

GBE-N Technical Advice on Potential Future Nuclear Power Plant Siting in Scotland

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Introduction

This report presents the findings of a high-level, internal technical desktop study undertaken by Great British Energy - Nuclear (GBE-N) in its advisory capacity to the Department for Energy Security and Net Zero (DESNZ). The purpose of the study is to identify land areas in Scotland that may be technically suitable for the future deployment of nuclear technologies¹, should the policy position of the Scottish Government change. The study concludes that, from a technical perspective, Scotland has land areas with high potential for new nuclear development.

Separately in November, alongside the announcement of Wylfa as the site for GBE-N's SMR project, GBE-N was further commissioned to undertake a wider study to consider land areas potentially suitable for deploying large-scale reactor technology in Great Britain (GB). This will conclude in Autumn 2026.

Nuclear policy is set at a UK-wide level by the UK government. However, the Scottish Government has a long-standing policy that it will not grant planning consent to new nuclear projects in Scotland. This report does not address policy aspects. The report summarises GBE-N's technical, desktop scoping, from an internal technical perspective only (and which therefore has not included external stakeholder engagement). The study evaluates land in Scotland for its potential suitability for new nuclear deployment, should the policy position of the Scottish Government change. The potential suitability of land areas identified in the report has been assessed based on information available at the time of writing this report.

Note that detailed grid connectivity assessments and dialogue with the National Energy System Operator (NESO) were not within scope of the study, however proximity to existing grid infrastructure was included as a generic criterion.

A Geographic Information System (GIS)-based methodology has been applied, to screen the Scottish mainland against exclusionary and evaluative criteria derived from relevant national policy, regulatory requirements, and engineering considerations. The same criteria have been applied consistently across all land areas, with the methodology intended to identify locations that are not precluded on technical grounds, rather than to determine overall suitability or development potential.

The application of this approach identifies land areas with differing contextual characteristics. Some areas are in the region of existing or former nuclear facilities and therefore have an established nuclear or energy-generation heritage, while others have not previously been associated with nuclear development. These differences are noted to provide technical context only; in all cases, identification reflects the outcome of the same high-level technical screening and does not imply endorsement, preference or development intent. Any land area identified would require substantially more detailed, site-specific assessment before more detailed conclusions on suitability could be drawn.

¹ Written statements - UK Parliament - <https://questions-statements.parliament.uk/written-statements/detail/2025-11-13/hcws1056?>

The study has not assessed the commercial status or interest of individual landowners. Land ownership data is not readily available in Scotland and so ownership has not been established for any areas examined. Any potential development opportunities for the areas identified would need to be explored directly with the relevant landowners through appropriate commercial discussions.

Context

Scotland has a long history of nuclear energy generation and hosts a small number of nuclear energy facilities, the majority of which are now being decommissioned. Torness Nuclear Power Station in East Lothian, contributes to Scotland's energy mix, alongside onshore and offshore wind, hydroelectric power, solar, and limited fossil-fuel generation. This diverse energy system is closely aligned with Scotland's geography, utilising its mountainous terrain, wind patterns, rural lowlands and extensive coastline to produce energy using a range of different technologies.

The land areas identified by the study are not intended to provide an exhaustive list of potentially suitable locations in Scotland. The study does indicate that, should the policy position of the Scottish Government change, there are areas which are potentially suitable for new nuclear development of all scales.

A site's strategic value is best understood in the context of all other potential siting options. The large-scale GBE-N Siting Study covering England, Wales and Scotland, due to report to DESNZ Ministers in Autumn 2026, will substantially improve understanding of the relative value of the land areas identified in this report.

Identification of any land area as potentially suitable does not imply endorsement or development intent. Confirmation of site suitability would only be achievable through detailed, site-specific assessment and the application of the full regulatory and planning processes, including early and extensive engagement with communities and stakeholders.

Scope & Focus

The study is **informed by current policy** including the National Policy Statement for Nuclear Energy Generation (EN-7)² in England and Wales published in December 2025, which presents a suite of factors which influence site selection.

The **geographical scope** considers the Scottish mainland. Scottish islands have been excluded from consideration noting several factors which make them significantly less suitable. This includes limited proximate grid capacity and connectivity, transport and logistics constraints, and overall feasibility relative to mainland options.

The **nuclear technology under consideration** includes land-based nuclear energy generation technology including microreactors (1 – 20Mwe), SMRs/ AMRs and GW-scale reactors. These different reactor types have varying operational site footprints, cooling technology, transport access and wider infrastructure requirements.

Access to suitable grid infrastructure has been a key factor in the previous selection of sites for the UK nuclear fleet. Engagement with NESO was beyond the scope of this study, so our findings exclude consideration of local grid constraints, transmission requirements and other factors related to strategic energy system planning or resilience. Siting a reactor closer to major energy users reduces transmission losses, lowers infrastructure cost and reduces project complexity. Advanced nuclear technologies can be designed not only to generate electricity but also to supply high-temperature heat, steam, and hydrogen, which are valuable for industrial processes.

Land areas of particular interest include former and existing nuclear and other energy generation sites which tend to offer proximity to high-capacity grid infrastructure, favourable terrain and access to major water bodies which provide cooling water and thermal dispersion. In addition, land areas previously considered for nuclear development in Scotland, as alternative locations to the current Scottish fleet, have also been considered through a review of historical records held in the National Archives, Kew.

Brownfield land areas with adequate land availability, and good transport access including movement of abnormal indivisible loads (AILs) are also of interest. The planning and construction activities for new nuclear developments tend to be longer than many infrastructure developments. In the context of siting, this may present an opportunity to secure currently occupied land in advance of any decommissioning or site clearance activities. Identifying such opportunities will rely on direct discussion with relevant landowners and has not formed part of the scope of this work.

Land areas with no apparent previous development are also considered, with particular interest in land designated for development or employment purposes, or adjacent to existing infrastructure so that any new development would avoid significant

² [EN-7 National Policy Statement for Nuclear Energy Generation - https://assets.publishing.service.gov.uk/media/69125d53ece74c08fbaa646e/national-policy-statement-nuclear-energy-generation-en-7.pdf](https://assets.publishing.service.gov.uk/media/69125d53ece74c08fbaa646e/national-policy-statement-nuclear-energy-generation-en-7.pdf)

change to the character of the local landscape.

The **temporal scope** of this assessment considers the suitability of land areas to support nuclear infrastructure through site-enabling, construction, operations and decommissioning activities. Current policy also requires interim storage of radioactive wastes on-site until a Geological Disposal Facility (GDF) is available.

Approach to Study

Methodology

The methodology used is consistent with previous nuclear siting related studies, some undertaken in support of informing UK Government policy. Previous studies have only considered sites in England and Wales; however, the methodology can be similarly applied to Scotland, noting the different data sources which inform the assessment.

The study is informed by a **Geographic Information System (GIS) model**, developed to support the identification and assessment of potential nuclear energy sites across the Scottish mainland. The GIS-model maps geospatial constraints which influence the siting of nuclear energy technology. Constraints broadly originate from policy (national, regional and local), nuclear energy technology requirements and commercial factors. The model integrates multiple datasets to provide a systematic, evidence-based approach to screening.

Using the GIS-model, the siting study is undertaken in two stages.

Stage 1 uses the GIS-model to identify constraints which preclude deployment of nuclear energy technologies in certain areas. For example, 'Population Density' which is assessed through application of the semi-urban population density criterion (SUPDC) in accordance with EN-7.

Stage 2 evaluates the remaining land area and applies discretionary policy, technology, regulatory and commercial factors to consider potential suitability for nuclear energy deployment for specific areas.

Geospatial Considerations

In Scotland (as elsewhere in Great Britain), the application of constraining geospatial factors removes significant land areas from further consideration. Those that exclude or discount significant land areas and in so doing, identify areas of focus in which localised impacts and opportunities are evaluated:

Groundwater	This EN-1 policy criterion precludes energy infrastructure development that would adversely impact sensitive locations for groundwater (through pollution and over-abstraction). This study has identified multiple apparently feasible land areas, all of which are coastal/on major rivers and so assumed to not require aquifer abstraction or result in impact to aquifers; on this basis this criterion has not been applied at this stage.
Population & Population Density (SUPDC)	This EN-7 policy criterion excludes significant land areas within the Scottish Central Belt, an area which is otherwise of interest for new nuclear due to the presence of the existing power stations of Torness and Hunterston, good accessibility, proximity to high energy users and (in general terms) good grid connectivity.
Proximity to Military Activities	This EN-7 policy criterion excludes significant land areas across Scotland, including a very large area in the south-west and large parts of the Highlands.
Civil Aviation	This EN-7 policy criterion has the potential to discount localised land areas around Scotland, as the introduction of a 'Restricted Area' would impact the numerous civil airports and private aviation facilities that are currently in operation. There may be opportunities to agree site-specific exemptions. Any proposal for a new Restricted Area would be subject to consultation. Consideration of this criterion has been applied following application of the exclusionary SUPDC and Military Activities criteria as individual candidate land areas have been identified.
Topography	This engineering consideration discounts significant land areas . Mountainous terrain limits development for reasons including land availability, materials management from site levelling and transport access/logistics considerations.
Transport Logistics	This engineering consideration focuses interest on areas served by major roads suitable for transporting AILs, rail corridors, and ports to support construction logistics. It discounts localised land areas. Consideration of this criterion has been applied following application of the exclusionary SUPDC and Military Activities criteria as individual candidate land areas have been identified.

Access to Cooling Water	This engineering consideration discounts significant land areas . This analysis has focused on coastal areas and land areas along the outer reaches of the major rivers/estuaries around Scotland to provide volume/ flow sufficient to support water abstraction and thermal dispersion. Inland water bodies (lakes and minor rivers) have not been considered.
Flooding	This engineering consideration discounts localised land area . Interest is primarily focused on land areas that falls outside Flood Zone 3.
Coastal Erosion and Landform Change	This engineering consideration discounts localised land areas. Consideration of this criterion has been applied following application of the exclusionary SUPDC and Military Activities criteria as individual candidate land areas have been identified. Interest has focused on areas with more limited/no coastal erosion or existing defences.
Environmental Protections	This consideration of impacts discounts significant land areas . Interest has been focused on land areas which do not have international ecological designations. However, water bodies which are internationally designated are considered.
Landscape Amenity	This consideration of impacts discounts significant land areas . Interest has been focused on areas outside of nationally designated landscapes.

Table 1: Geospatial considerations applied in the methodology

Land areas which meet the exclusionary policy criteria and are deemed compatible with the other considerations outlined in Table 1 are then evaluated for potential suitability:

- Some evaluation is less subjective; for example, proximity to cooling water, cooling water availability and thermal dispersion of discharge.
- Other aspects of evaluation are more subjective; for example, whilst constructing a nuclear power station in a remote location may be technically possible, the complexities involved in establishing and supporting a workforce in this type of setting is inherently challenging. These judgements are valid but can have the impact of ruling out significant land areas.

Following this analysis, land areas of potential interest have been collated.

Summary of Findings

This study has identified several land areas of varying sizes which are potentially suitable for new nuclear energy development. They meet the key EN-1 and EN-7 policy constraints and technical requirements and are situated in locations around Scotland.

This study focused on land types of particular interest; specifically, former and existing nuclear and other energy generation sites, brownfield sites and previously undeveloped land, with particular interest in land areas designated for development or adjacent to existing infrastructure. Several areas of interest have been found in all categories: there are strong candidates in the first two categories, whilst there are also areas of apparently undeveloped land that may satisfy the constraints with varying potential. All prospects are either coastal or sited on major rivers or estuaries.

In some cases, specific locations are highlighted due to their proximity to existing infrastructure or notable landmarks. In that regard there can be a “funnelling” effect whereby, even if there is a larger geographic area which meets the constraints, it has been deemed more prudent to focus on a more limited area close to existing activity or industrial sites which may benefit from existing infrastructure to support construction and operations, and the landscape context which may support a development consent application.

In other instances, a longer stretch of coast is identified that could provide several locations for deployment. If this area of the country was of strategic interest, the stretch of coastline could be subject to detailed evaluation to identify the optimum site or sites. It should be noted that within any larger area, some locations may be capable of hosting multiple reactors, while in others, factors such as cooling water availability may constrain development. Large land areas should not be interpreted as having unlimited development potential; practical limits will always apply, whether dictated by the size of the site, various environmental constraints, or grid capacity.

Ultimately, confirmation of the suitability of any location would be determined if a site-specific proposal is developed. This would confirm details of the type and number of reactors, wider infrastructure development and construction methods, all of which inform the impacts, mitigations and opportunities such a scheme would present. Several elements are likely to require detailed consideration, regardless of the technology under consideration; however, this assessment did not identify evidence to conclude that any of these factors is sufficient to prevent the identified land areas from being considered as potentially suitable. Any decision to approve a scheme in any of these locations would be via the established regulatory and planning processes for nuclear energy development which would include in depth engagement with the local community, statutory consultees and other interested parties.

Land Areas of Interest

Areas of interest have been identified across Scotland due to the holistic nature of the study approach. A consistent application of the study criteria and mapping data identified areas of land that have not previously been developed for the deployment of nuclear, however they have a strong industrial heritage and do have a history of electricity generation. The findings here represent a snapshot; further analysis is needed to bolster the knowledge and understanding of the context of each potential land area.

High-level modelling identified the land areas not previously associated with nuclear development as having outline potential for nuclear development, and they have been retained as areas of interest within the two-stage study. In the absence of an existing nuclear heritage, the summary highlights other factors supporting potential suitability. Any decision to progress areas beyond established nuclear sites would require extensive further study across a broad range of technical, environmental, and socio-economic considerations.

Land Area	County	Summary Narrative
Torness NPP and surrounding Coast	East Lothian	The land area around Torness NPP performs strongly against key technical siting criteria and appears to offer a high-potential location for new nuclear development. The area benefits from coastal access to cooling water, flat terrain, strong transport links by road, rail and sea, and proximity to existing nuclear infrastructure. The presence of an established restricted area, skilled workforce and stakeholder arrangements further strengthens suitability. Environmental designations including a Special Protected Area (SPA) and Site of Special Scientific Interest (SSSI) are present offshore and along the coast, and several heritage assets lie within the wider area, which may constrain development. Flood risk is generally low, but localised surface and river flood zones would require mitigation through careful site layout.
Dounreay Nuclear Site and surrounding Coast	Caithness	The land area around the existing Dounreay nuclear site offers technical advantages including coastal access for cooling, flat terrain, low population density and an established nuclear safety and regulatory context. The area benefits from a workforce experienced in nuclear and other safety critical industries, although the local skills pool is smaller than at other sites. Key challenges include the site's remoteness from major population centres and transport infrastructure, as well as compatibility with grid priorities, which may affect commercial viability.

Land Area	County	Summary Narrative
Hunterston NPP and surrounding Coast	North Ayrshire	The Hunterston area benefits from direct coastal access for cooling, proximity to existing and recently upgraded grid infrastructure, and an established nuclear regulatory context. However, available flat land areas are constrained by surrounding settlements, recent grid development and challenging topography, potentially limiting deployment scale and timing. Flood risk is generally manageable near the existing stations but increases in adjacent low-lying marsh areas. Environmental, heritage and landscape sensitivities, including nearby historic assets and recreational land, may further restrict development options.
North Shore, Firth of Forth Estuary	Fife	The northern shore of the Firth of Forth benefits from a strong industrial heritage, existing brownfield land, good transport connections and historic use of river water for power station cooling. The presence of previous energy generation sites and proximity to major industrial hubs supports technical suitability. Flood risk is a notable constraint, with some areas identified as high likelihood for coastal flooding and limited existing defences. The proximity of major COMAH sites and oil and gas infrastructure, including the Forties Pipeline System, introduces additional safety and planning complexity.
Stirling, South Bank of the Forth	Stirling	Parts of the south bank of the River Forth meet key siting criteria, offering flat land, access to transport networks and proximity to an established energy producing region. Cooling water availability is likely to be a limiting factor, with reliance on river abstraction and no supporting flow data currently available. The inland nature of the area suggests smaller scale reactors and cooling units may be more appropriate than large GW-scale deployment. Flood risk, interaction with other river users and nearby COMAH sites require further assessment.

Land Area	County	Summary Narrative
Angus & Aberdeen-shire East Coast	Multiple – primarily in Angus & Aberdeen-shire	Areas of the east coast meet technical siting criteria, with coastal access for cooling, low population density outside major towns and a workforce experienced in offshore wind, oil and gas. Existing energy infrastructure and grid capacity provide potential advantages, though the strategic value of additional generation would need careful consideration. Some coastal sections are constrained by localised exclusion zones and major population centres, reducing deployable land. The presence of multiple Control of Major Accident Hazards (COMAH) sites and the Forties Pipeline System introduce additional safety and planning considerations.

Table 2: Summary of the land areas

Consideration of Change

Any siting assessment and site acquisition decision is taken against an ever-changing landscape of policy and regulatory change, nuclear technology and engineering developments and commercial opportunity.

In the case of EN-7, the Nuclear Regulatory Taskforce Report³ published in November 2025 has recommended amending the SUPDC. If a change is implemented, it is expected to alter the area of land currently excluded by this policy provision. Should further nuclear siting policy constraints be amended, for example those associated with MOD activities, further land areas in Scotland could be considered in any future siting analysis. Other aspects of the nuclear policy and regulatory regime are slated in the Nuclear Regulatory Taskforce Report for re-examination and possible refinement and should be considered for any influence on future siting opportunities.

Existing and future potential nuclear sites around GB are being influenced by other non-nuclear development (e.g. new housing developments, grid strengthening). Developers across multiple policy areas have interest in securing land which offers many of the same characteristics as those required for nuclear new build (e.g. data centres, hydrogen production); the potential for competition and complexity in co-locating certain facilities is a key consideration for new nuclear siting. Land that is currently potentially suitable for nuclear development risks being excluded from future development due to offsite but nearby development (e.g. airport expansion, housing).

³ assets.publishing.service.gov.uk/media/692080f75c394e481336ab89/nuclear-regulatory-review-2025.pdf

Identification of a land area as potentially suitable does not prevent further unrelated development from influencing it and rendering it unsuitable, or another developer securing the site for other purposes. As previously stated, land areas not available or deemed suitable now may become available and/or suitable in the future due to the progression of demolition plans or commercial changes.

Conclusions & Next Steps

The study confirms that from a high-level technical perspective, Scotland has land areas with potential for new nuclear development; further analysis would be required to determine the commercial case for developing in these locations including interest in baseload electricity generation in each location, relative costs of development and commercial considerations for the land areas of potential interest. Should the policy position of the Scottish Government change, specific local considerations and uncertainties notwithstanding, several significant land areas appear to offer suitable terrain, ready access to a source of cooling water, transport access by road, rail and sea as well as access to a skilled workforce, indicating a new nuclear power plant could be hosted.

These findings are presented with the following points to note:

- Siting decisions should be viewed as technically multi-dimensional, made against an ever-changing commercial/regulatory/policy/technology landscape.
- The work has identified the ongoing potential for competition and conflict between different policy areas – collaboration between relevant organisations should be prioritised.
- Further proactive steps should be taken to support a future UK nuclear fleet, in particular, unification of these findings with NESO's ongoing work.