GETTING
UK EXPLORATION
BACK ON TRACK

Geoscience and courage

Hamish Wilson

Agenda and Thesis

1. Is there a systemic issue with UK exploration?
   - Small discoveries and low commercial success rates
   - Primarily a geological problem due to a combination of maturing of the geological plays and poor exploration decision-making
2. What could we do?
   - Investment in integrated basin-wide, geological play and prospect evaluation
   - Peer review all wells
   - Generate the investment case for new plays
3. Onshore and unconventionals
   - Landowners perspective
   - Ineos/Peel/Igas
   - Government courage to let exploration take place

UK Exploration - Observations

- Investment levels have held up
- UK is attracting its share of exploration investment
- But
  - Very high finding costs
  - Small discoveries

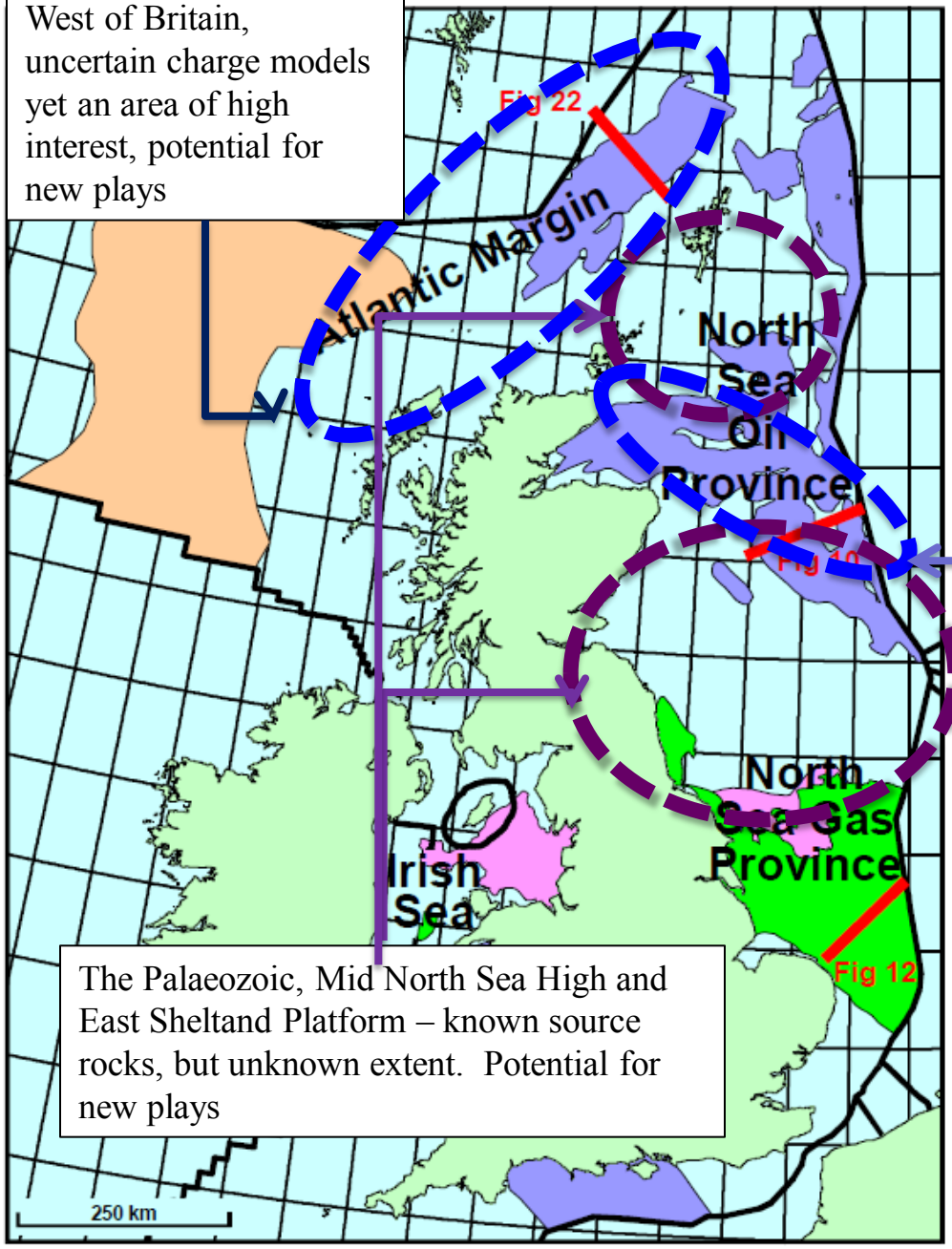
Conclusion

  - Lack of discoveries is primarily a geological issue

But……

- Continual pleas from the authorities to drill more exploration wells
  - No! We've drilled too many wells
  - We've drilled bad wells

West of Britain, uncertain charge models yet an area of high interest, potential for new plays



Jurassic oil-prone mudstones (Kimmeridge Clay world class source)

Jurassic oil-prone mudstones- uncertain distribution

Carboniferous coal measures gas source

Carboniferous oil-prone basinalmudstones

Regional cross-section

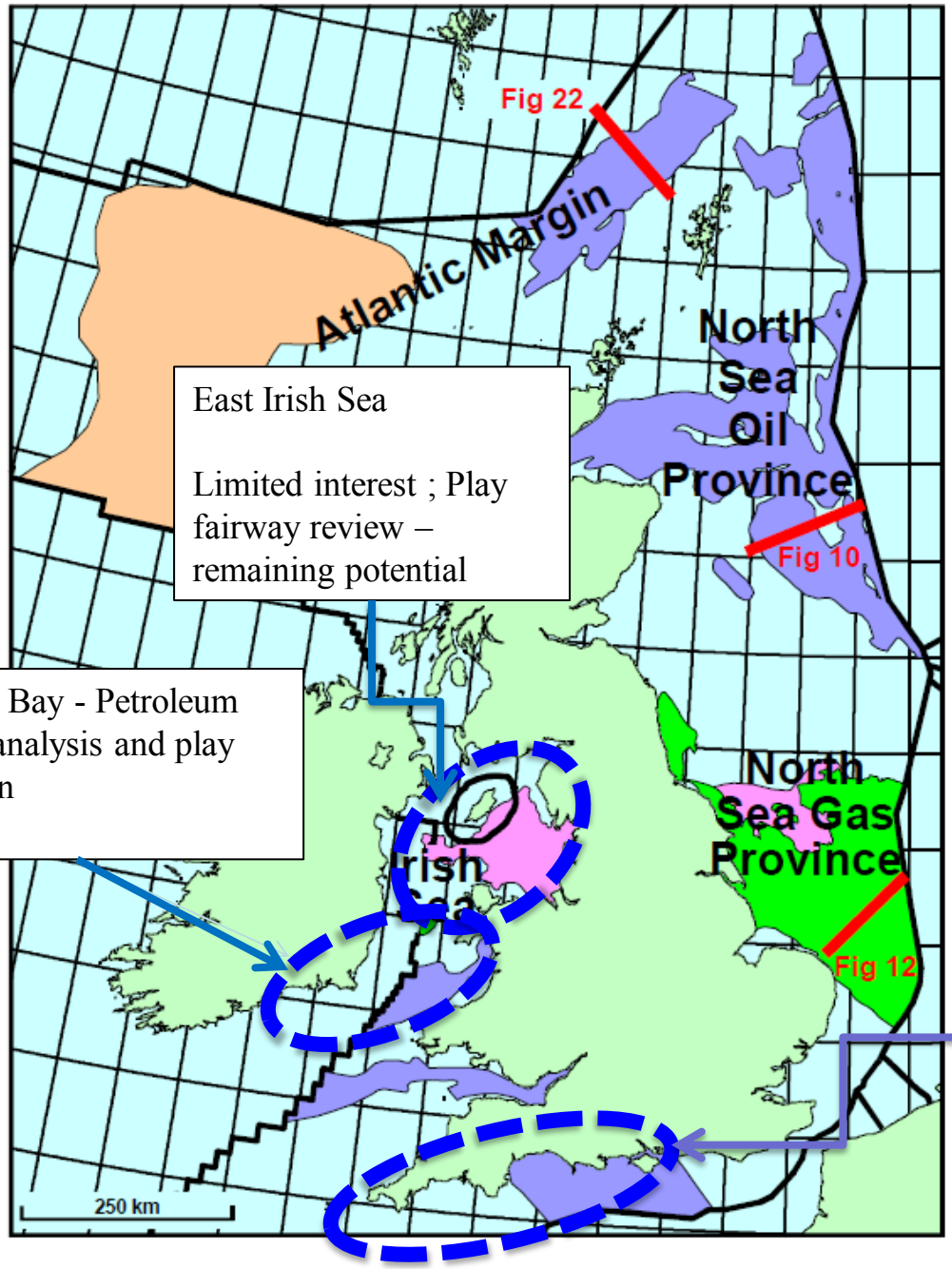
CNS/MF – complex plays with no clear consensus on key risks

- Competitive issues
- Strong infrastructure 'demand'
- Propose a Well Failure analysis

The Palaeozoic, Mid North Sea High and East Sheltand Platform – known source rocks, but unknown extent. Potential for new plays

Fig. 4 Distribution of oil and gas provinces and petroleum source rocks on the UK Continental Shelf

After DECC



East Irish Sea

Limited interest ; Play fairway review – remaining potential

Cardigan Bay - Petroleum systems analysis and play evaluation

SW Approaches – under explored
Need to establish extent of source kicthens

Fig. 4 Distribution of oil and gas provinces and petroleum source rocks on the UK Continental Shelf

After DECC

New plays – invest to generate the investment case

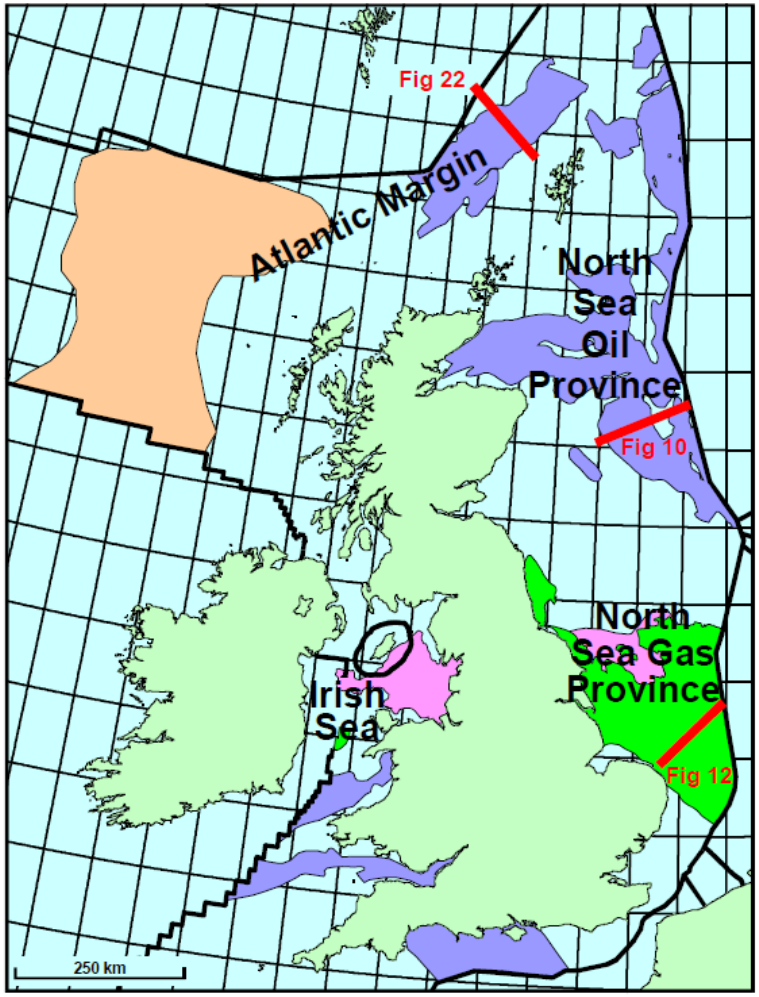


Fig. 4 Distribution of oil and gas provinces and petroleu
UK Continental Shelf

- There are a number of frontier basins around the UK that are not being explored
- Each has elements of a successful petroleum system (e.g. source rock)
- To explore these plays requires
  1. Structured play fairway analysis to prepare understand the resource potential and scale (prospect size) in these frontier basins
  2. Actively promote the new story to the industry (i.e. market the UK)
  3. Link the geoscience work to a programme of licencing rounds working round the frontier basins of the UKCS
  4. In parallel sponsor data acquisition from a major contractor – perhaps link the purchase of the data to the participating in the round

Existing plays –
Invest in geoscience to improve understanding of exploration prospectivity for better prospect volume and risk prediction

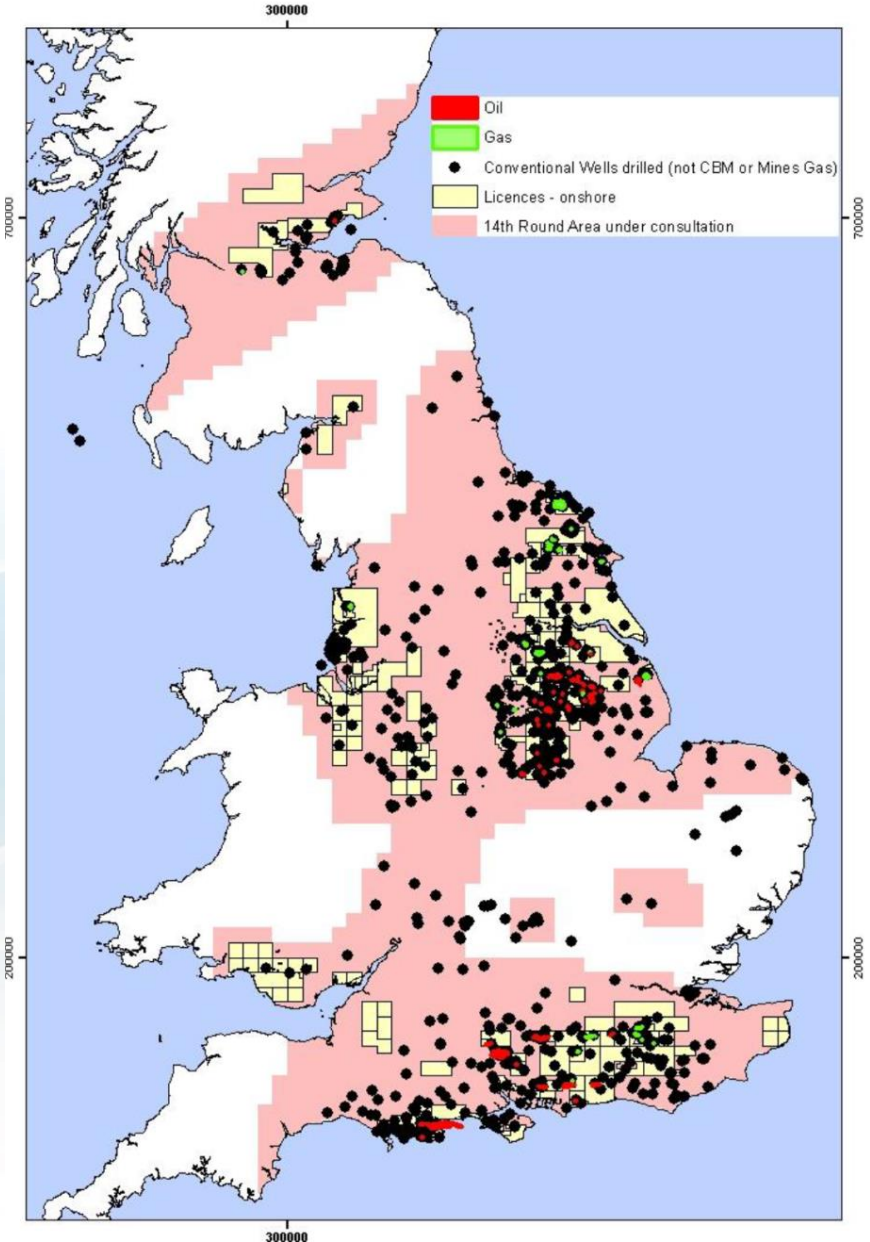
- No single company has the access to data, or resources to undertake the basin scale geoscience studies needed to better understand the petroleum systems in the UKCS and improve exploration performance
- Without improved understanding
  - Exploration performance will decline – further dry wells will drive away investment
  - The UK does not have a good understanding of the remaining resource potential of the basin – and thus cannot actively manage our resource base

Consider this Norwegian example that makes the point…….

What is the government doing?

- Set up the Oil and Gas Authority
- Sponsored the 21st Century Road Map study
- Engaged BGS to undertake a study of the Palaeozoic
- Hired Christian Matthieu to undertake a well failure analysis of the Central North Sea and Moray Firth.

14th Onshore Licence Round



- Not JUST shale and CBM
- Competitive bids submitted 28 Oct 2014
- PEDL 5 yr 1st Term
  - relinquishment at term end
  - Subject to Retention or Development areas
- 2nd term is appraisal & development – 5 yrs
- 3rd term is production – 20+ yrs

Size of the Prize

- BGS 1329 tcf Bowland Shale GIIP
- Assume 10% recovery - 133 tcf
- 3tcf pa UK current demand
- That's 44 years supply or….
- 88 years at 50% or **133 yrs at 33%**

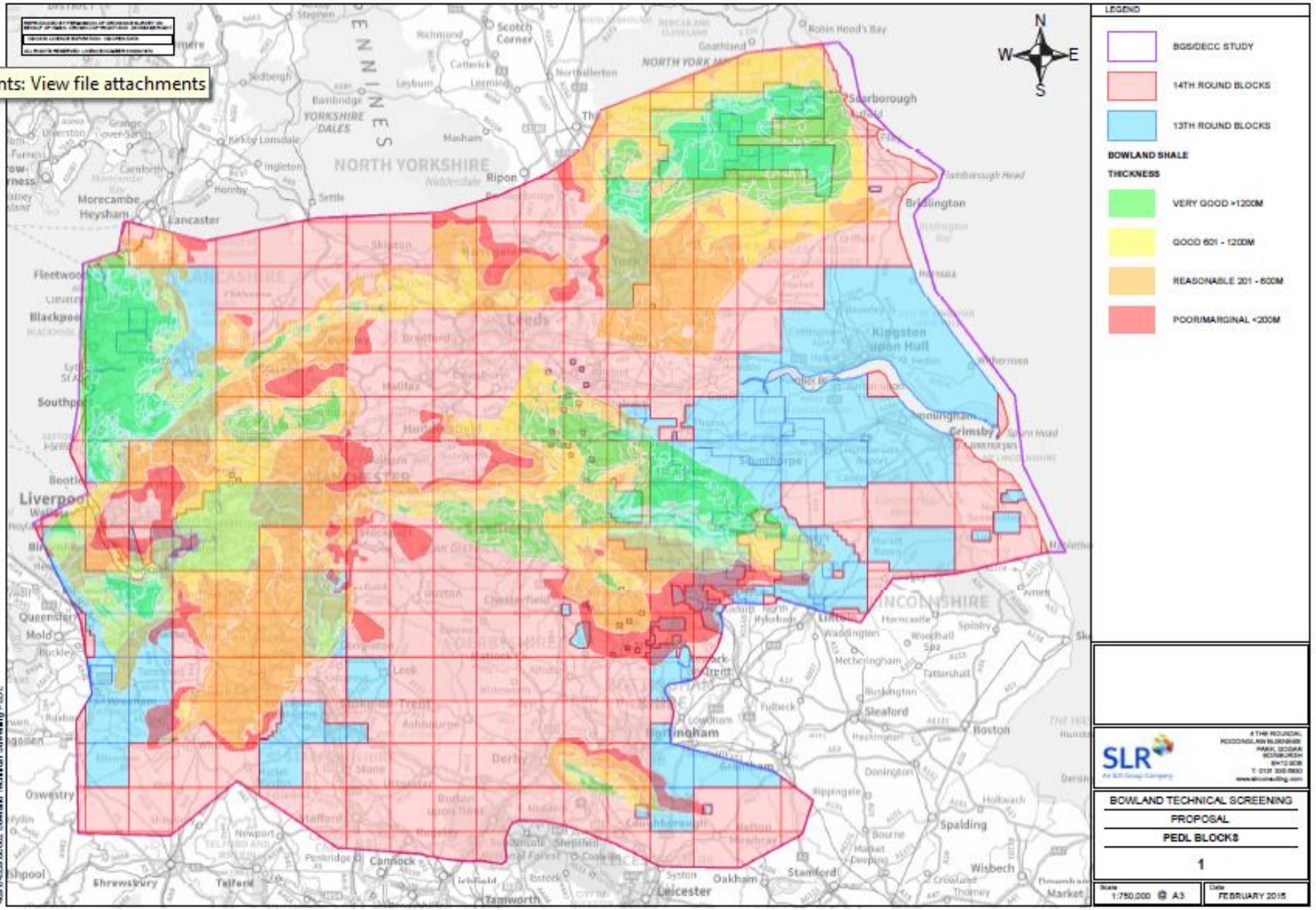
The bigger picture

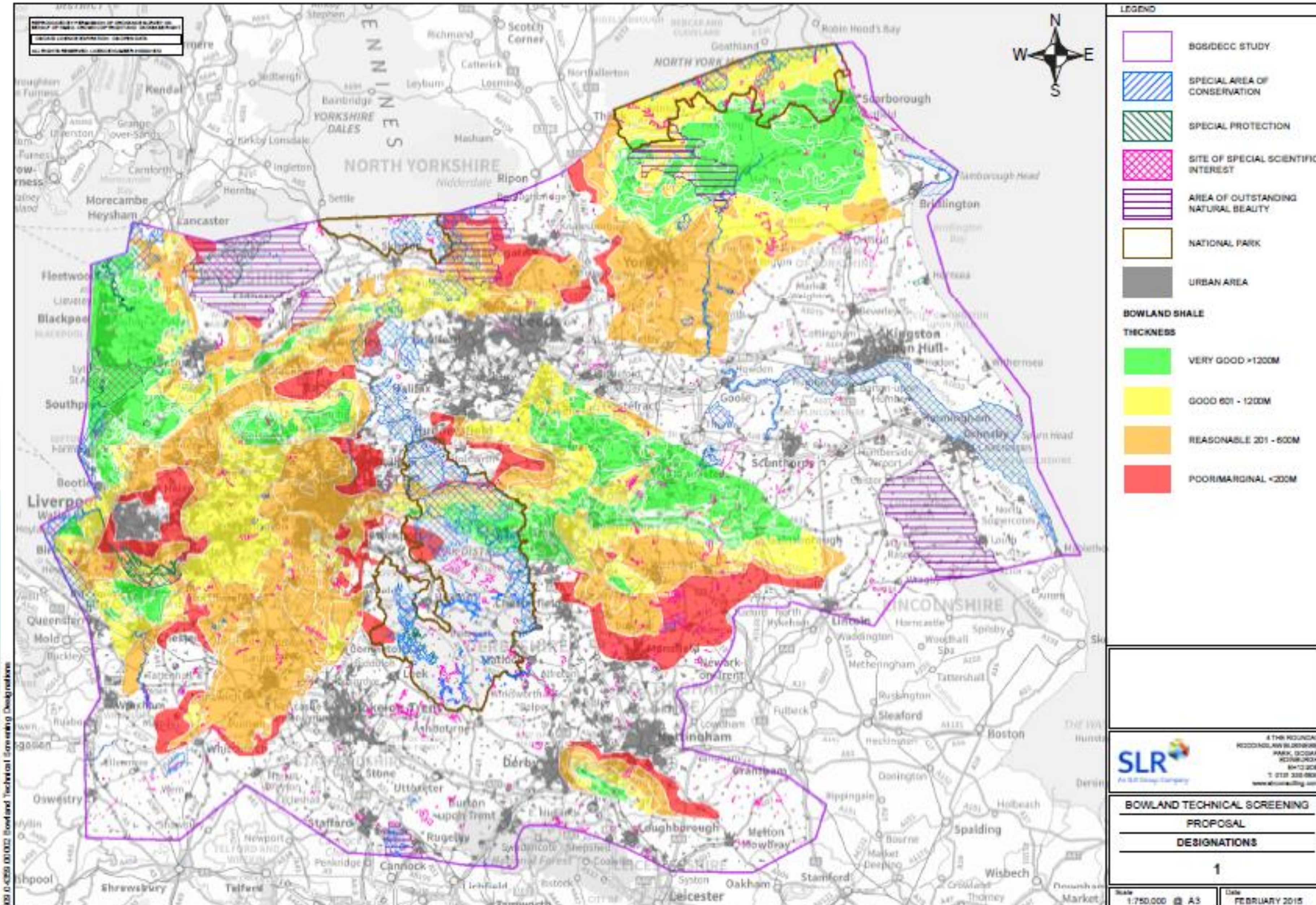
•For every therm imported, HMRC derives 0 direct tax revenue

•For every therm of imported gas displaced by UK Shale, HMRC derives ~ 60% marginal tax

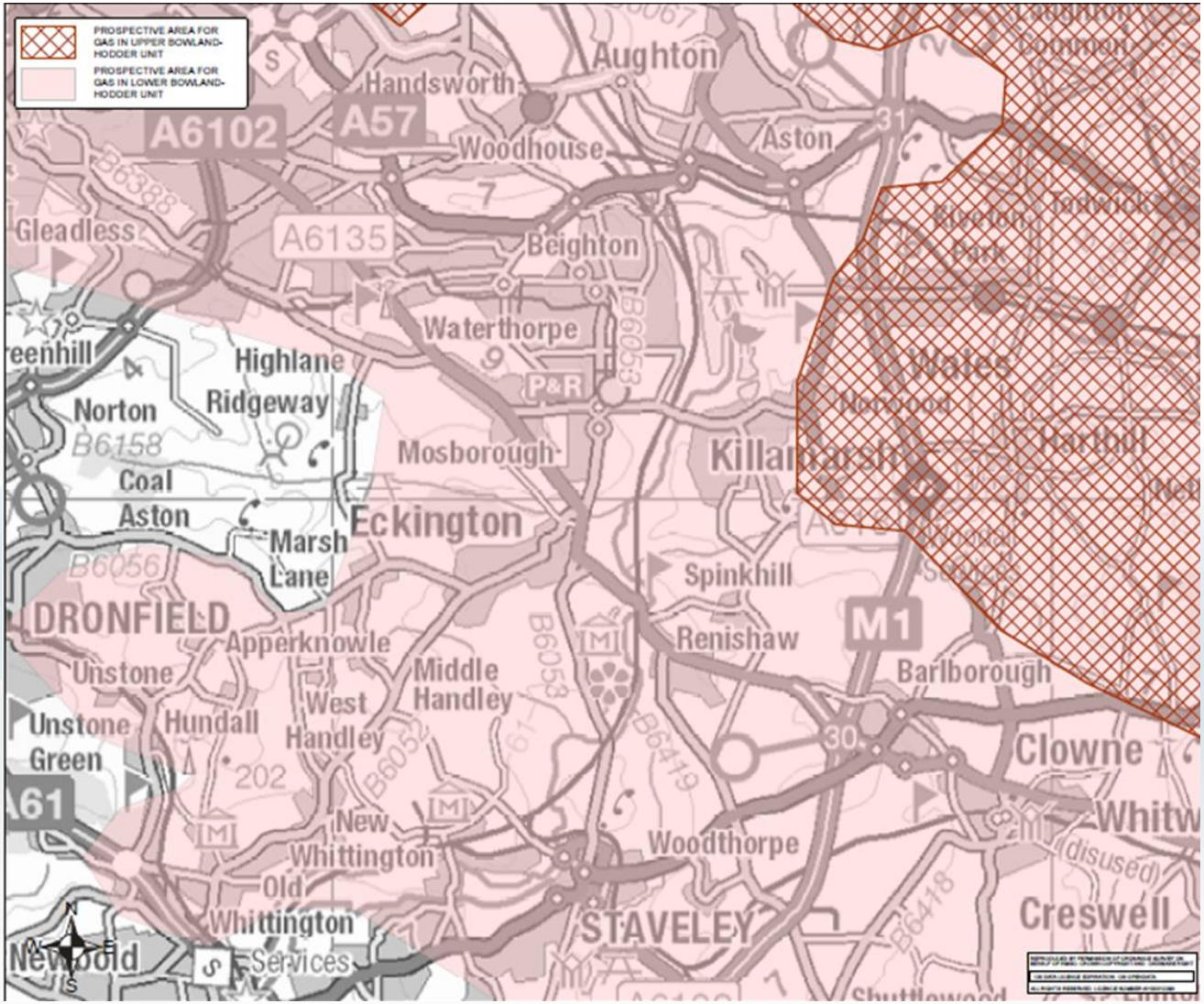
•For Bowland Shale alone, & using high level assumptions, HMRC may derive +/- £100bn

•Jobs: IOD suggest ~ 74,000


ments: View file attachments
N
W
E
S
LEGEND
BGS/DECC STUDY
14TH ROUND BLOCKS
13TH ROUND BLOCKS
BOWLAND SHALE
THICKNESS
VERY GOOD >1200M
GOOD 601 - 1200M
REASONABLE 201 - 600M
POOR/MARGINAL <200M
NORTH YORKSHIRE
YORKSHIRE DALES
LINCOLNSHIRE
Leeds
Liverpool
Nottingham
Leicester
Scarborough
Ripon
Lancaster
Morecambe
Heysham
Blackpool
Fleetwood
Southport
Bridlington
Kingston upon Hull
Grimsby
Boston
Spalding
Sleaford
Wisbech
Stamford
Oakham
Cannock
Telford
Shrewsbury
Oswestry
Mold
Queensferry
Scotch Corner
Robin Hood's Bay
Whitby
Skipton
Harrogate
York
Doncaster
Scunthorpe
Lincoln
Newark
Derby
Stafford
Tamworth
SLR
BOWLAND TECHNICAL SCREENING
PROPOSAL
PEDL BLOCKS
1
1:750,000 @ A3
FEBRUARY 2015

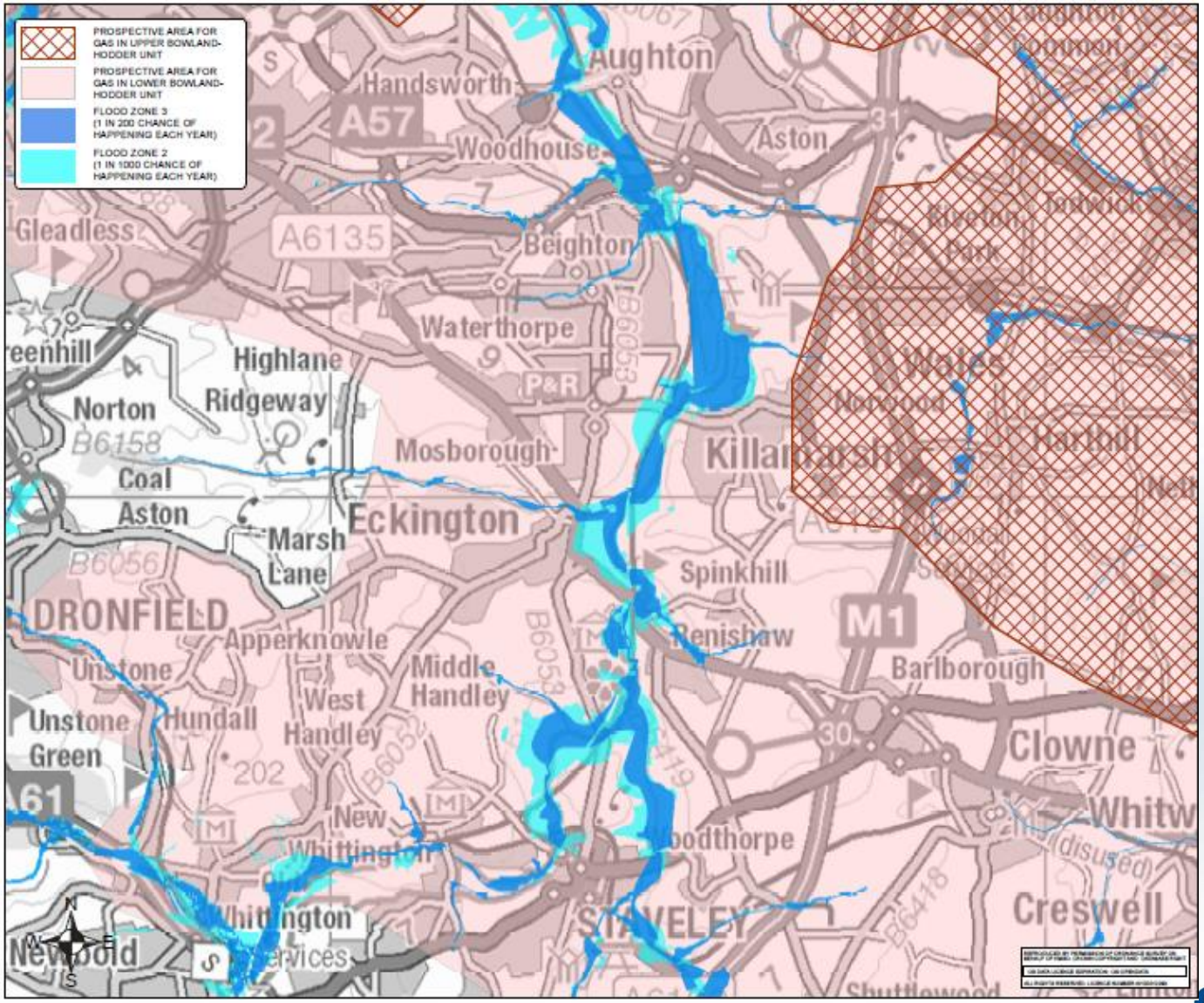

LEGEND
BGS/DECC STUDY
SPECIAL AREA OF CONSERVATION
SPECIAL PROTECTION
SITE OF SPECIAL SCIENTIFIC INTEREST
AREA OF OUTSTANDING NATURAL BEAUTY
NATIONAL PARK
URBAN AREA
BOWLAND SHALE THICKNESS
VERY GOOD >1200M
GOOD 601 - 1200M
REASONABLE 201 - 600M
POOR/MARGINAL <200M
SLR
BOWLAND TECHNICAL SCREENING
PROPOSAL
DESIGNATIONS
1
Scale 1:750,000 @ A3
Date FEBRUARY 2015
NORTH YORKSHIRE
LINCOLNSHIRE

Licence Block – Gas Resource



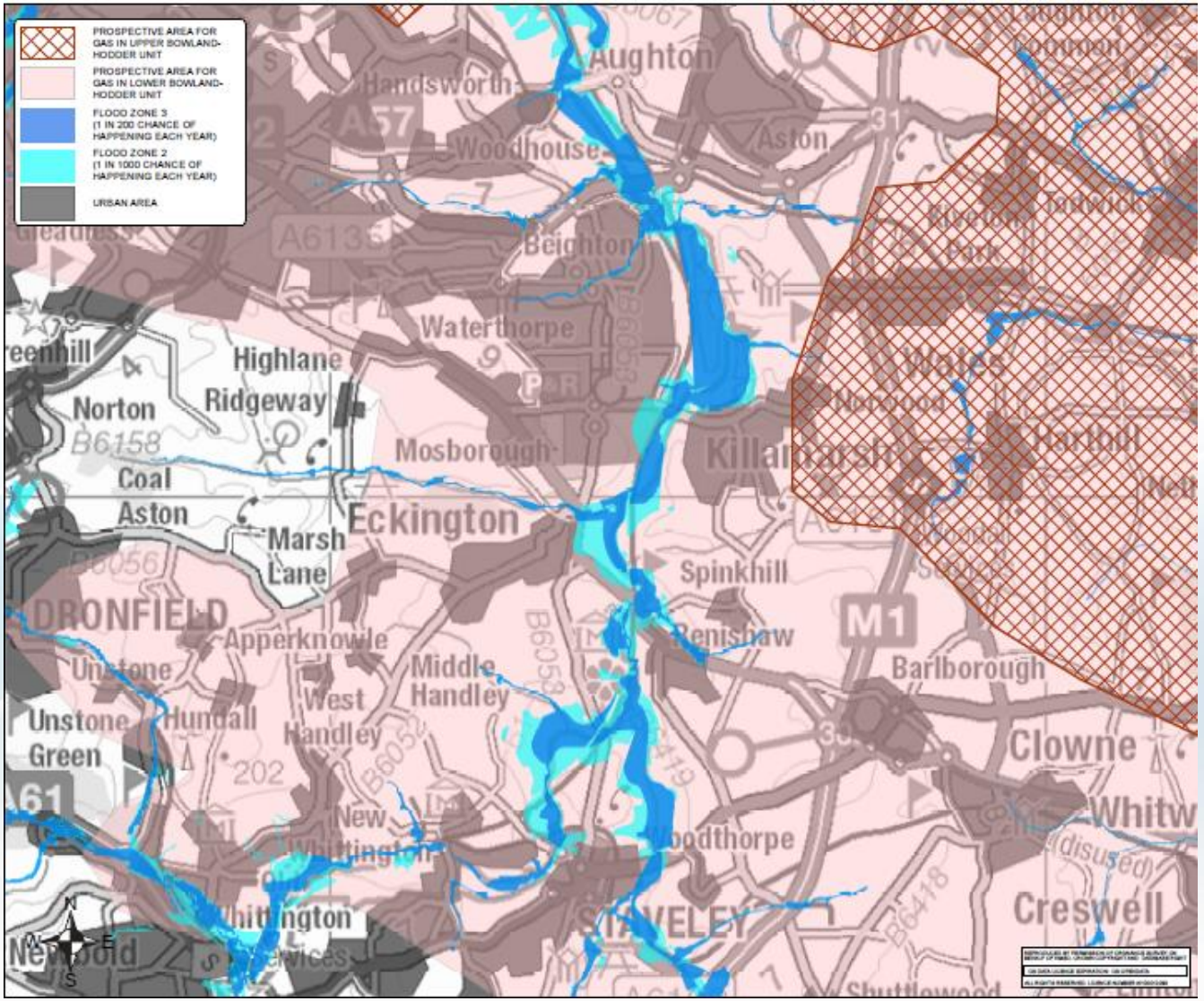
SLR

Flood Risk Zones



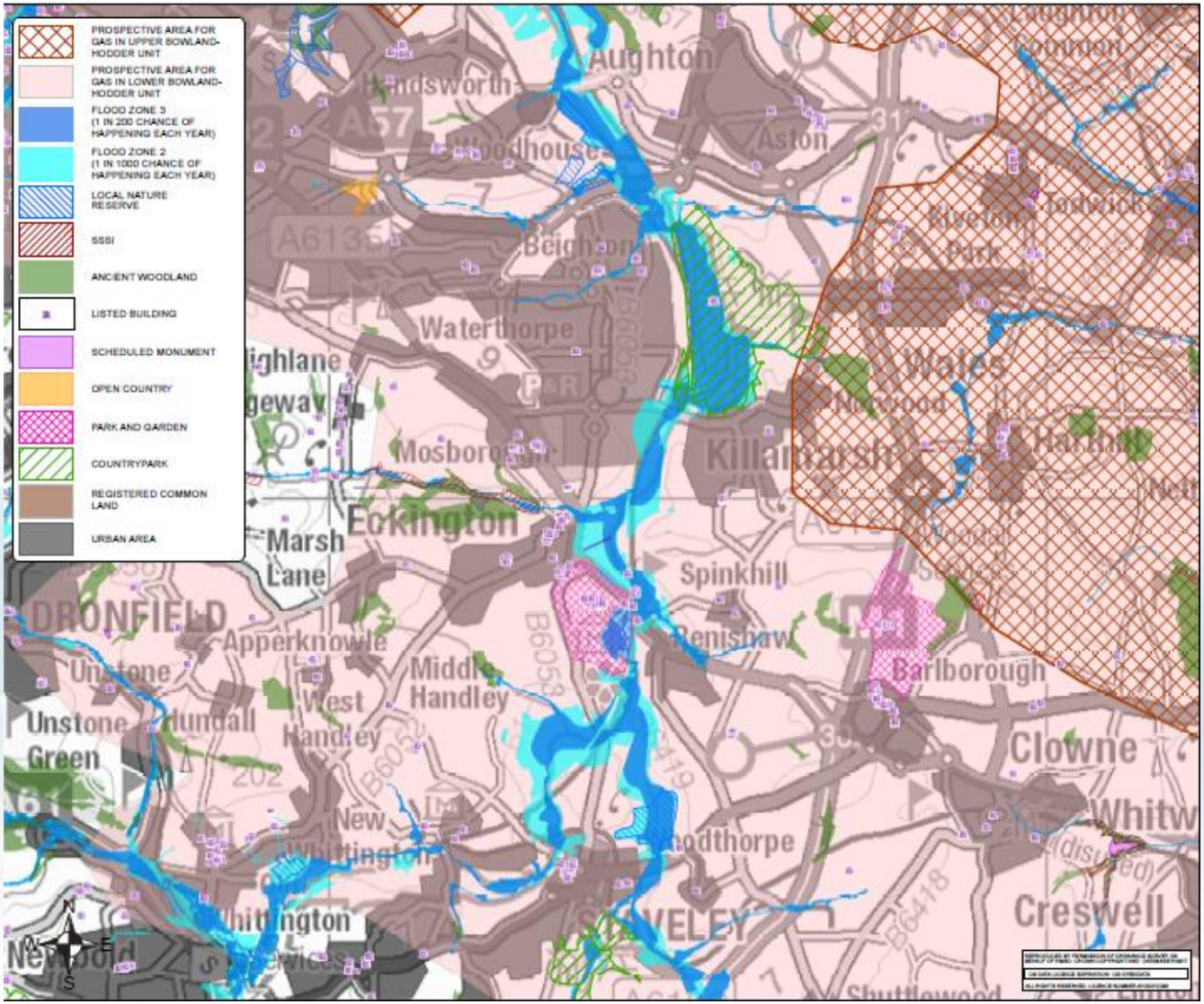
SLR

Urban Areas

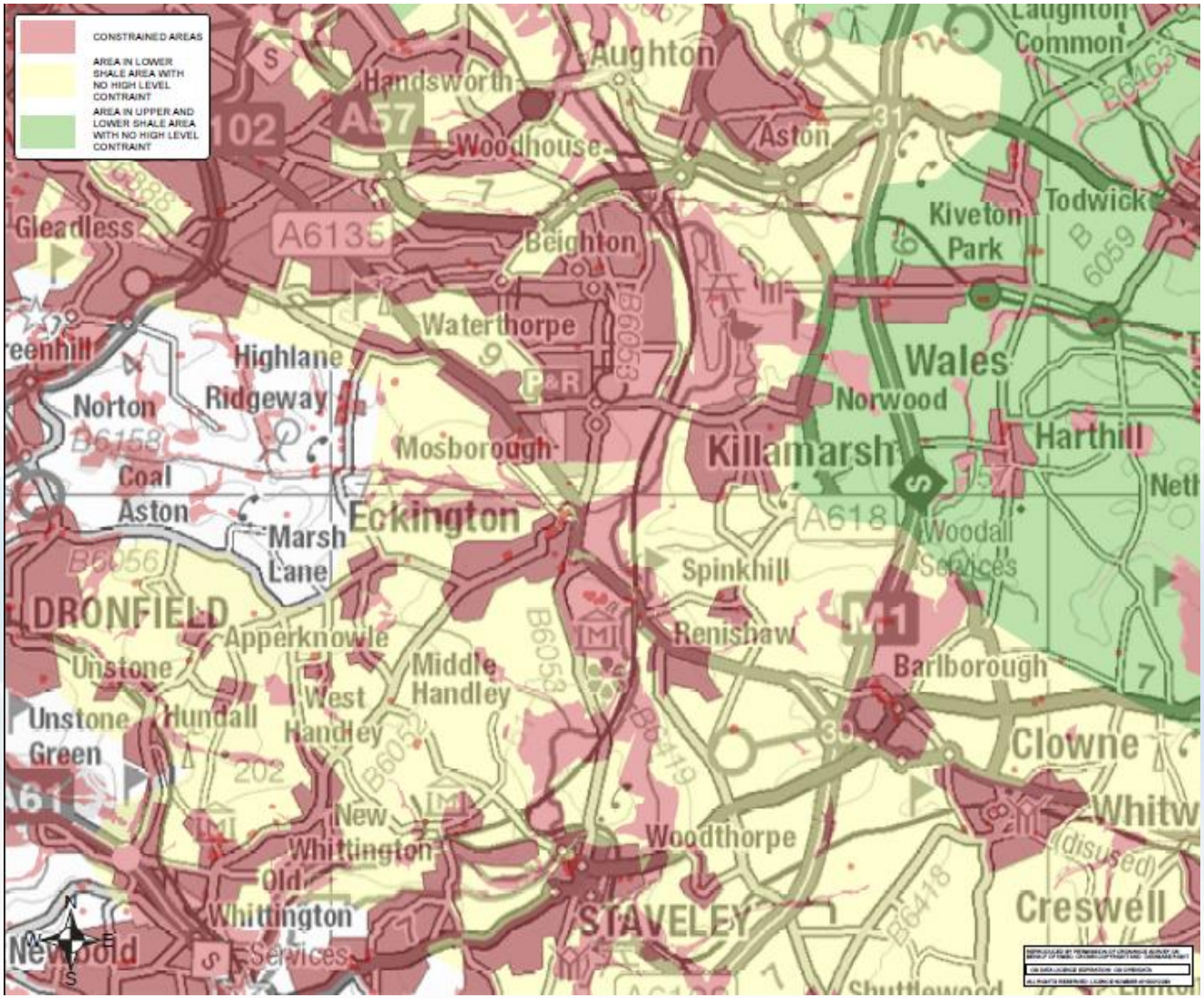


SLR

Ecology and Cultural Heritage



Constrained Area Summary

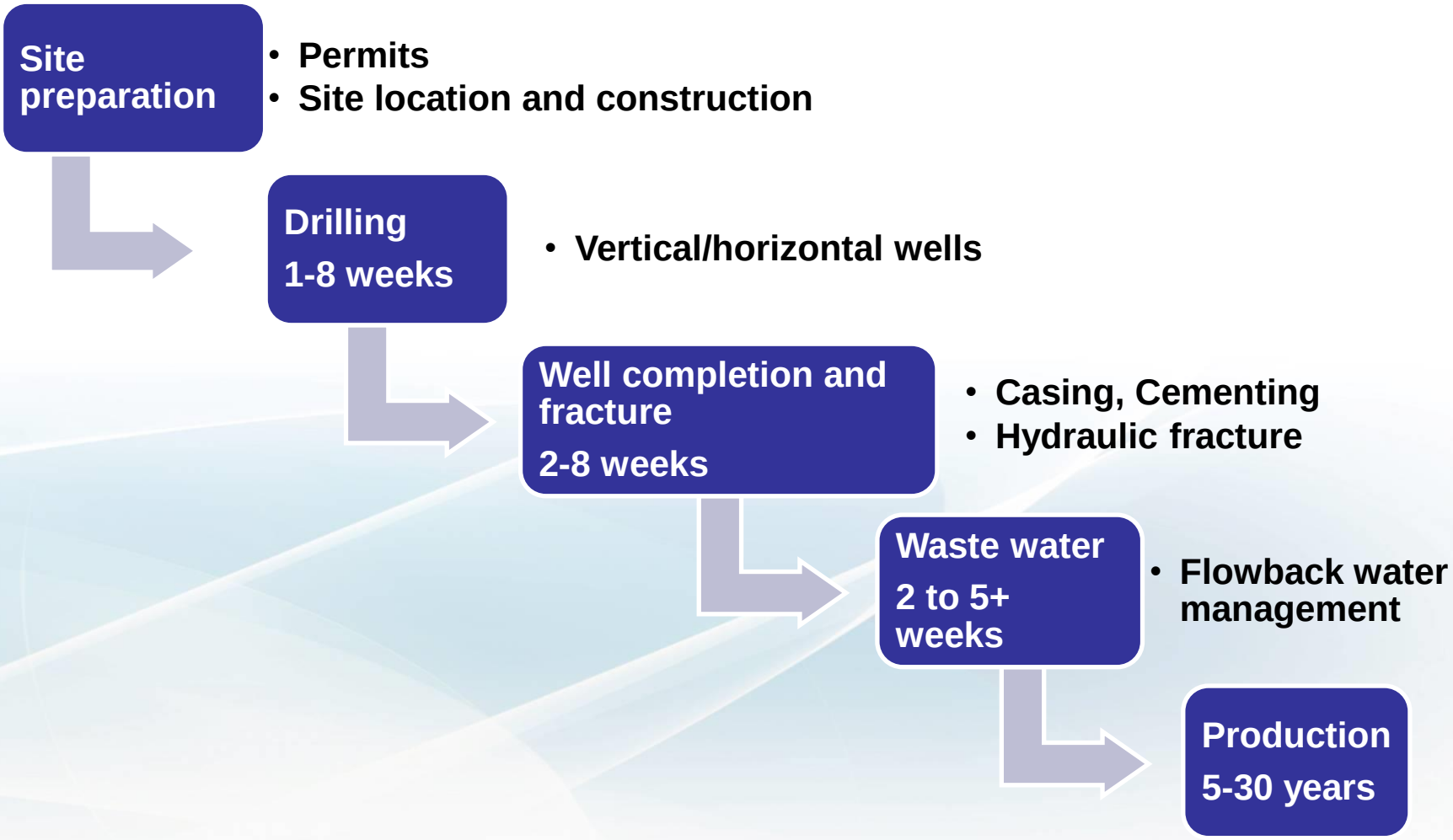


SLR

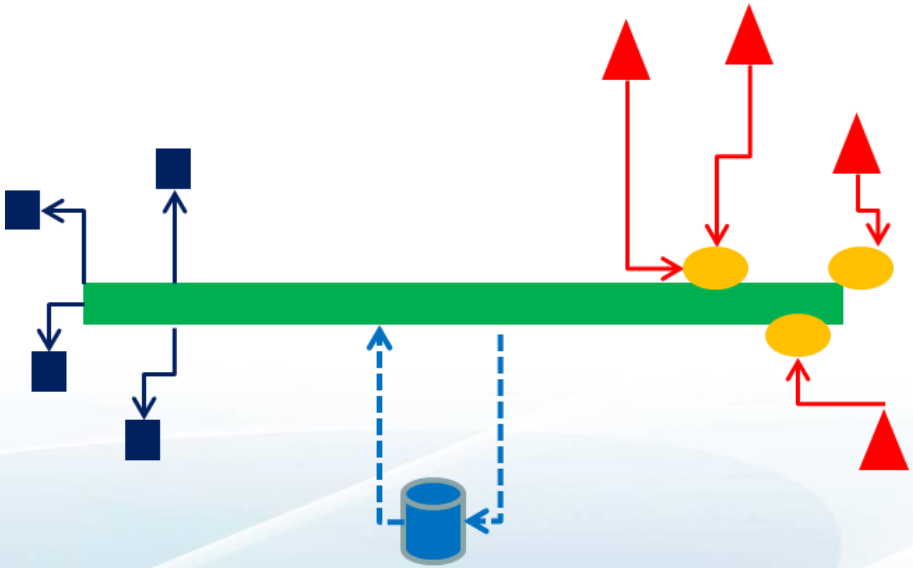
3. What's in it for the landowner?

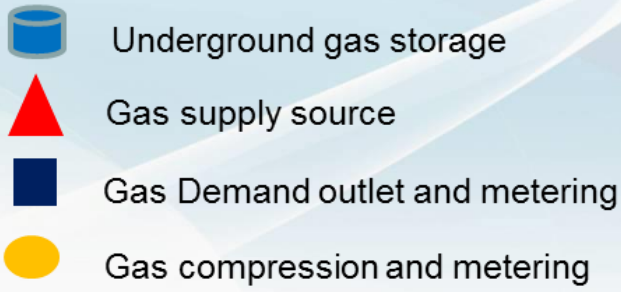
Upside	Downside
Rent	Disruption
Production related payments	Environmental impact
Community benefit	Temporary land sterilisation
Public Relations	Access/traffic
	Public Relations

The shale gas lifecycle



Connecting the market

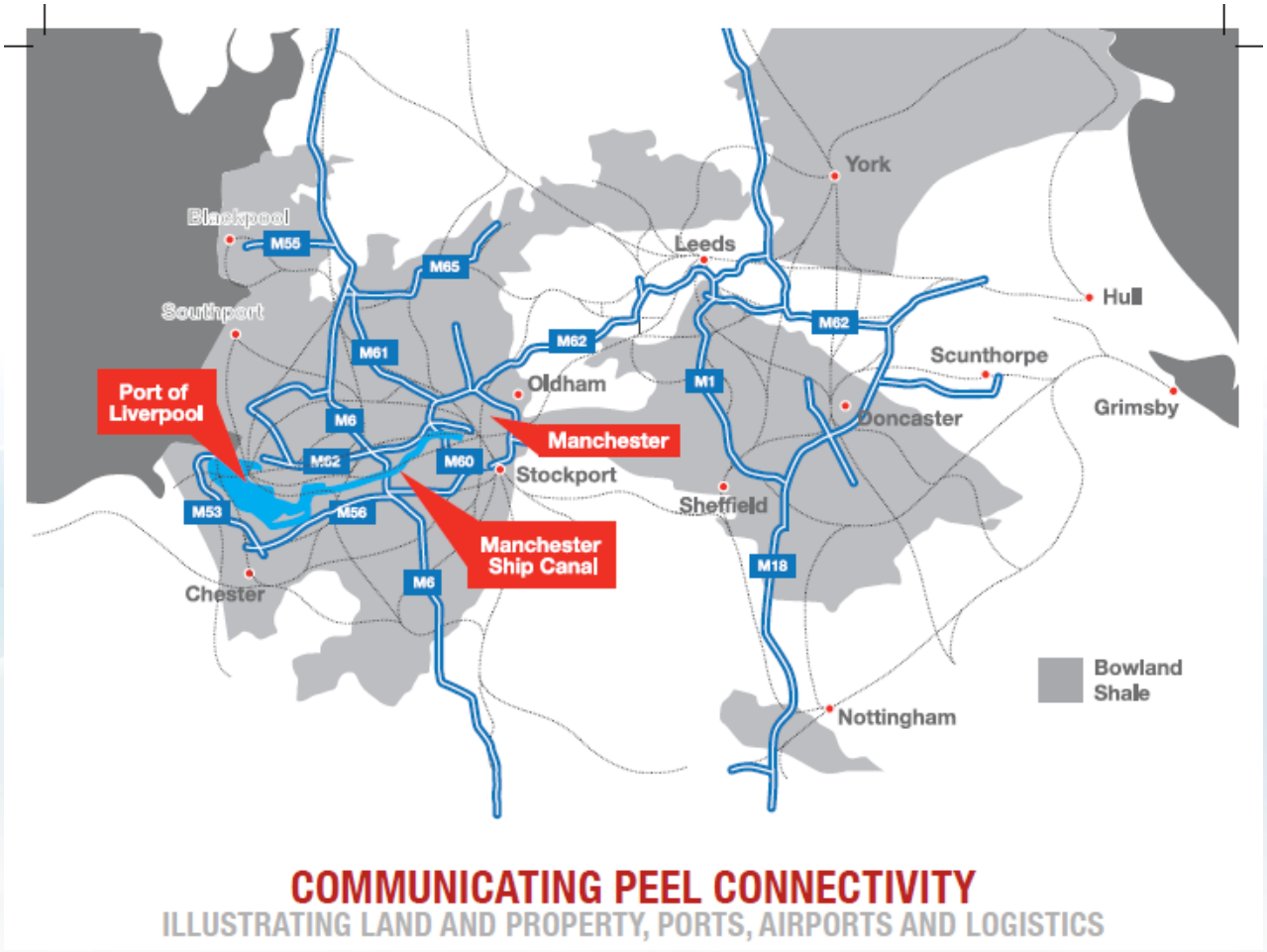




5. Peel Case Study

- Peel is major landowner in NW England overlaying attractive shale gas geology in Bowland Shale
- Has agreement with IGas and owns the land where 3 of the 5 exploratory wells were drilled at Ince, Barton Moss & Ellesmere Port
- Developed a land based proposition to 13th and 14th Round operators to take 'land risk' in return for a commercial settlement
- Formed Peel Gas and Oil Ltd to address the opportunity
- Utilises the infrastructure assets to facilitate development
  - Manchester Ship Canal for water, transport and land
  - Supply base via Port of Liverpool for steel, rig, sand etc
  - Commissioned high level assessment for pipeline to connect the market to demand centres
- Co-sponsored the 'Amion Report' on Shale Gas in the NW to supply only regional data and currently addressing the Supply chain economic case

Peel Case Study



Peel Case Study

- More than ‘just’ land ownership
- Provide an attractive ‘value proposition’ to Operators
- Risk / Reward model
- Partnership business approach
- Connect the market
- Understand and manage community impact
- UKOOG Members

Conclusions

- Powerful landowners see a business opportunity.
- Ineos farming into I-gas and partnering with Peel forms a very strong lobby group
- They will make things happen
- However it does require the government to back them
- Perhaps centralising permitting and over riding local planning authorities
- The government cannot ignore the size of the prize represented by Shale Gas.