
Environment
Agency

Good Practice Guide for GSHC in E&W

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Environment Agency

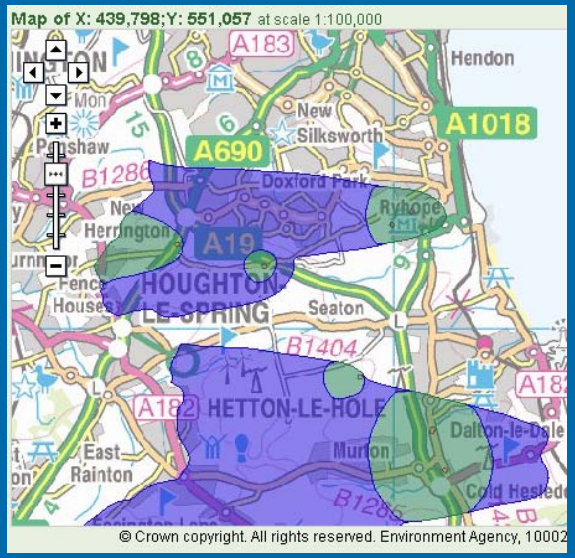
Environmental good practice guide for ground source heating and cooling

GEHO0311BTPA-E-E

Environment Agency

Environmental good practice guide

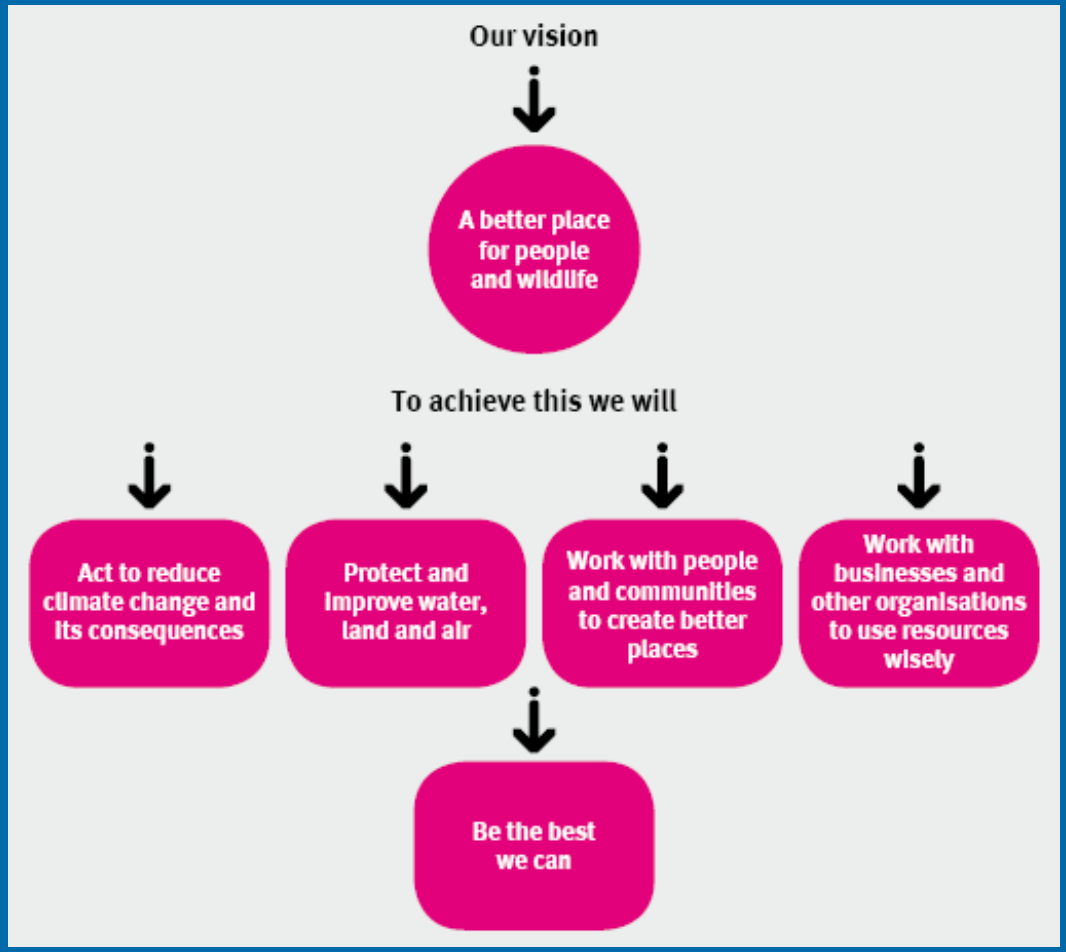
- Why?
- Work with industry (GSHPA)
- Audience
- Uses
- What it does not do!



- Step by step approach:
  - Location
  - Geology
  - Good practice – drilling, construction, installation & decommissioning

Context

- The Environment Agency
- Our Corporate Strategy
- Importance of renewables

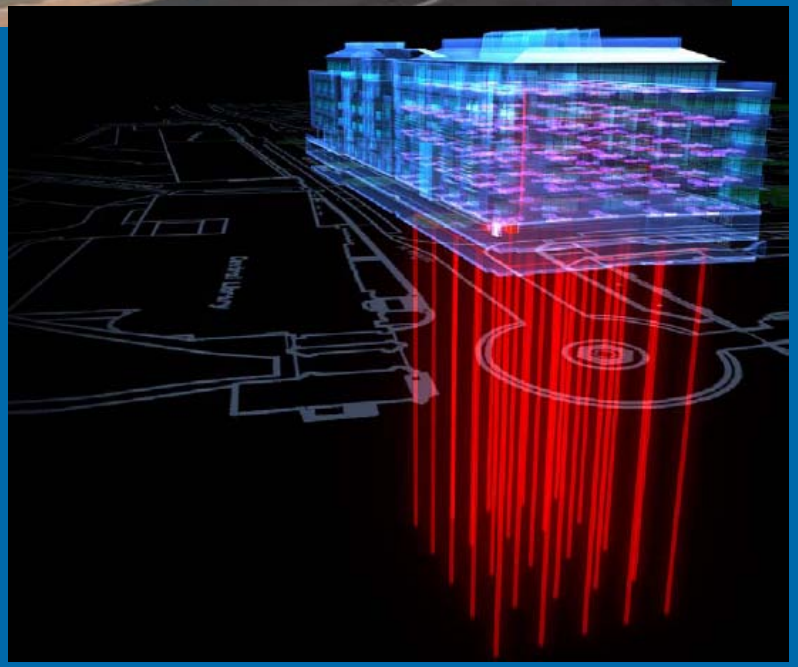


Our approach to renewables

1. Better regulation of renewables
2. Technical evidence to support sustainable renewables
3. Deploying renewables on our own estate

Horizon House

- 25 BHs 50-60m deep
- Both heating and cooling
- Considerable CO2 saving
- Cost savings



Our position

- We support the deployment of GSHC schemes to meet GHG emissions targets
- We encourage well designed and managed schemes that present a low risk to the environment
- Where we have to issue permissions, we will take a proportionate approach
- We have published an Environmental Good Practice Guidance (EGPG) for GSHC schemes
- We are developing a simple, streamlined permitting process for GSHC systems we regulate

Our role

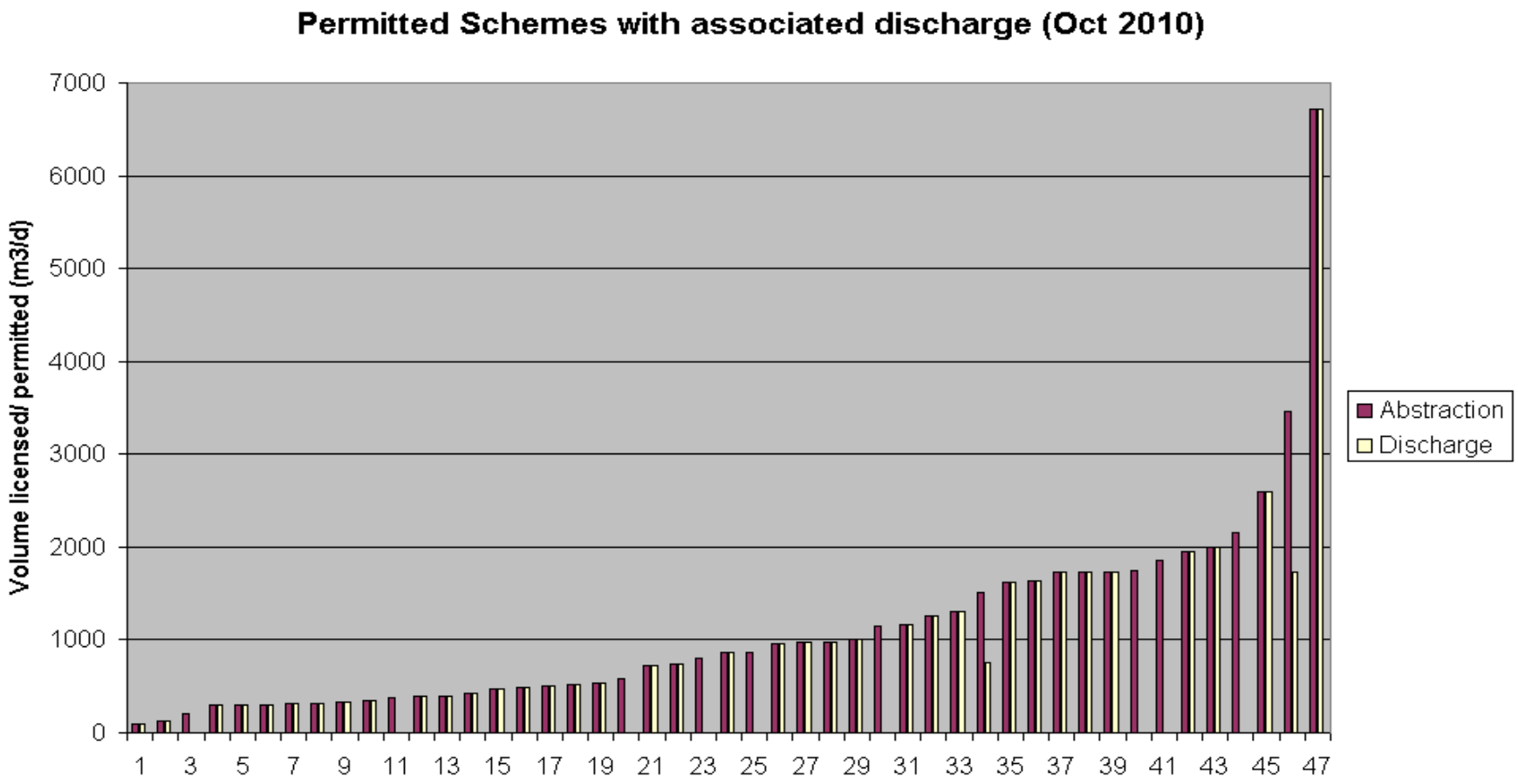
- We have no specific powers to control heat or coolth
- We can control pollutants (substances) to prevent pollution under Environmental Permitting Regulations (EPR)
- Heat or coolth are not substances
- But hot/ warm/ cold water are substances and so discharges can be permitted to protect the environment
- We control groundwater abstractions (>20m^3/d) through abstraction licensing

England and Wales Stats (Oct 2010)

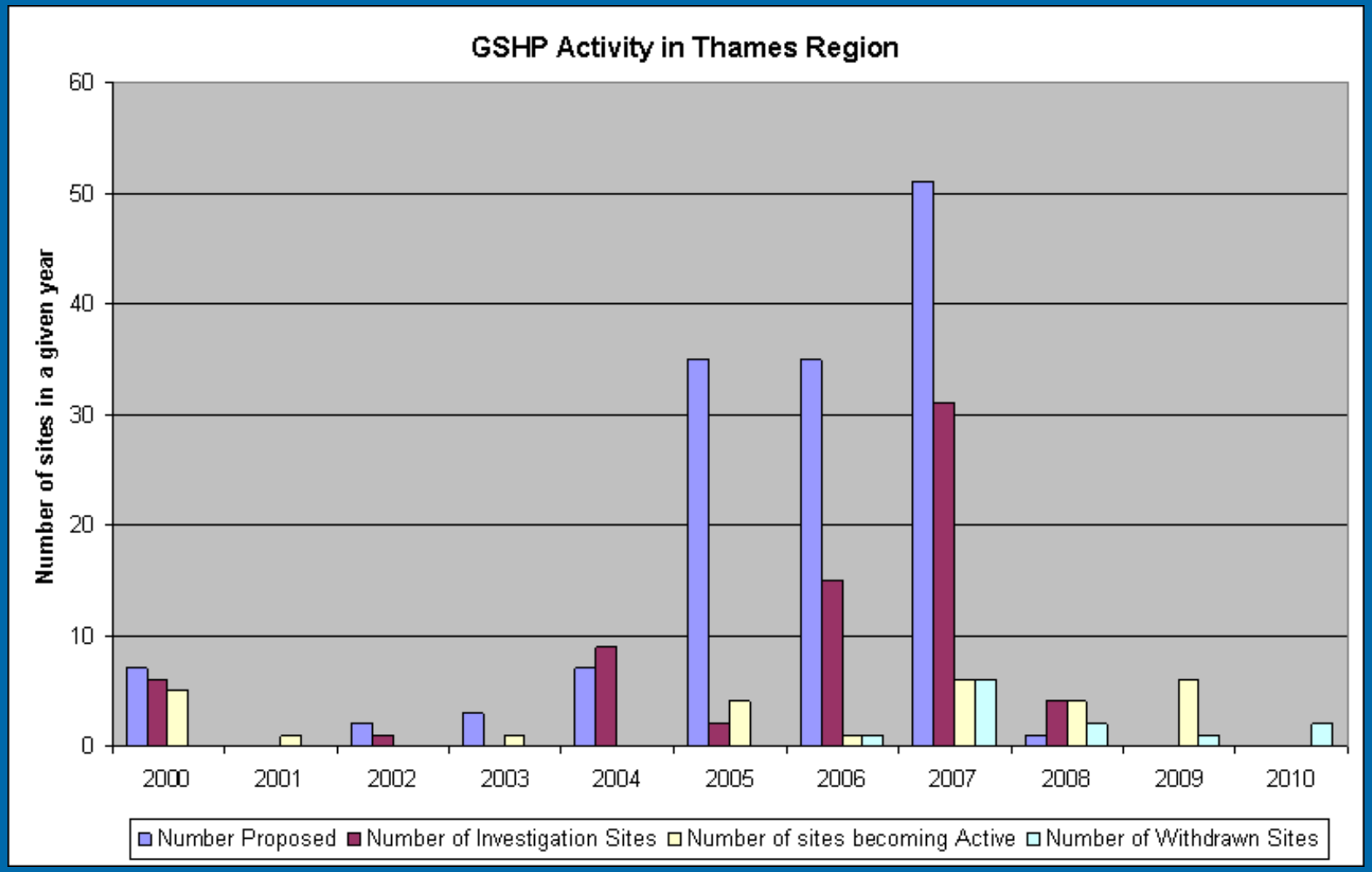
- 68 open loop schemes
- 48 have an associated discharge (to ground or surface water) (70%)
- 20 do not have an associated discharge (30%)
- Volumes abstracted between 94m^3/d – 6720m^3/d
- Temperature change criteria applied to permits

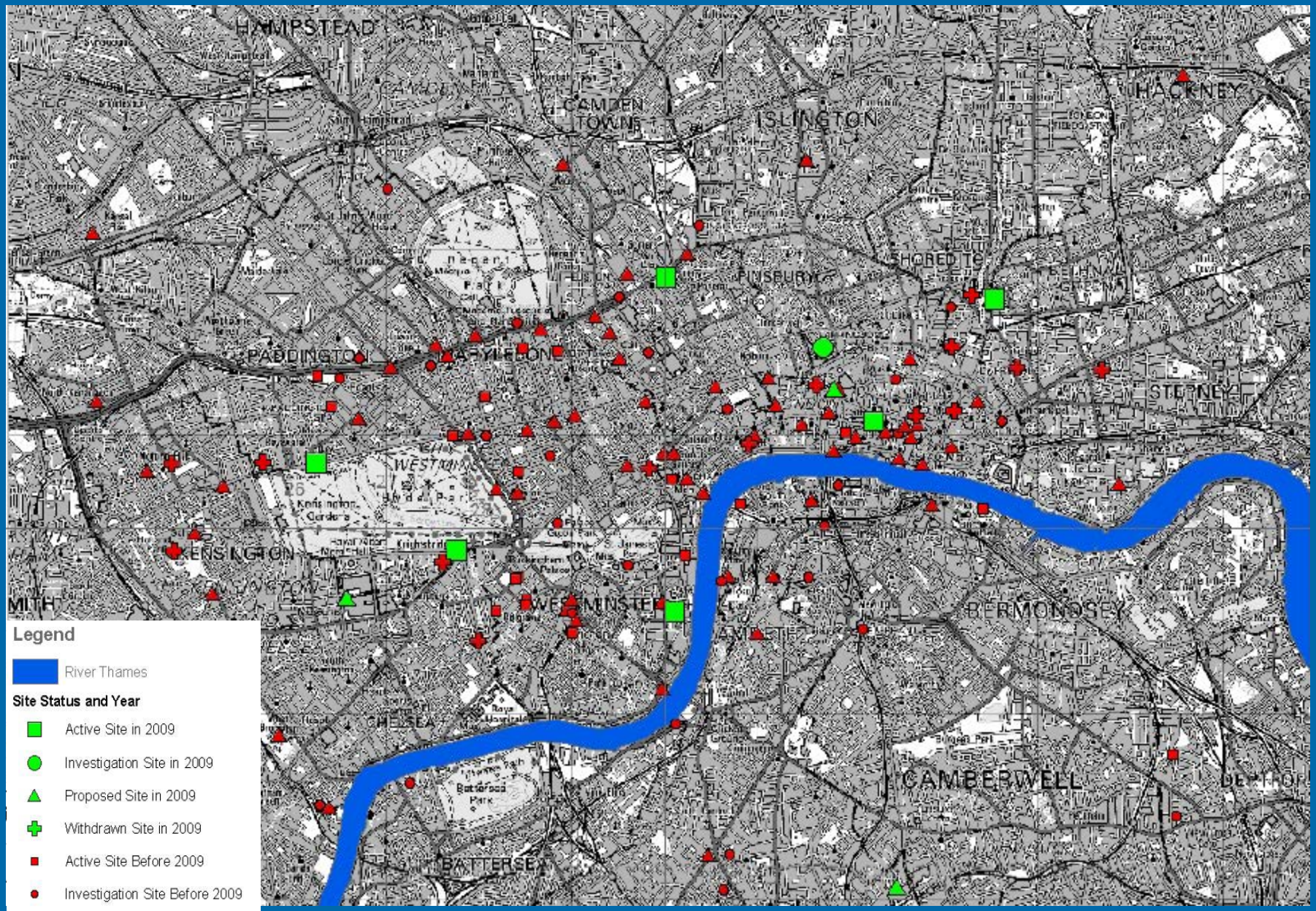
	Min	Average	Max
Temp change (ºC)	5	9	11
Temp max (ºC)	16	22	34

England and Wales Stats (Oct 2010)



London open loop schemes




HAMPSTEAD
CAMDEN TOWN
ISLINGTON
HACKNEY
PADDINGTON
MARYLEBONE
KENSINGTON
WESTMINSTER
BERMONDSEY
CHELSEA
CAMBERWELL
BATTERSEA
Legend
River Thames
Site Status and Year
Active Site in 2009
Investigation Site in 2009
Proposed Site in 2009
Withdrawn Site in 2009
Active Site Before 2009
Investigation Site Before 2009
Proposed Site Before 2009
Withdrawn Site before 2009

GSHC Growth?

Total number of installations	8,000
Current installation rate (per annum)	4,000
Thermal capacity (MWth)	152
Energy produced (GWh)	489
Number of open loop systems	300
Number of dedicated cooling/heat and cool systems	500

	Growth	High Growth
Total number of installations	320,000	1,200,000
Installation rate in 2019 (per annum)	40,000	400,000
Thermal capacity (MWth)	6,700	25,150
Energy produced (TWh)	21	78
Number of open loop systems	7,800	29,000
Installation rate in 2019 for open loop systems (per annum)	1,000	9,200

Closed loop

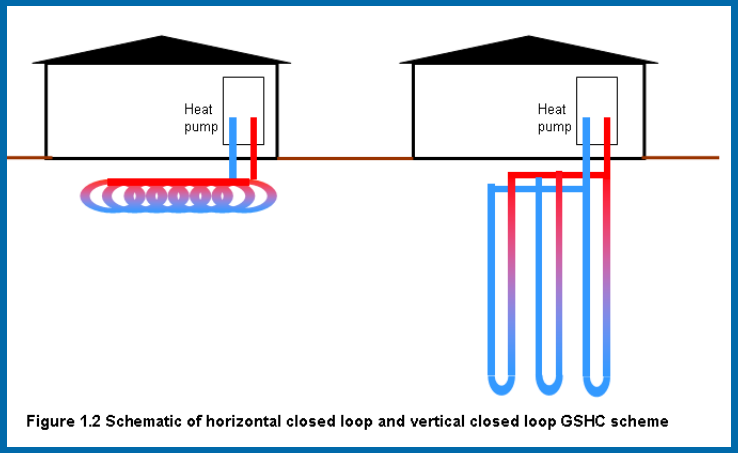


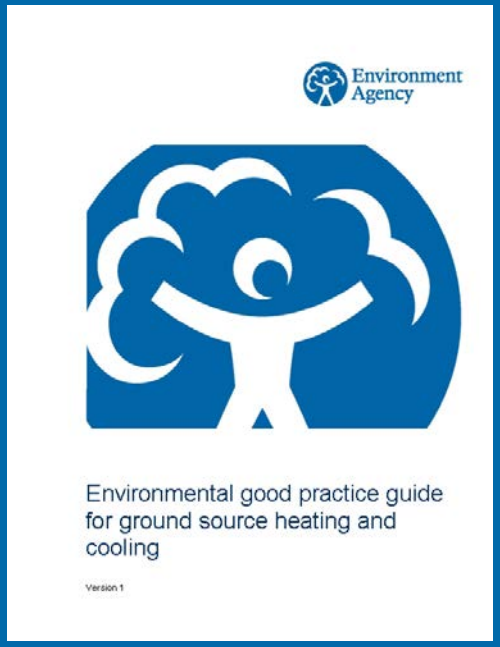
Figure 1.2 Schematic of horizontal closed loop and vertical closed loop GSHC scheme

- We don't regulate

BUT….

- Follow our Environmental good practice guide FOR YOU/ YOUR CLIENTS' BENEFIT..

Liabilities: pollution
flooding
artesian conditions
interference effects

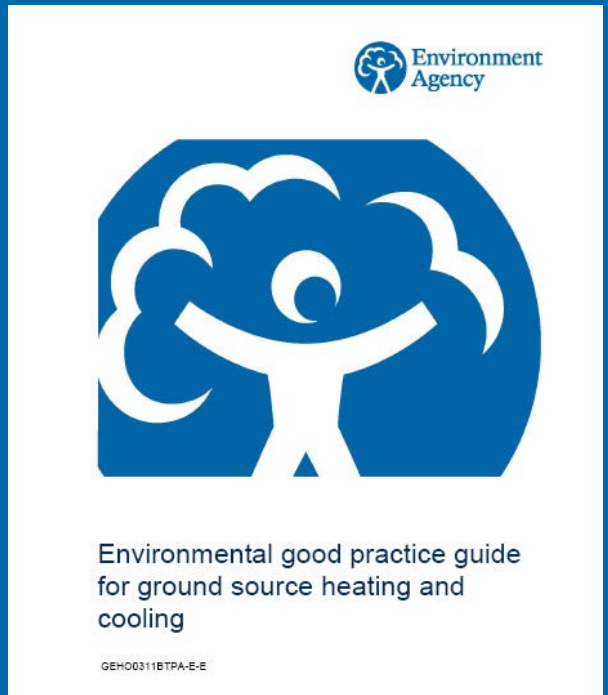


(BUT…we could serve a Notice)

Environmental good practice guide

Step by step approach:

- Location
- Geology
- Good practice – drilling, construction, installation & decommissioning



Site Location

Table 2.1 Site checklist

Tick box		Check whether the propos…tions	Note number
Yes	No		
		Within a defined gr…tion zone 1 or within 50m fro…ble used for potable supply?	1
		On l…nation?	2
		C… wetland site?	3
		W… atercourse?	4
		Clo…er GSHC schemes?	5
		Adja…t to a septic tank or cesspit	6

THINK AND UNDERSTAND THE RISKS

Geological checklist

Table 2.2 Geological checklist

Tick box		A geological checklist	Note Number
Yes	No		
		Is the proposed scheme in a principal aquifer?	1
		Is the proposed scheme likely to penetrate multiple aquifer horizons?	2
		Is the proposed scheme likely to go through contaminated soil, rock or water?	3
		Is the proposed scheme in an area with likely artesian conditions?	4
		Is the proposed scheme in a coal mining or unworked coal area?	5
		Is the proposed scheme in an area of significant evaporites or karstic conditions?	6

- Statutory requirements highlighted e.g. artesian overflow

Environmental good practice guide

- Our remit:
  - To issue groundwater investigation consents and licence the abstraction to protect:
    - Other abstractions, dependent ecosystems (wetlands, lakes, rivers etc.), the groundwater resource.
  - To issue the environmental permit to discharge, with conditions, to prevent pollution to protect:
    - Quality of other abstractions, dependent ecosystems (wetlands, lakes, rivers), the groundwater.
  - Make the developer aware of other environmental issues we are aware of within their area of responsibility.
  - Serve Notices to prevent pollution

Environmental good practice guide

- Developer/ designer/ installer's remit:
  - Cover off liabilities such as impacts on third party assets (e.g. flooding basements)
  - Efficient well designed system
  - Design, construct and install scheme so as to prevent pollution (esp. leakage from closed loop)

Good practice - closed

- Environmental impact considered through lifecycle, including decommissioning
- Leak prevention
  - Pressure testing
  - Quality of materials
  - Limit any below ground joints, integrity of any joints
- Leak mitigation
  - Shut off valves – isolation and automatic with pressure drop
  - Mark underground pipework
  - Emergency plan

Good practice – closed loop

- Complete with low permeability grout throughout entire length
- Alternatives depending on risk setting
  - Completion as a water well
  - Installed via cone push/ penetrometer
- Do not recommend direct circulation
  - Circulate hazardous substances (fluorinated hydrocarbons)
  - Encourage responsible development of alternatives

Thermal Transfer Fluid – Closed loop

- Monoethylene glycol (MEG) toxic to humans, animal and ecosystems
  - Do not recommend its use
  - Refer to GSHPA technical standards for properties needed for alternatives
- MEG and propylene glycol not yet determined as a hazardous substance or non hazardous pollutant
- Review is being undertaken by the UK Environment Agencies
- More information http://www.wfduk.org/jagdag.

Activity	Closed loop	Op/. You*
Siting of scheme (contaminated land, SPZ, water features)		√
Determine environmental impact of scheme		√
Assessment of geological conditions (multiple layers, artesian conditions)		√**
Ensure pipework integrity to prevent leaks		√
Pressure testing of scheme		√
Type of carrier fluid to be used		√
Operational monitoring of pressure in loop		√
Development of care and maintenance and emergency plan		√
Monitoring of temperatures		√
Determine long term sustainability of scheme – will include testing and possibly thermal modelling		√

*To ensure that the system is operating efficiently, for your information
**Only for a vertical scheme

Activity	Open loop	Op/ you*	Us
Siting of scheme (contaminated land, SPZ, water features		√	√
Determine environmental impact of scheme		√	√
Assessment of geological conditions (multiple layers, artesian conditions)		√	√
Development of care and maintenance and emergency plan		√	
Monitoring volumes abstracted and discharged		√	√
Monitoring of temperatures		√	√
Testing recharge well		√	
Test pumping to determine quality and quantity of water available		√	√
Determine and potential risk of flooding, impact on third party assets (subsidence/ movement)		√	
Determine long term sustainability of scheme – will include testing and possibly thermal modelling		√	

*To ensure that the system is operating efficiently, for your information

Application forms for GSHC systems

Groundwater Investigation Consent

WR32 – Groundwater Investigation consent

Requires following details:
- Applicant(s) details, address etc
- Rates of abstraction
- Purpose, Location & construction of works
- Discharge of water during test pumping

Abstraction Licence

WR173 – Water Abstraction

Requires following details:

- Applicants details, address etc
- Request for Environmental Report or EIA where appropriate
- Application fee

WR174 – Water Abstraction

Requires following details:

- Location of abstraction inc NGR
- Entitlement to apply (including confirmation of right of access)
- Abstraction details, Considerations

Environmental Permit – Point Source Discharge

PART A – About You

Requires following details:

- Applicant(s) details, address etc.

PART F2 – Charging for discharges

Requires following details:
- Payment of application charge.

PART B2 – General Bespoke Permit:

- Discharge address & NGR,
- Type of activity,
- Outline potential effects on other users of receiving water,
- Planning status,
- Supporting information etc. Supply

PART B6 – New bespoke water discharge activity and groundwater activity

- Details & type of effluent discharged inc. SIC,
- Duration of discharge, Discharge quantity, Discharge composition,
- Monitoring arrangements, Where discharging to, Design criteria

Abstraction licence

•Receive application forms, log, check application fee correct - **21 days max**

•If appropriate, check received groundwater investigation consent

• National permitting check application valid, undertake screening
• Application deemed valid if not rejected before relevant date

10 working days

RELEVANT DATE (abstraction)

DULY MADE DATE (EPR)

EPR – discharge

• Receive application forms & application charge, check apps correct forms, required info provided, correct fee etc.

• Letter sent to applicant to acknowledge application

• Clock can stop for up to 10 working days (for missing information)

Bespoke permit

Determination Period (4 months from duly made date)

Application publicised and external consultation begins within 30 days of duly made date. Consultees given 20 working days to respond

Draft permit sent to operator for review. Given 10 working days

Tiered regulation under EPR for discharges

Regulatory approach	Approach to discharge to groundwater with changed temperature only	Current approach to discharge to surface water with changed temperature only
Deregulated	All discharges are regulated at present though we are working on proposals to reduce regulation on low risk discharges over the next few years.	No permit is needed if the discharge is from a single dwelling with the system used only for heating where water is abstracted from the same watercourse
Registered exemption		
Standard permit		The discharge must meet a number of specific criteria
Bespoke permit	Required.	If does not meet criteria in standard permit

Summary

- Our legislation not intended to deal with these schemes
- Need to ensure our regulatory regime is not a barrier to use of these technologies
- Need to promote good practice for use in those technologies we don’t regulate
- Working with others (e.g. GSHPA) to come up with joint industry approaches