

**Fairfield**

**Water Treatment Plant**

**Operation & Maintenance Manual**

**0500 Biological Treatment**

**0500 Biological Treatment**

**Operation Manual**



# 1. General



**Fairfield Water Treatment Plant  
Operation Manual**



## **1. FAIRFIELD PLANT OPERATION**

### **1.1. 0500 Biological Treatment**

*0500 Alum Dosing*

*0500 Bioreactor Aeration*

*0500 Waste Activated Sludge*

*0500 Recycle & RAS*

#### **1.1.1. 0500 References**

##### **1.1.1.1. 0500 P&ID**

##### **Fairfield WRP Biotreat P&ID Drawings**

7107-I-DWG-5008

7107-I-DWG-5012

7107-I-DWG-5024

##### **1.1.1.2. 0500 Equipment Layout**

##### **Fairfield WRP Biotreat Site Layout Drawings**

##### **Fairfield WRP Biotreat MBR Layout & Piping & Air Supply & Piping Under Ground**

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## Fairfield Water Treatment Plant Operation Manual



### 1.1.1.3. 0500 Citect Screens

#### Plant Overview

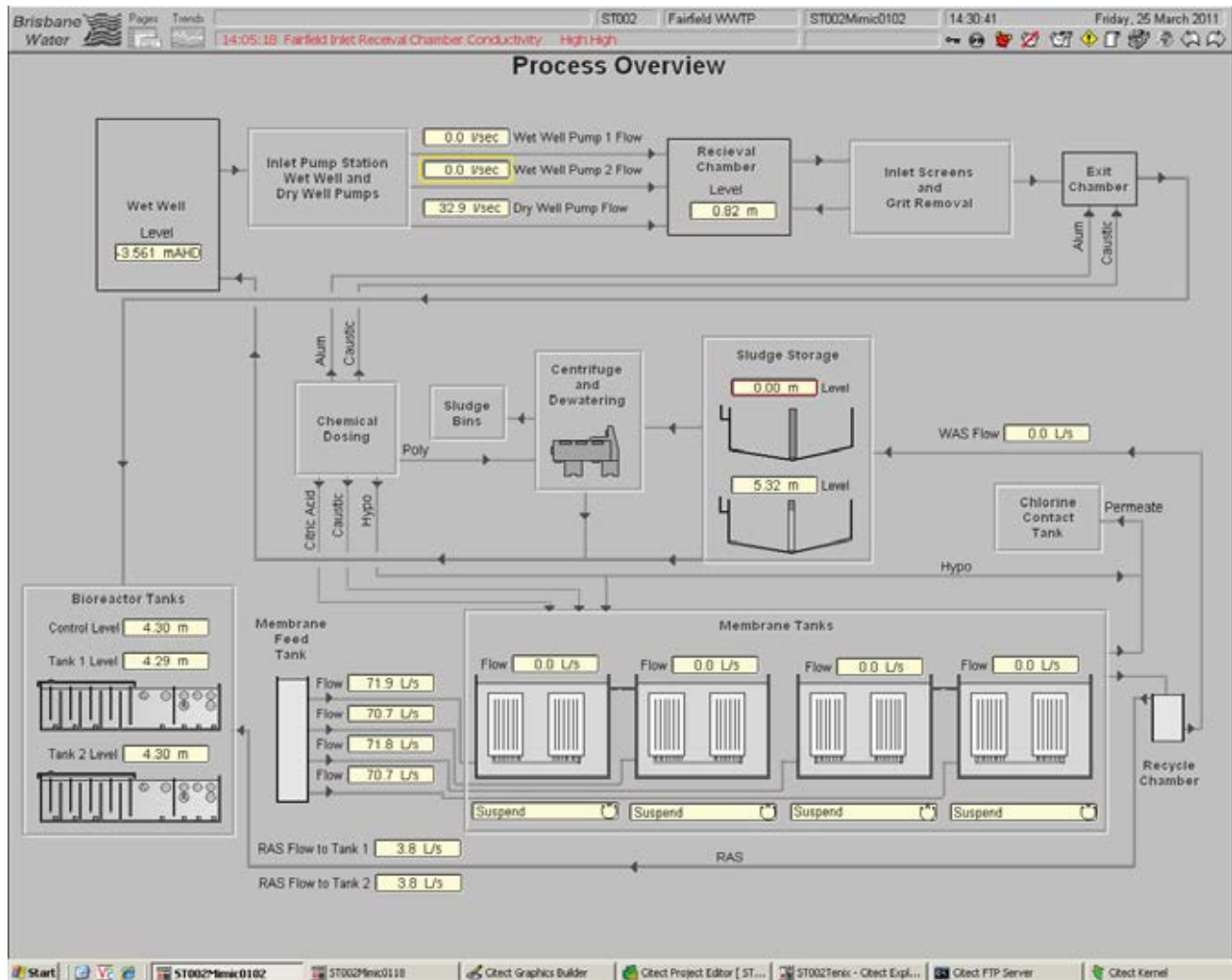




## Fairfield Water Treatment Plant Operation Manual



### Process Overview



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## Bioreactor Tanks FIT0630001

**ST002BIO01FIT0630001**

**Bioreactor Tank  
No.1 RAS Flow**

Status

3.1 L/s	Value
202.967 kL	Total
328.380 kL	Total Y'day

Alarm Setpoint	Alarm
5.0 L/s	High High
90.0 L/s	High
10.0 L/s	Low
1.0 L/s	Low Low
	Reverse
	Signal OK
	Profibus Available

Reset

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## Bioreactor Tanks FIT0630002

**ST002BIO01FIT0630002**

**Bioreactor Tank  
No.2 RAS Flow**

Status

3.1 L/s	Value
203.806 kL	Total
323.318 kL	Total Y'day

<u>Alarm Setpoint</u>	<u>Alarm</u>
5.0 L/s	High High
30.0 L/s	High
10.0 L/s	Low
1.0 L/s	Low Low
	Reverse
<div style="border: 1px solid blue; padding: 2px; display: inline-block; background-color: #4F81BD; color: white;">Reset</div>	Signal OK
	Profibus Available

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## Bioreactor Tanks AIT0511001

**ST002BIO01AIT0511001**

**Anoxic/Aerobic  
Tank No.1 DO**

**Status**

0.41 mg/L Value

Total

Total Yday

**Alarm Setpoint**      **Alarm**

8.00 mg/L High High

7.00 mg/L High

0.00 mg/L Low

0.00 mg/L Low Low

Reverse

Reset

Signal OK

Profibus

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### Bioreactor Tanks LIT0511002

**ST002BIO01LIT0511002**

**Bioreactor Tank  
No.1 Level**

Status

4.33 m	Value
	Total
	Total Yday

<u>Alarm Setpoint</u>	<u>Alarm</u>
4.63 m	High High
4.50 m	High
1.20 m	Low
1.00 m	Low Low
	Reverse

Signal OK  
 Profibus  
 Available



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## Bioreactor Tanks AIT0512001

**ST002BI001AIT0512001**

**Anoxic/Aerobic  
Tank No.2 DO**

Status

0.06 mg/L Value

Total

Total Yday

Alarm Setpoint      Alarm

8.00 mg/L High High

7.00 mg/L High

0.00 mg/L Low

0.00 mg/L Low Low

Reverse

Signal OK

Profibus Available



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### Bioreactor Tanks LIT0512002

**ST002BI001LIT0512002**

**Bioreactor Tank  
No.2 Level**

Status

4.32 m Value

Total

Total Yday

Alarm Setpoint      Alarm

4.63 m High High

4.50 m High

1.20 m Low

1.00 m Low Low

Reverse

Signal OK

Profibus Available

Reset

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Bioreactor Tanks AIT0511005a

**ST002BIO01AIT0511005A**

**Bioreactor Tank  
No.1 ORP**

Status

326.4 mV Value

Total

Total Yday

Alarm Setpoint      Alarm

750.0 mV High High

480.0 mV High

-750.0 mV Low

-1000.0 mV Low Low

Reverse

Signal OK

Profibus Available

Reset

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## Fairfield Water Treatment Plant Operation Manual



### Bioreactor Tanks AIT0511003a

**ST002BIO01AIT0511003A**

**Bioreactor Tank  
No.1 DO**

Status

0.95 mg/L

Value

Total

Total Yday

<u>Alarm Setpoint</u>	<u>Alarm</u>
8.00 mg/L	High High
7.00 mg/L	High
0.00 mg/L	Low
0.00 mg/L	Low Low
	Reverse

Reset

Signal OK

Profibus

Available

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## Fairfield Water Treatment Plant Operation Manual



### Bioreactor Tanks AIT0511003b

**ST002BI001AIT0511003B**

**Bioreactor Tank  
No.1 Temp**

Status

28.23 oC Value

Total

Total Yday

Alarm Setpoint      Alarm

35.00 oC High High

30.00 oC High

10.00 oC Low

15.00 oC Low Low

Reverse

Signal OK

Profibus Available

Reset

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#### Bioreactor Tanks AIT0511004

**ST002BIO01AIT0511004**





**Bioreactor Tank  
No.1 MLSS**

Status

6100 mg/L Value

Total

Total Y/day

Alarm Setpoint      Alarm

12000 mg/L High High


11000 mg/L High


3000 mg/L Low

2000 mg/L Low Low

Reverse

Signal OK


 Profibus  
Available



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**Fairfield Water Treatment Plant**  
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Bioreactor Tanks AIT0512005a

**ST002BIO01AIT0512005A**





**Bioreactor Tank  
No.2 ORP**

Status

326.4 mV Value

Total

Total Y/day

Alarm Setpoint      Alarm

950.0 mV      High High

900.0 mV      High

-750.0 mV      Low


-1000.0 mV      Low Low

Reverse

Signal OK

Profibus Available

Reset



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#### Bioreactor Tanks AIT0511005b

**ST002BIO01AIT0511005B**





**Bioreactor Tank No.1 pH**

Status

6.716 pH Value


Total

Total Y'day

Alarm Setpoint	Alarm
8.500 pH	High High
90.000 pH	High
10.000 pH	Low
6.000 pH	Low Low
	Reverse
	Signal OK
	Profibus Available

Reset



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### Bioreactor Tanks AIT0512003a

**ST002BIO01AIT0512003A**

**Bioreactor Tank  
No.2 DO**

Status

0.29 mg/L Value

Total

Total Yday

Alarm Setpoint      Alarm

8.00 mg/L High High

7.00 mg/L High

0.00 mg/L Low

0.00 mg/L Low Low

Reverse

Signal OK

Profibus Available

Reset



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Bioreactor Tanks AIT0512003b

**ST002BIO01AIT0512003B**





**Bioreactor Tank  
No.2 Temp**

Status

28.04 oC Value

Total

Total Y/day

Alarm Setpoint      Alarm

35.00 oC High High

30.00 oC High

10.00 oC Low


15.00 oC Low Low

Reverse

Signal OK

Profibus Available

Reset



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### Bioreactor Tanks AIT0512004

**ST002BIO01AIT0512004**

**Bioreactor Tank  
No.2 MLSS**

Status

6279 mg/L Value

Total

Total Yday

Alarm Setpoint      Alarm

12000 mg/L High High

90 mg/L High

10 mg/L Low

3000 mg/L Low Low

Reverse

Signal OK

Profibus Available

Reset

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### Bioreactor Tanks AIT512005b

**ST002BIO01AIT0512005B**

**Bioreactor Tank  
No.2 pH**

Status

6.518 pH Value

Total

Total Y'day

Alarm Setpoint	Alarm
8.500 pH	High High
90.000 pH	High
10.000 pH	Low
6.000 pH	Low Low
	Reverse
	Signal OK
	Profibus Available

Reset

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#### Bioreactor Tanks FIT0520001

ST002BIO01FIT0520001

**Bioreactor Tank**  
**No.1 Air Flow**

Status

0 Nm3/h	Value
0 Nm3	Total
0 Nm3	Total Y'day

<u>Alarm Setpoint</u>	<u>Alarm</u>
1000 Nm3/h	High High
900 Nm3/h	High
0 Nm3/h	Low
0 Nm3/h	Low Low
	Reverse

Reset

Signal OK

Profibus

Available

+

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### Bioreactor Tanks FIT0520002

**ST002BIO01FIT0520002**

**Bioreactor Tank  
No.2 Air Flow**

Status

0 Nm <sup>3</sup> /h	Value
1942 Nm <sup>3</sup>	Total
2657 Nm <sup>3</sup>	Total Y'day

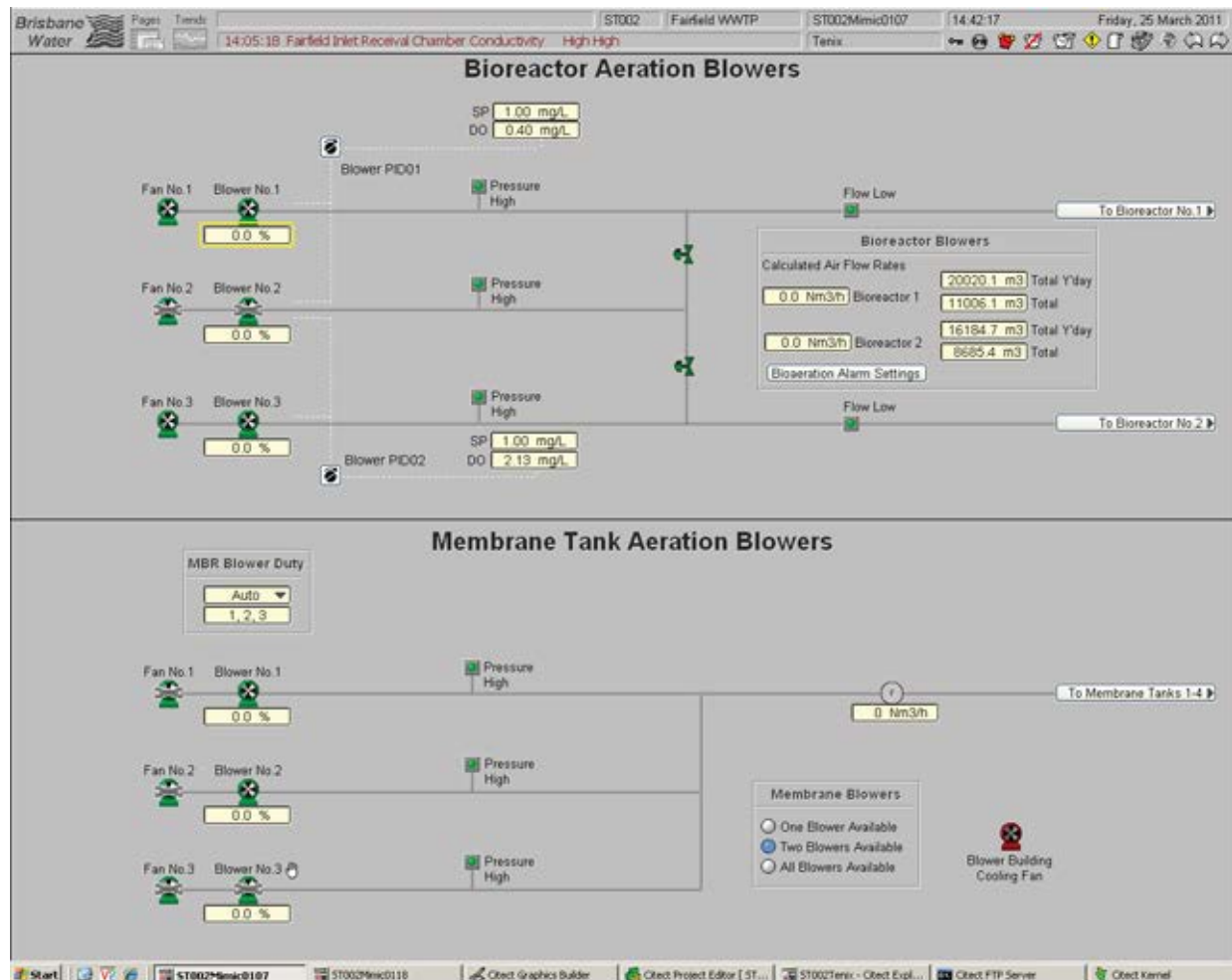
Alarm Setpoint	Alarm
1000 Nm <sup>3</sup> /h	High High
900 Nm <sup>3</sup> /h	High
0 Nm <sup>3</sup> /h	Low
0 Nm <sup>3</sup> /h	Low Low
	Reverse
	Signal OK
	Profibus Available



## Fairfield Water Treatment Plant Operation Manual



### Blowers



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Bioaeration Alarm Settings

**ST002PopupBioAerationAlarmSettings**

**Bioaeration Alarm Settings**

---

**Blower Speed Alarm Settings**

Blower Low Speed Watchdog Timer SP

Blower 1 Low Speed Alarm Elapsed Time

Blower 2 Low Speed Alarm Elapsed Time

Blower 3 Low Speed Alarm Elapsed Time

☐ Blower 1 Low Speed Alarm

☐ Blower 2 Low Speed Alarm

☐ Blower 3 Low Speed Alarm

---

**Aeration Deviation Alarm Settings**

PID Deviation Alarm Time SP

PID01 Deviation Alarm Elapsed Time

PID02 Deviation Alarm Elapsed Time

☐ PID01 Output Deviation Alarm

☐ PID02 Output Deviation Alarm

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#### Blowers AIT0511003a

Bioreactor Tank 1 - DO

**ST002BIO01AIT0511003A**

**Bioreactor Tank  
No.1 DO**

Status

0.65 mg/L Value

Total

Total Y'day

Alarm Setpoint      Alarm

8.00 mg/L      High High

7.00 mg/L      High

0.00 mg/L      Low

0.00 mg/L      Low Low

Reverse

Signal OK

Profibus

Available

Reset



## Fairfield Water Treatment Plant Operation Manual



### Blowers AIT0512003a

Bioreactor Tank 2 - DO

**ST002BIO01AIT0512003A**





**Bioreactor Tank  
No.2 DO**

Status

0.86 mg/L Value

Total

Total Yday

Alarm Setpoint      Alarm

8.00 mg/L High High


7.00 mg/L High

0.00 mg/L Low


0.00 mg/L Low Low

Reverse

Signal OK



Profibus Available

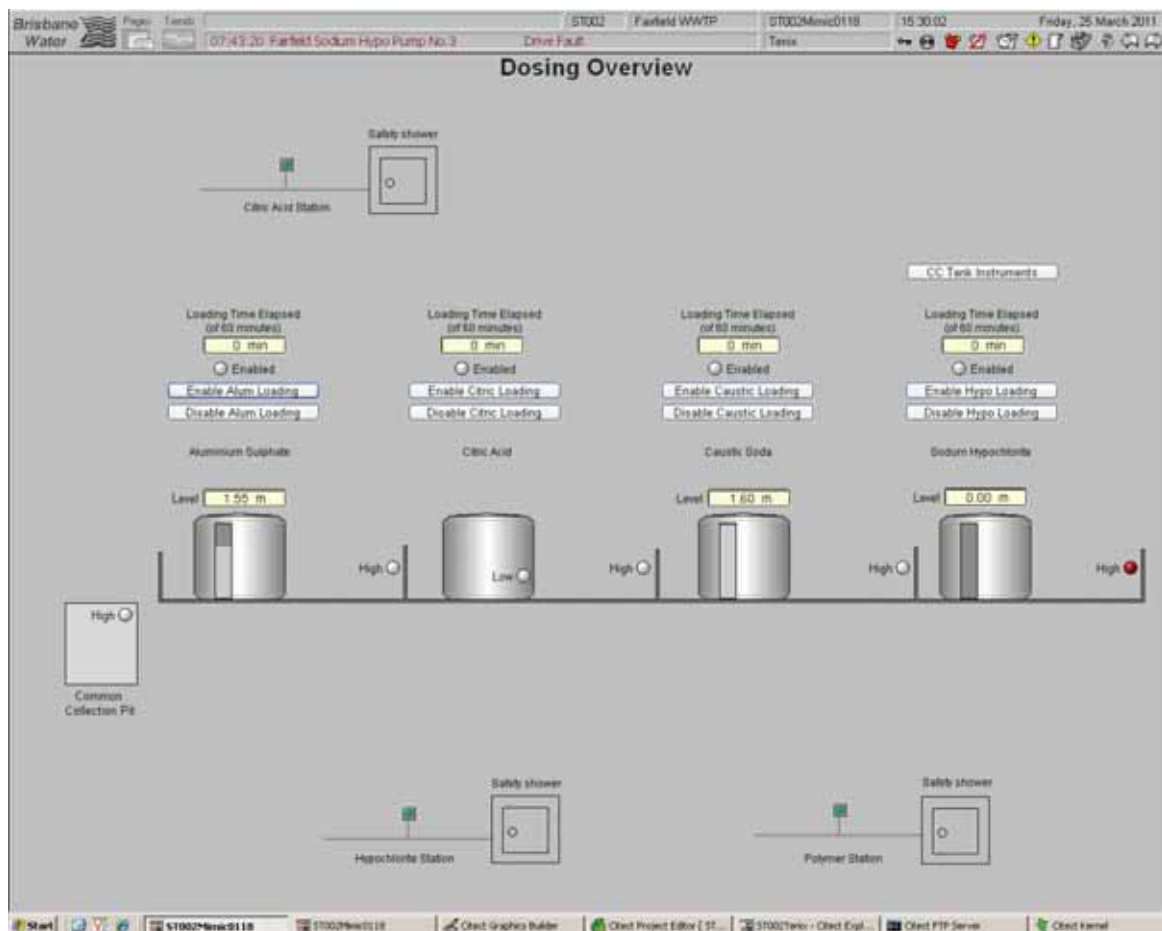




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### Dosing Overview



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### Dosing Overview LIT0584001

**ST002D0505LIT0584001**





**Alum Tank Level**

Status

1.55 m Value

Total

Total Yday

Alarm Setpoint      Alarm

2.20 m High High

2.15 m High

0.30 m Low


0.20 m Low Low

Reverse

Signal OK

Profibus Available

Reset



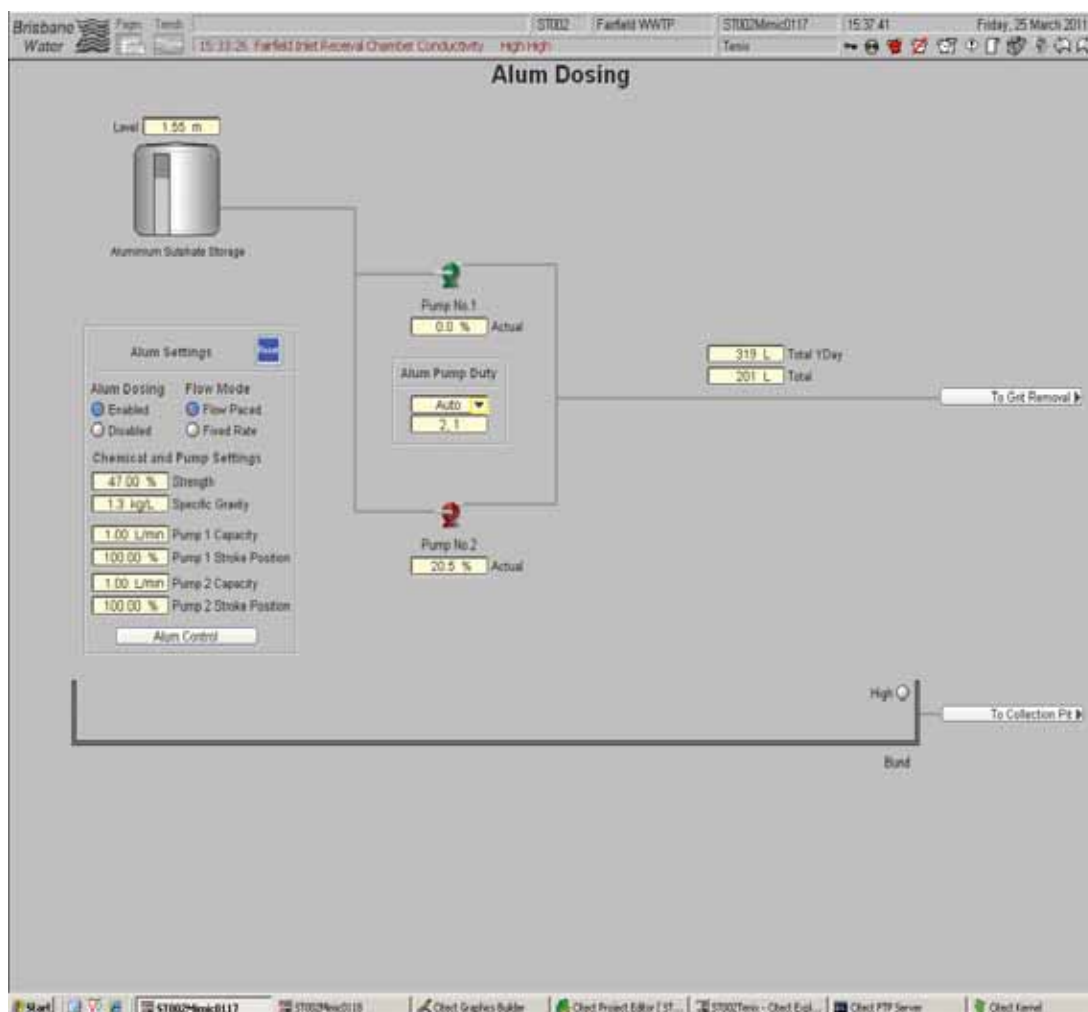
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## Fairfield Water Treatment Plant Operation Manual



### Alum Dosing





## Fairfield Water Treatment Plant Operation Manual



### Alum Dosing settings

**ST002PopupAlumDosing**

**Alum Dosing Settings**

**Alum Dosing**

☒ Enable Alum Dosing

☐ Disable Alum Dosing

**Flow Paced Dosing**

☒ Enable Flow Paced

Dose Concentration

Required Flow Rate

**Fixed Rate Dosing**

☐ Enable Fixed Rate

Flow Rate	Time
<input type="text" value="0.12 L/min"/>	00:00-01:00
<input type="text" value="0.12 L/min"/>	01:00-02:00
<input type="text" value="0.12 L/min"/>	02:00-03:00
<input type="text" value="0.12 L/min"/>	03:00-04:00
<input type="text" value="0.12 L/min"/>	04:00-05:00
<input type="text" value="0.12 L/min"/>	05:00-06:00
<input type="text" value="0.12 L/min"/>	06:00-07:00
<input type="text" value="0.12 L/min"/>	07:00-08:00
<input type="text" value="0.12 L/min"/>	08:00-09:00
<input type="text" value="0.12 L/min"/>	09:00-10:00
<input type="text" value="0.12 L/min"/>	10:00-11:00
<input type="text" value="0.12 L/min"/>	11:00-12:00
<input type="text" value="0.12 L/min"/>	12:00-13:00
<input type="text" value="0.12 L/min"/>	13:00-14:00
<input type="text" value="0.12 L/min"/>	14:00-15:00
<input type="text" value="0.12 L/min"/>	15:00-16:00
<input type="text" value="0.12 L/min"/>	16:00-17:00
<input type="text" value="0.12 L/min"/>	17:00-18:00
<input type="text" value="0.12 L/min"/>	18:00-19:00
<input type="text" value="0.12 L/min"/>	19:00-20:00
<input type="text" value="0.12 L/min"/>	20:00-21:00
<input type="text" value="0.12 L/min"/>	21:00-22:00
<input type="text" value="0.12 L/min"/>	22:00-23:00
<input type="text" value="0.12 L/min"/>	23:00-24:00
<input type="text" value="0.12 L/min"/>	Current Fixed Rate



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### Biosolids Storage WAS Control

**ST002PopupWASControl**

**Wasting Activated Sludge Control**

95.0 kL

Daily Maximum Flow

100.041 kL

Current Total

☐ Enable Tank 1
☒ Disable Tank 1

☒ Enable Tank 2
☐ Disable Tank 2

100 L

WAS Flow Total This Week

610 L

WAS Flow Total Last Week

**Enable WAS Time**

**Start Time \***

**Run Time**

☒ Enable Time 1
☐ Disable Time 1

☒ Enable Time 2
☐ Disable Time 2

☒ Enable Time 3
☐ Disable Time 3

☒ Enable Time 4
☐ Disable Time 4

☒ Enable Time 5
☐ Disable Time 5

☒ Enable Time 6
☐ Disable Time 6

7 hrs

0 min

9 hrs

0 min

11 hrs

0 min

13 hrs

0 min

15 hrs

0 min

17 hrs

0 min

60 min

60 min

60 min

60 min

60 min

60 min

☒ Sequence Permitted

Elapsed Time

0 min

**Sequence Permissives**

☒ WAS Pump 1 Available
☒ WAS Pump 2 Available

☒ WAS Pump 1 Remote
☒ WAS Pump 2 Remote

☒ WAS Pump 1 Auto
☒ WAS Pump 2 Auto

☐ Tank 1 Transfer Enabled
☒ Tank 2 Transfer Enabled

☐ Tank 1 WAS Valve Open
☒ Tank 2 WAS Valve Open

☒ Tank 1 Level High High OK
☒ Tank 2 Level High High OK

☒ Train 1 Production
☐ Train 1 Standby
☐ Train 1 Recycle

☒ Train 2 Production
☐ Train 2 Standby
☐ Train 2 Recycle

☒ Train 3 Production
☐ Train 3 Standby
☐ Train 3 Recycle

☒ Train 4 Production
☐ Train 4 Standby
☐ Train 4 Recycle

☒ Sequence Permitted

\* Note: WAS start times must be entered in ascending order from beginning to end of day



## Fairfield Water Treatment Plant Operation Manual



### Biosolids Storage FIT0441001

**ST002B5501FIT0441001**

**WAS Stream Flow**

Status

0.0 L/s	Value
100.041 kL	Total
100.038 kL	Total Y'day

Alarm Setpoint	Alarm
10.0 L/s	High High
90.0 L/s	High
10.0 L/s	Low
0.0 L/s	Low Low
	Reverse

Signal OK  
 Profibus  
 Available

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## Fairfield Water Treatment Plant Operation Manual



Biosolids Storage FIT0441002

**ST002B5501FIT0441002**

**Digester 1&2  
Supernatant Flow**

Status

0.0 L/s	Value
0.000 kL	Total
11.530 kL	Total Y'day

Alarm Setpoint	Alarm
95.0 L/s	High High
30.0 L/s	High
10.0 L/s	Low
1.0 L/s	Low Low
	Reverse
	Signal OK
	Profibus
	Available

Reset

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## Fairfield Water Treatment Plant Operation Manual



### Trends - Bioreactor 1



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## Fairfield Water Treatment Plant Operation Manual



### Trends - Bioreactor 2



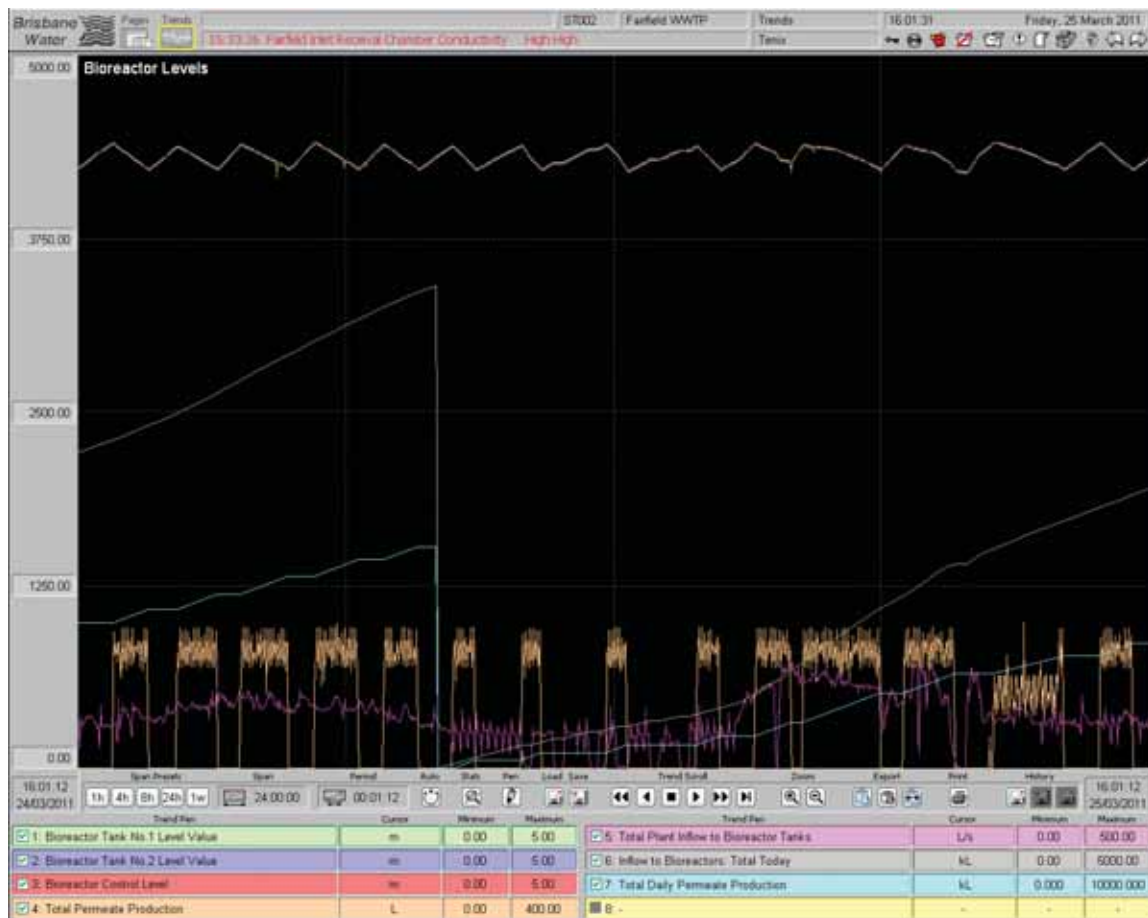
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## Fairfield Water Treatment Plant Operation Manual



### Trends - Bioreactor Levels



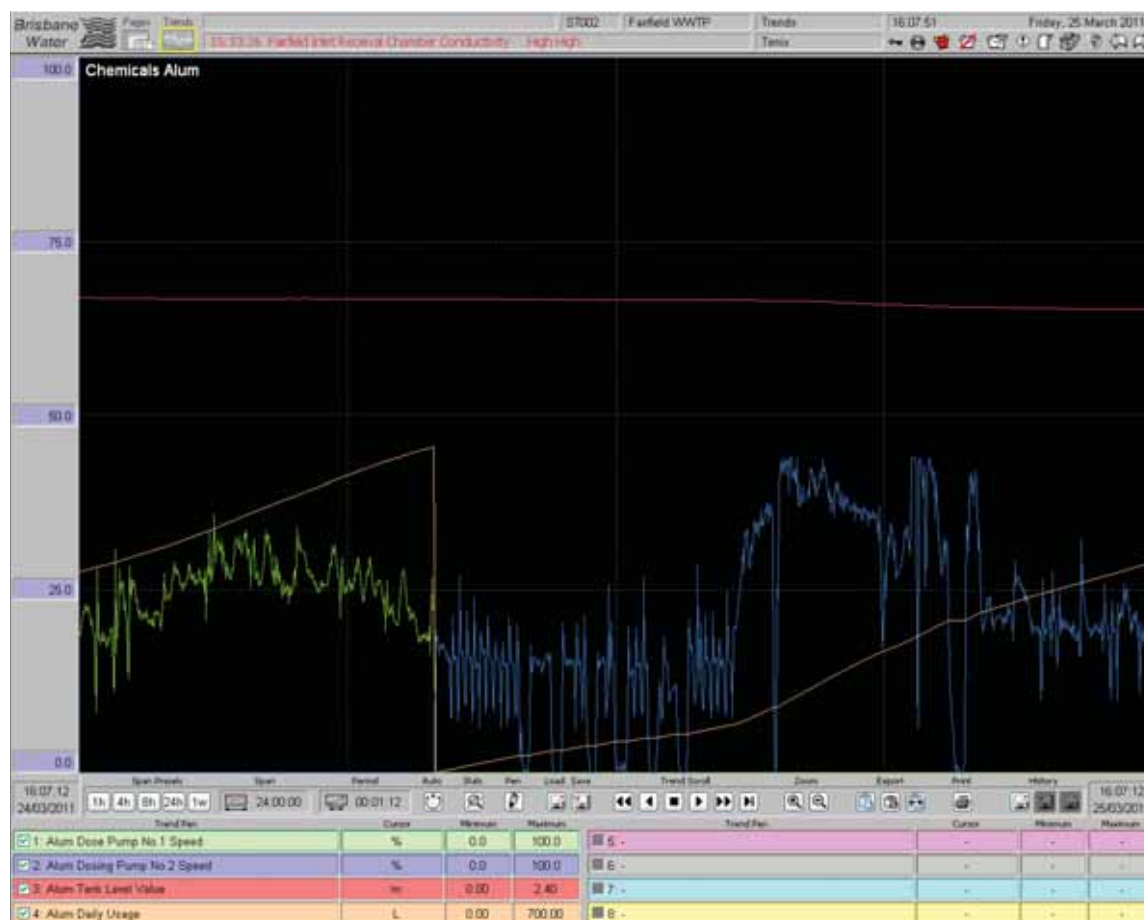
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## Fairfield Water Treatment Plant Operation Manual



### Trends - Chemicals Alum



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## Fairfield Water Treatment Plant

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#### 1.1.2. 0500 Routine Operation

##### 1.1.2.1. 0200 Process Description

#### 0500 Alum Dosing

##### **Aluminium Sulphate Dosing**

The Operator is to nominate the appropriate Alum Dosing concentration and enable the Dosing Pumps. There are two dosing pumps in arranged in Duty/Standby configuration and the Alum Storage Tank has a capacity of 20,000L.

Alum is dosed into the wastewater downstream of the Grit Chamber at the Inlet Works via the respective metering pump using flow pacing from the Net Flow calculated from the sum of the Inlet Flowmeters (FE0111001, FE0111002 and FE0111003).

Aluminium when dosed into water chemically removes inorganic phosphate by precipitating it as aluminium phosphate. The precipitate settles and is removed with Sludge Wasting (WAS). Aluminium is normally delivered as a solution of hydrated aluminum sulphate (alum) with a concentration of 47-48% w/w. The reaction with phosphates is as follows:



#### 0500 Bioreactor Aeration

Dissolved oxygen and mixing is needed for the aerobic biological treatment of the wastewater. Air is blown into the Bioreactor with a positive displacement type Blower through grids of diffusers positioned on the bottom of the aerobic/anoxic tank and the Bioreactor Tank. This produces fine bubble aeration with high oxygen transfer suitable for the biological reactions. Air from the blowers is also provided for a short period of time on a daily basis to the Bioselector Tank. This assists with scum removal and breaks up dried sludge on the surface of the bioreactor.

Three (3) variable speed Bioreactor Blowers are installed in a Duty/Duty/Standby arrangement with two (2) Actuated Valves to isolate the Standby Blower. There is an actuated valve for each of the anoxic/aerobic zones of each bioreactor to allow selective aeration of this zone. In each Bioreactor Tank, there are three (3) Aeration Grids with stainless steel lateral pipes connected to the aeration header. There is a single grid in each Aerobic/Anoxic Tank. Each grid is weighed down with concrete ballast and provided with lifting cables to facilitate removal.

The Bioreactor Tank can be aerated continuously or intermittently on a timer basis. The Operator can set a dissolved oxygen setpoint and the Duty Blowers vary speed as required or, the Operator can set the speed of the blowers at a constant value. The Aerobic / Anoxic Tank is aerated intermittently or left without aeration (anoxic). The Operator can set durations for the valve to be opened and closed, however, aeration to the anoxic/aerobic tank can only be provided when the main Bioreactor Tank is receiving aeration.

#### 0500 Waste Activated Sludge

The mixed liquor for wasting is drawn from the Recycle Chamber at the head of the plant. There are two waste activated sludge (WAS) pumps in duty/standby configuration and one flow element to control and measure the WAS flow to the Aerobic Sludge Storage Tanks.

WAS transfer is a time based operation and can be selected for a nominal wasting start time and interval every day to achieve consistent wasting.

The biological treatment of wastewater involves the degradation of waste products (nitrogen, phosphorus, organics) and the growth of micro-organism. As the micro-organisms grow, excess biomass (activated sludge) is produced and this must be removed before it is detrimental to the process. This is achieved by drawing mixed liquor from the bioreactor system and pumping it to existing Aerobic Sludge Storage Tanks.



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#### 0500 Recycle & RAS

As the wastewater flows from the inlet of the bioreactor tank to the outlet of the bioreactor tank, it is treated by the activated sludge process and then filtered by the membrane filtration units. In order to operate efficiently, the membranes need a mixed liquor flow rate of approximately four times the flow rate of permeate. Lower ratios result in excessive thickening of the mixed liquor in the membrane tanks which can consequently lead to fouling of the membranes.

There are four recycle pumps and four membrane tanks. The mixed liquor overflows from the top of the membrane tanks back to the bioreactor via pipes that run along the bottom centre wall of the bioreactor back to the Recycle Chamber. From the Recycle Chamber the mixed liquor flows by gravity back to the Anaerobic Zone of the bioreactor system.

A sub-stream of mixed liquor recycle flow is directed to the bioselector as RAS via gravity flow. This RAS flow can be adjusted manually by gate valves (HV\_-0511-001, HV\_-0512-001) and flow monitored by magflow meters FE0630001 and FE0630002.

The mixed liquor recycle is critically interlocked with Production Mode and failure of the recycle pump will shutdown the Production mode for that given

MBR train. The recycle flow rate is controlled by a flow rate setpoint for each flux mode; hence the recycle pump varies speed as required depending on the flux mode in operation.

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#### 1.1.2.2. 0500 Operating Envelopes

##### Recycle Pump Or Compressor

##### **Membrane Aerating On Recycle Pump Failure Or Compressor Failure**

The following procedures enable membrane aeration when a recycle pump fails or a compressor fails:

##### **Recycle Pump**

When Membrane Train is in Auto and a Recycle Pump fails the Membrane Train turns OFF and none of the membrane train modes are shown as Available on the SCADA screen.

Note: The Recycle Pump is considered Unavailable if the pump is not in Auto or Remote.

##### **Procedure**

- 1) Ensure the Permeate Valve is Closed. The Permeate Valve should already be closed as the Membrane Train is not in production; If it is not closed, ensure that valve is closed.
- 2) Close the Manual Knife-gate Valve located along the Membrane Tank Feed Line to prevent the Membrane Tank from draining to empty.
- 3) Fill the Membrane Tank until the membrane is fully submerged.
- 4) Isolate the Recycle Pump at the MCC or put the Recycle Pump into Manual mode in SCADA.
- 5) Switch the Membrane Train to Manual mode on SCADA.
- 6) Note that the Safe Aeration Mode Available indication turns ON for that train. (The membrane train needs to be in manual mode and the recycle pump must not be available for this mode to be available)
- 7) Activate the Safe Mode Aeration at the SCADA Screen.
- 8) The Membrane Train is now included in the normal Membrane Aeration Cycle.

##### **Compressor Failure**

When the Compressor Fails or the Compressed Air Un-available signal is activated it is most likely the aeration valves will be Open state as they are Fail Open type valves. This procedure assumes that Compressor has Failed and the Aeration Valves and the Permeate Valves are in there Open state.

When compressed air is not Available it is possible to continue production without flooding, ventilation or cleaning as long as the;

- Recycle Pump is Available and Healthy
- Permeate Pump is Available and Healthy
- Permeate Valve Open Feedback is received and
- Aeration Valve Open Feedback is received.

##### **Procedure**

- 1) Select Manual mode for all Membrane Trains.
- 2) Disable De-aeration and Ventilation for all Membrane Trains.
- 3) Select Manual mode for Cleaning ensuring that the Automatic Daily Clean is Deactivated.
- 4) Select Production Mode for all healthy Membrane Trains.





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- 5) Check all healthy Membrane Trains now continue producing permeate as normal.
- 6) Note that when three or more Membrane Trains are Available, two Blowers will run as they do in Normal Continuous Aeration mode.

#### 1.1.2.3. 0500 Control

##### Interlocks

##### **Aluminium Sulphate Dosing**

If alum dosing pumps are ON and no flow is detected for >10 sec then the sequence will disable due to alum low flow alarm.

The alum flow pacing calculation should be performed every 20 sec and a new dosing rate selected if required.

##### **0500 Bioreactor Aeration**

If AE0511003 faults: its value is forced low to force the blowers to provide excess air.

If AE0512003 faults: its value is forced low to force the blowers to provide excess air.

If FS0520001 detects low air flow rate: BL-0520-002 and BL-0520-002 critical interlock is activated.

If FS0520002 detects low air flow rate: BL-0520-003 and BL-0520-002 critical interlock is activated.

##### **0500 Waste Activated Sludge**

Sludge Storage Tank 1 High High level — inhibit WAS transfer to Sludge Storage Tank 1

Sludge Storage Tank 2 High High level - inhibit WAS transfer to Sludge Storage Tank 2

##### **0500 Recycle & RAS**

If FEOS4000X faults: its value is forced low so PU\_-0540-00X critical interlock is activated.

#### 1.1.3. 0500 Non-routine Operation

Revise this section over a period of 1 year operations

##### 1.1.3.1. Non-routine Events

##### Sample Locations

[Fairfield WRP Biotreat 0500 Bio/Treat Photos](#)

[Fairfield WRP Biotreat Sampling Probes MBR](#)

AsBuilt



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Alarms – High Priority

*Setpoints | Controls Parameters – Refer to SCADA Screen for Details*

**0500 Biological Treatment Process Area**

TAG	Description	Category
ST002BIO01LIT0511002dsHiHi	High High	1
ST002BIO01LIT0512002dsHiHi	High High	1
ST002MBR01AUTOdsTrain1Alarm	In Auto but not in Production	1
ST002MBR01AUTOdsTrain1HighTMP	High Limit	1
ST002MBR01AUTOdsTrain1LowTMP	Low Limit	1
ST002MBR01AUTOdsTrain2Alarm	In Auto but not in Production	1
ST002MBR01AUTOdsTrain2HighTMP	High Limit	1
ST002MBR01AUTOdsTrain2LowTMP	Low Limit	1
ST002MBR01AUTOdsTrain3Alarm	In Auto but not in Production	1
ST002MBR01AUTOdsTrain3HighTMP	High Limit	1
ST002MBR01AUTOdsTrain3LowTMP	Low Limit	1
ST002MBR01AUTOdsTrain4Alarm	In Auto but not in Production	1
ST002MBR01AUTOdsTrain4HighTMP	High Limit	1
ST002MBR01AUTOdsTrain4LowTMP	Low Limit	1
ST002AER01AUTOdsPID01Deviation	Deviation Alarm	4
ST002AER01AUTOdsPID02Deviation	Deviation Alarm	4
ST002AER01BL0520001AldsInvalid	Signal Invalid	4
ST002AER01BL0520001dsEstop	Emergency Stop	4
ST002AER01BL0520001dsF2Start	Fail to Start/Stop	4
ST002AER01BL0520001dsFieldCct	Field Circuit/Isolated	4
ST002AER01BL0520001dsPower	Control Supply N/A	4
ST002AER01BL0520001dsVSDFault	VSD Fault	4
ST002AER01BL0520002AldsInvalid	Signal Invalid	4
ST002AER01BL0520002dsEstop	Emergency Stop	4
ST002AER01BL0520002dsF2Start	Fail to Start/Stop	4
ST002AER01BL0520002dsFieldCct	Field Circuit/Isolated	4
ST002AER01BL0520002dsPower	Control Supply N/A	4
ST002AER01BL0520002dsVSDFault	VSD Fault	4
ST002AER01BL0520003AldsInvalid	Signal Invalid	4
ST002AER01BL0520003dsEstop	Emergency Stop	4
ST002AER01BL0520003dsF2Start	Fail to Start/Stop	4
ST002AER01BL0520003dsFieldCct	Field Circuit/Isolated	4
ST002AER01BL0520003dsPower	Control Supply N/A	4
ST002AER01BL0520003dsVSDFault	VSD Fault	4
ST002AER01FCV0520003dsF2Close	Fail to Close	4
ST002AER01FCV0520003dsF2Open	Fail to Open	4
ST002AER01FCV0520006dsF2Close	Fail to Close	4
ST002AER01FCV0520006dsF2Open	Fail to Open	4
ST002AER01FNA0520001AdsF2Start	Fail to Start/Stop	4
ST002AER01FNA0520001AdsFieldCct	Field Circuit/Isolated	4
ST002AER01FNA0520001AdsPower	Control Supply N/A	4
ST002AER01FNA0520001AdsTOLoad	Thermal Overload	4



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TAG	Description	Category
ST002AER01FNA0520002AdsF2Start	Fail to Start/Stop	4
ST002AER01FNA0520002AdsFieldCct	Field Circuit/Isolated	4
ST002AER01FNA0520002AdsPower	Control Supply N/A	4
ST002AER01FNA0520002AdsTOLoad	Thermal Overload	4
ST002AER01FNA0520003AdsF2Start	Fail to Start/Stop	4
ST002AER01FNA0520003AdsFieldCct	Field Circuit/Isolated	4
ST002AER01FNA0520003AdsPower	Control Supply N/A	4
ST002AER01FNA0520003AdsTOLoad	Thermal Overload	4
ST002AER01FS0520001dsAlarm	Alarm Active	4
ST002AER01FS0520002dsAlarm	Alarm Active	4
ST002AER01PSH0520001dsAlarm	Alarm Active	4
ST002AER01PSH0520002dsAlarm	Alarm Active	4
ST002AER01PSH0520003dsAlarm	Alarm Active	4
ST002AER02BL0650001AldsInvalid	Signal Invalid	4
ST002AER02BL0650001dsEstop	Emergency Stop	4
ST002AER02BL0650001dsF2Start	Fail to Start/Stop	4
ST002AER02BL0650001dsFieldCct	Field Circuit/Isolated	4
ST002AER02BL0650001dsPower	Control Supply N/A	4
ST002AER02BL0650001dsVSDFault	VSD Fault	4
ST002AER02BL0650002AldsInvalid	Signal Invalid	4
ST002AER02BL0650002dsEstop	Emergency Stop	4
ST002AER02BL0650002dsF2Start	Fail to Start/Stop	4
ST002AER02BL0650002dsFieldCct	Field Circuit/Isolated	4
ST002AER02BL0650002dsPower	Control Supply N/A	4
ST002AER02BL0650002dsVSDFault	VSD Fault	4
ST002AER02BL0650003AldsInvalid	Signal Invalid	4
ST002AER02BL0650003dsEstop	Emergency Stop	4
ST002AER02BL0650003dsF2Start	Fail to Start/Stop	4
ST002AER02BL0650003dsFieldCct	Field Circuit/Isolated	4
ST002AER02BL0650003dsPower	Control Supply N/A	4
ST002AER02BL0650003dsVSDFault	VSD Fault	4
ST002AER02FIT0650001dsHi	High	4
ST002AER02FIT0650001dsHiHi	High High	4
ST002AER02FIT0650001dsInvalid	Signal Invalid	4
ST002AER02FIT0650001dsLo	Low	4
ST002AER02FIT0650001dsLoLo	Low Low	4
ST002AER02FNA0650001AdsF2Start	Fail to Start/Stop	4
ST002AER02FNA0650001AdsFieldCct	Field Circuit/Isolated	4
ST002AER02FNA0650001AdsPower	Control Supply N/A	4
ST002AER02FNA0650001AdsTOLoad	Thermal Overload	4
ST002AER02FNA0650002AdsF2Start	Fail to Start/Stop	4
ST002AER02FNA0650002AdsFieldCct	Field Circuit/Isolated	4
ST002AER02FNA0650002AdsPower	Control Supply N/A	4
ST002AER02FNA0650002AdsTOLoad	Thermal Overload	4
ST002AER02FNA0650003AdsF2Start	Fail to Start/Stop	4
ST002AER02FNA0650003AdsFieldCct	Field Circuit/Isolated	4
ST002AER02FNA0650003AdsPower	Control Supply N/A	4



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TAG	Description	Category
ST002AER02FNA0650003AdsTOLoad	Thermal Overload	4
ST002AER02PSH0650001dsAlarm	Alarm Active	4
ST002AER02PSH0650002dsAlarm	Alarm Active	4
ST002AER02PSH0650003dsAlarm	Alarm Active	4
ST002BIO01AIT0511001dsHi	High	4
ST002BIO01AIT0511001dsHiHi	High High	4
ST002BIO01AIT0511001dsInvalid	Signal Invalid	4
ST002BIO01AIT0511001dsLo	Low	4
ST002BIO01AIT0511001dsLoLo	Low Low	4
ST002BIO01AIT0511003AdsHi	High	4
ST002BIO01AIT0511003AdsHiHi	High High	4
ST002BIO01AIT0511003AdsInvalid	Signal Invalid	4
ST002BIO01AIT0511003AdsLo	Low	4
ST002BIO01AIT0511003AdsLoLo	Low Low	4
ST002BIO01AIT0511003BdsHi	High	4
ST002BIO01AIT0511003BdsHiHi	High High	4
ST002BIO01AIT0511003BdsInvalid	Signal Invalid	4
ST002BIO01AIT0511003BdsLo	Low	4
ST002BIO01AIT0511003BdsLoLo	Low Low	4
ST002BIO01AIT0511004dsHi	High	4
ST002BIO01AIT0511004dsHiHi	High High	4
ST002BIO01AIT0511004dsInvalid	Signal Invalid	4
ST002BIO01AIT0511004dsLo	Low	4
ST002BIO01AIT0511004dsLoLo	Low Low	4
ST002BIO01AIT0511005AdsHi	High	4
ST002BIO01AIT0511005AdsHiHi	High High	4
ST002BIO01AIT0511005AdsInvalid	Signal Invalid	4
ST002BIO01AIT0511005AdsLo	Low	4
ST002BIO01AIT0511005AdsLoLo	Low Low	4
ST002BIO01AIT0511005BdsHi	High	4
ST002BIO01AIT0511005BdsHiHi	High High	4
ST002BIO01AIT0511005BdsInvalid	Signal Invalid	4
ST002BIO01AIT0511005BdsLo	Low	4
ST002BIO01AIT0511005BdsLoLo	Low Low	4
ST002BIO01AIT0512001dsHi	High	4
ST002BIO01AIT0512001dsHiHi	High High	4
ST002BIO01AIT0512001dsInvalid	Signal Invalid	4
ST002BIO01AIT0512001dsLo	Low	4
ST002BIO01AIT0512001dsLoLo	Low Low	4
ST002BIO01AIT0512003AdsHi	High	4
ST002BIO01AIT0512003AdsHiHi	High High	4
ST002BIO01AIT0512003AdsInvalid	Signal Invalid	4
ST002BIO01AIT0512003AdsLo	Low	4
ST002BIO01AIT0512003AdsLoLo	Low Low	4
ST002BIO01AIT0512003BdsHi	High	4
ST002BIO01AIT0512003BdsHiHi	High High	4
ST002BIO01AIT0512003BdsInvalid	Signal Invalid	4



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TAG	Description	Category
ST002BIO01AIT0512003BdsLo	Low	4
ST002BIO01AIT0512003BdsLoLo	Low Low	4
ST002BIO01AIT0512004dsHi	High	4
ST002BIO01AIT0512004dsHiHi	High High	4
ST002BIO01AIT0512004dsInvalid	Signal Invalid	4
ST002BIO01AIT0512004dsLo	Low	4
ST002BIO01AIT0512004dsLoLo	Low Low	4
ST002BIO01AIT0512005AdsHi	High	4
ST002BIO01AIT0512005AdsHiHi	High High	4
ST002BIO01AIT0512005AdsInvalid	Signal Invalid	4
ST002BIO01AIT0512005AdsLo	Low	4
ST002BIO01AIT0512005AdsLoLo	Low Low	4
ST002BIO01AIT0512005BdsHi	High	4
ST002BIO01AIT0512005BdsHiHi	High High	4
ST002BIO01AIT0512005BdsInvalid	Signal Invalid	4
ST002BIO01AIT0512005BdsLo	Low	4
ST002BIO01AIT0512005BdsLoLo	Low Low	4
ST002BIO01FCV0520001dsF2Close	Fail to Close	4
ST002BIO01FCV0520001dsF2Open	Fail to Open	4
ST002BIO01FCV0520002dsF2Close	Fail to Close	4
ST002BIO01FCV0520002dsF2Open	Fail to Open	4
ST002BIO01FCV0520004dsF2Close	Fail to Close	4
ST002BIO01FCV0520004dsF2Open	Fail to Open	4
ST002BIO01FCV0520005dsF2Close	Fail to Close	4
ST002BIO01FCV0520005dsF2Open	Fail to Open	4
ST002BIO01FIT0520001dsHi	High	4
ST002BIO01FIT0520001dsHiHi	High High	4
ST002BIO01FIT0520001dsInvalid	Signal Invalid	4
ST002BIO01FIT0520001dsLo	Low	4
ST002BIO01FIT0520001dsLoLo	Low Low	4
ST002BIO01FIT0520002dsHi	High	4
ST002BIO01FIT0520002dsHiHi	High High	4
ST002BIO01FIT0520002dsInvalid	Signal Invalid	4
ST002BIO01FIT0520002dsLo	Low	4
ST002BIO01FIT0520002dsLoLo	Low Low	4
ST002BIO01FIT0540001dsHi	High	4
ST002BIO01FIT0540001dsHiHi	High High	4
ST002BIO01FIT0540001dsInvalid	Signal Invalid	4
ST002BIO01FIT0540001dsLo	Low	4
ST002BIO01FIT0540001dsLoLo	Low Low	4
ST002BIO01FIT0540002dsHi	High	4
ST002BIO01FIT0540002dsHiHi	High High	4
ST002BIO01FIT0540002dsInvalid	Signal Invalid	4
ST002BIO01FIT0540002dsLo	Low	4
ST002BIO01FIT0540002dsLoLo	Low Low	4
ST002BIO01FIT0540003dsHi	High	4
ST002BIO01FIT0540003dsHiHi	High High	4



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TAG	Description	Category
ST002BIO01FIT0540003dsInvalid	Signal Invalid	4
ST002BIO01FIT0540003dsLo	Low	4
ST002BIO01FIT0540003dsLoLo	Low Low	4
ST002BIO01FIT0540004dsHi	High	4
ST002BIO01FIT0540004dsHiHi	High High	4
ST002BIO01FIT0540004dsInvalid	Signal Invalid	4
ST002BIO01FIT0540004dsLo	Low	4
ST002BIO01FIT0540004dsLoLo	Low Low	4
ST002BIO01FIT0630001dsHi	High	4
ST002BIO01FIT0630001dsHiHi	High High	4
ST002BIO01FIT0630001dsInvalid	Signal Invalid	4
ST002BIO01FIT0630001dsLo	Low	4
ST002BIO01FIT0630001dsLoLo	Low Low	4
ST002BIO01FIT0630002dsHi	High	4
ST002BIO01FIT0630002dsHiHi	High High	4
ST002BIO01FIT0630002dsInvalid	Signal Invalid	4
ST002BIO01FIT0630002dsLo	Low	4
ST002BIO01FIT0630002dsLoLo	Low Low	4
ST002BIO01LIT0511002dsHi	High	4
ST002BIO01LIT0511002dsInvalid	Signal Invalid	4
ST002BIO01LIT0511002dsLo	Low	4
ST002BIO01LIT0511002dsLoLo	Low Low	4
ST002BIO01LIT0512002dsHi	High	4
ST002BIO01LIT0512002dsInvalid	Signal Invalid	4
ST002BIO01LIT0512002dsLo	Low	4
ST002BIO01LIT0512002dsLoLo	Low Low	4
ST002BIO01MX0511001dsF2Start	Fail to Start/Stop	4
ST002BIO01MX0511001dsFieldCct	Field Circuit/Isolated	4
ST002BIO01MX0511001dsPower	Control Supply N/A	4
ST002BIO01MX0511001dsThermistor	Thermistor	4
ST002BIO01MX0511001dsTOLoad	Thermal Overload	4
ST002BIO01MX0511001dsWaterInStator	Water In Stator	4
ST002BIO01MX0512001dsF2Start	Fail to Start/Stop	4
ST002BIO01MX0512001dsFieldCct	Field Circuit/Isolated	4
ST002BIO01MX0512001dsPower	Control Supply N/A	4
ST002BIO01MX0512001dsThermistor	Thermistor	4
ST002BIO01MX0512001dsTOLoad	Thermal Overload	4
ST002BIO01MX0512001dsWaterInStator	Water In Stator	4
ST002BIO01PU0530001dsF2Start	Fail to Start/Stop	4
ST002BIO01PU0530001dsFieldCct	Field Circuit/Isolated	4
ST002BIO01PU0530001dsMoistureInOil	Moisture In Oil	4
ST002BIO01PU0530001dsPower	Control Supply N/A	4
ST002BIO01PU0530001dsThermistor	Thermistor	4
ST002BIO01PU0530001dsTOLoad	Thermal Overload	4
ST002BIO01PU0530002dsF2Start	Fail to Start/Stop	4
ST002BIO01PU0530002dsFieldCct	Field Circuit/Isolated	4
ST002BIO01PU0530002dsMoistureInOil	Moisture In Oil	4



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TAG	Description	Category
ST002BIO01PU0530002dsPower	Control Supply N/A	4
ST002BIO01PU0530002dsThermistor	Thermistor	4
ST002BIO01PU0530002dsTOLoad	Thermal Overload	4
ST002BIO01PU0540001AldsInvalid	Signal Invalid	4
ST002BIO01PU0540001dsEstop	Emergency Stop	4
ST002BIO01PU0540001dsF2Start	Fail to Start/Stop	4
ST002BIO01PU0540001dsFieldCct	Field Circuit/Isolated	4
ST002BIO01PU0540001dsMoistureInOil	Moisture In Oil	4
ST002BIO01PU0540001dsPower	Control Supply N/A	4
ST002BIO01PU0540001dsVSDFault	VSD Fault	4
ST002BIO01PU0540002AldsInvalid	Signal Invalid	4
ST002BIO01PU0540002dsEstop	Emergency Stop	4
ST002BIO01PU0540002dsF2Start	Fail to Start/Stop	4
ST002BIO01PU0540002dsFieldCct	Field Circuit/Isolated	4
ST002BIO01PU0540002dsMoistureInOil	Moisture In Oil	4
ST002BIO01PU0540002dsPower	Control Supply N/A	4
ST002BIO01PU0540002dsVSDFault	VSD Fault	4
ST002BIO01PU0540003AldsInvalid	Signal Invalid	4
ST002BIO01PU0540003dsEstop	Emergency Stop	4
ST002BIO01PU0540003dsF2Start	Fail to Start/Stop	4
ST002BIO01PU0540003dsFieldCct	Field Circuit/Isolated	4
ST002BIO01PU0540003dsMoistureInOil	Moisture In Oil	4
ST002BIO01PU0540003dsPower	Control Supply N/A	4
ST002BIO01PU0540003dsVSDFault	VSD Fault	4
ST002BIO01PU0540004AldsInvalid	Signal Invalid	4
ST002BIO01PU0540004dsEstop	Emergency Stop	4
ST002BIO01PU0540004dsF2Start	Fail to Start/Stop	4
ST002BIO01PU0540004dsFieldCct	Field Circuit/Isolated	4
ST002BIO01PU0540004dsMoistureInOil	Moisture In Oil	4
ST002BIO01PU0540004dsPower	Control Supply N/A	4
ST002BIO01PU0540004dsVSDFault	VSD Fault	4
ST002DOS05AUTOdcPump1LowFlow	Low Flow	4
ST002DOS05AUTOdcPump2LowFlow	Low Flow	4
ST002DOS05FIT0584001dsHi	High	4
ST002DOS05FIT0584001dsHiHi	High High	4
ST002DOS05FIT0584001dsInvalid	Signal Invalid	4
ST002DOS05FIT0584001dsLo	Low	4
ST002DOS05FIT0584001dsLoLo	Low Low	4
ST002DOS05LIT0584001dsHi	High	4
ST002DOS05LIT0584001dsHiHi	High High	4
ST002DOS05LIT0584001dsInvalid	Signal Invalid	4
ST002DOS05LIT0584001dsLo	Low	4
ST002DOS05LIT0584001dsLoLo	Low Low	4
ST002DOS05LSH0584002dsAlarm	Alarm Active	4
ST002DOS05PU0584001dsDriveFault	Drive Fault	4
ST002DOS05PU0584001dsF2Start	Fail to Start/Stop	4
ST002DOS05PU0584002dsDriveFault	Drive Fault	4



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TAG	Description	Category
ST002DOS05PU0584002dsF2Start	Fail to Start/Stop	4
ST002MBR02AUTOdsBFLevelLowPump1	Low Level Interlock Pump 1	4
ST002MBR02AUTOdsBFLevelLowPump2	Low Level Interlock Pump 2	4
ST002MBR02AUTOdsBFLevelLowPump3	Low Level Interlock Pump 3	4
ST002MBR02AUTOdsBFLevelLowPump4	Low Level Interlock Pump 4	4
ST002MBR02AUTOdsTrain1FloodSkipped	Skipped/Fault	4
ST002MBR02AUTOdsTrain2FloodSkipped	Skipped/Fault	4
ST002MBR02AUTOdsTrain3FloodSkipped	Skipped/Fault	4
ST002MBR02AUTOdsTrain4FloodSkipped	Skipped/Fault	4
ST002RAS01AUTOdsPID01DivAlm	Output Deviation	4
ST002RAS01AUTOdsPID02DivAlm	Output Deviation	4
ST002RAS01AUTOdsPID03DivAlm	Output Deviation	4
ST002RAS01AUTOdsPID04DivAlm	Output Deviation	4

**ST002 Digital alarms**

TAG	Name	Description
ST002AER01EQUIPdsFault	Fairfield Aerator No.1	Fault
ST002AER01VSD01dsInvalid	Fairfield Aerator No.1 VSD Speed	Invalid
ST002AER02DO001dsHi	Fairfield Dissolved Oxygen No.1	High
ST002AER02DO001dsHiHi	Fairfield Dissolved Oxygen No.1	High High
ST002AER02DO001dsInvalid	Fairfield Dissolved Oxygen No.1	Invalid
ST002AER02DO001dsLo	Fairfield Dissolved Oxygen No.1	Low
ST002AER02DO001dsLoLo	Fairfield Dissolved Oxygen No.1	Low Low
ST002AER02EQUIPdsFault	Fairfield Aerator No.2	Fault
ST002AER02VSD01dsInvalid	Fairfield Aerator No.2 VSD Speed	Invalid
ST002DAF01MT001dsFault	Fairfield SysDaf Scraper Motor	Fault
ST002DAF01PMP01dsFault	Fairfield SysDaf Recirculation Pump	Fault
ST002DAF01PRE01dsLo	Fairfield SysDaf Vessel Pressure	Low
ST002DIG01LVL01dsHi	Fairfield Digester No.1 Remaining Level	High (Empty)
ST002DIG01LVL01dsInvalid	Fairfield Digester No.1 Remaining Level	Invalid
ST002DIG01LVL01dsLo	Fairfield Digester No.1 Remaining Level	Low
ST002DIG01LVL01dsLoLo	Fairfield Digester No.1 Remaining Level	Low Low
ST002DIG02LVL01dsHi	Fairfield Digester No.2 Remaining Level	High (Empty)
ST002DIG02LVL01dsInvalid	Fairfield Digester No.2 Remaining Level	Invalid
ST002DIG02LVL01dsLo	Fairfield Digester No.2 Remaining Level	Low
ST002DIG02LVL01dsLoLo	Fairfield Digester No.2 Remaining Level	Low Low
ST002RAS01FLW01dsHi	Fairfield RAS Discharge Flow	High
ST002RAS01FLW01dsInvalid	Fairfield RAS Discharge Flow	Invalid
ST002RAS01FLW01dsLo	Fairfield RAS Discharge Flow	Low
ST002RAS01LS001dsHi	Fairfield RAS Well High Level Switch	Surcharge



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TAG	Name	Description
ST002RAS01LVL01dsHi	Fairfield RAS Well Level	High
ST002RAS01LVL01dsHiHi	Fairfield RAS Well Level	High High
ST002RAS01LVL01dsInvalid	Fairfield RAS Well Level	Invalid
ST002RAS01LVL01dsLo	Fairfield RAS Well Level	Low
ST002RAS01LVL01dsLoLo	Fairfield RAS Well Level	Low Low
ST002RAS01PMP01dsF2Operate	Fairfield RAS Pump No.1	Fail to Start/Stop
ST002RAS01PMP01dsFault	Fairfield RAS Pump No.1	Fault
ST002RAS01PMP01dsMainsFail	Fairfield RAS Pump No.1	Mains Fail
ST002RAS01PMP01dsRefluxF2Close	Fairfield RAS Pump No.1 Reflux	Fail to Close
ST002RAS01PMP01dsRefluxF2Open	Fairfield RAS Pump No.1 Reflux	Fail to Open
ST002RAS01PMP01dsRflxFault	Fairfield RAS Pump No.1 Reflux	Fault
ST002RAS01PMP01dsVFDFault	Fairfield RAS Pump No.1 VFD	Fault
ST002RAS01PMP02dsF2Operate	Fairfield RAS Pump No.2	Fail to Start/Stop
ST002RAS01PMP02dsFault	Fairfield RAS Pump No.2	Fault
ST002RAS01PMP02dsMainsFail	Fairfield RAS Pump No.2	Mains Fail
ST002RAS01PMP02dsRefluxF2Close	Fairfield RAS Pump No.2 Reflux	Fail to Close
ST002RAS01PMP02dsRefluxF2Open	Fairfield RAS Pump No.2 Reflux	Fail to Open
ST002RAS01PMP02dsRflxFault	Fairfield RAS Pump No.2 Reflux	Fault
ST002RAS01PMP02dsVFDFault	Fairfield RAS Pump No.2 VFD	Fault
ST002RAS01SGP01dsHi	Fairfield RAS Pump Well	High
ST002RAS01SMP01dsFault	Fairfield RAS Sump Pump	Fault
ST002RAS01SMP01dsMainsFail	Fairfield RAS Sump Pump	Mains Fail
ST002RAS01SWB01dsMainsFail	Fairfield RAS Switchboard	Mains Fail
ST002WAS01FLW01dsHi	Fairfield WAS Flow	High
ST002WAS01FLW01dsInvalid	Fairfield WAS Flow	Invalid
ST002WAS01FLW01dsLo	Fairfield WAS Flow	Low
ST002WAS01FLW01dsZero	Fairfield WAS Pump	No Flow
ST002WAS01PMP01dsFault	Fairfield WAS Pump	Warning

External Conditions

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*1.1.3.2. 0500 Performance Parameters*

Equipment Datasheets

[Fairfield WRP Biotreat Equipment Schedule](#)

[Fairfield WRP Biotreat Instrument Schedule](#)

[Fairfield WRP Biotreat Valve Schedule](#)

*1.1.3.3. 0500 Out of Specification - Supply*

Check Sheets

[Fairfield WRP Biotreat Check Sheet](#)

*1.1.3.4. Breakdowns*

**SWMS**

[Fairfield WRP Biotreat SWMS & Standard Operation Procedures](#)

*1.1.3.5. 0500 Maintenance Procedures*

Taking Off Line

**SOP**

[Fairfield WRP Biotreat SWMS & Standard Operation Procedures](#)

Preventive

[Preventive Maintenance](#)

*1.1.3.6. 0500 Suppliers*

[Fairfield WRP Biotreat 0500 Biological Treatment Suppliers List](#)

*1.1.3.7. Spares*

Fairfield WRP Biotreat 0500 Biological Treatment Spares

NIL

ASBUILT



## Fairfield Water Treatment Plant

### Operation Manual



#### 1.1.4. Vendor \ Equipment

##### 1.1.4.1. Area – Site

##### [Fairfield WRP Biotreat Site Layout Drawings](#)

##### [Fairfield WRP Biotreat Site Layout Drawings Piping Under Ground](#)

##### [Fairfield WRP Biotreat Electrical Valve Location Drawings](#)

##### [Fairfield WRP Biotreat Site Chemical Layout Drawings](#)

##### 1.1.4.2. Building

##### [Fairfield WRP Biotreat Building - Blower Room](#)

##### 1.1.4.3. Blower

##### [Fairfield WRP Biotreat Blower SN822 S1409A PDA 3,000 Nm3/hr @ 55kPa Relief](#)

Tag No.			Description	Model
BL	0520	001	Bioreactor air blower No.1 (Duty)	SN822
BL	0520	002	Bioreactor air blower No.2 (Standby)	SN822
BL	0520	003	Bioreactor air blower No.3 (Duty)	SN822

##### 1.1.4.4. Diffusers

##### [Fairfield WRP Biotreat Diffuser Description Aquablade Aquatec](#)

##### [Fairfield WRP Biotreat Diffuser Operation AquaBlade Aquatec](#)

##### [Fairfield WRP Biotreat Diffuser Warranty Aquablade Aquatec](#)

Description	Type	Make
Bioselector 1 air diffusers	Coarse bubble membrane	MaxAir EDI
Bioselector 2 air diffusers	Coarse bubble membrane	MaxAir EDI
Bioreactor 1 air diffusers	Fine bubble membrane	Aquablade Aquatec-Maxcon
Bioreactor 2 air diffusers	Fine bubble membrane	Aquablade Aquatec-Maxcon

##### 1.1.4.5. Mixer

##### [Mixer Submersible ITT Flygt](#)

##### [Fairfield WRP Biotreat Mixer 4640 Flygt](#)

##### [Fairfield WRP Biotreat Mixer Parts 4640 Flygt](#)

Tag No.			Description	Model
MX	0511	001	MBR 1 Anoxic Zone Mixer	SR4640.410SG15
MX	0512	001	MBR 2 Anoxic Zone Mixer	SR4640.410SG15



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#### 1.1.4.6. Pump

##### Dosing - Chemical Dosing

##### Fairfield WRP Biotreat Alum Dosing System

##### Fairfield WRP Biotreat Chemical Storage Layout

##### Fairfield WRP Biotreat Pump Dosing Pulsation Dampener

##### Fairfield WRP Biotreat Calibration Cylinder - Alldos

Grundfos - Alldos

Tag No.			Description	Duty	Model
PU	0584	001	Alum dosing pump (Duty)	50 L/hr @ 10m Head	
PU	0584	002	Alum dosing pump (Standby)	50 L/hr @ 10m Head	

##### Recycle Pump

Membrane Feed Pump

##### Fairfield WRP Biotreat Pump Recycle Dimension ABS

##### Fairfield WRP Biotreat Pump Recycle ABS

##### Fairfield WRP Biotreat Pump Recycle Davit ABS

RCP500 60 Hz ABS

Tag No.			Description	Duty
MV	0540	001	Recycle pump Stream 1	35 L/s @ 0.47 m head (ADWF) 138 L/s @ 1.3 m head (PWWF)
MV	0540	002	Recycle pump Stream 2	35 L/s @ 0.47 m head (ADWF) 138 L/s @ 1.3 m head (PWWF)
MV	0540	003	Recycle pump Stream 3	35 L/s @ 0.47 m head (ADWF) 138 L/s @ 1.3 m head (PWWF)
MV	0540	004	Recycle pump Stream 4	35 L/s @ 0.47 m head (ADWF) 138 L/s @ 1.3 m head (PWWF)

##### WAS Pump

##### Fairfield WRP Biotreat Pump WAS ABS

##### Fairfield WRP Biotreat Pump WAS Layout

Tag No.			Description	Duty	Supplier
PU	0530	001	WAS pump (Duty)	3 L/s @ 10 m head	ABS
PU	0530	002	WAS pump (Standby)	3 L/s @ 10 m head	ABS



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### 1.1.4.7. Tanks

#### Chemical

[Fairfield WRP Biotreat Tanks - Chemical GA Drawings](#)

[Fairfield WRP Biotreat Tanks GA Drawings - Clark](#)

[Fairfield WRP Biotreat Level Indicators WEKA](#)

[Fairfield WRP Biotreat Tank Inspection Annual Clark](#)

### 1.1.4.8. Ventilation

[Fairfield WRP Biotreat Ventilation Blower Building](#)

### 1.1.4.9. Instrument Layout

[Fairfield WRP Biotreat Instrument Layouts Drawings](#)

### 1.1.4.10. Instrument Analyser

#### Dissolved Oxygen Analyser

[Fairfield WRP Biotreat DO Analyser Royce 9200](#)

Royce Technologies Signals for D.O and Temperature

96 A .9200 Analyser+ Jet head

Tag No	Description	Location	Tag Drawing	P&ID
AIT0511001	Anoxic/Aerobic Tank No 1 Dissolved Oxygen Transmitter	TK-0511-001	7107-E-DWG-4552	7107-I-DWG-5008
AIT0511003	Bioreactor Tank No 1 Dissolved Oxygen Transmitter	TK-0511-001	7107-E-DWG-4552	7107-I-DWG-5008
AIT0512001	Anoxic/Aerobic Tank No 2 Dissolved Oxygen Transmitter	TK-0512-001	7107-E-DWG-4552	7107-I-DWG-5008
AIT0512003	Bioreactor Tank 2 Dissolved Oxygen Transmitter	TK-0512-001	7107-E-DWG-4552	7107-I-DWG-5008

#### pH&ORB Analyser

[Fairfield WRP Biotreat Analyser Hach sc100 Controller](#)

[Fairfield WRP Biotreat Analyser Hach sc100 Datasheet](#)

[Fairfield WRP Biotreat Analyser Sensor pH ORP DPD1R1 Hach](#)

HACH pH Transmitter Controller: LXV401.52.00002, Sensor: DPD1R1, Installation Kit: 6136400

Tag No	Description	Location	Tag Drawing	P&ID
AIT0511005	Bioreactor Tank No 1 ORP/PH Transmitter	TK-0511-001	7107-E-DWG-4552	7107-I-DWG-5008
AIT0512005	Bioreactor Tank No 2 ORP/PH Transmitter	TK-0512-001	7107-E-DWG-4552	7107-I-DWG-5008



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Turbidity Analyser

[Fairfield WRP Biotreat Analyser Hach sc100 Controller](#)

[Fairfield WRP Biotreat Analyser Hach sc100 Datasheet](#)

[Fairfield WRP Biotreat Analyser Sensor Turbidity 423 99 00100](#)

MLSS - Measurement Transmitter HACH

Controller: LXV401.52.00002, Sensor: LXV423.99.00100

Installation Kit: 5734400 Sunshield: LZX961.54

Tag No	Description	Location	Drawing	P&ID
AIT0511004	Bioreactor Tank No 1 MLSS Transmitter	TK-0511-001	7107-E-DWG- 4552	7107-I-DWG- 5008
AIT0512004	Bioreactor Tank No 2 MLSS Transmitter	TK-0512-001	7107-E-DWG- 4552	7107-I-DWG- 5008

*1.1.4.11. Flow Meter*

Anu Bar Emerson

[Fairfield WRP Biotreat Pressure Transmitter 3051 Datasheet](#)

[Fairfield WRP Biotreat Pressure Transmitter 3051 Instal](#)

[Fairfield WRP Biotreat Pressure Transmitter 3051 User Emerson](#)

Tag No	Description	Model	Drawing	P&ID
FIT0520001	Bioreactor Tank No 1 Air Flowmeter	3051SFADG120ZSHPS 2T100031AA1B2RLQ4	7107-E-DWG- 4552	7107-I-DWG- 5008
FIT0520002	Bioreactor Tank No 2 Air Flowmeter	3051SFADG120ZSHPS 2T100031AA1B2RLQ4	7107-E-DWG- 4552	7107-I-DWG- 5008

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Mag Flow Transmitter Emerson

[Fairfield WRP Biotreat Flowmeter Magflow Pits](#)

[Fairfield WRP Biotreat Flowmeter 8712 Datasheet Emerson](#)

[Fairfield WRP Biotreat Flowmeter 8712 Emerson - Installation](#)

[Fairfield WRP Biotreat Flowmeter Transmitter - 8712E Emerson](#)

[Fairfield WRP Biotreat Flowmeter 8700 Emerson Rosemount](#)

Transmitter 8712ESR1A2NAM4B6 570TM100C4SSFXAA1AM

Tag No	Description	Drawing	P&ID
FIT0540001	Membrane Feed Pump No 1 Flowmeter	7107-E-DWG-4548	7107-I-DWG-5008
FIT0540002	Membrane Feed Pump No 2 Flowmeter	7107-E-DWG-4548	7107-I-DWG-5008
FIT0540003	Membrane Feed Pump No.03 Flowmeter	7107-E-DWG-4548	7107-I-DWG-5008
FIT0540004	Membrane Feed Pump No.04 Flowmeter	7107-E-DWG-4548	7107-I-DWG-5008
FIT0584001	Alum Dosing Pipework Flowmeter		7107-I-DWG-5024
FIT0630001	Bioreactor Tank No 1 RAS Flowmeter		7107-I-DWG-5008
FIT0630002	Bioreactor Tank No 2 RAS Flowmeter		7107-I-DWG-5008
FIT0660001	MBR Permeate Pump No 1 Flowmeter		7107-I-DWG-5010

Flow Meter ABB

[Fairfield WRP Biotreat Flowmeter ABB Quick Ref Program Guide](#)

[Fairfield WRP Biotreat Flowmeter ABB Mag Datasheet](#)

[Fairfield WRP Biotreat Flowmeter ABB BK2 Mech Instal](#)

[Fairfield WRP Biotreat Flowmeter ABB BK3 Elect Instal](#)

[Fairfield WRP Biotreat Flowmeter ABB BK4 Operations](#)

[Fairfield WRP Biotreat Flowmeter ABB BK5 Fault Finding](#)

[Fairfield WRP Biotreat Flowmeter ABB BK6 Accessories](#)

Tag No	Description	Location	Tag Drawing	P&ID
FIT0441002	Digester 1&2 Supernatant Flowmeter	Refer to Tag drawings		7107-I-DWG-5015



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**Flow Switch**

**Fairfield WRP Biotreat Flow Switch SI6000 Thermal IFMs**

Tag No	Description	Tag Drawing	P&ID
FS0520001	Blower to Bioreactor Tank No 1 Flow Switch		7107-I-DWG-5012
FS0520002	Blower to Bioreactor Tank No 2 Flow Switch		7107-I-DWG-5012

**1.1.4.12. Level Indicator**

**Fairfield WRP Biotreat Level Indicators WEKA**

**1.1.4.13. Level Switch**

**Float Level Switch**

**Fairfield WRP Biotreat ENM-10ITT Flygt - Technical**

**Fairfield WRP Biotreat Float Flygt ENM-10 - Brochure**

Tag No	Description	Drawing	P&ID
LSH0584001	Alum Tank Level Switch	7107-E-DWG-4555	7107-I-DWG-5024
LSH0584002	Alum Tank Bund Level Switch	7107-E-DWG-4555	7107-I-DWG-5024

**1.1.4.14. Level Transmitter**

**Ultrasonic Level Vega**

**Fairfield WRP Biotreat Level Vegadis 61**

**Fairfield WRP Biotreat Level Display Vegadis 12 Operating**

**Fairfield WRP Biotreat Level Display Vega PLICSCOM**

Tag No	Description	Model	Drawing	P&ID
LIT0584001	Alum Tank Level Transmitter	SN61.XXAGHKMX X, Display DIS61.XXKMAV	7107-E-DWG-4555	7107-I-DWG-5024



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Hydrostatic Level Transmitter

Fairfield WRP Biotreat Level VEGAWELL 52

Fairfield WRP Biotreat Level Vegadis 62 Vega

VEGAWELL52+ VEGADIS11X+DIS62.XXKMAXXV Vega

Tag No	Description	Location	Drawing	P&ID
LIT0511002	Bioreactor Tank No 1 Level Transmitter	TK-0511-001	7107-E-DWG-4552	7107-I-DWG-5008
LIT0512002	Bioreactor Tank No 2 Level Transmitter	TK-0512-001	7107-E-DWG-4552	7107-I-DWG-5008

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**1.1.4.15. Pressure Instrument**

**Pressure Indicator**

***Pressure Indicator Blower Package***

**Fairfield WRP Biotreat Blower Press Vac SwitchX1381**

Tag No	Description	P&ID
PI0520001	Bioselector/Bioreactor Blower No 1 Discharge Pressure Indicator	7107-I-DWG-5012
PI0520002	Bioselector/Bioreactor Blower No 2 Discharge Pressure Indicator	7107-I-DWG-5012
PI0520003	Bioselector/Bioreactor Blower No 3 Discharge Pressure Indicator	7107-I-DWG-5012

**Pressure Switch**

***Blower Package***

**Fairfield WRP Biotreat Blower Press Vac SwitchX1381**

Tag No	Description	Drawing	P&ID
PSH0520001	Bioreactor Blower No 1 Discharge Pressure Switch	7107-E-DWG-4554	7107-I-DWG-5012
PSH0520002	Bioreactor Blower No 2 Discharge Pressure Switch	7107-E-DWG-4554	7107-I-DWG-5012
PSH0520003	Bioreactor Blower No 3 Discharge Pressure Switch	7107-E-DWG-4554	7107-I-DWG-5012

Allidos: Refer Section 1.1.4.6

Tag No	Description	Drawing	P&ID
PI584014	Alum Discharge Line Pressure Indicator		7107-I-DWG-5024



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1.1.4.16. Valve - Manual Ball Valve

Fairfield WRP Biotreat Ball VKD-PVC 16-63 AVFI

Fairfield WRP Biotreat Ball VKD-PVC 75-110 AVFI

Tag	Valve Description	Size	Model Number	DWG
HV0584001	Alum Fill Line Drain Valve	25	VKDLV-320	7107-I-DWG-5024
HV0584002	Alum Fill Line Valve	65	VKDLV-750	7107-I-DWG-5024
HV0584003	Alum Storage Tank Drain Valve	50	VKDLV-630	7107-I-DWG-5024
HV0584004	Alum Storage Tank Isolation Valve	50	VKDLV-630	7107-I-DWG-5024
HV0584005	Alum Strainer Drain Valve 1	15	VKDLV-200	7107-I-DWG-5024

Ball Valve SS AVFI V3-316-020

Fairfield WRP Biotreat Valve Ball V3E SS AVFI

Tag	Valve Description	Size	Model Number	DWG
HV0520003-6	Bioselector 1 Aeration Isolation Valve 1-4	25	V3-316-050	7107-I-DWG-5008
HV0520013	Bioselector 2 Aeration Isolation Valve 1	25	V3-316-025	7107-I-DWG-5008
HV0520014-16	Bioselector 2 Aeration Isolation Valve 2-4	25	V3-316-025	7107-I-DWG-5008

Ball Valve PVC Grundfos

Tag	Valve Description	Size	DWG
HV0584006	Alum Line 1 Suction Isolation Valve	15	7107-I-DWG-5024
HV0584007	Alum Line 1 Alternative Intake Valve	15	7107-I-DWG-5024
HV0584008	Alum Line 1 Bypass/Drain Valve	15	7107-I-DWG-5024
HV0584009	Alum Line 1 Discharge Isolation Valve	15	7107-I-DWG-5024
HV0584010	Alum Line 2 Suction Isolation Valve	15	7107-I-DWG-5024
HV0584011	Alum Line 2 Alternative Intake Valve	15	7107-I-DWG-5024
HV0584012	Alum Line 2 Bypass/Drain Valve	15	7107-I-DWG-5024
HV0584013	Alum Line 2 Discharge Isolation Valve	15	7107-I-DWG-5024
HV0584014	Alum Dosing Pressure Indicator Isolation Valve	15	7107-I-DWG-5024
HV0584015	Alum Dosing Pressure Bleed Valve	15	7107-I-DWG-5024
HV0584017	Alum Dosing Discharge Isolation Valve	15	7107-I-DWG-5024
HV0584018	Alum Calibration Cylinder Isolation Valve	15	7107-I-DWG-5024
HV0584019	Alum Dosing Pulsation Dampner Isolation Valve	15	7107-I-DWG-5024



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1.1.4.17. Butterfly Valve

Fairfield WRP Biotreat Butterfly B1000 & 2000 AVFI

Tag	Valve Description	Size	Model Number	DWG
HV0520007	Anoxic/Aerobic Zone 1 Aeration Isolation Valve	150	B2000L-AS-150	7107-I-DWG-5008
HV0520008	Bioreactor Tank 1 Aeration Isolation Valve 1	150	B2000L-AS-150	7107-I-DWG-5008
HV0520009	Bioreactor Tank 1 Aeration Isolation Valve 2	150	B2000L-AS-150	7107-I-DWG-5008
HV0520010	Bioreactor Tank 1 Aeration Isolation Valve 3	150	B2000L-AS-150	7107-I-DWG-5008
HV0520017	Anoxic/Aerobic Zone 2 Aeration Isolation Valve	150	B2000L-AS-150	7107-I-DWG-5008
HV0520018	Bioreactor Tank 2 Aeration Isolation Valve 1	150	B2000L-AS-150	7107-I-DWG-5008
HV0520019	Bioreactor Tank 2 Aeration Isolation Valve 2	150	B2000L-AS-150	7107-I-DWG-5008
HV0520020	Bioreactor Tank 2 Aeration Isolation Valve 3	150	B2000L-AS-150	7107-I-DWG-5008
HV0520023	Bioselector 1 Aeration Isolation Valve	80	B2000L-AS-080	7107-I-DWG-5008
HV0520024	Bioselector 2 Aeration Isolation Valve	80	B2000L-AS-080	7107-I-DWG-5008
HV0520002	Bioreactor Blower 1 Isolation Valve	250	B2000L-AS-250	7107-I-DWG-5012
HV0520012	Bioreactor Blower 2 Isolation Valve	250	B2000L-AS-250	7107-I-DWG-5012
HV0520022	Bioreactor Blower 3 Isolation Valve	250	B2000L-AS-250	7107-I-DWG-5012

Butterfly Valve PVC 567/568 AVFI

Fairfield WRP Biotreat Valve Butterfly PVC 567-568 GF

Tag	Valve Description	Size	Model	DWG
HV0811006	Bioselector/Anaerobic Zone Odour Control Cover Valve 1	100	567/568	7107-I-DWG-5008
HV0811007	Bioselector/Anaerobic Zone Odour Control Cover Valve 2	100	567/568	7107-I-DWG-5008



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#### 1.1.4.18. Check Valve

##### Fairfield WRP Biotreat Check CI-SC-AS 41-8x Series Resilient Seated Swing AVFI

##### Fairfield WRP Biotreat Check Piston VR-PVC Avfi

##### Fairfield WRP Biotreat Check Swing Eurocheck Res Seated Avfi

##### Fairfield WRP Biotreat Check VP-440 UPVC Ball Double Union Avfi

#### Check Valve Cast Iron/SS/EPDM or Nitrile 41 AVFI

Tag	Valve Description	Size	Model Number	DWG
NRV0530001	WAS Pump 1 Non-return Valve	65	41/25-065	7107-I-DWG-5008
NRV0530002	WAS Pump 2 Non-return Valve	65	41/25-065	7107-I-DWG-5008

#### Check Valve Cast Iron/SS/EPDM or Nitrile PDA

Tag	Valve Description	Size	DWG
NRV0520001	Bioreactor Blower 1 Non-return Valve	250	7107-I-DWG-5012
NRV0520002	Bioreactor Blower 2 Non-return Valve	250	7107-I-DWG-5012
NRV0520003	Bioreactor Blower 3 Non-return Valve	250	7107-I-DWG-5012

#### 1.1.4.19. Gate Valve AVFI

##### Fairfield WRP Biotreat Gate CI-SV-AS-HW 57-48 Series Resilient Seat AVFI

#### Gate Valve 57/48 - AVFI

Tag	Valve Description	Size	Model Number	DWG
HV0511001	Bioreactor 1 Feed Isolation Valve	300	57/48-300	7107-I-DWG-5008
HV0512001	Bioreactor 2 Feed Isolation Valve	300	57/48-300	7107-I-DWG-5008
HV0530007	WAS Pumps Isolation Valve (Suction)	100	57/48-100	7107-I-DWG-5008
HV0540005	Membrane Feed Tank Drain Valve	150	57/48-080	7107-I-DWG-5008
HV0630001	RAS to bioselector 1 Isolation Valve	100	57/48-100	7107-I-DWG-5008
HV0630002	RAS to bioselector 2 Isolation Valve	100	57/48-100	7107-I-DWG-5008
HV0630003	RAS flowmeter 1 Isolation Valve	100	57/48-100	7107-I-DWG-5008
HV0630004	RAS flowmeter 2 Isolation Valve	100	57/48-100	7107-I-DWG-5008



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Gate Valve Brass A-59M- AVFI

Fairfield WRP Biotreat Valve Gate A-59M Tested AVFI

Tag	Valve Description	Size	Model Number	DWG
HV0530008	WAS Pumps Sample Valve	25	A-59M-025	7107-I-DWG-5008
HV0530012	Receival Chamber Sample Valve	25	A-59M-025	7107-I-DWG-5008
HV1030020	Service Water Hose Reel Isolation Valve	25	A-59M-025	7107-I-DWG-5008

1.1.4.20. Knifegate Valve

Fairfield WRP Biotreat Knifegate XDV-150-RS & MS SS AVFI

Cast Iron/SS/EPDM or Nitrile AVFI

Tag	Valve Description	Size	Model Number	DWG
HV0530003	WAS Pump 1 Suction Isolation Valve	100	XDV-150RS-100	7107-I-DWG-5008
HV0530004	WAS Pump 2 Suction Isolation Valve	100	XDV-150RS-100	7107-I-DWG-5008
HV0530005	WAS Pump 1 Discharge Isolation Valve	65	XDV-150RS-065	7107-I-DWG-5008
HV0530006	WAS Pump 2 Discharge Isolation Valve	65	XDV-150RS-065	7107-I-DWG-5008
HV0540001	Recycle Pump 1 Isolation Valve	300	XDV-150RS-300	7107-I-DWG-5008
HV0540002	Recycle Pump 2 Isolation Valve	300	XDV-150RS-300	7107-I-DWG-5008
HV0540003	Recycle Pump 3 Isolation Valve	300	XDV-150RS-300	7107-I-DWG-5008
HV0540004	Recycle Pump 4 Isolation Valve	300	XDV-150RS-300	7107-I-DWG-5008

1.1.4.21. Penstock

Fairfield WRP Biotreat Water Gates 25A, 25S

Fairfield WRP Biotreat Water Gates US Series



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*1.1.4.22. Pressure Relief Valve*

**Fairfield WRP Biotreat Safety Relief SRV & SRV-SS AVFI**

**Fairfield WRP Biotreat PRV SRV & SRV-SS Installation AVFI**

Pressure Relief \ Regulating Valve Grundfos

Tag	Valve Description	Valve Type	Size	DWG
PRV0584001	Alum Line 1 Pressure Relief Valve	Pressure Relief Valve	15	7107-I-DWG-5024
PRV0584002	Alum Line 2 Pressure Relief Valve	Pressure Relief Valve	15	7107-I-DWG-5024
PSV0584001	Alum Pressure Sustaining Valve	Pressure Regulating Valve	15	7107-I-DWG-5024

Pressure Relief \ Regulating Valve PDA

Tag	Valve Description	Valve Type	Size	DWG
PRV0520001	Bioreactor Blower 1 Pressure Relieve Valve	Pressure Relief Valve Vendor	250	7107-I-DWG-5012
PRV0520002	Bioreactor Blower 2 Pressure Relieve Valve	Pressure Relief Valve Vendor	250	7107-I-DWG-5012
PRV0520003	Bioreactor Blower 3 Pressure Relieve Valve	Pressure Relief Valve Vendor	250	7107-I-DWG-5012

*1.1.4.23. Solenoid*

**Fairfield WRP Biotreat Solenoid SV-ZS & SV-ZSB AVFI**

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**1.1.4.24. Valve Actuated Butterfly Valve**

**Air Actuated Ebro**

**Fairfield WRP Biotreat Actuator Pneumatic EB SR Ebro**

**Fairfield WRP Biotreat Butterfly Valve F012K1 Ebro**

**Fairfield WRP Biotreat Butterfly Valve Z014 Ebro**

Tag Number	Description	Body	Valve Seat	Size
FCV-0520-001	Bioreactor Tank No 1 Bioselector Aeration Valve	Ductile Iron / SS	EPDM	80
FCV-0520-002	Bioreactor Tank No 1 Aerobic/Anoxic Zone Aeration Valve	Ductile Iron / SS	EPDM	150
FCV-0520-003	Bioselector/Bioreactor Aeration Changeover Valve No 2	SS	Polyurethane or EPDM, bi-directional	300
FCV-0520-004	Bioreactor Tank No 2 Bioselector Aeration Valve	Ductile Iron / SS	EPDM	80
FCV-0520-005	Bioreactor Tank No 2 Aerobic/Anoxic Zone Aeration Valve	Ductile Iron / SS	EPDM	150
FCV-0520-006	Bioselector/Bioreactor Aeration Changeover Valve No 1	SS	Polyurethane or EPDM, bi-directional	300

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#### 1.1.5. 0500 CFD - Equipment Control

##### 1.1.5.1. Aluminium Sulphate Dosing

#### Process Objectives

To provide flow-paced dosing of alum to the inlet chamber to assist with phosphorus removal in the MBR process.

#### Hand Operated Equipment

HV-0584-001; Alum fill line drain valve

FIV\_-0584-002; Alum fill line isolation valve

HV-0584-003; Alum tank drain valve {locked}

HV-0584-004; Alum tank isolation valve

HV\_-0584-005; Alum dosing line drain valve

HV-0584-006; Alum dosing pump 1 suction isolation valve

HV\_-0584-007; Alum dosing pump 1 flushing/external chemical addition valve HV-0584-008; Alum dosing pump 1 discharge drain valve

HV-0584-009; Alum dosing pump 1 discharge isolation valve

HV\_-0584-010; Alum dosing pump 2 suction isolation valve

HV-0584-011; Alum dosing pump 2 flushing/external chemical addition valve HV\_-0584-012; Alum dosing pump 2 discharge drain valve

HV-0584-013; Alum dosing pump 2 discharge isolation valve

HV\_-0584-014; Pressure gauge isolation valve

HV-0584-015; Alum dosing pressure release valve

H V\_-0584-016; Alum bond isolation valve

HV\_-0584-017; Alum magflow meter isolation valve

HV-0584-018 Alum dosing calibration cylinder isolation valve

HV-0584-019; Alum pressure damper isolation valve

#### Automated Equipment

PU\_-0584-001; Alum dosing pump No.1

PU0584-001; Alum dosing pump No.2

#### Instrumentation

Description	Tag	Units	Min	Max	Offset	Alarms
Alum Tank Level Switch High	LSH0584001		0	1		H
Alum Tank Level Indication	LIT0584001	m	0	3.0		LL, L, H, HH
Alum Magflow Meter	FIT0584001	L/sec	0	0.2		



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#### Auto Operation

#### Operator Selections and Setpoints

Description	Units	Minimum	Maximum	Preset
Select "flow-paced" or "set flow rate dosing"				Flow paced
Alum dosing concentration (flow-paced)	mg/L	0	500	0
*Alum dosing flow rate (set flow rate)	L/h	0	50	0

\*Alum dosing flow rate (L/h) to be provided in 24 x 1 hour interval table with dose rates between 0 — 50L/h selectable for each hour interval of the day.

#### Sequence 1— Alum Dosing

*Permissives (all - sequence execution begins)*

Alum dosing pump 1 or 2 in Auto

*Inhibits (any - sequence execution ends)*

Alum dosing pump 1 or 2 not in Auto Alum dosing tank level low (LAL0584001)

*Starting / Opening*

Select Alum dosing "Enabled"

*Steady State*

Alum dosing pumps run according to flow paced or set flow rate mode over 24 x 1hr time intervals. In flow paced mode the flow pacing calculation is used to determine the pump output. In set flow rate dosing mode the speed of the pump is adjusted to achieve the flow rate entered in the interval lookup table.

*Stopping / Closing*

Select Alum Dosing "Disabled"

#### Interlocks Defaults and Forces

- If alum dosing pumps are ON and no flow is detected for >10 sec then the sequence will disable due to alum low flow alarm.
- The alum flow pacing calculation should be performed every 20 sec and a new dosing rate selected if required.

#### Process Alarms

Alum Dosing Low Flow Alarm

#### Process Calculations

*Flow pacing:*

The speed of the pump during flow pacing mode is calculated according to the following calculation.

Conc. required (xxx mg/L) \* Inlet works flow rate (L/sec) \* 3600 sec/h / Spec. gravity (1.4 kg/L)  $10^6$  mg / kg = Dosing rate required (L/h).

Pump speed (%) = Dosing rate required (L/h) / Maximum dosing pump rate (50 L/h).



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#### Process and Operation Feedback

Description	Units	Minimum	Maximum	Preset
Calculated dosing rate required	L/h	0	50	0

#### Process Trends

Description	Trigger
Alum dosing meter (FE 0584001)	

#### *1.1.5.2. Bioreactor Aeration*

##### *Supplying Air to the Bioreactor*

#### Process Objectives

To supply the bioreactor tank and the aerobic/anoxic tank with the correct amount of air for the micro-organisms in the activated sludge to treat the wastewater.

To supply the bioselector tank with the amount of air needed to mix the tank contents.

#### Hand Operated Equipment

- HV\_-0520-002, HV\_-0520-012, HV\_-0520-022; Bioreactor Blower isolation valves, used to isolate the individual blower units during maintenance. These are open during normal operation.
- HV\_-0520-024 HV\_-0520-003, HV\_-0520-004, HV\_-0520-005, HV\_-0520-006; Bioselector 1 isolation valves, used to isolate aeration to individual bioselector tanks. These are open during normal operation.
- HV\_-0520-023, HV\_-0520-013, HV\_-0520-014, HV\_-0520-015, HV\_-0520-016; Bioselector 2 isolation valves, used to isolate aeration to individual bioselector tanks. These are open during normal operation.
- HV\_-0520-007; Bioreactor 1 anoxic/aerobic isolation valve. Used to isolate the aerobic/anoxic zone of Bioreactor 1. These are open during normal operation.
- HV\_-0520-017; Bioreactor 2 anoxic/aerobic isolation valve. Used to isolate the aerobic/anoxic zone of Bioreactor 2. These are open during normal operation.
- HV\_-0520-008; HV\_-0520-009, HV\_-0520-010; Bioreactor 1 aeration isolation valves. Used to isolate the individual aeration laterals in Bioreactor 1. These are open during normal operation.
- HV\_-0520-0018; HV\_-0520-0019, HV\_-0520-020; Bioreactor 2 aeration isolation valves. Used to isolate the individual aeration laterals in Bioreactor 2. These are open during normal operation.



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#### Automated Equipment

Bioreactor blowers BL-OS20-001, BL-0520-002 and BL-OS20-003 are located at the inlet of the air header and are used to blow air into the bioreactor, via the aeration diffusers. The blowers are arranged as duty / duty / standby.

The blowers are positive displacement type. The packages have a blower, motor, acoustic enclosure, enclosure cooling fan, pressure relief valve, non-return valve, pressure gauge and a high pressure switch.

The motors are standard variable speed types with remote manual and auto control modes.

Standby blower control valves FCV0520006 and FCV0520003 are located on the line that connects the outlet lines of the bioreactor blowers. Valve FCV0520006 facilitates aeration to Bioreactor 1 via Blower BL-OS20-002 in the event that Blower BL-0520-001 is not in Auto. Valve FCV0520003 facilitates aeration to Bioreactor 2 via Blower BL-OS20-002 in the event that Blower BL-0520-003 is not in Auto.

The valves are butterfly type. The actuators are standard non-modulating motorised type with local, remote manual and auto control modes.

Bioselector aeration control valves FV0520001 and FV0520004 are located on lines to bioselector tank 1 and bioselector tank 2 respectively that tee off the common outlet line of the bioreactor blowers. They are opened periodically to aerate the bioselector. The times for bioselector aeration are nominated from the Bioreactor Aeration Table (refer to Sect 10.2.8.3; Operator Selections and Setpoints)

The valves are butterfly type. The actuators are standard non-modulating motorised type with local, remote manual and auto control modes.

Aerobic/Anoxic Zone air valves FV0520002 and FV0520005 are located on lines to the Aerobic/Anoxic zone of Bioreactor 1 and Aerobic/Anoxic zone of Bioreactor 2 respectively that tee off the common outlet line of the bioreactor blowers. They may be opened intermittently to aerate the zone. The times for Aerobic/Anoxic zone aeration are nominated from the Bioreactor Aeration Table (refer to Operator Selections and Setpoints)

The valves are butterfly type. The actuators are standard non-modulating motorised type with local, remote manual and auto control modes.

#### Instrumentation

Description	Tag	Units	Min	Max	Offset	Alarms
Anoxic/aerobic Zone 1 DO Conc.	AIT0511001	mg/L	0	10		
Anoxic/aerobic Zone 2 DO Conc.	AIT0512001	mg/L	0	10		
Bioreactor Tank 1 DO Conc.	AIT0511003	mg/L	0	10		L H
Bioreactor Tank 2 DO Conc.	AIT0512003	mg/L	0	10		L H
Bioreactor 1 Air Flow Switch	FS0520001		0	1		L
Bioreactor 2 Air Flow Switch	FS0520002		0	1		L
Bioreactor 1 Air Flow Meter (annubar)	FIT0520001	Nm <sup>3</sup> /h	0	1000		
Bioreactor 2 Air Flow Meter (annubar)	FIT0520002	Nm <sup>3</sup> /h	0	1000		

#### Local Operation

- BL-0520-001, BL-0520-002, BL-0520-003: standard.
- FVC0520001, FVC0520002, FVC0520003, FVC0520004, FVC0520005, FV0520006: standard.



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#### Remote Manual Operation

- BL-0520-001, BL-0520-002, BL-0520-003: standard.
- FVCO520001, FCV0520002, FCV0520003, FCV0520004, FCV0520005, FV0520006: standard non-modulating valve control.

#### Auto Operation

##### 1 Duty / Duty / Standby Selection

If BL-0520-001 is not in auto, FCV0520006 opens and BL-0520-002 operates as the duty blower for Bioreactor 1

If BL-0520-003 is not in auto, FCV0520003 opens and BL-0520-003 operates as the duty blower for Bioreactor 2

If BL-0520-002 and BL-0520-003 are not in auto, priority is given to the first duty blower to need BL-0520-002.

Operator intervention will eventually be needed in this situation to ensure air from one blower is evenly shared between both bioreactors.

#### PLC Parameters

Description	Units	Minimum	Maximum	Preset
Blower BL-0520-001 Speed	Hz	15	50	-
Blower BL-0520-002 Speed	Hz	15	50	-
Blower BL-0520-003 Speed	Hz	15	50	-

#### Operator Selections and Setpoints

##### Bioreactor Aeration Table:

Aeration to the bioreactors is controlled via feedback loop from the relative DO measurement. The aeration intensity can be modified by increasing /decreasing the DO setpoint but also by selecting the aeration interval for every hour of the day. Similarly the aeration provided to the anoxic zone can be selected by choosing the aeration interval for every hour via the on and off timers. Aeration in the anoxic/aerobic zone will only occur if the main bioreactor is being aerated. If aeration ON time is selected for the Anoxic/Aerobic tank whilst the Bioreactor aeration is not occurring, the Anoxic/Aerobic aeration control valve will simply open with no airflow present.

The bioselector aeration can be selected during any interval where aeration is provided to the main bioreactor tank. Normal operation is for the bioselector to be aerated for 5 ---10 min per day.

For aeration intervals NOT adding up to the full hour, e.g. 20min ON and 20min OFF, the timer will recycle after the OFF period and return to the ON timer for that hour period, e.g. 20min ON and 20 min OFF will be followed by another 20 min ON period.

The bioselector aeration can be selected during any interval where aeration is provided to the main bioreactor tank. Normal operation is for the bioselector to be aerated for 5 – 10 min per day. For the bioselector aeration the interval time will simply begin at the start of the time period and not recycle. Each bioreactor has an aeration control table as detailed below:

Description	D. O. Setpoints			Bioreactor aeration interval (min)			Anoxic/Aerobic aeration interval (min)			Bioselector Aeration ON time (min)	
	Min	Max	Preset	On min	Off min	Preset min	On min	Off min	Preset min	Time min	Preset min
00:00-01:00	0	3	2	0 - 60	0 -60	60 On	0- 60	0 -60	OFF	0	0
01:00-02:00	0	3	2	0 - 60	0 -60	60 On	0 - 60	0 -60	OFF	0	
02:00-03:00	0	3	2	0- 60	0 -60	60 On	0- 60	0 -60	OFF	0	0



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Description	D. O. Setpoints			Bioreactor aeration interval (min)			Anoxic/Aerobic aeration interval (min)			Biosselector Aeration ON time (min)	
03:00-04:00	0	3	2	0- 60	0 -60	60 On	0- 60	0 -60	OFF	0	0
04:00-05:00	0	3	2	0 - 60	0 -60	60 On	0 - 60	0 -60	OFF	0	0
05:00-06:00	0	3	2	0 - 60	0 -60	60 (On)	0 - 60	0 -60	OFF	0	0
06:00-07:00	0	3	2	0- 60	0 -60	60 On	0- 60	0 -60	OFF	0	0
07:00-08:00	0	3	2	0- 60	0 -60	60 On	0- 60	0 -60	OFF	0	0
08:00-09:00	0	3	2	0 - 60	0 -60	60 On	0 - 60	0 -60	OFF	0	0
09:00-10:00	0	3	2	0 - 60	0 -60	60 On	0 - 60	0 -60	OFF	10	10
10:00-11:00	0	3	2	0- 60	0 -60	60 On	0- 60	0 -60	OFF	0	0
11:00-12:00	0	3	2	0 - 60	0 -60	60 On	0 - 60	0 -60	OFF	0	0
12:00-13:00	0	3	2	0 - 60	0 -60	60 (On)	0 - 60	0 -60	OFF	0	0
13:00-14:00	0	3	2	0- 60	0 -60	60 On	0- 60	0 -60	OFF	0	0
14:00-15:00	0	3	2	0 - 60	0 -60	60 On	0 - 60	0 -60	OFF	0	0
15:00-16:00	0	3	2	0 - 60	0 -60	60 (On)	0 - 60	0 -60	OFF	0	0
16:00-17:00	0	3	2	0 - 60	0 -60	60 On	0 - 60	0 -60	OFF	0	0
17:00-18:00	0	3	2	0 - 60	0 -60	60 On	0 - 60	0 -60	OFF	0	0
18:00-19:00	0	3	2	0 - 60	0 -60	60 On	0 - 60	0 -60	OFF	0	0
19:00-20:00	0	3	2	0 - 60	0 -60	60 On	0 - 60	0 -60	OFF	0	0
20:00-21:00	0	3	2	0- 60	0 -60	60 On	0- 60	0 -60	OFF	0	0
21:00-22:00	0	3	2	0- 60	0 -60	60 On	0- 60	0 -60	OFF	0	0
22:00-23:00	0	3	2	0- 60	0 -60	60 On	0- 60	0 -60	OFF	0	0
23:00-0:00	0	3	2	0 - 60	0 -60	60 On	0 - 60	0 -60	OFF	0	0

A separate aeration table can be selected for weekend settings. If selected, the aeration parameters from this table will be functional from midnight Friday to midnight Sunday. This allows flexibility to change aeration setting when the diurnal loading patterns changes across the weekend.

Blower Control: The blower control settings are detailed below, these setting are available on the blower control page.:

Parameter	Min	Max	Comment
PID Loop 05121003 Auto	-	-	
PID Loop 05121003 Manual	-	-	
PID Loop 05121003 OP	0	100	
PID Loop 05121003 OP Maximum	80	100	
PID Loop 05121003 OP Minimum	0	20	
PID Loop 05121003 P	0	10	
PID Loop 05121003 I	0	10	
PID Loop 05121003 D	0	10	
PID Loop 05122003 Auto	-	-	
PID Loop 05122003 Manual	-	-	
PID Loop 05122003 OP	0	100	
PID Loop 05122003 OP Maximum	80	100	
PID Loop 05122003 OP Minimum	0	20	
PID Loop 05122003 P	0	10	
PID Loop 05122003 I	0	10	
PID Loop 05122003 D	0	10	



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#### Sequence 1 Blowers and Bioreactor Aeration

##### *Permissives (all - sequence execution begins)*

- Bioreactor 1 aeration: BL-0520-002 is in auto or BL-0520-002 is in auto and FV0520006 is fully opened and FV0520003 is fully closed.
- Bioreactor 1 aeration: BL-0520-003 is in auto or BL-0520-003 is in auto and FV0520003 is fully opened and FV0520006 is fully closed.

##### *Inhibits (any - sequence execution ends)*

- Bioreactor 1 aeration: BL-0520-002 is not in auto and BL-0520-003 is not in auto or FV0520006 is not fully opened or FV0520003 is not fully closed.
- Bioreactor 2 aeration: BL-0520-003 is not in auto and BL-0520-002 is not in auto or FV0520003 is not fully opened or FV0520006 is not fully closed.

##### *Starting*

DO set point is moved to PID loop 0511003 SP according to clock time.

If PID loop 0511002 is in auto (DO mode), BL-0520-002 starts if DO setpoint (time XX:X\_X-XX:XX) is > PV (AE0511003). If PID loop 0511002 is in manual (speed mode), BL-0520-002 starts.

DO setpoint (at time XN:XX-XX:XX) is moved to PID loop OS12002 SP according to clock time.

If PID loop 0512003 is in auto (DO mode), BL-0520-003 starts if DO setpoint (time XX:XX-XX:XX) is > PV AE0512003). If PID loop 0512003 is in manual (speed mode), BL-0520-003 starts.

DO setpoint (at time X\_X:XX-XX:XX) is moved to PID loop 0512003 SP according to clock time.

If Duty blower is unavailable, Standby blower output will replace duty blower in control loop.

##### *Steady State*

If PID loop 0511002 is in Auto, the OP automatically varies in response to the SP and PV. If PID loop OS11002 is in Manual, the OP does not change unless the Operator enters a different value. BL-0520-002 operates at the speed determined by the OP.

If PID loop 0512003 is in Auto, the OP automatically varies in response to the SP and PV. If PID loop OS12003 is in Manual, the OP does not change unless the Operator enters a different value. BL-0520-003 operates at the speed determined by the OP.

##### *Stopping*

If PID loop 0511002 is in Auto, PV is > SP and OP = PID loop 0511002 OP Minimum for 120s, BL-0520-002 stops. Note: if PID loop 0511002 is in Manual, Blower BL-0520002 is not commanded to stop.

If PID loop 0512003 is in Auto, PV is > SP and OP = PID loop 0511003 OP Minimum for 120s, BL-0520-003 stops. Note: if PID loop 0512003 is in Manual, Blower BL-0520003 is not commanded to stop.

#### Sequence 2 – Anoxic/Aerobic Zone Aeration

##### *Permissives (all - sequence execution begins)*

- FV0520002: FV0520002 is in Auto.
- FV0520005: FV0520005 is in Auto.

##### *Inhibits (any - sequence execution ends)*

- FV0520002: FV0520002 is not in Auto.
- FV0520005: FV0520005 is not in Auto.

##### *Opening*

If Anoxic/Aerobic zone aeration interval ON timer is > 0 min, the Anoxic/Aerobic aeration control valve will open for the duration of the ON timer.

##### *Steady State and Closing*

FCV0520002 opens for Aerobic/Anoxic Zone 1 ON duration timer and closes for Aerobic/Anoxic Zone 2 OFF duration timer, for the time interval (XX:XX – XX:XX), FCV0520005 opens for Aerobic/Anoxic Zone 2 ON duration timer and closes for Aerobic/Anoxic Zone 2 OFF duration timer for the time interval (XX:XX – XX:XX).



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#### Sequence 3 – Bioselector Valves

##### *Permissives (all - sequence execution begins)*

- FV0520001: FV0520001 is in Auto.
- FV0520004: FV0520004 is in Auto.

##### *Inhibits (any - sequence execution ends)*

- FV0520001: FV0520001 is not in Auto.
- FV0520004: FV0520002 is not in Auto.

##### *Opening*

When Bioselector 1 Aeration Interval time is selected the Bioselector Aeration valve FV0520001 opens for the nominated period of ON time (xx min – refer to Section 10.2.8.3).

When Bioselector 2 Aeration Interval time is selected the Bioselector Aeration valve FV0520002 opens for the nominated period of ON time (xx min – refer to Section 10.2.8.3).

##### *Steady State and Closing*

FV0520001 opens for the duration of Bioselector 1 Aeration ON time and closes once this timer has elapsed.

.FV0520004 opens for the duration of Bioselector 1 Aeration ON time and closes once this timer has elapsed.

#### Interlocks Defaults and Forces

- If AE0511003 faults: its value is forced low to force the blowers to provide excess air.
- If AE0512003 faults: its value is forced low to force the blowers to provide excess air.
- If FS0520001 detects low air flow rate: BL-0520-002 and BL-0520-002 critical interlock is activated.
- If FS0520002 detects low air flow rate: BL-0520-003 and BL-0520-002 critical interlock is activated.

#### Process Alarms

- PID loop 0511003 SP > PV for 20 minutes.
- PID loop 0512003 SP > PV for 20 minutes.

#### Process Calculations

- Bioreactor 1 Calculated Flow Rate of Air [Nm<sup>3</sup>/h] = (BL-0520-002 Capacity [Nm<sup>3</sup>/h @ 50Hz] x BL-0520-002 Speed [Hz] / 50) OR (BL-0520-002 Capacity [Nm<sup>3</sup>/h @ 50Hz] x BL-0520002 Speed [Hz] / 50). when FV0520006 is OPEN for standby blower.
- Bioreactor 2 Calculated Flow Rate of Air [Nm<sup>3</sup>/h] = (BL-0520-003 Capacity [Nm<sup>3</sup>/h @ 50Hz] x BL-0520-003 Speed [Hz] / 50) OR (BL-0520-002 Capacity [Nm<sup>3</sup>/h @ 50Hz] x BL-0520-002 Speed [Hz] / 50). when FV0520003 is OPEN for standby blower.
- Bioreactor 1 Air Volume Today [Nm<sup>3</sup>] Bioreactor 1 Actual Flow Rate of Air [Nm<sup>3</sup>/h] / 360 totalised every 10 seconds for 24h.
- Bioreactor 2 Air Volume Today [Nm<sup>3</sup>] = Bioreactor 2 Actual Flow Rate of Air [Nm<sup>3</sup>/h] / 360 totalised every 10 seconds for 24h.
- Bioreactor 1 Air Volume Yesterday [Nm<sup>3</sup>] Bioreactor 1 Air Volume Today [Nm<sup>3</sup>] saved from the previous day.
- Bioreactor 2 Air Volume Yesterday [Nm<sup>3</sup>] = Bioreactor 2 Air Volume Today [Nm<sup>3</sup>] saved from the previous day.



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#### Process and Operation Feedback

Description	Units	Minimum	Maximum	Preset
PID loop 0511001 SP	mg	0	3	-
PID loop 0511001 PV	mg/L	0	10	
Bioreactor 1 Calculated Flow Rate of Air	Nm3/h	0	3,000	
Bioreactor 1 Air Volume Today	Nm3	0	72,000	-
Bioreactor 1 Air Volume Yesterday	Nm3	0	72,000	-
PID loop 0512003 SP	mg/L	0	3	
PID loop 0512003 PV	mg/L	0	10	-
Bioreactor 2 Calculated Flow Rate of Air	Nm3/h	0	3,000	-
Bioreactor 2 Air Volume Today	Nm3	0	72,000	
Bioreactor 2 Air Volume Yesterday	Nm3	0	72,000	-

#### Process Trends

Description	Trigger
PID loop 0511002 SP	PID loop 0511001 is in Auto
PID loop 0511001 PV	-
PID loop_ 0511003 SP	PID loop 0511003 is in Auto
PID loop 0511003 PV	

AsBuilt



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#### 1.1.5.3. Waste Activated Sludge

##### *WAS Draw Off*

##### Documents and Drawings

P&ID 7107-I-DWG-5008

P&ID 7107-I-DWG-5015

##### Process Objectives

To draw off the volume of recycled mixed liquor required to keep the mixed liquor suspended solids (MLSS) concentration stable (at —8 g/L).

##### Hand Operated Equipment

- HV\_0530-007 is a sluice valve located on the common inlet line of WAS pumps PU\_-0530-001 and PU\_-0530-002. It is opened during normal operation.
- HV\_0530-003 and HV\_0530-004 are sluice valves located on the inlet lines of WAS pumps PU\_-0530-001 and PU\_-0530-002 respectively. They are opened during normal operation.
- HV\_0530-012 is a ball valve located on lines that tee off the inlet lines of WAS pumps PU\_-0530-001 and PU\_-0530-002 respectively. It is normally closed and is opened only to flush the pumps or sample WAS.
- HV\_0530-005 and HV\_0530-006 are sluice valves located on the outlet lines of WAS pumps PU\_-0530-001 and PU\_-0530-002 respectively. They are opened during normal operation.
- HV\_0530-008 is a sluice valve located on the line that tees off the outlet line of WAS pumps PU\_-0530-001 and PU\_-0530-002 respectively. It is normally closed and is opened only to flush the pumps or sample WAS.
- HV0441-001 is a sluice valve located after the WAS flowmeter on the WAS sludge line. It is opened during normal operation and closed to isolate the WAS flowmeter.
- HV\_0441-006 is a sluice valve located after the decanter in Sludge Storage Tank No. 1. it is normally open and closed to isolate the flow control valve FCV0441002.
- HV\_0441-006 is a ball valve located on the sample line that tees off the common outlet line of WAS pumps PU\_-0530-001 and PU\_-0530-002. It is normally closed and is opened only to flush the line or sample WAS.
- HV\_0442-001 is a sluice valve located on the line to sludge storage tank 2 that tees off the common outlet line of WAS pumps PU\_-0530-001 and PU\_-0530-002. It is opened during normal operation.
- HV\_0421-005 is a sluice valve located after the decanter in Sludge Storage Tank No. 2. it is normally open and closed to isolate the flow control valve FCV0442002.
- HV\_0441-004 is a sluice valve located on a line that tees off the common outlet line of WAS pumps PU\_-0530-001 and PU\_-0530-002. It is opened to bypass the sludge storage tanks.
- HV\_0441-007 is a sluice valve on the overflow line from Sludge Storage Tank 1 that can direct overflow to sewer rather than Sludge Storage Tank 2.



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#### Automated Equipment

- WAS pumps PU\_-0530-002 and PU\_-0530-002 are located at the outlet of the recycle chamber. They are used to pump mixed liquor from the chamber to the sludge storage tanks.

The pumps are centrifugal type. The motors are standard DOL, fixed speed type with local, remote manual and auto control modes. The pumps are in duty/standby configuration with a standard duty changeover operation.

- WAS transfer valves FCV0441001 and FCVO442001 are located on lines to sludge storage tank 1 and sludge storage tank 2 respectively that tee off the common outlet line of WAS pumps PU\_-0530-001 and PU\_-0530-002. They are opened to direct mixed liquor to tank 1 or tank 2.

The valves are knife gate type. The actuators are standard non-modulating motorised type with local, remote manual and auto control modes.

#### Instrumentation

Description	Tag	Units	Min	Max	Offset	Alarms
WAS Flow Rate	FIT0441001			5		L
Sludge Storage Tank 1 Level	LIT0441001	m	0	10		LL, L, H, HI -I
Sludge Storage Tank 2 Level	LIT0441001	m	0	10		LL, L, H, HI-I

#### Local Operation

- PU\_-0530-001 and PU\_-0530-002: standard local operation.
- FCV0441001 and FCVO442001: standard local operation.

#### Remote Manual Operation

- PU\_-0530-001 and PU\_-0530-002: standard remote operation.
- FCVO441001 and FCVO442001: standard remote operation.

#### Auto Operation

##### Duty / Standby Selection

- Standard.

As Built

#### PLC Parameters

Description	Units	Minimum	Maximum	Preset
Sludge Storage Tank 1 High High level	in	0	10.0	9.4
Sludge Storage Tank 2 High High level	m	0	10.0	9.4



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#### Operator Selections and Setpoints

WAS transfer is enabled by selecting the Sludge Storage Tank for the WAS to be delivered to. This will open the correct WAS discharge valve FCV0441001 or FCV0442001, Six (6) WAS transfer start times are available (XX:XX) to allow for wasting during different times of the day. One to six WAS transfer start times can be enabled each day. Each transfer start time has its own WAS transfer timer (xxx min). The idea of this is to allow WAS transfer during the aerated time periods in the Aerobic Sludge Storage Tanks (up to 6 x 2 hour periods per day). WAS transfer during this aeration period will not cause disruption to settling or supernatant withdrawal.

A WAS transfer volume setpoint is selectable to allow a prescribed volume of WAS to be delivered to the Sludge Storage Tank(s) each day. Once the setpoint volume has been reached, no further WAS transfer will occur (for that day), regardless of whether further sludge transfer time is available.

#### *Waste Activated Sludge WAS Control.*

Description	Units	Minimum	Maximum	Preset
WAS to Sludge Storage Tank 1 Enabled	-	-	-	
WAS to Sludge Storage Tank 2 Enabled			-	-
WAS transfer time 1 Enabled				-
WAS transfer time 2 Enabled	-	-	-	
WAS transfer time 3 Enabled	-	-	-	-
WAS transfer time 4 Enabled			-	
WAS transfer time 5 Enabled	-	-	-	
WAS transfer time 6 Enabled	-		-	
WAS transfer start time 1	Clock time	0:00	23:59	
WAS transfer time 1	min	0	600	
WAS transfer start time 2	Clock time	0:00	23:59	
WAS transfer time 2	min	0	600	
WAS transfer start time 3	Clock time	0:00	23:59	
WAS transfer time 3	min	0	600	
WAS transfer start time 4	Clock time	0:00	23:59	
WAS transfer time 4	min	0	600	
WAS transfer start time 5	Clock time	0:00	23:59	
WAS transfer time 5	min	0	600	
WAS transfer time 5	min	0	600	
WAS transfer start time 6	Clock time	0:00	23:59	
WAS transfer time 6	min	0	600	
WAS transfer volume setpoint	kL	0	300	-



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#### Sequence 1- WAS Valves

##### *Permissives (all - sequence execution begins)*

- FCV0441001: FCV0441001 is in auto.
- FCV0442001: FCV0442001 is in auto.

##### *Inhibits (any - sequence execution ends)*

- FCV0441001: FCV0441001 is not in auto.
- FCV0442001: FCV0442001 is not in auto.

##### *Opening / Starting*

When WAS to Sludge Storage Tank 1 is enabled, FCV0441002 opens, When WAS to Sludge Storage Tank 2 is selected, FCV0442002 opens.

##### *Closing*

When WAS to Sludge Storage Tank 1 is disabled, FCV0441002 closes. When WAS to Sludge Storage Tank 2 is disabled, FCV0442001 closes.

#### Sequence 2 WAS Pumps

##### *Permissives (all - sequence execution begins)*

- PU\_-0530-001 is in auto or PU\_-0530-002 is in auto.
- WAS transfer to Sludge Storage Tank 1 or 2 is Enabled
- FCV0441001 is fully opened or FCV0442001 is fully opened.
- MBR Train 1 is in Production Mode, Standby Mode or Recycle Mode or, MBR Train 2 is in Production Mode, Standby Mode or Recycle Mode or, MBR Train 3 is in Production Mode, Standby Mode or Recycle Mode or, MBR Train 4 is in Production Mode, Standby Mode or Recycle Mode.
- WAS transfer start time X:XX = clock time.

##### *Inhibits (any - sequence execution ends)*

- PU\_-0530-001 is not in auto and PU\_-0530-002 is not in auto.
- FCV0441001 is not fully opened or FCV0442001 is not fully opened
- MBR Train 1 is not in Production Mode, Standby Mode or Recycle Mode and, MBR Train 2 is not in Production Mode, Standby Mode or Recycle Mode and, MBR Train 3 is not in Production Mode, Standby Mode or Recycle Mode and, MBR Train 4 is not in Production Mode, Standby Mode or Recycle Mode.
- Level LE044100X for Sludge Storage Tank X is at High High level

##### *Starting*

WAS transfer starts when WAS transfer start time X (XX:XX) = clock time.

##### *Steady State*

PU-0530-001 or PU\_-0530-002 runs for the duration of the WAS transfer timer (xxx min).

##### *Stopping*

WAS transfer stops when WAS transfer timer (xxx min) has expired. The duty WAS transfer pump stops.

#### Interlocks Defaults And Forces

- Sludge Storage Tank 1 High High level — inhibit WAS transfer to Sludge Storage Tank 1
- Sludge Storage Tank 2 High High level - inhibit WAS transfer to Sludge Storage Tank 2



## Fairfield Water Treatment Plant

### Operation Manual



#### Process Alarms

PU\_-0530-001 and PU\_-0530-002 not in Auto  
Sludge Storage Tank X High High level alarm

#### Process Calculations

- WAS Volume Today [kL] = FE0441001 Flow Rate [L/s] totalised every second for 24h.
- WAS Volume Yesterday (kL) -= WAS Volume Today [kL] saved from the previous day.
- WAS Volume this week [kL] WAS Volume totalised from midnight (0:00) Sunday evening.

#### Process and Operation Feedback

Description	Units	Minimum	Maximum	Preset
WAS Volume Today (current volume)	kL	0	300	-
WAS Volume Yesterday	kL	0	300	-
WAS Volume This week	kL	0	2100	-

#### Process Trends

Description	Trigger
WAS Volume Yesterday	
WAS Volume this week	

#### Displays

- Mimics: Bioreactor.
- Sequence Popups: WAS.
- Trends: Bioreactor

#### Notes

Bypassing the Sludge Storage Tanks can be done by manual operation only (HV\_-0411-004).

ASBUILT



**1.1.5.4. Recycle & RAS****Recycling Mixed Liquor****Process Objectives**

To recycle an amount of mixed liquor that permits permeate extraction without excessive thickening of the mixed liquor in the membrane tank.

To direct the correct flow rate of RAS to the bioselector.

**Hand Operated Equipment**

- HV-0540-001, HV\_-0540-002, HV\_-0540-003 and HV\_-0540-002 are knife gate valves on the outlet lines of recycle pumps PU\_0540-001, PU0540-002, PU\_0540-003 and PU\_0540-004 respectively. They are opened during normal operation.
- HV\_-0660-033 and HV\_-0660-034 are sluice valves on lines that tee off the outlet line of recycle pump PU\_0540-001, They are opened during normal operation,
- HV\_-0660-035 and HV\_-0660-036 are sluice valves on lines that tee off the outlet line of recycle pump PU\_0540-002, They are opened during normal operation.
- HV\_-0660-037 and HV\_-0660-038 are sluice valves on lines that tee off the outlet line of recycle pump PU\_0540-003. They are opened during normal operation.
- HV\_-0660-039 and HV\_-0660-040 are sluice valves on lines that tee off the outlet line of recycle pump PU0540-004. They are opened during normal operation.
- HV-0630-001 and HV\_-0630-003 are sluice valves on the RAS line to Bioselector 1. They are adjusted to obtain the correct flow rate of RAS.
- HV\_-0630-002 and HV\_-0630-004 are sluice valves on the RAS line to Bioselector 2. They are adjusted to obtain the correct flow rate of RAS.
- HV\_-0630-001. HV\_-0630-002. HV\_-0630-003 and HV\_-0630-004 are sluice valves on the outlet lines of the recycle chamber. They are opened during normal operation.
- SB\_-0630-001 is a stop board on the recycle channel to Bioreactor Tank 1. It is opened during normal operation.
- SB-0630-002 is a stop board on the recycle channel to Bioreactor Tank 2. It is opened during normal operation.
- SB\_-0512-001 is a stop board on the recycle channel from Bioreactor Tank I to the Membrane Feed Tank . It is opened during normal operation.
- SB\_-0512-002 is a stop board on the recycle channel from Bioreactor Tank 2 to the Membrane Feed Tank. It is opened during normal operation.

**Automated Equipment**

Membrane Feed Pumps PU\_-0540-001, PU\_-0540-002, PU\_-0540-003 and PU\_-0540-004 are located in the Membrane Feed Tank, which is hydraulically connected to both bioreactor tanks. They are used to pump mixed liquor from the bioreactor tank to the membrane tanks.

The pumps are propeller type. The motors are standard variable speed type with remote manual and auto control modes.



Instrumentation

Description	Tag	Units	Min	Max	Offset	Alarms
MBR Train 1 Recycle Flow Rate	FIT0540001	L/s	0	200		L, LL
MBR Train 2 Recycle Flow Rate	FIT 0540002	L/s	0	200		L, LL
MBR Train 3 Recycle Flow Rate	FIT 0540003	L/s	0	200		L, LL
MBR Train 4 Recycle Flow Rate	FIT 0540004	L/s	0	200		L, LL
Bioselector 1 RAS Flow Rate	FIT 0630001	L/s	0	5		L, LL
Bioselector 2 RAS Flow Rate	FIT 0630002	L/s	0	5		L, LL

Local Operation

- PU\_-0540-001, PU\_-0540-002, PU\_-0540-003 and PU\_-0540-004: standard.

Remote Manual Operation

- PU-0540-001, PU\_-0540-002, PU\_-0540-003 and PU\_-0540-004: standard.

Auto Operation*PLC Parameters*

Description	Units	Minimum	Maximum	Preset
PU_-0540-001 Speed	Hz	20	50	
PU_-0540-002 Speed	Hz	20	50	
PU_-0540-003 Speed	Hz	20	50	
PU_-0540-004 Speed	Hz	20	50	



Operator Selections and Setpoints

Description	Units	Minimum	Maximum	Preset
Fopt Recycle Flow Rate (for all recycle pumps)	L/s	0	150	50
Frmax Recycle Flow Rate (for all recycle pumps)	L/s	0	150	105
Foff Recycle Flow Rate (for all recycle pumps)	L/s	0	150	50
PID Loop 0540001 Auto	-	-		-
PID Loop 0540001 Manual	-	-	-	-
PID Loop 0540002 OP (Manual)	%	40	100	
PID Loop 0540002 OP Maximum	%	60	100	
ND Loop 0540002 OP Minimum	%	40	60	
PID Loop 0540001 P				
PID Loop 0540001 I				
PID Loop 0540001 D				
PID Loop 0540002 Auto	-	-	-	-
PID Loop 0540002 Manual	-	-		-
PID Loop 0540002 OP (Manual)	%	40	100	
PID Loop 0540002 OP Maximum	%	60	100	
PID Loop 0540002 OP Minimum	%	40	60	
PID Loop 0540002 P				
PID Loop 0540002 I				
PID Loop 0540002 D				
PID Loop 0540003 Auto	-	-	-	-
PID Loop 0540003 Manual	-	-	-	
PID Loop 0540002 OP (Manual)	%	40	100	
PID Loop 0540002 OP Maximum	%	60	100	
PID Loop 0540002 OP Minimum	%	40	60	
PID Loop 0540003 P				
PID Loop 0540003 I				
PID Loop 0540003 D				
PID Loop 0540004 Auto	-	-	-	
PID Loop 0540004 Manual	-	-	-	
PID Loop 0540002 OP (Manual)	%	40	100	
PID Loop 0540002 OP Maximum	%	60	100	
PID Loop 0540002 OP Minimum	%	40	60	
PID Loop 0540004 P				
PID Loop 0540004 I				
PID Loop 0540004 D				



Sequence 1– Recycle Pumps Flow Rate Mode and Speed Mode***Permissives (all - sequence execution begins)***

- PU\_-0540-001: PU\_-0540-001 is in Auto and MBR Train 1 is in Production Mode or Standby Mode or Recycle Mode.
- PU\_-0540-002: PU\_-0540-002 is in Auto and MBR Train 2 is in Production Mode or Standby Mode or Recycle Mode.
- PU\_-0540-003: PU\_-0540-003 is in Auto and MBR Train 3 is in Production Mode or Standby Mode or Recycle Mode.
- PU\_-0540-004: PU\_-0540-004 is in Auto and MBR Train 4 is in Production Mode or Standby Mode or Recycle Mode.

***Inhibits (any - sequence execution ends)***

- PU\_-0540-001: PU\_-0540-002 is not in Auto or MBR Train 1 is not in Production Mode and not in Standby Mode and not in Recycle Mode.
- PU\_-0540-002: PU\_-0540-002 is not in Auto or MBR Train 2 is not in Production Mode and not in Standby Mode and not in Recycle Mode.
- PU\_-0540-003: PU\_-0540-003 is not in Auto or MBR Train 3 is not in Production Mode and not in Standby Mode and not in Recycle Mode.
- PU\_-0540-004: PU\_-0540-004 is not in Auto or MBR Train 4 is not in Production Mode and not in Standby Mode and not in Recycle Mode.

***Starting***

If PID loop 054000X is in Auto (flow rate mode), PU-0540-00X starts if SP is > PV, If PID loop 054000X is in Manual (speed mode), PU-0540-00X starts.

***Steady State***

If PID loop 054000X is in Auto, the OP automatically varies in response to the SP and PV. If PID loop 054000X is in Manual, the OP does not change unless the Operator enters a different value. PU-0540-00X operates at the speed determined by the OP.

***Stopping***

If MBR Train X is not in Production Mode and not in Standby Mode and not in Recycle Mode, recycle pumping will stop for that train,

Interlocks Defaults And Forces

- If FE054000X faults: its value is forced low so PU\_-0540-00X critical interlock is activated.

Process Alarms

- PID loop 054000X SP > PV for 10 minutes.

Process Calculations

- Recycle Ratio MBR Train X [number] = Recycle flow rate FE054000X [L/s] / (FE066000X Net permeate Flow Rate [L/s] (refer to MBR permeate flow sequences).



Process And Operation Feedback

Description	Units	Minimum	Maximum	Preset
N D loop 0540001 SP	L/s	0	200	-
PID loop 0540001 PV	L/s	0	200	-
Recycle Ratio MBR Train 1	n	0.0	10.0	-
PID loop 0540002 SP	L/s	0		-
PID loop 0540002 PV	L/s	0		-
Recycle Ratio MBR Train 2	n	0.0	10.0	
PID loop 0540003 SP	L/s	0		-
PID loop 0540003 PV	L/s	0		-
Recycle Ratio MBR Train 3	n	1.0	10.0	
PID loop 0540004 SP	L/s	0		-
PID loop 0540004 PV	L/s	0		
Recycle Ratio MBR Train 4	n	0.0	10.0	-

Process Trends

Description	Trigger
PID loop 0540001 SP	PID loop 0540001 is in Auto
PID loop 0540001 PV	-
Recycle Ratio MBR Train 1	-
PID loop 0540002 SP	PID loop 0540002 is in Auto
PID loop 0540002 PV	-
Recycle Ratio MBR Train 2	-
PID loop 0540003 SP	PID loop 0540003 is in Auto
PID loop 0540003 PV	
Ratio MBR Train 3	
PID loop 0540004 SP	PID loop 0540004 is in Auto PID
loop 0540004 PV	
Recycle Ratio MBR Train 4	

Displays

- Mimics: Bioreactors and MBR Trains.
- Sequence Popups: Recycle.
- Trends: Recycle.

Notes

- RAS flow rates are set using hand operated valves.



**Preventive Maintenance Schedule****1.0 Blowers**

BL	0520	001	Bioreactor air blower No.1 (Duty)
BL	0520	002	Bioreactor air blower No.2 (Standby)
BL	0520	003	Bioreactor air blower No.3 (Duty)

No. of Units

3

Lubricant Recommended

Quantity to Fill

1.8 Litre

1.5 Litre

80 g

PDA Blower Drive side Mobil SHC 630

PDA Blower Non Drive Mobil SHC 630

TECO Motor – Shell Alvania R3

Period Between Re-Lubrication

Pre-lubed

YES

PDA Blower: Blower Casing – 4000 hours

Manufacturer: **PDA SN822 75kW**

REFER TO VENDOR'S EQUIPMENT MAINTENANCE MANUAL FOR SPECIFIC TASK DETAIL					
MAINTENANCE TASK	Days	Week	Mth	Qtr	Yrly
<b>Inlet Air Filter Indicator</b> Check		X			
Clean filter & indicator 1000 hours.				X	
<b>Oil Level - Check</b>		X			
<b>Blower Oil Change</b>					
First time: 200 hours					
Thereafter: 4000 hours					
<b>200 Hour Check</b>					
Operating limits are not exceeded.		X			
Vee-belt alignment & tension			X		
Coupling alignment & mounting bolts			X		
Taper lock screws & motor mounting bolts tightness			X		
Blower mounting bolts are tight & drive guards			X		
Pressure relief valve operation & setting			X		
Vibration mount bolts are tight			X		
All mounting bolts are tight			X		



**Preventive Maintenance Schedule**

Continued:-

REFER TO VENDOR'S EQUIPMENT MAINTENANCE MANUAL FOR SPECIFIC TASK DETAIL					
MAINTENANCE TASK	Days	Week	Mth	Qtr	Yrly
V-Belts - Replace 8000 hours					
Filter – replace					3 yrs
Drive Belts					3 yrs
Main Shaft Seal					3 yrs
Motor					
Ensure air intake space is not blocked and is dust free.		X			
Check terminals are tight				X	
Ensure contactor terminals are tight				X	
Check thermal overload is mechanically OK				X	
Check 6 Monthly					
Stator Resistance					
Supply Voltage					
Check for noise.					
Clean					X
Check Full Load Conditions					X

**Servicing:**

- Complete inspection with oil change after 200 hours
  - Yearly for three years :
    - Replacement of filter cartridge(s)
    - Draining & replacement of the oil.
    - Replacement of the drive belts
    - Replacement of the main shaft seal
  - During the 3<sup>rd</sup> year, replace pulleys before 24,000 hours of operation.
- Servicing Plan

Interval in Service hours	Accessories	Transmission	Motor/ Blower
After <sup>1</sup> /2 hour		Check Belt tension	
After 24 hours		Check Belt tension	
Once weekly	Check fouling of Suction filter and clean		Check oil levels (mid of sight glass)
After 200 hours			Drain & replace oil In blower



**Preventive Maintenance Schedule**

Every 1000 hours	Check that the Enclosure air vents are not blocked. Test the relief	Check the belt condition.	
Every 4000 hours			If the unit discharge temperature is greater than 120 0 C, drain and replace the blower oil.
After 8000 hours		Check the pulleys for wear and replace the belts if necessary	Drain & replace oil in blower

initial fill Synthetic Oil **Mobil SHC630**

Blower oil level can only be checked when blower is stopped.

Correct oil level is when oil is seen midway through sight glasses.

Over or under filling of oil will cause severe failure of blower.

Note: SN Series units are lubricated with oil both ends

#### Oil Quantities in Litres For Horizontal Position

Machine	<b>822</b>
Drive End	<b>1.8</b>
Non- Drive End	<b>1.5</b>

#### Filter Recommended Service Instructions

- remove element
- blow off dust by directing compressed from inside to out
- wash in warm water with a commercial detergent
- Replace element when dry.

#### Air Dirty Indicator

Blowing units are fitted with a "dirty filter" indicator fitted on the inlet side of the blower. This should be inspected minimum 160 hourly intervals for clean ambient conditions. Inspect 40 hourly intervals (minimum) for dirty ambient conditions.

In any case filter must be cleaned or replaced if red "tell tale" mark on filter indicator appears.



**Preventive Maintenance Schedule****2.0 Instruments****2.1 pH Analyser**

AIT0511005	Bioreactor Tank No 1 ORP/PH Transmitter
AIT0512005	Bioreactor Tank No 2 ORP/PH Transmitter

No. of Units

2

Lubricant Recommended

Quantity to Fill  
NIL

Period Between Re-Lubrication

Pre-Lubed

NIL

Manufacturer

DPD1R1 Hach

REFER TO VENDOR'S EQUIPMENT MAINTENANCE MANUAL FOR SPECIFIC TASK DETAIL				
MAINTENANCE TASK	Weekly	3 Months	6 Months	Yearly
Clean Sensor	X			
Calibration		X		



**Preventive Maintenance Schedule****2.2 DO Analyser**

AIT0511001	Anoxic/Aerobic Tank No 1 Dissolved Oxygen Transmitter
AIT0511003	Bioreactor Tank No 1 Dissolved Oxygen Transmitter
AIT0512001	Anoxic/Aerobic Tank No 2 Dissolved Oxygen Transmitter
AIT0512003	Bioreactor Tank 2 Dissolved Oxygen Transmitter

No. of Units

4

Lubricant Recommended

Quantity to Fill

NIL

Period Between Re-Lubrication

Pre-Lubed

NIL

Manufacturer

**Royce 9200**

REFER TO VENDOR'S EQUIPMENT MAINTENANCE MANUAL FOR SPECIFIC TASK DETAIL				
MAINTENANCE TASK	Weekly	3 Months	6 Months	Yearly
Clean Sensor		X		
Inspect Cap for good order		X		



**Preventive Maintenance Schedule****2.3 MLSS Analyser**

AIT0511004	Bioreactor Tank No 1 MLSS Transmitter
AIT0512004	Bioreactor Tank No 2 MLSS Transmitter

No. of Units

2

Lubricant Recommended

Quantity to Fill

NIL

Period Between Re-Lubrication

Pre-Lubed

NIL

Manufacturer

**Solitax Sensor Turbidity 423 99 00100**

REFER TO VENDOR'S EQUIPMENT MAINTENANCE MANUAL FOR SPECIFIC TASK DETAIL				
MAINTENANCE TASK	Weekly	Months	6 Months	Yearly
Visually Inspect		X		
Check Calibration		X		
Inspect for good order (counter)			X	
Change seal				2yrs
Change Wiper				4 years



**Preventive Maintenance Schedule****3.0 Mixer**

MX	0511	001	MBR 1 Anoxic Zone Mixer	SR4640.410SG15
MX	0512	001	MBR 2 Anoxic Zone Mixer	SR4640.410SG15

No. of Units

2

Lubricant Recommended

Quantity to Fill  
As provided

Period Between Re-Lubrication

Pre-Lubed  
YES

as required

Manufacturer ITT Flygt

REFER TO VENDOR'S EQUIPMENT MAINTENANCE MANUAL FOR SPECIFIC TASK DETAIL				
MAINTENANCE TASK	Mthly	3Mths	6 Mths	Year
Inspect for wear of impeller and intake is free.			X	
Clean and inspect the power and control circuit cables			X	
Check for smooth running			X	
Clean the power and control circuit cables		X		
Check the current consumption at the ampere meter.		X		
Check electrical connections are tight			X	
Check Insulation resistance			X	
Check the lifting handle			X	
Check Functional testing of the monitoring devices			X	
Check bolts are tight				X



**Preventive Maintenance Schedule****4.0 Pumps****4.1 Alum Dosing Pump No 1 & 2 & 3**

PU	0584	001	Alum dosing pump (Duty)
PU	0584	002	Alum dosing pump (Standby)

No. of Units

2

Lubricant Recommended

Quantity to Fill  
Nil

Period Between Re-Lubrication

Pre-Lubed

Yes

Manufacturer **Grundfos DME**

REFER TO VENDOR'S EQUIPMENT MAINTENANCE MANUAL FOR SPECIFIC TASK DETAIL

MAINTENANCE TASK	Daily	Weekly	Mthly	6Mths	Yrly
Clean			X		
<b>Motor</b>					
Ensure air intake space is not blocked and is dust free.		X			
Check terminals are tight				X	
Ensure contactor terminals are tight				X	
Check Running temperature				X	
Stator Resistance				X	
Supply Voltage				X	
Check for noise.				X	
Check Full Load Conditions					X



**Preventive Maintenance Schedule****4.2 Recycle Pump**

MV	0540	001	Recycle pump Stream 1
MV	0540	002	Recycle pump Stream 2
MV	0540	003	Recycle pump Stream 3
MV	0540	004	Recycle pump Stream 4

No. of Units

4

Lubricant Recommended

Quantity to Fill  
As provided

Period Between Re-Lubrication

Pre-Lubed  
YES

as required

Manufacturer **ABS RCP400**

REFER TO VENDOR'S EQUIPMENT MAINTENANCE MANUAL FOR SPECIFIC TASK DETAIL				
MAINTENANCE TASK	Mthly	3Mths	6 Mths	Year
Inspect for wear of impeller and intake is free.		X		
Clean and inspect the power and control circuit cables		X		
Check for smooth running		X		
Clean the power and control circuit cables	X			
Check the current consumption at the ampere meter.	X			
Check electrical connections are tight			X	
Check Insulation resistance			X	
Check the lifting handle		X		
Check Functional testing of the monitoring devices			X	
Check bolts are tight				X



**Preventive Maintenance Schedule****4.3 WAS Pump**

PU	0530	001	WAS pump (Duty)
PU	0530	002	WAS pump (Standby)

No. of Units

2

Lubricant Recommended

Quantity to Fill  
2.0 Litres  
60 g

Pump Sump – Mobil Whiterex 309 ISO VG15FP175C  
Bearings – Shell Alvania 3

Period Between Re-Lubrication

Pre-Lubed  
YES

Pump Sump – 3 year as required

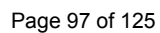
Manufacturer **ABS** WAS Pump AFC 50\50P

REFER TO VENDOR'S EQUIPMENT MAINTENANCE MANUAL FOR SPECIFIC TASK DETAIL				
MAINTENANCE TASK	Daily Weekly	Mthly	3Mths	Yrly
Inspect for noise & performance.			X	
Inspect cable gland is tight			X	
Check for smooth running			X	
Check oil for emulsification				X
Replace oil (if required)				X
Check electrical connections are tight				X
Check stator temperature				X
Check bolts are tight			X	

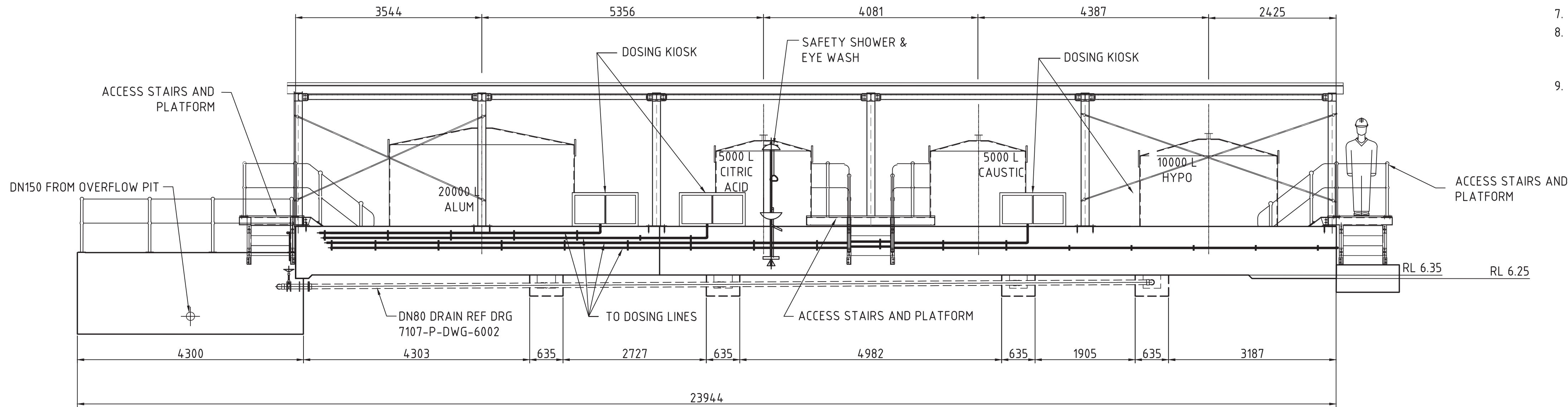
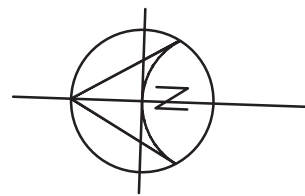


## 2. Drawings

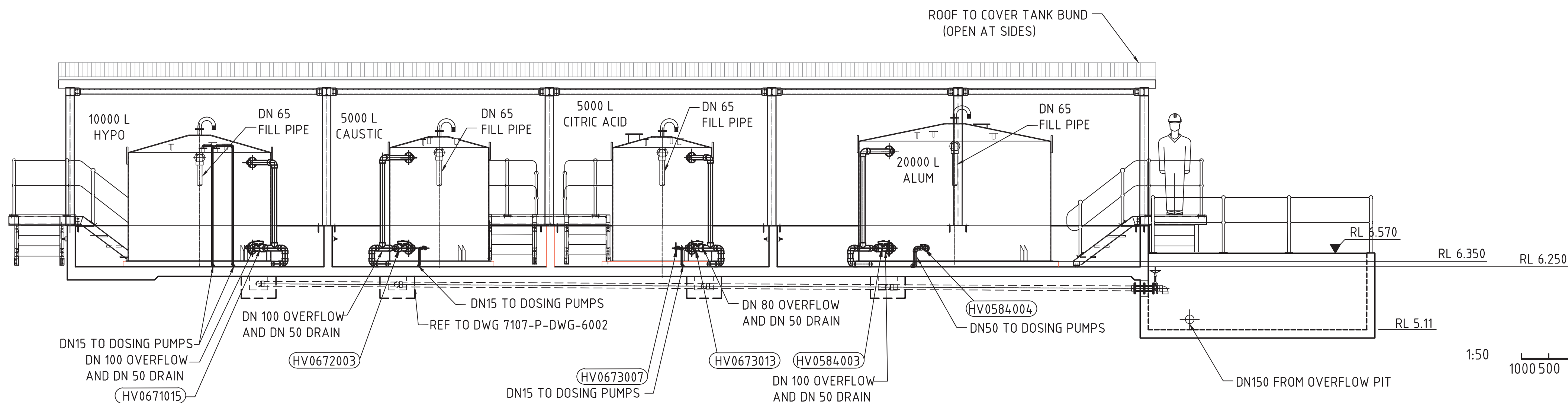




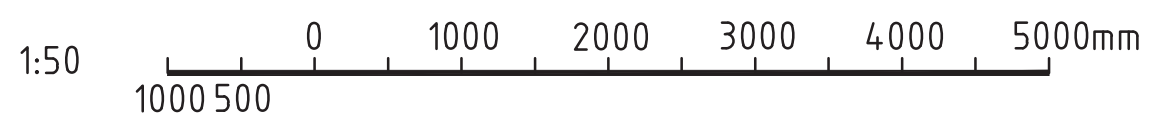




SECTION C  
SCALE 1:50



SECTION B  
SCALE 1:50



PROJECT MANAGER:  
\* P.CHANDLER  
RPEQ No.:  
APPROVED:  
\* G.SIOOTI  
RPEQ No.: 9321

AS CONSTRUCTED DETAILS FOR AMEND. A  
I CERTIFY THAT THE "AS CONSTRUCTED" DETAILS SHOWN ON THIS PLAN ARE TRUE AND ACCURATE RECORD OF THE WORKS

7107-M-DWG-3208  
DESIGN: D.WILLIAMS DRAWN: G.SIMS CHECK: D.WILLIAMS  
APPROVED: D.WILLIAMS DATE: 27.01.09

SIGNED: \* G.SIOOTI  
NAME of SIGNATORY: \* G.SIOOTI  
RPEQ No. or LICENCE: 9321  
COMPANY NAME: TENIX PTY LTD

DRAWING TITLE  
CHEMICAL STORAGE  
LAYOUT  
SHEET 2

SHEET No. 1 OF  
WATER DISTRIBUTION DRAWING No.  
486/5/5-0052-638  
AMEND. A

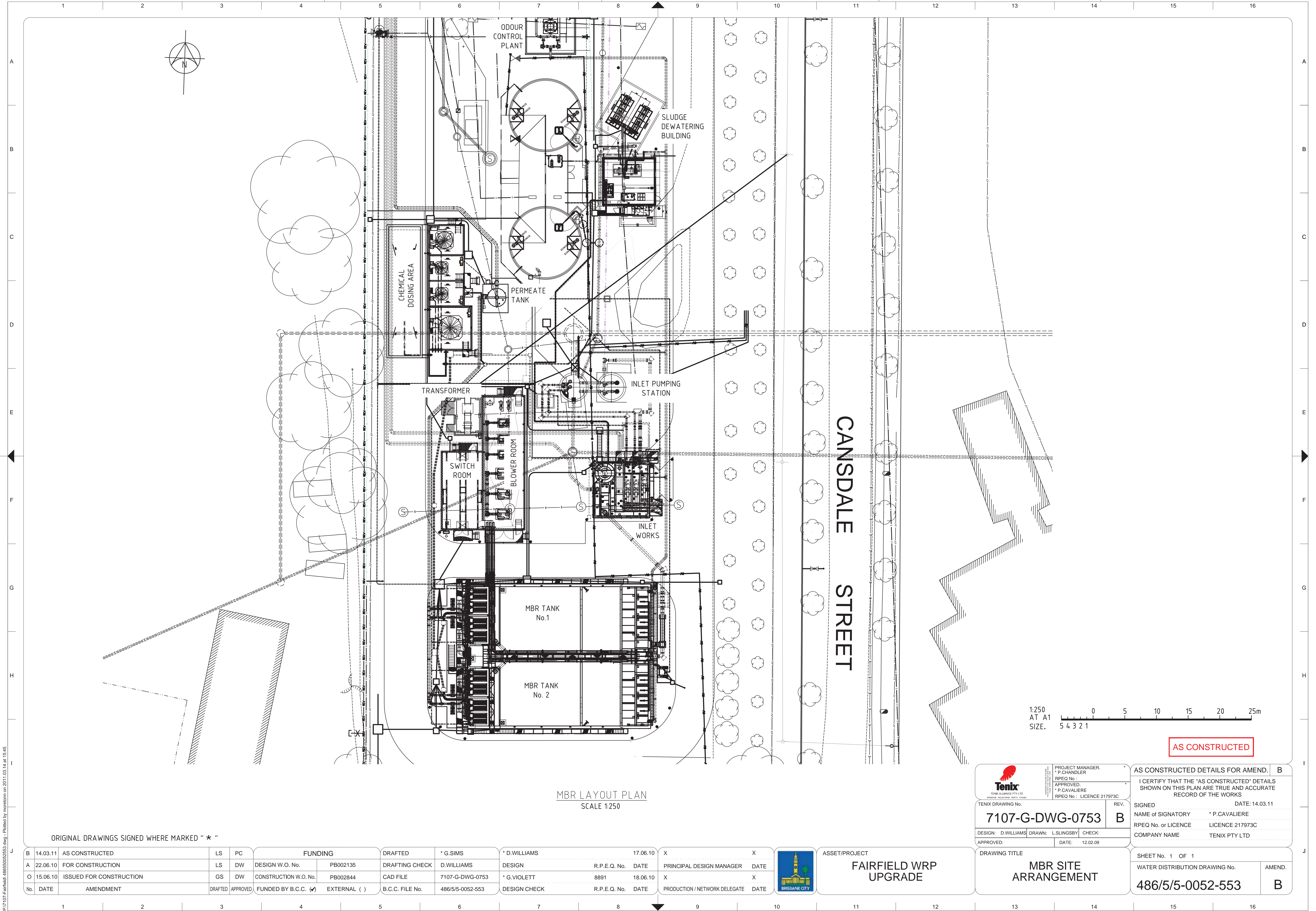
AS CONSTRUCTED

FAIRFIELD WRP  
UPGRADE



No.	DATE	AMENDMENT	DRAFTED	FUNDING	DRAFTING CHECK	B.C.C. FILE No.	* L.SLINGSBY	* D.WILLIAMS	R.P.E.Q. No.	DATE	X	X
A	01.04.11	AS CONSTRUCTED	LS	PC	DESIGN W.O. No.	PB002135	* M.SNARE	DESIGN	R.P.E.Q. No.	DATE	X	X
O	29.09.09	FOR CONSTRUCTION	LS	DW	CONSTRUCTION W.O. No.	PB002844	7107-M-DWG-3208	* S. KUSTERS	R.P.E.Q. No.	DATE	X	X
No.	DATE	AMENDMENT	DRAFTED	APPROVED	FUNDED BY B.C.C. (✓)	EXTERNAL ( )	B.C.C. FILE No.	DESIGN CHECK	R.P.E.Q. No.	DATE	PRODUCTION / NETWORK DELEGATE	DATE





MBR LAYOUT PLAN  
SCALE 1:250

ORIGINAL DRAWINGS SIGNED WHERE MARKED " \* "

B	14.03.11	AS CONSTRUCTED	LS	PC
A	22.06.10	FOR CONSTRUCTION	LS	DW
O	15.06.10	ISSUED FOR CONSTRUCTION	GS	DW
No.	DATE	AMENDMENT	DRAFTED	APPROVED

FUNDING	
DESIGN W.O. No.	PB002135
CONSTRUCTION W.O. No.	PB002844
FUNDED BY B.C.C. (✓)	EXTERNAL ( )

DRAFTED	* G.SIMS
DRAFTING CHECK	D.WILLIAMS
CAD FILE	7107-G-DWG-0753
B.C.C. FILE No.	486/5/5-0052-553

* D.WILLIAMS	17.06.10	X	X
DESIGN	R.P.E.Q. No.	DATE	PRINCIPAL DESIGN MANAGER
* G.VIOLETT	8891	18.06.10	X
DESIGN CHECK	R.P.E.Q. No.	DATE	PRODUCTION / NETWORK DELEGATE



ASSET/PROJECT  
**FAIRFIELD WRP  
UPGRADE**



PROJECT MANAGER:  
\* P.CHANDLER  
RPEQ No.:  
APPROVED:  
\* P.CAVALLIERE  
RPEQ No.: LICENCE 217973C

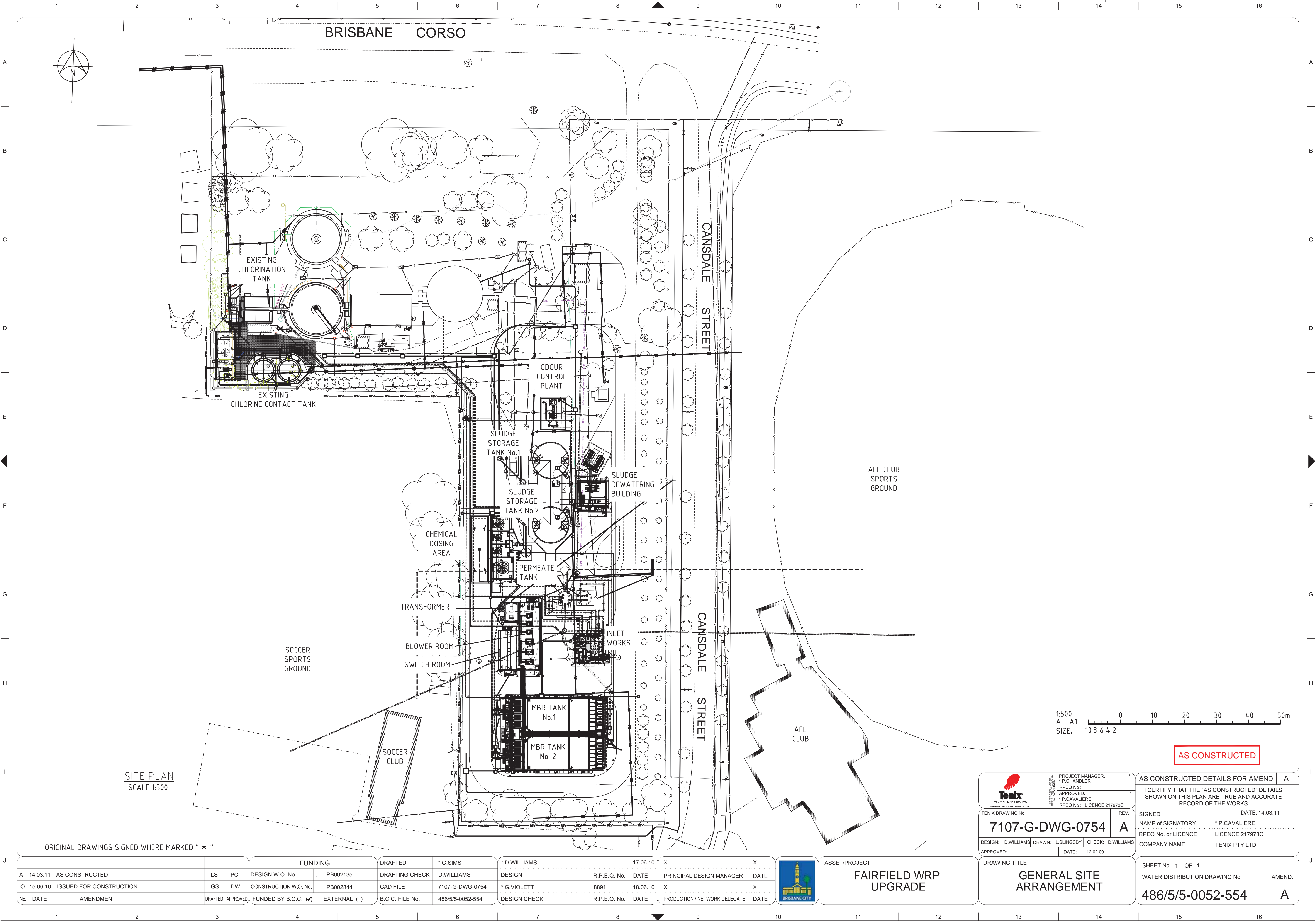
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<b>7107-G-DWG-0753</b>	<b>B</b>
DESIGN: D.WILLIAMS	DRAWN: L.SLINGSBY
APPROVED:	CHECK: DATE: 12.02.09

DRAWING TITLE  
**MBR SITE  
ARRANGEMENT**

AS CONSTRUCTED DETAILS FOR AMEND. <b>B</b>	
I CERTIFY THAT THE "AS CONSTRUCTED" DETAILS SHOWN ON THIS PLAN ARE TRUE AND ACCURATE RECORD OF THE WORKS	
SIGNED	DATE: 14.03.11
NAME of SIGNATORY	* P.CAVALLIERE
RPEQ No. or LICENCE	LICENCE 217973C
COMPANY NAME	TENIX PTY LTD

SHEET No. 1 OF 1	AMEND. <b>B</b>
WATER DISTRIBUTION DRAWING No.	
<b>486/5/5-0052-553</b>	





SITE PLAN  
SCALE 1:500

ORIGINAL DRAWINGS SIGNED WHERE MARKED " \* "

				FUNDING	
A	14.03.11	AS CONSTRUCTED	LS	PC	DESIGN W.O. No. PB002135
O	15.06.10	ISSUED FOR CONSTRUCTION	GS	DW	CONSTRUCTION W.O. No. PB002844
No.	DATE	AMENDMENT	DRAFTED	APPROVED	FUNDED BY B.C.C. (✓) EXTERNAL ( )

DRAFTED	* G.SIMS
DRAFTING CHECK	D.WILLIAMS
CAD FILE	7107-G-DWG-0754
B.C.C. FILE No.	486/5/5-0052-554

* D.WILLIAMS	17.06.10	X	X
DESIGN	R.P.E.Q. No. DATE	PRINCIPAL DESIGN MANAGER	DATE
* G.VIOLETT	8891 18.06.10	X	X
DESIGN CHECK	R.P.E.Q. No. DATE	PRODUCTION / NETWORK DELEGATE	DATE



ASSET/PROJECT  
**FAIRFIELD WRP  
UPGRADE**

PROJECT MANAGER:  
\* P.CHANDLER  
RPEQ No.:  
APPROVED:  
\* P.CAVALLIERE  
RPEQ No.: LICENCE 217973C

TENIX DRAWING No.  
**7107-G-DWG-0754**

DESIGN: D.WILLIAMS DRAWN: L.SLINGSBY CHECK: D.WILLIAMS  
APPROVED: DATE: 12.02.09

AS CONSTRUCTED DETAILS FOR AMEND. **A**

I CERTIFY THAT THE "AS CONSTRUCTED" DETAILS SHOWN ON THIS PLAN ARE TRUE AND ACCURATE RECORD OF THE WORKS

SIGNED NAME of SIGNATORY RPEQ No. or LICENCE COMPANY NAME  
\* P.CAVALLIERE LICENCE 217973C TENIX PTY LTD

DATE: 14.03.11

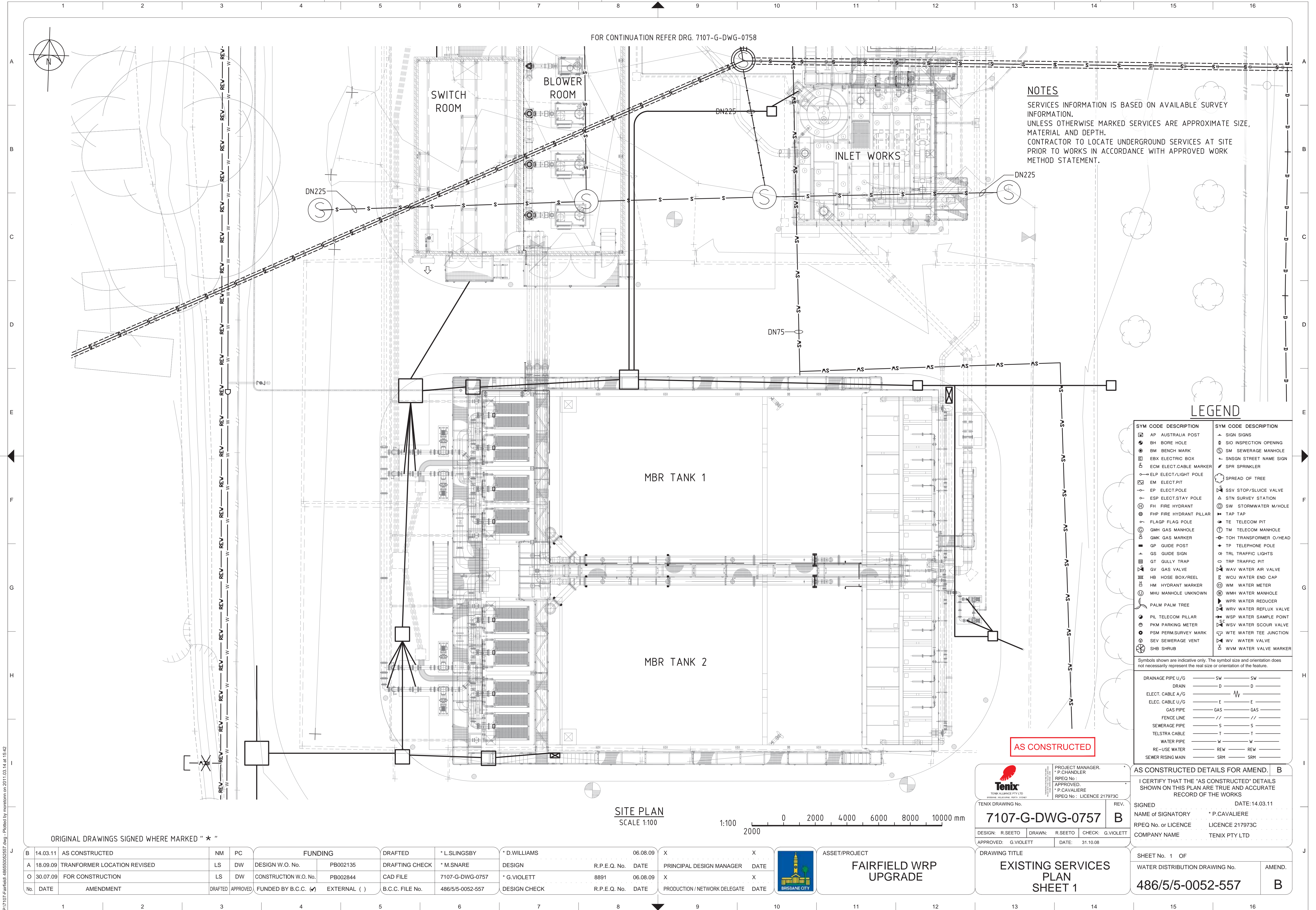
DRAWING TITLE  
**GENERAL SITE  
ARRANGEMENT**

SHEET No. 1 OF 1

WATER DISTRIBUTION DRAWING No. **486/5/5-0052-554**

AMEND. **A**





ORIGINAL DRAWINGS SIGNED WHERE MARKED " \* "

B	14.03.11	AS CONSTRUCTED	NM	PC	FUNDING	DRAFTED	* L.SLINGSBY	06.08.09	X	X	ASSET/PROJECT	FAIRFIELD WRP UPGRADE	DRAWING TITLE	EXISTING SERVICES PLAN SHEET 1	SHEET No. 1 OF	WATER DISTRIBUTION DRAWING No.	AMEND.	B
A	18.09.09	TRANSFORMER LOCATION REVISED	LS	DW	DESIGN W.O. No.	PB002135	DRAFTING CHECK	* M.SNARE	R.P.E.Q. No.	DATE	PRINCIPAL DESIGN MANAGER	DATE						
O	30.07.09	FOR CONSTRUCTION	LS	DW	CONSTRUCTION W.O. No.	PB002844	CAD FILE	7107-G-DWG-0757	8891	06.08.09	X	X						
No.	DATE	AMENDMENT	DRAFTED	APPROVED	FUNDED BY B.C.C. (✓)	EXTERNAL ( )	B.C.C. FILE No.	486/5/5-0052-557	R.P.E.Q. No.	DATE	PRODUCTION / NETWORK DELEGATE	DATE						



PROJECT MANAGER:  
\* P.CHANDLER  
RPEQ No.:  
APPROVED:  
\* P.CAVALLIERE  
RPEQ No.: LICENCE 217973C

DRAWING No. 7107-G-DWG-0757 B

DESIGN: R.SEETO DRAWN: R.SEETO CHECK: G.VIOLETT  
APPROVED: G.VIOLETT DATE: 31.10.08

AS CONSTRUCTED DETAILS FOR AMEND. B  
I CERTIFY THAT THE "AS CONSTRUCTED" DETAILS SHOWN ON THIS PLAN ARE TRUE AND ACCURATE RECORD OF THE WORKS

SIGNED NAME of SIGNATORY \* P.CAVALLIERE  
RPEQ No. or LICENCE LICENCE 217973C  
COMPANY NAME TENIX PTY LTD




















































DATE: 14.03.11  
SHEET No. 1 OF  
WATER DISTRIBUTION DRAWING No. 486/5/5-0052-557  
AMEND. B






SERVICES INFORMATION IS BASED ON AVAILABLE SURVEY INFORMATION.  
UNLESS OTHERWISE MARKED SERVICES ARE APPROXIMATE SIZE, MATERIAL AND DEPTH.  
CONTRACTOR TO LOCATE UNDERGROUND SERVICES AT SITE PRIOR TO WORKS IN ACCORDANCE WITH APPROVED WORK METHOD STATEMENT.




## LEGEND

SYM	CODE	DESCRIPTION	SYM	CODE	DESCRIPTION
	AA	AUSTRALIA POST		SS	SIGN SIGNS
	BH	BORE HOLE		SIO	SIGNIFICATION OPENING
	BM	BENCH MARK		SM	SEWERAGE MANHOLE
	EBX	ELECTRIC BOX		SN	STREET NAME SIGN
	ECM	ELECTRIC CABLE MARKER		SPR	SPRINKLER
	ELP	ELECTRIC LIGHT POLE		ST	SPREAD OF TREE
	EM	ELECTRIC PIT		SSV	STOP/SLUICE VALVE
	ESP	ELECTRIC STAY POLE		STN	STATION STATION
	FH	FIRE HYDRANT		STW	STORMWATER M/HOLE
	FHP	FIRE HYDRANT PILLAR		TAP	TAP
	FLAG	FLAG		TE	TELECOM PIT
	GMH	GAZ MANHOLE		TM	TELECOM MANHOLE
	GMK	GAZ MARKER		TOH	TRANSFORMER O/HEAD
	GP	GUIDE POST		TP	TELEPHONE POLE
	GS	GUIDE SIGN		TL	TRAFFIC LIGHTS
	GT	GULLY TRAP		TRP	TRAFFIC PIT
	GV	GAZ VALVE		WAV	WATER VALVE AIR VALVE
	HB	HOSE BOX/REEL		WCU	WATER END CAP
	HM	HYDRANT MARKER		WM	WATER METER
	MHU	MANHOLE UNKNOWN		WMH	WATER MANHOLE
		PALM PALM TREE		WPR	WATER REDUCER
		PILM TELECOM PILLAR		WRV	WATER REFLEX VALVE
	PSM	PERKING SURVEY MARK		WSW	WATER SAMPLE POINT
	PSP	PERKING SURVEY MARK		WSV	WATER SCOUR VALVE
	SEV	SEWERAGE VENT		WTE	WATER TE JUNCTION
	SHB	SHRUB		WW	WATER VALVE
				WV	WATER VALVE MARKER

Symbols shown are indicative only. The symbol size and orientation does not necessarily represent the real size or orientation of the feature.

DRAINAGE PIPE U/G	SW	SW
DRAIN	D	D
ELECT. CABLE A/G		
ELEC. CABLE U/G	E	E
GAS PIPE	GAS	GAS
FENCE LINE	//	//
SEWERAGE PIPE	S	S
TELSTRA CABLE	T	T
WATER PIPE	W	W
RE-USE WATER	REW	REW
SEWER RISING MAIN	SRM	SRM

AS CONSTRUCTED

 <b>Tenix</b> TENIX ALLIANCE PVT LTD 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 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692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889, 890, 891, 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183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889, 890, 891, 892, 893, 894, 895, 896, 897, 898, 899, 900, 901, 902, 903, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913, 914, 915, 916, 917, 918, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000	 <b>Tenix</b> TENIX ALLIANCE PVT LTD 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742
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AS CONSTRUCTED DETAILS FOR AMEND.

I CERTIFY THAT THE "AS CONSTRUCTED" DETAILS SHOWN ON THIS PLAN ARE TRUE AND ACCURATE RECORD OF THE WORKS

SIGNED	DATE: 07.04.11
NAME of SIGNATORY	P.CAVALIERE
RPEQ No. or LICENCE	LICENCE 217973C
COMPANY NAME	TENIX PTY LTD

SHEET No. 2 OF	
WATER DISTRIBUTION DRAWING No.	AMEN
486/5/5-0052-558	B

B	11.03.11	AS CONSTRUCTED	NM	PC	FUNDING		DRAFTED	* L.SLINGSBY
A	18.09.09	TRANSFORMER LOCATION REVISED.	LS	DW	DESIGN W.O. No.	PB002135	DRAFTING CHECK	* M.SNARE
O	30.07.09	FOR CONSTRUCTION	LS	DW	CONSTRUCTION W.O. No.	PB002844	CAD FILE	7107-G-DWG-0758
No.	DATE	AMENDMENT	DRAFTED	APPROVED	FUNDED BY B.C.C. (✓)	EXTERNAL ( )	B.C.C. FILE No.	486/5/5-0052-558

* D.WILLIAMS		07.08.09	X	X
DESIGN	R.P.E.Q. No.	DATE	PRINCIPAL DESIGN MANAGER	DATE
* G.VIOLETT	8891	07.08.09	X	X
DESIGN CHECK	R.P.E.Q. No.	DATE	PRODUCTION / NETWORK DELEGATE	DATE

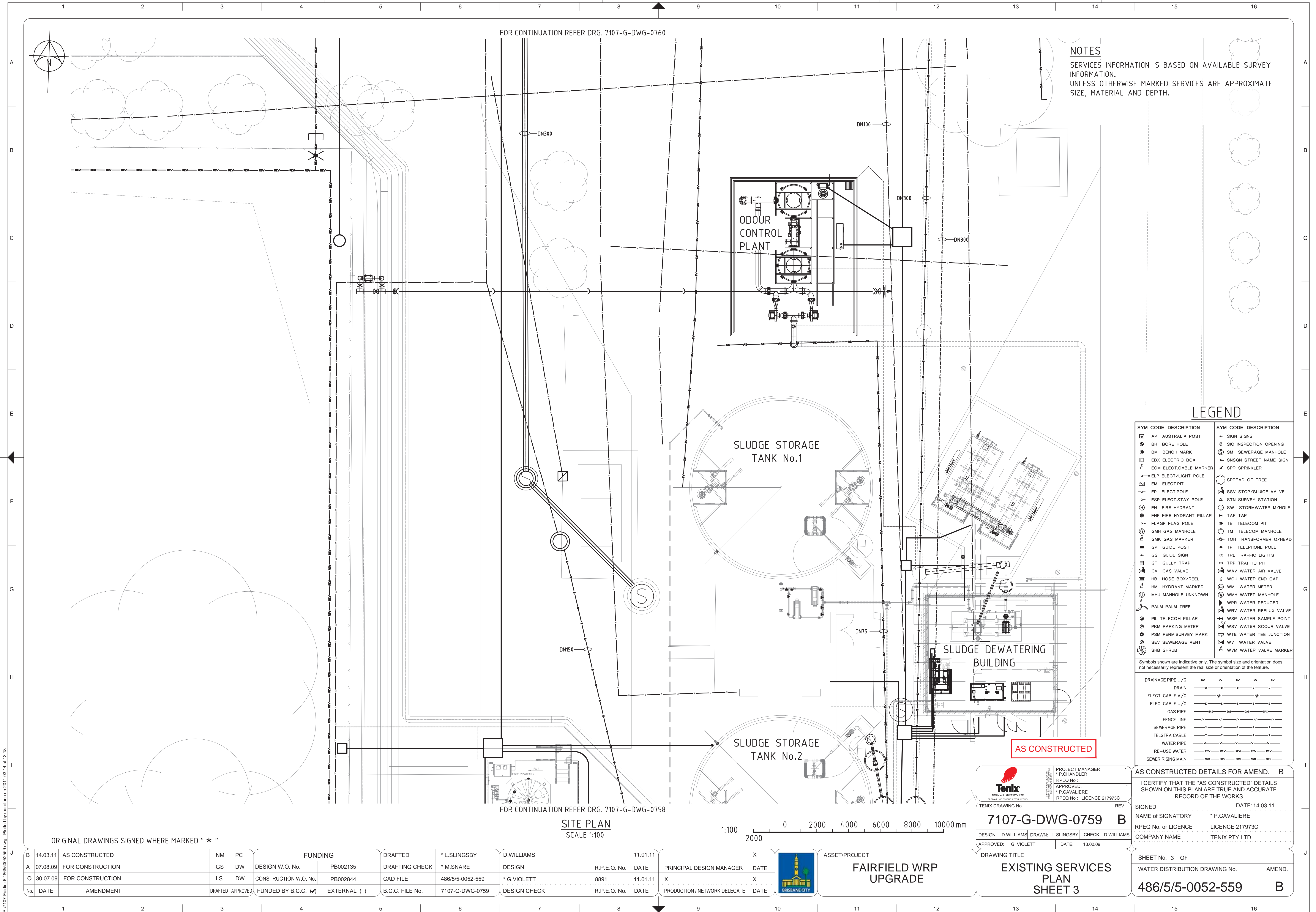


ASSET/PROJECT

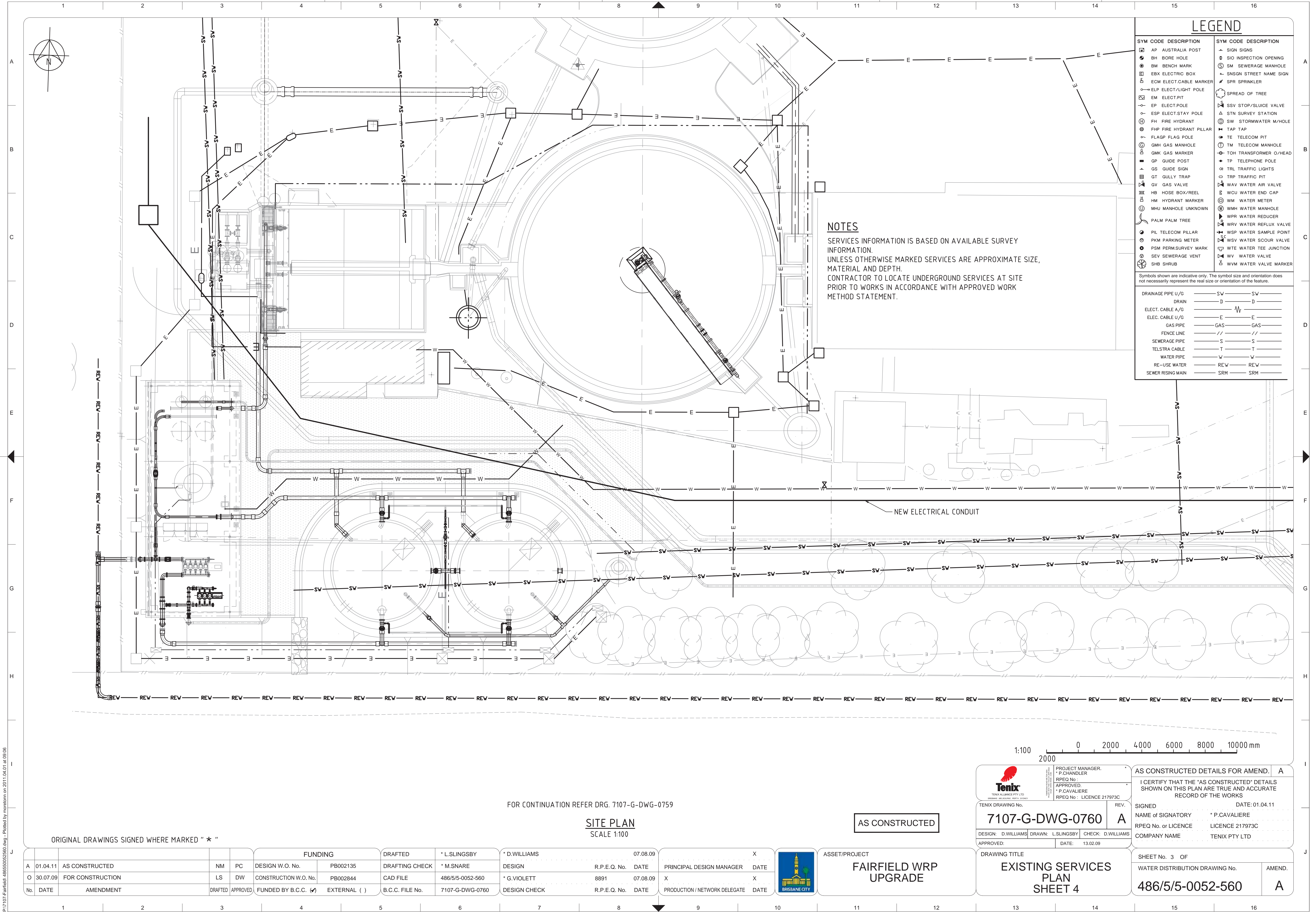
FAIRFIELD WRP  
UPGRADE

EXISTING SERVICES  
PLAN  
SHEET 2

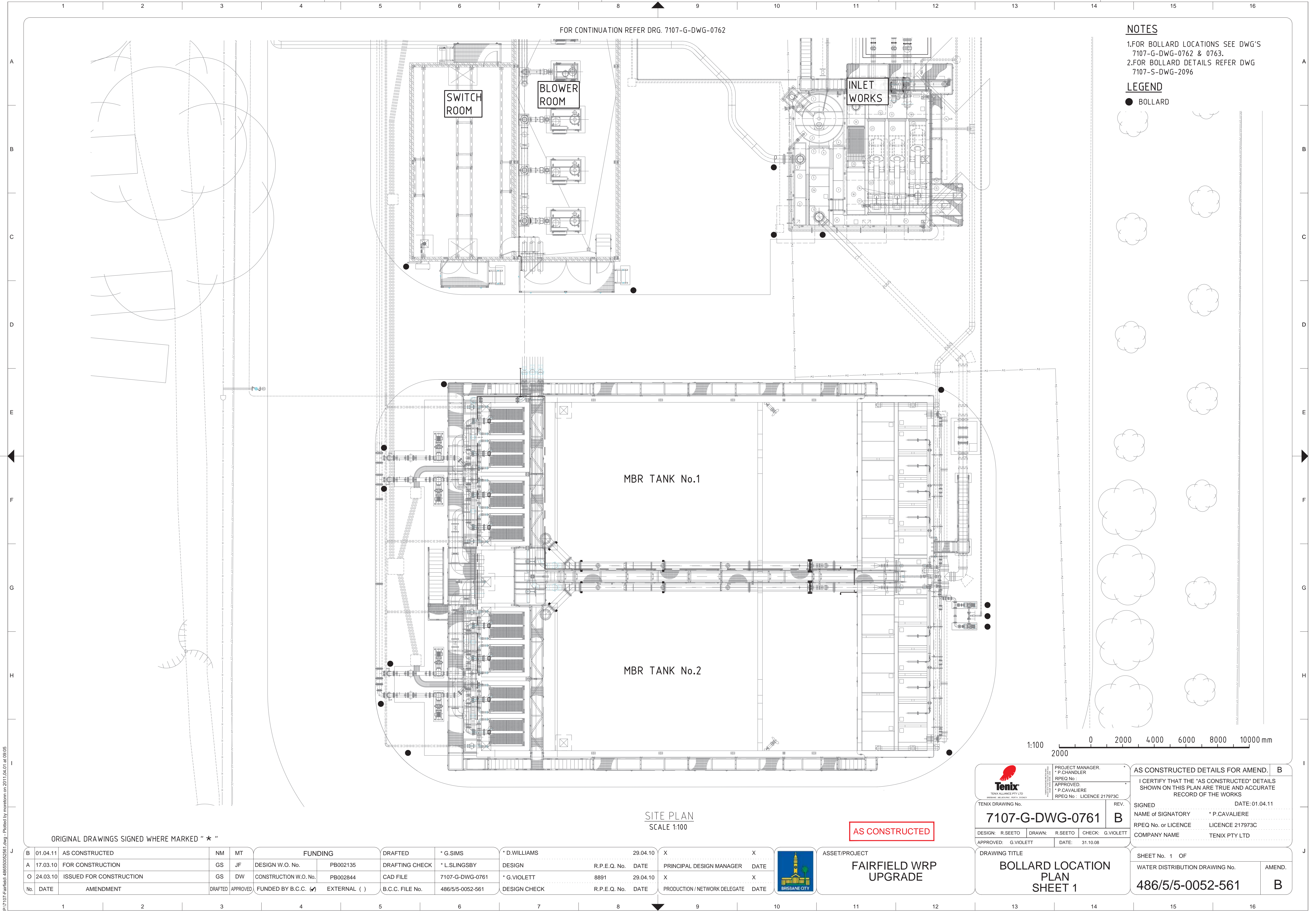












ORIGINAL DRAWINGS SIGNED WHERE MARKED " ★ "

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O	24.03.10	ISSUED FOR CONSTRUCTION	GS	DW
No.	DATE	AMENDMENT	DRAFTED	APPROVED

FUNDING	
DESIGN W.O. No.	PB002135
CONSTRUCTION W.O. No.	PB002844
FUNDED BY B.C.C. (✓)	EXTERNAL ( )

DRAFTED	* G.SIMS
DRAFTING CHECK	* L.SLINGSBY
CAD FILE	7107-G-DWG-0761
B.C.C. FILE No.	486/5/5-0052-561

* D.WILLIAMS	29.04.10	X	X
DESIGN	R.P.E.Q. No.	DATE	PRINCIPAL DESIGN MANAGER
* G.VIOLETT	8891	29.04.10	X
DESIGN CHECK	R.P.E.Q. No.	DATE	PRODUCTION / NETWORK DELEGATE



ASSET/PROJECT  
**FAIRFIELD WRP  
UPGRADE**



PROJECT MANAGER  
\* P.CHANDLER  
RPEQ No.:  
APPROVED:  
\* P.CAVALLIERE  
RPEQ No.: LICENCE 217973C

TENIX DRAWING No.	REV.
<b>7107-G-DWG-0761</b>	<b>B</b>
DESIGN: R.SEETO	DRAWN: R.SEETO
APPROVED: G.VIOLETT	CHECK: G.VIOLETT
DATE: 31.10.08	

DRAWING TITLE  
**BOLLARD LOCATION  
PLAN  
SHEET 1**

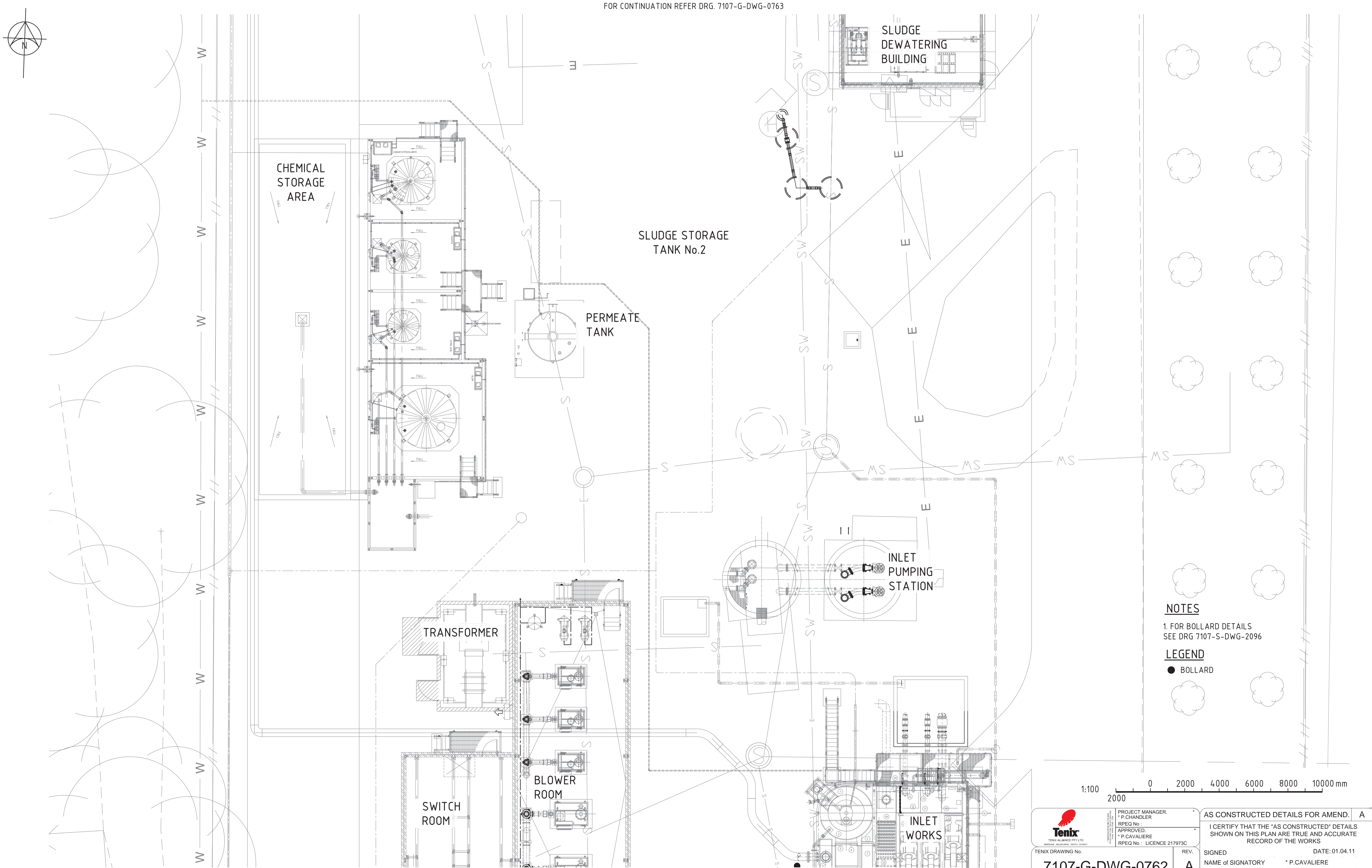
AS CONSTRUCTED DETAILS FOR AMEND.	B
I CERTIFY THAT THE "AS CONSTRUCTED" DETAILS SHOWN ON THIS PLAN ARE TRUE AND ACCURATE RECORD OF THE WORKS	
SIGNED	DATE: 01.04.11
NAME of SIGNATORY	* P.CAVALLIERE
RPEQ No. or LICENCE	LICENCE 217973C
COMPANY NAME	TENIX PTY LTD

SHEET No. 1 OF	AMEND.
WATER DISTRIBUTION DRAWING No.	
<b>486/5/5-0052-561</b>	<b>B</b>



FOR CONTINUATION REFER DRG. 7107-G-DWG-0763

FOR CONTINUATION REFER DRG. 7107-G-DWG-0761

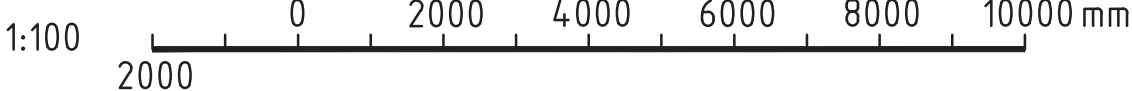



NOTES

1. FOR BOLLARD DETAILS  
SEE DRG 7107-S-DWG-2096

LEGEND

● BOLLARD



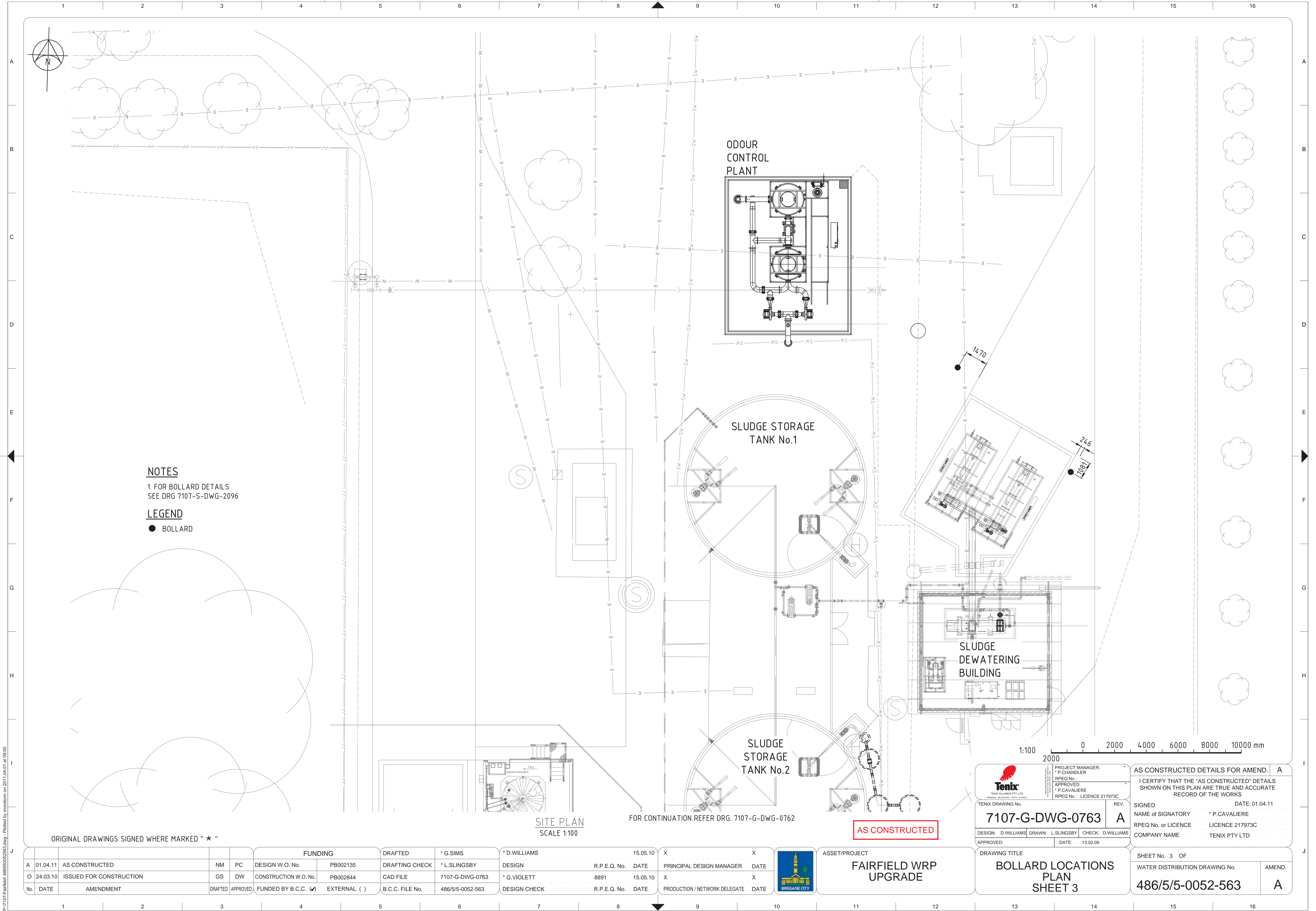
 TENIX ALUMINUM PTY LTD BRISBANE AUSTRALIA PROJECT MANAGER: * P.CHANDLER RPEQ No.: APPROVED: * P.CAVALLIERE RPEQ No.: LICENCE 217973C		AS CONSTRUCTED DETAILS FOR AMEND. A I CERTIFY THAT THE 'AS CONSTRUCTED' DETAILS SHOWN ON THIS PLAN ARE TRUE AND ACCURATE RECORD OF THE WORKS SIGNED DATE: 01.04.11 NAME OF SIGNATORY * P.CAVALLIERE RPEQ No. or LICENCE LICENCE 217973C COMPANY NAME TENIX PTY LTD	
TENIX DRAWING No. <b>7107-G-DWG-0762</b>		REV. A	
DESIGN: R.SEETO	DRAWN: R.SEETO	CHECK: G.VIOLETT	APPROVED: G.VIOLETT
DATE: 31.10.08		DATE: 31.10.08	
DRAWING TITLE <b>BOLLARD LOCATIONS PLAN SHEET 2</b>		SHEET No. 2 OF WATER DISTRIBUTION DRAWING No. <b>486/5/5-0052-562</b>	
		AMEND. A	

FUNDING		DRAFTED		* G.SIMS		* D.WILLIAMS		18.05.10		PIPEWORK PLAN		X	
A	01.04.11	AS CONSTRUCTED	NM	PC	DESIGN W.O. No.	PB002135	DRAFTING CHECK	* L.SLINGSBY	DESIGN	R.P.E.Q. No.	DATE	PRINCIPAL DESIGN MANAGER	DATE
O	24.03.10	ISSUED FOR CONSTRUCTION	GS	DW	CONSTRUCTION W.O. No.	PB002844	CAD FILE	7107-G-DWG-0762	* G.VIOLETT	8891	18.05.10	X	X
No.	DATE	AMENDMENT	DRAFTED	APPROVED	FUNDED BY B.C.C. (✓)	EXTERNAL ( )	B.C.C. FILE No.	486/5/5-0052-562	DESIGN CHECK	R.P.E.Q. No.	DATE	PRODUCTION / NETWORK DELEGATE	DATE



ASSET/PROJECT  
**FAIRFIELD WRP  
UPGRADE**





P:\7107-Fairfield\4865005052563.dwg - Plotted by morden on 2011.04.01 at 09:00

No.	DATE	AMENDMENT	DRAFTED	APPROVED	FUNDED BY B.C.C. (✓)	EXTERNAL ( )
A	01.04.11	AS CONSTRUCTED	NM	PC	DESIGN W.O. No.	PB002135
O	24.03.10	ISSUED FOR CONSTRUCTION	GS	DW	CONSTRUCTION W.O. No.	PB002844

FUNDING	
DESIGN W.O. No.	PB002135
CONSTRUCTION W.O. No.	PB002844

DRAFTED	* G.SIMS
DRAFTING CHECK	* L.SLINGSBY
CAD FILE	7107-G-DWG-0763
B.C.C. FILE No.	486/5/5-0052-563

* D.WILLIAMS	15.05.10	X	X
DESIGN	R.P.E.Q. No.	DATE	PRINCIPAL DESIGN MANAGER
* G.VIOLETT	8891	15.05.10	X
DESIGN CHECK	R.P.E.Q. No.	DATE	PRODUCTION / NETWORK DELEGATE



ASSET/PROJECT
FAIRFIELD WRP UPGRADE

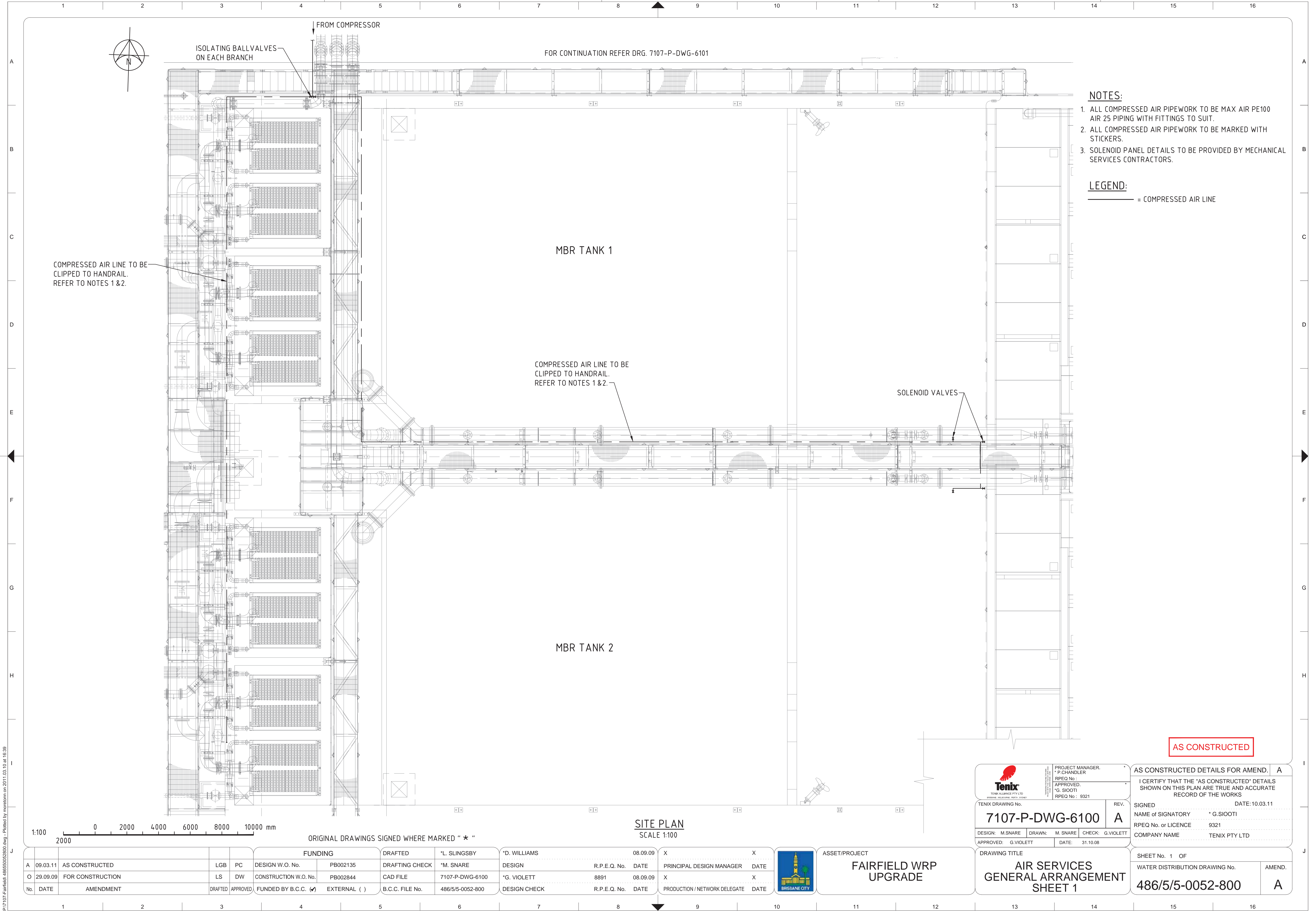
	PROJECT MANAGER * P.CHANDLER RPEQ No.: APPROVED: * P.CAVALLIERE RPEQ No.: LICENCE 217973C
DRAWING No.	REV.
7107-G-DWG-0763	A
DESIGN: D.WILLIAMS	DRAWN: L.SLINGSBY
APPROVED:	CHECK: D.WILLIAMS
DATE: 13.02.09	

DRAWING TITLE
BOLLARD LOCATIONS PLAN SHEET 3

AS CONSTRUCTED DETAILS FOR AMEND.	A
I CERTIFY THAT THE "AS CONSTRUCTED" DETAILS SHOWN ON THIS PLAN ARE TRUE AND ACCURATE RECORD OF THE WORKS	
SIGNED	DATE: 01.04.11
NAME of SIGNATORY	* P.CAVALLIERE
RPEQ No. or LICENCE	LICENCE 217973C
COMPANY NAME	TENIX PTY LTD

SHEET No. 3 OF	AMEND.
WATER DISTRIBUTION DRAWING No.	
486/5/5-0052-563	A






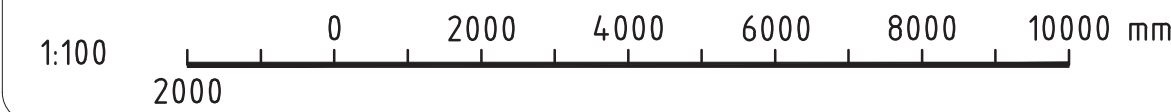
- NOTES:**
- 1. ALL COMPRESSED AIR PIPEWORK TO BE MAX AIR PE100 AIR 25 PIPING WITH FITTINGS TO SUIT.
  - 2. ALL COMPRESSED AIR PIPEWORK TO BE MARKED WITH STICKERS.
  - 3. SOLENOID PANEL DETAILS TO BE PROVIDED BY MECHANICAL SERVICES CONTRACTORS.

**LEGEND:**

\_\_\_\_\_ = COMPRESSED AIR LINE

AS CONSTRUCTED

 TENIX ALLIANCE PTY LTD 200/201 STATION STREET, BRISBANE QLD 4000 AUSTRALIA RPEQ No. 9321		PROJECT MANAGER: * P. CHANDLER RPEQ No. 9321 APPROVED: * G. SIOOTI RPEQ No. 9321	
TENIX DRAWING No. <b>7107-P-DWG-6100</b>		REV. <b>A</b>	
DESIGN: M. SNARE	DRAWN: M. SNARE	CHECK: G. VIOLETT	DATE: 31.10.08
DRAWING TITLE <b>AIR SERVICES GENERAL ARRANGEMENT SHEET 1</b>		SHEET No. 1 OF WATER DISTRIBUTION DRAWING No. <b>486/5/5-0052-800</b>	
AS CONSTRUCTED DETAILS FOR AMEND. <b>A</b>		I CERTIFY THAT THE "AS CONSTRUCTED" DETAILS SHOWN ON THIS PLAN ARE TRUE AND ACCURATE RECORD OF THE WORKS	
SIGNED NAME of SIGNATORY RPEQ No. or LICENCE COMPANY NAME		DATE: 10.03.11 * G. SIOOTI 9321 TENIX PTY LTD	



ORIGINAL DRAWINGS SIGNED WHERE MARKED " \* "

**SITE PLAN**  
SCALE 1:100

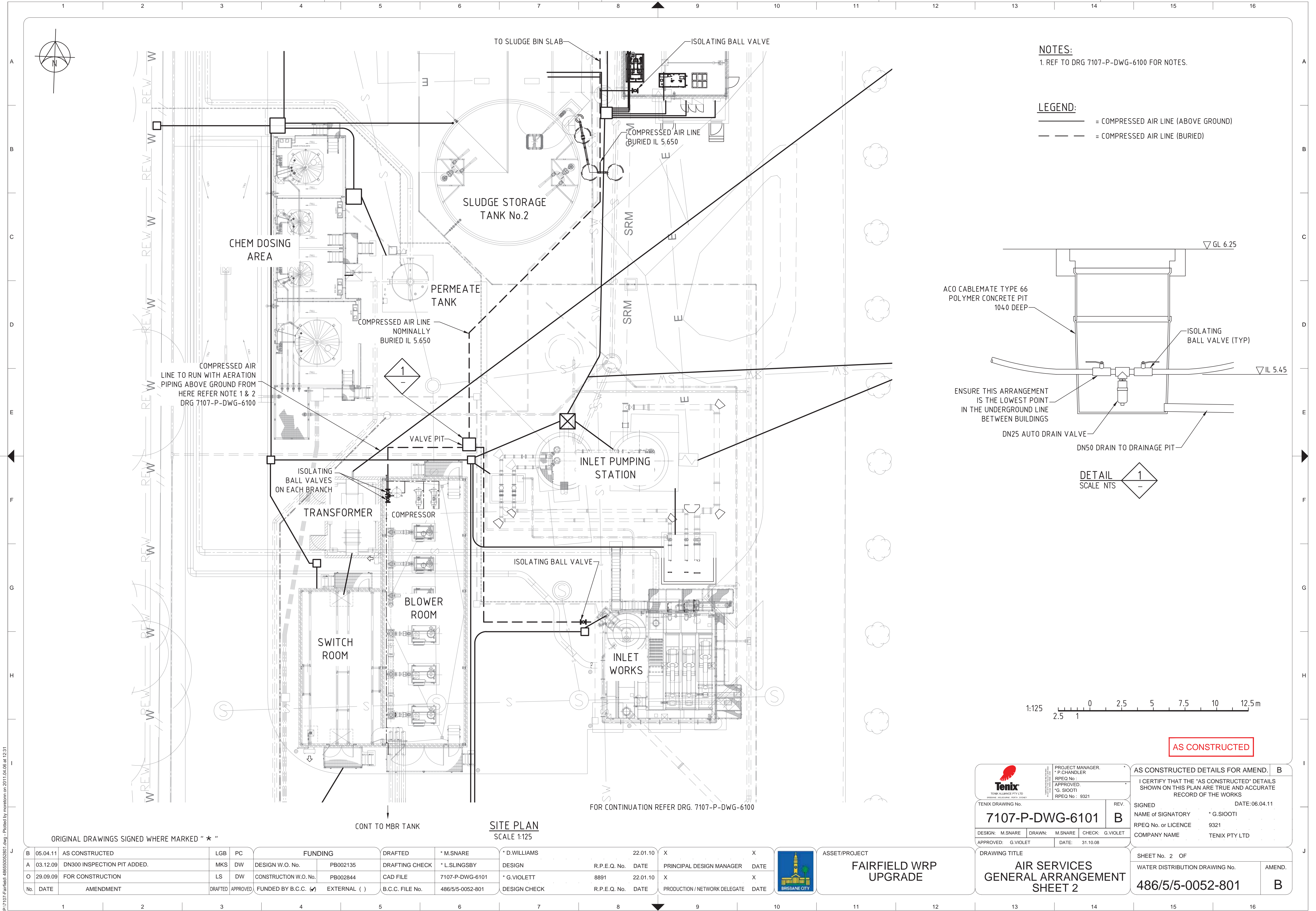
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O	29.09.09	FOR CONSTRUCTION	LS DW	CONSTRUCTION W.O. No.	PB002844	CAD FILE	7107-P-DWG-6100	*G. VIOLETT	8891 08.09.09
								DESIGN CHECK	R.P.E.Q. No. DATE

*D. WILLIAMS	08.09.09	X	X
DESIGN	R.P.E.Q. No. DATE	PRINCIPAL DESIGN MANAGER	DATE
*G. VIOLETT	8891 08.09.09	X	X
DESIGN CHECK	R.P.E.Q. No. DATE	PRODUCTION / NETWORK DELEGATE	DATE




ASSET/PROJECT  
**FAIRFIELD WRP  
UPGRADE**





P:\17107-Fairfield-48650052801.dwg - Plotted by mardon on 2011.04.08 at 12:31

ORIGINAL DRAWINGS SIGNED WHERE MARKED " \* "

B	05.04.11	AS CONSTRUCTED	LGB	PC	FUNDING		DRAFTED	* M.SNARE	* D.WILLIAMS	22.01.10	X	X		ASSET/PROJECT  FAIRFIELD WRP UPGRADE	DRAWING TITLE  AIR SERVICES GENERAL ARRANGEMENT SHEET 2	SHEET No. 2 OF		
A	03.12.09	DN300 INSPECTION PIT ADDED.	MKS	DW	DESIGN W.O. No.	PB002135	DRAFTING CHECK	* L.SLINGSBY	DESIGN	R.P.E.Q. No.	DATE	PRINCIPAL DESIGN MANAGER				DATE	WATER DISTRIBUTION DRAWING No.	AMEND.
O	29.09.09	FOR CONSTRUCTION	LS	DW	CONSTRUCTION W.O. No.	PB002844	CAD FILE	7107-P-DWG-6101	* G.VIOLETT	8891	22.01.10	X				X	486/5/5-0052-801	B
No.	DATE	AMENDMENT	DRAFTED	APPROVED	FUNDED BY B.C.C. (✓)	EXTERNAL ( )	B.C.C. FILE No.	486/5/5-0052-801	DESIGN CHECK	R.P.E.Q. No.	DATE	PRODUCTION / NETWORK DELEGATE	DATE					

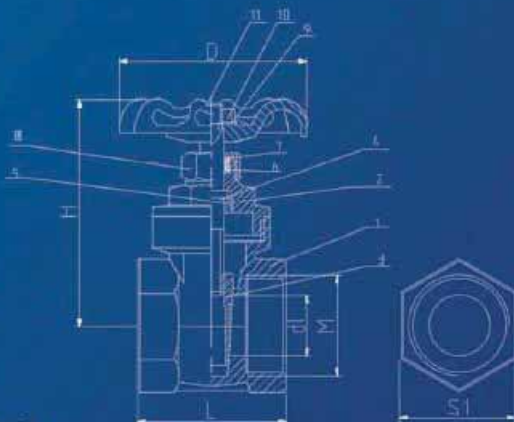


# 3. Manufacturers Technical Data - General





## A-59M AVFI TESTED GATE VALVE - AS1628



**Working Temperature** Water 15 TO 90 deg C  
**Available in sizes from** 15mm (1/2) to 100mm (4")  
**Max Pressure Rating** 2500kpa

SIZE		L	d1	M	H	D	S1
in	mm	mm	mm	in	mm	mm	mm
1/2"	15	67	14.0	1/2	83.6	63	28.6
3/4"	20	62	19.0	3/4	92	68.5	34
1"	25	70	25.0	1	107	65	40
1 1/4"	32	80	32.0	1 1/4	122	71	51
1 1/2"	40	88	40.0	1 1/2	129	77.5	57
2"	50	95	49	2	150	86.5	70
2 1/2"	65	118	64	2 1/2	178	96	87
3"	80	138	79	3	210.5	108	101
4"	100	168	99	4	254	126	127

CODE	DESCRIPTION	MATERIAL
1	Body	DZR/Brass
2	Cover	DZR/Brass
3	Gate	DZR/Brass
4	Stem	DZR/Brass
5	Lock nut	Brass
6	Seat	PTFE
7	Gasket	Brass
8	Hex cap	Brass
9	Washer	Al
10	Nut	Brass
11	Handle	Cast Iron





More  
possibilities  
with the new  
butterfly valves

The innovative  
butterfly valves  
type 567 and 568  
PVDF/PTFE seal



# FEATURES





# SYSTEM OVERVIEW

The new 567/568 PTFE butterfly valves from GF Piping Systems are an ideal addition to the existing product range. Thanks to the new seal made of polytetrafluoroethylene (PTFE), they offer even greater chemical resistance and are suitable for conveying aggressive media.

## Extensive range of products

The 567/568 PTFE butterfly valves are available as manually operated valves with a hand lever, with manual reduction gear or as pneumatically or electrically actuated models from DN 50 to DN 300. Lug and wafer types are available for end or intermediate installations respectively.

## Modular products

The GF Piping Systems product range

is based on a modular concept, which means individual system components can be replaced at any time: fast, easy and effortlessly.

## Integrated electric position indicator

This function enables continuous monitoring of the system, i.e. which valves are open or closed.

The feedback concept includes a selection of five different types of limit switches.

## Relevant standards

You have a choice of the following installation standards:

- metric: DIN, EN, ISO
- inch: BS, ASTM
- JIS (only wafer types)

So you always have the perfect solution for your application.

## International norms

The 567/568 butterfly valves from GF Piping Systems comply with the following international norms:

DIN EN ISO 16136

Industrial valves – thermoplastic butterfly valves

ISO 9393

Thermoplastic valves – pressure tests and requirements

EN 558

Face-to-face length of the butterfly valves corresponds to EN558

## Approvals:

DIBt, ACS, TA Luft, KTW approval for drinking water

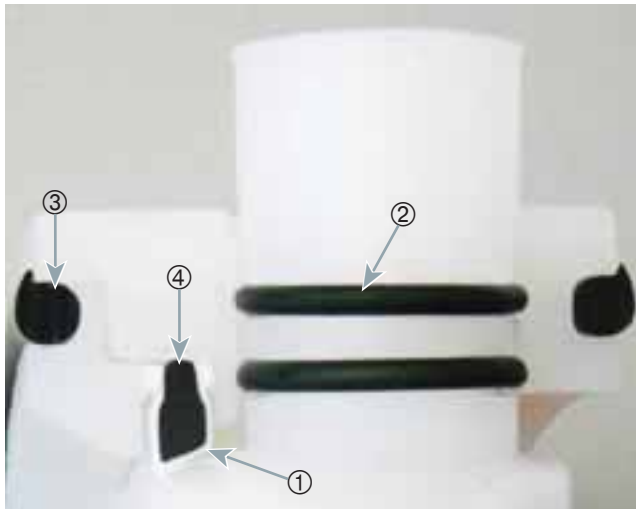
Approvals pending:  
NSF61

## Modular Product Line

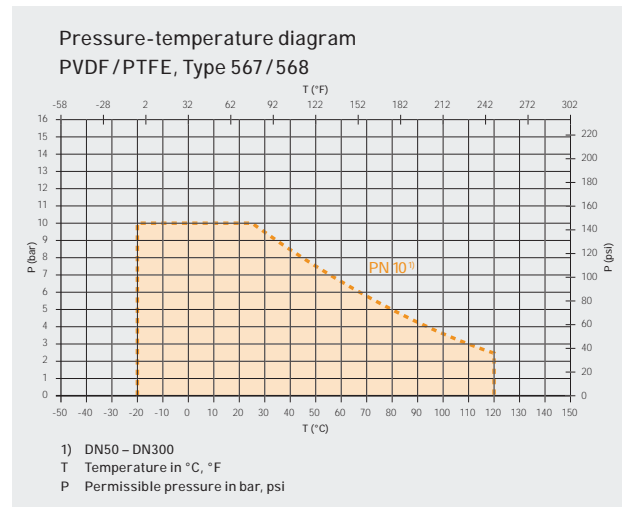




# DETAILS



PTFE sealing concept for applications in the chemical process industry



The Georg Fischer name has stood for reliability and longevity for over 200 years. Our products guarantee quality, functionality and innovation. GF Piping Systems once again sets new benchmarks in relation to reliability, cost-efficiency and service life with the new 567/568 PTFE butterfly valves.

## Special features

By combining the two high-performance plastics (PVDF/PTFE), the new butterfly valves are now even more reliable in operation and in processes, and are therefore ideal for applications in the chemical process industry. A further benefit of the new valves is the reduced cost of maintenance and servicing.

## Proven concept

The PTFE butterfly valves are based on the proven, double, two-sided sealing concept of the bearing bushes. The optimized design of the bearings guarantees no direct contact of the medium to the shaft and also clearly reduces the risk of

leakage to the outside. Our customers are therefore assured of high corrosion protection and absolute reliability

## Always the right seal

When aggressive media are transported, the seal on a butterfly valve is a crucial aspect. That is why GF Piping Systems examined each sealing function separately and why each seal is designed specifically for its particular function.

Essentially, three separate sealing elements are used:

- Seal in the passage ①: PTFE profile seal in the passage ensures maximum process reliability and is adapted to the double eccentricity.
- Seal to the outside ②: double internal shaft seal on both sides.
- Flange seal ③: special profile seal with broader contact face.

## PTFE passage seal

The PTFE passage seal ensures together with the FPM backing seal ④ and the PVDF inner body the highest

degree of safety and resistance to media which could diffuse through diverse materials. The result is excellent chemical resistance and outstanding frictional properties.

## Special components

The quality of a butterfly valve is determined by the quality of the individual components. Consequently, GF Piping Systems uses, for example, O-rings with integrated PTFE powder for the 567/568 butterfly valves. In this way, a higher operational reliability can be warranted for applications of the butterfly valves with degreasing media, thanks to the good dry-sliding properties of PTFE.

GF Piping Systems is always willing to accommodate special requirements, e.g. special shaft materials, on request. Contact us - we are always ready to help.



# GF Piping Systems > worldwide at home

Our sales companies and representatives ensure local customer support in over 100 countries.

[www.piping.georgfischer.com](http://www.piping.georgfischer.com)



The technical data is not binding. They neither constitute expressly warranted characteristics nor guaranteed properties nor a guaranteed durability. They are subject to modification. Our General Terms of Sale apply.

## Adding Quality to People's Lives

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# V-3E<sub>TYPE</sub>

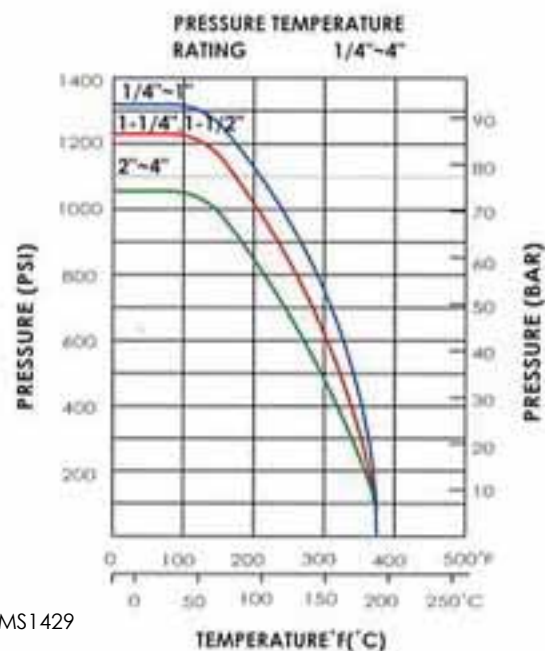
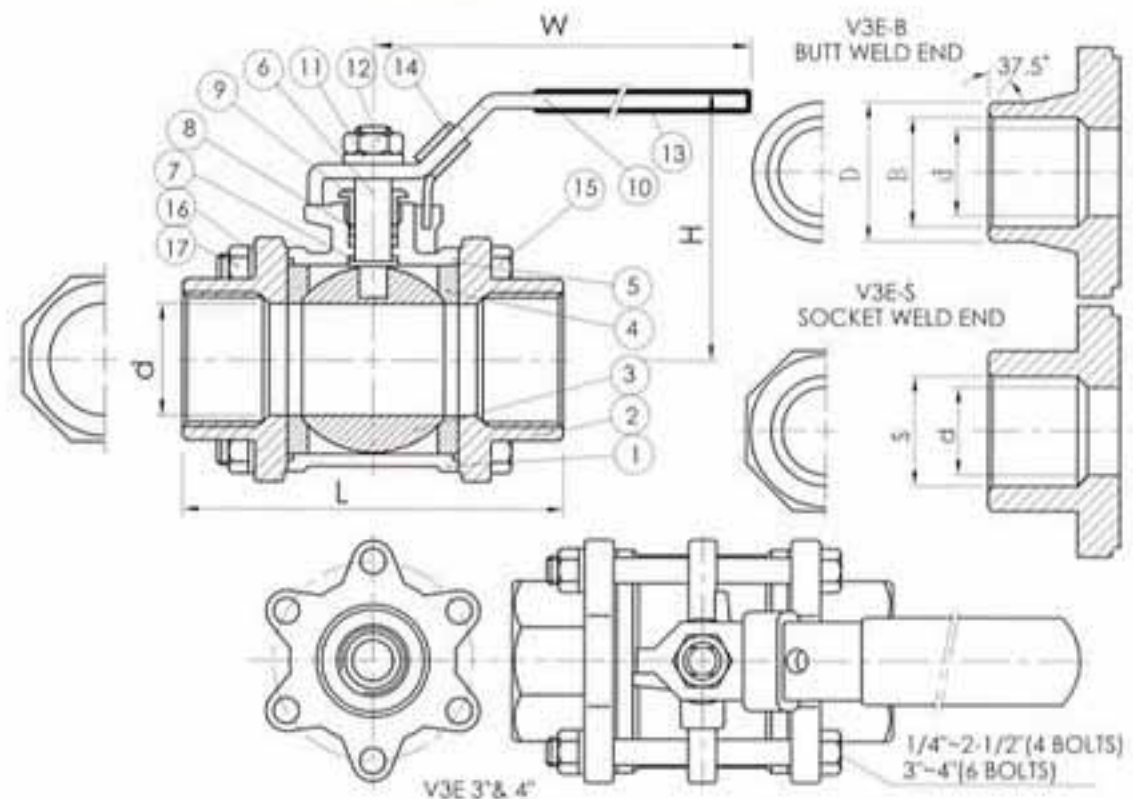
SIZE: 1/4"~4"

## STAINLESS STEEL AISI 316 (DIN 1.4408) CARBON STEEL S-45C (DIN 1.0619)

- FEATURES:**
- \*Pipe thread in accordance with ANSI B2.1, BS 21 1973, DIN 259/2999, ISO 228
  - \*Lug body
  - \*Blow-out proof stem/Full port
  - \*Investment casting body and cap
  - \*1000 PSI (69 BAR) W.O.G.
  - \*Material: ASTM-A351-CF8M, ASTM-A351-CF8, ASTM-A216-WCB
  - \*OPTION: Locking device



ITEM	PARTS	Q'TY	MATERIALS	
			V3E	V3E-C
1	BODY	1	ASTM-A351-CF8M	ASTM-A216-WCB
2	CAP	2	ASTM-A351-CF8M	ASTM-A216-WCB
3	BALL	1	ASTM-A351-CF8M	ASTM-A351-CF8M
4	BALL SEAT	2	15% R-PTFE	15% R-PTFE
5	JOINT GASKET	2	PTFE	PTFE
6	STEM	1	AISI 316	AISI 316
7	THRUST WASHER	1	PTFE	PTFE
8	STEM PACKING	2	PTFE	PTFE
9	GLAND NUT	1	AISI 304	AISI 304
10	HANDLE	1	AISI 304	AISI 304
11	STEM WASHER	1	AISI 304	AISI 304
12	STEM NUT	1	AISI 304	AISI 304
13	PLASTIC COVER	1	PLASTIC	PLASTIC
14	LOCK DEVICE	1	AISI 304	AISI 304
15	BOLT	4-6	AISI 304	AISI 304
16	SPRING WASHER	4-12	AISI 304	AISI 304
17	HEX NUT	4-12	AISI 304	AISI 304



DIMENSIONS							UNIT:mm			
NOMINAL SIZE	d	L	H	W	B	D	S	Cv FACTOR	TORQUE kgf-cm	KG
1/4"	11.6	54	51	95	12	18	14.1	6.6	40	0.34
3/8"	12.7	54	51	95	12.52	18	17.6	7.9	40	0.34
1/2"	15	61.5	55	95	15.8	22	21.7	11.2	54	0.46
3/4"	20	71	58.5	110	20.93	28	27.2	21	74	0.62
1"	25	83.5	73	135	26.64	34	33.9	34	104	0.96
1-1/4"	32	97	78.5	135	35.05	44	42.6	57	135	1.49
1-1/2"	38	110.5	90.5	165	40.9	50	48.7	80	180	2
2"	50	129	99	165	52.5	61.5	61.1	148	250	3.12
2-1/2"	65	171.5	127	215	69	76	76.9	265	480	6.5
3"	80	200	136	215	82	90	89.8	415	750	10.42
4"	100	252	172	325	106	115	115.4	780	1100	20.2



## 4. Lists and Checksheets



## **Check Sheet**

Visually Check Level in Wet Well

Listen for excessive pump noise in Dry Well

Check Autosampler has empty bottles

Check OCU Fans are running

Visually Check Flowmeter registers



## **Check Sheet**

Visually Check Level in Receival Chamber

Visually Check Autoscreen is running

Visually Check Conveyor runs

Visually Check Grit paddle and Pump runs

Visually Check CIT & pH Instruments register



## **Check Sheet**

Visually Check Level in Sludge Bin has spare capacity

Visually Check Level in Polymer Mixing Tank is sufficient



## **Check Sheet**

Visually Check Level in Bioselector Tank is sufficient

Visually Check Level in Membrane Feed Tank is sufficient

Visually Check Level in Alum Tank is sufficient

Check of LCP Blowers is active



## Check Sheet

Visually Check Level in Membrane Tanks is sufficient

Visually Check Level in Membrane Balance Tank is sufficient

Visually Check Level in Acid & Caustic Tank is sufficient

Check of LCP Blowers is active



## **Check Sheet**

Visually Check Level in Hypo Tank



## **Check Sheet**

Visually Check Air Receiver Tank Pressure at gauge

Check LCP of Compressor is active

Visually Check Service Water Reservoir Pressure at gauge

Check LCP of Service Water is active

Check PLC Panel is powered

Check Controls Server is functioning