



# 9th International Conference on **MANAGING PAVEMENT ASSETS (ICMPA9)**

## **Development and Implementation of a Simplified System for Assessing the Condition of Irish Regional and Local Roads.**

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[www.pms.ie](http://www.pms.ie)



# Overview

- 1) Background to the System**
- 2) Pavement Defects on Irish Roads**
- 3) The Simplified Rating System and Mobile App**
- 4) Implementation and Training**
- 5) Use of the Simplified System in Pavement Management in Ireland**
- 6) Benefits & Summary**

# 1) Background



- ❑ Overall 99,008 kilometres (61,521 miles) of Road
- ❑ National Roads: 5,415 km (3,365 miles) - 6%
- ❑ Regional and Local Roads: 93,593 km (58,156 miles) - 94%
- ❑ 31 Local Authorities
- ❑ Total national expenditure in 2014 of c. €552 million (c. \$750 million)

# Regional and Local Roads

- ❑ Regional and Local Roads: 93,593km
  - 13,121 km of Regional road
  - 80,472 km of Local roads
- ❑ Irish word for road in '**bóthar**' which means '**cow track**'
- ❑ Most are legacy, narrow local roads with poor geometry which carry low volumes of traffic
- ❑ Not cost effective to carry out network machine-based surveys or detailed visual inspection
- ❑ **A simplified visual rating system has been developed for surveying these roads**



## 2) Pavement Defects on Irish Roads

### Irish Roads: 10 no. Distress Types – 4 Categories

#### ❑ Surface Defects

- Bleeding
- Ravelling

#### ❑ Pavement Deformation

- Rutting
- Surface Distortion (Shape problems, depressions/sags, shoving, bumps)

#### ❑ Cracks

- Alligator Cracking
- Edge Cracking and Breakup
- Other Cracking (longitudinal, transverse, reflection, slippage, etc.)

#### ❑ Surface Openings

- Patching
- Potholes
- Road Disintegration

# Regrouping of Distresses

## ☐ Surface Defects

- Bleeding
- Ravelling

## ☐ Other/Localised Distresses

- Other Cracking (non-structural, L&T, reflection, slippage)
- Surface Distortion/Shape Problems
- Good/Fair Patching

## ☐ Structural Distresses

- Rutting
- Alligator Cracking
- Edge Cracking/Breakup
- Potholes
- Poor/Failed Patching
- Road Disintegration

# Surface Defects

## □ Bleeding



## □ Ravelling



# Other/Localised Distresses

## □ L & T Cracking



## □ Surface Distortion



# Structural Distress

## ❑ Alligator Cracking



## ❑ Rutting



# Structural Distress

## ❑ Potholes



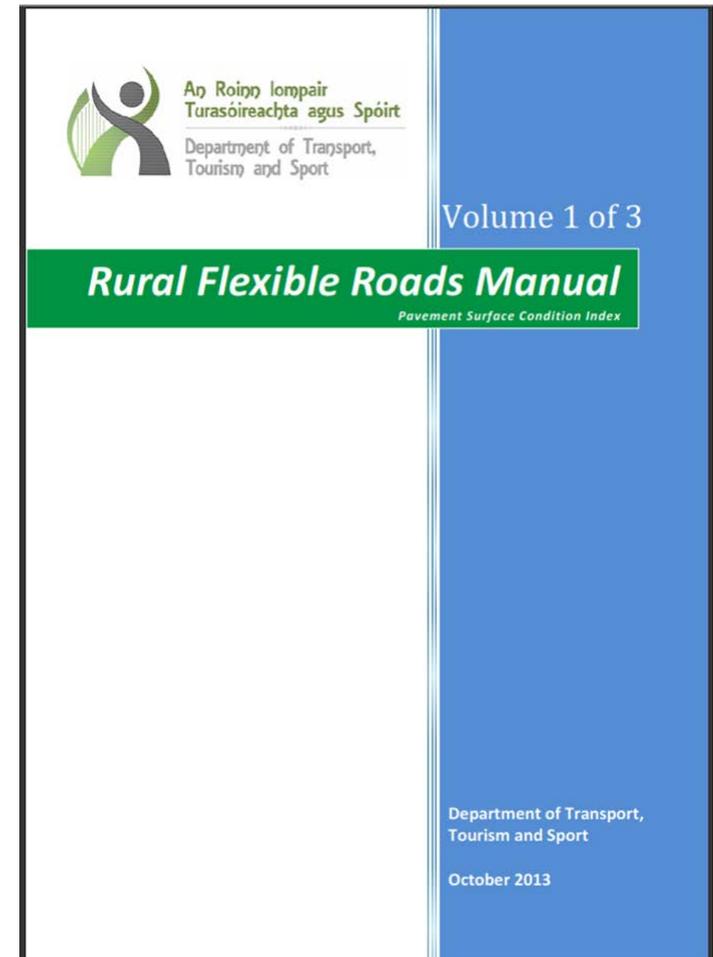
## ❑ Edge Cracking/Breakup



# 3a) The Simplified Rating System

- ❑ **Steering Group of DTTAS, LGMA, LA's & PMS**
- ❑ **New Rural Flexible Roads Manual Developed**
- ❑ **New Condition Rating Index**
  - Pavement Surface Condition Index (PSCI)
  - Simplified 1 to 10 system
  - Based on visible pavement defects
  - Links pavement defects to condition rating
- ❑ **Links Rating to Treatment**
  - Standardised approach to link pavement distress to treatment measures

(Index – Treatment – Money)



# Pavement Surface Condition Index (PSCI)

□ Colour-Coded:

**RED, AMBER,**

**BLUE, GREEN**

□ Rating assigned based on visible pavement distress.

Table 1: The PSCI Rating System

Overall PSCI Rating	Primary Rating Indicators*	Secondary Rating Indicators*
10	<b>No Visible Defects.</b>	Road surface in perfect condition.
9	<b>Minor Surface Defects<sup>1</sup>.</b> Ravelling or Bleeding <u>≤10%</u> .	Road surface in very good condition.
8	<b>Moderate Surface Defects<sup>1</sup>.</b> Ravelling or Bleeding <u>10% to 30%</u> .	Little or No Other defects.
7	<b>Extensive Surface Defects<sup>1</sup>.</b> Ravelling or Bleeding <u>≥ 30%</u> .	Little or No Other defects. <b>Old surface with aged appearance.</b>
6	<b>Moderate Other Pavement Defects<sup>2</sup>.</b> Other Cracking <u>≤ 20%</u> . Patching generally in Good condition. Surface Distortion requiring some reduction in speed.	Surface defects <sup>1</sup> may be present. No structural distress <sup>3</sup> .
5	<b>Significant Other Pavement Defects<sup>2</sup>.</b> Other Cracking <u>≥ 20%</u> . Patching in Fair condition. Surface Distortion requiring reduction in speed.	Surface defects <sup>1</sup> may be present. <b>Very localised structural distress<sup>3</sup></b> ( < 5 m <sup>2</sup> or a few isolated potholes).
4	<b>Structural Distress<sup>3</sup> Present.</b> Rutting, Alligator Cracking or Poor Patching for <u>5% to 25%</u> . Short lengths of Edge Breakup/Cracking. Frequent Potholes.	Other defects may be present.
3	<b>Significant Areas of Structural Distress<sup>3</sup>.</b> Rutting, Alligator Cracking or Poor Patching for <u>25% to 50%</u> . Continuous lengths with Edge Breakup/Cracking. More frequent Potholes.	Other defects may be present.
2	<b>Large Areas of Structural Distress<sup>3</sup>.</b> Rutting, Alligator Cracking or Very Poor Patching for <u>≥ 50%</u> . Severe Rutting ( <u>≥ 75mm</u> ). Extensive Very Poor Patching. Many Potholes.	Very difficult to drive on.
1	<b>Extensive Structural Distress<sup>3</sup>.</b> Road Disintegration of surface. Pavement Failure. Many large and deep Potholes. Extensive Failed Patching.	Severe Deterioration. Virtually undrivable.

# Linking Rating to Treatment Measures

Overall Rating	Treatment Measures	Surface	Structure
		Excellent	
10	Routine Maintenance	Very Good	
9		Fair	Good
8	Poor		
7	Resealing & Restoration of Skid Resistance	Fair	Fair
6		Poor	
5	Surface Restoration - Carry out localised repairs and treat with surface treatment or thin overlay.	Fair	Fair
4		Poor	
3	Structural Overlay - Required to strengthen road. Localised patching and repairs required prior to overlay.	Poor	Overall
2		Very Poor	
1	Road Reconstruction - Needs full depth reconstruction with extensive base repair.	Failed	Overall

## 5 Options

- Routine Maintenance
- Restoration of Skid Resistance
- Surface Restoration
- Structural Overlay
- Road Reconstruction

# Example from Manual of Rating 7

## Rating 7

### **Good - Restoration of Skid Resistance**

Greater than 30% of surface with surface defects (ravelling or bleeding). Little or No Other defects: No structural distresses (rutting, alligator cracking, edge problems, potholes); No patching; No other cracking present, and road shape is good. This category also includes old roads with aged appearance that need a surface dressing to maintain or restore waterproofing of the pavement surface.



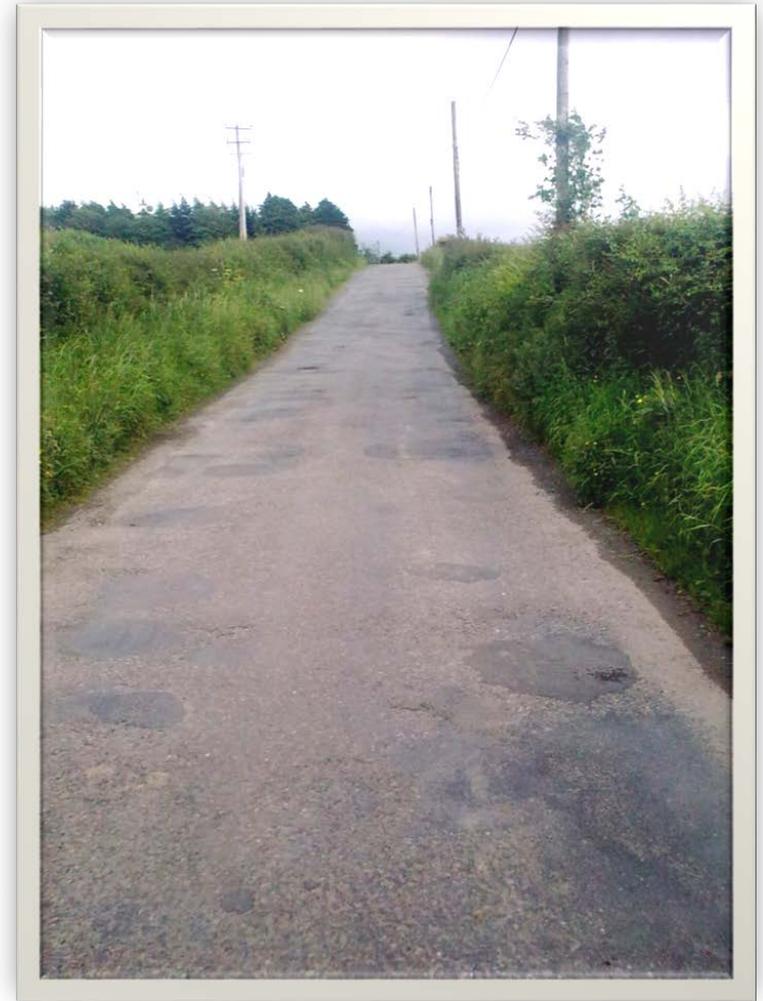
Rating 7: Extensive Ravelling (> 30%) over most of pavement surface.



Rating 7: Extensive Bleeding (> 30%) over most of pavement surface.

# Ratings 3 or 4

- ❑ Structural Distress present



# Ratings 1 or 2

## ❑ Severe Structural Distress

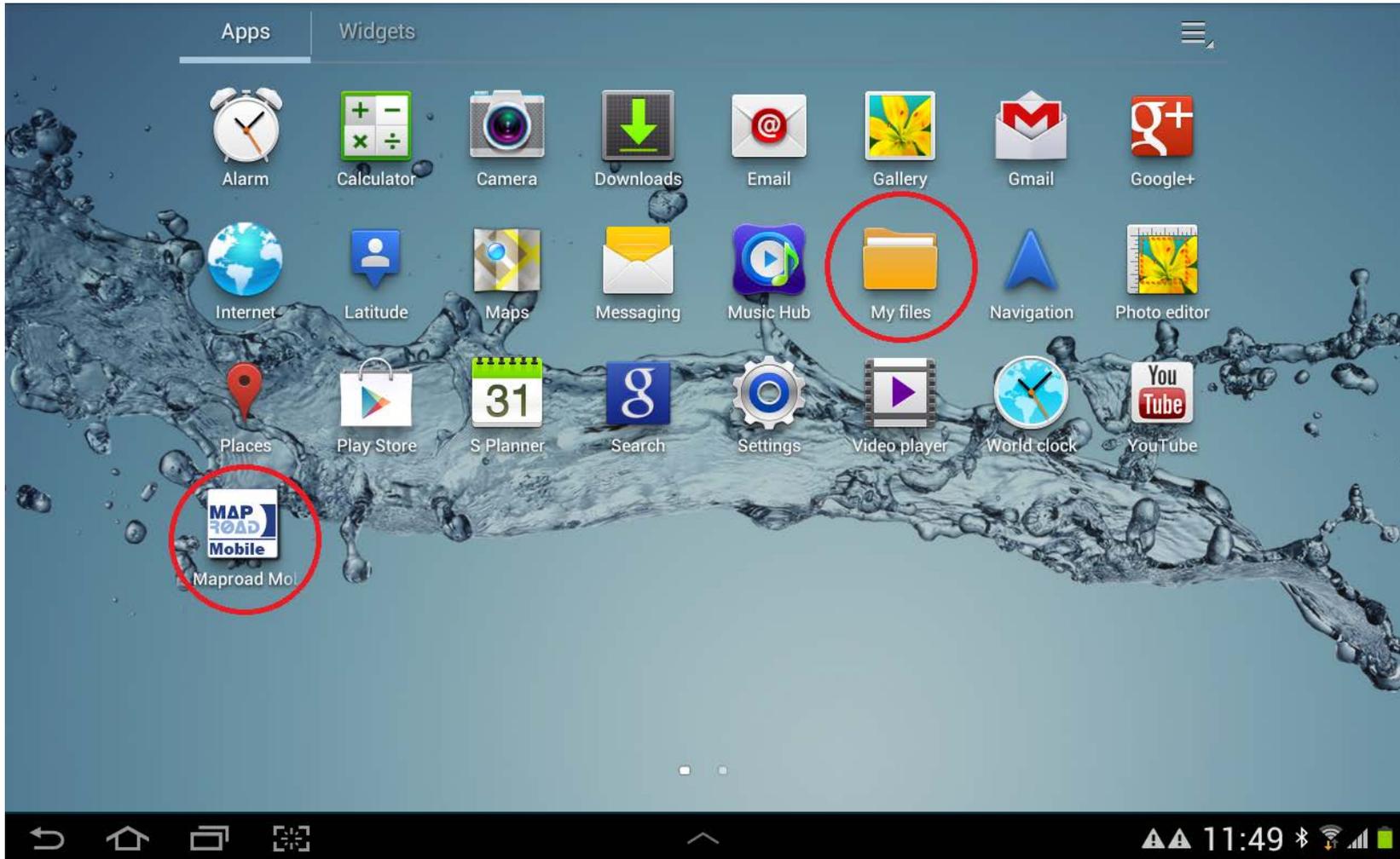


# 3b) MapRoad Mobile App

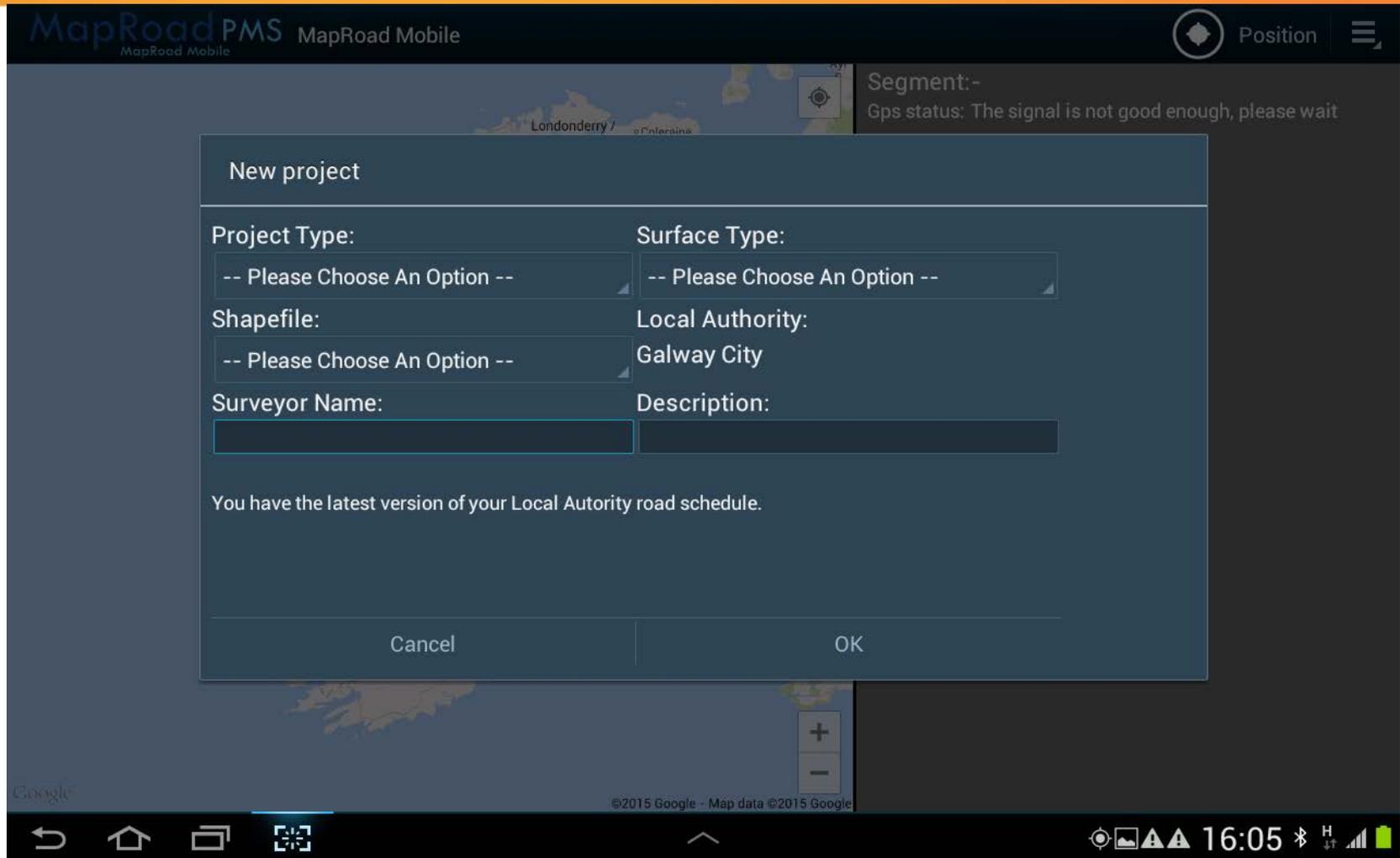


- ❑ Driven Survey (2 Person Team: Driver and Rater)
- ❑ Data is Recorded electronically using **Tablet and App**
- ❑ Mobile Survey App, **MapRoad Mobile**, has been developed
- ❑ **Samsung Galaxy Tablet** (10.1' inch) recommended due to screen and supports 3G & Wi-Fi
- ❑ GPS location used to store PSCI visual rating data points
- ❑ **GPS accuracy of 5 to 10 metres** (can be increased to 2 to 3 metres)

# MapRoad Mobile App



# MapRoad Mobile App



# MapRoad Mobile App



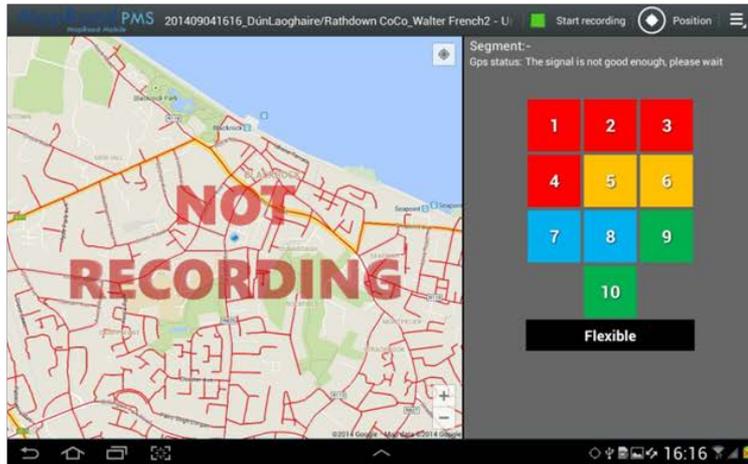
# MapRoad Mobile App

- ❑ Assigned PSCI (1 to 10) Rating and associated GPS data are recorded in real-time
- ❑ PSCI data is uploaded directly to **MapRoad PMS**
- ❑ MapRoad PMS is an integrated, GIS enabled, Roads Management Information System operated by DTTAS.
  
- ❑ Survey speed range: typically 30 to 50 km/hr
- ❑ Typical daily output of **150 to 200 km per day**

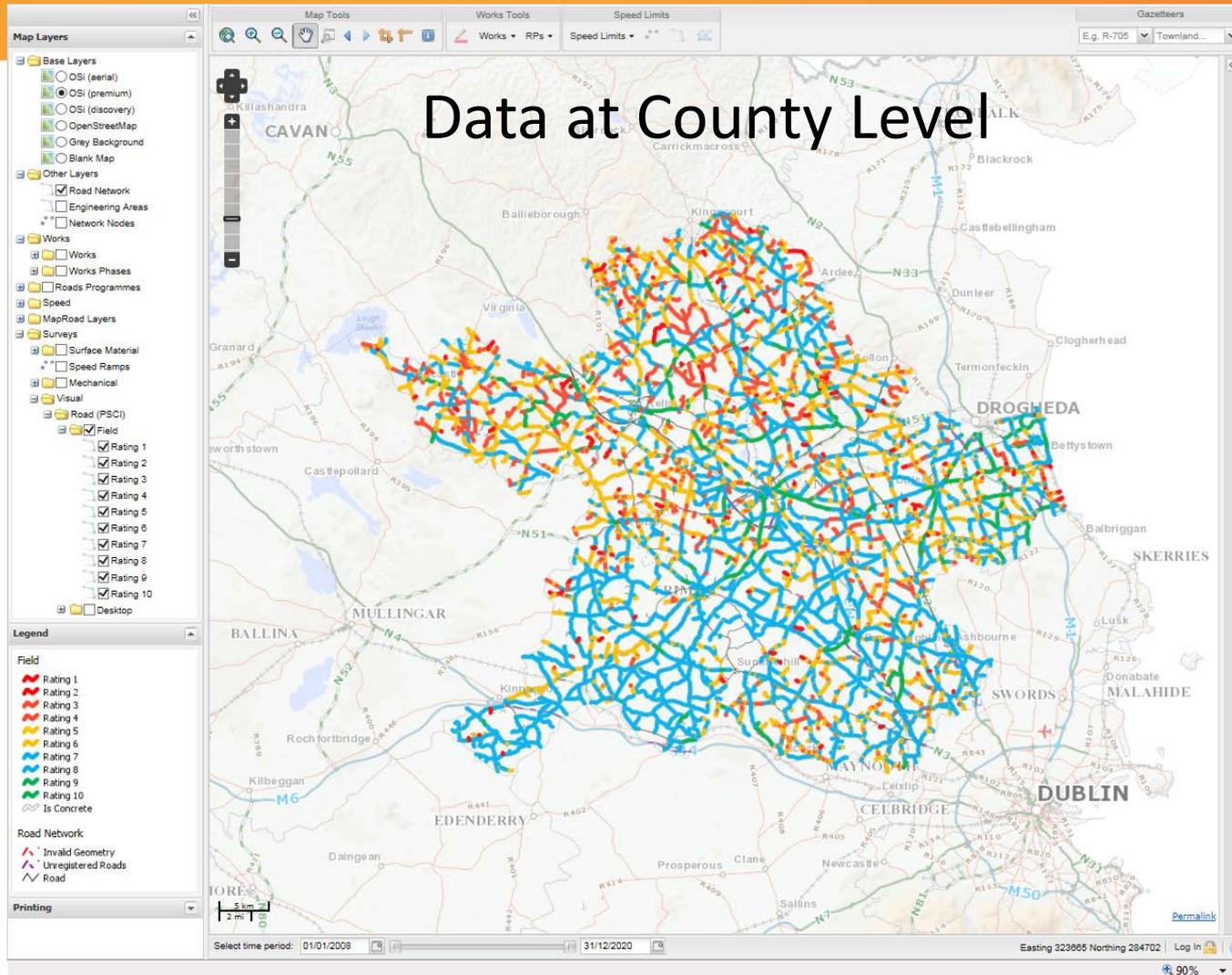
# PSCI rating uploaded directly to MapRoad PMS

## PSCI Ratings

Map Filtered for Local Primary only



# MapRoad PMS – PSCI Data



# MapRoad PMS – PSCI Data



# PSCI from Digital Video

The screenshot displays a software window titled "Number Rating". The main area is a video viewer showing a road with a white car in the distance. A red "4" is overlaid on the top left of the video, with "\*1170m" below it. To the right of the video is a "Controls" panel. It includes a "Rating" section with buttons for numbers 1 through 10, where 10 is green, 9 is green, 8 is blue, 7 is blue, 6 is yellow, 5 is yellow, 4 is red, 3 is red, 2 is red, and 1 is red. Below the rating buttons are buttons for "Choose first jpeg", "Current position:" (with a text box containing "0003.035000"), "Back 100m", "Back to rating start", "Play", and "Pause". There is also a "Speed Intervals" section with radio buttons for 70 km/hr, 55 km/hr, 35 km/hr, 20 km/hr, 10 km/hr (which is selected), and 5 km/hr. At the bottom of the controls is an "Ext" button. Below the controls panel, it says "Current Rating: 4".

# 4) Implementation & Training

- ❑ **National & Regional Workshops held**
- ❑ **Buy-in from Local Authority staff**
- ❑ **In Use by all 31 Local Authorities**
- ❑ **Training Course Developed**
  - ❑ 2 Parts
    1. Classroom Training – 1 day
    2. Site Practical Exam (live survey on c. 10km route)
  - ❑ Over 35 training courses completed since 2013
  - ❑ Over 300 personnel trained from 31 Local Authorities
  - ❑ >80% Pass rate
  - ❑ Moving to Blended Learning

# 5) Use of PSCI in Pavement Management

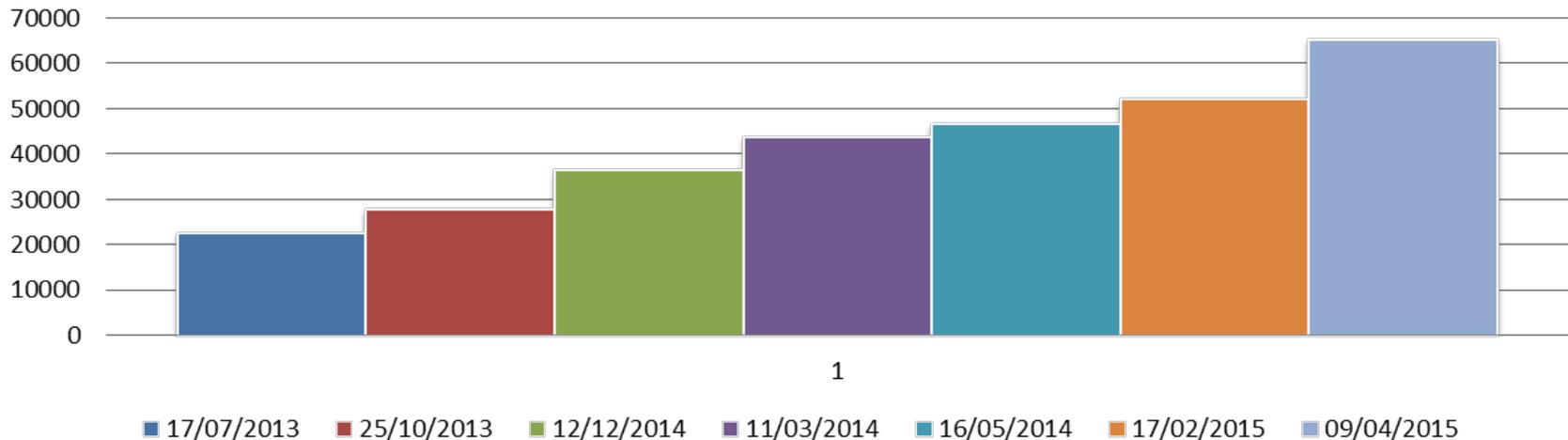


- ❑ There is never enough money and there are always too many roads, so roads have to be prioritised.
- ❑ The PSCI is playing a major role in this regard.
- ❑ PSCI is a Key Performance Indicator (KPI) used by the DTTAS and LA's for:
  - Scheme Selection/Prioritisation
  - Treatment Selection
  - Allocation of Funding
  - Financial Planning

# PSCI Data Nationally

- ✓ MapRoad Mobile – 1 to 10 PSCI survey
- ✓ c. 64,000 km (70%) of Regional and Local Roads surveyed

## PSCI Survey Length



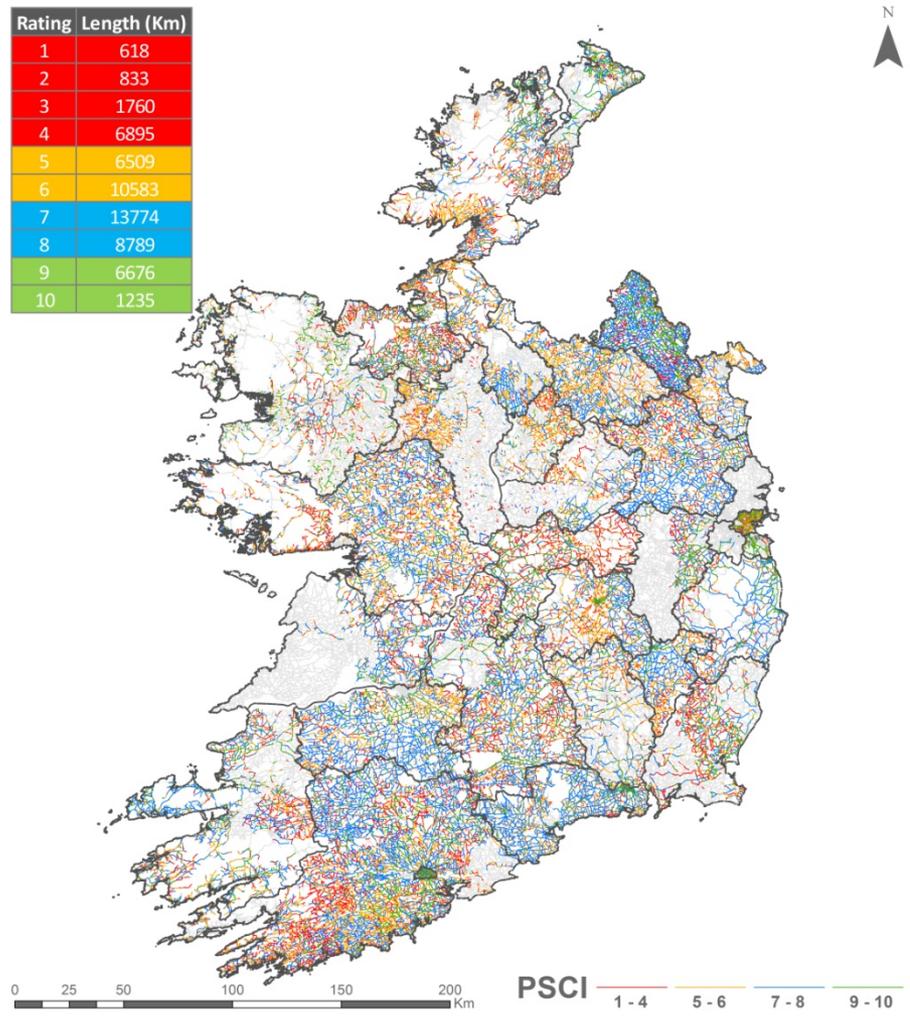
# National Picture 13<sup>th</sup> May, 2015

**c. 64,000 km surveyed  
(c. 70% coverage)**

**by Local Authority Staff  
Off their own bat.**

## Pavement Surface Condition Index (PSCI): 13/05/2015

Rating	Length (Km)
1	618
2	833
3	1760
4	6895
5	6509
6	10583
7	13774
8	8789
9	6676
10	1235



Notes:  
 - Map data includes PSCI test data in Wicklow  
 - Map data includes PSCI test loop assessment data  
 Map data correct as of 13/05/2015  
 Created by WFrench, Compass Informatics

# PSCI & Pavement Management

- ❑ Provides a Picture of Network (Rating Number, Colour)
- ❑ Provides evidential basis for funding
- ❑ Supports justification for scheme selection and in prioritising works
  
- ❑ PSCI is required by DTTAS from the Local Authorities:
  - ❑ for the selection of projects for Maintenance works
  - ❑ for Maintenance Treatment selection
  - ❑ for 'Before' and 'After' surveys of all maintenance and improvement works from 2012 onwards
- ❑ These requirements have accelerated the implementation process

# 6) Benefits of PSCI (1 to 10)

## Fast

- Walking Survey (Sampling): c. 5 km/day
- Windshield Survey: c. 50 km/day
- Driven PSCI Survey: 150 to 200 km/day

## Continuous – 100% Survey

## Fit for Purpose (**Network Level**)

## Much **Safer** – huge consideration in Ireland

## GIS based Tablet & App – **no paper** involved

## Uploaded directly to Cloud and **Immediately Available**

## **Colour-coded/Easy to Understand** – ‘Picture tells 1000 Words’ so is very attractive to funding managers and politicians – **they like it.**



# Summary

- ❑ Simplified 1 to 10 Rating Developed (PSCI)
- ❑ Collected using a Tablet and Android App
- ❑ Rural, Urban and Concrete Roads
- ❑ Links: Defects – Index – Treatment – Money
- ❑ Integrated into the DTTAS MapRoad PMS
- ❑ Implemented in all Local Authorities
- ❑ Management at National and Local level – overall objective is to establish current condition and lengths of road requiring various remedial works plus costs at both nationally and at county level.

Thank You

Go n-éirí on Bóthar Leat.

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