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[www.hdservicesltd.co.uk](http://www.hdservicesltd.co.uk)

# OPEN-LOOP GROUND SOURCE HEAT PUMPS

For domestic and small commercial buildings across the South -East of England

## HEATING THAT WON'T COST THE EARTH

## H.D. Services Ltd specialise in the installation of Open-Loop Ground Source Heat Pump systems.

We supply and install UK manufactured heat pumps for use in small commercial and domestic open-loop systems across England's south east.

We are an award winning company that has been installing domestic open-loop systems since 2009.

Utilising groundwater as a heat source we help clients reduce energy costs and improve their carbon footprint, offering additional benefits such as independent drinking water\* and grey water supplies.

\*subject to analysis and suitable filtration





## BACKGROUND

H.D. Services was formed by Frank Harris, a Civil Engineer experienced in soil mechanics and well drilling, and became incorporated as a limited company in 1988. The company initially focused on drilling water supply and soakaway boreholes plus the installation and maintenance of sewage treatment systems.

The compatibility between the construction of water supply boreholes and the growing Renewable Energy market began to suggest itself and following attendance at a European seminar on ground source heat pumps (GSHP) in 2009, we decided to invest in the Open Loop Ground Source Heat Pump market.

We are a fully accredited Microgeneration Certification Scheme (MCS) company and subscribe to the Renewable Energy Consumer Code (RECC), meaning our customers can be assured of a high quality installation service by a registered installer.

## HOW WE WORK

We work hard to ensure the highest quality workmanship and service is delivered and we take pride in our approach to our work.

We have a partnering agreement with a British manufacturer with whom we work closely to ensure the highest quality installation and service. As this type of renewable heating system is best suited to new homes with under-floor heating, we initially focused our attention on the new-build market. With the development of new under-floor heating technology, we have now expanded into the retrofit market.

We aim to provide the highest quality Open Loop Ground Source Heat Pump service available in South East England. Our customers rely on our advice and flexibility to suit their individual requirements and we associate ourselves with like-minded suppliers. As a contractor committed to the highest service standards, H.D. Services is dedicated to completing contracts on time.

H.D. Services Ltd has been winning awards for their work for the past 10 years, starting with the RHI Installer of the year for the South East region of the Green Deal and ECO Awards in 2015. We have won awards at regional events every year since, but in October 2024 we attended our first National Energy Efficiency Awards, coming third and adding yet another accolade to our list.

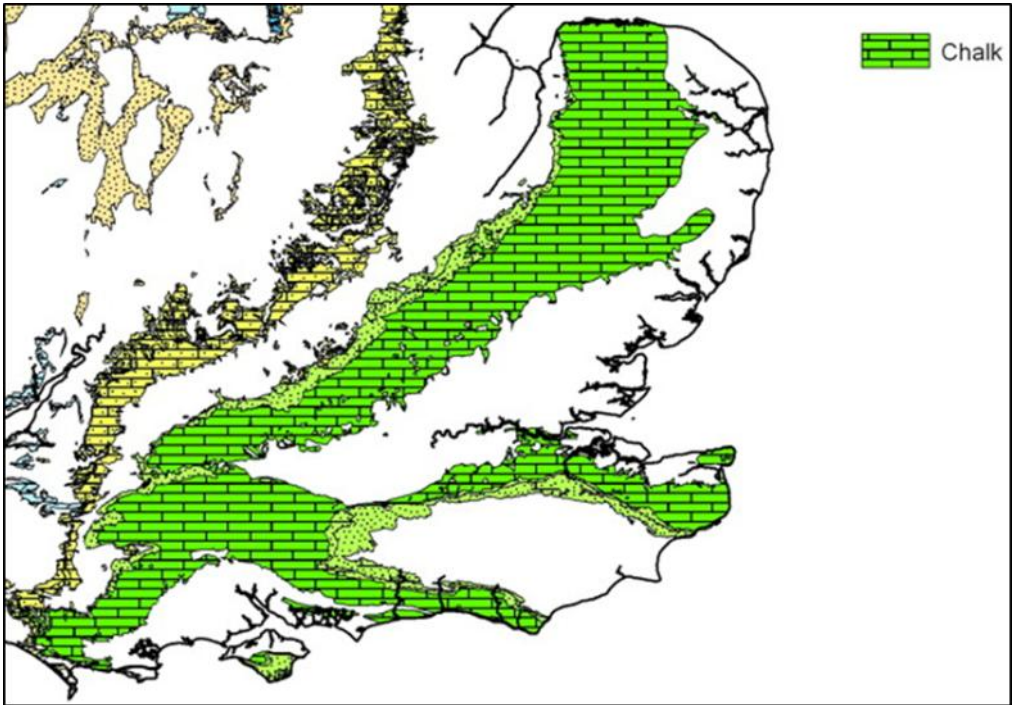


# BACKGROUND

All drilling works associated with the installation of our Open Loop Ground Source Heat Pump systems are undertaken in-house. We have been constructing water supply and soakaway boreholes throughout South East England since 1988 and have a vast knowledge of the hydro-geology throughout this area.

We only operate cable percussion drilling rigs, the drilling method acknowledged by the Environment Agency and water companies as the most suitable way to drill the chalk aquifer.

Feasibility of a proposed installation can often be determined upon the receipt of a site postcode.



H.D. Services Ltd. are BS EN ISO 9001 and 14001 certified.



# HEAT PUMPS

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**For millions of years, the sun has provided enough energy to support life on Earth, most of which is just passing us by. If we can utilise just a fraction of this energy to heat our homes, we can move away from using fossil fuels and help put a stop to the destruction of our planet.**

**One way in which we can do this is to use heat pumps to provide heating and hot water for our homes.**

## **THE BASIC PRINCIPLES**

The earth continually absorbs heat from the sun. Although the surface of the earth is subject to seasonal temperature fluctuations, below a depth of approximately 1.5 metres the ground temperature in England is constant at between 8 and 14°C all year round. A ground source heat pump is designed to use this constantly renewed energy to supply your domestic heating and hot water requirements and could reduce heating bills by more than 50%.

Ground source heat pumps work on the same principal as a refrigerator cooling circuit but in reverse. Low temperature heat is taken from the ground or ground-water and 'upgraded' to a higher temperature and used to heat the water in the heating system to provide space heating and/or hot water. In a typical system, for every unit of electrical energy used to drive the system, between 3 and 5 units of heat are produced.

### **Closed-Loop:**

Closed-Loop systems pump an anti-freeze solution through pipes buried in the ground. The loops can be installed either horizontally in trenches or vertically in a series of boreholes drilled into the ground. The overall length of these loops depends on the size of the heat pump and the thermal conductivity of the ground in which they are laid.

Heat losses between the antifreeze solution and the loop-pipe, the loop-pipe and the grout surround and the grout surround and the ground itself can reduce the efficiency of these systems over time. A closed-loop system can, however, be installed anywhere in the country.

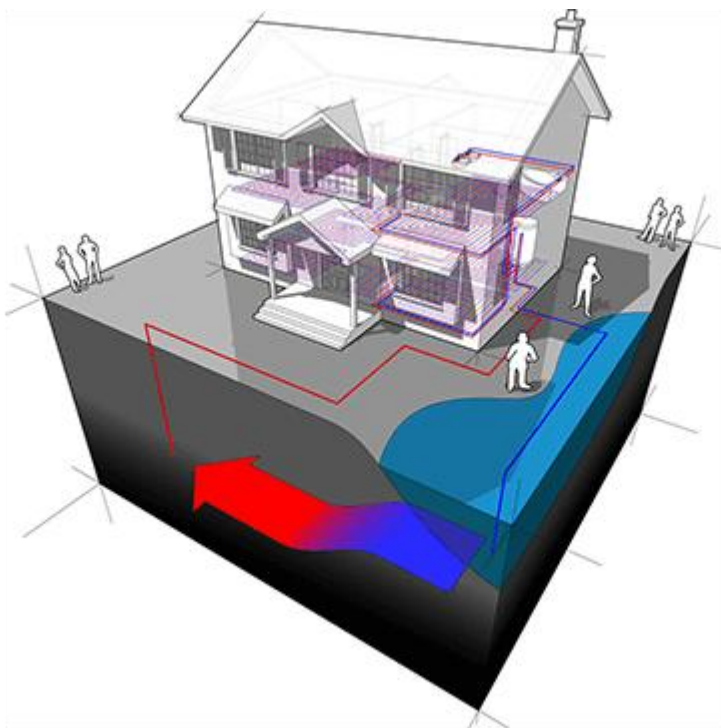
# HEAT PUMPS

## Open Loop:

Open Loop systems are the most efficient ground source heat pump option. They extract heat from ground water, usually abstracted from an aquifer. As the water is in direct contact with the ground there are no heat losses between surfaces. The water is extracted via a borehole and pumped through the heat pump, where heat is extracted from the water. The water is cooled by approximately 5°C before being returned to the ground, where it immediately begins to regain heat from the earth.

Heat extracted from the ground water is raised in temperature using compressors and delivered to the domestic hot water and space heating systems. The highest grade temperature is available to the hot water, enabling temperatures up to 65°C.

We design our water supply boreholes at sufficient diameter to accommodate two borehole pumps. The pumps are switched to run alternatively as 'duty' and 'standby' to ensure a heat source in the event of a pump failure.



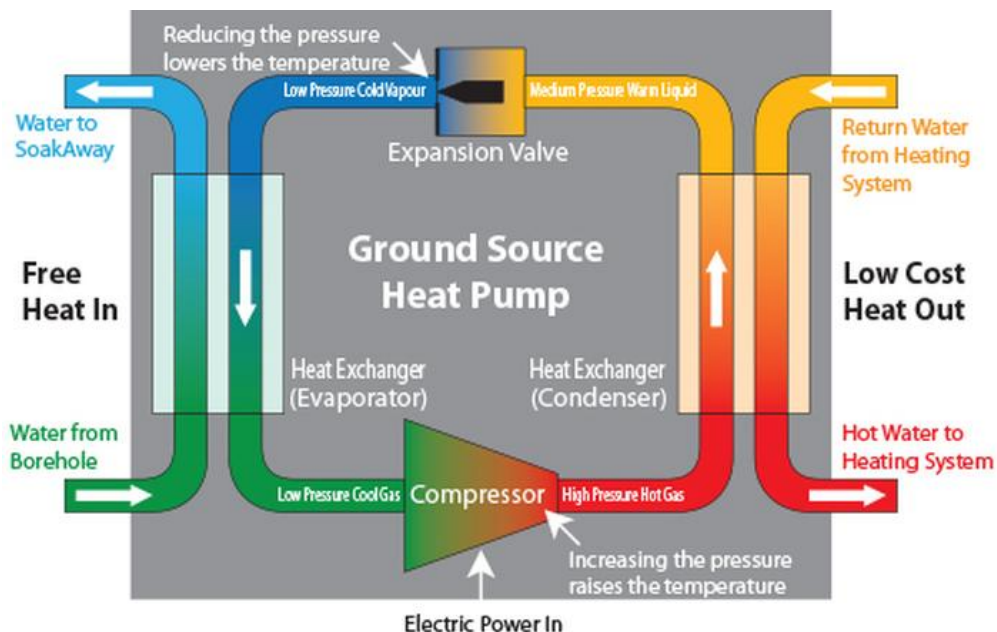


## HEAT PUMPS

With seasonal performance factors (SPFs) of up to 5.0, Open Loop ground source heat pumps offer an environmentally friendly source of heating with significantly lower running costs than a conventional heating system.

This type of system will only work in areas where there is sufficient ground water available. H.D. Services prefer to install Open Loop systems as:

- Open Loop systems require a water supply borehole and soakaway; H.D. Services Ltd has been drilling the chalk aquifers of South East England since 1988 and has considerable experience and expertise in this area.
- An Open Loop system does not pump chemicals through the ground.
- The installation of an Open Loop system is less invasive compared to that of a Closed Loop system.
- An Open Loop system can also provide you with an independent water supply. This means you could save money on your water bills and you will not be subject to hosepipe bans.





# HEAT PUMPS—BENEFITS

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There are many benefits to choosing an Open-Loop GSHP system:

## FINANCIAL

**Lower running costs**—consistent coefficient of performance (COP) compared to air source or closed loop heat pumps.

**Independent Water Supply**—no mains water required, saving you money on water charges.

**Potentially eligible for the Boiler Upgrade Scheme (BUS)** —financial support is available for those installing renewable heat technologies.

[https://assets.publishing.service.gov.uk/government/uploads/attachment\\_data/file/1063493/bus-installer-leaflet.pdf](https://assets.publishing.service.gov.uk/government/uploads/attachment_data/file/1063493/bus-installer-leaflet.pdf)

## GENERAL

**A reduced Carbon Footprint**—a heat pump is responsible for less carbon dioxide than even the most efficient gas condensing boiler.

**Greater water efficiency**—borehole water can usually be filtered for consumption and discharge water can be used for grey water; irrigation, feeding cattle troughs, car washing or patio cleaning.

**High System efficiency**—as underground water temperatures remain constant throughout the year.

**Better Annual SPF**—compared to either air source or closed loop heat pumps.

**Minimal installation disruption**—no need to dig up the garden to install the system, unlike a horizontal closed –loop system.

**MCS accredited**—guarantees a high-quality standard.

**Less space needed**—as no loop-pipe is used in trenches and only one supply borehole and one soakaway are constructed.

\*The Water Act 2003 allows for the abstraction of water from the ground without charge, provided the daily abstraction rate is less than 20,000 litres of water per day.

## INSTALLATIONS

At a fraction of the running cost of an oil or gas boiler, an Open-Loop GSHP installation could meet all your domestic heating requirements and your water needs. The 'cooled' water could also provide a 'grey water' supply, ideal for car washing/garden watering/feeding cattle troughs etc.



**HEATING**



**HOT WATER**



**DRINKING WATER**



**GREY WATER**

Our service includes the supply, installation and commissioning of a complete water supply and Open Loop heat pump system with the least disruption possible.

We are a fully accredited Microgeneration Certification Scheme (MCS) company and subscribe to the Renewable Energy Consumer Code (RECC), meaning our customers can be assured of a high-quality installation service by a registered installer. Use of an MCS registered installer means your installation may also be eligible for a grant from the Boiler Upgrade Scheme (BUS).

We work hard to ensure that the highest quality workmanship and service is delivered to our customers/clients and we take pride in our approach to our work and if we do not think the site is suitable for an Open Loop heat pump system, we will tell you.

After commissioning, we register an installation with the MCS. All installations are provided with a workmanship warranty and the client offered an annual maintenance contract to ensure the heat pump is working efficiently.

### **The installation process:**

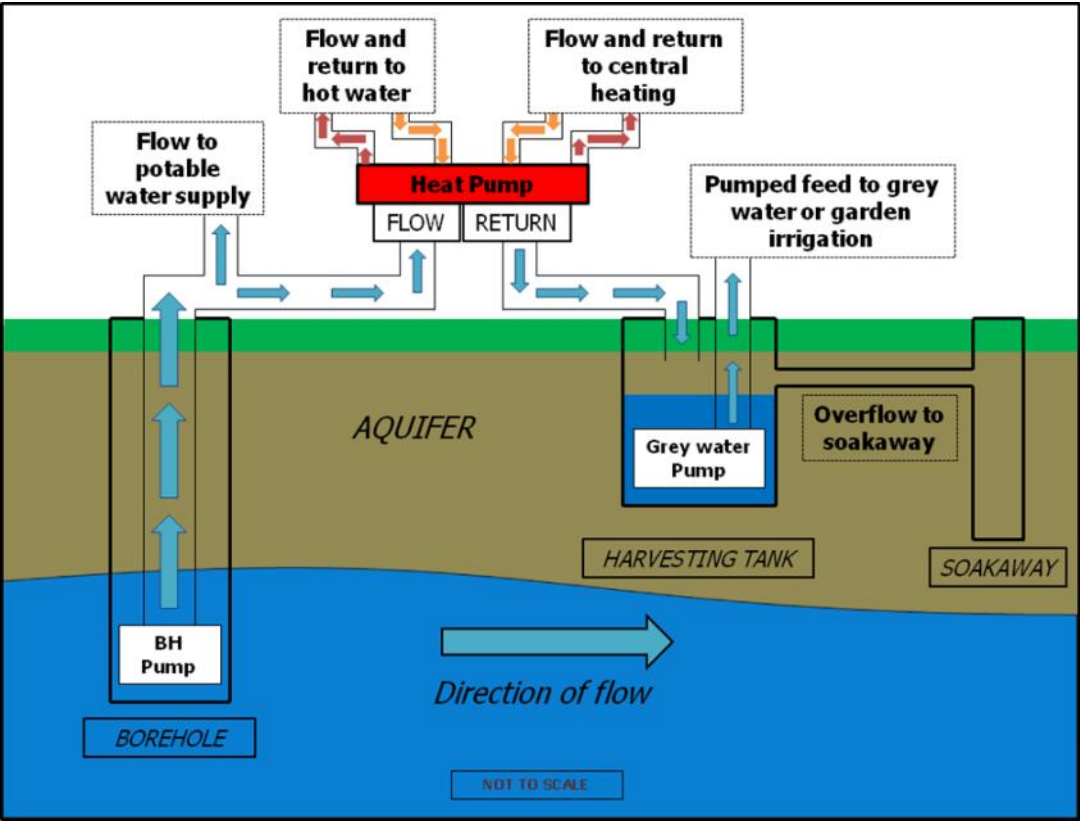
A water supply borehole would be drilled and a soakaway constructed, with the efficiency of both being proved by pumping continuously from one to the other. Ground water at a temperature of around 11°C would then be pumped into the building. Flow could be diverted to feed both a potable water supply (subject to analysis and suitable filtration) and an Open-Loop heat pump.

# INSTALLATIONS

The heat pump extracts heat from the water and uses it to raise the temperature of water being circulated throughout the house. There are two separate water circuits, one for space heating up to 55 °C and another for domestic hot water up to 65°C.

Cooled water at around 6°C is directed from the heat pump back into the ground, where the water begins to reclaim heat.

A harvesting tank can be installed to store the discharge from the heat pump, thereby providing a water supply for garden irrigation or other 'grey-water' use. Unlike rain water harvesting tanks which are only replenished when it rains, a heat pump harvesting tank is replenished whenever the heat pump is in operation. If the harvesting tank is buried in the ground, the water will start to reclaim heat immediately.



# BOILER UPGRADE SCHEME

**The scheme is currently available to applicants until 2028.**

The Boiler Upgrade Scheme will provides grants to encourage property owners to replace existing fossil fuel heating with more efficient, low carbon heating systems.

## Grant levels

- Grants will reduce the upfront cost of installing a low carbon heating system.
- £7,500 is available towards ground source heat pumps.

To make the application for the scheme as simple as possible, it will be led by your installer, with an opportunity for you to give consent that you are happy to proceed with the application.

## Finding an installer

Your chosen installer will need to be certified by the Microgeneration Certification Scheme (MCS). MCS is a nationally recognised standards organisation that gives you assurance of the quality of your product and competence of your installer. It also means your installer complies with high consumer protection standards.

## What will your chosen installer do?

- Apply to Ofgem, the scheme administrator, for a grant voucher.
- Provide your details to Ofgem. Ofgem will email you, asking you to consent to the installer applying on your behalf.
- Complete the installation in line with industry standards and scheme requirements.
- Redeem the voucher and receive the grant following installation and commissioning.

## Eligibility

Your installer will work with you to ensure that your property and technology meet the full range of eligibility requirements. These are the key requirements:

- Homes and small non-domestic properties in England and Wales will be eligible. The maximum installation capacity of up to 45kWth covers the vast majority of these properties.
- Your property will need a valid energy performance certificate with no outstanding recommendations for loft or cavity wall insulation. This is because your heating system will work more efficiently with these insulation measures in place. For further information and details of exceptions, please speak to your installer.
- Heat pumps are eligible either on or off the gas grid.
- Your installer must commission and install the heat pump within 120 days of applying for the grant or it will not be eligible.
- You must be fully replacing an existing fossil fuel system such as oil, gas or direct electric. Funding will not be available for the replacement of existing low carbon heat systems.
- New build homes and social housing will not be eligible for the Boiler Upgrade Scheme, custom-build properties will be eligible.

## APPROACH

H.D Services Ltd. provides a one-stop solution throughout South East England for domestic and small commercial Open Loop Ground Source Heat Pump installations by offering:

- **FREE** feasibility study
- **COMPLETE** supply, installation and maintenance service
- **EXPERIENCED STAFF** most of whom are directly employed
- **FULLY TRAINED AND ACCREDITED** personnel
- **ANNUAL** servicing/maintenance programme

H.D. Services has long and positive working relationships with the British Geological Survey and the Environment Agency. We are committed to providing the best heat pump installation service we can. Consequently, we are members of and subscribe to the following:



**CERTIFIED**



## CASE STUDIES

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Since 2010 we have installed dozens of domestic and small scale commercial Open Loop heat pump systems in various locations across South East England.

We work closely with our clients and contractors, architects and consultants to determine system requirements throughout the build process.

We firmly believe in making the installation process of a Ground Source Heat Pump as stress-free as possible, which is why we provide a free consultancy service to all customers who request a quotation from us. The knowledge and expertise held within the company will allow customers to make an informed decision regarding the type of Ground Source Heat Pump they require.



In 2010, we installed a 20kW Open - Loop Ground Source Heat Pump at this barn conversion for holiday lets in Buckinghamshire.

The client benefits from a water supply borehole which feeds the domestic supply (which is treated to allow consumption), the heating and hot water systems and a harvesting tank which is used to feed cattle troughs.

## CASE STUDIES

### **H.D. Services Ltd Open Loop GSHP installation in Berkshire helps company to win RHI Installer of the Year - South East Region at the Green Deal & ECO Awards .**

At a site in Berkshire, H.D. Services Ltd. was instructed to install an Open Loop Ground Source Heat Pump system, an HD Sewage Treatment System, Water Supply Borehole, and Surface Water Soakaways for use in a 4 bedroom detached house. The idea was for the property to be as self-sufficient as possible.



H.D. Services Ltd were asked to quote for a complete heat pump installation (independent water supply borehole with pumps, heat pump, harvesting tank and soakaway); a sewage treatment system and a surface water soakaway. Using the postcode of the site we were able to confirm the hydro-geology and submit a quotation.

#### **Open Loop Ground Source Heat Pump:**

Working from detailed floor plans and SAP reports, H.D. Services Ltd sized the heat pump

and designed the water supply borehole and soakaway. The efficiency of both the water borehole and soakaway was proved by pumping from one to the other.

Upon completion of construction of the property, the heat pump was installed and commissioned. All our installations are covered by a 5 year workmanship warranty and an annual maintenance contract is offered.

Apart from the environmental and economical advantages of an Open Loop Ground Source Heat Pump, an additional benefit is that the discharge water can feed a harvesting tank, from where it can be pumped for garden irrigation or other 'grey-water' uses.

Unlike rainwater harvesting tanks which only replenish when it rains and empty very quickly in dry weather, a harvesting tank fed from a heat pump will replenish whenever the heat pump is in operation, meaning that the garden can be irrigated throughout the summer regardless of hosepipe bans. It is an option which was adopted in this installation.

#### **Water Supply Borehole and Surface Water Soakaways:**

The water supply borehole was drilled using a cable-percussion rig - the method preferred by water companies and the Environment Agency when drilling into the chalk aquifer. A duty/standby dual pumping system was adopted in the borehole, meaning there is always a standby pump to act as backup should one pump fail. This method is always recommended by H.D. Services as it means that any pump issues can be addressed without major disruption to the water supply and heating system.



## CASE STUDIES

Water was pumped from the supply borehole to the soakaway to prove the efficiency of both. Borehole logs were submitted to both the British Geological Survey and Environment Agency to protect the abstraction from derogation by a third party.

### Summary:

Work commenced in August 2012 when the water supply borehole was drilled and a pump left in situ to provide the construction site with a water supply during the building process. Work was completed in 2014. The installation benefits from a 5 year workmanship warranty, an annual maintenance contract and is in receipt of the domestic RHI.

### Sewage Treatment System:

A bespoke HD-SM Sewage Treatment System (STS) was designed based upon the number of people that could live at the property. The final effluent from an HD-SM STS is designed to achieve a discharge standard of 20:30:10 (BOD:SS:NH<sub>4</sub>) but increased standards can be accommodated by internal adjustments or additional chambers. Three months after the system was commissioned, a courtesy visit was conducted to confirm compliance with the design standard.

All HD-SM's are covered by a full 24 month extendible warranty and an annual service contract is offered. Our expertise covers not only the design, supply, installation, commissioning and servicing of sewage treatment systems but also septic tank installation and modification. We have been installing our bespoke sewage treatment systems for more than three decades.



## CASE STUDIES

### **‘Green Apple Award’ winning development utilises water supply boreholes to provide drinking water, grey water and heating and hot water.**

At a site in south Buckinghamshire, Open Loop ground source heat pumps use water from the chalk aquifer to provide the renewable heat for heating and hot water systems. This water can also be used for domestic consumption (subject to analyses and suitable filtration) and as a grey water supply.



In 2011 the company were approached by Acanthus Developments and asked to tender for the installation of three water supply boreholes to serve each of three prestige properties. Closed-loop ground source heating was being considered, however the availability of a reliable ground water supply from the chalk aquifer and our experience in the installation of Open Loop ground source heating systems, resulted in H.D Services being contracted to install three heat pumps as well as the water supply boreholes.

The development went on to win a Green Apple award in recognition of the Sustainable Nature of the development and the Architectural Design Excellence of the properties.

Using the postcode of the site to assess the hydro-geology, a quotation was submitted for the construction of both the water supply borehole and soak away and the installation of the heat pump at each location. The deal was that both the water supply borehole and soakaway were constructed and water pumped from one to the other to prove the worthiness of both before any payment was requested. It was several months later, once the construction of the properties had been completed, that the heat pumps were installed and commissioned. Each is covered by a 5 year workmanship warranty and annual maintenance contracts were offered and accepted.

Working from building plans and SAP reports, the quote allowed for the supply and installation of 3 three-phase heat pumps; two 18-kW and one 26-kW. The boreholes were drilled using a cable-percussion rig as it does not cause the aquifers or fissures to become filled with sediment - this method is preferred by the Environment Agency and water companies when drilling into the chalk aquifer. To protect the abstractions from derogation by a third party, borehole drilling logs were submitted to both the British Geological Survey and Environment Agency.

## CASE STUDIES



In January 2024, we installed an open loop system at a Village Hall in Winchester. The site benefits from its proximity to the River Itchen and also from the fact the river is a chalk stream and ideally suited to this technology. Visually there is virtually nothing to see, just a couple of manhole covers on the ground. The water comes in from the ground at 11 degrees centigrade.

The application process was supported by grant funding. They did not get BUS (Boiler Upgrade Scheme) even though it seemed they would be

eligible. But they did benefit from the change in VAT rules for charities (VAT at 0% from February 2024). When we took on this project, we had provisionally quoted for one 13kW single phase Kensa heat pump, however upon receiving more information from our client and further heat loss calculations, we decided this would not be sufficient for the hot water and heating demand. Calculations showed that a cascade system would be most suitable for this building. This meant we would need to install two 13kW single phase heat pumps. Having received this information we were able to provide a 'firm quote' which also included for the cost of a water supply borehole. Overall, this was an interesting project for us being the first 'cascade' system we have installed in this kind of set up. As a result of this project, we won third place for National Heat Project of the year at the National Energy Efficiency Awards 2024.

### CUSTOMER TESTIMONIAL

'Our Village Hall needed to replace its aged gas boilers with heating that would take advantage of our new solar panels and would also lower our carbon footprint and so utilise the climate change grants available. We used HD Services to install an Open-Loop Ground Source Heat Pump. We are very pleased with them. This is not a common type of installation, but the estimate was detailed and explanatory setting out exactly what we could expect. The borehole drilling and heat pump installation was undertaken by their own staff in a neat, tidy and safe manner and they were very accommodating to our hirers of the hall. We were given a full guide to operating the heat pumps. The GSHP will safeguard our energy costs against rises in the price of carbon-based fuels and enable us to keep our hire charges affordable for the local community. In all we felt the work was carried out very professionally and we would use HD Services again. I would classify HD Services as first class contractors.'



## KEY PERSONNEL

### Mr. F. J. Harris – DIRECTOR

Since founding the company in 1984, Frank has twice served as Vice-Chairman of the Well Drillers Association. He is a qualified Civil Engineer and Mechanical Engineer, a Member of the Institute of Civil Engineers and a Fellow of the Geological Society.

### Mr. M. Caterer—Heat Pump engineer

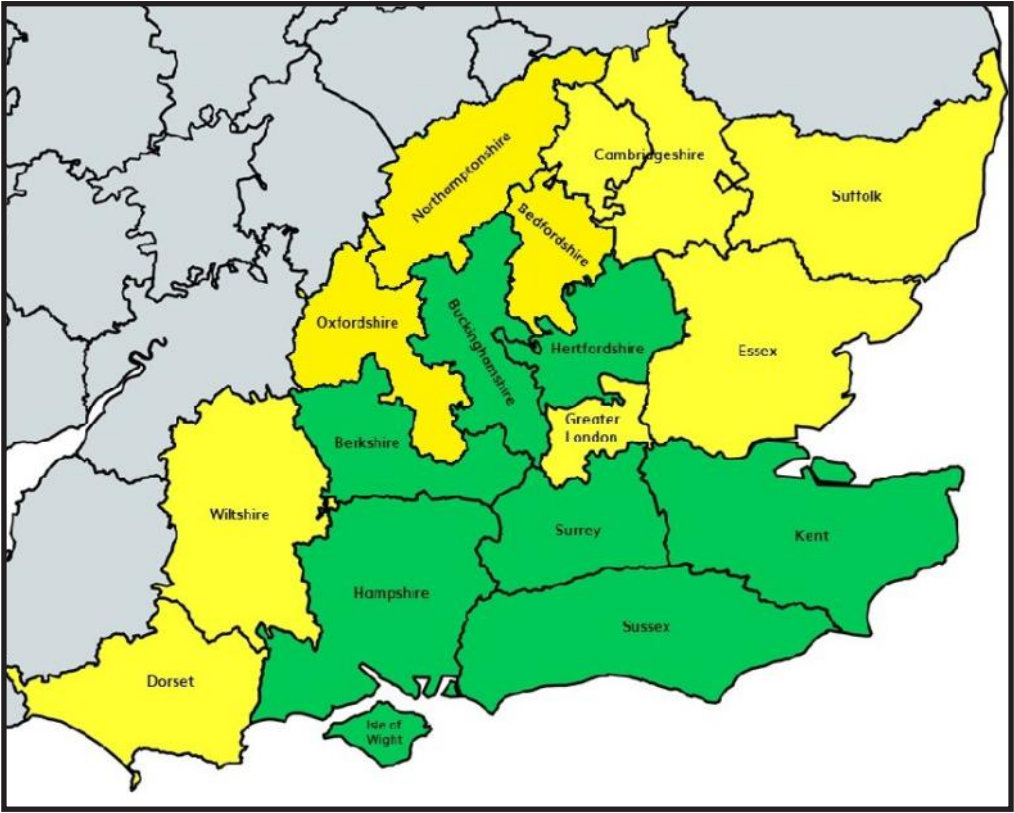
Malcom has been with H.D. Services for a number of years. A fully qualified plumber, Malcolm brings a high level of expertise along with his skill set.

### SITE PERSONNEL

Our site staff, many of whom have been with the company for more than a decade, are all qualified in their various fields of expertise, including land drillers, electricians and plumbers.



OPERATIONAL AREA



Areas of operation



Will consider projects in these areas



## CONTACT DETAILS

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