Road Asset Safety Inspections: A Risk Based Approach

Road Asset Safety Inspections - Operations Manual

Document Information

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Author	
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1. Purpose

1.1. The Inspections Operations Manual is one of several documents in the SCOTS Risk Based Approach suite; this document is aimed at Road Asset Safety Inspectors (Inspectors), providing information and guidance regarding the method to be deployed in undertaking risk assessment and the prioritisation of defects.

1.2. 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.

2. Background

2.1. The methodology described in this document has been designed to comply with the following current requirements, legislative or otherwise:

2.2. 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."

2.3. 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 reasonable 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?

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 On 28th October 2018, Well Maintained Highways was superseded by Well Managed Highway Infrastructure (WMHI), removing all prescriptive intervention levels, action timescales, inspection frequencies, etc.

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

3. Inspector Competency

3.1. Competency and Training

3.1.1. Road Authorities must ensure that all Inspectors are competent in carrying out safety defect inspections.

3.1.2. Inspectors within the Council will undergo the SCOTS Risk-based Approach to Safety Defect Inspections training and be required to achieve a pass grade on the course assessment to demonstrate competency in assessing risk. Training will be delivered by an approved SCOTS trainer utilising the SCOTS training toolkit. The person delivering the training will be required to have been trained and assessed as competent by successfully completing the SCOTS 'Train the Trainer' course.

3.1.3. The Inspectors will be required to successfully complete an IHE Accredited Road Inspector Training Course, and will be added to the IHE Register for Highway Inspectors.

3.1.4. Annual Standardisation meetings will be held with the Inspectors to review, discuss and agree defect responses

3.2. Competency Training Records and Plans

3.2.1. Inspector training and competency records will be maintained and reviewed during the Inspectors ERDP for completeness and to identify when inspector re-assessment is due, to ensure that they continue to meet the Road Authority's minimum competency requirements.

3.2.2. The Training and competency records are held in the Inspectors Personal Training File

3.2.3. If an Inspector does not meet the Council's minimum competency requirements, a Training Plan will be developed by the Roads Maintenance Manager to assist the inspector achieve the necessary level of competency.

4. Inspection Procedures

4.1. Planned Cyclic Safety Inspections

4.1.1. 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.

4.1.2. Cyclic Safety Inspections are carried out to specified frequencies, dependent upon the hierarchy of each section of road.

4.1.3. Inspections in urban areas (speed limit of 40mph or less) will be walked.

4.1.4. Inspection in rural areas (speed limit over 40mph) will be driven in a slow moving conspicuous vehicle, at an appropriate speed to allow any defects to be identified. These inspections will be single manned, with the Inspector pulling over to a safe location when recording defects.

4.1.5. Inspections of remote cycle tracks will either be walked or cycled.

4.1.6. 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.

4.1.7. 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

4.1.8. Moray Council is split into 28 inspection areas with each inspection area assigned to an Asset Inspector.

4.1.9. Monthly routes have been created for each of the 28 inspection areas, these routes contain the appropriate sections of roads/streets/footpaths/cycle tracks in accordance with their inspection frequencies as described in the Road Safety Inspection Strategy document.

4.1.10. Inspection routes will be maintained by the Roads Maintenance Asset Team.

Inspection Tolerances

4.1.11. For efficiency, to prevent multiple trips around the inspection areas to carry out inspections on defined road hierarchies, the inspection routes are designed to incorporate all inspections required in an area in any given month.

4.1.12. Moray Council have adopted this inspection strategy for several years and are satisfied that this system works successfully in operation.

4.1.13. These inspections, except for any exceptional circumstances, should be completed during the targeted calendar month.

4.1.14. In the event of being aware that the due date for a programmed inspection cannot be met, the inspector must, without delay, inform the Roads Maintenance Manager and provide the reason(s) for this.

4.1.15. If an inspection Due Date falls during an extended period of absence e.g. inspector holiday or illness, and the Inspector will be unable to complete it within its target month, then the inspection should be allocated to another suitably experienced member of staff who has the capacity to undertake the inspection.

4.1.16. If and for reasons beyond the control of the roads authority (e.g. substantial/prolonged snow fall), any inspection cannot be carried out within the specified month the roads authority will as soon as reasonably practicable carry out a deferred safety inspection

4.2. Ad-Hoc reactive Safety Inspections

4.2.1. Inspectors may be instructed to undertake ad-hoc safety inspections e.g. in response to a third party report

4.2.2. All enquiries are logged in the Asset Management system with a responsible officer allocated based on either its geographic area or a specific officer based on the nature of the enquiry.

4.2.3. The risk assessment methodology outlined in the 'Defect Identification and Risk Assessment Process' section of this document will also be adopted for ad-hoc reactive safety inspections, whether carried out by the Inspector or any other Responsible Officer.

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

4.2.5. Some defects, if judged to likely require P1 response based on the information received, may be referred directly to Operations for immediate action.

4.3. Traffic Signal Inspections

4.3.1. During a planned cyclic safety inspection of a road, any Council owned permanent traffic signals will be inspected at the same time.

4.3.2. This inspection will entail checking the operation of the signal heads, as well as checking the pedestrian buttons and associated visual, audible and tactile functionality

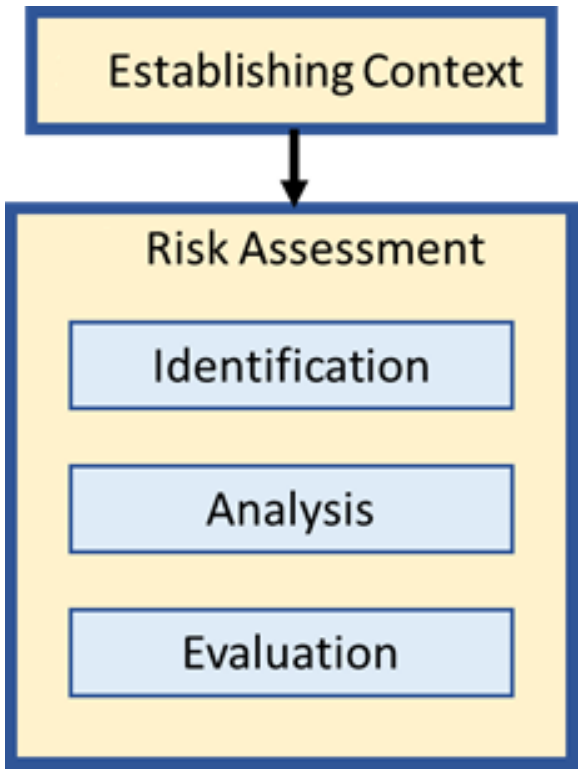
5. Defect Identification and Risk Assessment Process

5.1. Introduction

5.1.1. 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:***
> *For many Councils this guidance represents a step change in the way that defects are assessed. 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. In the past this has led to inappropriate and often unnecessary, costly, temporary repairs. Instead, by using a risk based approach, Councils can reduce such reactive interventions and target more of their scarce resources towards programmed work that in the longer term will lead to an overall improvement of road condition.*

5.1.2. Moray Council is adopting the SCOTS recommended procedure for risk assessment that is based on the ISO31000 Risk Management Process (contained in Appendix A). In undertaking assessment of safety defects, the following steps are applicable:



5.2. Step 1: Establishing Context

5.2.1. 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.).

5.3. Step 2: Risk Assessment

Step 2a: Hazard Identification

5.3.1. 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.

5.3.2. 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 Analysis to determine the defect's risk category and priority response as per New Roads and Street Works Act 1991 Code of Practice for Inspections (see section 5.4.6. below)

Step 2b: Risk Analysis

5.3.3. 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.

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

5.3.5. 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,

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

5.3.7. 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

5.3.8. Table 5a (below) should be used to assess Risk Likelihood.

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

5.3.10. 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 5a - Risk Likelihood

Likelihood / Probability	Likelihood Description		
Almost Certain	Will undoubtedly happen	Over 90%	Daily
Likely	Will probably happen, but not a persistent issue	Up to 90%	Weekly
Possible	May happen occasionally	Up to 65%	Monthly
Unlikely	Not expected to happen, but it is possible	Up to 20%	Annually
Remote	Improbable	Less than 5%	100 years

2. Assess Risk Consequence (Impact/Severity)

5.3.11. Table 5b (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 5b - 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, sever 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	Significant financial loss	Medical treatment required, semi-permanent harm up to 1 year	Some adverse publicity, legal implications
Minor	Minor impact on service objectives	Moderate 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

5.3.12. 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.

5.3.13. 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

5.3.15. The outcomes from the Likelihood and Consequence assessment are used to determine the risk category of the hazard (Table 5c).

5.3.16. The defect evaluation will be carried out within the Asset Management Software. The response priority will be calculated using the assessed likelihood and consequence of each defect in accordance with the Risk Matrix in Table 5c below. These likelihood and consequence scores will be recorded in the database for future reference.

Table 5c - 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 5d - Risk Category & Priority Response

Risk Category	Priority Response	
Critical Risk	Priority 1 response	The associated response times have been deliberately omitted from this guidance to encourage Inspectors to be objective in their assessment and not be influenced by consideration of response times.
High Risk	Priority 2 response	
Medium Risk	Priority 3 response	
Low Risk	Priority 4 response	
Negligible Risk	No response	

5.4. Intersections and Multiple Road Users Types

5.4.1.1. 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 each road user type and/or route hierarchy**. The priority of the response is based on the highest priority determined from the risk matrix (Table 5c).

5.4.2. 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.

5.5. Critical Risk – Priority 1 Response

5.5.1. If a defect is assessed as a serious hazard (Critical Risk - Priority 1 response) to road users, the inspector should remain at the hazard until it is made safe.

5.5.2. The Inspector should park the vehicle protecting the public from the defect if possible, with beacons illuminated, or sign or guard the defect if appropriate until operations crews can "make safe" the defect.

5.5.3. In terms of a pothole defect, the inspector, if safe to do so, may make the defect safe by repairing the pothole with a suitable cold applied macadam.

5.6. Defective Utility Apparatus

5.6.1. The inspector should conduct a Risk Analysis to determine the defect's risk category and priority response as follows:-

- P1 Defect – make safe and inform the appropriate Utility immediately with details of the defect, location, and what action has been taken. The inspector must make arrangements so that the defect is logged in Scottish Road Works Register (SRWR)
- P2 Defect – inform Utility via the SRWR, and consider direct contact.
- P3 Defect – inform Utility via the SRWR.

5.6.2. Further information on this procedure can be found in the New Road and Street Works Act 1991 Code of Practice for Inspections

5.7. Inspection Records

Inspections on Adopted Roads, Footpaths and Cycle Tracks:-

5.7.1. Inspection records are captured and stored using the asset management database software and associated hardware. Tablet PCs are to be used on site to record the location and nature of the defect, along with photographs where required.

5.7.2. The data is uploaded into the asset management database on return to depot, where any defects are given a unique reference

Third Party Defects:-

5.7.3. Any defects which are recorded but are not the responsibility of the Roads Authority will be passed onto the appropriate Council section or utility company, etc. A redirect to third party task will be created in the system in which details of the third party are recorded as well as the date that the defect was passed on. After completion of this task the defect will be closed off in the system.

6. Health and Safety

6.1. General

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

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

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

6.2. Health and Safety

6.2.1. Inspections are to be conducted in accordance with the Council procedures for the health, safety and health of its employees and others:

- All staff engaged in inspections must wear high visibility clothing to BS EN 471 class 3.
- 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.

6.2.2. All Inspectors should have access to two-way communications (i.e. radio /mobile telephone) in case of emergency.

6.2.3. 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 (other than answering a 2-way radio call)

6.2.4. Drivers must also adhere to the Councils own Driving Safely Policy.

6.2.5. 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.

6.2.6. 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.

6.3. Equipment

6.3.1. All Inspectors will be issued with a tablet PC. These will be used for inspections and have built in GPS and camera.

6.3.2. All inspection vehicles should carry, at minimum, the following kit

- 3no 750mm Cones
- Broom
- Spade
- Loppers
- Bushman Saw
- 13mm Spanners
- Road Marking Paint
- Measuring Wheel
- Tape Measure
- Cold Applied Macadam
- Tamper
- Manhole Lifters
- Hazard Tape

6.3.3. The above kit should be kept clean and serviceable at all times and should be inspected regularly by the inspector and replaced as necessary.

6.4. Documents

6.4.1. The Inspectors should carry a copy of the following documents in their vehicles:

- This guidance document
- New Roads & Street Works Act 1991 – Code of Practice for Inspections
- Safety at Street Works and Road Works, A Code of Practice

Appendix A – ISO31000 Risk Management Process