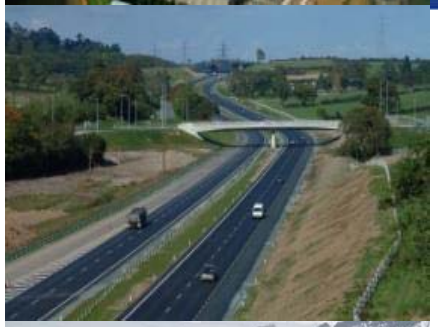

# Road Safety Engineering

**Forbes Vigors**
**Project Manager Road Safety**
**National Roads Authority**

*National Roads Authority – Standards Section*
*Training for New Developments*
*April 2013*

ARUP

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# Topics for Discussion

- EU RISM Directive (Directive 2008/96/EC)
  - S.I. No. 472 of 2011
- Road Safety Management Procedures for National Roads in Ireland
  - NRA HD 15/12 Network Safety Ranking
  - NRA HD 16/12 Temporary Safety Measures Inspection
  - NRA HD 17/12 Road Safety Inspection
  - NRA HD 18/12 Road Safety Impact Assessment
  - NRA HD 19/12 Road Safety Audit

# Road Safety in Ireland

- 1924 – recording of traffic accident statistics
- 1929 – recording system expanded and improved. This scheme was implemented through the Garda Síochána, Routine Order A. 33 which became effective on Jan 1st, 1930. A specially designed form – A.58 or A.59 had to be completed in respect of all accidents reported to the Garda Síochána
- 1933 – the passing of the Road Traffic Act, 1933, gave a new impetus to the recording of road traffic accidents insofar as Section 173 made it mandatory for drivers of mechanically propelled vehicles which had been involved in a traffic accident to report such an occurrence to the Garda Síochána. Report forms A.58 and A.59 were changed and renumbered C(T) 35 and C(T) 36 respectively
- 1936 – Garda Síochána produced a detailed annual “Return of Traffic Accidents”
- 1959 – C(T) 36 dropped, reporting and analysis of Mat Damage ‘Only’ discontinued
- 1961 – Major Changes C(T) 61 created, CSO introduced a mechanised processing procedure.

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# Road Safety in Ireland

- 1965 – An Foras Forbartha invited Dr. R. J. Smeed, then, Deputy Director of the Road Research Laboratory to undertake a survey and investigation of road safety in Ireland.
- Within “Traffic Accident Reporting Criteria of Principal Users in Illinois. 1965” there are Five distinct, basic purposes of traffic accident records were identified these are:-
  - (i) To have knowledge of traffic accidents as a cause of mortality, morbidity and economic loss
  - (ii) To point out where, when and to whom, traffic accidents are a critical problem
  - (iii) To suggest lines of preventive action to be taken
  - (iv) To measure the effect of accident-prevention efforts and
  - (v) To determine negligence or fault.
- 1968 – C(T) 68 introduced, Road Safety Records Bureau
- 1994 – C(T) 68 minor updates
- 2001 – C(T) 68 replaced with PC 16 Form
- 2013 – Update to the Pulse System to include Pictograms


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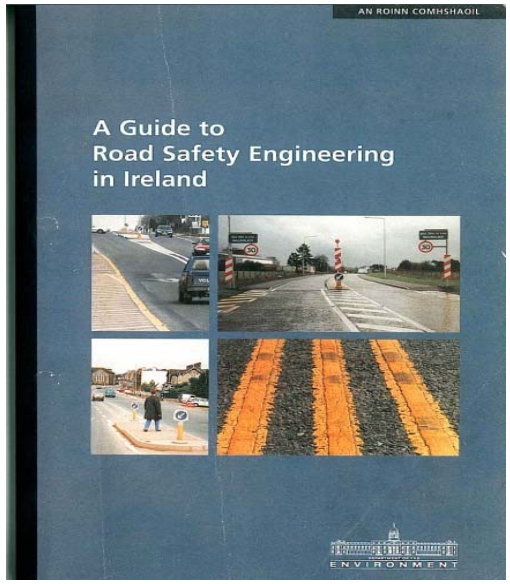
# What is a collision

DoE (Department of the Environment), A Guide to Road Safety Engineering in Ireland, 1996

In a Guide to Road Safety Engineering in Ireland published in 1996, it gave two definitions', the first definition is that used by the RSA, the second defines a road collision is a rare, random, multi-factor event preceded by a situation in which one or more road users have failed to cope with their environment.



# Collision Types

**Fatal Collision**
Where at least one person is killed as a result of the collision and death occurs within 30 days.

**Serious Collision**
Is an injury for which the person is detained in hospital as an ‘in-patient’, or any of the following injuries whether or not detained in hospital: fractures, concussion, internal injuries, crushing, severe cuts and lacerations, severe general shock requiring medical treatment.

**Minor Collision**
Where there are no deaths or serious injuries. A ‘minor injury’ is an injury of a minor character such as a sprain or bruise.

**Material Damage**
Where there are no deaths or injuries. A collision is a ‘material damage collision’ if damage is caused to a vehicle or property.

RSA proposes to explore how an international definition of a serious injury can be agreed and how a medical categorisation (rather than a police categorisation) can be arrived at.

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# EU Road Safety Infrastructure Management (2008/96/EC)

- Directive requires the establishment and implementation of procedures relating to:
  - Safety Ranking & Management of the road network in operation
  - Road Safety Inspection
  - Road Safety Impact Assessments
  - Road Safety Audit & Training Requirements
  - Also includes:
    - Best Practice Exchange
    - Data Management requirements
    - Adoption of Guidelines.
- Directive adopted on the 19th November 2008
- Came into force 19th December 2010

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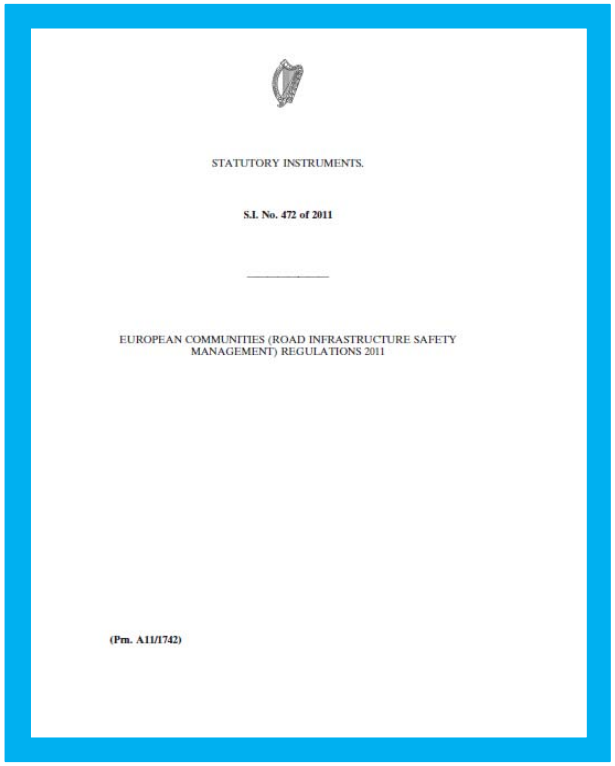
# S.I. No. 472 of 2011

- S.I. No. 472 signed on the 21st of September 2011
- Regulations only apply to roads in the State which are part of the Trans-European road network (TERN)



STATUTORY INSTRUMENTS.

S.I. No. 472 of 2011

EUROPEAN COMMUNITIES (ROAD INFRASTRUCTURE SAFETY MANAGEMENT) REGULATIONS 2011

(Prn. A11/1742)

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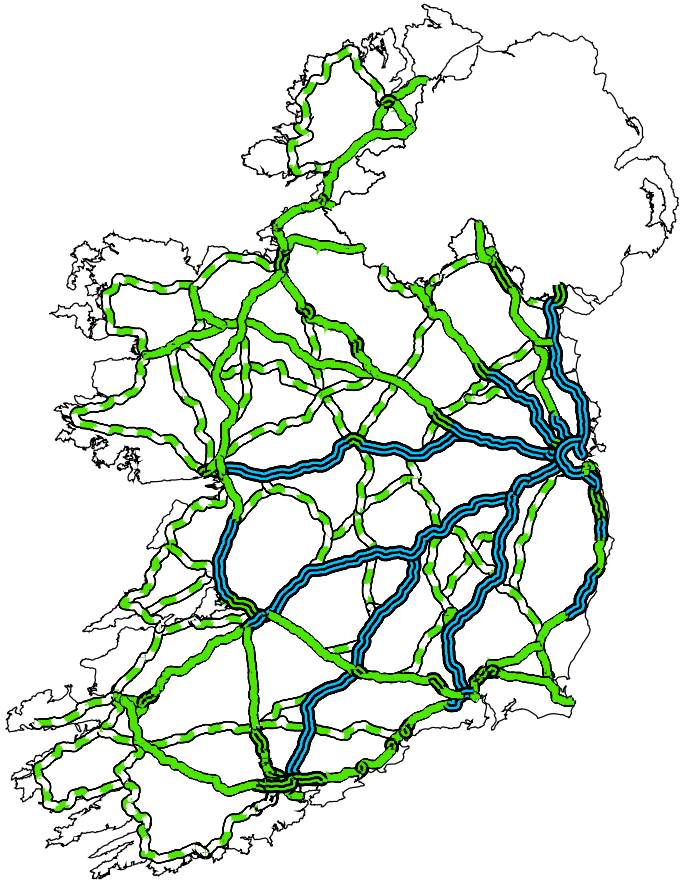
# How does this effect us?

## Legacy Road Network

**Network Safety Ranking**

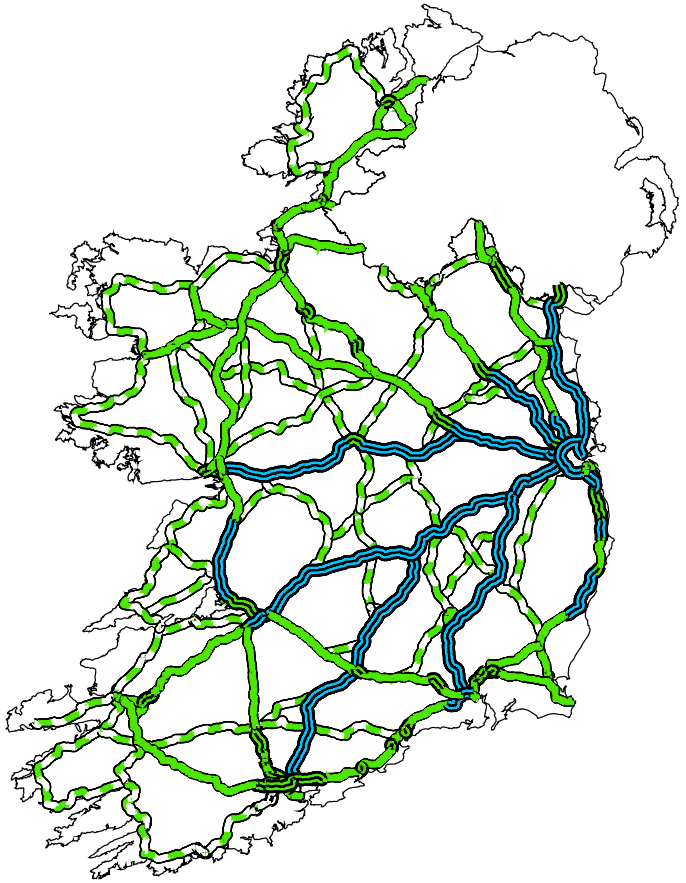
**Road Safety Inspections**



# How does this effect us?

## Designed Network

**Road Safety Impact Assessments** → **Road Safety Audits**

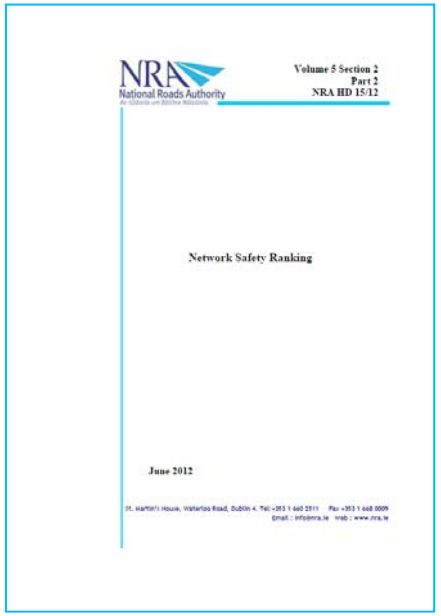


# HD 15 Network Safety Ranking

Article 5 : Safety Ranking and management of the road network in operation

1). Member States shall ensure that the ranking of high accident concentration sections and the network safety ranking are carried out on the basis of reviews, at least every three years, of the operation of the road network

2). Member States shall ensure that road sections showing higher priority according to the results of the ranking of high accident concentration sections and from network safety ranking are evaluated by expert teams by means of site visits guided by the elements referred to in point 3 of Annex III. At least one member of the expert team shall meet the requirements set out in Article 9(4)(a).

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# HD 15 Network Safety Ranking who does it?

## Article 5 : Safety Ranking and management of the road network in operation

Article 9(4)(a).
they have relevant experience or training in road design, road safety engineering and accident analysis

S.I. No. 472.
(a) appoint expert teams, comprising at least one member with relevant experience or training in road design, road safety engineering and accident analysis, to evaluate the said sections by means of site visits guided by the elements referred to in point 3 of Annex III to the Directive;

## HD 15 Network Safety Ranking – Site Assessment Qualifications

3.1 Assessment Team Member (ATM). (Post Dec 2013)
At least one member of the Assessment Team will be a Chartered Engineer or equivalent with seven years post graduate experience with a minimum of five years in the design and construction of road projects and /or Road Safety Schemes, and will have two or more years experience of collision investigation and remedial measures.
They will have taken part in ten road safety audits as a Team Member.
They will hold a Certificate of Competence in Road Safety Audit.

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# HD 15 Network Safety Ranking Definitions

- Objective of the Standard
- Ranking of high collision concentration sections
- Network Safety Ranking
- Reference Populations
- Collision Frequency
- Collision Rates
- Potential for Improvement
- High Concentration of Collisions

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# HD 15 Network Safety Ranking

- Roads to be Inspected
- Exemption
- Review Periods

# HD 15 Network Safety Ranking Multi-Stage Process

- Initial Desktop Study
- Detailed Desktop Study
- Site Assessment
- Define the Problem
- Measures to Resolve the Problem
- Prioritise the Schemes on the Network

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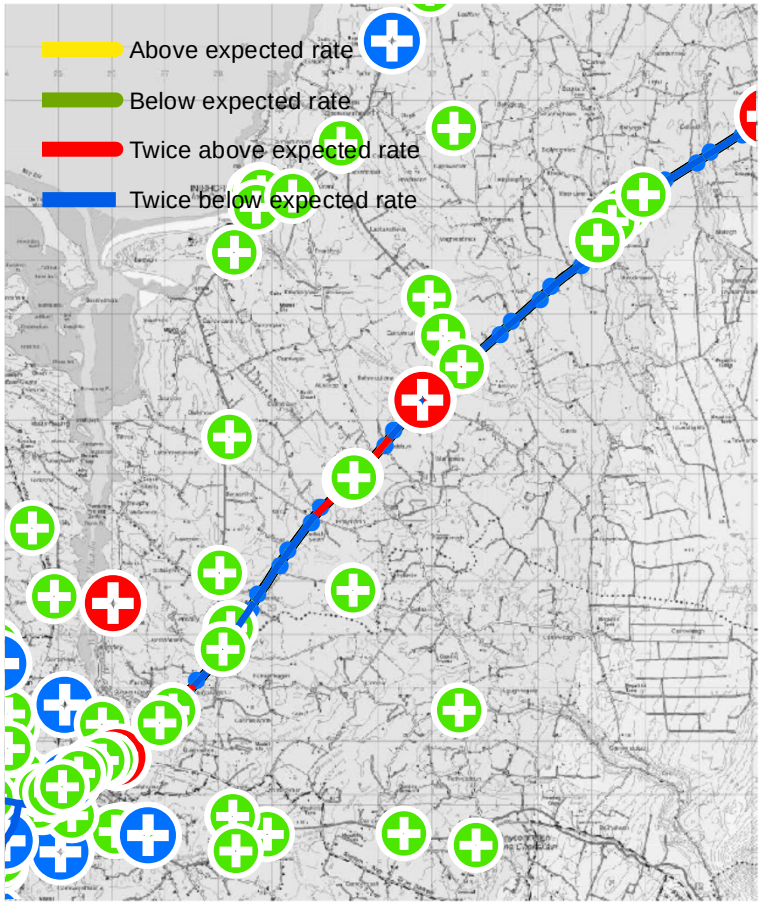
# Initial Desktop Study

- Divide the Network into the R.P.
- Divide the R.P into 1km Segments
- Assign the collision data to each segment
- Assign the AADT to each Segment

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# Detailed Desktop Study?

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# Detailed Desktop Study

- Accuracy of the Data

station: [redacted] garda: [redacted] incident no: [redacted]

GPS Coordinates

Coordinate Type, DMD

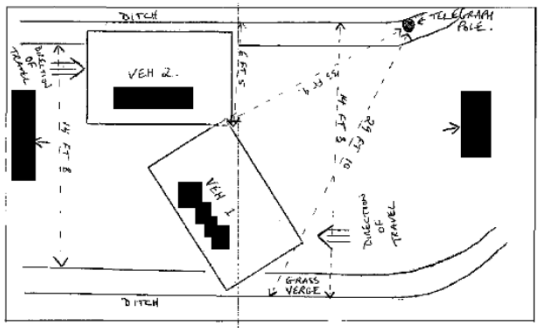
Latitude (N): 52:56.0050

Longitude (W): 009 . 06.924

map title: *(to be handwritten)*

diagram (specify markings, widths, signs, etc.)

**mark and record grid line number




description:

2 veh rta. veh 1 [redacted] which was travelling from [redacted] towards [redacted] and crossed over to the opposite side of the road and collided with veh 2 [redacted], driver and front seat passenger of veh 2 were taken to hospital. front seat passenger from veh 2 had to be cut from car as a precaution. rear seat passengers in veh 2 uninjured and driver and front seat passenger of veh 1 uninjured.

**mark and record grid line number to be recorded on top right hand corner of page

4 of 4

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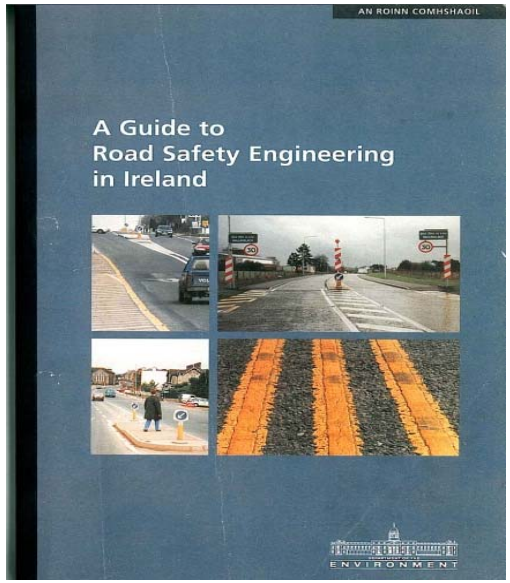
# Site Visit

- Site Visit
- Defining the Problem
  - Chapter 5.5 Single Site Study – 1
  - Chapter 5.6 Single Site Study – 2
- Measures to Resolve the Problem
- Prioritising the Schemes on the Network



# HD 17 Road Safety Inspections

Article 6 : Safety Inspections

1). Member States shall ensure that safety inspections are undertaken in respect of the roads in operation in order to identify the road safety related features and prevent accidents.

2). Safety inspections shall comprise periodic inspections of the road network and surveys on the possible impact of roadworks on the safety of the traffic flow.

3). Member States shall ensure that periodic inspections are undertaken by the competent entity. Such inspections shall be sufficiently frequent to safeguard adequate safety levels for the road infrastructure in question.

# HD 17 Road Safety Inspection What is it?

## Article 6 : Road Safety Inspection

| | |
|---|---|
| Def 7. "safety inspection" means an ordinary periodical verification of the characteristics and defects that require maintenance work for reasons of safety; | S.I. No. 472.<br>“safety inspection” means an ordinary periodical verification of the characteristics<br>and defects that require maintenance work for reasons of safety; |

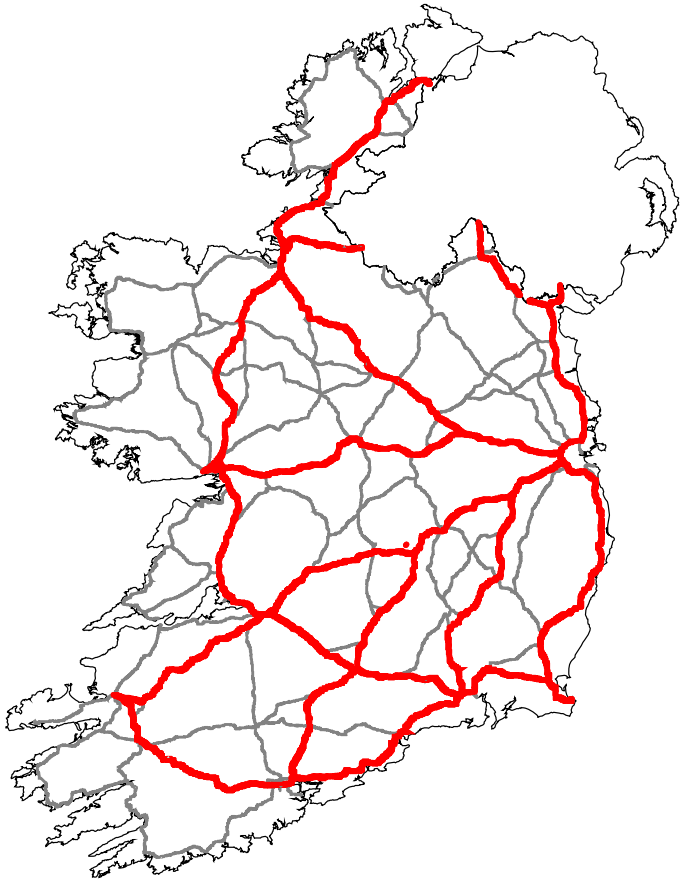
## HD 17 Road Safety Inspection – Inspection Team Qualifications

3.1 Inspection Team Leader (ITL)
An Inspection Team Leader will be a Chartered Engineer or equivalent.
They will have ten years post graduate experience with a minimum of seven years in the design and construction of Road Projects and /or Road Safety Schemes and will have two or more years experience of collision investigation and remedial measures. They will have taken part in ten road safety audits as team member, and will have a Certificate of Competence in Road Safety Audit.

3.2 Inspection Team Member (ITM)
An Inspection Team Member will have seven years post graduate experience with a minimum of five years in the design and construction of Road Projects and or Road Safety Schemes, and will have two or more years experience of collision investigation and remedial measures. They will have taken part as a trainee in five road safety audits, and will have attended an accredited three to five day course in road safety audit theory and practice.

# HD 17 Road Safety Inspections Definitions

- Objective of the Standard
- Road Safety Inspection
- Inspection Team
- Inspection Brief
- Roads to be Inspected & Inspection Frequency
- Scope of the Inspection



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# HD 17 Road Safety Inspection Inspection Process

- NRA prepares an Inspection Brief
- Inspection team completes a Desktop Study
  - Review of Route information & Collision Trends
  - Inspect the Route, Both directions, day and night
    - Identify Hazards, (image and text)
    - Describe the Hazard
    - Assign an Associated Risk Rating

| Risk Rating | | Likelihood of Occurrence | | |
|---|---|---|---|---|
| | | Likely | Possible | Unlikely |
| Severity of Outcome | Severe | High | High | Medium |
| | Medium | Medium | Medium | Low |
| | Minor | Medium | Low | Low |

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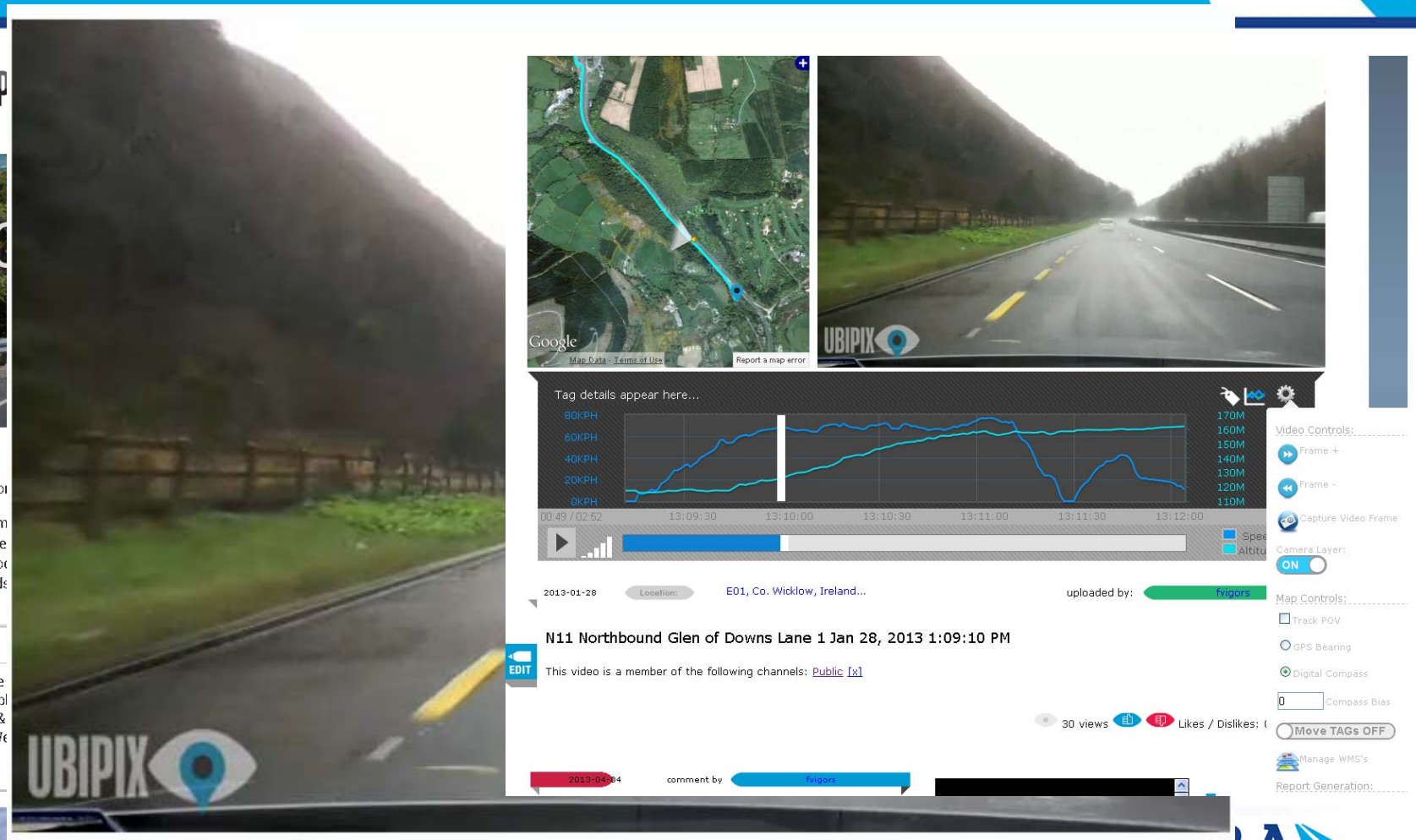
# Data Capture

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# HD 17 Road Safety Inspection

| Approx_AADT_2007 | NRA_Site_ID | Hazard_ID | Element | Location_Desc | Field_Notes_1 | Problem | Severity | Likelihood | Risk |
|---|---|---|---|---|---|---|---|---|---|
| 4147 | N05RN_XXXXX | N05RN_XXXXX | S | XXXX southbound approach to the N05 | Vertical barrier terminal | A vertical safety barrier terminal has been provided following the removal of upstream barrier section. Should an errant vehicle strike the barrier terminal it may result in an increased collision severity for vehicle occupants. | S | P | H |
| 5040 | N05RN_XXXXX | N05RN_XXXXX | S | Side road approach to the N05 | Visibility to right obscured by house boundary | Visibility to the right for drivers entering the N05 is inhibited by the boundary wall. Potential inappropriate vehicular movements and conflicts with through traffic. | S | P | H |


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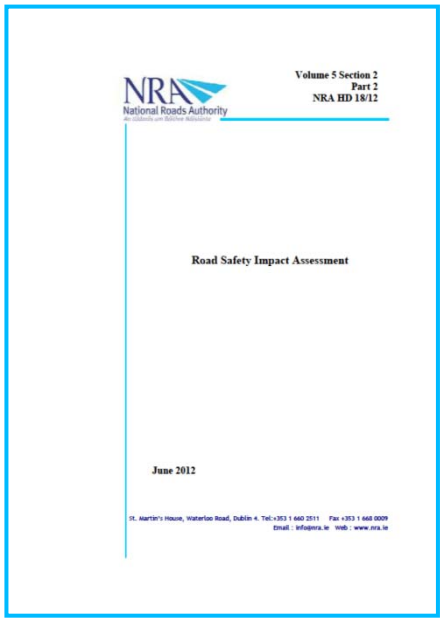
# HD 18 Road Safety Impact Assessments

Article 3 : Road safety impact assessment for infrastructure projects

1). Member States shall ensure that a road safety impact assessment is carried out for all infrastructure projects.

2). The road safety impact assessment shall be carried out at the initial planning stage before the infrastructure project is approved. In that connection, Member States shall endeavour to meet the criteria set out in Annex I.

3). The road safety impact assessment shall indicate the road safety considerations which contribute to the choice of the proposed solution. It shall further provide all relevant information necessary for a cost-benefit analysis of the different options assessed.

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# HD 18 Road Safety Impact Assessment

## Article 3 : Road safety impact assessment for infrastructure projects

Def 3. "road safety impact assessment" means a strategic comparative analysis of the impact of a new road or a substantial modification to the existing network on the safety performance of the road network;

S.I. No. 472.
“road safety impact assessment” means a strategic comparative analysis of the impact of a new road or a substantial modification to the existing road network on the safety performance of the road network;

## HD 18 Road Safety Impact Assessment– Impact Assessment Team Qualifications

The Impact Assessment Team will consist of a minimum of two persons, one with Road Design experience and one with Road Safety Auditing experience.

2.1 *Road Design Engineer (RDE)*

A Road Design Engineer will have a recognised University degree to Level 8 or equivalent, they will have seven years post graduate experience with a minimum of five years in road design and /or road safety schemes.

2.2 *Road Safety Auditor (RSA)*

A Road Safety Auditor will be a road safety engineer, road design engineer or road traffic engineer. They will have taken part as trainee in five road safety audits, and will have attended an accredited three to five day course in road safety audit theory and practice.

# HD 18 Road Safety Impact Assessment - Definitions

- Objective of the Standard
- Road Schemes
- Scope of the Impact Assessment
- Stage of the Impact Assessment

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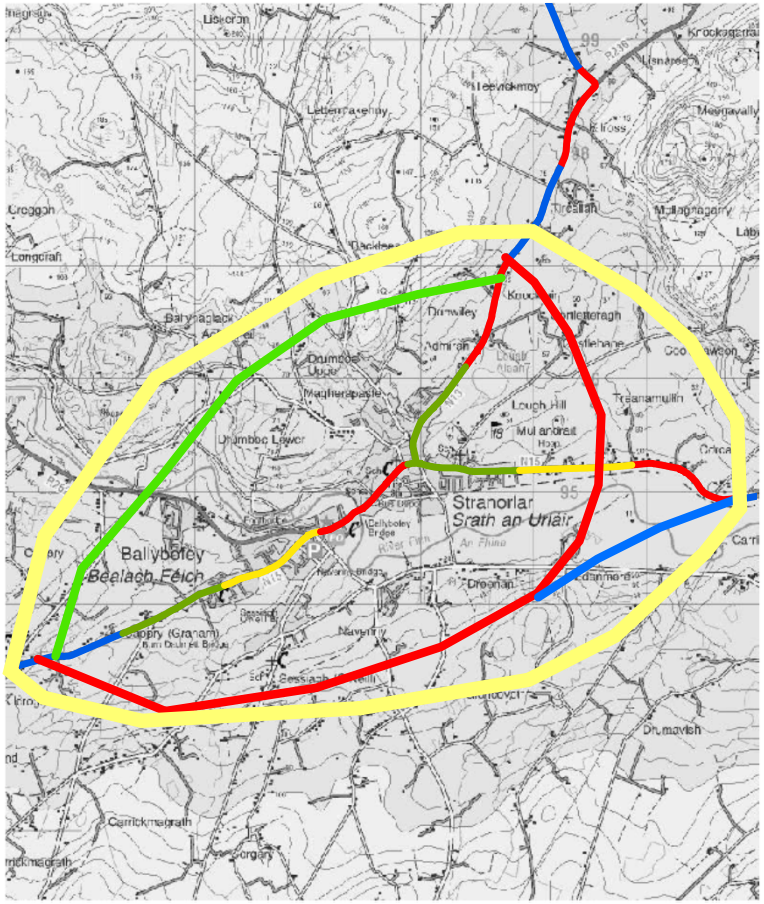
# Impact Assessment Elements

- Problem Def, Objectives
- Existing COBA
- Collision Data and Analysis
- Traffic Surveys, incl VRU's
- Existing Road Network
- Amenities and centres of activity
- Previous Road Safety Reviews

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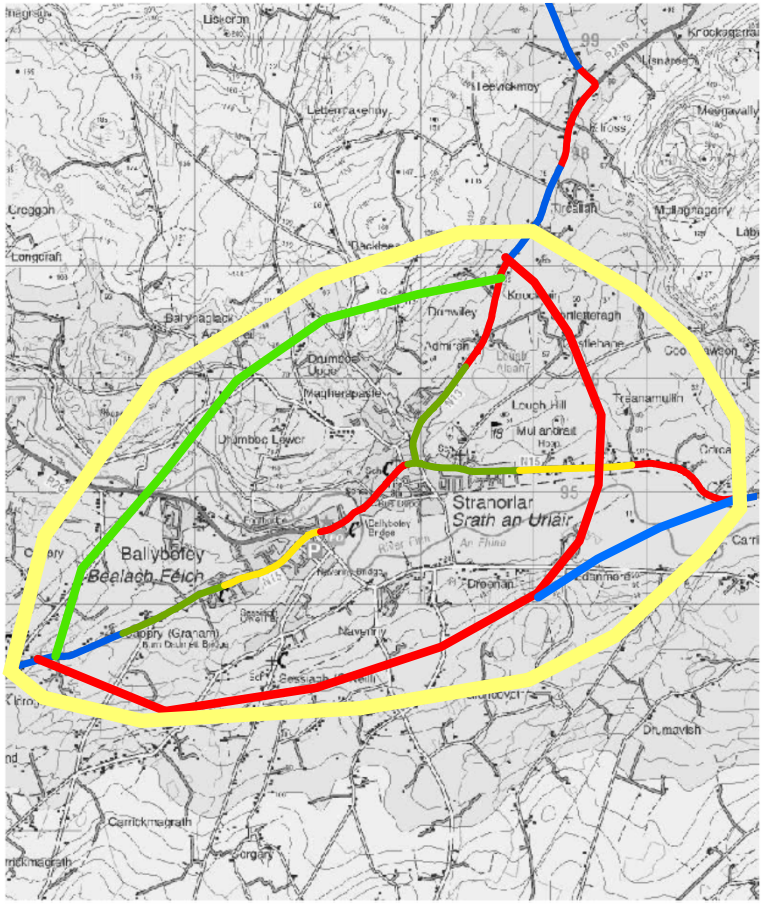
# Impact Assessment Elements

- Assess the
  - Do Nothing
  - Do Minimum
  - Alternatives considered

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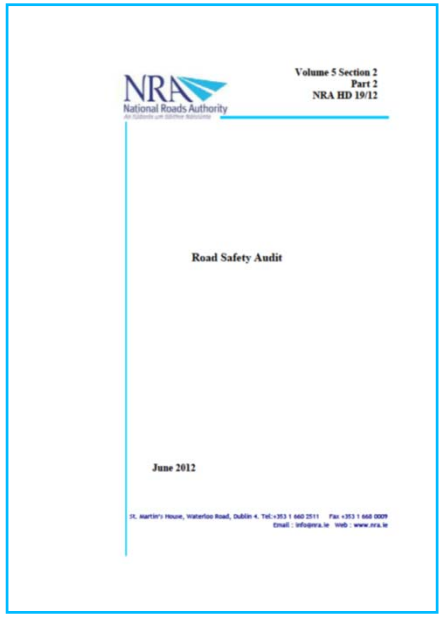
# HD 19 Road Safety Audits

Article 4 : Road safety audits for infrastructure projects

1). Member States shall ensure that road safety audits are carried out for all infrastructure projects.

2). The auditor shall be appointed in accordance with the provisions of Article 9(4) and shall have the necessary competence and training provided for in Article 9. Where audits are undertaken by teams, at least one member of the team shall hold a certificate of competence as referred to in Article 9(3)..

3). Road safety audits shall form an integral part of the design process of the infrastructure project at the stage of draft design, detailed design, pre-opening and early operation.

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# HD 19 Road Safety Audit

## Article 4 : Road safety audits for infrastructure projects

Def 4. "road safety audit" means an independent detailed systematic and technical safety check relating to the design characteristics of a road infrastructure project and covering all stages from planning to early operation;

S.I. No. 472. A road safety auditor shall—
(*a) have relevant experience or training in road design, road safety engineering* and accident analysis,
(*b) from 19 December 2013, be in possession of a valid certificate of competence*

## HD 19 Road Safety Audit – Audit Team Qualifications

3.1 *Audit Team Leader (ATL)*
An Audit Team Leader will be a Chartered Engineer or equivalent with at least two years experience of collision investigation and remedial measures, will have a Certificate of Competence in Road Safety Audit and will have taken part in ten road safety audits as team member, An Audit Team Leader will have completed as team member at least two audits of a similar stage and scheme type to that for which approval is being sought. They will also have done at least five road safety audits within the preceding three years.

3.2 *Audit Team Member (ATM)*
An Audit Team Member will be a road safety engineer, road design engineer or road traffic engineer. They will have taken part as trainee in five road safety audits and will have attended an accredited three to five day course in road safety audit theory and practice.

# HD 19 Road Safety Audits Stages

- Audit Stages
  - Stage F
  - Stage 1
  - Stage 2
  - Stage 3
  - Stage 4

| Type and Complexity of Scheme | Stage | | | | | |
|---|---|---|---|---|---|---|
| | F | 1 | 2 | 1/2 | 3 | 4 |
| Major Scheme | X | X | X | - | X | X |
| Minor Improvement Scheme # | - | X | X | (X) | X | - |
| Major Development + | X | X | X | - | X | - |
| Minor Development | - | - | - | X | X | - |
| Junction / Traffic Scheme | - | X | X | (X) | X | - |
| Planned diversions * | - | - | - | X | X | - |

# See NRA TA 85/11.
+ Meets criteria in NRA Traffic and Transport Assessment Guidelines Table 2.2
*For planned diversions of significant impact, associated with NRA Major Road projects See paragraph 2.2.

# HD 19 Road Safety Audit Process

- Appointment of the Audit Team
- Audit Brief
- Site Visits
- Audit Report
- Feedback form

| Problem accepted | Recommended measure accepted | Alternative measures or reasons accepted by auditors | Exception report needed |
|---|---|---|---|
| Yes | Yes | - | NO |
| Yes | No | Yes | NO |
| Yes | No | No | YES |
| No | No | Yes | NO |
| No | No | No | YES |

# HD 19 Road Safety Audit

- Exception Report
- Final Audit Report

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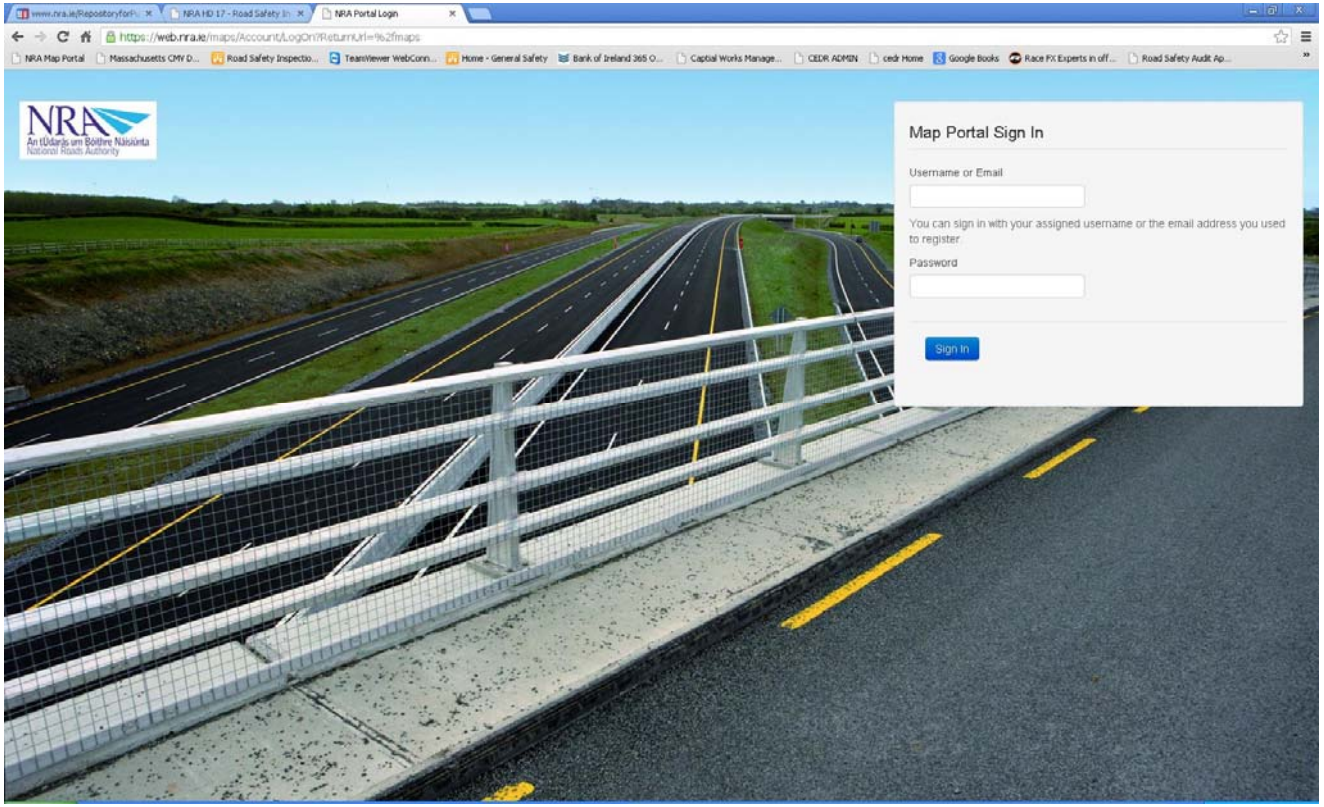
# Collision Data & Trends

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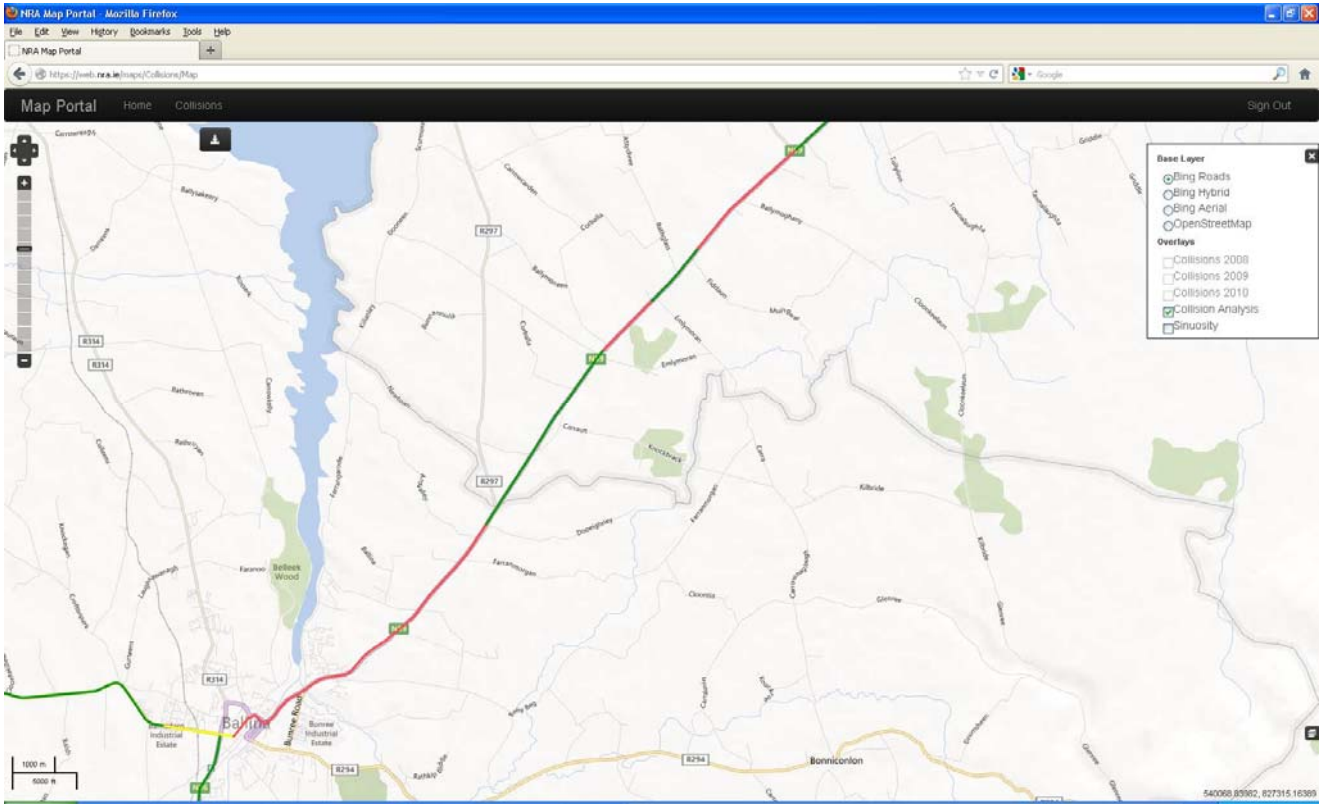
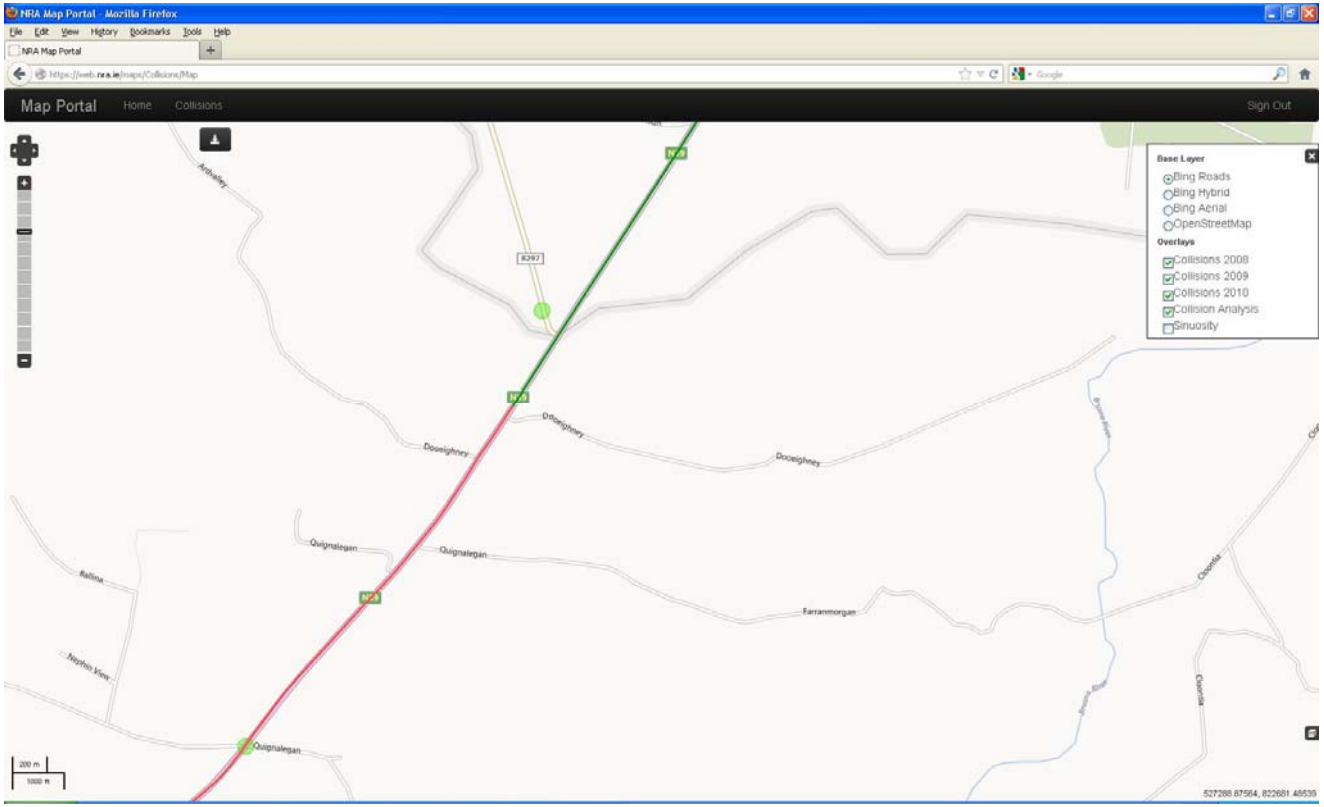
# Collision Data and Trends



# Collision Data & Trends



# Collision Data and Trends

| | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | OBJECT | ACCNU | TYPE | DAYS | MONTI | YEAR | HOUR | MINUT | WEEKD | SPLIM | NOVE | NOPE | COUN | NR | MOTORV | RTENU | LIGHT | WEAT | WEAT | SU |
| 2 | 1 | 4497 | 3 | 9 | 12 | 8 | 10 | 15 | 3 | 80 | 2 | 0 | 15 | | | 0 | 1 | 2 | 0 | |
| 3 | 2 | 2624 | 3 | 5 | 4 | 8 | 2 | 20 | 7 | 80 | 1 | 0 | 15 | | | 0 | 6 | 1 | 0 | |
| 4 | 3 | 2626 | 3 | 11 | 6 | 8 | 0 | 30 | 4 | 80 | 1 | 0 | 15 | | | 0 | 4 | 1 | 0 | |
| 5 | 4 | 2627 | 3 | 10 | 7 | 8 | 9 | 50 | 5 | 80 | 1 | 0 | 15 | | | 0 | 2 | 2 | 0 | |
| 6 | 5 | 243 | 1 | 3 | 10 | 8 | 14 | 15 | 6 | 50 | 2 | 0 | 17 | | | 0 | 1 | 8 | 0 | |
| 7 | 6 | 258 | 1 | 28 | 1 | 8 | 21 | 50 | 2 | 100 | 1 | 0 | 17 | | | 0 | 6 | 1 | 0 | |
| 8 | 7 | 233 | 1 | 29 | 12 | 8 | 0 | 30 | 2 | 80 | 1 | 1 | 4 | | | 0 | 4 | 1 | 0 | |
| 9 | 8 | 218 | 1 | 25 | 11 | 8 | 8 | 15 | 3 | 80 | 1 | 0 | 24 | | | 0 | 1 | 1 | 0 | |
| 10 | 9 | 4486 | 3 | 10 | 9 | 8 | 18 | 10 | 4 | 80 | 2 | 0 | 24 | | | 0 | 1 | 1 | 0 | |
| 11 | 10 | 260 | 1 | 8 | 8 | 8 | 17 | 20 | 6 | 100 | 2 | 0 | 11 | | | 0 | 1 | 1 | 0 | |
| 12 | 11 | 2013 | 3 | 4 | 2 | 8 | 18 | 40 | 2 | 80 | 2 | 0 | 9 | Y | | 9 | 6 | 2 | 0 | |
| 13 | 12 | 119 | 1 | 5 | 10 | 8 | 5 | 12 | 1 | 80 | 1 | 0 | 7 | | | 0 | 6 | 2 | 0 | |
| 14 | 13 | 186 | 1 | 10 | 4 | 8 | 7 | 6 | 5 | 80 | 1 | 0 | 19 | | | 0 | 1 | 2 | 0 | |
| 15 | 14 | 3855 | 3 | 24 | 7 | 8 | 21 | 10 | 5 | 80 | 2 | 0 | 19 | | | 0 | 1 | 1 | 0 | |
| 16 | 15 | 3865 | 2 | 29 | 12 | 8 | 2 | 30 | 2 | 80 | 1 | 0 | 19 | | | 0 | 6 | 3 | 0 | |
| 17 | 16 | 3857 | 3 | 13 | 8 | 8 | 15 | 45 | 4 | 50 | 2 | 0 | 19 | Y | | 52 | 2 | 2 | 0 | |
| 18 | 17 | 3864 | 3 | 24 | 9 | 8 | 13 | 0 | 4 | 80 | 1 | 0 | 19 | | | 0 | 1 | 1 | 0 | |
| 19 | 18 | 3867 | 3 | 9 | 12 | 8 | 8 | 50 | 3 | 80 | 1 | 0 | 19 | | | 0 | 1 | 3 | 0 | |
| 20 | 19 | 1406 | 3 | 16 | 1 | 8 | 15 | 15 | 4 | 50 | 2 | 0 | 6 | | | 0 | 1 | 1 | 0 | |
| 21 | 20 | 1129 | 3 | 21 | 2 | 8 | 17 | 10 | 5 | 60 | 1 | 1 | 6 | Y | | 81 | 1 | 1 | 0 | |
| 22 | 21 | 1130 | 3 | 4 | 2 | 8 | 18 | 45 | 2 | 50 | 1 | 2 | 6 | Y | | 81 | 3 | 1 | 0 | |
| 23 | 22 | 1132 | 3 | 6 | 2 | 8 | 8 | 30 | 4 | 60 | 1 | 1 | 6 | | | 0 | 1 | 1 | 0 | |
| 24 | 23 | 1136 | 3 | 31 | 3 | 8 | 7 | 50 | 2 | 50 | 2 | 0 | 6 | | | 0 | 1 | 1 | 0 | |
| 25 | 24 | 1139 | 3 | 27 | 5 | 8 | 15 | 15 | 5 | 50 | 2 | 0 | 6 | | | 0 | 7 | 8 | 0 | |
| 26 | 25 | 1141 | 3 | 5 | 6 | 8 | 10 | 15 | 5 | 50 | 1 | 1 | 6 | | | 0 | 7 | 0 | 0 | |
| 27 | 26 | 3868 | 3 | 8 | 12 | 8 | 9 | 50 | 2 | 80 | 1 | 0 | 19 | Y | | 80 | 1 | 0 | 0 | |

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# Collision Data and Trends

| | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | W | X |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Date | Time | Day | No Veh | No Ped | Light Condition | Weather | Surface | Junction Control | Road Charact er | Road Marking | Skiddin g | Junction Type | Primry Coll Type | Single Vehicle Collided With | Ped Action | Ped Sex, Age, Severity | Driver Action | Veh 1 | Driver Sex, Age, Severity | Veh 2 | Driver Sex, Age, Severity |
| 2 | 09/12/2008 | 10:15 | Tues | 2 | 0 | Dy Gvis | Wet | Ft / Ice | Unk | Stt | C Cline | Unk | | Hd On | | | ,0, | Other | P. Car | F,32,N | P. Car | ,0, |
| 3 | 05/04/2008 | 02:20 | Sat | 1 | 0 | Dk No | Dry | Dry | Unk | Bnd | C Cline | | | SVO | Oth | | ,0, | Other | P. Car | M,19,M | | ,0, |
| 4 | 11/06/2008 | 00:30 | Wed | 1 | 0 | Dk Plight | Dry | Dry | Unk | | N Mrk | Yes | | SVO | Oth | | ,0, | | P. Car | M,48,M | | ,0, |
| 5 | 10/07/2008 | 09:50 | Thur | 1 | 0 | Dy Pvis | Wet | Wet | Unk | Bnd | C Cline | Unk | | SVO | Ditch | | ,0, | Other | P. Car | F,24,M | | ,0, |
| 6 | 03/10/2008 | 14:15 | Fri | 2 | 0 | Dy Gvis | Unkno | Dry | Unk | | | No | | | Oth | | ,0, | Other | P. Cycle | M,75,F | P.S.V. | ,0, |
| 7 | 28/01/2008 | 21:50 | Mon | 1 | 0 | Dk No | Dry | Dry | Unk | Stt | C Cline | Unk | | SVO | Oth | | ,0, | Other | P. Car | M,17,F | | ,0, |
| 8 | 29/12/2008 | 00:30 | Mon | 1 | 1 | Dk Plight | Dry | Dry | Unk | HCr | C Cline | No | | Ped | Oth | Oth | F,80,F | Other | P. Car | M,20,N | | ,0, |
| 9 | 25/11/2008 | 08:15 | Tues | 1 | 0 | Dy Gvis | Dry | Dry | Unk | Stt | N Mrk | No | | SVO | Ditch | | ,0, | Other | P. Car | F,32,F | | M,16,M |
| 10 | 10/09/2008 | 18:10 | Wed | 2 | 0 | Dy Gvis | Dry | Wet | Unk | Bnd | C Cline | Unk | | Re St | | | ,0, | | P. Car | M,50,N | P. Car | F,50,M |
| 11 | 08/08/2008 | 17:20 | Fri | 2 | 0 | Dy Gvis | Dry | Dry | Unk | Stt | C Cline | | | A B St | | | ,0, | Other | H.G.V | ,0, | P. Car | ,0, |
| 12 | 04/02/2008 | 18:40 | Mon | 2 | 0 | Dk No | Wet | Wet | Unk | Stt | C Ccline | Unk | | Re St | | | ,0, | | P. Car | M,30,M | P. Car | ,0, |
| 13 | 05/10/2008 | 05:12 | Sun | 1 | 0 | Dk No | Wet | Wet | Unk | Oth | N Mrk | No | | SVO | Wl / Gt | | ,0, | Other | P. Car | M,24,F | | ,0, |
| 14 | 10/04/2008 | 07:06 | Thur | 1 | 0 | Dy Gvis | Wet | Wet | Unk | Bnd | C Cline | Unk | | SVO | Oth | | ,0, | Other | Van | M,37,F | | ,0, |
| 15 | 24/07/2008 | 21:10 | Thur | 2 | 0 | Dy Gvis | Dry | Dry | Unk | Bnd | N Mrk | No | | Hd On | | | ,0, | | P. Car | M,28,N | Van | ,0, |
| 16 | 29/12/2008 | 02:30 | Mon | 1 | 0 | Dk No | Ft / Ice | Ft / Ice | Unk | | C Cline | Yes | | SVO | Ditch | | ,0, | Other | P. Car | F,20,S | | ,0, |
| 17 | 13/08/2008 | 15:45 | Wed | 2 | 0 | Dy Pvis | Wet | Wet | No C | Stt | L Mrk | No | T Jnt | Re St | | | ,0, | Other | P. Car | M,24,M | P. Car | F,25, |
| 18 | 24/09/2008 | 13:00 | Wed | 1 | 0 | Dy Gvis | Dry | Dry | Unk | Bnd | N Mrk | | | SVO | Ditch | | ,0, | Other | H.G.V | M,38,M | | ,0, |
| 19 | 09/12/2008 | 08:50 | Tues | 1 | 0 | Dy Gvis | Ft / Ice | Ft / Ice | Unk | Bnd | N Mrk | Yes | | SVO | Ditch | | ,0, | Other | P. Car | M,36,M | | F,31,M |
| 20 | 16/01/2008 | 15:15 | Wed | 2 | 0 | Dy Gvis | Dry | Wet | Unk | Stt | C Cline | No | | | | | ,0, | | P. Cycle | F,0,M | P. Car | ,0, |
| 21 | 21/02/2008 | 17:10 | Thur | 1 | 1 | Dy Gvis | Dry | Dry | Unk | Stt | C Cline | Unk | | Ped | Oth | Oth | M,17,M | Other | M. | M,27,N | | ,0, |
| 22 | 04/02/2008 | 18:45 | Mon | 1 | 2 | Dk Glight | Dry | Dry | Unk | Stt | C Cline | Yes | | Ped | Oth | Oth | M,34,N | | P. Cycle | F,25,M | | ,0, |
| 23 | 06/02/2008 | 08:30 | Wed | 1 | 1 | Dy Gvis | Dry | Dry | Unk | Stt | | | | Ped | Oth | Other | F,10,M | | P. Car | M,0,N | | ,0, |
| 24 | 31/03/2008 | 07:50 | Mon | 2 | 0 | Dy Gvis | Dry | Wet | Unk | Stt | C Cline | | | Hd On | | | ,0, | Att Otake | M. | M,30,M | P. Car | ,0, |
| 25 | 27/05/2008 | 15:15 | Thur | 2 | 0 | Unknown | Unkno | | Unk | Bnd | | | | Re St | | | ,0, | Other | P. Car | M,30,M | Van | ,0, |
| 26 | 05/06/2008 | 10:15 | Thur | 1 | 1 | Unknown | | | Unk | | | | | Ped | Oth | Other | M,79,M | | P.S.V. | ,0, | | ,0, |
| 27 | 08/12/2008 | 09:50 | Mon | 1 | 0 | Dy Gvis | | Other | Unk | | C Cline | | | SVO | Wl / Gt | | ,0, | | Truck | M,33,M | | ,0, |
| 28 | 08/10/2008 | 20:50 | Wed | 2 | 0 | Dk Unlit | Dry | Dry | Unk | Stt | N Mrk | No | | | | | ,0, | Other | P. Car | M,30,N | P. | ,0, |
| 29 | 16/06/2008 | 20:45 | Mon | 1 | 0 | Dy Gvis | Dry | Dry | Unk | Bnd | C Cline | Unk | | SVO | Wl / Gt | | ,0, | Other | P. Car | M,22,F | | ,0, |
| 30 | 28/03/2008 | 17:15 | Fri | 2 | 0 | Dy Gvis | Wet | Wet | Unk | Stt | C Cline | | | Re St | | | ,0, | | Van | ,22,M | P. Car | ,0, |
| 31 | 29/03/2008 | 17:45 | Sat | 2 | 0 | Dy Gvis | Dry | Wet | Unk | Oth | C Cline | Yes | | Hd On | | | ,0, | T A Act | P. Car | F,67,S | P. Car | ,0,N |

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# Collision Data and Trends

| Collisions by Type and Year | | | | | |
|---|---|---|---|---|---|
| Year | Fatal | Serious | Minor | Total | % of Total |
| 2007 | 0 | 0 | 0 | 0 | 0% |
| 2008 | 16 | 8 | 75 | 99 | 100% |
| 2009 | 0 | 0 | 0 | 0 | 0% |
| 2010 | 0 | 0 | 0 | 0 | 0% |
| 2011 | 0 | 0 | 0 | 0 | 0% |
| 2012 | 0 | 0 | 0 | 0 | 0% |
| 2013 | 0 | 0 | 0 | 0 | 0% |
| Total | 16 | 8 | 75 | 99 | |
| % of Total | 16% | 8% | 76% | | |

| Casualities by Type and Year | | | | | |
|---|---|---|---|---|---|
| Year | Fatal | Serious | Minor | Total | % of Total |
| 2007 | 0 | 0 | 0 | 0 | 0% |
| 2008 | 16 | 10 | 113 | 139 | 100% |
| 2009 | 0 | 0 | 0 | 0 | 0% |
| 2010 | 0 | 0 | 0 | 0 | 0% |
| 2011 | 0 | 0 | 0 | 0 | 0% |
| 2012 | 0 | 0 | 0 | 0 | 0% |
| 2013 | 0 | 0 | 0 | 0 | 0% |
| Total | 16 | 10 | 113 | 139 | |
| % of Total | 12% | 7% | 81% | | |

| Collisions by Type and Day | | | | | |
|---|---|---|---|---|---|
| Weekday | Fatal | Serious | Minor | Number | % |
| Sunday | 2 | 1 | 8 | 11 | 11% |
| Monday | 5 | 2 | 8 | 15 | 15% |
| Tuesday | 4 | 0 | 7 | 11 | 11% |
| Wednesda | 2 | 2 | 15 | 19 | 19% |
| Thursday | 1 | 1 | 13 | 15 | 15% |
| Friday | 2 | 0 | 11 | 13 | 13% |
| Saturday | 0 | 2 | 13 | 15 | 15% |

| Light Conditions | | |
|---|---|---|
| Description | Number | Loc % |
| Day Good Visibility | 61 | 64% |
| Day Poor Visibility | 4 | 4% |
| Dark Good Lighting | 9 | 9% |
| Dark Poor Lighting | 5 | 5% |
| Dark Unlit | 2 | 2% |
| Dark No Lighting | 15 | 16% |
| **Weather Conditions** | | |
| Dry | 68 | 71% |
| Wet | 23 | 24% |
| Frost / Ice | 3 | 3% |
| Snow | 0 | 0% |
| Fog / Mist | 0 | 0% |
| High Winds | 0 | 0% |
| Other | 0 | 0% |
| Unknown | 2 | 2% |
| **Surface Conditions** | | |
| Dry | 57 | 59% |
| Wet | 34 | 35% |
| Frost / Ice | 4 | 4% |
| Snow | 0 | 0% |
| Other | 2 | 2% |
| **Road Character** | | |
| Straight | 56 | 64% |
| Bend | 23 | 26% |
| Hillcrest | 2 | 2% |
| Some Gradient | 3 | 3% |
| Other | 3 | 3% |
| **Skidding Occurred** | | |
| Yes | 16 | 29% |
| No | 39 | 71% |

| Primary Collision Type | | |
|---|---|---|
| Description | Number | Loc % |
| Pedestrian | 17 | 20% |
| Single Vehicle | 29 | 35% |
| Head - on - Conflict | 12 | 14% |
| Head - on - Right turn | 6 | 7% |
| Angle both straight | 2 | 2% |
| Angle right turn | 3 | 4% |
| Rear - end straight | 13 | 15% |
| Rear - end right turn | 1 | 1% |
| Rear - end left turn | 1 | 1% |
| **Single Vehicle Collided With** | | |
| Bollard / Island | 0 | 0% |
| Parked Car | 0 | 0% |
| Parked Truck | 0 | 0% |
| Parked Skip | 0 | 0% |
| Pole | 1 | 2% |
| Tree | 2 | 4% |
| Animal | 1 | 2% |
| Wall / Gate | 5 | 11% |
| Ditch | 12 | 26% |
| Other | 25 | 54% |
| **Contributory Factors** | | |
| Layout | 2 | 67% |
| Skid Risistance | 1 | 33% |
| Road Signs | 0 | 0% |
| Lighting | 0 | 0% |
| Surface Evenness | 0 | 0% |
| Road Markings | 0 | 0% |
| Sight Distance | 0 | 0% |
| Crossfall/Camber | 0 | 0% |
| Traffic Signs | 0 | 0% |

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# Collision Data and Trends

| Driver Contributory Action | | | |
|---|---|---|---|
| **Description** | **Driver 1** | **Driver 2** | **% of Total** |
| Drove through stop/yield | 0 | 1 | **9%** |
| Exceeded safe speed limit | 2 | 0 | **18%** |
| Went to wrong side of road | 2 | 3 | **45%** |
| Improper overtaking | 0 | 0 | **0%** |
| Drove through traffic signal | 0 | 0 | **0%** |
| Failed to signal | 0 | 0 | **0%** |
| Other Action | 3 | 0 | **27%** |

| Driver Action | | | |
|---|---|---|---|
| **Description** | **Driver 1** | **Driver 2** | |
| Exiting / Entering | 0 | 4 | 4% |
| Attempting to Overtake | 2 | 1 | 3% |
| Turning right | 4 | 7 | 10% |
| Turning left | 1 | 2 | 3% |
| Reversing | 2 | 0 | 2% |
| Chaining lanes | 0 | 0 | 0% |
| Taking Avoidance action | 8 | 4 | 11% |
| Other | 52 | 22 | 68% |

| Pedestrian Action | | | |
|---|---|---|---|
| **Description** | **Ped 1** | **Ped 2** | |
| Xing mask by pk Vehicle | 1 | 0 | 6% |
| Otherwise crossing | 8 | 1 | 50% |
| Walking with traffic | 0 | 0 | 0% |
| Walking against traffic | 1 | 0 | 6% |
| Standing in Road | 1 | 0 | 6% |
| Playing in Road | 0 | 0 | 0% |
| Lying in Road | 0 | 0 | 0% |
| Other | 6 | 0 | 33% |

| Junction Type | | |
|---|---|---|
| T Junction | 12 | 60% |
| Cross Roads | 6 | 30% |
| Y Junction | 1 | 5% |
| Roundabout | 0 | 0% |
| Complex Junction | 1 | 5% |
| **Junction Controlled by** | | |
| Traffic Signals | 0 | 0% |
| Stop Sign | 7 | 44% |
| Yield Sign | 1 | 6% |
| Road Marking Only | 1 | 6% |
| Roundabout | 0 | 0% |
| Pedestrian Crossing | 1 | 6% |
| Within 50ft of Ped X | 0 | 0% |
| No Control | 6 | 38% |
| Other | 0 | 0% |

| Vehicle Type | | | |
|---|---|---|---|
| **Type** | **Veh 1** | **Veh 2** | **%** |
| P. Cycle | 4 | 2 | 4% |
| M. Cycle | 5 | 2 | 5% |
| P. Car | 73 | 36 | 78% |
| Van | 6 | 4 | 32% |
| Taxi | 1 | 0 | 5% |
| Hackney | 0 | 0 | 0% |
| P.S.V. Mini | 1 | 2 | 15% |
| P.S.V. Bus | 1 | 1 | 12% |
| L.G.V | 0 | 0 | 0% |
| H.G.V | 3 | 1 | 27% |
| Truck | 1 | 0 | 9% |
| Artic | 1 | 2 | 30% |
| Artic C | 0 | 1 | 14% |
| Other | 3 | 3 | 100% |
| Total | 99 | 54 | |

| Age Profile | | | | | |
|---|---|---|---|---|---|
| **Age** | **Veh** | **Veh 2** | **Ped 1** | **Ped 2** | **%** |
| < 25 | 26 | 10 | 5 | 0 | 32% |
| 25 - 35 | 20 | 5 | 4 | 2 | 24% |
| 35 - 45 | 15 | 3 | 2 | 0 | 16% |
| 45 - 55 | 11 | 3 | 1 | 0 | 12% |
| 55 - 65 | 5 | 0 | 1 | 0 | 5% |
| 65 - 75 | 5 | 1 | 2 | 0 | 6% |
| > 75 | 4 | 0 | 2 | 0 | 5% |
| Total | 86 | 22 | 17 | 2 | |

| Gender Profile | | | | | |
|---|---|---|---|---|---|
| **Gender** | **Veh** | **Veh 2** | **Ped 1** | **Ped 2** | **%** |
| Male | 62 | 11 | 8 | 1 | 62% |
| Female | 30 | 12 | 8 | 1 | 38% |
| Total | 92 | 23 | 16 | 2 | |

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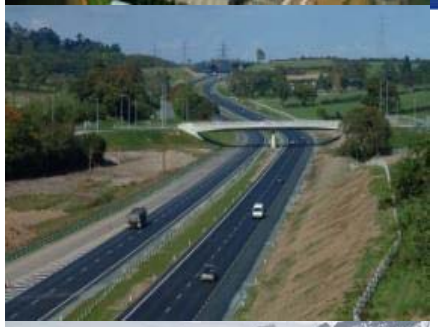

# Road Safety Engineering

## THANK YOU

### ANY QUESTIONS??

*National Roads Authority – Standards Section*
*Training for New Developments*
*April 2013*

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