GAMAN CONSULTANTS INC.
Barrie, Ont.
705-279-9156
ghendy.gaman@outlook.com

February 11, 2023

SCAL Properties Ltd.
46 Lepage Court
Toronto, Ontario
M3J 1Z9

Attention: Mr. Amir Soleimani, Executive VP and COO

Dear Sirs:

Re: Water Supply Evaluation
Limen Head Office
15123 Woodbine Avenue
Town of Whitchurch-Stouffville, York Region
Our File 21013.02

GAMAN Consultants Inc. was retained by SCALS Property Ltd. to complete a water supply evaluation to support the above noted Phase 2 development fronting on Woodbine Avenue.

The proposed development is located east of Aurora fronting on Woodbine Avenue on a 4.02 ha parcel of land as shown on Figures 1 and 2. The site will be developed to support the Limen Head Office on Phase 2A site of 1.52 ha and a future building on Phase 2B site on 2.50ha. It is proposed to service these future lots, subject of severance applications to the Town, with individual drilled wells for water supply, individual on-site subsurface sewage disposal systems and a stormwater pond. A stormwater management report and sewage system report will be prepared in support of planning applications for the site by other consultants. This report was prepared to evaluate the feasibility of servicing the two sites with individual wells.

A: SCOPE OF WORK AND OBJECTIVES

The purpose of this evaluation was to identify a source of groundwater, the anticipated yield, groundwater quality and to complete an effects assessment to support the planning applications and building permit.

The scope of work was comprised of evaluating existing information to identify a source of water for the development. The sources of information for this evaluation included:

1) MECP water well records.
2) Oak Ridges Moraine Groundwater Program Website.
3) Other readily available sources of information on the deeper aquifer that is a source of water for this site.

B: PHYSICAL SETTING

The site is situated within the Schomberg Clay Plains Physiographic Region as described by Chapman and Putnam (1984) and just north of the Oak Ridges Moraine. The clay plain in the vicinity of Newmarket is described as drumlinized till plain. The surficial geology illustrated in Figure 3 shows the presence of drumlins in the vicinity of the site. The site is also located near the northern boundary of the Oak Ridges Moraine so there are sandy surficial deposits that extend onto the site and into the surrounding area.

Drainage is north to northwest through a tributary of the East Branch Holland River. The Holland River eventually discharges into Lake Simcoe at Cook's Bay.

C: SHALLOW GROUNDWATER MOVEMENT

Shallow groundwater movement is a reflection of local topography and drainage. The Oak Ridges Moraine Groundwater Program (ORMGP) is an interactive web-site analytical tool used to evaluate hydrogeological data at a high scale. Figure 4 is an interpretation of shallow groundwater movement based on shallow groundwater monitors and wells in the database.

The overall direction of shallow groundwater movement is northward through the site at a regional scale.

D: HYDROSTRATIGRAPHY

Aquifers are sources of groundwater yielding enough water to supply a well. Aquifers are commonly derived from saturated sand and/or gravel deposits within overburden and also from fractured bedrock. Aquitards are barriers to groundwater movement and can provide protection to aquifers from sources of contamination. Aquitards are commonly comprised of silt, clay, till or bedrock. Figure 5 is a stratigraphic cross section from west to east through the site. The section was created from the ORMGP site and extends from just west of Woodbine Avenue to Warden Avenue.

There are three hydrostratigraphic units of interest to this investigation.

- The Newmarket Aquitard
- The Oak Ridges Aquifer Complex
- The Thorncliffe Aquifer Complex

The Newmarket (Till) Aquitard is the uppermost stratigraphic unit beneath the site. This unit is expected to behave as an aquitard that protects or buffers deeper sources of groundwater from contamination.

The Oak Ridges Moraine is a source of groundwater for municipal, communal and individual wells and is referred to as the Oak Ridges Aquifer Complex (ORAC). It is a major recharge area for deeper aquifers and a source of recharge for the headwaters to many streams originating on or down hill of the Moraine. The ORAC is exposed at surface east of the site as shown in Figure 5.

The Thorncliffe (Formation) Aquifer Complex is an aquifer where its composition is comprised of coarser deposits of saturated sand and/or gravel. Locally, the Thorncliffe Aquifer Complex (TAC) is a source of groundwater to municipal, communal and individual

wells in the vicinity of Aurora, Newmarket and the Town of Whitchurch-Stouffville. The TAC is a proposed source of groundwater for this site as described later in this report.

The west to east Cross-Section shows deeper stratigraphic units comprised of other aquitards or aquifers. These deeper deposits are below the hydrostratigraphic units relevant to this water taking evaluation.

E: WATER REQUIREMENTS

It is proposed to construct an inground, class 4 subsurface sewage disposal system for each building. The maximum capacity for this conventional class 4 system is expected to be less than 10,000 L/day. Though the size of the beds have not been finalized, the long-term average water taking will need to be less than 9,000 L/day for each system to avoid surcharging the bed with effluent. A proposal to extract up to 9,000 L/day from each of these wells is less than the 50,000 L/day threshold for a Permit To Take Water. The well yield needed to sustain 9,000 L/day equates to about 6.25 L/min for each well.

F: LOCAL WATER WELLS

Figure 6 illustrates the location of water wells in the vicinity of the site.

Most wells extend into the TAC. The reported test rates of wells terminating in the TAC ranges from 9 to 273 L/min in this area. Most wells yield more than the reported test rates because the wells were not tested to evaluate maximum yield. The average test rate of wells terminating in the TAC and appearing in Figure 6 is 68 L/min.

There is evidence of a few dug wells or a sand point terminating within perhaps sandy fractions of the Newmarket Aquitard. Some wells extract groundwater from a productive zone less than 30 metres below grade and we suspect that these wells may be hydraulically connected with the TAC given the history of the water takings in the Vandorf Area.

The water well at 28 Fortecon Drive was drilled and constructed by Wilson Water Wells provides an example of expected yields from wells terminating in the TAC as illustrated in

Well Record A199020 (attached). This well was drilled to a depth of 60.35 metres below grade and terminates within the TAC. The total volume of water removed from the well was 2,720 litres in one hour. The drawdown-time trend in Figure 7 shows evidence of a confined aquifer which is expected for this hydrostratigraphic aquifer. The well is overlain with a thick sequence of Newmarket Aquitard that behaves as a protective layer to buffer this water from sources of contamination. The well test provides evidence of a long-term sustainable yield of 45.5 L/min.

The observed test rates at wells appearing in Figure 6 and from this Fortecon Well (A199020) all exceed the water requirements for this site, estimated at 6.25 L/min. There is a high probability of successfully constructing a well to yield this volume of water.

G: GROUNDWATER QUALITY

The well records in the vicinity of this site document water quality as fresh. Water quality analysis will be complete for the future well at this site to verify the need for treatment according to Ontario Regulation 170/03 as Amended.

H: EFFECTS ASSESSMENT

The Thorncliffe Aquifer Complex is a thick and productive aquifer in this area of the site. Experience shows that wells capable of yielding enough water for communal supplies from confined aquifers commonly have hydraulic properties in the range of 25 m^2/day for transmissivity and $1x10^{-4}$ for storativity. Transmissivity is an aquifer property used to assess the ease with which groundwater flows through saturated sediments. Storativity is a property relating to the volume of water released from the aquifer.

The following effects assessment uses these aquifer properties to estimate the size of the cone of depression from two pumping wells with daily water demands up to 10,000 L/day/well to accommodate the Phases 2a and 2b. Table 1 and Figure 6 show the cone of depression to 0.5

metres of drawdown extends less than 200 metres from the well. There is more than 20 metres of available drawdown for wells terminating in the Thorncliffe Aquifer. This small change in water level around the well is not expected to have an adverse affect to neighbouring wells.

I: SUMMARY

The evaluation documented in this report provides a reasonable degree of confidence that individual drilled wells extending into the Thorncliffe Aquifer Complex can provide enough water of suitable quality and quantity to support this development for the Phase 2A and Phase 2B sites. The taking of water for this development is small and unlikely to cause disruptions to neighbouring water supplies. It is proposed to drill, construct, and test a well for Phase 2A in the near future to confirm the study findings and address the requirements of Ontario Regulation 170/03 as Amended. The Local Health Unit is expected to review the treatment requirements for this supply once the information is available.

We trust that this is satisfactory.

Yours truly,
GAMAN Consultants Inc.

Gary R. Hendy, P.Eng.
Consulting Engineer
Grh
Attachments

NOTES

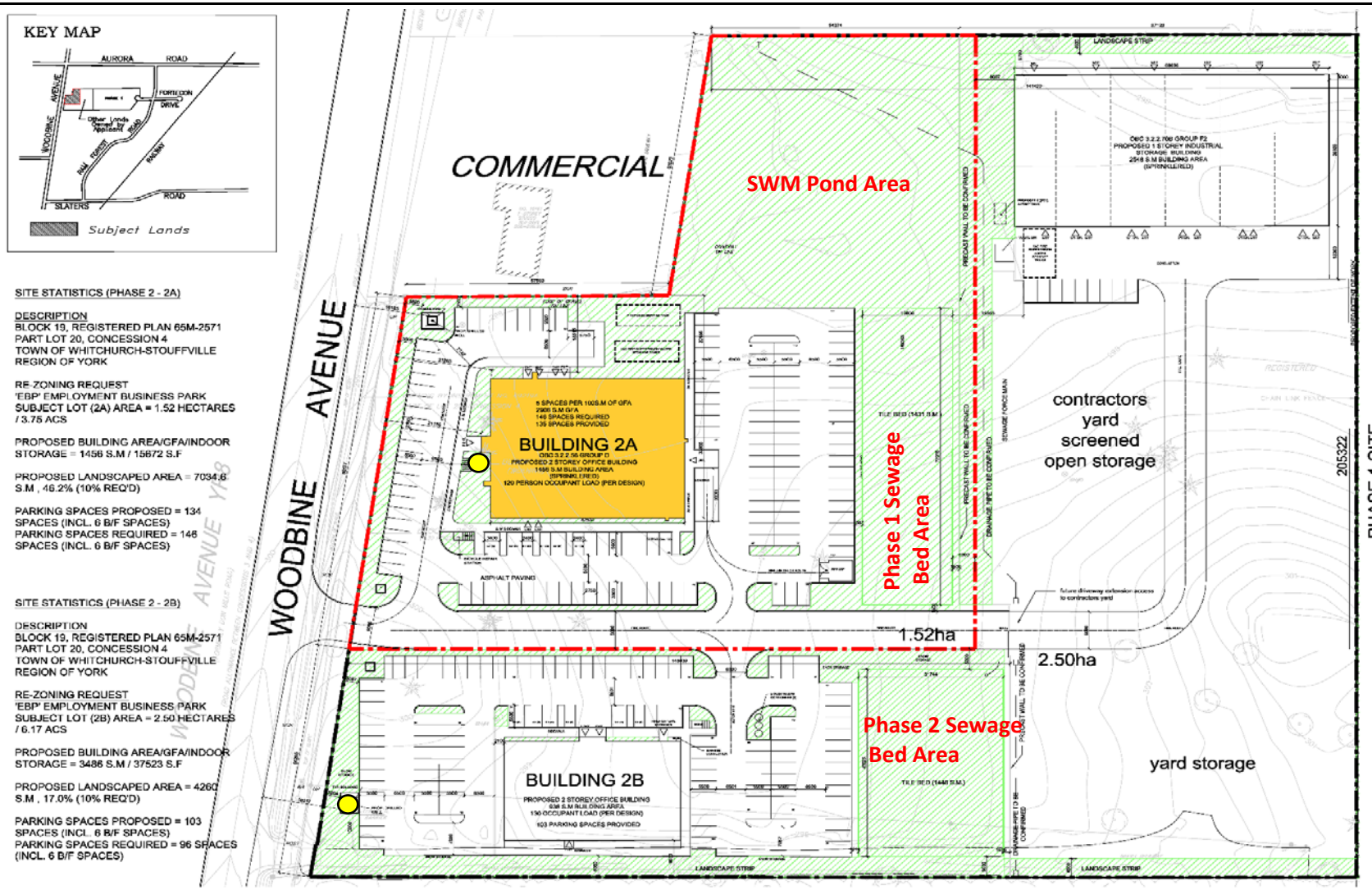
SITE LOCATION

Water Supply Evaluation, Limen Head Office,
15123 Woodbine Avenue
For Scal Properties Ltd

Date:	Feb-23	Scale:	as shown
Project:	21013.02	Ref No:	

GAMAN Consultants Inc.

Figure 1



NOTES

Future Drilled Well Locations

Areas where infiltration can occur.

Site Plan

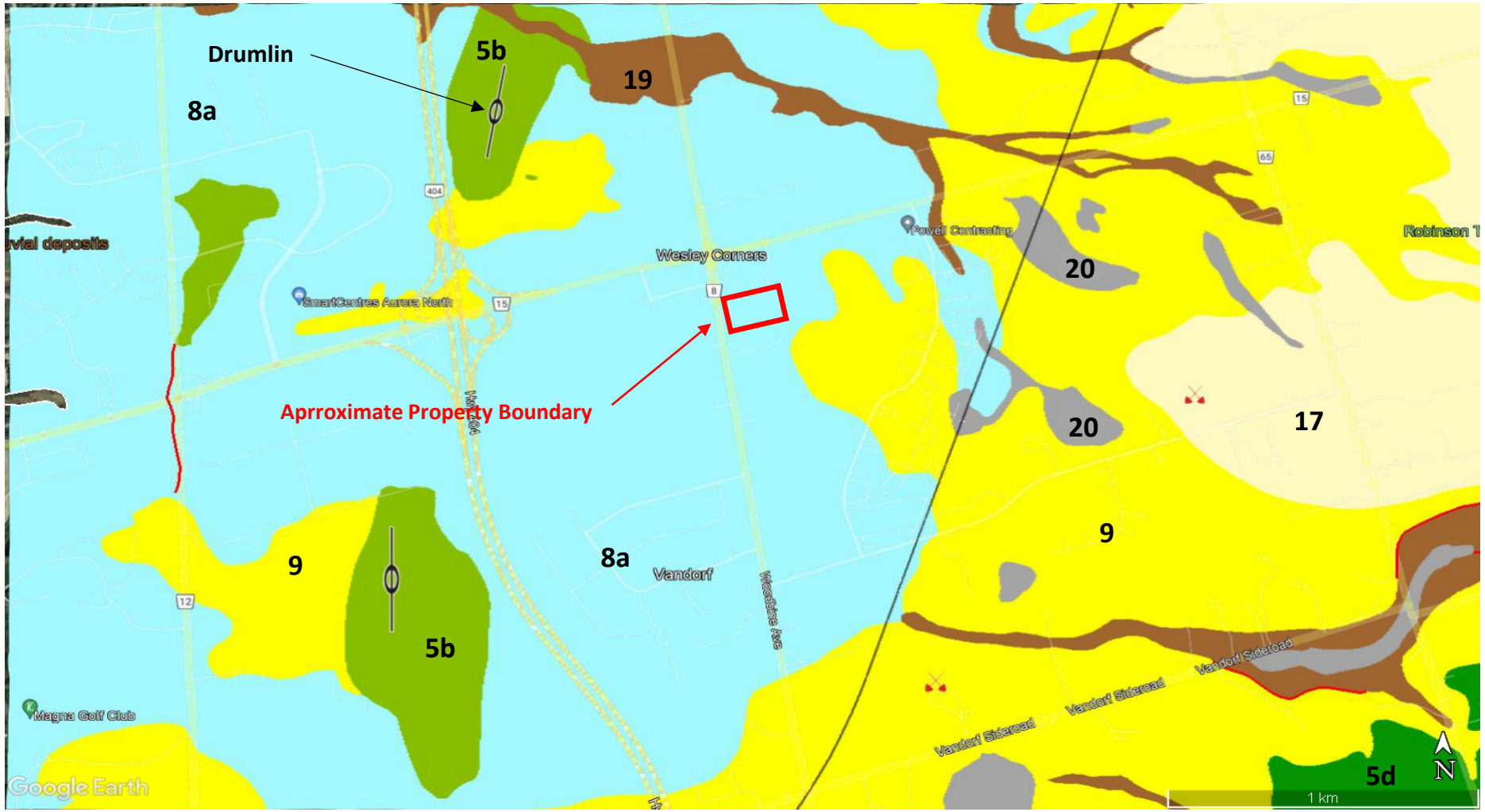
Water Supply Evaluation, Limen Head Office, Woodbine Avenue 15123

For Scal Properties Ltd

Date:	Feb-23	Scale:	as shown
Project:	21013.02	Ref No:	

GAMAN Consultants Inc.

Figure 2



NOTES

5b	Sandy silt to silty sand till
5d	Clay to silt textured till
8a	Fine Textured Glaciolacustrine Deposits (silt & clay, trace sand/gravel
9	Coarse Textured Glaciolacustrine Deposits
17	Fine to very fine sand and silt
19	Modern Alluvial Deposits (gravel sand, silt, clay)
20	Organic Deposits (peat, muck marl)

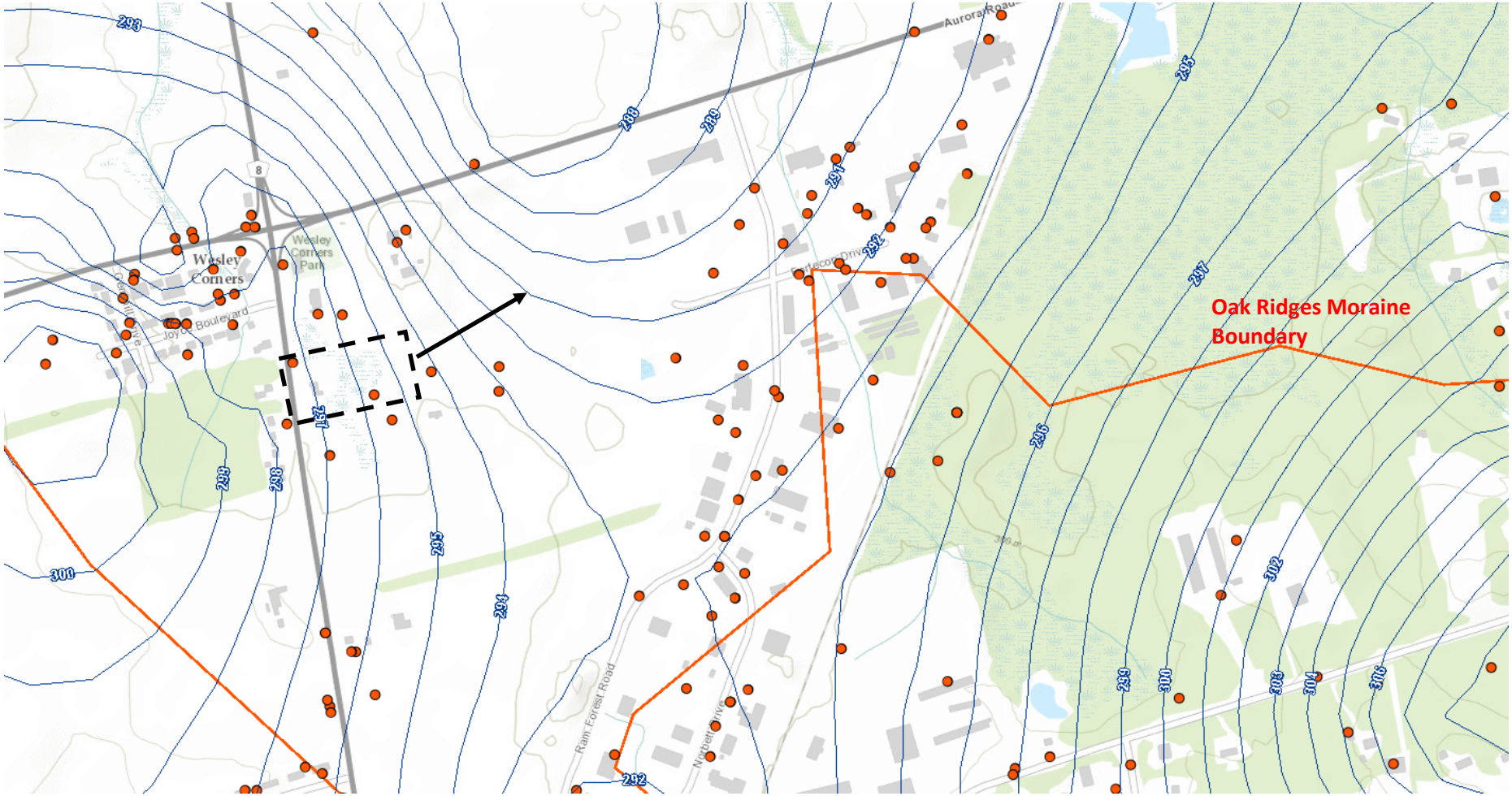
Surficial Geology

Water Supply Evaluation, Limen Head Office,
15123 Woodbine Avenue
For Scal Properties Ltd

Date:	Feb-23	Scale:	as shown
Project:	21013.02	Ref No:	

GAMAN Consultants Inc.

Figure 3



NOTES

Groundwater Table Elevations -Oak Ridges Moraine Groundwater PGM

Approximate Site Boundary

Interpretion direction of shallow groundwater movement

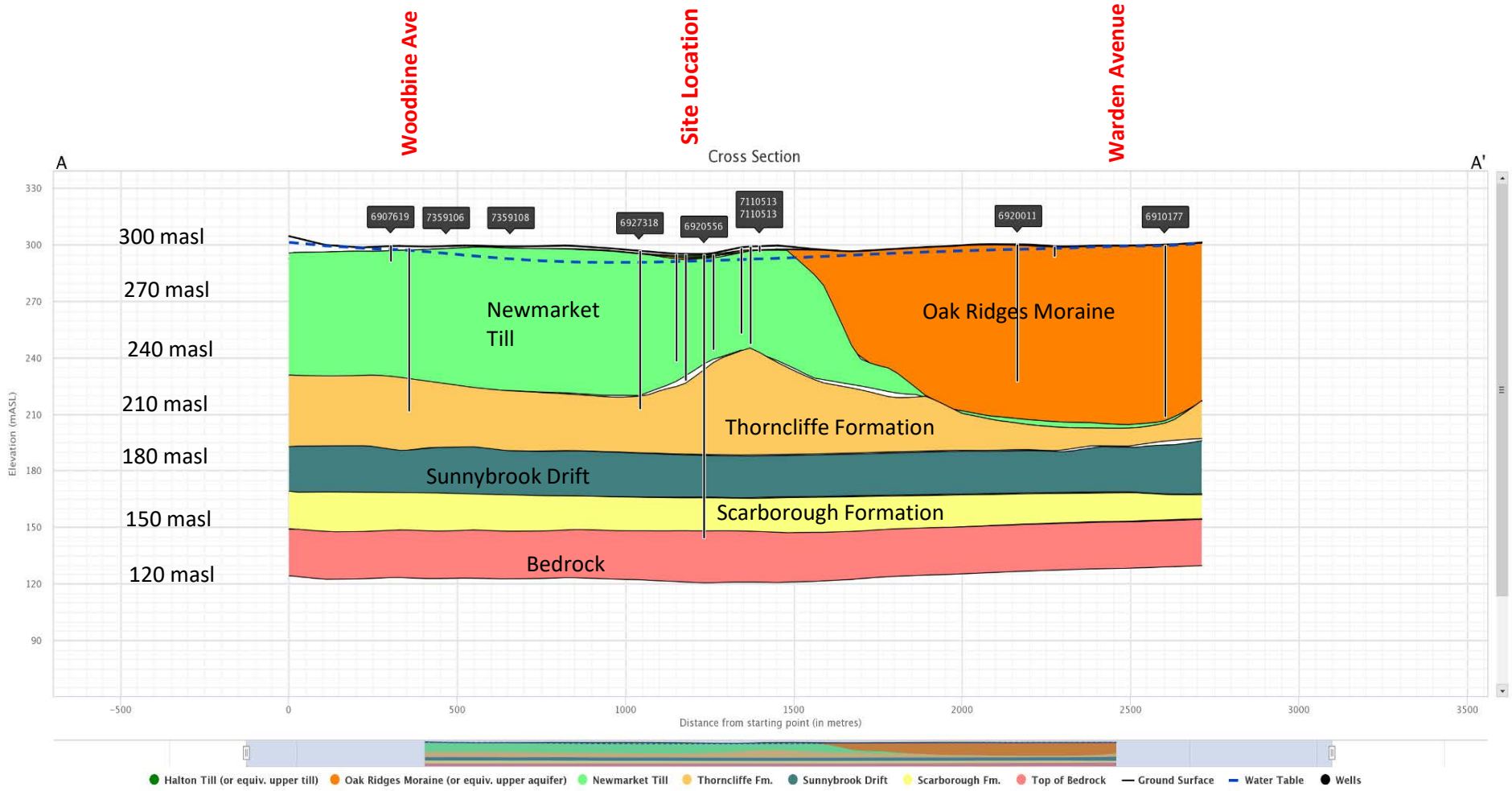
Shallow Groundwater Movement

Water Supply Evaluation, Limen Head Office,
15123 Woodbine Avenue
For Scal Properties Ltd

Date:	Feb-23	Scale:	as shown
Project:	21013.00	Ref No:	

GAMAN Consultants Inc.

Figure 4



NOTES

Source of Information: -Oak Ridges Moraine Groundwater Program

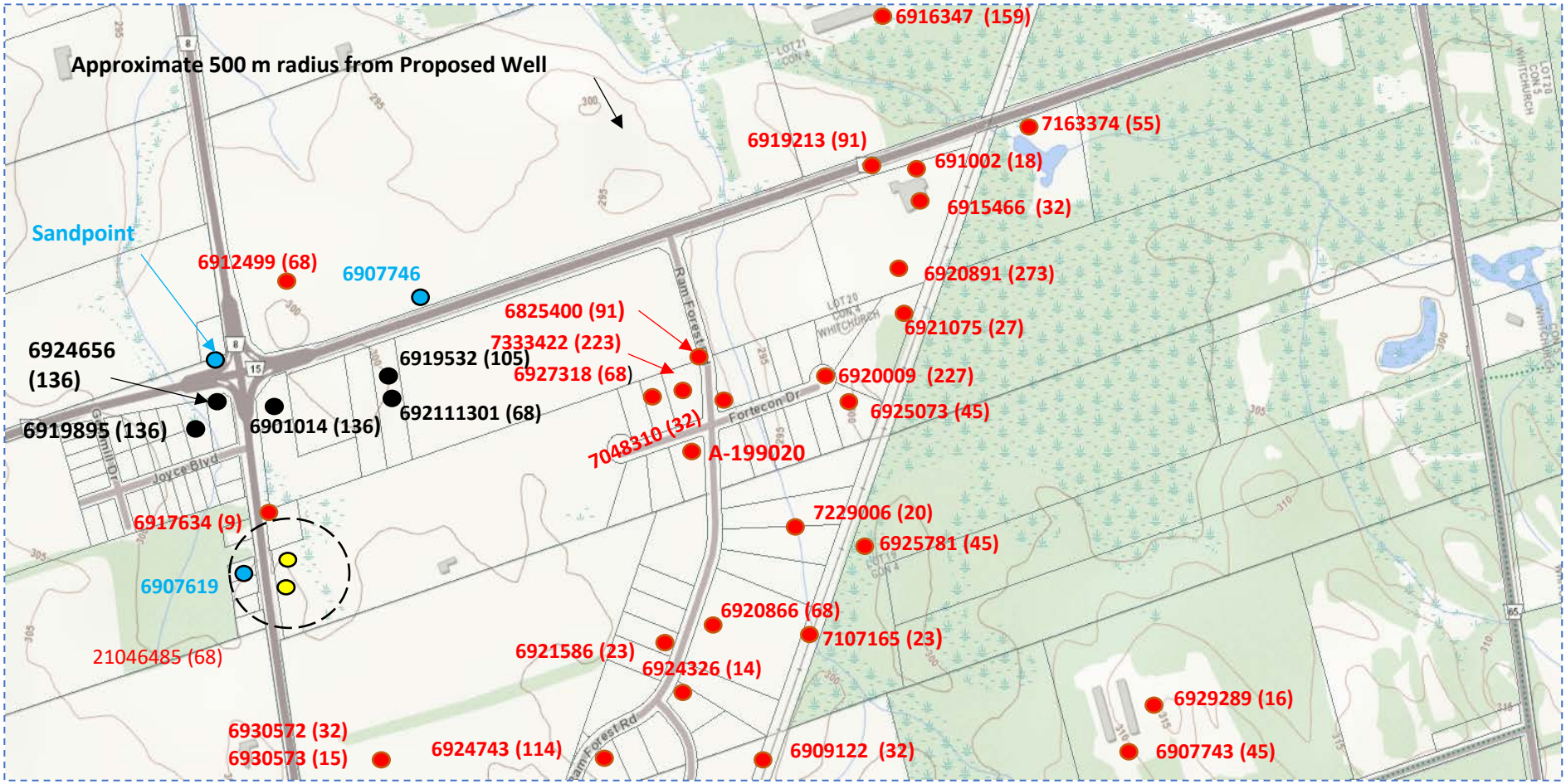
Cross Section A-A'

Water Supply Evaluation, Limen Head Office,
15123 Woodbine Avenue
For Scal Properties Ltd

Date:	Feb-23	Scale:	as shown
Project:	21013.00	Ref No:	

GAMAN Consultants Inc.

Figure 5



NOTES

- Proposed Well Locations (approximate)
- Wells terminating Thorncliffe Aquifer Complex (test rate L/min)
- Dug Well
- Drilled Wells Less Than 30m Deep (tesr rate L/min)

Predicted Zone of Influence to 0.5 metres for drawdown at 20,000 L/day combined pumping Phases 2A/2B

Water Well Location Map

Water Supply Evaluation, Limen Head Office,
15123 Woodbine Avenue
For Scal Properties Ltd

Date:	Feb-23	Scale:	as shown
Project:	21013.02	Ref No:	

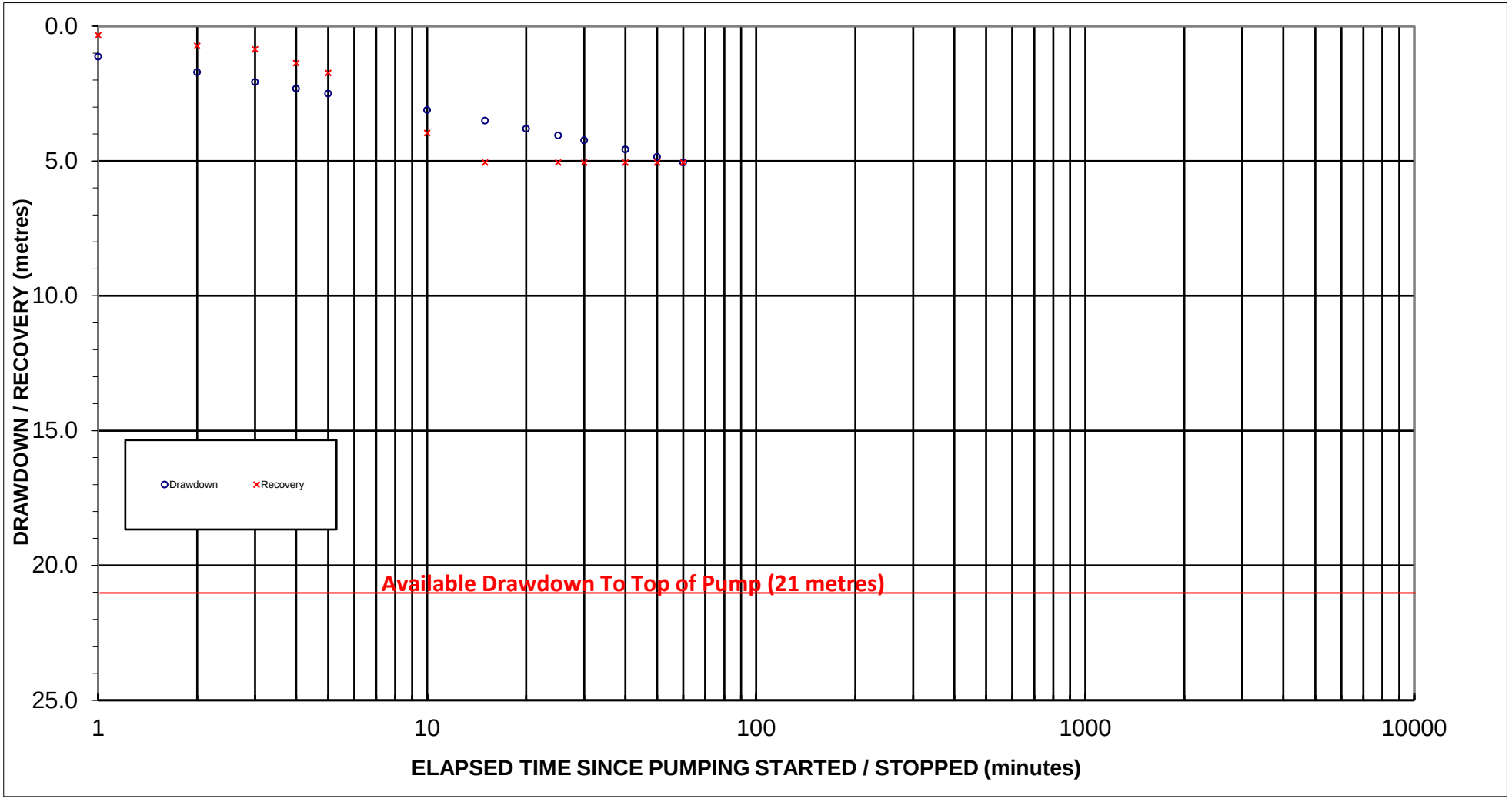
GAMAN Consultants Inc.

Figure 6

FIGURE 7

PUMPING WELL 28 Fortecon Drive (A199020)

Static Water Level : 34.75 m bgl Well Depth: 60.35 m bgl Pumping Rate: 45.5 L/min	Project Name : **Water Supply Evaluation Limen Head Office 15123 Woodbine** Project No : 21013.02 Date: 11-Jul-21
mbtoc - metres below top of casing mbgl - metres below ground level L/min - litres per minute	Distance from pumping well (m) = 0.075



C:\Users\GARY\Documents\Projects\2021\21013 Limen Group\02 Phase 2\Tech\Ph 2 Water Supply\Figure 7 Wilson Well Test A199020.xlsx

TABLE 2: PUMPING WELL 28 Fortecon Drive (A199020)

Project : Water Supply Evaluation Limen Head Office 15123 Woodbine

Project # 21013.02

OW:	28 Fortecon	DEPTH(m bgl):	60.35	mp (agl)*:	
PW:	28 Fortecon	SWL(m bmp):	34.75	Discharge (L/min):	45.5
DATE:	Jul-21	SWL(m bgl):	34.75	Radius from pumped well (m):	0.075
TIME:	na	I.D. (mm):	150	Pump setting(mbgl):	na

D R A W D O W N			RECOVERY			C O M M E N T S
ELAPSED TIME (minutes)	**WATER LEVEL (m bmp)**	**DRAWDOWN (metres)**	**ELAPSED TIME (minutes)**	**WATER LEVEL (m bmp)**	**RECOVERY (metres)**	
1	35.87	1.13	1	39.47	0.34	
2	36.45	1.71	2	39.08	0.73	
3	36.820	2.073	3	38.95	0.85	
4	37.064	2.32	4	38.44	1.37	
5	37.247	2.50	5	38.07	1.74	
10	37.856	3.11	10	35.84	3.96	
15	38.252	3.51	15	34.75	5.06	
20	38.557	3.81	20	34.75	5.06	
25	38.801	4.05	25	34.75	5.06	
30	38.984	4.24	30	34.75	5.06	
40	39.319	4.572	40	34.75	5.06	
50	39.594	4.846	50	34.75	5.06	
60	39.807	5.060	60	34.75	5.06	100% recovery

Q: discharge
SWL: static water level
L/min: litres per minute

r: distance from pumped well
PW: pumped well

mbmp: metres below measuring point
mbgl: metres below ground level

Table 1: PREDICTED ZONE OF INFLUENCE

Water Supply Evaluation Limen Head Office (21013.02)

Flow Rate m3/day	Transmissivity m2/day	Storativity	Time days	Distance metres	Drawdown metres
20.0	25	0.0001	150	1	1.16
				10	0.87
				100	0.57
				200	0.49
				300	0.44
				400	0.40
				500	0.37

Total flow for two wells, each pumping 10,000 Lday to service Buildings 2a and 2b.