Seymour Civil Engineering

Prairie Redcar WTP- O&M Manual Water Treatment System

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			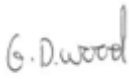
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	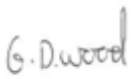		
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1 INTRODUCTION

This document provides an overall description and guidance on the operation and maintenance of the 36m^3/hr water treatment system (WTS) supplied by GRS for Seymour for the treatment of impacted water at the Prairie Redcar site in Redcar, Trunk Road, Lackenby Gate, Middlesbrough, TS6 7RT.

An induction to the plant will be provided to Seymour staff before the plant is handed over for operation by Seymour operatives on site. This manual should be read in full and understood by all staff operating the system.

1.1 GRS contacts

Table 1. GRS contact details

Name	Project Role	Contact No.	Email
Chris Wilson	Principal Engineer	07917 425232	cwilson@grsremediation.com
Roy Daniell	Principal Engineer	07393465619	rdaniell@grsremediation.com
Gareth Wood	Project Manager	077933 65850	gwood@grsremediation.com

1.2 Health and Safety

The following safety notes are not intended to replace or change the site operator's (Seymour) safety systems, which will take precedence in the event of conflict between these instructions and the site safety regulations.

The following notes are intended to make the operators aware and/or emphasize any specific safety matters relating to the water treatment system (WTS).

The WTS is of bespoke design and has been designed specifically for the application of water treatment at the Prairie Redcar site. It should not be used for any other purpose. It should not be used to handle chemicals or contaminated water of any other type or composition other than that for which it was designed and supplied.

The system should only be operated and/or serviced by competent trained personnel who are familiar with the principles and risks associated with operating and maintaining a plant of this nature. They should understand the process logic. This is to include the capability of tracing/following process piping routes and understanding the logic of flow, awareness of the function of all valves, pumps and instrumentation. The consequences of inappropriate adjustments include, for example, "dead heading" pumps, stopping flow by shutting valves instead of stopping pumps etc.

Protection of hazards arising from process fluids should be taken. As well as contamination in the water, the fluids being processed could be contaminated by the introduction of external contamination e.g. flaking paint, rust etc. Seymour staff should not need to handle, touch any items related to the pH dosing system, in particular dealing with the acid. Please contact GRS if attempting to amend anything related to the pH dosing and acid usage.

The water treatment process involves the pumping of fluid streams under pressure. These fluids are all held within the various vessels, filters, pump tanks and pipework associated with the WTS.

PPE must always be worn when operating the plant, to include as a minimum; hard hat, robust chemical resistant gloves covering the sleeve openings, fastened hi-vis long-sleeved jacket, protective trousers, safety boots and goggles/safety glasses/shields. When close to pipe connections and items under pressure, a full-face visor is recommended.

Never lean over tanks containing liquids and breath in the airspace above the tank. The air may contain volatile organic compounds (VOCs). Avoid skin contact and do not ingest any fluids.

In the event of an incident report immediately to Seymour site safety manager. If skin contact occurs flush with clean water immediately.

Beware at all times of slip and trip hazards, trapping of limbs and fingers, vehicle movements, site conditions (e.g. rain, ice, mud, wind and dust, flying debris.)

It is also necessary to appreciate the dynamics of the process. For example, if during plant monitoring and operation the discharge flow rate suddenly changes, or a tank is taking longer to empty than usual, this may indicate there is a problem in the system (e.g. pipe blocked, pump stopped, valve position changed).

2 OPERATION AND MAINTENANCE

2.1 Plant monitoring (Seymour)

Seymour should monitor the following during system operation:

- Discharge flow-meter readings, cumulative and flow rate (to be recorded daily - with date and time of reading)
- Inlet flow-meter readings, cumulative and flow rate (to be recorded daily - with date and time of reading)
- Visual water quality throughout system for the presence of silts, oils and any other indication of water quality
- Operating pressure and vessel pressure gauges
- Water level within tanks
- All pipe work and fittings should be inspected visually for damages or leaks.

2.2 Plant operation and maintenance (Seymour)

The system installed by GRS on site comprises the following main components, as shown on Appendix A – Process Flow Diagram:

- Excavation sump pump - P1
- Inlet flowmeter – F1
- Inlet tank - T1
- Forwarding pump – P2
- Silt trap – HB50 – T2
- Skip type tank – T3
- Forwarding pump – P3
- 2 x GS1750 sand filter vessels - SF-01 and SF-02
- 4 x BI50 GAC vessels - Gac-01 to Gac-04
- P-trap (anti siphon loop)
- Discharge flowmeter – F2
- Clean backwash tank - T4
- Backwash pump – P4
- Dirty backwash tank - T5
- Dirty backwash pump – P5
- Bund sump pump – P6

- Control Panel
- Associated pumps, fittings and pipework.

A process flow diagram of the water treatment plant is illustrated in Appendix A.

2.2.1 Process Description

2.2.1.1 Inlet tank and silt removal

P1 (excavation pump) will be installed in an appropriate location (as instructed by Seymour), and connected back to the water treatment system. The flow from this pump can be adjusted using hand valve V1. The WTS is rated for 36 m^3/hr. GRS will not be responsible for any adverse effects caused to the system by the adjustment of these valves. A radio link will be established between P1 and the water treatment system. This will ensure P1 shuts down if the water treatment system is stopped.

The water abstracted from the excavation sump is pumped into the inlet of tank T1. Baffles and weirs in this tank will separate free phase oils and prevent them passing further into the water treatment system.

T1 is fitted with a high-high (H-H; IT01-L-HH03) level control. In the event of a high-high water level, P1 will shut off until the high-level clears from T1. High level (IT01-L-H02) and low level (IT01-L-L01) controls are also present in T1. Forwarding pump P2 will then pump water into tank T2. This is a lamella plate separator, and its purpose is to reduce the concentration of suspended solids in the aqueous phase. T2 is fitted with a high-high level control (T2-L-HH01) which will shut down P2 if activated.

The clarified water from T2 flows by gravity into T3. Forwarding pump P3 is installed in this tank. T3 is fitted with high-high (T3-L-HH03) level control. In the event of high-high water level, P1 will shut off until the high-level clears from T3.

In normal operation the tank levels will cycle between high (H) and low (L) level. When H level is reached the pump will start and continue until the level in the tank falls to the L level, at which point the pump will stop. The pump will start again when the water level reaches the H point.

2.2.1.2 Filter vessels

The forwarding pump P3 will pump water through the two sand filters, SF-01 and SF-02 in parallel. The flow route will be: the exit from P3 will pass through valves V2 and V3 and into the sand filters. It will leave the sand filters through valves V4 and V5. Valves V15, V16, V17 and V18 will be shut (these are used for backwashing only).

The flow through V4 and V5 combines and then splits before entering the first two GAC absorbers (Gac-01 and Gac-02) through valves V6 and V8. The water exits Gac-01 and Gac-02 via valves V9 and V7, respectively. The flow then combines before splitting again and passing through the second two GAC vessels (Gac-03 and Gac-04) through valves V12 and V10. The water exits Gac-03 and Gac-04 via valves

V13 and V11, respectively. All other GAC valves are not used during normal operation and always remain closed.

From V11 and V13, water passes through the discharge meter (F2) before passing through the anti-siphon loop.

2.2.1.3 Backwashing

In addition to the flow path described above there is a requirement to periodically backwash SF-01 and SF-02, in order to remove accumulated sediments and improve efficiency. To carry out the operation a supply of clean water is required. Clean water is provided from the discharge of the water treatment system, redirected into clean backwash tank T4 via valve V14. Backwash pump P4 pumps water from T4, through the sand filters and into dirty backwash tank T5. During backwashing, one of the sand filters can be taken off-line for backwashing and the plant left running for short periods with only one sand filter in service. This may result in some flow reduction.

If SF-01 is to be backwashed, valves V3 and V5 will be closed. V15 and V16 will be opened and P4 started. This will cause clean backwash water to flow through SF-01 in reverse direction thus expanding the bed and forcing out trapped suspended solids. The dirty water exiting the filter flows through V16 to dirty backwash tank T5. Once the solids have settled out the clarified water in T5 can then be slowly returned to inlet tank T1 via forwarding pump P5. **This operation requires constant supervision.** A similar procedure can be adopted to backwash SF-02. V2 and V4 will be closed. V17 and V18 will be opened and P4 started.

2.2.2 Normal Operation

Table 2. Normal operating conditions

Item	Function	Status	Comment
P1	Excavation pump	On / Off	Pumping water from excavation to T1. Low (L) level detection at excavation will turn pump off.
F1	Flowmeter	In line operation	Electromagnetic flowmeter
V1	Hand valve flow adjustment	Open or part open as per commissioning	V1 should **never be dead** headed when operating.
T1	Inlet tank – oil/water separator	Water above L and below H level	H-H level will shut down P1
P2	Forwarding pump	On / Off	P2 operates between H and L levels.
T2	Solids settlement	Full – water level below high-high level	H-H level will shut down P2.

T3	Skip tank	Water above L level and below high (H) level	H-H level will shut down P2
P3	Forwarding pump	On / Off	P3 operates between H and L levels.
V2 & V3	Hand valves sand filter inlets	Fully open	Will only be closed when backwashing.
V4 & V5	Hand valves sand filter outlets	Fully open	Will only be closed when backwashing.
V16 & V15	SF-01 backwash valves	Fully closed	Will only be open when backwashing into SF-01.
V17 & V18	SF-02 backwash valves	Fully closed	Will only be open when backwashing into SF-02.
V6 & V8	Gac-01 and Gac-02 adsorber inlet valves	Fully open	Will never be closed during normal operation
V7 & V9	Gac-01 and Gac-02 adsorber outlet valves	Fully open	Will never be closed during normal operation
V10 & V12	Gac-03 and Gac-04 adsorber inlet valves	Fully open	Will never be closed during normal operation
V11 & V13	Gac-03 and Gac-04 adsorber outlet valves	Fully open	Will never be closed during normal operation
PI	Pressure indicators	Normal operation as per commissioning	Any reading 0.5-0.75 bar above baseline (start date) commissioning readings, system backwash required. **Stop if vessel pressure reaches 2.5 bar. Contact GRS.**
P4	T4	Operating as part of backwash procedure	Operates between H and L level during backwashing, and a pre-set timer (3 mins)
P5	T5	Operating as part of backwashing procedure	Operates until L level during T5 emptying.

P6	Bund pump	Manual operation as required	Empties bund water into T1 inlet tank.
V14	Automatic valve	Fully Closed	Opens to allow clean water to fill tank T4 via HH level float (clean backwash tank) (when P3 is running)
F2	Discharge flow meter	In line operational	Electromagnetic flowmeter

With the valves set as above and the process pumps operational water will be abstracted from the excavation sump, be pumped through the water treatment plant and discharged to sewer. Levels in the system will be controlled by the level devices in T1 and T3.

If the water level in tanks T1-T5 reaches H-H, the WTS will shut down.

If the level in the bund reaches H-H the system will shut down.

Table 3. Level control identification table

PFD NUMBER:	LOCATION:	FUNCTION:
ES-H-01	Excavation sump	L
IT-L-HH03	T1	H-H
IT-L-H02	T1	H
IT-L-L01	T1	L
T2-L-HH01	T2	H-H
T3-L-HH03	T3	H-H
T3-L-H02	T3	H
T3-L-L01	T3	L
T4-L-HH03	T4	H-H
T4-L-H02	T4	H
T4-L-L01	T4	L
T5-L-HH03	T5	H-H
T5-L-H02	T5	H
T5-L-L01	T5	L
BS-L-HH01	Bund	H-H

2.2.3 Start Up

The system will have been commissioned and checked by GRS. Ensure all valves are in the correct position and before powering on the panel(s) ensure **all** mains isolators are in the **"OFF"** position.

If the system has been shut down by switching function buttons off, but power has been left on to the panel(s) it is advisable to switch off mains power to the panel, wait a minute or so and then switch it on. This will ensure the PLC has re-set. See locations of panel functions below:

2.2.4 Control panel

When the main isolator on control panel is switched to the **ON** position, the HDMI screen will start up. Figure 1 shows the control panel as installed on site.

Figure 1. Control panel

Check there are no active alarms. (if the alarm symbol is active press it, and the alarm screen will be displayed). follow the instructions on the screen to refresh/reset the current alarms.

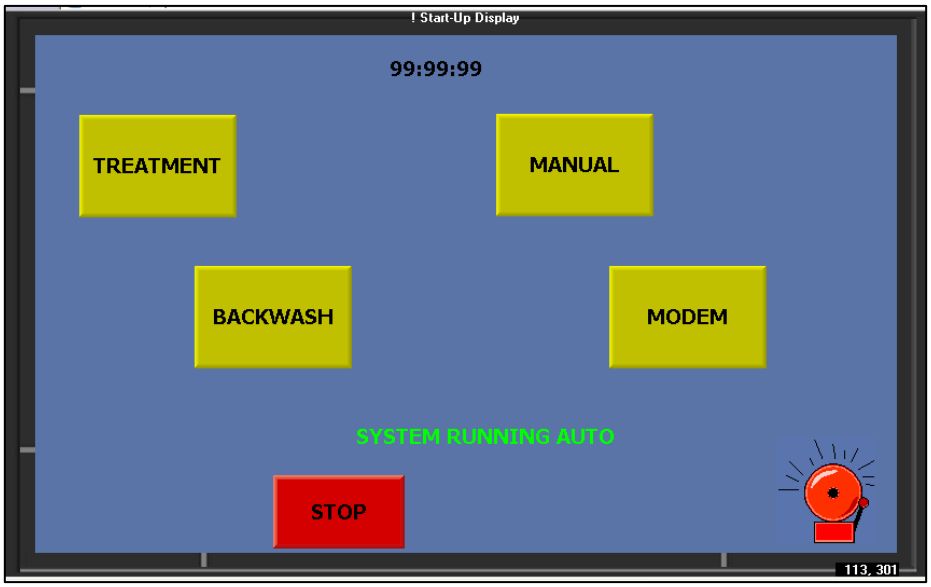


Figure 2. Start-up display

For normal operation, press the ‘treatment’ button.

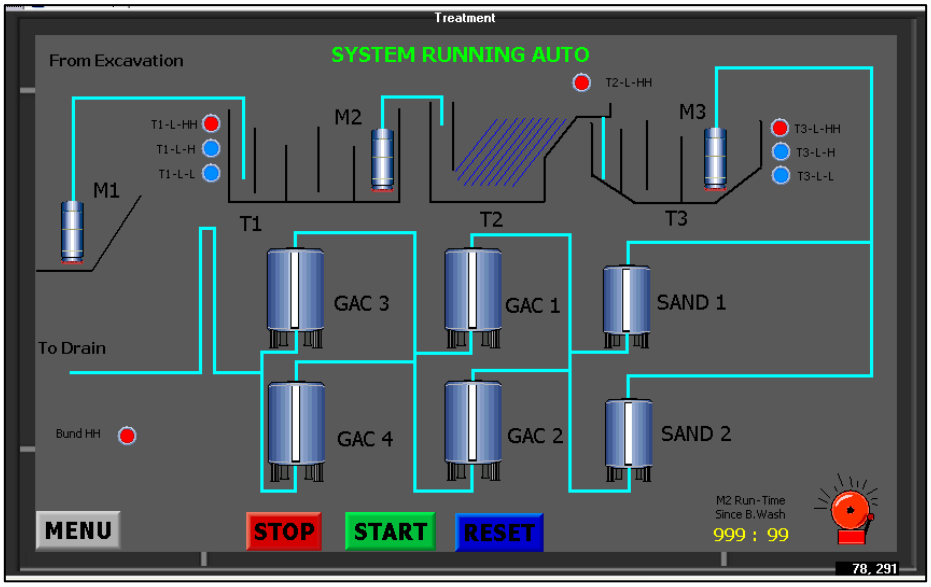


Figure 3. Treatment display

If the alarm symbol is not shown, press green ‘start’ button. WTS is now operational.

If the alarm symbol is shown, press the blue ‘reset’ button. If the alarm symbol stays on the screen, go to alarm page by pressing the alarm symbol and trace the alarm.

When the “emergency stop alarm activated” is present, normally during powering up, this is reset by first pressing the manual start button (green) to the left of the HDMI screen, then the refresh HDMI button in the left-hand corner of the HDMI alarm screen.

Water will now pump from the excavation pump to the WTS. The WTS will gradually fill and when the correct level is reached in each tank the associated pump will start and thereafter function in auto.

The HDMI screen is colour coded for operational parts. Pump colours and status are as follows:

- Red – overload
- Green – operating
- Blue – active

Float switch status is as follows:

- Low (L) and High (H):
  - blue – active
  - clear – inactive
- High-High (H-H):
  - red – active
  - clear – inactive

2.2.5 Emergency Shut Down.

Emergency shutdown procedure is as follows:

a) Pressing the E-stop button on panel or shut off main power supply to plant (at the generator)

b) Identify the reason for the emergency shut down

c) Record what has happened and report to the site manager after ensuring the system is in a safe condition and all personnel are safe and no one is in danger. If necessary, solicit the assistance of others to police the area. For example, to ensure the generator is not restarted. People do not enter the bunded area until a proper procedure has been put in place. Any water in the bund may be contaminated.

d) If the reason is due to large leakage or discharge of water, it is necessary to isolate the sections of the system from which the water leakage is occurring. This will require a logical survey of the system. Once the power has been isolated the pumps will not be active and the volume of any leak will be limited by the volume of the largest tank. The bund is designed to accept volume from the largest tank discharging. However, it is possible water flow can continue due to siphoning. This will depend on the relative levels.

e) Contact GRS as soon as it is safe to do so.

2.2.6 Backwashing

It is advisable to backwash the sand filters regularly. A specific timescale cannot be stated because the time between backwashes depends on the quality of water being processed, particularly the concentration of suspended solids.

Typically, a backwash every two days would be appropriate on this type of application. However, if the flow through the system falls away, of the inlet pressure to the sand filters has been observed to increase by 0.5-0.75 bar then a backwash should be carried out.

Before backwashing it is necessary to ensure the clean water backwash T4 is full and the dirty backwash water T5 has been drained of any settled water.

To empty dirty backwash tank T5:

- Go to the manual screen (figure 4), press the ‘start’ button, a timer icon will appear 5min and start to count down.

Figure 4. Manual screen

- Press ‘M5’ and the decant pump (P5) inside T5 will start to discharge to the inlet of T1
- P5 will run for the 5min count down time, if the level inside T5 is still high repeat the operation until the tank is a low level, the pump (P5) will also shut down on the low float inside T5
- Automatic valve V14 should always keep T4 full while the system is operational via the HH level float in T4
- When T5 has been emptied of water and T4 is full of clean water. Backwashing can begin.
- To backwash SF-01:

- Close valves V3 and V5
- Open Valves V15 and V16
- On the HDMI screen start-up display, press ‘backwash’
- A warning message will display, as shown in Figure 5 below.

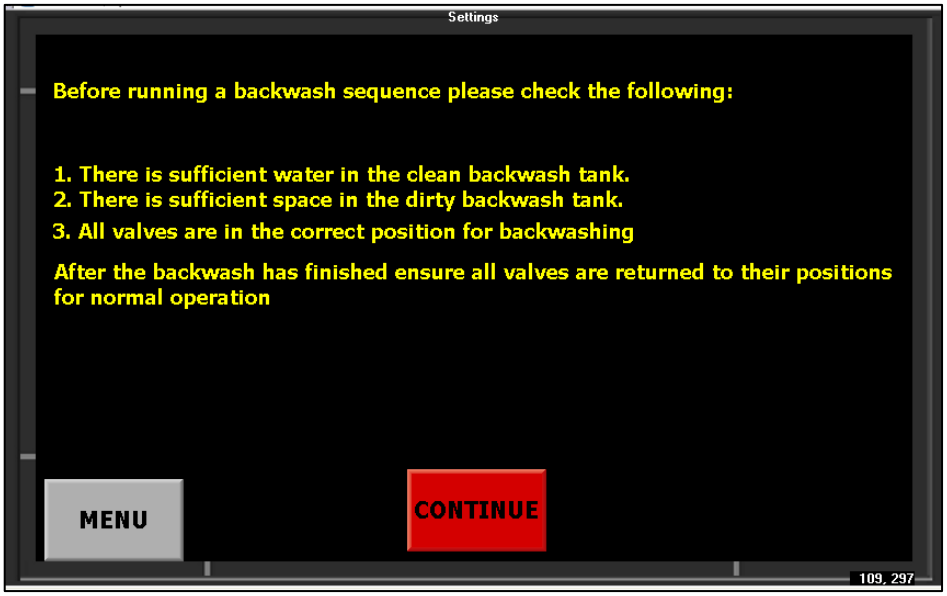


Figure 5. Backwash warning display

- If the conditions shown above are met, press ‘continue’. On the backwash screen shown in Figure 6, press ‘run backwash’.

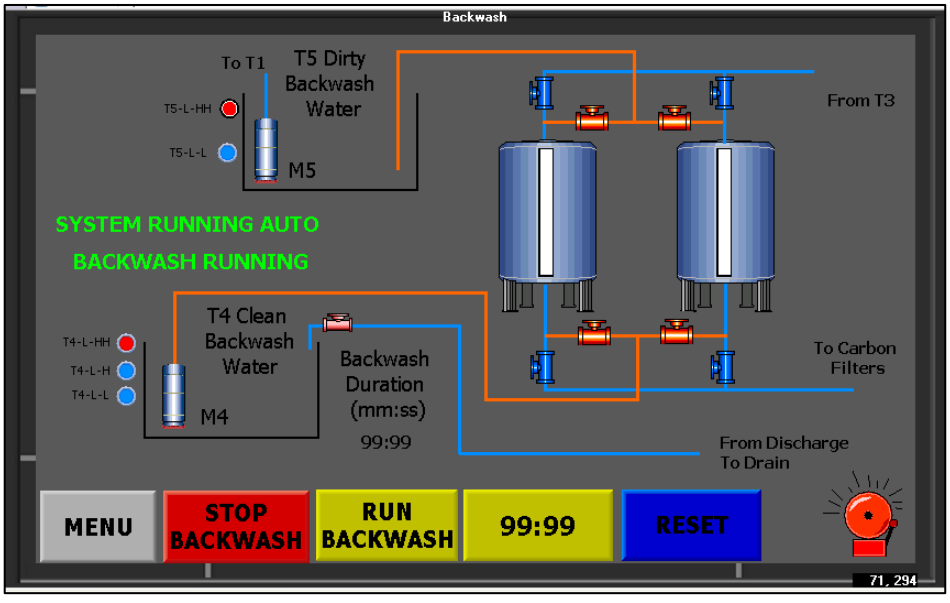


Figure 6. Backwash screen

- Backwash through SF-01
- When T5 is full (or water runs clear), stop backwashing
- Close valves V15 and V16
- Open valves V3 and V5
- Return to normal operation

3 EQUIPMENT

3.1 P1 excavation pump

Valve V1 will be set during installation and commissioning to ensure the correct flow is passing through the system. It is possible for the flow rate entering the water treatment plant will exceed the discharging capacity; this could lead to an overflow. In order to confirm this is not happening, the water level within the inlet tanks should be observed when the pumps are operational.

3.2 Treatment Tanks & pH Dosing

3.2.1 Inlet tank – T1

The inlet tank (Figure 7) receives water from the excavation pump P1. Baffles and weirs located within the tank separate water and free phase oils. Oils are retained in T1, as P2 will only pump water from the base of the tank into tank T2. Contact GRS if oils begin to accumulate in T1. Oils may need to be periodically removed.

Figure 7. Inlet tank T1

3.2.2 Silt Separator – T2

The HB50 (Figure 8) is the primary treatment unit for separation of silts. The bottom hoppers must be emptied on a regular basis to minimise silt carryover into T3, where removal of silts is more labour intensive. The water quality and level of suspended solids carried into the T3 can be used as indicator for when the hopper should be emptied. The use of sticks or rods to physically check the depth to silts of T2 can also be used as an indicator. When the hoppers are confirmed to be filled with silts then cleaning should proceed. The recommended method is to temporarily turn the water

treatment plant off, let sediments settle and connect a vacuum tanker to both of the HB50 hoppers for removal of settled solids/liquids.

Figure 8. Silt Separator

3.2.3 Skip tank - T3

The discharge from the HB50 (T2) feeds by gravity into tank T3. The primary purpose of this tank is to contain the process pump, P3, and house the level detection devices that control the operation of the pump. Other than visually checking levels and by checking the water is of suitable quality, i.e. containing excess solids, no adjustment is required. In the event of excess solids being carried over, stop the system and contact GRS.

Excess solids can carry over if the system is operated at above design flowrate of 36 m^3/hr and/or the excavation pump is lowered to a level where it enters the residual water/solids from the sludge in the bottom of the excavation.

3.2.4 pH Dosing Sysetm

The pH dosing system has been installed to dose hydrochloric acid into the system to bring the pH down to below 10 to allow discharge to the public sewer. The dosing system has been commissioned by GRS and is currently dosing at the required rate which is bringing the pH to within limits. Any maintenance to the pH dosing system will be completed by GRS staff only on planned maintenance visits. Should there be any fault with the system, then we advise that Seymour calls GRS for guidance prior to attempting to interact with the dosing system.

The acid will periodically require replacing, Seymour are to inform GRS when levels within the IBC reach 300litres so more acid can be ordered. GRS advise Seymour that a safety shower is present on site when the pH dosing system is being used.

Acid IBC

pH Dosing Pump

pH probe and monitor

3.3 Filter Vessels

3.3.1 Sand Filters SF-01 and SF-02

The GS1750 sand filters (Figure 9) will gradually increase backpressure as suspended solids are filtered by the sand and accumulate within the top layer of the vessel. The increase in pressure at the inlet pressure gauge is the main indicator to the operator that silts are building up. At this point, a system backwash should be planned. The operating pressures observed during commissioning are listed below. The gradual increase of fines within the sand filter will lead to an increase of suspended solids on the outlet of the sand filter. Sample taps are fitted to the sand filters to allow the engineer to collect samples from the outlet for visual inspections and testing.

It is recommended that regular backwashing of the sand filters is scheduled. Initially, this should be performed daily. When more data is available, it may be possible to extend the duration between backwashes. The sand filters should be backwashed when the pressure at the inlet has risen by 0.5 to 0.75 bar above commissioning readings or every two days (whichever is sooner). It is recommended that pressure during operation does not exceed 2.5 bars.

Note: The increase in backpressure at the sand filter will affect the performance of the transfer pump, which may lead to activation of the H-H levels should the discharging flow rate become lower than the inlet flow rate. The discharge pump flow rate may be adjusted (increased) by opening further the control valves however this is not recommended as continued operation of the pump at high backpressure may result in system failure.

Figure 9. GS1750 Sand filter

3.3.2 Carbon Vessels Gac-01 to Gac-04

A pressure increase in the BI50 carbon vessels indicates that silting, bio fouling or mineral precipitation may have occurred. In the event of an increase in pressure drop across the GAC adsorbers contact GRS. The pressure drop across the filter will vary with flow. Hence, the pressure drop (i.e. the difference between the inlet and outlet reading on the pressure gauges) should always be calculated with the same flow going through the vessels.

The table shows the operational pressure and the point at which a backwash should be performed. Each gauge on the WTP will hold one of these ID numbers and will be clearly labelled. Gauges not included in this table are irrelevant during normal operations.

Table 4. Guidance table for operating pressures during normal operation

Gauge Number	Operation pressure (Bar)	Backwash Trigger Pressure (Bar)
SF1 inlet – PI2		0.5-0.75 bar above baseline
SF1 outlet – PI3		0.5-0.75 bar above baseline
SF2 inlet– PI2		0.5-0.75 bar above baseline
SF2 outlet– PI3		0.5-0.75 bar above baseline
Gac-01 inlet – PI3		0.5-0.75 bar above baseline
Gac-01 outlet– PI4		0.5-0.75 bar above baseline
Gac-02 inlet– PI4		0.5-0.75 bar above baseline
Gac-02 outlet– PI5		0.5-0.75 bar above baseline
Gac-03 inlet – PI		0.5-0.75 bar above baseline
Gac-03 outlet– PI		0.5-0.75 bar above baseline
Gac-04 inlet– PI		0.5-0.75 bar above baseline
Gac-04 outlet– PI		0.5-0.75 bar above baseline

Figure 10 below shows a BI50 carbon vessel as installed as part of the WTS.

Figure 10. BI50 carbon vessel (GAC)

3.3.3 Sampling points - GACs

A sampling tap is located at the base of each filter. The water from these taps represents the water after it has been filtered by the filter sand / activated carbon. It

is good practice to perform a daily visual inspection of the water leaving the GAC filters and to collect samples from each vessel for periodic laboratory assessment of the water quality. As a minimum the water discharged into the foul sewer will have to be checked in accordance with the requirements of the discharge consent. GRS are not responsible for any sampling requirement for the WTS.

It should be noted that the GAC adsorbers operate in series. During early stages of operation of the system, the “lead” vessels (Gac-01 and Gac-02) will remove the organic contaminants to below or close to discharge consent limits. Any contaminant breakthrough will be adsorbed in the “lag” GAC adsorbers (Gac-03 and Gac-04). It is important that analysis is carried out periodically between the GAC adsorbers. As soon as breakthrough is detected from the “lead” vessels, contact GRS as a carbon change will be required. The system should not be operated if the discharge to foul sewer exceeds consent limits. An example sample point is shown in Figure 11 below.

Figure 11. Sample tap at system inlet (T1)

3.4 Clean Water Backwash Tank T4

The clean water backwash tank (Figure 12) holds clean water used to backwash the sand filters. This tank is filled as described in section 2.2.6. This tank is fitted with H-H level protection.

It is advisable to always keep this tank full. This ensures a supply of clean water is always available for an immediate backwash if unusual circumstances occur e.g., high solids loading on the sand filters.

Figure 12. Backwash tank T4

3.5 Dirty Water Backwash Tank T5

The dirty water backwash tank (Figure 13) collects dirty water produced following the backwashing of the sand filters. The dirty water can be re-circulated and processed through the water treatment plant once sediments are settled. Tank T5 is fitted with H-H level protection.

Figure 13. Backwash tank T5

3.6 Discharge water meter

Readings within the discharge water meter(s) should be recorded daily at the beginning of the day and at the end of the day together with the time and date. The daily flow meter readings are a requirement for both the discharge consent and environmental permit. This meter is a critical requirement for the discharge consent, therefore any damage or faults to the meter should be reported to GRS **immediately** so that a new meter can be installed or the original repaired. There are 2No flowmeters which require recording:

- F1 – Inlet flow meter
- F2 – Discharge flow meter

Figure 14 below shows the flowmeter in operation as part of the WTS.

Figure 14. Electromagnetic flowmeter

4 TROUBLESHOOTING

4.1 Lack of flow in normal operation or backwash

Check all valve positions are correct. A list of valve positions for normal operation and backwash is found in section 2.2.2.

Check tanks T1 to T3 for silts or presence of foreign matter i.e. polythene bags, leaves etc. If there is a large amount of silt present within these tanks then cleaning is required. Seymour are to complete clean out of tanks / vessels, please contact GRS if assistance is required.

4.2 High-High (H-H) fault

A system failure due to the presence of high water levels in the tanks will be indicated on the control panel by alarms. If an alarm is present then it may reset, if this doesn't happen then investigation will be needed to determine the fault.

In addition, pumps in the system can be operated in manually in 'hand' mode to empty specific tanks. When in the 'hand' position, the pumps will not be monitored by the level controls and as such constant supervision of tank levels should be implemented to avoid potential tank overflow or damage to pumps due to operating below low level.

Identify causes of H-H level and correct. A backwash may be required prior to restarting the system. Also check system and pipework for obstructions that could be reducing discharge flow rate and check if all vales are in the correct position. Once the fault has been corrected restart the WTS. Contact GRS for guidance.

4.3 Electrical overload/trip

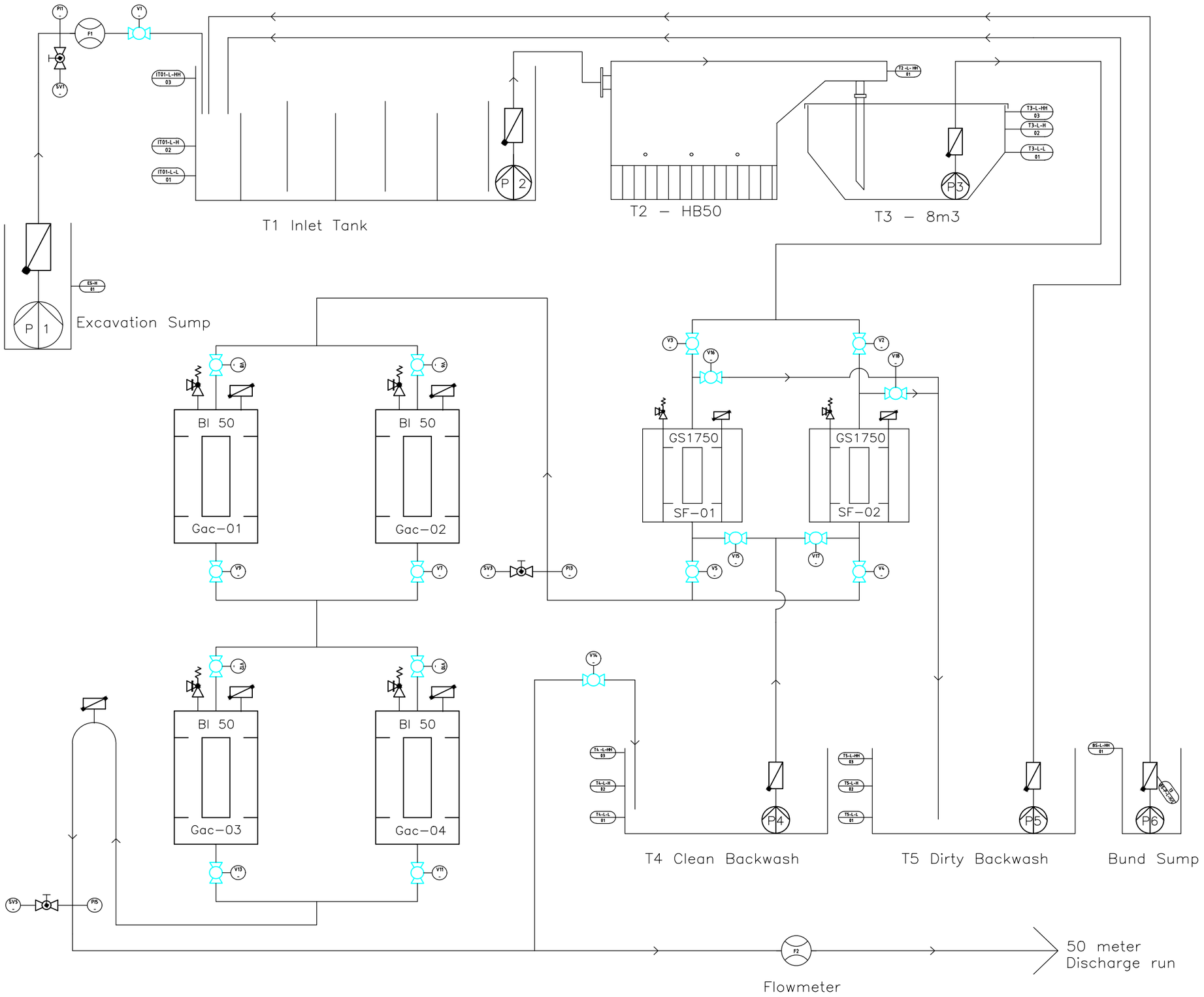
If this fault occurs**,** the red lights present in the pump icons on the control screen. If the red-light icon for pumps are on, please contact GRS.

5 SIGNATURES

I attest that I have read and understood this document.

Name	Company	Signature	Date

APPENDIX A – System PFD



LEGEND

Bund area

15 meters x 15 meters

Rev.	Date	Amendment	Drawn	Chkd.	Appd.
00	16.03.2021	-	RD	FC	-

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Client: Seymour Civil Engineering

Project Title: Praire Excavation Water Treatment System

Drawing Title: Process Flow Diagram

Drawn	Date	Checked	Date	Approved	Date
RD	16.03.21	FC	16.03.21	-	-

Dimensions	Scale	Original Size
m	NTS	A3

Project Number	Drawing Number
170988	Figure 1

Drawing File	Rev
170988 - PFD - rev 00	00