Oak Glen Golf Course Stormwater Reuse System

A. Project Location

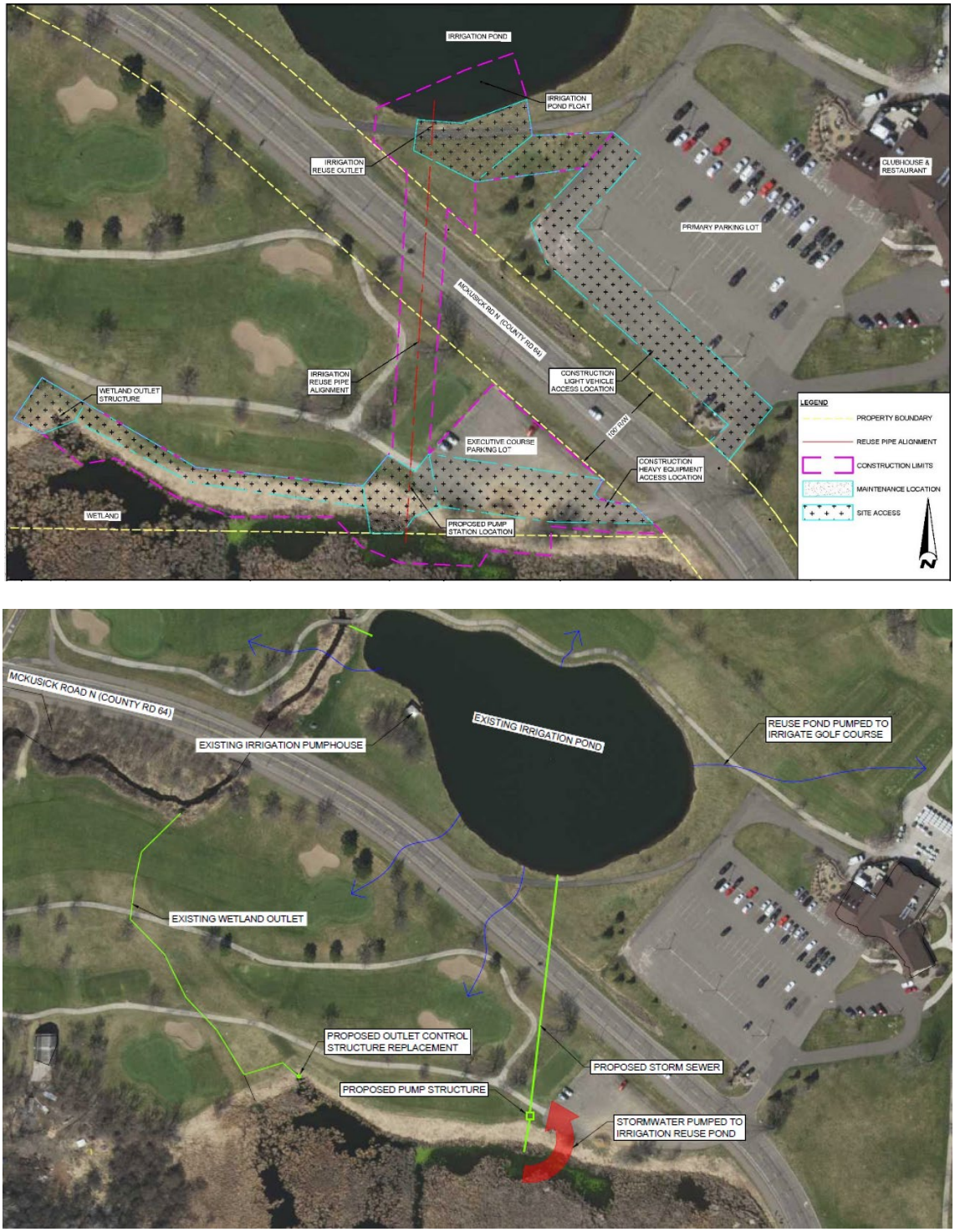


Figure 1. Location map for the Stormwater Reuse System at Oak Glen Golf Course.

Project Location	Immediate Waterbodies Impacted	BMP Performance	
		Thermal Reduction (°C)	P Reduction (lbs/yr)
Oak Glen Golf Course : located along McKusick Road North in the City of Stillwater, MN. (Figure 1)	Brown's Creek	0.4 (design)	78 lb (design)

B. Description of Facility

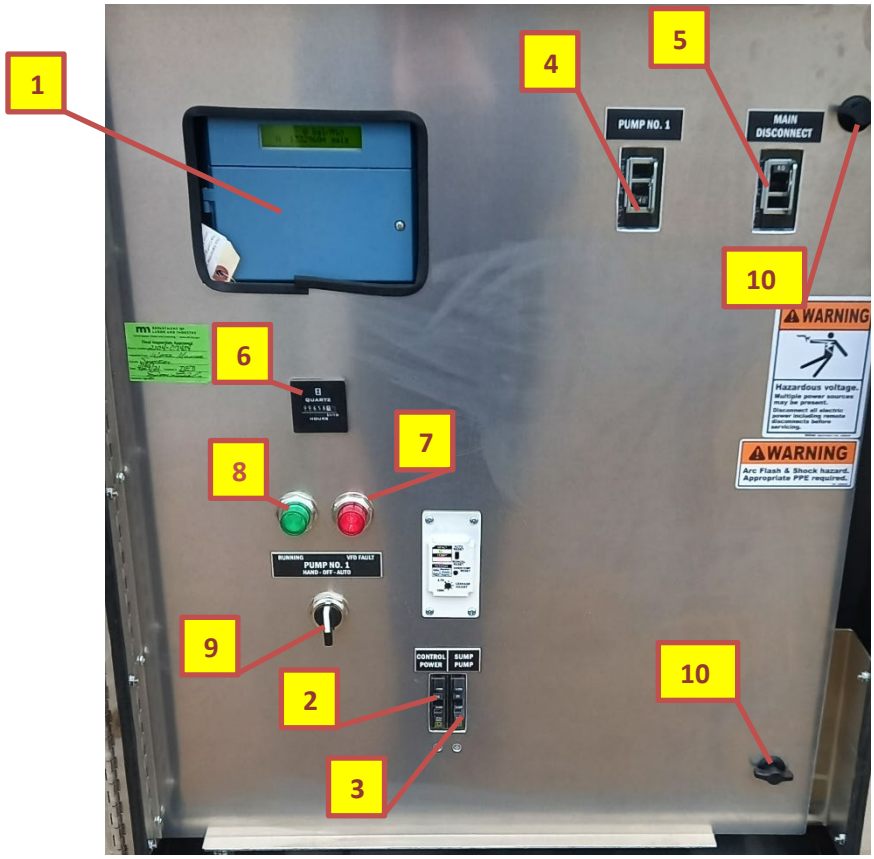
i. General Site Description

Partners	Project Purpose	Drainage Size	Project Completed	Maintenance Requirement
(BCWD) Oak Glen Golf Course	Stormwater harvesting and irrigation reuse system.	300 Acres	2021	Entire life of project.

ii. Parts Inventory

Line Item	Base Bid Item	Estimated Quantity
	METER MANHOLE	**1 Each**
	4" DUCTILE IRON PIPE SEWER	**8 Linear Feet**
	6" HDPE PIPE SEWER	**368 Linear Feet**
	6" RODENT GUARD	**1 Each**
	12" SCH. 40 PIPE SEWER	**46 Linear Feet**
	12" RODENT GUARD	**1 Each**
	LIFT STATION (PUMP & CONTROLS)	**1 Each**
	OUTLET STRUCTURE & STOPLOGS	**1 Each**
	6" RUBBER CHECK VALVE	**1 Each**
	4" GATE VALVE AND BOX	**1 Each**
	12" GATE VALVE AND BOX	**1 Each**

Figure 2. Control Cabinet Inner Door Components (Yellow Highlight Defined Below)

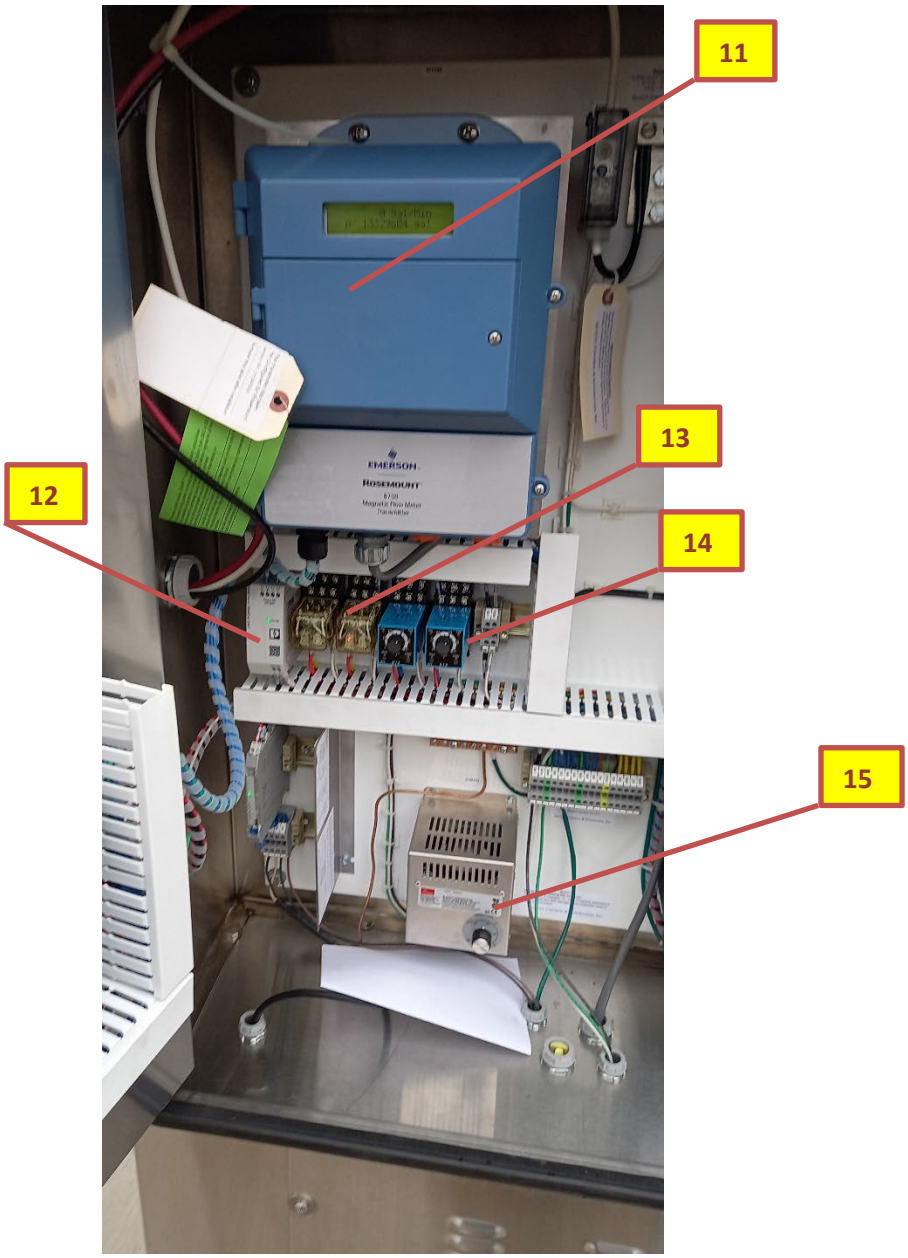


1. Pump Meter Log (PML)	6. Pump Elapse Volume Meter (ETM)
2. Cabinet Control Breaker (CCB)*	7. Pump Bearing Seal Failure Light (PL)
3. Sump Pump Breaker (CPB)	8. Pump Running Light (RL1)
4. Pump Motor Breaker(MB)	9. Pump Switch (Hand**, Off, Auto - HOA)
5. Main Breaker & Inner Door Lock (MCB)	10. Inner Door Latch

* Caution – Any wire connection/disconnection must be made with breaker off

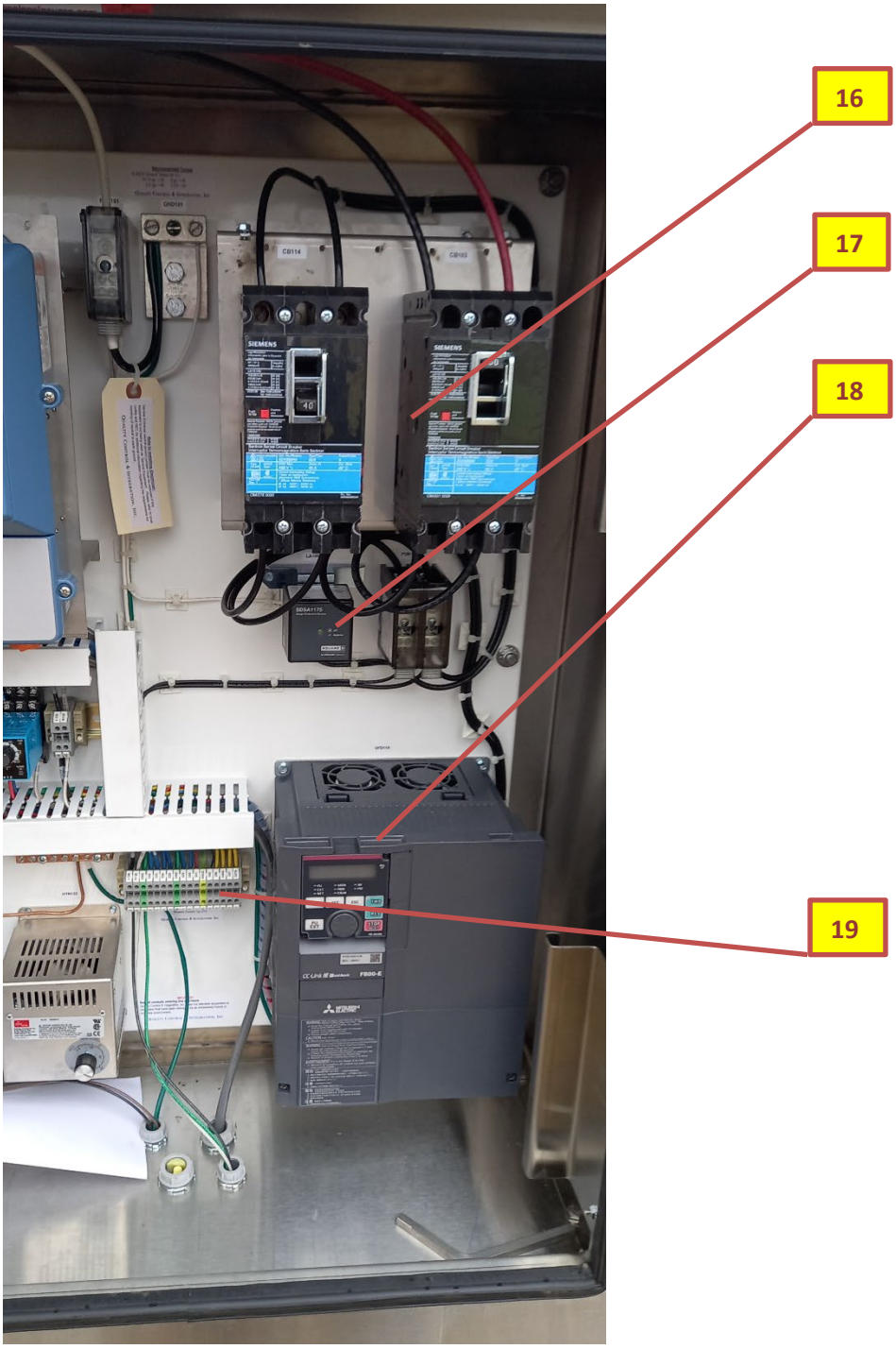
**Caution - Manual “Hand” operation overrides automated program and can allow wet well to run dry.

Figure 3. Control Cabinet Components Left (Yellow Highlight Defined Below)



11. Flowmeter Display (FM)	14. Control Light (CL)
12. 24VDC Power Supply (PS)	15. Heating Element (HE)
13. Thermostat (TH)	

Figure 4. Control Cabinet Components Right (Yellow Highlight Defined Below)



16. Circuit Breakers	18. Variable Frequency Drive (VFD)
17. Surge Protective Devices	19. Terminal Strip (TS-B/C)

iii. Stormwater Management Facilities

The stormwater harvesting and irrigation reuse system pumps water from the wetland north of Lake Mckusick which has approximately 300 acres of agricultural, residential and golf course lands draining to it. The water is pumped under Mckusick Road (County Road 64) to OGCC's 2.7-acre irrigation pond located adjacent to the clubhouse parking lot. This pond is connected to the existing golf course irrigation system. A new outlet structure replaced the old wetland outlet in disrepair.

Lift (Pump) Station

The reuse pump is housed underground within an 8' (96") diameter concrete manhole. The normal water elevation of the wetland is approximately 850.8-feet and the normal water level of the golf course's irrigation pond is 851.0-feet. Thus, it is necessary to use a lift station to pump the water from the constructed pond to the filter. The lift station consists of a 14-foot deep well, a 9-foot deep in-line valve manhole, and a stainless steel electrical and control cabinet. Water is pumped through a 6-inch, 368-foot long force main into the irrigation pond. The pump is controlled by two (2) floats, one in the lift station well and one in the irrigation pond. The float in the irrigation pond ensures the irrigation pond water level does not rise or fall too greatly, it controls when the pump is activated: the pump turns on when the pond elevation drops below 850.0 and turns off when the water level rises back to 851.0. The float inside the lift station is tied to the water level of the wetland. This float turns the pump off when the water level drops below 849.8.

Irrigation Pond

Pumped water discharges into the golf course's irrigation pond where it is then available for irrigation throughout the property. The irrigation pump is housed in a small structure adjacent to the pond. There is also a riser outlet structure on the north end of the pond that outlets into Brown's Creek. Previous inspections have shown this structure to be leaking and allowing water to outlet at a lower elevation.

Native Vegetation

All disturbed areas within the existing native prairie have been reseeded with native grasses, wildflowers, and forbs matching what was originally vegetated. In addition to the native vegetation, a small garden was planted near the lift station structure. All remaining disturbed areas were seeded with commercial grade turf.

iv. Accessibility

To maintain the reuse system, access is necessary to multiple infrastructure locations. Access to the reuse pump station and wetland outlet structure is available via the executive golf course parking lot (south of McKusick Road). The controls and electrical cabinet is locked with the code available to both Watershed and golf course staff. Inside the cabinet is a key to access the lift station access hatch for maintenance of the pump and system components. The reuse pipe outlet and irrigation pond float is accessible through the main golf course parking lot (north of Mckusick Road) along the paved cart path. Access is made available through an easement path on the north side of the cul-de-sac (refer to the **Figure 1** site map).

v. Start-Up and Operating Procedures

The spring start-up process will occur the golf course is prepared to begin irrigating the course. Typically this will occur shortly after overnight temperatures are no longer below freezing. System shut-down/winterization will be performed when foreseeable temperatures are to remain below freezing and golf course irrigation activities have ceased for the season. Timing of these tasks is subject to annual review and coordination with the golf course based on site conditions.

The following personnel can be contacted for normal operating procedure questions.

Contact Personnel		Contact Number	Organization
Primary	Karen Kill, Administrator	651-330-8220 x26	BCWD
Secondary	John Sarafolean, Water Resources Specialist	651-470-5421	Emmons & Olivier Resources, Inc.

vi. Common Operating Problems

Maintaining the reuse system is crucial for the long-term functionality of the system, though the system is designed to minimize and simple operations and maintenance activities.

C. Maintenance and Inspection Requirements

i. Planning Maintenance and Inspections

Inspections should be made monthly during the system operating months (typically between April and November) and prior to start-up and following winterization to ensure system efficiency is maintained.

Wetland Irrigation Outlet

After construction the reuse system should require minimal maintenance. OGGC will visually inspect the irrigation pump system (inlet/outlet pipes, pump well) monthly for debris build up and after large storm events. Debris will be removed by hand or with a rake if it is impeding flow. At the time of the inspection any damage to the structures will be noted. Additionally, the lift station should be inspected prior to start-up and following winterization for sediment and debris buildup within the structure and clean as necessary to maintain system efficiency. OGGC will notify Brown's Creek Watershed District (BCWD) if sediment accumulation or internal pipe obstructions are observed that cannot be readily removed/cleaned by the OGGC. The BCWD may occasionally survey the wetland and irrigation pond to determine depth and sediment accumulation. The BCWD will remove pond sediment as it finds necessary to maintain proper performance.

Wetland Buffer

A Native Buffer will be established on the south end of the irrigation pond where pipe installation disturbed the existing native vegetation. This area will be marked with buffer signage and left unmowed and natural. OGGC will be responsible for inspection and maintenance of this buffer.

Wetland Outlet Structure

The OGCC will visually inspect the outlet and remove any debris buildup. The OGCC will report any maintenance issues beyond their capability to the City. The City of Stillwater will remain responsible for maintenance of the new wetland outlet structure.

Pipe

Regular inspection of the pipe system is not required. If there is lack of flow from the wetland, the inlet and outlet of the pipes and the pump structure can provide access points for inspection. If there is not an obvious cause of the lack of flow, OGGC will contact BCWD to have the pipe televised and have the obstruction removed.

Valve System

The system will include manual valves for winterizing the system. The manufacturer's recommendations for testing and maintenance of the valves and related components (floats, control panel, etc.) shall be followed. At a minimum, all system components will be visually inspected and test-operated at least twice a year, at the beginning and end of each season's use. A similar mid-season inspection is recommended.

ii. Inspection Procedures

Item	Item Location	Parameter Measured	Inspection Frequency
Wetland & Pond	North and south sides of Mckusick Road	Visual inspection for sediment accumulation, float operation	Annually
Pond Buffer	North of Mckusick Road	Visual inspection and maintenance	Annually
Wetland Outlet Structure	South of Mckusick Road and North of wetland	Inspection of debris build up at outlets and visual inspection of stoplogs and CMP structure.	Quarterly and after major storm events
Pipe	Runs under Mckusick road from wetland to pond	Visual inspection of pipe	Only as needed
Wetland Irrigation Outlet	South of Mckusick Road, North of wetland, adjacent to parking lot	Visual inspection of debris build up at inlet and within system, float operation, monthly pump volumes/times	Monthly

Inspections should include documentation (*Outlined in Section G, Record of Annual Inspection and Maintenance Program*) and measurements of the following BMP components:

1. Document the presence of sediment, cattails, or other debris at the wetland outlet structure. Such conditions could block flow and reduce the capacity of the outlet structure.

2. Document the presence of sediment, cattails, or other debris at the inlet of the reuse system. Such conditions could block flow from entering the reuse system and reduce available wetland reuse volume.

3. Measure the depth of sediment and/or organic layer in bottom of the lift station after winterization. The measurement should be recorded from the top of the access manhole rim to the sediment and/or organic layer. Initial measurements can be taken with a large stick or piece of string with a flat weight on the end. These measurements will allow for inspection measurements to being taken from outside of the system, eliminating the need for manned entrance.

   During inspections, elevations of sediment height should be taken from each riser and cleanout. These elevations should be recorded on the Inspection and Maintenance log sheet. Also during the inspection, personnel should be looking for blockages to inlet or outlet stubs.

4. Document the presence of sediment, leaf litter, or other debris in the pond at the reuse pipe outlet. The presence of discharged material could indicate the pump is inadvertently discharging sediment and/or debris because there is a build up at the inlet.

5. Document the presence of sediment, debris, or erosion at the end of the outlet pipe entering Brown's Creek from Mckusick wetland.

iii. Maintenance procedures

Item	Corrective Action	Maintained by	Maintenance Frequency	Estimated Annual Cost *(Based on 2020 Estimate)*
Wetland & Pond	Bathymetric survey	Contracted party (BCWD)	Every 10 years or as needed	$500 (not inclusive of surveying or dredging)
Pipe	Televising and maintenance within the pipe	Contracted party (BCWD)	Only as needed	$500 ($3,000 pipe televising)
Valve System	Testing and maintenance of the valves and related components	OGGC	Semi-annually	$750 - $1,500
Anticipated Total Yearly Cost:				$2,500

In the spring, once regular irrigation is ready to commence for the year, the valves will be opened, one (1) 6" stoplog will be installed in the wetland outlet structure, and the floats will be installed in the irrigation pond and wetland. Floats will determine when the pump is operated. The floats/trigger system will be set in a manner that will allow water to be pumped to the irrigation

pond from the reuse wetland prior to any pumping of well water. OGCC will coordinate with BCWD on the initial settings for the float triggers during the first year of operations. OGCC will notify BCWD prior to any adjustments to the float triggers after the initial settings are established.

In the fall after irrigation has ceased for the year, the system will be winterized. The valves shall be closed after draining the pipe and the pump well drained. The control floats within the pond and wetland shall also be removed prior to the winter. One (1) 6" stoplog will be removed from the wetland outlet structure.

Irrigation should occur at night after the golf course has closed to minimize evaporation losses and minimize human contact with the reuse water. If irrigation occurs during the day, signs should be posted around irrigation areas or daytime irrigation should only occur in minimally trafficked areas (2018 Interagency Workgroup Report and Recommendations – Advancing Safe and Sustainable Water Reuse in Minnesota)

OGCC will maintain records regarding all operations of the control valves and any supplemental groundwater pumping that is needed for irrigation. OGCC will provide these records to BCWD on an annual basis. OGCC will also allow BCWD site access to monitor outflows from the wetland.

The BMPs shall be maintained and repaired by the District within 90-days of the following BMP deficiencies:

1. Sediment, cattails, or other debris accumulated at the wetland outlet structure. Material shall be removed when an obstruction obviously limits the outlet structure capacity.

2. Sediment, cattails, or other debris accumulated at the inlet of the reuse system. Material shall be removed when the pipes are found to have 25% or greater of the pipe inlet blocked.

3. Any areas of erosion, scouring, or destabilization associated with any of the aforementioned BMP components shall be corrected by the District on an as-needed basis.

iv. System Cleaning

When using water jet and a vacuum truck; the high pressure nozzle with rear facing jets is attached to a hose and dragged downstream, washing sediment and debris downstream with it. The vacuum truck would then be located on the downstream end and remove the sediment and debris with its vacuum hose. It should be noted that multiple passes of the water jet may be needed to clean the run, dependent on the amount of soil loading.

v. Corrective Actions and Modifications

Corrective actions and modifications are driven based on the performance of the reuse system, change in land use, and (or) property tenant change.

D. Maintenance Responsibilities and Agreements

BCWD is responsible and will complete regular maintenance to remove trapped sediment and debris within the wetland and irrigation pond. OGGC is responsible for maintaining the pumping system.

i. Transfer of Responsibilities

In accordance with the agreement filed for record in the Office of the Washington County Recorder and Registrar of Titles, the maintenance responsibilities of the OGGC as stated in this manual will be assumed by any successor in title to the OGGC land on which the Water Reuse System elements are located.

E. Manufacturer's recommendations

Before the system is cleaned, the following considerations should be made:

1. The system will be much easier to clean when there is little to no flow into the system and the system does not have any standing water. For this reason, system cleaning should be scheduled when the system has been winterized.
2. Before cleaning begins, all inlet and outlet stubs should be blocked off. If this is not done, sediment loading could back up or plug downstream pipelines adding to cleaning expenses. This is also done to prevent any of the debris or pollutants from washing into downstream waterways.
3. When beginning the cleaning process all upstream pipelines and pre-treatment units should be cleaned prior to starting on the retention or detention system.
4. When cleaning the retention or detention system, it is best to start at the highest elevation of the system and work towards the lowest elevation.

F. Safety

Ensure all OSHA and local safety regulations are being followed. Only personnel with appropriate confined space permits and personal protective equipment should be allowed to enter the system.

G. Records and Reporting

Records and reporting should be submitted to and maintained by BCWD and shall follow the inspection report below:

Record of Annual Inspection and Maintenance Program: (outline)

Inspection Visit Number _____				
Date:		Inspector Name:		
Identifier	Structure Description	Debris / Sediment	Sediment Depth (in)	Notes
1.	Wetland Outlet Structure	Y / N		
	Wetland Outlet Pipe	Y / N		
2.	Reuse System Inlet	Y / N		
	Reuse System Outlet	Y / N		
3.	Pump Wet Well	Y / N		
Describe suggested maintenance				
Maintenance Description				
Date:				
Contractor / Maintenance Crew Information				
Name:				
Phone:				
Address:				
Maintenance Description				

i. Sampling and Performance Monitoring

Sampling and Analysis – BCWD is responsible for coordination of routine sampling. Water quality sampling is to be added to normal inspection procedure.

Performance monitoring – BCWD is responsible for recording and interpreting results of samples. If a sample is believed to be of the contaminant nature, further lab testing may be required. Consult the BCWD Administrator if samples appear to be of the contaminant nature.

Well Flow Meter – BCWD shall record and submit monthly pumping records to the Minnesota Department of Natural Resources (MNDNR) to ensure compliance with the District's Water Appropriations permit during golf course operations.

H. Emergency Plan and Operating Procedures – Identify hazards, need for safety measures.

i. Emergency Plan

Issues that would trigger the Emergency Operating Procedure consist of large oil or other contaminant spills that enter the wetland or reuse system. If exposed wire is observed at any time call BCWD immediately. Always call 911 in a situation that presents a risk of immediate bodily harm to yourself or the surrounding community.

ii. Emergency Operating Procedures

In the event on an operational emergency, please contact the following personnel for further assistance.

Contact Personnel		Contact Number	Organization
Primary	Karen Kill, Administrator	651-330-8220 x26	BCWD
Secondary	John Sarafolean, Water Resources Specialist	651-470-5421	Emmons & Olivier Resources, Inc.

Appendices

- ***As-built drawings – Oak Glen Golf Course Stormwater Reuse***
- ***Manufacturer Documentation***
- ***Annual maintenance report form (see above in Records and Reporting)***
- ***Oak Glen Golf Course – Brown's Creek Watershed District Agreement***

RECORD DRAWING
CONTRACTOR: NORTHWEST ASPHALT
CONSTRUCTION COMPLETION DATE: MAY 2021

REMOTE FLOAT SWITCH
02
09

6" HDPE OUTLET W/
RODENT GUARD
& RUBBER CHECK VALVE

25 LF IPS 6" HDPE DR17
(TRENCH INSTALLATION)

CONSTRUCTION LIMITS

4+50
4+00
3+00
2+00
1+00
0+00

MCKUSICK RD N (COUNTY RD 64)

OCS - 01
RIM: ~~852.8~~ 852.9
INV: ~~849.8~~ 849.7
TOP WEIR: 850.3
01
09

CONTRACTOR SHALL AVOID IMPACT
TO GOLF COURSE TEES, FAIRWAYS,
AND GREENS UNLESS AUTHORIZED
BY ENGINEER (TYP.)

343 LF 6" IPS HDPE DR17
(JACK & BORE OR GBM)

4" GATE
VALVE & BOX
RIM: 857.0
INV: 849.0

FLOWMETER (48" MH)
RIM: ~~857.0~~ 856.9
INV IN/OUT: ~~849.0~~848.9
SUMP: ~~848.0~~ 847.9
01
10

LIFT STATION
(96" MANHOLE)
RIM: 857.0
INV IN/OUT: 849.0
SUMP: 843.0
01
10

INSTALL 1"Ø 8LF STAINLESS
STEEL PIPES 3' SPACING
FG: 852.0

IRRIGATION HEAD (TYP.)
- CONTRACTOR SHALL COORDINATE
LOCATION ALL ADJACENT HEADS
AND PROTECT FROM DAMAGE

12" GATE
VALVE & BOX
RIM: 855.0
INV: 849.0

ELECTRICAL CONTROL
CABINET

12" HDPE INLET W/
RODENT GUARD
INV: 848.0

TRENCH 3 pz
ELECTRICAL

INSTALL 1"Ø 8LF STAINLESS
STEEL PIPES 3' SPACING
FG: 852.0

NOTES:
1. CONTRACTOR SHALL NOTIFY OGCC, CITY OF STILLWATER, AND WASHINGTON COUNTY A MINIMUM OF 48 HR PRIOR TO HORIZONTALLY DIRECTIONAL DRILLING.

N

SCALE IN FEET
0 30 60 120

NO	DATE	BY	REVISION
6			
5			
4			
3			
2	11/29/2021	KDC	RECORD PLANS
1	11/06/2020	KDC	IFC PLANS

GSOC GOPHER STATE ONE CALL 811 Know what's below. Call before you dig.

I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION, OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.

KYLE CRAWFORD
DATE: 11/06/2020 LICENSE # 54906

SUBMISSION DATE: 11/06/2020

DESIGN BY	DRAWN BY	CHECKED BY
KDC	BR	KDC

EOR PROJECT NO. 00041-0369

Emmons & Olivier Resources, Inc.
1919 University Ave W,
St Paul, MN 55104
Tele: 651.770.8448
www.eorinc.com
water ecology community

BROWN'S CREEK WATERSHED DISTRICT

OAK GLEN GOLF COURSE
STORMWATER REUSE
STILLWATER, WASHINGTON COUNTY, MINNESOTA

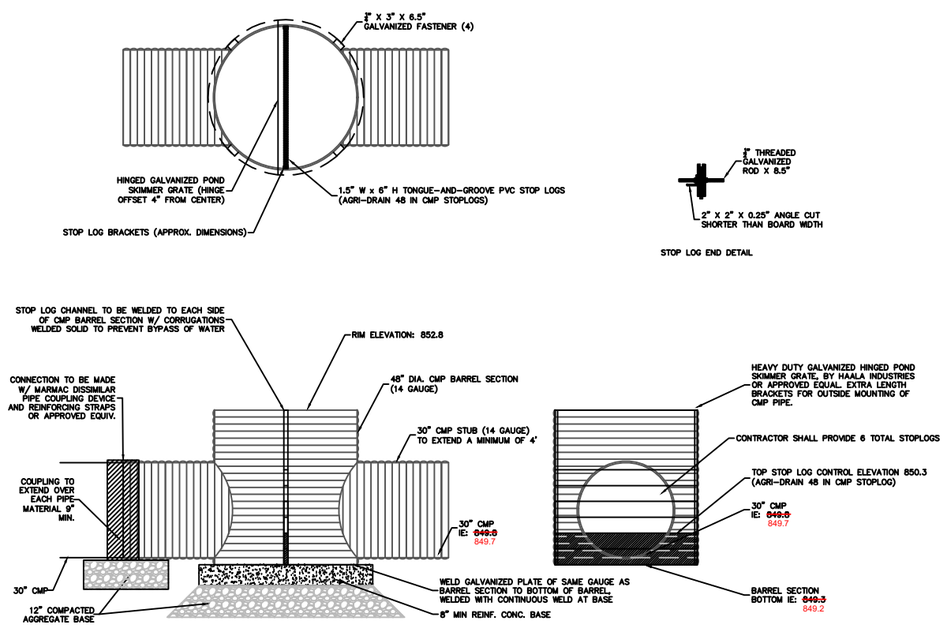
STATE PROJECT NO. ---- CITY PROJECT NO. #

GRADING AND DRAINAGE PLAN

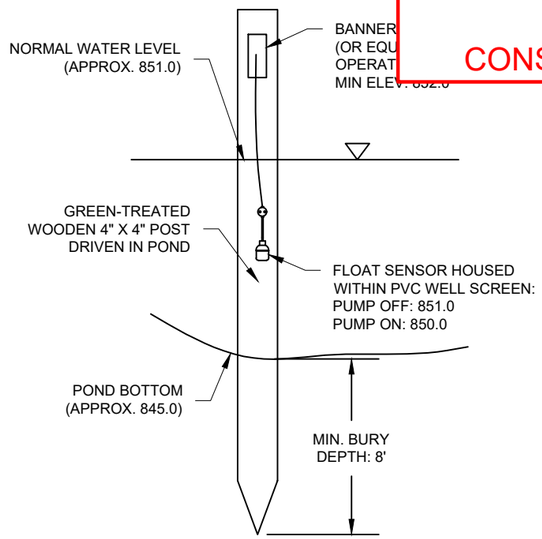
SHEET 04 OF 11 SHEETS

Plot Date: 11/29/2021
Drawing name: X:\Clients_WD\041_BCWD\0369_Oak_Glen_Course_Reuse_Design\09_GIMS\dwg\41-0369_CD_RecordPlans.dwg
Xrefs: 41-0369_xbase2, 41-0369_pbase2, AgriDrain_control_structure

RECORD DRAWING
CONTRACTOR: NORTHWEST ASPHALT
CONSTRUCTION COMPLETION DATE: MAY 2021



01
10
WETLAND OUTLET STRUCTURE



02
09
IRRIGATION POND FLOAT
(No Scale)

NO	DATE	BY	REVISION
6			
5			
4			
3			
2	11/29/2021	KDC	RECORD PLANS
1	11/06/2020	KDC	IFC PLANS

GSOC GOPHER STATE ONE CALL 811 Know what's below. Call before you dig.

I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION, OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.

KYLE CRAWFORD
DATE: 11/06/2020 LICENSE # 54906

SUBMISSION DATE: 11/06/2020

DESIGN BY	DRAWN BY	CHECKED BY
KDC	BR	KDC

EOR PROJECT NO. 00041-0369

Emmons & Olivier Resources, Inc.
1919 University Ave W,
St Paul, MN 55104
Tele: 651.770.8448
www.eorinc.com
water ecology community

BROWN'S CREEK WATERSHED DISTRICT

OAK GLEN GOLF COURSE
STORMWATER REUSE
STILLWATER, WASHINGTON COUNTY, MINNESOTA

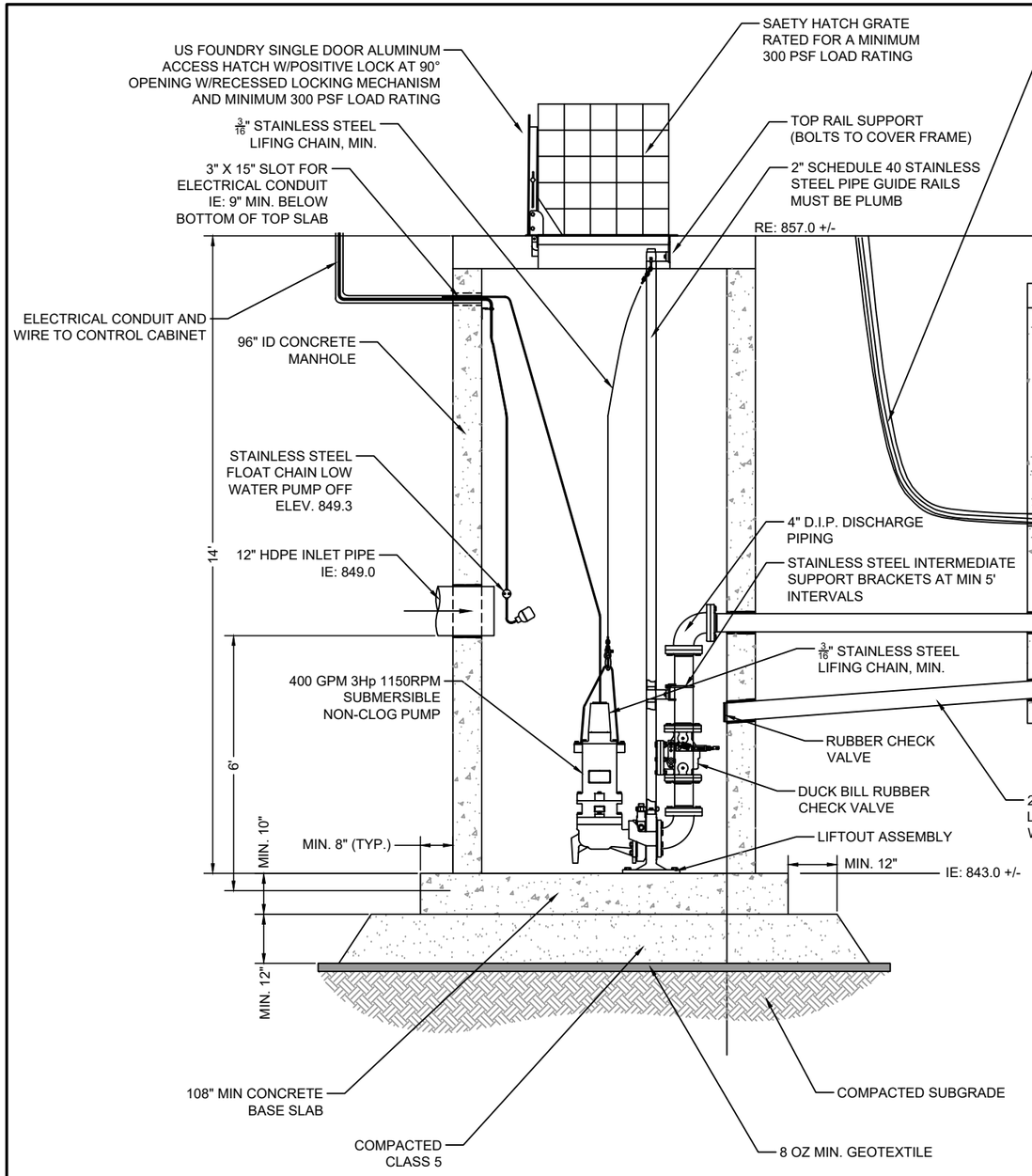
STATE PROJECT NO. ---
CITY PROJECT NO. #

DETAILS SHEET 2

SHEET 10 OF 11 SHEETS

Plot Date: 11/29/2021
Drawing name: X:\Clients_WD\041_BCWD\0369_Oak_Glen_Course_Reuse_Design\09_GIMS\dwg\41-0369_CD_RecordPlans.dwg
Xrefs: _41-0369_xbase2, 41-0369_pbase2, AgriDrain_control_structure

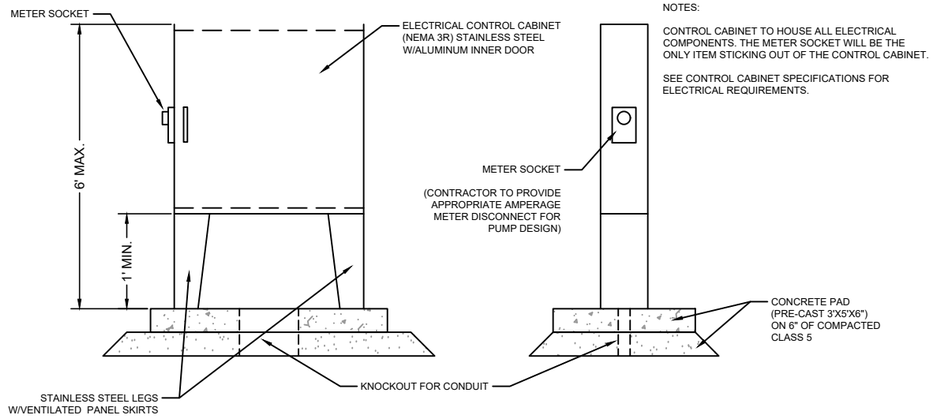
RECORD DRAWING
CONTRACTOR: NORTHWEST ASPHALT
CONSTRUCTION COMPLETION DATE: MAY 2021



01
10
LIFT STATION - ELEVATION VIEW
(No Scale)

CABINET (INCLUDING ELECTRICAL DESIGN) AND MANHOLE STRUCTURES.

2. ALL ATTACHMENT HARDWARE (BRACKETS, BOLTS, ANCHORS, ETC.) SHALL BE STAINLESS STEEL.
3. VERTICAL PIPING SHALL BE SUPPORTED TO THE MANHOLE WALL AS NEEDED USING STAINLESS STEEL BRACING. THIS BRACING SHALL BE PLACED AT MID-HEIGHT OF VERTICAL PIPING OR MORE FREQUENTLY, AS NEEDED.
4. CONTRACTOR IS REQUIRED TO COORDINATE WITH UTILITY COMPANIES TO GET POWER TO THE LIFT STATION.
5. PIPES THROUGH THE MANHOLE WALLS SHALL BE SEALED WITH A RUBBER BOOT SEAL AND GUARANTEED WATER TIGHT.
6. CONTRACTOR SHALL GUARANTEE INLINE FLOW METER MANHOLE TO BE WATER TIGHT FOR ONE YEAR.
7. CONTRACTOR SHALL GUARANTEE LIFT STATION MANHOLE AGAINST BOUYANCY.
8. SEE PLAN VIEW FOR PIPING ORIENTATION.
9. FOLLOWING INSTALLATION, CONTRACTOR SHALL INSTALL A PRESSURE GAUGE TO TEST THE IRRIGATION SYSTEM AND INSTALL STAINLESS STEEL ORIFICE PLATE AS NECESSARY TO OPTIMIZE HEAD CONDITION.



02
10
LIFT STATION CONTROL CABINET
(No Scale)

NO	DATE	BY	REVISION
6			
5			
4			
3			
2	11/29/2021	KDC	RECORD PLANS
1	11/06/2020	KDC	IFC PLANS

GSOC GOPHER STATE ONE CALL — 811 Know what's below. Call before you dig.

I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION, OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.

KYLE CRAWFORD
DATE: 11/06/2020 LICENSE # 54906

SUBMISSION DATE: 11/06/2020

DESIGN BY	DRAWN BY	CHECKED BY
KDC	BR	KDC

EOR PROJECT NO. 00041-0369

Emmons & Olivier Resources, Inc.
1919 University Ave W,
St Paul, MN 55104
Tele: 651.770.8448
www.eorinc.com
water ecology community

BROWN'S CREEK WATERSHED DISTRICT

OAK GLEN GOLF COURSE
STORMWATER REUSE
STILLWATER, WASHINGTON COUNTY, MINNESOTA

STATE PROJECT NO. ---- CITY PROJECT NO. #

DETAILS SHEET 3

SHEET 11 OF 11 SHEETS

Plot Date: 11/29/2021
Drawing name: X:\Clients_WD\041_BCWD\0369_Oak_Glen_Course_Reuse_Design\09_GIMS\dwg\41-0369_CD_RecordPlans.dwg
Xrefs: 41-0369_xbase2, 41-0369_pbase2, AgrDrain_control_structure

Submersible Wastewater, Sewage Pump

Model DLFU
Model DVFU
Model DDLFU

water | wastewater | flood control

EBARA

EBARA Fluid Handling

an EBARA International Corporation company

Model DLFU, DLKFU, DDLFU

K-Series, Model DLKFU – Features

Model DLKFU series pumps are designed to tackle clogging challenges with enhanced passage capabilities for handling of fibrous waste. The design features address the most common reasons for clogging caused by fibrous materials:

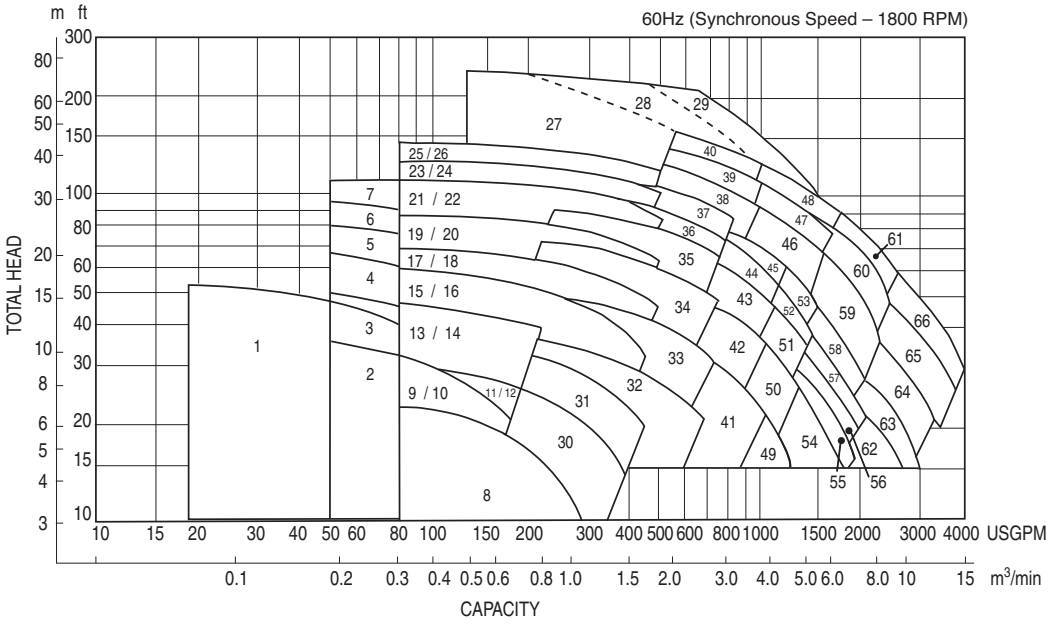
- Reduces material caught on the vane tips
- Increases inlet pressure which keeps debris moving instead of recirculating
- E-liminator groove disrupts the accumulation of fibrous debris.

Standard Specifications

Design	Discharge	2, 3, 4, 6, 8, 10, 12 inch
	Horsepower	2 to 60
	Capacity	13 to 4000 GPM
	Total head	7 to 243 feet
	Max.Liquid temp.	104°F/40°C
Speed		1800 RPM
Materials	Casing	Cast Iron
	Impeller	Cast Iron (2 to 60HP) Ductile Iron (150-300DLFU, 40 to 60HP)
	Shaft	403 Stainless Steel, 2 to 5HP 420 Stainless Steel, 7½ to 60HP
	Motor Frame	Cast Iron
	Fastener	304 Stainless Steel
Construction	**Mechanical Seal**	Double Mechanical Seal
	Material – Upper	Carbon/Ceramic *Optional*: Tungsten Carbide/Tungsten/Carbide
	Material – Lower	Silicon Carbide/Silicon Carbide, 2 to 60HP *Optional*: Tungsten Carbide/Tungsten/Carbide Tungsten Carbide/Tungsten Carbide, 150-300DLFU, 50 & 60 HP
	Impeller Type	Semi-open, 2 to 30HP Enclosed, 40 to 60HP
	Bearing	Prelubricated Ball Bearing
	Motor	Insulation Class H *Optional*: FM Explosion Proof Class 1, Division 1, Group C, D
	Three Phase	208/230V, 460V
	Service Factor	1.15
	Motor Protection	Built-in Thermal Detector - Klixon Mechanical Seal Leakage - Float Switch
Submersible Cable		2 to 5HP - 33 ft. standard cable length 7½ to 60HP - 40 ft. standard cable length Optional _____ ft. (customer specified)
Accessories		Optional QDC System

DLFU selection chart

1	50DLFU61.5 2HP	34	100DLFU611 15HP
2	80DLMFU61.5 2HP	35	100DLFU615 20HP
3	80DLMFU62.2 3HP	36	100DLFU618 25HP
4	80DLMFU63.7 5HP	37	100DLFU622 30HP
5	80DLMFU65.5 7½HP	38	150DLFU630 40HP
6	80DLCMFU67.5 10HP	39	150DLFU637 50HP
7	80DLCMFU611 15HP	40	150DLFU645 60HP
8	100DLFU61.5 2HP	41	150DLFU67.5 10HP
9	80DLFU61.5 2HP	42	150DLFU611 15HP
10	100DLMFU61.5 2HP	43	150DLFU615 20HP
11	80DLFU62.2 3HP	44	150DLFU618 25HP
12	100DLMFU62.2 3HP	45	150DLFU622 30HP
13	80DLFU63.7 5HP	46	200DLFU630 40HP
14	100DLMFU63.7 5HP	47	200DLFU637 50HP
15	80DLFU65.5 7½HP	48	200DLFU645 60HP
16	100DLMFU65.5 7½HP	49	200DLFU67.5 10HP
17	80DLFU67.5 10HP	50	200DLFU611 15HP
18	100DLMFU67.5 10HP	51	200DLFU615 20HP
19	80DLFU611 15HP	52	200DLFU618 25HP
20	100DLMFU611 15HP	53	200DLFU622 30HP
21	80DLFU615 20HP	54	250DLFU611 15HP
22	100DLMFU615 20HP	55	250DLBFU615 20HP
23	80DLFU618 25HP	56	250DLCFU615 20HP
24	100DLMFU618 25HP	57	250DLFU618 25HP
25	80DLFU622 30HP	58	250DLFU622 30HP
26	100DLMFU622 30HP	59	250DLFU630 40HP
27	100DLFU630 40HP	60	250DLFU637 50HP
28	100DLFU637 50HP	61	250DLFU645 60HP
29	100DLFU645 60HP	62	300DLFU618 25HP
30	100DLFU62.2 3HP	63	300DLFU622 30HP
31	100DLFU63.7 5HP	64	300DLFU630 40HP
32	100DLFU65.5 7½HP	65	300DLFU637 50HP
33	100DLFU67.5 10HP	66	300DLFU645 60HP



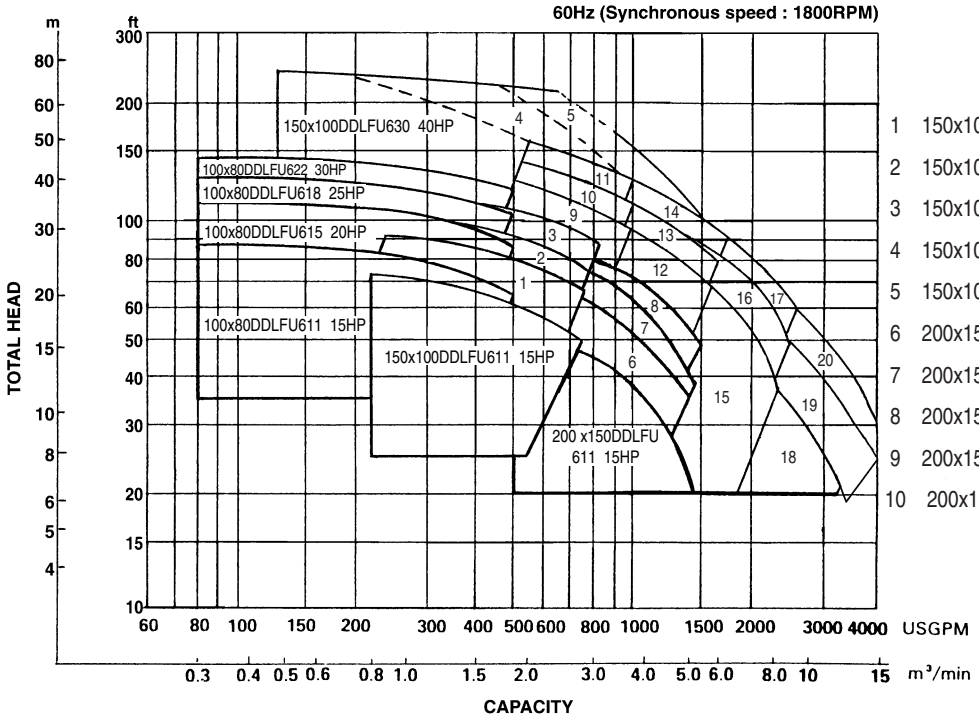
Please note: *Overlap in coverage is designated by the two numbers; for example "9 / 10". Refer to the legend left for the specific model numbers.*

Model DDLFU

Standard Specifications

Design	Discharge	4"×3", 6"×4", 8"×6", 8"×8", 10"×10", 12"×12"
	Horsepower	15 to 60HP
	Capacity	80 to 4000 GPM
	Total head	20 to 243 feet
	Max.Liquid temp.	104°F/40°C
Speed		1800 RPM
Materials	Casing	Cast Iron
	Impeller	Cast Iron
	Shaft	420 Stainless Steel
	Motor Frame	Cast Iron
	Fastener	304 Stainless Steel
Construction	**Mechanical Seal**	
	Double Mechanical Seal – Tandem Arrangement	
	Material – Upper	Carbon/Ceramic
		Optional: Tungsten Carbide/Tungsten/Carbide
	Material – Lower	Silicon Carbide/Silicon Carbide
		Optional: Tungsten Carbide/Tungsten/Carbide
		Tungsten Carbide/Tungsten Carbide (200×150DDLFU and greater, 50 & 60 HP only)
	Impeller Type	Semi-open for 15 to 30HP
		Enclosed for 40 to 60HP
	Bearing	Prelubricated Ball Bearing
	Motor	Insulation Class H
		Optional: FM Explosion Proof Class 1, Division 1, Group C, D
	Three Phase	208/230V, 460V
	Service Factor	1.15
	Motor Protection	Built-in Thermal Detector - Klixon
		Mechanical Seal Leakage - Float Switch
Submersible Cable		40 ft. standard cable length, Optional 66 ft.
		Optional _____ ft. (customer specified)

DDLFU selection chart



1	150x100DDLFU615 20HP	11	200x150DDLFU645 60HP
2	150x100DDLFU618 25HP	12	200x200DDLFU630 40HP
3	150x100DDLFU622 30HP	13	200x200DDLFU637 50HP
4	150x100DDLFU637 50HP	14	200x200DDLFU645 60HP
5	150x100DDLFU645 60HP	15	250x250DDLFU630 40HP
6	200x150DDLFU615 20HP	16	250x250DDLFU637 50HP
7	200x150DDLFU618 25HP	17	250x250DDLFU645 60HP
8	200x150DDLFU622 30HP	18	300x300DDLFU630 40HP
9	200x150DDLFU630 40HP	19	300x300DDLFU637 50HP
10	200x150DDLFU637 50HP	20	300x300DDLFU645 60HP

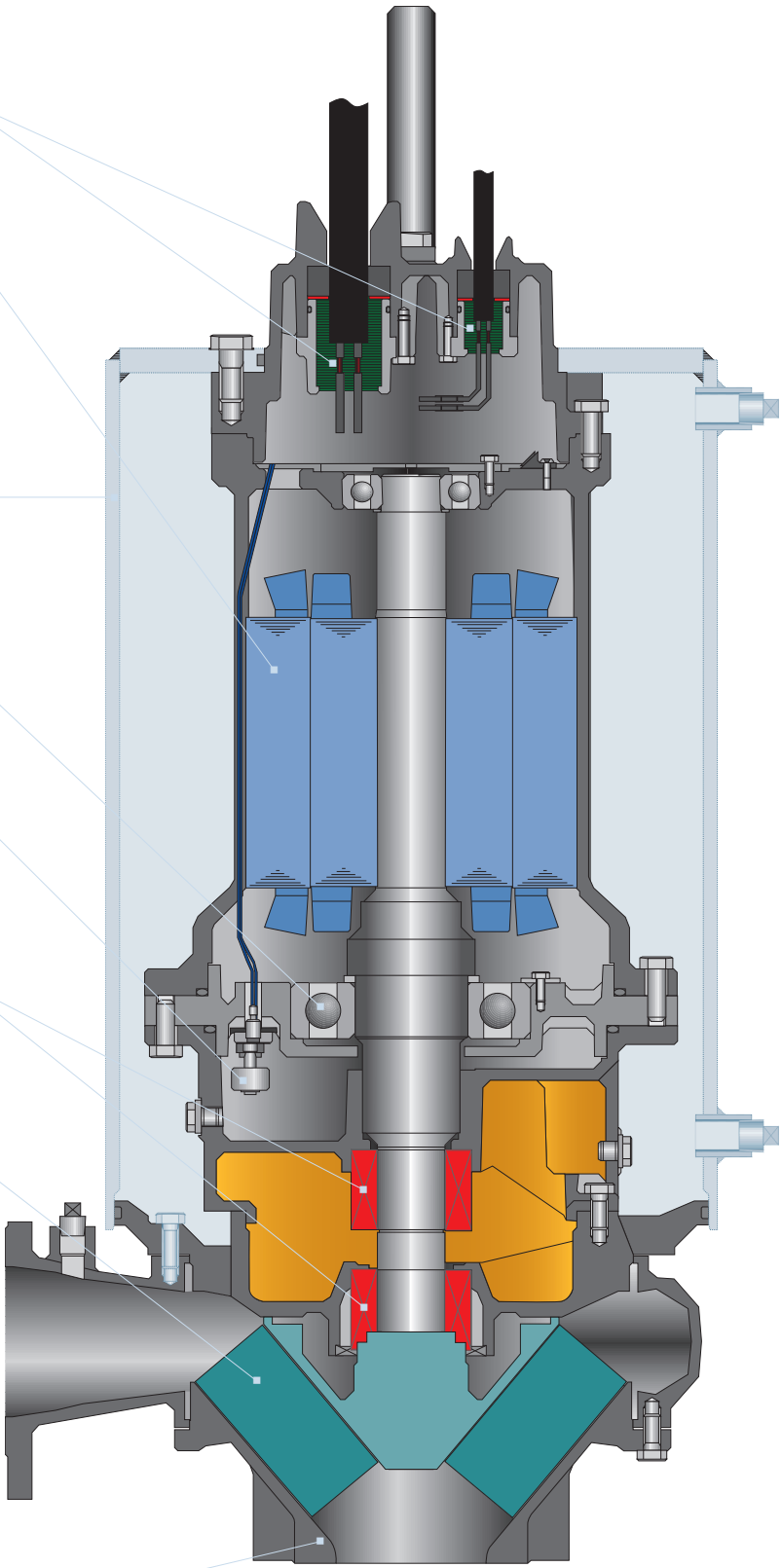
Model DLFU, DLKFU, DDLFU

Features

- **Watertight cable entry system** prevents capillary action and protects against moisture; reduces maintenance costs
- **Heavy duty, high efficiency, air filled, Class H insulated, rated for 356°F with a 1.15 service factor** dissipates heat easily; thermal protection in each phase of windings protects; operates cooler with higher efficiencies; longer service life with lower operating costs
- **Self cooling jacket** (Model DDLFU) eliminates the need for external pumping devices or special heat transfer fluids; offers simplicity and high reliability by effectively dissipating heat in dry pit applications only
- **Single and double row thrust bearings** carries thrust loads with L-10 life of 60,000 hours; ensures long, dependable operation and lowers maintenance costs
- **Mechanically actuated float switch** provides early warning of mechanical seal failure; avoids costly motor repairs
- **Double mechanical seals – silicon carbide lower seals, carbon/ceramic upper** – hard faced upper and lower seals operate in an oil bath; providing longer service life and lower maintenance costs
- **High efficiency impellers** pass large solids with high outputs and reduces power consumption; impellers are optimized for hydraulic coverage; lowers operating costs

Model DLKFU series pumps are designed to tackle clogging challenges with enhanced passage capabilities for handling of fibrous waste.The design features address the most common reasons for clogging caused by fibrous materials: Reduces material caught on the vane tips, increases inlet pressure which keeps debris moving instead of recirculating and E-liminator groove disrupts the accumulation of fibrous debris

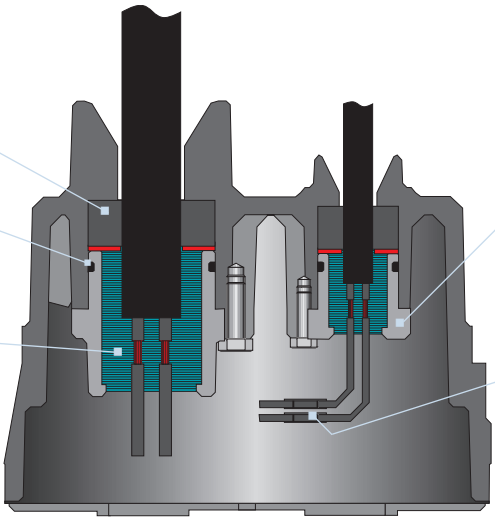
- **Replaceable wear components** maintains working clearances while reducing casing and volute costs



Model DLFU, DLKFU, DDLFU

Cable Entry System

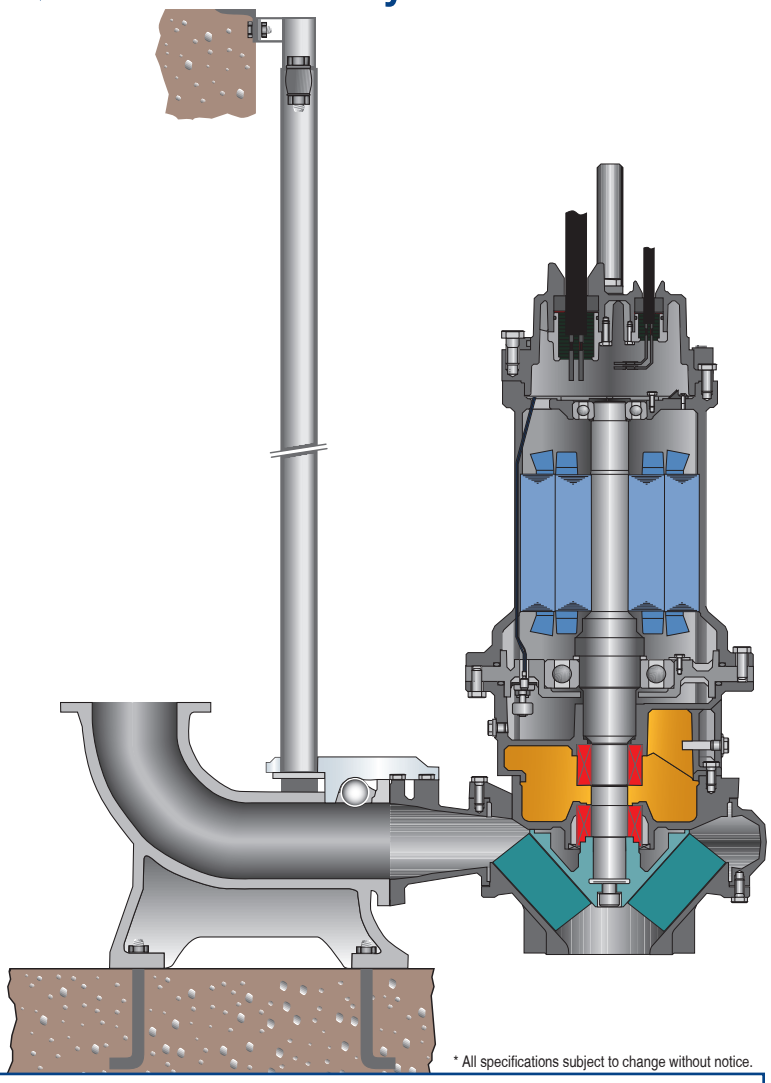
- **Primary seal** – grommet (NBR)
- **Secondary sealing** – O-rings (NBR)
- **Epoxy resin** – prevents capillary action
- **Solid joint butt connector** (copper)



- **Cable gland** (grey cast iron)
- **Solid joint butt connector** (copper)

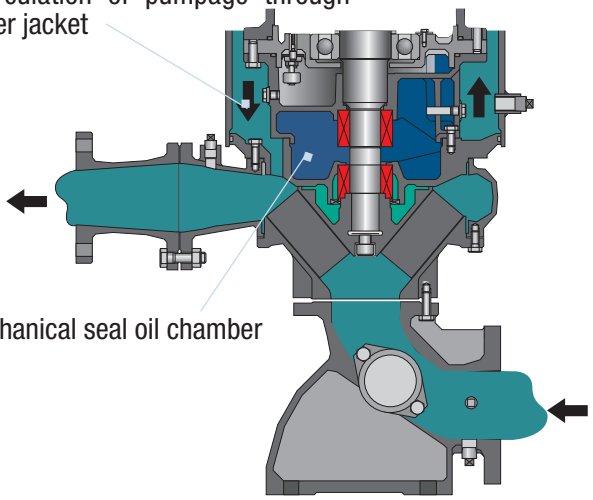
Note: Entry system is the same for both power and control cables.

QDC & Slide Rail System



DDLFU Dry Pit Design

- Motor cooling is provided by internal recirculation of pumpage through water jacket
- Mechanical seal oil chamber



* All specifications subject to change without notice.

EBARA Fluid Handling
1651 Cedar Line Drive • Rock Hill, SC 29730 • t (803) 327 - 5005 • f (803) 327 - 5097
www.pumpsebara.com

Amendment to the Project Agreement
Between Oak Glen LLC and
Brown's Creek Watershed District

Oak Glen Golf Course Project

May 11, 2021

This amends the September 9, 2020, agreement between Oak Glen LLC, a private Minnesota corporation (Oak Glen), and Brown's Creek Watershed District, a watershed district created pursuant to Minnesota Statutes chapters 103B and 103D (BCWD). The amendment is made to incorporate an additional technical component into the reuse/irrigation project at Oak Glen Golf Course that is the subject of the agreement (the Reuse System).

WHEREAS integration of a flow meter into the irrigation system at Oak Glen Golf Course will facilitate automated monitoring of the performance of the Reuse System that is integrated into the Golf Course irrigation system through logging of the timing and volume of groundwater pumped by the Golf Course for irrigation; and

WHEREAS in fulfillment of a term of the agreement, Oak Glen granted BCWD an access, use and construction easement over certain portions of the Golf Course property, but the easement did not extend to the location of the maintenance and operations facility that houses the groundwater pump that is the subject of this amendment, and Oak Glen wishes to facilitate the installation and operation of the flow meter by extending a license to BCWD for such purposes; and

WHEREAS Oak Glen and BCWD enter into this amendment to facilitate the installation and operation of the flow meter on property owned by Oak Glen legally described as:

Oak Glen Outlot G, Washington County, Minnesota.

NOW, THEREFORE, in consideration of the foregoing recitals, which are incorporated into and made a part of this amendment, and other good and valuable consideration, the sufficiency of which is hereby acknowledged, and to continue to facilitate the Project for the benefit of the parties and the general public, the parties amend the agreement as follows:

1. The Project design and specifications, development of which is provided for in paragraph 1B of the agreement, are amended to include the installation of the flow meter and programmable logic controller and other components as shown and described in Attachment A1 to this amendment or equipment determined to be materially equivalent in form, function and operation by the BCWD engineer (the Flow Meter) into the Golf Course groundwater pump piping, and by its signature hereunder Oak Glen approves of the addition of the Flow Meter to the Reuse System design and the integration of the Flow Meter into the Golf Course groundwater-pump system.
2. BCWD, or a contractor acting on behalf of BCWD, will install and operate the Flow Meter on Oak Glen's existing groundwater pump and integrate the Flow Meter into the Golf Course electric system at BCWD's sole expense, though Oak Glen will provide and pay the costs of the electrical power necessary to operate the Flow Meter.

3. *License*.

    a. To facilitate the installation and operation of the Flow Meter, Oak Glen hereby grants and conveys an irrevocable term license to BCWD, its contractors, agents and assigns over Oak Glen Outlot G to access and use the Golf Course facility known as the South Pump House for purposes and the duration of the installation and operation of the Flow Meter. The license granted hereby includes but is not limited to the right to ingress and egress and pass over Oak Glen on foot and using motorized equipment for staging of installation and installation of the Flow Meter, reading, downloading data from, replacing components and otherwise repairing, and maintaining of the Flow Meter and otherwise ensuring its function and operation. BCWD will exercise its rights under the license in a reasonable manner, mindful of the role the operation and maintenance facility in the Golf Course operations.

    b. No right of access or use of the operations and maintenance facility is granted to the general public by the license.

    c. The license will terminate on termination of the agreement.

    d. BCWD will notify Oak Glen at least 72 hours prior to commencement of any exercise of BCWD's right under the license.

4. On completion of the installation of the Flow Meter, the Flow Meter becomes an integrated part of the Project, as defined in the agreement, and ownership of the Flow Meter and associated warranties will be conveyed to Oak Glen. BCWD will have ongoing access to all data collected by the Flow Meter and will timely provide any and all such data to Oak Glen.

5. The O&M Plan to be drafted to fulfill the terms of paragraphs 1E and 2B of the agreement will include and address operation and maintenance of the Flow Meter as necessary and appropriate.

Except as specifically modified herein, all terms of the September 9, 2020, agreement between the parties remain effective and BCWD's rights under the easements provided in the agreement are not expanded by this amendment.

[Signature page follows.]

IN WITNESS WHEREOF, the undersigned have executed this amendment intending to be legally bound by its terms as of the date of complete execution.

Oak Glen LLC

Patrick Renner

Patrick Renner, Manager

Date: 2021-05-12

Brown's Creek Watershed District

Karen Kill

Karen Kill, Administrator

Date: 2021-05-12

Approved as to Form and Execution

Counsel, Brown's Creek Watershed District

Attachment A1

Flow Meter Description and Specifications

Flow Meter Specifications

Location & Installation:

The inline flow sensor will be installed on the horizontal four-inch cast iron pipe running along the South Pump House northeast wall. The flow sensor placement will meet the minimum specification of no less than 20 times the internal diameter length of straight pipe immediately upstream and five times the internal diameter length of straight pipe downstream. The sensor will be installed at zero degrees upright on the pipe. Work to include all hardware, fittings, and labor required for a water-tight installation.

The control panel will be mounted on the pump house interior wall adjacent to the flow meter or, alternatively, on the southwest interior wall adjacent the existing well pump control panel and electrical enclosures. Work to include all hardware, fittings, wiring, auxiliary components, labor, and programming such that the logging of date, time, and duration of pumping is recorded to Contractor supplied SD card.

Product Materials:

All pipe and pipe fittings are to be made of iron, carbon steel, stainless steel, or schedule 80 PVC.

The inline flow sensor is to be Signet 2537 Paddlewheel Flowmeter or approved equal (Attachment 1).

The programmable logic controller is to be IDEC SmartAXIS FT1A, 24 volt, with 48 Input-Output range, and include SD card for data logging or approved equal (Attachment 2).

Attachments 1 & 2

Paddlewheel Flowmeter Specifications &

Programmable Controller Specifications

Signet 2537 Paddlewheel Flowmeter

The Signet 2537 Flowmeter is the next generation in fluid measurement technology from the inventor of the original paddlewheel flowmeter. This sensor is an improvement on what's already an industry standard. It has the added functionality of various output options including flow switch, multi-functional pulse, digital (S^3L) or 4 to 20 mA. Additionally, it offers low flow, low power and high resolution and can be configured on-site directly through the built-in user interface.

Installation is simple because the Signet 2537 utilizes the same fittings as the popular Signet 515 and 2536 Paddlewheel Sensors and fits into pipe sizes ranging from DN15 to DN200 (½ to 8 inches). Available in Polypropylene and PVDF, it is ideal for a variety of applications including chemical processing, water and wastewater monitoring and scrubber control.

Features

- **Digital (S^3L) or 4 to 20 mA outputs or (Multi-function)**
- **Allows for up to six sensors to Signet 8900 Multi-Parameter Controller**
- **Low flow capabilities down to 0.1 m/s (0.3 ft/s)**
- **Polypropylene or PVDF sensor bodies**
- **Polypropylene and PVDF retaining nuts standard, Valox optional**
- **Installs into pipe sizes DN15 to DN200 (½ to 8 in.)**
- **Test certificate included for -X0, -X1**
- **Low power and high resolution**

(3-2537-XC-PX version only)

Applications

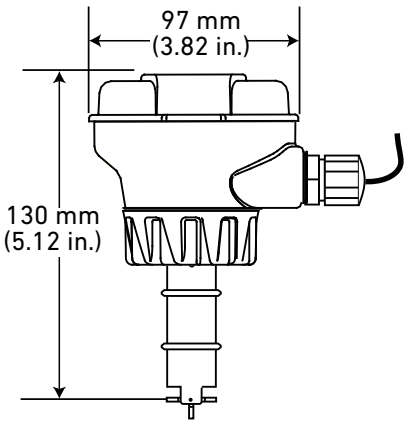
- **Process Flow Monitoring**
- **Pump Protection**
- **Pure Water Production**
- **Filtration Systems**
- **Chemical Production**
- **Reverse Osmosis**
- **Demineralization/Regeneration**
- **Fume Scrubbers**
- **Cooling Towers**
- **Proportional Metering Pump**

Specifications

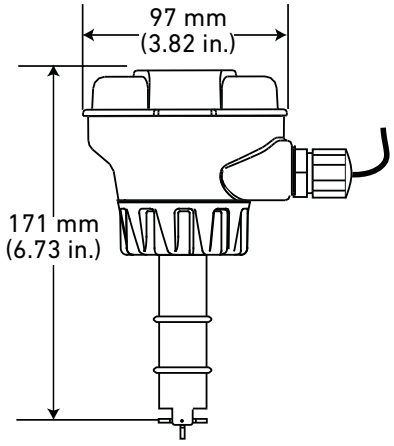
General			
Operating Range		0.1 m/s to 6 m/s	0.3 ft/s to 20 ft/s
Pipe Size Range		DN15 to DN200	½ to 8 in.
Linearity		±1% of max. range @ 25 °C (77 °F)	
Repeatability		±0.5% of max. range @ 25 °C (77 °F)	
System Response		100 ms update rate nominal	
Wetted Materials			
Sensor Body	Glass-filled PP (black) or PVDF (natural)		
O-rings	FKM (std) optional EPR (EPDM) or FFKM		
Rotor Pin	Titanium, Hastelloy-C or PVDF; optional Ceramic, Tantalum or Stainless Steel		
Rotor	Black PVDF or Natural PVDF; optional ETFE, with or w/o carbon fiber reinforced PTFE sleeve for rotor pin		
Electrical			
Multi	With Dry-Contact Relay	24 VDC nominal, ±10%, regulated, 30 mA max current	
	With Solid-State Relay	6 V to 24 VDC, ±10%, regulated, 30 mA max current	
	Digital (S^3L)	5.0 VDC min to 6.5 VDC max., 30 mA max current (1.5 mA nominal)	
	4 to 20 mA	400 mV max ripple voltage, 30 mA max current	
	Maximum Pulse Rate	300 Hz	
	Maximum Pulse Width	50 ms	
	Minimum Pulse Rate	0.5 Hz	
	Compatible with PLC, PC or similar equipment		
	Compatible with customer supplied metering pump		
Digital (S^3L) Version		5 VDC nominal, regulated, 3 mA max current	
	Type	Serial ASCII, TTL level 9600 bps	
	Max. Cable Length	Refer to Signet 8900 wiring specifications.	
	Compatible with Model Signet 8900, 9900 and 9950		
4 to 20 mA Version		12 to 32 VDC nominal, ±10%, regulated, 21 mA max current	
	Loop Accuracy	±32 µA @ 25 °C @ 24 VDC)	
	Loop Resolution	5 µA	
	Temp. Drift	±1µA per °C max.	
	Power Supply Rejection	±1µA per V	
	Max. Cable	305 m	1000 ft
	Maximum Loop Resistance	600 Ω @ 24 VDC	1 KΩ @ 32 VDC
	Load Impedance	375 Ω	
Reverse Polarity and Short Circuit Protected		Up to 40 V, 1 hour	
Over-voltage Protection		> 40 VDC over 1 hour	
Relay Specifications			
	Mechanical SPDT	5 A @ 30 VDC, 5 A @ 250 VAC	
	Solid-State Relay	100 mA @ 40 VDC, 70 mA @ 33 VAC	
	Relay Modes	Low, High	
	Time Delay	0.0 to 6400.0 seconds	
	Hysteresis	Adjustable for exiting alarm condition	
Max. Temperature/Pressure Rating			
Storage Temperature		-10 °C to 75 °C	14 °F to 167 °F
Operating Temperature		0 °C to 65 °C	32 °F to 149 °F
Relative Humidity		0 to 90%, non-condensing	
Flow Sensor/ Retaining Nut	PP	12.5 bar @ 20 °C	181 psi @ 68 °F
		1.7 bar @ 85 °C	25 psi @185 °F
	PVDF	14 bar @ 20 °C	203 psi @ 68 °F
		1.7 bar @ 85 °C	25 psi @ 185 °F
Operating Temperature			
	PP	-18 °C to 85 °C	0 °F to 185 °F
	PVDF	-18 °C to 85 °C	0 °F to 185 °F
Environmental			
Enclosure	NEMA 4X/IP65		
Shipping Weight			
	0.640 kg	1.41 lb	
Standards and Approvals			
	CE, FCC, UL, NSF (3-2537-XC-PX version only)		
	RoHS compliant, China RoHS		
	Manufactured under ISO 9001 for Quality and ISO 14001 for Environmental Management and OHSAS 18001 for Occupational Health and Safety.		

Dimensions

½ in. to 4 in. pipe

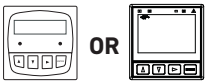
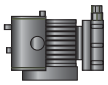
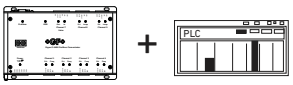
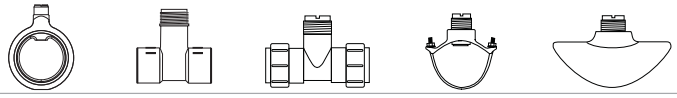


5 to 8 in. pipe



In-Line Installation

System Overview

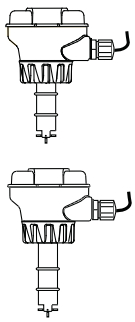
Panel Mount	4 to 20 mA Dry Contact, Solid State	4 to 20 Output	Automation System
Signet Instruments 8900 9900 9900-1BC 9950 	Customer Supplied Metering Pump 	Customer Supplied Chart Recorder, Programmable Logic Controller , or Programable Automation Controller 	0486 Profibus Concentrator and Customer Supplied Programmable Logic Controller or Programmable Automation Controller 
Signet 2537 Paddlewheel Flowmeter 			
Signet Fittings 			All sold separately

Application Tips

- Select PVDF Rotor Pin for use in Deionized Water.
- Use a sleeved rotor in abrasive liquids to reduce wear.
- Sensor plug is used to plug installation fitting after extraction of sensor from pipe.
- For liquids containing ferrous particles, use Signet Magmeters.
- For systems with components of more than one material, the maximum temperature/pressure specification must always be referenced to the component with the lowest rating.

Please refer to Wiring, Installation, and Accessories sections for more information.

Ordering Information



Mfr. Part No.	Code	Output
Paddlewheel Flowmeter - Integral Mount (8512 sensors)		
DN15 to DN100 - ½ to 4 in.		
Polypropylene body, black polypropylene retaining nut, black PVDF rotor, Titanium pin, FKM O-rings		
3-2537-1C-P0	**159 001 291**	Pulse/Flow Switch DCR
3-2537-2C-P0	**159 001 292**	Pulse/Flow Switch SSR
3-2537-5C-P0	**159 001 295**	Digital (S^3L)
3-2537-6C-P0	**159 001 296**	4 to 20 mA
Natural PVDF body, natural PVDF retaining nut, rotor and pin, FKM O-rings*		
3-2537-1C-T0	**159 001 315**	Pulse/Flow Switch DCR
3-2537-2C-T0	**159 001 316**	Pulse/Flow Switch SSR
3-2537-5C-T0	**159 001 319**	Digital (S^3L)
3-2537-6C-T0	**159 001 320**	4 to 20 mA
DN125 to DN200 - 5 to 8 in.		
Polypropylene body, black polypropylene retaining nut, black PVDF rotor, Titanium pin, FKM O-rings		
3-2537-1C-P1	**159 001 303**	Pulse/Flow Switch DCR
3-2537-2C-P1	**159 001 304**	Pulse/Flow Switch SSR
3-2537-5C-P1	**159 001 307**	Digital (S^3L)
3-2537-6C-P1	**159 001 308**	4 to 20 mA

*PVDF available ½ in. to 4 in. only

Accessories and Replacement Parts

Mfr. Part No.	Code	Description
Rotors		
3-2536.320-1	**198 820 052**	Rotor, PVDF Black
3-2536.320-2	**159 000 272**	Rotor, PVDF Natural
3-2536.320-3	**159 000 273**	Rotor, ETFE
3-2536.322-1	**198 820 056**	Sleeved rotor, PVDF Black
3-2536.322-2	**198 820 057**	Sleeved rotor, PVDF Natural
3-2536.322-3	**198 820 058**	Sleeved rotor, ETFE
Rotor Pins		
M1546-1	**198 801 182**	Pin, Titanium
M1546-2	**198 801 183**	Pin, Hastelloy-C
M1546-3	**198 820 014**	Pin, Tantalum
M1546-4	**198 820 015**	Pin, Stainless Steel
P51545	**198 820 016**	Pin, Ceramic
O-rings		
1220-0021	**198 801 000**	O-ring, FKM (2 required per sensor)
1224-0021	**198 820 006**	O-ring, EPR (EPDM) (2 required per sensor)
1228-0021	**198 820 007**	O-ring, FFKM (2 required per sensor)
Miscellaneous		
P31536	**198 840 201**	Sensor plug, Polypropylene
3-2536.321	**198 820 054**	PVDF Natural, Rotor kit (rotor and pin)
3-8050.390-1	**159 001 702**	Retaining nut replacement kit, NPT, Valox
3-8050.390-3	**159 310 116**	Retaining nut replacement kit, NPT, PP
3-8050.390-4	**159 310 117**	Retaining nut replacement kit, NPT, PVDF
3-8050.396	**159 000 617**	RC Filter kit (for relay use)
3-9000.392-1	**159 000 839**	Liquid tight connector kit, NPT (1 piece)
3-9000.392-2	**159 000 841**	Liquid tight connector kit, PG13.5 (1 piece)
7310-1024	**159 873 004**	24 VDC Power Supply, 10W, 0.42 A
7310-2024	**159 873 005**	24 VDC Power Supply, 24W, 1.0 A
7310-4024	**159 873 006**	24 VDC Power Supply, 40W, 1.7 A
7310-6024	**159 873 007**	24 VDC Power Supply, 60W, 2.5 A
7310-7024	**159 873 008**	24 VDC Power Supply, 96W, 4.0 A

3-2537.099 Rev L (07/18)

3401 Aero Jet Avenue, El Monte, CA 91731-2882 U.S.A. • Tel. (626) 571-2770 • Fax (626) 573-2057 • www.gfsignet.com • e-mail: signet.ps@georgfischer.com

New Generation PLC

FT1A Series SmartAXIS - 48 I/O

Key Features

- Available in 100-240 VAC and 24 VDC power
- Available with/without embedded LCD
- USB Mini-B Programming Port
- Embedded 8-pt analog inputs (0-10VDC, 10-bit, DC power)
- Integrated 4 x 100KHz high-speed counters
- Embedded Ethernet port
- Supports Modbus TCP and RTU
- SD Memory card for data logging and program storage
- Optional RS232C/RS485 adapter
- 100KHz high-speed outputs

General Specifications

Part Numbers	FT1A-H48KA, H48SA	FT1A-B48KA, B48SA	FT1A-H48KC, H48SC	FT1A-B48KC, B48SC
Appearance				
LCD Screen	Yes	N/A	Yes	N/A
Operating Temperature	0 to +55°C (operating ambient temperature)			
Storage Temperature	–25 to +70°C (no freezing)			
Rated Power Voltage	24V DC		100 to 240V AC	
Allowable Voltage Range	20.4 to 28.8V DC (Including ripple voltage)		85 to 264V AC	
Rated Power Frequency	–		50/60Hz (47 to 63Hz)	
Maximum Power Consumption	6.0W		43VA	
Weight	Approx. 380g		Approx. 540g	

Function Specifications

Part Numbers		FT1A-H48KA, H48SA, B48KA, B48SA	FT1A-H48KC, H48SC, B48KC, B48SC
Program Capacity Note 1		47,400 bytes (11,850 steps)	
Input	Points	30	
	Digital Input (Terminal No.)	22 (I0 to I7, I10 to I17, I20 to I25)	30 (I0 to I7, I10 to I17, I20 to I27, I30 to I35)
	Shared Analog Input (Terminal No.)	8 (I26, I27, I30 to I35)	–
	Output Points	18	
	10A Relay Output (Terminal No.)	–	
	2A Relay Output (Terminal No.)	–	
	Transistor Output (Terminal No.)	18 (Q0 to Q7, Q10 to Q17, Q20, Q21)	
User Program Storage		Flash ROM (10,000 rewriting life)	
Backup Function	RAM	Backup data: Internal relay, shift register, counter current value, data register Note 2, clock data (year, month, and day)	
	Backup Duration	Approx. 30 days (typical) at 25°C after backup battery fully charged	
	Battery	Lithium	
	Charging Time	Approx. 15 hours for charging from 0% to 90% of full charge	
	Battery Life	5 years	
	Replaceability	Not possible	
Clock Function Note 3		Clock accuracy: ±30 sec/month (typical) at 25°C	
Control System		Stored program system	

Specifications con't on next page

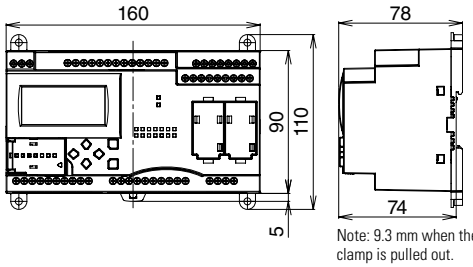
Specifications con't

Part Numbers		FT1A-H48KA, H48SA, B48KA, B48SA	FT1A-H48KC, H48SC, B48KC, B48SC
Instruction Words	Basic Instructions	42	
	Advanced Instructions	DC: 125, AC: 111	
Processing Time	Basic Instruction	0.95ms (1000 steps)	
	END Processing	640µs	
Internal Relay		1024	
Shift Register		128	
Data Register		2,000	
Counter (adding, reversible)		200	
Timer (1-sec, 100ms,10ms, 1ms)		200	
Input Filter		Without filter, 3 to 15ms (selectable in increments of 1ms)	
Catch Input/Interrupt Input	Input Points	6	
Self-diagnostic Function		Keep data, Power failure, Clock error, Watchdog timer, Timer/counter preset value change error, User program syntax, User program execution, System error, Memory cartridge transfer error	
High-speed Counter	Points	Total 6 points	–
	Maximum Counter Frequency	Single/two-phase selectable: 100kHz (2 points) , Single-phase: 100kHz (4 points)	
	Counting Range	0 to 4,294,967,295 (32 bit)	
	Operation Mode	Rotary encoder mode and adding counter mode	
Pulse Output (Maximum frequency: 100kHz)	Points	2 (Q14, Q15)	
Pulse Output (Maximum frequency: 5kHz)	Points	2 (Q16, Q17)	
Analog Voltage Input	Points (Terminal No.)	8 (I26, I27, I30 to I35)	–
	Input voltage Range	0 to 10V DC	
	Digital Resolution	0 to 1000	
USB Port	Points	1	
	USB Standard	USB 2.0	
	Connector	Mini-B type	
Expansion Communication Ports		2	
Ethernet Port		1	
Memory Cartridge Connectors		1	
SD Memory Card Slots		1	

1. Step is equivalent to 4 bytes.
2. Among data registers D0 to D1999, only D0 to D999 are backed up.
3. Set the calendar/clock using the clock function in WindLDR.

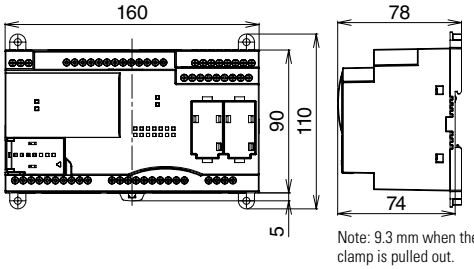
Dimensions (mm)

With LCD
FT1A-H48*A/*C



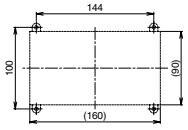
Note: 9.3 mm when the clamp is pulled out.

Without LCD
FT1A-B48*A/*C



Note: 9.3 mm when the clamp is pulled out.

Mounting Hole Layout



IDEC Corporation • 1175 Elko Drive • Sunnyvale, CA 94089 • 800-262-IDEC (4332) • Fax: 408-745-5258 • www.IDEC.com/usa

Signature Certificate

Document Ref.: UHGOK-WAUHP-BLBAW-86I9F

Document signed by:

Patrick Renner

Verified E-mail:
patrick@wilsongolfgroup.com

IP: 50.244.220.69 | Date: 12 May 2021 13:57:40 UTC

Michael Welch

Verified E-mail:
welch@smithpartners.com

IP: 50.249.103.157 | Date: 12 May 2021 15:16:02 UTC

Karen Kill

Verified E-mail:
kkill@mnwcd.org

IP: 174.53.172.141 | Date: 12 May 2021 15:19:09 UTC

Document completed by all parties on:
12 May 2021 15:19:09 UTC