GEOTHERMAL APPLICATION

Property Owner's name _____ **Phone No.**_____

Address _____

- Two (2) original signed and ***notarized applications***–***If new owner***, proof of ownership (example deed, contract of sale, etc.)
- Three (3) Engineer's Stamped Plans – see page 6 for additional instructions
- Letter of Intent (commercial)
- Letter of Authorization from Owner (commercial)
- Contractors' and Electrician's Suffolk County license and insurance if not current and on file (Workers' Compensation, Disability and Liability) with valid expiration dates
- Fee – cash or check to the Town of Smithtown – check current fee schedule

Submit this page with application

(To be filled in by Building Department)

Application/Permit # _____ **Date** _____

S.C.T.M _____ **Zoning District** _____

Receipt # _____

Plan Approved by _____ **Date** _____

Permit Issued _____ **Permit Expires** _____

*To receive a **Certificate of Compliance** you must also submit the following:*

1. **Notarized Letter of Certification**
   On "Company Letterhead" reference building permit number and property owner's name and address. Must state that the installation is to manufacturer's specifications and all applicable New York State Building Codes
2. Electric Certificate from an approved Agency
3. Final construction approval
4. As-Built Drawings (see page 3)

Current Fees Payment due with application
Check or cash only

Commercial – $250 Residential $150
(Certificate of Compliance included)

For Design Standards see §112-1.4.Geothermal permitting code

☐ **COMMERCIAL*** ☐ **RESIDENTIAL**

**Approval <u>may</u> be required from Planning and Engineering*

Address/location of System_____

Engineer_____Address_____

Village/City_____State_____Zip_____Tel._____

Fax _____ E-Mail_____

Contractor_____Address_____

Village/City_____State_____Zip_____Tel._____

Fax _____ E-Mail_____

Electrician_____Address_____

Village/City_____State_____Zip_____Tel._____

Fax _____ E-Mail_____

Electrical Inspection Agency_____

Geothermal Systems

(indicate type of system)

☐ ***<u>A Closed Loop System</u>*** uses buried high-density polyethylene (HDPE) plastic piping installed in drilled and grouted boreholes that conductively exchanges thermal (heat) energy with the ground via circulating water or a water/antifreeze mixture through the piping system.

☐ ***<u>An Open Loop System</u>*** *is a series of standard water wells that extract and use groundwater durectkt as a geat-exchange source then return the heated or colled groundwater back to the aquifer*

☐ ***<u>A Direct Exchange System</u>*** *uses buried copper tubing that conductively exhanges heat energy with the ground via circulating a refrigerant through the tubing*

I, _____ as the _____

print name *Agent, Contractor, Engineer, Owner,*

Signature_____

Sworn before me:

This _____day of _____, 20____

_____

Notary stamp

For Design Standards see §112-1.4.Geothermal permitting code

APPLICATION FOR PERMIT

Permit applications shall include, but not be limited to, the following items which may be satisfied by documentation supplied by the design engineer, installer or equipment manufacturer as applicable:

(1) Demonstrate compliance with applicable site plan requirements.

(2) A plot plan on an approved property survey no greater than 1" = 40' scale depicting the limits of the setback zone distance from structures, property lines and public roads.

(3) Certification by the design engineer and/or installer that the Geothermal System complies with all applicable regulations and all applicable state and/or local building codes.

(4) Certification by the design engineer and/or installer that the Geothermal System was installed as designed and that the design and installation complies with the relevant industry standards and guidelines outlined below in section C(2), including but not limited to AirConditioning Contractors of America (ACCA) Manual J heat pump unit sizing for residential systems, ACCA Manual N or comparable load calculation techniques for commercial systems, and manufacturer-specified closed loop and DX field design guidelines

(5) For Open Loop systems only, a one-line diagram of the electrical components on the plot plan (submersible pump power supply)in sufficient detail to allow for a determination that the manner of installation conforms to the National Electric Code, Electrical Code of theTown of Smithtown and the New York State Uniform Fire Prevention and Building Code.

(6) Certification of (1) through (5) above must be performed by a licensed Professional Engineer.

AS-BUILT DRAWINGS

Upon completion of construction, a scaled as-built drawing must be provided showing the locations of buried wells, closed loops, DX boreholes and horizontal connector piping, triangulated from two points on the property such as a building corner or other permanent structure. Offsets must also be shown from the nearest property line,and on-site septic systems and private water wells. As-built drawings must be certified by a licensed Professional Engineer.

DECOMMISSIONING

A. If the Geothermal System remains nonfunctional or inoperative for a continuous period of one year, the Building Director may require that the buried ground heat exchanger be taken out of service by the property owner

B. Closed Loop piping systems shall be decommissioned by flushing and filling the piping with potable water and capping off the ends. If the heat transfer fluid contains regulated materials (e.g., antifreeze, biocides, or corrosion inhibitors), the heat transfer fluid shall be contained and disposed of in accordance with applicable regulations.

C. Open Loop wells shall be decommissioned per NYSDEC requirements.

For Design Standards see §112-1.4.Geothermal permitting code

SETBACKS AND SEPARATION
Distances for Geothermal Systems (in feet)

Provide Separation Setbacks

	Closed Loop and DX Systems		OPEN LOOP SYSTEMS[3]					
			Supply Well			Return Well		
	Required	ACTUAL	<45 gpm Required	>45 gpm Required	ACTUAL	<45 gpm Required	>45 gpm Required	ACTUAL
Public water Supply Well	100[1]		100[1]	100[1]		200[1]	200[1]	
Private Water Supply Well	25		25	50[1,2]		50	100[1,2]	
Sewage Disposal Structure, e.g. septic tank, cesspool	25[1]		50	75[1,2]		25	50[1]	
Storm water Recharge Structure, e.g., leach field, unlined catch basin	25		25	50[1]		25	50[1]	
Potential Source of contamination, e.g. Underground Petroleum Storage Tank, Chemical Use and Waste Storage Area, etc.	25		25[2]	50[2]		25	25	
On-Site Utility, Sewage and Water Line, Lined Catch Basin	10		10	10		10	10	
Building Foundation	10		10	10		10	10[2]	
Property Line	10		10	10		10	10	

NOTES

1. Consistent with SCDHS General Guidance Memorandum #25, Guidelines Regarding the Use of Geothermal Well Systems for Closed Loop and Open Loop systems (applies to geothermal systems proposed in conjunction with applications for the approval of sewage disposal and water supply facilities).

2. Setbacks and separation distances should be verified by a qualified water supply engineer or hydrogeologist for protection of building structures during re-injection through return well (under shallow water table conditions), protection of geothermal supply well water quality from sewage or chemical contamination, and protection of private drinking water supply well from thermal

3. Separation distance between the supply and return wells at a project site should at a minimum be based on recommendation from the drilling contractor, geothermal system designer, and heat pump manufacturer to minimize thermal interference. For high capacity systems (rated >45 gpm), separation distances should be verified by a qualified water supply engineer or hydrogeologist.

For Design Standards see §112-1.4.Geothermal permitting code

§ 112-1.4. Geothermal permitting code.

A. Geothermal Systems

1. Definitions

   a. A Closed Loop system uses buried high-density polyethylene (HDPE) plastic piping installed in drilled and grouted boreholes that conductively exchanges thermal (heat) energy with the ground via circulating water or a water/antifreeze mixture through the piping system.

   b. An Open Loop system is a series of standard water wells that extract and use groundwater directly as a heat-exchange source then return the heated or cooled groundwater back to the aquifer.

   c. A Direct Exchange system uses buried copper tubing that conductively exchanges heat energy with the ground via circulating a refrigerant through the tubing.

2. There are several types of Geothermal Systems, also known as Ground Source Heat Pumps, typically used on Long Island for space heating and cooling. They include: Closed Loop, Open Loop, and Direct Exchange systems and are distinguished by the type of Ground Heat Exchanger (GHX) installed in the earth for heat transfer.

3. The Closed Loop and Direct Exchange (DX) GHXs may be installed vertically in drilled boreholes or horizontally in excavated trenches then backfilled. The Open Loop systems are installed only in vertical drilled boreholes.

4. When Geothermal Systems are proposed in conjunction with applications for the approval of sewage disposal and water supply facilities at a particular project site, the installation is also subject to guidelines issued by Suffolk County Department of Health Services (SCDHS) in *General Guidance Memorandum #25-Guidelines Regarding the Use of Geothermal Well Systems* (Memo 25).

B. Permitted Geothermal Systems and Locations

1. Geothermal Systems may be permitted, installed, and erected pursuant to a building permit and subject to the project meeting all other requirements including compliance with applicable plumbing, electrical and mechanical codes.

2. Permitted Geothermal Systems eligible to receive a building permit are those that are of a system listed in Section A(1); comply with the applicable General Requirements in Section C; and satisfy the following basic criteria:

   a. An Open Loop system using standard water well(s) to both extract and return groundwater from/to the same aquifer and with well screens set within 50 vertical feet of one another.

   b. An Open Loop system that is not connected to a potable water system.

   c. An Open Loop system where the depth to groundwater is at least 20 feet below the surface.

d. A vertical Closed Loop system using standard HDPE“U-bends” installed into drilled boreholes and grouted fully from bottom to top per industry standards.

e. A Horizontal Closed Loop System, using standard HDPE pipe installed into horizontal trenches and backfilled per industry standards.

f. A DX-to-earth contact system including either horizontal, diagonal or vertical loops and DX-to-water systems including vertical loops.

g. Is not proposed to be located within the following Areas of Potential Sensitivity:

(i) 100 year Flood hazard zones considered V or AE zone on the FEMA Flood Maps.

(ii) Tidal or fresh water wetland.

(iii) Regulated tidal or fresh water surface water body.

(iv) Coastal erosion hazard area.

3. Other Geothermal Systems that are not eligible for a building permit under the requirements of Section B(2) - including those located within Areas of Potential Sensitivity- may be allowed at the discretion of the Building Director after appropriate additional review and evaluation and contingent on obtaining other required permits or approvals from other regulatory agencies, such as the New York State Department of Environmental Conservation (NYSDEC) and the U.S. Environmental Protection Agency (USEPA).

C. General Requirements

1. Permit applications shall be submitted to the Building Department on forms it provides and shall comply with the requirements therein, including but not limited to the following:

a. Application for Permit.

(i) Permit applications shall include, but not be limited to, the following items which may be satisfied by documentation supplied by the design engineer, installer or equipment manufacturer as applicable:

(1) Demonstrate compliance with applicable site plan requirements.

(2) A plot plan on an approved property survey no greater than 1" = 40' scale depicting the limits of the setback zone distance from structures, property lines and public roads.

(3) Certification by the design engineer and/or installer that the Geothermal System complies with all applicable regulations and all applicable state and/or local building codes.

(4) Certification by the design engineer and/or installer that the Geothermal System was installed as designed and that the

design and installation complies with the relevant industry standards and guidelines outlined below in section C(1)(b) including but not limited to Air Conditioning Contractors of America (ACCA) Manual J heat pump unit sizing for residential systems, ACCA Manual N or comparable load calculation techniques for commercial systems, and manufacturer-specified closed loop and DX field design guidelines.

(5) For Open Loop systems only, a one-line diagram of the electrical components on the plot plan (submersible pump power supply) in sufficient detail to allow for a determination that the manner of installation conforms to the National Electric Code, Electrical Code of the Town of Smithtown and the New York State Uniform Fire Prevention and Building Code.

(6) Certification of (1) through (5) above must be performed by a licensed Professional Engineer.

b. Design Standards and Guidelines

(i) The design and installation standards of Geothermal Systems including related wells and boreholes for the GHX shall conform to applicable industry standards, including, but not limited to, those listed below by type of system, and shall comply with the Building Code as well as all other applicable requirements:

(1) All Systems: The American National Standards Institute (ANSI), the American Society for Testing and Materials (ASTM), the American Society of Heating, Refrigeration, and Air Conditioning Engineers (ASHRAE), the Air-Conditioning and Refrigeration Institute (ARI), ACCA, Refrigeration Section of the International Building Code, and other similar certifying organizations. The manufacturer specifications shall be submitted as part of the application. The individual piping loops, circuits, and fully constructed piping network for all Geothermal Systems shall be pressure tested for integrity of original material and joints prior to backfill in accordance with the manufacturer's instructions and the governing standards or guidelines. Materials used to backfill horizontal GHXs and the buried, horizontal piping for vertical GHXs shall be suitable granular soil and shall be free from frozen lumps, ashes, refuse, vegetable or organic matter, rocks or boulders over 150 mm (6 in) in any dimension, or other materials that may damage the piping. The backfilled excavations shall be compacted in accordance with industry standard practice and governing guidelines and regulations.

(2) Open Loop Systems: The National Ground Water Association (NGWA) and the American Water Works Association (AWWA).

(3) Closed Loop Systems: the International Ground Source Heat Pump Association (IGSHPA) and the NGWA.

For Design Standards see §112-1.4.Geothermal permitting code

(4) Direct Exchange (DX) Systems: the Canadian Standards Association (CSA), the National Association of Corrosion Engineers (NACE), the American Society of Mechanical Engineers (ASME) and in accordance with manufacturer's guidelines, methods and standards.

(ii) For Closed Loop systems, the following specifically applies:

(1) Closed Loop borefield installers must be trained and accredited by IGSHPA and certified by the piping manufacturer in polyethylene pipe heat-fusion or electro-fuse welding techniques, whichever is used.

(2) Closed Loop borefields that will supply greater than 50 tons of heating/cooling capacity must be designed by an IGSHPA Certified Geothermal Designer in good standing with IGSHPA.

(3) If antifreeze solutions are used as a circulating fluid in the buried ground heat exchanger, only antifreeze recommended by IGSHPA such as methanol, ethanol, and food grade propylene glycol shall be permitted.

(4) The borehole annulus (space between the borehole wall and piping) shall be filled and sealed through its entire depth with a high-solids bentonite clay grout (at least 20 percent solids by weight), from the bottom of the borehole to the top using the tremie method of grouting.

(5) Where grouting material extends through zones of salt water, a salt water resistant grout material shall be used.

(iii) For Open Loop systems, the following specifically applies:

(1) Open Loop system contractors must be registered by NYSDEC for drilling and installing wells and installing and start-up of submersible pumps and a copy of a NYSDEC Well Completion Report must be submitted after the installation of the wells.

(2) Well drilling contractors must notify the Suffolk County Water Authority (SCWA) of the location of wells installed as part of an Open Loop geothermal system.

(3) Open Loop systems with rated pumping capacity of greater than 45 gallons per minute (gpm), or systems of lesser capacity proposed on a site with existing water supply wells and for which the combined pumping capacity of proposed and existing wells exceeds 45 gpm, must obtain a Long Island Well Permit from the NYSDEC Division of Water.

(4) Open Loop systems with rated pumping capacity of greater than 45 gpm shall employ use of a plate-frame or shell-in-tube heat exchanger (HX) installed between the well piping and

building hydronic loop to prevent cross-contamination of the return water by refrigerant, biocides, or corrosion inhibitors.

(5) Heat pump coils and HX material of construction for Open Loop systems must be compatible with the groundwater chemistry per manufacturer's limits.

(6) Water Extraction

(i) Open Loop systems may utilize a waterway to the extent permissible under Federal, State, or local municipal laws or regulations.

(ii) Installation requirements for Open Loop wells shall be the same as those for potable water wells, with respect to the means to prevent aquifer contamination (grouting, etc.), or in conformance with standards, regulations, or guidelines established by the Town Engineer, NYSDEC, NGWA, and AWWA.

(iii) Any water table drawdown caused by an extraction well or wells shall not cause harm to the environment or otherwise impact the use of existing water supply wells on neighboring properties.

(7) Discharge of Water

(i) Discharge of water from Open Loop systems into storm or sanitary sewer systems shall be prohibited, except upon written approval by the SCDHS, NYSDEC, or other authority having jurisdiction.

(ii) Discharge of water from Open Loop systems into a waterway or tidal or fresh water wetland is not allowed unless approved by applicable Federal, State, and local authorities.

(iii) Underground injection of water discharge from an open loop system shall be subject to the following conditions:

(1) Returned water shall contain no treatment additives or other introduced chemicals.

(2) The return well shall recharge the same aquifer from which the supply water is extracted and recharge shall occur within 50 vertical feet of the supply well screen.

(3) The return well shall discharge the water below the water table depth to prevent aeration of the return water which can lead to precipitation of iron or other minerals and premature plugging of the well screens.

(8) Return water practices shall not cause erosion, harm to the environment or flooding at the surface or other nuisance conditions on neighboring properties.

(iv) For DX systems, the following applies:

(1) DX system contractors shall demonstrate they have successfully completed a DX system installers training course and are certified by an applicable equipment and material manufacturer to install DX systems.

(2) Piping and tubing shall be of a material equivalent to or better than Type Air Conditioning Refrigeration (ACR) piping, tubing and associated fittings in accordance with the appropriate ASTM Standard and ASME Standard.

(3) Below-grade joints shall be purged with inert gas and brazed in accordance with American Welding Society (AWS) Standards. Piping tubing and fittings shall be installed in accordance with CSA standards.

(4) DX system contractors shall perform joining of all refrigerant connections per CSA standards.

(5) All underground Type ACR piping and tubing shall have a cathodic protection system which shall be designed and installed in accordance with the appropriate CSA standards and local site-specific conditions.

(6) For vertical DX boreholes that are drilled into saturated aquifer materials (below the water table), the borehole annulus shall be filled and sealed through its entire depth with a geothermal grout from the bottom of the borehole to the top using the tremie method of grouting per CSA standards.

(7) Horizontal DX GHXs and vertical DX boreholes lying above the water table shall be backfilled and compacted as specified in section B(1)(b)(i)(1). Due consideration shall be given to settling of the excavated area.

2. As-Built Drawings

a. Upon completion of construction, a scaled as-built drawing must be provided showing the locations of buried wells, closed loops, DX boreholes and horizontal connector piping, triangulated from two points on the property such as a building corner or other permanent structure. Offsets must also be shown from the nearest property line, ond on-site speptic systems and private water wells. As-built drawings must be certified by a licenset Professional Engineer

3. Decommissioning

    a. If the Geothermal System remains nonfunctional or inoperative for a continuous period of one year, the Building Director may require that the buried ground heat exchanger be taken out of service by the property owner.

    b. Closed Loop piping systems shall be decommissioned by flushing and filling the piping with potable water and capping off the ends. If the heat transfer fluid contains regulated materials (e.g., antifreeze, biocides, or corrosion inhibitors), the heat transfer fluid shall be contained and disposed of in accordance with applicable regulations.

    c. Open Loop wells shall be decommissioned per NYSDEC requirements.

4. Setbacks and Separation Distances

Setbacks and Separation Distances for Geothermal Systems (in feet)

	Closed Loop and DX Systems	**Open Loop Systems[3]**			
		Supply Well		**Return Well**	
		<45 gpm	**>45 gpm**	**<45 gpm**	**>45 gpm**
Public Water Supply Well	100[1]	100[1]	100[1]	200[1]	200[1]
Private Water Supply Well	25	25	50[1,2]	50	100[1,2]
Sewage Disposal Structure, e.g., septic tank, cesspool	25[1]	50	75[1,2]	25	50[1]
Storm water Recharge Structure, e.g., leach field, unlined catch basin	25	25	50[1]	25	50[1]
Potential Source of Contamination, e.g. Underground Petroleum Storage Tank, Chemical Use and Waste Storage Area, etc.	25	25[2]	50[2]	25	25
On-Site Utility, Sewage and Water Line, Lined Catch Basin	10	10	10	10	10
Building Foundation	10	10	10	10	10[2]
Property Line	10	10	10	10	10

For Design Standards see §112-1.4.Geothermal permitting code

Notes:

1. Consistent with SCDHS *General Guidance Memorandum #25, Guidelines Regarding the Use of Geothermal Well Systems* for Closed Loop and Open Loop systems (applies to geothermal systems proposed in conjunction with applications for the approval of sewage disposal and water supply facilities).
2. Setbacks and separation distances should be verified by a qualified water supply engineer or hydrogeologist for protection of building structures during re-injection through return well (under shallow water table conditions), protection of geothermal supply well water quality from sewage or chemical contamination, and protection of private drinking water supply well from thermal effects or water level drawdown caused by geothermal wells.

3. Separation distance between the supply and return wells at a project site should at a minimum be based on recommendation from the drilling contractor, geothermal system designer, and heat pump manufacturer to minimize thermal interference. For high capacity systems (rated >45 gpm), separation distances should be verified by a qualified water supply engineer or hydrogeologist.

Dated: March 19, 2015