Unconventional Gas in Scotland:

Environmental risk and regulations

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Scottish Environment Protection Agency (SEPA)

- Scotland's environmental regulator
- Protect and improve the environment
- Regulate and monitor
- Non departmental public body

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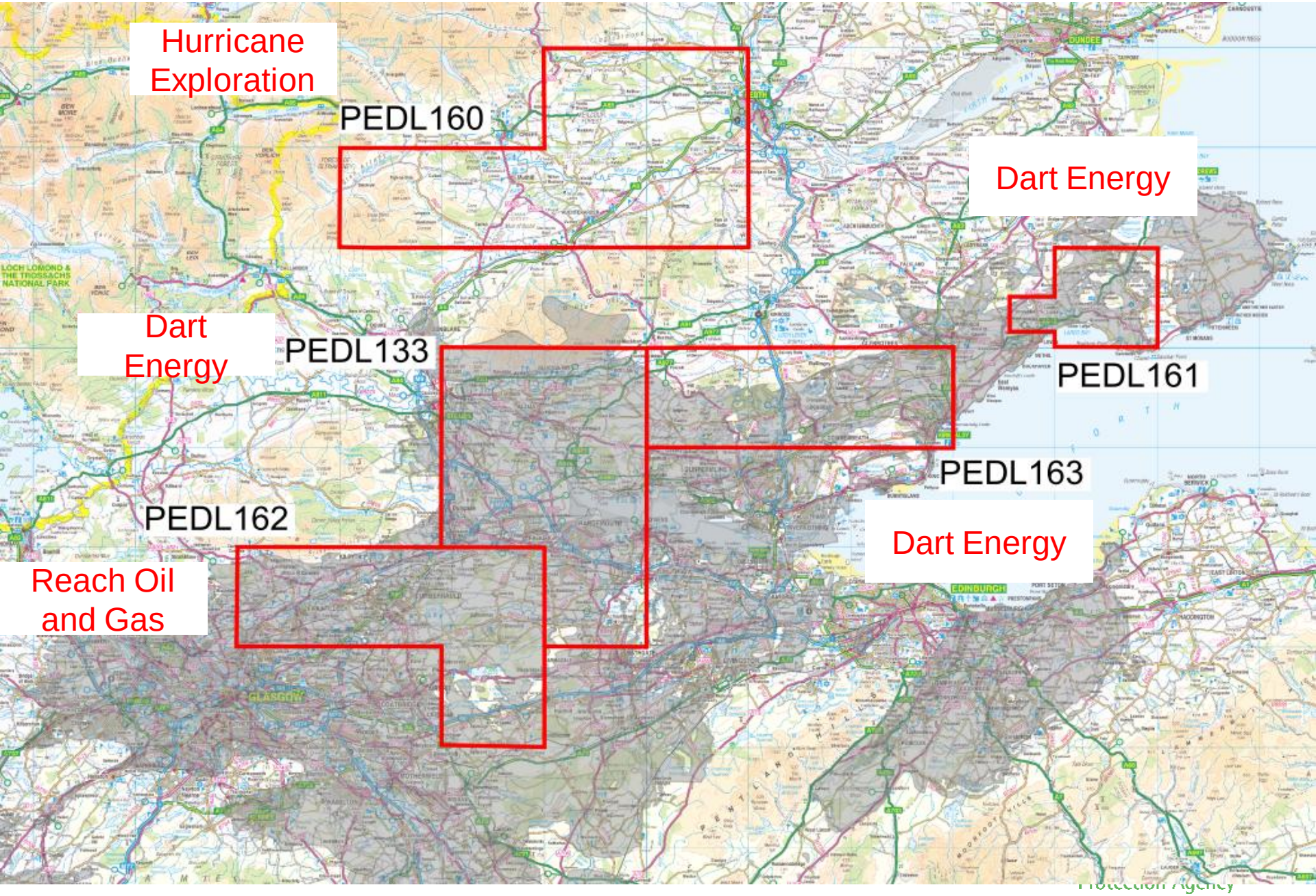
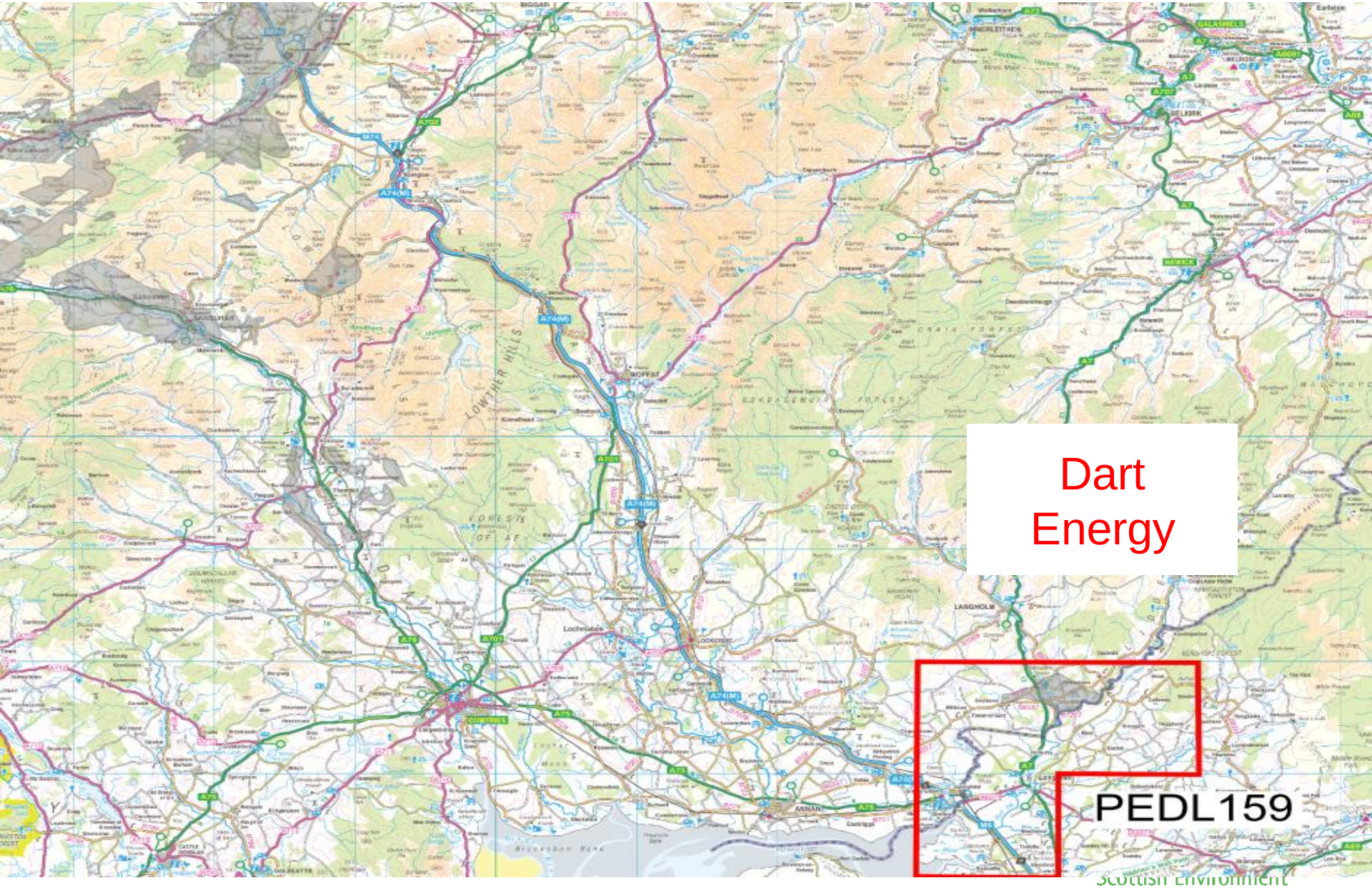
Onshore PEDLs in Scotland -1



Onshore PEDLs in Scotland - 2



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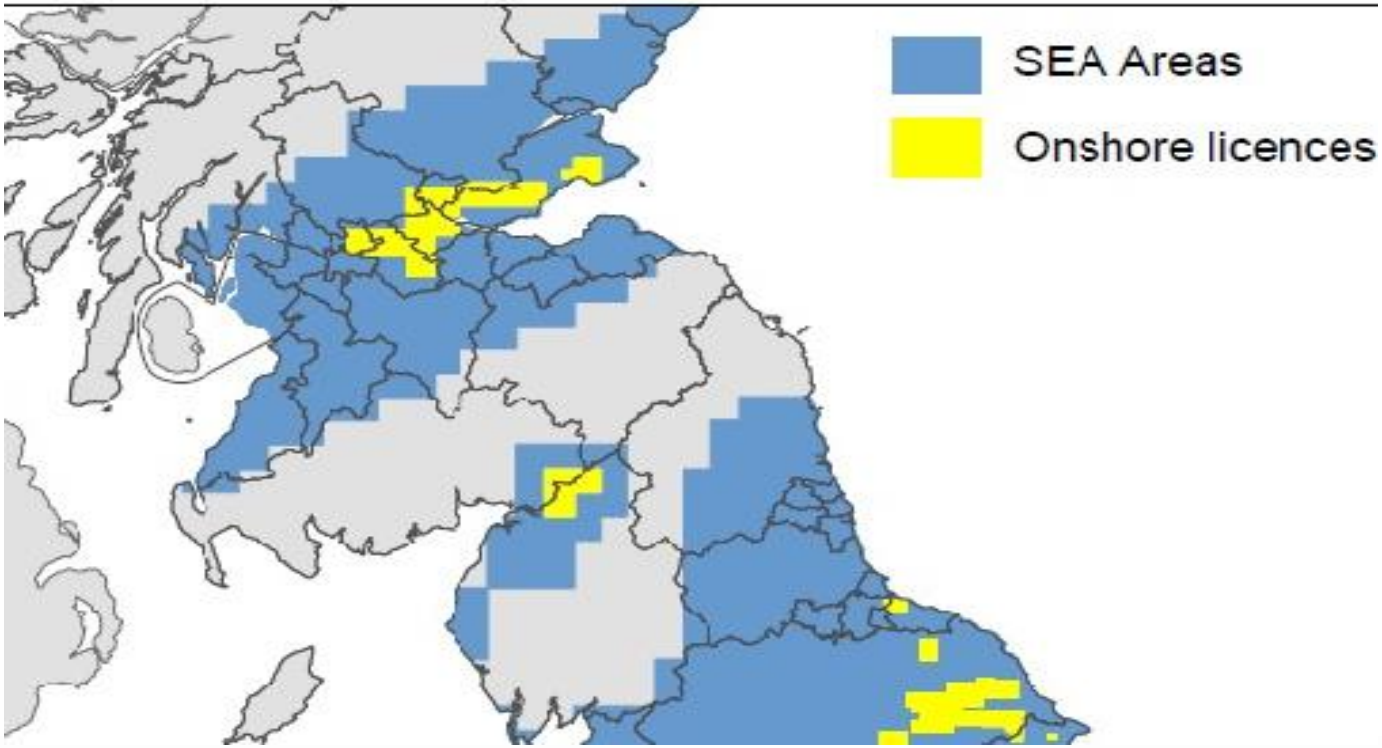
14th PEDL Round in Scotland



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Potential impacts on water environment

Cross contamination of groundwater aquifer due to poor borehole construction	CAR regime*
Pollution from gas or drilling/fracturing fluid into groundwater	CAR regime
Pollution from discharge of groundwater	CAR regime
Over abstraction of water leading to an unacceptable impact on the water environment or other abstractors	CAR regime

**The Water Environment (Controlled Activities)(Scotland) Regulations 2011 (CAR)*

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Other potential environmental impacts may include:

Potential Impacts:	**Controls:**
Flaring	DECC and SEPA via Pollution Prevention and Control (PPC)
Fugitive emissions of gas to air	PPC permit boundary, Local Air Quality (local planning), indirectly HSE and SEPA through borehole construction controls
Abandonment of wells	HSE and SEPA through CAR regime
Climate Change	Scottish Government, local planning authority and SEPA Under the Climate Change (Scotland) Act 2009
Seismic Activity (from fracking only)	Local planning authority and DECC

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Regulatory Role for SEPA

- Water Environment (Controlled Activities)(Scotland) Regulations 2011 (CAR)
- Pollution Prevention Control (PPC)
- The Control of Major Accident Hazards Regulations 1999 (COMAH)
- Environmental Liability (Scotland) Regulations 2009 (ELR)
- NORM Radioactive Substances

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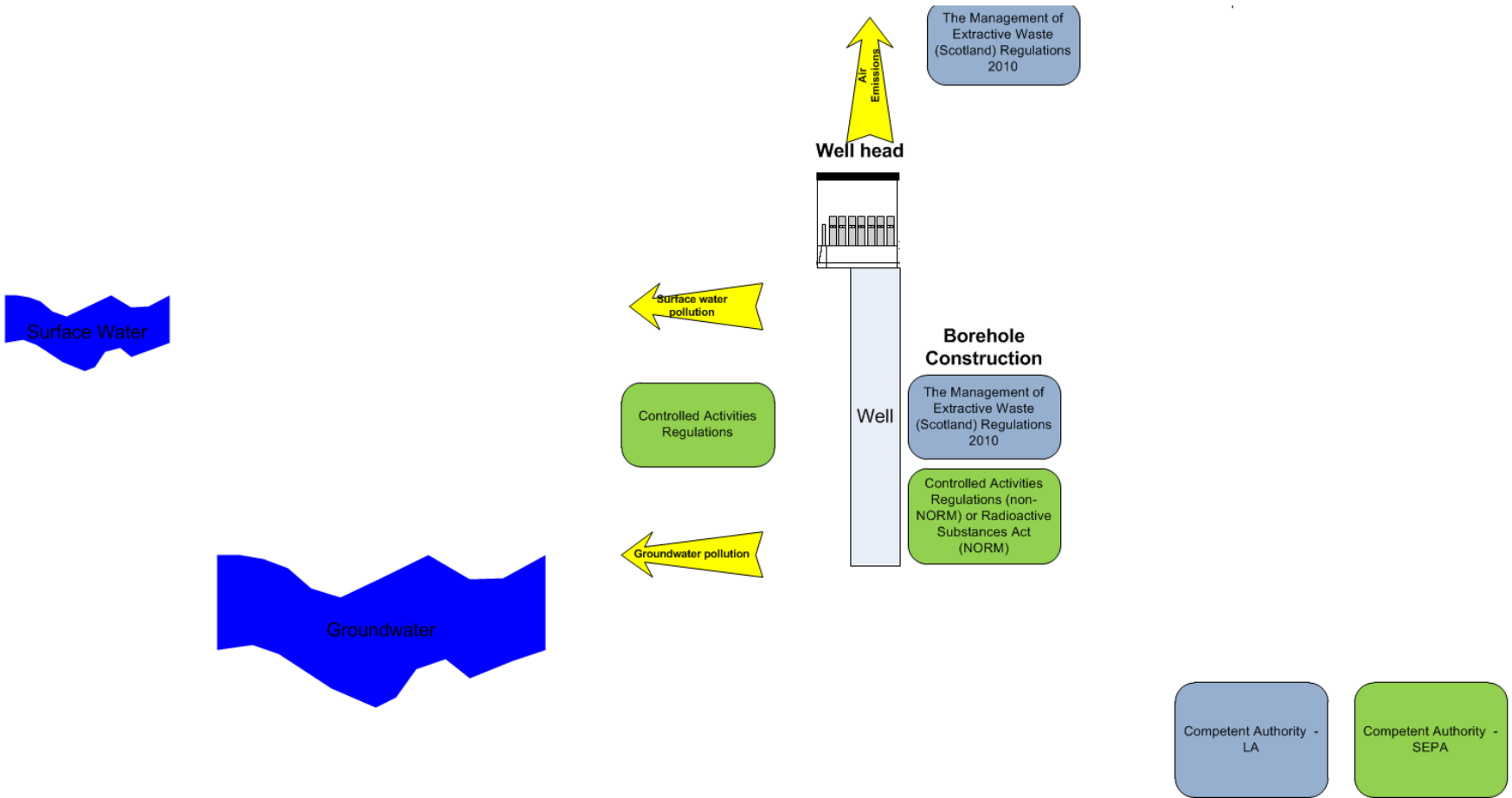
Simplified Graphic Showing Environmental Controls on Unconventional Gas Operations



Well Construction

Fracturing Equipment

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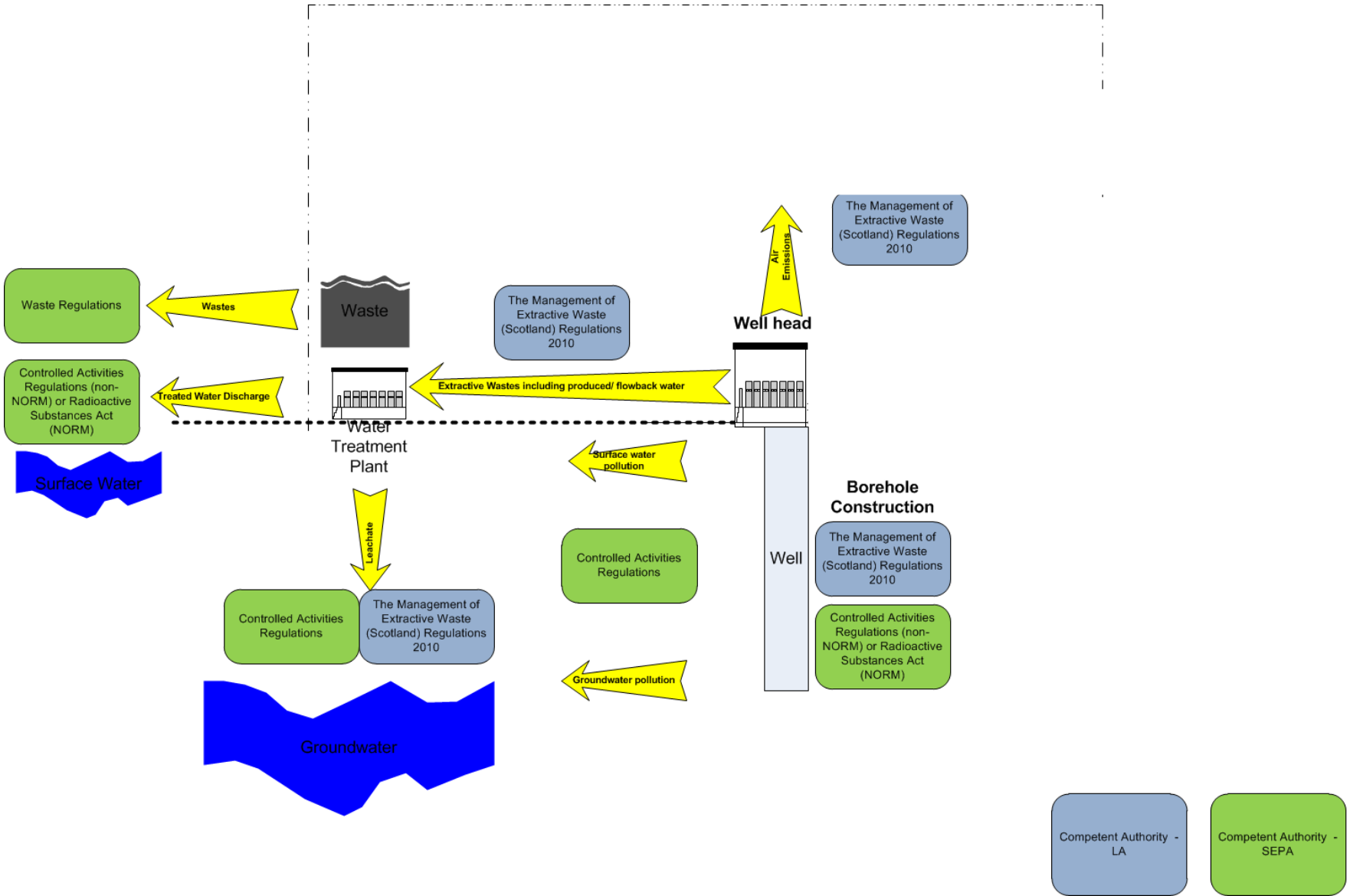
Simplified Graphic Showing Environmental Controls on Unconventional Gas Operations



Well pad at production phase

Exploration central gas and water facility

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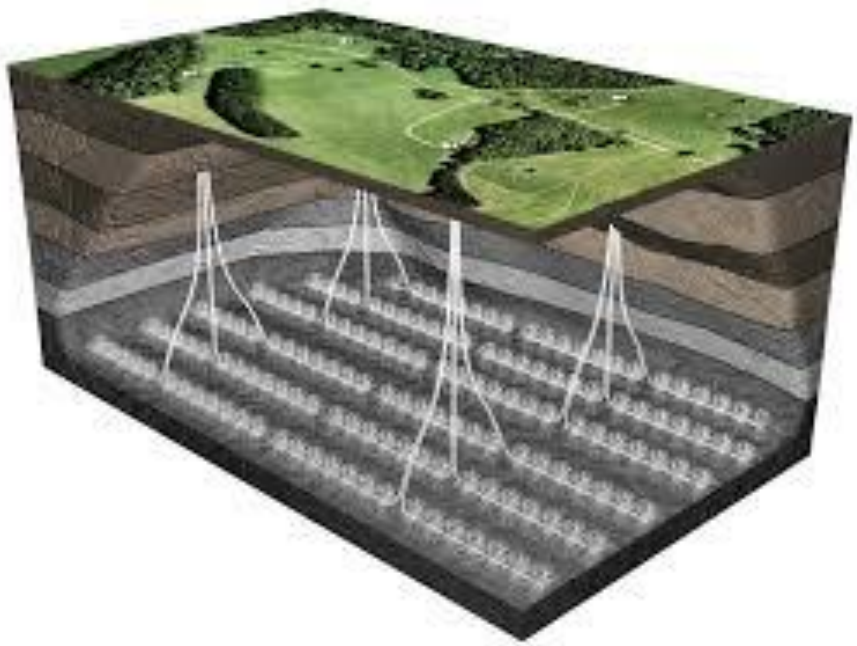
Muti well cross section



Well distribution in USA

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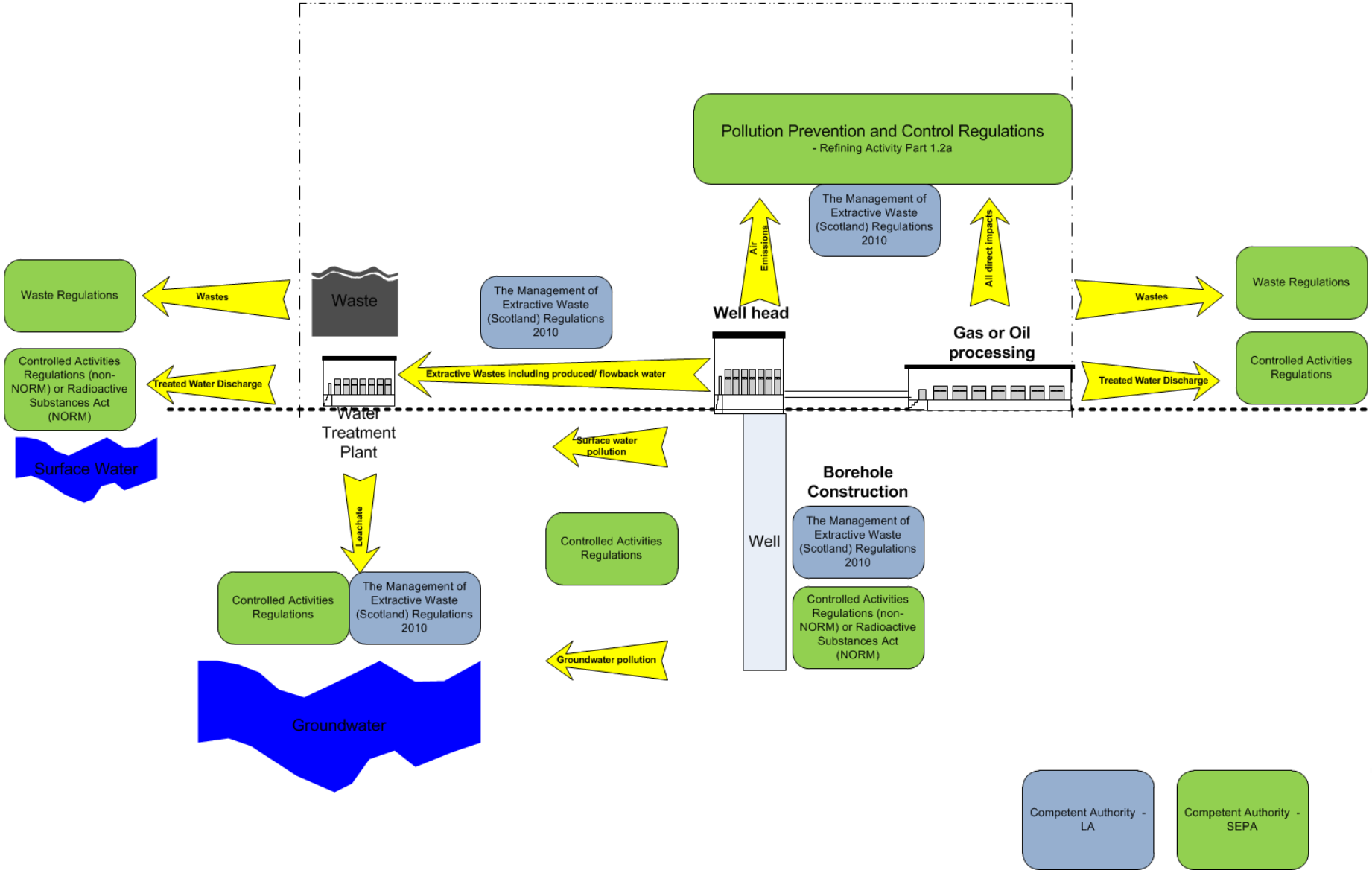
Simplified Graphic Showing Environmental Controls on Unconventional Gas Operations



Local Authority Responsibilities

- The Management of Extractive Waste (Scotland) Regulations 2010
- Planning and Environmental Impact Assessment
- Local Air Quality Management (LAQM)

Include: Nitrogen dioxide, Particulate matter less than 10µm in diameter (PM10), Sulphur dioxide, Lead, Benzene, Carbon monoxide and 1,3 butadiene.

Other pollutants such as ozone, poly-aromatic hydrocarbons (PAHs), PM2.5 and various heavy metals are included in a wider air quality strategy.

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Scottish Planning Policy

- Applicants should undertake a risk assessment for all proposals for shale gas and coal bed methane extraction.
- Consult local communities so that it can inform the design of the proposal.
- Local authority should consider buffer zones informed by the risk assessment
- Consider most efficient sequence of extraction

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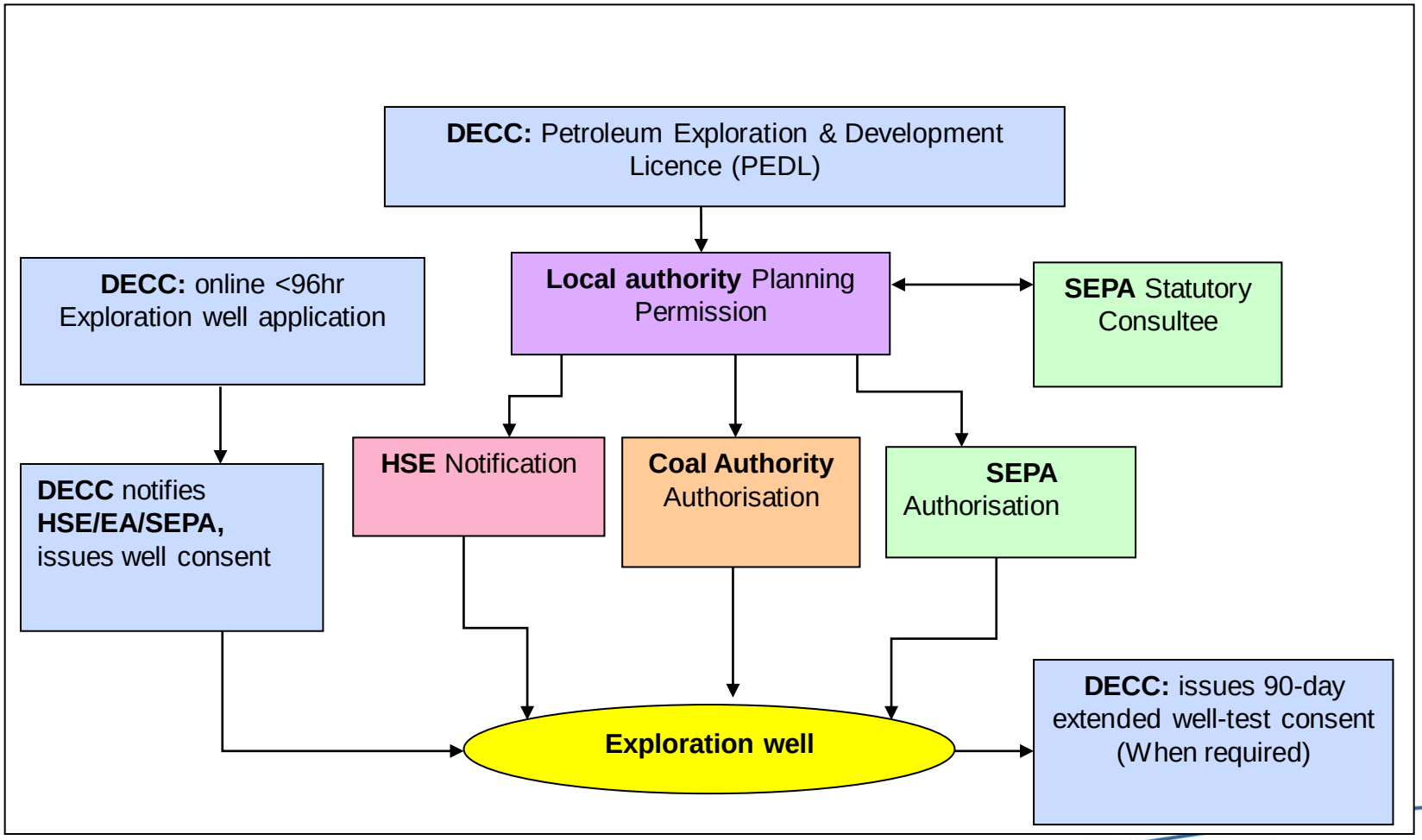
Other regulators



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Unconventional gas

What are unconventional gases and how are they extracted?

The term unconventional gas refers to methods used to extract methane gas from underground shale rock and coal beds, rather than the gas itself. These methods are referred to as fracturing, also known as fracking.

Conventional gas deposits are contained in porous reservoirs, often limestone or sandstone, which have interconnected spaces that allow the gas to flow freely in the rock and through well boreholes. These reservoirs may be many miles from the organic material that was the original source of the gas.

However, unconventional gas deposits are contained in reservoirs of lower porosity, such as shale and coal which require greater levels of technology The gas is held in fractures, tiny pore spaces and adsorbed on to the organic material of the rock. Unconventional gas reservoirs are often also the source of the gas.

Operations to extract the gas involve drilling boreholes, often to considerable depth and in some cases horizontally. Gas extraction works by releasing pressure in the rock by natural gas production or the pumping of water from the rock.

Shale gas

- shale was originally mud that has over millions of years been compacted and hardened into a fine-grained, sedimentary rock composed of clay minerals and tiny fragments of other minerals, especially quartz and calcite.
- shale gas extraction involves extraction of the natural gas held in fractures, pore spaces and adsorbed on to the organic material of shale.

Coal Bed Methane (CBM)

- coal is a combustible black or brownish-black sedimentary rock normally occurring in rock strata in layers or veins called coal beds or coal seams.
- coal bed methane, often referred to as CBM, is different to a typical sandstone or other conventional gas reservoirs, as the methane is held within the coal by a process called adsorption.
- coal bed methane (CBM) extraction works by releasing pressure in coal seams by natural gas production or the pumping of water from the coal bed.

Extracting unconventional gas

Exploration for unconventional gases is at a very early stage in the UK. Recent technological advances mean that it could be viable for industry to explore the potential for extracting unconventional gas onshore, such as:

- shale gas;
- coal bed methane.

We have a role alongside other organisations in regulating the extraction of unconventional gases to ensure the environment

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Regulatory guidance:
Coal bed methane and shale gas

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Thank you for listening

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