

Aviation & Radar Report

West London Devco

Uxbridge Tower

1st March 2019

PLANNING SOLUTIONS FOR:

- Solar
- Telecoms
- Railways
- Defence
- Buildings
- Wind
- Airports
- Radar
- Mitigation

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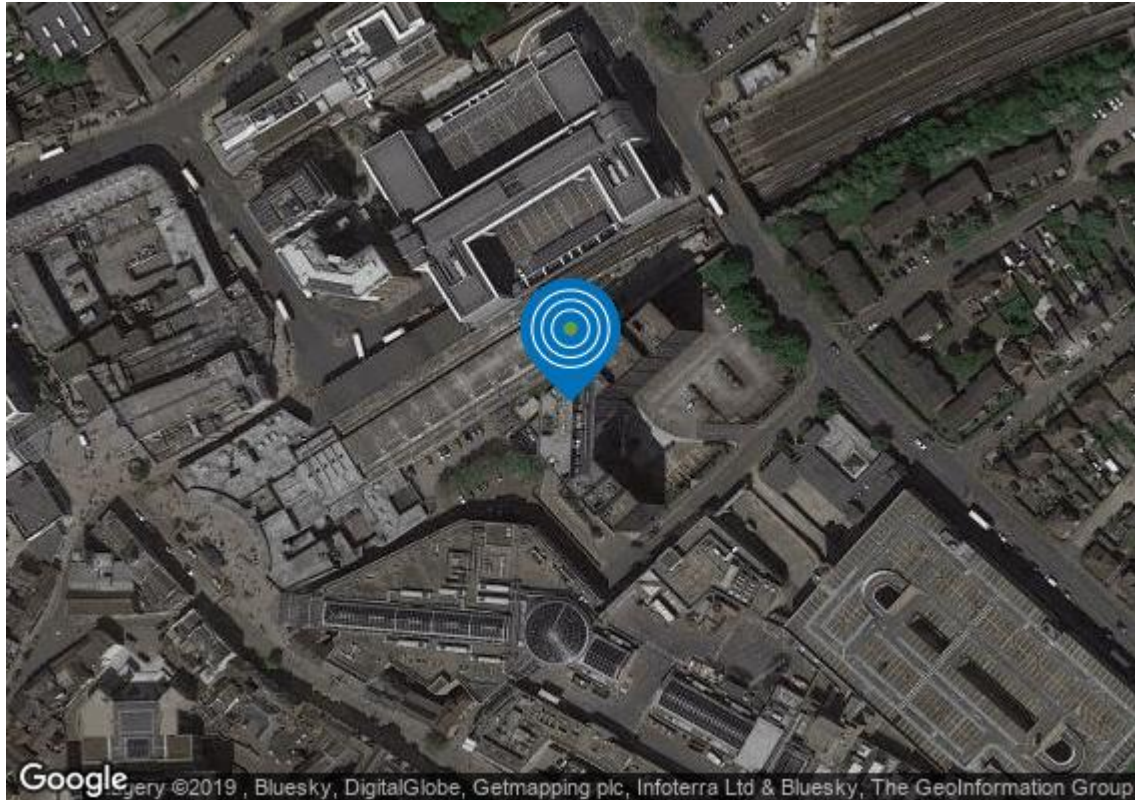
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This assessment was requested on 1st March 2019 at 10:03.

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1 ASSESSED SITE: UXBRIDGE TOWER



Structure	Coordinates		Height (agl)
UT1	505696	184175	50m

2 REPORT PURPOSE

Purpose

The purpose of this assessment is to inform developers about potential planning risks relating to aviation and radar.




This report has been prepared automatically and has not been professionally reviewed which means results are indicative only.

This is not a scoping report. It is a basic overview of identified aerodromes and radar that could be affected by the proposed development.

Considered in this Assessment




- | | |
|--|--|
| <ul style="list-style-type: none"> • NATS En-Route Primary Surveillance Radar (PSR) • NATS En-Route Secondary Surveillance Radar (SSR) • Aeronautical Radio Navigation Beacons • NATS Air Ground Air (AGA) sites • Civil Airports • Heliports • Gliding Clubs • Microlight sites • Minor Airfields • Met (Weather) Radar | <ul style="list-style-type: none"> • MOD Air Traffic Control Primary Surveillance Radar (PSR) • MOD Air Traffic Control Secondary Surveillance Radar (SSR) • MOD Air Defence Radar (PSR, ASACS) • MOD Precision Approach Radar (PAR) • MOD Threat Radar Sites • MOD Contractor Radar Installations • MOD Airbases • MOD Training Airfields • MOD Low Fly Zones • MOD Range Radar |
|--|--|

4 POTENTIAL IMPACTS: UXBRIDGE TOWER

Top 3 Potentially Impacted Receptors			Stakeholder
	Northolt PAR	4.2 km	MOD
	AGA 21	1.1 km	NATS NERL
	London Heathrow PSR	9.9 km	Airports

Potential Impacts
<p>The table above shows three potentially impacted receptors for Uxbridge Tower.</p> <p>Where appropriate a Radar Line of Sight Calculation chart is provided.</p>

5 UNDERSTANDING RESULTS

Receptor		Potential Impact
	Obstruction	The development could obstruct low flying aircraft.
	Radar	The development could affect a radar.
	Other	The development could affect something that is not Radar or Obstruction.

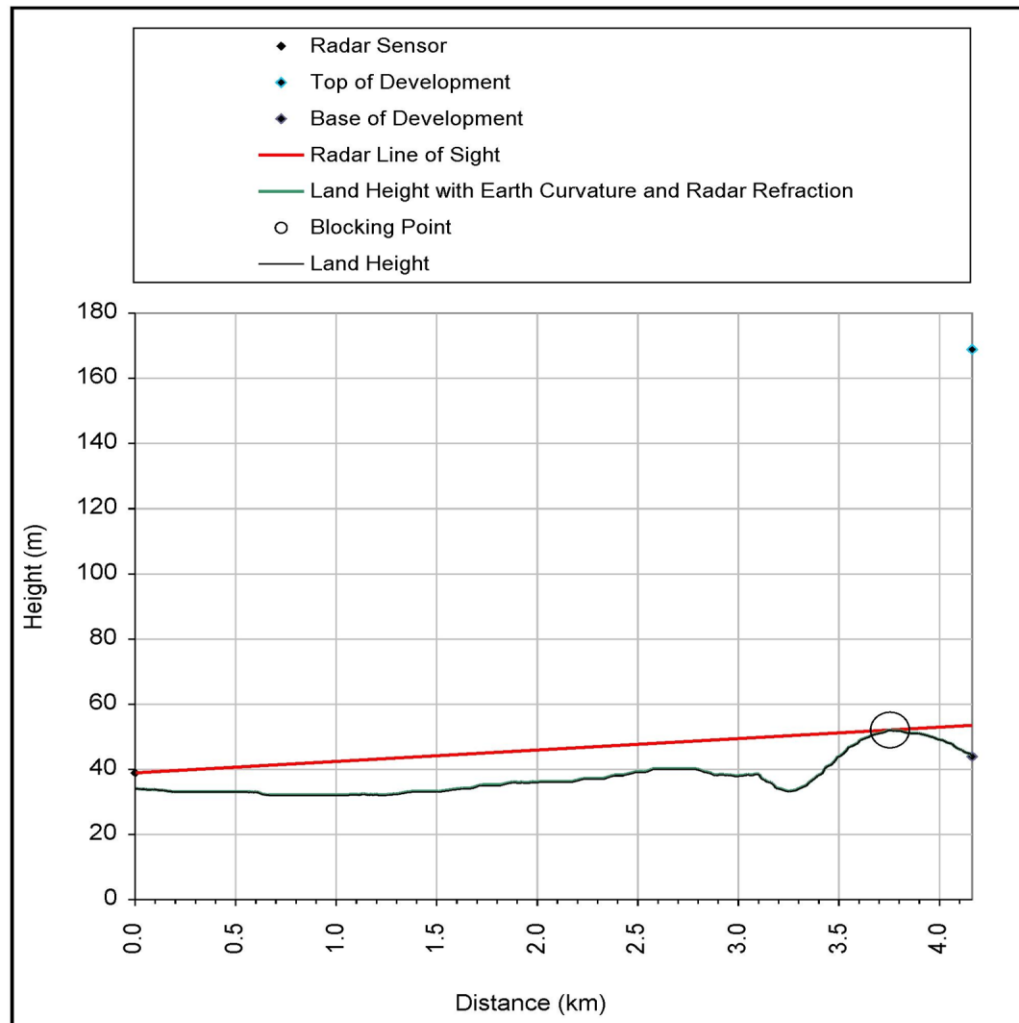
6 RADAR LINE OF SIGHT CALCULATION CHARTS

Radar Line of Sight Calculation

Prepared for Pager Power
Northolt PAR

Uxbridge Tower

Development	UT1
Result	VISIBLE
Certainty	115.4 metres



Development Height (m)	125
Development Elevation (m)	50
Turbine Location	150
Distance to radar (km)	4.2
Blocking Point Location	E506098 N184246
Distance to BP (km)	0.4

Additional Analysis

Angle (Radar to Tip)	1.776 degrees up
Maximum Height	9.60 metres

See Appendix for further information

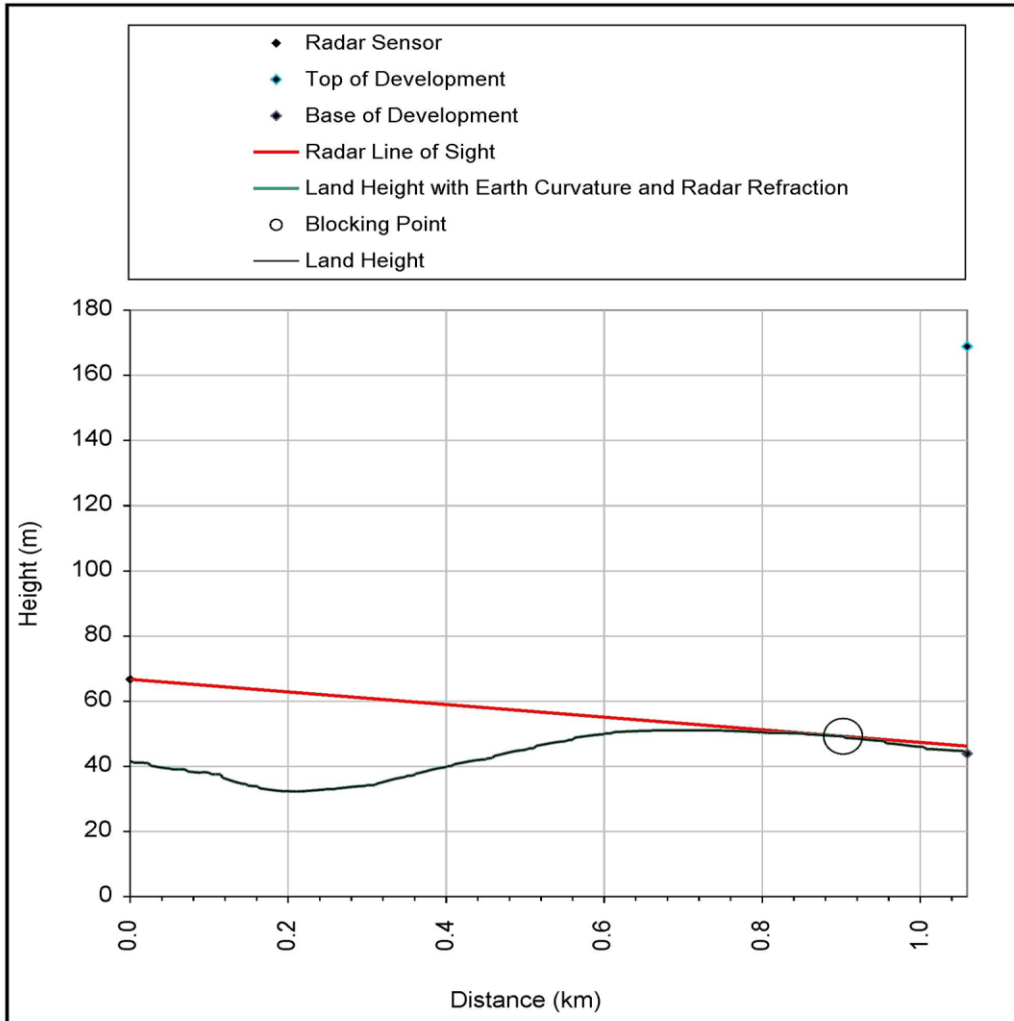
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Radar Line of Sight Calculation

Prepared for Pager Power
AGA 21

Uxbridge Tower

Development	UT1
Result	VISIBLE
Certainty	122.7 metres



Development Height (m)	125
Development Elevation (m)	50
Turbine Location	150
Distance to radar (km)	1.1
Blocking Point Location	E505853 N184172
Distance to BP (km)	0.2

Additional Analysis	
Angle (Radar to Tip)	5.533 degrees up
Maximum Height	2.28 metres

See Appendix for further information

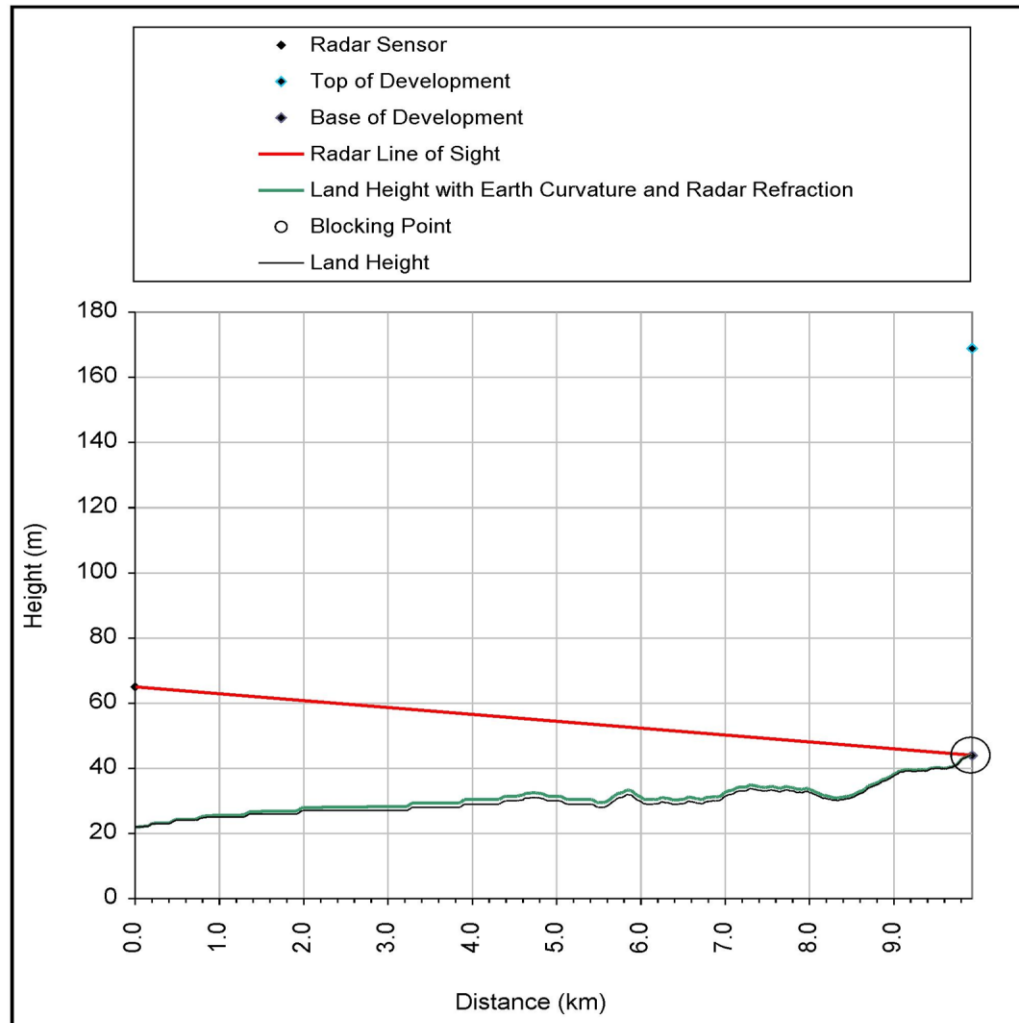
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Radar Line of Sight Calculation

Prepared for Pager Power
London Heathrow Airport PSR

Uxbridge Tower

Development	UT1
Result	VISIBLE
Certainty	124.9 metres



Development Height (m)	125
Development Elevation (m)	50
Turbine Location	150
Distance to radar (km)	9.9
Blocking Point Location	E505702 N184156
Distance to BP (km)	0.0



Additional Analysis	
Angle (Radar to Tip)	0.566 degrees up
Maximum Height	0.11 metres

See Appendix for further information


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7 ALL POTENTIAL IMPACTS

MOD - Ministry of Defence


Aviation Risk		
	Northolt PAR	4.2 km
	Northolt Airfield	4.1 km

NATS NERL - NATS En Route

Aviation Risk		
	AGA 21	1.1 km
	Bovingdon PSR	18.6 km
	Northolt Beacon	3.1 km


	AGA 30	8.4 km
	London VOR/DME (Closing 2019) Beacon	6.6 km

Aviation Risk		
	London Heathrow PSR	9.9 km


	London Heathrow SSR	9.9 km
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	London Heathrow Airport	7.8 km
	Farnborough PSR	36.0 km

Met Office

Aviation Risk		
	Chenies MET Radar	16.3 km

Civil Airfields

Aviation Risk		
	London (Crowne Plaza London Heathrow) Heliport	5.6 km
	Denham, Licensed	5.3 km

8 METHODOLOGY

Scope

This assessment:

- Is new and takes no previous assessment into account
- Calculates potential aviation and radar risks for Uxbridge Tower
- Uses radar line of sight analysis that accounts for terrain, earth curvature and refraction effects
- Uses an advanced terrain data processing algorithm optimized for accurate and reliable radar visibility calculations

Categories of Development

This report may be appropriate for:

- Buildings
- Roads and highways
- Electricity transmission lines
- Railways
- Wind Turbines
- Chimneys
- Telecommunications Towers
- Other tall structures

Key Parameters

- Coordinate System = Local Grid
- Vertical Units = Metres
- Location and height information for radar, aerodromes and other installations are sourced from a managed database. Best endeavours are undertaken to keep this database up to date and free of errors, however, such information is both volatile and in some cases of subjective nature.

Radar Line of Sight Calculation

- Radar Line of Sight Calculations are widely used to make an initial determination as to whether a radar will be affected by a development
- Other types of calculation may be more accurate in some circumstances
- Developments that are **VISIBLE** to radar will not necessarily affect them
- There are few, if any, examples of developments that are **HIDDEN** from a radar which do affect the radar

Radar Line of Sight Calculation – Accuracy Details

- Terrain data used normally has a vertical accuracy of better than three metres
- Comparisons and site measurements suggest the terrain data used has a vertical accuracy of around two metres
- This gives a typical accuracy of four metres for Radar Line of Sight Calculation results
- Process accuracy is enhanced and designed to give cautious results by:
 - A. Using software developed specifically for wind turbine radar calculations
 - B. Using a weighted average algorithm to determine terrain elevation from terrain data
 - C. Using an algorithm that underestimates, rather than overestimates, terrain peaks
 - D. Using terrain rather than surface data
 - E. Using terrain data that sometimes under-represents peaks
 - F. Continuous software development and improvement specifically for Radar Line of Sight Calculations
- Continuous process for managing radar position and height data

9 BACKGROUND

Report Preparation

This report has been created by a custom-built advanced online service which has the following features:

- Fast report delivery by email
- Knowledgeable technical support team
- Advanced terrain data processing algorithms

Tall Structures and Low Flying Aircraft

Tall structures can be a physical obstruction to low flying aircraft.

A system of physical safeguarding is often in place around airports, airfields and MOD bases to protect their operations. If a proposed development does not comply a planning objection is likely.

There are also designated areas where military low flying training takes place. Developments in these areas can be prevented by the MOD.

Effects of Tall Structures on Radar

Tall structures can have a number of effects which are sometimes significant. These are caused by when developments reflect or block radar signals. Potential effects include:

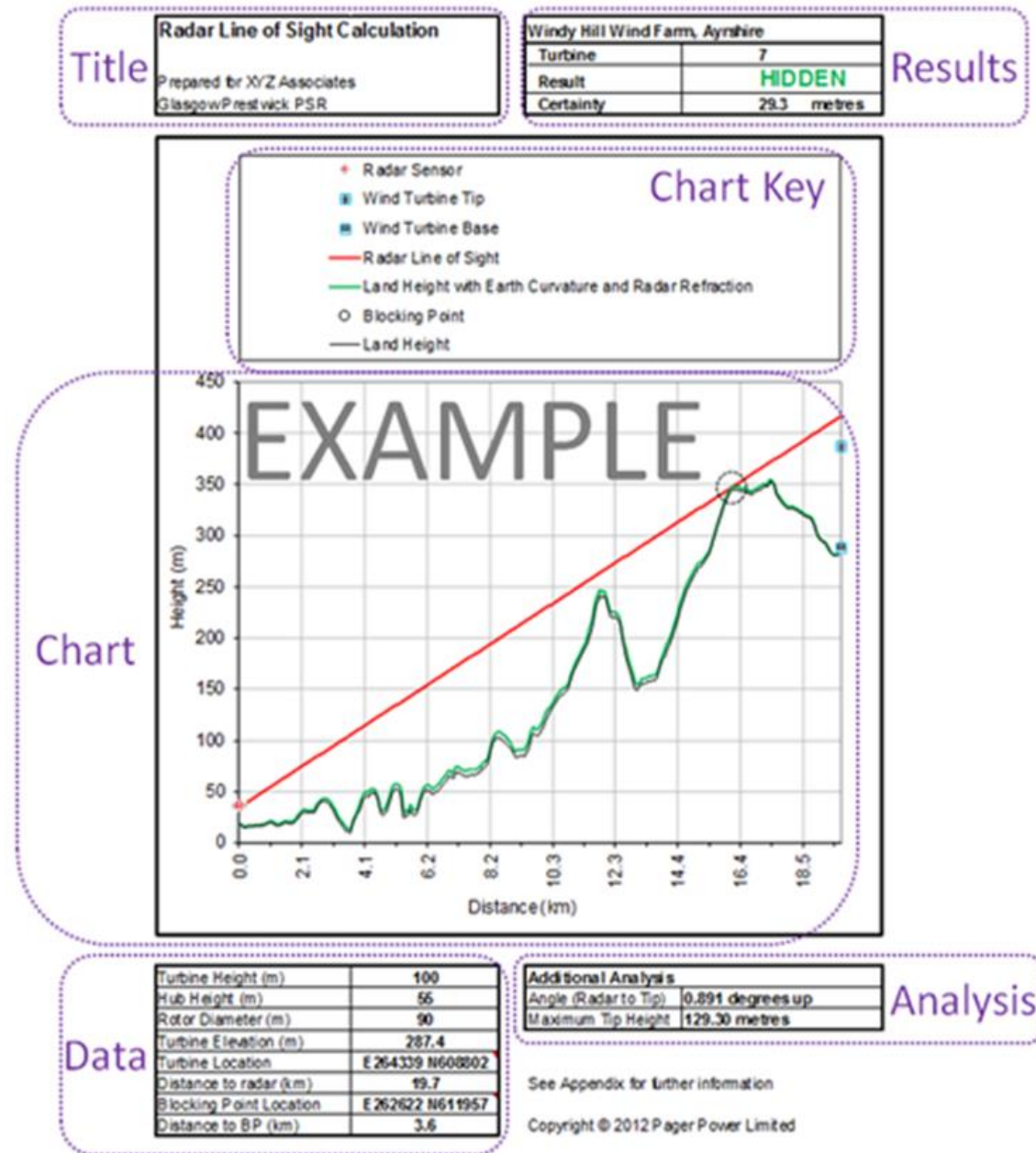
- False returns on radar displays
- Reduction in the radar's ability to detect aircraft
- Reduction in the overall capabilities of the radar

Signals reflected from moving objects affect radar more than signals reflected from static objects. This means that wind turbines and vehicles can have a greater effect on radar than static structures.

10 NOTICES

1. This document is subject to Copyright. Copyright © 2019 Pager Power Limited.
2. This document should only be distributed or circulated in its entirety.
3. Aerial photography has been sourced from Google.
4. This assessment uses data from a variety of sources. These include radar operators, Pager Power research and surveys, terrain data providers and customers. This data is carefully managed but errors and inaccuracies in the data may lead to errors and inaccuracies in calculation results. Whilst every effort is made to ensure the accuracy of this report it cannot be legally relied upon.

11 APPENDIX - RADAR LINE OF SIGHT CALCULATION NOTES



Results	
Name of the development (as entered)	
Development	Development ID as entered
Result	VISIBLE developments have the potential to affect the radar whereas HIDDEN developments are unlikely to affect the radar.
Certainty	This is a vertical distance in metres and is the distance from the top of the development to the line of sight. The higher the number the greater the certainty.

Chart Key	
Radar Sensor	This is the radar antenna. It is a single point at the left of the chart.
Development Top	This is the highest point of the development. It is a single point at the right of the chart.
Development Base	This is the bottom of the development. It is a single point at the right of the chart.
Radar Line of Sight	This is a straight line from the Radar Sensor towards the development which coincides with the terrain between the radar and the development.
Land Height with Earth Curvature and Radar Refraction	This is the terrain profile between the radar and the development. Calculation accuracy is increased by including both Earth curvature and standard radar refraction. Refraction means that the radar signal bends slightly as it passes through the atmosphere.
Blocking Point	This is a single point where the Radar Line of Sight is the same as Land Height with Earth Curvature and Refraction.
Land Height	This is calculated accurately using an advanced weighted average algorithm and height data from a terrain database.

Chart	
Vertical Axis	Height above sea level in metres.
Horizontal Axis	Distance from the radar in kilometres.

Data	
Development Height (m)	The maximum development height above ground level in metres.
Development Elevation (m)	The height of the ground on which the development stands relative to sea level.
Development Location	The coordinates of the development location.
Distance to radar (km)	The horizontal distance from the radar to the development in kilometres.
Blocking Point Location	The coordinates of the Blocking Point. Buildings and trees at this location might mean the radar is less likely to be affected by the development.
Distance to BP (km)	The horizontal distance from the development to the Blocking Point in kilometres.

Analysis	
Angle (Radar to Top)	This is the vertical angle from the radar to the top of the development.
Maximum Height	A development having this height would be HIDDEN . A development that was any higher would be VISIBLE .



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