

TECHNICAL ASPECTS OF TREE RISK AND VEGETATION MANAGEMENT:

AN INTRODUCTION TO THE NEW INTERNATIONAL RAILWAY STANDARD

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WHO AM I?

- *Consultant to UIC*
- *Special Advisor on Tree Risk Management to the UK's Network Rail*
- *Internationally recognized authority on tree risk assessment*
- *Designer of numerous tree assessment systems, UK & overseas*
- *Author of THREATS tree risk management architecture*
- *UK High Court level Expert Witness*
- *Lead author of draft British Standard 'Tree Safety Inspection'*
- *Technical editor for BS5837 'Trees in Relation to Construction'*
- *Review panel member BS3998 'Tree Work'*
- *Lead author on IRS 'Tree Risk & Vegetation Management'*

A BRIEF OVERVIEW OF MY WORK FOR NETWORK RAIL

- 2009 onwards designing tree and vegetation management systems
- Lead accident investigator for tree/ train collisions
- 2012 new method for NR Scotland: *Storm Resilience Model*
Designed to reduce network disruption from tree failure during severe weather events
- SRM is based on remote sensing technology (LiDAR) & automated data extraction & analysis (developed in partnership with Astrium, now Airbus Defence & Space)
- Substantial cost savings €millions and reduced network downtime
- 2014 developed new derailment risk reduction strategy *FAILSAFE* and related system architecture (e.g. *VIPER*)
- *FAILSAFE* and *VIPER* are also based on remote sensing by LiDAR
- 2015 designed POLESTORM to enhance UK rail network storm resilience: currently being rolled out nationwide

July 2010

high risk of derailment at 155km/h and toppling down embankment



IRS – Overview



The new IRS is not:

- A manual: it does not tell railway vegetation managers what to do, or how to do it
- A rulebook: railway managers are free to ignore it!
- An encyclopaedia: it cannot cover everything in 45 pages!

So what is it?

The new IRS is intended to provide:

- A **common framework** for describing railway vegetation issues
- **Guidance** and **recommendations** regarding methods of assessment and management
- Examples of **best** and **effective** practice
- A structured way of considering tree risk and vegetation management **issues** and cost-effective **solutions**
- **Up-to-date** information

Summary of Contents



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The new IRS provides detailed information and advice on:

- The need for vegetation control
- Methods for recording and assessing vegetation
- Use of design and engineering to exclude vegetation
- Control by use of herbicides
- Mechanical management: comparison of methods
- Tree risk assessment and control
- Leaf-fall management
- Management and use of arisings
- Biodiversity action plan design for lineside habitat

Following detailed desk-based research into vegetation management methods I reached the following conclusion:

The majority of vegetation control within and adjacent to the operational corridor will continue to rely on herbicide for the foreseeable future

The new IRS supports and promotes the ongoing use of herbicide, for which there is no currently viable alternative

Guidance and recommendations on best practice in herbicide application including:

- A comparative assessment of the 24 chemical treatments known to be in use by worldwide railway operators
- A summary of:
 - Herbicide management systems
 - Environmental protection
 - Choice of agents
 - Means of application
 - Recording treatments and effectiveness monitoring
 - Corrective actions
 - Best practice model
 - Signpost to emerging technology

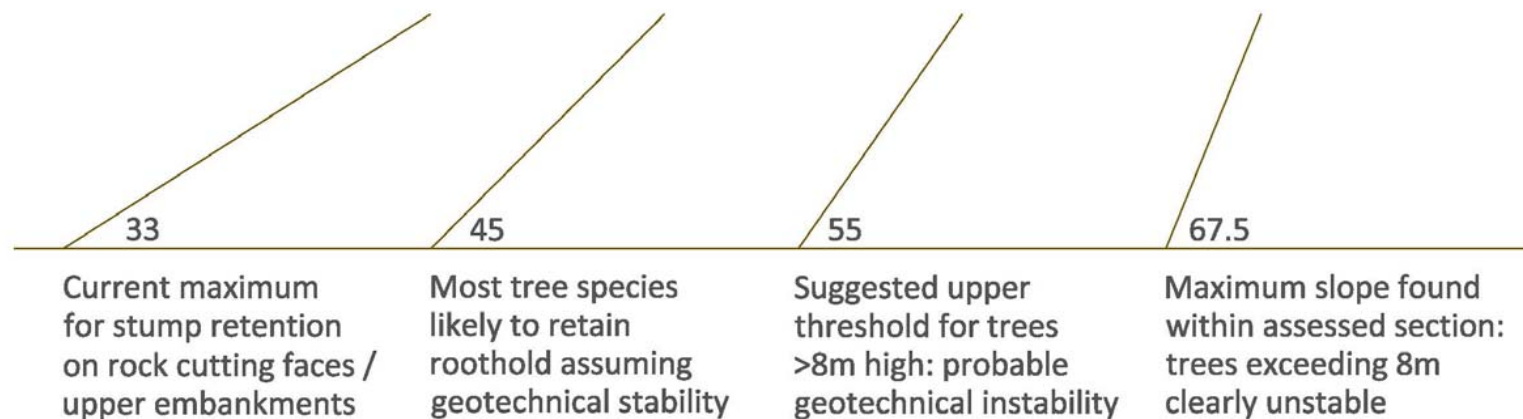
Remote sensing for vegetation management



Research project for Network Rail

2010: stability criteria for trees on slopes

GRAPHIC REPRESENTATION OF DEGREES OF SLOPE



Slope and tree height found by airborne LiDAR survey



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POLESTORM



POLESTORM:

- Uses site-related factors to identify the **storm resilience** of any given location
- Does not seek to model *tree* risk, so much as *site* risk: some locations are unsuitable for bearing tree cover
- Provides a framework for identifying these sites, which are located and mapped using airborne LiDAR

The LiDAR data is run through a computer programme to identify the high-risk sites for priority tree removal

FLAC operational JV partner Airbus Defence and Space

FAILSAFE

Derailment protection system, designed to avoid...

Taiwan, April 2011



Derailement of low speed, narrow gauge train:
5 dead, 107 injured



155km/h
900mm dia.

Remote sensing for tree health assessment:

The majority of trees that fall onto the railway are diseased, dying or dead

Airborne remote sensing using infra-red spectroscopy can be used to find them...

Obviously dead tree – readily visible to the
naked eye



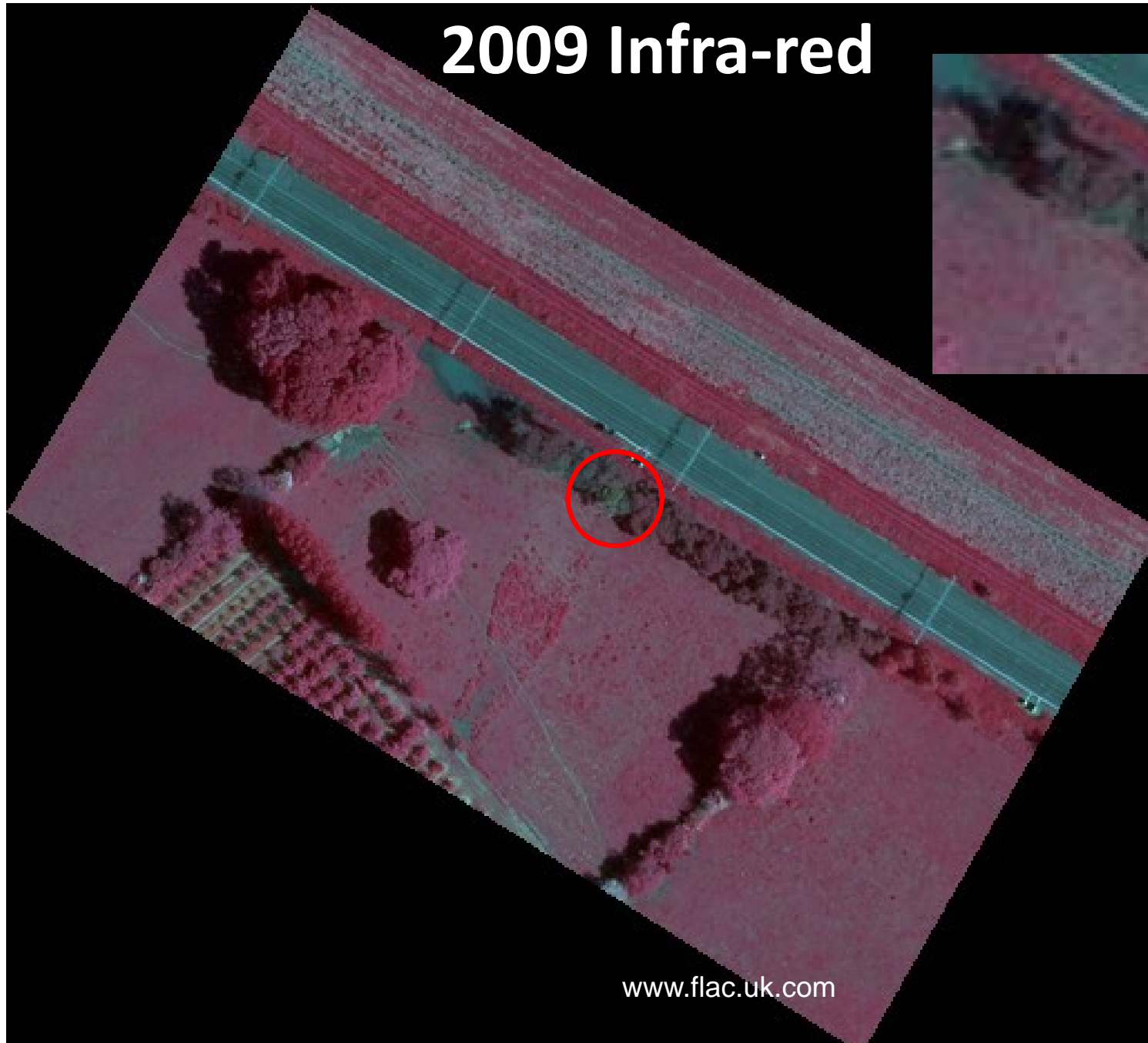
2004



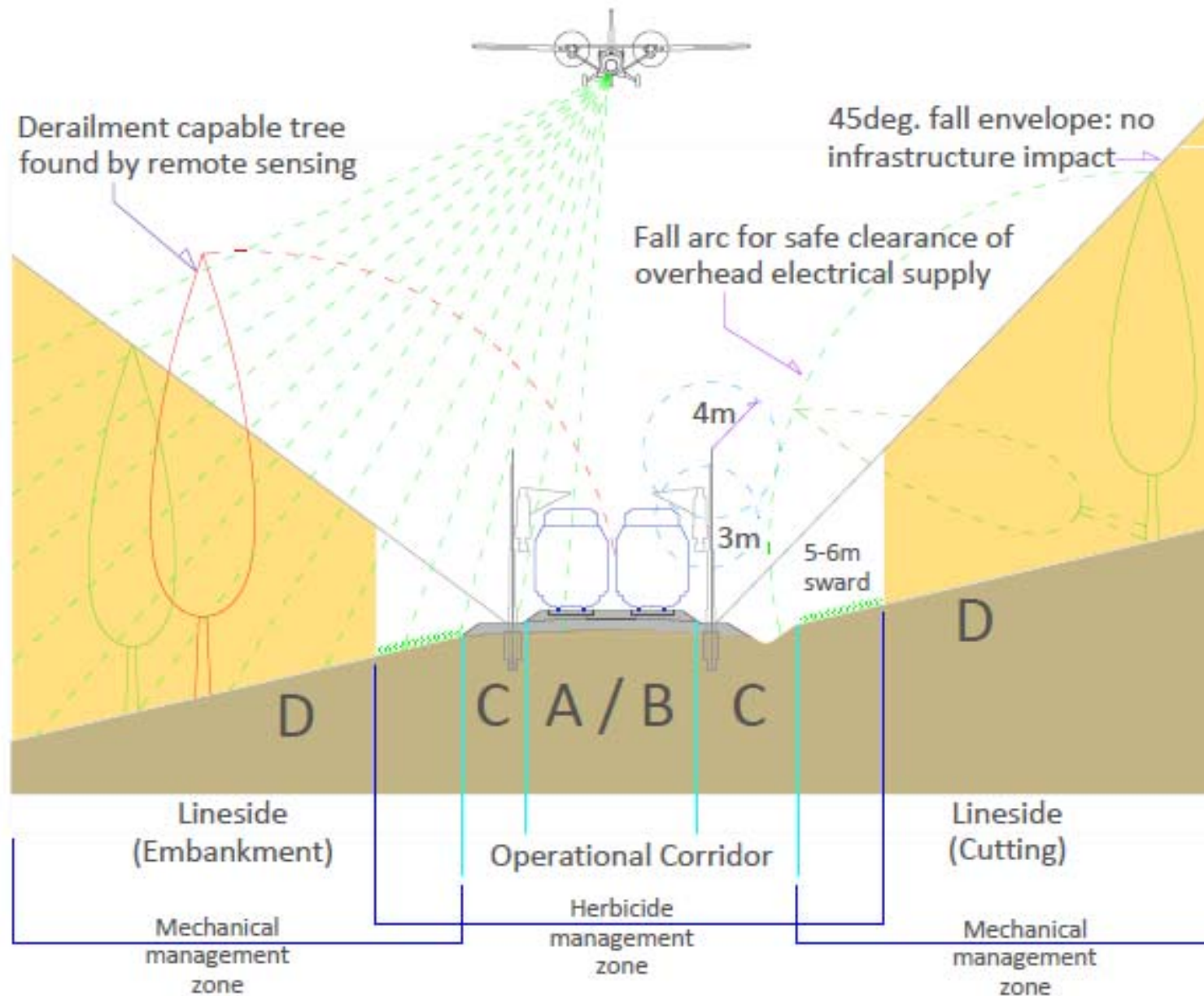
2010



2009 Infra-red



The managed railway - schematic



Closing remarks on the new IRS

- A single source of cutting-edge information on all aspects of vegetation management
- Sound justification for the continued use of herbicide
- Detailed advice on herbicides and their use
- State of the art guidance on tree risk management
- Promotes preservation and enhancement of lineside biodiversity in the context of necessary and responsible vegetation control

Thank you for listening

