

Introduction

Ground source heat pumps can, despite the name, take energy from a number of different sources to provide the required heating to buildings.



If the property is next to a water source then it is possible to use the water as the energy source. This is generally the most cost effective means of installing arrays as digging is kept to a minimum. Water source systems can be either open source or closed source. The most popular water source system is a closed loop system. In this system the slinkies are attached to a frame (pond mat) and will absorb energy from the surrounding water. Pond mats are made up of 250m of HDPE pipe fixed onto a 1m x 2.5m stainless steel frame and they collect energy from bodies of water. There are multiple considerations when installing pond

mats to make sure they function correctly. They are a closed loop installation containing Thermox DTX (food grade) antifreeze mixture and when installed in the correct application are a great solution as an energy collector. The water source has to be sufficiently deep to avoid freezing around the slinky and to avoid any damage from passing boat traffic.

Initial considerations

- Initial Pond mat survey should be completed (attached)
- Intended use for the body of water. If fishing or boats are being used the potential to damage the pond mats needs to be assessed.
- Access for installation and location of pond mats
- Potential Maintenance requirements (e.g. silted lake, heavy tree cover)
- Pontoon installation potential
- Method for fixing location within the lake
- Pond Mats will extract on average 4-5kW of Energy
- 9m² of surface area per kW of the heat pumps output. (@2-3m in depth)
- If the body of water is stagnant then the area required matches the square meters of land required for shallow ground arrays (straight pipe/ Slinkys)

Each pond mat install is bespoke. Many dynamic considerations should be taken into account before confirming their use. Used in suitable installations they are efficient collectors with little disruption (other than Manifold and headering requirements). Much like other shallow ground arrays, header pipe size and pressure drop calculations should be confirmed with Kensa before ordering.

Lake bed composition considerations



Silted bed— When locating pond mats into potential silted lakes a few options are available. Firstly if the option is available for sinking Slinkys into the lake, rather than pond mats, this becomes an install and forget solution (refer to the slinky installation guide). If the area of the lake isn't available for Slinkys then drainage crates and a maintenance schedule should be drawn up with the client, If a pond mat is covered in silt it will cease to function. Drainage crates can be used to elevate the pond mats from soft lake beds, but the suggestion for periodic maintenance should be discussed.

Fig 2 A pond mat with drainage crates for soft bed clearance

Solid lake Bed.

This is the ideal bed to locate the pond mats onto. In this circumstance, weights should be added to the pond mat to fix them to the bottom of the lake (drilled breeze blocks can be used.) The pond mats will float when empty so can be easily floated into place using a boat. Once filled with water they will sink to the lake bed.



Pontoon Installations

A good solution if available is to locate the pond mats underneath a constructed pontoon. The pond mats are hung from their frame in this orientation. The pontoon solution is an ideal installation if the lake bed is not solid and the ability to install or use an existing pontoon is available. Fig 4 shows a bespoke pontoon in construction. The bays between the poles have a pond mat chained between the gaps above the lake bed, which in this instance is not suitable for laying the pond mats on the lake bed, due to potential silting and the client's requirement for a minimal maintenance collector. The lake was utilized as the energy source for 3 properties.



Fig 4 Bespoke Pontoon Construction

River application



Pond mats can be located in streams and Rivers. The energy is being constantly replenished. This is another great solution for a collector system. Like many installations of pond mats, considerations need to be made on location, protection from debris traveling in the river, or increased flow due to heavy rain or flooding and the fixing method used to locate. Areas can be created to locate pond mats (see Fig 5) ,giving the ability to protect and maintain the pond mats with the use of sluices gates.



Maintenance Considerations

When installing pond mats into any body of water the identification of possible debris like leaves from overhanging trees or the potential for silting to occur should be considered and discussed. It is advisable to leave strops or chains with a location buoy onto any pond mat that has been identified with potential silting/ covering issues. These can be used when needed to lift the pond mats and clean any debris. When pond mats are covered they cease to work efficiently.

Survey Form

The following form will enable Kensa to complete a viability report on whether an available water source on site is suitable to utilise a pond mat system.

Type of water source

Stream / River

Lake / Pond

Stream / River Systems

Dimensions Average width (m) _____

Average depth (m) _____

Comments

Use a stick to measure depths across the width.

Is there flow all year round? _____

Yes / No

Estimated Flowrate

Summer (m3/h) _____

Winter (m3/h) _____

The methodology for this can be found on the internet or contact Kensa

Lake / Pond Systems

Dimensions Surface area (m2) _____

Average depth (m) _____

Visible flow in and out of the lake / pond? _____

Yes / No

Is water flowing in and out of the lake / pond?

Application (AIS)

Pond Mat Installation

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General

Comments:

Composition of the river / lake bed?

Is the bed made up of silt, sand, rocks, etc?

Susceptible to silting?

Yes / No

Depth of existing silt? (m)

This can be measured by pushing a stick through the silt until it stops.

Water Temp (oC)

Please specify what time of year this was measured .

Usage of water source ?

Is the lake or river used for boating / fishing / etc?

Environmental considerations?

This determines the type of antifreeze required.

Have permissions been sought?

Yes / No

i.e. Has the owner of the lake or river given consent? Does the Environmental agency need to be informed?

Are there existing or planned pontoons?

Yes / No

Pontoons are an ideal fixing point for pond mats.

Initial pond mat installation entry point into water?

Can the pond mats be launched from a slipway or sloping bank into the water source?

Is a boat available?

Yes / No

For a large or deep water source a boat is required to install the pond mats.

Distance from manifold? (m)

This is the distance from the manifold to the entry point of the header pipes into the water.

Distance from plantroom? (m)

This is the distance from the plantroom to the entry point of the header pipes into the water.

Additional comments

Application (AIS)

Pond Mat Installation

Page(s)



Sketch of Water Source

A large, empty rectangular box with a thin black border, intended for a hand-drawn sketch of the water source. The box is currently blank, except for a faint, large, light-orange circular graphic that overlaps its bottom right corner.

Please return to Kensa Heat pumps.