



STATE OF ALASKA  
ALASKA CLEAN/DRINKING WATER FUND  
GREEN PROJECT ASSESSMENT FORM

As applicable under the EPA annual capitalization grants provided to the Alaska Clean Water Fund (ACWF) and Alaska Drinking Water Fund (ADWF) loan programs, a portion of funds appropriated shall be for projects to address green infrastructure, water or energy efficiency improvements or other environmentally innovative activities." To meet this condition under the federal grant for administering these funds, this assessment form is provided to document this eligibility or what is termed a "Categorical" or "Business Case" justification, which will be reviewed by DEC for provisional compliance. For more information on green infrastructure development, please review the following EPA web site:

[http://cfpub.epa.gov/npdes/home.cfm?program\\_id=298](http://cfpub.epa.gov/npdes/home.cfm?program_id=298)

For those projects requiring a "Business Case," Part 2 will require completion to qualify a "traditional project" as green; justification is broken down into two parts, technical and financial. The technical part should use information from a variety of sources such as maintenance or operation records, engineering studies, project plans or other applicable documentation to identify problems (including any data on water and/or energy inefficiencies) in the existing facility, and that clarifies the technical benefits from the project in water and/or energy efficiency terms. Financial justification needs to show estimated savings to a project based on the technical benefits, and demonstrate that the green component of the project provides a substantial savings and environmental benefit.

For more information and assistance in completing this assessment form, please contact the Municipal Matching Grants & Loans program in Anchorage at 907-269-7673, or in Juneau at 907-465-5300.

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GENERAL INFORMATION

Name of Community Petersburg Borough  
Address P.O. Box 329  
Petersburg, AK 99833  
Contact Name Chris Cotta Title Asst. Public Works Dir. Telephone (907) 772-4430

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PROJECT INFORMATION

Project Name Scow Bay 1 Pump Station Upgrade Location Petersburg, AK  
Project Type:  New Construction  Upgrades  
 Stormwater Infrastructure  Energy Efficiency Project  
 Water Efficiency Project  Innovative Environmental Project

Green Project Description: Replace Scow Bay 1 Pump Station with a new, properly sized, more efficient station. Current station has worn out pumps, undersized wet well and "across the line" control systems. New station will feature intelligent electronic controls with variable frequency pump drives, optimized for energy efficiency.

## PART 1 – GREEN PROJECT CATEGORY & COSTS

Identify the most appropriate “Green” Clean Water or Drinking Water category project type. Note, any selection with (BC) at the end will require a Business Case demonstration.

**ENERGY EFFICIENCY** – the use of improved technologies and practices to reduce the energy consumption of water quality projects.

- Wastewater/water utility energy audits       Clean power for public owned facilities  
 Leak detection equipment       Retrofits/upgrades to pumps & treatment processes (BC)  
 Replace/rehabilitation of distribution (BC)       Other: \_\_\_\_\_ (BC)

**WATER EFFICIENCY** – the use of improved technologies and practices to deliver equal or better services with less water.

- Water meters       Fixture Retrofit       Landscape/Irrigation  
 Graywater or other water recycling       Replace/rehabilitation of distribution (BC)  
 Leak detection equipment       OTHER: \_\_\_\_\_ (BC)

**GREEN INFRASTRUCTURE** – Practices that manage and treat stormwater and that maintain and restore natural hydrology by infiltrating, evapotranspiring and capturing and using stormwater.

- Green Streets       Water harvesting and reuse  
 Porous pavement, bioretention, trees, green roofs, water gardens, constructed wetlands  
 Hydromodification for riparian buffers, floodplains, and wetlands  
 Downspout disconnection to remove stormwater from combined sewers and storm sewers  
 OTHER: \_\_\_\_\_ (BC)

**ENVIRONMENTALLY INNOVATIVE PROJECTS** – Demonstrate new/innovative approaches to managing water resources in a more sustainable way. This may include projects that achieve pollution prevention or pollutant removal with reduced costs and projects that foster adaptation of water protection programs and practices to climate change.

- Wetland restoration       Decentralized wastewater treatment solutions  
 Water reuse       Green stormwater infrastructure       Water balance approaches  
 Adaptation to climate change       Integrated water resource management  
 OTHER: \_\_\_\_\_ (BC)

**PROJECT & GREEN COMPONENT COSTS**

	<u>TOTAL PROJECT COSTS</u>	<u>TOTAL "GREEN" COMPONENT COSTS</u>
Administration	\$ _____	\$ _____
Legal	\$ _____	\$ _____
Preliminary Studies/Reports	\$ _____	\$ _____
Engineering Design	\$ <u>75,000</u>	\$ _____
Inspection/Surveying/Construction Management	\$ <u>60,000</u>	\$ _____
Construction	\$ <u>250,000</u>	\$ <u>250,000</u>
Equipment	\$ <u>15,000</u>	\$ <u>15,000</u>
Contingencies	\$ _____	\$ _____
Other _____	\$ _____	\$ _____
Total Costs	\$ <u>400,000</u>	\$ <u>265,000</u>

**PART 2 – PROJECT “BUSINESS CASE” TECHNICAL/FINANCIAL ASSESSMENT**

**TECHNICAL ANALYSIS OF BENEFITS\***

In addition to this form, a supporting technical and financial analysis is required to verify energy and water saving efficiencies for any green component of the project. For green infrastructure and innovative environmental type projects, the analysis should include any applicable efficiency and environmental benefits. For assisting MGL in evaluating “Business Case” assessments of water main, meter, and pump facility replacement type projects, the attached form titled “ADWF - Water/Energy Efficiency Determination - Water Main Replacement/Meter/Pump Facility” is required to be completed. Once the form is complete along with any supporting documentation, please submit documentation to the MGL program for review and concurrence. Note, only water/energy efficiencies that achieve a 20% or greater increase in efficiency will categorically qualify as a Green project.

**CERTIFICATION STATEMENT:**

I certify the above information is current and accurate.

Chris Cotta  
Name

Asst. Public Works Dir.  
Title

Chris Cotta  
Signature

9/19/14  
Date

Submit Completed Form to:

Alaska Department of Environmental Conservation  
Municipal Matching Grants & Loans  
555 Cordova Street  
Anchorage, AK 99501-2617

## Green Project Business Case

### Petersburg Borough – Scow Bay 1 Pump Station Upgrade

#### Business Case Summary

The Scow Bay 1 Pump Station Upgrade project is a key piece of Petersburg's overall wastewater capital project plan. Among the primary goals of the project are pollution prevention and energy efficiency.

Due to past efforts to expand the sanitary sewer collection system, the infrastructure at Scow Bay Pump Station #1 is being pushed above its design criteria. Inadequate wet well storage capacity and inefficient/worn pumps are causing the station to pump continuously during storm events as well as surcharging of the collection system until the pumps can catch up. In heavy storm events, bypass of the station to the environment has occurred to protect its electrical components from flooding. Replacement with a properly sized and rated submersible pump station is desired.

A second major goal of the project is to increase energy efficiency of the pumping system. Pumps at Scow Bay 1 were installed in 1990 and have lost significant efficiency over the years. Often both pumps must run to keep up with system flows. The control system uses "across the line" starters, with no control over pump speed once the pump is energized. Current efficiency of the pumps at Scow Bay 1 Pump Station is estimated at 25%. Planned pump station upgrades include complete replacement of the pump station, with all new high efficiency pumps and intelligent electronic control system featuring variable frequency drives.

Existing pumps at Scow Bay 1 Pump Station are (2 ea.) 5 hp Hydromatic 40 MPC with 9 5/32" impellers. New pumps will be (2 ea.) 5 hp Flygt model 3102s with model 462 impellers. Pump curves for the new pumps are attached for reference.

#### Technical and Financial Analysis

At Scow Bay 1 Pump Station, the pumps are worn to the point that the original pump curves aren't of much use in calculating flow rates and pump efficiencies. In addition, many parts of the pumps are no longer original. Taking these things into account, Public Works has calculated pump efficiencies using observed flow data (gathered through draw down testing) and the electrical usage of the pump station. A summary of the electrical costs for the Scow Bay 1 Pump Station are attached. Following are the efficiency numbers for existing pumps:

Operating Cost = \$58.19/month (calendar year 2013)

Flow = 45,000 gals per day

Total Dynamic Head = 31.5 ft

System Horsepower Requirements =  $(31.5 \text{ ft of TDH} * 220 \text{ gpm}) / 3960 = 1.75 \text{ hp}$

Existing HP usage =  $(17.47 \text{ kw/day}) / (3.4 \text{ hours/day runtime}) / (.746 \text{ kw/hp}) = 6.9 \text{ hp}$

Existing Efficiency =  $1.75 \text{ hp required} / 6.9 \text{ hp used} = 25\%$

Upgrades to the pump station will result in much higher pump efficiencies. Power usage for the new pump station is estimated as follows:

New Total Dynamic Head = 40 ft

New HP Requirement =  $(40 \text{ ft} * 280 \text{ gpm}) / 3960 = 2.83 \text{ hp}$

New HP Usage =  $2.83 \text{ hp required} / 68\% \text{ efficiency for new pumps} = 4.16 \text{ hp}$

New KW =  $4.16 \text{ hp} * .746 \text{ kw/hp} = 3.1 \text{ kw}$

New Electric Usage =  $(45,000 \text{ gpd} / 280 \text{ gpm}) / 60 \text{ min/hr} = 2.7 \text{ hrs/day runtime}$

New Operating Cost =  $3.1 \text{ kw} * 2.7 \text{ hr/day} * 30 \text{ day/month} * .111 \text{ per kwh} = \$27.87/\text{month}$

To summarize the above calculations:

Present electrical cost \$58.19/month avg

Anticipated post-construction electric cost \$27.87/month avg

**Difference: Decrease of \$30.32/month or 52% overall**

As the preceding analysis illustrates, the Borough expects power usage to decrease sharply as a result of the pumping system upgrades at Scow Bay Pump Station 1. Additional savings are anticipated through use of variable frequency drives to optimize system efficiency.

Attachments: Power usage history for Scow Bay Pump Station 1 (1 page)  
Scow Bay 1 Pump Station pump curve data (6 pages)

# Scow Bay 1 Pump Station

karen  
Petersburg Borough

## Usage History

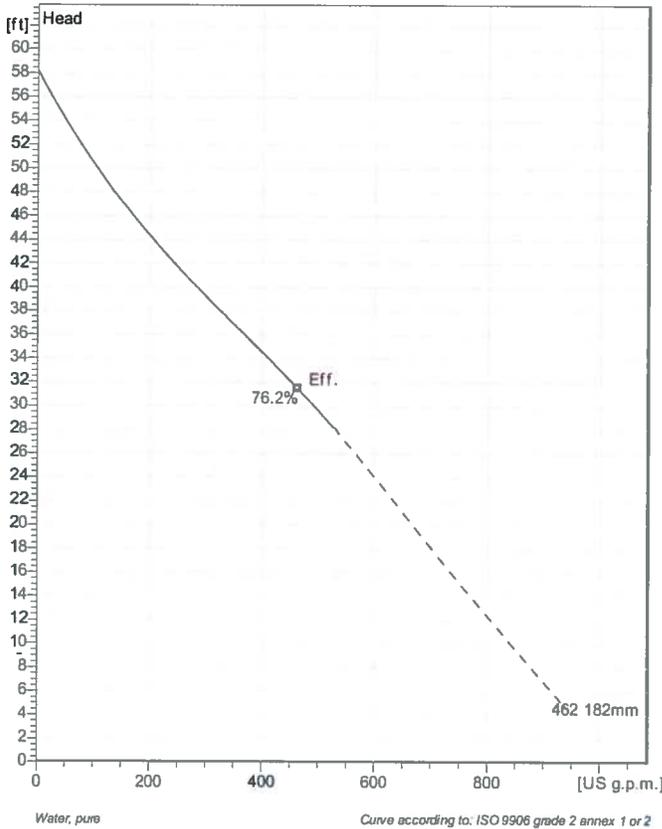
Page 1 of 3  
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PETERSBURG BOROUGH  
Account 37158  
192 MITKOF HIGHWAY  
ELEC

	<u>Metered Usage</u>	<u>Billed Usage</u>	<u>Charge</u>
Aug-12	508.00	508.00	56.39
Sep-12	630.00	630.00	69.93
Oct-12	608.00	608.00	67.49
Nov-12	597.00	597.00	66.27
Dec-12	647.00	647.00	71.82
Jan-13	731.00	731.00	81.14
Feb-13	711.00	711.00	78.92
Mar-13	503.00	503.00	55.83
Apr-13	417.00	417.00	46.29
May-13	546.00	546.00	60.61
Jun-13	466.00	466.00	51.73
Jul-13	486.00	486.00	53.95
Aug-13	325.00	325.00	36.08
Sep-13	495.00	495.00	54.95
Oct-13	570.00	570.00	63.27
Nov-13	588.00	588.00	65.27
Dec-13	453.00	453.00	50.28
Jan-14	544.00	544.00	60.38
Feb-14	296.00	296.00	32.86
Mar-14	375.00	375.00	41.63
Apr-14	498.00	498.00	55.28
May-14	354.00	354.00	39.29
Jun-14	318.00	318.00	35.30
Jul-14	258.00	258.00	28.64
Aug-14	454.00	454.00	50.39
Maximum:	731	731	\$ 81.14
Minimum:	258	258	\$ 28.64
Monthly Average:	495	495	54.96
Avg Cost/Usage:			0.1110

2013 total electric cost \$698.32  
 Monthly avg \$58.19  
 2013 total electric use 6291 kwh  
 Cost per kwh \$.111

**NP 3102 MT 3~ 462**  
Technical specification



Note: Picture might not correspond to the current configuration.

**General**  
Patented self cleaning semi-open channel impeller, ideal for pumping in waste water applications. Possible to be upgraded with Guide-pin® for even better clogging resistance. Modular based design with high adaptation grade

**Impeller**

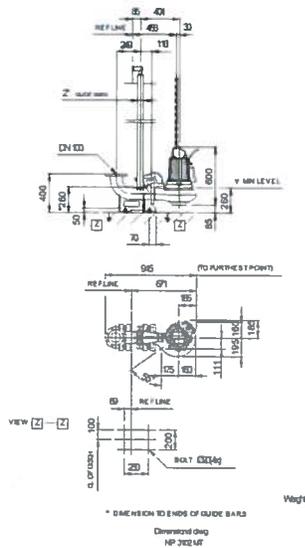
Impeller material	Grey cast iron
Discharge Flange Diameter	100 mm
Suction Flange Diameter	100 mm
Impeller diameter	182 mm
Number of blades	2

**Motor**

Motor #	N3102.181 18-11-4AL-W 5hp
Stator variant	1
Frequency	60 Hz
Rated voltage	460 V
Number of poles	4
Phases	3~
Rated power	5 hp
Rated current	6.8 A
Starting current	42 A
Rated speed	1745 1/min
Power factor	
1/1 Load	0.81
3/4 Load	0.75
1/2 Load	0.63
Efficiency	
1/1 Load	85.0 %
3/4 Load	85.0 %
1/2 Load	83.5 %

**Configuration**

**Installation: P - Semi permanent, Wet**



Project	Project ID	Created by	Created on 2014-09-15	Last update
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# NP 3102 MT 3~ 462



## Performance curve

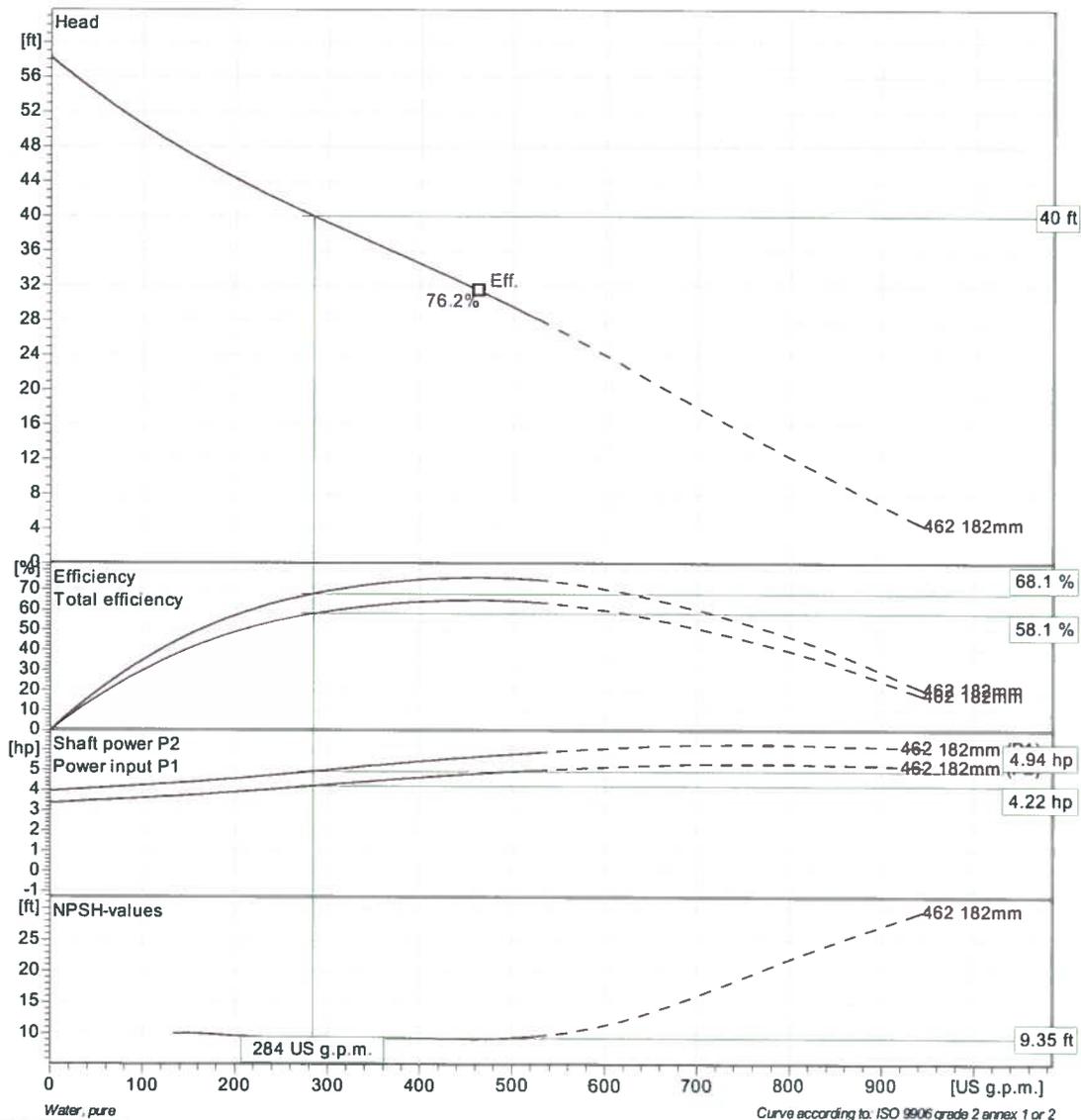
### Pump

Discharge Flange Diameter	100 mm
Suction Flange Diameter	100 mm
Impeller diameter	182 mm
Number of blades	2

### Motor

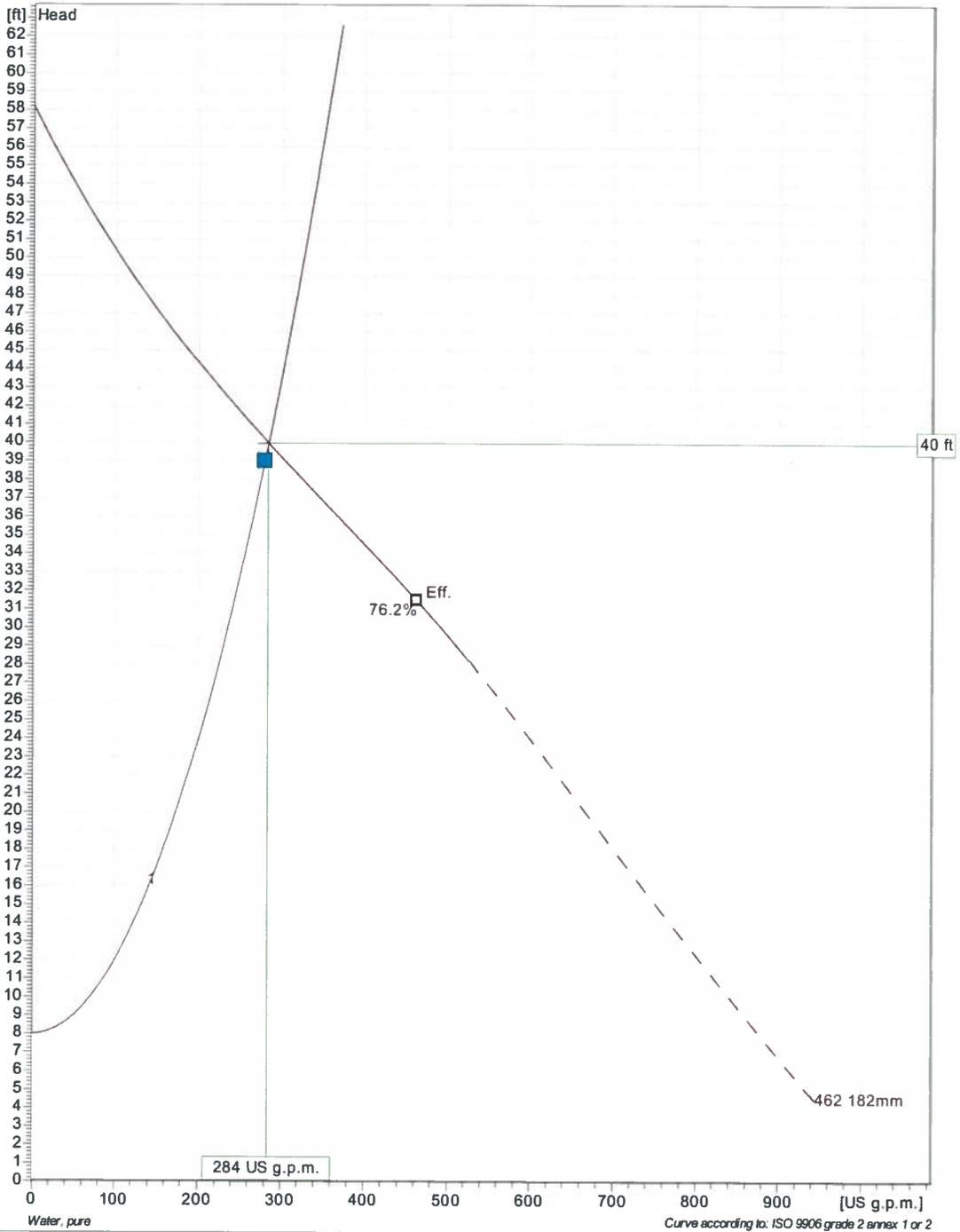
Motor #	N3102.181 18-11-4AL-W 5hp
Stator variant	1
Frequency	60 Hz
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Rated power	5 hp
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1/2 Load	0.63
Efficiency	
1/1 Load	85.0 %
3/4 Load	85.0 %
1/2 Load	83.5 %



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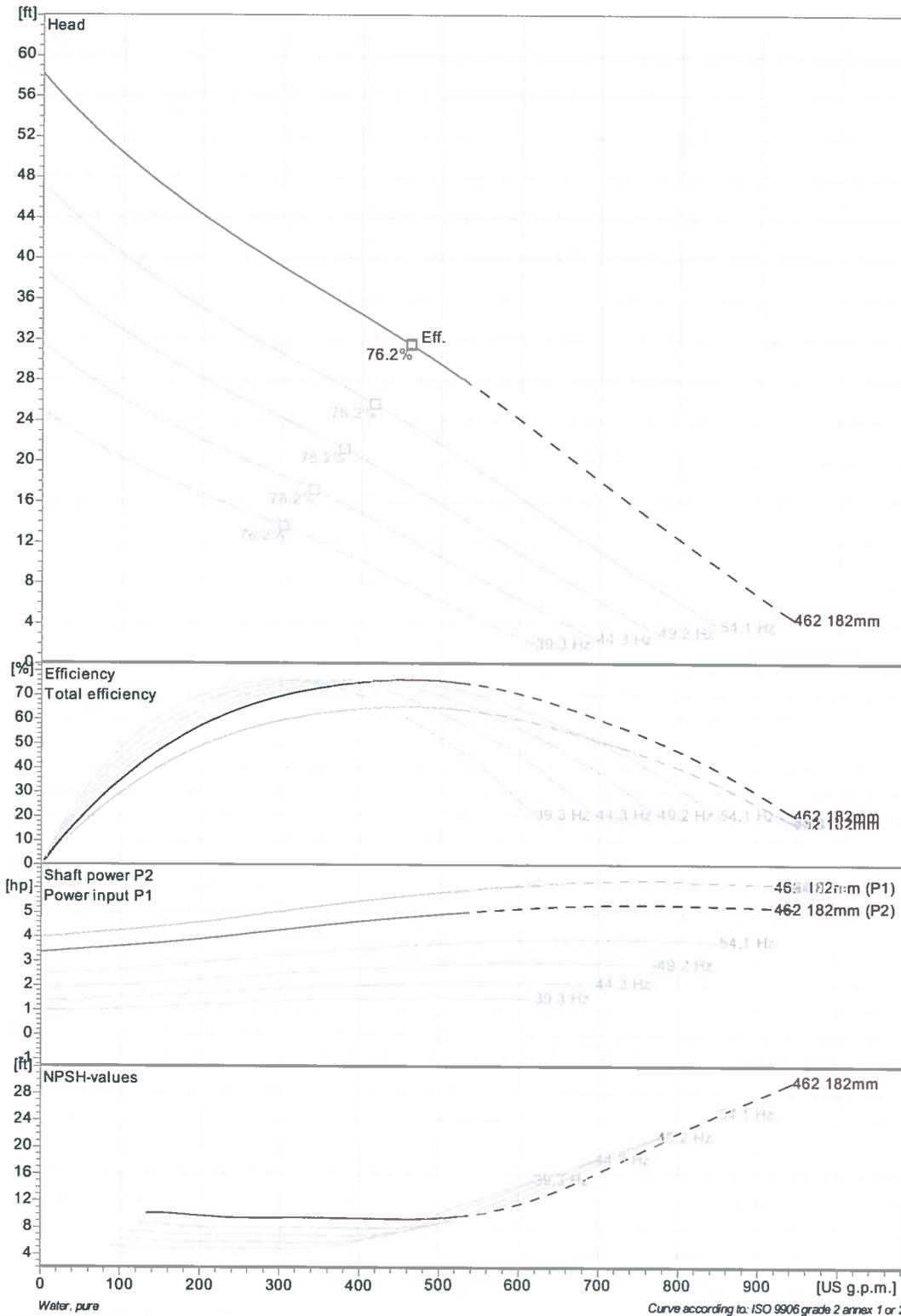
**NP 3102 MT 3~ 462**  
Duty Analysis



Pumps running /System	Individual pump			Total					
	Flow	Head	Shaft power	Flow	Head	Shaft power	Hyd. eff.	Specific energy	NPSHre
1	284 US g.p.m.	40 ft	4.22 hp	284 US g.p.m.	40 ft	4.22 hp	68.1 %	216 kWh/US MG	9.35 ft

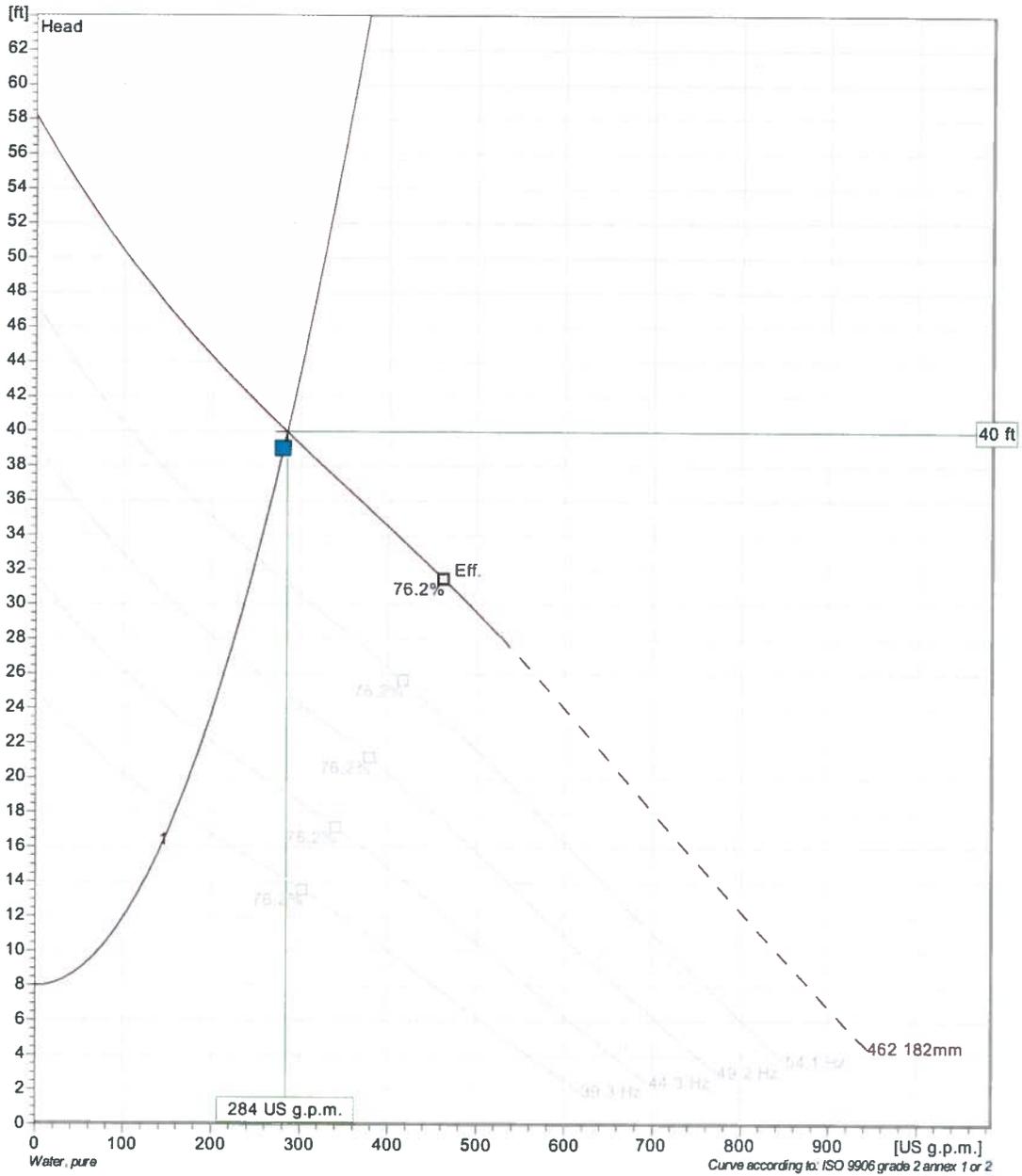
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**NP 3102 MT 3~ 462**  
**VFD Curve**



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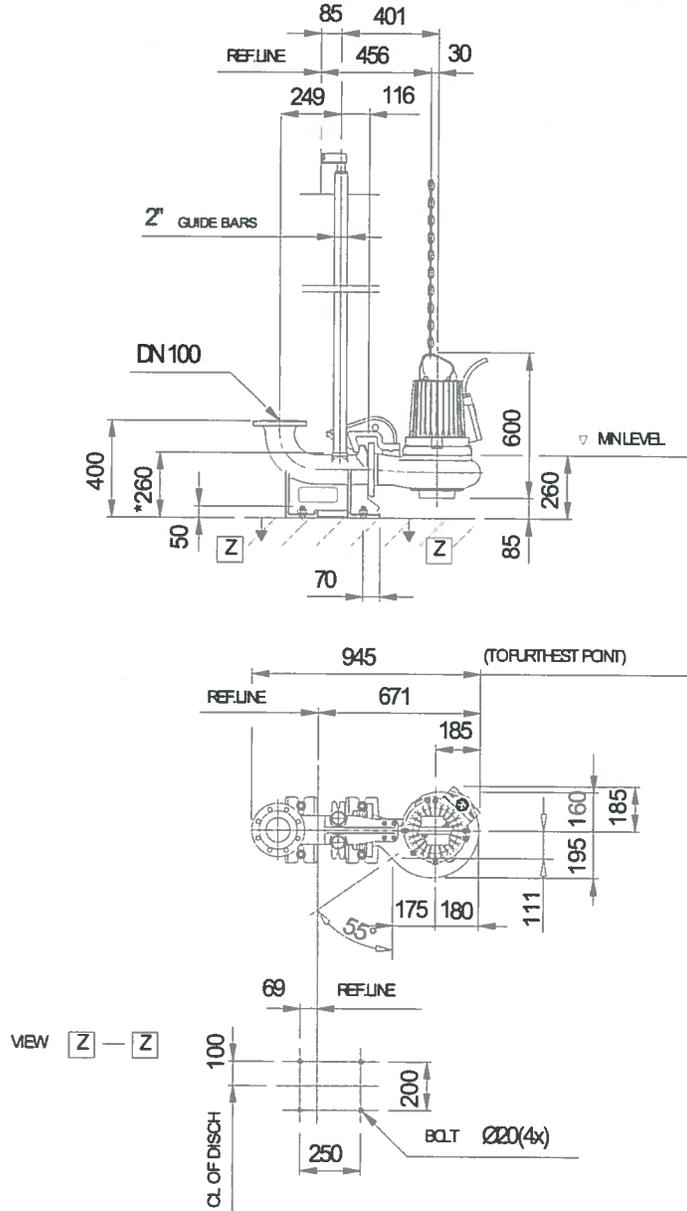
**NP 3102 MT 3~ 462**  
VFD Analysis



Pumps running /System	Individual pump				Total					
	Frequency	Flow	Head	Shaft power	Flow	Head	Shaft power	Hyd eff.	Specific energy	NPSHre
1	60 Hz	284 US g.p.m.	40 ft	4.22 hp	284 US g.p.m.	40 ft	4.22 hp	68.1%	216 kWh/US MG	9.35 ft
1	54.1 Hz	250 US g.p.m.	32.8 ft	3.08 hp	250 US g.p.m.	32.8 ft	3.08 hp	67.4%	238 kWh/US MG	7.92 ft
1	49.2 Hz	221 US g.p.m.	27.3 ft	2.29 hp	221 US g.p.m.	27.3 ft	2.29 hp	66.6%	262 kWh/US MG	6.81 ft
1	44.3 Hz	191 US g.p.m.	22.4 ft	1.66 hp	191 US g.p.m.	22.4 ft	1.66 hp	65.5%	296 kWh/US MG	5.76 ft
1	39.3 Hz	160 US g.p.m.	18.1 ft	1.15 hp	160 US g.p.m.	18.1 ft	1.15 hp	63.6%	345 kWh/US MG	4.79 ft

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**NP 3102 MT 3~ 462**  
Dimensional drawing



Weight

\* DIMENSION TO ENDS OF GUIDE BARS

Dimensional chng  
NP3102MT

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