

# TOWN OF GIBSONS PROWSE ROAD SANITARY PUMP STATION CONDITION ASSESSMENT AND EVALUATION STUDY

**NOVEMBER 2009** 



Paragon File 2008-50



#### SANITARY LIFT STATION EVALUATION STUDY

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# EXECUTIVE SUMMARY

**Paragon Engineering Ltd.** has assessed and evaluated the condition of existing Prowse Road Pump Station located in the Town of Gibsons. The assessment was completed in conjunction with **Gil Tech Services** of Maple Ridge, BC.

General site conditions have been noted, including comments on site, pumps and mechanical details, and general electrical details.

A condition assessment highlighting distinctive features and deficiencies noted at the station has been completed. Suggested solutions or improvements to correct problems evidenced are noted.

The Station Rating Summaries below illustrates that the existing station is in fair to poor condition.

#### **Structural and Mechanical Condition Summary**

|                             | VESSEL    | <u>VESSEL</u> | PUMPS     | <u>VALVES &amp;</u> |
|-----------------------------|-----------|---------------|-----------|---------------------|
|                             | CONDITION | PLATFORMS     | CONDITION | <u>PIPES</u>        |
| Prowse Road Pump<br>Station | fair      | n/a           | fair      | poor                |

#### Electrical Condition Summary

|                             | HYDRO   | <u>CONTROL</u> | <u>LEVEL</u> | TEMPORARY |
|-----------------------------|---------|----------------|--------------|-----------|
|                             | SERVICE | <u>PANEL</u>   | CONTROLS     | POWER     |
| Prowse Road Pump<br>Station | fair    | poor           | fair         | good      |

#### **General Condition Summary**

- Station is easily accessible by service vehicles, and is well graded and drained.
- The concrete wetwell chamber appears to be in good condition, but undersized, too shallow (insufficient sump volume) and not conducive to optimal pump operation
- Prowse Road is the main station in Gibsons and, as such, is critical in terms of overall system operation. Continuous operation of Prowse Road Pump Station is imperative.





#### **Upgrading Recommendations**

A review of condition of the Prowse Road Sanitary Pump Station has resulted in the general conclusion and recommendation that the station should be upgraded to satisfy Kerr Wood Leidal Associates Ltd.'s (KWL) (Town of Gibsons Waste Water Collection Strategic Development Draft Report April 2008, File 2312.005) OCP PWWF<sub>25</sub> projected flow of 75 l/s (after upstream diversions are completed).

This can be accomplished by:

- constructing a new 3.05 metre diameter, 8.5 metre deep wetwell to provide sufficient pumping volume sufficient to maintain pump cycling at 3 to 4 pump cycles per hour per pump; and
- replacing existing pumps with Flygt NP3301 HT (460 impeller) 105 Hp pumps, complete with soft starts, and replacement of all piping and valves.

In addition, the following upgrading works should be done:

#### Site:

• Install new gravity inlet complete with isolation valve and new 450 mm gravity inlet to wetwell complete with isolation (plug) valve.

#### Mechanical:

• Upgrade to include manual bypass port for emergency situations;

#### **Electrical:**

- Upgrade generator (complete with double insulated sub-base tank) and controls to suit three pump operation;
- Upgrade power and wiring to accommodate the new 105 Hp Pumps. The existing VFD/Direct Online Starters will need to be replaced with soft starts.

#### Maintenance:

- Update Record Drawings to record any additions or modifications to stations (including pump changes, wiring diagrams, or other);
- Continue with regular maintenance program

Upgrading Costs are shown on next page.





#### PROWSE ROAD SANITARY PUMP STATION

#### Paragon File 2008-50 NOVEMBER 2009

| LIFT STATION EVALUATION STUDY<br>UPGRADING COST ESTIMATE<br>STATION: Prowse Road Pump Station<br>ADDRESS: Gibsons Marina<br>REVISION DATE: 11-Nov-09 |       |   |        |                |                   |  |  |  |
|--|-------|---|--------|----------------|-------------------|--|--|--|
| ITEM   | UNIT  | UNIT PRICE                              | AMOUNT | соѕт           | TOTAL COST        |  |  |  |
| Site Works   |       | II                                      |        |                |                   |  |  |  |
| Regrading  | LS    | \$10.000.00                             | 1.0    | \$10.000.00    |                   |  |  |  |
| Bollards   | each  | \$500.00                                | 4.0    | \$2,000.00     |                   |  |  |  |
| Remove existing wetwell  | LS    | \$5,000.00                              | 1.0    | \$5,000.00     |                   |  |  |  |
| Paving and Restoration   | LS    | \$3,000.00                              | 1.0    | \$3,000.00     |                   |  |  |  |
| Bypass pumping   | each  | \$75,000.00                             | 1.0    | \$75,000.00    |                   |  |  |  |
| SUBTOTAL SITE WORKS  |       |   | •      |                | \$95,000          |  |  |  |
| Structural:  |       |   |        | -              |                   |  |  |  |
| Paint Building   | each  | \$2,500.00                              | 1.0    | \$2,500.00     |                   |  |  |  |
| Convert wetwell to Valve Chamber   | each  | \$55.000.00                             | 1.0    | \$55.000.00    |                   |  |  |  |
| New Wetwell (for storage & pump volume)  | each  | \$350,000.00                            | 1.0    | \$350,000.00   |                   |  |  |  |
| New hatch (improve access)   | each  | \$5,500.00                              | 1.0    | \$5,500.00     |                   |  |  |  |
| SUBTOTAL STRUCTURAL  |       |   |        |                | \$413,000         |  |  |  |
| Mechanical:  | each  | \$2,000,00                              | 15.0   | \$30,000,00    |                   |  |  |  |
| Plug Valve (450 mm diamter)  | each  | \$2,000.00                              | 10.0   | \$30,000.00    |                   |  |  |  |
| Rebench Collection Manhole   | each  | \$5,000.00                              | 1.0    | \$5,000.00     |                   |  |  |  |
| Install quide Bars   | each  | \$3,000.00                              | 1.0    | \$3,000.00     |                   |  |  |  |
| Replace Pumps (w 105 Hp NP 3301 180 HT - 460   | each  | \$65,000.00                             | 2.0    | \$130,000.00   |                   |  |  |  |
| Replace Valves   | each  | \$7,500.00                              | 2.0    | \$30,000.00    |                   |  |  |  |
| Discharge Pining (ungrade to stainless)  | each  | \$20,000,00                             | 1.0    | \$20,000.00    |                   |  |  |  |
| Bynass   | each  | \$20,000.00                             | 1.0    | \$20,000.00    |                   |  |  |  |
| Flow meter   | each  | \$20,000.00                             | 1.0    | \$20,000.00    |                   |  |  |  |
|  | Cauri | Ψ20,000.00                              | 1.0    | ψ20,000.00     | \$273 000         |  |  |  |
| Electrical:  |       |   |        | L              | <i>~</i> 2. 3,000 |  |  |  |
| New MCC  | each  | \$85,000,00                             | 1.0    | \$85,000,00    |                   |  |  |  |
| Replace Transfer Switch  | each  | \$5,000,00                              | 1.0    | \$5,000,00     |                   |  |  |  |
| Upgrade wiring   | each  | \$25,000,00                             | 1.0    | \$25,000,00    |                   |  |  |  |
| Three phase power  | each  | \$25,000.00                             | 1.0    | \$25,000.00    |                   |  |  |  |
| 230 Kw Genset  | each  | \$110,000,00                            | 1.0    | \$110.000.00   |                   |  |  |  |
| SUBTOTAL ELECTRICAL  |       | ÷ ::;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;; |        | ÷ · · 0,000.00 | \$250.000         |  |  |  |
| SUB-TOTAL COSTS  |       |   |        | Ĺ              | \$1,031,000       |  |  |  |
| ENGINEERING  |       |   | 20%    | Ì              | \$206 200         |  |  |  |
| CONTINGENCY  |       |   | 15%    |                | \$154 650         |  |  |  |
| τοται  |       |   | 1070   | Ĺ              | ¢104,000          |  |  |  |
|  |       |   |        | L              | \$1,391,65U       |  |  |  |
| BUDGET   |       |   |        |                | \$1,392,000       |  |  |  |







# **Town of Gibsons**

#### PROWSE ROAD SANITARY PUMP STATION EVALUATION STUDY

## **GENERAL REPORT**





#### **SECTION 1.0**

#### INTRODUCTION

#### 1.1 OVERVIEW

**Paragon Engineering Ltd.** has assessed and evaluated the condition of existing Prowse Road Sanitary Pump Station located in the Town of Gibsons. The assessment was completed in conjunction with **Gil Tech Services** of Maple Ridge, BC.

General site conditions have been noted, including comments on site, accessibility and features. Size and construction material of the wetwell are summarized, complete with details on size of incoming pipes and forcemain, pump and mechanical details and general electrical details, including service size, control panel and standby power, are noted. Included as part of the assessment and evaluation are probable cost and recommendations for upgrading.

#### 1.2 LOCATION

The Lift Station is located in the Town of Gibsons. Station location is shown below (from KWL Town of Gibsons Waste Water Collection Strategic Development Draft Report April 2008, File 2312.005).







#### 1.3 STATION DETAILS

Wetwell size

Elevation inlet invert Elevation floor Forcemain size Inlet size Pump shut off Pump start Forcemain length Forcemain Invert Static head \* Total Dynamic Head 2400 mm square with ~ 2400 x 1200 mm triangular ends by ~ 4.8 metres deep -1.65 metres -2.25 metres 250 mm diameter 3 @ 150 mm and 1 at 350 mm -1.75 metres -1.75 metres 560 metres (AC) 0.90 metres 50 metres 56.0 metres





#### **SECTION 2.0**

#### INSPECTION

#### 2.1 SYSTEM RECORDS

The Town of Gibsons provided available record information on the Lift Station. The following is a summary of information provided:

| LIFT STATION | DWG          | INFO<br>DTLS. | DATA FILE | FLOW<br>CAP'Y<br>ANAL | FIELD<br>MTC. |
|--------------|--------------|---------------|-----------|-----------------------|---------------|
| Prowse Road  | $\checkmark$ | Х             | х         | ~                     | х             |

#### 2.2 **REVIEW OF INFORMATION PROVIDED**

Initial planning for field investigation involved the assembly of available record information, identification of key system attributes, and obtaining knowledge of performance history.

A general review of information provided by the Municipality was done to familiarize the study team with location of the station, type of record information maintained, deficiencies in data on file, and apparent problems, all as a means to decide upon investigative effort.

Key system attributes including, installation dates, construction details, previous inspection history, maintenance records, condition of vessel, piping, kiosk and electrical controls, design and measured flows, sump capacity, and pump operation were considered as relevant record information.

This study was completed as a visual assessment only. A full investigation including detailed modeling was beyond the terms of reference of this study and was not carried out.

#### 2.3 BACKGROUND

Hydraulic Capacity of the station has been completed as part of a separate study completed by Kerr Wood Leidal Associates Ltd.'s (KWL). The KWL Town of Gibsons Waste Water Collection Strategic Development Draft Report April 2008, File 2312.005, has been used for establishing station capacity at 75 l/s at 50 metre total dynamic head (TDH) with one pump operating, and 95 l/s at 56 TDH with both pumps operating. KWL has stated that the Prowse Road Pump Station typically operates between 77 and 82% full speed during average dry weather flow conditions. Range is 6 – 20 l/s (average 12 l/s). Overall pump efficiency at full speed has been estimated at 67% while at average dry weather flow, overall efficiency drops to 18%. KWL has further stated that existing wetwell has an available control volume of approximately 9.3 cubic metres based on their interpretation of Town of Gibsons Record Drawings, and have stated that the volume is not sufficient to maintain pump cycling at 3 to 4 starts per hour per pump.

KWL has stated that, based on their modeling conducted, OCP PWWF<sub>25</sub> expect that the Prowse Road Pump Station is approximately 111 l/s, which exceeds the 2 pump capacity of the station. KWL has further stated that diversions are recommended to be constructed upstream to reduce flows to the station to alleviate the need for increasing pumping capacity. The following summarizes diversions recommended as summarized and illustrated below:

- Diversion of Upper Gibsons and Gospel Rock Neighbourhood Planning area flows away from the station to reduce flows by 25 1/s to 86 1/s
- Diversion of North Way flows away form the station to reduce flows by a further 12 L/s to 74 l/s





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Forcemain has been identified as 250 mm diameter Asbestos Cement (AC) running from Prowse Road Pump Station to the wastewater treatment plant and is approximately 570 metres in length (constructed in 1971). The pressure pipe has an operating pressure range from 100 - 200 psi. Estimated operating pressure in the forcemain is 50 metres (70 psi) with one pump at full speed and 56 metres (80 psi) for two pumps, which has been deemed to be satisfactory for AC pipe. Surge analysis has not been undertaken.

The Town of Gibsons has reported frequent plugging of the pump station. KWL has stated that pumps should be cycled at minimum 0.9 m/s scouring velocity and, further, that, based on SCADA data provided by the Town, velocity ranges are between 0.1 and 0.4 m/s during ADWF. KWL has stated that operating pumps at full speed would increase forcemain velocity to 1.5 m/s (sufficient for scouring).

#### 2.4 INSPECTION

A site inspection was completed by John Kupskay, P. Eng. of Paragon Engineering Ltd. and Gil Schwab, A.Sc.T. of Gil Tech Services on July 24, 2008 with Greg Foss, Director of Public Works, Town of Gibsons. The inspection included:

- a review of general information, including availability of plans, emergency and operating procedures and instructions, and maintenance records;
- a general condition inspection of site to confirm accessibility, aesthetics, noise & odour, drainage and impact on neighbouring properties;
- a visual inspection to confirm material and condition of vessel, top hatch, platform and ladders,
- a visual inspection of components, including pumps, valves, piping, guide bars and gravity inlet;
- a visual inspection to confirm electrical service & power supply, wiring, meter & breaker panel, transfer switch, emergency power system, telemetry, level controls & alarms;

Inspection summary and photographs are included in Appendix II.





#### 2.5 SITE DRAWINGS

The following is a listing of available plans (not attached):

| LIFT STATION | DATE | CONSULTANT | DRAWING NO.                       |
|--------------|------|------------|-----------------------------------|
| Prowse Road  | 1972 | D & K      | 9-18-12 (1 to 3)                  |
| Prowse Road  | 1993 | HAS        | D-4519-17-3-300, D-4519-17-3-400, |
|              |      |            | D-4519-17-2-050, D-4519-17-3-200  |

Record drawings are on file at Township Engineering Department.

D & K Dayton & Knight Ltd.

HAS H. A. Simons Ltd.





#### **SECTION 3.0**

#### **ASSESSMENT AND EVALUATION**

#### 3.1 GENERAL DESCRIPTION

Assessment of the Sanitary Lift Station included a review of record information provided by the Municipality, a review of inspection reports recently completed by Paragon, analysis of the physical, mechanical, and electrical condition of the station, and an analysis of the hydraulic capacity of the station.

#### 3.2 EXISTING SYSTEM

#### 3.2.1 Station

The following table summarizes a description of the Lift Station (information from Municipal Records):

| LOCATION    |      | PUMPS     | VESSEL SIZE   | VESSEL MAT'L |
|-------------|------|-----------|---|--------------|
| Prowse Road | 1993 | 2 - 88 Hp | 2400 mm square<br>with ~ 2400 x 1200<br>mm triangular<br>ends by ~ 4.8<br>metres deep | Concrete     |

#### 3.3 CONDITION ASSESSMENT

#### 3.3.1 GENERAL

The following summary documents general condition overview, condition assessment, hydraulic capacity analysis and budget cost estimates for improvements for the station.

#### 3.3.2 Station Details and Overview

The Prowse Road Station exists in the Town of Gibsons at the Gibsons Marina. The station exists close to existing housing. Electrical components are housed within a building structure at the site. Site location plan and photographs are included immediately after this section.

Vessel is 2400 mm square with ~ 2400 x 1200 mm triangular ends and is approximately 4.8 metres deep. The station is fed by a 350 mm diameter Ductile Iron sanitary sewer. A 560 meter long 250 mm diameter forcemain exists between the station and outfall at the Town's Wastewater Treatment Plant. The forcemain exists as Asbestos Cement between the station and trunk sewer discharge manhole. The section of forcemain between the station and the trunk sewer discharge manhole is made of Asbestos Cement pipe.

Two Flygt CP 3300 HT (464 impeller) 1750 Rpm, 65 kW (88 Hp), 480 Volt, 3 phase, 60 Hz, Duplex Submersible pumps serve the station.

Electrical service is 480 volts 200 Amp. The station has a standby generator.





#### 3.3.3 Condition Assessment

The condition assessment that follows highlights overall site, structural, mechanical, and electrical condition of the Station. A brief discussion highlights distinctive features or deficiencies noted. Suggested solutions or improvements to correct problems evidenced are noted.

#### 3.4 CONDITION SUMMARY

#### Site:

The station is easily accessible by service vehicles, and is well graded and drained. The station is subject to regular flow from year round occupied residences at Gibsons.

#### Structural:

The concrete wetwell chamber appears to be in good condition, but undersized. If pumps fail, overflow could occur.

#### Mechanical:

Valves and piping should be upsized to provide more pumping volume and flow.

#### **Electrical & Controls:**

Existing generator is sufficient to run one pump only. Generator and controls will need to be upgraded to suit two pump operation.





#### **SECTION 4.0**

#### RECOMMENDATIONS

#### 4.1 GENERAL

Our recommendations are based on the information assembled in this report, and are suggested as a means to correct current operating deficiencies at Prowse Road Sanitary Lift Station.

Given the fact that the Town of Gibsons has reported frequent plugging of the pump station likely due to low velocity flows resulting in less than required minimum scouring velocity (based on SCADA data provided by the Town, velocity ranges are between 0.1 and 0.4 m/s during ADWF), and the fact that operating pumps at full speed would increase forcemain velocity to 1.5 m/s (sufficient for scouring), and given the fact that the exiting wetwell size, depth, and configuration are insufficient to provide sufficient batch volume to allow pumps to operate at full speed, Paragon Engineering Ltd. recommends the following:

#### **Upgrading Recommendations**

A review of condition of the Prowse Road Sanitary Pump Station has resulted in the general conclusion and recommendation that the station should be upgraded to satisfy Kerr Wood Leidal Associates Ltd.'s (KWL) (Town of Gibsons Waste Water Collection Strategic Development Draft Report April 2008, File 2312.005) OCP PWWF<sub>25</sub> projected flow of 75 l/s (after upstream diversions are completed).

This can be accomplished by:

- constructing a new 3.05 metre diameter, 8.5 metre deep wetwell to provide sufficient pumping volume sufficient to maintain pump cycling at 3 to 4 pump cycles per hour per pump; and
- replacing existing pumps with Flygt NP3301 HT (460 impeller) 105 Hp pumps, complete with soft starts, and replacement of all piping and valves.

In addition, the following upgrading works should be undertaken:

#### Site:

- Install new gravity inlet complete with isolation valve and new 375 mm gravity inlet to wetwell **Mechanical**:
- Upgrade to include manual bypass port for emergency situations;

#### **Electrical:**

- Upgrade generator (complete with double insulated sub-base tank) and controls to suit two pump operation;
- The upgrade to the 88 HP NP Pumps. The existing VFD/Direct Online Starters will need to be replaced with soft starters.

#### Maintenance:

- Update Record Drawings to record any additions or modifications to stations (including pump changes, wiring diagrams, or other);
- Continue with regular maintenance program





#### **SUMMARY**

The above measures are considered as minimum upgrading to be done.

The implementation of the above measures will result in a satisfactory upgraded operating system that will function for design service life.

Regular Station Maintenance should include:

- $\Rightarrow$  continuation of regular maintenance and inspection program
- $\Rightarrow$  repairs to current defects noted in condition assessment reports

Upgrading Costs are shown on next page.





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#### PROWSE ROAD SANITARY PUMP STATION

#### Paragon File 2008-50 NOVEMBER 2009

| LIFT STATION EVALUATION STUDY<br>UPGRADING COST ESTIMATE<br>STATION: Prowse Road Pump Station<br>ADDRESS: Gibsons Marina<br>REVISION DATE: 11-Nov-09 |      |              |        |              |           |  |  |  |
|--|------|--------------|--------|--------------|-----------|--|--|--|
| ITEM   | UNIT | UNIT PRICE   | AMOUNT | COST         | TOTAL CO  |  |  |  |
| Site Works   |      |              | II     |              |           |  |  |  |
| Regrading  | LS   | \$10.000.00  | 1.0    | \$10.000.00  |           |  |  |  |
| Bollards   | each | \$500.00     | 4.0    | \$2.000.00   |           |  |  |  |
| Remove existing wetwell  | LS   | \$5.000.00   | 1.0    | \$5.000.00   |           |  |  |  |
| Paving and Restoration   | 1.5  | \$3,000,00   | 1.0    | \$3,000,00   |           |  |  |  |
| Bypass pumping   | each | \$75.000.00  | 1.0    | \$75.000.00  |           |  |  |  |
| SUBTOTAL SITE WORKS  |      | ÷ : 5,000.00 | •      | ÷ •,•••••    | \$95,0    |  |  |  |
| Structural:  |      |              |        |              |           |  |  |  |
| Paint Building   | each | \$2,500.00   | 1.0    | \$2,500.00   |           |  |  |  |
| Convert wetwell to Valve Chamber   | each | \$55,000.00  | 1.0    | \$55,000.00  |           |  |  |  |
| New Wetwell (for storage & pump volume)  | each | \$350,000.00 | 1.0    | \$350,000.00 |           |  |  |  |
| New hatch (improve access)   | each | \$5,500.00   | 1.0    | \$5,500.00   |           |  |  |  |
| Mechanical:  |      |              |        | L            | <i> </i>  |  |  |  |
| Forcemain Gravity Main relocation (450 mm diam   | each | \$2,000.00   | 15.0   | \$30,000.00  |           |  |  |  |
| Plug Valve (450 mm diamter)  | each | \$15,000.00  | 1.0    | \$15,000.00  |           |  |  |  |
| Rebench Collection Manhole   | each | \$5,000.00   | 1.0    | \$5,000.00   |           |  |  |  |
| Install guide Bars   | each | \$3,000.00   | 1.0    | \$3,000.00   |           |  |  |  |
| Replace Pumps (w 105 Hp NP 3301.180 HT - 460   | each | \$65,000.00  | 2.0    | \$130,000.00 |           |  |  |  |
| Replace Valves   | each | \$7,500.00   | 4.0    | \$30,000.00  |           |  |  |  |
| Discharge Piping (upgrade to stainless)  | each | \$20,000.00  | 1.0    | \$20,000.00  |           |  |  |  |
| Bypass   | each | \$20,000.00  | 1.0    | \$20,000.00  |           |  |  |  |
| Flow meter   | each | \$20,000.00  | 1.0    | \$20,000.00  |           |  |  |  |
| SUBTOTAL MECHANICAL  |      |              |        |              | \$273,0   |  |  |  |
| Electrical:  |      |              |        |              |           |  |  |  |
| New MCC  | each | \$85,000.00  | 1.0    | \$85,000.00  |           |  |  |  |
| Replace Transfer Switch  | each | \$5,000.00   | 1.0    | \$5,000.00   |           |  |  |  |
| Upgrade wiring   | each | \$25,000.00  | 1.0    | \$25,000.00  |           |  |  |  |
| Three phase power  | each | \$25,000.00  | 1.0    | \$25,000.00  |           |  |  |  |
| 230 Kw Genset  | each | \$110,000.00 | 1.0    | \$110,000.00 |           |  |  |  |
| SUBTOTAL ELECTRICAL  |      |              |        |              | \$250,0   |  |  |  |
| SUB-TOTAL COSTS  |      |              |        | [            | \$1,031,0 |  |  |  |
| ENGINEERING  |      |              | 20%    | ſ            | \$206,2   |  |  |  |
| CONTINGENCY  |      |              | 15%    | L            | \$154,6   |  |  |  |
| TOTAL  |      |              |        | [            | \$1,391,8 |  |  |  |
| BUDGET   |      |              |        | ſ            | \$1 392 0 |  |  |  |





# **APPENDIX I**

# PROWSE ROAD

# LIFT STATION INFORMATION

- A1-1 SITE PLANS
- A1-2 PROWSE ROAD PUMP STATION PHOTOGRAPHS
- A1-3 TECHNICAL SUMMARY
  - $\Rightarrow$  Data Sheets
  - $\Rightarrow$  Pump Curves
  - $\Rightarrow$  Drawdown Calculations
  - $\Rightarrow$  Condition Evaluation Forms
  - $\Rightarrow$  WaterCAD Hydraulic Analysis including System Capacity Curve for proposed upgrading
  - $\Rightarrow$  Proposed Generator and Pump





# SITE PLAN – existing conditions





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PARACON



# SITE PLAN – proposed upgrading



# PROWSE ROAD PUMP STATION PHOTOGRAPHS



Front view of station



Hydro Service



Wetwell



Piping inside wetwell





Piping inside wetwell





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Collection Manhole



Existing VFD



Existing Generator



SCADA Control Panel



Existing Pump Control Panel



Existing MCC Existing Generator





# **APPENDIX II**

# **TECHNICAL SUMMARY**

The pages following contain Technical Information related to this Pump Station. Included are:

**CONDITION EVALUATION FORM** -comments made during individual station inspections on site, structural, electrical, mechanical, and general condition, complete with suggested improvement

**DATA SHEETS** - information on Pumps, Electrical and Mechanical Equipment, Record Drawings, forcemain, and float settings;

**PUMP CURVES** - Station specific Pump Performance and Duty Point curves – existing CP3300 and proposed NP 3301;

**CAPACITY ANALYSIS (UPGRADED SCENARIO ONLY)** - summary of input data, and Total Dynamic Head from WaterCAD v7.0 computer program – proposed pump.

**PROPOSED GENERATOR AND PUMP** – proposed 230 Kw Generator (spec sheet and drawing) and 105 Hp pump (Pump Curve, Dimensional Drawing)





#### LIFT STATION CONDITION INSPECTION FORM



| STATION:     | Prowse Road                  | _                                |           |      |        |      |                |       |      |            |           |                 |              | PARAGON FILE 2008-50            |
|--------------|------------------------------|----------------------------------|-----------|------|--------|------|----------------|-------|------|------------|-----------|-----------------|--------------|---------------------------------|
| ADDRESS:     | Gibsons Marina               | RATING                           |           |      |        |      |                |       |      |            |           |                 |              |                                 |
| SURVEY DATE: | 24-Jul-08                    | _                                | EXCELLENT | GOOD |        | POOR | NOT APPLICABLE |       | GOOD | ACCEPTABLE | DEFECTIVE | NEEDS ATTENTION | NON EXISTENT |                                 |
| FEATU        | RES                          | COMMENTS                         | 1         | 2    | 3 RA   | 4    | 5              |       | 1    | 2          | 3         | 4               | 5            | COMMENTS                        |
|              | ACCESSIBILITY - VEHICLES     | OK - PAVED ENTRANCE              |           |      | V      |      |                |       |      |            |           |                 |              |                                 |
|              | ENCLOSURE                    | N/A - BUILDING                   | <b>_</b>  |      | 1      |      | ļ              |       |      | 1          |           |                 |              |                                 |
| GENERAL      | AESTHETICS                   | ок                               |           |      | V      |      | <b> </b>       |       |      |            |           |                 |              |                                 |
|              | ODOUR                        |                                  | +         |      | V      |      | <b>+</b>       |       |      | J          |           |                 |              |                                 |
|              | DRAINAGE                     | OK                               | +         |      | V      |      | <u> </u>       |       |      | Ż          |           |                 |              |                                 |
| SITE         | LANDSCAPING                  | ок                               | 1         |      |        |      | †              |       |      |            |           |                 |              |                                 |
|              | NEIGHBOUR PROPERTIES         | MARINA                           | [         |      |        |      | [              |       |      |            |           |                 |              |                                 |
|              | OVERALL SITE                 | GOOD                             |           |      |        |      |                |       |      |            |           |                 |              |                                 |
|              | KIOSK                        | INSIDE BUILDING                  |           |      | N      |      | ,              |       |      |            |           | γ               |              | REPLACE WITH MCC                |
|              | KIOSK - TROUBLE LIGHT        | N/A - BUILDING                   |           |      |        |      | N              |       |      |            |           |                 |              |                                 |
|              |                              |                                  |           |      | 7      |      | N              |       |      |            |           |                 |              |                                 |
| ELECTRICAL   | SERVICE & POWER SUPPLY       | 600 / 3 / 60                     |           |      | Ť      |      |                |       |      |            |           |                 |              |                                 |
|              | WIRING                       | ок                               |           |      | V      |      |                |       |      | V          |           |                 |              |                                 |
|              | METER & BREAKER PANEL        | ок                               |           |      |        |      |                |       |      |            |           |                 |              |                                 |
|              | TRANSFER SWITCH              | AUTOMATIC (THOMSON TECHNOLOGIES) |           |      |        |      |                |       |      |            |           |                 |              |                                 |
|              | EMERGENCY POWER RECEPT.      | N/A                              |           |      |        |      |                |       |      |            |           |                 |              |                                 |
|              | PUMP DISCONNECT              | 2 INDIVIDUAL                     |           |      | N.     |      |                |       |      |            |           | V               |              | REPLACE WITH PUMPS              |
|              | TELEMETRY                    | SCADA                            |           |      | N      |      |                |       |      | ν          |           |                 |              |                                 |
|              | STARTERS                     | ONE VFD/ ONE DIRECT ONLINE       |           |      | N<br>V |      |                |       |      | ~          |           | N               |              | REPLACE WITH SOFT STARTS        |
|              | 120 VOLT RECEPTACI E         |                                  |           |      | Ì      |      |                |       |      | Ĵ          |           |                 |              |                                 |
|              | VENT FAN SWITCH              | NONE                             |           |      | Ń      |      |                | ••••• |      |            |           |                 |              |                                 |
|              | ELAPSED TIME TOTALIZER       | CONTROL PANEL (ONE ON EACH)      |           |      |        |      |                |       |      |            |           |                 |              |                                 |
|              | CURRENT LIMITING MOTOR       |                                  |           |      | V      |      |                |       |      |            |           | V               |              |                                 |
|              |                              |                                  |           |      | Ť      |      |                |       |      |            |           | Ĵ               |              |                                 |
|              | AMMETER                      | UNKNOWN                          |           |      | V      |      |                |       |      |            |           | Ń               |              |                                 |
|              | HOA SELECTOR                 | ON PANEL DOORS                   |           |      |        |      |                |       |      |            |           |                 |              |                                 |
|              | PUMP RUN LIGHTS              | ON PANEL DOORS                   |           |      |        |      |                |       |      |            |           |                 |              |                                 |
|              | HEATER                       | IN BUILDING                      |           |      | V      |      |                |       |      | √          |           |                 |              |                                 |
|              | COOLING FAN                  | ON VFD ONLY                      |           |      | N      |      |                |       |      |            |           |                 |              |                                 |
|              | STANDBY GENERATOR            | FLYGT - 130 KW - IN BUILDING     |           |      | N      |      |                |       |      | γ          |           |                 |              |                                 |
|              |                              |                                  |           |      | V      |      | v              |       |      |            |           | 7               |              |                                 |
|              | CODE                         | WETWELL CONFIGURATION NEEDS      |           |      | ,      |      |                |       |      |            |           | ,               |              |                                 |
|              | EXTERIOR - GENERAL           | REWORKING                        |           |      |        |      |                |       |      |            | ν         | 2               |              |                                 |
|              |                              |                                  |           |      | V      |      |                |       |      | J          |           | V               |              | CONFINED SPACE ENTRY FOR ACCESS |
| STRUCTURAL   | VESSEL - CONDITION           | FAIR                             |           |      | Ż      |      |                |       |      |            |           |                 |              |                                 |
|              | VESSEL - TOP HATCH           | 4 HEAVY STEEL DOORS              |           |      |        |      |                |       |      |            |           |                 |              |                                 |
|              | VESSEL - PLATFORMS           | NONE                             |           |      |        |      |                |       |      |            |           |                 |              |                                 |
|              | VESSEL - BOTTOM              | UNKNOWN                          |           |      |        |      |                |       |      |            |           |                 |              |                                 |
|              | VESSEL - ELEV. ABOVE GD.     | 0.3 METER                        |           |      | N      |      |                |       |      | √          |           |                 |              |                                 |
|              | WALLS - ACCESS LADDER        | 2 GALVANIZED STEEL               |           |      | N      |      |                |       |      |            |           | N               |              |                                 |
|              | WASHDOWN - WATER SVCF        |                                  |           |      | V      |      |                |       |      | V          |           |                 |              |                                 |
|              | VENTILATION                  | NONE                             |           |      | Ŵ      |      |                |       |      |            |           |                 |              |                                 |
|              | GRAVITY INLET                | 4 GRAVITY INLETS                 |           |      |        |      |                |       |      |            |           |                 |              | NEED TO REPLACE WITH ONE        |
|              | GUIDE BARS                   | ок                               |           |      |        |      |                |       |      |            |           |                 |              |                                 |
| MECHANICAL   | PIPING                       | STEEL RUSTED                     |           |      |        |      |                |       |      |            |           |                 |              |                                 |
|              | CHECK VALVES                 | ANNUAL MAINTENANCE - RUSTED      |           |      | N      |      |                |       |      |            |           | N               |              |                                 |
|              | GATE VALVES                  | WEDGE GATE RUSTED                |           |      | N      |      |                |       |      |            |           | N               |              |                                 |
|              | BYPASS PORT                  |                                  | +         |      | V<br>V |      |                |       |      |            |           | 1               |              | KEPLACE                         |
|              | PUMPS (STARTERS)             | DRIVES - 1 VFD. 1 DOL            |           |      | Ì      |      |                |       |      |            |           | Ż               |              |                                 |
|              | PUMPS - CONDITION            | OK (EXCESSIVE HOURS ON 1 PUMP)   | 1         |      | Ń      |      |                |       |      |            |           | ·               |              |                                 |
| GENERAL      | PLANS AVAILABLE              | SOME                             |           |      |        |      |                |       |      |            |           |                 |              |                                 |
|              | RECORDS AVAILABLE            | SOME                             |           |      | V      |      |                |       |      |            |           |                 |              |                                 |
|              | MTC & OPERATING INSTRUCTIONS | APPARENTLY AVAILABLE             | 1         |      |        |      | <b> </b>       |       |      |            |           |                 |              |                                 |
|              | PARTS LIST                   | APPARENTLY AVAILABLE             | ļ         |      |        |      |                |       |      |            |           |                 |              |                                 |

Condition Comments

PROCEDURES

Summary: STATION CONDITION:

POOR

IN STATION



**PUMP INFORMATION :** 



PROWSE n/a CONCRETE

#### TOWN OF GIBSONS - PROWSE ROAD SANITARY PUMP STATION

| Lift Station Name : | PROWSE ROAD              | Station No :      |
|---------------------|--------------------------|-------------------|
| Location :          | GIBSONS MARINA           | Installation No : |
| Construction Date : | 1993 UPGRADE (HA SIMONS) | Station Type :    |

PUMP #1

PUMP #2

| Manufacturer : | Flygt              |
|----------------|--------------------|
| Model :        | CP 3300            |
| Impeller :     | 464                |
| Motor Hp :     | 55 kW (88 Hp)      |
| Voltage :      | 600                |
| Type :         | Duplex Submersible |
| Rpm :          | 1770               |
| Phase :        | 3                  |
| Frequency :    | 60 Hz              |
| Serial No :    | 13-9330062         |

| Flygt              |
|--------------------|
| CP 3300            |
| 464                |
| 55 kW (88 Hp)      |
| 600                |
| Duplex Submersible |
| 1770               |
| 3                  |
| 60 Hz              |
| 13-9030048         |

#### **MECHANICAL AND ELECTRICAL INFORMATION :**

| MCC Manufacturer: | unknown (VFD manufacturer Digital Drive Systems Inc.)                     |                    |
|-------------------|---|--------------------|
| Transfer Switch:  | Thompson Technology TS 753 TF - 225A - 600 (dwg DSA 9250014-s/n 925044 (3 | 47/600) - 225 AMP) |
| Check Valve:      | 2 - 200 mm (8 inch) Swing check valve                                     | -                  |
| Gate Valve:       | 2 - 200 mm (8 inch) wedge gate  | -                  |
| Generator Plug:   | N/A - automatic transfer  | -                  |
| Generator         | 130 Kw Flygt c/w Thompson Technology ATS                                  | -                  |

#### **RECORD INFORMATION :**

|                               |                 | Measured Flow:    | not measured             |
|-------------------------------|-----------------|-------------------|--------------------------|
| As Built No :(Forcemain Only) |                 | Theoretical Flow: | 50 l/s @ 50 m head (1188 |
|                               |                 |                   | USGPM @ 164 feet)        |
| Vessel Diameter :             |                 | Static Head :     | 61.5                     |
| Rim Elev. :                   | 2.80            | Theoretical TDH   | 50.00 m                  |
| Ground Elev. :                | 2.50            | Bottom Elev.:     | -2.25 m                  |
| Inlet Invert :                | -1.65           | Inlet Diameter :  | 350 mm                   |
| Inlet Type:                   | unknown         | F.M. Invert :     | 0.9 m                    |
| F.M. Diameter :               | 250 mm          | F.M. Length:      | 560 m , 250 mm dia.      |
|                               |                 | Overflow:         | none                     |
| F.M. Type :                   | Asbestos Cement |                   |                          |
| F.M. Velocity :               | 1.0 TO 1.1      | m / s             |                          |
| <u>FLOATS :</u>               | (metres)        |                   |                          |
| High Level Alarm :            | 1.50 m          | Lag Pump On :     | -1.75 m                  |
| Lead Pump On :                | -1.75 m         | All Pump Stop:    |                          |
| Low Level Alarm :             |                 |                   |                          |
| <u>REMARKS :</u>              |                 |                   |                          |
| Station upgraded in 1993      |                 |                   |                          |
| VFD - constant flow elevation |                 |                   |                          |
|                               |                 |                   |                          |



FLYPS3.1.5.7 (20060531)



FLYPS3.1.2.0 (20081110)





Scenario: Base

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Scenario: Base

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# 230-JC6DT3

# 230 ekW 60 Hz Standby 195 ekW 60 Hz Prime 208 - 600V



- EPA Tier 3 Certified
- Generator Set Tested to ISO 8528-5 for Transient Response
- UL2200, CSA Listing Offered
- Accepts Rated Load in One Step Per NFPA 110, Level 1
- All gen-sets are prototype and factory tested
- MTU DD is a single source supplier
- Global Product Support
- 2 Year Standard Warranty
- Complete Range of Accessories
- Custom Design for any Application

6090HF485 Diesel Engine

- 9.0 Liter Displacement
  - 4-Cycle

Permanent Magnet Generator (PMG) - Optional

- Brushless, Rotating Field
- 300% Short Circuit Capability
- 2/3 Pitch Windings

Digital Control Panel(s)

- UL Recognized, 🔊 , NFPA 110
- Complete System Metering
- LCD Display
- Cooling System
  - Integral Set-mounted
  - Engine Driven Fan

## **GEN-SET RATINGS**

Standby

| Voltage (L-L) | Phase | PF  | Hz | kW  | kVA   | AMPS | skVA @ 30%<br>voltage dip | Generator<br>Model* | Temp Rise  | Connection       |
|---------------|-------|-----|----|-----|-------|------|---------------------------|---------------------|------------|------------------|
| 240v**        | 1     | 1.0 | 60 | 210 | 210   | 875  | 370                       | 432PSL6228          | 130°C/27°C | 4 LEAD           |
| 208v**        | 3     | 0.8 | 60 | 230 | 287.5 | 798  | 520                       | 432CSL6210          | 130°C/27°C | 12 LEAD LOW WYE  |
| 240v**        | 3     | 0.8 | 60 | 230 | 287.5 | 692  | 520                       | 432CSL6210          | 130°C/27°C | 12 LEAD HI DELTA |
| 480v**        | 3     | 0.8 | 60 | 230 | 287.5 | 346  | 510                       | 431CSL6208          | 130°C/27°C | 12 LEAD HI WYE   |
| 600v**        | 3     | 0.8 | 60 | 230 | 287.5 | 277  | 510                       | 431PSL6243          | 125°C/40°C | 4 LEAD WYE       |

| Prime         |       |     |    |     |        |      |                           |                     |            |                  |
|---------------|-------|-----|----|-----|--------|------|---------------------------|---------------------|------------|------------------|
| Voltage (L-L) | Phase | PF  | Hz | kW  | kVA    | AMPS | skVA @ 30%<br>voltage dip | Generator<br>Model* | Temp Rise  | Connection       |
| 240v          | 1     | 1.0 | 60 | 195 | 195    | 813  | 370                       | 432PSL6228          | 105°C/40°C | 4 LEAD           |
| 208v          | 3     | 0.8 | 60 | 195 | 243.75 | 677  | 520                       | 432PSL6210          | 105°C/40°C | 12 LEAD LOW WYE  |
| 240v          | 3     | 0.8 | 60 | 195 | 243.75 | 586  | 520                       | 432PSL6210          | 105°C/40°C | 12 LEAD HI DELTA |
| 480v          | 3     | 0.8 | 60 | 195 | 243.75 | 293  | 510                       | 432PSL6208          | 105°C/40°C | 12 LEAD HI WYE   |
| 600v          | 3     | 0.8 | 60 | 195 | 243.75 | 235  | 510                       | 431PSL6243          | 105°C/40°C | 4 LEAD WYE       |

\* The Generator Model Number identified in the table is for standard C Series Configuration. Consult the factory for alternate configuration. \*\* UL2200 Offered





# STANDARD EQUIPMENT

#### ENGINE

- Air Cleaners •
- Oil Pump •
- Full Flow Oil Filter
- Jacket Water Pump .
- Thermostat .
- Exhaust Manifold dry .
- Blower Fan & Fan Drive •
- Radiator Unit Mounted •
- Electric Starting Motor 12V •
- Governor Electric Isochronous .

DETROIT DIESEL

- Base Formed Steel .
- SAE Flywheel & Bell Housing .
- Charging Alternator - 12V
- Battery Box & Cables •
- Flexible Fuel Connectors •
- Flexible Exhaust Connection .
- **EPA** Certified Engine .

### DIGITAL CONTROL PANEL(S)

- Digital Metering
- Engine Parameters
- Generator Protection Functions
- **Engine Protection**
- SAĔ J1939 Engine ECU Communications
- Windows-based Software
- Multilingual Capability
- Remote Communications to our RDP-110 **Remote Annunciator**
- 16 Programmable Contact Inputs
- 7 contact outputs
- UL Recognized, 🔊 , CE approved
- Event Recording
- IP 54 Front Panel Rating with Integrated Gasket
- NFPA110 Level Compatible

#### **GENERATOR**

- NEMA MG1, IEEE and ANSI standards compliance for temperature rise and motor starting
- Sustained short circuit current of up to 300% of the rated current for up to 10 seconds
- Self Ventilated and Drip-proof
- Superior Voltage Waveform
- Digital, Solid State, Volts-per-hertz Regulator
- No Load to Full Load Regulation
- Brushless Alternator with Brushless Pilot Exciter
- .
- 4 pole, Rotating Field 130°C Standby Temperature Rise .
- •
- •
- 1 Bearing, Sealed Flexible Coupling Full Amortisseur Windings •
- 125% Rotor Balancing
- 3-phase Voltage Sensing .
- $\pm$  1% Voltage Regulation .
- 100% of Rated Load One Step .
- 3% Maximum Harmonic Content





#### 230 ekW Diesel Gen-Set

# **APPLICATION DATA**

#### Engine

| Manufacturer:                        | John Deere  | Rated RPM:     |                    |       |
|--------------------------------------|-------------|----------------|--------------------|-------|
| Model:                               | 6090HF485   | Engine Gover   | rnor:              | JDEC  |
| Туре:                                | 4-Cycle     | Max Power:     | Standby: bhp (kWm) |       |
| Arrangement:                         | 6-Inline    |                | Prime: bhp (kWm)   |       |
| Displacement: in. <sup>3</sup> (lit) | 548 (9.0)   | Speed Regula   | ition:             | ±.25% |
| Bore: in. (cm)                       | 4.66 (11.8) | Frequency:     |                    | 60 Hz |
| Stoke: in. (cm)                      | 5.35 (13.6) | Air Cleaner: . |                    | Dry   |
| Compression Ratio:                   | 16:1        |                |                    |       |

#### 

# Fuel System Fuel Consumption Fuel Supply Connection Size: '/2" NPT Fuel Return Connection Size: '/2" NPT Maximum Fuel Liff: ft (m) 6 (2) Recommended Fuel: Diesel #2 Total Fuel Flow: gal/hr (lit/hr) 63.4 (240)

#### **Cooling - Radiator System**

|  | Standby     | Prime       |
|--|-------------|-------------|
| Ambient Capacity                             |             |             |
| of Radiator: °F (°C)                         | 122 (50)    | 122 (50)    |
| Maximum Allowable                            |             |             |
| Static Pressure on                           |             |             |
| Radiator Exhaust: in. H <sub>2</sub> 0 (kPa) | 0.5 (0.12)  | 0.5 (0.12)  |
| Water Pump                                   |             |             |
| Capacity: gal/min (lit/min)                  | 74 (280)    | 74 (280)    |
| Heat Rejection to                            |             |             |
| Coolant: BTUM (kW)                           | 7,001 (123) | 6,887 (121) |
| Heat Rejection to                            |             |             |
| Air to Air: BTUM (kW)                        | 4,309 (76)  | 4,229 (74)  |
| Heat Radiated to                             |             |             |
| Ambient: BTUM (kW)                           | 1,956 (34)  | 1,566 (28)  |

#### **Air Requirements**

|  | Standby       | Prime          |
|--|---------------|----------------|
| Aspirating: CFM (m <sup>3</sup> min)   |               | 778 (22.0)     |
| Air Flow Required                      |               |                |
| for Radiator Cooled                    |               |                |
| Unit: CFM (m <sup>3</sup> min)         | 14,500 (411)  | .14,500 (411)  |
| Air Flow Required for                  |               |                |
| Heat Exchanger/                        |               |                |
| Remote Radiator based                  |               |                |
| on 25°F Rise: CFM (m <sup>3</sup> min) | 4,346 (123.0) | . 3,481 (98.5) |
| on 25°F Rise: CFM (m <sup>3</sup> min) | 4,346 (123.0) | . 3,481 (98.5) |

#### **Exhaust System**

|   | Standby    | Prime      |
|---|------------|------------|
| Gas Temp.(Stack): °F (°C)                 | 882 (475)  | 795 (424)  |
| Gas Volume at Stack                       |            |            |
| Temp: CFM (m <sup>3</sup> min)            | 1,930 (55) | 1,769 (50) |
| Maximum Allowable                         |            |            |
| Back Pressure: in. H <sub>2</sub> 0 (kPa) | 40 (10)    | 40 (10)    |



# **EMISSIONS DATA**

<u>NOx + NMHC</u> <u>CO</u> <u>PM</u> 2.76 ......0.0.43 ......0.064

All units are in g/hp-hr and are EPA D2 cycle values.

Emission levels of the engine may vary as a function of ambient temperature, barometric pressure, humidity, fuel type and quality, installation parameters, measuring instrumentation, etc. The data provided are laboratory results from one engine representing this rating. The data was obtained under controlled environmental conditions with calibrated instrumentation traceable to the United States National Bureau of Standards and in compliance with US EPA regulations found within 40 CFR Part 89. The weighted cycle value from each engine is guaranteed to be below the US EPA Standards at the US EPA defined conditions.

# SOUND DATA

|  | <u>Standby Full Load</u> | <u>Standby No Load</u> | Prime Full Load | <u>Prime No Load</u> |
|--|--------------------------|------------------------|-----------------|----------------------|
| 23 ft (7m) OPU w/ critical grade muffler: (dBA). |                          |                        | 92              | 87                   |
| 23 ft (7m) Sound Attenuated Enclosure: (dBA)     |                          |                        |                 | 79                   |

## **RATING DEFINITIONS and CONDITIONS**

- Ambient capability factor at 300m (984ft). Consult your local MTU DD Power Generation Distributor for other altitudes.
- Standby ratings apply to installations served by a reliable utility source. The standby rating is applicable to varying loads for the duration of a power outage. No overload capability for this rating. Ratings are in accordance with ISO-3046/1, BS 5514, AS 2789, and DIN 6271.
- Prime power ratings apply to installations where utility power is unavailable or unreliable. At varying load, the number of generator set operating hours is unlimited. A 10% overload capacity is available for one hour in twelve. Ratings are in accordance with ISO-8528/1, overload power in accordance with ISO-3046/1, BS 5514, AS 2789, and DIN 6271. For limited running time and base load ratings, consult the factory.

• Deration Factors:

**DISTRIBUTED BY:** 

Altitude: Derate 5% per 1,000 ft (305m) above 8,900 ft (2,700m). Temperature: Derate 0.5% per 10°F (5.5°C) above 77°F (25°C).

#### Weights & Dimensions

| Length: in. (cm)       | 120 (305)     |
|------------------------|---------------|
| Width: in. (cm)        | 48 (122)      |
| Height: in. (cm)       | 68.4 (174)    |
| Weight (dry): lb. (kg) | 4,653 (2,111) |



Drawing above for illustration purposes only, based on standard open power 480 volt generator. Lengths may vary with other voltages. \*Do Not Use for Installation Design

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