agreed to limit the scope of the master site development plan to the 4 acre parcel. It was felt that with the country residential community of Canal Court master site development plan would be too far reaching.

The MSDP emphasis is on site design with the intent to provide Council and the public with a clear idea of the final appearance of the development. More specifically, it is to address:

- a) building placement and setbacks;
- b) building height and general architectural appearance;
- c) parking and public lighting;
- d) landscaping for visual appearance and/or mitigation measures;
- e) agriculture boundary design guidelines; and
- f) anticipated phasing.

An **Operational Plan** forms part of the MSDP to fulfill criteria previously mentioned, basically hours of operation and how the facility is looked after.

Owners

Calgary Lao Buddhist Society, Contact: Amphon Phiaxay E-Mail tanoiguy@gmail.com
Of 233104 Range Road 280, Rocky View Alberta T1X 0H5 Phone Amphon 587-899-7664

Agent

Carswell Planning: Bart Carswell E-Mail bart.carswell@carswellplanning.ca
Office Address: #200, 525 – 28th St, SE Calgary, AB T2A 6W9 (Remax Complete Commercial)
Mailing Address: P.O. Box 223, 104 – 1240 Kensington Rd. NW Calgary, AB T2N 3P7



Location

The proposal is located in east Rocky View, north of Indus in the country residential community of Canal Court. Geographic coordinates are 50.9708867 N, -113.7712813 E. The address is 233104 Highway 791, Rocky View County.

History

The Calgary Lao Buddhist Society has been having modest services at this location for 10 years and the property was purchased in 2008 in president's name, then group's 2011. Their vision is, "to advance religion by establishing and maintaining a house of worship (Temple) that provides prayer services, ceremonies, learning of culture/religion, and peace of mind conducted (or held) in accordance with tenets and doctrines of Theravada Buddhism for the Lao community and all residents in Rocky View County, the Calgary area and the rest of Canada." The interior of their religious assembly appears on the cover page with the resident monks.

Legal Description

The proposed temple site is 1.619 ha (4 acres), legal description Plan 0714198; Block 1; Lot 22, municipally known as 233104 – Highway 791. Figure 1: Aerial Images of Site shows the site in SW-19-23-27-W4M, RVC and an accompanying inset of the property itself showing the parking lot and 2000 sq. ft. building to be used for religious gatherings and ceremonies. There are 2 monks that live at the temple full time with an attendant to care for their needs.

Figure 1: Aerial Images of Site



Evaluation of Planning Policies

Rocky View County Municipal Development Plan (County Plan)

RVC's County Plan, Bylaw C-7280-2013 provides goals, policies and actions for development within the County. The proposal is not in an Area Structure Plan where growth is focused, but the use has existed for a number of years and serves a religious need of the community.





As per Section 11 of the County Plan, the use is an institutional land use that benefits residents and contributes to the community by serving religious needs. Goals include institutional land uses being appropriately located and well designed and enhance the local community, while being compatible with surrounding land uses. Policy suggests this use is encouraged to locate in country residential communities and it is on the periphery of the Canal Court.

Section 11.2 directs that the "proposed institutional ... land use demonstrate:

- a) a benefit to the local area or community; and
- b) compatibility with existing land uses."

Benefit is evident from the size of the parish. Compatibility is evident from having a positive history with neighbours helping and not raising concerns over the last decade.

Section 11.5 for "redesignation ... applications for institutional ... land uses *should* provide:

- a) an **operational plan** outlining details such as facility hours, capacity, staff and public numbers, facility use, parking requirements, garbage collection, and security; and
- b) a **master site development plan**, as per section 29. The master site development plan shall address servicing and transportation requirements and sure the site is of sufficient size to accommodate the parking requirements as set out in the Land Use Bylaw."

Appendix C notes that the County may require studies, reports, and tests to be submitted as per section 29 on matters of County interest. Included in this is a summary of the community consultation and results.

Land Use Bylaw

To meet the uses proposed, redesignation from Residential Two (R-2) District to Public Service (PS) District is recommended. In this instance, PS District benefits residents and contributes to the community by serving religious needs.

Land use definitions that best fit the uses proposed would be Religious Assembly. This is a discretionary use in the PS District.

"Religious Assembly means a development owned by a religious organization used for worship and related religious, philanthropic, or social activities and includes accessory rectories, manses, meeting rooms, classrooms, dormitories, and other buildings. Typical facilities would include churches, chapels, mosques, temples, synagogues, parish halls, convents, and monasteries."

Minimum parcel size for a PS District is 0.50 hectares (1.24 acres). The site is 1.619 ha (4 acres) and easily meets this requirement. Another requirement is a minimum of 10% of the site area shall be landscaped. Some flexibility exists in the landscaping requirement because the periphery has plantings that have satisfied neighbours. Neighbours to the property have been friendly and





dealt with kindness in return without incident. The following figures 2 and 3 show the parcel layout from the land registry and corresponding aerial image.

Figure 2: Land Registry Mapping



Figure 3: Aerial with Property Lines



The Site

Building Placement and Setbacks

The existing building is not proposed to be altered in any significant manner. The Building is centered front to back and towards the southern property line with appropriate setbacks.

Building Height and General Architectural Appearance

For all intents and purposes, the building height and general architectural appearance resembles a residential dwelling and is in character with the surrounding area.

Parking and Public Lighting

Parking is a gravel area between the highway and the structure more on the north side of the building. The area for religious assembly is typically in the garage area of the building. In keeping with the character of its country setting, lighting is dark sky friendly.





Landscaping for Visual Appearance and/or Mitigation Measures

Landscaping for visual appearance is minimal, given its residential appearance manicured gardens by the monks and tree plantings that are already in place.

Agriculture Boundary Design Guidelines

The property is surrounded by residential use and not agricultural use. Therefore, agriculture boundary design guidelines would not apply.

Traffic

Traffic is expected once a month on various dates throughout the year depending on the Buddhist calendar, mostly on a Sunday and occasionally on Friday or Saturday 10:30 am to 12:30 pm. Peak attendance in the summer is typically 100-120 people with approx. 50 vehicles that flow into the parking lot up to an hour before and after the ceremony with no line-up of vehicles observed entering or exiting the site. Winter months usually anticipate 65-70 people accounting for approx. 30 vehicles. Post ceremony exits are varied with some staying to help or to chat with monks before leaving. Larger functions occurring on the Buddhist New Year in April are held at a rented hall in Calgary. Overall, the site is used nine months of the year. Parking fits the gravel area north of the driveway.

Travel routes come from Calgary (70 % of members), Chestermere, Airdrie using the Trans Canada Highway. Highway 22X serves those from High River and some come from Indus.

Scheffer Andrew Ltd was retained by Calgary Lao Buddhist Temple to conduct a Traffic Review in support of the application for land designation change in Rocky View County (Scheffer Andrew Ltd., 2018. *Lao Buddhist Temple – Traffic Review Report*). The Temple is located in SW-19-23-27-W4 with the address 233104 Range Road 280 (Highway 791), Rocky View County, AB. The purpose of the study was to:

- Understand existing traffic volume generated by the temple.
- Understand the existing traffic volume utilizing the intersection of Highway 791 and Canal Court.
- Determine if future traffic growth will warrant intersection geometry upgrade at Canal Court and if this may result in a potential conflict with the existing temple driveway.

On a ceremony day, Sunday June 10, 2018, a traffic count found that 80 percent of the traffic travels to and from the North on Highway 791, while 20 percent of the traffic travels to and from the south on Highway 791. Two peak hours were identified during the count: 29 vehicles arrived in the hour prior to the ceremony start, and 40 vehicles departed in the hour after the ceremony end. The total number of vehicles on site during the ceremony was 61. It is understood that ceremonies only occur once per month on a Sunday morning.

Based on the proposed re-designation and the current use of the site, the temple access will only generate insignificant traffic volume during non-peak hours when traffic on Highway 791 is already very low. The intersection of Canal Court is not expected to warrant any upgrades in the





foreseeable future (2038), and therefore the existing driveway (195 m from Canal Court), is not expected to cause any conflict with the Canal Court intersection.

Highway Access

Regarding transportation, the site is located on a Provincial highway. Highway 791 serves as a north-south corridor that connects smaller communities and provides for a direct connection between Highway 22X and Highway 1. The two-lane undivided paved highway has a posted speed of 80 km/hr and is classified as a "Level 3" arterial highway with a 9 m pavement surface. It generally serves traffic of an inter-county nature. Discussions with Alberta Transportation have been problematic for an entrance other than for agricultural or residential, although the Traffic Review Report has confirmed that the existing driveway would not cause any conflicts with future requirements of the Highway or Canal Court. There are ongoing discussions with Alberta Transportation (AT) on whether this entrance can continue to be used.

As an interim solution, the Calgary Lao Buddhist Society has a written agreement with the neighbour to the north, who owns the panhandle behind the property and provides access to Canal Court. This owner has verbally agreed to register this access on title following approval of the application.

Potable Water

Currently and in keeping with RVC Standards for institutional use, a cistern is in place to handle peak demand when ceremonies take place once a month, then pumped from the well to replenish the water.

Ken Hugo of Groundwater Information Technologies was retained by Calgary Lao Buddhist Temple to conduct a review of the water supply and pump rate in support of the application for land designation change in Rocky View County. A water supply evaluation was undertaken for a water well for the temple with the purpose of determining the long-term safe yield of the supply well. A total water supply of 300 cubic metres per year is estimated to be required for the site.

An initial pumping test by Aaron Drilling Ltd. in May, 2018 had to be terminated early due to the well drying up during the test. Bacterial encrustation of the well bore was impeding flow. Once this was cleaned, flow improved with a 2 hour flow / 2 hour buildup test at a rate of 4.5 litres per minute during the second pump test June 12, 2018. A considerable lowering of the water level was observed, which is expected given the marginal nature of this aquifer.

Application to the Province (Alberta Environment and Parks) for diversion of water for institutional purposes was made for a water license to supply the Lao Buddhist Temple south-east of Calgary in Rocky View County. The water is to be used for 3 permanent residents and occasional services. The water is supplied by an onsite water well initially installed for domestic purposes in 2004. Details of the well, pumping test, long term yield and water quality are contained in a report from Groundwater Information Technologies Ltd (File 18-1502) dated July 4, 2018.





Sanitary Sewage

Sanitary sewage is proposed to be handled by a private sewage treatment system. For institutional sewage, a holding tank could be used as a means to collect and temporarily store sewage from a facility or dwelling, for subsequent removal and transport to an approved treatment and disposal site.

RVC Servicing Standards 507.2 Industrial, Commercial and Institutional (IC&I) Private Wastewater Treatment Systems and Disposal Systems notes, "The County generally requires sewage holding tanks for IC&I PSTS. Where proposed, the septic field method of sewage disposal must be fully engineered and justified for all IC&I lot developments. The use of septic fields for other than normal domestic sewage will not be supported by the County." Two septic designers have been contacted and both indicate that a system can be designed to meet standards.

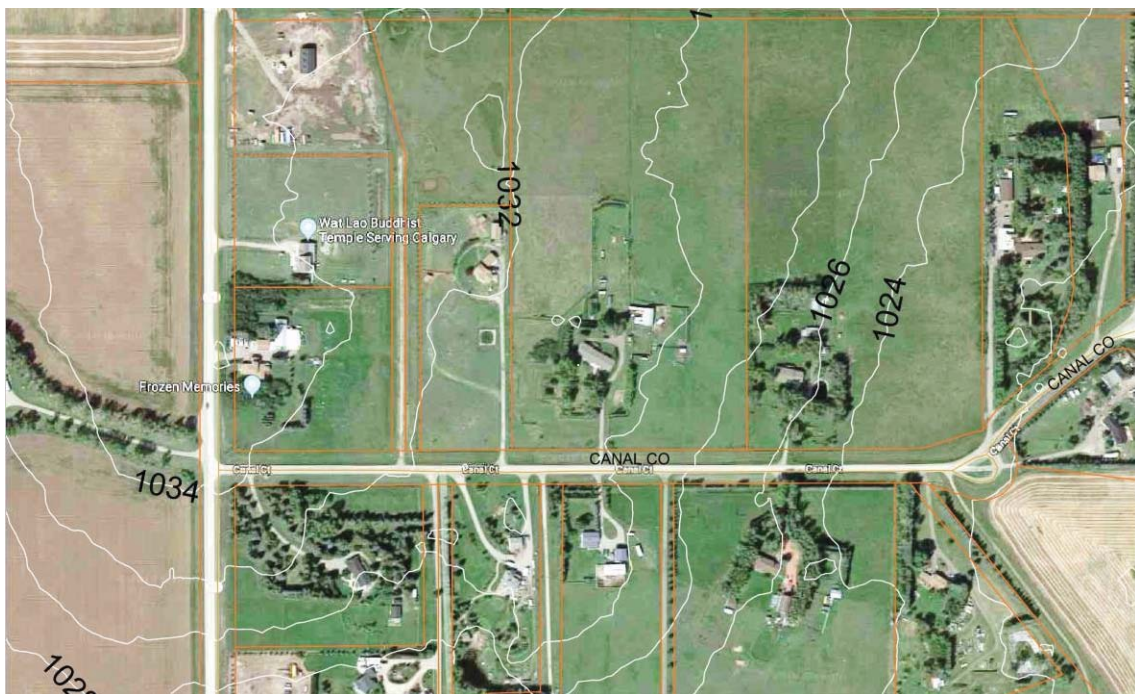
Storm Water

There is no significant change to the site which would warrant a storm water management report, as confirmed by RVC administration. A linear ditch along the eastern property line functions for any overland flow.

Topographic Contours

The following topographic map shows the proposal is relatively level with a gentle slope towards the southeast. No land grading is proposed that would change this.

Figure 4: Topographic Mapping

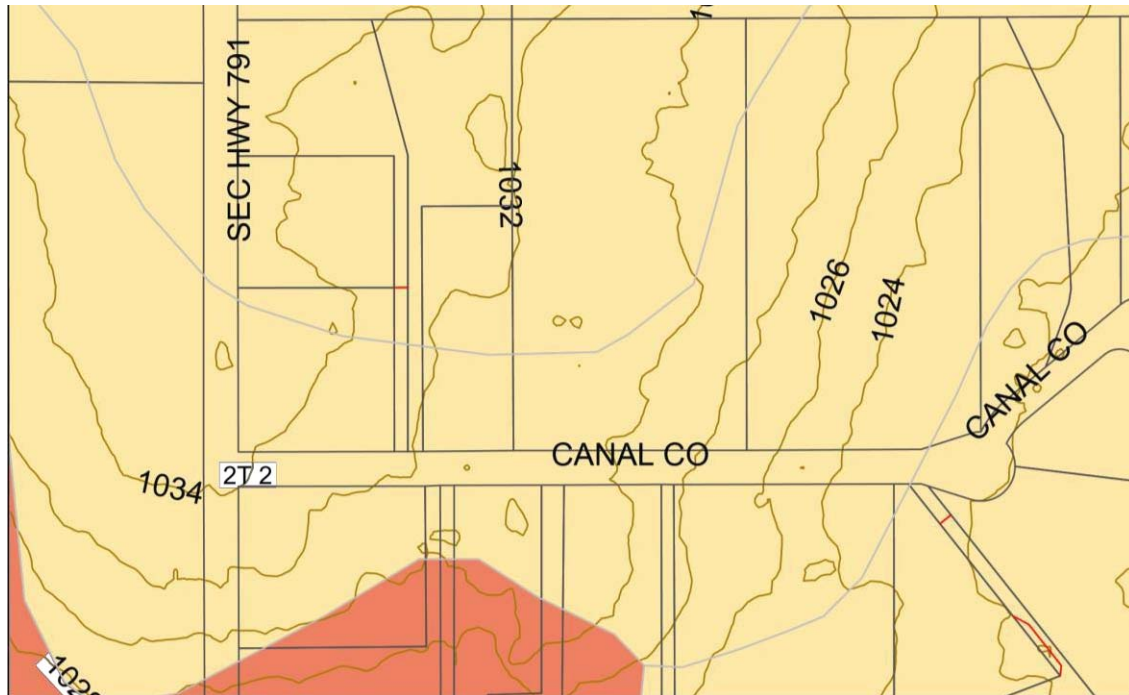




Soils Mapping

The attached soils map uses Land Capability Classification Mapping, 2T2 showing there is potential for agricultural production for crops. However, this area is fragmented and country residential in character.

Figure 5: Soils Mapping



Landscaping

As previously mentioned, policy suggests 10% of the site shall be landscaped. Trees have been planted on most of the perimeter. The car parking area and landscape maintenance is currently conducted by officials/volunteers. The monks have been looking after the gardens.

Garbage Removal

Waste/garbage collection and disposal is already contracted out to a local contractor.

Security

Outdoor and indoor video surveillance could be installed with sensor operated outsidelighting. A third-party company could also be engaged to provide security services to the facility at night. Consideration is given to dark sky friendly lighting.

Operations Plan

The following operations plan addresses most of the aforementioned matters.





Calgary Lao Buddhist Society

233104 Range Road 280
Rocky View, AB T1X 05H

CLBS Operations Plan

1. This facility will be operated every day from dawn to 9pm, provided if there is a Buddhist Monk on site, for anyone, regardless of origins, location, political belief and religion, that needs to pray, seek advices from the monks and wish to learn about Theravada Buddhist practices.
2. This facility will be used for the Theravada Buddhist ceremony once a month for about 9 months of the year. This ceremony usually takes place on Sunday from 10AM to 12:30 PM.
3. Any gathering or event used at this facility will not include gambling and/or any unlawful activities. The officials and the resident monks will ensure compliance with these conditions.
4. This facility is opened for anyone to donate/provide breakfast and lunch to the monks in the morning. Monks have to consume food before noon.
5. The CLBS officials will use this facility for meetings.
6. Outdoor (parking lot, snow removal and landscape) maintenance will be taken care by officials/volunteer
7. Liquid effluent and garbage collection and disposal will be contracted out to local contractors.
8. Currently, the facility is equipped with outside sensor lights and fire extinguishers.
9. In the future, we will install security system with surveillance cameras.

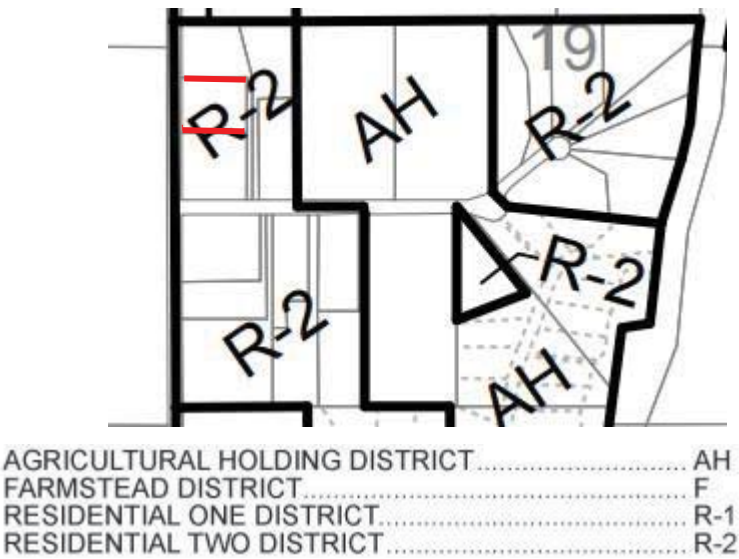
Figure 6: Streetview of Site



Land Use Compatibility

Figure 7: Land Use Districts shows the subject lands as Residential Two (R-2). Although the area is predominantly R-2, Pockets of Agricultural Holdings (AH) exist in the area for some of the larger lots in the Canal Court subdivision. The Redesignation from R-2 to PS for the proposal supports County policy that encourages this use to locate in country residential communities The attached PS land use district proposed has the permitted and discretionary uses to support the proposal. The neighbours have been on good terms for over ten years without incident. Letters of support have been provided.

Figure 7: Land Use Districts



Public Engagement

An open house was held on the site on July 17, 6:00 – 8:00 pm and ten attended. Notices supplied to RVC were mailed to engage neighbours regarding the proposed development. The hospitality offered by the Buddhists was generous with the selection of cuisine and BBQ for guests. Numerous storyboards were on display with Carswell Planning present. Brief surveys were distributed to seek public input and provided with timely responses. Neighbours were pleased that the 2000 sq. ft. house would remain as it has been.

Common responses support the proposal. No one has noticed any problems for the community over the last decade while the Buddhist Society has been using the site for monthly assemblies. There is support for their continued religious assemblies, as they have been. No one has experienced any significant traffic concerns from the site. There is support for the Operations Plan as being comprehensive in matters addressed and neighbours find no outstanding matters. Finally, there is support to see the redesignation to PS for religious assembly as appropriate for formal recognition of the uses on the property.





Figure 8: Storyboards of Open House



Conclusion

After careful consideration of policies, meetings with RVC staff, findings of studies, and public engagement, Carswell Planning recommends support for the proposed Land Use Redesignation followed by a DP recognizing the temple as a religious assembly.

Respectfully submitted,

Bart Carswell

Bart Carswell, MA, MCIP, RPP



Site Plan

Redesignation

Public Service

Property Area
1.619 ha (4 acres)

Legal Description
Plan 0714198,
Block 1, Lot 22

SW-19-23-27-W4M

Municipally known as
233104 - Highway 791



No.	Revision/Issue	Date

Firm Name and Address

Carswell Planning Inc.

Bart.Carswell@carswellplanning.ca
587 437-6750

Project Name and Address

Calgary
Lao Buddhist
Society

Project

Sheet

Date
June, 2019

Scale



34

The use of Access Right-of-Way agreement

The Agreement is made on the 6th day of June, 2018 BETWEEN

Brian Stamler/Mike Allen (The GRANTOR), the owner's of the property of
22 Canal Court, Rocky View, Alberta, T1X 0H5

PLAN 0714198, BLOCK 1, LOT 23
LINC: 0032 636 558, SHORT LEGAL : 0714198;1;23, TITLE NUMBER : 161055015

AND

Calgary Lao Buddhist Society (The GRANTEE)
of 233104 Range Road 280, Rocky View, Alberta, T1X 0H5

PLAN 0714198, BLOCK 1, LOT 22
LINC: 0032 636 656, SHORT LEGAL : 0714198;1;22, TITLE NUMBER : 111 015 345

RECITALS

1. Legal Description of Parcel Subject to Easement

- a. Brian Stamler/ Mike Allen (The Grantor) covenants that he, his heirs, successors, assigns has agreed to let the Calgary Lao Buddhist Society (the Grantee) use the Access Right of Way east to the Grantee's property. This Access Right of Way belongs to the Grantor and is registered with Government of Alberta Land Title under the Plan # 0111643, Legal Description of 4;27;23;19;SW.
- b. The Grantee will use the portion of this Access Right of Way starting from Canal Court up to about 2/3 of the way. The total dimension is about 0.2 Hectare (Ha)
- c. Refer to the attached Figure 1 for illustrations.

2. Usage and Maintenance

- a. The Grantee will use this portion of the Access Right of Way for the sole purpose of accessing their property.
- b. The Grantee is responsible for any road construction and maintenance of the specified portion of the Access Right of Way. The Grantee plans to create gravel road.
- c. Grantee agrees to acquire, understand, implement and comply with the Safety and Environmental policies and procedures of the Grantor and any other policies and procedures that the Grantor may deem necessary to carry on the usage of this Access Right of Way.
- d. If the Access Right of Way is no longer needed, the Grantee will restore the road to the Grantor's satisfaction.

3. Easement & Access Agreement to Run with Land

This shared access/easement and maintenance agreement described herein shall run with the land and shall be for the benefits and use of the present owner, and his, her or their grantees, heirs, successors or assigns and shall be binding upon all future parties with interest in the parcel herein described.

4. Termination of the agreement

This agreement can be terminated upon the mutual agreement of the Grantor and Grantee.

Signature:  Date: 6/22/2018

Name(print): Mike Allen

Owner of the property (Grantor)

Signature: Brian Stamler  Date: 6/22/2018

Name(print): Brian Stamler

Owner of the property (Grantor)

Signature:  Date: 22/06/18.

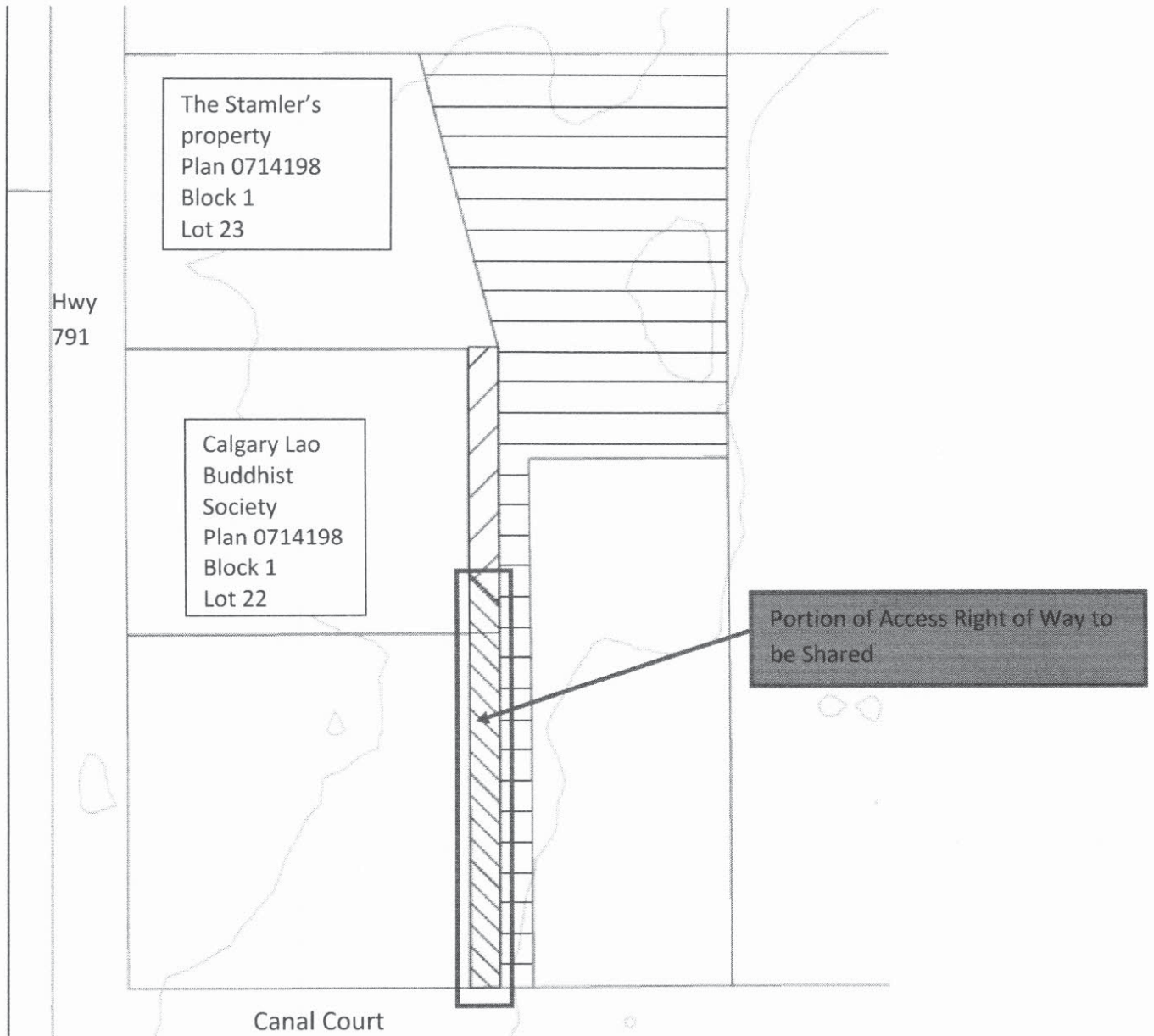
Name (print): KHAMSENG SUNDARA .

Title: President.

Calgary Lao Buddhist Society (Grantee)

Figure 1. Share the below marked portion of the Access Right of Way

Survey Plan #: 0111643 , Plan type: RIGHT OF WAY PLAN, Legal Description: 4;27;23;19;SW



Total Dimension of the Shared Access Right of Way: 0.2 Hectare (Ha)



Rocky View County

Wat Lao Buddhist Temple – Traffic Review Report

June 21 2018

File #144101

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1 Introduction

1.1 Background and Site Context

Scheffer Andrew Ltd (SAL) was retained by Calgary Lao Buddhist Temple (CLBT) to conduct a Traffic Review in support of the application for land designation change in Rocky View County. The Temple is located in SW-19-23-27-W4 with the address 233104 Range Road 280 (Highway 791), Rocky View County, AB. The temple location is shown in Figure 1. The property is bounded by Highway 791 to the west and private properties north, east and south. The land parcel currently has residential zoning and CLBT is seeking to obtain land designation change to institutional within Rocky View County.

1.2 Study Purpose

The purpose of the study is to:

- Understand existing traffic volume generated by the temple.
- Understand the existing traffic volume utilizing the intersection of Highway 791 and Canal Court.
- Determine if future traffic growth will warrant intersection geometry upgrade at Canal Court and if this may result in a potential conflict with the existing temple driveway.

1.3 Study Methodology

The Traffic Review Report includes:

- An examination of the CLBT area with respect to existing traffic conditions.
- **Background Traffic Projection:** Projection of future Annual Average Daily Traffic (AADT) and peak hour traffic volumes for considered horizons.
- **Trip generation:** Estimation of trip generation for the site based on traffic counts.
- **Trip distribution:** Overview of traffic origin and destination based on vehicle arrival and departure at the site.
- **Trip assignment:** Estimation of vehicle demands on adjacent Highway 791 based on traffic counts.
- **Impact Assessment and Recommendations:** An overall analysis and assessment of the roadways within the study area to identify possible roadway constraints and to assess the overall traffic impacts from the development area.

1.4 Existing Roadway Network and Intersections

The CLBT is located approximately 25 km east of the City of Calgary on Highway 791 south of Highway 560. The Temple was originally built as a residential acreage and is bounded by private land to the north, east, and south. The site has its driveway onto Highway 791 and there is no viable option to construct a back access to Highway 791 via Canal Court to the south.

Highway 791

Highway 791 is identified as a Level 3 highway service class by Alberta Transportation¹, and is a designated Major Two-lane Highway². It runs north-south along a section line. It is currently developed as a two-lane undivided roadway with a 9 m pavement surface similar to the design specifications of Alberta Transportation's Standard RAU/RCU 209-110. The posted speed limit of 80 km/hr.

Canal Court

Canal Court is a local gravel road access connecting rural residential properties located within the cul-du-sac to Highway 791. It runs generally east-west, east of Highway 791.

Site Access

The CLBT has one access directly onto Highway 791, on the east side of the highway approximately 200m north of the Canal Court intersection. Due to its positioning, the site has no viable option to establish a back access onto Canal Court as it is surrounded by private land.

Canal Court and Highway 791

The intersection is an at-grade three-leg intersection servicing Canal Court to the east. It is a Type-Ia intersection with no tapers or dedicated turning lanes. The intersection is neither illuminated nor signalized. There is a residential property west of this intersection with an access that appears like a fourth leg of the intersection, but it is offset about 15m to the north and functions as a private access. The intersection has unrestricted sight distance to the south on Highway 791. To the north, sight distance of the intersection is limited at about 160m due to a dip in the road – however, visibility is available beyond that distance.

1.5 Existing Site Conditions

The existing site is currently designated as country residential. A house structure exists on site and serves as the temple building with gravel parking lot and green space. Highway 560 (Glenmore Trail extension) is approximately 1 km to the north and Highway 22X is approximately 7 km to the south. At this location, Highway 791 functions to connect between Highway 560 and Highway 22X for local traffic, and it appears that limited through traffic utilizes Highway 791 at this location. No major commercial or residential developments exist within the vicinity of the site except for the Canal Court subdivision.

1.1 Existing Traffic Volumes

The most current information on the historical Weekday Average Traffic Volumes on Hwy 791 near the site were obtained from Alberta Transportation's Traffic Count Database and are illustrated in Table 1 below. This information was used to estimate the linear background traffic growth on Hwy 791. The data was collected at the intersection of Highway 560 and Highway 791 north of the subject site and Highway 22X and Highway 791 south of the subject site. Alberta Transportation's traffic counts are

¹ http://www.transportation.alberta.ca/Content/docType329/Production/Hwy_Service_Class_map.pdf

² http://www.transportation.alberta.ca/Content/docType329/Production/Roadside_Development_map_2013_11x17.pdf

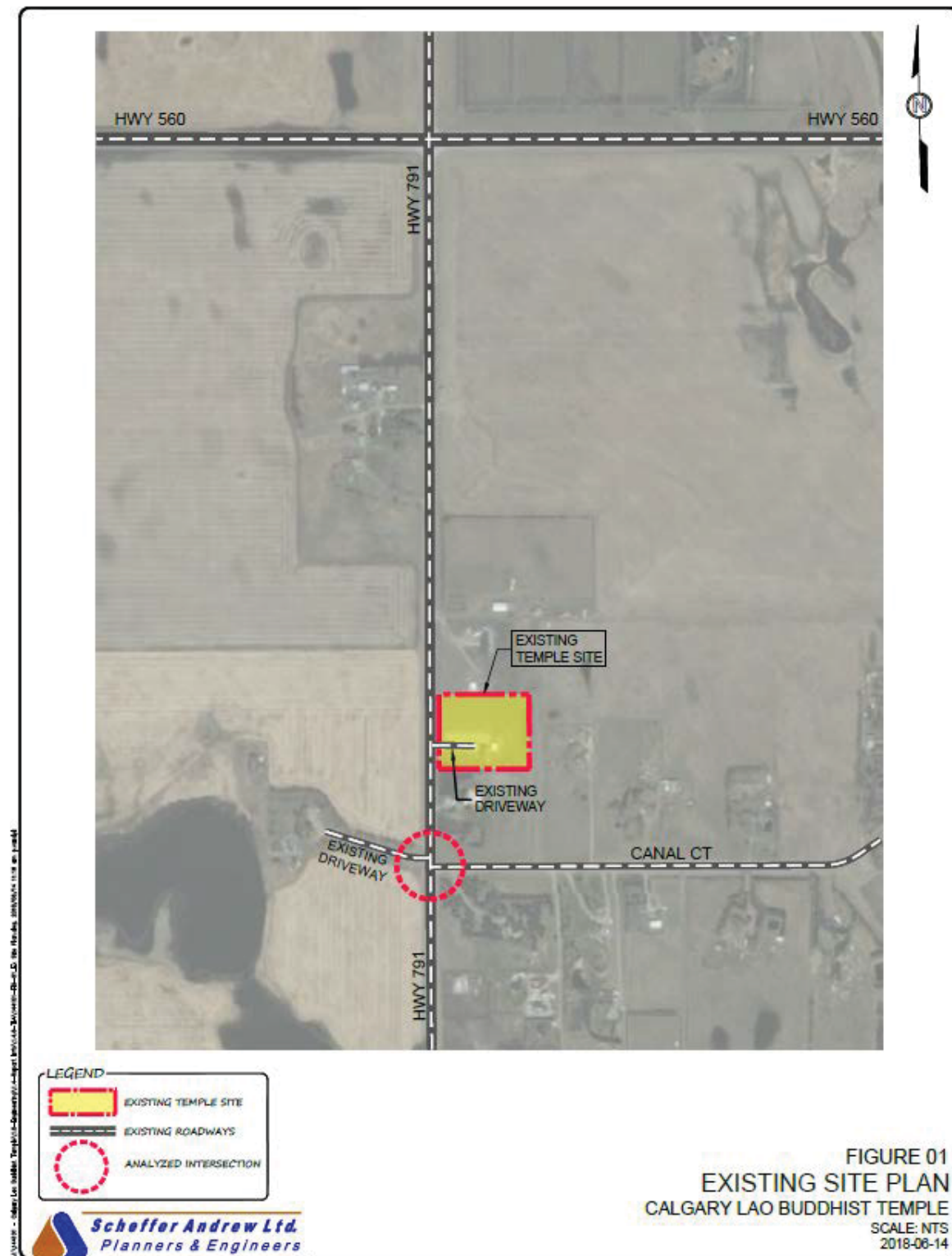
based on a traffic model algorithm which was calibrated by manual traffic counts in 2011 and 2016. This calibration revised traffic data higher in 2011 and lower in 2016. Therefore, the 10-year growth average was calculated and utilized as more reliable than the 5-year growth average. The calculated growth rate of 2.3% is close to the Alberta Transportation 2.5% default growth rate. The Alberta Transportation default growth rate of 2.5% was used to calculate future background traffic growth as more conservative approach.

Table 1: Average Traffic Volume History 2008 – 2017 AADT

Roadway Link	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	10 year growth rate
Highway 791 south of Highway 570	880	860	860	1730	1770	1770	1730	1770	1100	1100	2.7%
Highway 791 north of Highway 22X	860	840	860	1120	1120	1120	1120	1150	1000	1000	1.8%
Average	870	850	860	1425	1445	1445	1425	1460	1050	1050	2.3%

SAL also completed independent traffic counts to understand the AM and PM peak hour traffic volumes on an average weekday along Highway 791 at Canal Court, as well as during a CLBT ceremony (Sunday morning) to confirm the volume of traffic entering and existing site. The two three-hour traffic counts on Highway 791 were conducted at the intersection of Highway 791 and Canal Court on Tuesday June 12, 2018 to observe the turning movements and to determine the AM and PM peak hours of the intersection of Canal Court and Highway 791. The observed AM peak hour was 7:30-8:30am and the observed PM peak hour was 4:00-5:00pm.

Figure 1: Site Context – Calgary Lao Buddhist Temple



2 Traffic Projections

This traffic review was completed in accordance with the Alberta Transportation Traffic Impact Assessment 20-year traffic forecast.

2.1 Trip Generation

Trip generation is defined as traffic generated by a development site. Typically, SAL estimates trips generated by site using the Institute of Transportation Engineers (ITE) 10th Edition Trip Generation Manual (September 2017). However, for the purpose of this review, the site is already established with no expansion plans. The generated trips by the CLBT is based on a traffic count conducted by SAL on Ceremony day (Sunday, June 10 2018).

A traffic count was completed at the Calgary Lao Buddhist Temple access. Two peak hours were identified during the count: 29 vehicles arrived in the hour prior to the ceremony start, and 40 vehicles departed in the hour after the ceremony end. The total number of vehicles on site during the ceremony was 61. Although two peak hours were identified, traffic arrival and departure from site was spread over multiple hours longer than 1 hour before or after the ceremony. It is understood that ceremonies only occur once per month on a Sunday morning.

2.2 Trip Distribution and Trip Assignment

The trip distribution breakdown is based on the observed traffic behaviour during the traffic count completed by SAL at CLBT on ceremony day. The following trip distribution was observed:

- 80 percent of the traffic travels to and from the North on Highway 791.
- 20 percent of the traffic travels to and from the south on Highway 791.

Trip assignment describes the routes which traffic utilizes to access the developed site. For the purpose of this review, traffic movement was not analyzed in details as the CLBT traffic volume is considered insignificant in relation to Highway 791, Highway 560, and Highway 22X traffic volumes considering that future CLBT ceremony days are planned to take place on Sundays.

2.3 Projected Background Traffic Volume

Background traffic is the component of the traffic on the adjacent streets that would be present regardless of traffic activity at CLBT. The background traffic growth was projected using 2.5% growth rate as a conservative approach (see Section 1.1). The current Highway 791 AADT was estimated using ten times the observed average between AM and PM peak hours traffic and shown in Table 3. The forecasted AADT growth is summarized in Table 3 below. The turning traffic volume growth at Canal Court was also forecasted to grow using 2.5% growth rates.

Table 2: Background Traffic (AADT) Growth Over 20 years

	2018	2023	2028	2038
Highway 791 at Canal Court (2.5%)	1420	1598	1775	2130

3 Intersection and Roadway Assessment

The intersection of Highway 791 and Canal Court was analyzed according to the Alberta Transportation Design Guide. The intersection analysis includes intersection layout analysis, signal installation warrant and intersection lighting warrant.

3.1 Intersections of Highway 791 and Canal Court

3.1.1 Intersection Layout Assessment

The intersection analysis was completed using the Alberta Transportation Highway Geometric Design Guide. The current AADT along Hwy 791 is estimated at 1420. PM peak hour traffic volume along with the forecasted traffic volumes for year 2038 were used to complete the intersection layout assessments for dedicated turning lanes warrants. This is acceptable as year 2038 traffic volume represent the highest traffic volume following 20 years of growth at 2.5%.

Based on Figure D-7.5, The current intersection has very similar characteristics to the Type-Ib intersection treatment. The initial assessment of the intersection layout was completed using the Alberta Transportation Highway Geometric Design Guide, Figure D-7.4. The current AADT of 1420 through the main leg of the intersection exceeds specifications, 1000 AADT, for Type-Ib. However, Figure D-7.4 is considered conservative as it provides guidelines for highways with design speed of 100 km/hr or more.

Further analyses on dedicated left lane and right turn lanes warrants were completed using the procedure provided in sections D.7.6 and D.7.7, respectively of the Alberta Transportation Highway Geometric Design Guide. The analysis results show that dedicated left turn lane and right turn lanes are not warranted based on the turning traffic volumes. To understand the impact of additional turning traffic growth at Canal Court, a sensitivity analysis was completed assuming the volume of turning traffic at the intersection doubles by year 2038. The analysis result did not warrant the addition of dedicated left turn and dedicated right turning lanes. Complete analysis steps are provided in Appendix F of this report.

3.1.2 Traffic Control Signal Warrants

A traffic signal warrant analysis for year 2038 traffic was completed (Appendix D), the results show that signalization is not warranted.

3.1.3 Warrants for Intersection Lighting

The warrant score for the post-development in 2038 is 72, therefore intersection illumination is not warranted.

4 Conclusions

This review was completed to understand the existing conditions of Canal Court and Highway 791 intersection and the Calgary Lao Buddhist Temple access. As the CLBT has only one access to site located on Highway 791, this review was completed to understand the impact of future growth within Canal Court on the geometry of the Canal Court and Highway 791 intersection and identify potential intersection upgrades that could conflict with the existing CLBT access.

A traffic count was completed during the ceremony day at the CLBT. The observed peak hour volumes provided in section 2.1 create insignificant contribution of traffic from the CLBT onto Highway 791. Traffic arrival and departure from site spans over multiple hours and ceremonies are held once a month on Sundays so they do not affect peak hour traffic operations. As the ceremonies take place 12 times a year, they add no significant traffic to the overall AADT of Highway 791. Site distance was also observed from the site for northbound and southbound traffic along Highway 791. There are no sight obstructions to the north for left turning vehicles onto the highway, however right turning passenger vehicles have approximately 150-180 m of visibility to the south. This sight range is within the accepted range of 160 – 180m provided in Figure D.4.2.2.2 for vehicles traveling 80-90 km/hr. Vehicles with higher than 1.5 m clearance have virtually no sight obstruction of northbound traffic on Highway 791 when completing a right turn onto the highway.

Highway 791 and Canal Court intersection is currently a Type-Ia intersection with no tapers. The current AADT is estimated at 1420 based on average AM and PM peak hour traffic which were obtained by SAL during two 3-hours traffic counts. To further evaluate the future intersection geometric requirements, background traffic volumes for year 2038 horizon were projected to complete the dedicated left and right turning lanes analyses. It is considered that year 2038, PM peak hour traffic represent the highest volume of traffic expected at the intersection. The analyses showed that dedicated left and right turning lanes are not warranted as the volume of traffic is not significant enough. As a conservative approach to analyzing the intersection's future demand, the southbound left turning traffic volume during PM peak hour in year 2038 was doubled and analyzed. The results showed that dedicated left and right turning lanes are still not warranted based on the forecasted traffic volume. The intersection warrants a type-IIa treatment with tapers based on the forecasted background traffic growth along Highway 791. It is estimated that type -IIa intersection treatment would require approximately 130 m of 25:1 tapering. The existing distance between the CLBT access and Canal Court and Highway 791 intersection is approximately 200 m. Therefore, the Temple access would not interfere with future type-IIa intersection upgrade.

A sight restriction for traffic parked at Canal Court exists for passenger vehicles with 1.5 m of clearance or less. Figure D-4.2.2.2 shows that 160 - 180 m of sight distance is required for passenger vehicles turning left onto highway with 80 - 90 km/hr design speed. It is estimated that 70% of this site distance is currently available due to a dip in the road, although visibility is available beyond this point. Vehicles traveling southbound on Highway 791 would be hidden for a very short period due to the vertical dip in the road. The current road painting does not permit passing for southbound vehicles for approximately 430 m from the intersection.

Sight limitation were taken into consideration when completing the intersection warrant analyses however, the Canal Court analyses shows that neither signalization nor illumination are warranted.

In summary, based on the proposed re-designation and the current use of the site, the CLBT access will only generate insignificant traffic volume during non-peak hours when traffic on Highway 791 is already very low. The intersection of Canal Court is not expected to warrant any upgrades in the foreseeable future (2038), and therefore the existing driveway (195 m from Canal Court), is not expected to cause any conflict with the Canal Court intersection.

Yours truly,
Scheffer Andrew Ltd.

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Groundwater Information Technologies Ltd.

Water Supply Evaluation

Well # 1020911

Lao Buddhist Temple

233104 – Highway 791 (Range Road 280)

Prepared For:

Carswell Planning

Attention: Bart Carswell

Prepared By

Groundwater Information Technologies Ltd.

Ken Hugo, P.Geol.

APEGA P12077

File: 18 – 1502

July 4, 2018



EXECUTIVE SUMMARY

A water supply evaluation was undertaken for a water well for the Lao Buddhist Temple located at 233104 Highway 791 within the County of Rockyview. The purpose of the study was to determine the long term safe yield of the supply well. A total water supply of 300 cubic metres per year is estimated to be required for the site.

The pumping well was installed on May 12th, 2004. The well obtains its water from two sandstone aquifers, interpreted to belong to the Lacombe Member of the Paskapoo Formation.

Over 50 groundwater users were identified in the area, mostly for domestic use. Overall the groundwater use in the area can be described as moderate.

An initial pumping test had to be terminated early due to the well drying up during the test. Bacterial encrustation of the well bore was interpreted and a well remediation program was conducted on the well in June of 2018.

A subsequent pumping test shows that the remediation program was effective in removing the bacterial encrustation and a 2 hour flow / 2 hour buildup test at a rate of 4.5 litres per minute was conducted on the well. A considerable lowering of the water level was observed which is as expected given the marginal nature of aquifers in the area.

A long term yield of 1.08 m³/day and annual amount of 400 m³ is calculated. This calculated long term yield is in excess of the requested 300 m³/year and shows the well is capable of supply the required amount of water.

The water quality in the area is a sodium bicarbonate type with a TDS and sodium content above maximum acceptable concentrations for drinking water standards. The exceedances are relatively slight and these limits are based on aesthetic criteria, as opposed to health based. Elevated iron, fluoride and coliform bacteria is also present. Treatment for these parameters will be required if the water from the well is used as a drinking water source.

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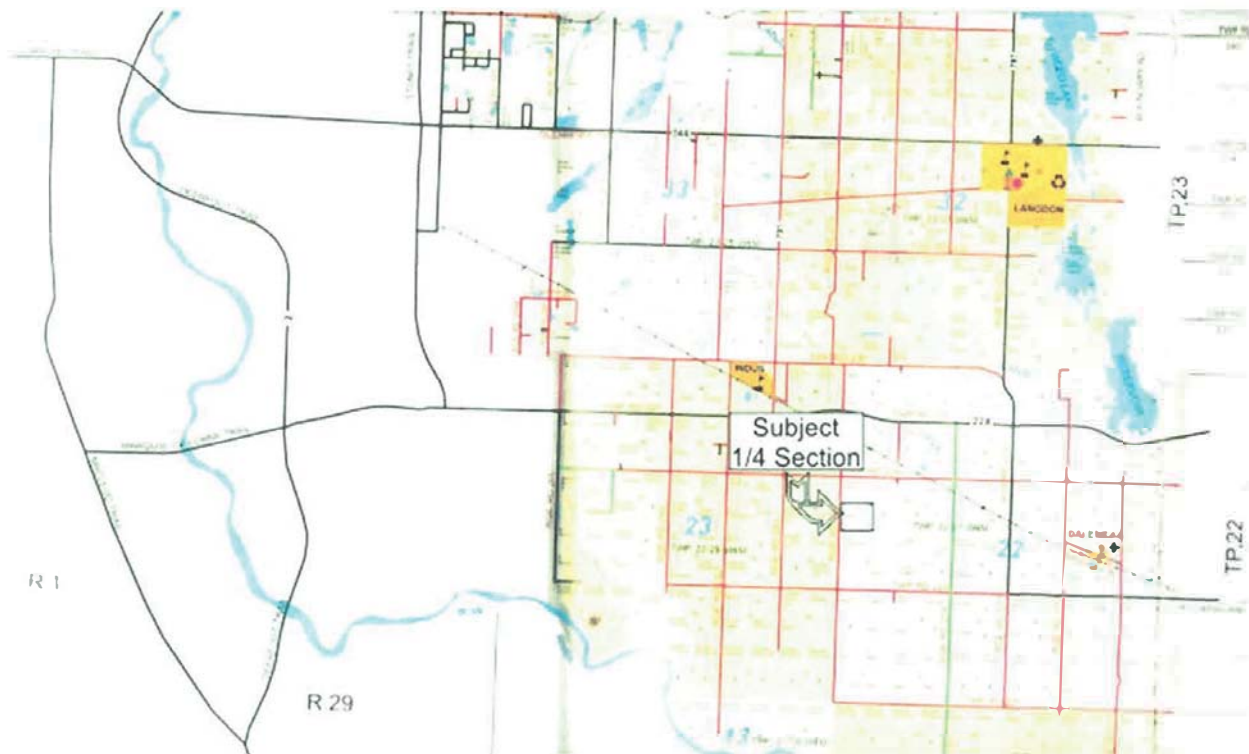
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Introduction

A groundwater investigation was undertaken for a supply well located at the Lao Buddhist Temple to obtain a water license from Alberta Environment and Parks (AEP). The site is located within the SW $\frac{1}{4}$ - 19 - 23 - 27W4 in Rockyview County and has legal address of Plan 0714198, Block 1, Lot 22.

A portion of the County of Rockyview Land Use Map is shown on Figure 1 that illustrates the site location as follows:

Figure 1 – County of Rockyview Land Use Map showing subject $\frac{1}{4}$ section



Water Needs

The Temple has three permanent residences and holds services approximately once per month for up to 70 people. According to the Alberta Private Sewage Systems Standard of Practice each residence requires 228 litres per day. Water demands for assembly halls or churches with kitchen are estimated at 32 litres per person per day.

As a result, a monthly demand of 23,000 litres per month or approximately 270 m³/year is calculated. Assuming that a small amount is used for miscellaneous washing and irrigation a water supply of 300 m³/year is requested.

Carswell Planning has also estimated water usage at considerably less (Appendix A) with a total demand of 91 m³/year or approximately 100 m³/year when miscellaneous uses are added. The higher number will be utilized in these calculations since both numbers are relatively small.

Well Construction Details

The well on site was installed in 2004 by personnel from Aaron Drilling Inc. (Well ID 1020911). The well is located at the front of the site and has GPS coordinates 50.970786° N, -113.771611° E. An air photo of the site showing the well location is as follows:

Figure 2 - Air photo of site showing well location



The well was initially installed for a residence on site and has appropriate setbacks from the septic field which is located towards the rear (east) side of the Temple.

The Water Well Drillers Report is attached in Appendix B. The well is 77.7 m deep and consists of steel surface casing from 0.6 m above ground to 12.2 m below ground. A PVC liner was installed from 10.7 – 77.7 m and was perforated from 53.3 – 77.7 m.

The well obtains water from two water bearing zones from 53.9 – 55.5 m and 70.7 – 77.1 m. It is acknowledged that wells for licensing should not obtain water from two aquifers unless the completion zone is less than 7.62 m. The well was initially installed as a domestic well where this was not a consideration.

There are limited options besides this multiple aquifer completion as will be shown on following sections. The water supply from these two zones is quite limited and recompleting the well over one zone would likely make the well unusable. A review of other water well records in the area also shows that all the wells in the area are marginal and utilize multiple aquifer completions to obtain barely sufficient water supplies. As a result, recompletion of this well or installing another well on site that utilizes one aquifer would probably not be a recommended process to obtaining sufficient water.

Area groundwater Users

The Alberta Environment and Parks water well database records 52 water well records within a 1.6 km radius of the site, all used for domestic purposes. Sixteen dry and abandoned records are also present in the database indicating a significant risk of no usable aquifers underneath a site being present.

Well depths range are generally in the range of 30 – 75 m and all wells obtain water from sandstones of the Lacombe Member of the Paskapoo Formation. Initial yields range from 4.5 – 136 litres per minute but are generally less than 20 litres per minute indicating marginal aquifers.

No springs are present in the area and static water levels are generally 10 m below surface indicating that no direct communication between the aquifers and surface water supplies exist.

Pump Test and Well Remediation Program

Initial Pumping Test and Remediation Program

An initial pumping test was conducted on the well in May of 2018 of which the plan was to pump the well for 2 hours at a rate of 4.5 litres per minute followed by recording water levels for 2 hours after pumping. The well could not sustain this rate and dried up before 1 hour of pumping.

The water quality was observed to be poor and it was interpreted that some well bore encrustation effects were causing well productivity deterioration. As a result, personnel from Aaron Drilling Inc. undertook a well rehabilitation program.

The pump was removed on June 11, 2018 and considerable iron bacteria and polysaccharide gel was observed on the well pump. A slight H₂S odour was also noted indicating that sulfate-reducing bacteria are also present.

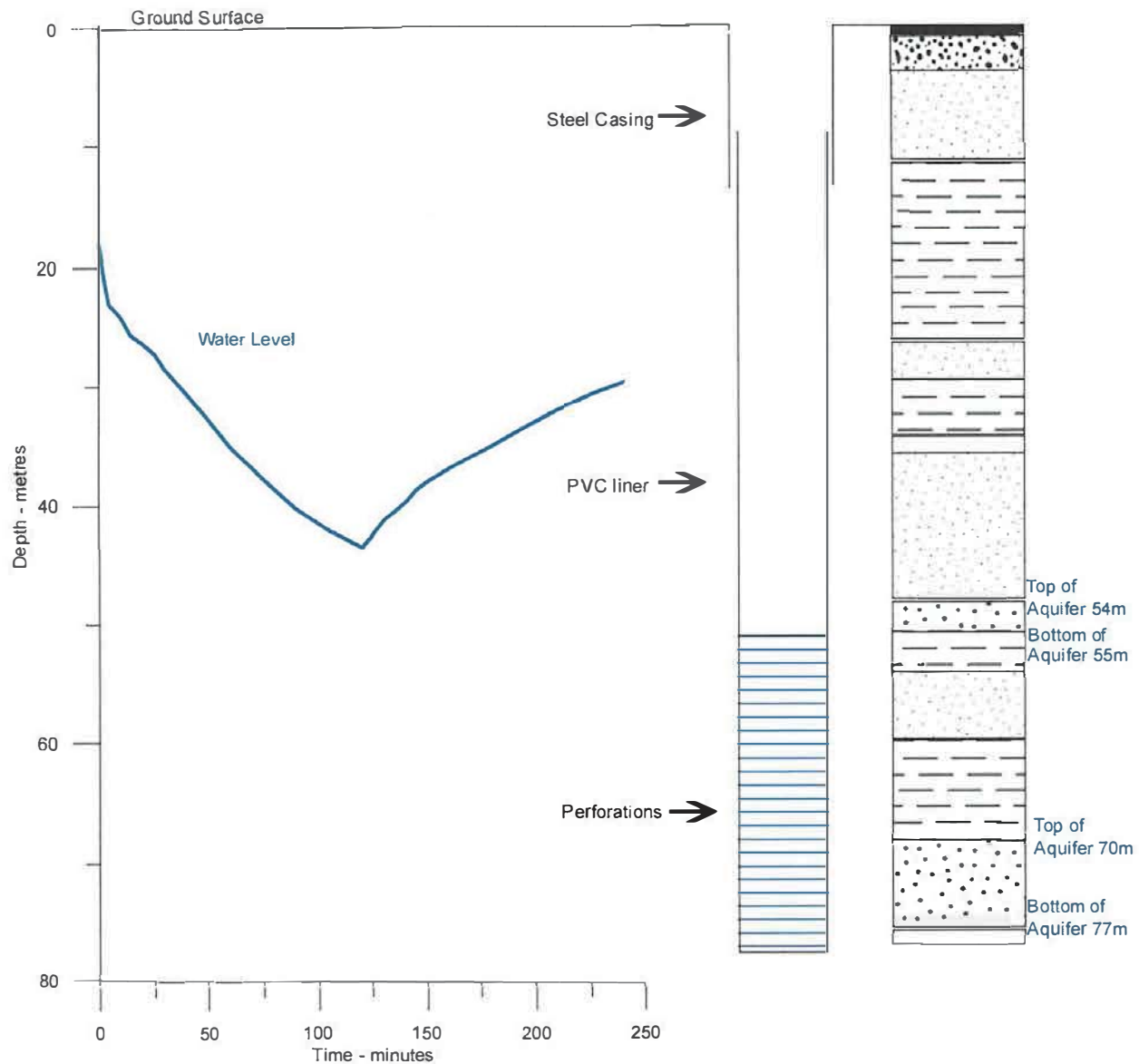
A chemical injection of chlorine bleach plus a pH lowering chemical (Hypochlor 12) was added to the well and allowed to sit in the well for 24 hours. The pump was also cleaned at the facilities of Aaron Drilling.

Post Remediation Pumping Test

A pumping test was conducted on June 12, 2018 which involved pumping the well at a rate of 1 imperial gallons per minute (4.54 litres per minute) for 2 hours followed by recording water levels for 2 hours after pumping ceased. The pumping test from Aaron Drilling Ltd. is attached in Appendix B.

A graph showing water levels with time along with a schematic of the strata and well completion is as follows:

Figure 3 – Supply Well Schematic and water levels during pumping test



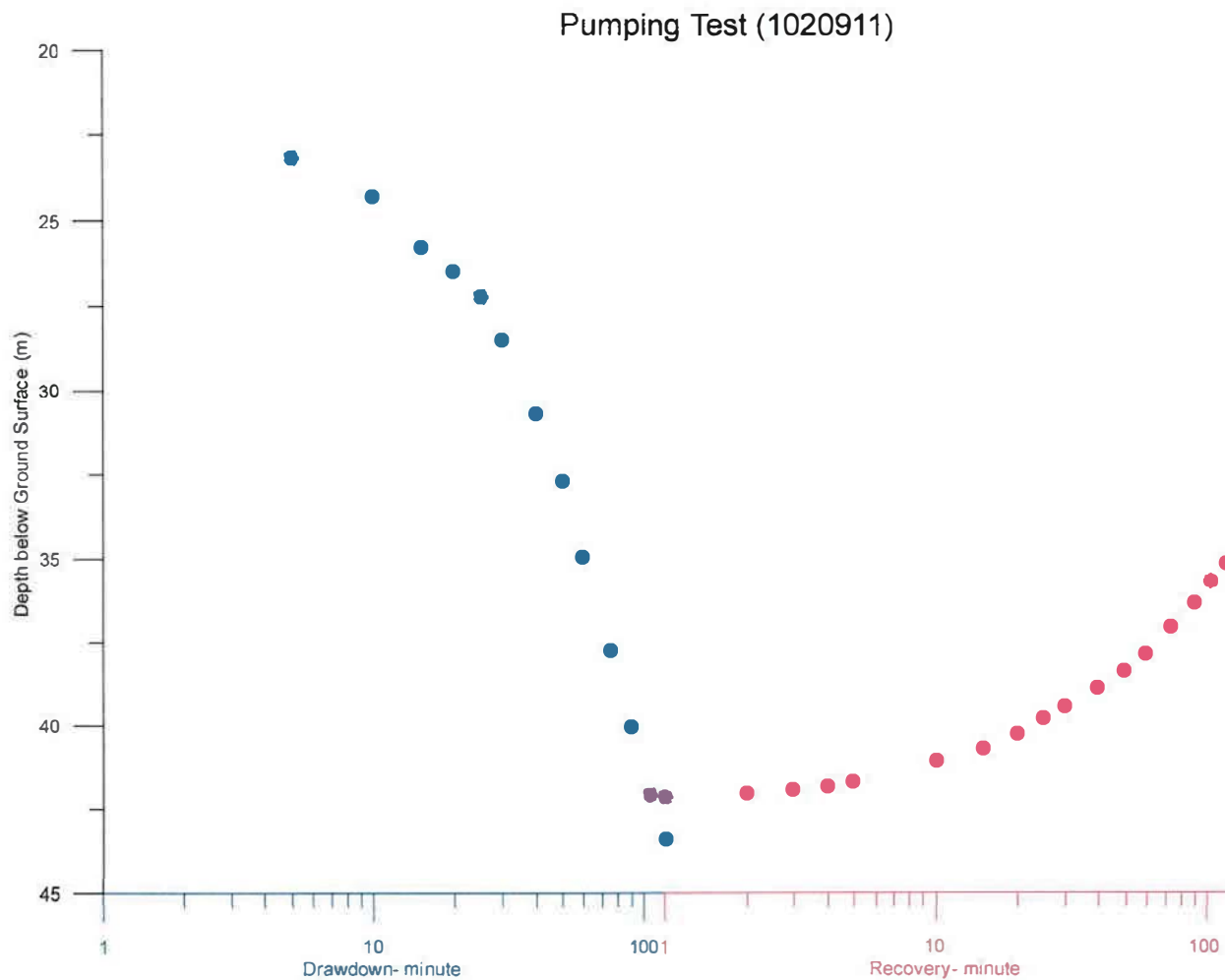
The well had an initial non-pumping water level of 18.23 m below the top of casing prior to the start of the pump test. The water level drew down to 43.43 meters by the end of the pumping period, water levels then recovered after pumping cessation to 29.60 after 120 minutes, for a recovery of 55%.

Interpretation of the pump test

A poorly productive well is indicated by the amount of drawdown given the small pump rate. Water levels declined to near the top of the aquifer indicating an unsustainable rate.

A dual semi-log plot of the pumping test data is shown as the following:

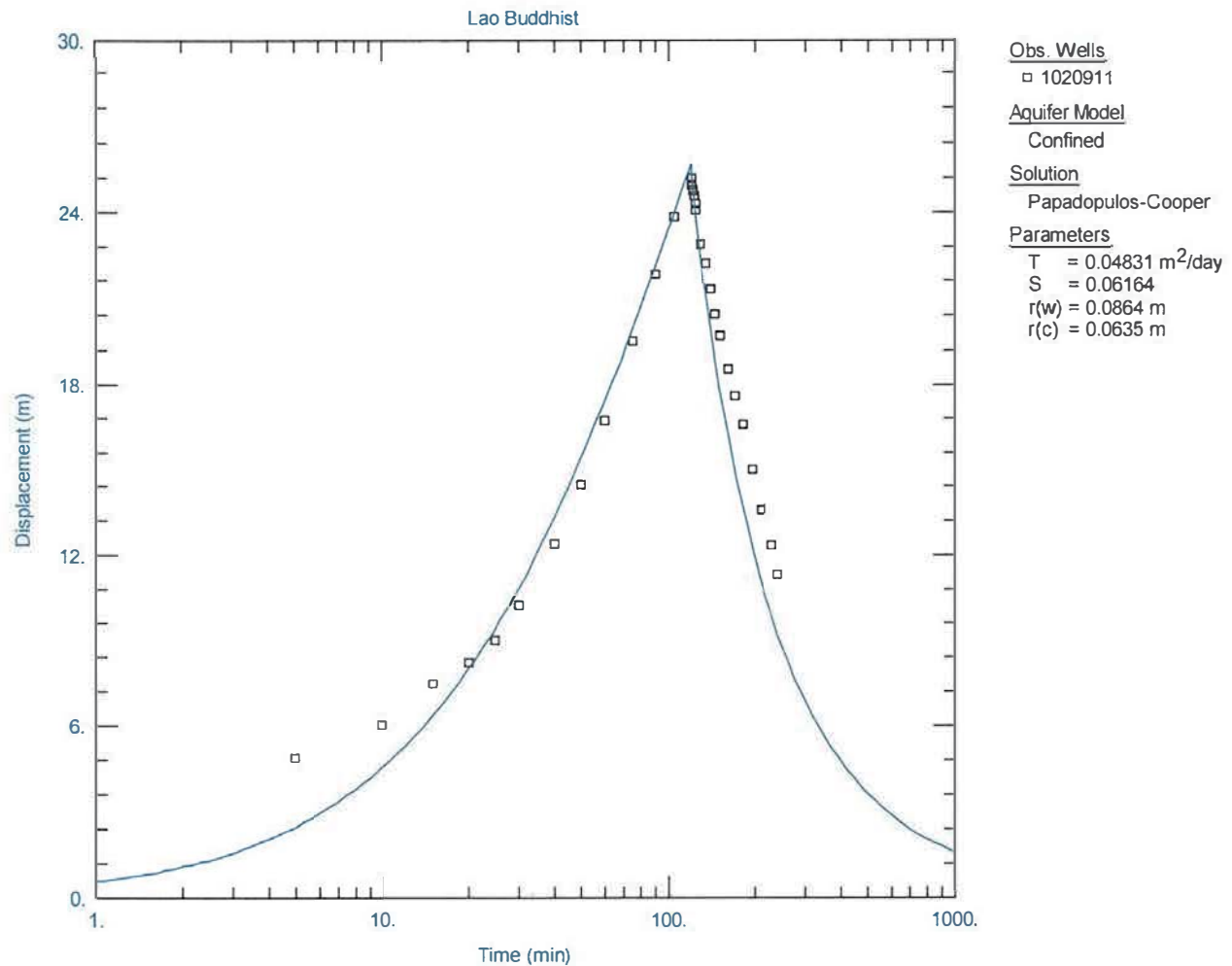
Figure 4 – Dual semi-log plot of drawdown and recovery of pump test



An increasing slope to the drawdown curve is observed after 30 minutes indicating that the remediation effort was effective in reducing the well bore skin effect, however a low permeable aquifer(s) is present.

The pumping test data was interpreted with the aid of the AQTESOLV program developed by HydroSoft Inc. A confined radial flow model was used with the Papadopulous-Cooper solution method which accounts for well bore storage. A graph showing water displacement with time and the calculated solution method is as follows:

Figure 5 - Papadopoulos-Cooper solution for confined aquifer



A good fit of the solution method to the data is observed with a transmissivity of $0.05 \text{ m}^2/\text{day}$ calculated. This is a low value and reflects the marginal aquifer conditions.

Well Yield

The twenty-year safe yield of the well (Q_{20}) can be calculated using the modified Moell method as suggested in Alberta Environments Guide to Groundwater Authorization (March 2011) as follows:

$$Q_{20} = \frac{(0.7 * Q * H_a)}{S_{100min} + (S_{20yrs} - S_{100th})}$$

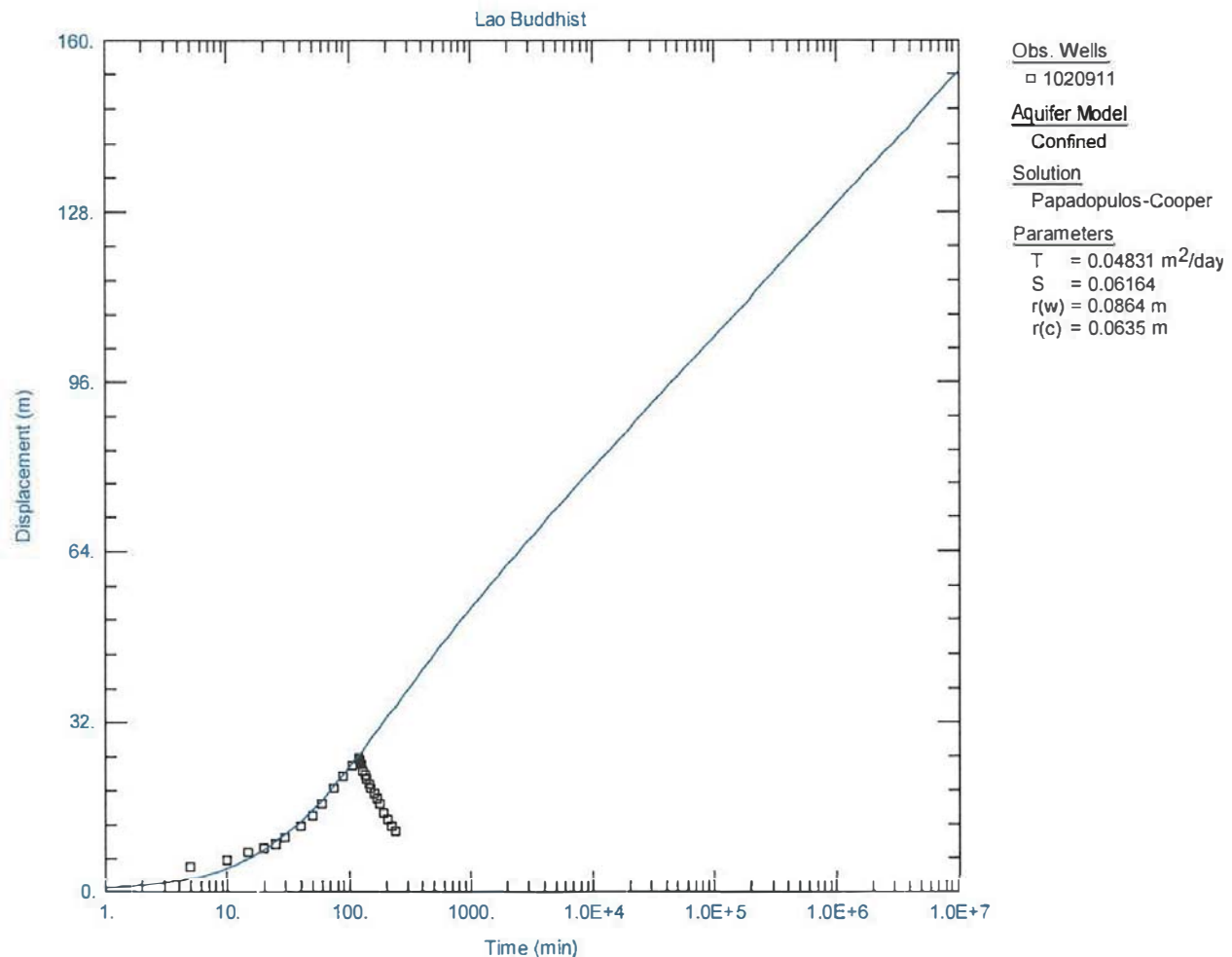
Where

Q	-	Pump test flow rate 6.54 m ³ /day (flow rate of 4.54 L/min)
H _a	-	Available hydraulic head above the aquifer (36.33 m)
S _{100 min}	-	Observed drawdown at 100 minutes (22.9 m)

$(S_{20\text{yrs}} - S_{100\text{min}})_{\text{Theor}}$ - Difference between drawdown at 20 years and 100 minutes
 (154.3 m – 22.9 m = 0.32m)
 0.7 - Safety factor

The $(S_{20\text{yrs}} - S_{100\text{min}})_{\text{Theor}}$ is calculated by extrapolating the Papadopoulos-Cooper solution to 20 years as follows:

Figure 6 – Papadopoulos-Cooper solution extrapolated to 20 years of continuous pumping



Substituting in these data values, a twenty year safe yield of 1.08 m³/day and annual amount of 400 m³ is calculated. This calculated twenty year safe yield is in excess of the requested 300 m³/year and shows the well is capable of supply the requested amount of water.

A cistern is in use at the Temple to provide sufficient water on days with high water demand.

Water Quality Assessment

Water Samples were collected towards the end of the pumping test in appropriate containers and submitted to WSH Labs (1992) Ltd. by personnel from Aaron Drilling Ltd. The water quality report from WSH Labs is attached in Appendix C. The results are summarized below with a comparison to CCME drinking water standards.

Table 1 – Water Chemistry

Parameter	1020911 Well	Drinking Water Limits
Lab pH	8.49	6.5-8.5
Lab EC	1457	No Guideline
		No Guideline
Calcium	9.2	No Guideline
Magnesium	2.8	No Guideline
Sodium	333	200
Potassium	1.3	No Guideline
Chloride	99.7	250
Nitrate	0.15	10
Sulfate	157	500
Manganese	0.04	<0.05
Bicarbonate	478	No Guideline
Total Dissolved Solids	861	500
Fluoride	3.28	1.5
Iron	1.11	<0.3
Total Coliform	41	< 1
E. Coli	0	< 1

All results in mg/L (ppm) except in pH in pH units; electrical conductivity $\mu\text{S}/\text{cm}$.

The water is a sodium bicarbonate type with parameters of sodium and TDS in exceedance of the maximum acceptable concentration (MAC) for drinking water standards. These exceedances are moderate and based on aesthetic parameters as opposed to health based. Water treatment by reverse osmosis or distillation may be required to make the water acceptable as a drinking water source.

Iron and fluoride concentrations are also high and treatment for these parameters is likely required.

No E. Coli bacteria are present but some coliform bacteria are present. These bacteria are likely natural and does not necessarily indicate contamination by surface water sources. The presence of bacteria is not unexpected given the bacterial problems with the well and indicates that bacterial problems may redevelop.

If the water is not used as a drinking water source, which is often the case in the area, the above considerations may not be relevant.