



# Yorkshire & Humber Carbon Capture, Transportation & Storage

Infrastructure Planning Commission: Introductory Presentation, May 2011



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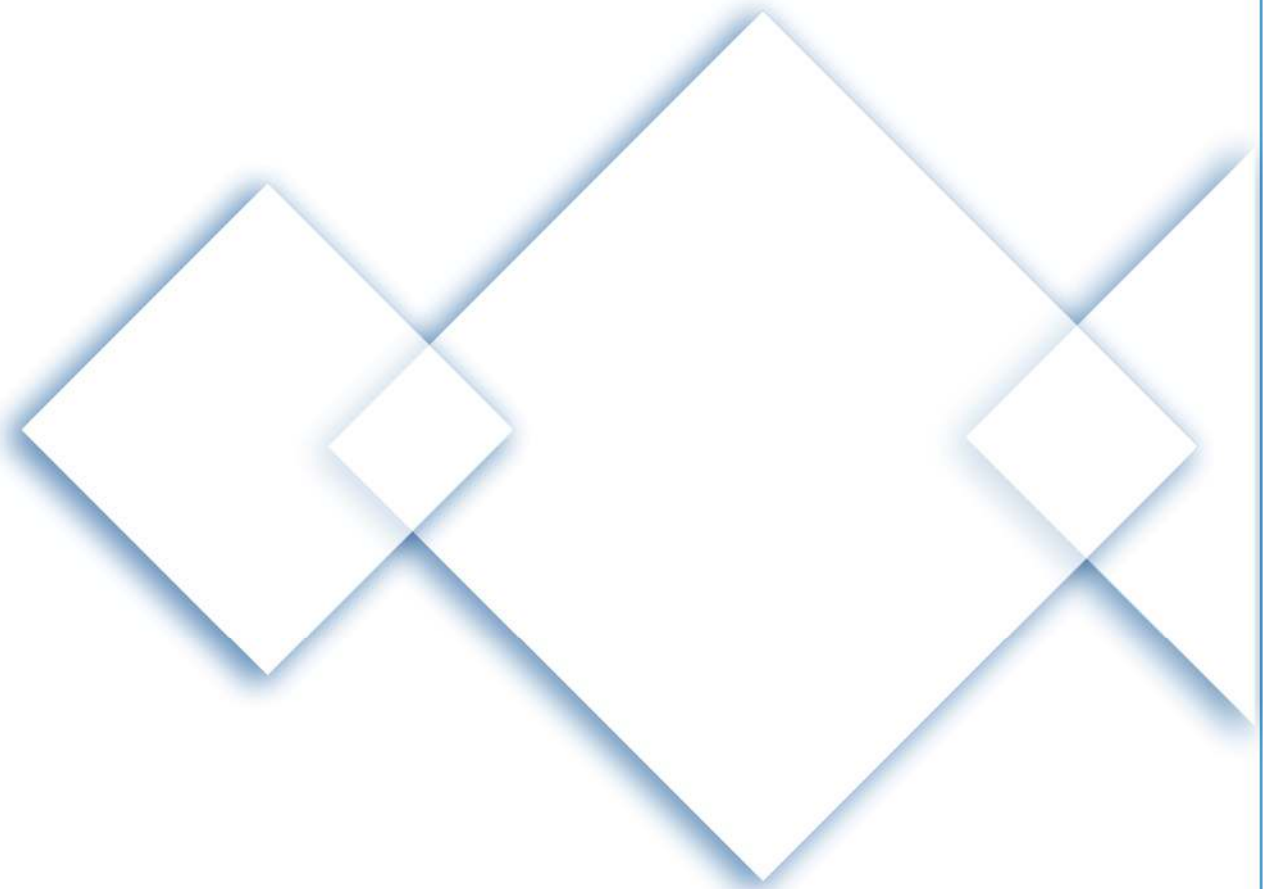
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# Purpose of the Presentation

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- Who is National Grid Carbon Limited and the Need Case for CCS?
- Project Background
- Project Programme
- Strategic Options Considered
- Discretionary Consultation & Route Corridor Investigation
- Approach to Pipeline Construction
- Issues for Further Consideration
- What Information Do you Need from Us?



## National Grid Carbon & The Need Case

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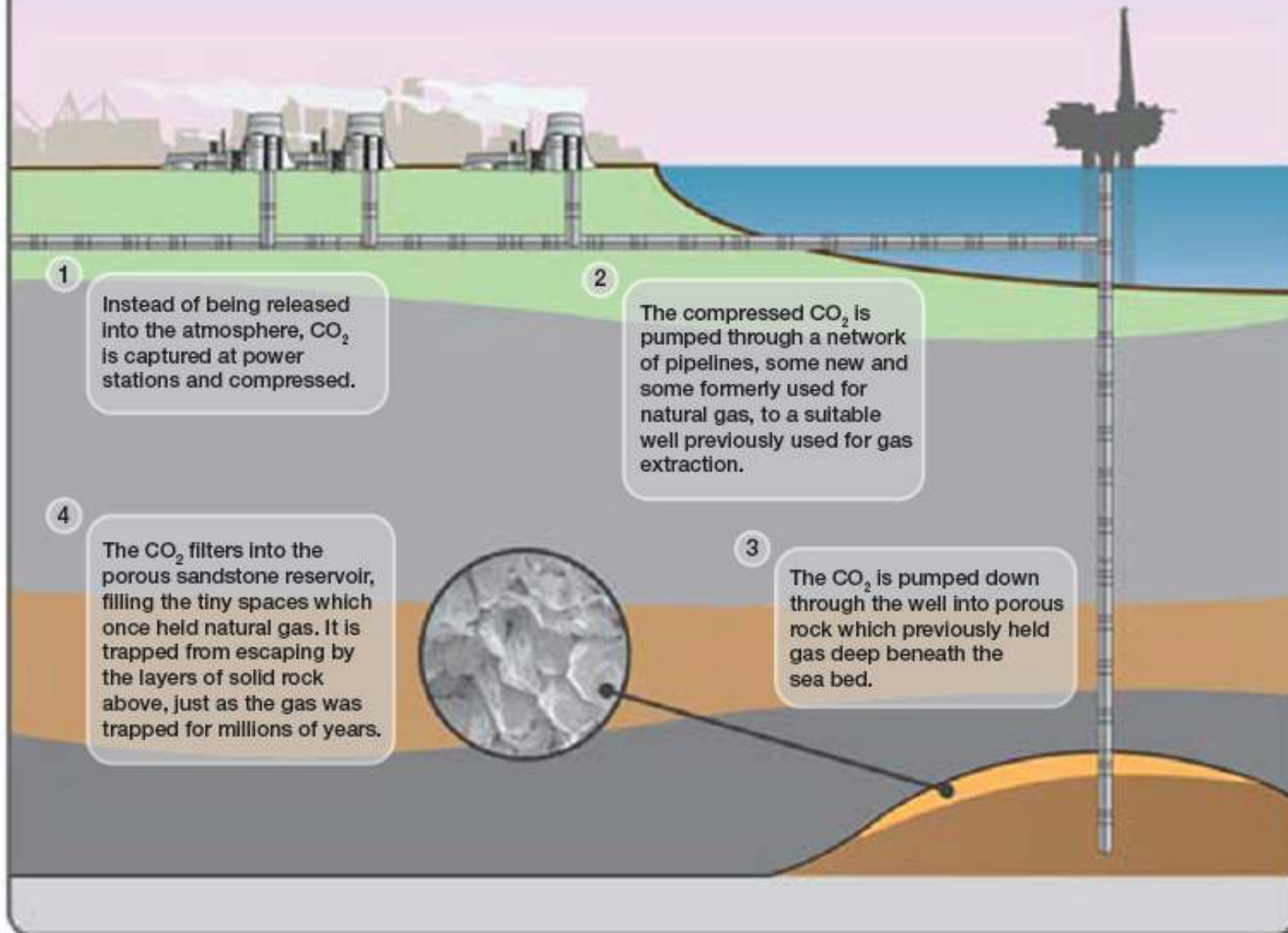
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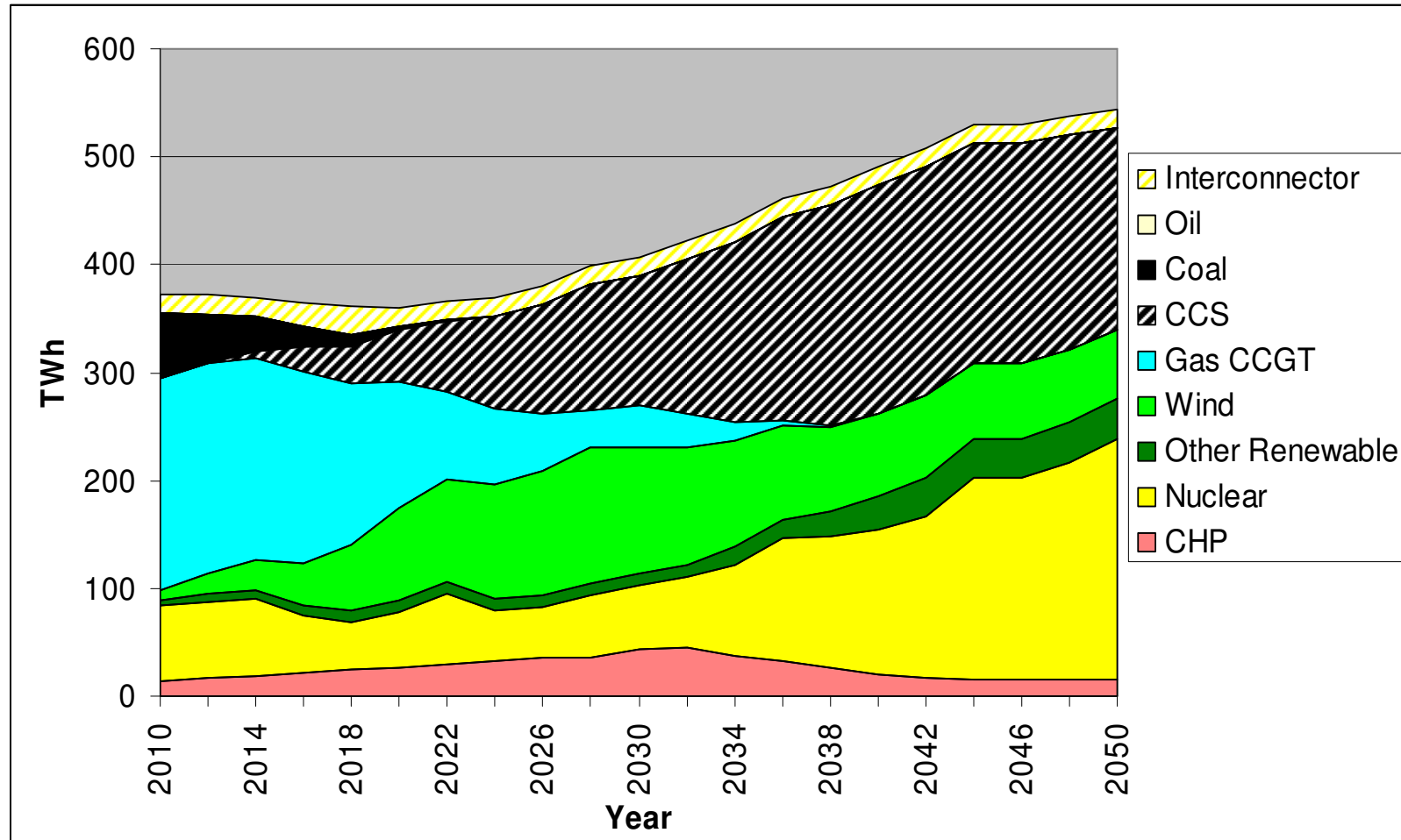


## Need Case

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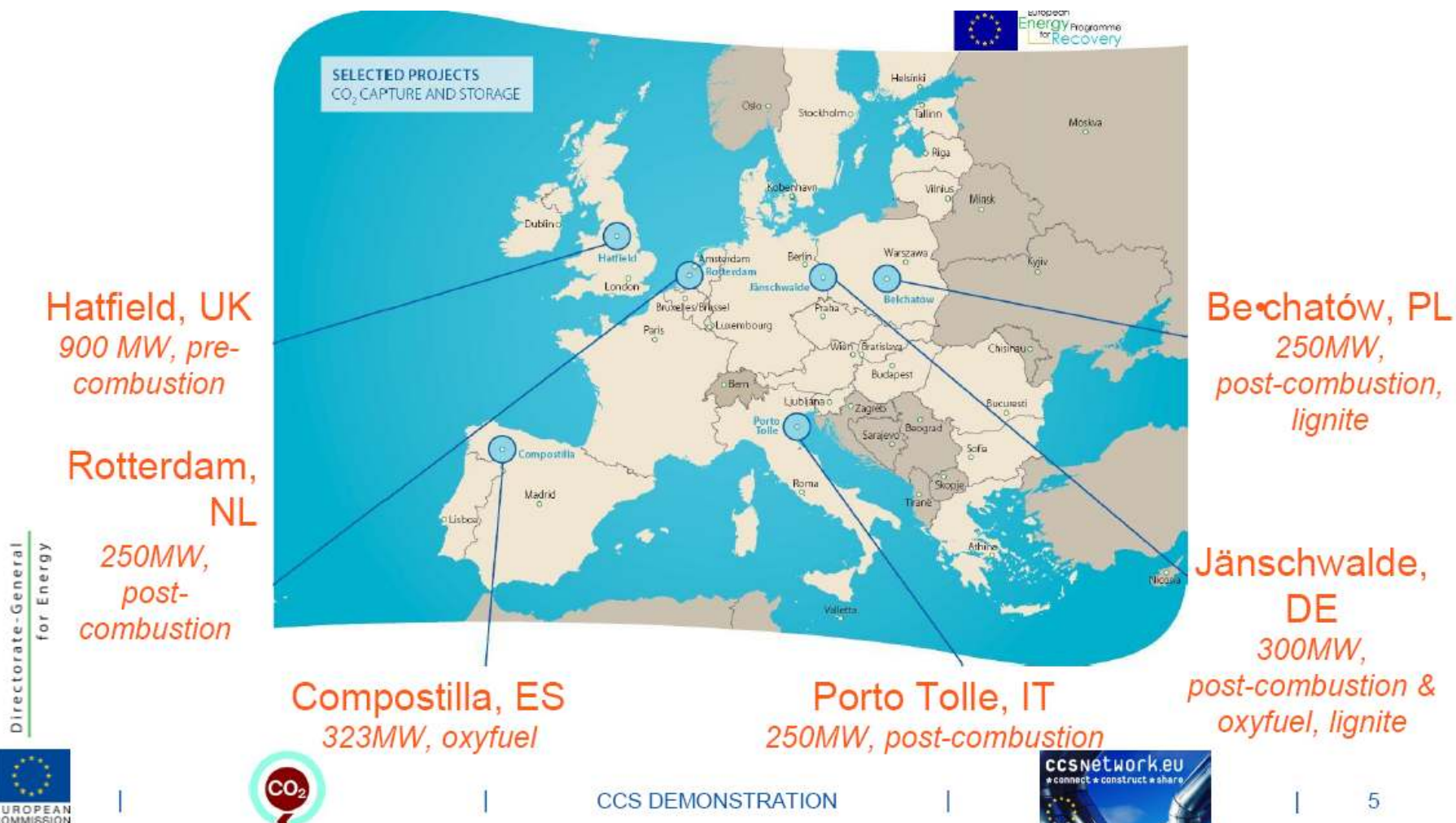
- International consensus on CO<sub>2</sub> contributions to Climate Change
- EU Policy and initiatives:
  - 20-20-20 Package
  - EEPER
  - NER300
- UK Policy and Initiatives:
  - Our Energy Future – Creating a Low Carbon Economy
  - Climate Change Act 2008
  - DECC 2050 Pathway Analysis
  - National Policy Statement EN-1
  - Low Carbon Economic Areas
- How Familiar is the IPC with the Need Case?

# Where will our electricity come from?

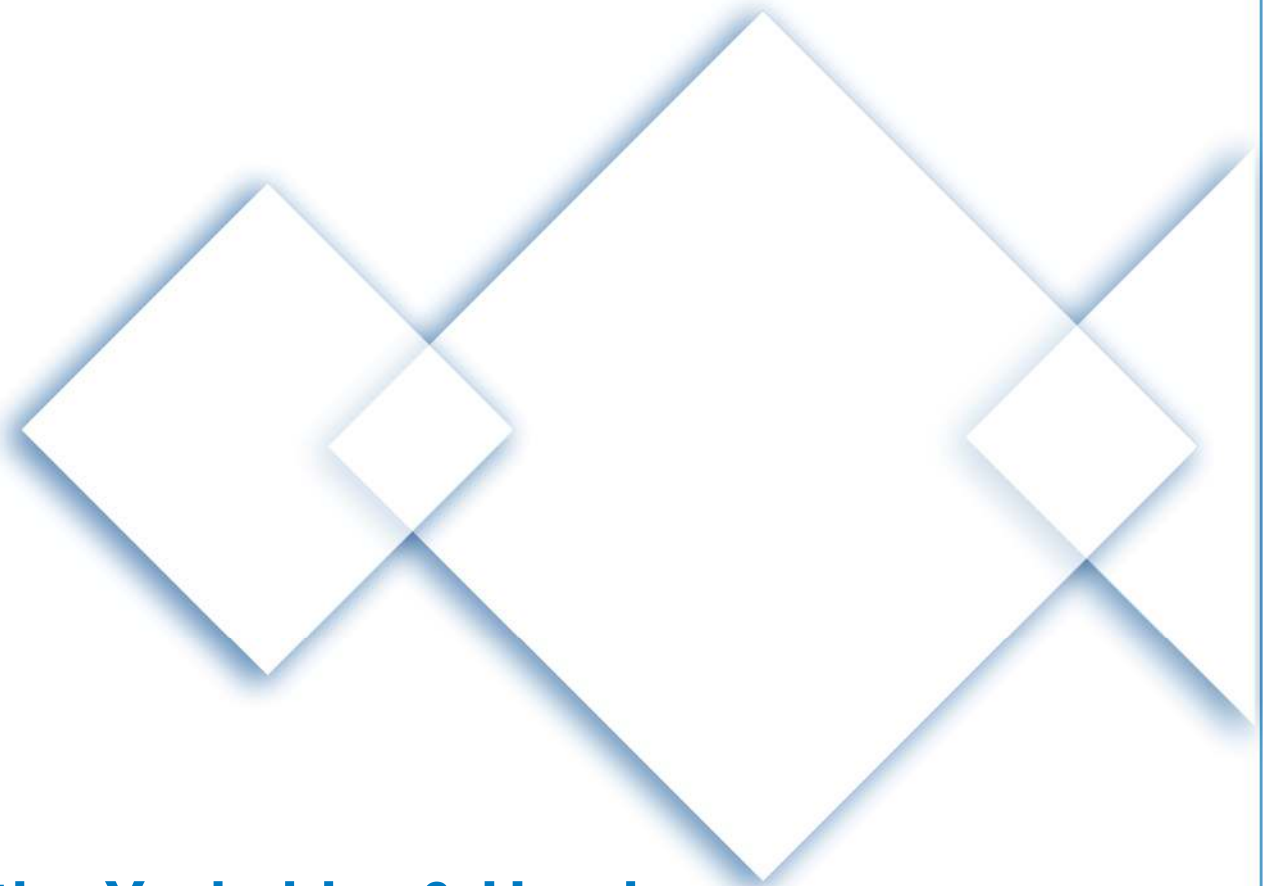


# Short Term: Demonstrate CCS by 2015

- €1bn funding for 6 projects committed
- NER 300 Instrument to provide additional financing







## **Background to the Yorkshire & Humber CCS Project**

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## Project Background

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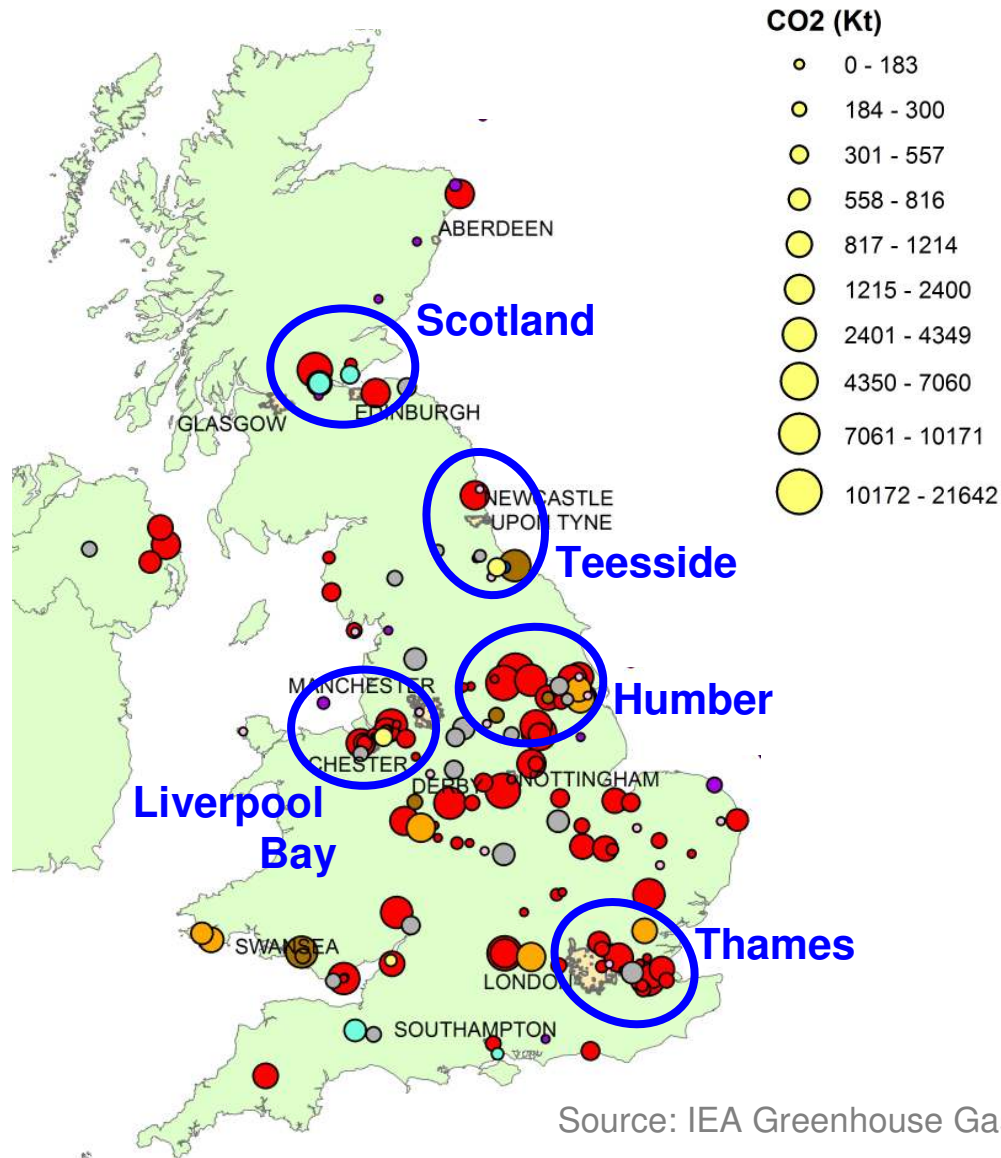
- 2009: Section 36 granted for the construction and operation of 900MW IGCC power station near Hatfield
- 2009: Award of EPR grant funding to Powerfuel Power Limited and National Grid to develop the transportation and storage aspects of the project
- 2010: Powerfuel Power Limited enter administration
- 2011: Acquisition of Powerfuel Power Limited by 2CO

## Why Yorkshire and Humber?

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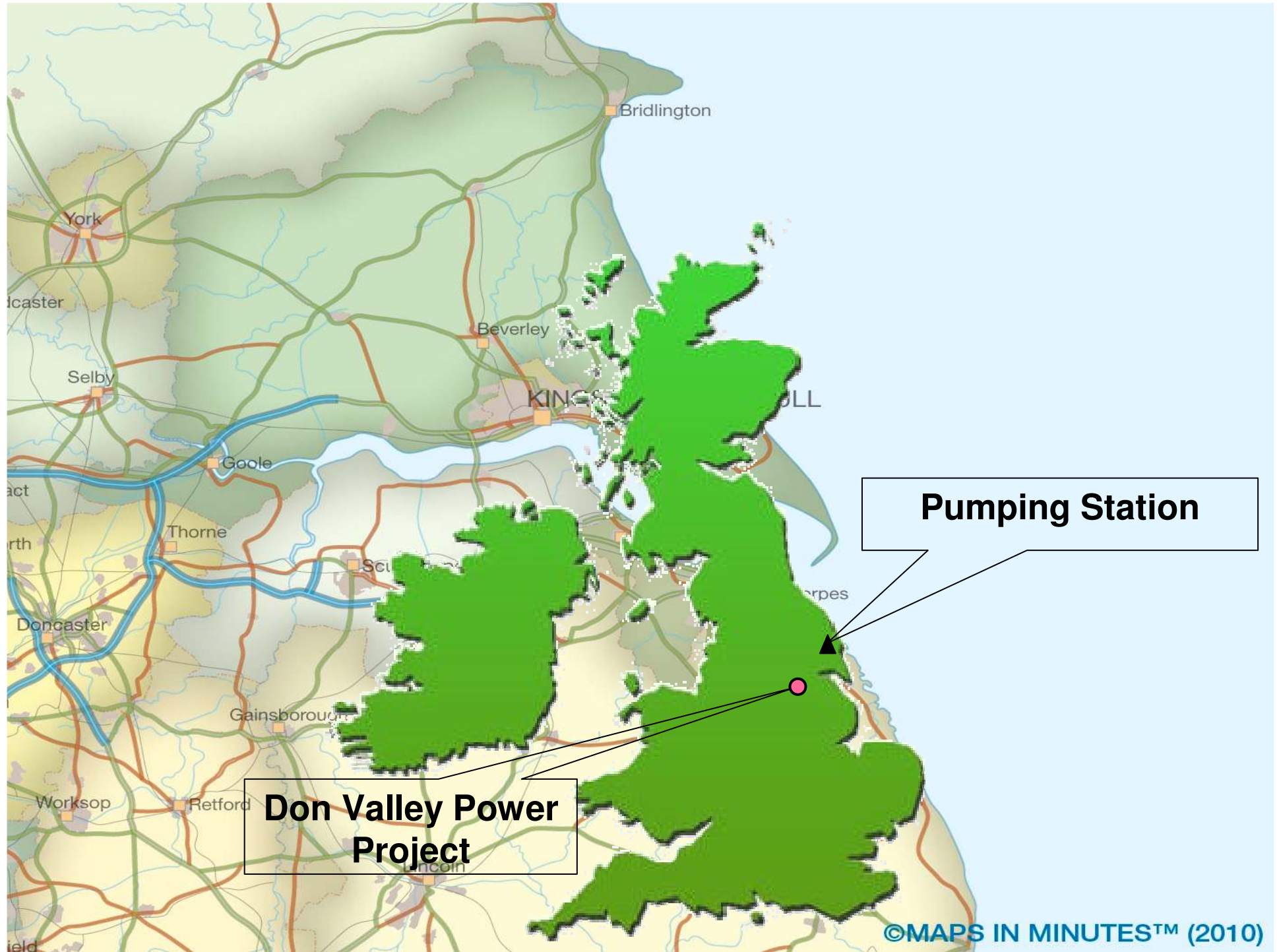
- 90Mt of CO<sub>2</sub> emissions in the region per year
- Approx 60Mt of CO<sub>2</sub> released from point source emitters
- Major emitters located in a relatively small geographic area
- Adjacent coastline to southern North Sea with significant storage potential
- Opportunity to gain a world lead for the region & UK
- Designation of the area as a LCEA

# Natural Clusters



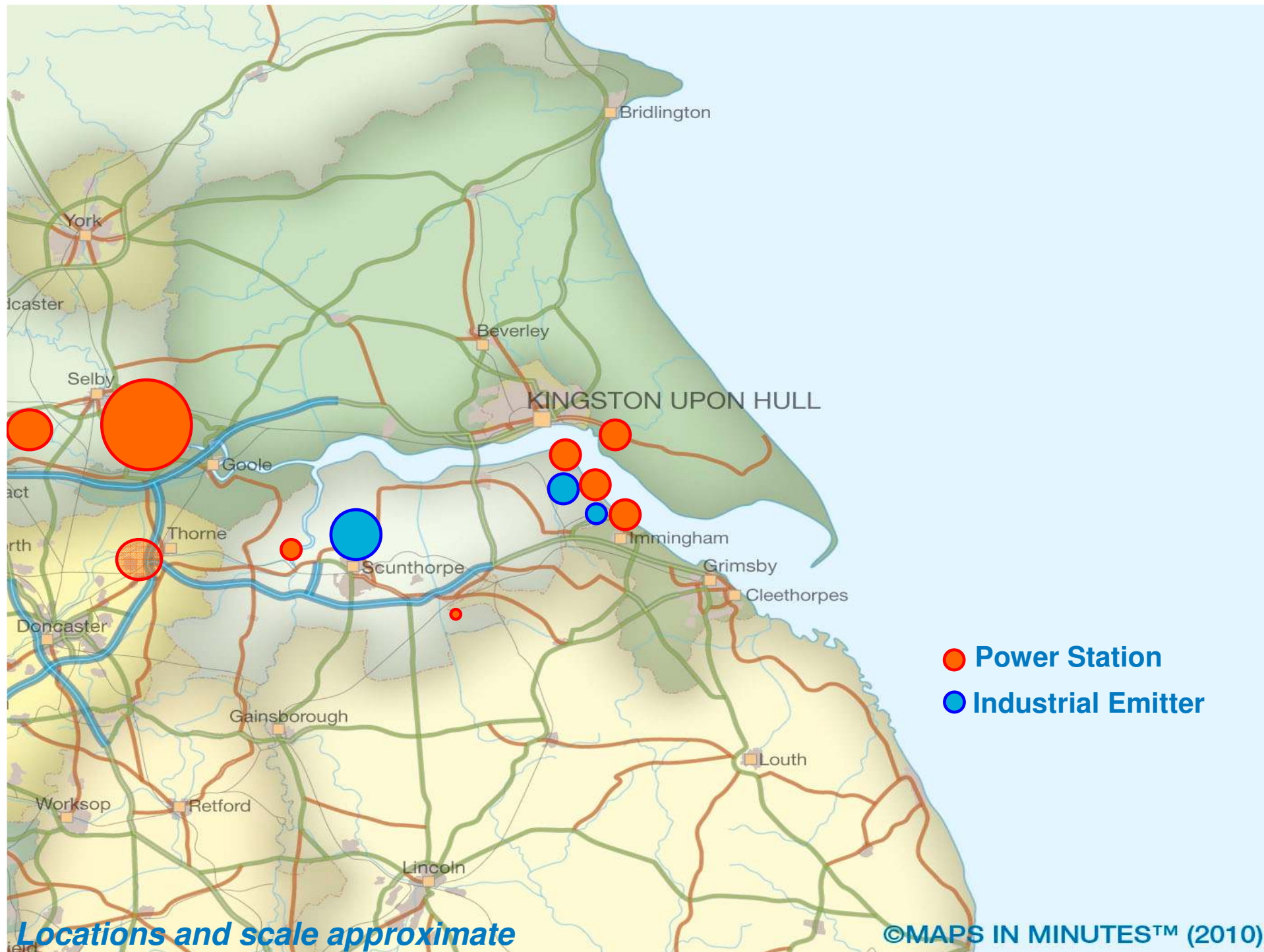
Cluster Region	CO <sub>2</sub> volume
Humber	60Mt
Thames	28Mt
Scotland	18Mt
Teesside	11Mt
Liverpool Bay	10Mt

Source: IEA Greenhouse Gas R&D Programme



**Don Valley Power Project**

**Pumping Station**



## Major Emitters in the Area

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Facility	Activity	CO <sub>2</sub> Emissions / yr (2009)
Drax	Power Station	19.9 Mt/y
Eggborough	Power Station	5.5 Mt/y
Corus Steel Works	Integrated Iron and Steel works	5.1 Mt/y
Ferrybridge 'C'	Power Station	4.0 Mt/y
Saltend Cogen	Power Station	3.4Mt/y
South Humber Bank	Power Station	3.3Mt/y
Immingham	Combined Heat and Power Station	2.9Mt/y
Killingholme 'A' and 'B'	Power Station	3.5 Mt/y
Humber Refinery	Oil Refinery	1.8Mt/y
Keadby	Power Station	1.5 Mt/y
Lindsey Refinery	Oil Refinery	1.4Mt/y
Brigg	Power Station	0.5Mt/y

Based on data from the World ETS Database, a comprehensive analytical tool incorporating all mandatory carbon trading schemes around the world, including the EU ETS Companies Database.

## Defining the Project

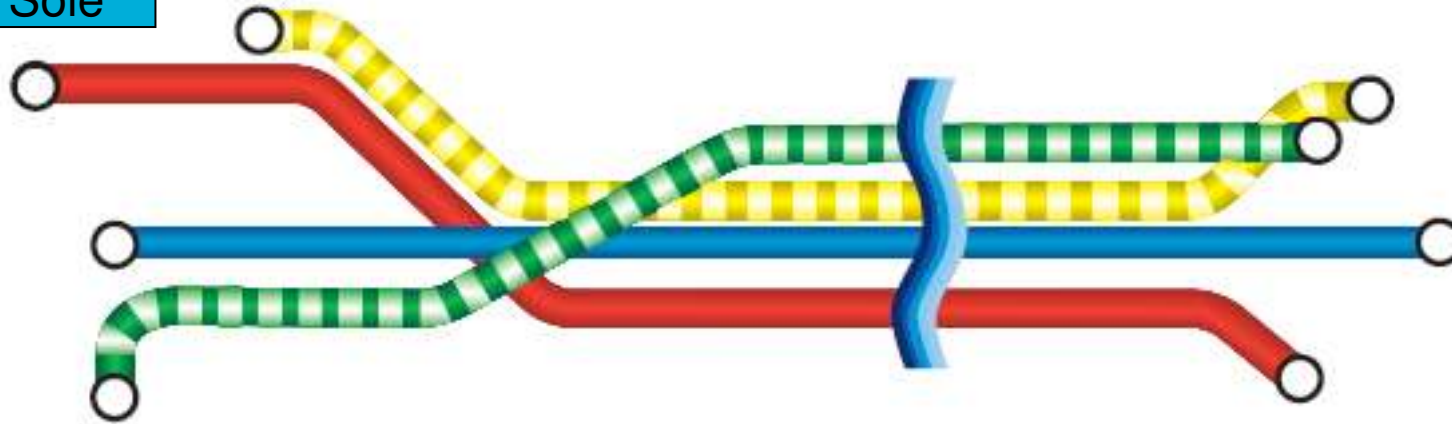
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- Section 36 already granted for Don Valley Power Project.
- Transportation and Storage components of the Project are expected to comprise:
  - Compressor
  - Buried Pipeline
  - AGI (at 15km intervals along the route length)
  - Pumping Station
  - Subsea pipeline
  - Offshore Rig

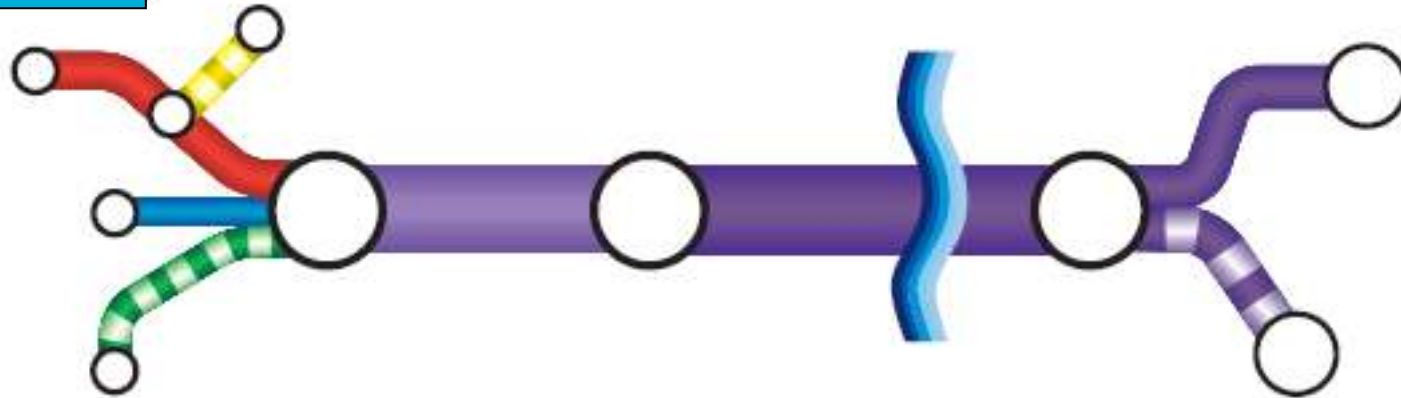



# Defining the Project

Sole



Shared

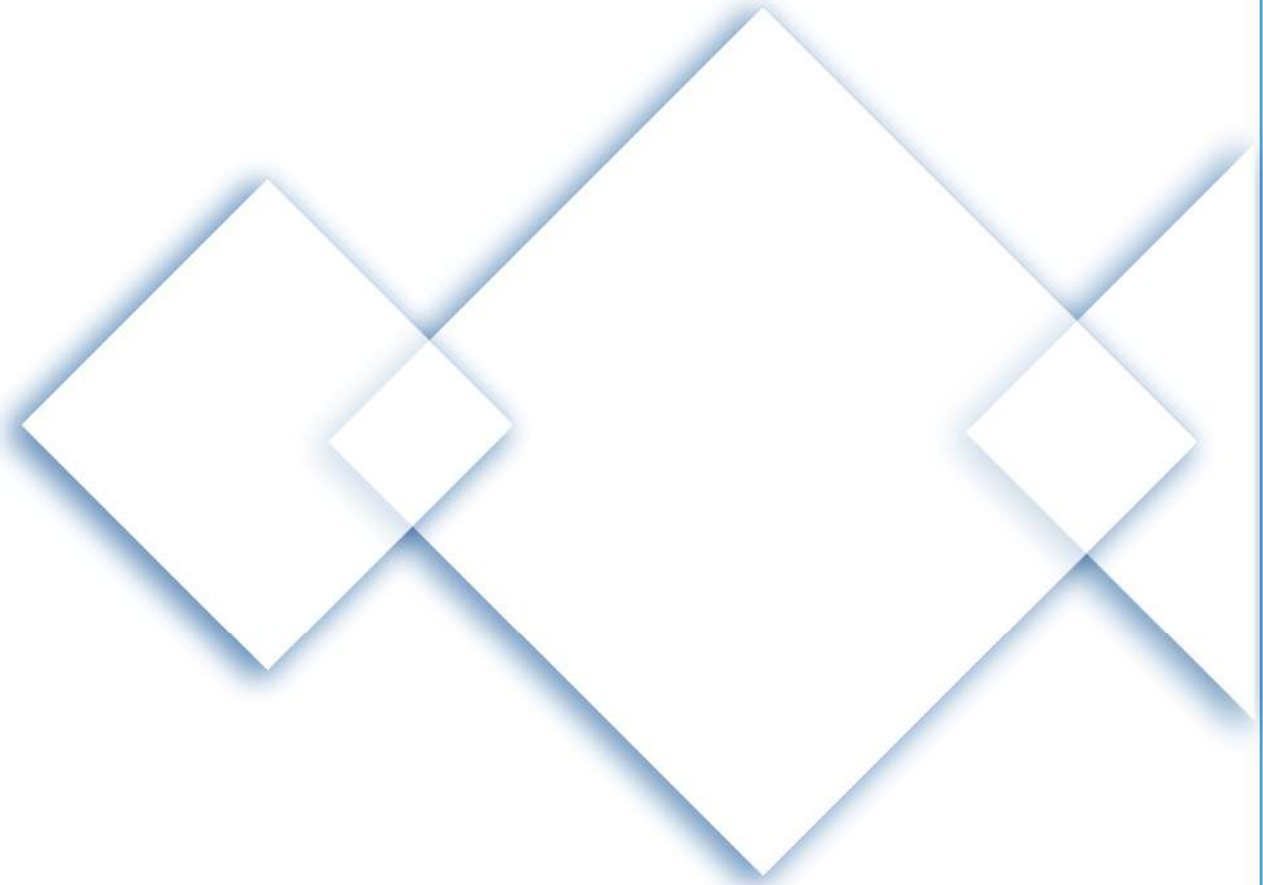


 Planned extensions/growth

# Defining the Project

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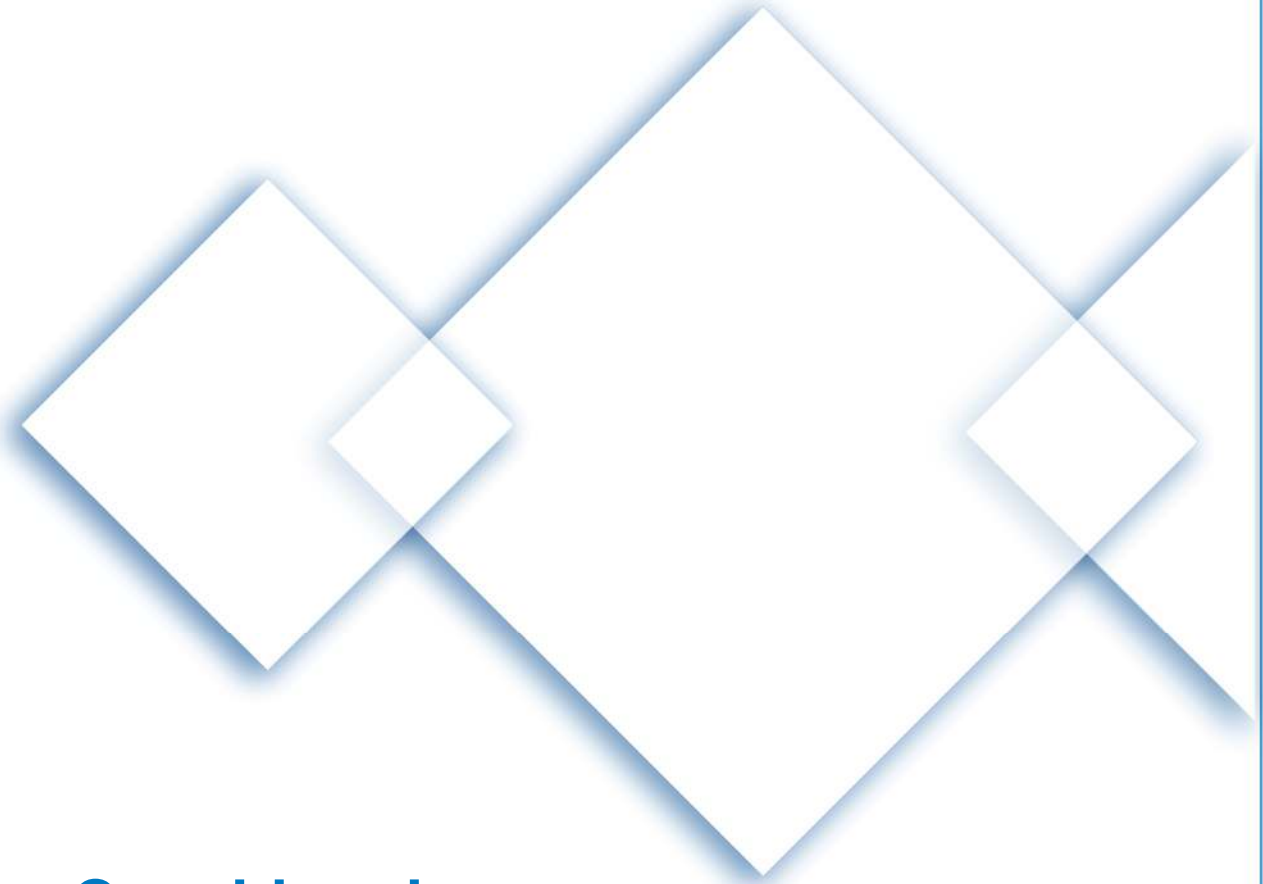
## Project Programme

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2011	2012	2013	2014	2015
<p>Strategic Options Appraisal Report Consultation Identification of Preferred Strategic Option</p>				
<p>Route Corridor Studies Development of Communications Strategy Consultation Identification of Preferred Route Corridor(s)</p>				
<p>Detailed Routeing EIAs (Onshore and Offshore) Consultation Identification of Preferred Alignment</p>				
		<p>Consent applications submitted and determined</p>		
			<p>Construction and Commissioning</p>	



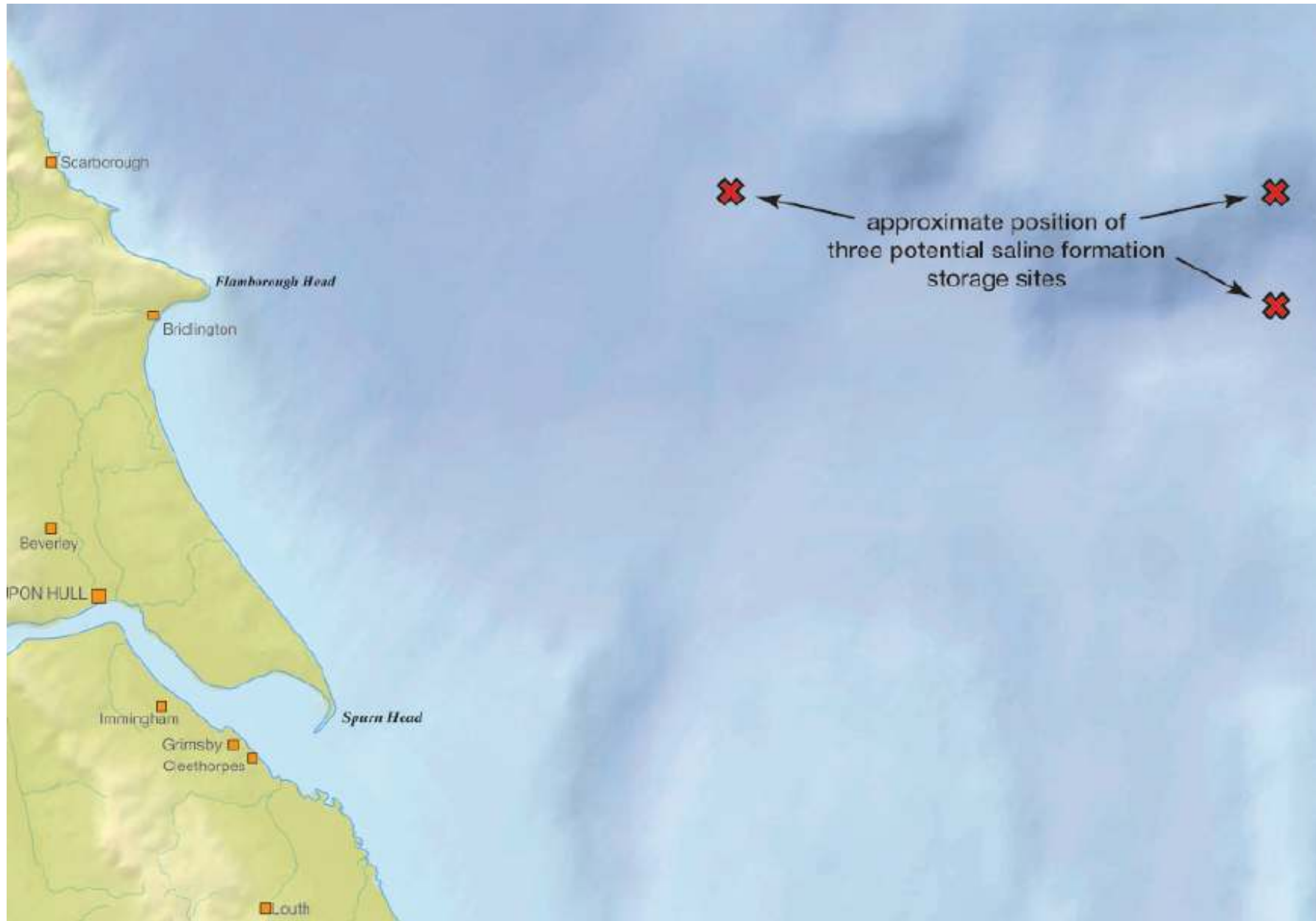
## Strategic Options Considered

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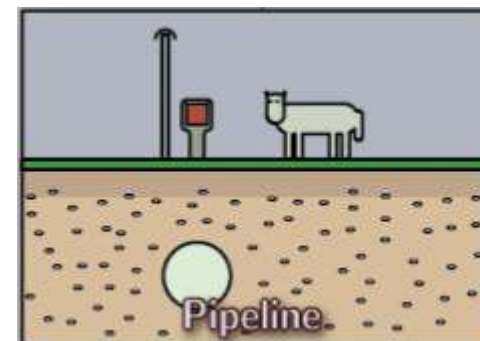
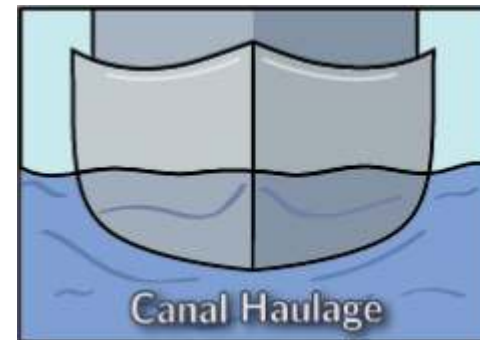
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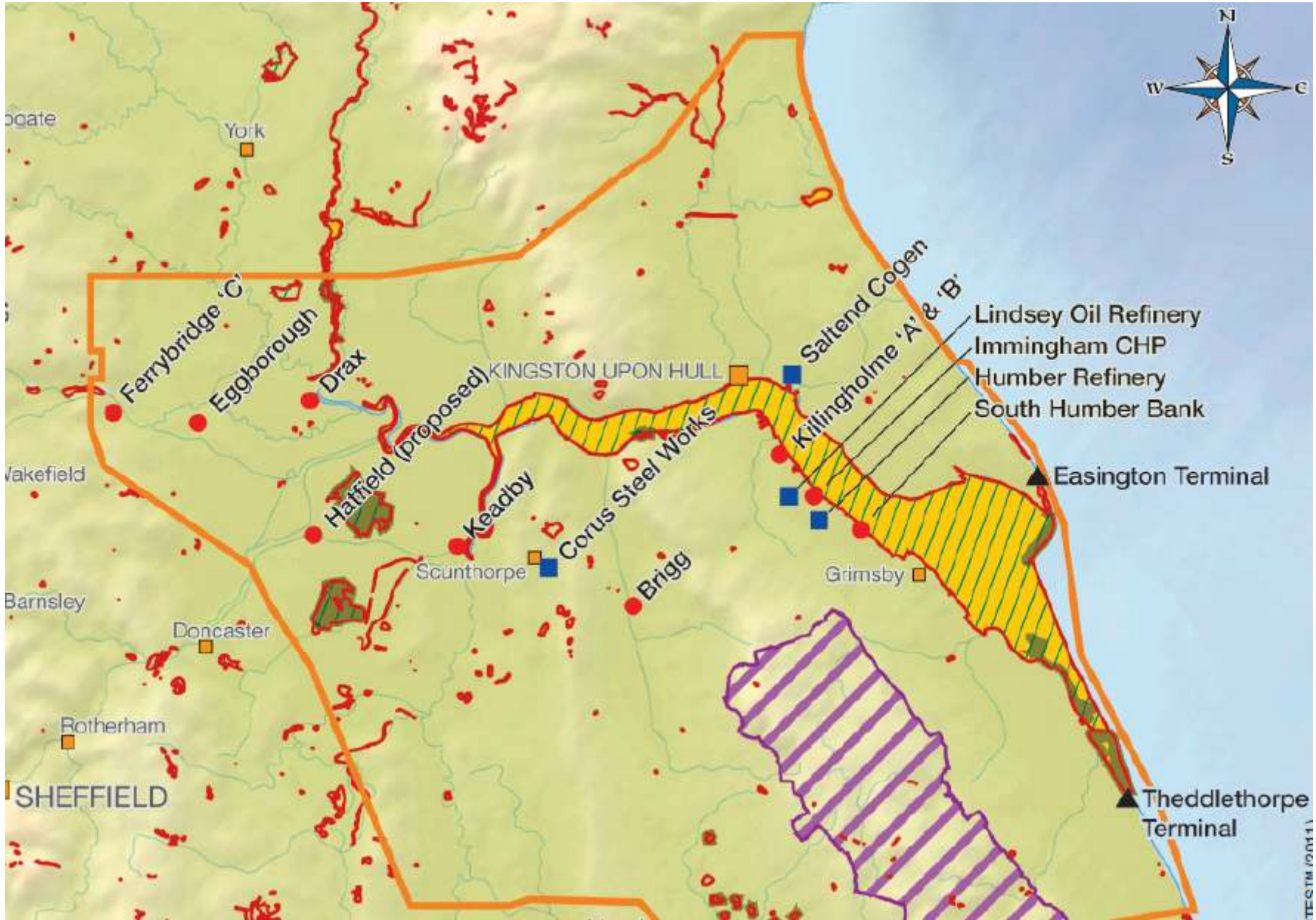


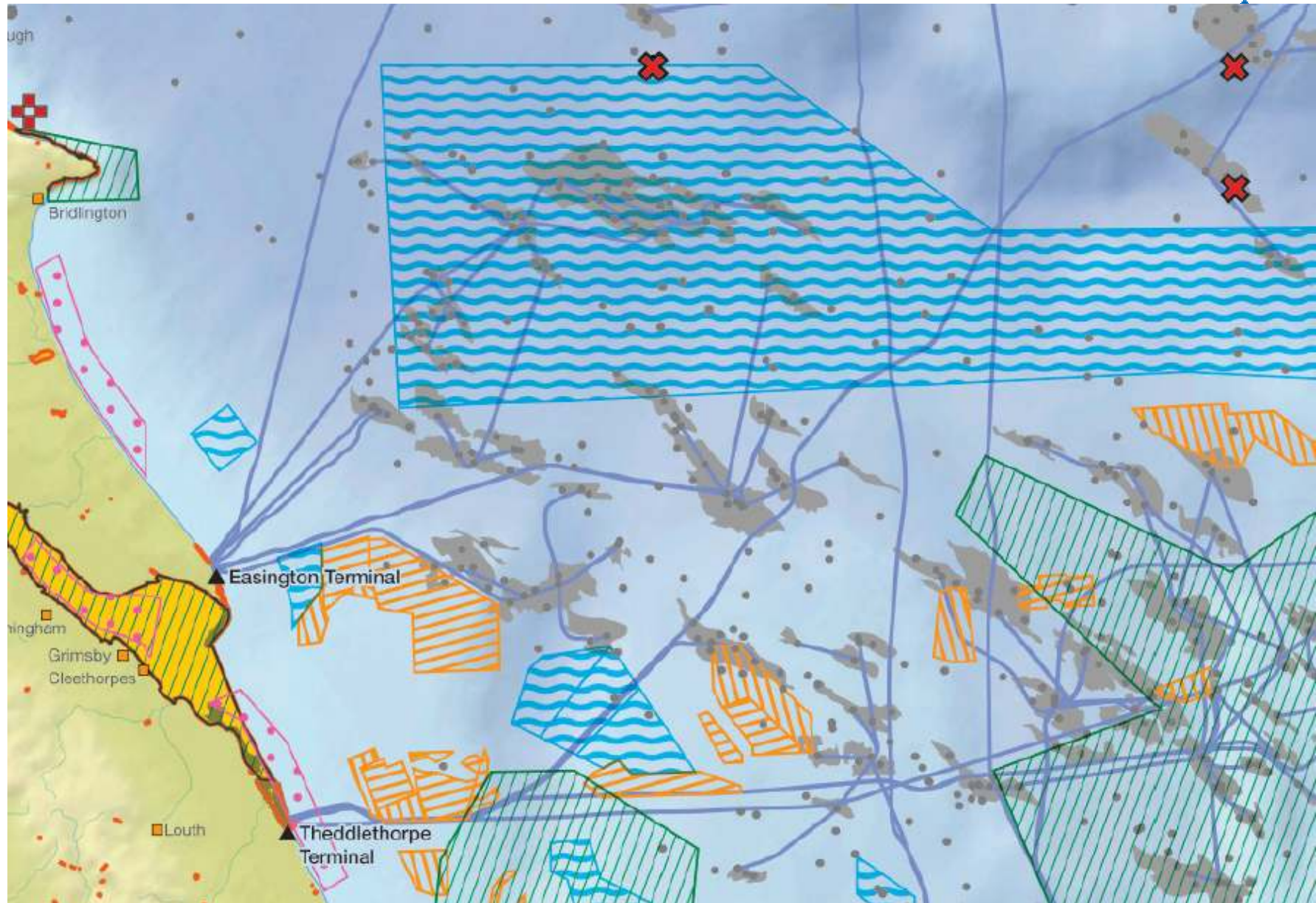
# Transport Mode for CO<sub>2</sub>

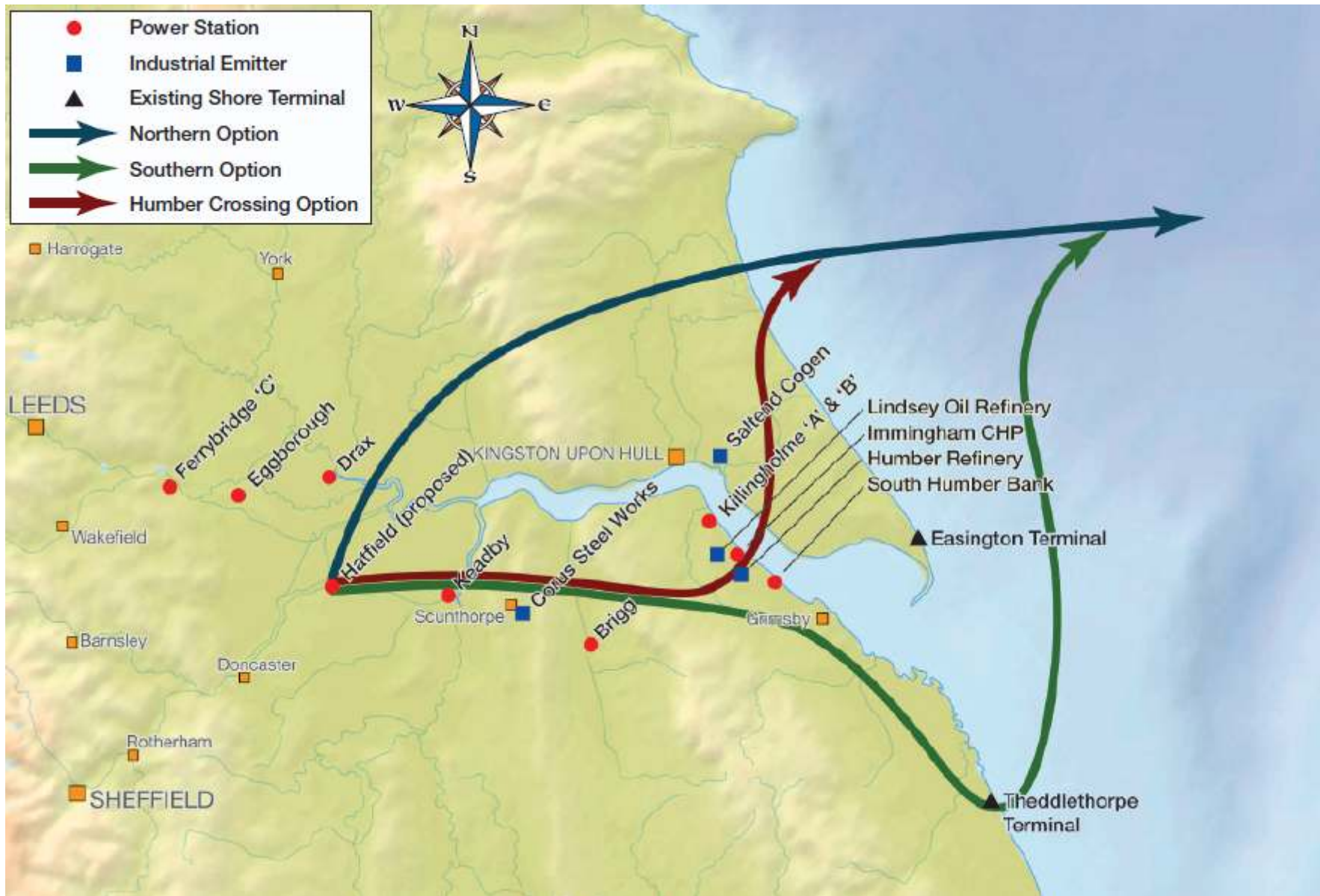
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## Recommendations

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Northern Option is considered to:

1. Offer the least potential environmental impact
2. Have the lowest resource requirements both during construction and operation
3. Have the least adverse impact on the agricultural resource and local economy
4. Be the least technically complex option to construct and maintain, with the lowest delivery risk and lowest capital cost of each option
5. Offers good connectivity to Aire Valley coal fired power stations

# Consultation on Strategic Options

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- Group presentation and Feedback session with key consultees on 15<sup>th</sup> February.
- Attendees:
  - Doncaster Council
  - East Lindsey District Council
  - East Riding of Yorkshire Council
  - Hull City Council
  - Lincolnshire County Council
  - North East Lincolnshire Council
  - North Lincolnshire Council
  - North Yorkshire County Council
  - Selby District Council
  - West Lindsey District Council
  - Environment Agency
  - Natural England
  - Marine Management Organisation
  - CO2 Sense

# Consultation on Strategic Options

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- Further Consultation letters to:
  - English Heritage
  - JNCC
  - DECC

# Consultation on Strategic Options

(1)

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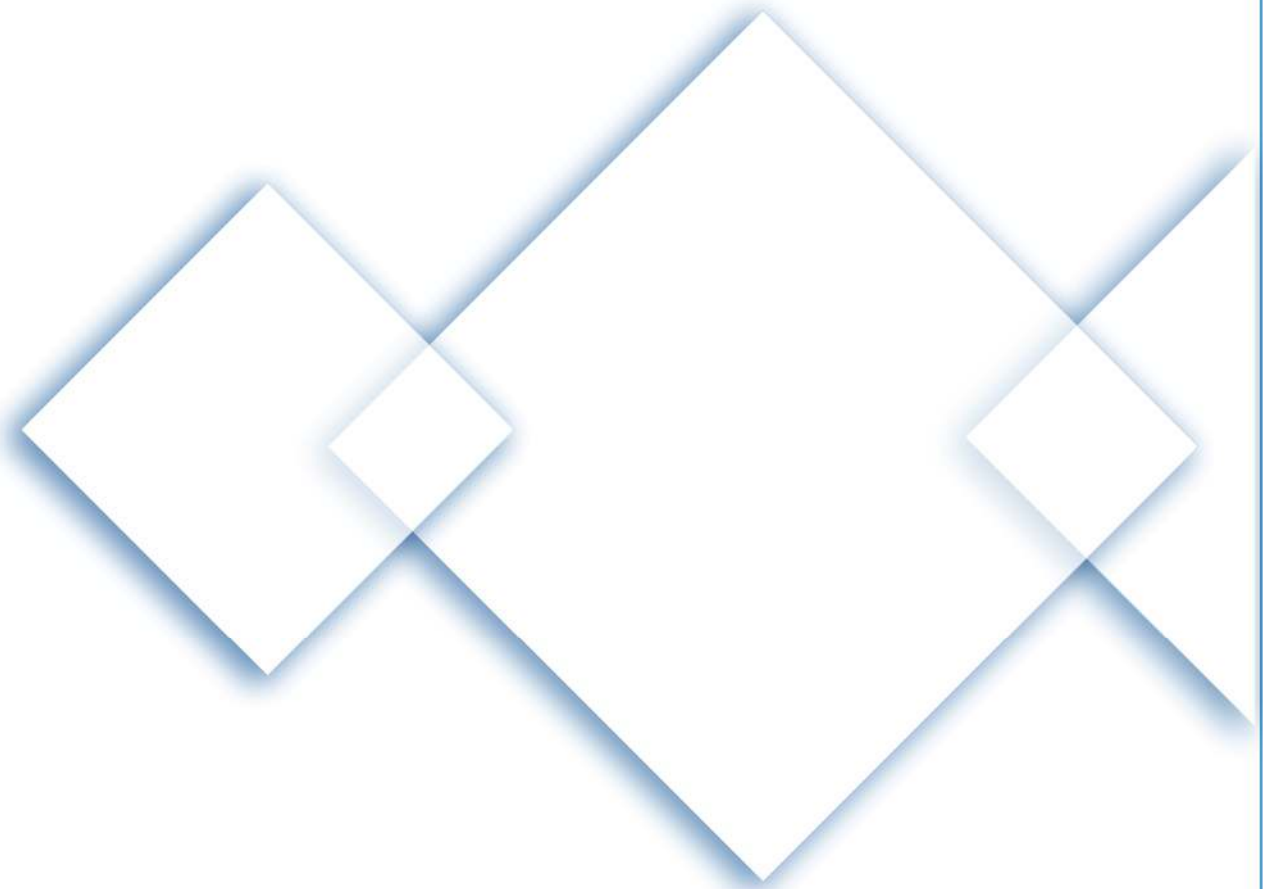
- Positive and supportive comments received from many stakeholders
- National Grid commended for it's "*open and inclusive*" approach to consultation
- Congratulated on our "*clear, concise and informative format of the consultation document*" from North East Lincolnshire Council

(2)

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- Broad agreement with the rationale behind the appraisal methodology and identification of the northern option as preferred solution
- Consultees keen for National Grid to progress subsequent phased extensions of the 'backbone route'
- Preferred Strategic Option Announced 18<sup>th</sup> May 2011





## **Discretionary Consultation & Route Corridor Investigations**

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**X = approximate location of consultation venue**

# Discretionary Public Consultation

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**27<sup>th</sup> June – 14<sup>th</sup> July 2011**

- **Wressle**
- **Stainforth**
- **Airmyn**
- **Carlton**
- **Holme On Spalding Moor**
- **Market Weighton**
- **Lund**
- **North Cave**
- **Leconfield Village**
- **Cherry Burton**
- **Hutton Cranswick**
- **Brandesburton**
- **Barmston And Fraisthorpe**
- **Skipsea**
- **North Frodingham**

# Discretionary Public Consultation

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**Yorkshire & Humber Carbon Capture, Transportation & Storage**

**CONSULTATION DRAFT: Consultation Strategy**

**Section 1: Project Information**

DRAFT

National Grid  
National Grid House  
Warwick Technology Park  
Gallows Hill  
Warwick  
CV34 6DA

9 May 2011



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National Grid is helping to develop solutions to reduce the carbon emissions from power stations and industrial plants in the Yorkshire and Humber region.

The UK is facing a major energy challenge over the next decade. To help meet the Government target to reduce emissions of carbon dioxide (CO<sub>2</sub>) by 34 per cent by 2020, new technology solutions are required that can cut CO<sub>2</sub> emissions while meeting the increasing demand for electricity.

One of the potential solutions being explored is carbon capture, transportation and storage (CCS) technology – National Grid is exploring the options for developing a pipeline for transporting carbon dioxide to support the development of a CCS project in the Yorkshire and Humber region.

CCS captures the CO<sub>2</sub> before it is released and transports it to be stored safely and permanently in natural porous rock formations beneath the sea bed. This can reduce the emissions from power stations by as much as 90 per cent. CCS could also act as a

'bridging technology', helping secure a supply of low-carbon energy while renewable energy sources are further developed.

The Yorkshire and Humber region is unique – its cluster of power stations and industrial plants provide a significant amount of the UK's energy needs and create thousands of jobs locally. However, this presents challenges. These facilities produce approximately 60 million tonnes of CO<sub>2</sub> annually – equivalent to about half of total UK domestic emissions.

Potentially, a number of CO<sub>2</sub> emitting generators and plants in the region could connect to a CCS pipeline, capturing tens of millions of tonnes of carbon dioxide each year.

To find out more about National Grid and how we are helping to meet the challenge of climate change, please visit our website: [www.nationalgrid.com](http://www.nationalgrid.com).

Securing our energy supply for future generations



# Discretionary Public Consultation

## Information live on 13<sup>th</sup> June:

[www.ccsnumber.co.uk](http://www.ccsnumber.co.uk)  
[ccsnumber@uk.ngrid.com](mailto:ccsnumber@uk.ngrid.com)  
 0800 954 9517  
 Freepost CCS National Grid


**Yorkshire & the Humber Carbon Capture, Transportation & Storage project** nationalgrid

Leading the transition to a low-carbon economy

**National Grid is helping to develop solutions to reduce the carbon emissions from power stations and industrial plants in the Yorkshire and Humber region.**

National Grid is at the early stages of exploring the options for developing a pipeline for transporting carbon dioxide (CO<sub>2</sub>) to support the provision of carbon capture, transportation and storage (CCS) technology in the Yorkshire and Humber region.

We are launching a programme of public consultation for local communities to find out more and give us their views on our proposals, including the route corridor options.



Key: — Indicative pipeline route corridor

**The project**

National Grid is proposing to use its expertise in building and running safe and effective pipeline networks to develop a new pipeline to transport carbon dioxide as part of a CCS project in the Yorkshire and Humber region. The CCS process that the project will support will involve capturing CO<sub>2</sub> emissions from the proposed Don Valley Power Project power station at Hatfield Colliery, Spenborough, transporting them via a buried pipeline to a suitable storage site beneath the North Sea, and storing them permanently within natural porous rock formations beneath the seabed. The pipeline would be designed so that further power stations and industrial plants in the region could potentially be connected in the future to form a regional CCS network.

**The need**

The UK is facing a major energy challenge over the next decade. To meet the Government target to reduce emissions of CO<sub>2</sub> by 34 per cent by 2020 and 80 per cent by 2050, new technology solutions are required that can cut carbon emissions while meeting the increasing demand for electricity.

CCS is part of a package of potential solutions. Capturing the carbon dioxide produced by existing and new coal and gas-fired power stations and industrial facilities and transporting it to be stored safely and permanently beneath the seabed can make a significant contribution to tackling climate change, securing a supply of low-carbon energy while renewable energy sources are further developed.

**Why the Yorkshire & Humber region?**

The Yorkshire and Humber region is unique – its cluster of power stations and industrial plants provides a significant amount of the UK's energy needs and creates thousands of jobs locally. However, this presents challenges. These facilities produce about 80 million tonnes of CO<sub>2</sub> annually – equivalent to about half of total UK domestic emissions. Potentially, a number of CO<sub>2</sub> emitting generators and plants in the region could connect to a CCS pipeline, capturing tens of millions of tonnes of carbon dioxide each year.

**How we will consult with local communities**

Our plans are still at an early stage. Listening to communities and gathering their feedback on our proposals is an extremely important part of the project. We will be undertaking further public consultation in the future and everyone will have the opportunity to give their views.

**Stage 1 Consultation (June – August 2011)**

We are about to begin the first stage of public consultation, where we will be asking for local views on a number of route corridor options within which a pipeline and associated above ground infrastructure could be developed.

We will be holding a number of public exhibitions in the areas where people will be able to find out more about the project and give us feedback. Details of these events are provided below. The results of this consultation will be taken into account in the determination of a preferred route corridor option.

**Public Exhibitions** The following public exhibitions will be taking place as part of the Stage 1 Consultation:

<p><b>Worsle Village Hall</b> – Monday 27 June, 2pm-7pm Worsle, YO15 2ET</p> <p><b>Stainforth Methodist Church</b> – Tuesday 28 June, 2pm-7pm Church Road, Stainforth DN7 5PR</p> <p><b>Almyn Village Hall</b> – Wednesday 29 June, 2pm-7pm Off Woodland Way, Almyn DN4 6HQ</p> <p><b>Carlton Village Hall</b> – Thursday 30 June, 2pm-7pm Church Lane, Carlton DN14 6BB</p>	<p><b>Holme Village Hall</b> – Friday 1 July, 2pm-7pm High Street, Holme-on-Spalding Moor YO43 4EH</p> <p><b>Market Woughton Community Centre</b> – Saturday 2 July, 11am-4pm Lonsdaleborough Road, Market Woughton YO43 5AY</p> <p><b>Lund Village Hall</b> – Monday 4 July, 2pm-7pm 20 North Road, Lund YO15 7TF</p>	<p><b>North Cave Village Hall</b> – Tuesday 5 July, 2pm-7pm 60 Westgate, North Cave HU16 2NJ</p> <p><b>Leconfield Village Hall</b> – Wednesday 6 July, 2pm-7pm Miles Lane, Leconfield HU17 7NW</p> <p><b>Cherry Burton Village Hall</b> – Thursday 7 July, 2pm-7pm Main Street, Cherry Burton HU17 7RF</p> <p><b>Hutton Cranswick Village Hall</b> – Friday 8 July, 2pm-7pm Ratcliffe Lane, Hutton Cranswick YO25 9QA</p>	<p><b>Brandsburton Village Hall</b> – Saturday 9 July, 11am-4pm Carnegie Lane, Brandsburton YO25 6SD</p> <p><b>Cammerham &amp; Foston Village Hall</b> – Monday 11 July, 2pm-7pm Barns Lane, Barnston YO25 8PG</p> <p><b>Skipsea Village Hall</b> – Wednesday 13 July, 2pm-7pm Brimington Road, Skipsea YO25 8TJ</p> <p><b>North Frodingham Village Hall</b> – Thursday 14 July, 2pm-7pm Main Street, North Frodingham YO25 8XJ</p>
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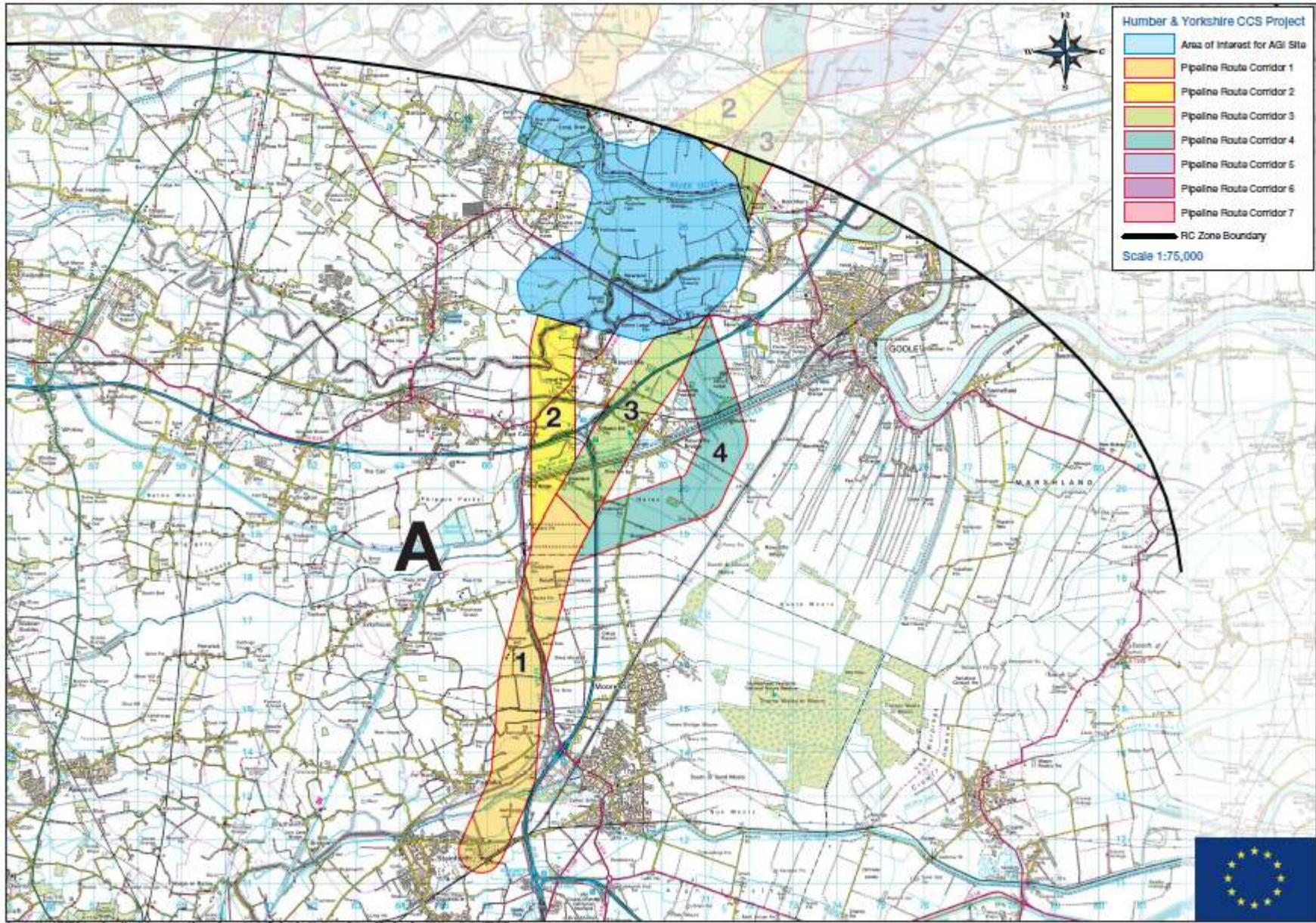
**How to find out more**

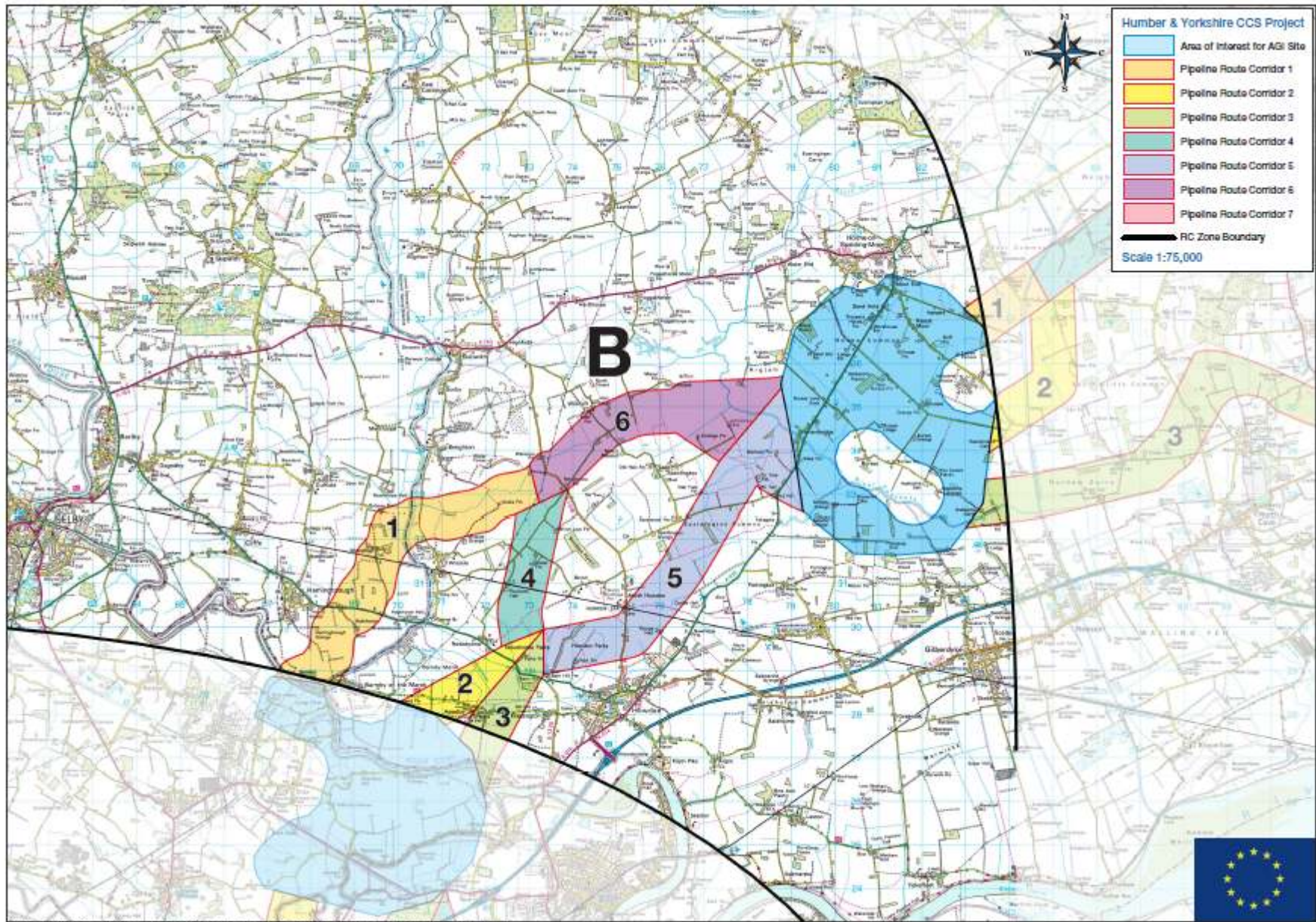
Visiting our project website at: [www.ccsnumber.co.uk](http://www.ccsnumber.co.uk)

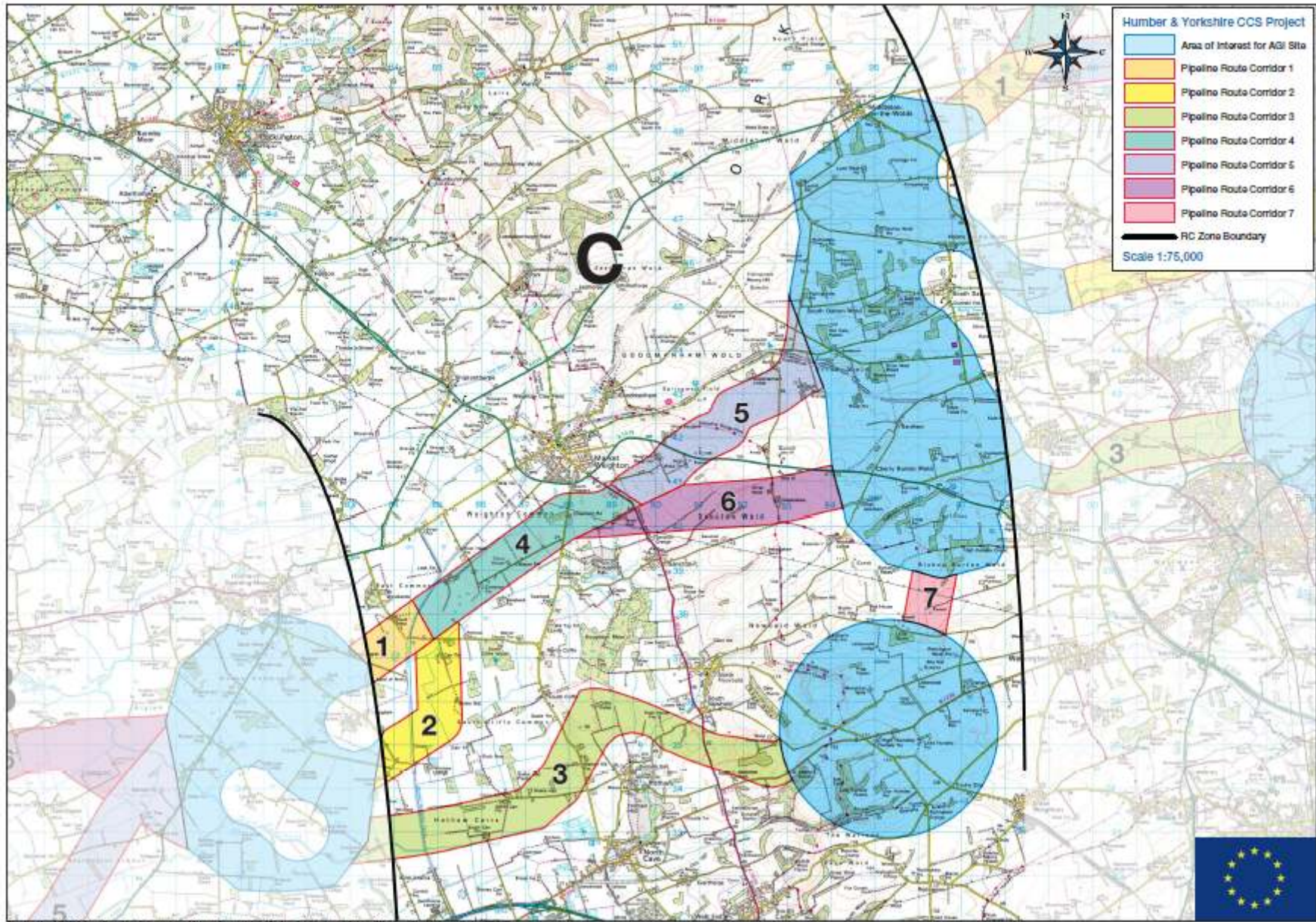
Information about the consultation events only is also available by calling our freephone number: 0800 954 9517. Lines are open between 10am – 5:00pm, Monday – Friday.

Sending an email to: [nationalgrid@ccsnumber.co.uk](mailto:nationalgrid@ccsnumber.co.uk)

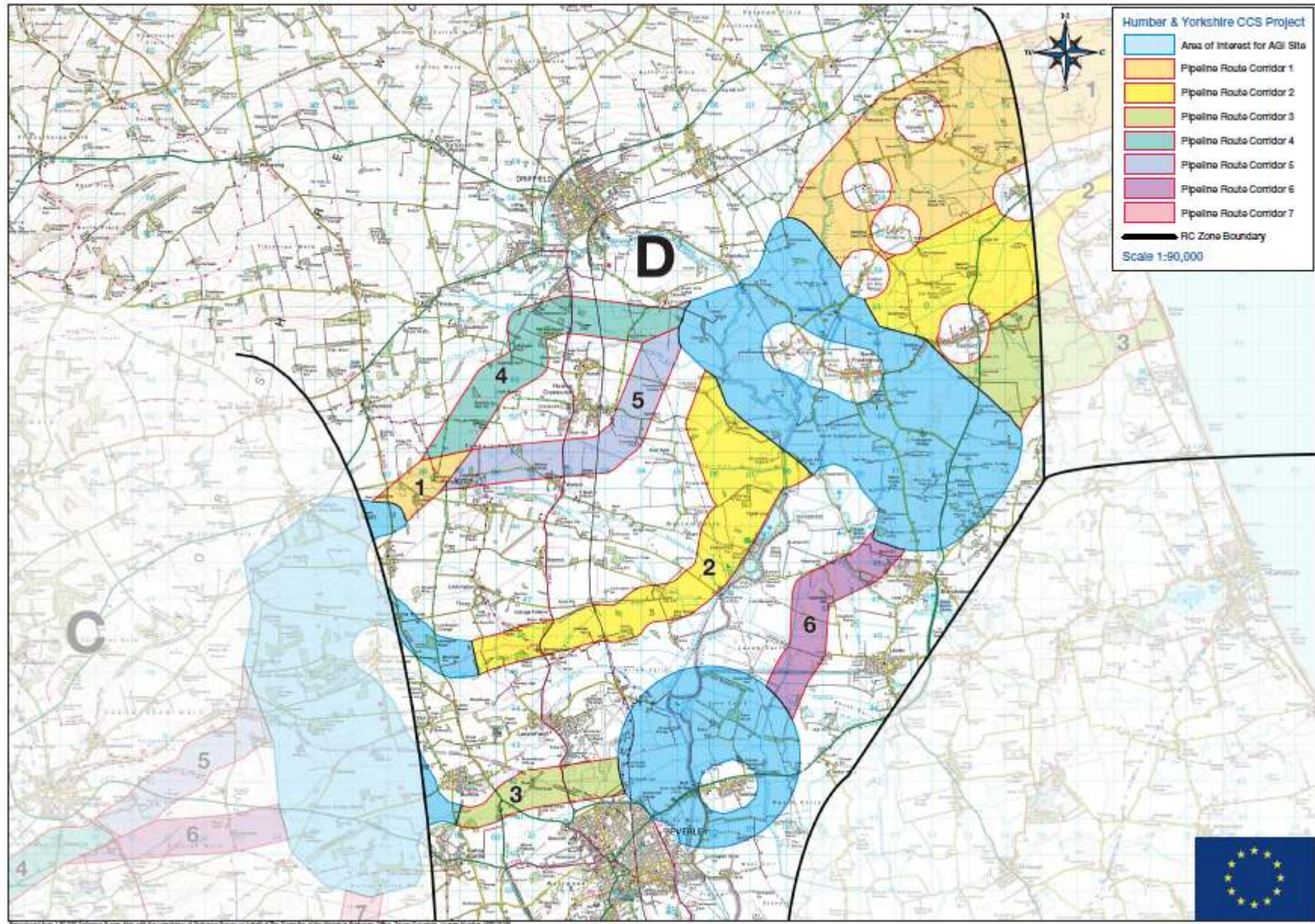
Writing to our Freepost stations at: **FREPOST CCS NATIONAL GRID**

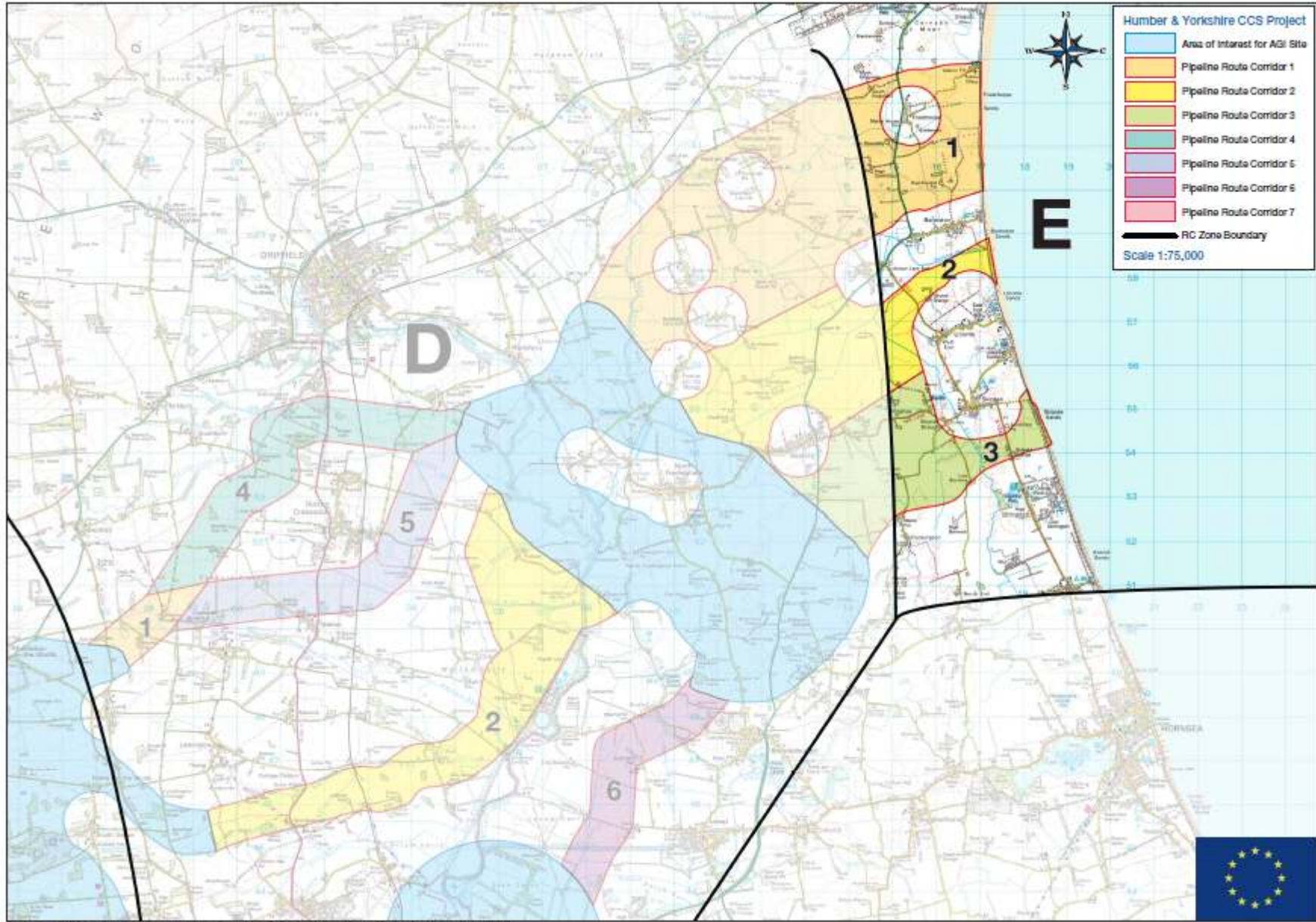




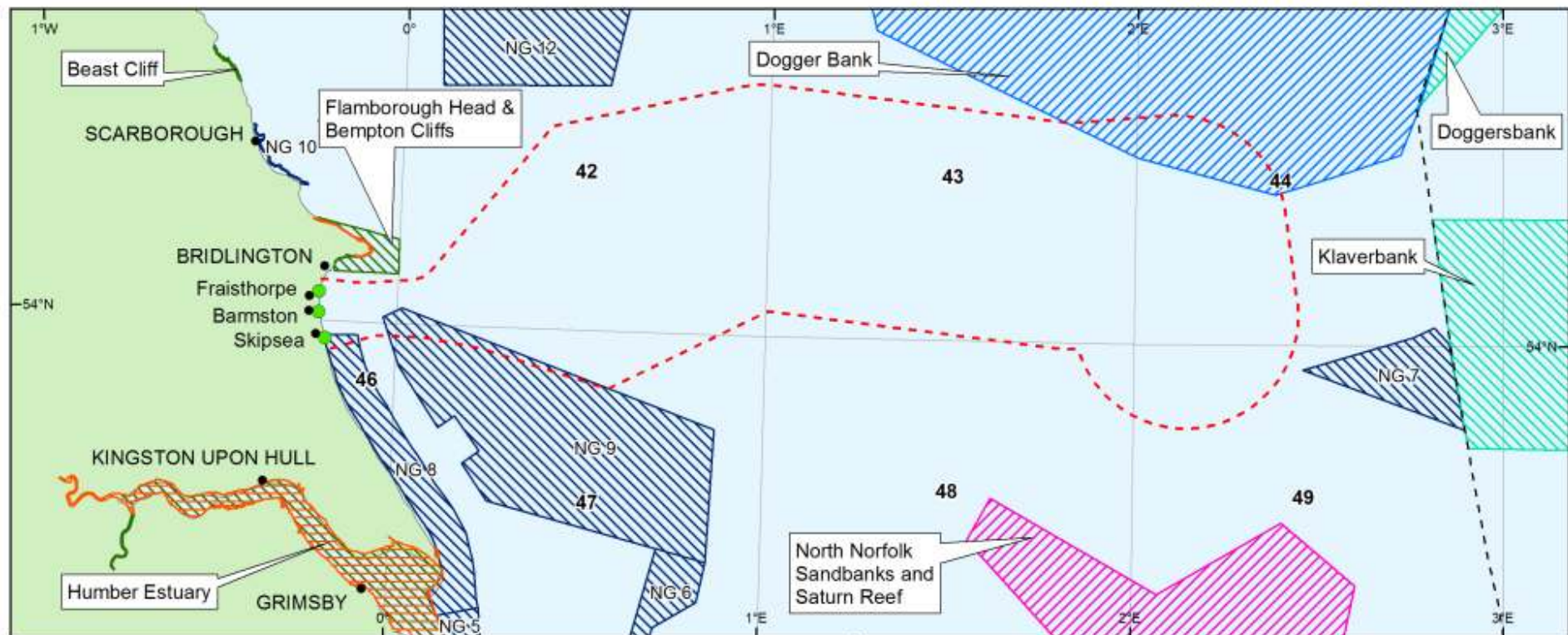












**Legend**

- - - Area of interest

● Centre points of landfall area of search

● Urban areas / settlements

- - - Median

**Conservation sites\***

Draft MCZ (3rd iteration)

SPA

SAC

Offshore pSAC

Offshore cSAC

Adjacent offshore SAC

**Data source:**

UKDeal, JNCC, EEA, Netgain, Ordnance Survey

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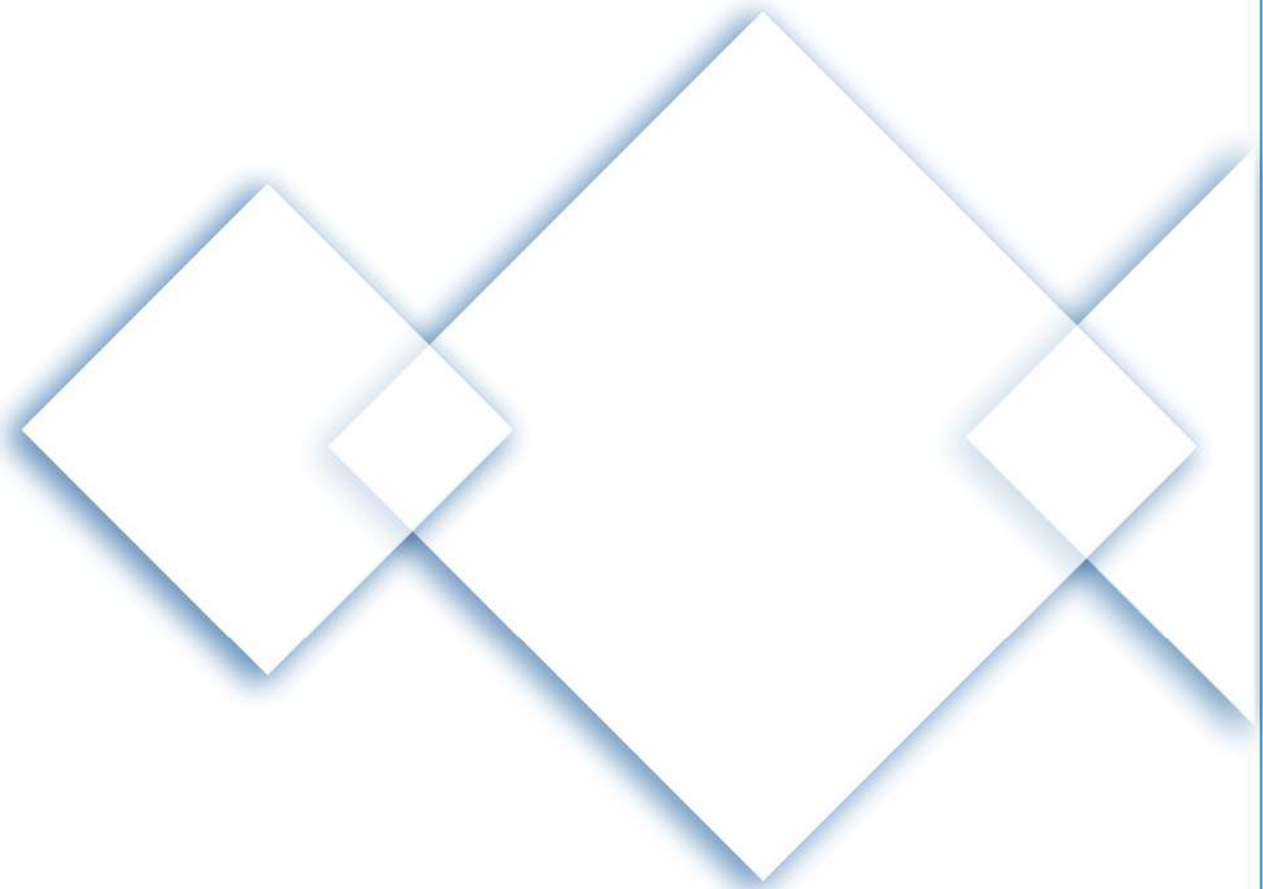
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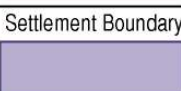



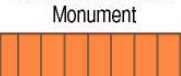

## Approach to Pipeline Construction

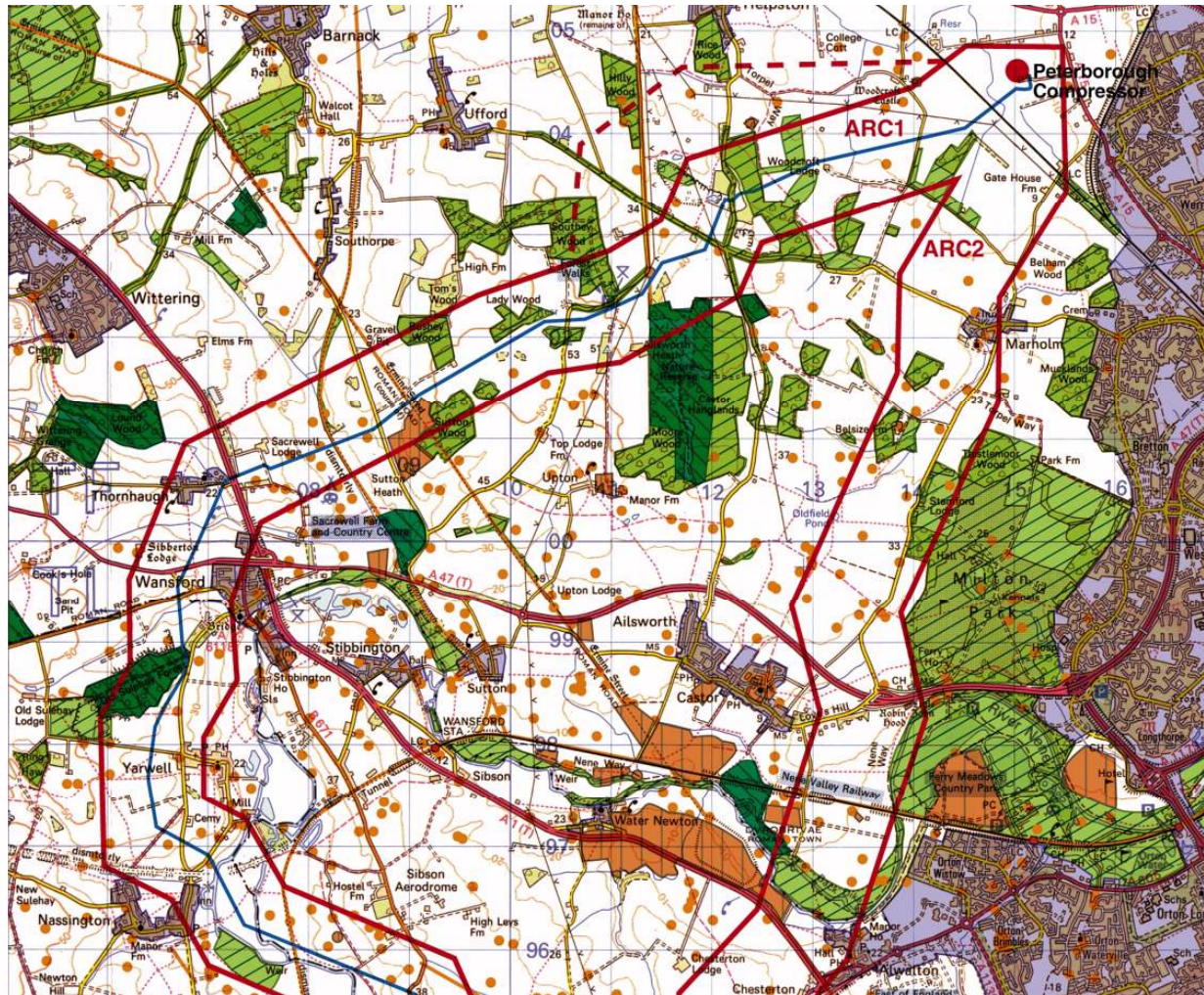
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# Example Route Corridor Constraints Mapping

**KEY**

Existing Pipeline	
Route Corridor	
Settlement Boundary	
Southern Township Area	
Site of Special Scientific Interest	
County Wildlife Site (Site of Nature Conservation Value)	
Scheduled Ancient Monument	
Archaeological Site	



# Ground Investigations/Surveys



Archaeological Investigation

Ecological Investigation



**Construction Sequence: Preparation**



- Receive materials - pipe etc.

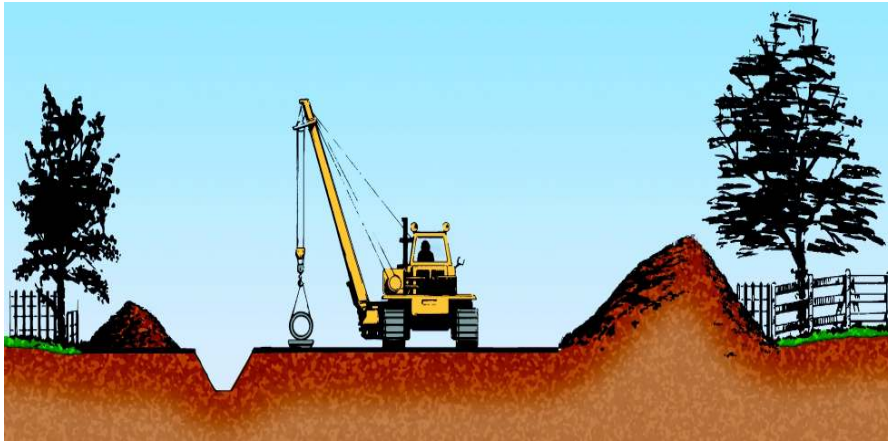


**Construction sequence: Preparation (Cont.)**



- Receive materials - pipe etc.
- Pre-works - hedge trimming, newt fencing etc.

## Construction Sequence: Preparation (Cont.)



- Receive materials - pipe etc.
- Pre-works - hedge trimming, newt fencing etc.
- Set out the working width

**Construction sequence: Preparation (Cont.)**



- Receive materials - pipe etc.
- Pre-works - hedge trimming, newt fencing etc.
- Set out the working width
- Pre-construction drainage

**Construction sequence: Preparation (Cont.)**



- Receive materials - pipe etc.
- Pre-works - hedge trimming, newt fencing etc.
- Set out the working width
- Pre-construction drainage
- Topsoil stripping

**Construction sequence: Preparation (Cont.)**



- Receive materials - pipe etc.
- Pre-works - hedge trimming, new fencing etc.
- Set out the working width
- Pre-construction drainage
- Topsoil stripping
- Deliver pipe to site (pipe “stringing”)

**Construction sequence: Mechanical construction**



- Bend pipe for direction changes (horizontal and vertical)

**Construction sequence: Mechanical construction (Cont.)**



- Bend pipe for direction changes (horizontal and vertical)
- Weld pipe together (manual) →

**Construction sequence: Mechanical construction (Cont.)**



- Bend pipe for direction changes (horizontal and vertical)
- Weld pipe together (automatic)



**Construction sequence: Mechanical construction (Cont.)**



- Bend pipe for direction changes (horizontal and vertical)
- Weld pipe together
- Excavate trench

**Construction sequence: Mechanical construction (Cont.)**



- Bend pipe for direction changes (horizontal and vertical)
- Weld pipe together
- Excavate trench
- Pipeline installation (“*lower and lay*”)

**Construction sequence: Reinstatement**



- Bend pipe for direction changes (horizontal and vertical)
- Weld pipe together
- Excavate trench
- Pipeline installation (*“lower and lay”*)
- Backfilling, bedding and covering pipe

**Construction sequence: Reinstatement (Cont.)**



- Install post-construction land drains

**Construction sequence: Reinstatement (Cont.)**



- Install post-construction land drains
- Reinstatement working width ("*sub soiling*" or "*ripping*")

**Construction sequence: Reinstatement (Cont.)**



- Install post-construction land drains
- Reinststate working width (“sub soiling” or “ripping”)
- Replace topsoil →

**Construction sequence: Reinstatement (Cont.)**



- Install post-construction land drains
- Reinstatement working width (“sub soiling” or “ripping”)
- Replace topsoil

**Construction sequence: Pre commissioning**



- Install post-construction land drains
- Reinststate working width (“sub soiling” or “ripping”)
- Replace topsoil
- Pressure test pipeline, dry and commission

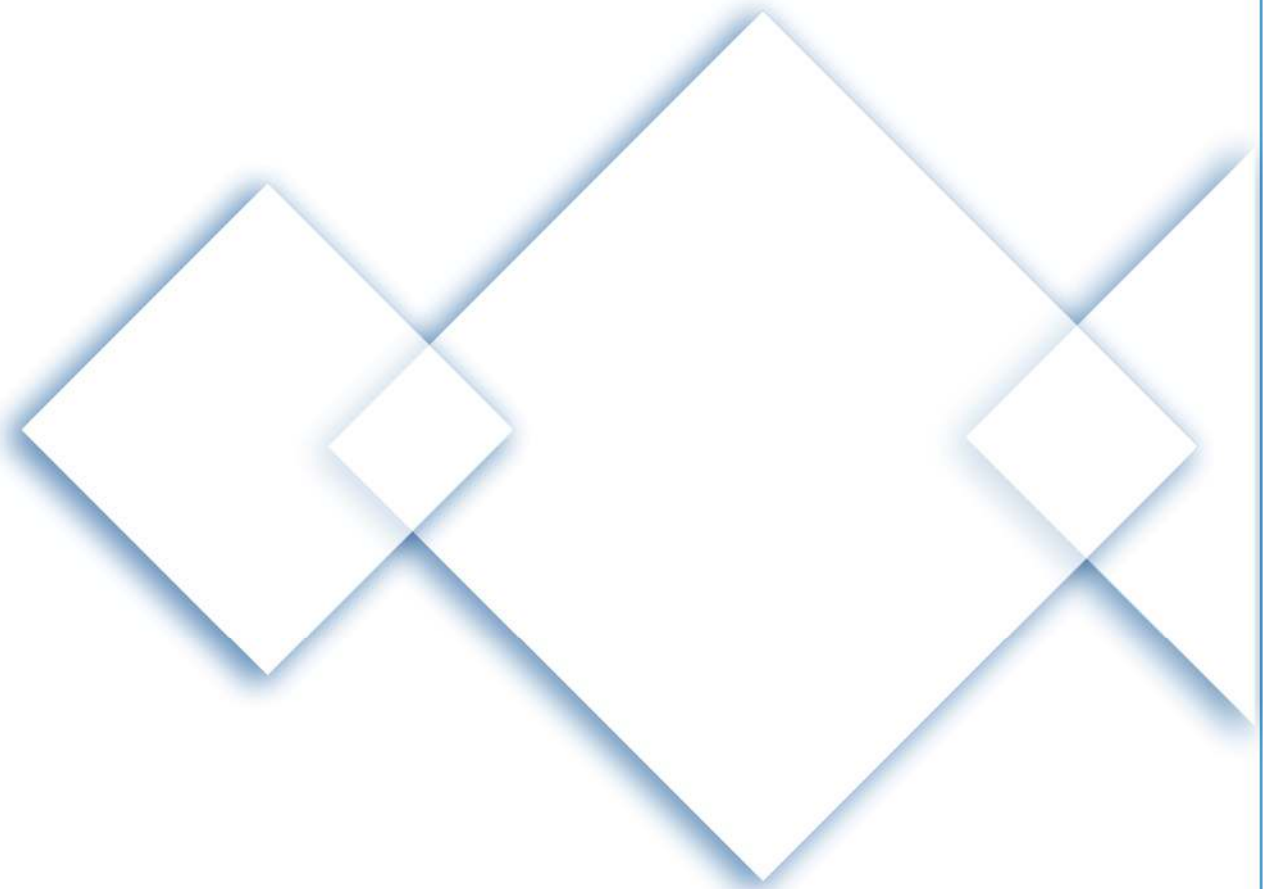


# Construction sequence: Before and After



# Construction sequence: Before and After





## Issues for further consideration

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# Key Licences, Permits & Consents

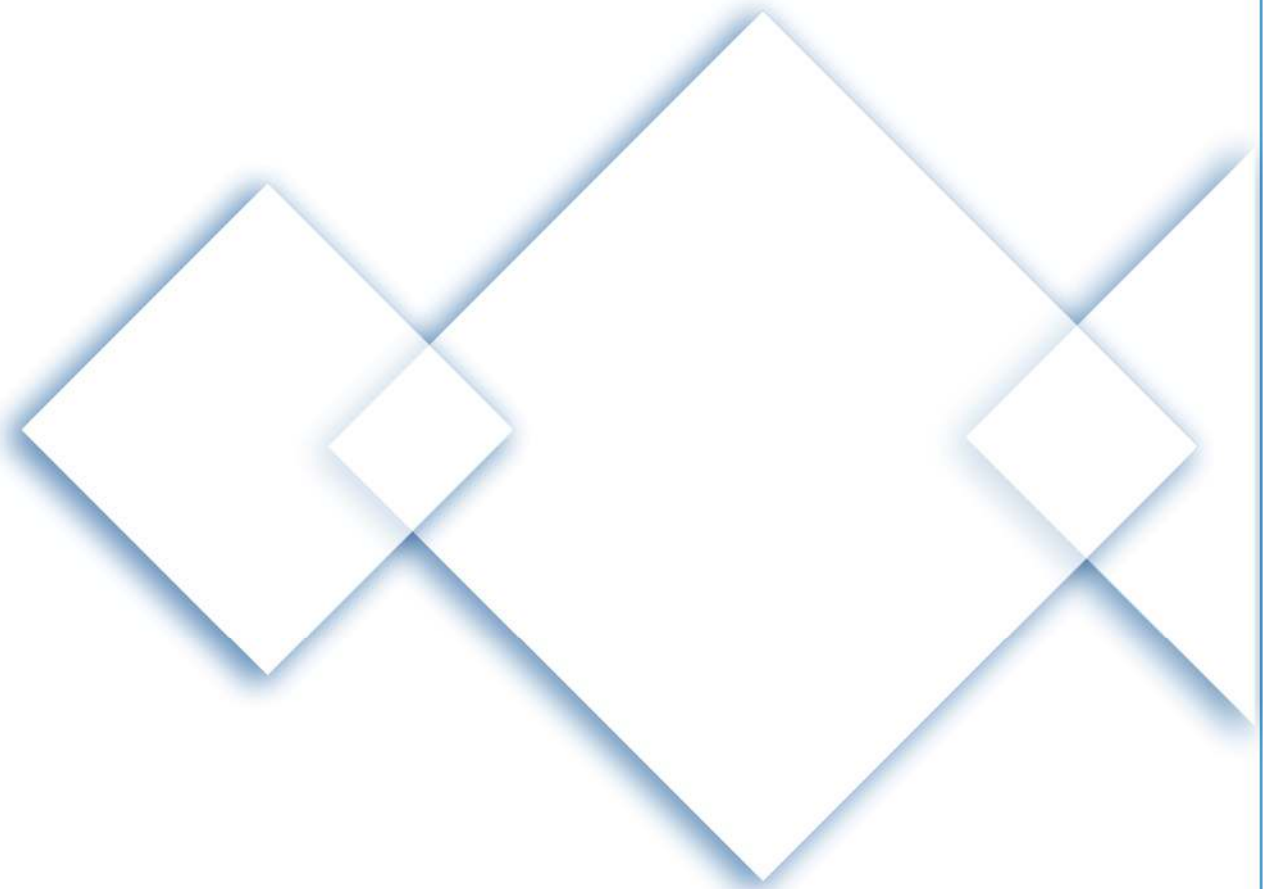
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- Onshore:
  - Development Consent Order (Pipeline) & Associated Development (AGIs)
  - Wildlife & Countryside Act (as appropriate)
  
- Offshore:
  - Petroleum Act (offshore pipeline)
  - Energy Act (offshore storage facility)
  - FEPA Licence (deposit on the seabed)
  - Appropriate Assessment (as appropriate)

## Questions for IPC

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- IPC Interest Offshore
- DECC / IPC Interface
- IPC Outreach Programme
- DECC Third Party Access Arrangements



What information would you like from us?

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