



Programme Area: Carbon Capture and Storage

Project: Scoping New Thermal CCS Power Station

Title: Stage A Identification of potential sites

Abstract:

URS was appointed by the Energy Technologies Institute (ETI) in June 2014 (Consultancy Agreement ref. NHE/CS/URS) to undertake a desk-top selection and review study, to identify potential sites available for the development of a new low carbon thermal power plant that can benefit from the marginal cost of connection to a carbon sink. This scope of works constitutes work package WP1.1 of ETI's 'Incentivisation of Thermal Power with CCS' programme. This report presents the conclusions at Stage A of this study, in which URS has identified a list of possible locations for new power stations, and applied qualitative criteria to highlight the highest ranking sites for further discussion and review with ETI.

Context:

The aim of this project was to scope out a potential ETI Project which would establish an investment proposal for a new, GW scale, carbon-abated, thermal power station, which minimised risk and built on infrastructure which was at the time being proposed in response to the DECC CCS Commercialisation Competition. This scoping exercise had two major components: a review of potential sites where such a station might be built, taking into account existing infrastructure and planned CO₂ transport and storage infrastructure; and the development of an investment model to identify the key features of an investable CCS power project. The ETI's ultimate objective was to establish a new investment consortium ready to undertake 'front-end engineering design' (FEED) on a major thermal power station development incorporating CCS (£2bn+ capex). This initial scoping project sought to create a clear view of the structure of that future FEED study, the likely shape of the power project and to identify potential partners.

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Stage A

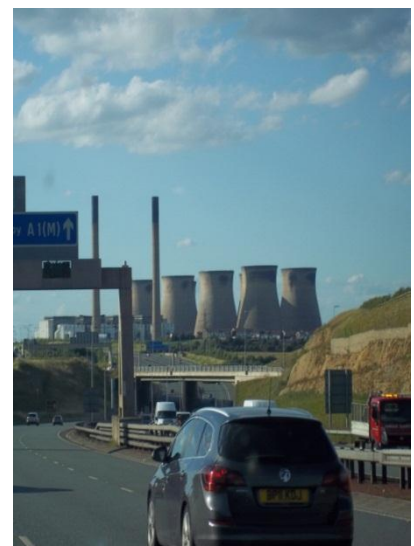
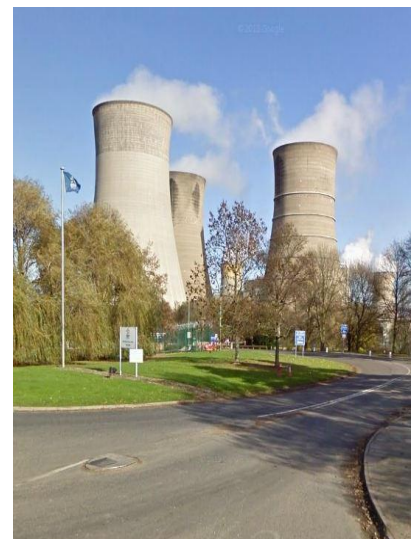
Identification of potential sites

July 2014

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UNITED
KINGDOM &
IRELAND



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2	28 July 2014	Minor corrections to ranking summary on Page 11			Martin Land Business Lines Director, Power

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Appendix A – Initial site ID list

Appendix B – Indicative Site Ranking Criteria

Appendix C – ‘Long list’

United Kingdom

1 INTRODUCTION

URS was appointed by the Energy Technologies Institute (ETI) in June 2014 (Consultancy Agreement ref. NHE/CS/URS) to undertake a desk-top selection and review study, to identify potential sites available for the development of a new low carbon thermal power plant that can benefit from the marginal cost of connection to a carbon sink. This scope of works constitutes work package WP1.1 of ETI's 'Incentivisation of Thermal Power with CCS' programme.

This report presents the conclusions at Stage A of this study, in which URS has identified a list of possible locations for new power stations, and applied qualitative criteria to highlight the highest ranking sites for further discussion and review with ETI.

Potential sites have been considered with respect to:

- Size and suitability for construction and operation of a gas and/or coal and/or biomass plant at 1,000MWe scale.
- Ease of access to fuel supplies (gas and/or coal and/or biomass) and cooling water
- Ease of access to grid connection
- Ease of access to the CO₂ pipeline
- Current status of consenting and likelihood/complexity of additional consents
- Current ownership/control and forward plans, where available

This Stage A report is presented as a basis for discussion of potential sites with ETI. It identifies the 'long list' of the variety of locations considered as possible sites for development of a thermal power with CCS generating plant, and ranks these against a number of agreed criteria to identify a potential list of 16 sites.

It is intended that this ranking and list of potential sites will be reviewed with ETI, with a view to deriving a 'short list' of three sites for further, more detailed, assessment.

However, it is noted that, due to uncertainties in the desk-top information, particularly with respect to site owner/operator and their ability or appetite for supporting a development of this type, a 'reserve' list of additional sites may be advisable to allow initial stakeholder discussions or 'market testing' to be instigated with a broader number of entities.

The results of Stage A of the study are presented in the following sections of this report, as follows:

- A description of the basis of identification of possible sites, and the selection criteria that have been used to derive the potential list of 16 sites
- A brief commentary on each of the 16 sites, outlining the basis of the ranking scores for these sites and an overall site summary
- Conclusions and recommendations for the next stages of the study and wider CCS incentivisation programme

2 SELECTION METHODOLOGY

2.1 Background

The methodology for identifying the possible list of 16 sites for further consideration has covered the following stages:

1. Identification of 'long list' of sites
2. Ranking of sites against agreed scoring criteria
3. Identification of possible sites

Each of these stages is described in more detail in the sections below.

2.2 Site Identification

The initial list of possible sites has identified significant existing or proposed brownfield power generation and industrial sites within an approximately 100 mile radius of Drax/Barmston. These are sites known to URS from our work with other clients, or sites identified through a high level mapping review, and in discussion with ETI. URS has not undertaken a detailed investigation of all possible greenfield sites within the study area, but has identified major sites with known significant power generation or industrial uses within the study area.

In some cases, areas have been identified where there are a cluster of potential sites, which may be under separate ownership but which are all of similar potential and rank similarly. In such cases, a 'typical' site has been identified and ranked, which should be considered as representative of a number of sites in that vicinity.

The initial site identification list and location map are provided in Appendix A.

2.3 Ranking

The ranking of potential sites has been based on criteria and scoring agreed with ETI during Stage A of the study. The ranking has been primarily based on spatial, development and interface criteria, as listed in section 1 above. The specific criteria that have been scored are listed below:

1. Site Area
2. Water Supply
3. Grid Connection
4. Fuel supply (solid fuel)
5. Constructability
6. Consenting Status
7. Environmental Constraints
8. CO₂ Export
9. Gas Supply

The scoring against each criterion uses a 'red/amber/green' traffic light scoring system, as below:

3	Requirements met
2	Highly likely / relatively easy (cheap) to meet requirements
1	Requirements partly met / may be possible (expensive) to meet requirements
0	Requirements not met / unable to be met

Where sites have been identified with a '0' against fundamental development criteria, such as site area, these sites have not been considered further.

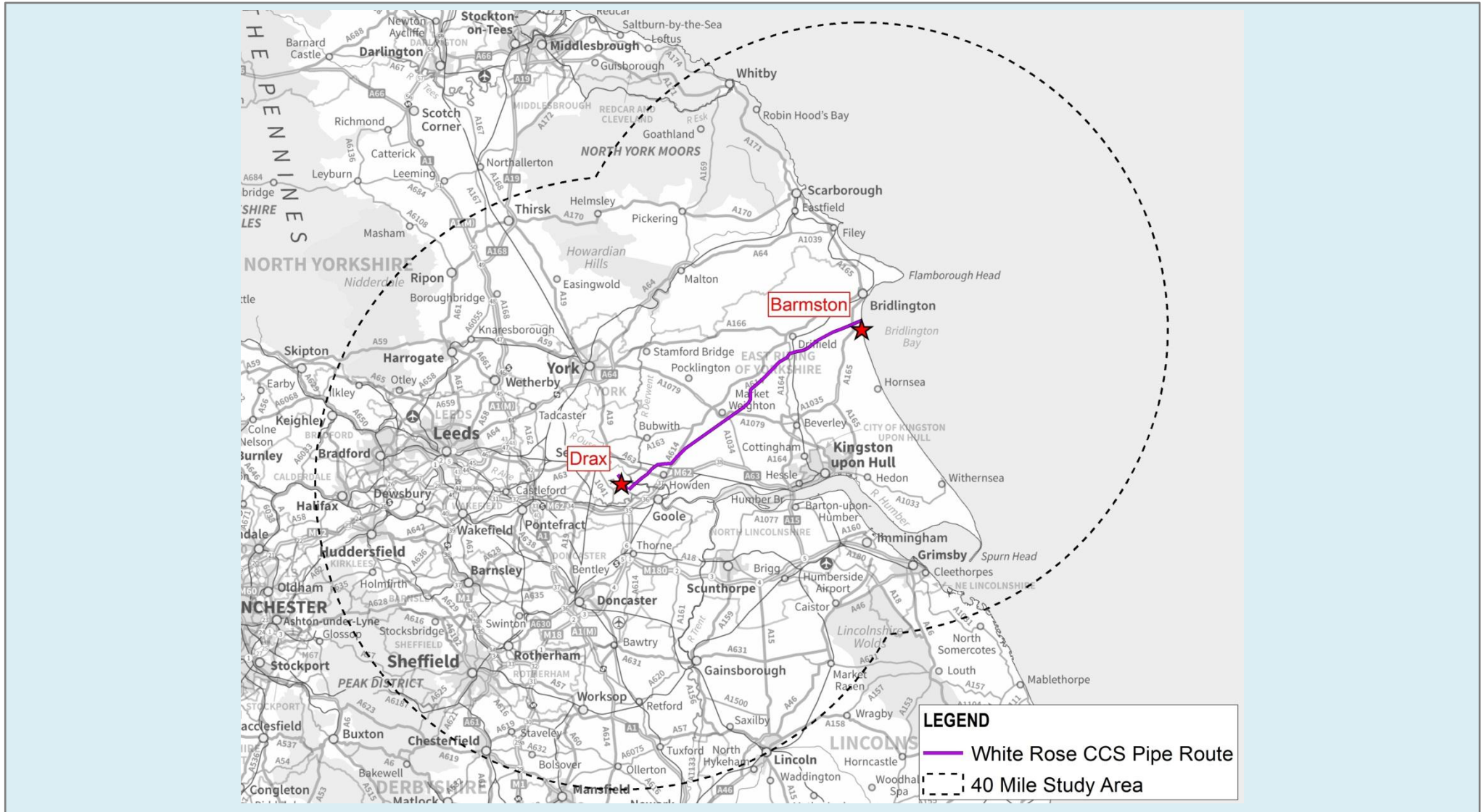
Details of the specific criteria, and the approach to scoring the sites against them, are provided in Appendix B.

Due to the significant differences in some of the requirements for potential coal (solid fuel) and gas sites, care has been taken not to exclude potential sites just on the basis of fuel specific criteria. The selection of the list of 16 potential sites therefore includes sites where rail or port facilities may not be possible, or gas supply may not be available, but that otherwise have high potential. This will allow consideration to be given, in the Stage A review workshop, as to how to proceed with sites that may favour or preclude a single fuel type.

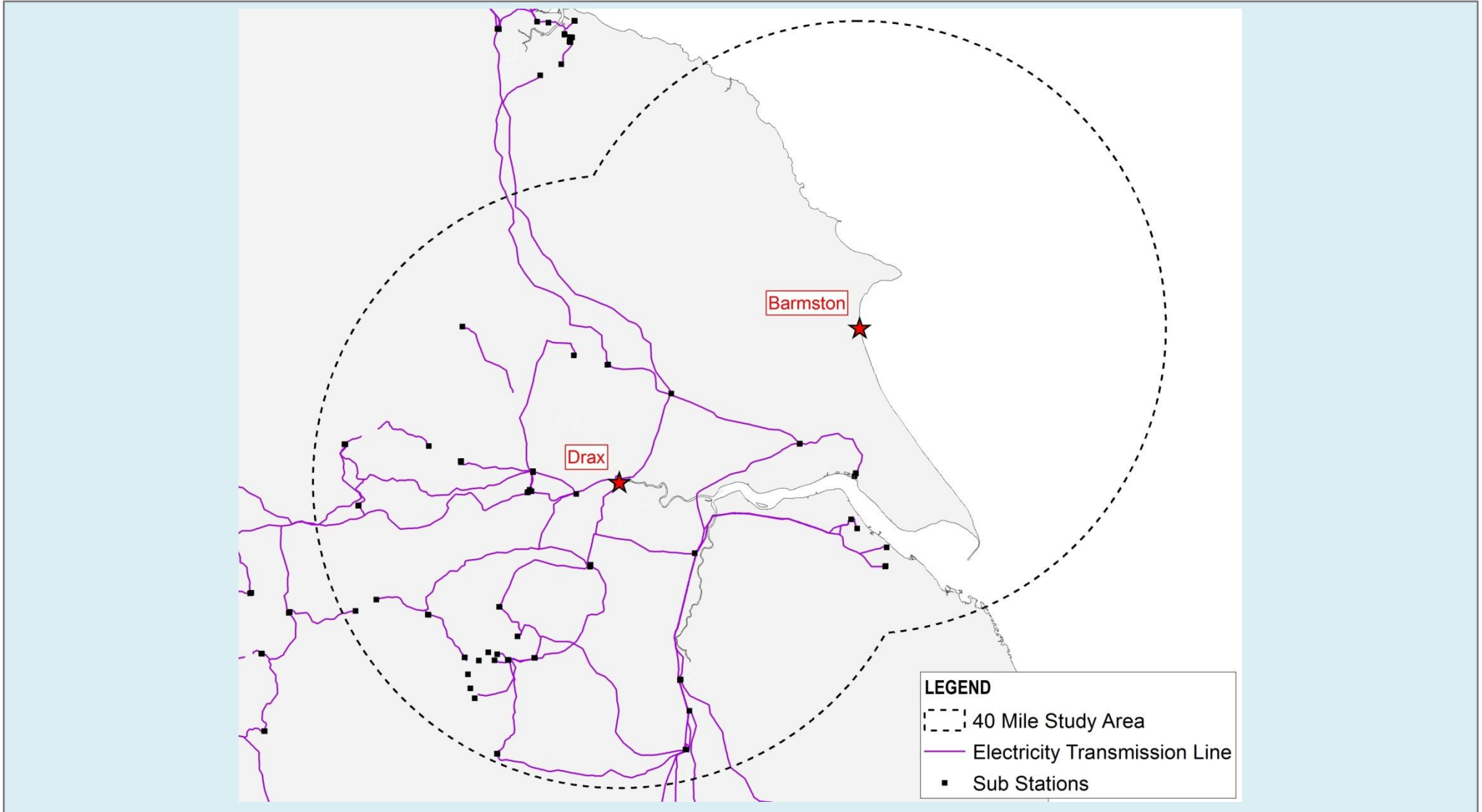
Ownership, or incumbent operator, will be noted and, as we progress through to Stage B, it may prove necessary to review the appropriate criteria and pathway, to consider strategic and viable commercial project support, and therefore to inform whether there is consistency between technically high ranking sites and how those specific preferred sites would be made available to Project Development stage.

To support and validate the site ranking process, a 'hot-spotting' approach has been used to geographically represent the ranking criteria. A series of criteria maps have therefore been produced. By overlaying these maps potential development 'hot spots' have been identified where a number of the interface requirements meet. This 'hot-spotting' approach is illustrated in the following figures.

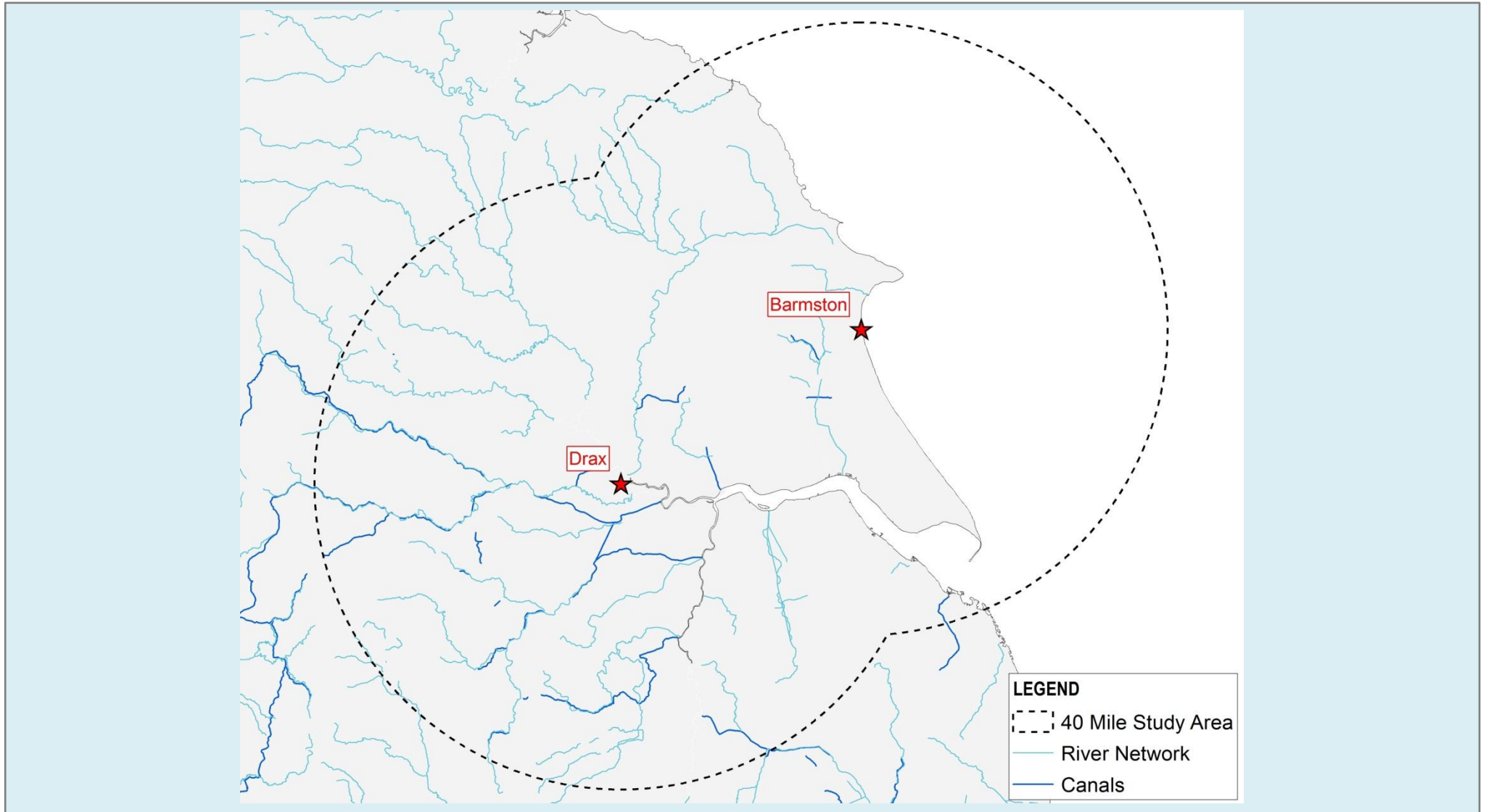
CO₂ Export



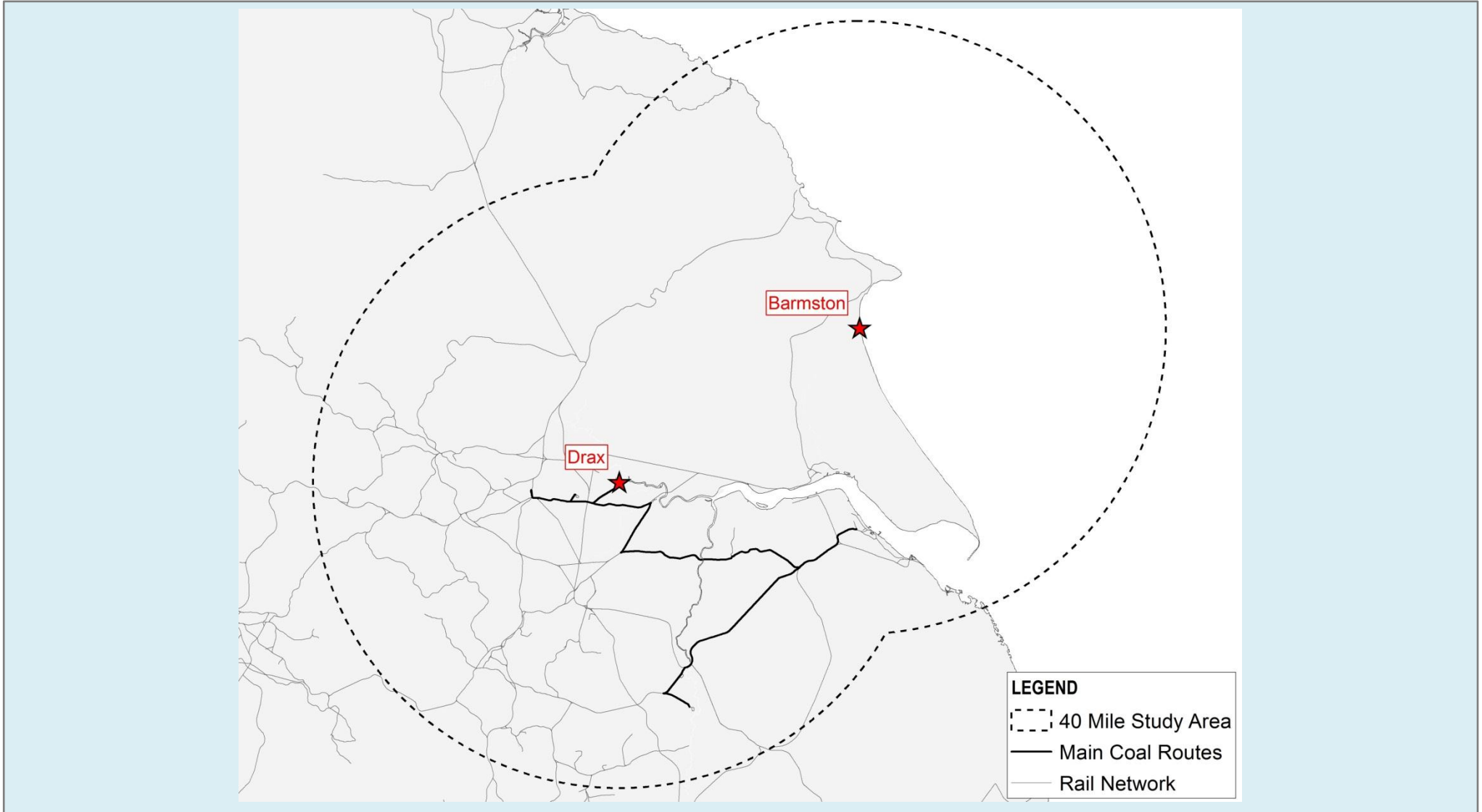
Grid Connection



Water Supply



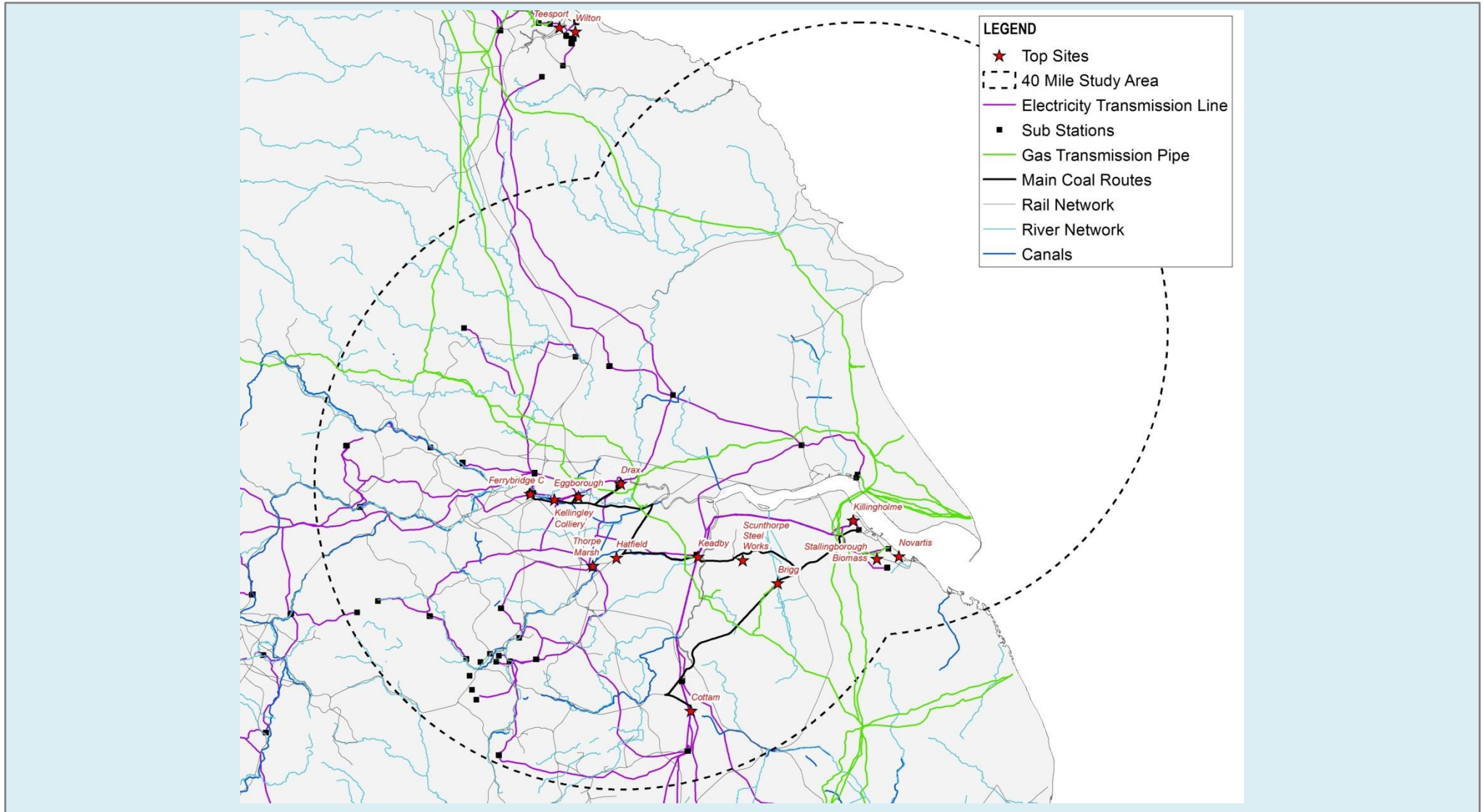
Solid Fuel



Gas Supply



Top Sites

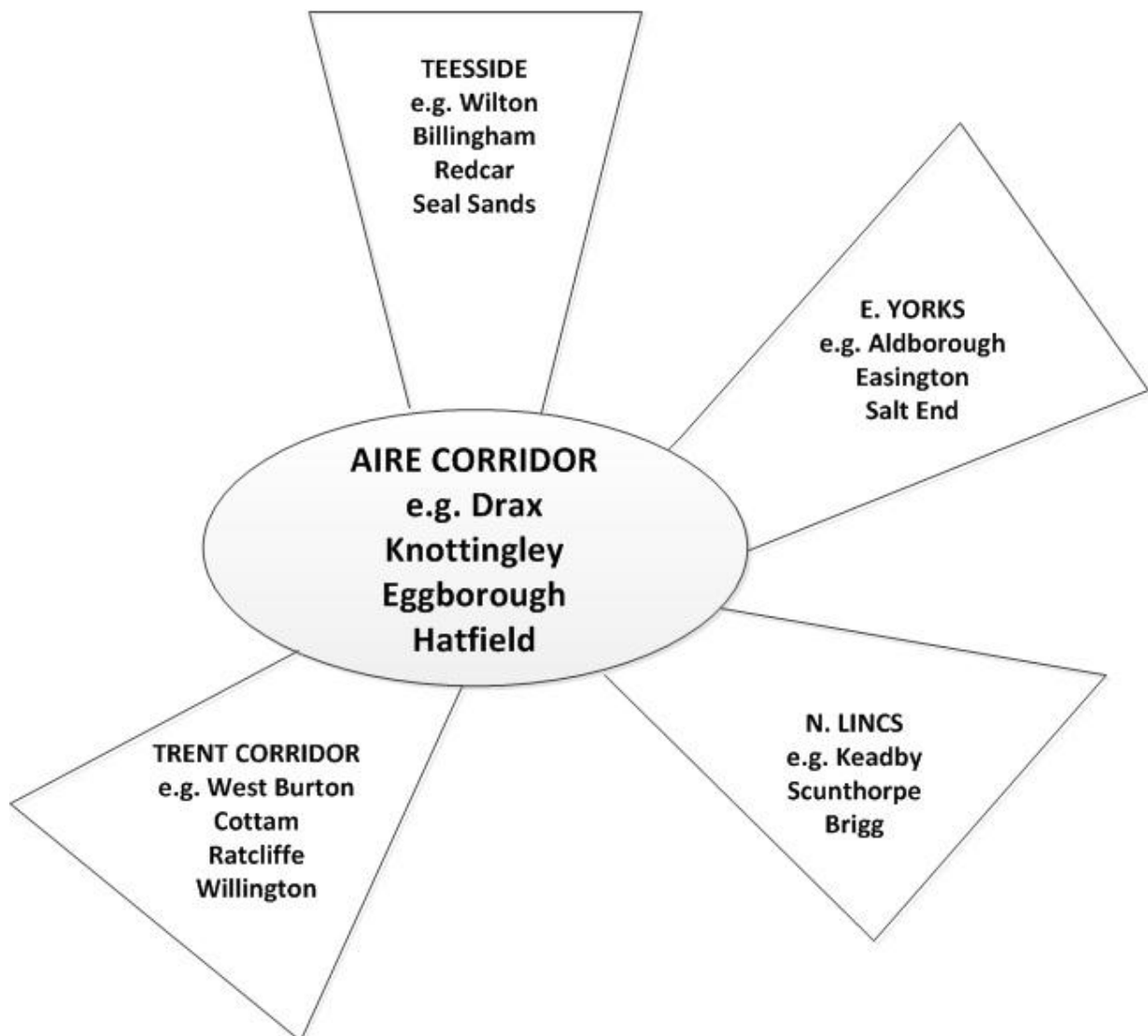


2.4 Primary and Secondary Geographical Grouping

In ranking the identified sites, it has become apparent that there is a primary group of sites in close proximity to the sink connection at Drax, and then a range of sites, still with significant potential, within a broader series of geographical sectors that form secondary groups of sites that have broadly similar characteristics.

The primary group (close proximity) is dominated by existing or planned power station sites, whilst the secondary groups (potential sites) have both power and large industrial sites. We are aware that the secondary groups may include regional or enterprise specific motivation to be involved in a future Project, and therefore are mindful not to exclude them at this stage. Therefore, a 'lead' site in each secondary grouping has been identified in this report, for further consideration in the Stage A workshop.

The example of primary and secondary geographical grouping is illustrated in the figure below:



3 SITE RANKING

3.1 Summary

The full site identification list, with all sites ranked against the agreed criteria, is provided in Appendix C. This ranking has led to a possible list of 16 high potential sites for development of a coal and / or gas thermal power station with CCS. These sites are:

Rank	Location	Fuel	Score	Page
1=	Drax	Coal / Gas	24	13
1=	West Burton	Coal / Gas	24	17
1=	Eggborough	Coal / Gas	24	21
4	Teesside (sample)	Gas / (Coal)	23	25
5=	Thorpe Marsh	Gas	22	29
5=	Keadby	Gas / (Coal)	22	33
5=	Cottam	Gas / Coal	22	37
5=	Ferrybridge	Coal / (Gas)	22	41
9=	Scunthorpe	Coal / Gas	21	45
9=	Hatfield	Coal / Gas	21	49
9=	Brigg	Gas	21	53
9=	Stallingborough	Gas / Coal	21	57
9=	Kellingley	Coal / Gas	21	61
14	Killingholme (sample)	Gas	20	65
15=	Novartis (Grimsby)	Gas	19	69
15=	Immingham	Coal / Gas	19	73

3.2 Top 16 Site review

A review of each of these 16 sites, providing some background to each site and a summary of the site scoring, is provided overleaf.

Drax

Drax, Yorkshire (Grid Reference 466593, 427015)

Category	0-3	Commentary
Site Area	2	Ample site area available within existing Drax Power ownership. Biomass conversion and new storage areas may be a constraint. CCS Development plan integration review necessary.
Water Supply	3	Existing cooling water intake from the River Ouse. Potential to increase current abstraction for new CCCW cooling towers likely, although not confirmed.
Grid Connection	3	400 kV / 275 kV major sub-station on site. Spare export capacity not confirmed.
Solid Fuel	3	Major Heavy Haul rail line and stocking area on site.
Constructability	2	Large amount of additional space within Drax ownership for lay down. Good road access for heavy loads. Phasing with construction of White Rose would need to be considered.
Consenting	3	Strong potential to consent.
Environmental Constraints	3	No significant environmental constraints anticipated. Cumulative effects with existing plant and White Rose project require consideration.
CO ₂ Export	3	Adjacent to White Rose Project CO ₂ pipeline entry.
Gas Supply	2	NTS within 3km of Drax site.
Other	-	
TOTAL (Desktop Study)	24	

Summary Commentary

Potential to expand site on at least two sides to north and west and to take advantage of close coupling to White Rose Project and CCS compression station. (STC). Good road access. Potential for gas fired solution to be examined further.

Single Site Operator – may need to consider new entrant with development appetite on adjacent site location.

Drax - Aerial view (without Biomass)



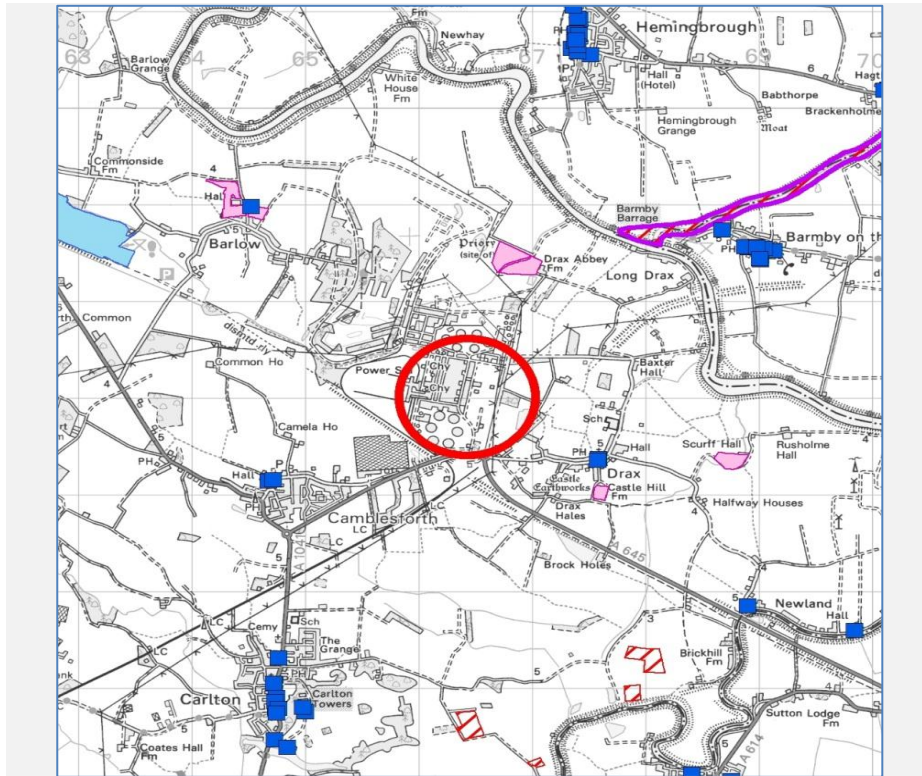
Drax - Site (showing new biomass storage area)



Drax - Environmental Constraints

Legend

- Special Area of Conservation
- RAMSAR
- Listed Building
- Sites of Special Scientific Interest
- National Nature Reserve
- Registered Park and Garden
- Special Protection Area
- Local Nature Reserve
- Scheduled Monument
- Battlefield



Drax - Immediate Vicinity

View of Drax from South West (from Eggborough)



West Burton

West Burton, Nottinghamshire (Grid Reference 478655, 385998)

Category	0-3	Commentary
Site Area	2	Significant area available at the site (>100 hectares) and surroundings.
Water Supply	3	Direct access to river cooling from River Trent.
Grid Connection	3	Direct connection to 400kV sub station.
Solid Fuel	3	Existing solid fuel offloading and storage area available.
Constructability	3	Good transport links and significant open land available.
Consenting	3	Already consented for coal fired power generation.
Environmental Constraints	3	Limited but already known and already impacted by coal-fired generation.
CO ₂ Export	2	Approx. 35km to Drax across largely open agricultural fields but some road crossings.
Gas Supply	2	Has a gas connection being utilised by new CCGT. Capacity uncertain.
Other	-	
TOTAL (Desktop Study)	24	

Summary Commentary

A significant site with excellent potential for both coal and CCGT development.

Would require demolition of many existing structures but could also utilise existing connections (road, rail, water, grid).

West Burton - Aerial View



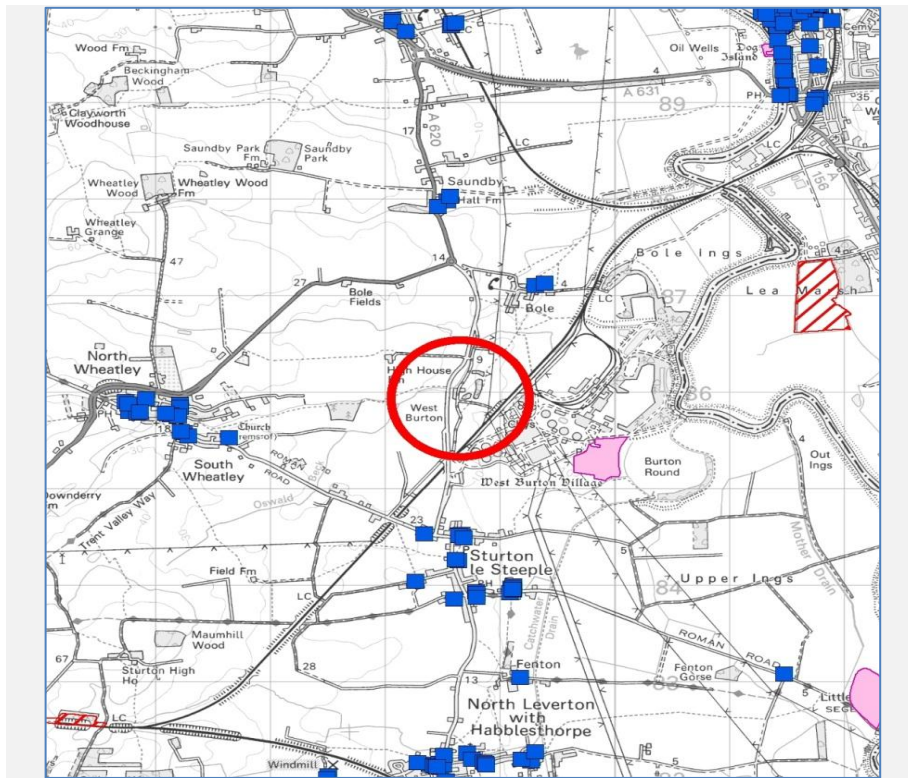
West Burton - Site



West Burton - Environmental Constraints

Legend

	Special Area of Conservation		RAMSAR		Listed Building
	Sites of Special Scientific Interest		National Nature Reserve		Registered Park and Garden
	Special Protection Area		Local Nature Reserve		Scheduled Monument
					Battlefield



West Burton - Immediate Vicinity

View looking north west from Common Lane (West Burton in the background).



Eggborough

Eggborough, Yorkshire (Grid Reference 457721, 424270)

Category	0-3	Commentary
Site Area	2	Significant area available at the site (100 hectares) and surroundings.
Water Supply	3	Direct access to river cooling from River Aire via Ings Drain.
Grid Connection	3	Direct connection to 400kV substation.
Solid Fuel	3	Existing solid fuel offloading and storage area available.
Constructability	3	Good transport links and significant open land available. Existing stores storage area other side of A19.
Consenting	3	Already consented for coal fired power generation.
Environmental Constraints	3	Limited but already known and already impacted by coal-fired generation.
CO ₂ Export	2	Only c. 8km to Drax across open agricultural fields.
Gas Supply	2	Not directly connected but NTS in close proximity.
Other	-	
TOTAL (Desktop Study)	24	

Summary Commentary

A significant site with excellent potential for both coal and CCGT development. Would require demolition of many existing structures but could also utilise existing connections (road, rail, water, grid).

Current site known to require significant investment to continue and it is understood the current owners are evaluating options for the future.

Eggborough - Aerial view (without Biomass)



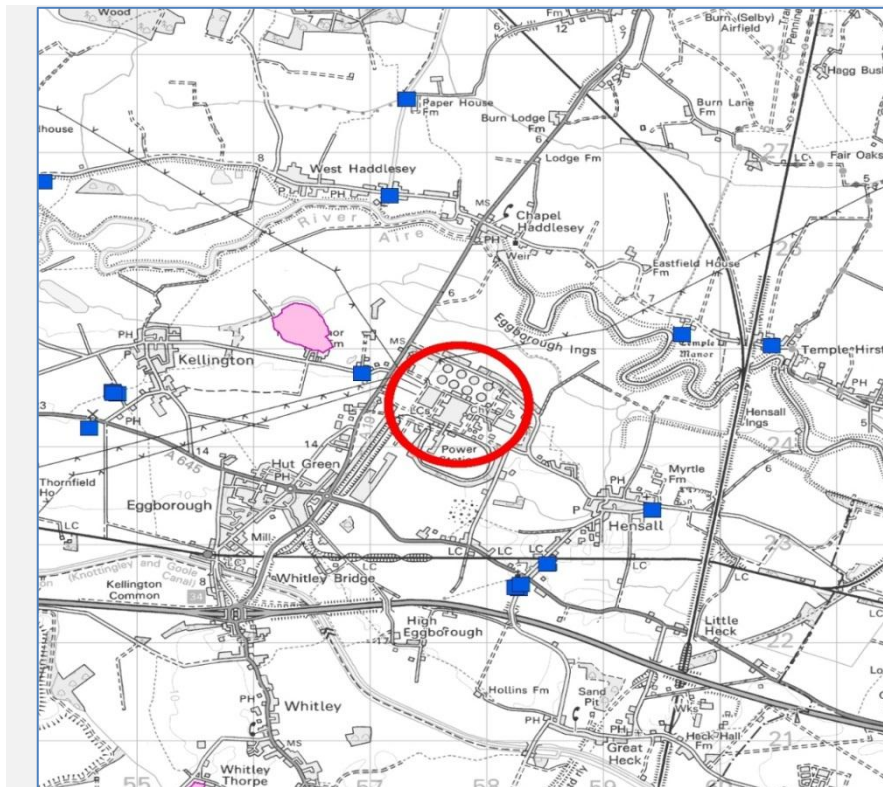
Eggborough - Single Site Operator



Eggborough - Environmental Constraints

Legend

- Special Area of Conservation
- RAMSAR
- Listed Building
- Sites of Special Scientific Interest
- National Nature Reserve
- Registered Park and Garden
- Special Protection Area
- Local Nature Reserve
- Scheduled Monument
- Battlefield



Eggborough - Immediate Vicinity

View of Land to North of Eggborough Site (Drax in background)



STAGE A FINAL – IDENTIFICATION OF POTENTIAL SITES

July 2014

Teesside

Teesside, Redcar and Cleveland (Grid Reference 456945, 520546)

Category	0-3	Commentary
Site Area	2	Significant area available at the Wilton site and adjacent Teesside CCGT (>250 hectares) with both an existing (mothballed) coal fired power station, a closed CCGT and significant vacant industrial land available.
Water Supply	3	Direct access to river cooling from River Tees with existing infrastructure in place.
Grid Connection	3	Direct connection to 400kV substation.
Solid Fuel	3	Existing coal offloading facilities available.
Constructability	3	Good transport links and open land available.
Consenting	2	Already consented for coal and gas fired generation, with sufficient land for CCS.
Environmental Constraints	3	Well understood. Limited constraints given the significant existing industrial heritage of the site.
CO ₂ Export	1	Approx. 85km to Barmston with National Park in between but offshore route could be considered.
Gas Supply	3	Gas connection on site.
Other	-	
TOTAL (Desktop Study)	23	

Summary Commentary

A significant industrial site with many areas of available land and an existing coal fired power station that is likely to close. Site with excellent potential for coal-fired plant or CCGT with CCS development. Could utilise existing connections (road, rail, water, grid). Distance to CCS pipeline could be prohibitive although site has previously been considered by developers for CCS potential.

Teesside – Aerial View



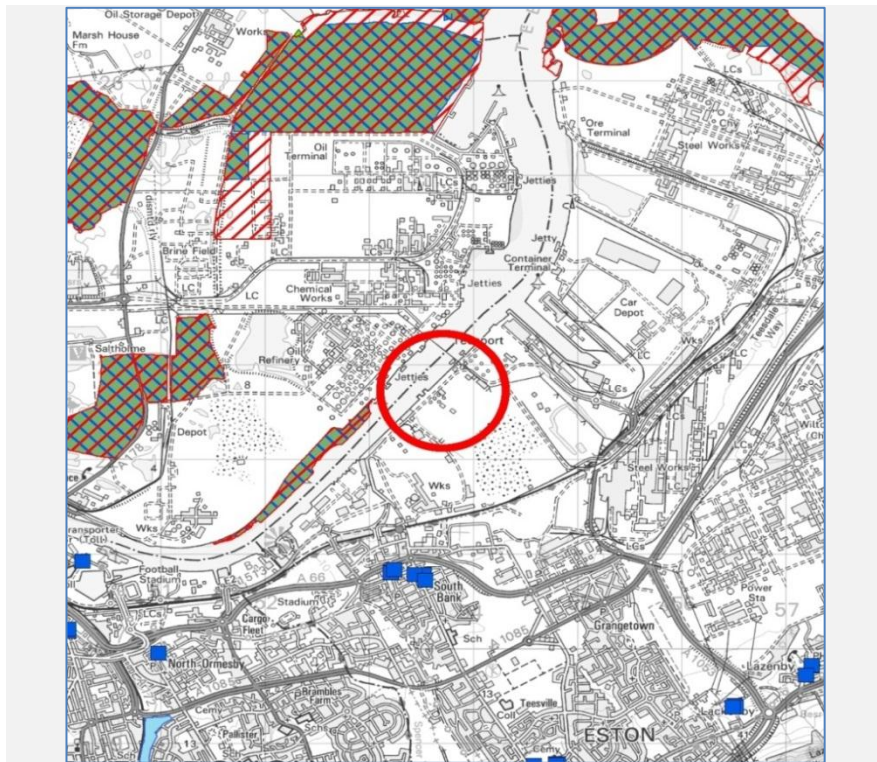
Teesside – Site



Teesside – Environmental Constraints

Legend

	Special Area of Conservation		RAMSAR		Listed Building
	Sites of Special Scientific Interest		National Nature Reserve		Registered Park and Garden
	Special Protection Area		Local Nature Reserve		Scheduled Monument
					Battlefield



Teesside - Immediate Vicinity

View looking east from Huntsman Drive



STAGE A FINAL – IDENTIFICATION OF POTENTIAL SITES

July 2014

Thorpe Marsh

Thorpe Marsh, Yorkshire (Grid Reference 460673, 409686)

Category	0-3	Commentary
Site Area	2	Large area available on/near old coal site. CCGT development ongoing.
Water Supply	3	The project is close to the River Don and Stainforth and Keadby Canal. Abstraction capacity for CCCW towers likely but not confirmed.
Grid Connection	3	400kV/275kV major substation on site, although capacity to accommodate new generating units not confirmed.
Solid Fuel	2	Adjacent to heavy haul rail line (incl. new Doncaster flyover) but former rail sidings and off-load facilities now disused.
Constructability	2	Good Space for lay down and reasonable road access for heavy loads, but abnormal load routing may not be straightforward.
Consenting	3	Existing Section 36 for CCGT development. Extension of consent to cover carbon capture and gas pipeline/rail offload would be required (gas pipeline DCO ongoing with PINS).
Environmental Constraints	3	No significant environmental constraints anticipated.
CO ₂ Export	2	c. 8km to formerly proposed 2CO Don Valley CO ₂ pipeline. Total distance to Drax c. 25km.
Gas Supply	2	c. 20km to nearest point of NTS.
Other	-	
TOTAL (Desktop Study)	22	

Summary Commentary

A significant site but with existing potential CCGT development.

Thorpe Marsh is to the southwest of Drax (25 km). Land availability within the site will need careful review. Existing site demolition complete.

Accommodation or extension of ongoing CCGT development by Acorn needs consideration.

Thorpe Marsh - Aerial view (showing cooling towers now demolished)

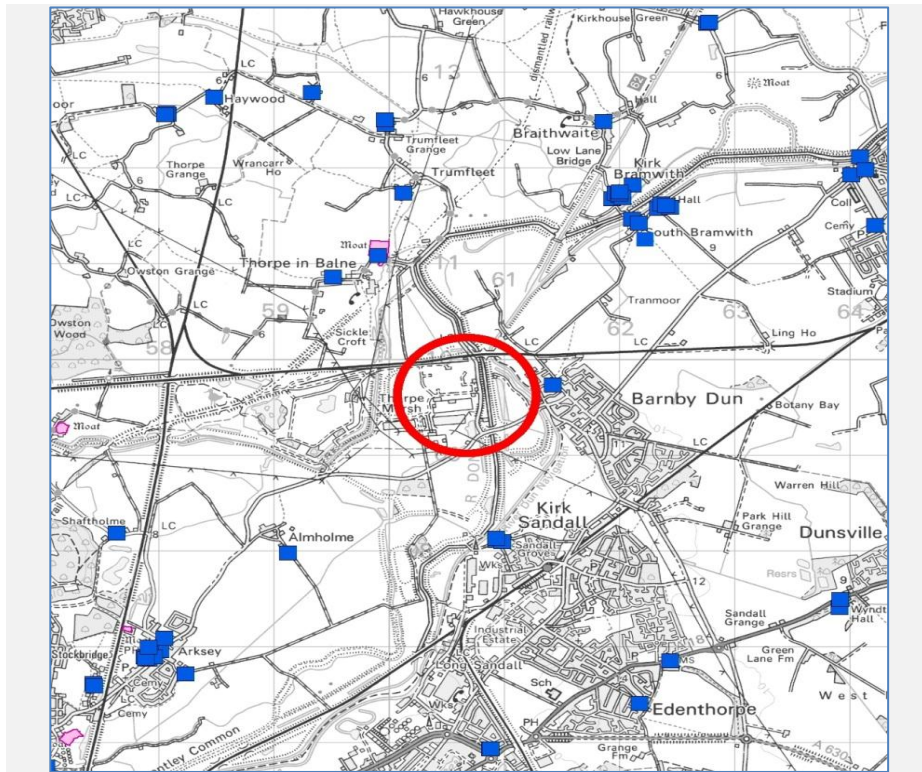
Thorpe Marsh - Site



Thorpe Marsh - Environmental Constraints

Legend

 Special Area of Conservation	 RAMSAR	 Listed Building
 Sites of Special Scientific Interest	 National Nature Reserve	 Registered Park and Garden
 Special Protection Area	 Local Nature Reserve	 Scheduled Monument
		 Battlefield



Thorpe Marsh - Immediate Vicinity

View looking east from Fordstead Lane (Thorpe Marsh in the background).



Keadby

Keadby, Lincolnshire (Grid Reference 482791, 411600)

Category	0-3	Commentary
Site Area	2	Significant area available at the site (>60 hectares) with both an existing (mothballed) CCGT and consent and land for a new second CCGT available.
Water Supply	3	Direct access to river cooling from River Trent and the adjacent Navigation.
Grid Connection	3	Direct connection to 400kV substation.
Solid Fuel	2	No existing infrastructure but jetty available on the riverside.
Constructability	2	Good transport links and open land available.
Consenting	3	Already consented for two CCGTs, with sufficient land to demonstrate CCR.
Environmental Constraints	2	Well understood. School on immediate approach to current power station although a second access across the Navigation would be possible.
CO ₂ Export	2	Approx. 22km to Drax across largely open agricultural fields but M62 would need to be crossed.
Gas Supply	3	Gas connection on site.
Other	-	
TOTAL (Desktop Study)	22	

Summary Commentary

A site with excellent potential for CCGT with CCS development.

Could demolish existing asset to free up additional space if required and could utilise existing connections (road, rail, water, grid). A bridge would be required over the Navigation. Crossing the M62 with the CO₂ pipeline represents the most significant identified potential constraint to date.

Keadby - Aerial View



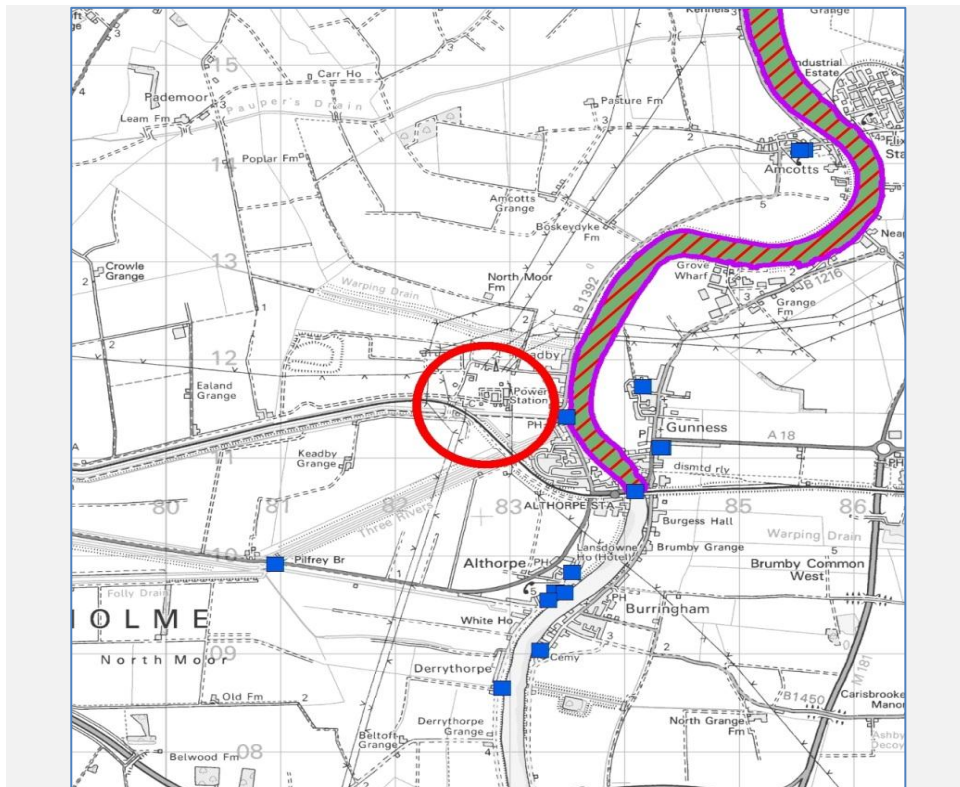
Keadby - Site



Keadby - Environmental Constraints

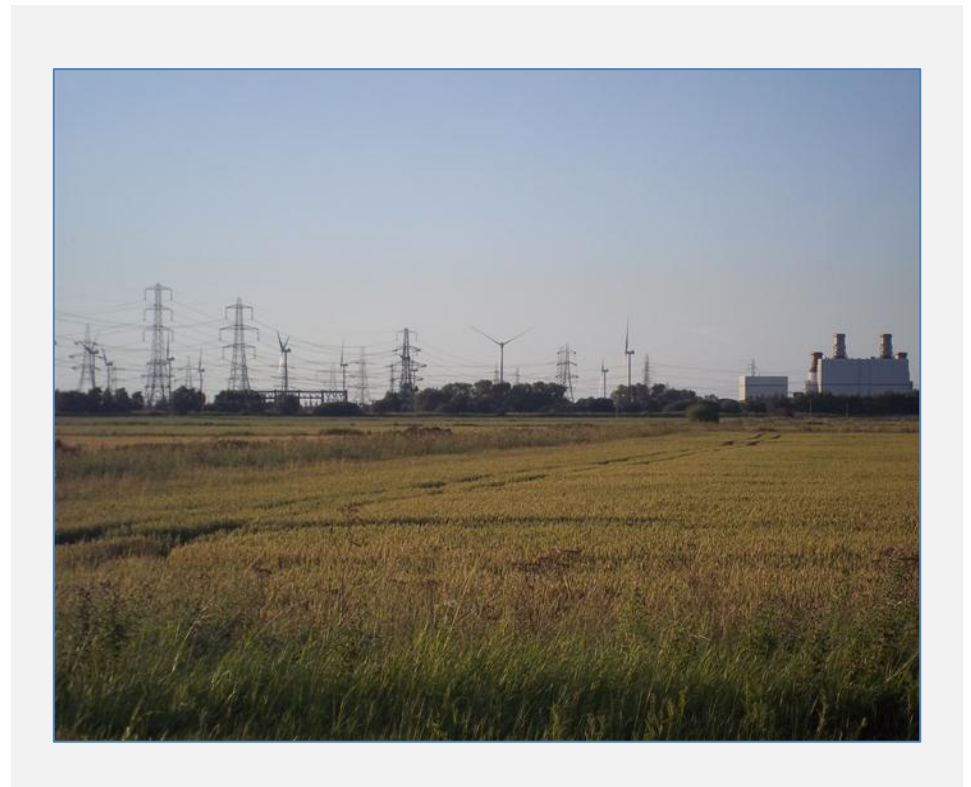
Legend

- Special Area of Conservation
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- Listed Building
- Sites of Special Scientific Interest
- National Nature Reserve
- Registered Park and Garden
- Special Protection Area
- Local Nature Reserve
- Scheduled Monument
- Battlefield



Keadby - Immediate Vicinity

Land to South (Wind Turbines to Left, CCGT to right)



STAGE A FINAL – IDENTIFICATION OF POTENTIAL SITES

July 2014

Cottam

Cottam, Nottinghamshire (Grid Reference 481303, 379243)

Category	0-3	Commentary
Site Area	2	Ample site area adjacent to existing plant.
Water Supply	3	Adjacent to River Trent. Capacity for additional abstraction for CCCW towers likely but untested.
Grid Connection	3	Existing 400kV substation on site. Presence of additional connection bays not confirmed.
Solid Fuel	3	Existing rail import facility on site.
Constructability	2	Significant adjacent land available for construction, but not confirmed to be within existing site ownership. Potential for waterway delivery of heavy equipment.
Consenting	3	No existing consents, but no significant obstacles envisaged given adjacent land use.
Environmental Constraints	3	No significant environmental constraints anticipated.
CO ₂ Export	1	50km to Drax. Pipeline route crosses Don and Aire.
Gas Supply	2	20km to Blyborough NTS off-take (capacity of existing pipeline for additional 1,00MW capacity plant not confirmed).
Other	-	
TOTAL (Desktop Study)	22	

Summary Commentary

One of the highest potential sites within the Trent Valley area. Cottam has Coal Units (EDF) and a CCGT unit (EON) on the site. Additional space on the opposite bank of the Trent has the potential for development too.

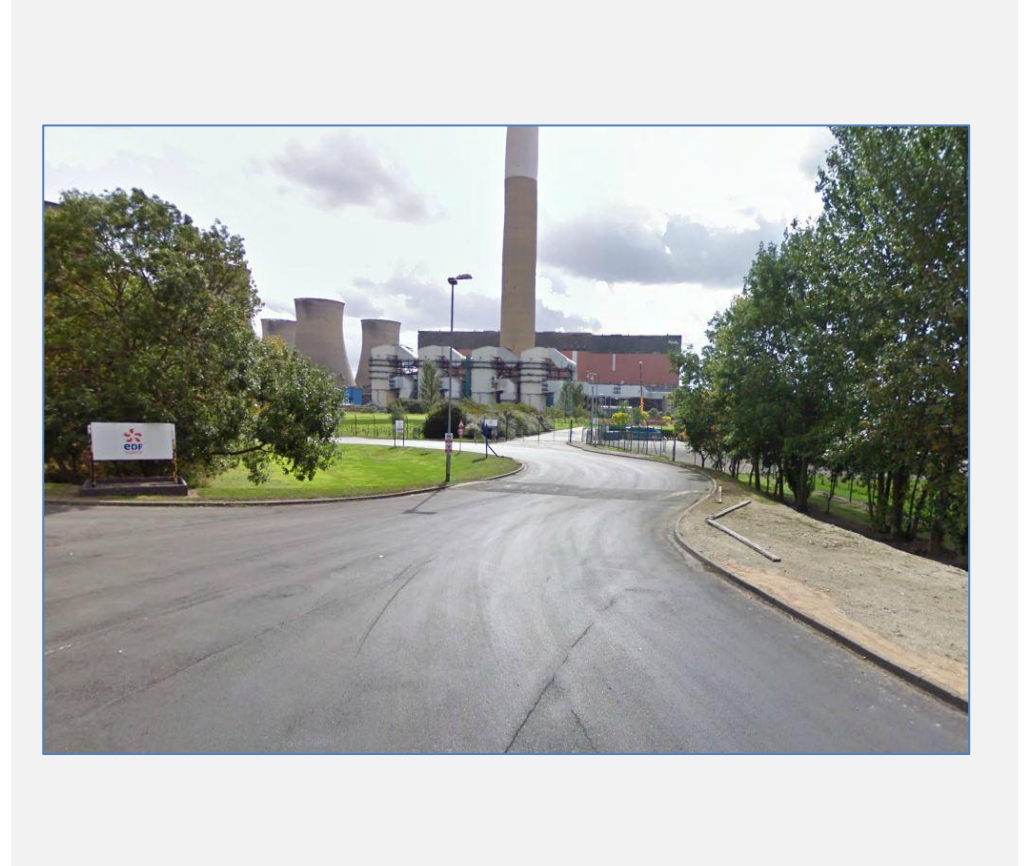
High Marnham and West Burton are also worthy of consideration based on local consenting constraints and owners' development appetite.

Length of CO₂ connection to Drax is the only significant issue, although this could present a potential catalyst for a 'Trent Valley Cluster' spur.

Cottam - Aerial View



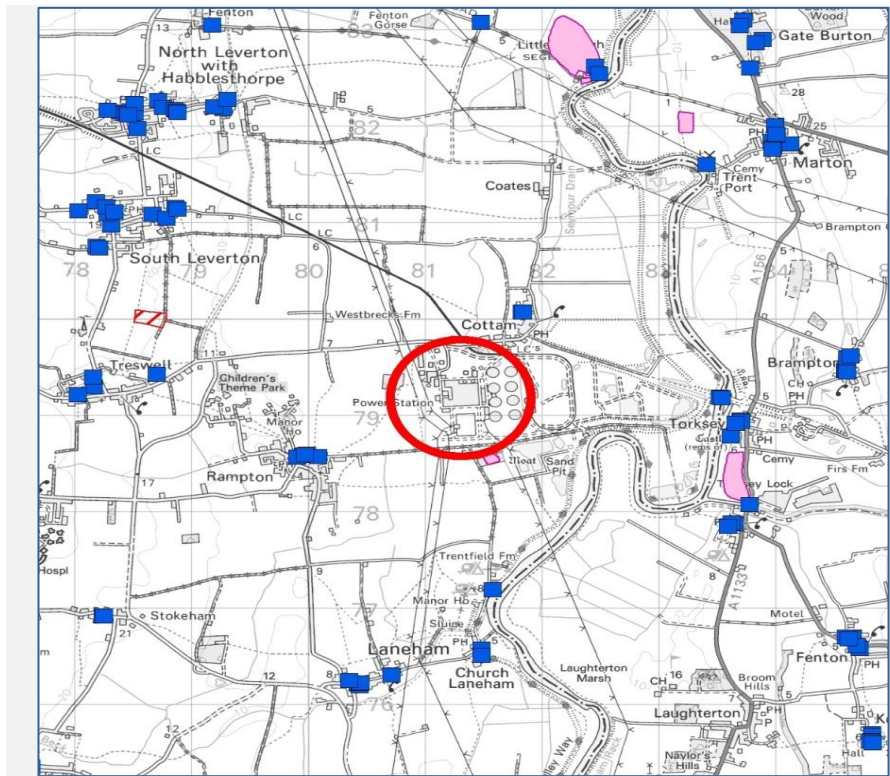
Cottam - Site



Cottam - Environmental Constraints

Legend

- Special Area of Conservation
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- Listed Building
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- National Nature Reserve
- Registered Park and Garden
- Special Protection Area
- Local Nature Reserve
- Scheduled Monument
- Battlefield



Cottam - Immediate Vicinity

View looking north from Trentfield Farm campsite (Cottam in the background).



Ferrybridge

Ferrybridge, Yorkshire (Grid Reference 447576, 424806)

Category	0-3	Commentary
Site Area	1	Significant area available at the site (>100 hectares) but recent FM1 and proposed FM2 developments do constrain this.
Water Supply	3	Direct access to river cooling from the River Aire.
Grid Connection	3	Direct connection to 400kV substation.
Solid Fuel	3	Existing solid fuel offloading and storage area available.
Constructability	3	Good transport links and open land available.
Consenting	3	Already consented for coal fired power generation.
Environmental Constraints	2	Well understood. No European sites in vicinity. Some housing in close proximity but existing community liaison committee engaged with them.
CO ₂ Export	2	Approx. 25km to Drax across largely open agricultural fields but some road crossings.
Gas Supply	2	Nearest NTS gas connection approx. 8km from site.
Other	-	
TOTAL (Desktop Study)	22	

Summary Commentary

A significant site with excellent potential for both coal and CCGT development. Would require demolition of many existing structures but could also utilise existing connections (road, rail, water, grid). Two of the four coal-fired units have closed and it is understood the current owners are evaluating options for the future. Site already has a CCS pilot plant installed and operational so its permitting and the wider environmental constraints are well known and understood.

Ferrybridge – Aerial View

Ferrybridge – Site

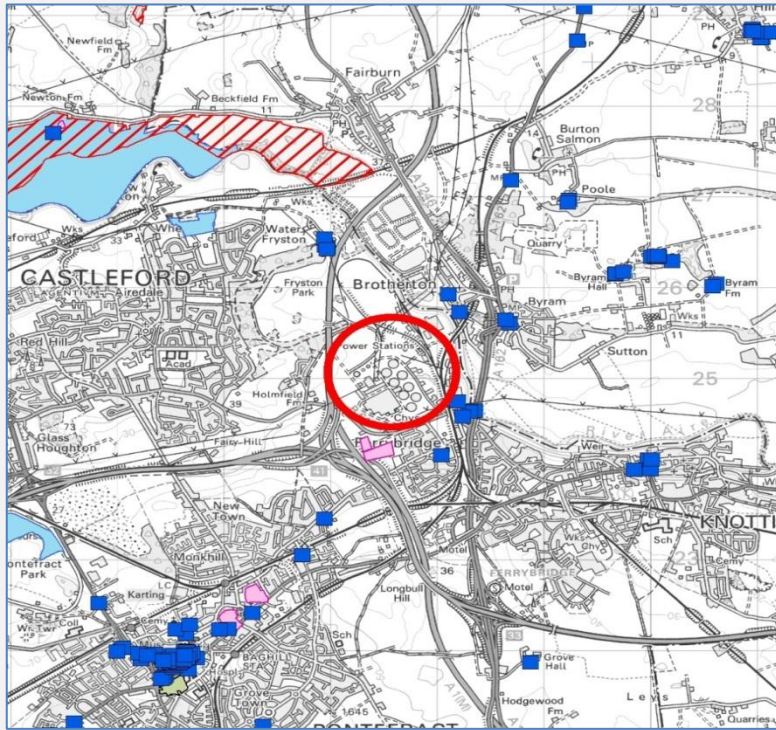
View of the site from overbridge on A1M (North West)



Ferrybridge – Environmental Constraints

Legend

	Special Area of Conservation		RAMSAR		Listed Building
	Sites of Special Scientific Interest		National Nature Reserve		Registered Park and Garden
	Special Protection Area		Local Nature Reserve		Scheduled Monument
					Battlefield



Ferrybridge – Immediate Vicinity

View of Ferrybridge from South (A1M)



STAGE A FINAL – IDENTIFICATION OF POTENTIAL SITES

July 2014

Scunthorpe Steel Works

Scunthorpe Steel Works, Lincolnshire (Grid Reference 492167, 410880)

Category	0-3	Commentary
Site Area	2	Significant area available at the site (>250 hectares) with potential benefit of on-site user for any power generation.
Water Supply	2	Indirect access to River Trent possible. Groundwater abstractions already employed on site.
Grid Connection	2	Proximity to 400kV substation.
Solid Fuel	3	Existing coal offloading facilities available.
Constructability	3	Good transport links and open land available.
Consenting	2	Already consented for industrial use.
Environmental Constraints	3	Well understood. Limited constraints given the significant existing industrial heritage of the site.
CO ₂ Export	2	Approx. 40km to Drax with National Park, motorways and the River Trent in between.
Gas Supply	2	Gas connection on site.
Other	-	
TOTAL (Desktop Study)	21	

Summary Commentary

This large site offers good potential for power development with CCS although water availability may be a constraint. CO₂ routing could be challenging.

Scunthorpe Steel Works – Aerial View



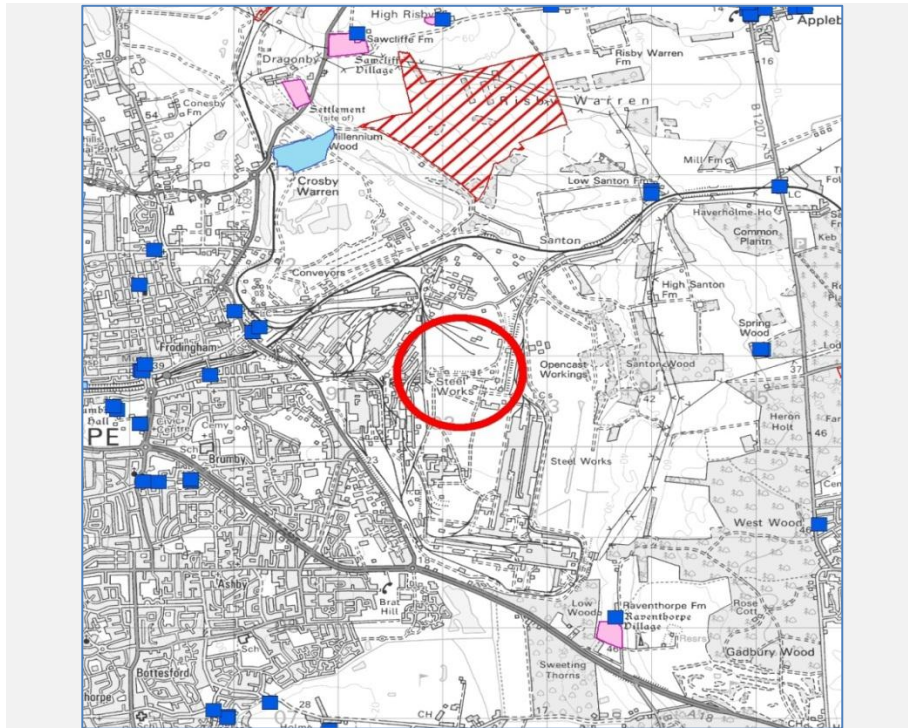
Scunthorpe Steel Works - Site



Scunthorpe - Environmental Constraints

Legend

- Special Area of Conservation
- Sites of Special Scientific Interest
- Special Protection Area
- RAMSAR
- National Nature Reserve
- Local Nature Reserve
- Listed Building
- Registered Park and Garden
- Scheduled Monument
- Battlefield



Scunthorpe Steel Works - Immediate Vicinity

View looking NORTH east from A18 (Steel works in the background).



Hatfield

Hatfield, Yorkshire (Grid Reference 465662, 411381)

Category	0-3	Commentary
Site Area	2	Adequate site area for IGCC proved by aborted FEED work undertaken by 2CO.
Water Supply	2	1km to Stainforth and Keadby canal. Existing abstraction agreement, but infrastructure not in place.
Grid Connection	2	8km OHL route to Thorpe Marsh substation has Section 37 consent, but line not constructed.
Solid Fuel	2	Heavy haul rail line passes adjacent to site, but no existing sidings or off-load infrastructure.
Constructability	3	Sufficient available land for construction laydown, good road/rail access. Site area currently used as colliery spoil tip.
Consenting	3	Site consented for two-unit IGCC. S37 for OHL in place. Consenting for other infrastructure connections progressed but on hold.
Environmental Constraints	3	No significant environmental constraints anticipated.
CO ₂ Export	2	Originally intended starting point of White Rose CO ₂ pipeline. Pipeline routing and design development progressed by National Grid.
Gas Supply	2	12km pipeline route to MOC on NTS. Routing design completed and consenting progressed but on hold.
Other	-	
TOTAL (Desktop Study)	21	

Summary Commentary

Site with existing, current consent for a two-unit IGCC. Significant project development already undertaken under EU funding.

Infrastructure connections not on site at present, and land availability subject to removal of colliery spoil.

Hatfield - Aerial View



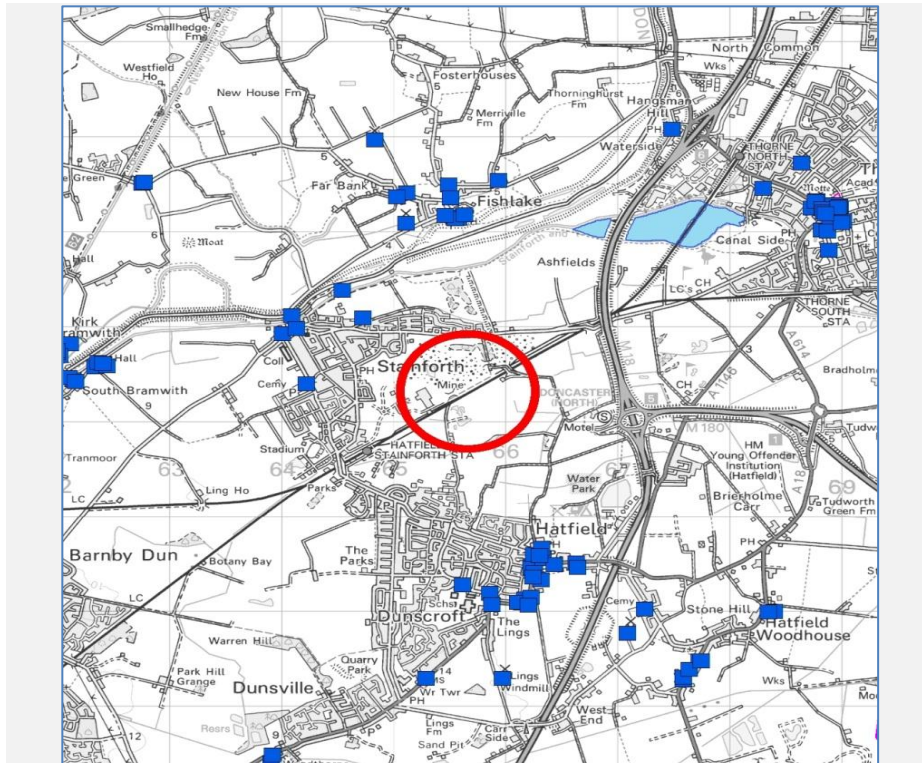
Hatfield - Site



Hatfield - Environmental Constraints

Legend

-  Special Area of Conservation
-  RAMSAR
-  Listed Building
-  Sites of Special Scientific Interest
-  National Nature Reserve
-  Registered Park and Garden
-  Special Protection Area
-  Local Nature Reserve
-  Scheduled Monument
-  Battlefield



Hatfield - Immediate Vicinity

View looking north east from Waggon's Way (Hatfield in the background).



STAGE A FINAL – IDENTIFICATION OF POTENTIAL SITES

July 2014

Brigg

Brigg, Lincolnshire (Grid Reference 499260, 405921)

Category	0-3	Commentary
Site Area	2	Ample site area for CCGT development. Coal plant not feasible.
Water Supply	3	Mothballing of existing CCGT frees-up abstraction capacity from adjacent River Ancholme.
Grid Connection	2	c. 15km OHL route to Keadby substation.
Solid Fuel	2	Heavy haul rail line passes adjacent to site, but no existing sidings or offload infrastructure.
Constructability	2	Limited site area for laydown, and abnormal load routing may not be straightforward.
Consenting	3	Existing generating station on site, and no significant obstacles to new consent envisaged.
Environmental Constraints	3	No significant environmental constraints identified.
CO ₂ Export	2	35km to Drax. Pipeline route crosses Trent, Don and Aire.
Gas Supply	2	15km pipeline to NTS at Blyborough. Assumed that existing gas supply to site has insufficient capacity for 1,000MW generating capacity.
Other	-	
TOTAL (Desktop Study)	21	

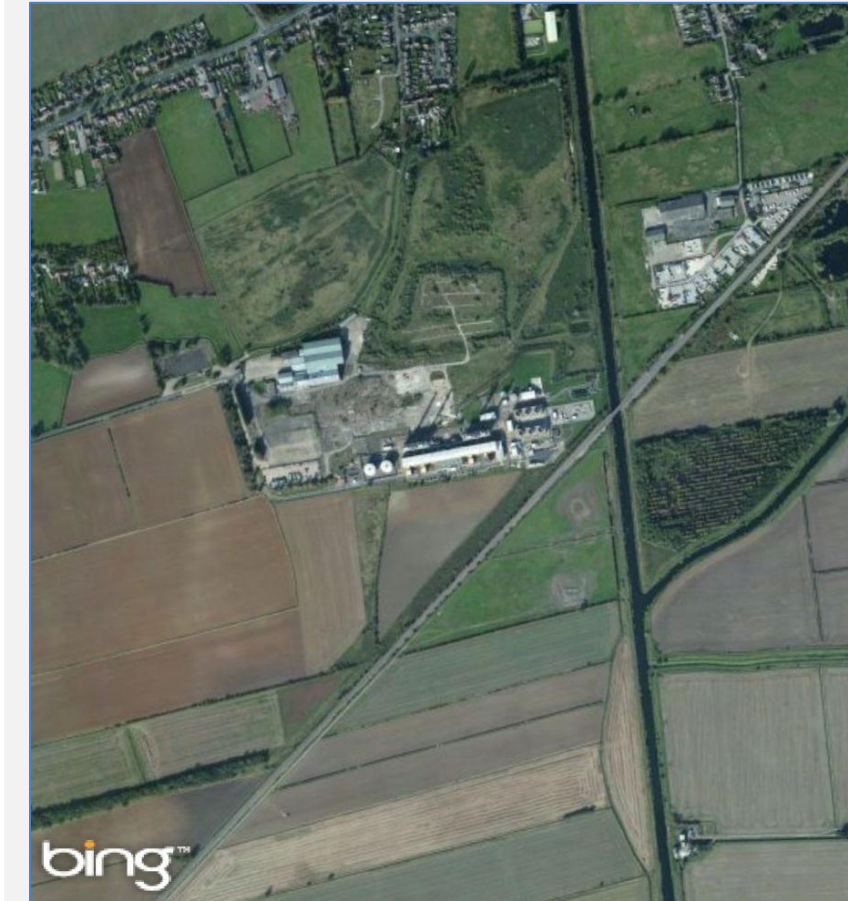
Summary Commentary

A significant site previously identified for potential CCGT development.

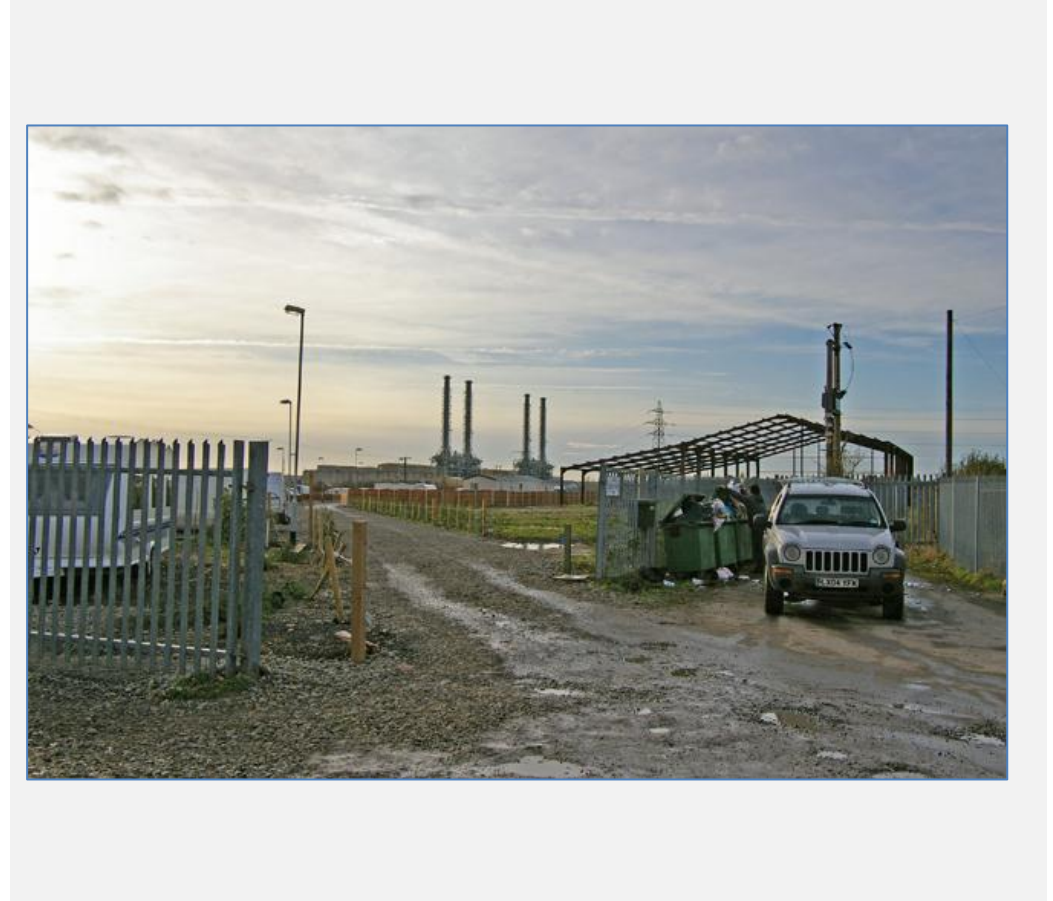
Land availability within the site is good, but access may be impacted by adjacent proposed biomass plant. Infrastructure connections not on site at present.

Unlikely to be suitable for coal development.

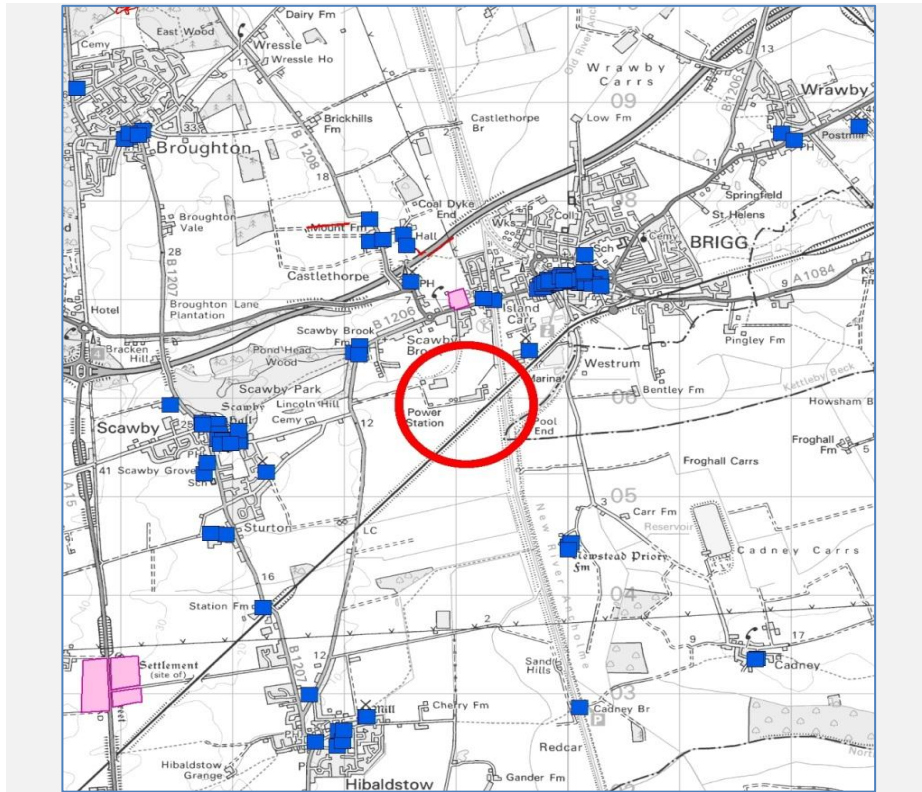
Brigg - Aerial View



Brigg - Site



Brigg - Environmental Constraints



Brigg - Immediate Vicinity

View looking north west from Cadney Road (Brigg in the background).



Stallingborough

Stallingborough, Lincolnshire (Grid Reference 522754, 413244)

Category	0-3	Commentary
Site Area	2	Various industrial/port sites could be available for development within the industrial area.
Water Supply	3	Good – adjacent to River Humber.
Grid Connection	3	Connections to 400kV are available.
Solid Fuel	2	No infrastructure currently in place although could be developed using the river for access.
Constructability	3	Good transport links and open land available.
Consenting	3	Well developed industrial heritage with other power projects consented, or under consent in the area.
Environmental Constraints	2	Humber Estuary is a sensitive European protected habitat site.
CO ₂ Export	1	60km from Drax and would have to negotiate the A15, the M62 and the river Humber or Ouse.
Gas Supply	2	Available in the locality.
Other	-	
TOTAL (Desktop Study)	21	

Summary Commentary

The area as a whole, and specific sites within it, such as the RWE Stallingborough biomass plant – offer good potential for power development with CCS. Coal handling would be possible although the CO₂ routing could be challenging.

Stallingborough – Aerial View



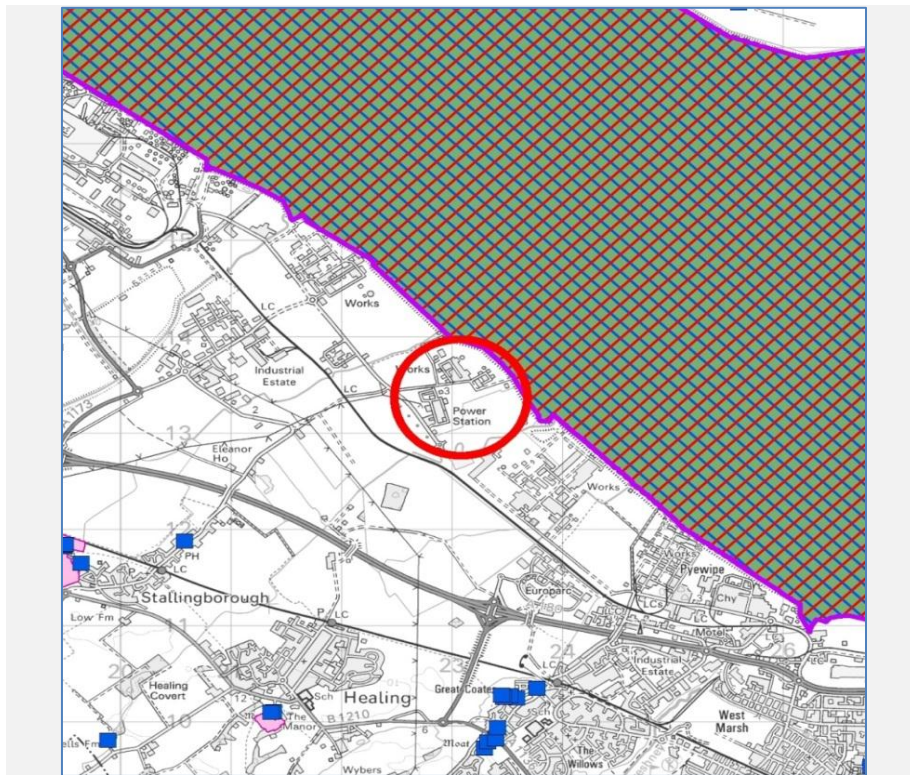
Stallingborough – Site



Stallingborough – Environmental Constraints

Legend

- | | | | | | |
|--|--------------------------------------|--|-------------------------|--|----------------------------|
| | Special Area of Conservation | | RAMSAR | | Listed Building |
| | Sites of Special Scientific Interest | | National Nature Reserve | | Registered Park and Garden |
| | Special Protection Area | | Local Nature Reserve | | Scheduled Monument |
| | | | Battlefield | | |



Stallingborough – Immediate Vicinity

View looking south east from Hobson Way (Stallingborough in the background).



Kellingley Colliery

Kellingley Colliery, Yorkshire (Grid Reference 452632, 423624)

Category	0-3	Commentary
Site Area	1	Sufficient land potentially available for development when colliery closes, but not confirmed that it is all in single ownership and/or industrial land use. Existing proposals for biomass plant on the site.
Water Supply	3	Adjacent to River Aire, although abstraction capacity not confirmed.
Grid Connection	2	Adjacent to 400kV line from Ferrybridge to Eggborough, but would require new substation/switchyard (potential tie-in with ESBI Knottingley development).
Solid Fuel	3	Potential to use/extend existing colliery rail facility.
Constructability	3	Good road and river access, and potential adjacent land available for laydown.
Consenting	2	No existing consents, but no significant obstacles envisaged.
Environmental Constraints	3	No significant environmental constraints anticipated.
CO ₂ Export	2	10km from Drax.
Gas Supply	2	5km from NTS.
Other	-	
TOTAL (Desktop Study)	21	

Summary Commentary

Significant potential site for CCGT or coal plant. Consenting potential untested. Most infrastructure connections not on site at present, but short, straightforward connections possible, and not considered to be a significant obstacle.

Adjacent, ongoing CCGT development of Knottingley site by ESBI needs consideration.

Kellingley Colliery - Aerial View



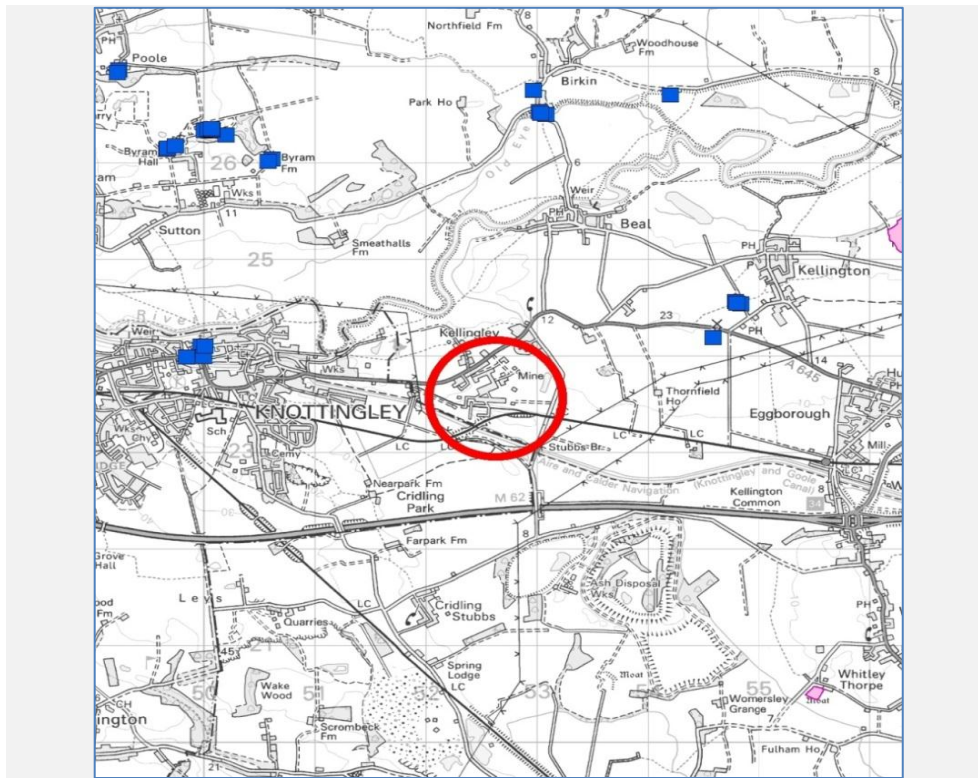
Kellingley Colliery - Site



Kellingley Colliery - Environmental Constraints

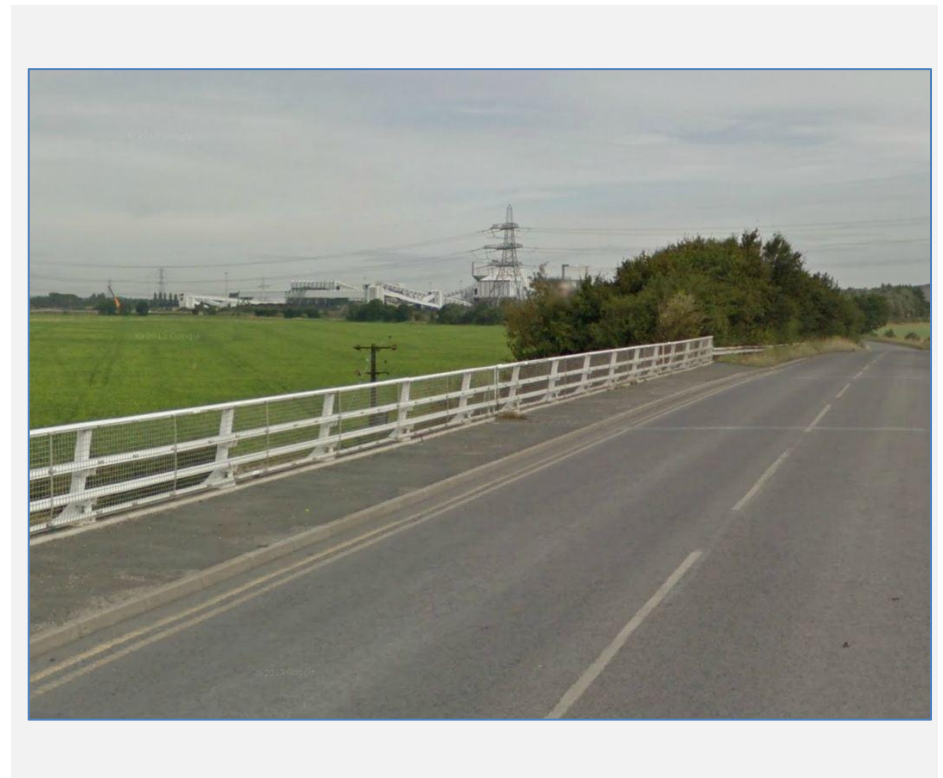
Legend

- Special Area of Conservation
- RAMSAR
- Listed Building
- Sites of Special Scientific Interest
- National Nature Reserve
- Registered Park and Garden
- Special Protection Area
- Local Nature Reserve
- Scheduled Monument
- Battlefield



Kellingley Colliery - Immediate Vicinity

View looking north from Beal Lane M62 overbridge (Kellingley in the background).



Killingholme

Killingholme, Lincolnshire (Grid Reference 515398, 419212)

Category	0-3	Commentary
Site Area	1	Relatively compact site available for CCGT development.
Water Supply	3	Good – adjacent to River Humber.
Grid Connection	3	Connections to 400kV are available.
Solid Fuel	2	No infrastructure currently in place although could be developed using the river for access.
Constructability	2	Good transport links and some open land available.
Consenting	3	Already consented for power generation.
Environmental Constraints	2	Humber Estuary is a sensitive European protected habitat site.
CO ₂ Export	1	60 km from Drax and would have to negotiate the A15, the M62 and the river Humber or Ouse.
Gas Supply	3	Available on site.
Other	-	
TOTAL (Desktop Study)	20	

Summary Commentary

The site is already in use as a CCGT although land availability is more constrained than other sites examined. Coal handling and storage would be challenging and CO₂ routing could be challenging.

Killingholme - Aerial View



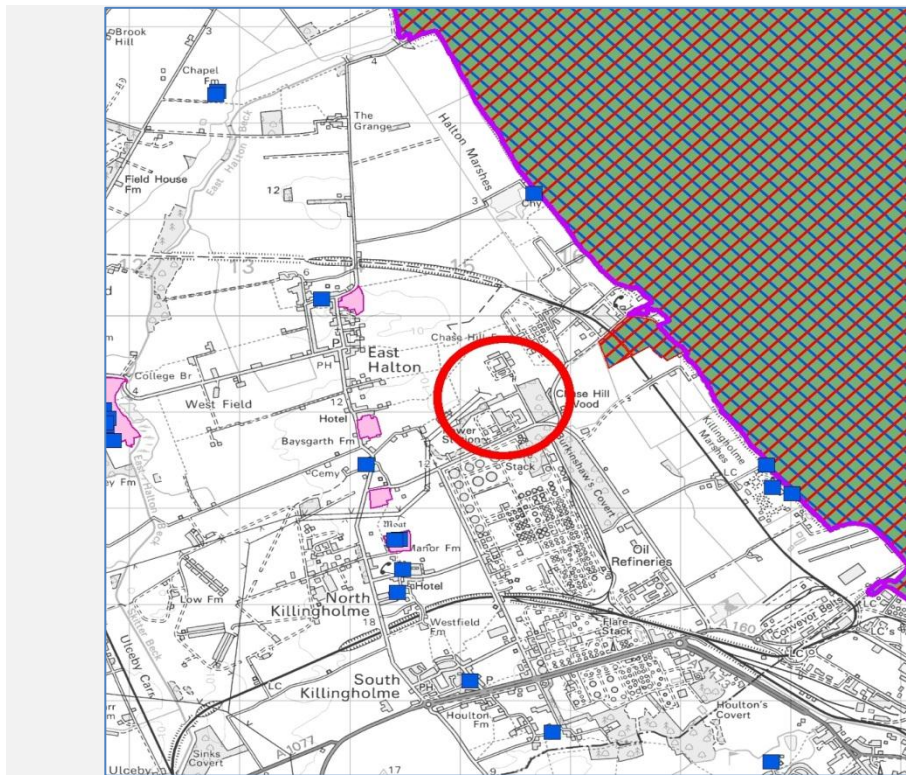
Killingholme - Site



Killingholme - Environmental Constraints

Legend

-  Special Area of Conservation
-  RAMSAR
-  Listed Building
-  Sites of Special Scientific Interest
-  National Nature Reserve
-  Registered Park and Garden
-  Special Protection Area
-  Local Nature Reserve
-  Scheduled Monument
-  Battlefield



Killingholme - Immediate Vicinity

Looking east



STAGE A FINAL – IDENTIFICATION OF POTENTIAL SITES

July 2014

Novartis

Novartis, Lincolnshire (Grid Reference 524973, 411700)

Category	0-3	Commentary
Site Area	2	Site around 20 hectares with additional open land surrounding it.
Water Supply	3	On River Humber so could access that for cooling. Limited groundwater potential.
Grid Connection	2	Site has own substation but not 400kV.
Solid Fuel	2	No bulk material handling, but it is on the river Humber.
Constructability	3	Significant open land in vicinity and good transport links.
Consenting	2	Consented for industrial use and in an industrial area.
Environmental Constraints	2	Humber is European designated site.
CO ₂ Export	1	60km from Drax and would have to negotiate the A15, the M62 and the river Humber or Ouse.
Gas Supply	2	Gas supply to the site – capacity unknown but considered reasonable.
Other	-	
TOTAL (Desktop Study)	19	

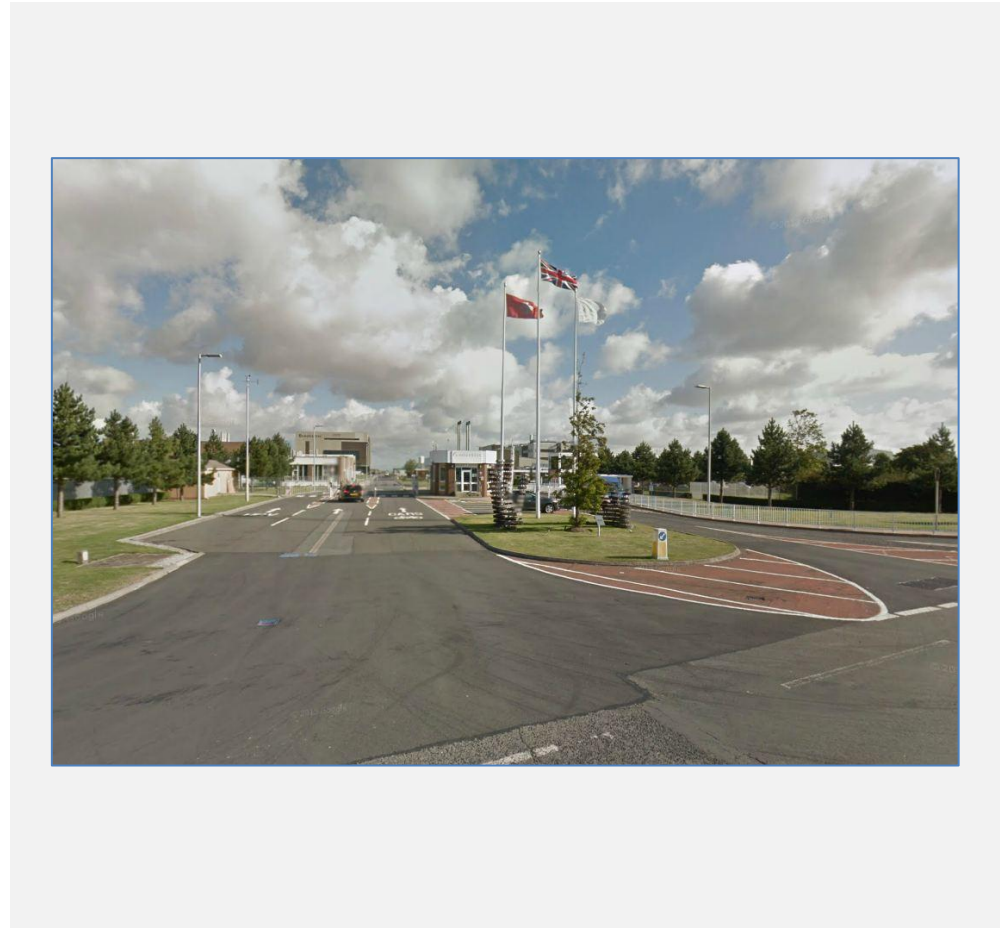
Summary Commentary

The site offers good potential for CCGT with CCS. Coal handling would be possible but the site area may be a constraint. CO₂ routing could be challenging.

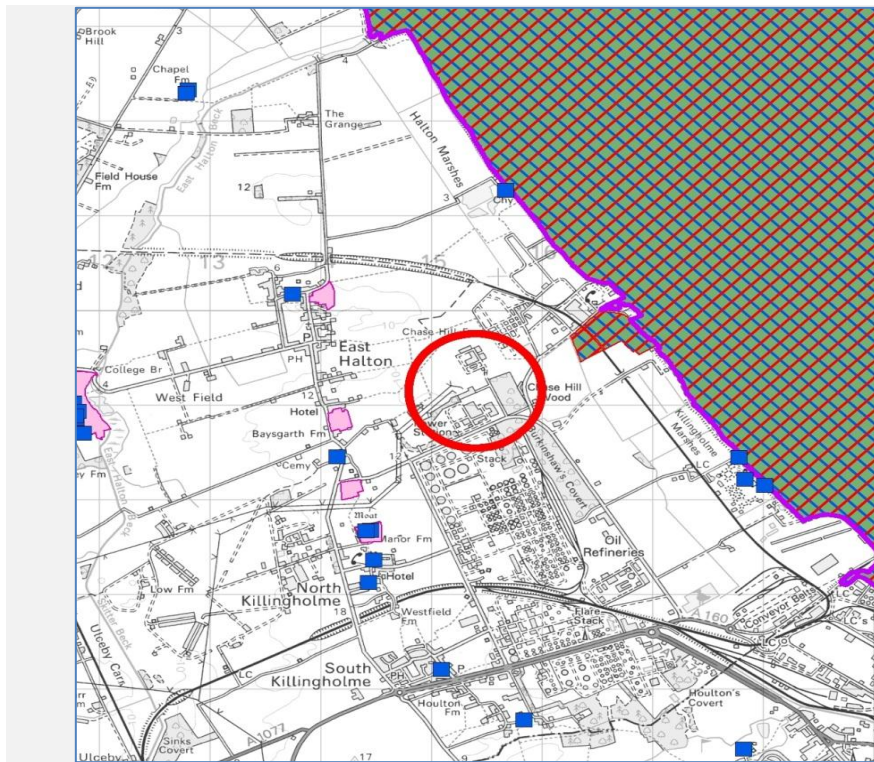
Novartis – Aerial View



Novartis – Site



Novartis - Environmental Constraints



Novartis - Immediate Vicinity

Looking towards the site from the banks of the River Humber



Immingham

4 CONCLUSIONS AND RECOMMENDATIONS

This Stage A report identifies 16 site locations that have potential for consideration for the development of a Blueprint carbon capture plant as a new build first of a kind (FOAK) deployment in UK. The qualitative ranking has identified these potential sites from a long list of over 100 current or historic power or brownfield sites in Yorkshire, Humber, Lincolnshire, Nottinghamshire and Teesside.

The relative scoring for the 16 sites ranges from 19 to 24 and presents a number of location options for further discussion and investigation. The potential sites were the subject of workshop discussions on 16th July 2014, between ETI and URS, where three specific sites were identified for further more detailed investigation. These will be the subject of Stage B of this site selection study.

The high ranking sites include land adjacent to existing sites at Drax and Eggborough in the direct vicinity of the White Rose CCS project and the potential for re-use of the deep mine site at Kellingley (Knottingley) which is due to close by 2016.

There are further sites within a reasonable distance of White Rose, adjacent to Keadby, West Burton and Ferrybridge that have potential for new build CCS, subject to clarification of other possible developments. Wider area sites in Teesside should be considered given their potential to form a 'carbon bridge' to the White Rose CO₂ export network. A further 9 sites in the top 16 sites are not highly differentiated at this stage.

It is recommended that further investigation on a limited number of sites is progressed following the workshop meeting on 16th July and that selective market testing is considered to establish owner/developer interest in specific technology at the possible locations being considered. This will help inform a project call.

Appendix A – Initial Site ID List

URS No.	Site	Grid. Ref	Location	County	Type	Notes
2	Bloom Street	384194, 397714	Manchester	Manchester	Coal	Opened 1901. Operated until 1990s. Still standing, unused. On Rochdale canal.
12	Forth Banks Stage 1	424658, 563532	Newcastle upon Tyne	Tyne and Wear	Coal	
22	Neptune Bank	430051, 565543	Wallsend	Tyne and Wear	Coal	Site closed in 1909 area redeveloped as industrial estate
24	Padiham A (Stage 1)	377739, 433396	Padiham	Lancashire	Coal	Outer boundary marker
25	Padiham A (Stage 2)	377739, 433396	Padiham	Lancashire	Coal	Outer boundary marker
27	Philadelphia	433405, 551997	Philadelphia	Tyne and Wear	Coal	
33	South Shore Road	426360, 563929	Gateshead	Tyne and Wear		Demolished and redeveloped into offices
36	Staythorpe C	476750, 353668	Southwell	Nottinghamshire	CCGT	Active.
40	Thornhill	422736, 420045	Ravensthorpe	Dewsbury	Gas	Active
46	Whinfield Stage 1	415182, 558128	Rowlands Gill	Tyne and Wear	Coal	Outer boundary marker
49	Winnington CHP	430796, 328867	Northwich	Cheshire	Gas CHP	Active. Ineos and Tata site. Nearby Wallescote site awaiting clearance
5	Chopwell Colliery	411400, 558600	Chopwell	County Durham	Coal	Demolished - no known redevelopment plans
43	Wakefield A	434917, 419651	Wakefield	West Yorkshire	Coal	Demolished - land currently shown as undeveloped woodland
1	Roosecote B	322437, 468331	Cumbria	North West	CCGT	Reference site to outer distance.
45	Wheldale	443100, 426400	Castleford	West Yorkshire	Gas	Active
26	Peterborough	521806, 299199	Peterborough	Cambridgeshire	CCGT	Early E class development. Larger industrial area and associated brickworks and quarries to south east

URS No.	Site	Grid. Ref	Location	County	Type	Notes
15	Humber	524002, 412508	Grimsby	North East Lincolnshire	Gas fired CHP	Active. Used as a Short Term Operating Reserve (STOR)
19	King's Lynn	560814, 317057	King's Lynn	Norfolk	CCGT	Active and due for upgrade. Consented site for new CCGT too.
23	North Tees	447722, 521553	Billingham	County Durham	Coal	Demolished - will be redeveloped into Billingham Biomass
37	Sutton Bridge A	548090, 319992	Sutton Bridge	Lincolnshire	CCGT	Active
39	Thor Cogeneration	451597, 523388	Seal Sands	County Durham	CCGT	Not yet developed. Adjacent Waste to Energy plant may impact site consenting now
30	Salt End (BP Chemicals)	516570, 428980	Salt End	Yorkshire and Humber	CCGT	Active
21	Lynemouth	430505, 590091	Lynemouth	Northumberland	Coal + Biomass	Power plant acquired by RWE and aiming for biomass conversion
31	Seal Sands	451592, 523790	Seal Sands	County Durham	OCGT	Active VIKING power plant. Large site areas across brinefields have potential for re-development
35	Spalding	525996, 324996	Spalding	Lincolnshire	CCGT	Active and New CCGT consented too
4	Carrington B	372805, 393307	Carrington	Greater Manchester	CCGT	New CCGT under build.
42	Trafford	372800, 393300	Carrington	Greater Manchester	CCGT	Consented site being developed by Carlton Power, adjacent to Manchester Ship Canal
7	Derwent	440395, 334498	Spondon	Derbyshire	CCGT	Active
16	Immingham	516899, 417208	Immingham Docks	North East Lincolnshire	CCGT	Active.

URS No.	Site	Grid. Ref	Location	County	Type	Notes
20	Knottingley	451421, 423386	Knottingley	Yorkshire	CCGT	Not yet active - still seems to be going through planning.
29	Rugeley	404921, 318685	Rugeley	Staffordshire	Coal	Active site. Biomass was intended here
14	High Marnham	481730, 379252	High Marnham	Nottinghamshire	Coal	Demolished - No known redevelopment plans since scoping discussions in 2009
9	Drakelow	646751, 325828	Burton	Derbyshire	Coal	Consented for 1200 MW D station. E station application withdrawn. Very large site.
28	Ratcliffe-on-Soar	450251, 330017	Ratcliffe-on-Soar	Nottinghamshire	Coal	Active Coal site. Large site with potential.
34	Southmoor	452860, 423852	Beal	North Yorkshire	Energy from waste	Will be developed at site of Kellingley Colliery
47	Willington	429476, 328561	Willington	South Derbyshire		Inactive, but not demolished. New CCGT Plant cosented but no timescale for decision.
3	Brigg	499260, 405921	Brigg	North Lincolnshire	CCGT	Active
13	Hatfield	465662, 411381	Stainforth	South Yorkshire	CCGT/IGCC	Not yet open - projected for 2016, though stated as "project frozen"
18	Killingholme	515398, 419212	Killingholme	North Lincolnshire	CCGT	Active
6	CDCL (Cottam Development Centre)	481303, 379243	Cottam	Nottinghamshire	CCGT	Active
32	Stallingborough	522754, 413244	Stallingborough	North East Lincolnshire	CCGT	Active. Adjacent sites had Biomass plant but never built after sale from Helius to RWE
41	Thorpe Marsh	460673, 409686	Doncaster	South Yorkshire		To be redeveloped into CCGT power station
17	Keadby	482791, 411600	Scunthorpe	North Lincolnshire	CCGT	Active with consented site for new build

URS No.	Site	Grid. Ref	Location	County	Type	Notes
11	Ferrybridge C	447576, 424806	Ferrybridge	West Yorkshire	Coal	Active
38	Teesside	456945, 520546	Wilton	Redcar and Cleveland	CCGT	In demolition phase. Near Eston Grange
48	Wilton	457053, 521938	Wilton	Redcar and Cleveland	Coal, Oil + Gas	Active
44	West Burton	478655, 385998	Gainsborough	Lincolnshire	CCGT	Active as Coal and Gas site
8	Drax	466593, 427015	Selby	North Yorkshire	Coal	Active
10	Eggborough	457721, 424270	Eggborough	North Yorkshire	Coal	Active
50	Barton-upon-Irwell	375623, 397198	Eccles	Lancashire	Biomass	Outer Market
53	North Blyth Power Station	430468, 583698	Blyth	Tyne and Wear	Biomass	Project received approval in 2013. RES ceased work following the withdrawal of a key partner.
54	Glanford Brigg Biomass Power Station	498870, 406110	Scunthorpe	North Lincolnshire	Biomass	DCO app May 2012 Station owned by Energy Power Resources (EPR) and operated by Fibrogen
55	Immingham Heron	519585, 416327	Immingham Docks	North East Lincolnshire	Biomass	TBD
58	Sleaford	508657, 345913	Sleaford	Lincolnshire	Straw	Active - opened 2014
57	Skelton Grange	436592, 430590	Leeds	West Yorkshire	Biogas	Active
63	Thornhill	422736, 420045	Ravensthorpe	Dewsbury	Biomass	Active
56	Portrack Incinerator	447509, 519792	Billingham	County Durham	Waste	Demolished
61	Teesside, dedicated biomass with combined heat and power.	452611, 527007	Teesside	Redcar and Cleveland	Biomass	Not yet developed
62	Teesside Few	456945, 520546	Billingham	County Durham	Waste	Active
51	Billingham Biomass	447722, 521553	Billingham	County Durham	Biomass	Due to be developed at the site of the former

URS No.	Site	Grid. Ref	Location	County	Type	Notes
						North Tees Power Plant.
52	Blackburn Meadows	439660, 391416	Sheffield	South Yorkshire	Biomass	Biomass plant under construction and nearing operation. Adjacent sites to North East and in strip to south of Rotherham rail line may be appropriate.
64	Wilton 10	457053, 521938	Wilton	Redcar and Cleveland	Biomass	Active
60	Teesport	453708, 522786	Teesport	Redcar and Cleveland	Biomass	Due for development - opening in 2016
59	Stallingborough Biomass	520361, 411173	Stallingborough	North East Lincolnshire,	Biomass	TBD
67	Allied Glass	450824, 423859	Knottingley	West Yorkshire	Container Glass	Site operational - minimal available land around the site.
68	Allied Glass	431038, 432342	Leeds	West Yorkshire	Container Glass	Site operational - minimal available land around the site.
71	Ardagh Glass	460577, 406646	Doncaster	South Yorkshire	Container Glass	Site operational - areas of land nearby currently undeveloped
72	Ardagh Glass	449486, 423160	Knottingley	West Yorkshire	Container Glass	Site operational - areas of land nearby currently undeveloped
74	Beatson Clark	442588, 393431	Rotherham	South Yorkshire	Glass	Site operational - minimal available land around the site.
84	FULJIFILM Diosynth Biotechnologies UK Ltd	446556, 522611	Billingham	Redcar and Cleveland	Chemicals Plant	Currently operational - located in Billingham Industrial Zone - availability of surrounding plots not currently known
89	Huntsman Tioxide Grimsby	525661, 411293	Grimsby	North East Lincolnshire	Chemicals Plant	Site has closed and it reportedly set to be demolished
91	Ineos Chlor Ltd	455826, 524458	Wilton	Redcar and Cleveland	Chemicals Plant	Site operational - located in Wilton Industrial Zone - availability of surrounding plots not currently known

URS No.	Site	Grid. Ref	Location	County	Type	Notes
92	Johnson Matthey Plc	447246, 522247	Billingham	Redcar and Cleveland	Chemicals Plant	Site operational - located in Billingham Industrial Zone - availability of surrounding plots not currently known
96	Lucite International UK Ltd	447246, 522247	Billingham	Redcar and Cleveland	Chemicals Plant	Current site operational
99	Outokumpu Stainless Steel Ltd	437437, 388784	Sheffield	South Yorkshire	Steel Production	Located on industrial estate - as such minimal space for expansion
101	Rohm and Haas	432590, 565755	Jarrow	Tyne and Wear	Chemicals Plant	Site set to close in next 12-18 months. No available land bank
102	Rotherham Steel Works	440825, 391556	Rotherham	South Yorkshire	Steel Production	Site converted to adventure centre but other site in region may be appropriate
107	Technical Absorbents Limited	527409, 410116	Grimsby	South Humberside	Chemicals Plant	Located at Grimsby Dock - availability of neighbouring plots currently unknown
76	Boormalt	487140, 476556	West Knapton, Malton	North Yorkshire	Malters	Unclear if site is operational - surrounded by undeveloped land.
78	British Gypsum	451262, 434341	Sherburn In Elmet	North Yorkshire	Production of construction materials	
112	Vickers	437352, 434638	East Leeds	West Yorkshire	Unknown	Site closed and currently vacant - large areas of the site undeveloped and areas to the south of the site undeveloped.
110	Thoresby Colliery	463557, 367483	Ollerton	North Nottinghamshire	Colliery	Site due for closure in the next 18 months. Extensive undeveloped land surrounding the site
115	Yara UK Ltd	469108, 448240	Elvington	York	Chemicals Plant	Appears to be a chemicals storage facility - large areas of undeveloped land to the north and east
103	Sabic UK Petrochemicals	458182, 520489	Wilton	Redcar and Cleveland	Chemicals Plant	Site appears to be operational - large areas of undeveloped land to the east and west of the site.
105	South Ferriby cement plant	497279, 420926	South Ferriby	North Lincolnshire	Cement	Surrounding land undeveloped

URS No.	Site	Grid. Ref	Location	County	Type	Notes
119	Theddlethorpe	548698, 387416	Theddlethorpe	Lincolnshire	Gas Terminal	
117	Aldbrough	526433, 435501	Albrough	East Yorkshire	Gas Terminal	
118	Hornsea	517790, 451487	Atwick	East Yorkshire	Gas Terminal	
82	EPAX Pharma UK Ltd	452815, 524711	Seal Sands	Redcar and Cleveland	Chemicals Plant	Site operational - located in Seal Sand Industrial Zone - availability of surrounding plots not currently known
83	Fine Organics Ltd	452815, 524711	Seal Sands	Redcar and Cleveland	Chemicals Plant	Site operational - located in Seal Sand Industrial Zone - availability of surrounding plots not currently known
87	Harvest Energy Limited	452815, 524711	Seal Sands	Redcar and Cleveland	Chemicals Plant	Site operational - located in Seal Sand Industrial Zone - availability of surrounding plots not currently known
113	Victrex Manufacturing Limited	453186, 524215	Seal Sands	Redcar and Cleveland	Chemicals Plant	Site operational - large area of undeveloped land to the west and north
116	Easington / Dimlington	539989, 419938	Easington	East Yorkshire	Gas Terminal	
66	Air Products (Chemicals) Teesside Ltd	447246, 522247	Billingham	Redcar and Cleveland	Chemicals Plant	Site operational - located in Billingham Industrial Zone - availability of surrounding plots not currently known
69	Anglian Water Services Ltd / Tioxide Europe Limited	452815, 524711	Seal Sands	Redcar and Cleveland	Chemicals Plant	
70	Arch UK Biocides Limited	452815, 524711	Seal Sands	Redcar and Cleveland	Chemicals Plant	Site closed - located in Seal Sands Industrial Zone - availability of surrounding plots not currently known

URS No.	Site	Grid. Ref	Location	County	Type	Notes
73	BASF PLC	452815, 524711	Seal Sands	Redcar and Cleveland	Chemicals Plant	Site closed and decommissioned
111	Univar Limited	451844, 520283	Middlesbrough	Redcar and Cleveland	Chemicals Plant	Site appears to be operational - large area of land available to the north east.
95	Lenzing Fibres Grimsby Ltd	523521, 412878	Grimsby	South Humberside	Chemicals Plant	Site operational -
75	Blue Star Fibres Co Ltd / Acordis UK Ltd	523287, 412679	Grimsby	North East Lincolnshire	Chemicals Plant	Site closed - areas of undeveloped land to east and south/west
80	CIBA Speciality Chemicals Plc	523521, 412878	Grimsby	South Humberside	Chemicals Plant	
94	Kemira Teesport Ltd	452815, 524711	Teesport	Redcar and Cleveland	Chemicals Plant	Site operational -
109	The Port of Grimsby	526854, 410831	Grimsby	North East Lincolnshire	Port	Availability of plots at the port is not currently known
97	Millennium Inorganic Chemicals Limited	521902, 414694	Immingham	North East Lincolnshire	Chemicals Plant	Plant operational an undeveloped land available to the east, west and south
65	Able Marine Energy Park (AMEP) - Humber port	516561, 420271	Humberside	East riding of Yorkshire	Port	Availability of plots at the port is not currently known but this was adjacent to Killingholme IGCC development.
79	Chemoxy International Ltd	447246, 522247	Billingham	Redcar and Cleveland	Chemicals Plant	Site operational - located in Billingham Industrial Zone - availability of surrounding plots not currently known
88	Hull - Paull	514306, 428651	Hull	East Riding of Yorkshire	Port	Availability of plots at the port is not currently known
90	Immingham Docks	519585, 416327	Immingham	North Lincolnshire	Port	Availability of plots at the port is not currently known
108	The Port of Goole	474748, 423210		East Riding of Yorkshire	Port	Availability of plots at the port is not currently known
81	Conocophillips Petroleum Co UK	452815, 524711	Seal Sands	Redcar and Cleveland	Chemicals Plant	Site operational - located in Seal Sand Industrial Zone - availability of surrounding plots not

URS No.	Site	Grid. Ref	Location	County	Type	Notes
	Ltd					currently known
86	Guardian Glass	472024, 422957	Goole	West Yorkshire	Sheet Glass	Site operational - surrounding land mostly undeveloped
100	Redcar/Teesside Steel Works	456336, 525270	Teesside	Redcar and Cleveland	Steel Production	Reopened in 2012 by SSI having been closed in 2009. Some available land bank around the site
106	Synthomer Limited	523299, 413610	Grimsby	South Humberside	Chemicals Plant	Site operational - land to the south of the site undeveloped
114	Wilton Industrial Zone	455826, 524458	Wilton	Redcar and Cleveland	Chemicals Plant	Encompasses a number of chemical works all located within close proximity to each other.
120	Teesside Gas Terminal	451592, 523790	Teesside	Redcar and Cleveland	Gas Terminal	
77	BP Chemicals	516570, 428980	Salt End	East riding of Yorkshire	CCGT / Chemicals Plant	Site operational - availability of plots at Salt End chemical site unknown. Undeveloped land to the east of the site.
85	Growhow UK (East) Ltd	447246, 522247	Billingham	Redcar and Cleveland	Chemicals Plant	Site operational - located in Billingham Industrial Zone - availability of surrounding plots not currently known
93	Kellingley Colliery	452632, 423624	Knottingley	West Yorkshire	Colliery	Site currently operational - due to close in next 18 months. Surrounding land largely undeveloped.
98	Novartis	524973, 411700	Grimsby	North East Lincolnshire	Chemicals Plant	Site operational - areas of undeveloped land to the west and Huntsman site to the east due to be demolished
104	Scunthorpe Steel Works	492167, 410880	Scunthorpe	East Riding of Yorkshire	Steel Production	Operated by Tata Available land bank to the east of the steelworks

Appendix B – Indicative Site Ranking Criteria

Appendix B - Indicative Site Ranking Criteria

The ranking for potential sites will primarily be based on spatial, development and interface category criteria with a simple scoring system to inform attractiveness of sites. The scoring will be supported by available evidence, where available, in the desk top study.

Categories for Site consideration

The categories used for the first pass filtering are as follows:

1. Site Area
2. Water Supply
3. Grid Connection
4. Fuel supply (solid fuel)
5. Constructability
6. Consenting Status
7. Environmental Constraints
8. CO₂ Export
9. Gas Supply
10. Additional Context

Scoring System against Categories

The scoring system used for the first pass filtering will be as follows;

Colour Ranking	Points	Category Ranking
Green	3	Requirements met
Yellow	2	May be able to achieve Requirements
	1	Requirements are partly met
Red	0	Requirements not met / Never likely

The specific scoring against the categories have been developed further and are captured in the next section.

Category Ranking

Site Area

- Green (3) – Ample site area for construction and operation within a single ownership / occupier.
- Amber (2) – Sufficient site area available but may require acquisition of adjacent land.
- Amber (1) - Site area may only be sufficient to accommodate certain plant configurations.
(e.g. CCGT with post-combustion amine capture, but not IGCC).
- Red (0) – Insufficient site area to accommodate construction of any CCS plant configurations.

Water Supply

- Green (3) – Ample cooling water supply, from nearby water body or existing cooling water system
- Amber (2) – Potential cooling water supply,
- Amber (1) - Abstraction capacity limited or uncertain but may suit closed cooling application. Red
- (0) – No nearby cooling water supply. Insufficient abstraction potential

Grid Connection

- Green (3) – Grid connection point on site / adjacent to site
- Amber (2) – Grid connection point at reasonable distance and with relatively straightforward route
- Amber (1) - Grid connection possible but capacity likely to be a limiting factor
- Red (0) – Grid connection point at excessive distance, or via impractical OHL / cable route

Note that grid access charges have not been included in this ranking, as the majority of the sites are likely to be within same grid zones. Therefore, it is not anticipated that access charges will be a defining constraint on the development potential of a site.

Fuel supply (solid fuel) (not applicable to CCGT with post-combustion capture)

- Green (3) – Existing coal off-load facility and stocking / blending facilities on site / adjacent to site
- Amber (2) – Adjacent sea transport infrastructure with potential for expansion / extension to site
- Amber (1) - Adjacent rail transport infrastructure with potential for branch connections
- Red (0) – No existing rail or sea transport infrastructure nearby

Constructability

- Green (3) – Straightforward construction logistics, ample laydown area, good abnormal load access.
- Amber (2) – Constrained but feasible site. May require phasing to work within available land area.

Amber (1) - Constrained and requires demolition of existing buildings and / or phasing with decommissioning of existing operations.

Red (0) – Impractical construction site, due to insufficient construction / laydown area, access, etc.

Consenting Status

Green (3) – Existing consent for power generation, with potential to extend or resubmit to cover CCS.

Amber (2) – Currently unconsented power generation or industrial site with reasonable potential for consenting

Amber (1) - Other Site Location with unclear local plan and consent should be achievable over time. Red (0)
 – Location where it is unlikely that a consent for generation with CCS could not be achieved

Environmental Constraints

Green (3) – Existing site and adjacent land use or designation that are unlikely to present significant difficulties during consultation and in obtaining a permit

Amber (2) – Existing and adjacent land use that may require mitigation for consent/ permit

Amber (1) - Existing and adjacent land use that may require significant mitigation for consent/ permit

Red (0) – Existing site or adjacent land use that is likely to present prohibitive constraints to development, e.g. ecological, visual impact, noise, water / air emissions, etc.

CO₂ Export

Green (3) – CO₂ network connection point on site / adjacent to site

Amber (2) – CO₂ network connection point at reasonable distance with relatively straightforward connection

Amber (1) - CO₂ network connection point at reasonable distance with difficult connection issues

Red (0) – CO₂ network connection point at excessive distance, or via impractical pipeline / shipping route

Gas Supply (only relevant to CCGT / IGCC configurations)

Green (3) – Existing NTS connection point on site / adjacent to site

Amber (2) – NTS connection point at reasonable distance and with relatively straightforward connection route

Amber (1) - NTS connection point at reasonable distance and with difficult connection route

Red (0) – NTS connection point at excessive distance, or via impractical pipeline / shipping route

Appendix C – ‘Long list’

URS No.	Site	Site Area	Water Supply	Grid Connection	Fuel Supply (solid fuels)	Constructability	Consenting Status	Environmental Constraints	CO2 Export	Gas Supply	Total Score
2	Bloom Street	0									0
12	Forth Banks Stage 1	0									0
22	Neptune Bank	0									0
24	Padiham A (Stage 1)	0									0
25	Padiham A (Stage 2)	0									0
27	Philadelphia	0									0
33	South Shore Road	0									0
36	Staythorpe C	0									0
40	Thornhill	0									0
46	Whinfield Stage 1	0									0
49	Winnington CHP	0									0
50	Barton-upon-Irwell	0									0
53	North Blyth Power Station	0									0
54	Glanford Brigg Biomass Power Station	0									0
55	Immingham Heron	0									0

URS No.	Site	Site Area	Water Supply	Grid Connection	Fuel Supply (solid fuels)	Constructability	Consenting Status	Environmental Constraints	CO2 Export	Gas Supply	Total Score
67	Allied Glass	0									0
68	Allied Glass	0									0
71	Ardagh Glass	0									0
72	Ardagh Glass	0									0
74	Beatson Clark	0									0
84	FULJIFILM Diosynth Biotechnologies UK Ltd	0									0
89	Huntsman Tioxide Grimsby	0									0
91	Ineos Chlor Ltd	0									0
92	Johnson Matthey Plc	0									0
96	Lucite International UK Ltd	0									0
99	Outokumpu Stainless Steel Ltd	0									0

URS No.	Site	Site Area	Water Supply	Grid Connection	Fuel Supply (solid fuels)	Constructability	Consenting Status	Environmental Constraints	CO2 Export	Gas Supply	Total Score
101	Rohm and Haas	0									0
102	Rotherham Steel Works	0									0
107	Technical Absorbents Limited	0									0
5	Chopwell Colliery	1	0								1
58	Sleaford	1	0								1
76	Boormalt	1	0								1
78	British Gypsum	1	0								1
112	Vickers	1	0								1
110	Thoresby Colliery	2	0								2
43	Wakefield A	1	3			0					4
1	Roosecote B	2	3	0							5
57	Skelton Grange	2	2	2	0						6
45	Wheldale	1	3	2	1	0					7

URS No.	Site	Site Area	Water Supply	Grid Connection	Fuel Supply (solid fuels)	Constructability	Consenting Status	Environmental Constraints	CO2 Export	Gas Supply	Total Score
115	Yara UK Ltd	1	1	1	0	2	2	0			7
63	Thornhill	1	3	2	2	0					8
56	Portrack Incinerator	2	3	2	2	2					11
26	Peterborough	1	1	1	0	1	3	3	0	2	12
103	Sabic UK Petrochemicals	1	1	2	0	2	2	3	1	2	14
119	Theddlethorpe	2	3	2	0	2	2	1	1	1	14
105	South Ferriby cement plant	2	3	1	0	2	2	1	3	0	14
82	EPAX Pharma UK Ltd	1	3	2	2	1	2	1	1	2	15
87	Harvest Energy Limited	1	3	2	2	1	2	1	1	2	15
97	Millennium Inorganic Chemicals Limited	1	3	2	1	2	2	1	1	2	15
109	The Port of Grimsby	1	3	2	3	1	2	1	1	1	15

URS No.	Site	Site Area	Water Supply	Grid Connection	Fuel Supply (solid fuels)	Constructability	Consenting Status	Environmental Constraints	CO2 Export	Gas Supply	Total Score
113	Victrex Manufacturing Limited	1	2	2	2	2	2	1	1	2	15
83	Fine Organics Ltd	2	3	2	1	3	2	1	1	2	15
117	Aldborough	2	2	2	0	2	2	2	2	1	15
118	Hornsea	2	2	2	0	2	2	2	2	1	15
61	Teesside, dedicated biomass with combined heat and power.	1	3	2	2	2	2	1	1	2	16
62	Teesside Few	1	1	2	1	2	3	3	1	2	16
66	Air Products (Chemicals) Teesside Ltd	1	3	2	2	1	1	3	1	2	16
69	Anglian Water Services Ltd / Tioxide Europe Limited	1	3	2	2	2	1	2	1	2	16
70	Arch UK Biocides Limited	1	3	2	2	2	1	2	1	2	16
73	BASF PLC	1	3	2	2	2	1	2	1	2	16

URS No.	Site	Site Area	Water Supply	Grid Connection	Fuel Supply (solid fuels)	Constructability	Consenting Status	Environmental Constraints	CO2 Export	Gas Supply	Total Score
111	Univar Limited	1	2	2	2	2	1	3	1	2	16
65	Able Marine Energy Park (AMEP) - Humber port	1	3	2	3	1	1	1	2	2	16
75	Blue Star Fibres Co Ltd / Acordis UK Ltd	1	3	2	2	1	1	2	2	2	16
95	Lenzing Fibres Grimsby Ltd	1	3	2	2	1	1	2	2	2	16
106	Synthomer Limited	2	3	2	1	2	2	1	1	2	16
116	Easington / Dimlington	2	3	2	0	2	2	2	2	1	16
19	King's Lynn	1	3	3	1	2	3	3	0	1	17
37	Sutton Bridge A	1	3	3	0	2	3	3	0	2	17
23	North Tees	1	3	2	2	1	2	3	1	2	17
39	Thor Cogeneration	1	3	2	2	2	2	2	1	2	17
51	Billingham Biomass	1	3	2	2	1	2	3	1	2	17
64	Wilton 10	1	2	2	1	2	3	3	1	2	17

URS No.	Site	Site Area	Water Supply	Grid Connection	Fuel Supply (solid fuels)	Constructability	Consenting Status	Environmental Constraints	CO2 Export	Gas Supply	Total Score
94	Kemira Teesport Ltd	1	3	2	2	2	2	3	1	1	17
15	Humber	1	3	3	1	1	2	2	2	2	17
52	Blackburn Meadows	1	3	2	2	2	3	2	2	0	17
80	CIBA Speciality Chemicals Plc	1	3	2	2	2	1	2	2	2	17
86	Guardian Glass	1	2	2	2	1	2	3	2	2	17
108	The Port of Goole	1	3	2	3	1	2	1	2	2	17
30	Salt End (BP Chemicals)	1	3	3	2	1	3	2	1	2	18
79	Chemoxy International Ltd	1	3	2	2	2	2	3	1	2	18
88	Hull - Paull	1	3	2	3	1	2	1	2	3	18
90	Immingham Docks	1	3	2	3	1	2	1	2	3	18
81	Conocophillips Petroleum Co UK Ltd	2	3	2	2	2	2	2	1	2	18

URS No.	Site	Site Area	Water Supply	Grid Connection	Fuel Supply (solid fuels)	Constructability	Consenting Status	Environmental Constraints	CO2 Export	Gas Supply	Total Score
100	Redcar/Teesside Steel Works	2	3	2	3	3	2	1	1	1	18
114	Wilton Industrial Zone	2	2	2	3	2	2	3	1	1	18
21	Lynemouth	1	3	3	3	3	2	2	0	2	19
16	Immingham	1	3	2	3	1	3	2	2	2	19
20	Knottingley	1	3	2	2	2	2	3	2	2	19
77	BP Chemicals	1	3	3	2	1	3	2	2	2	19
35	Spalding	2	3	3	0	2	3	3	0	3	19
31	Seal Sands	2	3	3	2	2	2	2	1	2	19
60	Teesport	2	3	2	2	2	3	2	1	2	19
98	Novartis	2	3	2	2	3	2	2	1	2	19
120	Teesside Gas Terminal	2	3	3	2	2	2	2	1	2	19
4	Carrington B	1	3	3	2	2	3	3	0	3	20
42	Trafford	1	3	3	2	2	3	3	0	3	20

URS No.	Site	Site Area	Water Supply	Grid Connection	Fuel Supply (solid fuels)	Constructability	Consenting Status	Environmental Constraints	CO2 Export	Gas Supply	Total Score
18	Killingholme	1	3	3	2	2	3	2	1	3	20
34	Southmoor	1	3	2	3	2	2	3	2	2	20
7	Derwent	2	3	3	2	2	3	3	0	2	20
29	Rugeley	2	3	3	3	2	2	3	0	2	20
14	High Marnham	2	3	3	1	3	2	3	1	2	20
85	Growhow UK (East) Ltd	2	3	2	3	3	2	2	1	2	20
93	Kellingley Colliery	1	3	2	3	3	2	3	2	2	21
9	Drakelow	2	3	3	2	3	3	3	0	2	21
28	Ratcliffe-on-Soar	2	3	3	3	3	3	3	0	1	21
47	Willington	2	3	3	2	3	3	3	0	2	21
32	Stallingborough	2	3	3	2	3	3	2	1	2	21
59	Stallingborough Biomass	2	3	3	2	3	3	3	1	1	21
3	Brigg	2	3	2	2	2	3	3	2	2	21
13	Hatfield	2	2	2	2	3	3	3	2	2	21
104	Scunthorpe Steel Works	2	2	2	3	3	2	3	2	2	21

URS No.	Site	Site Area	Water Supply	Grid Connection	Fuel Supply (solid fuels)	Constructability	Consenting Status	Environmental Constraints	CO2 Export	Gas Supply	Total Score
11	Ferrybridge C	1	3	3	3	3	3	2	2	2	22
6	CDCL (Cottam Development Centre)	2	3	3	3	2	3	3	1	2	22
17	Keadby	2	3	3	2	2	3	2	2	3	22
41	Thorpe Marsh	2	3	3	2	2	3	3	2	2	22
38	Teesside	2	3	3	3	3	2	3	1	3	23
48	Wilton	2	3	3	3	3	2	3	1	3	23
10	Eggborough	2	3	3	3	3	3	3	2	2	24
44	West Burton	2	3	3	3	3	3	3	2	2	24
8	Drax	2	3	3	3	2	3	3	3	2	24