Via: email

January 27, 2020

File: ASC-458 103l

Mr. Ben Pilon
BPE Developments
141 Hickson Avenue
Kingston, Ontario
K7K 2N7

Subject: Response to 2nd Draft Technical Comments from Malroz Engineering Inc.
Hydrogeological Study – Proposed Unity Farm, Inn and Spa
2285 Battersea Road, Kingston, Ontario

Dear Mr. Pilon:

Further to our meeting of January 15, 2020, we present our comments on the 2nd Draft Technical Review from Malroz Engineering Inc. (Malroz) regarding the above captioned property.

We reviewed the following Malroz document:

Review of Malroz Engineering Inc., Comments on Response to Draft Technical Comments Proposed Unity Inn & Spa, 2285 Battersea Road, Glenburnie, Ontario K0H 1S0, dated October 23, 2019.

We offer the following comments in order of the Malroz 2nd Draft Technical Review:

1305 Princess Street, Kingston, ON
K7M 3E3
(613) 561 7088
www.asc-environmental.com

1.0 Comments

Servicing Options

1. The proponent should outline all water supply needs for the site and evaluate the provision of onsite services to support the full proposed development.

Since submission of the Hydrogeological Study, additional modifications to the proposed development include:

- The Unity Inn and Spa development will encompass the whole property, approximately 13.7 hectares consisting of a 27-suite inn, a spa, a small-scale restaurant, an assembly hall, and forty (40) one bedroom "tiny living" rental cabins. The site will include farmland, vineyards, gardens, and accessory buildings; one of which will include a fruit and vegetable stand, and a craft winery/brewery/cidery.
- Water supply to the development will be supplied via on-site well water for the operations except for the Spa outdoor pools which will be filled with City of Kingston municipal water, and subsequent "make-up" water will be supplied via on-site wells.
- Laundry will be conducted off-site.
- Beneficial re-use of 20% of treated water, for recycling to toilets (following treatment).
- Relocation of 20 suites, and spa elements to the north west quadrant of the property.

Based on the proposed development modifications, the water supply needs for the site are presented in the attached Table, including full build-out flows calculated using the Ontario Building Code (**OBC**) Table 8.2.1.3.A/B. Table 1 shows the project distribution and theoretical water needs for each proposed use.

The proponent plans to make use of on-site storage tanks housed in the lower level of the maintenance building. Initial water taking for storage purposes, prior to full operations start-up, will not exceed 25,000 L/day. The proponent will have the ability to store approximately 50,000 litres of water in storage tanks, to supplement the initial operations.

As shown in Table 1, maximum daily water taking would not exceed 38,912 L/day for a fully operational enterprise; including water recycling of 20% for toilets. Spa pool make-up water will be suppled via on-site wells. It is anticipated that peak operational use will potentially occur on weekends; resulting in approximately 100 days per year of peak operation when fully developed.

A site location plan shows the property limits of the proposed site development and a Concept Plan shows the distribution of the development. These are presented in Appendix A.

Table 1 - Unity Inn/Spa - Theoretical Flow Calculations as per O.B.C 8.2.1.3 A/B

Building Part	OBC Occupancy Type	Description	Unit Flow	Number of Units	Water Supply Needs L/day
• Hotel - Cabins (Bachelor/1 Bedroom)	5.a) Hotels and Motels (excluding bars and restaurants) – Regular, per room	Cabins – Bachelor/1 bedroom – 500 sq ft.	250	40	10000
Hotel	5.a) Hotels and Motels (excluding bars and restaurants) – Regular, per room	Suites – 1 bedroom 500 sq ft.	250	27	6750
Restaurant	12.a) Food Service operations Restaurant (not 24 hr) per seat	Main Building Dining – Farm to Table (not 24 hr), per seat	125	40	5000
Restaurant	12.a) Food Service operations Restaurant (not 24 hr) per seat	Tied House and Cafe	125	40	5000
Indoor Restaurant	12.a) Food Service operations Restaurant (not 24 hr) per seat	Spa Café - per seat	125	40	5000
Assembly Hall	2 b) Assembly Hall – per seat food service provided	Assembly with food	36	140	5040
Spa	23. Swimming and Bathing Facilities – per person	Swimming/bathing/Massage Per Person	40	80	3200
Inn and Spa Staff	12 h) ii) Food Service operations – Take Out per employee per 8-hour shift	Per Employee Per 8 hr Shift	75	14	1050
Farm Produce Sales / Retail Store	12 j) v) Food Service operations Food Outlet – per water closet	Sale of beer, wine, cider, fruits and vegetables, and locally-produced agricultural products.	950	1	950
• Winery/brewery/cidery	Craft winery/brewery/cidery	Craft winery/brewery/cidery Production	1250	1	1250
Beer and Wine Staff	12 h) ii) Food Service operations – Take Out per employee per 8-hour shift	Staff	75	2	150
Kitchen / Housekeeping Staff	15. a) Office Building Per employee per 8-hour shift	Per non-resident staff per 8-hour shift	75	38	2850
• Spa Make-up Water	Ontario Regulation 495/17: Public Spas, Section 7. (1),	Spa daily Make up Water	30 l/person	80	2400
Total (before using recycled water for toilets)					**48,640**
Recycled Water (20%)					**9728**
Total (water taken from wells when fully built out and 100% occupied)					**38,912**

- **NB – Prior to operations start-up; water taking will be undertaken at a rate of 15,000 – 25,000L/day for on-site storage to make-up the 48,640 litres required for initial use in the distribution system. Maximum daily water taking from wells during full capacity operations would be approximately 38,912 L/day.**

- **Craft Winery/ Brewery/Cidery**

The proposed craft winery/brewery/cidery will be housed in a new construction building (designated as AR on Concept Plan in Appendix A). The winery/brewery/cidery will not be a large production facility. The goal is to provide product on a seasonal basis to the restaurant and over the counter sales.

Water taking requirements for production/brewing/cleaning processes are expected to be approximately 3.5 L water/1 L of beer (Craftbrewers.com) to 5 L water/1 L beer (MacKinnon Brothers Brewing Company -http://www.mackinnonbrewing.com/beers/ and Labatt Breweries of Canada (Cresto B.C.)).

The proposed craft winery/brewery/cidery operation is anticipated to produce approximately 3,000 litres of wine/beer/cider per month (100 l/day).

The proponent has proposed that the small operation will consist of a 250 L mash tank, producing 250 L of product resulting in an overall peak daily water taking of 1,250 litres (5 L/ 1 L). The proposed production would be 2 - 3 batches per week resulting in 750 litres produced in a week; with off-days used for cleaning the system, where it is anticipated that only 250 – 500 litres per day of water taking would be required for cleaning to prepare for batch processing.

Therefore, on a weekly basis, it is expected that a total of 3,750 litres of water taking will be required for batch processing (3 peak times per week) and 2,000 litres of water taking will be required for cleaning (4 off-peak times per week). As indicated peak water taking would be anticipated 2 - 3 times per week.

During off-peak days (non batch production days), water taking up to 750 litres per day) may be considered from the water supply wells for cleaning (500 litres) and storage (250 litres), to reduce the peak water taking required during batching days. This would effectively reduce the peak water taking from the wells by 250 litres per day when batching. The storage tanks are proposed for the lower level of the maintenance building (designated J on Concept Plan, Appendix A) and lower level of brewery building (AR).

.

For presentation purposes the peak daily flow (1,250 litres) has been shown on Table 1 above; the anticipated average flow per day (including peak, cleaning days and storage) is anticipated to be in the order of 860 litres per day. During the operational phase of the development, water taking will be metered daily to confirm anticipated water taking.

- **Spa - Make-up Water**

It is proposed that the Spa pools will initially be filled with water sourced from the City of Kingston municipal water supply, delivered using water trucks.

On-site water storage tanks servicing the Spa will be housed in the lower level of the maintenance building (designated J on Concept Plan). These will be used to supply make-up water for the pools during daily routine maintenance. The make-up water would be sourced from the on-site well water supply system.

Based on our understanding of the current project, four (4) "hot" pools (volume of 10,874 litres/pool) and one (1) "cold" pool (volume of 2,038 litres), are proposed for the Spa portion of the development. The location of the pools is shown on the Concept Drawing in Appendix A, attached. The pools servicing the Spa will have a total volume capacity of 45,534 L. It is anticipated that a 40,000 L water supply truck would be required to initially fill the Spa pools, and then make-up water would be supplied on an as needed daily basis from the on-site storage supply tanks supplied from the on-site wells.

Referencing Ontario Regulation 495/17: Public Spas, Section 7.(1), every operator of a public spa with a volume that exceeds 4,000 litres shall add make-up water to the spa during each operating day in an amount that is not less than 30 litres per bather use, to a maximum of 20 per cent of the total spa volume.

The proposed development has been designed to accommodate a maximum of 80 patrons (30 l/bather) in peak times, and on this basis, the required volume of make-up water would not be less than 2,400 litres per day based on bathers. Therefore, the daily make-up water required is considerably less than the maximum allowable.

- **Hotel – Cabins**

The proposed 1-bedroom cabins, shown in the north west quadrant of the Concept Plan, will incorporate a footprint of approximately 500 sq ft; including a ¾ piece bathroom (toilet, sink and shower). The footprint is similar to a standard hotel/motel 1- bedroom with no additional amenities and on that basis considering the size and proposed purpose of the cabins we believe that *OBC Section 8.2.1.3.A 5.a) Hotels and Motels (excluding bars and restaurants) – Regular, per room* is a reasonable categorization for the proposed cabins.

- **Beneficial Re-Use of Treated Water**

The proponent has proposed to recycle 20% of the treated water from the sewage treatment facility for beneficial re-use to toilets.

Day 1 - Water taking under peak use, fully built out conditions based on Table 1 above would theoretically result in a net daily flow of 48,640 litres required to commission the distribution system. This volume would initially be partially obtained from on-site water storage (15,000 – 25,000 litres) and water taking from the on-site well water supply system. The total fresh water flow from Day 1 - 48,640 litres would be directed to the sewage treatment facility, and once treated, 9,728 litres would be pumped to a holding tank for beneficial re-use in toilets; and the remainder discharged to the clay lined pond for potential irrigation purposes.

Day 2 (operational) – Net daily flow volumes for peak, fully built out conditions would be achieved through daily water taking of approximately 38,912 litres from the well water supply system and the treated water supply of 9,728 litres from holding tank (for re-use in toilets) to make-up the 48,640 litres.

We concur with Malroz that the peak daily flow anticipated may not be fully realized until full buildout for the proposed uses. Therefore, the monitoring program during the operations phase of the development will include metering of groundwater extraction, wastewater treatment, and treated water usage daily to confirm water demand.

Based on the results of the 48-hour pumping tests (August and September 2018), and subsequent level logger monitoring data; sufficient long-term groundwater supply is available to meet the total daily peak demand for the proposed development.

2. The consultant does not identify how, should offsite water sources be permitted, the offsite water will be separated from onsite sources.

Clarification was provided to Malroz in the first round of technical comments, and Malroz indicated that no further comments were required.

2.2 Groundwater Quantity

3. *Section 1.4 of the hydrogeological study identifies a peak daily water demand of 75,375 litres, in accordance with the Ontario Building Code. The report further identifies that 29,960 litres per day will be recycled, resulting in a peak daily water taking from groundwater of 45,415 litres.*

During the site visit, the proposed development was identified to include a brewery, a winery and potentially an open loop groundwater geothermal system. The hydrogeologic study considered for this review does not evaluate for a water demand beyond those outlined on Page 4, in the Table titled 'Anticipated Flow Calculations Based on Site Use for Phase 1 and Phase 2 of Development' which does not include a winery, open loop geothermal system or brewery.

The anticipated flow calculations indicate that the spa, with bathhouse, showers and toilets, will have a demand of 150 litres per day. This appears to be low and the peak number of patrons to the spa should be re-evaluated.

Page 37, item 8, identifies that the re-use water will supply toilets and laundry. Supporting calculations on the demand for toilet water is not provided (laundry is shown as 7,500 litres per day) and should be included.

A Permit to Take Water (PTTW) from the MECP is required for water takings of 50,000 litres or more in any 24-hour period. As well, both closed and open-loop groundwater geothermal systems can require approvals and/or licensed installers though the MECP.

Considering the site is projecting a peak of 45,415 litres per day of groundwater takings and that there are potential additional water supply needs for tubs, a brewery and winery, or other uses, the proponent should consider the requirement to obtain a PTTW and other approvals. Should additional groundwater use beyond those identified on Page 4, in the Table titled 'Anticipated Flow Calculations Based on Site Use for Phase 1 and Phase 2 of Development', further adequate study should be undertaken.

Malroz confirmed that clarification was provided by ASC Environmental regarding anticipated daily water takings for the proposed uses of the development, including the spa, winery and brewery. In addition, Malroz acknowledged that clarification was provided by ASC Environmental confirming that an open loop groundwater geothermal system is not proposed for the development.

Water takings from on-site wells for storage purposes prior to commencing operations will be conducted at approximately 15,000 – 25,000 litres per day, which would not trigger a Permit to Take Water.

Based on the proposed uses (theoretical flows) as shown on the Table above, the initial water demand will be less than 50,000 litres per day. We concur with Malroz regarding an operations phase monitoring program which will include metering of total daily water taking to closely monitor the proposed uses, and if it is determined that groundwater taking is in excess of the theoretical calculations, then a Permit to take Water (PTTW) would be required.

4. *Page 44 recommends a groundwater monitoring program for during and post-site development. However, a detailed monitoring program was not provided in the report. The proponent should provide a proposed monitoring program for review. The monitoring program should include a protocol for responding to water taking concerns from the construction phase and operations phase of the development.*

Malroz has confirmed that a groundwater monitoring program was provided by ASC Environmental outlining monitoring during construction and operations phase of the development.

Off-site groundwater monitoring is currently being undertaken at three neighbouring residents located north adjacent, south west adjacent and south of the development. These neighbouring wells are representative of the local wells in the area that access the unconfined limestone aquifer. We also propose to monitor once a month during and post construction, monitoring wells located south and south east of the development at the Church of Latter-Day Saints and the local public school.

On site Test well TW02 and observation well OW20 currently have level loggers installed in them, recording daily well water levels.

During the operations phase of the development, the monitoring program will include daily metering of the total water takings by on-site supply wells including the time the measurement is recorded.

The groundwater monitoring program will be undertaken during construction and for a period of two years following the final operational phase of the development.

Well water sampling and quality measurements of neighbouring water supply was undertaken during the hydrogeological study. Select neighbouring residents will be included in a groundwater sampling program to establish baseline water quality measurements. We anticipate including the neighbouring wells currently being monitored, the Church and public school to be representative of the local neighbouring well supply.

5. Groundwater monitoring in on-site and off-site wells was undertaken as a part of the hydrogeologic assessment. The following details should be provided in the pumping test and water level monitoring data tables (eg: Appendix F) to facilitate evaluation:

i. water level measurements from a datum (eg. metres below ground, metres below top of casing, etc.),

ii. depth of well,

iii. clarification regarding the units of numbers stated in cell following "pumping started at".

Details for i and ii are included in revised data tables included in Appendix B, and units stated in cell following "pumping started at" refer to the 24-hour time clock (i.e. 17:12, is 5:12 PM).

Malroz acknowledged receiving the additional data.

Table D3 should include whether the datum for water level measurements was the top of the well casing or ground surface.

Water level monitoring datum was chosen as the top of the well casing for each well included in the monitoring program during pumping tests. Updated Table D3 is attached in Appendix B.

The Groundwater Elevation table showing monitoring in August, September, November, December and January with data from on- and off-site wells indicates that the elevations are referenced to a geodetic datum. The consultant should clarify how the geodetic elevations were determined.

Geodetic elevations on-site were determined using the Grading and Servicing Plan provided by The Greer Galloway Group Incorporated. Neighbouring residential well elevations were estimated based on the Grading and Servicing Plan, well records and local topographic data.

6. The consultant describes the pumping test at TW02 as lasting 48 hours, however, although field water quality monitoring data for 48 hours was provided (table D1), the groundwater monitoring data only reflected 24 hours (table D2 and Figure 1 TW2 Pumping Test Drawdown). The consultant should clarify and provide the additional data, if available.

Malroz acknowledged receiving the additional data, and no further comment was requested.

7. The report does not identify whether additional water supply wells are considered or not. Should additional wells be installed at the site, we recommend that they be assessed for water, quantity, and interference by a qualified hydrogeologist.

Malroz acknowledged that ASC Environmental provided additional clarification that no additional wells are proposed for the development at this time. If contemplated in the future, these will be assessed for water quantity, quality and interference by a qualified hydrogeologist.

Groundwater Quality

8. During the site visit, it was noted that a water treatment system will be installed at the site to treat and condition the groundwater. Considering that the site will be open to the public, as a commercial operation, the proponent must seek the appropriate approval from the MECP and/or health unit for the drinking water system. We recommend that this information be provided to the City.

Malroz acknowledged that ASC Environmental concurred with the peer review comment, and no further comment was requested.

9. Should additional wells be installed at the site, we recommend that they be assessed for water quality by a qualified hydrogeologist, considering the reported water quality.

Malroz acknowledged that ASC Environmental concurred with the peer review comment, and no further comment was requested.

Closure

This document provides response to the Draft peer review comments from Malroz, for the proposed development hydrogeology study located at 2285 Battersea Road, Kingston, Ontario.

Professional judgement, experience with similar investigations, and available data collected within the scope of work form the basis of this document. *ASC* has prepared this document using information understood to be factual and correct and shall not be responsible for information or facts that were inaccurate, concealed or not fully revealed at the time of our work.

Environmental conditions can be expected to change over time. The findings and conclusions of this document are valid only at the time at which this work was conducted. If future work is undertaken, or additional information becomes available, *ASC* shall be requested to re-evaluate the conclusions and make amendments if required.

ASC makes no other representations whatsoever, including those concerning the legal significance of its findings, or as to other legal matters touched on in this report, including, but not limited to, ownership of any property, or the application of any law to the facts set forth herein. With respect to regulatory compliance issues, regulatory statutes are subject to interpretation and these interpretations may change over time.

This document has been prepared by *ASC* for the use of *BPE Developments* and *its assigns*. Unauthorized reuse of this document for any other purposes, or by third parties, without the express written consent of *ASC*, shall be at such party's sole risk without liability to *ASC*. We trust that this information is satisfactory for your present needs. If you have questions or concerns regarding this matter, please contact the undersigned.

Yours truly,

ASC Environmental Inc.

LICENSED PROFESSIONAL ENGINEER
27/01/2020
P. N. JOHNSTON
PROVINCE OF ONTARIO

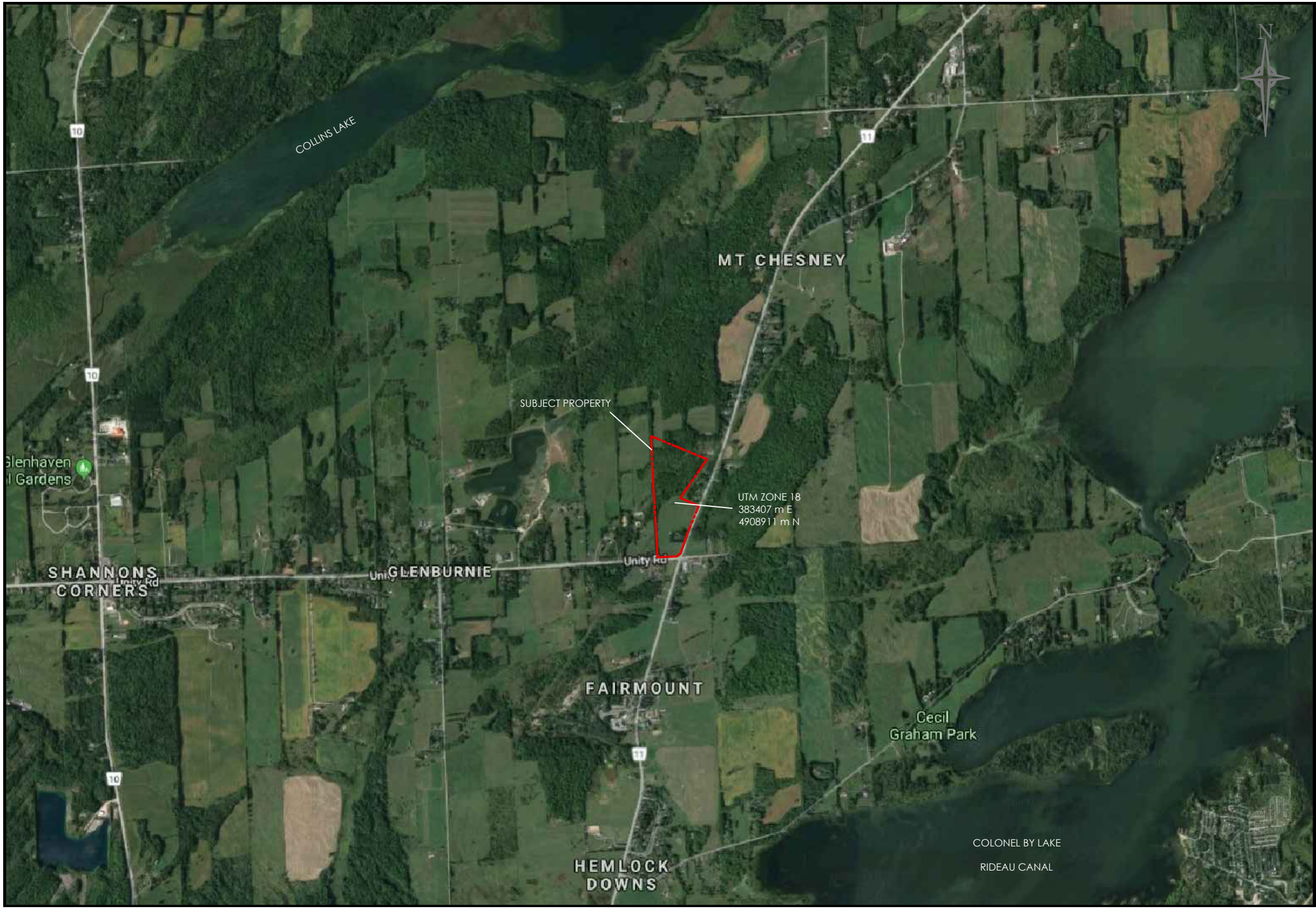
Paul N. Johnston, M.Sc., P.Eng., QP ESA
Principal/Project Manager

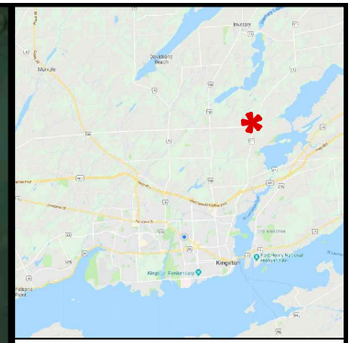
Attachments: Appendix A – Drawings
Appendix B – Support Documentation

APPENDIX A
Figures and Concept Plan

ASC ENVIRONMENTAL

1305 Princess Street,
Kingston, ON K7M 3E3
Tel: (613) 561- 7088





LEGEND

SUBJECT PROPERTY LOCATION

SUBJECT PROPERTY LINE

DRAWING TITLE
Site Location Plan

FIGURE NO.	DRAWN BY
01	J. F.

PROJECT
Hydrogeological Study, Servicing Options and Terrain Analysis

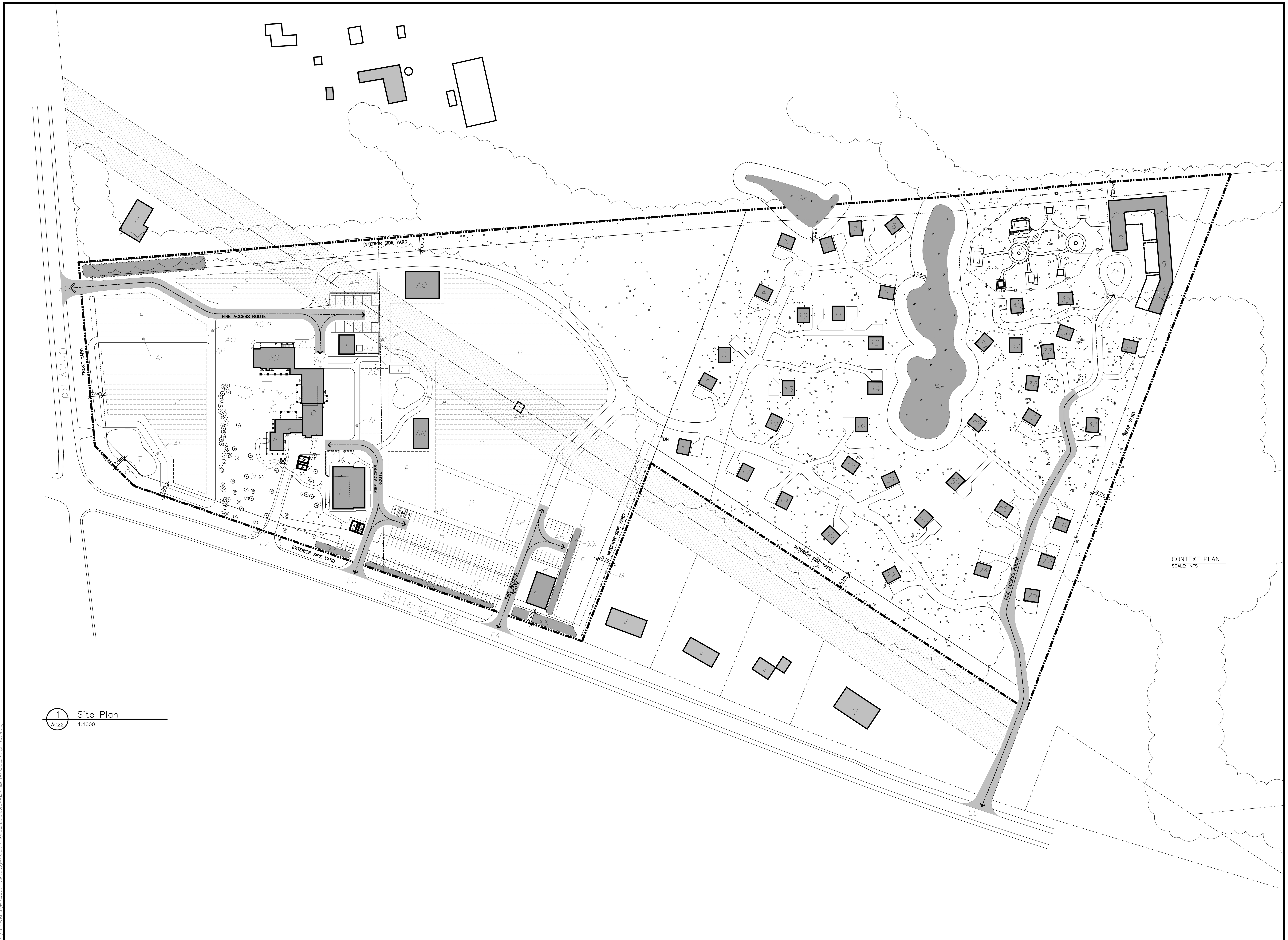
CLIENT
BPE Development

LOCATION
2285 Battersea Road, Kingston, ON

PROJECT NO.	SCALE:
ASC-458	0 METRES 525
DATE 1-Feb-2019	

ASC ENVIRONMENTAL
1305 Princess Street
Kingston, ON, K7M 3E3

(613)634-5596
www.ascenvironmental.ca



1 A022 Site Plan 1:1000

DRAWING LEGEND

A. SUITES (3)
B. INN & SUITES (20)
C. RESTAURANT, SUITES (4)
D. SPA QUIET ROOM, TREATMENT ROOM, YOGA STUDIO, & SUITES
E. SPA COURTYARD
F. STORE & CAFE
G. FIRE HYDRANT LOCATION
H. INN & SPA PARKING (121 SPACES)
I. CORPORATE VENUE & SUITES
J. RELOCATED SMALL BARN MAINTENANCE SHED
K. OUTDOOR PATIO
L. FLOWER CUTTING OR AGRICULTURE
M. FENCE
N. OUTDOOR GARDENS AND SEATING
O. EXISTING STONE PILLARS
P. VINEYARD OR AGRICULTURE
Q. SIGN
R. BUS PARKING (1)
S. ACCESS ROAD
T. POND
U. WATER TREATMENT FACILITY
V. APPROXIMATE LOCATION OF NEIGHBOURING HOUSE
W. RESERVED
X. BLUE SPRUCE
XX. TREES AND SHRUBS
XXX. TREES AND FENCE
Y. RESERVED
Z. AGRICULTURE STORAGE BUILDING
AA. EMPLOYEE PARKING (18)
AB. SERVICE PARKING (12)
AC. NEW WELL LOCATION
AD. --
AE. TURNAROUND
AF. APPROXIMATE LOCATION OF WETLAND
AG. EVENT PARKING (10 SPACES)
AH. SNOW STORAGE
AI. GOLF CART PATH / AGRICULTURE PATH
AJ. MAIN BUILDING CHILLER
AK. LOADING ZONE (30'x12')
AL. PARKING FOR VEHICLES AWAITING ACCESS TO LOADING SPACES (30'x12')
AM. HYDRO TOWER
AN. GREEN HOUSE
AO. TRANSFORMER
AP. SHED
AQ. COVERED PORT
AR. CIDERY, WINERY, CLASSES

ENTRANCE LEGEND

E1. UNITY ENTRANCE
E2. MAIN GUEST ENTRANCE
E3. APPROX LOCATION OF EXISTING BARN ENTRANCE & FIRE DEPARTMENT ACCESS
E4. APPROX LOCATION OF EXISTING FIELD ENTRANCE & FIRE DEPARTMENT ACCESS
E5. PHASE 3 BACK ACCESS

APPROXIMATE LOCATION OF WETLAND (AS PROVIDED BY BPE)
ELECTRICAL EASEMENT
BUILDING
FUTURE VINEYARD (OR AGRICULTURE)
6m WIDE FIRE ACCESS ROUTE (12m TURNING RADIUS TO CENTRE OF ROAD)
APPROXIMATE LOCATION OF TREE LINE
EXIT DOOR LOCATION

Revision	Description	Date

Project
Unity Farm, Inn & Spa

Location
2285 Battersea Rd
Glenburnie, ON

Client
BPE Development

Drawing
Conceptual Site Plan

Drawn by: BGV	Date: November 26 2019
File Name: 14-01-2019, 2285 Battersea Conceptual Floor Plan	Scale: 1:1000
Client Project #: Client Proj. #	Drawing Number: A022
Project #: 17091 / Revision #: --	

APPENDIX B
Support Documentation

1305 Princess Street,
Kingston, ON K7M 3E3
Tel: (613) 561- 7088

Table D3. Observation well drawdown during pumping test.

	Pumping Test - Drawdown		Test Well:	TW1
	Project No.:	ASC-458	Date:	7-Aug-2018
	Client:	BPE Development	Pumping start time	
	Location:	2285 Battersea Road, Kingston, ON	17 12	PM

OW1 (2196 Battersea Rd.)					OW2 (2217 Battersea Rd.)				
WL	WL	DD	Time	ET	WL	WL	DD	Time	ET
(ft)	(m)	(m)	H:Min	(min)	(ft)	(m)	(m)	H:Min	(min)
16.896	5.150	0.000	12 35	0	16.568	5.050	0.000	12 45	0
16.980	5.176	0.026	18 16	64	16.850	5.136	0.086	18 19	67
16.950	5.166	0.016	20 55	223	17.750	5.410	0.360	21 0	228
17.000	5.182	0.032	22 46	334	18.050	5.502	0.452	22 50	338
16.900	5.151	0.001	24 22	430	17.300	5.273	0.223	24 28	436
16.850	5.136	-0.014	26 10	538	15.900	4.846	-0.204	26 14	542
16.750	5.105	-0.045	28 51	699	16.800	5.121	0.071	28 55	703
16.850	5.136	-0.014	30 16	784	17.200	5.243	0.193	30 20	788
16.800	5.121	-0.029	31 57	885	16.950	5.166	0.116	32 0	888
16.800	5.121	-0.029	33 23	971	16.950	5.166	0.116	33 33	981
26.550	8.092	2.942	35 23	1091	18.500	5.639	0.589	35 28	1096
16.530	5.038	-0.112	36 53	1181	17.050	5.197	0.147	36 57	1185
16.550	5.044	-0.106	38 19	1267	16.200	4.938	-0.112	38 22	1270
16.500	5.029	-0.121	39 57	1365	17.300	5.273	0.223	40 0	1368
16.200	4.938	-0.212	41 54	1482	15.300	4.663	-0.387	41 57	1485
16.050	4.892	-0.258	43 48	1596	15.100	4.602	-0.448	43 50	1598
16.000	4.877	-0.273	45 22	1690	14.650	4.465	-0.585	45 28	1696
15.950	4.862	-0.288	47 17	1805	12.850	3.917	-1.133	47 22	1810
16.000	4.877	-0.273	48 40	1888	14.700	4.481	-0.569	48 45	1893
16.850	5.136	-0.014	51 21	2049	13.200	4.023	-1.027	51 25	2053
15.900	4.846	-0.304	53 25	2173	14.100	4.298	-0.752	53 30	2178
16.450	5.014	-0.136	55 51	2319	13.260	4.042	-1.008	55 56	2324
15.850	4.831	-0.319	57 49	2437	13.200	4.023	-1.027	57 52	2440
15.750	4.801	-0.349	59 22	2530	13.300	4.054	-0.996	59 26	2534
15.000	4.572	-0.578	60 58	2626	13.025	3.970	-1.080	61 4	2632
15.518	4.730	-0.420	62 24	2712	12.795	3.900	-1.150	62 27	2715
18.373	5.600	0.450	63 45	2793	13.419	4.090	-0.960	63 51	2799

OW3 (2225 Battersea Rd.)					OW4 (2224 Battersea Rd.)				
WL	WL	DD	Time	ET	WL	WL	DD	Time	ET
(ft)	(m)	(m)	H:Min	(min)	(ft)	(m)	(m)	H:Min	(min)
18.438	5.620	0.000	13 33	0	16.240	4.950	0.000	12 55	0
18.500	5.639	0.019	18 40	88	16.850	5.136	0.186	18 45	93
18.550	5.654	0.034	21 5	233	16.850	5.136	0.186	21 10	238
18.500	5.639	0.019	22 57	345	16.850	5.136	0.186	23 0	348
18.300	5.578	-0.042	24 38	446	16.750	5.105	0.155	24 33	441
18.350	5.593	-0.027	26 25	553	16.750	5.105	0.155	26 30	558
18.250	5.563	-0.057	28 59	707	16.600	5.060	0.110	29 2	710
21.600	6.584	0.964	30 25	793	17.200	5.243	0.293	30 27	795
19.750	6.020	0.400	32 3	891	16.910	5.154	0.204	32 6	894
20.950	6.386	0.766	33 43	991	17.400	5.304	0.354	33 40	988
18.700	5.700	0.080	35 35	1103	16.900	5.151	0.201	35 30	1098
18.880	5.755	0.135	37 2	1190	17.500	5.334	0.384	37 5	1193
18.800	5.730	0.110	38 26	1274	16.900	5.151	0.201	38 28	1276
18.830	5.739	0.119	40 4	1372	17.200	5.243	0.293	39 10	1318
18.700	5.700	0.080	42 5	1493	16.500	5.029	0.079	42 0	1488
15.750	4.801	-0.819	43 55	1603	15.650	4.770	-0.180	44 0	1608
15.400	4.694	-0.926	45 37	1705	15.300	4.663	-0.287	45 44	1712
15.300	4.663	-0.957	47 25	1813	14.100	4.298	-0.652	47 28	1816
15.250	4.648	-0.972	48 50	1898	15.100	4.602	-0.348	48 54	1902
15.050	4.587	-1.033	51 27	2055	14.900	4.542	-0.408	51 31	2059
14.900	4.542	-1.078	53 34	2182	15.750	4.801	-0.149	53 38	2186
15.400	4.694	-0.926	56 1	2329	14.750	4.496	-0.454	56 5	2333
15.100	4.602	-1.018	57 57	2445	14.700	4.481	-0.469	58 0	2448
15.100	4.602	-1.018	59 33	2541	14.700	4.481	-0.469	59 30	2538
15.100	4.602	-1.018	61 7	2635	14.800	4.511	-0.439	61 5	2633
14.698	4.480	-1.140	62 32	2720	14.436	4.400	-0.550	62 35	2723
14.698	4.480	-1.140	63 54	2802	14.436	4.400	-0.550	63 56	2804
15.256	4.650	-0.970	64 30	2838	14.469	4.410	-0.540	64 5	2813

	Pumping Test - Drawdown		Test Well:	TW1
	Project No.:	ASC-458	Date:	7-Aug-2018
	Client:	BPE Development	Pumping start time	
	Location:	2285 Battersea Road, Kingston, ON	17 12	PM

OW5 (2252 Battersea Rd.)						OW6 (799 Unity Rd.)					
WL	WL	DD	Time		ET	WL	WL	DD	Time		ET
(ft)	(m)	(m)	H:Min		(min)	(ft)	(m)	(m)	H:Min		(min)
22.375	6.820	0.000	13	11	0	44.423	13.540	0.000	13	15	0
22.650	6.904	0.084	18	48	96	45.850	13.975	0.435	17	15	3
22.700	6.919	0.099	21	18	246	49.400	15.057	1.517	21	21	249
22.650	6.904	0.084	23	5	353	44.900	13.686	0.146	23	7	355
22.550	6.873	0.053	24	43	451	44.600	13.594	0.054	24	53	461
22.550	6.873	0.053	26	34	562	44.500	13.564	0.024	26	36	564
22.400	6.828	0.008	29	6	714	44.500	13.564	0.024	29	10	718
22.620	6.895	0.075	30	30	798	44.500	13.564	0.024	30	35	803
24.200	7.376	0.556	32	7	895	44.690	13.622	0.082	32	11	899
24.800	7.559	0.739	33	53	1001	44.700	13.625	0.085	33	57	1005
23.250	7.087	0.267	35	41	1109	45.150	13.762	0.222	35	50	1118
22.950	6.995	0.175	37	8	1196	45.900	13.990	0.450	37	11	1199
22.900	6.980	0.160	38	31	1279	44.900	13.686	0.146	38	34	1282
22.950	6.995	0.175	39	14	1322	45.200	13.777	0.237	39	20	1328
19.950	6.081	-0.739	42	8	1496	44.500	13.564	0.024	42	20	1508
19.500	5.944	-0.876	44	3	1611	43.700	13.320	-0.220	44	8	1616
19.450	5.928	-0.892	47	31	1819	42.650	13.000	-0.540	46	5	1733
19.250	5.867	-0.953	48	57	1905	42.200	12.863	-0.677	47	35	1823
19.050	5.806	-1.014	51	33	2061	41.750	12.725	-0.815	49	0	1908
19.300	5.883	-0.937	53	37	2185	41.440	12.631	-0.909	51	37	2065
19.300	5.883	-0.937	56	9	2337	41.650	12.695	-0.845	53	45	2193
19.200	5.852	-0.968	58	2	2450	41.200	12.558	-0.982	56	12	2340
19.100	5.822	-0.998	59	36	2544	41.050	12.512	-1.028	58	7	2455
19.100	5.822	-0.998	61	12	2640	41.050	12.512	-1.028	59	48	2556
18.734	5.710	-1.110	62	38	2726	41.100	12.527	-1.013	61	15	2643
18.766	5.720	-1.100	63	59	2807	40.568	12.365	-1.175	62	41	2729
18.766	5.720	-1.100	64	30	2838	40.568	12.365	-1.175	64	1	2809
						40.682	12.400	-1.140	65	40	2908

OW7 (808 Unity Rd.)						OW8 (796 Unity Rd.)					
WL	WL	DD	Time		ET	WL	WL	DD	Time		ET
(ft)	(m)	(m)	H:Min		(min)	(ft)	(m)	(m)	H:Min		(min)
40.797	12.435	0.000	13	20	0	33.268	10.140	0.000	13	26	0
41.400	12.619	0.184	19	3	111	39.840	12.143	2.003	19	6	114
41.300	12.588	0.153	21	25	253	40.800	12.436	2.296	21	30	258
41.700	12.710	0.275	23	10	358	40.300	12.283	2.143	23	13	361
41.450	12.634	0.199	24	57	465	40.050	12.207	2.067	25	1	469
41.200	12.558	0.123	26	47	575	39.800	12.131	1.991	26	50	578
41.100	12.527	0.092	29	19	727	39.550	12.055	1.915	29	24	732
41.000	12.497	0.062	30	38	806	39.550	12.055	1.915	30	36	804
42.760	13.033	0.598	32	14	902	40.490	12.341	2.201	32	16	904
40.100	12.222	-0.213	34	4	1012	41.100	12.527	2.387	34	13	1021
39.800	12.131	-0.304	35	58	1126	40.200	12.253	2.113	36	0	1128
41.400	12.619	0.184	37	19	1207	40.050	12.207	2.067	37	23	1211
41.300	12.588	0.153	38	39	1287	40.750	12.421	2.281	38	41	1289
41.600	12.680	0.245	40	35	1403	40.300	12.283	2.143	40	32	1400
42.100	12.832	0.397	42	31	1519	40.600	12.375	2.235	42	28	1516
42.400	12.924	0.489	44	10	1618	40.800	12.436	2.296	44	12	1620
41.500	12.649	0.214	46	8	1736	40.000	12.192	2.052	46	11	1739
41.250	12.573	0.138	47	37	1825	39.750	12.116	1.976	47	41	1829
40.900	12.466	0.031	49	4	1912	39.400	12.009	1.869	49	7	1915
40.450	12.329	-0.106	51	39	2067	39.050	11.902	1.762	51	43	2071
40.250	12.268	-0.167	53	49	2197	38.700	11.796	1.656	53	52	2200
40.700	12.405	-0.030	56	22	2350	38.120	11.619	1.479	56	28	2356
42.000	12.802	0.367	58	21	2469	41.400	12.619	2.479	58	25	2473
40.950	12.482	0.047	59	58	2566	39.500	12.040	1.900	59	55	2563
40.400	12.314	-0.121	61	20	2648	39.200	11.948	1.808	61	8	2636
39.764	12.120	-0.315	62	45	2733	39.698	12.100	1.960	62	49	2737
40.453	12.330	-0.105	64	5	2813	39.764	12.120	1.980	64	10	2818
39.436	12.020	-0.415	67	25	3013	28.740	8.760	-1.380	65	50	2918

ASC ENVIRONMENTAL	Pumping Test - Drawdown		Test Well:	TW1
	Project No.:	ASC-458	Date:	7-Aug-2018
	Client:	BPE Development	Pumping start time	
	Location:	2285 Battersea Road, Kingston, ON	17 12	PM

OW9 (2245 Battersea Rd.)					OW10 (874 Unity Rd.)				
WL	WL	DD	Time	ET	WL	WL	DD	Time	ET
(ft)	(m)	(m)	H:Min	(min)	(ft)	(m)	(m)	H:Min	(min)
91.043	27.750	0.000	13 44	0	43.750	13.335	0.000	14 21	0
91.500	27.889	0.139	19 15	123	42.550	12.969	-0.366	19 20	128
91.450	27.874	0.124	21 35	263	43.600	13.289	-0.046	21 40	268
92.500	28.194	0.444	23 30	378	43.150	13.152	-0.183	23 35	383
92.050	28.057	0.307	25 8	476	42.325	12.901	-0.434	25 22	490
91.900	28.011	0.261	26 55	583	42.400	12.924	-0.411	27 0	588
91.900	28.011	0.261	29 29	737	42.400	12.924	-0.411	29 33	741
91.900	28.011	0.261	30 55	823	44.000	13.411	0.076	31 0	828
93.950	28.636	0.886	32 27	915	43.300	13.198	-0.137	32 30	918
92.050	28.057	0.307	34 24	1032	43.900	13.381	0.046	34 28	1036
92.000	28.042	0.292	36 5	1133	43.900	13.381	0.046	36 20	1148
92.200	28.103	0.353	37 28	1216	43.650	13.305	-0.030	37 31	1219
92.100	28.072	0.322	38 50	1298	43.500	13.259	-0.076	38 56	1304
92.000	28.042	0.292	40 43	1411	44.200	13.472	0.137	41 0	1428
92.050	28.057	0.307	42 34	1522	43.700	13.320	-0.015	42 35	1523
92.050	28.057	0.307	44 27	1635	51.800	15.789	2.454	44 35	1643
92.900	28.316	0.566	46 23	1751	50.450	15.377	2.042	46 28	1756
92.350	28.148	0.398	47 47	1835	44.700	13.625	0.290	47 55	1843
92.300	28.133	0.383	49 13	1921	47.850	14.585	1.250	49 20	1928
94.000	28.651	0.901	51 44	2072	47.450	14.463	1.128	51 53	2081
92.500	28.194	0.444	53 57	2205	48.200	14.691	1.356	54 3	2211
92.450	28.179	0.429	56 34	2362	48.100	14.661	1.326	56 38	2366
93.700	28.560	0.810	58 11	2459	48.150	14.676	1.341	58 30	2478
92.750	28.270	0.520	60 3	2571	45.700	13.929	0.594	60 10	2578
92.700	28.255	0.505	61 23	2651	46.400	14.143	0.808	61 28	2656
94.488	28.800	1.050	62 54	2742	45.932	14.000	0.665	62 59	2747
94.521	28.810	1.060	64 14	2822	46.260	14.100	0.765	64 20	2828
88.583	27.000	-0.750	68 3	3051	46.100	14.051	0.716	68 10	3058

OW11 (896 Unity Rd.)					OW12 (904 Unity Rd. A)				
WL	WL	DD	Time	ET	WL	WL	DD	Time	ET
(ft)	(m)	(m)	H:Min	(min)	(ft)	(m)	(m)	H:Min	(min)
41.050	12.512	0.000	14 46	0	54.350	16.566	0.000	14 54	0
41.070	12.518	0.006	19 24	132	54.250	16.535	-0.030	19 29	137
41.050	12.512	0.000	21 55	283	54.350	16.566	0.000	10 0	-432
41.050	12.512	0.000	23 40	388	54.300	16.551	-0.015	11 44	-328
41.080	12.521	0.009	25 29	497	54.600	16.642	0.076	25 37	505
41.090	12.524	0.012	27 5	593	54.450	16.596	0.030	27 10	598
40.850	12.451	-0.061	29 38	746	54.400	16.581	0.015	29 44	752
40.850	12.451	-0.061	31 25	853	54.300	16.551	-0.015	31 30	858
41.900	12.771	0.259	32 36	924	54.250	16.535	-0.030	32 37	925
40.800	12.436	-0.076	34 35	1043	54.300	16.551	-0.015	34 45	1053
40.800	12.436	-0.076	36 25	1153	54.300	16.551	-0.015	36 30	1158
40.800	12.436	-0.076	37 35	1223	54.450	16.596	0.030	37 39	1227
40.800	12.436	-0.076	38 57	1305	54.400	16.581	0.015	39 3	1311
40.600	12.375	-0.137	41 5	1433	54.300	16.551	-0.015	41 13	1441
40.600	12.375	-0.137	42 35	1523	54.400	16.581	0.015	42 40	1528
40.800	12.436	-0.076	44 43	1651	54.250	16.535	-0.030	44 48	1656
48.200	14.691	2.179	46 34	1762	54.000	16.459	-0.107	46 40	1768
40.750	12.421	-0.091	48 0	1848	53.700	16.368	-0.198	48 5	1853
40.750	12.421	-0.091	49 30	1938	53.500	16.307	-0.259	49 35	1943
40.950	12.482	-0.030	51 58	2086	53.120	16.191	-0.375	52 2	2090
40.800	12.436	-0.076	54 8	2216	52.850	16.109	-0.457	54 20	2228
40.900	12.466	-0.046	56 43	2371	52.600	16.032	-0.533	56 59	2387
40.800	12.436	-0.076	58 34	2482	52.400	15.972	-0.594	58 40	2488
40.600	12.375	-0.137	60 23	2591	52.200	15.911	-0.655	60 35	2603
40.600	12.375	-0.137	61 35	2663	52.100	15.880	-0.686	61 38	2666
40.518	12.350	-0.162	63 4	2752	51.542	15.710	-0.856	63 8	2756
40.387	12.310	-0.202	64 25	2833	51.345	15.650	-0.916	64 30	2838
40.730	12.415	-0.098	67 56	3044	51.500	15.697	-0.869	65 43	2911

	Pumping Test - Drawdown		Test Well:	TW1
	Project No.:	ASC-458	Date:	7-Aug-2018
	Client:	BPE Development	Pumping start time	
	Location:	2285 Battersea Road, Kingston, ON	17 12	PM

OW13 (904 Unity Rd. B)

WL (ft)	WL (m)	DD (m)	Time H:Min	ET (min)
62.050	18.913	0.000	14 54	0
60.960	18.581	-0.332	19 29	137
61.350	18.699	-0.213	10 0	-432
54.300	16.551	-2.362	11 44	-328
60.400	18.410	-0.503	25 37	505
60.300	18.379	-0.533	27 10	598
60.400	18.410	-0.503	29 44	752
61.900	18.867	-0.046	31 30	858
61.800	18.837	-0.076	32 37	925
61.600	18.776	-0.137	34 45	1053
61.600	18.776	-0.137	36 30	1158
60.200	18.349	-0.564	39 3	1311
60.400	18.410	-0.503	41 13	1441
61.300	18.684	-0.229	42 40	1528
70.500	21.488	2.576	44 48	1656
57.300	17.465	-1.448	46 40	1768
65.900	20.086	1.173	48 5	1853
65.100	19.842	0.930	49 35	1943
63.950	19.492	0.579	52 2	2090
63.350	19.309	0.396	54 20	2228
63.300	19.294	0.381	56 59	2387
62.500	19.050	0.137	58 40	2488
62.500	19.050	0.137	60 35	2603
63.100	19.233	0.320	61 38	2666
63.123	19.240	0.327	63 8	2756
63.320	19.300	0.387	64 30	2838
62.650	19.096	0.183	65 43	2911

OW14 (942 Unity Rd.)

WL (ft)	WL (m)	DD (m)	Time H:Min	ET (min)
57.270	17.456	0.000	15 10	0
57.550	17.541	0.085	19 33	141
58.400	17.800	0.344	22 0	288
59.050	17.998	0.543	23 50	398
58.250	17.755	0.299	25 42	510
57.800	17.617	0.162	27 25	613
56.750	17.297	-0.158	29 54	762
58.500	17.831	0.375	31 37	865
59.050	17.998	0.543	32 45	933
57.200	17.435	-0.021	34 56	1064
59.150	18.029	0.573	36 33	1161
57.900	17.648	0.192	37 45	1233
57.830	17.627	0.171	39 10	1318
57.800	17.617	0.162	41 30	1458
57.800	17.617	0.162	42 45	1533
55.400	16.886	-0.570	44 53	1661
54.400	16.581	-0.875	46 45	1773
53.325	16.253	-1.202	48 10	1858
52.950	16.139	-1.317	49 40	1948
53.770	16.389	-1.067	52 8	2096
53.880	16.423	-1.033	54 26	2234
53.400	16.276	-1.180	57 7	2395
54.200	16.520	-0.936	58 44	2492
53.000	16.154	-1.301	60 40	2608
52.600	16.032	-1.423	61 42	2670
52.559	16.020	-1.436	63 13	2761
52.379	15.965	-1.491	64 38	2846
53.400	16.276	-1.180	67 32	3020

OW15 (2329 Battersea Rd.)

WL (ft)	WL (m)	DD (m)	Time H:Min	ET (min)
71.750	21.869	0.000	15 50	0
75.787	23.100	1.231	20 35	203
74.950	22.845	0.975	22 20	308
75.150	22.906	1.036	24 0	408
74.950	22.845	0.975	25 53	521
74.350	22.662	0.792	27 32	620
73.950	22.540	0.671	29 59	767
74.750	22.784	0.914	32 56	944
74.800	22.799	0.930	35 4	1072
74.400	22.677	0.808	36 37	1165
74.400	22.677	0.808	37 56	1244
74.100	22.586	0.716	39 21	1329
75.100	22.890	1.021	41 43	1471
74.800	22.799	0.930	43 2	1550
75.450	22.997	1.128	44 58	1666
77.750	23.698	1.829	46 50	1778
79.150	24.125	2.256	48 22	1870
74.300	22.647	0.777	49 45	1953
73.300	22.342	0.472	52 19	2107
73.150	22.296	0.427	54 31	2239
73.150	22.296	0.427	57 21	2409
72.550	22.113	0.244	58 56	2504
73.000	22.250	0.381	60 50	2618
71.700	21.854	-0.015	62 0	2688
71.129	21.680	-0.189	63 18	2766
71.588	21.820	-0.049	64 42	2850
71.850	21.900	0.030	67 16	3004

OW16 (2359 Battersea Rd.)

WL (ft)	WL (m)	DD (m)	Time H:Min	ET (min)
87.520	26.676	0.000	16 15	0
84.678	25.810	-0.866	20 30	198
87.850	26.777	0.101	22 29	317
83.990	25.600	-1.076	24 5	413
83.700	25.512	-1.164	26 2	530
83.150	25.344	-1.332	27 35	623
82.750	25.222	-1.454	30 3	771
83.550	25.466	-1.210	33 0	948
83.800	25.542	-1.134	35 0	1068
83.850	25.557	-1.119	36 40	1168
83.850	25.557	-1.119	38 0	1248
83.300	25.390	-1.286	39 24	1332
83.900	25.573	-1.103	41 37	1465
83.500	25.451	-1.225	42 58	1546
87.500	26.670	-0.006	45 2	1670
84.600	25.786	-0.890	46 58	1786
83.750	25.527	-1.149	48 26	1874
83.450	25.436	-1.241	49 50	1958
82.100	25.024	-1.652	52 23	2111
83.000	25.298	-1.378	54 36	2244
82.000	24.994	-1.682	57 26	2414
81.400	24.811	-1.865	59 1	2509
81.700	24.902	-1.774	60 53	2621
80.500	24.536	-2.140	61 56	2684
80.741	24.610	-2.066	63 23	2771
80.151	24.430	-2.246	64 46	2854
82.100	25.024	-1.652	67 11	2999

	Pumping Test - Drawdown		Test Well:	TW1
	Project No.:	ASC-458	Date:	7-Aug-2018
	Client:	BPE Development	Pumping start time	
	Location:	2285 Battersea Road, Kingston, ON	17 12	PM

OW17 (2370 Battersea Rd.)						OW18 (885 Unity Rd.)					
WL	WL	DD	Time		ET	WL	WL	DD	Time		ET
(ft)	(m)	(m)	H:Min		(min)	(ft)	(m)	(m)	H:Min		(min)
73.200	22.311	0.000	16	24	0	28.700	8.748	0.000	19	55	163
75.525	23.020	0.709	20	20	188	28.733	8.7577	0.010	20	55	223
75.050	22.875	0.564	22	34	322	28.720	8.7539	0.006	22	55	343
74.450	22.692	0.381	24	10	418	28.734	8.758	0.010	24	55	463
73.950	22.540	0.229	25	58	526	28.731	8.757	0.010	25	55	523
73.650	22.449	0.137	27	35	623	28.749	8.763	0.015	27	55	643
73.300	22.342	0.030	30	6	774	28.750	8.763	0.015	30	55	823
74.100	22.586	0.274	33	6	954	28.735	8.758	0.011	33	55	1003
74.000	22.555	0.244	35	20	1088	28.763	8.767	0.019	35	55	1123
74.000	22.555	0.244	36	45	1173	28.795	8.777	0.029	36	55	1183
73.600	22.433	0.122	38	5	1253	28.831	8.788	0.040	38	55	1303
73.850	22.509	0.198	39	30	1338	28.848	8.793	0.045	39	55	1363
74.100	22.586	0.274	41	35	1463	28.882	8.803	0.055	41	55	1483
74.000	22.555	0.244	42	55	1543	28.896	8.8074	0.060	42	55	1543
74.300	22.647	0.335	45	6	1674	28.878	8.802	0.054	45	55	1723
74.300	22.647	0.335	47	0	1788	28.856	8.7953	0.048	47	55	1843
73.200	22.311	0.000	48	31	1879	28.188	8.5917	-0.156	48	55	1903
72.900	22.220	-0.091	49	57	1965	28.930	8.8178	0.070	49	55	1963
72.030	21.955	-0.357	52	27	2115	28.344	8.6391	-0.109	52	55	2143
71.600	21.824	-0.488	54	41	2249	28.909	8.8116	0.064	54	55	2263
72.900	22.220	-0.091	57	32	2420	28.861	8.7967	0.049	57	55	2443
70.750	21.565	-0.747	59	5	2513	28.849	8.7933	0.046	59	55	2563
71.300	21.732	-0.579	60	57	2625	28.846	8.7922	0.044	60	55	2623
69.300	21.123	-1.189	61	53	2681	27.845	8.4871	-0.261	61	55	2683
69.324	21.130	-1.181	63	27	2775	28.311	8.6291	-0.119	63	55	2803
68.996	21.030	-1.281	64	49	2857	27.679	8.4365	-0.311	64	55	2863
69.200	21.092	-1.219	67	4	2992	28.554	8.7034	-0.044	67	40	3028

Note: Water levels in Table D3 are measured from top of casing for each well respectively