HOWARD COUNTY HEALTH DEPARTMENT

64804

DATE 3/15/17

Received From Chesapeake Ecosystems PHONE # 459-5020

For Well Permit / 9001 Furnace Ave.

☐ CASH

☒ CHECK

NO. 39515

One hundred sixty Dollars

$ 160.00

Received By

C 1 53255 — SEQUENCE NO. (MDE USE ONLY)

1 2 3 6 (THIS NUMBER IS TO BE PUNCHED IN COLS. 3-6 ON ALL CARDS)

STATE OF MARYLAND
WELL COMPLETION REPORT
FILL IN THIS FORM COMPLETELY
PLEASE TYPE

THIS REPORT MUST BE SUBMITTED WITHIN 45 DAYS AFTER WELL IS COMPLETED.

COUNTY NUMBER 30111

ST/CO USE ONLY — DATE Received MM DD YY: 06/28/09 (8–13)

DATE WELL COMPLETED MM DD YY (15–20): 05 23 09

Approved 7/9/2009 LD

Depth of Well (22–26): 400 (TO NEAREST FOOT)

PERMIT NO. FROM "PERMIT TO DRILL WELL" (28–37): HO 18 - 0067

OWNER Naylor (last name) Gregory (first name)

WELL SITE ADDRESS 7007 Furrow Ave TOWN Ellicott City

SUBDIVISION 9114 SECTION LOT 19

WELL LOG
Not required for driven wells

STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING

DESCRIPTION (Use additional sheets if needed)	FEET FROM	FEET TO	check if water bearing
Moist Dense Brown Fine Sandy Silt	0	60	
Wet Dark Brown C-F Silty Mica	60	110	
Weathered Rock	110	120	
Rock	120	400	
2X Geothermal			

NUMBER OF UNSUCCESSFUL WELLS: 0

WELL HYDROFRACTURED: yes [Y] no [N]

CIRCLE APPROPRIATE LETTER
- A — A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED
- E — ELECTRIC LOG OBTAINED
- P — TEST WELL CONVERTED TO PRODUCTION WELL

I HEREBY CERTIFY THAT THIS WELL HAS BEEN CONSTRUCTED IN ACCORDANCE WITH COMAR 26.04.04 "WELL CONSTRUCTION" AND IN CONFORMANCE WITH ALL CONDITIONS STATED IN THE ABOVE CAPTIONED PERMIT, AND THAT THE INFORMATION PRESENTED HEREIN IS ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE.

DRILLERS LIC. NO. M D 598

Wes Wolfe
DRILLERS SIGNATURE (MUST MATCH SIGNATURE ON APPLICATION)

LIC. NO. ___ D ___

SITE SUPERVISOR (sign. of driller or journeyman responsible for sitework if different from permittee)

GROUTING RECORD
WELL HAS BEEN GROUTED (Circle Appropriate Box) yes [Y] (44) no [N] (44)

TYPE OF GROUTING MATERIAL (Circle one)

CEMENT [C M] (45 46) BENTONITE CLAY [B C] (45 46)

NO. OF BAGS 18 NO. OF POUNDS 900

GALLONS OF WATER 132

DEPTH OF GROUT SEAL (to nearest foot)

from 0 (48–52 TOP) ft. to 40 (54–58 BOTTOM) ft.

(enter 0 if from surface)

CASING RECORD
casing types insert appropriate code below: [S T] STEEL, [C O] CONCRETE, [P L] PLASTIC, [O T] OTHER

MAIN CASING TYPE (60–61)	Nominal diameter top (main) casing (nearest inch) (63–64)	Total depth of main casing (nearest foot) (66–70)

EACH CASING — OTHER CASING (if used)

	diameter inch	depth (feet) from	depth (feet) to

SCREEN RECORD
screen type or open hole — insert appropriate code below: [S T] STEEL, [B R] BRASS, BRONZE, [P L] PLASTIC, [H O] OPEN HOLE, [O T] OTHER

C 2 (1–2)

DEPTH (nearest ft.)

EACH SCREEN

1	8–9	11–15	17–21		
2	23–24	26–30	32–36		
3	38–39	41–45	47–51		

SLOT SIZE 1 ____ 2 ____ 3 ____

DIAMETER OF SCREEN ____ (NEAREST INCH) (56–60)

from ____ to ____

GRAVEL PACK IF WELL DRILLED WAS FLOWING WELL INSERT F IN BOX 68 ____ (68)

MDE USE ONLY (NOT TO BE FILLED IN BY DRILLER)

T (E.R.O.S.) W Q

70 ____ TELESCOPE CASING

72 ____ LOG INDICATOR

74 75 78 ____ OTHER DATA

C 3 (1–2)

PUMPING TEST
HOURS PUMPED (nearest hour) ____ (8–9)

PUMPING RATE (gal. per min.) ____ (11–15)

METHOD USED TO MEASURE PUMPING RATE ____

WATER LEVEL (distance from land surface)

BEFORE PUMPING ____ ft. (17–20)

WHEN PUMPING ____ ft. (22–25)

TYPE OF PUMP USED (for test)

[A] air (27) [P] piston (27) [T] turbine (27)

[C] centrifugal (27) [R] rotary (27) [O] other (describe below) (27)

[J] jet (27) [S] submersible (27)

PUMP INSTALLED
DRILLER INSTALLED PUMP (CIRCLE) (YES or NO) YES NO

IF DRILLER INSTALLS PUMP, THIS SECTION MUST BE COMPLETED FOR ALL WELLS.

TYPE OF PUMP INSTALLED PLACE (A,C,J,P,R,S,T,O) IN BOX 29. ____ (29)

CAPACITY: GALLONS PER MINUTE (to nearest gallon) ____ (31–35)

PUMP HORSE POWER ____ (37–41)

PUMP COLUMN LENGTH (nearest ft.) ____ (43–47)

CASING HEIGHT (circle appropriate box and enter casing height)

[+] above (49) / [–] below (49) LAND SURFACE

____ (nearest foot) (50–51)

LATITUDE 39.311947

LONGITUDE 76.829775

(DEFAULT COORD. WGS 84)

Pursuant to §10-624 of the State Govt. Article of the Maryand Code personal info. requested on this form is used in processing this form pursuant to COMAR 26.04.04. Failure to provide the info. may result in this form not being processed. You have the right to inspect, amend, or correct this form. The Maryland Department of the Environment is subject to the Maryland Public Information Act. This form may be made available on the Internet via MDE's website and is subject to inspection or copying, in whole or in part, by the pulic and other governmental agencies, if not protected by federal or state law.

EMERGENCY/TEMP NO. IF ANY

TAG = N/A

B 1 | SEQUENCE NO. (MDE USE ONLY): 62847 | 1 2 3 6

STATE OF MARYLAND
APPLICATION FOR PERMIT TO DRILL WELL
please type

STATE PERMIT NUMBER: HO-18-0067 (70 79)

fill in this form completely

Date Received (APA): 8 MM DD YY 13

OWNER INFORMATION

15 Last Name: Naylor | Owner | First Name: Gregory 34

36 Street or RFD: 9007 Furrow Avenue 55

57 Town: Ellicott City 70 State: MD 72 Zip: 21042-1841 76

DRILLER INFORMATION

Driller's Name: Wes Wolfe | M | ND 598 (76 License No. 81)

Firm Name: Chesapeake Geosystems, Inc.

Address: 6720 Fort Smallwood Rd Balt.

Signature: Wes Wolfe | Date: 3/21/19

B 2 WELL INFORMATION

1 2

APPROX. PUMPING RATE (GAL. PER MIN.): N/A (8 12)

AVERAGE DAILY QUANTITY NEEDED (GAL. PER DAY): N/A (14 20)

USE FOR WATER (CIRCLE APPROPRIATE BOX)

22
- [D] DOMESTIC POTABLE SUPPLY & RESIDENTIAL IRRIGATION
- [F] FARMING (LIVESTOCK WATERING & AGRICULTURAL IRRIGATION)
- [I] INDUSTRIAL, COMMERCIAL, DEWATERING
- [P] PUBLIC WATER SUPPLY WELL
- [T] TEST, OBSERVATION, MONITORING
- [O] OPEN LOOP GEOTHERMAL
- [C] CLOSED LOOP GEOTHERMAL

APPROXIMATE DEPTH OF WELL: 400 FEET (24 28)

APPROXIMATE DIAMETER OF WELL: 6 NEAREST INCH

METHOD OF DRILLING (circle one)

30 BORED (or Augered) | JETTED | Jetted & DRIVEN
AIR-ROTary | AIR-PERcussion | ROTARY (Hydraulic Rotary)
37 CABLE | REVerse-ROTary | DRive-POINT
other

REPLACEMENT OR DEEPENED WELLS
(CIRCLE APPROPRIATE BOX)

- [N] THIS WELL WILL NOT REPLACE AN EXISTING WELL
- [Y] THIS WELL WILL REPLACE A WELL THAT WILL BE ABANDONED AND SEALED
- 39 [S] THIS WELL WILL REPLACE A WELL THAT WILL BE USED AS A STANDBY-CONTACT LOCAL APPROVING AUTHORITY FOR POLICY ON STANDBY WELLS
- [D] THIS WELL WILL DEEPEN AN EXISTING WELL

PERMIT NUMBER OF WELL TO BE REPLACED OR DEEPENED (IF AVAILABLE) 41 ____-____-____ 52

Not to be filled in by driller (MDE OR COUNTY USE ONLY)

APPROP. PERMIT NUMBER ------G---

PERMIT No. HO-18-0067 (70 71 72 73 74 75 76 77 78 79)

B 3 LOCATION OF WELL

8 COUNTY: Howard County 21

23 SUBDIVISION: 9114 42

SECTION (44 46) | LOT: 19 (48 50)

52 NEAREST TOWN: Ellicott City 71

B 4

SOURCES OF DRILLING WATER
1. municipal
2.
3.

11 STREET ADDRESS: 9007 Furrow Avenue 30

ON WHICH SIDE OF ROAD (CIRCLE APPROPRIATE BOX): NORTH N, W WEST, E EAST, S SOUTH

34 70 37 DISTANCE FROM ROAD: FT (38 39 ENTER FT OR MI)

TAX MAP: 17 BLK: 5 PARCEL 30

NOT TO BE FILLED IN BY DRILLER
HEALTH DEPARTMENT APPROVAL

COUNTY NAME: HOWARD | COUNTY NO.: XIII

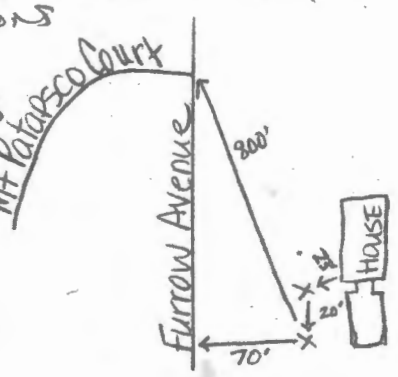
STATE SIGNATURE | INSERT S → 41

DATE ISSUED: 05/06/2019 | CO SIGNATURE | EXP. DATE: 05/06/2020
43 MM DD YY 48

DOW: 5/21/2019 DOC: 05/23/2019 DOY: N/A

PROPOSED LOCATION OF WELL ON LOT
SHOW PERMANENT STRUCTURES SUCH AS BUILDINGS, SEPTIC SYSTEM, ROADS AND/OR LANDMARKS AND INDICATE NOT LESS THAN TWO DISTANCE MEASUREMENTS TO WELL

INSPECTIONS AFTER ACTIVITIES COMPLETED FOR THE DAM



N

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SPECIAL CONDITIONS
NOTE APPROVING AUTHORITIES SHOULD USE SEPARATE SHEET IF NEEDED: CALL IN WELL ACTIVITIES FOR INSP. X1771

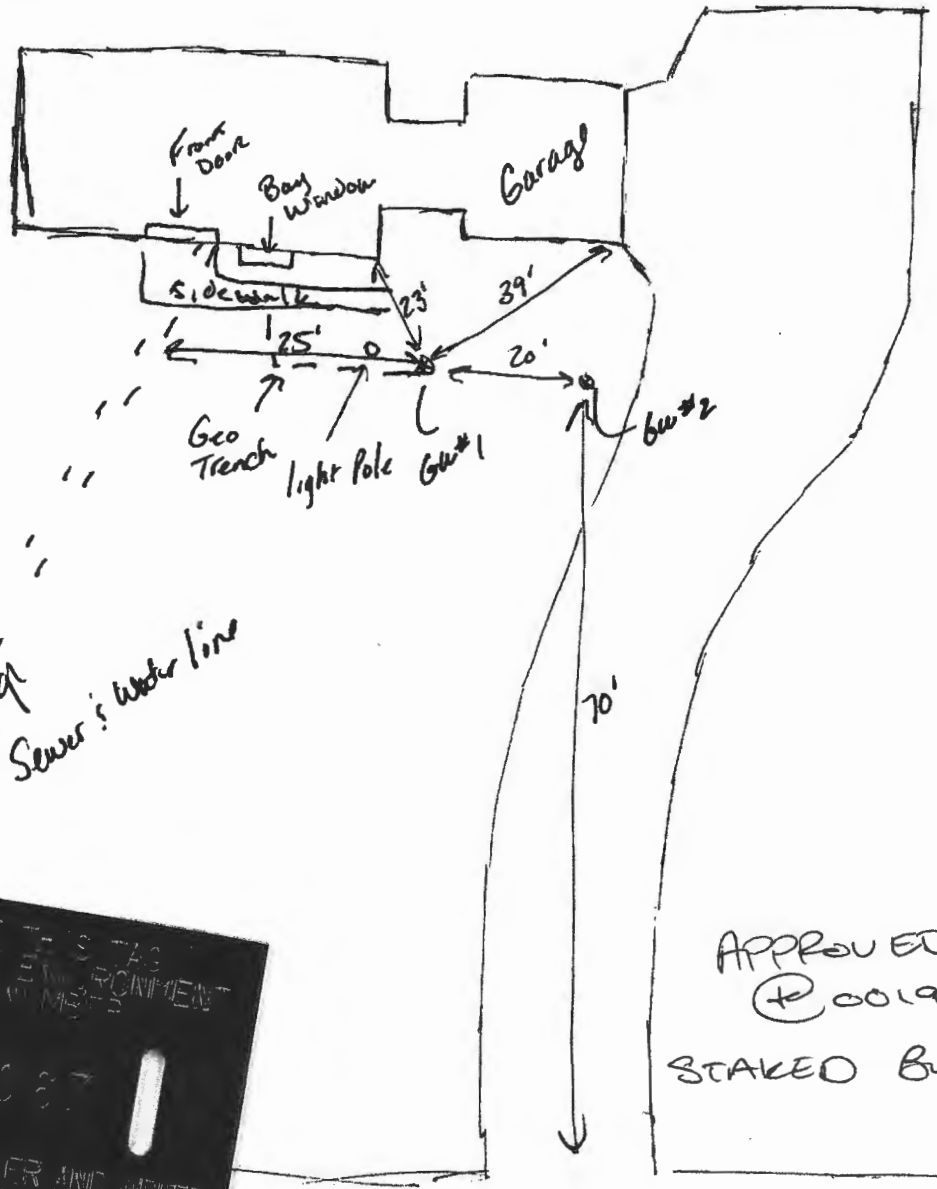
MDE/WMA/PER.071

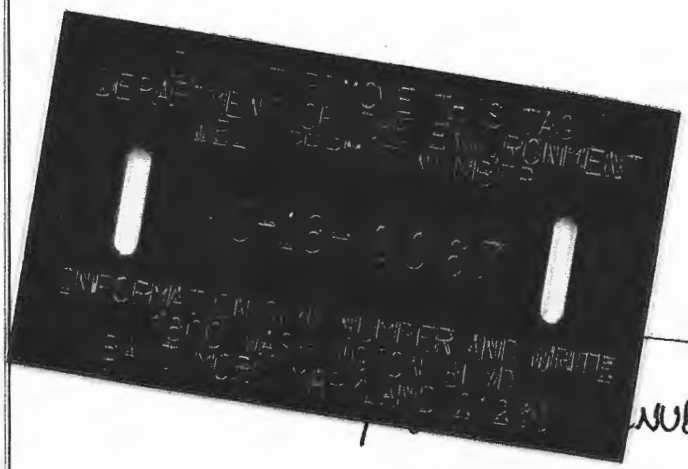
② COUNTY

22' Trench from Well to Mobile Shot. (32' TOTAL TO WALL)

Greg Naylor
9007 Furrow Ave
Ellicott City Md 21042

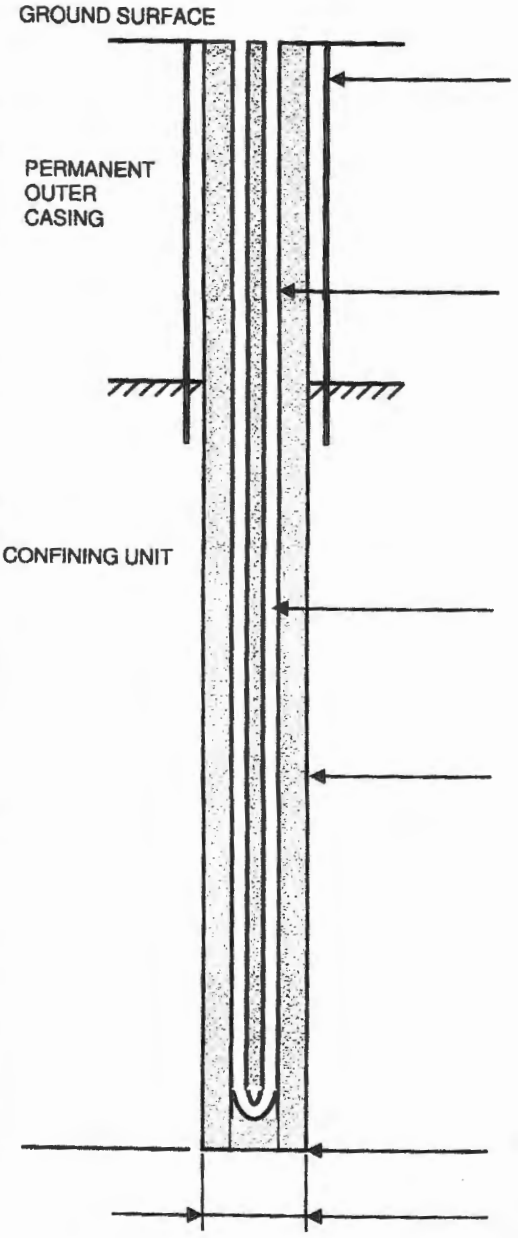
2 wells @ 400' each
w/ 1.25" Closed Loop
geothermal





APPROVED 05/06/2019
#001997
STAKED BY DRILLER

WELL SCHEMATIC FORM



PERMANENT OUTER CASING (if area contaminated)

MATERIAL _____

DIAMETER _____

LENGTH _____

DEPTH INTO CONFINING UNIT _____

TUBE CASING (if not regular, single loop)

ATTACH HORIZONTAL SCHEMATIC

NUMBER OF TUBES PER BOREHOLE _____

DIAMETER OF TUBES _____

MATERIAL _____

SHAPE AND LENGTH _____

TUBE CONNECTION METHOD _____

TUBE CONNECTION MATERIAL _____

LOOP PIPE CASING (regular, single loop)

MATERIAL HDPE? YES ☑ NO ☐

DIAMETER 1.25"

LENGTH 405'

GROUT

MATERIAL Bentonite

PERMEABILITY 1×10^{-7}

WATER / GROUT RATIO 24/50

PERCENT SOLIDS 20%

TREMIE GROUTED FROM BOTTOM OF BOREHOLE ? YES ☒ NO ☐

USING A POSITIVE DISPLACEMENT PUMP? YES ☒ NO ☐

DEPTH TO THE BOTTOM OF HOLE 400'

DIAMETER OF BOREHOLE 6"

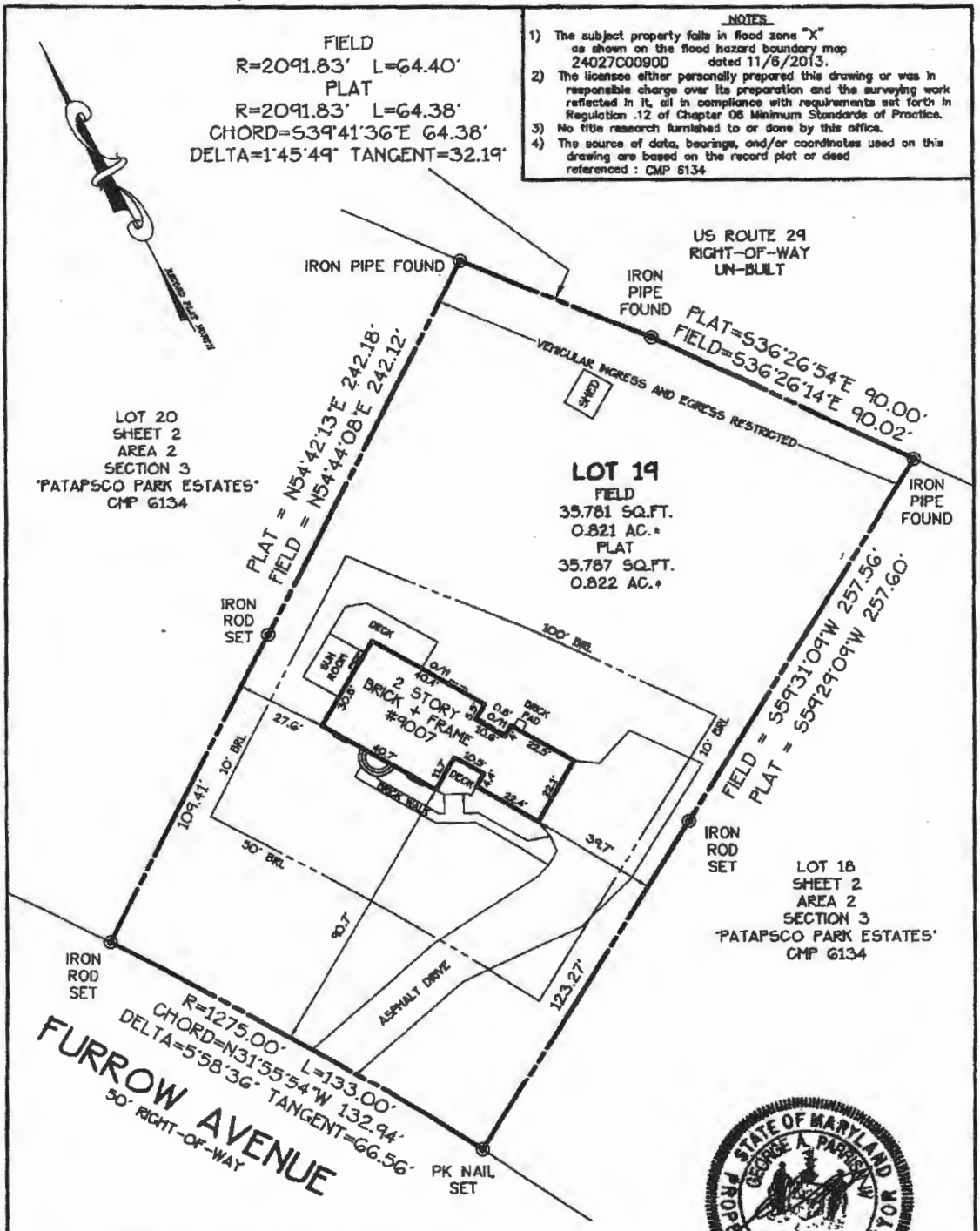
WELL ADDRESS 9007 Furrow Ave Ellicott City Md 21042

LOT NUMBER: 19

SQUARE NUMBER: _____

WELL OWNER: Greg Naylor

OWNER ADDRESS: 9007 Furrow Ave Ellicott City Md 21042



I hereby certify to the best of my professional knowledge and belief, that the property shown hereon has been accurately surveyed by a transit, tape or total-station survey (subject to title search), and that the improvements shown hereon, have been accurately located.

GEORGE A. PARRISH IV PROP. L.S. #577 4/22/14
LICENSE EXPIRATION DATE: 3/24/2015

9007 FURROW AVENUE CMP 6134

BOUNDARY SURVEY AND LOCATION DRAWING
LOT 19 SHEET 2 AREA 2 SECTION 3
PATAPSCO PARK ESTATES

SECOND DISTRICT
HOWARD COUNTY, MARYLAND
SCALE: 1" = 40' APRIL 2014
FILE #110 PROJECT #39867
CAD FILENAME: PATAPSCOPARKEST-A2-S3-SH2-L19
DRAWN BY: JMS CHECKED BY:

ADVANCED SURVEYS
Established 1979
3140 West Ward Road Suite 103
Dunkirk, Maryland 20754
Ph: 410-286-9712 Fax: 410-286-9716

DEPARTMENT OF INSPECTIONS, LICENSES & PERMITS
3430 COURT HOUSE DRIVE
ELLICOTT CITY, MD 21043
PERMITS (410) 313-2455
INSPECTIONS (410) 313-1850

HOWARD COUNTY RESIDENTIAL HEATING-VENTILATION-AIR CONDITIONING AND REFRIGERATION PERMIT APPLICATION

HVACR PERMIT # M19000172

BUILDING PERMIT #

BUILDING ADDRESS: 9007 Furrow Ave SUITE/APT:

SUBDIVISION:
CENSUS TRACT: SECTION: AREA:
LOT: TAX MAP: PARCEL:
BLOCK: ZONE:

PROPERTY ID: MAP COORDINATES:

TYPE OF IMPROVEMENTS: USE:

OWNERS NAME: Greg Naylor
ADDRESS: 9007 Furrow Ave
CITY: Ellicott City,
STATE: MD ZIP CODE: 21042
HOME PHONE: 410-952-4797 WORK PHONE:

	CHECK ONE	HOW MANY
SINGLE FAMILY DWELLING	X	2 ZONES
SINGLE FAMILY TOWNHOUSE	☐	____ ZONES
MULTI-FAMILY / HOTEL/MOTEL	☐	____ ROOMS
ASSISTED LIVING HOMES (16 OR FEWER RESIDENTS)	☐	____ ROOMS

COMPANY NAME: Total Energy Concepts Inc.
LICENSEE NAME: Terry Artman
ADDRESS: PO Box 605
CITY: Churchville
STATE: MD ZIP CODE: 21028
PHONE: 410-452-0562 HVACR LICENSE NO: 14202-01

New
- ☐ Heating and Air Conditioning
- ☐ Geo Thermal System
- ☐ Heating System Only
- ☐ Ductless Mini Splits
- ☐ Other Work (Describe):
- ☐ Thru The Wall Systems

Replacement
- ☐ Heating
- ☐ Air Conditioning
- X Heating and Air Conditioning / Geothermal

Additions and Alterations
- ☐ Heating
- ☐ Air Conditioning
- ☐ Heating and Air Conditioning

****Replacement Geo Thermal Systems are not required; However, if a tax credit is being sought a permit is required****

Zones		Rooms	
Permit Fee = # of Zones x $40 =	80-	Permit Fee = # of Rooms x $80 =	____
Technology Fee (10% of Permit Fee) =	8-	Technology Fee (10% of Permit Fee) =	____
Plus Application Fee	$50.00	Plus Application Fee $50	$50.00
Total Fees Due =	138-	Total Fees Due =	____

I HAVE CAREFULLY EXAMINED AND READ THIS APPLICATION AND KNOW IT IS TRUE AND CORRECT. THE WORK DESCRIBED HEREIN WILL BE PERFORMED BY A STATE HVACR LICENSED PERSON(S), AND ALL WORK WILL BE PERFORMED IN COMPLIANCE WITH APPLICABLE CODES AND STANDARDS OF HOWARD COUNTY THE STATE OF MARYLAND.

Vice President 3/14/19
SIGNATURE OF LICENSEE DATE

Terry L. Artman
PRINT NAME OF LICENSEE

terry@totalenergycooling.com
Email Address

Approved Septic System Plan
Howard County Health Department
Signature Date 04/26/2019

Make check payable to: DIRECTOR OF FINANCE OF HOWARD COUNTY

Word doc: T:\Updated Forms\hvac application
Rev:10.2009

Validation
Check Number: 17242
Cash: ____
Receipt Number: 5680221

RECEIVED
MAR 14 2019
LICENSES & PERMITS DIVISION

M19000172

Greg Naylor
HVAC Load Calculations

for

Greg Naylor
9007 Furrow Ave
Ellicott City, MD 21042

Elite Software

RHVAC RESIDENTIAL HVAC LOADS

Prepared By:

Terry Artman
Total Energy Concepts, Inc
PO Box 605
Churchville, MD 21028
410-452-0562
Monday, March 11, 2019

Rhvac is an ACCA approved Manual J and Manual D computer program.
Calculations are performed per ACCA Manual J 8th Edition, Version 2, and ACCA Manual D.

Project Report

General Project Information

Project Title:	Greg Naylor
Designed By:	Terry Artman
Project Date:	3/11
Client Name:	Greg Naylor
Client Address:	9007 Furrow Ave
Client City:	Ellicott City, MD 21042
Client Phone:	410-952-4797
Company Name:	Total Energy Concepts, Inc
Company Representative:	Terry Artman
Company Address:	PO Box 605
Company City:	Churchville, MD 21028
Company Phone:	410-452-0562
Company Fax:	410-452-0563
Company E-Mail Address:	terry@totalenergyonline.com

Design Data

Reference City:		Baltimore, Maryland
Building Orientation:		Front door faces West
Daily Temperature Range:		Medium
Latitude:	39	Degrees
Elevation:	148	ft.
Altitude Factor:	0.995	

	Outdoor Dry Bulb	Outdoor Wet Bulb	Outdoor Rel.Hum	Indoor Rel.Hum	Indoor Dry Bulb	Grains Difference
Winter:	0	11.86	n/a	n/a	70	n/a
Summer:	95	75	40%	50%	75	34

Check Figures

Total Building Supply CFM:	1,018	CFM Per Square ft.:	0.405
Square ft. of Room Area:	2,512	Square ft. Per Ton:	630
Volume (ft³):	21,120		

Building Loads

Total Heating Required Including Ventilation Air:	58,236 Btuh	58.236	MBH
Total Sensible Gain:	42,033 Btuh	88	%
Total Latent Gain:	5,827 Btuh	12	%
Total Cooling Required Including Ventilation Air:	47,860 Btuh	3.99	Tons (Based On Sensible + Latent)

Notes

Rhvac is an ACCA approved Manual J and Manual D computer program.
Calculations are performed per ACCA Manual J 8th Edition, Version 2, and ACCA Manual D.
All computed results are estimates as building use and weather may vary.
Be sure to select a unit that meets both sensible and latent loads according to the manufacturer's performance data at your design conditions.

Miscellaneous Report

System 1 First Floor Input Data	Outdoor Dry Bulb	Outdoor Wet Bulb	Outdoor Rel.Hum	Indoor Rel.Hum	Indoor Dry Bulb	Grains Difference
Winter:	0	11.86	100%	n/a	70	n/a
Summer:	95	75	40%	50%	75	34.25

System 2 Second Floor Input Data	Outdoor Dry Bulb	Outdoor Wet Bulb	Outdoor Rel.Hum	Indoor Rel.Hum	Indoor Dry Bulb	Grains Difference
Winter:	0	11.86	100%	n/a	70	n/a
Summer:	95	75	40%	50%	75	34.25

Duct Sizing Inputs

	Main Trunk		Runouts	
Calculate:	Yes		Yes	
Use Schedule:	Yes		Yes	
Roughness Factor:	0.00300		0.01000	
Pressure Drop:	0.1000	in.wg./100 ft.	0.1000	in.wg./100 ft.
Minimum Velocity:	650	ft./min	450	ft./min
Maximum Velocity:	900	ft./min	750	ft./min
Minimum Height:	0	in.	0	in.
Maximum Height:	0	in.	0	in.

Outside Air Data

	Winter		Summer	
Infiltration Specified:	0.467	AC/hr	0.210	AC/hr
	164	CFM	74	CFM
Infiltration Actual:	0.219	AC/hr	0.000	AC/hr
Above Grade Volume:	X 21,120	Cu.ft.	X 21,120	Cu.ft.
	4,618	Cu.ft./hr	0	Cu.ft./hr
	X 0.0167		X 0.0167	
Total Building Infiltration:	77	CFM	0	CFM
Total Building Ventilation:	150	CFM	150	CFM

---System 1---
Infiltration & Ventilation Sensible Gain Multiplier: 21.88 = (1.10 X 0.995 X 20.00 Summer Temp. Difference)
Infiltration & Ventilation Latent Gain Multiplier: 23.17 = (0.68 X 0.995 X 34.25 Grains Difference)
Infiltration & Ventilation Sensible Loss Multiplier: 76.59 = (1.10 X 0.995 X 70.00 Winter Temp. Difference)
Winter Infiltration Specified: 0.410 AC/hr (87 CFM), Construction: Average, Fireplaces: 1, 20 CFM, Average
Summer Infiltration Specified: 0.210 AC/hr (45 CFM), Construction: Average

---System 2---
Infiltration & Ventilation Sensible Gain Multiplier: 21.88 = (1.10 X 0.995 X 20.00 Summer Temp. Difference)
Infiltration & Ventilation Latent Gain Multiplier: 23.17 = (0.68 X 0.995 X 34.25 Grains Difference)
Infiltration & Ventilation Sensible Loss Multiplier: 76.59 = (1.10 X 0.995 X 70.00 Winter Temp. Difference)
Winter Infiltration Specified: 0.410 AC/hr (57 CFM), Construction: Average
Summer Infiltration Specified: 0.210 AC/hr (29 CFM), Construction: Average

Duct Load Factor Scenarios for System 2

No.	Type	Description	Location	Attic Ceiling	Duct Leakage	Duct Insulation	Surface Area	From ITMDD
1	Supply		Attic	16C	0.12	8	281	No
1	Return		Attic	16C	0.12	8	208	No
2	Supply		Cond. Space	-	0.12	6	648	No
2	Return		Cond. Space	-	0.12	6	480	No

Load Preview Report

Scope	Net Ton	ft.²/Ton	Area	Sen Gain	Lat Gain	Net Gain	Sen Loss	Sys Htg CFM	Sys Clg CFM	Sys Act CFM	Duct Size
Building	3.99	630	2,512	42,033	5,827	47,860	58,236	1,018	848	1,018	
System 1	2.00	737	1,472	22,245	1,738	23,983	31,813	596	471	596	9x13
Ventilation				1,641	1,738	3,379	5,744				
Zone 1			1,472	20,604	0	20,604	26,069	596	471	596	9x13
1-Kitchen & Family Room			640	9,055	0	9,055	9,623	220	207	220	2–6
2-Living Room			256	3,216	0	3,216	4,745	108	73	108	1–6
3-Foyer			128	1,341	0	1,341	1,690	39	31	39	1–4
4-Dining Room			256	3,036	0	3,036	3,992	91	69	91	1–6
5-Mud Room			192	3,956	0	3,956	6,019	138	90	138	2–5
System 2	1.99	523	1,040	19,788	4,089	23,877	26,423	422	378	422	8x11
Ventilation				1,641	1,738	3,379	5,744				
Supply Duct Latent					895	895					
Return Duct				1,624	457	2,081	2,199				
Zone 1			1,040	16,523	1,000	17,523	18,480	422	378	422	8x11
6-Master Bedroom			512	8,049	400	8,449	9,081	207	184	207	2–6
7-Bedroom 1			144	2,076	200	2,276	2,042	47	47	47	1–4
8-Bedroom 2			192	2,624	200	2,824	3,270	75	60	75	1–5
9-Bedroom 3			192	3,774	200	3,974	4,087	93	86	93	1–6

Total Building Summary Loads

Component Description	Area Quan	Sen Loss	Lat Gain	Sen Gain	Total Gain
1D-cm-o: Glazing-Double pane, operable window, clear, metal frame no break, u-value 0.87, SHGC 0.67	298	18,151	0	24,064	24,064
12F-2sw: Wall-Frame, R-21 insulation in 2 x 6 stud cavity, R-2 board insulation, siding finish, wood studs	388	1,630	0	426	426
12B-0sw: Wall-Frame, R-11 insulation in 2 x 4 stud cavity, no board insulation, siding finish, wood studs	1554	10,551	0	4,387	4,387
16B-30: Roof/Ceiling-Under Attic with Insulation on Attic Floor (also use for Knee Walls and Partition Ceilings), Vented Attic, No Radiant Barrier, Dark Asphalt Shingles or Dark Metal, Tar and Gravel or Membrane, R-30 insulation	1360	3,047	0	2,393	2,393
19A-0cp: Floor-Over enclosed crawl space, No insulation on exposed walls, sealed or vented space, passive, no floor insulation, carpet or hardwood	192	1,489	0	426	426
Subtotals for structure:		34,868	0	31,696	31,696
People:	5		1,000	1,150	2,150
Equipment:			0	1,200	1,200
Lighting:	0			0	0
Ductwork:		5,984	1,352	4,705	6,057
Infiltration: Winter CFM: 77, Summer CFM: 0		5,896	0	0	0
Ventilation: Winter CFM: 150, Summer CFM: 150		11,488	3,475	3,282	6,757
Total Building Load Totals:		58,236	5,827	42,033	47,860

Check Figures

Total Building Supply CFM:	1,018	CFM Per Square ft.:	0.405
Square ft. of Room Area:	2,512	Square ft. Per Ton:	630
Volume (ft³):	21,120		

Building Loads

Total Heating Required Including Ventilation Air:	58,236	Btuh	58.236	MBH
Total Sensible Gain:	42,033	Btuh	88	%
Total Latent Gain:	5,827	Btuh	12	%
Total Cooling Required Including Ventilation Air:	47,860	Btuh	3.99	Tons (Based On Sensible + Latent)

Notes

Rhvac is an ACCA approved Manual J and Manual D computer program.
Calculations are performed per ACCA Manual J 8th Edition, Version 2, and ACCA Manual D.
All computed results are estimates as building use and weather may vary.
Be sure to select a unit that meets both sensible and latent loads according to the manufacturer's performance data at your design conditions.

Equipment Data - System 1 - First Floor

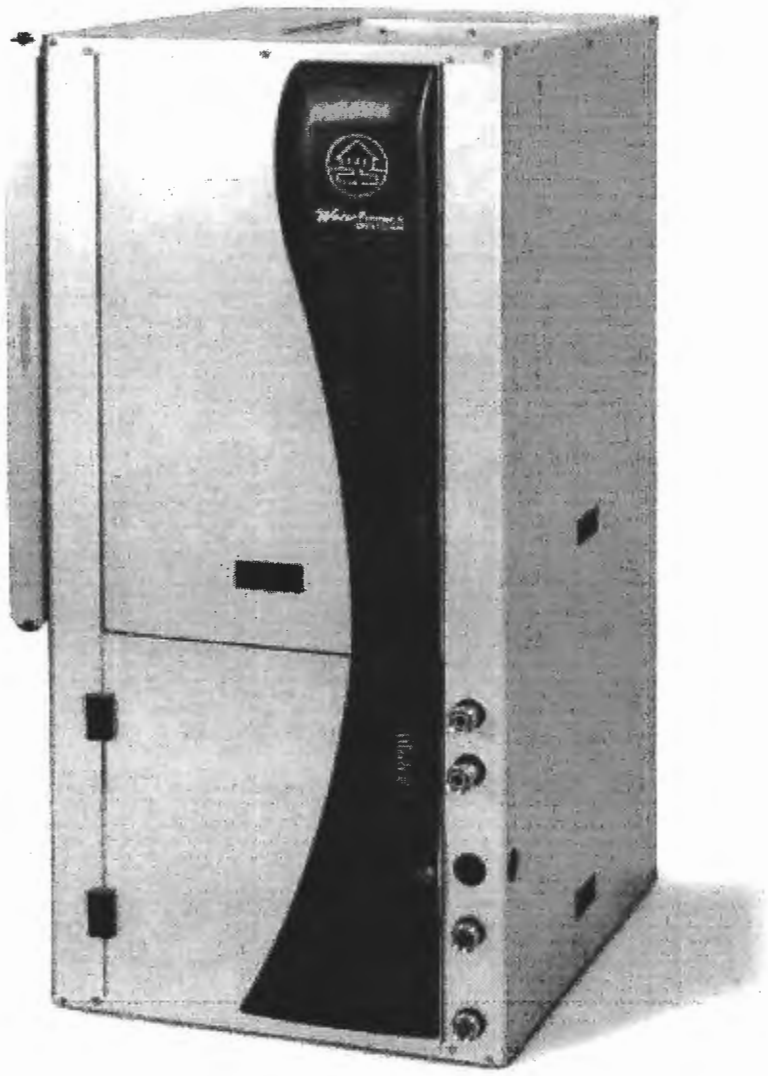
Cooling

System Type:	Two Stage Ground Source HP
Outdoor Model:	NDV/NDH038**4*1
Tradename:	ENVISION SERIES DUAL CAPACITY
Outdoor Manufacturer:	WATERFURNACE INTERNATIONAL, INC.
Description:	Two Stage Ground Source Heat Pump
AHRI Reference No.:	1269488
Capacity:	40200
Efficiency:	Hi: 20.1 / Lo: 30 EER

Heating

System Type:	Two Stage Ground Source HP
Model:	NDV/NDH038**4*1
Tradename:	ENVISION SERIES DUAL CAPACITY
Manufacturer:	WATERFURNACE INTERNATIONAL, INC.
Description:	Two Stage Ground Source Heat Pump
Capacity:	27000
Efficiency:	Hi: 4.2 / Lo: 5 COP

Heat Pump Equipment Picture



Equipment Data - System 2 - Second Floor

Cooling

System Type:	Two Stage Ground Source HP
Outdoor Model:	NDZ026G1
Indoor Model:	NAH026*
Tradename:	5 SERIES INDOOR SPLITS
Outdoor Manufacturer:	WATERFURNACE INTERNATIONAL, INC.
Description:	Two Stage Ground Source Heat Pump
AHRI Reference No.:	6657623
Capacity:	26200
Efficiency:	Hi: 17 / Lo: 24.5 EER

Heating

System Type:	Two Stage Ground Source HP
Model:	NDZ026G1
Tradename:	5 SERIES INDOOR SPLITS
Manufacturer:	WATERFURNACE INTERNATIONAL, INC.
Description:	Two Stage Ground Source Heat Pump
Capacity:	19500
Efficiency:	Hi: 3.9 / Lo: 4.4 COP