Oxfordshire Highways
www.oxfordshirehighways.org
Improving Your Roads

Highway Inspections Guidance Manual

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Improving your roads

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Appendices

1. Purpose of this Manual

The purpose of this Manual is to provide general guidance to Highways Inspectors and other Oxfordshire Highways staff on the identification and recording of defects during Safety Inspections and the subsequent rectification of identified defects.

The Manual will also help to inform County Councillors, the public and other stakeholders of the County Council's approach to the maintenance of the highway network and response to identified defects.

Although this Manual provides the framework to enable the consistent identification, recording and repair of highway defects in Oxfordshire, on-site judgement will always need to be exercised by Inspectors when taking account of the particular circumstances of any defect.

The Manual should be considered as an 'interim' document with regard to defect repair times until reliable statistical information is available through the proposed electronic systems (mainly EXOR). Accurate information will then be available to assess repair performance and assist in determining the appropriate levels of funding. Until then the document will serve simply to provide a guide to the types of defect which should be able to be repaired within the proposed response times.

2. The Inspection Regime

The Code of Practice for Highway Maintenance Management (July 2005) defines three categories of inspections and surveys:

1. Safety Inspections
2. Service Inspections
3. Condition Surveys

The scope of this Manual is limited to Safety Inspections.

Safety Inspections are designed to identify all defects likely to create danger or serious inconvenience to users of the network or the wider community. The risk of danger is assessed on site, and the defect identified either as a Category 1 or 2, with an appropriate priority response.

Although highway authorities are not statutorily obliged to undertake inspections of all highway elements under these three categories, they are strongly advised to undertake Safety Inspections in order to support a defence under Section 58 of the Highways Act 1980, which requires a court to have regards to:

"...whether the highway authority knew or could reasonably be expected to know, that the condition of the part of the highway to which the action relates was likely to cause danger to users of the highway."

Oxfordshire County Council, therefore, carries out a regime of statutory Safety Inspections across the entire network for which it is responsible.

3. Frequency of Inspection

The inspection frequencies for roads within Oxfordshire are based on the road category as defined in the New Roads and Street Works Act 1991. Footways and cycle routes inspection frequencies are also included in Table 1 below:

Feature	Description	Category	Inspection Frequency
Roads		Category 0 Category 1 Category 2 Category 3 Category 4	Monthly Monthly Monthly 3 Monthly 12 Monthly
Footways	Town Centre Core Pedestrian Routes Local Pedestrian Routes All Other Routes	1 (a) 1 2 3 and 4	Monthly Monthly 3 Monthly 12 Monthly
Cycle Routes	Part of Carriageway Core Cycle Routes National Cycle Network Non-Core Cycle Routes	A B C D	As for Roads 3 Monthly 6 Monthly 12 Monthly

It may be appropriate for some Category 4 highways to be inspected at 6 month intervals and such routes should be identified and recorded by the Area Office.

4. Inspection Arrangements

Most inspections will be undertaken from a moving vehicle. Speeds will depend on the character of the road, but should not be greater than 25 mph. In difficult areas it may be slower.

Pre-defined routes have been identified where it is a requirement for driven inspections to be carried out with a two person crew in the interests of road safety. These routes are listed at Appendix A. Some routes will require a purpose built vehicle to be used.

Also, at certain locations on defined roads a following escort vehicle equipped with crash cushion will be required. These locations have been identified and agreed between Inspectors and their managers.

During the working week defects should be entered onto the inspection record system within 24 hours of the completion of the inspection.

Footway inspections are to be carried out on foot in accordance with the County Council Footway Hierarchy 2005. Cycleways are to be inspected using a bicycle or on foot in accordance with the Cycleway Hierarchy (to be developed). It is however recognised that at the present time (July 2007) only certain identified routes are able to be inspected with the current inspectorate resource. These routes are listed at Appendix A2.

5. Items for Inspection

The items to be inspected during Safety Inspections are set out in Appendix B.
An example of the categorisation of defects as recorded by the data-capture devices is shown at Appendix C.

6. Assessment of Defects and Response Times

6.1. Critical Risk Levels

Oxfordshire County Council, in common with other highway authorities, has a limited budget with which to maintain the network and must balance the money available with the risk to the safety of road users.

In recognition of this the Council has set a risk level against which all observed deficiencies should be measured. This is called the Critical Risk Level (CRL).

This Critical Risk Level is currently set at 3. (Calculating the level of risk is explained later in this chapter).

Subject to the proviso of Note 1 below, any deficiency on the highway which corresponds to, or is in excess of, the stated Critical Risk Level is to be recorded and considered for repair.

Identification of a defect that exceeds the Critical Risk Level (and is consequently recorded) does not automatically mean that the defect will be repaired - see flow chart in Section 8 of this Manual.

Note 1:

It is important to emphasise that the Critical Risk Level is provided as guidance only. It is simply intended to assist Inspectors in deciding when it becomes necessary to record a defect.

An Inspector will therefore record a defect and its risk assessment result when a deficiency meets or exceeds the relevant CRL.

However, he/she may on occasion also record and risk assess a deficiency if he/she considers that the particular local circumstances warrant it. For example, a deficiency not meeting the CRL may be recorded in order to assist with the wider recording of the general condition of the highway for planned maintenance purposes or if the location / type of the defect represents an increased risk to public safety or longevity of the asset.

The CRL is not intended as an arbitrary minimum level of intervention at which point repair should automatically be carried out.

6.2. Risk Assessment

Deficiencies which exceed the Critical Risk Level of 3 should be recorded as defects.

The risk is a function of the likelihood (probability) of the defect endangering safety and the extent of any damage that might occur as a result (impact).

Section 9.4.17 of the Code advises that:

"The degree of deficiency in highway elements will be crucial in determining the nature and speed of response. Although some general guidance can be given on the likely risk associated with particular defects, on-site judgement will always need to take account of particular circumstances. For example, the degree of risk from a pothole depends not merely on its depth but also its surface area and location."

Such local factors may also include the close proximity of a school, hospital or other establishment which attracts increased activity and should be taken into account in the risk assessment.

Risk Level = Risk Impact x Risk Probability

Risk Impact

The Risk Impact is quantified by assessing the extent of damage likely to be caused by the risk and should be quantified on a scale of 1 to 4 as follows:

1 = Little or negligible impact

2 = Minor or low impact

3 = Noticeable impact

4 = Major, high or serious impact

The Impact will not only depend on the nature and severity of the defect (size, depth etc) but is also likely to increase with increasing speed. So the amount of traffic and type of road / footway / cycleway will also be important factors to take into account when assessing the Risk Impact.

For example, a pothole on a high-speed road is likely to have a higher Risk Impact than the same sized pothole on a residential cul-de-sac.

Risk Probability

The Risk Probability is quantified by assessing the likelihood of road users encountering or being affected by the defect and should be quantified on a scale of 1 to 4 as follows:

1 = Very low probability

2 = Low probability

3 = Medium probability

4 = High probability

The Probability of Risk is likely to increase with increasing vehicular or pedestrian flow and therefore the type of road / footway / cycleway and the location of the defect on the network will be important considerations in the assessment of the probability.

So, for example, a rocking paving slab in the centre of a shopping area will have a higher Risk Probability than a rocking paving slab on a Local Pedestrian Route.

Other factors to consider include the location of the defect relative to other features such as junctions and bends, proximity to other defects and the forecast weather conditions especially where surface water may collect.

Risk Level

The Risk Level for a defect is obtained by multiplying the Risk Impact score by the Risk Probability.

Risk Level = Risk Impact x Risk Probability

Therefore, the Risk Level can be in the range from 1 to 16 and reflects the overall seriousness of the defect, with 1 being of minor concern and 16 representing a serious hazard to road users.

Category 1a
Category 1b
Category 2a
Category 2b
Category 2c
Category 2d

		Probability			
		Very Low	Low	Medium	High
Impact	Negligable	1	2	3	4
	Low	2	4	6	8
	Noticeable	3	6	9	12
	High	4	8	12	16 16

The Risk Level defines the defect into one of six different categories.

For example, a risk which has a low probability of occurring but would have a high impact if it did occur would have a Risk Level of 8 (2 x 4) and would therefore be classed as a Category 2b defect.

6.3. Response Times

Once the defect has been assessed and the Risk Level calculated in accordance with the table above the appropriate Response Time will be determined.

Note 2:

The Response Time is the period from identification of the defect to its repair or making safe. Therefore prompt notification of the defect to the Contractor is essential in order to maximise the time in which to repair the defect and reduce the risk to the road user.

The County Council has set the following Response Times which correspond to the colours in the table above:

Response Times		
Category	Time	Scores
1a	2 hours	16*
1b	24 hours	16
2a	7 days	(12-15)
2b	28 days	(8 - 9)
2c	Programmed repair	(4 - 6)
2d	No action at present / monitor	(1 - 3)

Category 1 Defects

Category 1 defects are those defects that represent an immediate hazard and must be repaired promptly.

Most Category 1 defects are likely to be Category 1b defects and should be made safe within 24 hours.

However, in certain cases the Inspector (or any other person identifying a defect) may consider that a more urgent response is required due to the nature of the risk (e.g. manhole collapse, major spillage etc) and will classify a defect as a Category 1a defect. Arrangements should then be made to make the situation safe within two hours or within a timescale appropriate to the risk.

Where a temporary repair is undertaken a permanent repair should be programmed to be carried out within 28 days.

Category 2 Defects

Category 2 defects are defects which, although they may have safety implications, are deemed not to represent an immediate or imminent hazard following a risk assessment. These defects may therefore be repaired or made safe over a longer time period, depending upon the results of the risk assessment.

For guidance purposes, examples of defect risk assessments and response times are provided in Appendix D.

7. Recording of Information

"During safety inspections, all observed defects that provide a risk to users should be recorded and the levels of response determined on the basis of risk assessment."

(Code of Practice for Highway Maintenance Management, 2005, Section 9.4.17)

It is essential that all information (including "nil returns") from the Safety Inspections is recorded fully and consistently. This is important not only in the event of a claim but enables Oxfordshire Highways to analyse the information and, in conjunction with other survey data, to help manage the maintenance of the network.

All information is to be recorded in the data-capture devices and downloaded onto the Highways Management System (Exor) within 24 hours of the inspection being completed during the working week.

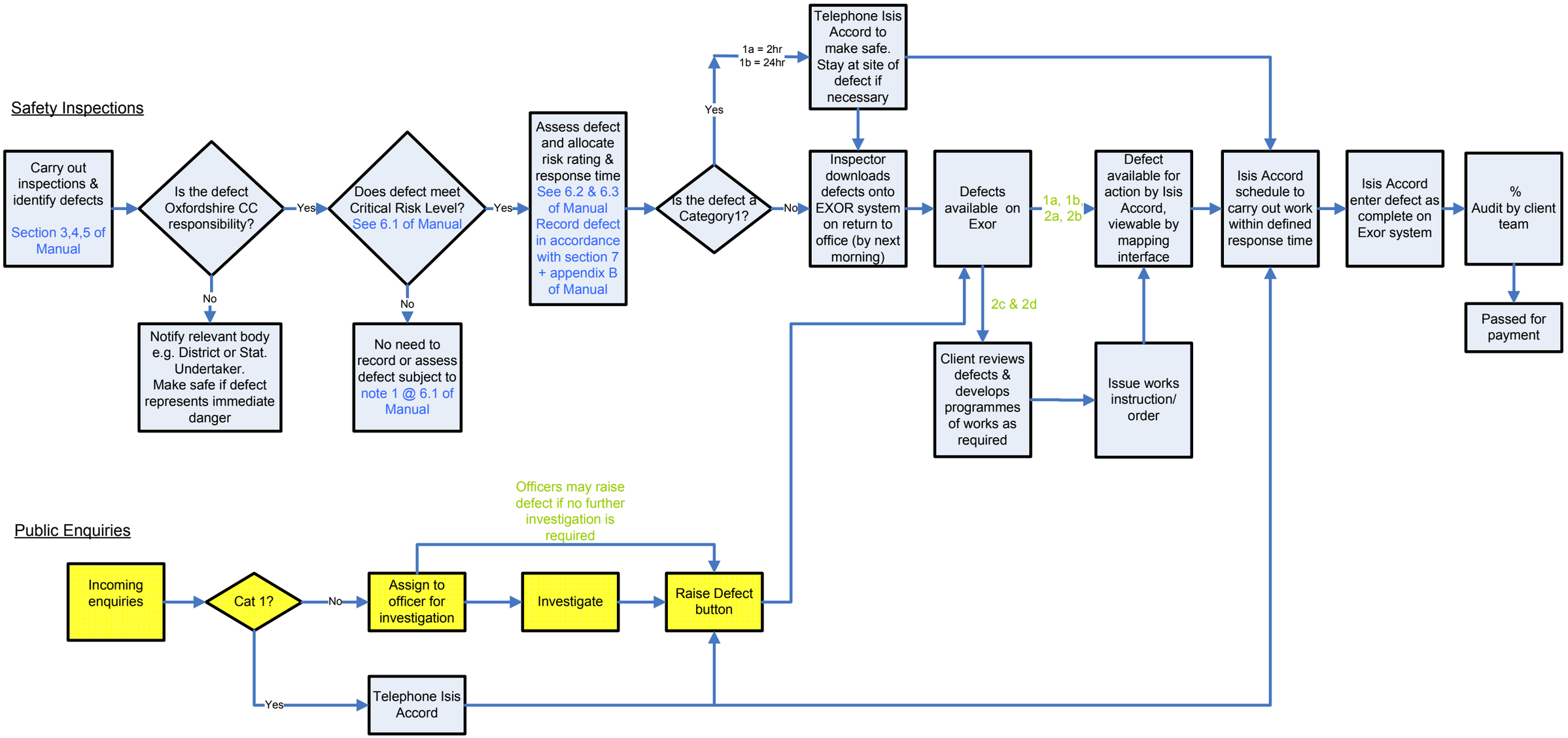
Defects are to be recorded and categorised in accordance with Appendix C, should be given a risk rating and have a response time entered. An accurate description of the defect and its location is to be included.

8. Defect Clearance Process

The following flowchart and accompanying notes define the process for the identification, assessment and notification of highway defects.

Non-Cyclical Maintenance

Defect Identification - Rectification



Appendix A1 - Dual Inspection routes

Southern Area

Road	Description
A40	Wolvercote RAB to M40 (Wheatley)
A44	Peartree Interchange to Wolvercote RAB
A417	County boundary (Berks) to County boundary (Glos)
A420	Botley Interchange to County boundary (Wilts)
A423	Heyford Hill RAB to Hinksey Interchange
A4074	Heyford Hill RAB to County boundary (Reading)
A4130	Rowstock Crossroads to Northfield End Henley
A4142	Headington RAB to Heyford Hill RAB (Eastern Bypass)
A4155	County boundary (Bucks) to County boundary (Reading)

Northern Area

A41	M40 to Bucks Border
A4421	Bicester to Finmere
A421	Finmere to Northants Border
B430	A34 to M40
A4095	Bicester to Enslow
B4011	Blackthorn to Bucks Border
B4030	Bicester to Middleton Stoney
B4100	Bicester to Baynards Green
A4260	Hopcrofts Holt to Bodicote Flyover
A361	Wycombe Lane to Great Tew turn
B4031	Clifton to A361
Road	Description
B4030	B430 to Hopcrofts Holt
B4100	Baynards Green to A4260
B4035	Banbury to Warwickshire Border
A361	Banbury to Northants Border
A423	Banbury to Warwickshire Border
B4100	Banbury to Warwickshire Border
A422	Banbury to Warwickshire Border
Banbury Inner Relief Road	
Bodicote Flyover to the Cross to Southam Road to Tescos Roundabout	
A422	Hennef WayA361 Oxford Road to Wycombe Lane
A4260	Upper Campsfield Road to Hopcrofts Holt
A4095	Enslow Bridge to Freeland Junction
A424	Burford to County Boundary
A361	Burford to B4031
B436	A44 to County Boundary

A3400	Chapel House Roundabout to County Boundary
A44	Bladon Roundabout to Chapel House Roundabout
A4095	Freeland to Radcot
A415	Witney to Hardwick
A415	Hardwick to Newbridge
B449	Hardwick to Eynsham (A40)
B4044	Swinford Toll Bridge
A4260	Langford Lane to Shipton on Cherwell
A361	Burford to Lechlade
A40	Asthall Leigh Roundabout to County Border

Minster Lovell to Lew Heath (A4095)

Appendix A2 - Cycleway Inspections

Most cycle routes are close to or adjacent to the main carriageway and are inspected at the same time. This appendix lists only cycle routes that are not close or adjacent to the carriageways.

Southern Area

A40	From Wheatley - Greenroad roundabout
A40	Northern By-Pass - from Greenroad roundabout to Woodstock Road roundabout
A4142	Eastern By-Pass - from Greenroad roundabout to Heyford Hill roundabout
A423	Southern By-Pass - from Heyford Hill roundabout to Hinksey Hill Interchange

These are all annual inspections that are carried out in June.

Northern Area
Henneff Way via Waterworks Road to Jugglers Close
Saltway Track (Sycamore Road via Bloxham Road to Broughton road)
Broughton Road, Sandfine Road to Fulling Mill to Shutford Road
Southwold Estate
Bure Farm Estate
Langford Village Estate
Bicester Town Centre
Glory Farm Estate
Kings Meadow Estate
Kings End
Boston Road Area Estate

Appendix B –Items for Inspection

- Debris, spillage or contamination on running surface or hard shoulder.
- Displaced road studs lying on running surface.
- Embankments and cutting apparently unstable.
- Trees with loose branches or apparently unstable.
- Signs damaged, defective, missing or unstable.
- Road markings and studs missing, misleading or badly worn.
- Signs dirty or obscured.
- Sightlines obscured by trees, unauthorised signs and other obstructions.
- Safety fencing, parapet fencing, handrail and other barriers missing or defective.
- Abrupt level differences in the running surface.
- Potholes, cracks or gaps in the running surface.
- Crowning, depression and rutting in the running surface.
- Edge deterioration of the running surface.
- Kerbing, edging or channel defects.
- Rocking or otherwise unstable footpath or cycleway surfaces.
- Apparently slippery running surface.
- Ironwork (gully lids, manhole etc) broken or missing.
- Gullies, drains or grips blocked or defective.
- Standing water, water discharging onto or overflowing across running surface.

Although not part of an Inspectors remit during a Safety Inspection if, during the course of a safety inspection, other defects are encountered these will also be recorded and the information passed to the appropriate department. Such additional defects might include:

- Damaged and exposed electrical wiring.
- Overhead wires damaged or unstable.
- Signals or lighting damaged, defective, missing or unstable.
- Signals or lighting dirty or obscured.

Appendix C- Examples of Categories and Types of Defect

GPS/Map	Category	Type	Dimensions	Response	Comments	Risk
			[LxWxD]	1a,1b,2a,2b, 2c, 2d		(Impact x Probability = Risk
				Response		
	Cwy	Pothole	LxWxD			
		Crazing/frettin	LxWxD			
		Cracking	LxWxD			
		Crowning	LxWxD			
		Depression	LxWxD			
		level	D			
		Slippery	LxWxD			
		Edge	LxWxD			
	Fwy/Cycleway	Pothole	LxWxD			
		Crazing/frettin	LxWxD			
		Cracking	LxWxD			
		Crowning	LxWxD			
		Depression	LxWxD			
		level	D			
		Slippery	LxWxD			
	Kerbing/Edgin	Broken	LxWxD			
		Uneven	LxWxD			
		Loose/Rockin	LxWxD			
		Missing	LxWxD			
	Slabs/ Blocks	Broken	LxWxD			
		Uneven	LxWxD			
		Loose/Rockin	LxWxD			
		Missing	LxWxD			
		Slippery	LxWxD			
	Ironwork	Broken				
		Uneven				
		Blocked				
	Utility Defect	Signing and				
		Leak				
		Excavation	LxWxD			
		Reinstatement	LxW			
	Street/Sign	Exposed				
		Damaged				
		Daylight				
	Traffic signals	Damaged				
		Bulbs out				
		Dirty Lens				
		Failure				
	Fencing/ Guard	Damaged	L			
		Missing	L			
	Obstruction	A boards				
		Vegetation				
		Unauthorized				
	Trees	Fallen				
		Risk of falling				
		Dropping				
		Obstruction				
	Debris/Spillage	Oil	LxW			
		Ice	LxW			
		Object				
		W ater	LxWxD			
		Paint	LxW			
		Concrete	LxW			
	Other					

Appendix D – Examples of Defects and Categorisation

The examples below are for guidance and are not exhaustive. A variety of defects will be encountered during inspection and on-site judgement should be exercised in order to assess the risk to safety taking into account the particular circumstances including:

- The depth, surface area or other degree of deficiency of the defect or obstruction
- The volume, characteristics and speed of traffic (including bicycles and pedestrians).
- The location of the defect relative to highway features such as junctions, bends
- The location of the defect relative to the positioning of users, especially vulnerable areas such as in traffic lanes or wheel tracks
- The nature of interaction with other defects and the potential deterioration of the defect
- Forecast weather conditions, especially potential for freezing of surface water and / or rate of deterioration of defect

Category 1 Defects

- Defects that are an urgent or immediate safety hazard or risk of rapid structural deterioration.
- Category 1a) Make safe or repair within 2 hours.
- Category 1b) Make safe or repair within 24 hours.

Examples of Category 1a Defects

Busy classified road
Pothole: 125mm deep, in wheel track
Location & severity of defect mean it is likely to be encountered by road users & cause loss of control or damage.

- Probability: 4
- Impact: 4
- Risk rating 16 Cat 1a)
- 2hr response time

Unclassified road, busy rat-run
Pothole depth: 200mm
Location & severity highly likely to cause severe damage or injury.

- Probability: 4
- Impact: 4
- Risk rating 16:
- Cat 1a
- 2hr response time

Busy city crossroad
Void beneath carriageway

- Probability: 4
- Impact: 4
- Risk rating: 16
- Cat 1a
- 2hr response

Busy residential estate near school

P.U. pothole – depth: 150mm

- Probability: 4
- Impact: 4
- Risk rating: 16
- Cat 1a
- 2hr response

Examples of Category 1b Defects

Busy rural classified road (B4044)

Surface deterioration – depth: 100mm

- Probability: 4
- Impact: 4
- Risk rating: 16
- Cat 1b
- 24hr response

Ridgeway – Busy pedestrian & vehicular route.
Pothole – depth 125mm

- Probability: 4
- Impact: 4
- Risk rating: 16
- Cat 1b
- 24hr response

Unclassified busy rat-run between villages
Edge deterioration / pothole on bend
Depth 120mm

- Probability: 4
- Impact: 4
- Risk rating: 16
- Cat 1b
- 24hr response

Outer city distributor road
Missing fence rails (short cut down embankment for local people

- Probability: 4
- Impact: 4
- Risk rating: 16
- Cat 1b
- 24hr response temporary repair

Busy City Centre Street
Blocked gully, large puddle

- Probability: 4
- Impact: 4
- Risk rating: 16
- Cat 1b
- 24hr response

City centre street (moderately busy)
Cracked concrete slabs some vertical movement evident

- Probability: 4
- Impact: 4
- Risk rating: 16
- Cat 1b
- 24hr response

Category 2 Defects

Defects not deemed to represent an immediate danger:-

- Category 2a: 7 day response
- Category 2b: 28 day response
- Category 2c: programmed repair
- Category 2d: no action planned at present

Example of Category 2a Defects

Busy unclassified residential road near ambulance station

Potholes – depth 75 mm

- Probability: 3
- Impact: 3
- Risk rating: 9
- Cat 2b
- 28 day response

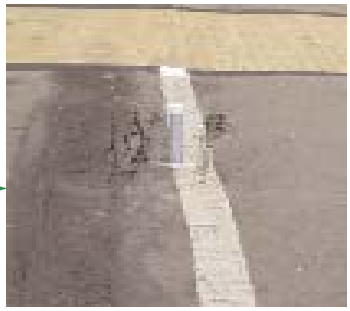
Moderately trafficked inter-village rural/agric route.
Potholes – depth 75mm

- Probability: 3
- Impact: 3
- Risk rating: 9
- Cat 2b
- 28 day response

Cycleway & Footway – busy urban cycleway

Damaged surface – depth 80mm

- Probability: 4
- Impact : 3
- Risk rating: 12
- Cat 2a
- 7 day response



Low traffic unclassified road on bend, in wheeltrack.
Pothole disguised by water leak – depth 120mm

- Probability: 3
- Impact : 4
- Risk rating: 12
- Cat 2a
- 7 day response

Moderately busy city road

Tarmac around manhole cover failing

- Probability: 4
- Impact: 3
- Risk rating: 12
- Cat 2a
- 7 day response

Examples of Category 2b Defects

Busy residential road

Pothole – depth 50mm

- Probability: 3
- Impact: 2
- Risk rating: 6
- Cat 2c
- Programmed repair

Residential road – moderate traffic, schools close by
Surface deterioration – depth 30mm

- Probability : 3
- Impact: 2
- Risk Rating: 6
- Cat 2c
- Programmed repair

Busy residential area – main spinal road for estate, schools nearby
Pothole – depth 50mm

- Probability: 4
- Impact: 2
- Risk rating: 8
- Cat 2b
- 28 day response

Residential road, lightly trafficked

Pothole – depth 75 mm

- Probability : 2
- Impact: 3
- Risk rating: 6
- Cat 2c
- Programmed repair

City distributor road
Damaged directional sign

- Probability: 3
- Impact: 2
- Risk rating: 6
- Cat 2c
- Programmed repair

Examples of Category 2c Defects

Single-track concrete access road to pumping station
Cracked, broken surface – depth 125mm

- Probability: 1
- Impact: 3
- Risk rating: 3
- Cat 2d
- No actions/monitor

Busy unclassified rural route

Deteriorating patched repairs – depth 35mm

- Probability: 3
- Impact: 1
- Risk rating: 3
- Cat 2d
- No action/monitor

Quiet residential cul-de-sac
Failing structural problem in carriageway – depth 75mm

- Probability: 1
- Impact: 3
- Risk rating: 3
- Cat 2d
- No action/monitor

Unclassified rural cul-de-sac loop road, houses nearby. Lightly trafficked

- Edge overrun
- Probability: 2
- Impact: 2
- Risk rating: 4
- Cat 2c
- programmed repairs

Moderately busy City street
Cracked but stable concrete slabs

- Probability: 4
- Impact: 1
- Risk rating: 4
- Cat 2c
- Programmed repairs

Housing estate in small town
Moss growing on Footpath

- Probability: 2
- Impact: 2
- Risk rating: 4
- Cat 2c
- Programmed repairs

Example of Category 2d Defects

Unclassified residential estate, lightly trafficked
Surface deterioration – depth 5 -10 mm. Less than Intervention Levels, therefore not necessary to record. However inspector may wish to note and risk assess in order to provide record of overall condition of highway.

- Probability: 2
- Impact: 1
- Risk rating: 2
- Cat 2d -
- No action planned