GDF

Identifying Areas of Focus within the Theddlethorpe Search Area

Finding a suitable site for a Geological Disposal Facility

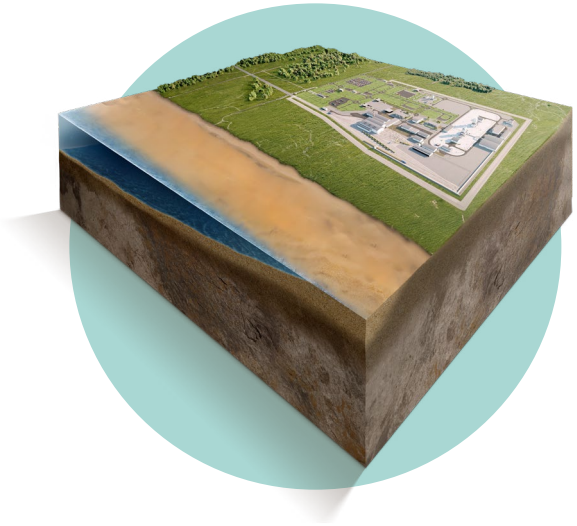
Nuclear Waste Services

01

Introduction to Government Policy and the Siting Process

Nuclear Waste Services (NWS) is delivering a GDF as the safe, secure, and long-term solution for the most hazardous radioactive waste. It is one of the largest environmental protection programmes in the UK and ensures we remove the costs and burden of having to keep the waste safe and secure in surface storage facilities for many thousands of years. The UK Government's Policy for a GDF requires NWS to find two things – a suitable site and a willing community. A GDF cannot go forward without both being in place. At this stage in the Programme, there are three Community Partnerships: South Copeland; Mid Copeland; and Theddlethorpe. These areas have potentially suitable geology, yet we are some years away from being able to confirm whether a site is actually suitable. The purpose of this document is to explain how NWS has identified Areas of Focus within the existing Search Area and adjacent inshore area, to enable us to focus Site Evaluation studies and determine the potential suitability of the areas to host a GDF.

Simon Hughes
Siting and Communities Director



NWS needs to identify both a suitable site and a willing community to host a Geological Disposal Facility (GDF). The key documents which set out this framework are the UK Policy Framework for Managing Radioactive Substances and Nuclear Decommissioning (the Policy) and Site Evaluation: How we will evaluate sites in England (the Site Evaluation document). NWS also undertakes an assessment of key siting decisions against factors relating to the overall GDF Programme. This includes consideration of NWS' Programme Deliverability, alongside technical and community considerations. Each of these three perspectives informs NWS' decision-making.

The Policy

The Policy puts a framework in place to ensure NWS works in partnership with communities to build trust and understanding of a GDF before any commitment to host a GDF is required. The Policy does not identify preferred sites or locations; it relies on communities working with NWS throughout the siting process and NWS undertaking the necessary technical analysis to assess the suitability of the areas under consideration. The Policy recognises that either a community or NWS may choose to withdraw from the siting process, ending the participation of the area in the GDF siting process.

The Siting Process

Site Evaluation: finding a suitable site

The Site Evaluation document establishes six 'siting factors' (and 26 associated 'evaluation considerations') against which we will assess site suitability throughout the siting process.

Safety & Security

Community

Environment

Engineering feasibility

Transport

Value for money

GDF Programme Deliverability

The mission of the GDF Programme is to deliver a permanent solution for the disposal of the UK's most hazardous radioactive waste through the design, construction, operation and closure of a GDF. When we take a decision, we need to understand how that decision impacts on our mission. We do this by considering Programme Deliverability, where (in addition to technical and community matters) we look at factors such as land access and acquisition, policy and legal considerations, permits, consents and licensing, Government and Programme stakeholders, operations and sustainability, and how the decision tends to perform against our Programme Objectives.

In order to deliver on this mission, our GDF Programme Objectives are:

- to build trust and work in partnership with one or more communities to gain consent and support to host a GDF;
- to facilitate economic benefits and growth, delivering regional jobs and skills and a positive legacy;
- to deliver a permanent solution for the safe disposal of the UK's most hazardous radioactive waste through the safe, sustainable, and cost-effective design, construction, operation and closure of a GDF;
- to enable the timely retirement of the significant and currently enduring financial liability and risk associated with above ground storage of the most hazardous radioactive waste, that would persist for thousands of years if a disposal solution was not developed.

02

Suitable Site and Willing Community

Under the Policy, a GDF will only be built where there is a suitable site with a willing community.

Willing Community

We started the process by engaging with people, groups, and organisations across the country to help them learn about the GDF Programme, so they could begin to consider whether their community might be interested.

The next stage of the process involves the formation of a Working Group. The Working Group's role is to open up engagement with the community, begin the work to understand the local area, and identify an initial Search Area for further consideration. The adjacent inshore area may also be considered.

The Working Group identifies initial members of a Community Partnership – which must include at least one relevant Principal Local Authority (rPLA) from the Search Area and will also include NWS – to take over from the Working Group and provide a longer-term platform for community engagement and involvement in the siting process.

Formation of a Community Partnership also triggers the availability of up to £1 million per year of Community Investment Funding. This funding is available for projects and initiatives that support economic development opportunities, improve community wellbeing, or enhance the local environment (including cultural and natural heritage). This Community Investment Funding will increase to up to £2.5 million per year if the community progresses to the next stage of the process, when deep borehole investigations are undertaken in that area.

As part of the Community Partnership, NWS will also work closely with communities to develop a positive and inclusive vision for the future of their area, should they ultimately decide to host a GDF. Significant Additional Investment would be made available in a community that hosts a GDF. This investment could include improved local education and skills capacity, enhanced transport infrastructure, or improved recreational facilities.

Onshore and inshore areas where a GDF and associated facilities may be located

Onshore (the area on dry land), the Search Area is the geographical area encompassing all the electoral wards within which we were able to search for potential sites.

The term 'inshore area' is used to refer to the area under the sea out to a maximum of 22km off the coast.

When ready, and once the community has had time to ask questions and learn about a GDF through community engagement, the rPLA on the Community Partnership will decide on a timeframe for determining the willingness of the Potential Host Community for a proposed GDF development through a Test of Public Support. A Test of Public Support will be taken in the Potential Host Community. If the residents of the Potential Host Community do not return a positive Test of Public Support, then the GDF Programme cannot progress in that location.

A decision to withdraw from the siting process can be taken at any time up until a Test of Public Support and must be agreed between the rPLAs on a Community Partnership. NWS can also choose to withdraw from the process in particular communities as our investigations continue and we narrow the options towards a final location.

Suitable Site

Alongside our community engagement, we also need to find a suitable site. Detailed studies and investigations of site suitability will be conducted to ensure a GDF can be constructed, operated, and closed safely and securely.

NWS evaluates each potential area to establish whether it is suitable for a GDF based on Six Siting Factors: safety and security, community, environment, engineering feasibility, transport, and value for money.

We carry out initial high-level evaluations of Search Areas and the adjacent inshore area, including non-intrusive activities such as geophysical surveys and desk studies of existing data such as geology, transport infrastructure, and power supply. Much of the information gathered as part of initial technical assessments may subsequently support the Development Consent Order process and the Environmental Permit applications required for Site Characterisation.

Site Characterisation is the further investigative work, including drilling deep boreholes to understand more about the geology deep below the surface where a GDF could be built.

The information gathered from these studies will also be essential for applications to secure the necessary regulatory permissions to build a GDF and will be key in the development of a GDF design and safety case.

Certain decisions, specifically the decisions on which communities to progress to deep borehole investigation and the final site selection, will require approval from the Secretary of State.

03

Areas of Focus

A key starting point in the siting process is identifying the Search Areas. The Search Areas are the geographical areas on land within which NWS considers potential sites for a GDF. Search Areas are defined by electoral ward boundaries. However, the boundaries are not fixed and as NWS' investigations progress, the Community Partnership may review and refine the Search Area, as it identifies areas that it would prefer to be ruled out of consideration, or brings in additional areas that were not initially part of the Search Area.

Equally important is understanding the adjacent inshore area (the area beyond the coast out to a maximum of 22km). The Sub-surface parts of the GDF may be constructed in the rocks deep under the seabed in the inshore area.

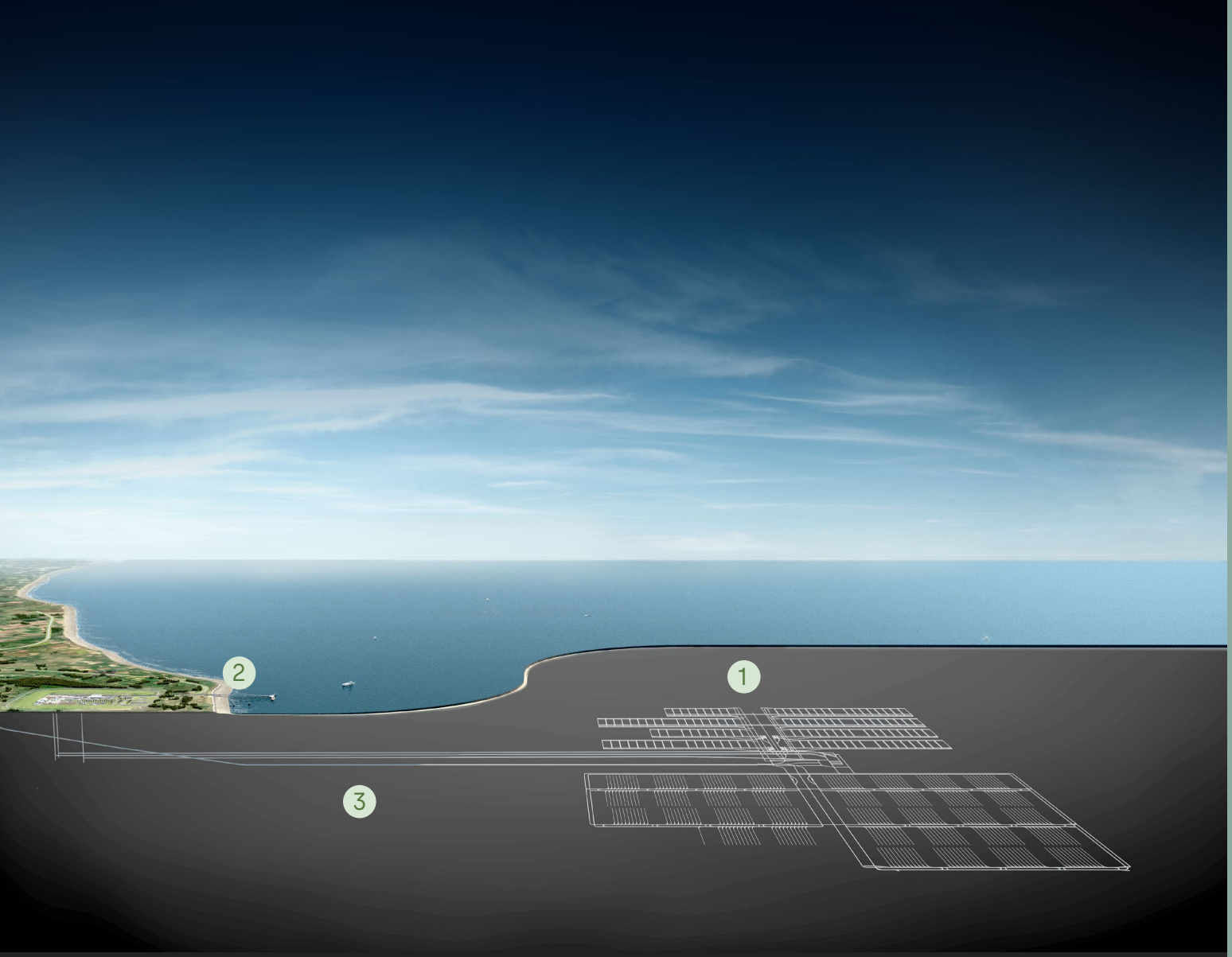
What are Areas of Focus?

Large, varied Search Areas and adjacent inshore areas make it challenging to undertake appropriately detailed and proportionate work to understand the feasibility of delivering a GDF.

We have sought to identify smaller areas within the Search Area and inshore as the first step in the process of determining potentially suitable locations for the GDF as a whole. Specifically, we focused on three distinct types of Areas of Focus: Surface, Sub-surface, and Accessways. These smaller areas will guide more detailed Site Evaluation studies and help prioritise resources for assessing the potential of each area to safely host a GDF.

The process we have followed in identifying Areas of Focus is similar to the approach taken by other large infrastructure projects. We have identified areas, based on current information, that may have the potential to host project infrastructure, taking into account potential constraints such as areas with environmental protection, close to settlements, or areas of flood risk.

Some studies and investigations will continue across the Search Area and beyond – for example, to understand the wider geology and the potential benefits and impacts of a GDF.



Illustrative example of a GDF

Geological Disposal Facility for the most hazardous radioactive waste

1. Sub-surface
2. Surface
3. Accessways

   Tunnels connecting surface site to disposal area

A GDF is formed of three elements

A GDF will comprise three main elements – the right Sub-surface geological environment deep underground for the disposal area, a Surface location, and the ability to connect the two with Accessways. NWS needs to identify potentially suitable locations for the three key components of the GDF:

Step 1 – Identifying Sub-surface Areas of Focus
At the initial stage, NWS uses the outputs of the National Geological Screening, alongside other existing geological data and information, to identify the areas that are more likely to have the characteristics to host a GDF.

Step 2 – Identifying the Surface Areas of Focus
Once a Sub-surface Area of Focus has been identified, NWS considers surface locations within the Search Area, that have the potential to host the surface facilities of a GDF. NWS identifies land-use constraints based on the assessment principles, 'impact topics' and decision-making criteria set out in the National Policy Statement for Geological Disposal Infrastructure.

Step 3 – Identification of Accessway Areas of Focus
Once potential Sub-surface and Surface Areas of Focus have been defined, NWS identifies a potential accessway area using community considerations and geological characteristics – a corridor within which the surface site could be connected to the Sub-surface. This could consist of inclined tunnels linking to a surface portal, or shafts with connecting tunnels below ground, or a combination of both.

Further considerations in identifying Areas of Focus

- We review potential Areas of Focus against our Six Siting Factors and consider relevant information from technical studies to date, including the proximity and viability of routes to transport networks, e.g. the road and rail networks, the design and assessment of which will follow subsequently; other nearby major development/project plans and the stage to which they have progressed; and the relative accessway distances between various areas under consideration.
- We also review the potential suitability of both the Sub-surface and Accessway Areas of Focus from a community and programme delivery perspective.
- We undertake a desktop review of land close to the boundaries of the potential Surface Areas of Focus to consider their inclusion.

This review process ensures that we look at the Areas of Focus to see whether they are realistically viable areas to carry out Site Evaluation studies. All Areas of Focus (Sub-surface, Surface and Accessway) are larger than required to allow for flexibility as we progress with the studies into design. The current estimate of the size of the surface site during the operational phase is about 1km^2, although this size could vary during construction. In some instances where there may be some constraints (for example flood risk areas), we may seek to still include that area and do more work to find out whether we can work within the constraints.

Areas of Focus going forward

As NWS' Site Evaluation work progresses and engagement activities continue to provide a better picture of the potential of the area to host a GDF, revisions to the Areas of Focus may be necessary.

As such, the Areas of Focus that NWS has identified are not irreversible. They are also not a formal refinement of the Search Area, where wider feasibility studies will also continue.

Areas of Focus will support further investigative and technical studies to inform NWS' decision on which areas to take forward to Site Characterisation.

How we identified Areas of Focus in the Theddlethorpe Search Area

The Search Area was established by the Theddlethorpe GDF Working Group and taken forward by the Theddlethorpe GDF Community Partnership. It includes the Withern & Theddlethorpe and Mablethorpe electoral wards.

The Working Group agreed that the focus for the Sub-surface part of a GDF – where the waste would be disposed of – would be in the deep geology beneath the inshore area up to 22km beyond the coast of the Search Area.

Our early work, which is available in the Initial Evaluation Report and subsequent Search Area Evaluation Report, confirmed the potential suitability of this Search Area and inshore area to host a GDF. These reports are available on the Community Partnership website.

NWS then applied its methodology for identifying Areas of Focus to define the Sub-surface, Surface and Accessway Areas of Focus in the Theddlethorpe Search Area and adjacent inshore area. The methodology looks at a range of factors such as geological characteristics, protected areas, environmental constraints and community considerations.

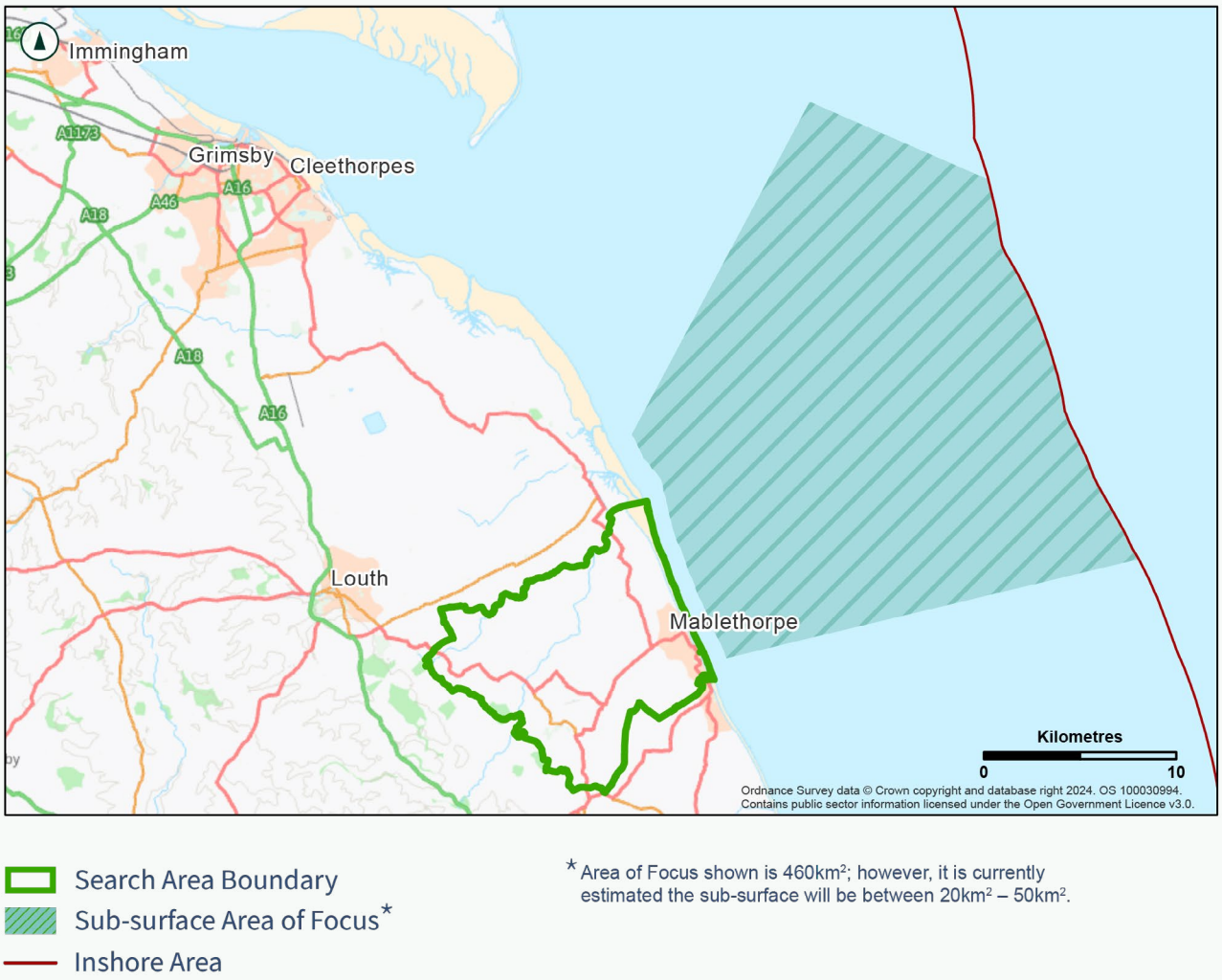


Figure 1: East Lincolnshire – Sub-surface Area of Focus – showing Theddlethorpe Search Area, and the Sub-surface Area of Focus

Sub-surface Area of Focus

Alongside the National Geological Screening data for Theddlethorpe Search Area, NWS examined existing legacy seismic and geological data for the area. This indicates that there is likely to be a volume of rock (the Ancholme Group) with suitable geological characteristics to host a GDF. Further studies will continue to develop our understanding of this sub-surface area as a potential host geology.

The Sub-surface Area of Focus is approximately 460km². The full area would not be needed, yet at this early stage, looking at a larger volume of rock gives us flexibility in the design and location of the underground vaults and tunnels.

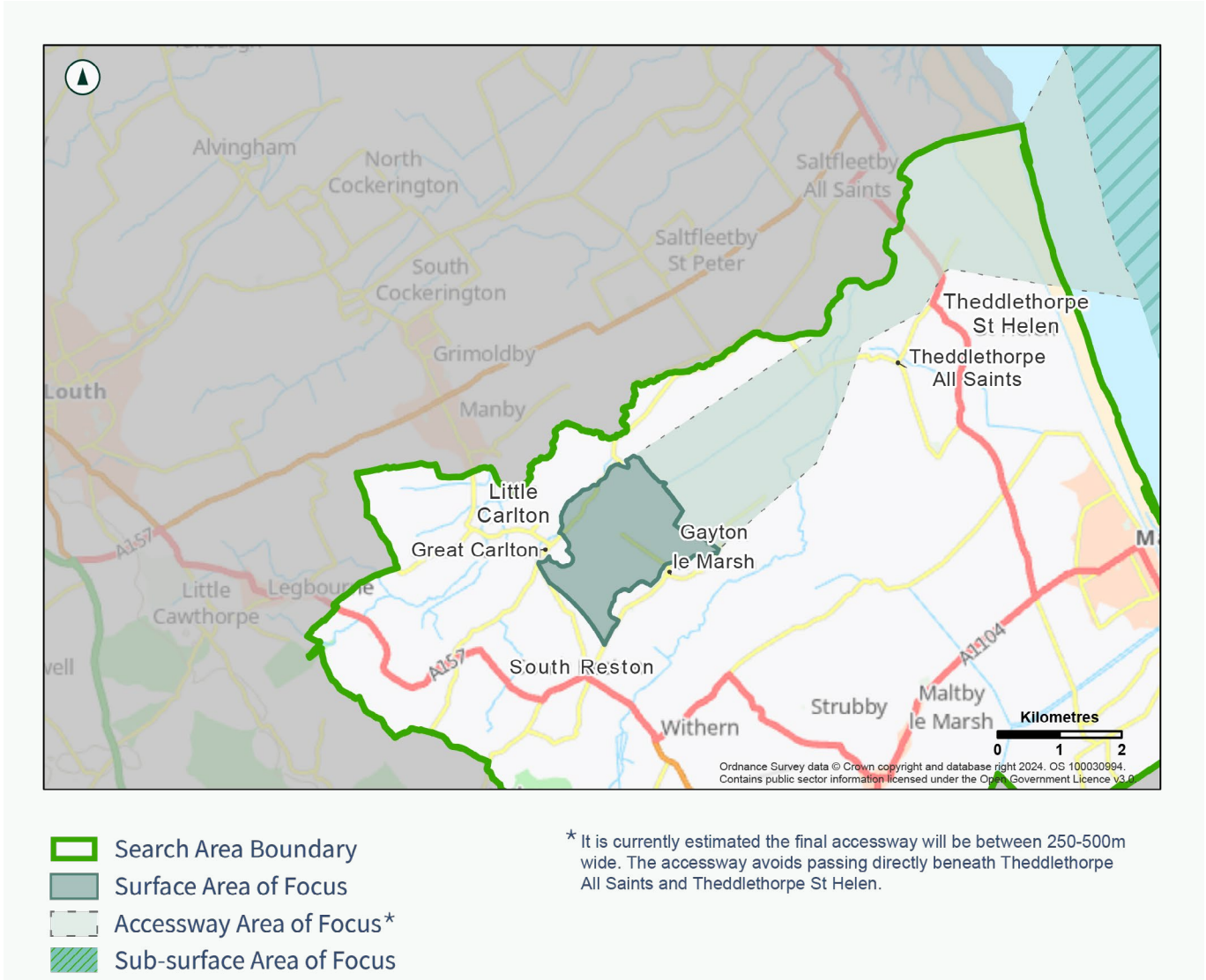


Figure 2: East Lincolnshire – Land between Gayton le Marsh and Great Carlton Surface Area of Focus

Surface Area of Focus

Through the application of the Areas of Focus methodology, a number of potentially suitable and less constrained areas were identified in the Theddlethorpe Search Area. Further consideration of these areas that took into account NWS' Siting Factors, as well as community and programme considerations, resulted in the identification of one Surface Area of Focus in East Lincolnshire that NWS will prioritise and consider further at this time.

Land between Gayton le Marsh and Great Carlton

The Surface Area of Focus is to the north of the A157, south-west of Gayton wind farm, between the villages of Gayton le Marsh and Great Carlton. Whilst maintaining the feasibility of the Surface Area of Focus, we have sought to minimise the number of included residential properties. The land is approximately 3.8km^2.

This Surface Area of Focus has been identified to help NWS consider the feasibility of delivering a GDF in the Search Area. It is located away from the coast so it has a lower risk of coastal flooding compared with some other parts of the Search Area.

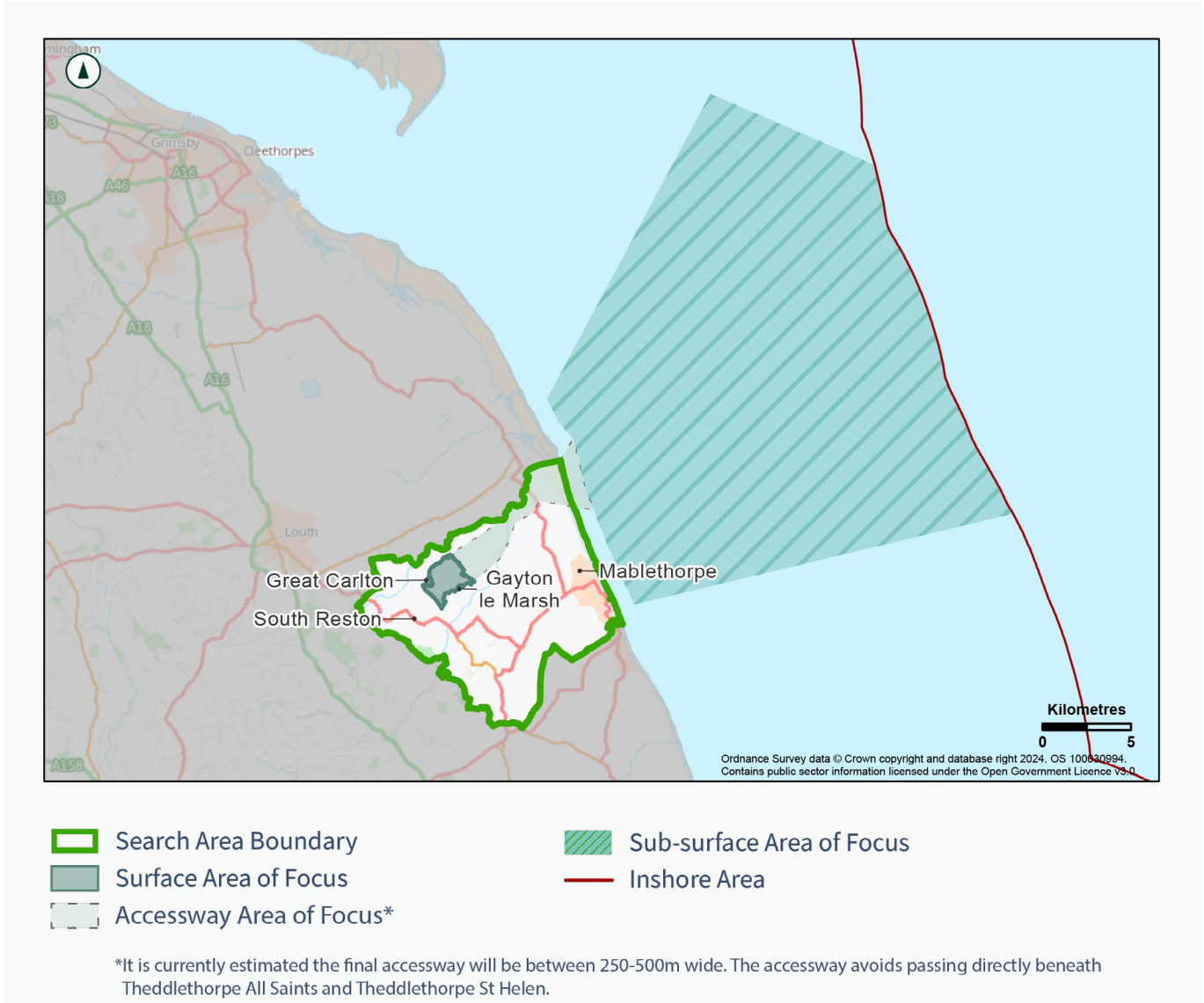


Figure 3: East Lincolnshire – Accessway with Sub-surface and Surface Areas of Focus

Accessway Area of Focus

Applying the Areas of Focus methodology, we have identified a potential accessway within which the connection tunnels could be constructed joining the Sub-surface Area of Focus to the Surface Area of Focus. This is significantly wider than will be required to allow for flexibility; it is currently estimated the final accessway will be between 250-500m wide. For the onshore part of the accessway, we have avoided passing directly beneath Mablethorpe, Theddlethorpe All Saints and Theddlethorpe St Helen.

Other areas NWS considered in the Search Area

Three other areas were looked at; however, at this stage, NWS is not prioritising these areas for the following reasons:

1. Former Gas Terminal site and adjacent land

The search for a suitable site for a GDF was initially focussed on the former gas terminal. Over the past year, competing interests at the gas terminal site have matured and additional interests have also emerged. In light of this, we have concluded that there is unlikely to be sufficient land to accommodate dual use of the former gas terminal site for

both the surface elements of a GDF and other interests. There are also other constraints currently associated with developing a GDF at the former gas terminal site, and the areas around it. These for example include the area being at higher risk from coastal flooding than areas further inland.

2. Reston and adjacent land

NWS applied the Areas of Focus methodology and identified this general area as a potential Surface Area of Focus that is relatively free of constraints, such as environmental designations, flood zones and built-up areas. Further reviews, however, highlighted a number of constraints and developing interests that currently make this area more challenging than elsewhere in the Search Area. This area includes the settlement of South Reston and contains cultural heritage features, including scheduled monuments and listed buildings. This area also contains the proposed corridor for the Grimsby to Walpole National Grid upgrade.

3. Strubby Airfield and adjacent land

NWS applied the Areas of Focus methodology and identified this general area as a potential Surface Area of Focus that is relatively free of constraints, such as environmental designations, flood zones and built-up areas. Further reviews, however, highlighted a number of constraints and developing interests that currently make this area more challenging than elsewhere in the Search Area.

This area includes Strubby Airfield and the settlement of Woodthorpe with associated businesses and leisure facilities. It is also adjacent to the settlements of Withern and Maltby le Marsh. This area also contains a number of competing interests including the proposed corridors for the Grimsby to Walpole National Grid upgrade and Greenlink 3 and 4 project.

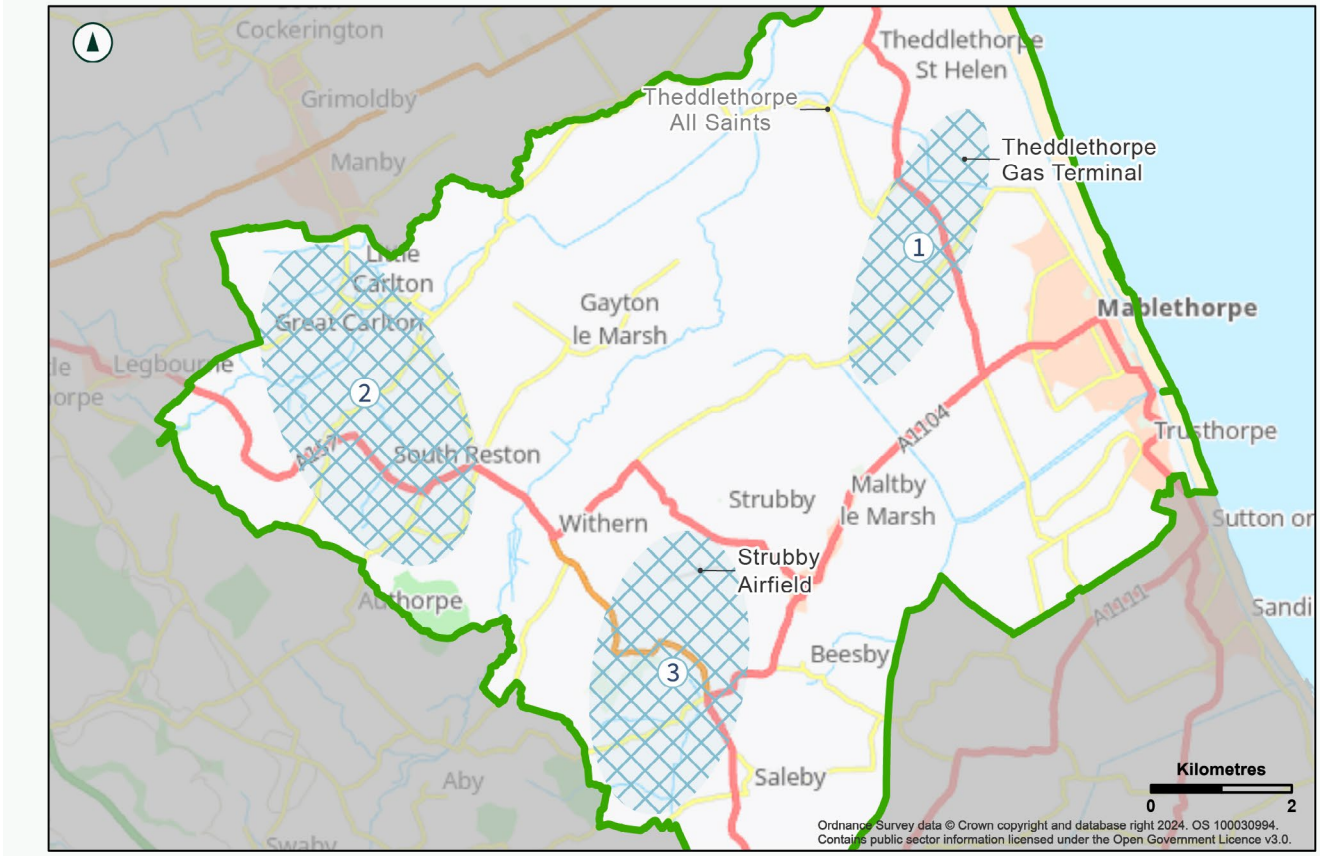


Figure 4: Other areas considered but not prioritised

04

Community

Theddlethorpe GDF Community Partnership

Theddlethorpe GDF Community Partnership was formed in June 2022. The Partnership members come from different sectors and reflect the community. They bring a range of skills, knowledge, and experience to enable them to respond to, and address, local questions and concerns.

The Community Partnership has hosted events in the area, including a series of Big Picture events, providing a selection of short films and Q&A sessions with NWS experts about geological disposal.

The engagement team, on behalf of the Community Partnership, are offering a weekly drop-in at the Coastal Centre and knocking on residents' doors and talking to people about a GDF, how they want to be involved, and where to find information.

Due to the importance of tourism in the area, the team has conducted holidaymaker and visitor engagement. This is to speak with tourists to find out if a GDF would affect their decision to visit the area. The aim is to understand what people know and think about a GDF and the discussions on doorsteps with local people and holidaymakers will continue.

The Partnership has established a regular newspaper providing accessible information delivered to households in the Search Area and surrounding villages. The aim is to understand the information needs and increase awareness and understanding of geological disposal and the siting process.

Members of the Partnership have increased their knowledge of geological disposal through talks with international GDF programmes, a trip to Andra in France and a visit to the British Geological Survey.

Community Investment Funding

The GDF programme provides up to £1 million per year in funding for communities which form a Community Partnership, and which are engaging in the siting process (Community Investment Funding).

Since forming, the Community Partnership has awarded £2 million to a variety of local community projects. Eight projects were awarded funding in the first year, and at the end of the second year, in June 2024, a further 16 projects benefitted from the funding for community facilities and services. A food bank, an advice service for the visually impaired, a school playground extension, village hall improvements and local events are some examples of the projects benefitting from the GDF programme funding.

Community Vision

The Partnership is working towards the creation of a long-term community vision. It is initially considering what this vision could look like to benefit the local area, should a GDF be hosted in East Lincolnshire.

As part of the GDF programme, NWS will work with communities engaged in the process to help develop a positive and inclusive vision for the future.

This will involve the Partnership asking the community what matters to them to help generate ideas and consider what they would like to see being developed. Significant Additional Investment will be made in a community that hosts a GDF, to enhance the economic benefits that are inherent in hosting a Nationally Significant Infrastructure Project and to recognise the commitment from the community. This could include improved local education and skills capacity, enhanced transport infrastructure, or improved recreational facilities.

To support this, the Community Partnership has agreed:

- a Programme of Activities with a visioning workstream;
- the formation of a vision subgroup – with Community Partnership members, rPLAs and NWS;
- alignment of the vision with Local Authority Strategic Plans;
- extensive engagement with communities, businesses, and stakeholders. Between July and December 2024, this engagement included information distributed to households and properties, online feedback opportunities and face-to-face events. This will help to identify 'what needs to change to make this a good place to live for future generations', which will support the creation of an advance vision;
- the procurement of services from a contractor specialising in visioning and planning; and
- the creation of an advanced report by March 2025.

05

What is the Timescale for the GDF Programme?

Timescales and Next Steps

This is an overview of the GDF programme, with a focus on activities over the next few years to deliver deep borehole investigations – also called "Site Characterisation".

Site Characterisation

We anticipate that the majority of new sub-surface information from techniques such as seismic surveys, shallow and deep boreholes, down-hole testing and sampling etc., will be generated during the Site Characterisation work that we will undertake.

Site Characterisation is a critical step for the GDF programme because the information obtained from the deep borehole drilling work will enable NWS to further design and develop the necessary safety cases for a GDF in that location.

What is a Development Consent Order?

Within the GDF programme, the drilling of deep boreholes, and any subsequent development of the GDF itself, are separate Nationally Significant Infrastructure Projects. Each requires a separate Development Consent Order (DCO), as well as environmental permits.

A DCO is the planning consent required to progress developments categorised as Nationally Significant Infrastructure Projects, defined in the Planning Act 2008. DCOs are examined by the Planning Inspectorate and granted by the Secretary of State.

Environmental permits establish conditions which projects must meet in order to protect people and the environment. Permits are granted and regulated by the Environment Agency in England.

For the GDF itself, we will also require a nuclear site licence. The regulatory powers which come with the nuclear site licence ensure the safe construction, commissioning, operation and eventual decommissioning of a nuclear site. It is granted by the Office for Nuclear Regulation. No nuclear site licence is required for the deep boreholes.

NWS has started preparatory work on DCO applications for the drilling of deep boreholes in the areas engaged in the siting process, although the decision on which areas to take forward will be subject to approval by the Secretary of State.

NWS will engage and consult widely on the evolving information which will support its DCO applications. Even once a DCO application has been submitted, there are multiple opportunities for the public to continue to participate in the process – both in writing and also in person at hearings. It's important that everyone involved and interested is able to see the information on NWS' proposals, ask questions and have an opportunity to have their say during development of the proposals.

In parallel to preparing and submitting its DCO applications, NWS will work with the Environment Agency to prepare and submit its application for the environmental permit which is also required before the drilling of deep boreholes can begin. The Environment Agency will consult with the public on applications for environmental permits.

Only once NWS has all the necessary consents can Site Characterisation work begin. The Site Characterisation stage is a long period of time, and it may result in NWS finding reasons why an area is not suitable and withdrawing from that community.

After the Site Characterisation work is completed, NWS will move to the next major phase of selecting a site and seeking approvals for the GDF itself. Before NWS can seek the regulatory approvals required for the GDF (including a new DCO and environmental permit, as well as a nuclear site licence), there must first have been a positive Test of Public Support in the relevant community.

The current planning assumption is that a GDF will be available for intermediate level waste emplacement in the 2050s and high-level waste and spent fuel from 2075. Construction, operation and closure of a GDF is expected to take around 150 years and will run into the next century.

Site Suitability Phase: Evaluating the suitability of an area to safely host a GDF

Desk-based studies, ground surveys, environmental assessment, consultation and engagement leading to DCO and Environmental Permit applications for borehole and other investigations that we need to develop our GDF design and safety case.

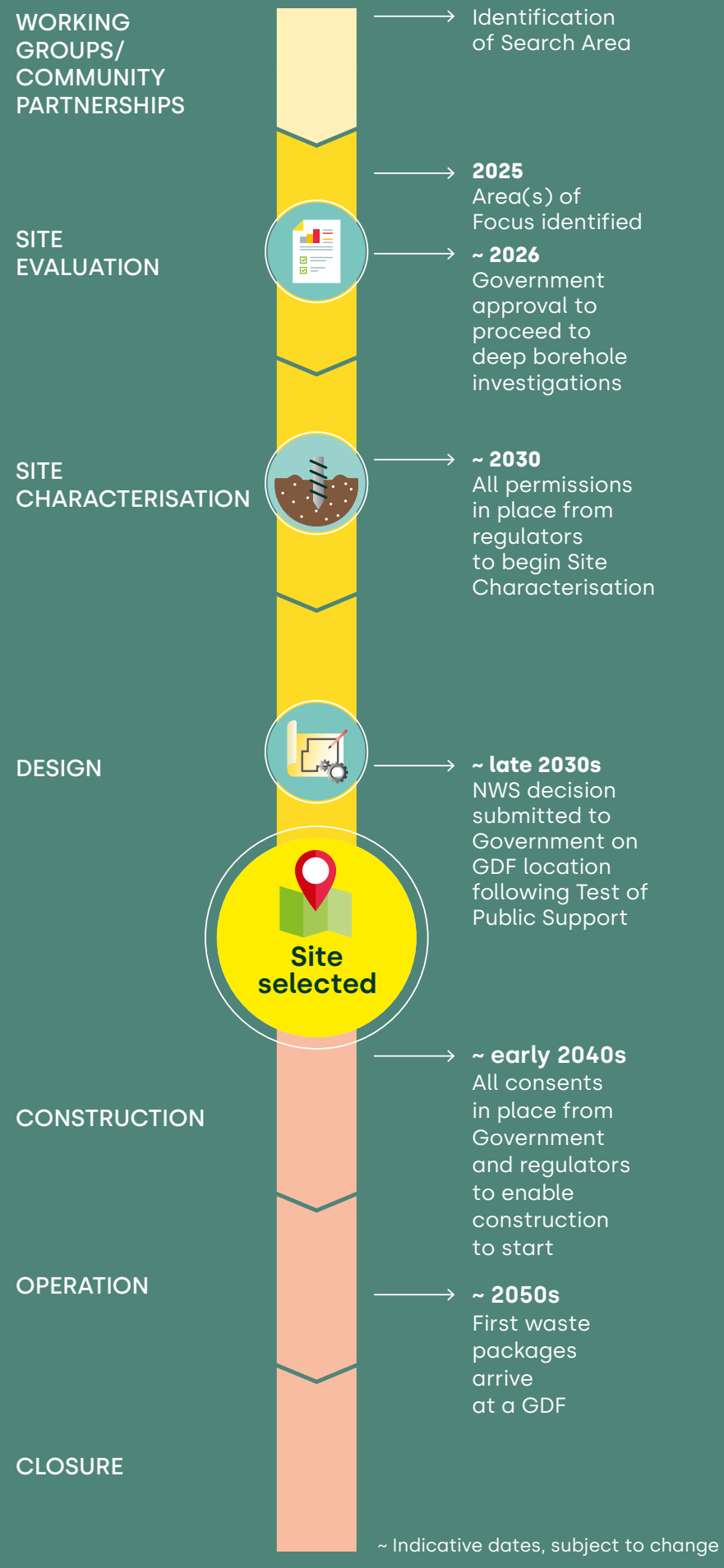
Approximately 10yrs of Site Characterisation works to enable development of our safety case and a potential GDF design.

It is possible that during this phase we could find reasons why an area wouldn't work and take it out of the process.

GDF Development Phase

If an area is considered suitable to safely host a GDF, we would progress our design proposals for the surface facilities, accessways and a disposal area within the Area of Focus.

Development of the GDF design would include desk-based studies, ground surveys, environmental assessment, consultation and engagement to DCO, Environmental Permit and Nuclear Site Licence applications.



~ Indicative dates, subject to change

What happens next?

(The following dates are indicative and subject to change).

Ongoing

Ongoing assessment of Area of Focus – there will be a range of desktop studies and on-the-ground surveys, as well as engagement with landowners, to collectively ensure we fully understand the potential of an area to host a GDF.

December 2025 - Spring 2026

We expect to submit a decision on the communities to take forward in the process to deep boreholes to enable more detailed investigations to DESNZ in December 2025, to enable Secretary of State approval, which is expected in spring 2026.

Autumn/Winter 2028

Where relevant, we expect to move from multiple Areas of Focus (for example, where we may be looking at two separate potential surface areas) in a community to identification of a single Area of Focus. This decision is expected to be taken in accordance with our Decision-Making Framework process – date autumn/winter 2028.

Spring 2025 - Spring 2028

Preparation of consents to enable the delivery of Site Characterisation – while the exact location of the Site Characterisation works is not yet known, they will be both inshore (within territorial waters) and onshore (on land). It will take a number of years to prepare the applications to obtain the various consents; we will be publishing more information including opportunities for public engagement next year on this programme of activity – date spring 2025 – spring 2028.

Spring/Summer 2028

Current estimated date for submission of consents for Site Characterisation – once we have prepared the applications, they are submitted for approval to regulators – date spring/summer 2028.

2030

Current estimate for commencement of Site Characterisation – assuming the required consents are granted, this is when we would commence characterisation activities, both at sea and on land, to supplement our understanding of an area's potential to host a GDF – date 2030.

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