# **Operation and Maintenance Plan**

# 708 East 26<sup>th</sup> Avenue Vancouver, BC



Prepared for: Fraser Street Residence GP Inc. 668 – 1199 West Pender Street Vancouver, BC V6E 2R1

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PGL File: 2554-05.02

March 2015



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### **Operation and Maintenance Plan**

Site ID: 14672

Site Location: 708 E 26<sup>th</sup> Avenue, Vancouver, BC

This document satisfies part of the reporting requirements for Type 2 risk controls outlined in Contaminated Sites Regulation *Administrative Guidance 14.* Specifically, it outlines the Operation and Maintenance Plan for the mechanically activated vapour management system (VMS) installed below 708 East 26<sup>th</sup> Avenue, Vancouver, BC. Operation of the VMS is the principal risk control outlined in PGL's March 2015 Performance Verification Plan for the Site. Operation of the VMS is required to maintain the Site's Risk-based Certificate of Compliance.

#### 1.0 VAPOUR MANEGMENT SYSTEM OBJECTIVES

The objective of the VMS is to manage risk from soil-vapour contaminants that can potentially accumulate to concentrations exceeding the Contaminated Sites Regulation Schedule 11 Standards. Specific vapour contaminants of concern to be managed are trichloroethene and vinyl chloride. These parameters exceed Contaminated Sites Regulation Schedule 11 Standards beneath the concrete slab at the southeast corner of the building, before operation of the VMS.

#### 2.0 VMS OPERATION

The VMS achieves its objective by providing fresh air exchange (air intake and exhaust) below the concrete slab. The concrete slab prevents vapour migration into the breathing zone. The system exhausts the sub-slab area by pulling air from perforated pipes (sub-slab exhaust [SSE]). Fresh air is supplied from the sub-slab drainage piping (sub-slab supply). Outdoor air is drawn from grade through the plumbing stack and transferred from the sub-slab supply to the pore space within the 3⁄4" clean rock sub-slab backfill via perforations in the piping. The exhaust air is drawn from the pore space through the SSE piping and discharged to the surface. Both sub-slab supply and SSE piping are composed of 4" diameter perforated polyvinyl chloride laid out as per the attached drawing. The piping lines are fitted with clean-outs for maintenance work. A pressure blower is installed in line with the SSE piping before the discharge point. The blower specifications are attached.

Key to the system's effective operation are the following:

- The pressure blower must run continually at a minimum exhaust rate of 34CFM.
- A sensor that monitors air flow or differential pressure across the fan must be installed with the pressure blower. This sensor must be wired to the building's annunciator panel to sound an alarm if the exhaust rate falls below 34CFM.
- The exhaust air is designed to discharge to the atmosphere at a location at least 3m away from other building intakes or openings.



#### 3.0 VMS MAINTENANCE

A comprehensive maintenance program must be in place for all aspects of the vapour management system (piping, communication, electrical, and mechanical equipment). As a minimum, inspection should include the following tasks:

- Service the blower fan and motor as per the manufacturer's recommendation;
- Ensure debris has not accumulated within the vicinity of the intake and exhaust air grills. Clean and remove small debris/lint/dust to ensure proper air flow and check that the blower is operating on a monthly basis;
- Verify the blower is operating with a constant air flow greater than a minimum flow of 34CFM on an annual basis; and
- Verify the annunciator panel alarm is functional and is properly reset following maintenance on an annual basis.

Records of VMS operation and maintenance must be maintained by the responsible persons (the building owner) or their agent. The records must be available for inspection by the Ministry of Environment if requested. The Ministry of Environment must be notified promptly by the persons responsible for the site if the VMS does not operate as described. In this event, the following information must be submitted to the Director with the notification, or as soon as practicable thereafter:

- The time period over which the VMS did not operate as described;
- The nature of the excursions;
- The temporary or permanent corrective measures implemented or to be implemented;
- An implementation schedule; and
- Supporting documentation.

#### 4.0 STANDARD LIMITATIONS

PGL prepared this report for Fraser Street Residences GP Inc. and its agents exclusively. It may be relied upon by these parties, the BC Ministry of Environment and the Contaminated Sites Approved Professionals Society exclusively. PGL accepts no responsibility for any damages that may be suffered by third parties as a result of decisions or actions based on this report.

The purpose of the Operation and Maintenance Plan is to provide the client and the Ministry of Environment with the steps necessary to operate and maintain the recommended risk management measures at the Site. These recommendations are based on information collected during PGL's environmental investigations. These investigations consisted of a screening for potential contamination and, as is true for all environmental investigations, potential remains for the presence of unknown, unidentified, or unforeseen surface or subsurface contamination. More or different investigation may be required, and additional risk management measures may be required if other risks are identified. The data used to develop these risk management measures is valid for the date of sampling, but Site conditions may change with time.

The findings and conclusions are Site-specific and were developed in a manner consistent with that level of care and skill normally exercised by environmental professionals currently practicing under similar conditions in the area. Changing assessment techniques, regulations, and site conditions means that environmental investigations and their conclusions can quickly become dated, so this report is for use now.



The project has been conducted according to our instructions and work program. Additional conditions and limitations on our liability are set forth in our work program/contract. This report is neither an endorsement nor a condemnation of the subject property. No warranty, expressed or implied, is made.

Respectfully submitted, 0 8 0 0 ENVIRONMENTAL CONSULTANTS POTTINGER GAHERT 2748 Per: Cory Nelson 0 BR MAT 20 TU Keith H. Gagne, B.A Corv Nelson, B.Sc. P.Ag.P.Ag Environmental Scientist Senior Environmental CDC/KHG/mlo

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Attachments: Vapour Management System Drawing Pressure Blower Specifications



Vapour Management System Drawing





Pressure Blower Specifications



#### ALUMINUM PRESSURE BLOWERS CAST **Belt Driven** MAXIMUM MOTOR FRAME SIZE AF SIZE A JK SHAFT DIA. KEYWAY L M U 8 C Ď Ę F Ģ H ti P п \$\* T ų ₩\* x Y Z ٨٨ 184-T 8 21/8 12 3 21% 4% 6% 3/4 3/10 X 3/32 4 4 41416 51%10 5%2 61% 15 13% 5 6 7 1% 31/2 3 1 1 1/15 1 184-T 4 5 71/4 64/12 73/4 15 1% 1 5 6 7 1% 3% 31/10 3% 12 1 3 22% 55% 73/10 1/16 34 3/18 X 3/52 9 6 1 1 5 6 7 11/2 33/4 33% 3% 12 1 3 221/2 + 63% 713/10 7/10 1/4 x 1/8 184-T 71/32 9 15 1 10 5 6 611/10 8% 11/8 81/2 101/4 15 1 5 6 7 11/2 41/4 1/4 x 1/8 184-T 91/4 11/2 3% 33%. 12 3 23 7% 3% 7/15 1 12 6 7 7¾ 1 1 15 8 \* 9% 11 10 12 19 1/10 19/10 1 7 8 9 11/2 5% 4% 75% 12 27% 434 31 47/10 7% 10 1/10 1/10 1/10 3/8 X 1/10 256-T D \* "B" Dimension on AF-15 = 7, 8, or 10 NOTE: AAAT OR SHOWN AAAT OL OPPOSITE HAND . 1 \*AF-15 CW or CCW-DB add one inch to dimension shown æ na 1 1 ARRANGEMENT 9 3 (ARRANGEMENT 1 å SAME AS SHOWN, **LESS MOTOR AND DRIVES)** - s 1 - t -- July ALDA + **Direct Driven** à AF 1 G H J ĸ L M N 0 P R s T U V Ď Ē B Ċ. F 3¾ 1% 23/4 31/2 21/8 21/8 5 5 11% 4%16 65/10 7/10 4 4 415/15 511/18 53/2 611/16 13% 81/2 1 - 8 5% 1/15 --- 9 4 5 6 714 61% 734 13% 101/2 3% 11/16 23/4 314 3% 31/15 6 7 131/8 7450 1 FRAME N 0 R s τ U ۷ W AF M 0 Р Ġ K L ۸ U ¢ D É F н J í 713/16 7/16 1%6 17/10 181 1% 111/2 5 7 147.56 6% 10 5 6 61/14 11/2 4 33/4 338 31/4 8 81/16 71% 9 8% 1% 13/14 54 Hal 12 6 7 734 7% Vis 10% 11/8 111/2 11/2 4 4% 3% 3%15 7 8 15 91/4 81/2 5 7 16% 7% 8% 7/16 1% 15/15 371 414 35/8 3% 8 12 6 7 9% 10% 11/8 111/2 5 11/2 4 7% 81/2 111/2 20 1/2 71/8 10 % 10 % 1% 23/15 5111 61/10 11/2 41/8 57/8 41/16 51/0 834 15 8 12 1% 15 \* 93% 11 10 122-1 15 B 11/2 47/8 51/8 41/16 51/4 83/4 101/2 20 1/2 71/8 1015/10 %5 130 23/10 1% 15 6% \* 9% 11 10 12 111 41/1 51/2 83/4 93/4 20 1/2 71/8 10 1/6 1/6 1/1 23/16 15 B + 938 11 10 12 1% 15 6% 11/2 4% 5% 1 BO ARRANGEMENT 4 4 **STEEL BASE** ۵ -- L 01 L - P -. w - 1 -J HOLES - A

### FLANGES



COLLAN O.D.	PÁAT NO,	88	CC	DD	EE	FF	GG	HH
- 4	414	4 1/10	4'51	3%10	73/4	1%	4	6%
- 5	415	5%	5'57.	4.10	778	1%	4	61/4
6	416	6": <sub>11</sub>	6'	512	9	1%	4	8
7	417	71/2	7'12	614	9%	15%	8	878
8	418	9	8:42	71:2	13%2	11/2	8	1134
10	419	10%	10%	-	16	11/8	8	14%

### **DISCHARGE POSITIONS**

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## SIZE 9-1030 AIR DENSITY: .075 LBS./CU.FT.

CFM	ov	0.50 SI	P. 1,00 HP RPM	SP. BHP	1.50 RPM 8	SP. BHP	2.00 RPM	SP.	2.50 RPM	SP.	3.00 RPM	SP. BHP	3.50 RPM	SP. BHP	4.00 RPM	SP. BHP	4.60 RPM	SP. BHP	5.0 RPM	O SP. BHP	Ġ. RPM	00 SP.	7.0 RPM	O SP.	8. RPM	00 SP. BHP	9.0 RPM	DO SP. BHP
87 105 122 140 157	1000 1200 1400 1600 1800	953 0. 1001 0. 1070 0. 1141 0. 1205 0.	01 1284 02 1309 02 1345 03 1390 03 1450	0.03 0.03 0.04 0.04 0.05	1557 ( 1571 ( 1592 ( 1626 ( 1664 (	0.04 0.05 0.05 0.06 0.07	1801 1815 1837 1869	0.07 0.08 0.08 0.09	2018 2032 2055	0.10 0.11 0.12	2202 2215 2230	0.13 0.13 0.14	2384 2397	0.16 0.17	2541 2555	0.19 0.20	2702	0.24										
175 192 209 227 244	2000 2200 2400 2600 2800	1265 0. 1330 0. 1403 0. 1479 0. 1556 0.	04 1520 05 1591 05 1659 07 1721 08 1781	0.06 0.07 0.08 0.09 0.11	1712 0 1775 0 1844 0 1915 0 1908 0	0.08 0.09 0.11 0.12 0.14	1905 1951 2002 2069 2139	0.10 0.11 0.13 0.15 0.17	2087 2124 2160 2215 2278	0.13 0.14 0.15 0.17 0.19	2265 2288 2324 2366 2415	0.15 0,17 0,18 0.20 0.22	2415 2440 2476 2512 2554	0.18 0.20 0.21 0,23 0,25	2560 2590 2617 2653 2609	0.22 0.23 0.25 0.26 0.28	2716 2731 2765 2766 2822	0,25 0.26 0.28 0.30 0.32	2855 2869 2888 2913 2913 2947	0.28 0.30 0.32 0.33 0.35	3115 3128 3142 3160 3185	0.36 0.37 0.39 0.41 0.43	3367 3381 3394 3413	0.45 0.47 0.49 0.52	3589 3603 3616 3630	0,54 0,56 0,58 0,61	3811 3025 3839	0.65 0.67 0.70
262 279 297 314 332	3000 3200 3400 3600 3800	1634. 0. 1713 0. 1792 0. 1873 0. 1955 0.	09 1842 10 1914 12 1987 14 2062 16 2139	0.12 0,14 0,15 0.10 0,20	2050 0 2113 0 2172 0 2233 0 2301 0	0.16 0.19 0.19 0.21 0.23	2210 2203 2347 2410 2471	0.19 0.21 0.24 0.26 0.20	2346 2416 2488 2561 2624	0.21 0.24 0.27 0.30 0.33	2473 2540 2610 2681 2753	0.24 0.27 0.30 0.33 0.37	2602 2657 2724 2793 2864	0.27 0.30 0.33 0.37 0.40	2732 2780 2834 2901 2969	0.31 0.33 0.36 0.40 0.44	285B 2902 2950 3003 3070	0.34 0.37 0.40 0.43 0.47	2983 3019 3065 3114 3168	0.38 0.40 0.44 0.47 0.51	3216 3252 3288 3328 3376	0.46 0.49 0.52 0.55 0.59	3437 3467 3503 3539 3575	0.54 0.57 0.60 0.64 0.67	3649 3673 3702 3738 3774	0.63 0.66 0.69 0.73 0.77	3852 3873 3897 3926 3962	0.73 0.76 0.79 0.83 0.87
349 367 304 401 419	4000 4200 4400 4600 4600	2036 0. 2122 0. 2207 0. 2292 0. 2370 0.	10 2215 21 2293 23 2372 26 2452 29 2532	0.22 0.25 0.28 0.31 0.34	2373 0 2447 0 2522 0 2598 0 2675 0	0.26 0.29 0.32 0.36 0.39	2531 2592 2661 2733 2807	0.31 0.33 0.36 0.40 0.43	2686 2748 2808 2068 2932	0.36 0.39 0.42 0.45 0.40	2024 2886 2948 3010 3070	0.40 0.44 0.47 0.51 0.54	2935 3008 3075 3137 3200	0.44 0.48 0.53 0.56 0.61	3039 3111 3183 3265 3317	0,48 0,52 0.57 0,62 0,66	3138 3209 3280 3552 3424	0.51 0.56 0.61 0.66 0.72	3235 3302 3373 3444 3515	0.55 0.60 0.65 0.71 0.76	3425 3482 3549 3617 3688	0.63 0.68 0.73 0.78 0.85	3521 3670 3719 3783 3850	0.72 0.76 0.81 0.87 0.93	3810 3853 3901 3950 4005	0.81 0.86 0.91 0.97 1.03	3998 4034 4074 4122 4170	0.91 0.96 1.00 1.05 1.13
436 454 471 489 506	5000 5200 5400 5600 5800	2465 0.1 2553 0.1 2642 0.4 2731 0.4 2820 0.1	33 2612   37 2694   41 2775   45 2858   50 2942	0.38 0.42 0.46 0.50 0.55	2753 0 2831 0 2910 0 2909 0 3069 0	0.43 0.47 0.51 0.55 0.60	2002 2950 3034 3111 3169	0.47 0.52 0.57 0.62 0.67	3004 3077 3150 3226 3301	0.52 0.57 0.61 0.67 0.72	3130 3191 3263 3335 3409	0.50 0.62 0.67 0.72 0.77	3261 3320 3381 3442 3512	0.65 0.69 0.73 0.70 0.03	3379 3442 3502 3562 3623	0.71 0.76 0.80 0.85 0.90	3490 3552 3614 3676 3736	0.77 0.82 0.87 0.93 0.98	3588 3657 3719 3781 3844	0.82 0.88 0.94 0.99 1.05	3768 3830 3902 3975 4038	0.91 0.98 1.05 1.13 1.19	3918 3988 4059 4131 4203	1.00 1.07 1.15 1.23 1.31	4071 4139 4208 4270 4349	1.09 1.16 1.24 1.33 1.42	4219 4284 4351 4419 4489	1.19 1.27 1.34 1.42 1.52
524 641 659 576 593	6000 6200 6400 6600 6800	2910 0.1 2999 0.1 3089 0.1 3179 0.1 3270 0.1	65 3027 60 3112 66 3197 72 3282 78 3369	0.60 0.65 0.71 0.77 0,83	3149 0 3230 0 3312 0 3393 0 3476 0	0.66 0.71 0.77 0.83 0.90	3267 3346 3425 3505 3585	0.72 0.77 0.83 0.90 0.97	3370 3455 3532 3610 3689	0.76 0.85 0.91 0.97 1.04	3483 3558 3634 3711 3768	0.63 0.90 0.97 1.04 1.11	3585 3658 3732 3807 3882	0,89 0.95 1.02 1.09 1,17	3684 3755 3827 3900 3974	0.95 1,02 1.08 1.15 1.23	3796 3857 3919 3991 4064	1.03 1.09 1.15 1.22 1.30	3904 3964 4025 4085 4151	1.11 1.17 1.23 1.29 1.37	4100 4163 4228 4285 4345	1.26 1.33 1.40 1.47 1.54	4276 4342 4403 4466 4528	1.40 1.40 1.55 1.64 1.72	4421 4493 4566 4633	1.51 1.60 1.70 1.79	4559 4630	1.62 1.72

SIZE 10-1030 AIR DENSITY: .075 LBS./CU.FT.

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	1	0.50 SP.	1.00 SP.	1.50 SP.	2.00 SP.	2.50 SP.	3.00 SP.	3.50 SP.	4.00	SP.	4.50 SP.	5.00 SP	6.00 SP.	7.00 SP.	8.00 SP.	9.00
CFI	VO	RPM BHP	RPM BHP	RPM BHP .	RPM BHP	RPM BHP	RPM BHP	RPM BHP	RPM	BHP	RPM BHP	RPM BHP	RPM BHP	RPM_BHP	RPM BHP	RPM BHP
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273 300 327 355 382	2000 2200 2400 2600 2800	1428 0.10 1514 0.11 1610 0.14 1712 0.17 1803 0.20	1652 0.13 1737 0.15 1818 0.19 1911 0.22 2007 0.26	1841 0.17 1924 0.20 2002 0.23 2087 0.26 2170 0.30	1992 0.22 2077 0.25 2166 0.28 2245 0.32 2324 0.36	2130 0.26 2211 0.30 2297 0.33 2305 0.37 2469 0.42	2291 0.32 2336 0.35 2418 0.39 2504 0.43 2591 0.48	2440 0.38 2484 0.41 2520 0.44 2615 0.49 2701 0.54	2590 2622 2666 2714 2805	0.45 0.48 0.51 0.55 0.61	2727 0.5 2757 0.5 2798 0.5 2840 0.6 2898 0.6	2859 0.58 2888 0.62 2919 0.65 2962 0.70 7 3006 0.74	3108 0,73 3133 0,77 3162 0,81 3192 0,85 3234 0,90	3348 0.68 3359 0.93 3387 0.97 3417 1.02 3446 1.07	3572 1.05 3583 1.09 3597 1.14 3626 1.20 3656 1.26	3781 1.22 3793 1.27 3604 1.32 3623 1.38 3652 1.44
409 436 464 491 510	3000 3200 3400 3600 3800	1894 0.23 1985 0.27 2082 0.31 2180 0.36 2279 0.42	2093 0.30 2180 0.34 2280 0.40 2302 0.46 2478 0.52	2252 0,34 2348 0.41 2445 0.48 2531 0,63 2617 0,69	2409 0.41 2492 0.46 2574 0.51 2665 0.59 2763 0.68	2545 0.47 2628 0.52 2713 0.58 2795 0.65 2877 0.72	2679 0.53 2755 0.59 2834 0.66 2919 0.72 3004 0.79	2788 0.60 2877 0.60 2954 0.73 3032 0.80 3115 0.87	2890 2977 3066 3145 3222	0.66 0,73 0,80 0.87 0.96	2989 0.7 3073 0.8 3160 0.0 3249 0.9 3329 1.0	3 3076 0.60 0 3166 0.67 7 3251 0.95 5 3338 1.03 1 3427 1.12	3278 0.96 3331 1.02 3422 1.10 3508 1.19 3594 1.29	3488 1.13 3532 1.19 3576 1.26 3663 1.35 3572 1.45	3685 1.31 3720 1.38 3771 1.45 3816 1.52 3094 1.62	3802 1.51 3912 1.57 3955 1.65 3999 1.73 4043 1.81
545 573 600 627 654	4000 4200 4400 4600, 4800	2378 0.40 2478 0.55 2577 0.61 2676 0.69 2776 0.77	2569 0.59 2859 0.65 2750 0.71 2843 0.79 2940 0.89	2710 0.66 2810 0.75 2912 0.84 3011 0.94 3100 1.02	2855 0,76 2941 0.84 3028 0.92 3119 1.01 3220 1.12	2968 0.00 3065 0.92 3161 1.03 3247 1.12 3333 1.22	3085 0.87 3167 0.96 3260 1.07 3357 1.20 3455 1.35	3201 0.96 3283 1.04 3365 1.14 3440 1.24 3455 1.36	3304 3369 3473 3555 3637	1.04 1.13 1.23 1.33 1.44	3406 1.1 3496 1.2 3571 1.3 3657 1.4 3738 1.6	3 3507 1.21 2 3584 1.31 2 3663 1.42 3748 1.53 3834 1.64	3682 1.38 3771 1.49 3848 1,60 3925 1,72 4004 1.85	3037 1.55 3924 1.65 4012 1.79 4099 1.92 4175 2.05	3985 1.74 4069 1.85 4155 1.97 4243 2.11 4332 2.25	4116 1.92 4207 2.05 4293 2.18 4370 2.31 4465 2.48
692 709 736 764 791	5000 5200 5400 5600 5800	2877 0.86 2978 0.96 3080 1.06 3102 1.17 3284 1.29	3038 0.98 3137 1.09 3235 1.20 3335 1.32 3435 1.45	3191 1.12 3202 1.21 3373 1.32 3466 1.43 3553 1.57	3322 1.24 3424 1.38 3516 1.49 3506 1.61 3696 1.73	3420 1.32 3516 1.45 3617 1.59 3719 1.75 3021 1.91	3540 1.45 3626 1.57 3713 1.69 3804 1.83 3904 1.99	3641 1.54 3738 1.71 3923 1.83 3909 1.97 3936 2.11	3725 3822 3920 4013 4099	1.58 1.75 1.94 2.11 2.26	3820 1.6 3903 1.7 3998 1.9 4095 2.1 4193 2.3	3916 1,77 3958 1,90 4080 2,04 4169 2,22 9 4266 2,43	4089 1,98 4175 2.12 4259 2.27 4340 2.42 4422 2.59	4252 2.19 4332 2.34 4416 2.49 4502 2.66 4507 2.83	4413 2.40 4409 2.56 4567 2.72 4648 2.89	4554 2.61 4642 2.78
816 845 873 900	6000 6200 6400 6600 5000	3386 1.42 3492 1.55 3602 1.71 3713 1.87 3823 2.04	3534 1.58 3633 1.72 3732 1.07 3632 2.03 3932 2.20	3660 1.71 3758 1.86 3857 2.02 3956 2.19 4055 2.37	3787 1.87 3879 2.00 3971 2.15 4067 2.32 4164 2.51	3915 2.06 4004 2.20 4094 2.36 4185 2.52 4276 2.62	4005 2:17 4107 2:36 4209 2:56 4300 2:73 4300 2:90	4084 2.26 4184 2.45 4285 2.65 4387 2.86 4489 3.09	4185 4272 4359 4459 4560	2.41 2.57 2.74 2,96 3.19	4283 2.5 4368 2.7 4455 2.9 4541 3.0 4629 3.2	4364 2.66 4461 2.90 4546 3.09 4632 3.27	4504 2.76 4599 3.00	4669 3.01		