ROADEX – practical road management and maintenance

New solutions to old problems

Ron Munro, Project Manager ROADEX III

Timber Transport Forum Conference, Carlisle, 4 March 2008

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European Regional Development Fund

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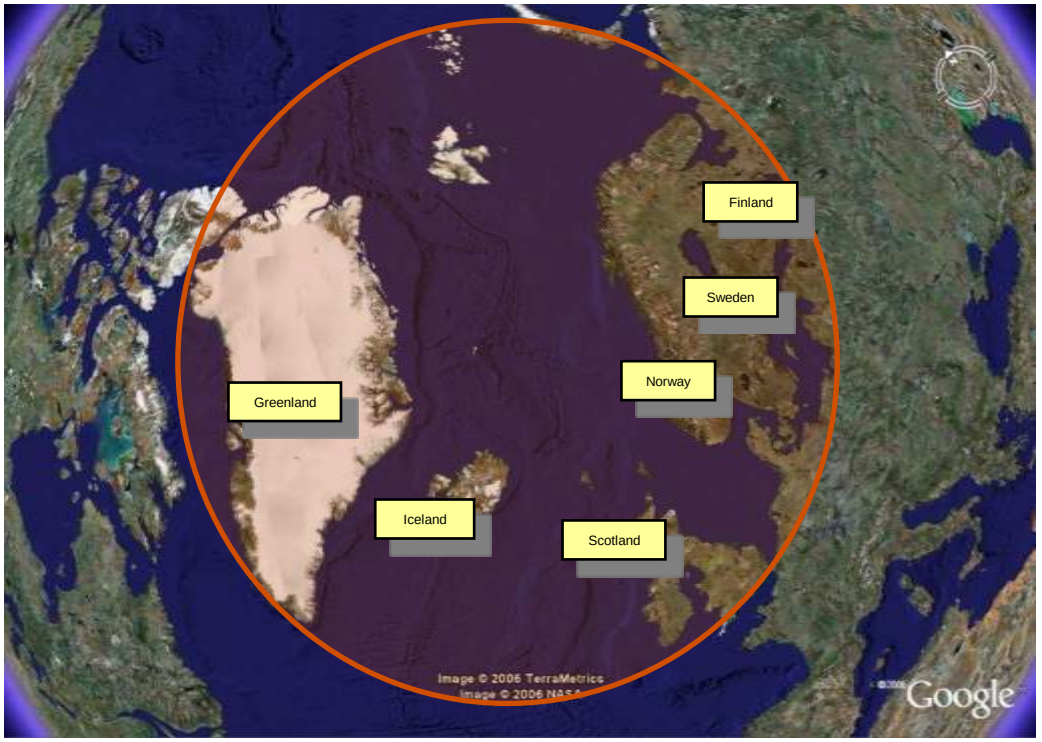
New solutions to old problems

ROADEX III
NORTHERN PERIPHERY

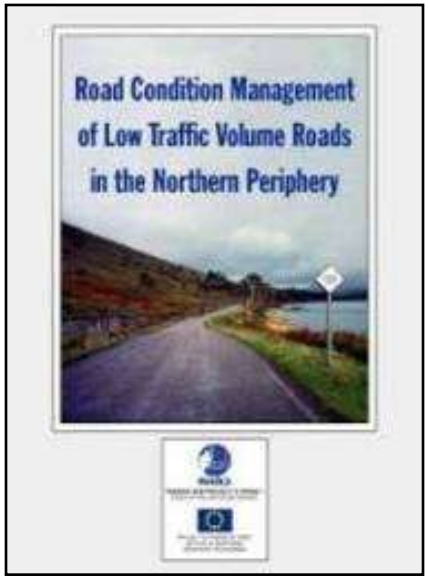
Outline:

- ROADEX
- managing the road
- managing the vehicle



The ROADEX area

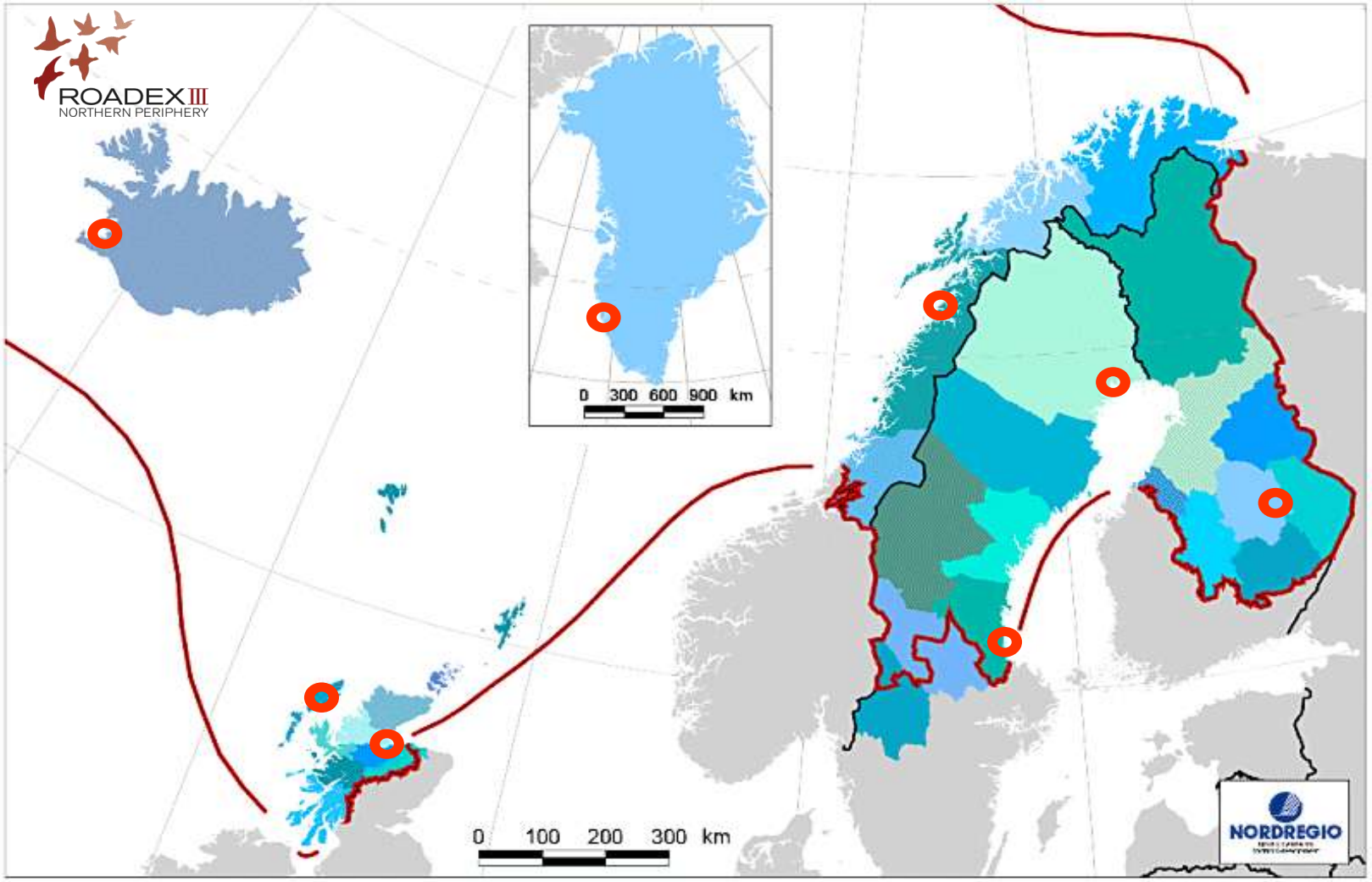
ROADEX 1998-2007



The technical network of the road districts of the European Northern Periphery

ROADEX III
NORTHERN PERIPHERY

The Northern Periphery" and the ROADEX Partner areas



The Problem

Modern production ”the *management of logistical chains”*

Reducing road funding

End User Needs: Increasing Heavy Traffic ⟷ **Road Owner Obligations: Road Network Performance**

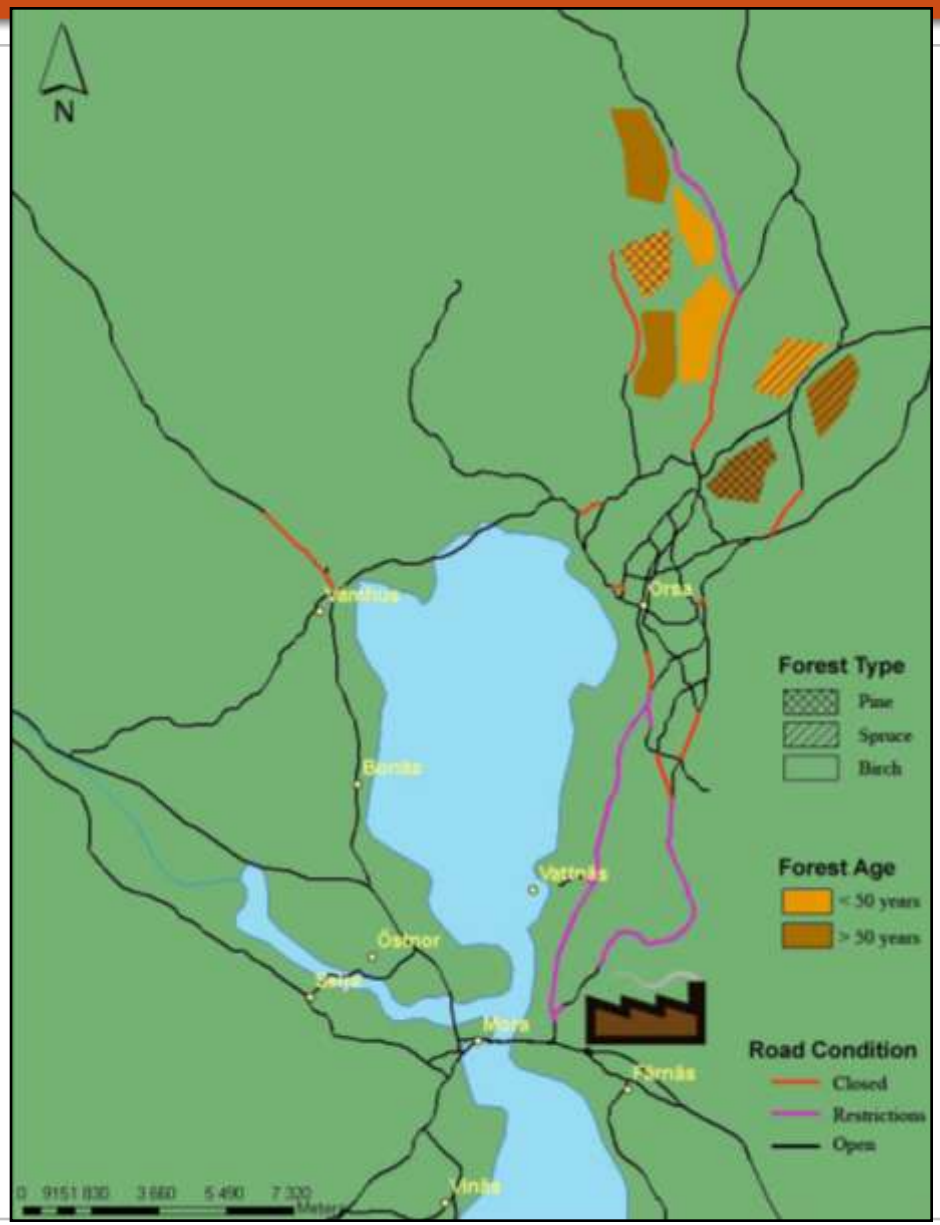
How to close the Gap?

Reaction / Decision Making

- **LOAD / TRAFFIC RESTRICTIONS**
- **MAINTENANCE / REHABILITATION MEASURES**
- **NO MEASURES**

Forest to Processer:

A typical arrangement of forest blocks, haul roads and processing unit



S Johansson, Roadscanners AB, Sweden

1. Managing the road

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IMPROVING RURAL ROAD PERFORMANCE

The "ROADEX solution":

- **Map the weak sections of road and FOCUS in on them**
- **Understand the processes causing the problems**
- **Innovate - find new 'fit for purpose' structures and treatments**

Road Condition Management in the Northern Periphery

Critical Parameters

	Structural condition	Functional condition	Winter maintenance	Spring thaw weakening
Critical parameters	-deflections -frost heave -cracking -permanent deformation (rutting) -roughness	<u>All roads:</u> -longitudinal roughness -bumps -rutting -potholes <u>Gravel roads:</u> -wash boarding -dusting -firmness	-Friction (ice, black ice) -Compacted snow -Drifting snow -Snow smoke	-permanent deformation -cracking -road surface becomes plastic

Monitoring Structural Condition

Typical structural problems (”Bearing Capacity”) in the ROADEX area:

- poor quality bound materials
- poor quality or thin unbound layers
- weak subgrade soils
- poorly performing drainage

ROADEX - monitoring structural condition

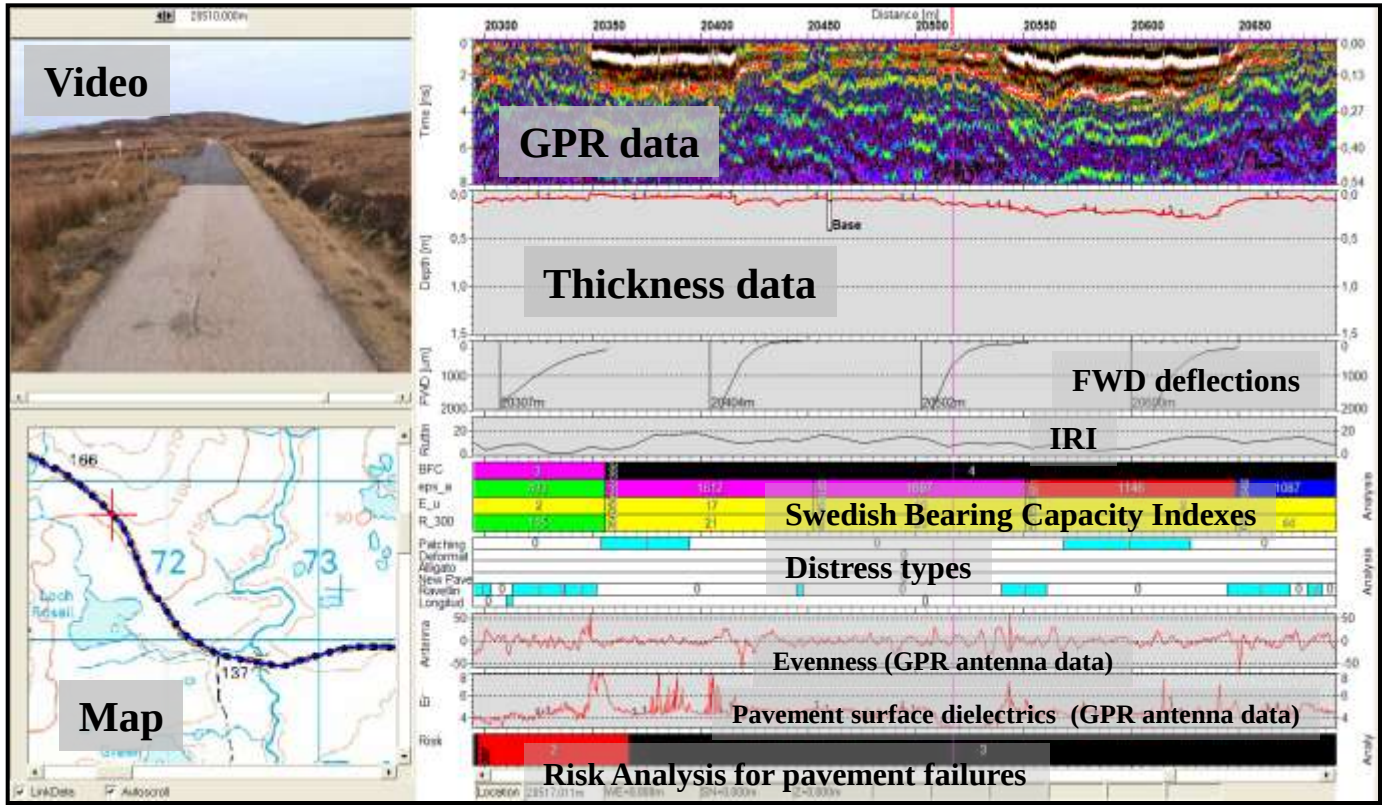
Survey Systems and Data Analysis

Survey systems

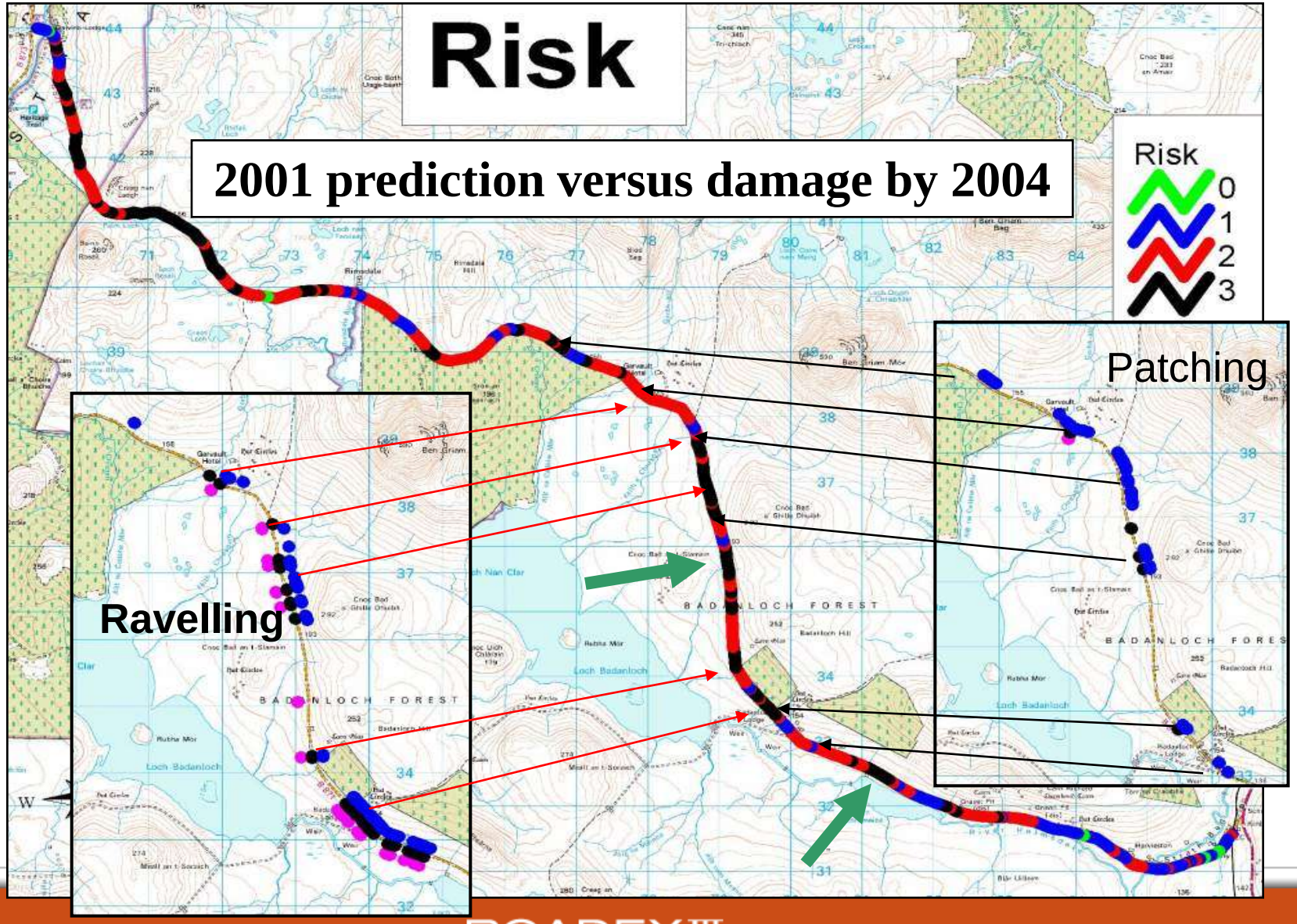
Towable FWD trailer

Vehicle equipped with GPR

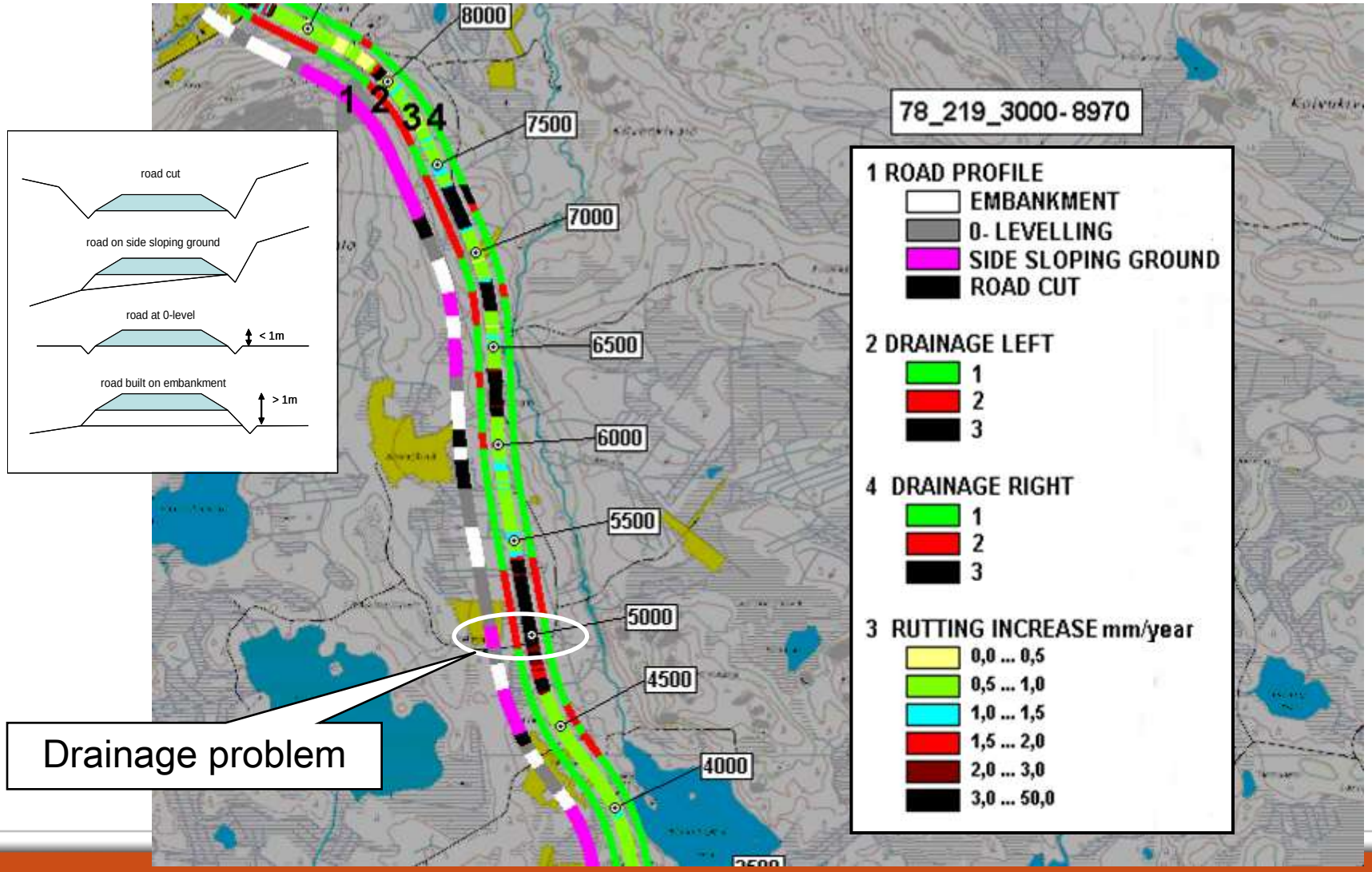
Integrated Data Analysis (Case B871, Scotland)



Risk


2001 prediction versus damage by 2004
Risk
0
1
2
3
Ravelling
Patching
BADANLOCH FOREST
Loch Badanloch

ROADEX – Drainage data collection and classification



Video camera(s)

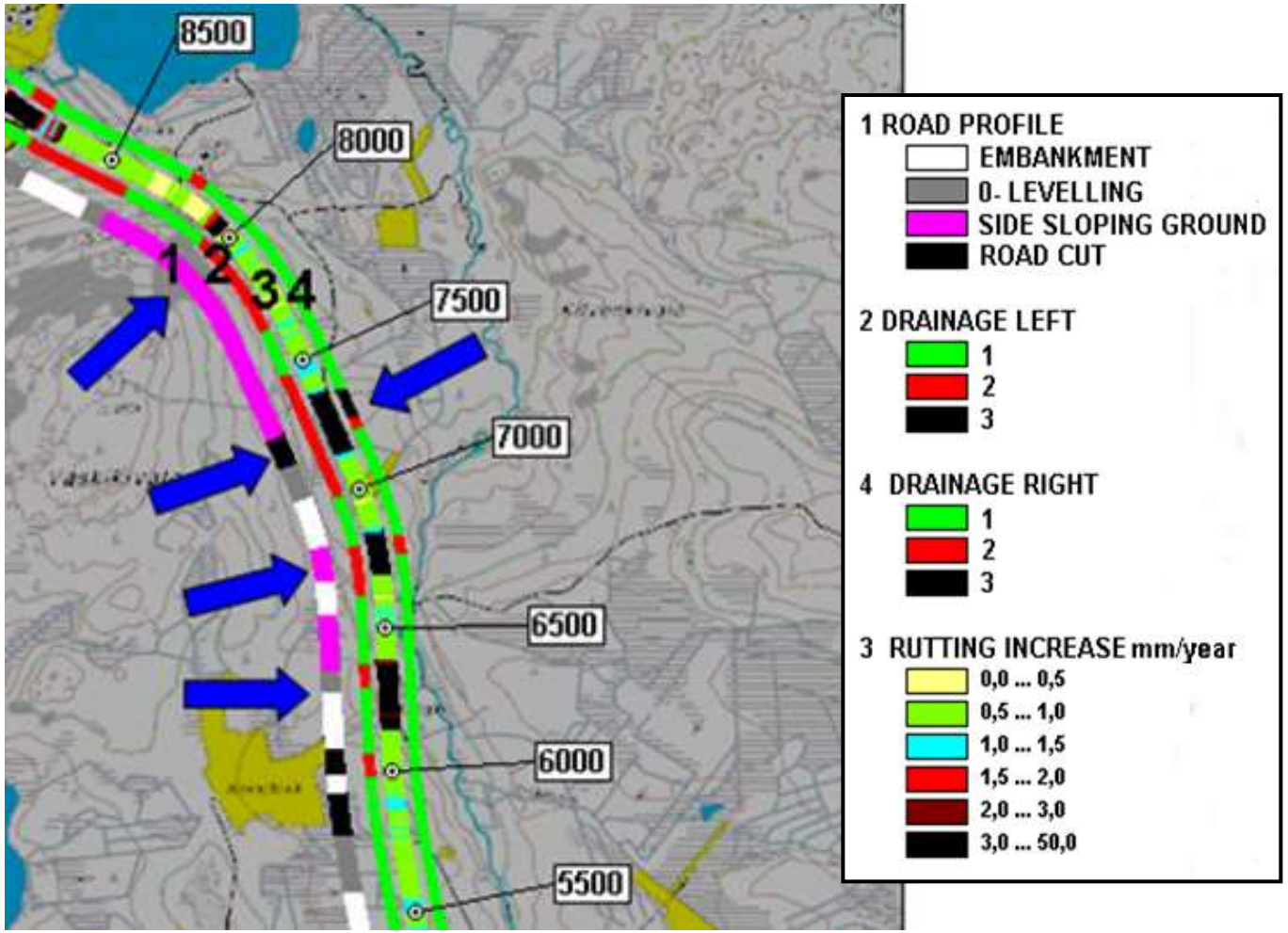
Audio commentary

Data collection - drainage condition

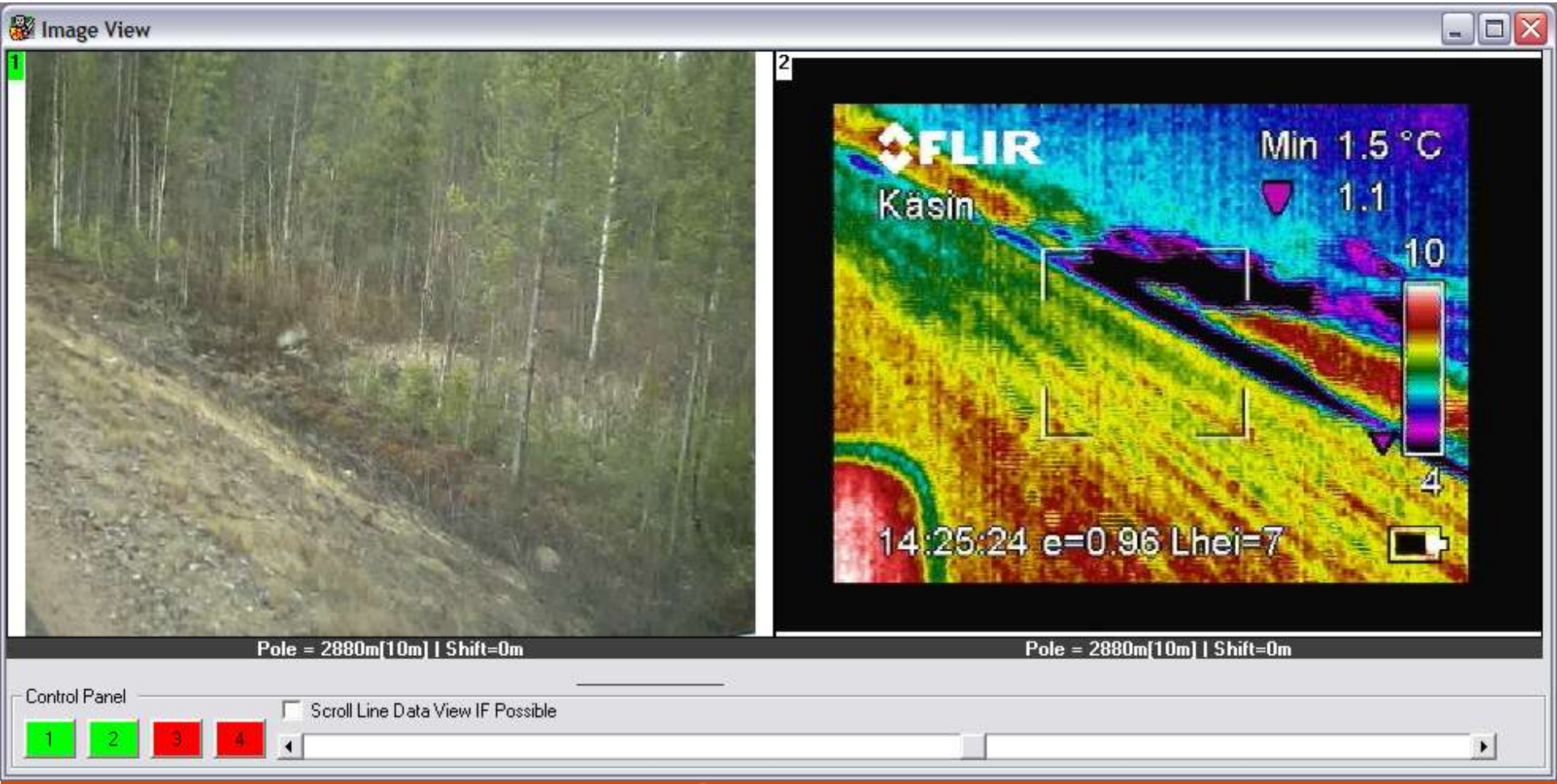
Analysis/classification

ROADEX – Drainage data collection and classification

Selection of areas for special maintenance work



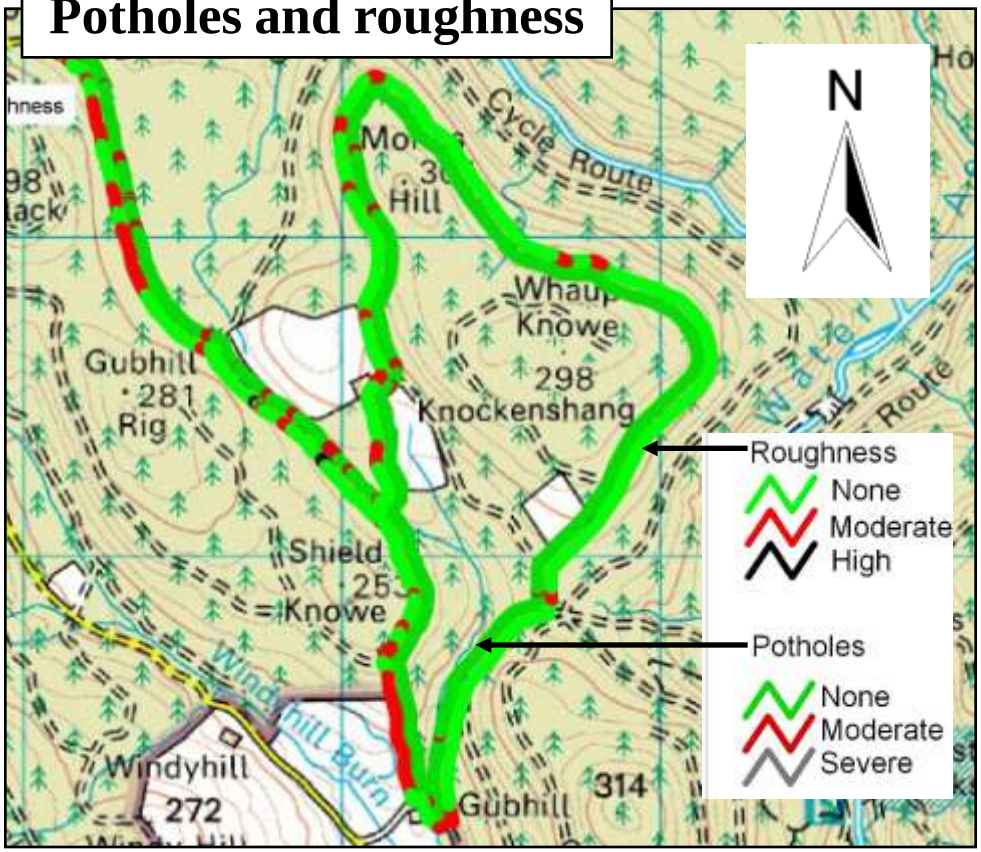
Drainage Surveys using Video and Thermal Cameras

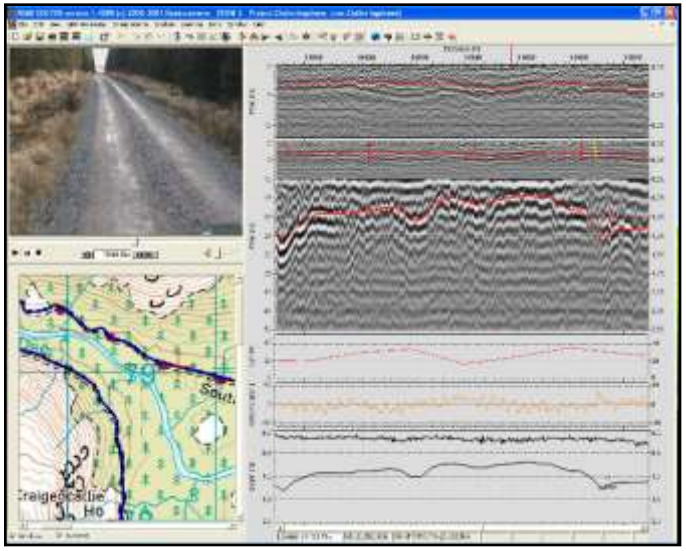


Monitoring Road Condition on Forest Roads

Dumfries & Galloway, Scotland

Potholes and roughness





Monitoring Road Condition on Forest Roads

Hand held PDA, Sweden

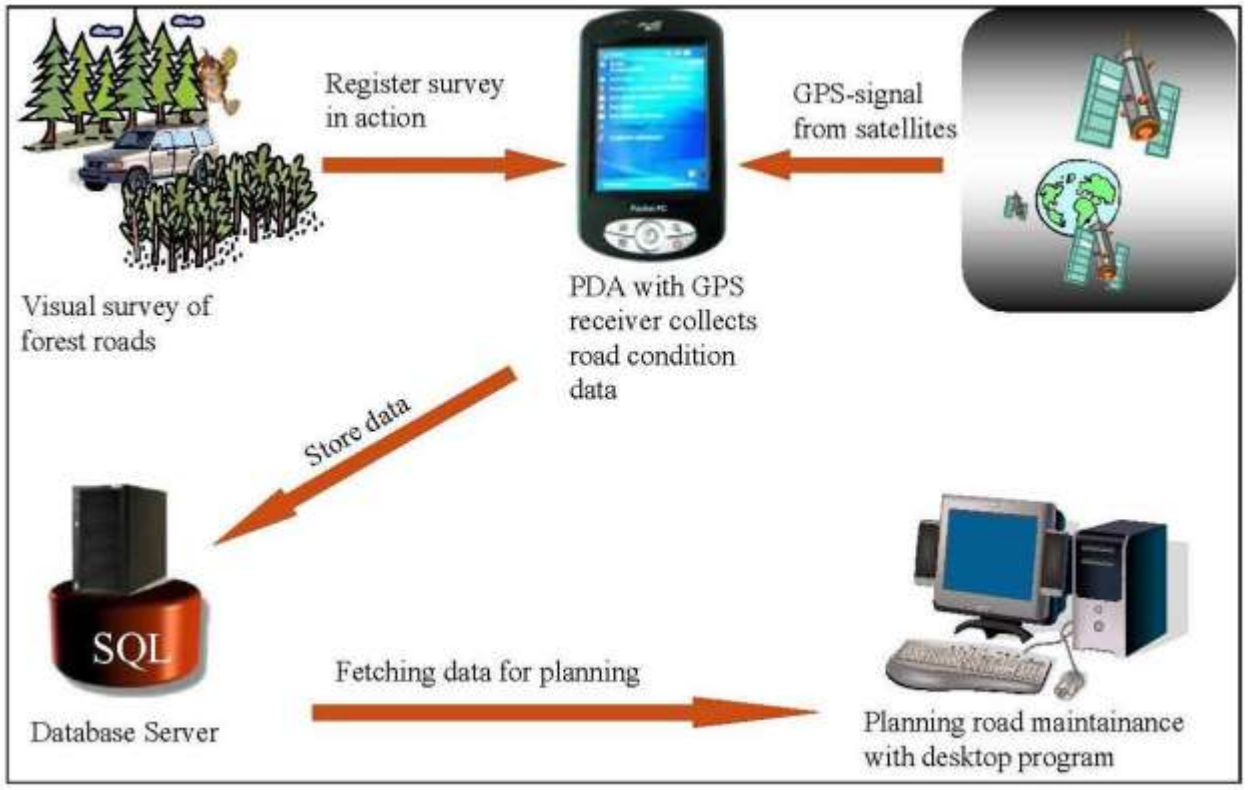


Figure 4-3 Principle for road survey with pocket PC.

S Johansson, Roadscanners AB, Sweden

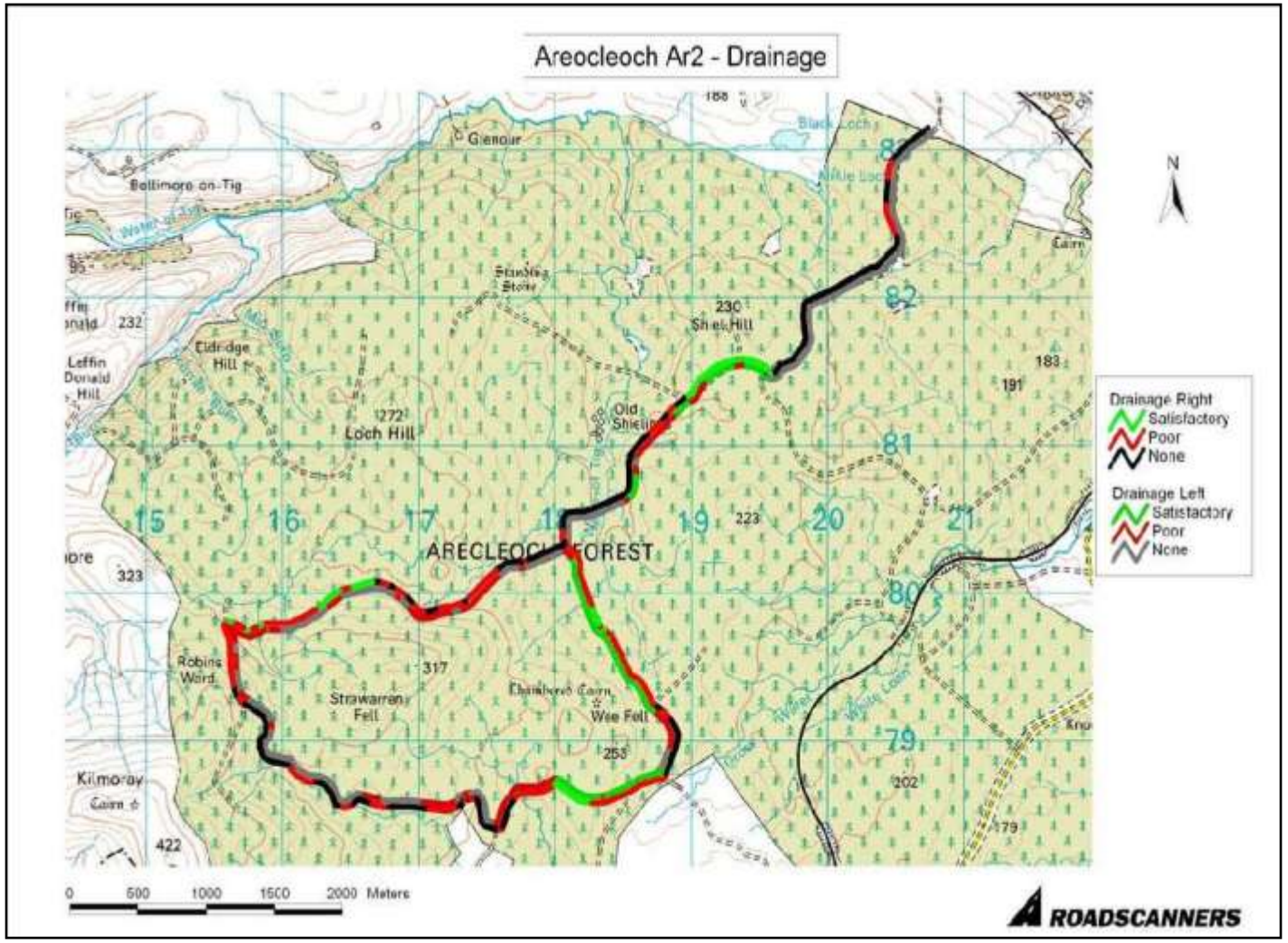
Location Map

Damage Type

Damage Class

Forest road condition survey using a hand held PDA

S Johansson, Roadscanners AB, Sweden



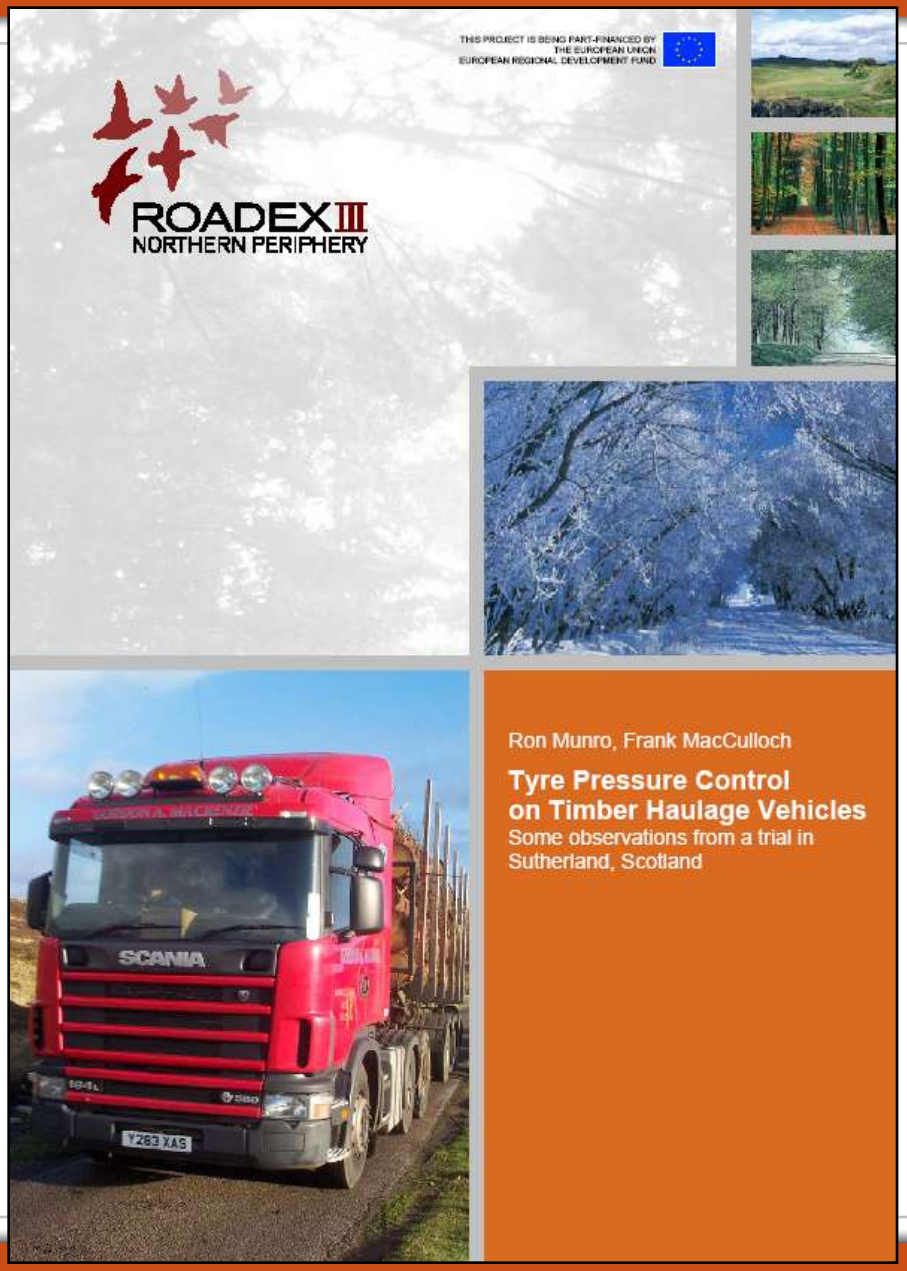
GIS map of drainage conditions along a forest road

2 Managing the vehicle:

ROADEX III Task B2 Report

Tyre Pressure Control
on Timber Haulage Vehicles
Some observations on a trial in Sutherland, Scotland

Ron Munro, Frank MacCulloch



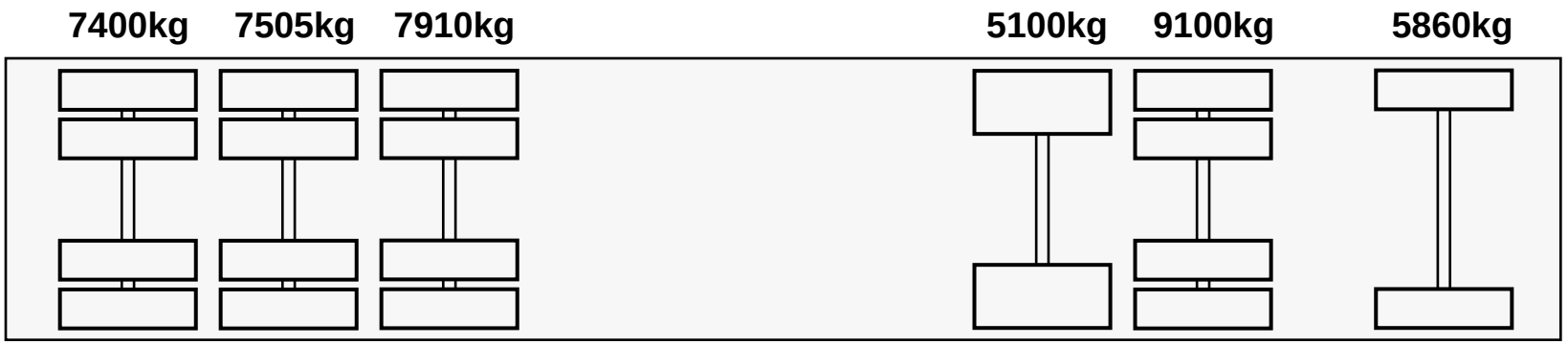
TPCS test vehicle at Confor 2007 Eskdalemuir


SCANIA


SCANIA

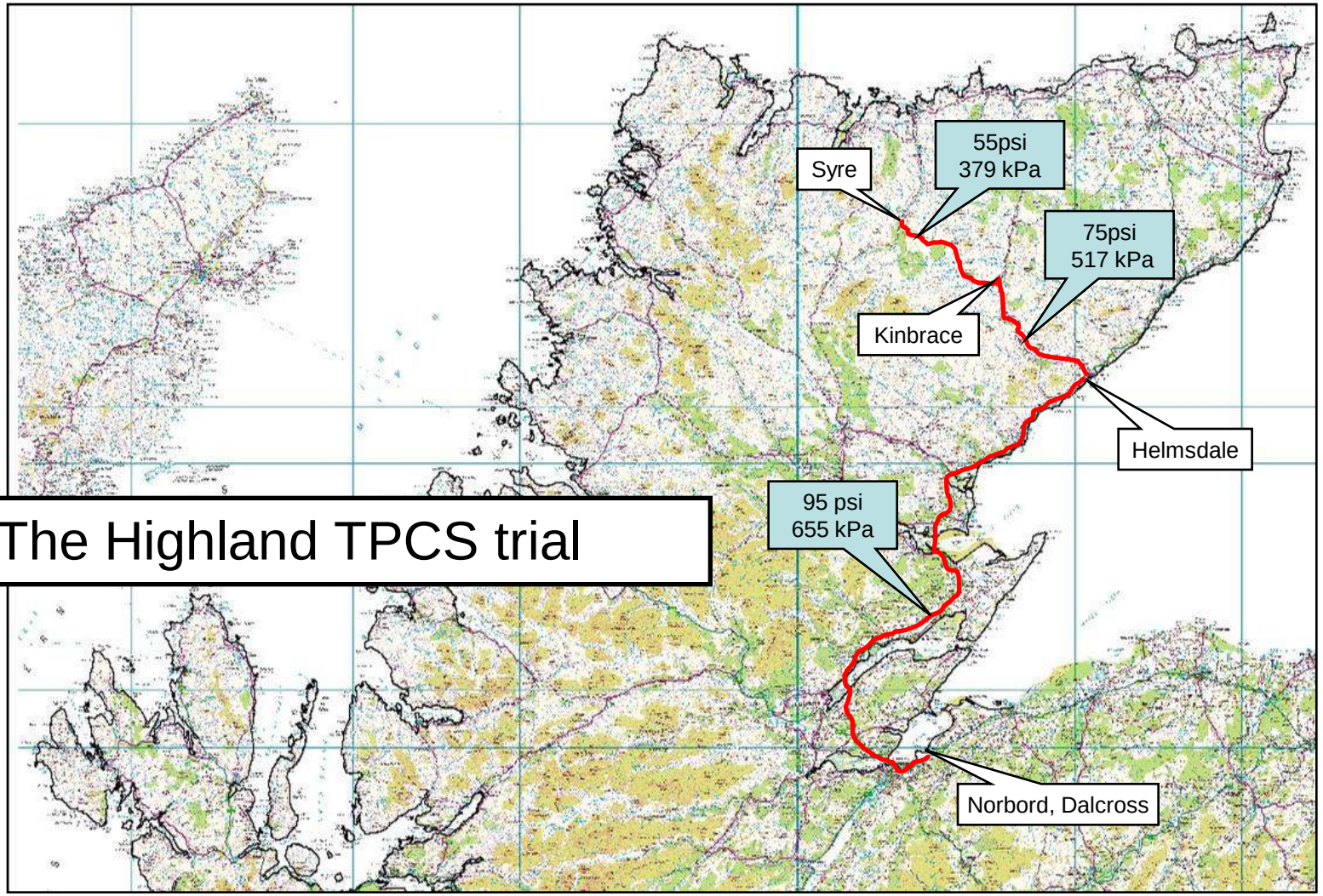

James Jones

The test vehicle



Axle arrangement of timber vehicle used in the TPCS trials
Total vehicle weight – 42.875t

The Highland TPCS trial

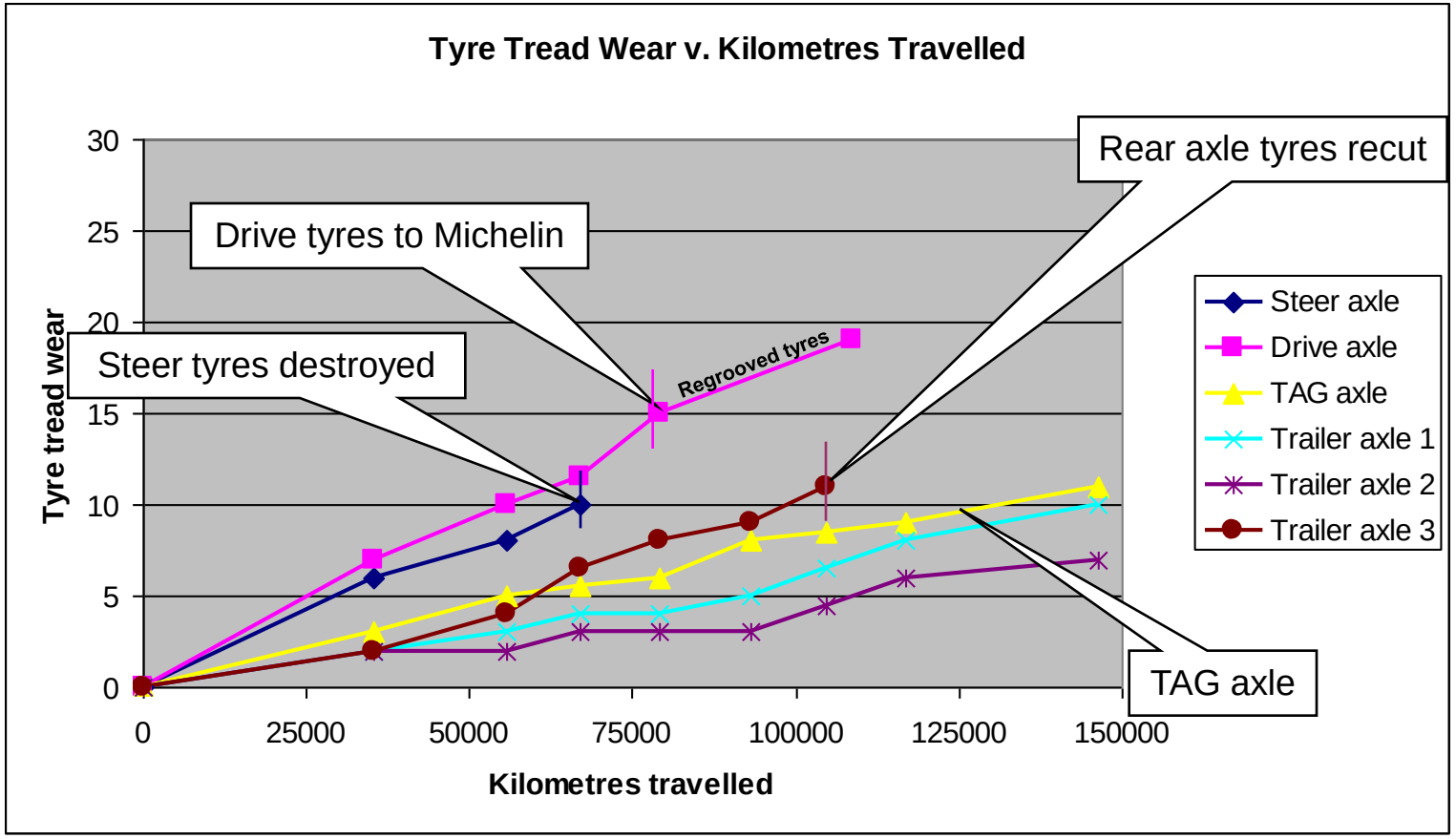


Loaded test vehicle loaded haul route from Syre in Sutherland to Norbord, Dalcross

Test vehicle tyre wear since tyres fitted new on 24/10/2006

Date	24/10/06	19/02/07	28/04/07	28/05/07	01/07/07	11/08/07	13/09/07	31/10/07	09/02/08
Km	423342	458536	479048	490304	502354	516524	526120	540078	569553
Axle	Average tread depth (mm)								
Steer axle	16	10	8	6	Damaged	n/a	n/a	n/a	n/a
Drive axle	19	12	9	7.5	Changed 4 to 22	19		Changed 16 to 9	5
TAG axle	17	14	12	11.5	11	9		8	6
Trailer axle 1	13	11	10	9	9	8		5	3
Trailer axle 2	13	11	11	10	10	10		7	6
Trailer axle 3	13	11	9	6.5	5	4	1 recut	3	n/a
Distance traveled		35194	55706	66962	79012	93182	104717	116736	146211
Tread wear on drive		7	10	11.5	15	18		21	25
Km/mm wear		5028	5571	5823	5267	5177		5559	5848

Period that drive tyres were at Michelin UK



Graph of tyre tread wear v. Distance travelled by test tyres

Photographs of drive tyres at 108,000km
(Tyres regrooved at 79,000km)

Results after 16 months, 150,000km, 12,000 tonnes of timber

Tyre performance

- Extended tyre life, even tread wear, “dramatically lowered damage”
- Less tyre changes
- Even tread wear across twin tyre assemblies
- One puncture – by a nail
- No blowouts
- Tyre carcases sent for recutting for first time
- Plan to try Michelin “4 lives” strategy to maximise tyre life: “new-recut-remix-recut”

Results after 16 months, 150,000km, 12,000 tonnes of timber

Vehicle impact

- Not yet fully quantified
- Decreased damage from shocks and vibration
- Reduced repair and maintenance costs
- Reduced downtime, more productive hauling
- Longer vehicle service life.

Results after 16 months, 150,000km, 12,000 tonnes of timber

Vehicle performance

- Improved traction
- Braking
- Improved ability on steep gradients
- Fewer bogging incidents requiring assistance
- More forest locations possible
- A longer haulage season

Results after 16 months, 150,000km, 12,000 tonnes of timber

Driver benefits

- Reduced vibration in the cab
- Fewer back problems
- Safer working environment
- Appreciative drivers

The Future?

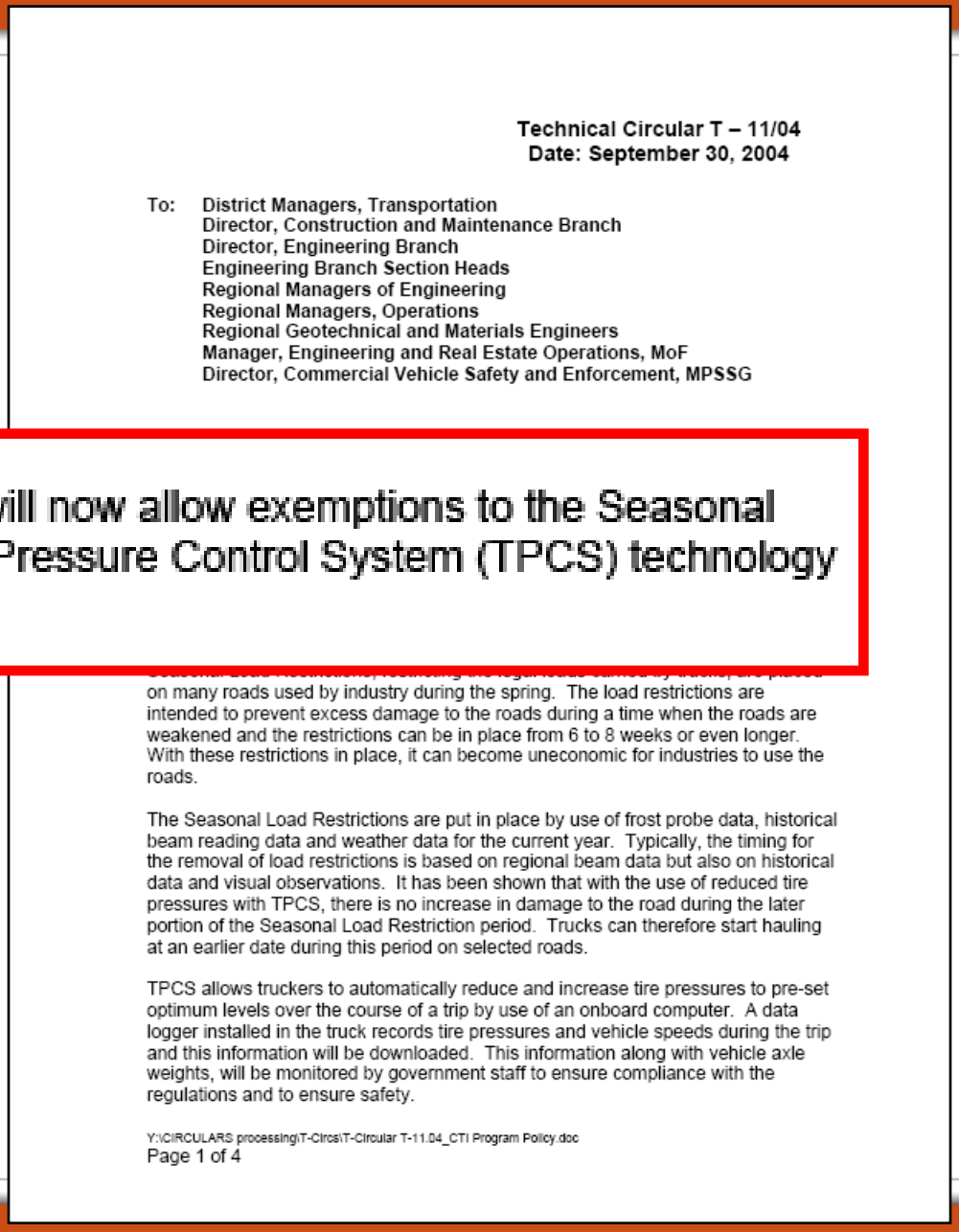
- Accreditation of TPCS in the UK
- Increasing demand for “road friendly” vehicles
- Increasing environmental regulation
- Forest owners looking for greatest return
- ‘6x2 with TPCS’ as a replacement for ‘6x4’?
- “TPCS regulation/exemption in other countries

TPCS in Canada

The Ministry of Transportation (MoT) will now allow exemptions to the Seasonal Load Restrictions Program when Tire Pressure Control System (TPCS) technology is used.

amended for TPCS vehicles

December 2004



Technical Circular T – 11/04
Date: September 30, 2004

To: District Managers, Transportation
Director, Construction and Maintenance Branch
Director, Engineering Branch
Engineering Branch Section Heads
Regional Managers of Engineering
Regional Managers, Operations
Regional Geotechnical and Materials Engineers
Manager, Engineering and Real Estate Operations, MoF
Director, Commercial Vehicle Safety and Enforcement, MPSSG

on many roads used by industry during the spring. The load restrictions are intended to prevent excess damage to the roads during a time when the roads are weakened and the restrictions can be in place from 6 to 8 weeks or even longer. With these restrictions in place, it can become uneconomic for industries to use the roads.

The Seasonal Load Restrictions are put in place by use of frost probe data, historical beam reading data and weather data for the current year. Typically, the timing for the removal of load restrictions is based on regional beam data but also on historical data and visual observations. It has been shown that with the use of reduced tire pressures with TPCS, there is no increase in damage to the road during the later portion of the Seasonal Load Restriction period. Trucks can therefore start hauling at an earlier date during this period on selected roads.

TPCS allows truckers to automatically reduce and increase tire pressures to pre-set optimum levels over the course of a trip by use of an onboard computer. A data logger installed in the truck records tire pressures and vehicle speeds during the trip and this information will be downloaded. This information along with vehicle axle weights, will be monitored by government staff to ensure compliance with the regulations and to ensure safety.

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Page 1 of 4

TPCS in Sweden

Seasonal Load Restriction Policy amended for TPCS vehicles February 2007

Vägverkets författningssamling

VVFS 2007:3

Vägverkets föreskrifter om färd med fordon med variabelt däckstryck;

Utkom från trycket den 8 februari 2007

beslutade den 22 januari 2007.

Vägverket föreskriver med stöd av 4 kap. 12 § 2 stycket och 13 § 3 stycket trafikförordningen (1998:1276) följande.

Inledande bestämmelser

1 § Dessa föreskrifter innehåller bestämmelser om färd med ett fordon eller ett fordonståg på en väg som tillhör bärighetsklass 2 eller 3 trots att de värden som anges i 4 kap. 12 § första stycket trafikförordningen (1998:1276) överskrids eller trots att de värden som anges i 4 kap. 13 § första stycket trafikförordningen underskrids.

2 § De beteckningar som används i dessa föreskrifter har samma betydelse som i lagen (2001:559) om vägtrafikdefinitioner och förordningen (2001:651) om vägtrafikdefinitioner.

3 § Om de villkor som anges i 4 - 8 § uppfylls får fordon och fordonståg framföras på de vägar som anges i bilagan, trots att de värden som anges för bärighetsklass 2 eller 3 i 4 kap. 12 § första stycket trafikförordningen (1998:1276) överskrids eller de värden som anges för bärighetsklasser 2 eller 3 i 4 kap. 13 § första stycket trafikförordningen underskrids. De värden som anges för bärighetsklass 1 i 4 kap. 12 § första stycket trafikförordningen får inte överskridas och de värden som anges för bärighetsklass 1 i 4 kap. 13 § första stycket får inte underskridas.

Villkor

4 § Fordonen skall ha utrustning för central reglering av däckstryck på alla hjul, CTI.

5 § Andra axlar än ett motorfordons framaxel eller framaxlar skall vara försedda med dubbelmonterade hjul.

6 § Fordonen får inte ha högre däckstryck än

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NORTHERN PERIPHERY

Thank you

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