



## **An assessment of UK conventional oil and gas well sites remediation practices**

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With the potential development of a shale gas industry within UK over the next few decades, there is the possibility that tens, to tens of thousands of new onshore wells could be drilled. Given shale gas development is a temporary activity, with well operational life lasting from a few years up to several decades, there is a growing concern about the legacy of these sites. In densely populated countries, for example the UK, land is precious; therefore, it is imperative that the land affected by this new industry is appropriately developed and when no longer required carefully remediated to ensure inactive well sites do not threaten the local ecosystems or cause long-term environmental issues. Thus, the aim of this study was to assess the level of remediation conventional well sites have received within the UK, determine if there are existing remediation issues, the scale of the problem and the potential long-term implications a new industry such as shale gas might bring. From this assessment suitable mitigation strategies required to prevent potential long-term impacts were developed.

Since the first gas well was drilled in the UK in 1895 there have been over 2000 wells developed, many of these are claimed to be fully remediated, thus the wells are plugged and abandoned, and the well-head cut off below ground level so that agriculture or other practices can resume over the well site. Using aerial imaging, the activity status of each well, the level of surface disruption well sites were generating (if any), and the level of remediation that abandoned wells had received was analysed. Following this, 15 sites were visited to assess if these abandoned and remediated oil and gas well sites showed differences in soil compaction compared to land that had been undisturbed.

For the first time, this study highlights two main issues the UK experiences with regards to oil and gas well site remediation. Firstly, not all well sites have been remediated fully. Thus, approximately 10% of the wells investigated for surface disturbance across the UK clearly showed or indicated where the well pad was once located, e.g. hard core and well site equipment have been left onsite. Secondly, well sites have been remediated at the surface; however subsurface remediation is not sufficient. Thus, of the 15 sites assessed in the field 13 wells sites showed a significant difference between the compaction depths at the well sites compared to the control, with 10 of these sites indicating soil compaction, thus an increase in soil strength leading to changes in vegetation cover and waterlogging.

Many well sites have not been appropriately remediated, indicating that improvements in the remediation process would be advantageous to limit further long-term implications from oil and gas exploration. Consequently, if a shale gas industry was to be developed independent checks and assessments onsite, and regular inspection of both suspended and abandoned well sites should be a key requirement.