

CONSULTANT PROJECT NO. 32190078  
VSW PROJECT NO. 19-VSW-KKH-014  
PWSID 271025

THIS PROJECT PROVIDES THE PRELIMINARY DESIGN OF WATER TREATMENT SYSTEM UPGRADES WHICH ARE NEEDED TO BRING THE SYSTEM INTO COMPLIANCE WITH THE SURFACE WATER TREATMENT RULE (SWTR) AS WELL AS THE LEAD COPPER RULE. THIS PROJECT FOLLOWS A 2018 PRELIMINARY ENGINEERING REPORT BY SUMMIT CONSTRUCTION.

A NEW WATER TREATMENT SYSTEM WILL BE PROVIDED THAT MEETS THE SWTR REQUIREMENTS FOR FILTRATION AND DISINFECTION. PH ADJUSTMENT WILL BE INCLUDED TO BRING THE PH UP TO 7. PLASTIC PIPING WILL BE USED IN ALL NEW PIPING. THE EXISTING WATER TREATMENT EQUIPMENT AND WATER STORAGE CONTAINERS WILL BE DEMOLISHED AND REMOVED FROM THE ORIGINAL WTP. A NEW WTP ANNEX HOUSING NEW TREATMENT EQUIPMENT AND (2) NEW TREATED WATER STORAGE TANKS (40,000 GALLONS EACH) WILL BE CONSTRUCTED ON EXISTING PILING LOCATED ADJACENT TO THE EXISTING WTP WHICH WERE LEFT FROM THE OLD RAW WATER STORAGE TANK (570,000 GALLONS).

PROJECT CONSTRUCTION WILL INCLUDE:

1. NEW WTP BUILDING CONSTRUCTED ON EXISTING STEEL PILES. TREATMENT COMPONENTS TO BE INSTALLED WITHIN NEW BUILDING INCLUDE:
  - 1.1. POTASSIUM PERMANGANATE INJECTION
  - 1.2. COAGULATION VIA ADDITION OF NALCO 8105 WITH INLINE MIXING & FLOCCULATION
  - 1.3. THREE (3) 36-INCH DIAMETER MULTI-MEDIA FILTERS
  - 1.4. PRE-NET & PRE-DISTRIBUTION CHLORINATION VIA ADDITION OF CALCIUM HYPOCHLORITE
  - 1.5. pH ADJUSTMENT VIA ADDITION OF SODA ASH
  - 1.6. SCADA SYSTEM
2. TWO (2) NEW 40,000 GALLON INSULATED, BOLTED STEEL POTABLE WATER STORAGE TANKS CONSTRUCTED ON EXISTING STEEL PILES ADJACENT TO NEW WTP BUILDING.
3. DEMOLITION OF TREATMENT COMPONENTS WITHIN EXISTING WTP, INCLUDING:
  - 3.1. SERIES OF (61) 65-GAL TANKS CURRENTLY USED FOR TREATED WATER STORAGE AND DISINFECTION.
  - 3.2. (6) BAG CARTRIDGE FILTERS
  - 3.3. POLYMER AND CHLORINE FEED SYSTEMS
  - 3.4. FLOCCULATION TANK
  - 3.5. (2) MEDIA FILTERS
  - 3.6. BACKWASH AND FILTER PUMPS
  - 3.7. ASSOCIATED PIPING & APPURTENANCES
4. THE FOLLOWING ITEMS WILL BE REPLACED IN-KIND IN THE EXISTING WTP BUILDING:
  - 4.1. (4) PRESSURE TANKS
  - 4.2. (2) PRESSURE PUMPS
  - 4.3. (1) FIRE PUMP

THE EXISTING WTP BUILDING WILL REMAIN FOR USE AS AN OFFICE, AS WELL AS TO HOUSE PRESSURE TANKS AND PRESSURE PUMPS.

VSW PROJECT ENGINEER: \_\_\_\_\_

CONSTRUCTION FOREMAN: \_\_\_\_\_



SHEET NO.	SHEET TITLE
-----------	-------------

A-101	TITLE PAGE, SCOPE, SHEET INDEX, LOCATION MAP
A-102	OPERATIONAL NARRATIVE & DESIGN CRITERIA
C-101	VICINITY MAP / EXISTING CONDITIONS
C-201	DEMOLITION PLAN: OLD WTP
C-301	SITE PLAN
P-101	EXISTING PROCESS SCHEMATIC
P-201	NEW PROCESS SCHEMATIC
P-301	FLOOR PLAN: NEW WTP
P-401	PROCESS DETAILS: FILTERS
P-402	PROCESS DETAILS: FILTERS
P-403	PROCESS DETAILS: CHEMICAL TANKS
P-404	PROCESS DETAILS: CONTROL PANEL & DETENTION CHAMBER
S-101	STRUCTURAL -- TO BE ADDED AT 95%
M-101	MECHANICAL PLAN
E-601	WTP POWER ONE--LINE

35% PRELIMINARY DESIGN

REVISIONS				REVISIONS				Project No. 32100078 AEECC No. 697	 <b>Bristol</b> ENGINEERING SERVICES COMPANY, LLC Phone (907) 563-0013 Fax (907) 563-6713		NOT FOR CONSTRUCTION	KONGIGANAK WATER TREATMENT PLANT KONGIGANAK, ALASKA				SHEET NO.	
NO.	DATE	BY	DESCRIPTION	NO.	DATE	BY	DESCRIPTION					TITLE PAGE, SCOPE, INDEX OF SHEETS, LOCATION MAP				A-101	
SCALE: N/A				DESIGNED: VBW		CHECKED: VBW		DRAWN: JDW		DATE: MAR 2021		SHEET 1 OF 1					

User: WANDER Mar 17, 2021 -- 1:22pm  
Drawing: C:\USERS\WANDER\APPDATA\LOCAL\TEMP\ACUPUBLISH\_47052\32190078\_KONG\_A-101-102\_COVER SHEET.DWG -- Layout: A-102  
Xrefs: BR22X34REV.DWG -- Images: None

## OPERATIONAL NARRATIVE

### SITE DESCRIPTION

KONGIGANAK IS AN UNINCORPORATED, TRADITIONAL YUP'IK ESKIMO VILLAGE WITH A SUBSISTENCE LIFESTYLE AND CULTURE. THE RESIDENTS OF THE NATIVE VILLAGE OF KONGIGANAK (VILLAGE) ARE REPRESENTED BY THE KONGIGANAK TRADITIONAL COUNCIL. THE COMMUNITY IS WITHIN THE CALISTA REGIONAL NATIVE CORPORATION.

KONGIGANAK IS LOCATED ON THE KUSKOKWIM RIVER, APPROXIMATELY 2.5 MILES INLAND FROM KUSKOKWIM BAY AND 70 MILES SOUTHWEST OF BETHEL (LATITUDE: 59.9594 LONGITUDE: -162.8871), WITHIN THE YUKON DELTA NATIONAL WILDLIFE REFUGE.

KONGIGANAK IS IN A LOW RELIEF AREA, SURROUNDED BY MARSHY WETLANDS, PONDS, AND MEANDERING STREAMS. THE AREA IS AT RISK OF PERIODIC FLOODING WITH A BASE FLOOD ELEVATION OF 20.7 FEET MEAN LOWER LOW WATER (MLLW) AND A SURGE ELEVATION OF 18.4 FEET MLLW. THE SUBSURFACE CONSISTS OF FINE GRAINED, WARMING PERMAFROST. KONGIGANAK HAS AN ANNUAL AVERAGE TEMPERATURE OF 30.7 DEGREES FAHRENHEIT (F), AN ANNUAL AVERAGE PRECIPITATION OF 21.3 INCHES, AND AN ANNUAL AVERAGE WIND SPEED OF 19.2 MILES PER HOUR (USA.COM).

HOMES IN KONGIGANAK DO NOT HAVE INTERIOR PLUMBING FOR WATER OR WASTEWATER. RESIDENTS SELF-HAUL DRINKING WATER AND WASTES USING ALL TERRAIN VEHICLES (ATVS). BUILDINGS ARE GENERALLY CONSTRUCTED ON PILINGS. THERE ARE NO GRAVEL SOURCE AREAS IN KONGIGANAK, SO THERE ARE VERY FEW ROADWAYS. THE COMMUNITY PRIMARILY RELIES ON A BOARDWALK SYSTEM FOR PEDESTRIAN AND ATV TRAFFIC.

### 2021 KONGIGANAK COMMUNITY WATER SYSTEM

THE KONGIGANAK PUBLIC WATER SYSTEM (PWS) HAS BEEN DESIGNATED AS A COMMUNITY PUBLIC WATER SYSTEM BY THE ALASKA DEPARTMENT OF ENVIRONMENTAL CONSERVATION (ADEC) DRINKING WATER PROGRAM, WITH A PUBLIC WATER SYSTEM IDENTIFICATION (PWSID) NUMBER OF 271025.

### RAW WATER

THE WATER SYSTEM OBTAINS RAW SURFACE WATER FROM CONTRACTOR'S LAKE.

RAW WATER IS TRANSFERRED VIA A SEASONAL TRANSMISSION LINE (9,400 LINEAR FEET, UN-INSULATED, 4-INCH DIAMETER, HIGH DENSITY POLYETHYLENE PIPE) WHICH IS INSTALLED ON THE GROUND SURFACE. A 1.2 MILLION GALLON RAW WATER STORAGE TANK (WST) IS FILLED AS SOON AS THE TRANSMISSION LINE THAWS IN THE LATE SPRING, AND IS TYPICALLY TOPPED OFF BEFORE THE TRANSMISSION LINE FREEZES IN THE FALL. THE SYSTEM HAS TO OPERATE OFF OF STORED WATER FOR APPROXIMATELY 10-11 MONTHS.

AT THE END OF WINTER THERE IS OFTEN INSUFFICIENT STORED WATER TO MEET DEMAND. THE COMMUNITY HAS REPORTED WATER SHORTAGES AND HAVING TO RATION WATER.

### TREATMENT PROCESSES

THE CURRENT TREATMENT SYSTEMS ARE IN POOR REPAIR, WITH MOST COMPONENTS WELL PAST THEIR DESIGN LIFE. THE DIRECT FILTRATION SYSTEM CURRENTLY FILTERS WATER AT 7 GALLONS PER MINUTE (GPM). FILTERED WATER IS STORED IN (61) 165-GALLON CONTAINERS THAT CONNECT TO A BASE MANIFOLD. CHLORINE IS INJECTED INTO A CENTRAL CONTAINER AND DOES NOT DISTRIBUTE THROUGH THE CONTAINERS. THE CURRENT SYSTEM DOES NOT MEET THE DISINFECTION REQUIREMENTS OF THE SWTR.

### 2021 SERVICE CONNECTIONS

THE KONGIGANAK PWS DOES NOT HAVE A PIPED DISTRIBUTION SYSTEM. WATER IS ONLY PROVIDED TO THE FOLLOWING FACILITIES.

### WASHETERIA

RESIDENTS RELY ON THE WASHETERIA FOR ACCESS TO TREATED WATER. THE WASHETERIA IS ATTACHED TO THE WTP AND CONNECTED BY INTERIOR PLUMBING. THE HIGHLY CORROSIVE NATURE OF THE FINISHED WATER HAS CONTRIBUTED TO OBSERVABLE CORROSION IN THE COPPER PIPING IN THE WTP AND WASHETERIA. THE PLUMBED EQUIPMENT WITHIN THE WASHETERIA IS DETERIORATED AND IN POOR REPAIR. A LIMITED NUMBER OF WASHING MACHINES AND SHOWER ROOMS ARE OPERABLE.

RESIDENTS INDIVIDUALLY HAUL TREATED WATER TO THEIR HOMES FROM A COMMUNITY WATERING POINT LOCATED ON THE EXTERIOR OF THE WASHETERIA. WATER IS TYPICALLY HAULED IN 5-GALLON CONTAINERS USING 4-WHEEL ATVS.

### OLD SCHOOL

A 3-INCH DIAMETER, HDPE SERVICE LINE WAS CONSTRUCTED BETWEEN THE WTP AND THE OLD SCHOOL. THE OLD SCHOOL CURRENTLY HAS LIMITED USE. HOWEVER THE COMMUNITY HAS PLANS FOR FUTURE, EXPANDED USE. THE NEW HEALTH CLINIC (2020), LOCATED ADJACENT TO THE OLD SCHOOL, IS CONNECTED TO THE EXISTING SCHOOL SERVICE LINE.

### AYAGINA'AR ELITNAURVIK SCHOOL WATER SYSTEM

THE AYUAINA'AR ELITNAURVIK SCHOOL WAS CONSTRUCTED IN 2010. THE LOWER KUSKOKWIM SCHOOL DISTRICT (LKSD) CURRENTLY OWNS AND OPERATES A SEPARATE NON-TRANSIENT NON-COMMUNITY PWS (PWSID 271245) WHICH SERVES THE SCHOOL AND TEACHER HOUSING. THE VILLAGE PROVIDES RAW WATER TO THE SCHOOL WITH A RAW WATER TRANSMISSION LINE (4,600 FEET, ARCTIC PIPE). MEMBRANE TREATMENT MODULES (PO FINE NANOFILTRATION) FILTER THE RAW WATER AT A RATE OF APPROXIMATELY 2,300 GPD. WATER IS CHLORINATED AND STORED IN (4) TANKS PROVIDING 2,600 GALLONS OF STORAGE EACH. TREATED WATER IS DISTRIBUTED TO THE SCHOOL AND TEACHER HOUSING.

THE LKSD REPORTS THAT THE 2020-2021 SCHOOL TREATED WATER DEMAND IS APPROXIMATELY 1,500 TO 1,600 GPD, HOWEVER THIS USE RATE MAY HAVE BEEN IMPACTED BY THE PANDEMIC.

### 2041 KONGIGANAK COMMUNITY WATER SYSTEM

THE FOLLOWING SECTION DESCRIBES THE PROPOSED WATER SYSTEM ASSOCIATED WITH THIS PROJECT.

### RAW WATER

THE COMMUNITY WILL CONTINUE TO RELY ON CONTRACTOR'S LAKE FOR RAW WATER. THERE WILL BE NO CHANGE TO RAW WATER STORAGE.

### TREATMENT PROCESSES

NEW TREATMENT PROCESSES INCLUDE:

- COAGULATION - USING NALCO 8105 COAGULANT
- DIRECT FILTRATION - (2) 42 INCH DIAMETER PRESSURE FILTERS, OPERATED IN PARALLEL AT 24 GPM
- A POLISHING FILTER - (1) MEDIA FILTER, 42 INCH DIAMETER, FOLLOWING PRIMARY FILTRATION
- CHLORINATION - USING CALCIUM HYPOCHLORITE
- PH ADJUSTMENT - USING SODA ASH
- TREATED WATER STORAGE - PROVIDED IN (2) 40,000-GALLON, BOLTED STEEL (INSULATED) TANKS, WITH INLET AND OUTLET SEPARATED TO PROVIDE 0.1 BAFFLE FACTOR (BF)

### 2041 SERVICE CONNECTIONS

THIS PROJECT DOES NOT INCLUDE OR ASSUME ANY FUTURE EXPANSION OF THE LIMITED COMMUNITY DISTRIBUTION SYSTEM. HOWEVER, SOME CHANGES IN USAGE ARE ANTICIPATED.

### WASHETERIA

THE WASHETERIA WILL CONTINUE TO BE THE COMMUNITY'S PRIMARY SOURCE FOR TREATED WATER. BASED ON COMMUNITY SURVEYS AND CURRENT WASHETERIA USE DATA, THE DEMAND FOR WASHETERIA SERVICES EXCEEDS THE CAPACITY OF OPERABLE FACILITIES. ONCE THE WASHERS AND SHOWERS ARE REPAIRED, IT IS EXPECT THAT USE WILL INCREASE TO MEET DEMAND.

### OLD SCHOOL

IT IS EXPECTED THAT THE COMMUNITY USE OF THE OLD SCHOOL FOR A PRESCHOOL AND OFFICE AREA WILL CONTINUE. NO ADDITIONAL USES WERE IDENTIFIED OR INCLUDED.

### HEALTH CLINIC

IT IS EXPECTED THAT THE NEW TREATMENT SYSTEM WILL CONTINUE TO PROVIDE TREATED WATER TO THE HEALTH CLINIC, AND THAT WATER USE WOULD INCREASE AT THE SAME RATE AS THE PROJECTED POPULATION INCREASE.

### AYAGINA'AR ELITNAURVIK SCHOOL WATER SYSTEM

LKSD SCHOOL REPRESENTATIVES HAVE EXPRESSED INTEREST IN PURCHASING TREATED WATER FROM THE VILLAGE INSTEAD OF RAW WATER. THEREFORE, SCHOOL DEMANDS INCLUDED IN THE DEMAND ESTIMATES FOR THE NEW SYSTEM. THE POPULATION GROWTH RATE (0.9%) WAS USED TO ESTIMATE THE 2041 SCHOOL POPULATION. A SCHOOL DEMAND OF 10 GPD PER PERSON WAS ASSUMED.

### 2041 OPERATIONS

THE 1.2 MG RAW WST WILL BE FILLED AS SOON AS THE RAW WATER LINE IS THAWED IN THE LATE SPRING / EARLY SUMMER. WATER WILL BE PUMPED FROM CONTRACTOR'S LAKE UNTIL THE RAW WST IS FULL.

RAW WATER WILL BE PUMPED FROM THE RAW WST THROUGH THE WATER TREATMENT SYSTEM IN THE NEW WTP ANNEX AT A MAXIMUM RATE OF 24 GPM. THE RAW WATER LINE WILL BE ENCLOSED IN AN INSULATED ARCTIC PIPE THAT ALSO CONTAINS THE HYDRONIC HEAT LOOP WHICH WILL PROVIDE WASTE HEAT TO THE ANNEX FROM THE EXISTING BOLERS. THIS WILL ALSO HEAT THE RAW WATER PRIOR TO TREATMENT.

THE WATER TREATMENT SYSTEM INCLUDES THE FOLLOWING PROCESSES. \*NOTE: THE CHEMICAL DOSAGES ARE BASED ON PRELIMINARY JAR TEST RESULTS, AND ARE EXPECTED TO BE FINALIZED AT SYSTEM START UP.

- PRE-OXIDATION WITH POTASSIUM PERMANGANATE (KMNO4) AS NEEDED TO CONTROL ORGANICS. THE KMNO4 WILL BE INJECTED AT THE POINT THAT THE RAW WATER ENTERS THE WTP ANNEX. A DETENTION CHAMBER (APPROXIMATELY 19 FEET OF 12 INCH PIPING) WILL PROVIDE TIME (14 MINUTES) FOR THE KMNO4 TO DISSOLVE PRIOR TO THE ADDITION OF COAGULANT.
- COAGULATION USING NALCO 8105 AT A DOSAGE OF APPROXIMATELY 7 MG/L.
- FILTRATION USING TWO MEDIA FILTERS (42 INCHES IN DIAMETER EACH), IN PARALLEL (12 GPM EACH), AT A LOADING RATE OF APPROXIMATELY 1.3 GPM PER SQUARE FOOT OF FILTER AREA.
- THE FILTERED WATER FROM BOTH FILTERS WILL THEN FLOW THROUGH A FINAL, MEDIA POLISHING FILTER (42 INCHES IN DIAMETER), AT A TOTAL FLOW OF 24 GPM, AND A LOADING RATE OF 2.5 GPM PER SQUARE FOOT OF FILTER AREA.
- A SOLUTION OF CALCIUM HYPOCHLORITE WILL BE INJECTED INTO THE WATER PRIOR TO DISCHARGE INTO TWO 40,000-GALLON TREATED WSTs, FOR A TOTAL TREATED WATER STORAGE VOLUME OF 80,000 GALLONS.
  - THE TWO TANKS WILL NORMALLY BE OPERATED IN SERIES. A MINIMUM VOLUME OF 17,000 GALLONS (7.5 FEET) WILL BE RESERVED IN THE FIRST TANK IN ORDER TO MEET REQUIRED 1-LOG CHLORINE INACTIVATION OF GIARDIA.
  - A MINIMUM FREE CHLORINE RESIDUAL OF 0.3 MG/L, AS MEASURED IMMEDIATELY AFTER THE FIRST WST, WILL BE MAINTAINED IN ORDER TO MEET THE REQUIRED 1-LOG CHLORINE INACTIVATION OF GIARDIA.
- SODA ASH WILL BE INJECTED AT A DOSAGE OF APPROXIMATELY 35 MG/L AFTER THE TREATED WST IN ORDER TO ACHIEVE A FINISHED WATER PH OF APPROXIMATELY 7.2, PRIOR TO DISTRIBUTION.

THE FILTER CLEANING PROCESS WILL INCLUDE:

- THE TWO MEDIA FILTERS AND THE POLISHING FILTER WILL BE BACKWASHED SEQUENTIALLY AT A RATE OF 144 GPM (15 GPM PER SQUARE FOOT) < INSERT TONKA PROCESS AT 95% > BACKWASH WILL OCCUR BASED ON:
  - PRESSURE DIFFERENTIAL (8 - 10 PSI), OR
  - FINISHED WATER TURBIDITY GREATER THAN 0.25 NTU, OR
  - ULTRAVIOLET LIGHT ABSORBANCE (UVA) GREATER THAN 0.1.
- FOLLOWING BACKWASH, THE FILTERS (INCLUDING POLISHING FILTER) WILL BE RINSED TO WASTE AT THE DESIGN FLOW OF THE WTP (24 GPM), UNTIL THE COMBINED FILTER EFFLUENT TURBIDITY, MEASURED AFTER THE POLISHING FILTER, IS LESS THAN 1.5 NTU.

## DESIGN CRITERIA

### RAW WATER QUALITY (JULY 2019)

COLOR	70	PCU
PH	5.8	
TOTAL NITRATE/NITRITE	0.185	MG/L
ARSENIC		BELOW DETECTION LIMIT
IRON	0.75	MG/L
MANGANESE	0.00996	MG/L
CALCIUM	0.282	MG/L
TOTAL DISSOLVED SOLIDS	27	MG/L
LANGELIER INDEX	-5.97	
HARDNESS	-	BELOW DETECTION LIMIT
ALKALINITY		BELOW DETECTION LIMIT
TOTAL ORGANIC CARBON	7.22	MG/L
DISSOLVED ORGANIC CARBON	5.96	MG/L
UV 254 ABSORBANCE	0.350	CM-1
SPECIFIC UV ABSORBANCE	5.87	L/MG-M
RAW WATER TURBIDITY	1.07	NTU

### POPULATION & DEMAND

2021 COMMUNITY POPULATION	539	PEOPLE (2018 DCCED CERTIFIED)
POPULATION GROWTH RATE	0.9	% (ADOL)
2041 COMMUNITY POPULATION	645	PEOPLE
2041 SCHOOL POPULATION	232	PEOPLE (STUDENTS AND STAFF)
2041 AVERAGE TOTAL DAILY DEMAND	8,800	GPD
2041 MAX TOTAL DAILY DEMAND	10,100	GPD

### RAW WATER

ESTIMATED SOURCE WATER VOLUME	4-5	MG (CONTRACTOR'S LAKE)
ADNR WATER RIGHTS	3,600	GPD (2002, LAS 23946)
RAW WATER STORAGE	1.20	MG
STORAGE INTERVAL	10-12	MONTHS

### TREATED WATER STORAGE

DAYS OF TREATED WATER STORAGE	6.5	DAYS
TOTAL STORAGE VOLUME	80,000	GALLONS
NUMBER OF TANKS	2	EA
TANK VOLUME (EA)	40,000	GALLONS
TANK DIAMETER	20	FEET
TANK HEIGHT	17	FEET

### FILTRATION

MINIMUM CRYPTOSPORIDIUM REMOVAL	2	LOG
MINIMUM GIARDIA REMOVAL	1	LOG
MINIMUM VIRUS REMOVAL	2	LOG
HOURS OF FILTER OPERATION PER DAY	6	HOURS
MINIMUM FILTRATION RATE (TOTAL)	24	GPM
NUMBER OF FILTERS	42	
FILTER DIAMETER	42	INCHES
FILTER LOADING RATE	1.3	GPM/SQFT
POLISHING MEDIA FILTER DIAMETER	42	INCHES

### BACKWASH (BW)

NUMBER OF BACKWASHES PER FILTER	1	PER WEEK
FILTERS BACKWASHED	3	EA (INCLUDING POLISHING FILTER)
BW LOADING RATE	15	GPM/SQFT
BW RATE (EA)	144	GPM
BW INTERVAL (EA)	15	MINUTES
BW VOLUME PER FILTER	2,165	GALLONS
AIR SCOUR LOADING RATE	4	CFM/SQFT
AIR SCOUR RATE (EA)	38	CFM

### FILTER TO WASTE (FTW)

MAXIMUM FTW CYCLES	1	PER WEEK
FTW RATE	24	GPM (ALL FILTERS SIMULTANEOUSLY)
FTW INTERVAL	20	MINUTES
FTW VOLUME	489	GALLONS

### WASTEWATER SURGE TANK

TANK HEIGHT	6	FEET
TANK DIAMETER	6	FEET
TANK VOLUME	5,000	GALLONS

### CHLORINATION

MINIMUM GIARDIA DISINFECTION	1	LOG
MINIMUM VIRUS DISINFECTION	2	LOG
HOURS OF ACTIVE WATER USE	16	HOURS/DAY
PEAKING FACTOR	3	
PEAK HOURLY FLOW FOR CT	28	GPM
MINIMUM REQUIRED VOLUME FOR CT	17,000	GALLONS
GIARDIA DISINFECTION	1	LOG
CHLORINE FREE RESIDUAL	0.40	MG/L
PH	7	

35% PRELIMINARY DESIGN

REVISIONS				REVISIONS			
NO.	DATE	BY	DESCRIPTION	NO.	DATE	BY	DESCRIPTION

Project No. 32190078  
AEC No. 687

**Bristol**

ENGINEERING  
SERVICES COMPANY, LLC

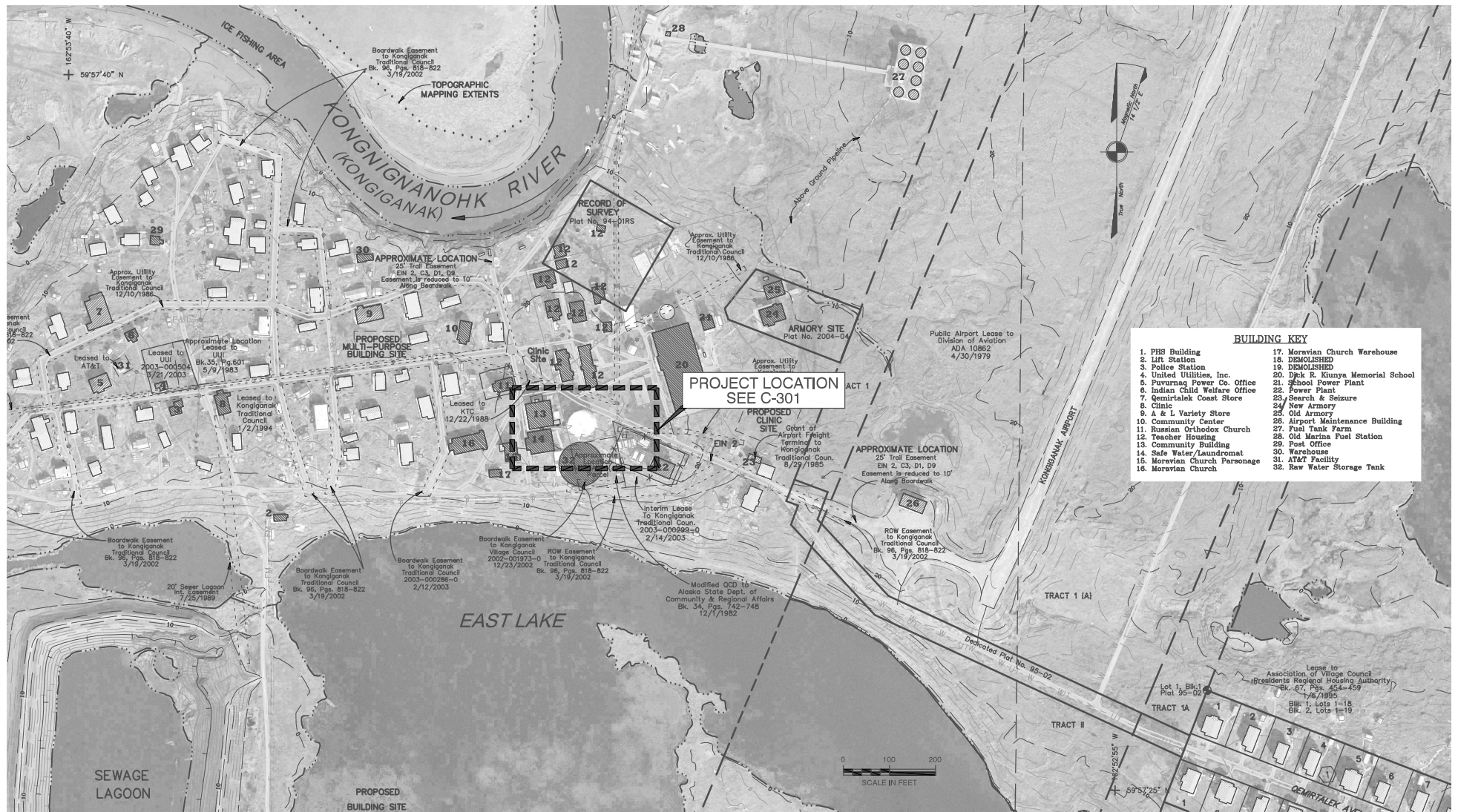
Phone (907) 563-0013 Fax (907) 563-6713

VILLAGE SAFE WATER

NOT FOR CONSTRUCTION

KONGIGANAK WATER TREATMENT PLANT KONGIGANAK, ALASKA					SHEET NO.
OPERATIONAL NARRATIVE & DESIGN CRITERIA					A-102
SCALE: N/A	DESIGNED: VWB	CHECKED: VWB	DRAWN: JDW	DATE: MAR 2021	SHEET 2 OF X

User: WANDER Mar 17, 2021 - 1:22pm  
Drawing: K:\085\32190078 KONGIGANAK VSW\ACAD-DESIGN\DWG\_C-101\_VICINITY MAP.DWG - Layout: C-101  
Xrefs: BR22\34\REV\DWG KONGIGANAK\_100.DWG - Images: KONG-1.FLT,IF KONG-2.FLT,IF



NOTE: THIS MAP WAS PREPARED BY THE ALASKA DEPARTMENT OF COMMERCE, COMMUNITY, AND ECONOMIC DEVELOPMENT (DCCED) USING FUNDING FROM MULTIPLE MUNICIPAL, STATE, FEDERAL AND TRIBAL PARTNERS. THE MAP WAS DEVELOPED IN 2004 AND MAY NOT ACCURATELY REPRESENT EXISTING CONDITIONS. DATA FROM THIS MAP WAS USED TO DEVELOP DRAWINGS FOR THE 2021 KONGIGANAK WTP PROJECT.

REVISIONS				REVISIONS			
NO.	DATE	BY	DESCRIPTION	NO.	DATE	BY	DESCRIPTION

Project No. 32190078  
AEC No. 687

**Bristol**  
ENGINEERING  
SERVICES COMPANY, LLC  
Phone (907) 563-0013 Fax (907) 563-6713

VILLAGE SAFE WATER

NOT FOR  
CONSTRUCTION

**35% PRELIMINARY DESIGN**

KONGIGANAK WATER TREATMENT PLANT  
KONGIGANAK, ALASKA

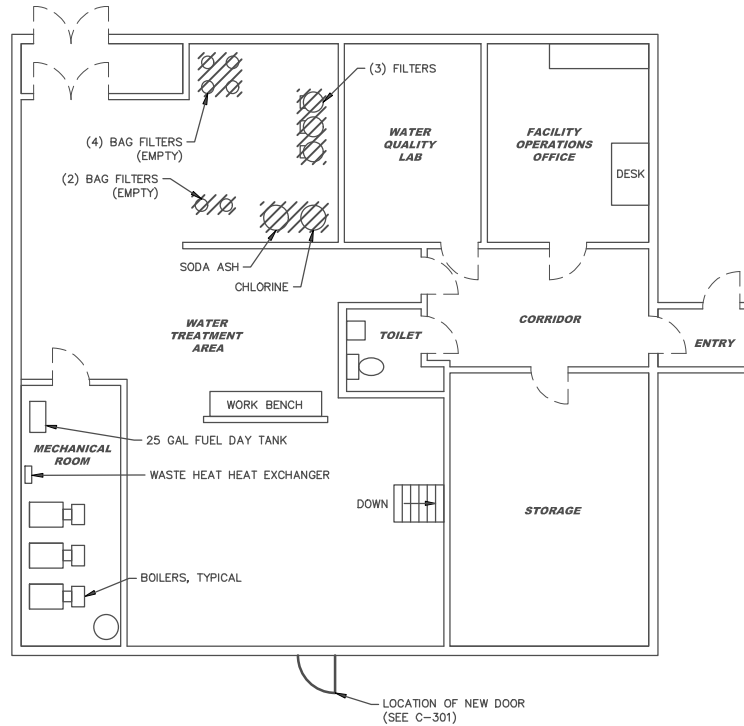
VICINITY MAP / EXISTING CONDITIONS

SHEET NO. C-101

SHEET X OF X

SCALE: SHOWN DESIGNED: JDW CHECKED: VBW DRAWN: JDW DATE: MAR 2021

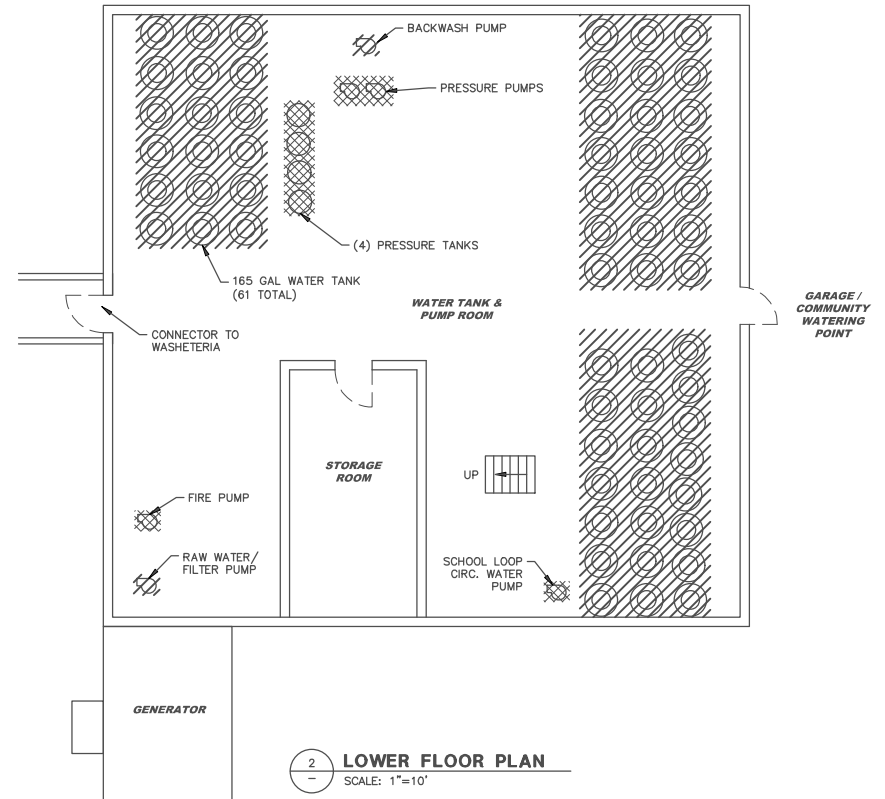
User: WANDER Mar 17, 2021 - 1:22pm  
Drawing: K:\JOBS\32190078 KONGIGANAK VSM\ACAD-DESIGN\DWG - Layout: C-201  
Xref: BR2234REV.DWG - Images: None



1  
—  
**MAIN (UPPER) FLOOR PLAN**  
SCALE: 1"=10'



LEGEND:  
X X X X REMOVE AND REPLACE  
/// REMOVE PERMANENTLY



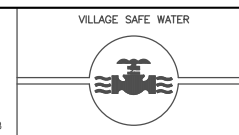
2  
—  
**LOWER FLOOR PLAN**  
SCALE: 1"=10'

35% PRELIMINARY DESIGN

REVISIONS				REVISIONS			
NO.	DATE	BY	DESCRIPTION	NO.	DATE	BY	DESCRIPTION

Project No. 32190078  
A/E/C No. 687

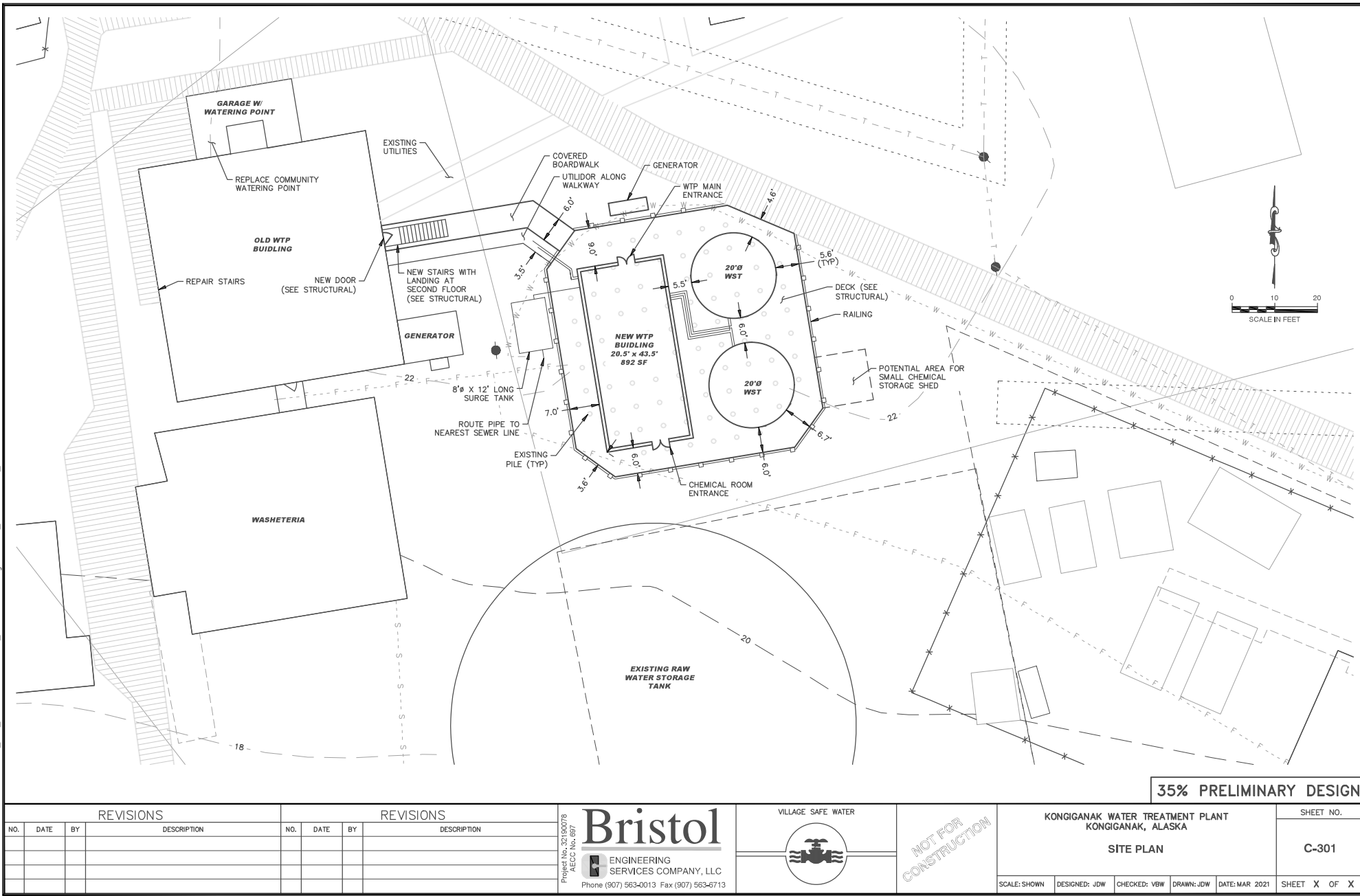
**Bristol**  
ENGINEERING  
SERVICES COMPANY, LLC  
Phone (907) 563-0013 Fax (907) 563-6713



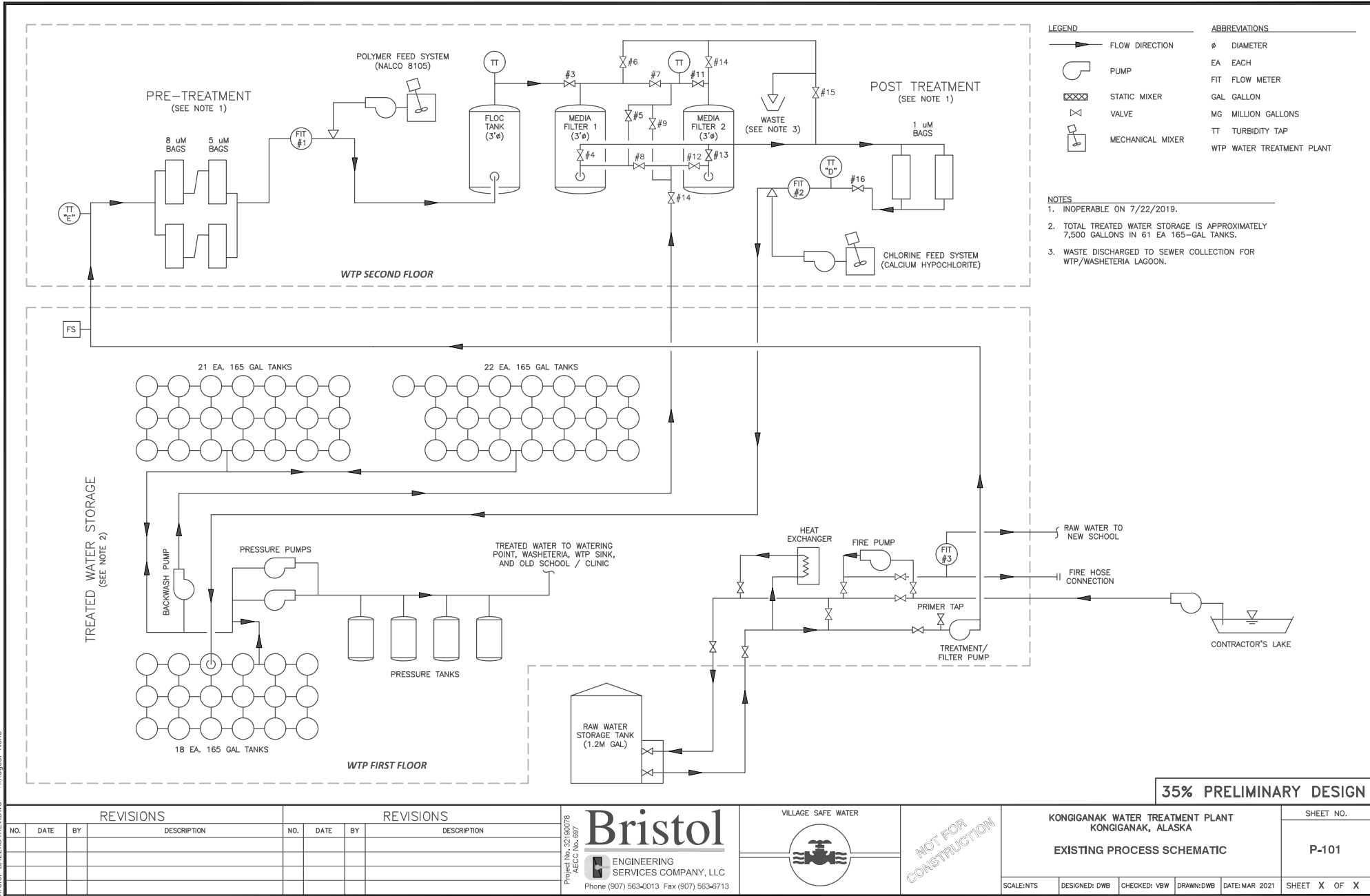
NOT FOR  
CONSTRUCTION

KONGIGANAK WATER TREATMENT PLANT KONGIGANAK, ALASKA					SHEET NO.
DEMOLITION PLAN OLD WTP					C-201
SCALE: SHOWN	DESIGNED: JDW	CHECKED: VBW	DRAWN: JDW	DATE: MAR 2021	SHEET X OF X

User: WANDER Mar 17, 2021 - 1:22pm  
Drawing: K:\JOBS\32190078 KONGIGANAK VSW\ACAD-DESIGN\AR PHASE I\32190078\_KONG\_C-301\_SITE\_PLAN.DWG - Layout: C-301  
Xrefs: BR22\34REV\DWG KONGIGANAK-IND-81.DWG KONGIGANAK-IND-81.DWG - Images: KONG-1FT.IIF KONG-2FT.IIF



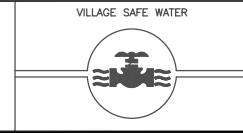
User: WANDER Mar 17, 2021 - 1:22pm  
Drawing: K:\JOBS\32190078 KONGIGANAK VSM ACAD-DESIGN\08 DAR PHASE 1\32190078\_KONG\_P-101\_EXISTING PROCESS SCHEMATIC.DWG - Layout: P-101  
Xref: BR2234REV.DWG - Images: None



REVISIONS				REVISIONS			
NO.	DATE	BY	DESCRIPTION	NO.	DATE	BY	DESCRIPTION

Project No. 32190078  
A/E/C No. 687

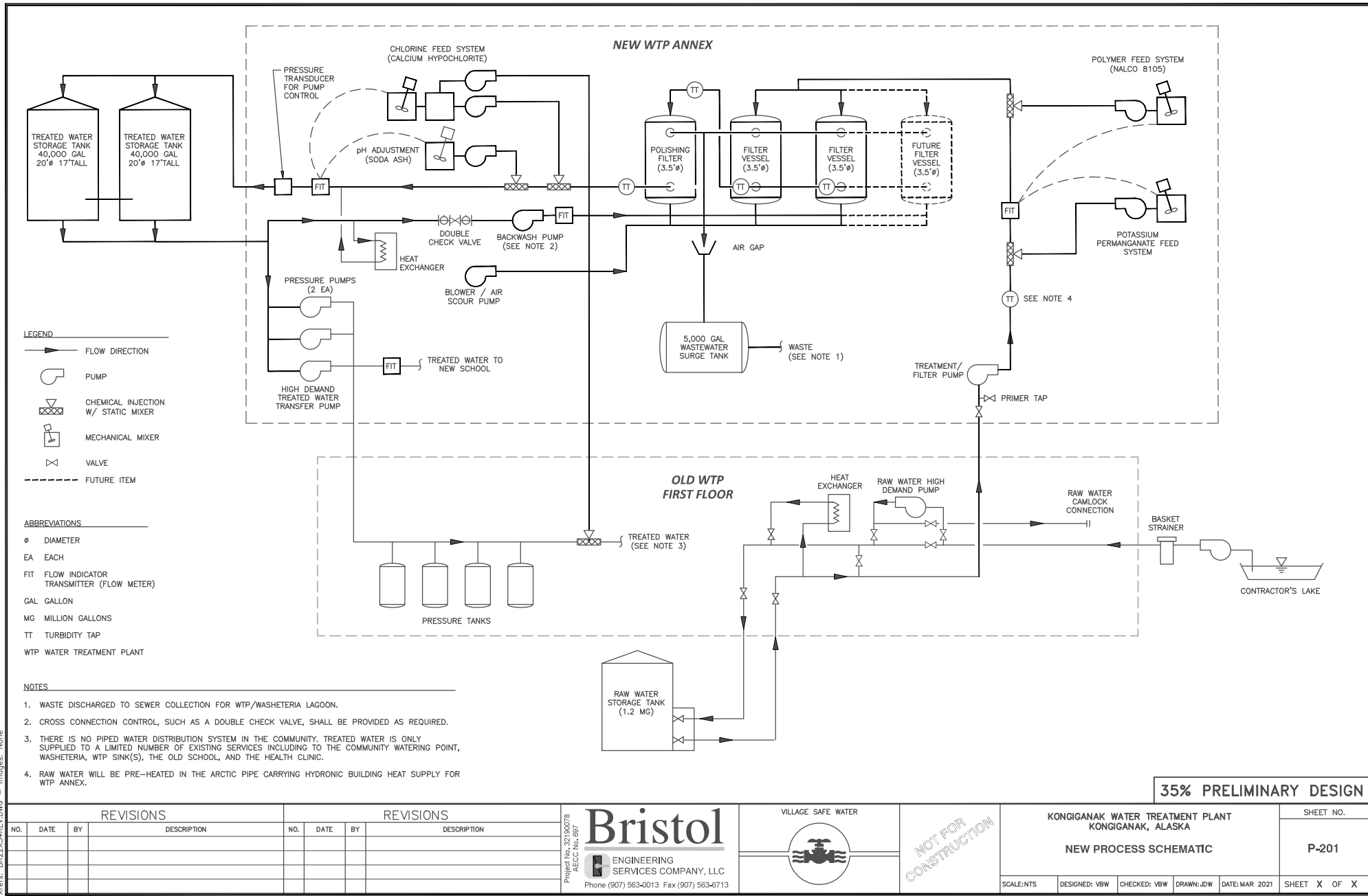
**Bristol**  
ENGINEERING  
SERVICES COMPANY, LLC  
Phone (907) 563-0013 Fax (907) 563-6713



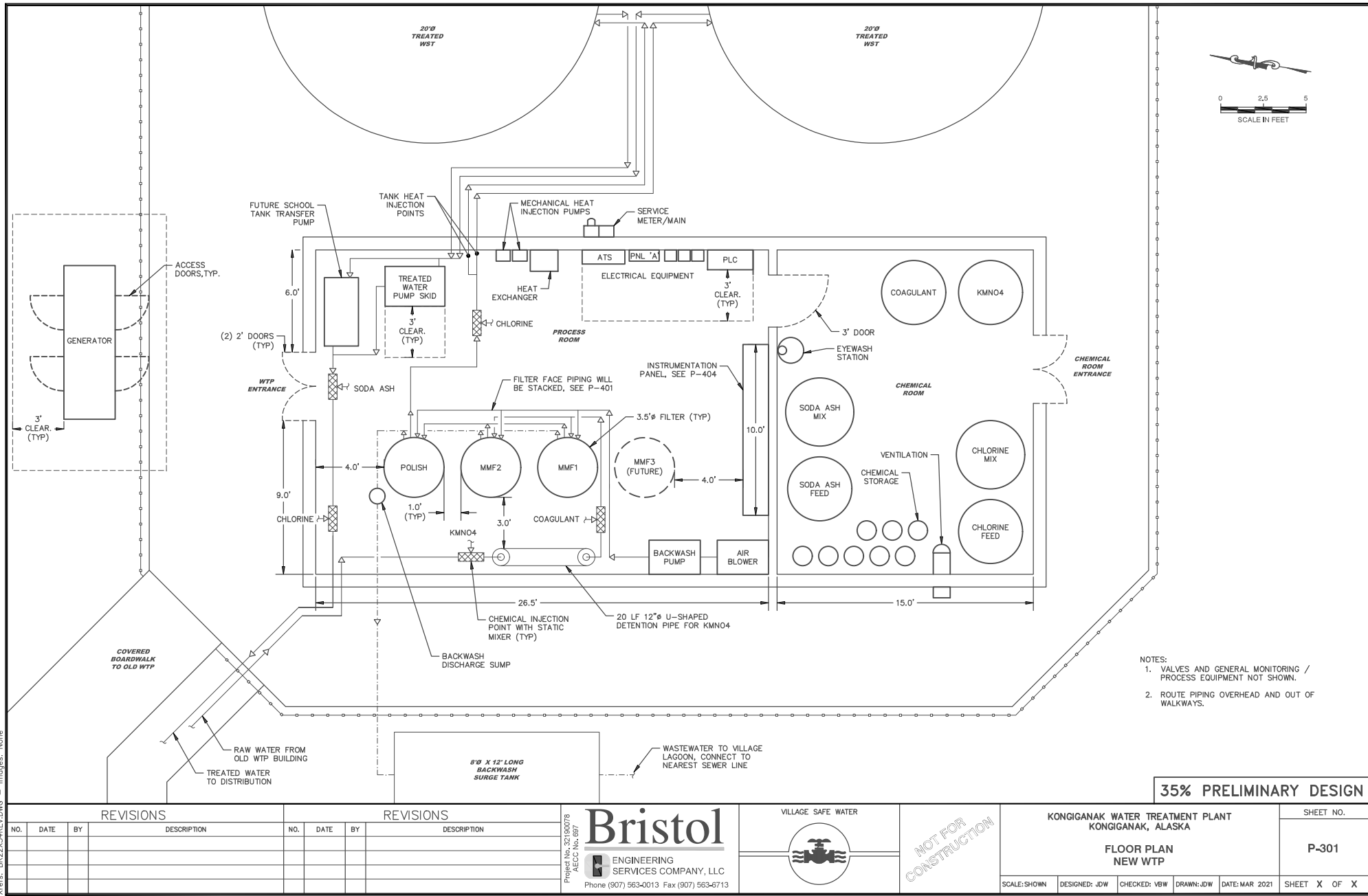
NOT FOR  
CONSTRUCTION

KONGIGANAK WATER TREATMENT PLANT KONGIGANAK, ALASKA					SHEET NO.
EXISTING PROCESS SCHEMATIC					P-101
SCALE: NTS	DESIGNED: DWB	CHECKED: VBW	DRAWN: DWB	DATE: MAR 2021	SHEET X OF X

User: WANDER Mar 17, 2021 - 1:22pm  
Drawing: K:\JOBS\32190078 KONGIGANAK  
Xref: BR2234REV.DWG - Images: None



User: J\WANDER Mar 17, 2021 - 1:23pm  
Drawing: K:\JOBS\32190078 KONGIGANAK VSM ACAD-DESIGN\DWG P-301\_FLOOR PLANDWG - Layout: P-301  
Xrefs: BR2234REV.DWG - Images: None



- NOTES:
1. VALVES AND GENERAL MONITORING / PROCESS EQUIPMENT NOT SHOWN.
  2. ROUTE PIPING OVERHEAD AND OUT OF WALKWAYS.

35% PRELIMINARY DESIGN

REVISIONS				REVISIONS			
NO.	DATE	BY	DESCRIPTION	NO.	DATE	BY	DESCRIPTION

Project No. 32190078  
A/E/C No. 687

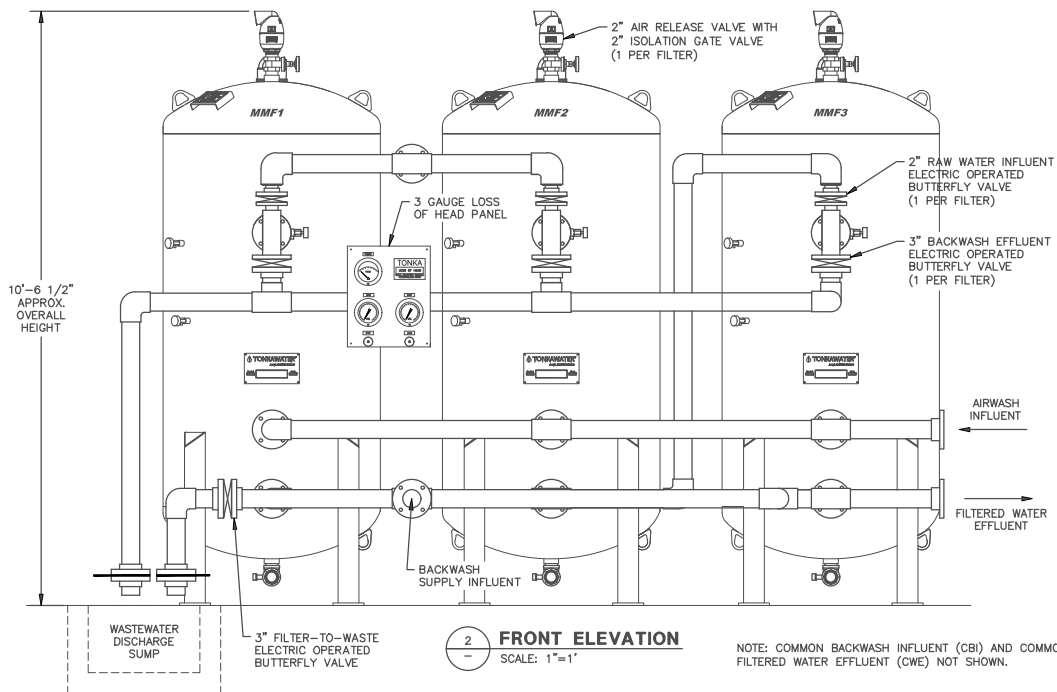
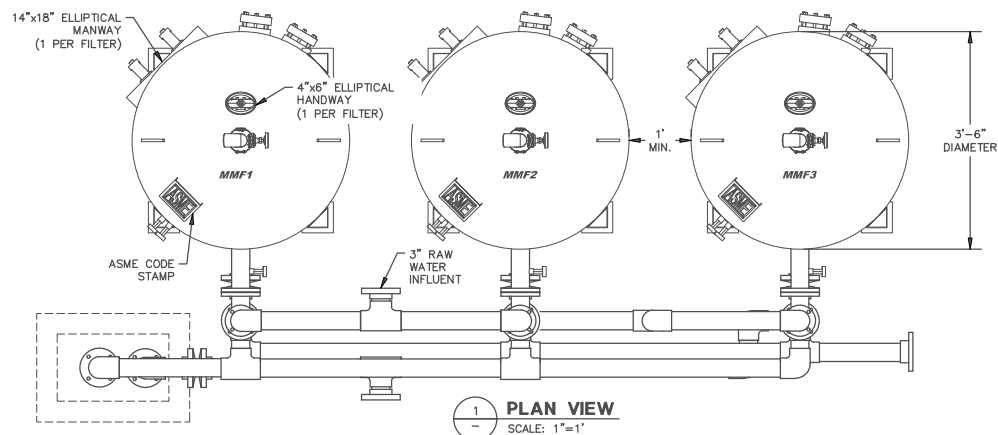
**Bristol**  
ENGINEERING  
SERVICES COMPANY, LLC  
Phone (907) 563-0013 Fax (907) 563-6713

VILLAGE SAFE WATER

NOT FOR  
CONSTRUCTION

KONGIGANAK WATER TREATMENT PLANT KONGIGANAK, ALASKA						SHEET NO.
FLOOR PLAN NEW WTP						P-301
SCALE: SHOWN	DESIGNED: JDW	CHECKED: VBW	DRAWN: JDW	DATE: MAR 2021	SHEET X OF X	





NOTE: COMMON BACKWASH INFLUENT (CBI) AND COMMON FILTERED WATER EFFLUENT (CWE) NOT SHOWN.

#### VERTACELL™ PRESSURE FILTER SPECIFICATIONS:

NUMBER OF FILTERS:  
TWO (2) IN PARALLEL FOLLOWED BY ONE (1) POLISHING FILTER IN SERIES

FILTER AREA:  
9.6 SQ. FT./FILTER

FILTRATION RATE:  
24 GPM (1.3 GPM/SQ.FT./FILTER)

BACKWASH RATE:  
144 GPM (15 GPM/SQ. FT./FILTER)  
(APPROXIMATE BACKWASH RATE ONLY. ACTUAL RATE SET BY TECHNICIAN AT START-UP)

SIMUL-WASH™ WATER RATE:  
43 GPM (5 GPM/SQ. FT.) PER FILTER  
AIR RATE:  
29 CFM (3 CFM/SQ. FT.)

SUPPORT GRAVELS:  
4" DEPTH = 3/4" x 1/2" GRADED GRAVEL  
4" DEPTH = 1/2" x 1/4" GRADED GRAVEL  
4" DEPTH = 1/4" x 1/8" GRADED GRAVEL  
3" DEPTH = TORPEDO SAND

FILTER MEDIA:  
18" SILICA SAND, 0.45-0.55 mm  
WITH A UNIFORMITY COEFFICIENT  
LESS THAN 1.6

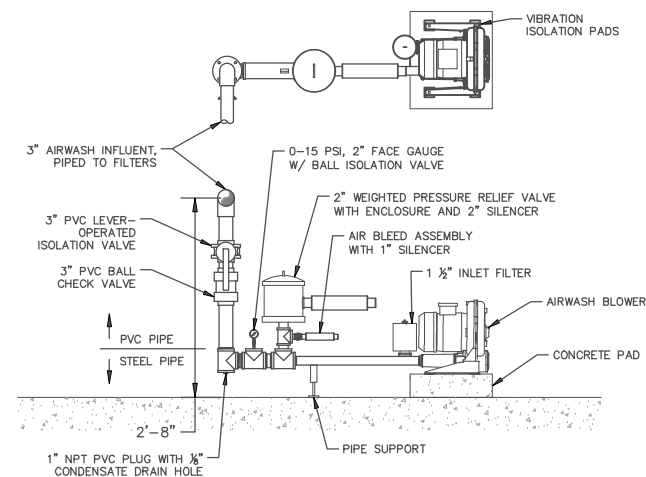
12" ANTHRACITE, 0.8-1.0 mm  
WITH A UNIFORMITY COEFFICIENT  
LESS THAN 1.6

UNDERDRAIN:  
TONKA PVC HEADER/LATERAL  
UNDERDRAIN COLLECTION/BACKWASH  
WATER DISTRIBUTION SYSTEM WITH  
TONKA ABS DIFFUSER NOZZLES

CONSTRUCTION:  
WORKING PRESSURE-100 PSIG  
HYDROSTATIC TEST PRESSURE-130 PSIG  
BUILT TO ASME CODE AND STAMPED.

PIPE:  
SCHEDULE 40 AND 80 PVC

TANK FLANGES:  
150 LBS. SLIP ON WELDED FLANGES.  
WELDED ON SPLIT CENTERS.



**35% PRELIMINARY DESIGN**

#### REVISIONS

NO.	DATE	BY	DESCRIPTION

#### REVISIONS

NO.	DATE	BY	DESCRIPTION

Project No. 32190078  
AEC No. 687  
**Bristol**  
ENGINEERING  
SERVICES COMPANY, LLC  
Phone (907) 563-0013 Fax (907) 563-6713

VILLAGE SAFE WATER



NOT FOR  
CONSTRUCTION

KONGIGANAK WATER TREATMENT PLANT  
KONGIGANAK, ALASKA

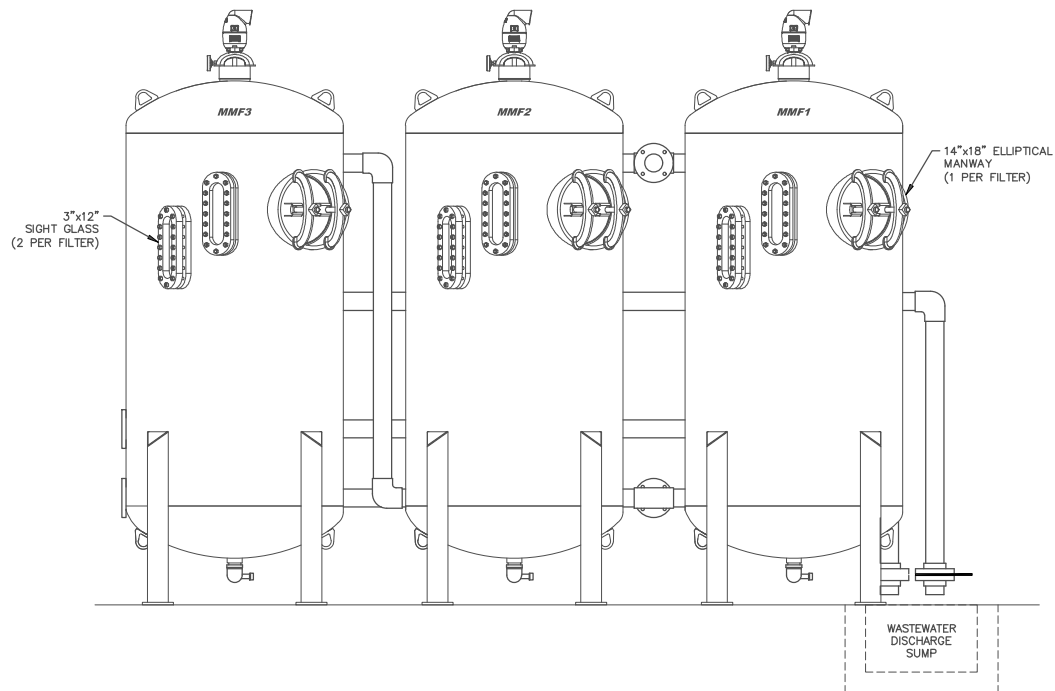
PROCESS DETAILS  
FILTERS

SCALE: SHOWN DESIGNED: VBW CHECKED: VBW DRAWN: JDW DATE: MAR 2021 SHEET X OF X

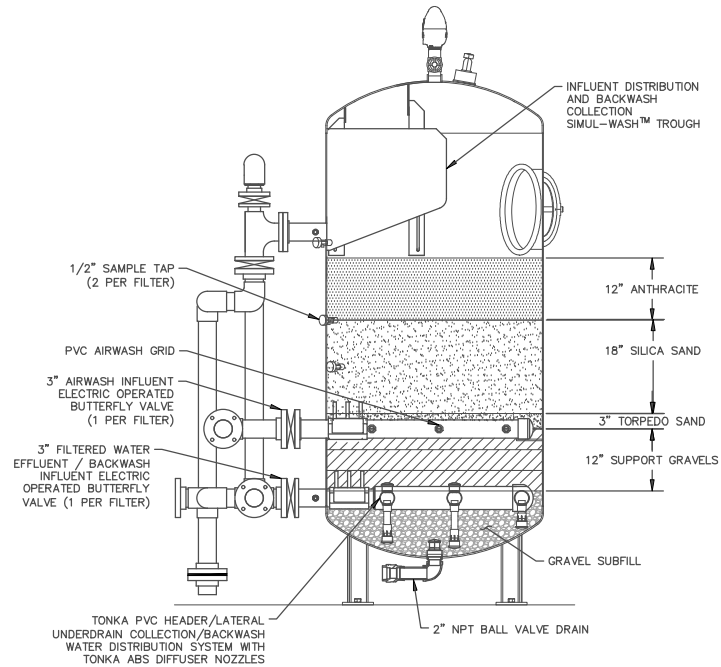
SHEET NO.

P-401

User: WANDER Mar 17, 2021 - 1:23pm  
Drawing: K:\JOBS\32190078 KONGIGANAK VSW\ACAD-DESIGN\AR PHASE I\32190078\_KONG\_P-401-405\_PROCESS DETAILS.DWG - Layout: P-402  
Xref: BR2234REV.DWG - Images: None



1 REAR ELEVATION  
SCALE: 1"=1'



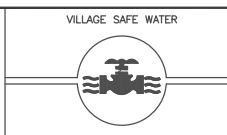
2 SECTION / SIDE ELEVATION  
SCALE: 1"=1'

35% PRELIMINARY DESIGN

REVISIONS				REVISIONS			
NO.	DATE	BY	DESCRIPTION	NO.	DATE	BY	DESCRIPTION

Project No. 32190078  
AEC No. 687

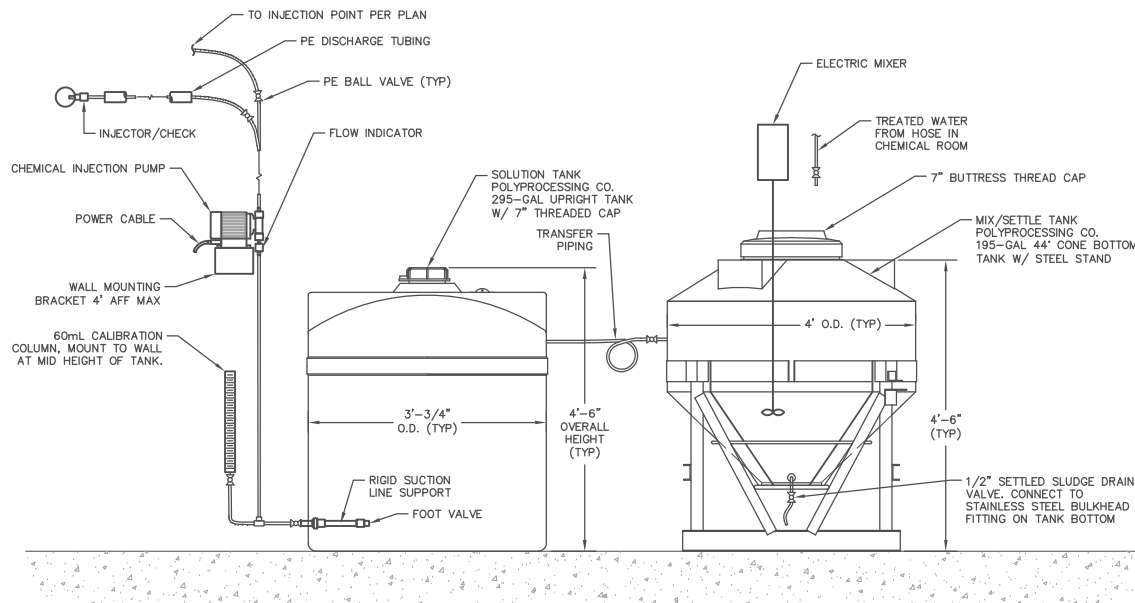
**Bristol**  
ENGINEERING  
SERVICES COMPANY, LLC  
Phone (907) 563-0013 Fax (907) 563-6713



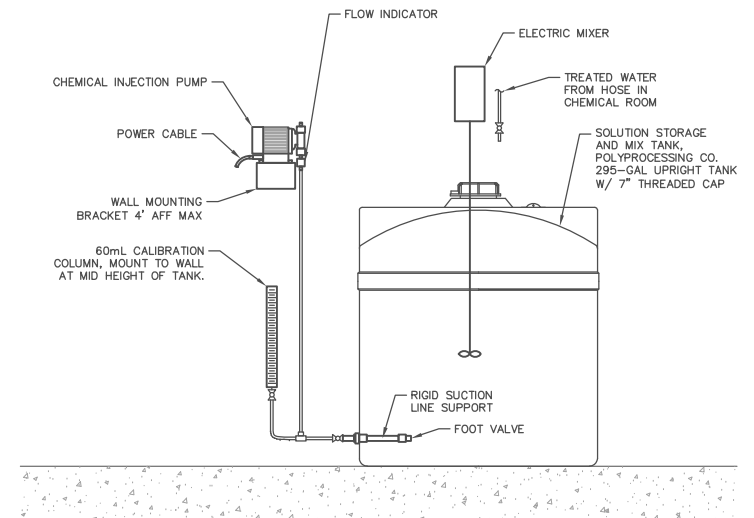
NOT FOR  
CONSTRUCTION

KONGIGANAK WATER TREATMENT PLANT KONGIGANAK, ALASKA						SHEET NO.
PROCESS DETAILS FILTERS						P-402
SCALE: SHOWN	DESIGNED: VBW	CHECKED: VBW	DRAWN: JDW	DATE: MAR 2021	SHEET X OF X	

User: WANDER Mar 26, 2021 - 4:11pm  
Drawing: K:\JOBS\32190078 KONGIGANAK VSW\ACAD-DESIGN\AR PHASE I\32190078\_KONG\_P-401-405\_PROCESS DETAILS.DWG - Layout: P-403  
Xref: BR2234REV.DWG - Images: None



**1 INJECTION SYSTEM - DRY CHEMICALS**  
SCALE: NTS  
USE FOR: CHLORINE, SODA ASH



**2 INJECTION SYSTEM - LIQUID CHEMICALS**  
SCALE: NTS  
USE FOR: COAGULANT, KMNO4

**35% PRELIMINARY DESIGN**

REVISIONS				REVISIONS			
NO.	DATE	BY	DESCRIPTION	NO.	DATE	BY	DESCRIPTION

**Bristol**  
ENGINEERING  
SERVICES COMPANY, LLC  
Phone (907) 563-0013 Fax (907) 563-6713

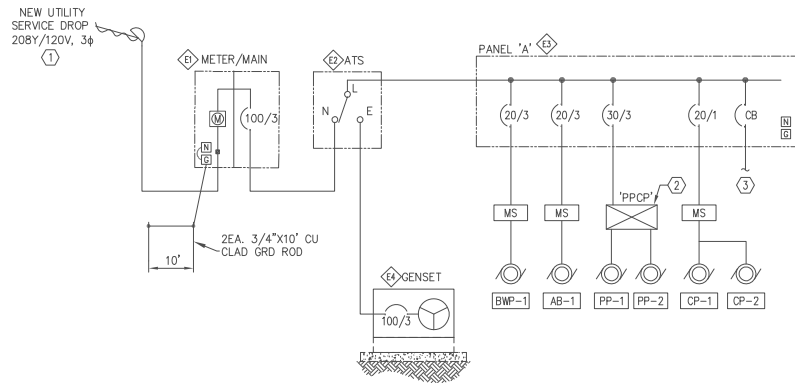
VILLAGE SAFE WATER

**NOT FOR  
CONSTRUCTION**

KONGIGANAK WATER TREATMENT PLANT KONGIGANAK, ALASKA						SHEET NO.
PROCESS DETAILS CHEMICAL TANKS						P-403
SCALE: NTS	DESIGNED: VBW	CHECKED: VBW	DRAWN: JDW	DATE: MAR 2021	SHEET X OF X	



User: JOINP Mar 11, 2021 - 1:51pm  
Drawing: P:\PROJECTS\BRISTOL ENVIRON\KONGIGANAK WTP\DWGS\ELEC\E-601 WTP POWER ONE-LINE.DWG - Layout: E-601 WTP POWER ONE-LINES  
Xrefs: X:\KONGIGANAK WTP BORDER.DWG - Images: None



1 POWER ONE-LINE - NEW WATER TREATMENT PLANT  
E-601 SCALE: NTS

#### SHEET NOTES

- 1 PROVIDE INSTALLATION OF NEW 3φ UTILITY SERVICE. COORDINATE ALL WORK IN ACCORDANCE WITH THE UTILITY'S REQUIREMENTS.
- 2 PRESSURE PUMP CONTROL PANEL (PPCP). SKID MOUNTED CONTROL PANEL AND PUMPS, USING VARIABLE FREQUENCY DRIVES (VFD) TO MAINTAIN DISTRIBUTION PRESSURE SET POINT.
- 3 ALL OTHER BRANCH CIRCUIT LOADS SUCH AS LIGHTING, RECEPTACLES AND 120V EQUIPMENT ARE NOT SHOWN. ONLY MAJOR EQUIPMENT LOADS RELATED TO THE TREATMENT PROCESS.

#### EQUIPMENT CONNECTION SCHEDULE

TAG ID	LOAD					CIRCUIT SIZE	NOTES
	KVA	HP	FLA	V	PH		
BWP-1				208	3	SEE POWER ONE-LINE	BACKWASH PUMP
AB-1				208	3	SEE POWER ONE-LINE	AIR BLOWER
PP-1				208	3	SEE POWER ONE-LINE	PRESSURE PUMP 1
PP-2				208	3	SEE POWER ONE-LINE	PRESSURE PUMP 2
CP-1				120	1	SEE POWER ONE-LINE	GLYCOL CIRC PUMP 1
CP-2				120	1	SEE POWER ONE-LINE	GLYCOL CIRC PUMP 2

#### ELECTRICAL EQUIPMENT SCHEDULE

ITEM NO.	DESCRIPTION	MANUFACTURER/ NOTES
E1	100A, 208Y/120V, 3φ, 4W METER/MAIN, NEMA 3R	EQUIPMENT IN ACCORDANCE WITH UTILITY STANDARDS
E2	100A, 208V, 3φ, 4W, 3PDT, NEMA 3R AUTOMATIC TRANSFER SWITCH 'ATS'	
E3	100A, 208Y/120V, 3φ, 4W PANELBOARD, 42 SPACE, NEMA 1	SQUARE D
E4	25KW, 208Y/120V, 3φ, 4W, STANDBY DIESEL-FIRED GENERATOR SET WITH INTEGRAL FUEL TANK IN WEATHERPROOF/SOUND ATTENUATED ENCLOSURE	

35% DESIGN SUBMITTAL

#### REVISIONS

NO.	DATE	BY	DESCRIPTION

#### REVISIONS

NO.	DATE	BY	DESCRIPTION



VILLAGE SAFE WATER



NOT FOR CONSTRUCTION

KONGIGANAK WATER TREATMENT PLANT  
KONGIGANAK, ALASKA

WTP POWER ONE-LINE

SCALE: AS NOTED DESIGNED: JP CHECKED: JP DRAWN: OM DATE: MAR 2021

SHEET NO.

E-601

SHEET X OF X