



Department  
of Energy &  
Climate Change

## Water Source Heat Pumps – Navigating the Way: A Customer Journey for potential developers

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### Water Source Heat Pumps - What are they?

Water source heat pumps (WSHPs) operate by taking the latent heat from water courses and boosting the temperature using electrically driven pumps. The resultant hot water can be fed into local heat networks or single buildings, providing a low-carbon source of renewable heat to local areas. WSHPs can also be used for cooling.

The water used can be from a range of “sources”, including rivers, canals, lakes, mines, the sea and groundwater aquifers (although the latter tends to be referred to as a ground source heat pump, the technology is basically the same). WSHPs can be “closed loop” or “open loop”. In an open loop system, water is abstracted from the water source and passed through a heat pump before being discharged back into the water source. In a closed loop system pipes or heat exchange panels are placed in the water and a water/antifreeze mixture is passed through the pipes/panels absorbing energy from the water

### Why are they important?

Most gas consumed in the UK is for heating. The Government is keen to develop and establish a role for lower carbon forms of heating and to maximise their contribution in safeguarding the UK’s energy security and cutting greenhouse gas emissions. Our vision for decarbonisation of heating involves a number of low carbon technologies, but our modelling shows that there is a particularly important role for heat pumps and for heat networks.

WSHPs in particular have a potentially important role to play in delivering large scale heat in densely populated urban areas. Water remains warmer than air on the coldest days which means they can be more efficient than air source heat pumps, and as water is much more dense than air, volumes are smaller so WSHP are quieter. Moreover, most dense urban areas have a river running through them which provides an ideal source of heat for properties near to suitable water sources, while land can be limited for extracting heat from the ground in a ground source heat pump.

You can find more information about our overall strategy for decarbonising heat in the Government’s 2013 policy paper [The Future of Heating, Meeting the Challenge](#).

### What is this ‘customer journey’ for?

The purpose of this ‘customer journey’ is to give a **high level** overview of the main stages required to install an **open loop, surface water source heat pump**. For the sake of simplicity, it assumes that the WSHP is located on a river or canal in England. It should, however, also provide useful information for those looking to install open loop WSHPs using other sources of water (e.g. the sea); and those looking to install a WSHP in other parts of the UK. Where possible, links have been provided to other organisations you may need to contact. The ‘customer journey’ is intended to be a complement to the Chartered Institution of Building Services Engineers (CIBSE) Code of Practice on WSHPs, which should appear later this year (see below).

The ‘customer journey’ follows the structure of the **‘Plan of Work’** set out in the CIBSE Code of Practice for Heat Networks; this provides a useful guide to the various stages required to plan, design, build and operate a WSHP project as well. It aligns the typical stages of a project with the main stages of the **planning process** for England and Wales, and the processes for obtaining the relevant consents required from the **Environment Agency** to abstract and discharge water from rivers, canals and tidal estuaries in England.

## Water Source Heat Pumps – Navigating the Way

By clicking on the boxes marked in [bold](#), you will be taken to further information later in the document. This information indicates areas which you may wish to consider at each stage. The 'customer journey' also includes links, where possible, to help you find further information, in particular about other organisations you may need to contact for various permissions and consents. As a general rule, it is recommended that you contact the relevant organisations **as early as possible** to start discussions and ensure your project has the maximum chance of success.

**To Note:** Following these steps will not guarantee the success of your project and the suggested areas for consideration at each stage are not intended to be exhaustive. Developers will need to follow all due processes required by the Environment Agency, planning authorities and other bodies for actual installation of a water source heat pump. Decisions on whether to grant the relevant permissions will be determined on the basis of site specific conditions and the relevant laws and regulations governing such permissions. There is also no guarantee that the Renewable Heat Incentive (RHI) will be available. Potential applicants should contact Ofgem at an early stage to discuss their plans.

### What else are you doing to help people interested in installing WSHPs?

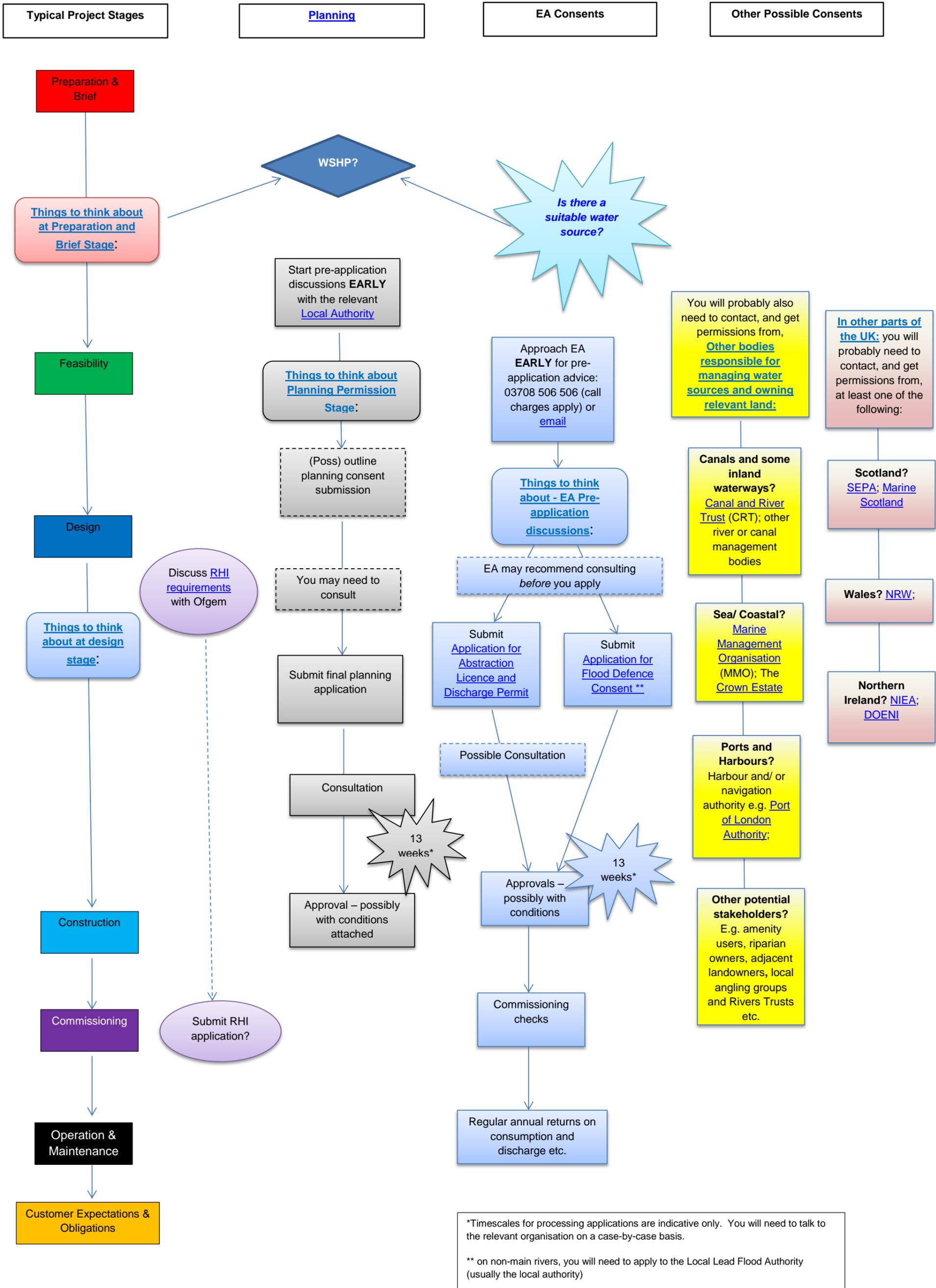
At the annual Heat Conference in November, we announced a package of actions designed to help overcome the barriers to deployment of water source heat pumps. These were in response to [stakeholder feedback](#) on the barriers to deployment of WSHPs. We have since made good progress:

- We have published a **detailed, interactive water source heat map** for England. This map has assessed local waterbody conditions, such as annual temperature and flow rates of rivers, estuaries, canals and coastal locations in England. It allows interested parties such as community groups, local authorities and developers to look at both the heat potential, and possible local constraints (e.g. environmental sensitivities) in particular locations. The aim of the map is to be an initial point of enquiry for potential installers, prior to commencing detailed investigations.
- The **Environment Agency** is improving its application forms for the necessary environmental permits, backed up with a central point of contact to facilitate early pre-application discussions.
- The Chartered Institution of Building Services Engineers (CIBSE), together with the Heat Pump Association, and Ground Source Heat Pump Association are developing a DECC-funded **Code of Practice on WSHPs** to drive up technical standards. This should be available later this year;
- We will be running a **roadshow** in June 2015 focusing specifically on those looking to install WSHPs;

You can find out more on the gov.uk website. We are keen to hear your views, including suggestions for how to improve the WSHP 'customer journey', so please do get in touch: [heatstrategypolicycorrespondence@decc.gsi.gov.uk](mailto:heatstrategypolicycorrespondence@decc.gsi.gov.uk)

# Water Source Heat Pumps – Navigating the Way

## WSHP Customer Journey – Key Steps



## Water Source Heat Pumps – Navigating the Way

### Things to think about:

The following sections are designed to give additional information and suggested considerations which those looking to install a WSHP may find useful at important stages of planning and designing a project, and applying for the relevant permissions. They are not intended as an exhaustive list. In some cases, consideration may need to be given to certain aspects earlier or later in the process.

### Things to think about at Preparation and Brief Stage:

- What is the projected heat (or cooling) load of your development. The more detailed this calculation is (peak load, but also annual heat load etc.), the more easily you will be able to consider the best heating source and the more accurately you can calculate the size of the heating source you choose.
- What are the sustainability aspirations for the building?
- What is the projected development plan – are there likely to be further phases or other developments nearby? Is there an existing heat network in the area? If so, it may be possible to create a heating/ cooling energy loop and/ or heat network.
- **Is there a suitable water source nearby which could be used for heating and/ or cooling?**
- What sources of data are there to help me calculate the cost and carbon savings of different heating options?
- Where can I get further information on water source heat pumps?
  - <http://www.gshp.org.uk/>
  - <http://heatpumps.org.uk/>
- Could the project be eligible for the [Renewable Heat Incentive \(RHI\)](#)?

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### Things to think about Planning Permission Stage:

- Do I need Planning Permission for a WSHP in this case?
  - [Non-domestic](#)
  - [Domestic](#)
- Do I have development rights for the relevant land (including for the plant room and pipework) – on land and below water?
- What are the sustainability requirements in the [local plan](#) for the area I am looking to install my WSHP?
- What documents will I need? Each local authority may have different requirements, but these are likely to include some or all of the following: an Energy Statement; an Environmental Impact Assessment; a Design Access Statement etc.
- [How long will it take](#) to get planning permission?
- What is the [process](#)?
- What will be the fees? You will need to discuss this with your local planning officer.

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## Water Source Heat Pumps – Navigating the Way

### Things to think about - EA Pre-application discussions:

- What is the projected quantum of water that may need to be abstracted & discharged to serve your scheme? This will depend on the maximum projected KW or MW for your project. NB it is worth considering the possibility of using waste heat from any cooling system to deliver a more efficient solution.
- Is the project for heating, or cooling, or both?
- Do you have the necessary rights of access to abstract the water, and to lay pipework etc?
- Are there any other existing abstraction licensees in the immediate vicinity to avoid any possibility of adverse impact on licensees existing rights?
- Are there any protected species or habitats within the area of development and/ or is the river within a Site of Special Scientific Interest (SSSI) or similar environmental designation?
- What are the details and locations of the proposed abstraction and discharge pipes' installation – depths, projections, pipe protection, marker buoys, proposed materials etc.?
- Will the temperature of the discharge have an effect on water quality in the receiving water body?
- What control measures do you have in place to restrict the return temperature of discharged water within an agreed range?
- Is there a risk of flood? NB – it is likely that you will need to apply for a Flood Defence Consent as well as an Abstraction Licence and Discharge Permit.
- What will be the method of recording and reporting the agreed abstraction & discharge information?
- How will you maintain and clean the system?
- What screening standard (e.g. for fish and/ or eels) will apply for intakes and discharges?
- What will be the fees for both the licences and ongoing supervision?
- Are there any other known users of the water in the vicinity? Who/ what are they, what are their requirements and might they have any relevance in respect of the proposed use?

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### Things to think about at design stage:

- What is the preferred location for the main plant room(s)?
- Is the preferred location for the plant room on land owned by you? If not, whose land is it, and will they cooperate in allowing the plant room to go there?
- Where will the pipework go (especially if your development is not right next to the water source)? Do you have development rights to the relevant land (e.g. you may need to acquire a leasehold) and how will the pipework be installed and maintained?
- Is the location tidal? If so, establish the high/ low tide in relationship to the depths of water. If not, does the water rise and fall, and what is its low point?
- Is there a barometric survey available of the body of water that can accurately indicate the geology of the bed and depth of water at its lowest point/ low tide?
- Are there boats/ barges etc. navigating the water course? If the abstraction point is likely to be in proximity, what minimum depth of water cover would be required above the deepest likely keel?
- Is the water fresh or salty? (This will affect the specification of pipes and filtration).
- What is the prevailing direction and known minimum/ maximum speed of water flow? (this is relevant for the design of the primary filtration).
- Are there likely to be any restrictions in respect of the points of abstraction and discharge. (Bear in mind that the two points must be separated by a suitable distance to avoid 'crossover').
- Are there likely to be any issues with regard to the pipework attachment/ crossing the river, canal, (etc) wall?
- Are there likely to be any issues regarding the attachment of pipework protection to the bed using needle piles or similar?
- Is it likely that the abstraction pipe installation would be vertical or horizontal? How far from the bank would the pipe run be?
- Are there any specific, known sensitivities that need to be taken into account in respect of environment or ecology, whether water or land based?
- Are there likely to be any other water-borne issues that need to be taken into account?

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### Other bodies responsible for managing water sources and owning relevant land:

You are likely to need consents and/ or permissions from other organisations for a WSHP project. Who you need to contact will depend upon the source of water being used and its location.

For example:

- The [Marine Management Organisation](#) (MMO) is responsible for marine licensing in English inshore and offshore areas and for Welsh and Northern Ireland offshore areas; inshore areas include not just coastal waters, but also the tidal extent of rivers. If your project involves construction in these areas, you will probably need a [Marine Licence](#), and may require other consents from the MMO as well as other bodies.
- The [Crown Estate](#) owns approximately half of the UK foreshore and almost the entire seabed below the Mean Low Water Mark out to the 12 nautical mile territorial limit. They will be an important stakeholder if your project involves any infrastructure in these areas;
- The [Canal and River Trust](#) has a network of 2,000 miles of canals in England and Wales, as well as being responsible for some docks. It will need to apply on your behalf for an abstraction licence if you wish to abstract water from one of its waterways.
- The [Port of London Authority](#) is responsible for the “tidal Thames” and acts as both a licensing authority (sometimes in conjunction with other bodies) as well as being the landowner.

This is not an exhaustive list. As set out above, these organisations are all responsible for consenting projects or granting rights and therefore will play an essential role to the success of a project. In all cases **early engagement** with any potential licensing or permitting organisations is recommended to help ensure a streamlined and efficient consenting process.

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### In other parts of the UK:

As set out above, the purpose of this ‘customer journey’ is to give a **high level** overview of the main stages required to install an **open loop, surface water source heat pump**. For the sake of simplicity, it assumes that the WSHP is located on a river or canal in England, and it requires an abstraction licence from the EA. In other parts of the UK, the processes may vary and different organisations may be involved. Where possible, the ‘customer journey’ includes links to further information.

For example:

In **Scotland** instead of the EA, the relevant authority regarding permissions in respect of abstractions and discharges would normally be the Scottish Environment Protection Agency (SEPA). Consent for associated engineering works would be required from SEPA (or possibly Marine Scotland if offshore). Application for consent to SEPA for all these activities could be made as a single application under Controlled Activities Regulation (CAR). Flood risk considerations are dealt with through planning in Scotland. Planning is a function that is devolved to the Scottish Government. There are some differences between the planning systems in England and Scotland. It will be important to contact the relevant planning authority at an early stage.

In **Wales**, the regulating authority for abstractions, discharges and inshore marine licensing is Natural Resources Wales (NRW). They are also responsible for issuing Flood Defence Consents on main rivers while works on or near ordinary watercourses are regulated by local authorities.

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