



ISO 9001:2015 CERTIFIED

ENGINEERS • PLANNERS • SCIENTISTS • CONSTRUCTION MANAGERS

614 N. Dupont Highway • Dover, DE 19901 • Phone 302-747-5999

3063/24



To: Mr. Gordon Woodrow
DNREC
State of Delaware
89 Kings Highway
Dover, DE 19901

Date: July 31, 2024

Re: **Milford Corporate Center Pump Station**

- We are submitting
- We are forwarding
- We are returning
- Herewith
- Under separate cover
- Sent via: Hand Delivered

Qty.	Description
1	Application for Construction Wastewater Collection & Conveyance System
1	Check in the amount of \$1,125.00.
	Letter, Design Information & Calculations
1 set	Drawings

- In accordance with your request
- For your review
- For processing
- Plans reviewed and accepted
- Plans reviewed and accepted as noted
- Conference requested at your convenience
- For your use
- For revision by you
- Please call when ready
- Please return to this office
- Approval requested

If you have any questions or for additional information, please contact me.

Kevin Nyamumbo, PE
Kevin.nyamumbo@kci.com

Employee-Owned Since 1988



Department of Natural Resources
and Environmental Control
89 Kings Hwy
Dover, DE 19901
dnrec.delaware.gov

Division of Water
Commercial and Government Services Section

Phone: (302) 739-9946
Fax: (302) 739-8369

INSTRUCTIONS FOR COMPLETING THE PERMIT APPLICATION FOR THE CONSTRUCTION OF WASTEWATER COLLECTION AND CONVEYANCE SYSTEMS

The following items must accompany the application. **Please note that incomplete application packages will be returned in their entirety and not reviewed until such time as all required information is received.**

- 1. A narrative summary of the intended purpose and design of the proposed facilities.
- 2. One (1) set of final construction plans and specifications, if applicable, signed and sealed by a Delaware-registered Professional Engineer, or a Delaware-registered Professional Land Surveyor for gravity systems only. One (1) electronic copy of final Plans.
- 3. One (1) electronic copy of final Plans.
- 4. The final plans must be drawn to scale showing slopes, inverts, pipe types and sizes, existing and proposed ground surfaces, tops of manholes, water lines, stormwater and stream crossings, encasements shown in plan and profile, and other information if pertinent or requested.
- 5. For pump/lift stations and force mains, include all calculations and pump/performance curves.
- 6. A check made payable to the State of Delaware for eight hundred twenty-five dollars (\$825.00), the non-refundable permit review fee. This fee covers the initial review and one follow-up review of any corrections or changes made to address the Division's comments. An additional eight hundred twenty-five dollars (\$825.00) non-refundable review fee must be submitted for resubmission of the plans if changes are made to the project which trigger a complete review of the permit application.
- 7. Your permit will have a public notice requirement if your system includes force mains or pump/lift stations. Include a check made payable to the State of Delaware for three hundred dollars (\$300.00) for the reimbursement of legal notices if the system has a force main connection or a pump/lift station.
- Please submit the completed application package, as outlined above, to DE DNREC, Division of Water, Commercial and Government Services Section, 89 Kings Highway, Dover, DE 19901. Please note, a new application, including the review fee, must be submitted if the Division's comments are not addressed or if requested supplemental information is not provided within one (1) year of the comment or request date.
- The following items must be submitted prior to permit issuance:
 - 8. Verification from the appropriate county or municipal planning authority that the project has the proper zoning approval.
 - 9. A letter from the owner/operator of the wastewater facilities to which the proposed collection and conveyance facilities connect. The letter must include confirmation that the owner/operator has approved the project, that the owner/operator will take responsibility for treating and disposing of the wastewater to be conveyed and that the downstream facilities have the capacity to manage the additional flows without causing or contributing to violations of Delaware's Environmental Protection Act (7 Del. C., Chapter 60) and the regulations promulgated thereafter. This includes, but is not limited to, unauthorized discharges such as overflows at manholes and violations of the treatment system's operating permit (for example, the National Pollutant Discharge Elimination System (NPDES) permit).

- Visit us on the web at: <https://dnrec.alpha.delaware.gov/water/surface-water/>

**APPLICATION FOR THE CONSTRUCTION OF
WASTEWATER COLLECTION AND CONVEYANCE SYSTEMS**

Application must be complete, typewritten or clearly printed

Date Application Submitted 06/XX/2024 (DRAFT)

PROJECT INFORMATION			
Project Name and Location/ Address Milford Corporate Center Pump Station Milford Harrington Highway/ State Route 14 Latitude N38° 56' 04.20" GRS80 - NAD83, Longitude W 075° 27' 45.20" GRS80 - NAD83			
Tax Parcel Number(s) MD-16-173.00-01-01.00-000			
County <input checked="" type="checkbox"/> Kent <input type="checkbox"/> New Castle <input type="checkbox"/> Sussex		Watershed (www.dnrec.delaware.gov/swc/wa/Pages/WatershedAssessment.aspx) <input type="checkbox"/> Chesapeake Bay <input checked="" type="checkbox"/> DE Bay/Estuary <input type="checkbox"/> Inland Bays/Atl Ocean <input type="checkbox"/> Piedmont	
Sewer District or Interceptor Milford/ Harrington		Wastewater Treatment/Disposal Facility Name Kent County Regional Resource Recovery Facility	
Anticipated Construction Start Date 9/1/2024		Treatment/Disposal Facility Owner and Operating Permit Number Kent County Levy Court, DE0020338	
Please note, construction permits expire three (3) years from the date of permit issuance.			
Are you requesting plan review and comment or WPCC Construction Permit issuance? (circle one)			
Design Flow (gallons/day) Average 309,500	Peak 479,848	Peak Factor 1.55	Basis of Design Milford, Kent County & 10 States Standards
Description Wastewater pumping system and conveyance for City of Milford Northwest region.			
OWNER/DEVELOPER			
Company Name City of Milford			
Mailing Address 119 South Walnut St			
City Milford	State DE	Zip 19963	
Contact Name James Puddicombe			
E-Mail Address jpuddicombe@milford-de.gov			
Telephone (302)422-6616	Cell N/A	Fax (302)424-3558	

ENGINEER					
Company Name KCI Technologies					
Mailing Address 614 N Dupont Highway					
City Dover		State DE		Zip 19901	
Contact Name Kevin A. Nyamumbo					
E-Mail Address Kevin.Nyamumbo@KCI.com					
Telephone (302)308-1130		Cell N/A		Fax N/A	
GRAVITY SEWER INFORMATION					
Ownership <input type="checkbox"/> Public <input checked="" type="checkbox"/> Private	Type of Sewer System <input type="checkbox"/> Residential <input type="checkbox"/> Commercial <input type="checkbox"/> Industrial <input type="checkbox"/> Other?			If Other, list below	
Type of Pipe	Length (ft)	Diameter (in)	Joint Specification	Min. Slope (ft/ft)	Min. Velocity (ft/sec)
Minimum Pipe Cover (ft)	Number of Manholes	Drop manholes provided? <input type="checkbox"/> Yes <input type="checkbox"/> No		Maximum Distance Between Manholes (ft)	
Minimum ten foot (10') horizontal & eighteen inch (18") vertical separation from water lines maintained?			If not, explain provisions to prevent cross-contamination:		
<input type="checkbox"/> Yes <input type="checkbox"/> No			Submitted separately N/A		
Explain any special challenges (for example, stream, highway and/or railroad crossings, directional drilling, elevated sewers, etc.)					
NONE					
Comments					

PUMP/LIFT STATION INFORMATION				
Ownership <input checked="" type="checkbox"/> Public <input type="checkbox"/> Private		Type of Wastewater <input checked="" type="checkbox"/> Residential <input checked="" type="checkbox"/> Commercial <input checked="" type="checkbox"/> Industrial <input type="checkbox"/> Other?		If Other, list below
Pump Station Flows (gallons/day) Design Average			Peak Factor	
576,000		309,500	Peak 479,725	1.55
Basis of Design Ten States Standards, Milford & Kent County Specs			Pump Type Submersible	
Will peak flows be accommodated if largest unit fails? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		Pump calc's and pump curves attached? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Cycle Time (minutes) 9	Wet Well Detention Time (minutes) Approx. 3 minutes at P.F.
Check valves provided on discharge line? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No			Gate valves provided on discharge line? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
If not, explain alternate procedure: N/A				
Ventilation provided in wet well? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		Dry Well? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Is an alarm system included? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Alternate source of power? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
What other provisions for emergency operations? Emergency by-pass connections				
Height of Influent Above Pump (suction head) (ft) N/A		Height of Effluent Above Pump (discharge head) (ft) 23.85		Friction Loss (ft) 6.17
Pump Design Point 400 GPM	Pump Operating Point 442 GPM	Static Head (ft) 82	Total Head (ft) 88.17	Required Motor Horsepower (hp) 17
FORCE MAIN INFORMATION				
Type of Pipe		Length (ft)		Diameter (in)
Hazen-Williams "C" Design Factor	Type of Joints	Velocity Under Design Conditions (ft/sec)		Minimum Pipe Cover (ft)
Air relief valves specified? <input type="checkbox"/> Yes <input type="checkbox"/> No	Clean-outs provided? <input type="checkbox"/> Yes <input type="checkbox"/> No	Maximum distance between clean-outs (ft) Submitted separately		
Minimum ten foot (10') horizontal & eighteen inch (18") vertical separation from water lines maintained? <input type="checkbox"/> Yes <input type="checkbox"/> No		If not, explain provisions to prevent cross-contamination:		
Comments				

1. Design Information

Date : 7/16/2023

Project: Milford Corporate Center Regional Pump Station
Milford, DE

Contact:  Kevin Nyamumbo
KCI Technologies, Inc.
614 N. DuPont Highway
Dover, DE 19901
Phone: 302.318.1130

Component: Pump Station

Calculation By: Jeff Cox

Description: This calculation is to design the PS serving the Milford Corporate Center while also accounting for flows from nearby strip lots, Hickory Glen, and Cascades Pump Station. From this PS, there will be a FM leading to an existing 14" FM along Church Hill Road. It is assumed that ductile iron will be used for the piping within the PS and the FM will be PVC. The design flow criteria came from the Sussex County code, chapter 110 Water and Sewers, City of Milford Standard Construction Specifications, and the Ten States Standards for Wastewater Facilities.

2. Design Basis

	MCC Pump Station Flow Contributors		
	Expected Flow (EDU)		
	Low	Mid	High
Milford Corporate Center	280	612	1190
Hickory Glen	399	399	399
Cascades Pump Station	150	197	250
Strip Lots	25	30	35
Total EDUs Expected	854	1238	1874
Assume 250 GPD/ EDU	250	250	250
Total Daily Flow	213,500	309,500	468,500
Pumping Required (GPM)	148.3	214.9	325.3
TDH (Feet)	41.06	35.37	
Force Main Dia (inches)	6	8	10
Wet Well Dia (Feet)	9	10	12

Assumptions:

PS piping - Ductile Iron

FM piping - PVC

<https://www.cityofmilford.com/176/City-Standard-Construction-Specification>

[2022083-MCC-Sewer Flow Report 2023-09-14.pdf](#)

[2022083 - Draft Utility Plans - 2023-09-14.pdf](#)

[Milford NW Water and Wastewater Study-No Exhibits.pdf](#)

MCC PUMP STATION & FORCE MAIN CALCULATION SHEET

A. Calculate Peak Design Flow:

1238	# of EDUs
250	GPD/EDU

Qavg =

309,500	gpd
214.93	gpm

Peak Factor 1.55

[<--Kent County peak factor equation](#)

Qpeak =

479,848	gpd
333.23	gpm

400.00	Flow Rate (gpm)
0.89	Flow Rate (cfs)

[Increased to 400GPM to meet minimum flow velocity in 8" Pipe](#)
[Due to unknown land uses in MCC, FM has sufficient capacity](#)

140 C-Factor * [Dependent upon Pipe Material and Age](#) DI PIPE

Analyze Pipe Diameters:

Pipe Diameter (in)	Actual Inside Pipe Diameter (in)	X - Sectional Area (sqft)	Flow Rate (cfs)	Velocity (fps)	hL (ft/100ft)
1.00	1.00	0.01	0.89	163.40	7,280.725
1.25	1.25	0.01	0.89	104.57	2,458.436
1.50	1.50	0.01	0.89	72.62	1,012.518
2.00	2.00	0.02	0.89	40.85	249.754
2.50	2.50	0.03	0.89	26.14	84.333
3.00	3.00	0.05	0.89	18.16	34.733
3.50	3.50	0.07	0.89	13.34	16.406
4.00	4.23	0.10	0.89	9.13	6.527
5.00	5.00	0.14	0.89	6.54	2.893
6.00	6.09	0.20	0.89	4.41	1.108
8.00	7.98	0.35	0.89	2.57	0.297
10.00	9.79	0.52	0.89	1.70	0.110
12.00	11.65	0.74	0.89	1.20	0.047
14.00	13.50	0.99	0.89	0.90	0.023
16.00	15.35	1.29	0.89	0.69	0.012

Design Flow (gpm) 400

Choose PS Pipe Diameter (in) 6.09 for a Velocity (V) = 4.41 fps

MCC PUMP STATION & FORCE MAIN CALCULATION SHEET

Pump Station Friction Losses

6 Actual Diameter of Piping within Pump Station (inches)

Fittings	Size (inch)	Leg (ft)	Qty.	Leg (ft)
Reducer 2/3	6	3	1	3
Plug Valve	6	1.25	2	2.5
Entrance Losses	6	3	1	3
90 deg. Elbow	6	6	2	12
Check valve	6	15	1	15
	6	0	0	0
45 deg bends	6	2.5	0	0
T (flow thru)	6	3.5	2	7
Pipe Length	6	1	40	40
	Total Leq (ft)			82.5

Force Main Friction Losses

8 Diameter of Force Main Piping (inches) Velocity (V) = **2.55** fps

Fittings	Size (inch)	Leg (ft)	Qty.	Leg (ft)
Reducer 2/3	8	0		0
Gate Valve	8	5.3		0
Entrance Losses	8	0		0
90 deg. Elbow	8	20		0
Check valve	8	15		0
Gate Valve	8	1.5	1	1.5
45 deg bends	8	10.6	5	53
22 deg bends	8	10.6	1	10.6
10 deg bends	8	10.6	1	10.6
Wye (flow thru)	8	0		0
Pipe Length	8	1	1690	1690
	Total Leq (ft)			1765.7

Static Head Loss:

102.25 High Point in System (ft) high water level Includes County FM head of 58 feet
20.40 "Pump Off" Elevation (ft) low point

81.85 Static Head

Calculate Total Dynamic Head:

* Summation of PS Friction Losses, Force Main Friction Losses, and Static Head

0.98 Pump Station Friction Losses (ft)
5.19 Force Main Friction Losses (ft)

Design Point:

88.02 TDH (ft)
400.00 Design Flow Rate (gpm) * This Flow and TDH is the desired design point

MCC PUMP STATION & FORCE MAIN CALCULATION SHEET

SYSTEM CURVE:

GPM	Static Loss	Loss in PS Pipe (ft)	Loss in FM Pipe (ft)	Total
0	81.85	0.00	0.00	81.85
100	81.85	0.08	0.40	82.32
200	81.85	0.27	1.44	83.56
300	81.85	0.58	3.05	85.47
400	81.85	0.98	5.19	88.02
500	81.85	1.49	7.84	91.18
600	81.85	2.08	10.99	94.92
700	81.85	2.77	14.61	99.23
800	81.85	3.54	18.71	104.10
900	81.85	4.41	23.26	109.52
1000	81.85	5.35	28.27	115.47
1100	81.85	6.39	33.72	121.96
1200	81.85	7.50	39.61	128.96
1300	81.85	8.70	45.93	136.48
1400	81.85	9.98	52.68	144.51

B. Wet Well Volume

General Guideline Equation: $V_{min} = (T_{min} \times Q_p) / 4$; Use $T_{min} = 10$ minutes

Note: Actual Pump Manufacturer's recommendations for on/off cycle times should be used to confirm sizing

T _{min}	<input type="text" value="10"/>	
Q _p	<input type="text" value="400"/>	
V _{min} =	<input type="text" value="1000"/>	gallons
	<input type="text" value="133.68"/>	cuft

Alternate Wet Well Volume Calcs:

T _{min}	<input type="text" value="10"/>	
Q _{in}	<input type="text" value="200.00"/>	* Q _{in} is Q _{out} (Q _{peak}) divided by 2, simulating best conditions for minimum time
Q _{out}	<input type="text" value="400.00"/>	* Q _{out} is Q _{peak} because Q _{peak} is output of wastewater at peak conditions
V _{min} =	<input type="text" value="1000.00"/>	gallons
	<input type="text" value="133.69"/>	cuft

Choose Wet Well Diameter, in feet

Required Operating Depth **normal 2 ft or smaller**

Round up to nearest 0.25 feet

MCC PUMP STATION & FORCE MAIN CALCULATION SHEET

C. Ventilation

* Ventilation fans must be positive pressure feeds per MD, Smyrna & NCC Standards

Fan Type (Intermittent(0)/Constant(1)) 1.00
 Volume of wet well = 6425.11 Cu. Ft

Smyrna flow rate changes/hr variable = 1285.02 CFM
 MD flow rate needing 30 changes/hr = 3212.56 CFM 214.17 CFM
 NCC flow rate changes/hr variable = 642.51 CFM

Net Positive Suction Head (NPSH) & Cavitation:

**Barometric Pressure of water column = 33.90 ft
 **Vapor Pressure of Liquid = 0.21 ft
 **Entrance Losses = 1.00 ft
 Transport Friction Losses = 0.00 ft
 Static Head= 1.00 ft

C Factor 140.00
 Pipe Diameter: 6.00

Fittings
 Pipe
 90 degree Elbow
 45 deg bends

** Change for high elevations

Design NPSHr = 13.50 ft
 Actual NPSHa = 33.69 ft

* This value is the specified operating NPSH given by the pump
 * Due to uncertainties, this value must 20% greater than NPSH
 (Refer below for determining safety factor.)

* Actual NPSH should be no lower than 16.20 ft

Buoyancy Calculations

Density Table:	
Water	62.4
Dry Soil	110
Wet Soil	70
Concrete	150

Wetwell Volume(inc. lip) = 2,565 CF
 Total Buoyant Force = 160,069 LBS.
 Weight of Pump Station = 5,000 LBS.

Vol. (Concrete Barrell) = 429
 Wt of Concrete Barrell = 64,423 LBS.

Vol. (Concrete Base + Top) = 154 CF
 Wt of Concrete Base = 23,091 LBS.

Vol. (Wet Soil) = 1,475 CF
 Wt of Wet Soil = 103,248 LBS.

Vol. (Dry Soil) = 1,475 CF
 Wt of Dry Soil = 162,248 LBS.

Dimension Table:

	Concrete	Soil	
Barrell Height	26.04	25.04	FT
Inner Dia.	10.00	11.00	FT
Outer Dia.	11.00	14.00	FT
Base Height	1		FT
Base Dia.	14.00		FT

(1)
(2)

Wt of Total Soil (LBS) = 103,248 (5 or 6)=(7)

(3)

Force Balance = 35,693
 (2)+(4)+(7)-(1)

(4)

(5)

Safety Factor = 1.22
SF of > 1.2 is Required

(6)

MCC PUMP STATION & FORCE MAIN CALCULATION SHEET

Water Hammer

K, For Water =	45792000	psf	Change in Pressure due to Waterhammer	195.40	psi
K, For Water =	318000.00	psi		449.42	ft of water
Density of Water =	1.936	slug/cu ft	AKA (ft lbs s-1) / cu ft		
Initial Acoustic Velocity =	4863.42	fps			
Gravity =	32.17	ft/s ²			
Pipe Internal Diameter =	6.09	in			
Pipe Wall Thickness =	0.69	in			
Young's Modulus (E) =	700000	psi			
Acoustic Velocity =	2172.91	fps			

PVC Approved to 185 psi
DIP Approved upto 500 PSI

D. Electrical Load Calculations

Horsepower sizing

Qpeak =	400.00	gpm
TDH =	88.02	ft
Specific g =	1.00	(dimensionless)
Horsepower	8.89	HP

EQUIPMENT	WATTS	VOLTS	AMPS.
Odor Control (Heat Trace)	1800	120	15
Odor Control (Ctrl panel)	1800	120	15
4 Floor Lights	640	120	5.33
Ext. Light	200	120	1.67
Wet Well Light	200	120	1.67
Hoist	748	120	6.23
Heater #1	3600	240	15.00
Heater #2	3600	240	15.00
Battery Charger	500	120	4.17
Generator Wat. J. Heater	1500	120	12.50
Supply Fan & Mtr. Dmpr.	230	120	1.92
Exhaust Fan	190	120	1.58
2 Louver Motors	200	120	1.67
Telemetry	100	120	0.83
Receptacle	1500	120	12.50
2 - 25HP Motor	37285	240	155.35
TOTAL			265.42



DEPARTMENT OF PUBLIC WORKS

Engineering Division
Wastewater Facilities Division

(302) 744-2430 Fax (302) 736-2100
(302) 335-6000 Fax (302) 335-0365

555 Bay Rd., Dover, DE 19901
139 Milford Neck Rd., Milford, DE 19963

July 16, 2024

Kevin A. Nyamumbo, P.E.
KCI Technologies, Inc.
614 N. Dupont Hwy.
Dover, DE 19901

RE: CONNECTION TO COUNTY SYSTEM & DOWNSTREAM CAPACITY CONFIRMATION

Permit Application for the Construction of Wastewater Collection and Conveyance Systems
Project: City of Milford – Corporate Center Pump Station

Dear Mr. Nyamumbo:

Please accept this letter in response to your e-mail request to our office dated July 10, 2024. Kent County Engineering Division has reviewed the proposed pump station and design flows for conformance with the appropriate County standards and approves the connection to the County conveyance system. Please accept this letter as confirmation that Kent County has adequate downstream capacity for conveyance and treatment to manage the additional flows to be generated by the project.

This project's local collection system, pump station and transmission system are to be owned and operated by the City of Milford.

Please contact me at (302) 744-2430, if you have any questions.

Sincerely,

Brian L. Hall
Engineering Project Manager II



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ENGINEERS • PLANNERS • SCIENTISTS • CONSTRUCTION MANAGERS

1352 Marrows Road, Suite 100 • Newark, DE 19711 • Phone 302-731-9176 • Fax 302-731-7807

Corporate Center Regional Pump Station

Project Narrative

The City of Milford plans to construct a regional sewage pump station designed to serve the proposed Milford Corporate Center property, adjacent developments and provide service to the Northwest part of the City of Milford. The following table lists the anticipated total daily average flow from developments served by this pump station based on their EDU counts.

Corporate Center Pump Station Flow Contributors	
Milford Corporate Center (Estimated)	612
Hickory Glen Development	399
Cascades Pump Station	197
Strip Lots	30
Total EDUs Expected	1238
Flow Per EDU (GPD)	250
Total Daily Flow (GPD)	309,500

The exact EDU contribution from the proposed Milford Corporate Center is not yet known since the exact use of each lot on the property will depend on its future use. However, estimates have been arrived at based on likely scenarios of businesses likely to be developed on the property.

The duplex pumping station consists of a 10' diameter pre-cast concrete wet well, with each pump capable of handling 100% of the anticipated peak flows to the station. The pump station is equipped with a grinder on the influent gravity sewer line to shred any incoming debris that may foul the pumps. Pump operation shall be based on wet well levels detected using a transducer with a float system backup. The pump station is also equipped with a forced air ventilation system. The wet well is sized for a minimum pump cycle time of 10 minutes. The wastewater shall be conveyed to the Kent County force main along Church Hill Road via a 1,690 linear foot 8" Ductile Iron Pipe force main.

To ensure reliable service, the pump station is designed with a main pump and a backup pump, it is equipped with a natural gas generator to provide backup power supply in the event of main power supply failure and a bypass pumping connection.

The Pump Station has been designed in conformance with Recommended Standards for Wastewater Facilities ("Ten State Standards"), 2014 Edition, Kent County Specifications and the City of Milford Standard Construction Specifications.



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1352 Marrows Road, Suite 100 • Newark, DE 19711 • Phone 302-731-9176 • Fax 302-731-7807

Pumping Station Design Calculation

The pumping station is designed to handle anticipated peak flows. The peaking factor was determined using the Kent County recommended peaking factor equation.

$$Q_{\max}/Q_{\text{avg}} = (20+2 [\text{EDU}/10]^{1/2}) / (5+2 [\text{EDU}/10]^{1/2})$$

Where: Q_{\max} = Maximum rate of sewage flow,

Q_{avg} = Average daily sewage flow

Average daily flow expected to be 309,500 GPD.

The peak flow is $309,500 \times 1.55 = 479,725$ GPD.

However, since the ultimate flow from the Corporate Center is not known, a larger 8" FM has been proposed to handle all future flows. To meet a flow velocity of 2.5 ft/s, the pumps will have a design point of 400gpm GPM and Total Dynamic Head (TDH) of 88 feet. The TDH takes into account the static head, friction losses through the pump station and force main and as well as back pressure from the county force main. The back pressure at the discharge point has been estimated at 25 PSI. This was determined by Sewer GEMS model of the Kent County Sewer system.

The pumps have an operating point of 442 ft and 89 ft of TDH.

RECEIPT

	August 1st, 2024		87
RCVD FROM	City of Milford		\$1,125.00
	One Thousand One Hundred Twenty Five Dollars and 00/100 <i>DOLLARS</i>		
FOR	WPCC 3063/24 Legal notice and permit application fee - Milford Corporate Center Pump		
ACCT	\$ 1,125.00	<input checked="" type="checkbox"/> x	CHECK # 2292608
PAYMENT	\$ 1,125.00		CASH
	\$ -		OTHER BY <i>Kevin Bronson</i>

DNREC, Commercial & Government Services Section, 89 Kings Hwy, Dover, DE 19901