North Ayrshire Council
Comhairle Siorrachd Àir a Tuath

# ROAD ASSET SAFETY INSPECTION OPERATIONS MANUAL

**Version 1.0**

**July 2019**

# Document Information

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| **Title** | Road Asset Safety Inspection Operations Manual |
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| **Description** | To provide information and guidance to inspectors on the method to be deployed in undertaking risk assessment and the prioritisation of defects. |

# Document Control

| Version | SCOTS Template Version | Date | Author | Changes from Previous Version |
|---|---|---|---|---|
| 1.0 | 1.0 | July 2019 | S Macfadyen | |
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# Purpose

This Road Asset Safety Inspection Operations Manual is based on the SCOTS Risk Based Approach guidance; this document is aimed at Road Asset Safety Inspectors, providing information and guidance regarding the method to be deployed in undertaking risk assessment and the prioritisation of defects.

The adoption of this SCOTS recommended approach across Scottish Authorities promotes a consistency in the management of the road network that focuses on delivering a programme of permanent repairs to improve its condition and safety.

# Background

## Legislative Requirements

The methodology described in this document has been designed to comply with the following current legislative requirements:

### Roads (Scotland) Act 1984

The Roads (Scotland) Act 1984 Section 1, states that "…a local roads authority shall manage and maintain all such roads in their area as are for the time being entered in a list (in this Act referred to as their "list of public roads") prepared and kept by them under this section."

### Common Law – Duty of Care

Road Authorities have a Duty of Care under Common Law. The criteria commonly used by the courts to determine if a defendant is liable are:

1. The harm which occurred must be a reasonably foreseeable result of the defendant's conduct;
    - Was the authority aware of the defect?
    - Was the route inspected within assigned timescales?
    - Experience of similar defects and the deterioration/degradation rates? Will the defect deterioration/degradation cause the likelihood and/or impact of the defect to increase before the next inspection?
    - Has there been similar incidents on the authorities' network or is the authority aware of similar incidents occurring?

2. It is fair, just and reasonable to impose liability.
    - Did the authority assess, prioritise and maintain the defect in accordance with their Maintenance Strategy/Manual or equivalent documents?
    - What was the defect risk and priority?
    - If necessary, what action(s) had been taken to repair the defect? Timescale for the repair?
    - Was the defect repaired within specified timescales?

### Well Managed Highway Infrastructure – a Code of Practice

On 28th October 2018, Well Maintained Highways was superseded by Well Managed Highway Infrastructure (WMHI), removing all prescriptive intervention levels, action timescales, inspection frequencies, etc.

The Inspection Operations Manual does not provide any minimum or default standards but provides guidance and advice to support the objective risk assessment of defects.

# Inspector Competency

## Competency and Training

Road Authorities must ensure that all Road Asset Safety Inspectors are competent.
Taking a consistent approach to this requirement, North Ayrshire Council are utilising the SCOTS Risk-based Approach to Safety Defect Inspections methodology and training resources.
All safety inspectors are therefore required to undertake this training and achieve a pass grade on the course assessment. This will be arranged by the Asset Team Leader.

All inspectors will attend further relevant training courses, e.g., managing safely, health and safety courses, as appropriate. Inspectors shall also undergo additional training equivalent to the Scottish Credit and Qualification Level 6 National Highway Safety Inspectors Training and Certification Scheme, operated by the Institute of Highway Engineers. New inspectors will initially be given in-house training provided by safety inspectors to ensure consistency in the identification of defects and the prioritisation of defect repairs.

**Competency Training Records and Plans**

A “Training and Competency” record will be kept locally and reviewed annually by the Asset Team Leader.

If an inspector does not meet minimum competency requirements, a Training Plan will be developed by the Locality Network Team Leader to assist the inspector achieve the necessary level of competency.

# Inspection Procedures

## Safety Inspections

### Planned Cyclic Safety Inspections

The Safety Inspection regime forms a key aspect of the road authority's strategy for managing liability and risk. Its purpose is to systematically identify defects which are hazardous (to any user of the road including drivers, pedestrians, equestrians and cyclists) so that an effective repair can be carried out within an appropriate response time, determined by the level of risk the defect poses.

Cyclic Safety Inspections are carried out to specified frequencies, dependent upon the maintenance hierarchy.

Safety inspections on carriageways in rural locations and on high speed roads are undertaken in a slow-moving vehicle with two personnel, one driving and the other inspecting. Within residential areas and heavily trafficked urban areas, walked inspections are required. Footway inspections are carried out at the same time as the associated carriageways. Shared footway/cycleways are inspected as footways. Bicycles are now provided to road inspectors to enable footpaths and remote cycleways to be inspected by bicycle, rather than on foot, where the road inspector chooses to do so. Cycle inspections may also be carried out in residential areas subject to risk assessments being undertaken considering safety of both inspection personnel and other road users including pedestrians.

The objectives of safety inspection activity are to:

- Minimise the risk of injury and disruption to road users as far as is reasonably practicable,
- Provide a regular, structured inspection of the public road network, within available resources,
- Deliver a consistent, reliable response to identified defects, within available resources,
- Maintain accurate and comprehensive records of inspections and response and
- Provide a clear, accurate and comprehensive response to claims.

During safety inspections, observed defects that provide any foreseeable degree of risk to users will be recorded. The degree of deficiency in the road elements will be crucial in determining the nature and speed of response. Judgement will always need to take account

of particular circumstances. For example, the degree of risk from a pothole depends upon not only its depth but also its surface area, location within the road network and other factors such as the volume and speed of traffic.

## Inspection Routes

Inspection routes are assigned as follows:

The road network is split into Locality areas, each inspector is allocated an area. Within the locality, the inspector is responsible for all programmed inspections, condition assessments and response to service requests and fault reports. The locality areas are North Coast and Cumbrae, Garnock Valley, 3 Towns, Irvine North and Kilwinning, and Irvine South East. The Asset inspector is responsible for inspection of development sites and non-adopted or additional assets that the Roads Service is responsible for maintaining. To ensure that knowledge of locality areas is maintained, the inspectors are paired up to carry out driven inspections and to cover absence. The inspectors work together as follows:

Garnock Valley & Dalry and Three Towns

North Coast & Cumbrae and the Asset Inspector

Irvine North & Kilwinning and Irvine South East

## Inspection Tolerances

All road safety inspections will be carried out to the SCOTS recommended frequencies detailed in the following table and should be completed within the tolerances shown in Table 1, as follows:

**Table 1 Inspection Tolerances**

| Frequency of Inspection | Inspection Tolerances |
|---|---|
| Monthly | ± 5 working days of the Due Date |
| Quarterly | ± 10 working days of the Due Date |
| Six Monthly | ± 15 working days of the Due Date |
| Annual | ± 20 working days of the Due Date |

**Definition of above terms**

- **Monthly** indicates that twelve regular spaced inspections will be carried out per year.
- **Quarterly** indicates that four regular spaced inspections will be carried out per year.
- **Annual** indicates that one regular spaced inspection will be carried out per year.

- **Due Date** is the programmed date of an inspection.

### Staff Contingency and Alterations to the Inspection Programme

- Due to the nature of the weather in Scotland it is probable that the road surface will be wet with some elements of standing or running water whilst an inspection is in progress. However, if the quantity of water is excessive or across the full width of the carriageway then the inspection should be abandoned, and an entry should be made to document the circumstances.
- If an inspection Due Date falls during an extended period of absence e.g. inspector holiday or illness, then the inspection should be allocated to another suitably experienced member of staff who has the capacity to undertake the inspection.
- If and for reasons beyond the control of the roads authority (e.g. substantial snow fall), any inspection cannot be carried out in compliance with Table 1 the Network Manager will decide on the viability of a safety survey being undertaken, taking into account the availability of staff and the prevailing weather conditions.
- As soon as reasonably practicable following the above events a deferred programmed safety inspection should be carried out on the affected length of road.
    - Where substantial unavoidable delays are incurred to other inspection frequencies the Network Manager may assess the impact and adjust the programme.
    - A record must be kept within the asset management system (WDM) of change decisions and reasons for them.

**Service Request Inspections – Externally Reported Defects**

Inspectors may be instructed to undertake ad-hoc safety inspections e.g. in response to a third-party report that is deemed to merit inspection of a defect to determine whether reactive repair is required.

Reports of dangerous defects should be responded to as Category 1 defects due to the risk associated with reports of this nature. All other reported defects should be recorded as fault reports and inspected within 5 working days with any identified defects prioritised in the same way as those defects identified through programmed inspections. Inspectors should ensure that they have cover when on leave with arrangements for other inspectors to undertake their programmed inspections and respond to fault reports and service requests in their absence. If there are any problems in ensuring that these are carried out, the inspector should speak to the appropriate Network Team Leader to resolve the issue.

Any individual safety-related defect identified and inspected outside a planned or ad-hoc cyclic safety inspection must also be recorded.

**Road Condition Inspections (or Structural Condition Surveys)**

Undertaken to consider the general condition of the individual roads and footways and the need for planned structural maintenance which can be programmed accordingly. Inspections for the carriageway asset are presently undertaken through the national Scottish Road Maintenance Condition Survey (SRMCS).

Visual condition surveys for both carriageways and footways/footpaths should be undertaken annually as programmed by the Asset Team and recorded in the council's WDM road management system.

**Safety Inspection of Highway Trees**

Defective trees, hedges or shrubs likely to cause a danger to road users by encroachment, visibility obstruction, damage or trip hazard should be recorded during road inspections. As under Section 83, or 91, of the Roads (Scotland) Act 1984, inspectors should consult with landowners and, if required, serve a Notice, regarding hedges, trees and shrubs growing on adjacent land which are likely to cause a danger to road users.

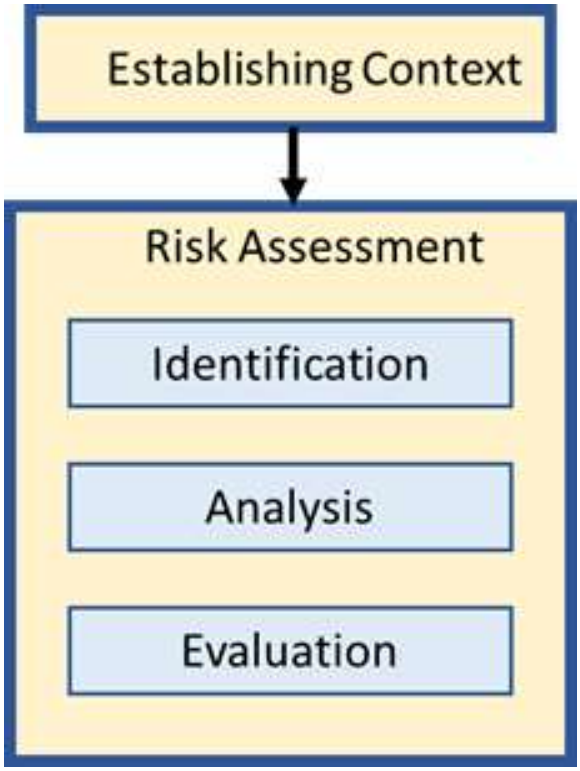
Additional tree inspections are carried out by a qualified arboriculturist, any concerns regarding the condition of a highway tree or a tree that may cause a danger to road users should be passed to the aboricultural officer for professional assessment.

**Defect Identification and Risk Assessment Process**

Inspectors undertaking safety inspections or responding to reported incidents require to use judgement in assessing the risk posed by reported defects. 'Well-Managed Highway Infrastructure: A Code of Practice' recommends that roads authorities adopt a system of defect risk assessment for determining the response categories to road defects.

> ***Note on the rationale behind a risk-based approach:***
> *Taking a risk-based approach, as per the above code of practice, means that there are NO prescriptive investigation or intervention levels to apply. The rationale for removing these is that the same defect will represent a different level of risk in a different context.*

North Ayrshire Council utilises the SCOTS recommended procedure for risk assessment that is based on the ISO31000 Risk Management Process. In undertaking assessment of safety defects, the following steps are applicable:



## Step 1: Establishing Context

Establishing context requires the inspector to utilise experience and knowledge during the inspections to assess the road characteristics, such as giving consideration to environment (speed limit, width, rural/urban, road hierarchy, visibility, bend, hill - incline/decline, road camber/crossfall, etc.), relevant road user types (pedestrians, cyclists, horse riders, cars, LGV's, HGV's, PSV's, etc.), traffic volumes, maintenance history, historical incidents/claims/complaints (e.g. experience/knowledge of similar hazards being a contributory factor to incidents/claims within the authority or a neighbouring authority), demographics and key local amenities (proximity to doctors surgery, hospitals, shopping areas, schools, etc.).

## Step 2: Risk Assessment

### Step 2a: Hazard Identification

The Risk Identification stage involves the inspector identifying road asset defects (hazards) which might pose a risk to road users i.e. lead to a negative consequence. Appendix B of this document provides a list of example hazards that inspectors should consider risk assessing during the inspections; however, it should be noted that the list is not exhaustive. Inspectors must utilise experience and judgement, the intention is not to limit identification of hazards to those provided in Appendix B.

Inspectors may identify defective equipment or assets which are NOT the responsibility of the authority, such as Statutory Undertakers reinstatements or equipment (e.g. sunk inspection chamber); in these circumstances a duty of care still applies. The inspector should conduct a Risk Assessment to determine the defect's risk category and priority response as well as following North Ayrshire's local procedure contained in the North Ayrshire Road Asset Safety Inspection Policy.

### Step 2b: Risk Analysis


In general, when assessing risk, the human tendency is to consider the worst possible outcome, rather than the most probable. Psychologically, the word ‘risk’ forces our thinking down that route.

The following risk analysis procedure is designed to mitigate this ‘worst case scenario’ thinking and ensure an objective assessment is carried out.

It is important that the analysis is carried out in the defined step sequence to determine the appropriate level of risk and corresponding priority response,

**DO NOT WORK BACKWARDS** from a Priority conclusion.

Hazards identified through the Hazard Identification step must therefore be analysed in terms of their significance which means assessing the **likelihood** of the risk occurring followed by the most probable **consequences (impact/severity)** should the risk occur.

## 1. Assess Risk Likelihood

Table 2 (below) should be used to assess Risk Likelihood.

It contains descriptions of the possible likelihood of encountering the hazard, quantified on a scale of Remote to Almost Certain.

The information ascertained in “Step 1 – Establish Context” should inform the inspector’s judgement in assessing the likelihood of a road user encountering the hazard.

**Table 2 Risk Likelihood**

| Likelihood / Probability | Likelihood Description | |
|---|---|---|
| **Almost Certain** | Will undoubtedly happen | Daily/Weekly |
| **Likely** | Will probably happen, but not a persistent issue | Monthly/ 3 Monthly |
| **Possible** | May happen occasionally | 6 Monthly/ Annually |
| **Unlikely** | Not expected to happen, but it is possible | 10 Years |
| **Remote** | Improbable | 20 Years |

## 2. Assess Risk Consequence (Impact/Severity)

Table 3 (below) should be used to assess the **most probable** (NOT worst possible) Consequence of a road user encountering the hazard (reasonably foreseeable extent of the impact on Service, Finance, People and Reputation). It contains descriptions of the possible consequences of encountering the hazard, quantified on a scale of Negligible to Catastrophic.

**Table 3 Consequence (Impact/Severity)**

| Consequence (Impact/Severity) | Description | | | |
|---|---|---|---|---|
| | **Impact on Service Objectives** | **Financial Impact** | **Impact on people** | **Impact on Reputation** |
| **Catastrophic** | Unable to function, inability to fulfil obligations | Severe financial loss | Death | Highly damaging, severe loss of public confidence |
| **Major** | Significant impact on services provision | Major financial loss | Extensive injury, major permanent harm | Major adverse publicity, major loss of confidence |
| **Moderate** | Service objectives partially achievable | Moderate financial loss | Medical treatment required, semi-permanent harm up to 1 year | Some adverse publicity, legal implications |
| **Minor** | Minor impact on service objectives | Minor financial loss | First aid treatment, non-permanent harm up to 1 month | Some public embarrassment, no damage to reputation |
| **Negligible** | Minimal impact, no service disruption | Minimal financial loss | No obvious harm/injury | No interest to the press, internal only |

All hazards identified must be assessed against each of the four consequence categories (Service Objectives, Financial, People and Reputation) contained in Table 3 (above); **the consequences with the highest severity** of the four categories should be considered in the Risk Analysis.


With practice and experience conducting the above risk assessment process steps is a quick assessment. Inspectors are not required to record their reasons for selecting a particular category of likelihood and impact, only the result of this assessment. The rationale for this is that to do so would slow down the inspection process and make it impractical to carry out with the current level of resources.

## Step 2c: Risk Evaluation

The outcomes from the Likelihood and Consequence assessment are used to determine the risk category of the hazard (Table4).

The risk assessment will be completed electronically during the inspection.

**Table 4 Risk Matrix**

| Consequence / Likelihood | Negligible | Minor | Moderate | Major | Catastrophic |
|---|---|---|---|---|---|
| **Remote** | NR | NR | NR | NR | P3 |
| **Unlikely** | NR | NR | P4 | P4 | P3 |
| **Possible** | NR | P4 | P4 | P3 | P2 |
| **Likely** | NR | P4 | P3 | P2 | P1 |
| **Almost Certain** | NR | P3 | P2 | P1 | P1 |

**Table 5 Risk Category & Priority Response**

| Risk Category | Priority Response |
|---|---|
| Critical Risk | **Priority 1 response** |
| High Risk | **Priority 2 response** |
| Medium Risk | **Priority 3 response** |
| Low Risk | **Priority 4 response** |
| Negligible Risk | **No response#** |

## Priority Response Times

### Safety Levels

For your information, the Priority Response Times for each Defect Category are shown in Table 6 below. **The assessment of risk must NOT be based on consideration of response times.**

**Table 6 SAFETY LEVELS - Defect Categories and Priority Response Times**

| Defect Category | 1 | 2 | 3 | 4 | NR |
|---|---|---|---|---|---|
| Standard Response Time | 4 Hours | 5 Working Days | 60 Working Days | Programmed work | No Action Required |
| Islands or Remote Locations Response Times | 24 Hours | | | | |

**Intersections and Multiple Road Users Types**

The hazard context considers the location and the types of road users which could be impacted by the defect. Inspectors should consider the different impacts and consequences for each road user type (e.g. pedestrians, cyclists, vehicle drivers, etc.) and at intersections, consider the hierarchy of each route. Inspectors **must therefore assess the likelihood and consequence for <u>each</u> road user type and/or route hierarchy**. The priority of the response is based on the highest priority determined from the risk matrix (Table 4).

Appendix A 'Example Scenarios' Scenario 1 provides an example scenario of assessing the impact and consequences of a defect on multiple road user types. The most common instance where this occurs is at pedestrian crossings where defects on the carriageway must be considered in terms of impact on pedestrians as well as vehicles.

### Inspection Records

Information from safety inspections is recorded in the road management system. The data is recorded on site using electronic devices and downloaded to the road management system on return to the office. Inspection records include the date and time of the inspection, the name of the person carrying out the inspection and any defects identified.

# Health and Safety

## General

In General road inspections are conducted from a slow-moving motor vehicle, bicycle or foot.

The Council's Lone Working Procedures must be followed when an inspector is undertaking a safety inspection on their own.

Vehicles must be driven or ridden at an appropriate speed to allow any defects to be identified.

## Health and Safety

Inspections are to be conducted in accordance with the council's procedures for the health, safety and health of its employees and others:

1. All staff engaged in inspections must wear high visibility clothing to BS EN 471 class 3.
2. All vehicles used to carry out inspections shall be liveried to an appropriate standard and all necessary vehicles and equipment (e.g. Data Capture Device, Software, etc) checks shall be carried out prior to inspections being undertaken.
3. Driven safety inspections should be undertaken by two people.

All surveys should make use of two-way communications (i.e. mobile telephone).

Drivers must abide by Regulation 110 of the Road Vehicles (Construction and Use) Regulations, which prohibits a person from driving a motor vehicle from using a held-hand mobile telephone or a hand-held device.

Communication devices must only be utilised by drivers when the vehicle is safely parked, unless it is an emergency and the driver needs to dial 999 and it is unsafe or impractical to stop.

When parking the vehicle, vehicles should be parked off the live carriageway wherever possible. If this cannot be achieved then there must be clear visibility in both directions and the roof mounted beacon must be switched on. Traffic must not be forced across continuously solid white lines. If this cannot be achieved, advanced temporary traffic signing must be installed.

## Make safe

If a defect is assessed as a serious hazard (Critical Risk - Category 1 response) to road users, the inspector should remain at the hazard until the risk treatment is implemented.

## Equipment

All inspection vehicles should carry a minimum of three 750mm traffic cones. The cones should be kept clean and should be inspected quarterly and replaced as necessary.

In addition to any other equipment they consider necessary, Inspectors should carry a digital camera to record defects and a GPS enabled system to accurately record the location of defects.

## Documents

The safety inspection team should also carry a copy of:

a) This guidance document

b) New Roads & Street Works Act 1991 – Code of Practice for Inspections

c) Safety at Street Works and Road Works, A Code of Practice

# Appendix A - Example Scenarios

The examples in this section **are for illustration purposes only**, demonstrating the thought process for the Risk Based Approach and highlighting how context changes can impact the Risk Category.

Scenario 1 provides an example showing the process for assessing a defect based on the different road user types that typically utilise the road asset.

Scenario 2 and 3 illustrate that the context can change the likelihood and/or consequences, therefore impact the Risk Category/Priority Response.

## Scenario 1

In this first scenario of a gully deterioration, the Inspector considers likelihood and consequences on each of the alternative road users that may be impacted by the defect to determine the appropriate response.

## Context

- Bituminous patch around a gully has deteriorated creating a difference in level in the road surface, plus edge of adjoining material and gully casing exposed, creating a possible trip hazard.

The following considerations, where known, should be considered.

Likelihood Considerations

- Urban Environment
- Narrow road (roughly 5 metres)
- Over 5,000 motor vehicles per day travel along the route
- Commuter route used by over 100 cyclists; no dedicated cycleways/cycle path.
- Local urban centre/high street, with shops and services (e.g. banks, doctors, dentists, etc) both sides of road
- Pedestrian crossing approximately 20 metres from location

Consequence Considerations

- 30mph speed limit on single two-lane carriageway
- Mixture of ages utilise the shops and facilities
- Part of a national cycle route and therefore relevant to the authority's strategy on promoting more sustainable transportation and healthier residents through cycling. Due to restrictive widths of the road boundary through the high street, the dedicated cycleway ends, due to not being possible to create or construct dedicated cycleway or cycle paths.


*The following considerations are included here for demonstration purposes, such information would only form part of the assessment if known by the inspector. It is not suggesting that inspectors seek out such information.*

- National cyclists group members magazine published article on the deterioration of the Scottish road network, using this road as an example and photograph of editor and his bike after his incident. This article was picked up by the BBC; BBC interviewed the editor and published his pictures on the national BBC website, plus appeared on BBC Scottish News.

- Five complaints over the last twelve months received from local cyclists and a nation cyclist group regarding the general condition of road, plus:
  - Reports/claims for property damage (damaged wheels)
  - Reports of minor injuries (cuts, grazes and bruises); one of the injured is editor of national cyclist group members magazine
- One claim over the last twelve months from pedestrian who tripped and fell over a similar defect, breaking their arm and collar bone.
- Ten claims for damaged tyres/wheels after hitting similar defects along the road in the last three years.

## Risk Analysis

### Road User 1: Car Driver

**Likelihood: Almost Certain**

Context indicates the road is narrow, plus the defect is roughly 0.5 metre from the kerb, which would be close to vehicles wheel paths.

**Consequence: Negligible**

There have been claims for damaged tyres and wheels in the last three years, but the likelihood of this is improbable based on the number of claims vs daily traffic flow. The likely consequences are that 'no noticeable injury' or 'minimal financial lose' occurs; therefore, the consequences are 'Negligible'.

**Priority: No Response Required (Negligible risk)**

Utilising the Risk Matrix (table 3) the defect is prioritised as "No Response Required".

### Road User 2: Motorcyclist

**Likelihood: Unlikely**

Context indicates the road is narrow, therefore motorcyclists would most likely ride down the centre of the lane, avoiding the defect.

**Consequence: Negligible**

Speed limit is low, therefore if a motorcyclist did hit the defect, the likely consequence is 'no noticeable injury' or 'minimal financial lose' occurs; therefore, the consequences are 'Negligible'.

**Priority: No Response Required (Negligible risk)**

Utilising the Risk Matrix (table 3) the defect is prioritised as "No Response Required".

**Road User 3: Cyclist**

**Likelihood: Possible**

Context indicates the road is narrow, therefore cyclists are likely to be pushed towards the kerb by motor vehicle drivers, therefore increasing the chance of hitting the defect.

**Consequence: Major**

- **Service –** It is the authority's strategy to promote cycling to improve health and sustainability of the authority and the route forms part of the national cycle route network. Due to the condition of the road, it would make people less likely to cycle to work or to shop. Therefore, the likely consequence is the 'Service objective is partially achievable' which is a '**Moderate'** consequence.
- **Financial** – Context indicates that there are up to five claims against the authority for damage to the bikes and loss of earnings over the last twelve months. These financial losses are likely to be moderate for the authority and/or the claimant, therefore the consequences have been assessed to be '**Moderate'**.
- **People** – Context indicates that cyclists that have hit similar defects are likely to get minor injuries, therefore the consequences have been assessed to be '**Minor'** due to 'First aid treatment, non-permanent harm up to 1 month'.
- **Reputation –** Context indicates that there has been national media interest in the authorities and specifically this roads condition, therefore the likely consequences of another incident are '**Major'**, due to 'Major adverse publicity'.

**Priority: P3 (Medium Risk)**

Utilising the Risk Matrix (Table 3) the defect is prioritised P3 "Medium Risk".

**Road User 4: Pedestrian**

**Likelihood: Possible**

Context indicates that there has been an incident where a pedestrian has tripped over a similar defect in the last twelve months.

**Consequence: Moderate**

Context indicates that the claimant's injuries include a broken arm and fractured collar bone; the consequences have been assessed to be:

- **People** – 'Moderate' due to 'Medical treatment required, semi-permanent harm up to 1 year'.

- **Financial –** 'Minor' due to the 'Moderate financial loss' to the injured claimant or the authority, if the claim is successful.

**Priority: 4 (Low risk)**

Utilising the Risk Matrix (Table 3) the defect is prioritised as Priority 4 (Low Risk) due to the reputational risk to the authority.

## Scenario 1 - Summary Risk Analysis

| Road User | Priority Response – Risk Category |
|---|---|
| Car Driver | No Response required |
| Motor Cyclist | No Response required |
| **Cyclist** | **P3 - Medium Risk** |
| Pedestrian | P4 – Low Risk |

**RESULT:** Following the SCOTS Risk Based Approach for all road user types, the highest Risk Category/Priority Response take precedence, therefore **'Priority 3 – Medium Risk'** for the Cyclist.

## Scenario 2

This scenario illustrates how the context can impact the likelihood of the defect and change the Risk Category/Priority Response.

## Scenario 2a

### Context

- Damaged Vehicle Restraint System (VRS) with a drainage ditch and woodland behind the VRS.

  <u>Likelihood Considerations</u>

  - Rural Environment
  - Over 1,000 vehicles per day travel along the route, of which 100 HGV's per day
  - Inspected Quarterly
  - No record of other historical VRS damage within 500m of location
  - Straight road with good visibility
  - No junctions or high-risk locations within 1km of the damage

Consequence Considerations

- 40mph Speed limit on Single Two-way Carriageway
- Majority of vehicles are cars.
- Narrow drainage ditch and woodland at same ground level as road behind VRS

### Risk Analysis

**Likelihood: Unlikely**

Based on the information provided in the context, the likelihood of the hazard being encountered (VRS being struck in close proximity of the damage) is **"Unlikely" ('Not expected to happen, but is possible')** due to low traffic flows and the location not being in the vicinity of highway high risk sites, such as features that could cause sudden braking e.g. junctions, crossings or bends.

**Consequence: Moderate**

The VRS damage will compromise the asset's structural performance affecting the VRS function of preventing vehicles from leaving the road. If the VRS was struck again while damaged, it is anticipated that it would not prevent the vehicle leaving the road and result in it hitting a tree causing **moderate injury (medical treatment required, semi-permanent harm up to 1 year) and moderate financial loss**. Based on this analysis, the consequence has been assessed as Moderate

**Priority: 4 (Low risk)**

Utilising the Risk Matrix (table 3) the defect is prioritised as Priority 4 – Low risk; likely action is to add the works to the VRS Planned Works Programme to be repaired based on the authorities works prioritisation process.

## Scenario 2b

### Context

- Damaged Vehicle Restraint System (VRS) with a drainage ditch and woodland behind the VRS.

Likelihood Considerations

- Rural Environment
- Over 10,000 vehicles per day travel along the route, of which 4,000 HGV's per day
- Inspected Weekly

- Damage is after right bend with poor visibility
- Damage within 100m of a traffic signal-controlled junction; traffic queues are known to be up to 50m during peak hours at the signals.
- 40mph speed limit on Single Carriageway

Consequence Considerations

- 40mph speed limit on Dual Carriageway
- Drainage ditch and woodland behind VRS

### Risk Analysis

**Likelihood: Likely**

Based on the information provided in the context, the likelihood of the VRS being struck in close proximity of the damage is **"Likely" ('Will probably happen, but not a persistent issue')** primarily due to the VRS damage being situated after a bend with poor visibility and close to a traffic signal-controlled junction. Additionally, at peak times, it is known that traffic queues can be up to 50m in length. Finally, the traffic flows have increased compared to Scenario 2a, which also contributes to the increase in the likelihood of a road user encountering the hazard.

**Consequence: Moderate**

Compared to Scenario 2a, the context has not changed any of the factors which would impact the consequence of the hazard, therefore it is anticipated the consequence are the same as Scenario 2a and remain as **"Moderate".**

**Priority: 3 (Medium risk)**

Based on the Risk Matrix (table 3) the defect priority increases to Priority 3 – Medium risk; the likelihood of the VRS being hit has increased, but the probable consequence remains the same. The authority should action a risk treatment within the Road Authorities local timescales for the Priority 3.

## Scenario 2c

### Context

- Damaged Vehicle Restraint System (VRS) on an elevated section of road, with 4m in height difference woodland behind the VRS and the road surface

Likelihood Considerations

- Rural Environment
- Over 10,000 vehicles per day travel along the route, of which 4,000 HGV's per day
- Inspected Weekly
- Damage is after right bend with poor visibility
- Damage within 100m of a traffic signal-controlled junction; traffic queues are known to be up to 50m during peak hours at the signals.
- 60mph speed limit on Single Carriageway

Consequence Considerations

- 60mph Speed limit on Single Two-way Carriageway
- Road is on an elevated section, with a 4-metre retaining wall behind the VRS followed by woodland.

## Risk Analysis

**Likelihood: Likely**

Compared to Scenario 2b, the speed limit has increased from 40mph to 60mph, this is anticipated to increase the possibility of incidents occurring, however, not sufficiently to change the likelihood from 'Likely' to 'Almost certain'; therefore, the likelihood remains '**Likely'**.

**Consequence: Catastrophic**

Compared to Scenario 3c, the speed limit has increased from 40mph to 60mph and the road is now on an elevated section with a 4-metre drop height difference between the road surface and the woodland ground. Due to the changes in speed limit and the height of the road, if a vehicle was to strike the damaged VRS and the VRS failed to contain the vehicle, it is anticipated that the most probable consequence is envisaged to result in a Death, due to the higher speed of the road and the vehicle also falling from a height of 4m. Therefore, the consequences have been assessed to be '**Catastrophic'.**

**Priority: 1 (Very High risk)**

Utilising the Risk Matrix (table 3) the defect is prioritised as Priority 1 – Very High risk; this hazard would require the inspector to take implement a risk treatment immediately to either reduce the likelihood, consequence or both of the hazard; the risk treatment can be a temporary measure until the permanent risk treatment can be implemented. The inspector could consider either temporary traffic management to

reduce the likelihood, a temporary barrier to reduce the consequence or a combination of both as temporary risk treatments.

Due to the Very High-risk nature of the hazard, the inspector must stay at the site until the temporary risk treatment is implemented; however, the priority is to safety, therefore the inspector must ensure that they follow the local Health and Safety Procedures.

## Scenario 2 - Summary Risk Analysis

| Context | Priority Response – Risk Category |
|---|---|
| If Context 2a applied | Priority 4 – Low risk |
| If Context 2b applied | Priority 3 – Medium risk |
| If Context 2c applied | Priority 1 – Very High risk |

**RESULT:** Scenario 2 examples provides an insight into how the risk rating can change for the **same defect** with slightly **different contexts that** changes the likelihood and /or consequences. It also demonstrates that not all defects are the same and the need to consider the characteristics of the location when assessing the likelihood of encountering the defect and the probable consequence.

## Scenario 3

As with scenario 2, this scenario illustrates how the context can impact the likelihood and/or consequence of the defect and change the Risk Category/Priority Response.

## Scenario 3a

### Context

- Deteriorated road surface on the approach to a junction with a high trafficked route which connects a city to a large town.

  Likelihood Considerations

  - Rural Environment
  - Minor road providing access to three farms only
  - Less than 20 vehicle movements per day
  - No recorded or experience of incidents at junction

  Consequence Considerations

  - 60mph Speed limit on major and minor roads

- Road is mainly utilised by agricultural, 4x4 and HGV's vehicles.

### Risk Analysis

**Likelihood: Almost Certain (Agricultural vehicles)**

Based on the information provided in the context, even though the vehicle numbers are low, the likelihood of vehicles (bearing in mind user type) running over the deteriorated carriageway surface is 'Almost Certain'. It would be difficult to avoid the hazard as the deterioration is extensive, with potholes along the road and loose chippings.

**Consequence: Negligible**

Consequence of the road deterioration on the Milk lorries and agricultural vehicles utilising the road is "Negligible" causing no harm/injury, no damage to reputation, minimal financial loss and minimal impact of services.

**Priority: No Response**

The Risk Matrix (Table 3) indicates that this defect is a NR (No Response).

## Scenario 3b

### Context

- Deteriorated road surface on the approach to a junction with a high trafficked route which connects a city to a large town.

<u>Likelihood Considerations</u>

- Rural Environment
- Minor road leading to a small village containing roughly 200 homes.
- Approximately 300 vehicles per day
- No recorded or experience of incidents at junction

<u>Consequence Considerations</u>

- 60mph Speed limit on major and minor roads
- Road is mainly utilised by cars, no experience or knowledge of motorcyclists or cyclists using the road

**Likelihood: Almost Certain (cars)**

Given the extent of deterioration across the road the likelihood of vehicles (mainly cars) driving over the hazard is still 'Almost Certain'.

**Consequence: Minor (Cars)**

The potholes are fairly near the junction, so vehicles should not be approaching them at high speed, however the volumes encountering them is high and deterioration before the next inspection is likely to continue. The probable consequence of a car driving over these potholes is damage to the vehicle such as a buckled wheel or damaged tyre, incurring a minor financial loss for the vehicle owner. Based on table 2, the impact would thus be classified as "Minor".

**Priority: 3 (Medium Risk)**

The Risk Matrix (Table 3) indicates that this defect is classified as a priority 3 defect.

## Scenario 3c

### Context

- Deteriorated road surface on the approach to a junction with a high trafficked route which connects a city to a large town.

  Likelihood Considerations

  - Rural Environment
  - Minor road connects two major routes; used as a rat run during peak times.
  - Over 750 vehicles per day
  - Recent incident where a motorcyclist received severe injuries when losing control on road in similar condition

  Consequence Considerations

  - 60mph Speed limit on major and minor roads
  - Road is mainly utilised by a variety of different vehicles

  **Likelihood: Almost Certain (cars), Likely (motor cyclists)**

  The likelihood of encountering the hazard is 'Almost Certain' for cars and large vehicles. For motor cyclists there is greater opportunity to 'navigate' the potholes approaching the junction, however encountering them is 'likely' due to the extent of the deterioration and previous incident occurring in similar circumstances.

  **Consequence: Minor (cars), Moderate (motor cyclists)**

The most probable consequence for cars will be as scenario 3b (Minor), however for a motorcyclist the risk is higher, most probably losing control and coming off the bike as in recent incident. Although a 60mph road, speed of approach is unlikely to be very high due to the proximity of the give way junction. The most probable consequence to the motorcyclist would be 'Moderate': medical treatment required, semi-permanent harm up to 1 year.

**Priority: 3 for motor cyclists (Medium Risk)**

The assessment should prioritise the road user to which the hazard poses the greatest risk, in this case motorcyclists. The Risk Matrix (Table 3) indicates that the hazard assessed as Likely/Moderate is classified as a priority 3 defect.

## Scenario 3 - Summary Risk Analysis

| Context | Priority Response – Risk Category |
|---|---|
| If Context 3a applied | No response required |
| If Context 3b applied | Priority 3 - Medium Risk |
| If Context 3c applied | Priority 3 - Medium Risk |

Scenario 3 examples provides an insight how the risk rating can change for the same defect within slightly different contexts that change the likelihood and/or consequences. It also demonstrates the need to consider the alternative road users and consider those to whom the hazard poses the greatest risk.

# Appendix B – Example Defects

## Carriageways

| Defect | Example |
|---|---|
| Surface Defects |  |
| Abrupt level differences in running surface |  |

| | |
|---|---|
| Edge deterioration of the running surface |  |
| Excessive standing water, water discharging onto and / or flowing across the road |  |

| | |
|---|---|
| Blocked gullies and obstructed drainage channels or grips which could lead to ponding or flooding |  |
| Debris and/or spillages likely to be a hazard |  |

| | |
|---|---|
| Missing road studs |  |
| Badly worn Stop, Give Way, double continuous white line or markings associated with TRO's |  |

| | |
|---|---|
| Missing or significantly damaged covers |  |

## Footways, Footpaths and Cycleway

| Defect | Example |
|---|---|
| Surface Defects |  |
| Excessive standing water and water discharging onto and or flowing across the foot/cycleway |  |

| | |
|---|---|
| Dangerous rocking paving slabs |  |
| Large cracks or gaps between paving slabs |  |

| | |
|---|---|
| Missing or significantly damaged covers |  |
| Debris and / or spillages likely to be a hazard |  |

| | |
|---|---|
| Damaged kerbs |  |

## Street Furniture

| Defect | Example |
|---|---|
| Damaged vehicle restraint systems, parapets, handrails or guardrails |  |
| Damaged boundary fence where animals or children could gain access |  |

| | |
|---|---|
| Damaged or missing signs, such as Give Way, Stop, Speed Limit |  |

## Street Lighting

| Defect | Example |
|---|---|
| Damaged column, cabinet, control pillar, wall mounting |  |
| Exposed, live electrical equipment |  |

## Other Assets

| Defect | Example |
|---|---|
| Sightlines obstructed by trees and other vegetation |  |

| | |
|---|---|
| Trees in a dangerous condition |  |
| Earth slips where material undermines road construction causing localised collapse. |  |

| | |
|---|---|
| Rocks or rock faces constituting a hazard to road users |  |
| Damaged road structures |  |