

# MOD AVIATION AND WIND TURBINES

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- All radar (a gentle reminder)
  - Air Traffic Control radar
    - Air Defence radar
      - Low flying
      - Eskdalemuir
- Service improvement



# Turbines are a problem for radar





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# All radar

## Evidence:

- Trial Swift Crofter
- Trial Mistral Crop
- Trial Quixotic Zephyr

## Conclusions:

- Turbine Radar Cross Section (RCS) > aircraft RCS
- Turbines have an effect regardless of distance
- Most significant effects are
  - Air Traffic Control (ATC) radar = clutter and false plots
  - Air Defence (AD) radar = overhead obscuration



# ATC radar

## MOD position:

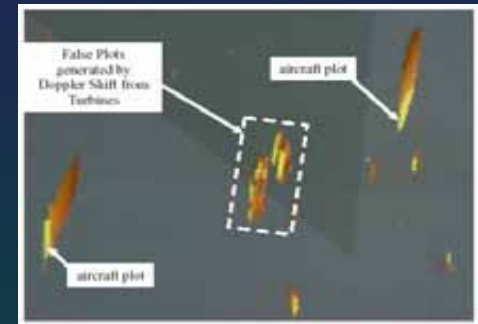
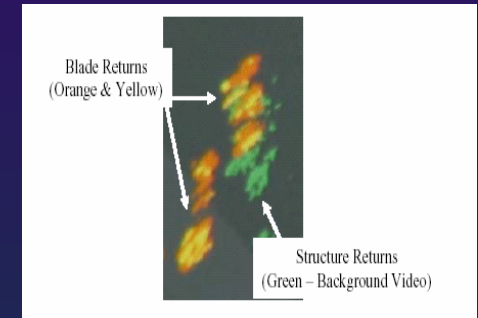
- We cannot and will not allow anything to unacceptably interfere with the top quality ATC service we provide

## Issues:

- The problem is what we can see → clutter, false plots
- Cannot have a standard policy (differences between airfields, aircraft, local environment etc.)

## Way forward:

- Keep turbines out of line of sight and away from where we control aircraft
- Trial Celtic Storm?



# AD radar

## MOD position:

- We cannot and will not allow anything to unacceptably reduce our ability to protect UK airspace (and support training for aircrew preparing for deployed operations)

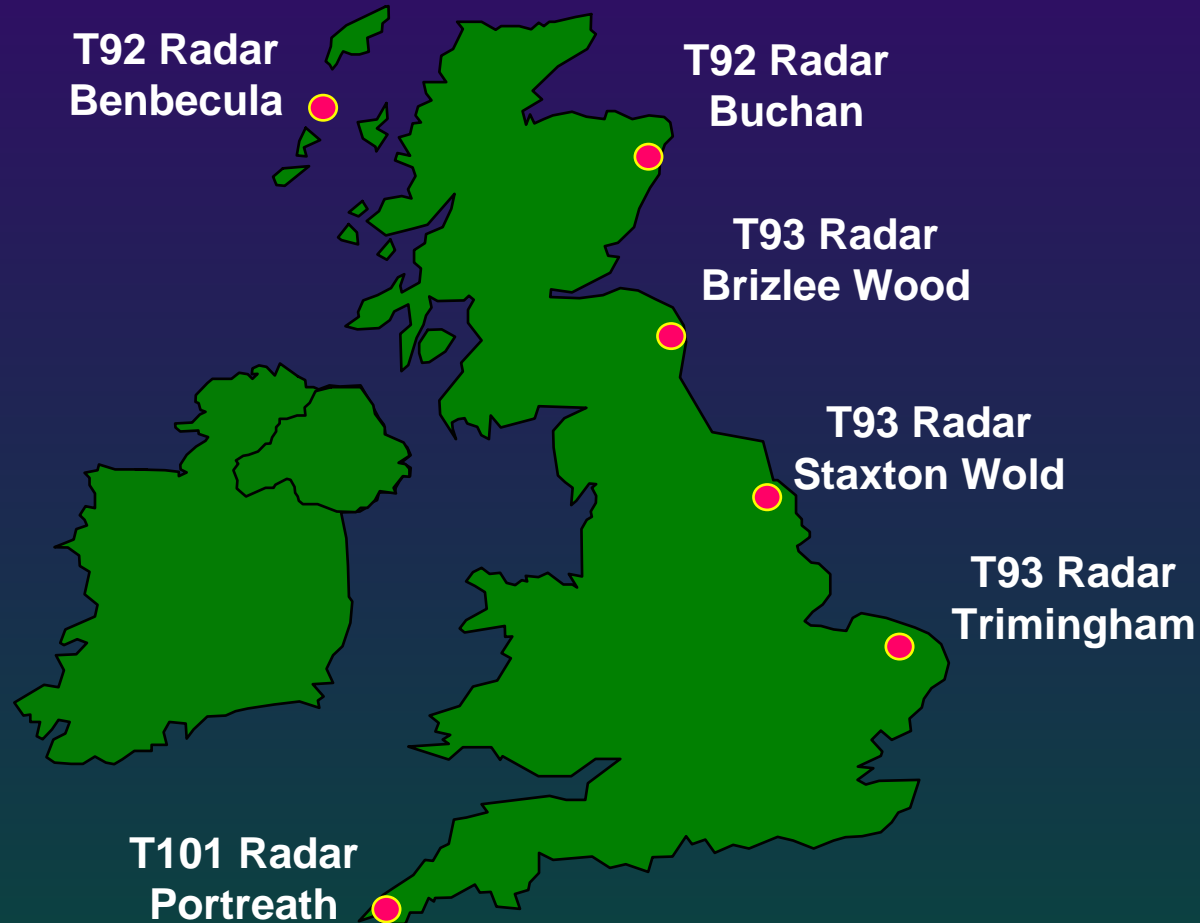


## Issues:

- The problem is what we can't see → overhead obscuration



# AD radar

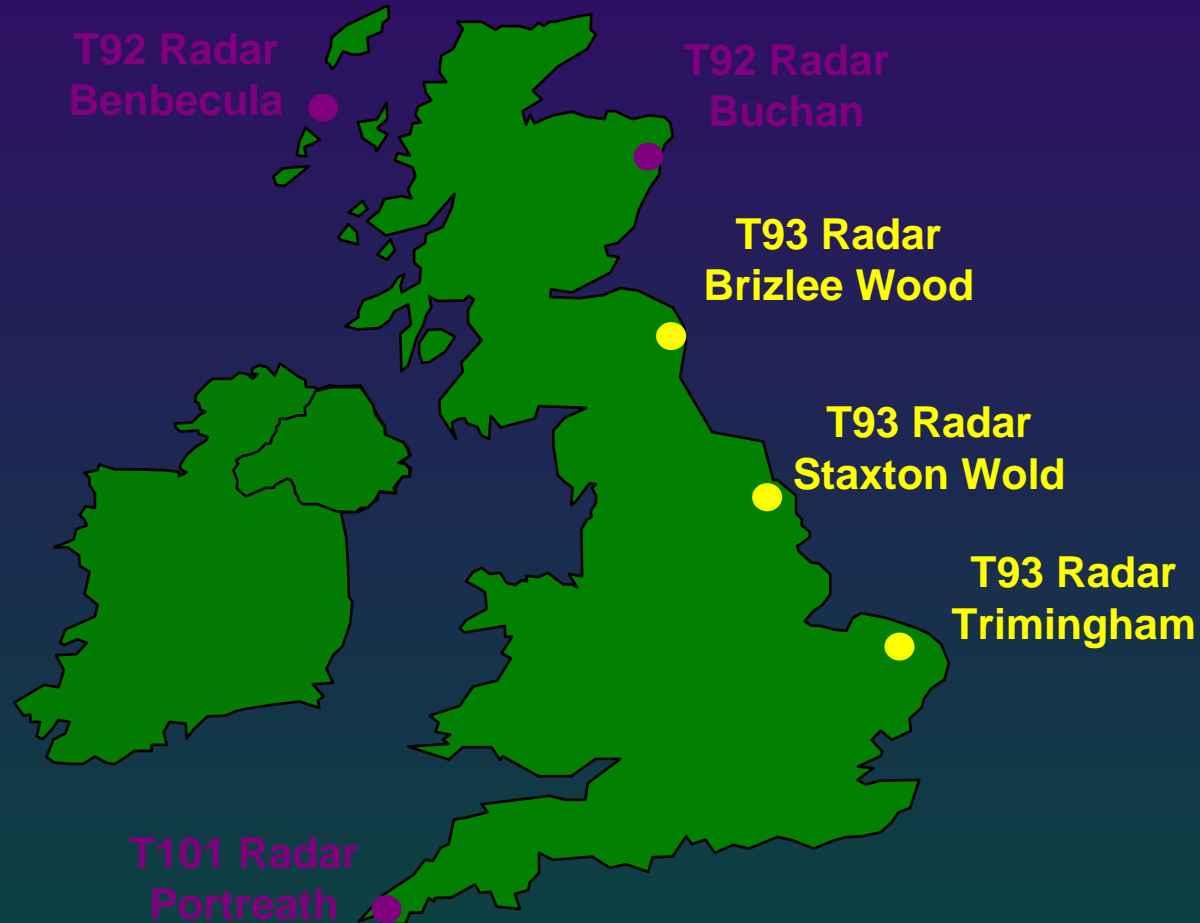


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# AD radar



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# AD radar

## AD radar upgrade / replacement programme:

- MOD planning to upgrade / replace T93
- Wind turbines mitigation is a **desirable** requirement
- Aiming to let contract by the end of 2006
- Earliest radar in place c. end 2007 / early 08



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# AD radar

## AD radar upgrade / replacement programme:

“Mitigation” (**not** a solution)

- Beam independent clutter maps to reduce effect of ground returns on upper beams
- High resolution clutter maps to prevent large dead zones around turbines and
- Advanced processing in background averager to reduce influence of noise spikes
- It is hoped that these could reduce the cylinder of dead air around / above each turbine



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# AD radar

## Way forward:

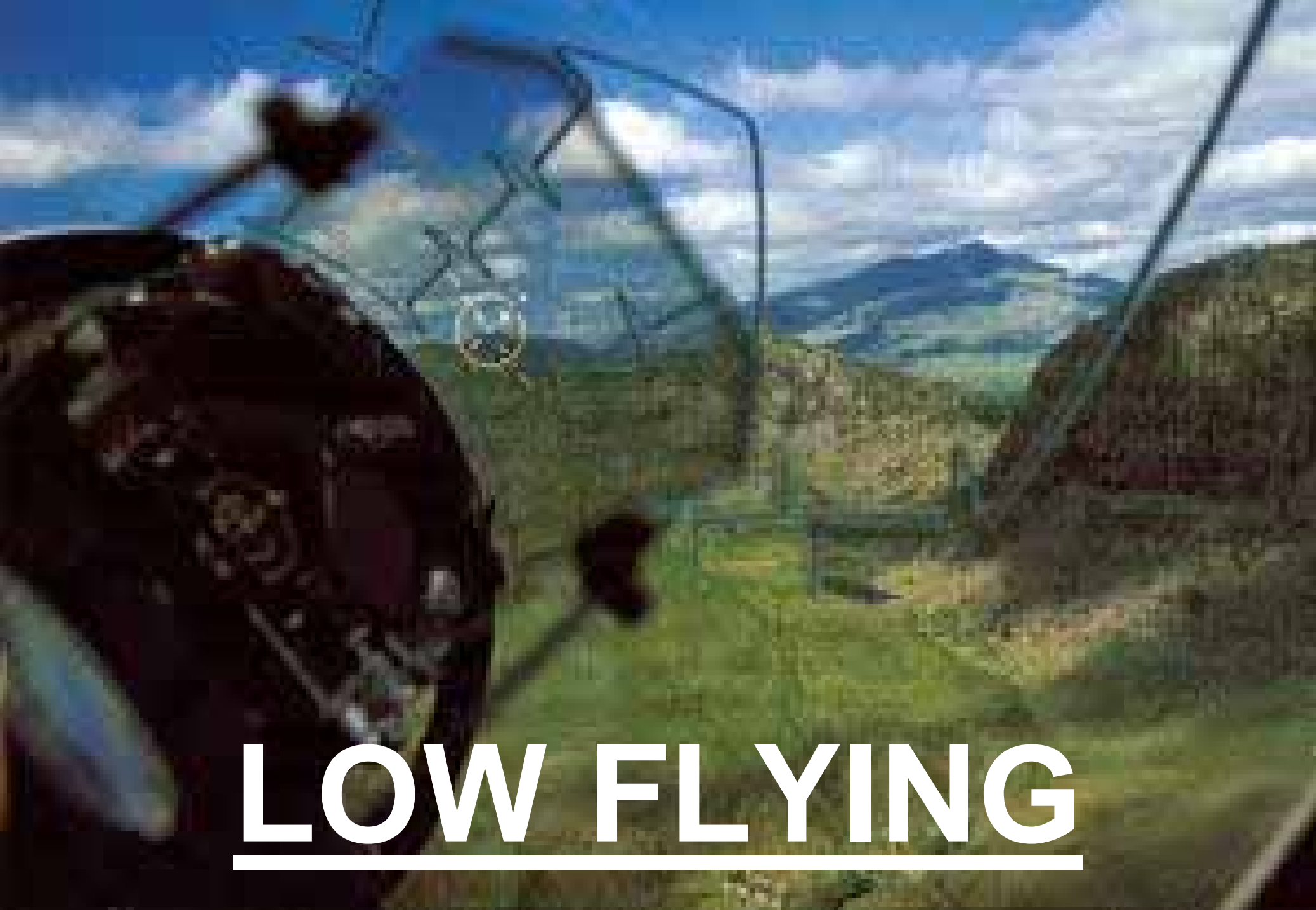
- You do your bit first (but we will work with you)
- “Tool box” approach
  - Turbine height
  - Layout
  - Lightning conduction
  - Stealth technology
- AD radar upgrade / replacement programme?
- In-fill radar?



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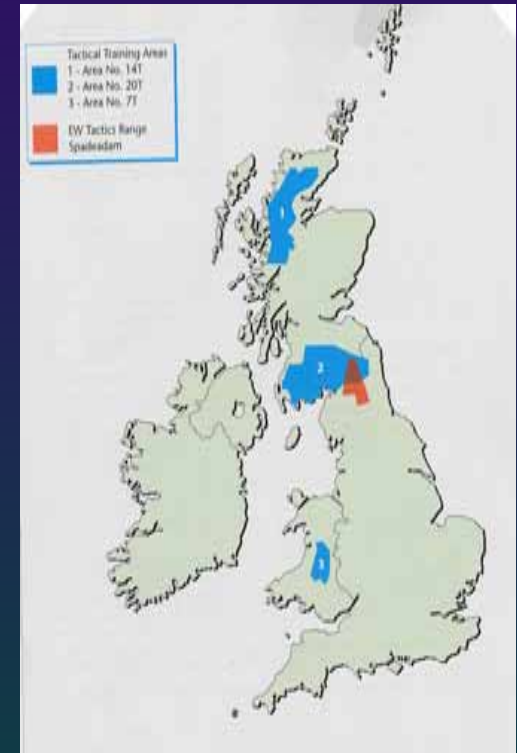




**LOW FLYING**

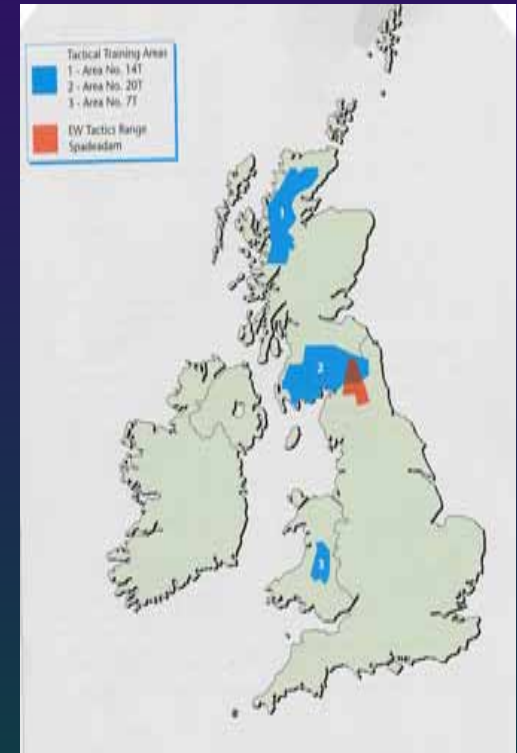
# Low Flying

- **Not** a safety issue!!
- UK Low Flying system
  - 14 Low Flying Areas
  - 8 Dedicated User Areas
  - 3 Tactical Training Areas
    - Mid Wales
    - Scottish Borders
    - North West Scotland
  - Electronic Warfare Tactics Range (EWTR) Spadeadam



# Low Flying

- Fixed wing fly down to 250ft in UKLFS
- Operational Low Flying = 100ft
- Many avoidance areas
- Limited resource
- Simulators/offshore training of limited use
- Need complete tactical freedom
- Single aircraft / formations

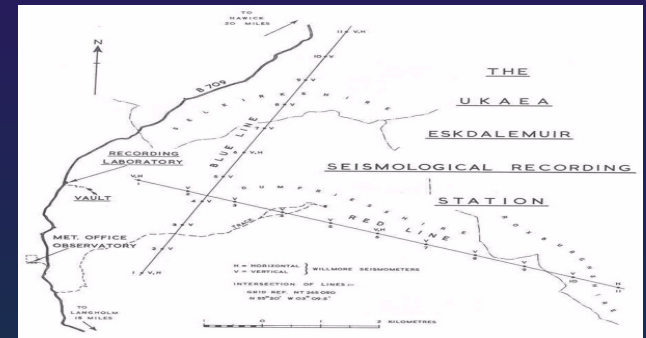




# ESKDALEMUIR

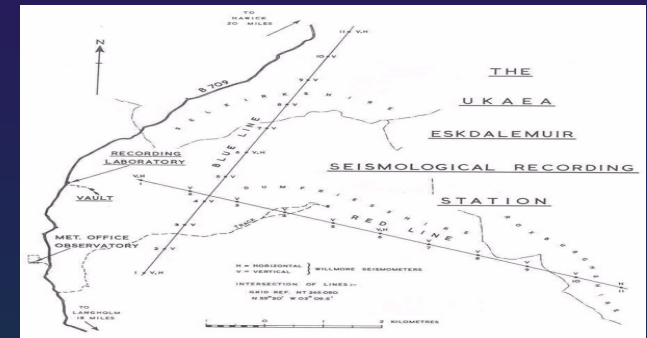
# Eskdalemuir

- Longest operating steerable seismometer array
- First statutory wind energy safeguarded area
- No wind turbines closer than 10km to the array
- Seismic noise budget for 10-50km area = 0.336nm
- Turbines 50+ km from array unlikely to be a problem
- Turbines 25+ km likely to provide greatest benefit

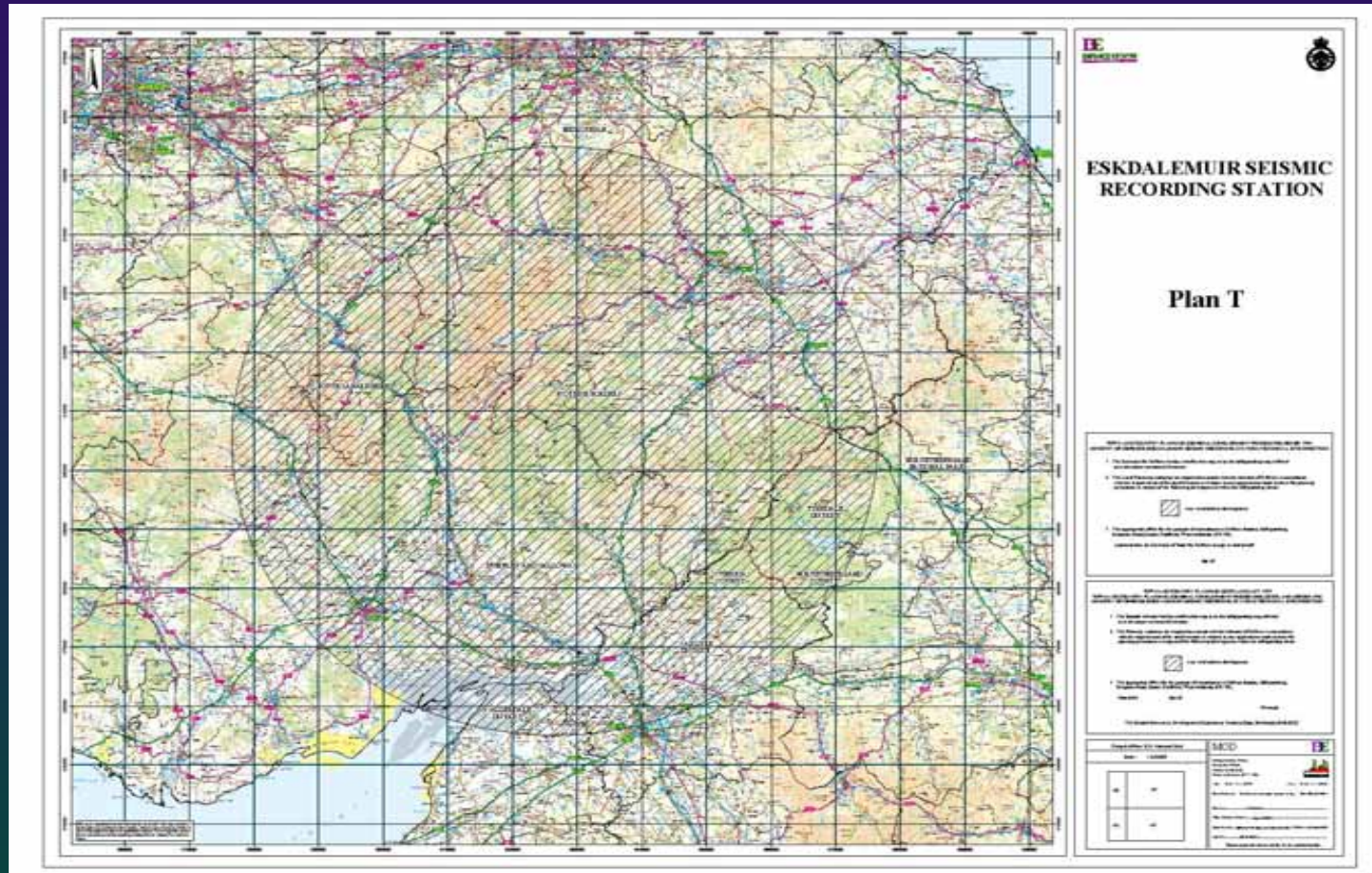


# Eskdalemuir

- Seismic noise budget almost used up
- Once consented turbines have used it up we will say no
- We are assuming turbines of current design
- Different designs and construction methods may help
- Don't forget other MOD issues and other stakeholders



# Eskdalemuir



# Service improvement

## Current position:

- Pre-planning consultation system
- Designed in the past
- Too risky for now / the future
- Too resource intensive
- We must (and will) do better (for us and you!)



# Service improvement

## The future:

- Introduce a three-stage, statutory process
- Stage 1 → Initial assessment
- Back to developer (to take forward with other stakeholders?)
- Stage 2 → Full assessment of schemes which make it to planning
- Stage 3 → Consultation by planning authority
- Need investment → may have to charge



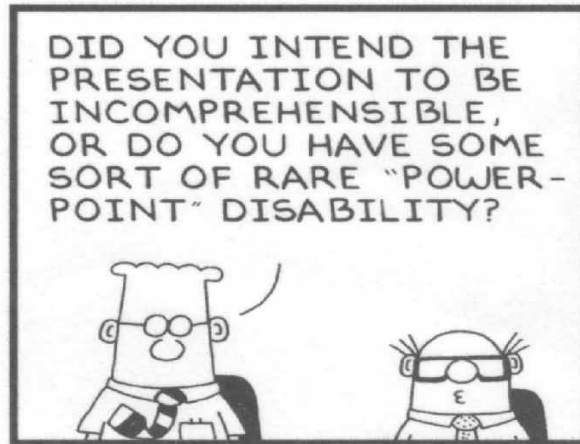
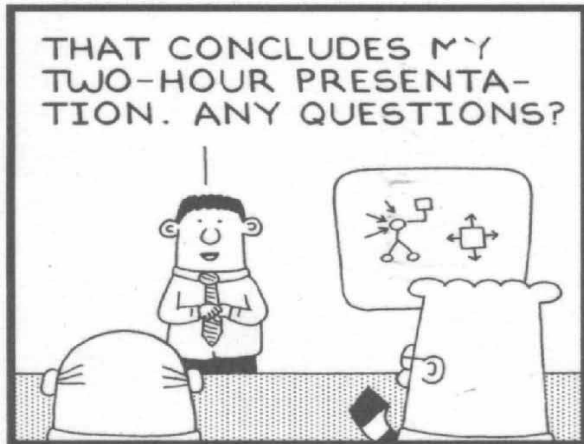
# Conclusion

- Those are the main risks / issues / concerns
  - We want to do better (for you and us!)
    - We have come a long way
    - Resources are tight for all of us
  - Need to concentrate on what will give the best results
  - We will always try and find a solution (if there is one!)
    - Please let us have your suggestions
- Let me or anyone in my team know if you have any comments



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