Enterprise Asset Management

Highway Safety Inspection Manual

Document Control

Rev Number	Date	Version / Changes
V0.1		
V0.2		
V0.3		
V1.0		

1. Introduction

This document has been developed following revision of the Highway Infrastructure Asset Management (HIAM) Policy, Strategy and Plan and is complimentary to these documents. The HIAM documents form the overarching approach to managing the highway network on the island and provide the basis for establishing an asset management system based on ISO 55000. In order to draw on best practice from across the wider highway industry, this document has also been developed in accordance with the recommendations of Well Managed Highway Infrastructure: A Code of Practice (2016) and the Highway Infrastructure Asset Management Guidance (2013).

This Highway Safety Inspection Manual is intended for employees of the Government of Jersey who are involved in the activity of inspecting the road network.

The Government of Jersey undertakes a rigorous Inspection regime supported by effective procedures to manage risk and ensure resilience across the network. This is then used to establish a response time and subsequent repair. These repairs should be based on the principle of 'right-first time' wherever possible.

Assets Inspected

The highway asset is made up of a number of asset groups. These are managed by a variety of teams within the Government of Jersey's Department for Infrastructure. The highways inspection team are part of the Highways and Coastal Team, and table 1 sets out which assets are directly maintained, and those managed by other Teams across the Department for Infrastructure.

Where defects are identified in other asset groups the relevant team will be informed. It should also be noted that other teams undertake bespoke inspection of some asset groups. For example, the traffic signs inventory is inspected annually by a dedicated team which also deliver repairs. This approach ensures that the network is adequately inspected.

Asset Group	Managed by Highways and Coastal	Managed Elsewhere in DfI
Carriageways	■	
Active Travel Ways	■	
Highway Structures	■	
Highway Drainage		■
Street Lighting		■
Intelligent Transport Systems		■
Vehicle Restraint Systems	■	
Road Signs & Markings	■	
Street Furniture	■	
Countryside Access Routes		■

TABLE 1 – ASSETS INSPECTED

Objectives

The purpose of this manual is to ensure that inspectors are provided sufficient guidance on delivering highway maintenance to keep the network safe whilst supporting the corporate objectives set out in the Government Plan.

Safety Inspections are intended to identify all defects which may create a danger or serious inconvenience to road users or the wider community. Risks are assessed by trained inspectors who use training and this manual to assign a suitable response. This activity is supplemented by ad-hoc inspection where appropriate.

The implementation of an effective regime of Highway Inspections are essential to ensuring the Highway Network is kept in a safe and serviceable condition, free from dangerous or hazardous defects. This ensures that the highway network can deliver its important contribute to the strategic objectives set out in Government Plan. From these objectives the maintenance of the local highway network directly contributes to supporting the local economy, enabling healthier and sustainable choices for travel and ensuring access to educational facilities for all modes.

The following activities are identified as supporting both the corporate and service objectives of the Government of Jersey:

- Carry out safety inspections, at prescribed frequencies on all carriageways and Active Travel Ways which are managed and maintained by the Government of Jersey.
- Carry out systematic inspections and ad-hoc inspections following customer requests for service to identify maintenance works.
- Prioritise planned, routine, reactive and emergency maintenance following these inspections.

In addition, The Inspection team monitor the delivery of utilities reinstatements to ensure compliance with the current specification. This approach safeguards the service life of highway components impacted by these activities. Inspection teams are also required to monitor developer works for compliance with the relevant licences that are granted. Alongside this supplementary activity inspectors also provide feedback on instances where embargos are breached across the network.

Risk Based Approach

Implementing a risk-based approach is a core value in Well Managed Highway Infrastructure: A Code of Practice. The information contained within this Manual sets out the practices in terms of network hierarchy, investigatory levels, frequency of inspection and response times to repair for defects identified via Risk Based Approach. The development of this approach is founded on:

- Alignment to the corporate objectives of the Government.
- Understanding of risk across the highway service across all areas, including people, data, finance, the infrastructure itself and the supply chain.
- A clear understanding of future potential risk and their impact on users, stakeholders and the Government.
- Understanding of the inventory, its function, any criticality and sensitivity.
- Development of hierarchy alongside levels of service and appropriate funding.
- Implementation of agreed levels of service.
- Ensuring the appropriate competency required in both developing and implementing the risk-based approach.
- Regular evidence-based review.

The development and implementation of an effective regime of inspection and recording is a vital link in delivering effective highway infrastructure maintenance. The nature of the regime, including the type, frequency, scope and anticipated response should be identified as the result of an assessment of the relative risks. When defining this risk, the location, agreed level of service, surrounding condition should be considered. This manual draws down the context for those considerations from the Government of Jersey's Highway Infrastructure Asset Management Policy, Strategy and Plan.

2. Inspection Systems and Record Keeping

It is recognised that the standard and quality of the recorded information held is of primary importance to the effective and efficient management of the highway asset. The data that is generated from inspections has a wide range of uses which can be used to reduce the reactive demand, not only reducing the cost of delivering the service, but reducing carbon emissions and disruption to road users.

As part of the activities undertaken by the Highways and Coastal Team, a range of data and information is held in a variety of systems. The application of these systems is detailed in the

highway infrastructure asset management plan.

The Government of Jersey system, Highway Worx is an integrated highway maintenance and management database that covers all aspects of highway service delivery. With reference to the Safety Inspection part of the highways operation the system is used to:

- Log and manage reports made via the 'Love Jersey' Website.
- Schedule and manage routine safety inspections.
- Maintain defect information.
- Organise and coordinate activities to resolve defects.
- Assist with the reporting of local performance indicators.

The Highway Worx system utilises tablet connectivity which allows inspectors to both access and enter data whilst on the network. This allows for the effective logging of defects in an accurate and consistent way, in turn assisting repair gangs to identify the correct location and establish an appropriate repair method in a timely and efficient way.

The Highway Worx system is in constant development to improve the efficiency of the inspection operation. Examples of this is the ongoing improvements in the identification of the ironworks owners to make liaison with them on defects and repairs more efficient and effective.

A future development in this part of the service is to improve the management of defects reported by telephone call from external stakeholders and road users.

In all cases, defect repair teams will take a photograph of the defect prior to the work, and a further image captured following the work. These images will have time and date parameters captured and will be framed so that sufficient detail is available to locate the defect and show its severity and nature where possible. This then forms a record of the repair being undertaken within the agreed timescale and captures the quality of the works which can be used to monitor contractor performance.

3. Inspector Competency and Training

The Government of Jersey recognises the importance of staff development and training. All highway inspectors undertake an accredited highway safety inspection training course after undergoing appropriate familiarisation of the network and the inspection policy.

Consistency across the island is important to developing a safe, well managed asset. The inspection team consists of a two-person team which means that many inspections are undertaken jointly for safety reasons. This methodology ensures consistency and in the event that more than two inspectors were part of the team a process of bi-annual standard setting reviews where inspectors will separately inspect a defined section of the highway network and the results compared will be required. This is then followed by moderation and review of the inspection results to resolve any differences. This process will provide a clear understanding of the consistency, repeatability and provide opportunity for continuous improvement for the safety inspections.

4. Undertaking Safety Inspections

All safety inspections are to be recorded on handheld data capture devices, which link to the Highway Worx system to allow automation of the defect works ordering process. This allows inspectors to focus on the task of undertaking inspection.

Driven carriageway inspections are inspected below 25mph. If a defect is identified the inspector will locate a safe place to park and view the defect for recording. In the event that this cannot be done safely, a return visit with a colleague will be required. In this case it is necessary to undertake the return visit and deliver the repair within the prescribed response time to ensure that any risk to the travelling public is managed appropriately.

All inspections of Active Travel Ways which cannot be reasonably observed from the driven

inspection perspective are carried out on foot unless it is not safe to do so. Cycleways will be generally inspected on foot, however if they are inspected on a bicycle the recommended speed is circa 5mph. The appropriate method of inspection for each part of the network is described in the relevant tables in the Safety Inspection Frequency Section.

Any identified defects falling within prescribed intervention criteria are to be subject to an order to make safe and/or repair within prescribed response times. Any defects made temporarily safe following inspection will be included in a programme for permanent repair.

Ad-hoc inspections are to be carried out to identify any required maintenance works following customer requests for service. All reported defects will be inspected within 5 working days of receipt. All ad-hoc inspections are to be recorded on a handheld data capture device and any identified defects falling within prescribed intervention criteria are to be subject to an order to make safe and/or repair within prescribed response time.

In some parts of the network there may be parked cars within the highway extent and the highway inspector will make every effort to safely observe the cycleway, footway and carriageway as appropriate from all directions for defects obscured by the parked vehicle.

5. Responding to Out of Hours Emergencies

It is not uncommon for issues to occur on the highway network out of hours. For example, storm damage or road traffic collision clean up may be required. To ensure that these details are managed in a timely way, an out of hours Duty Officer is identified. This officer will be contacted about issues on the network and can deploy a works gang to initiate a make safe repair as required.

Following this initial make safe intervention a permanent repair is scheduled to appropriately mange future risk.

Examples of make safe signage which are designed to temporarily manage risks can be found in Appendix 2.

6. Safety Inspection Frequency

Safety inspections are undertaken to ensure that the highway is safe and resilient. These inspections directly contribute to a number of the objectives within the Government Plan.

The carriageway and active travel asset groups are inspected at a frequency of inspection based on the corresponding position in the network hierarchy. Routes are then grouped together based on frequencies of inspection to form a series of recognised routes for inspection.

Safety inspections are designed to identify all defects likely to create danger or serious inconvenience to users or the wider community. Alongside this it is the identification of defects which present issues for network resilience are captured. By taking this holistic and forward-looking approach the condition of the highway asset is protected as far as reasonably practicable.

From time to time, it may be necessary to increase a route's inspection frequency. This may be a response to rapid changes in condition or usage. In these cases, the change will be documented, and inspections programmed at the revised frequency.

The inspection frequencies have been developed by considering the recorded Personal Injury Collisions, the recorded traffic flows and the existing defect records across the highway network managed by the DfI.

The following tables set out the inspection frequencies for the carriageway and active travel networks.

Carriageway Asset Group Inspection Frequencies

Asset Group	Hierarchy Description	Description	Frequency	Method of Inspection
Carriageways	Class 1	Routes with the highest usage, supporting main population centres.	Monthly (12 per year)	Driven
	Class 2	Class 2 roads link settlements and provide links across the island.	Every other month (6 per year)	Driven
	Class 3	In rural areas these roads link the smaller villages to the Class 2 roads. They are capable of varying width and not always capable of carrying two-way traffic. In urban areas they are residential or industrial interconnecting roads.	Quarterly (4 per year)	Driven
	Unclassified	This is a small network, and these routes serve small settlements and provide access to individual properties and land. In urban areas they are often residential loop or cul-de-sac roads.	Six Monthly (2 per year)	Driven

TABLE 2 – CARRIAGEWAY INSPECTION FREQUENCIES

Active Travel Way Asset Group Inspection Frequencies

Asset Group	Hierarchy Description	Description	Frequency	Method of Inspection
Active Travel Ways	Prestige Areas	Prestige Areas in St. Helier where pedestrian usage is high.	Monthly (12 per year)	Walked
	Active Travel Network Class 1	High usage parts of the network which link between significant trip generating destinations. They often have frequent service vehicle activity. These routes may be divorced from the carriageway network but require specific inspection.	Six Monthly (2 per year)	Walked
	Active Travel Network Class 2	Lower usage parts of the network, including leisure routes. As with the Class 1 sections, these routes may by divorced from the carriageway network and will likely be of bituminous construction.	Annually (Once per Year)	Walked
	Active Travel Class 3	Parts of the network constructed using Hoggin materials. These are identified separately to reflect the specific repair requirements and inspection	Annually (Once per Year)	Walked
	Routes Adjacent to Carriageways (Those not part of Prestige Areas)	Other active travel ways which are adjacent to carriageways which can be reasonably inspected from a vehicle. These are generally concentrated in the main towns and villages, but some offer longer distance walking links.	As Adjacent Carriageway	Driven

TABLE 3 – ACTIVE TRAVEL WAYS INSPECTION FREQUENCIES

The meeting of the specified time frames is a priority for the service, however from time to time it may be necessary to deploy resources elsewhere to manage unforeseen incidents or occurrences, such as during extreme weather events. In these circumstances the inspection frequency is subject to the following tolerances.

Inspection Frequency	Tolerance
1 Month	+/- One Week
3 Months	+/- Three Weeks
6 Months	
Annual	

TABLE 4 – INSPECTION FREQUENCY TOLERANCE

The service runs on a two-inspector team who generally work alone with one inspector operating on the east of the island, including St Helier and the other the west of the island and all active travel routes. The inspection frequencies are designed around these inspectors being available for a normal working year. In times where an inspector is unavailable for a long period of time a revised frequency may need to be developed based on the availability of resources available or a driver will be identified to enable inspections to continue in a robust way.

Supporting this inspection team is an Engineering Technician and the focus of this role is dealing with a range of issues to ensure that inspectors have sufficient opportunity to complete inspections on time and organise any required interventions.

7. Scope of Inspections

There are a diverse range of assets which make up the highway network, and this Manual is relevant to all asset groups which form the highway network managed by the Department for Infrastructure. Items that are inspected as part of the highway safety inspection are set out in the table below:

Asset Group	Indicative Scope of Risks Identified by Inspections
Carriageways	▪ Surface Defects • Pothole/Spalling • Crowning • Depression • Rutting • Gap/Crack • Sunken Ironwork • Missing/Defective Antiskid Material • Damaged Traffic Calming ▪ Kerbs and Edge Defects ▪ Surface Skid Resistance – Visual Assessment ▪ Mud, Debris, Spillage or Contamination on Running Surfaces ▪ Obstructions ▪ Flooding ▪ Markings, Road Studs ▪ Covers, Ironwork ▪ Highway Tree Damage ▪ Trench Failures ▪ Utility reinstatements not in accordance with specification ▪ Developer works not in accordance with license conditions.

Asset Group	Indicative Scope of Risks Identified by Inspections
	▪ Embargo Breaches
Cycleways and Footways	▪ Surface Defects: ▪ Trip Hazard or Potholes ▪ Rocking Slabs or Blocks ▪ Open Joint ▪ Tree Root Damage ▪ Sunken Ironwork ▪ Defective Coal Plates/Basement Lights etc. ▪ Defective Mastic Asphalt in Footway ▪ Kerbs and Edge Defects: Dislodged/Missing/Loose/Rocking ▪ Highway Weeds Causing Slippery Surfaces or Trip Hazards ▪ Mud, debris, Spillage or Contamination on the surface ▪ Obstructions ▪ Flooding ▪ Loss of Grout ▪ Covers or Ironworks ▪ Utility reinstatements not in accordance with specification ▪ Developer works not in accordance with license conditions. ▪ Embargo Breaches
Drainage	▪ Accumulation of Water on the Carriageway, Footway and Cycleway ▪ Blocked Drainage that may Lead to the Above.
Embankments and Cuttings	▪ Risk of Loose Material Falling to Injure Users or Damage Facility ▪ Slippage Causing Loss of Support to the Highway
Fences and Barriers	▪ Integrity and Location of All Highway Fences ▪ The Functionality of Visibility Fences Including Obstructions ▪ Integrity of All Safety Barriers, Including Instances of Strikes
Traffic Signs and Bollards	▪ Identification of Risk to Users ▪ Separation of Potential Traffic Conflicts ▪ Route Delineation in Darkness and Bad Weather
Traffic Signals and controlled Crossing	▪ Segregation of potential traffic conflicts ▪ Key safety contributor for vulnerable road users
Condition of Street Lighting/Illuminated Signs and Bollards	▪ Damaged or defective lighting columns/illuminated signs and bollards
Road Markings and Studs	▪ Route delineation in darkness and bad weather ▪ Potential for damage and injury if studs are loose. ▪ Traffic control
Bridges, Tunnel and Underpass	▪ Accident and other damage
Street Furniture	▪ Damaged or missing street furniture ▪ Damaged or missing benches. ▪
Landscaped Areas and Highway Trees	▪ Obstruction of visibility and signage ▪ Hazardous trees and branches ▪ Leaf fall causing slippery surfaces.

Asset Group	Indicative Scope of Risks Identified by Inspections
	▪ Root growth causing surface irregularity. ▪ Noxious weeds ▪ Other hazards

TABLE 5 – SCOPE OF INSPECTION

Ironworks

Ironworks in the highway is a particular feature of the highway network on the island. There are a large number of chambers owned by a variety of organisations which are part of the wider infrastructure. The management of the way that these features interact with the highway and the efficient resolution of defects that develop are continually evolving.

Section 41 of the Road Works and Events (Jersey) Law (2016) sets out that damage or defects which are caused by an access frame cover, usually within 0.5m are the responsibility of the relevant undertaker to resolve. This is to be undertaken as soon as reasonably practicable and to the satisfaction of the highway authority. It should be noted that this dimension is variable in circumstances depending on the nature of the failure under the provision of Section 41.

Specific guidance on ironworks defects can be found in Appendix 1. Following the identification of a defect the inspector should raise an Ironworks (IW) defect on the Traffic Worx system and pass an instruction to the appropriate company to resolve the issue. It is important to log these defects under the ironworks defect category so that the scale of the issues derived from ironworks can be quantified more effectively.

8. Investigatory Levels

Reactive maintenance involves attending to and rectification of dangerous or hazardous defects identified as priority. In order to identify these defects falling into these categories the inspector must undertake a risk assessment.

There are a variety of defects which can contribute to risk on the network and to assist inspectors there is guidance in Appendix 1 of commonly occurring defects on the network.

When evaluating the risk that may be presented by a defect consideration is given to its location, the volume of traffic, the nature of such traffic, usage by children, elderly and disabled persons, and the extent of visibility to the defect at the site.

The asset group along with the typical types of defects commonly observed is detailed in Table 5, above. A highways inspector will record defects that may present a risk to highway users as set out in Table 6 of this protocol.

In terms of the specific investigatory level, this is defined as any defect that a reasonable person would recognise as a defect in the highway asset when travelling via the mode being used by the highway inspector at the time of inspection. The ‘Undertaking Safety Inspections’ section outlines scenarios where inspectors may need to vary the method of inspection to ensure appropriate observations are made.

9. Defect Risk Assessment Using the Risk Matrix

The principles of a system of defect risk assessment for application to safety inspections are set out below. Any item that meets the investigatory level is to be assessed using the risk assessment matrix in Figure 2, below.

When assessing the risk posed by a defect in the highway infrastructure the risk factor for a particular risk can be expressed as:

Risk Factor = Likelihood x Severity

It is this Risk Factor that identifies the overall risk rating and consequently the appropriateness of the speed of response to remedy the defect.

The risk assessment matrix detailed below will be the principal tool used by the Highway Inspectors during the course of their inspections. The matrix will be used to assess the risk associated with the defect and the appropriate response.

Likelihood / Severity	Very Low	Low	Medium	High
Low				
Medium				
High				
Defect Category	**4**	**3**	**2**	**1**
Response Time	**Recorded** for Programme Consideration where required	**4 Months**	**2 Months**	**24 hours** for and Initial Response with follow up in **7 Days** where appropriate

TABLE 6 – DEFECT RISK MATRIX

As the inspector finalises the assessment of risk, they take into account other on-site local factors. Local factors may include the close proximity of a school, hospital or other establishment which attracts increased activity. The location of the defect relative to other features such as junctions and bends, proximity to other defects along with any other factor is taken into account. The final on site risk assessment by the inspector allows the appropriate response to be identified.

Likelihood

Likelihood of occurrence is the inspector's assessment of the probability of the defect to pose a risk or serious inconvenience to users of the network or the wider community. It follows an assessment of the road Hierarchy and the location of the defect within the road, as set out above.

The table below sets out the description of the likelihood evaluated by inspectors for the application of the risk matrix. This description is also supplemented with indicative parameters to assist in illustrating the application of the risk matrix.

Likelihood	Description	Indicative Parameters
High	More than 80% chance of occurrence.	Usage of the identified part of the network by any (or all) user groups is considered high. There are significant vulnerable road users who use the asset. The specific location or nature of the defect identified will make it difficult for a road user to appreciate and then avoid the hazard. For example, a pothole located beyond a crest. Forward visibility to the defect is compromised in some way.
Medium	Between 40 – 80% chance of occurrence.	Usage of the network is considered high by any (or all) users, but different modes are less likely to be present. The location of and nature of the defect is such that a user acting in a responsible manner could reasonably identify and avoid the hazard. Forward visibility to the defect is good.
Low	Between 10 – 40% chance of occurrence.	Usage of the network by all users is considered to be moderate or low. There are unlikely to be a wide range of user groups in this part of the network. The location of and nature of the defect is such that a user acting in a responsible manner could reasonably identify and avoid the hazard.
Very Low	Less than 10% chance of occurrence.	Usage of the network by all users is considered to be low. The envelope of speed between users is likely to be low. The location of and nature of the defect is such that a user acting in a responsible manner could reasonably identify and avoid the hazard.

TABLE 7 – LIKELIHOOD RISK RATINGS

Severity

The severity of the occurrence is the assessed impact quantified by considering the extent of damage likely to be caused should the risk be realised. The main consideration of impact is the magnitude or dimension of the defect. However, other variables such as road speed, forward visibility and placement may also affect the likely impact. When assessing this, an inspector will also consider all users of the network.

The following table sets out the description of a defect severity as evaluated by inspectors for the application of the risk matrix. This description is also supplemented with indicative parameters to assist in illustrating the application of the risk matrix.

Severity	Description	Indicative Parameters
High	The Hazard presented by the defect, or because of the short-term structural deterioration of the defect, could result in serious injury or a fatality.	If the severity is realised it will result in serious damage to people or property. The defect is of sufficient severity that road users will have no choice but to take avoiding action. This action will place road users at risk. The defect could result in a vehicle becoming unstable, placing road users at risk.
Medium	The Hazard presented by the defect, or because of the short-term structural deterioration of the defect, could result in injury.	If the severity is realised it will result in damage to people or property, from which they are likely to recover. The defect is of sufficient severity that road users will have no choice but to take avoiding action. This action will place road users at risk. The defect could result in a vehicle becoming unstable, placing road users at risk.
Low	The Hazard presented by the defect as it is found or due to the short-term structural deterioration in the defect, could result in minor injury. If left untreated the defect is likely to result in the acceleration of deterioration of the highway asset. In addition, the defect is likely to further deteriorate before the next inspection.	The severity is unlikely to result in injury. Highway users are also unlikely to instinctively avoid the defect and interacting with it is unlikely to destabilise the vehicle unduly. The defect will be identified as such users, its presence will be a negative influence on their perception of the Highway Asset. If left untreated the defect is likely to result in the acceleration of deterioration.

TABLE 8 – SEVERITY RISK RATING

10. Defect Response Times

During safety inspections, all observed defects that meet the investigatory level are risk assessed and the required timescale for response determined with all information being recorded at the time of inspection. The following table sets out the defect severity, the response actions and the response time for the defect to either be made safe or permanently repaired.

Category	Response Actions	Response Time
1	Where necessary to protect those using the highway from immediate risk caused by the severity of the defect an immediate response is appropriate. Where a 'right first time' repair is not deliverable due to the severity of the risk temporary mitigation will be delivered within the specified time period. This may be a temporary repair or the installation of traffic management to make safe the immediate risk. A permanent repair shall be programmed following this to remove future risk from the highway network.	**24 Hours** for initial response and follow up within **7 days** where required.
2	All defects of this category will be responded to as reactive work with the specified timescale to allow either a temporary or permanent repair. Wherever possible a 'right first time' approach to remedial works should be taken. Wherever a temporary repair is deployed, it shall be identified as temporary on site (for example marked 'TEMP' with road marking spray paint) and shall be recorded as such. Following the delivery of the temporary repair a permanent repair should be programmed.	**2 Months**
3	These defects may represent an elevated safety risk or the inspector judges that deterioration may occur which will elevate the risk in severity or likelihood prior to the next inspection. Works to mitigate the risk will be programmed as part of a short-term programme of works. This enables permanent repairs to be delivered 'right first time'. In the event that the mitigation will not be delivered in the timescales identified the site must be kept safe through mitigation designed to have a service life that will last to the time when the permanent repair is delivered. In the cases where temporary repairs are utilised to manage risks, they will be delivered in accordance with the identified timescales for this defect type.	**4 Month**
4	The defects categorised in this band do not constitute a safety concern and are not likely to further deteriorate before the next inspection date. In the event that the defect is assessed as being of high severity they are noted for re-assessment at the next inspection and recorded to inform future planned maintenance in the forward programme.	Considered for **Works Programme**

TABLE 9 – RESPONSE ACTIONS

11. Establishing Repair Type and Specification

Implementing well designed repairs is more cost effective over the whole life of the highway asset. This because poorly considered and implemented ‘make safe’ repairs, may address the immediate risk posed by a defect, may need to be revisited and further rectified prior to the next planned maintenance treatment, in turn increasing whole life cost. Numerous make safe repairs may also reduce the treatment options available to address the future condition of the asset.

In all cases a ‘right first time’ approach should be taken to repair. This may take into account the residual service life of the asset in question. For example, if the residual service life is short, a lower standard repair may be appropriate to keep the asset safe until the planned intervention is delivered. This approach should only be adopted in areas where schemes are identified in a current or forward programme.

In determining this, the nature of the route is considered by inspectors along with the material type that they are evaluating. This will vary across the asset groups, but the overarching principle remains constant.

In some cases, such as a carriageway defect which is considered an emergency, it is not possible for a ‘right first time’ repair to be delivered in the time scales set out above. To manage the risk to road users it may be necessary to install a temporary repair or appropriate traffic management measures until a permanent repair can be delivered. This allows more complex repairs to be planned which gives the opportunity to improve the financial efficiently of delivering repairs, as well as managing environmental impacts. However, during periods of exceptionally high demand, such as after weather events, it may be necessary to deliver a higher portion of ‘temporary’ repairs to keep the network safe. Safety should always be the overriding factor and where possible and effective to do so more robust repairs can be programmed at an appropriate time.

The approach outlined in this safety inspection protocol will enable a right-first-time approach to permanent repairs, wherever practicable. This will reduce the risk to the travelling public in the longer term and also result in:

- The reduced use of resources on repeated defect repairs.
- Reduction in the exposure of the workforce to danger.
- Reduced disruption and reduced overall risk to the highway users.
- Reduction in the environmental impact of delivering the service.

When considering the specification to be followed, this shall be in accordance with the relevant contract specification for the nature of the defect. The defect repairs will be organised by works supervisors and the quality assured by the processes described in the associated works management documents.

12. Review of the Highway Inspection Protocol

It is important to review the content of the manual to both identify opportunities to continuously prove the process and build upon lessons learnt from the practical application of the process.

Reviewing inspection frequency generally occurs on an annual basis but may be reviewed more frequently as required to reflect the needs of the network and respond to emerging changes in demand.

A full document review at a suitable time period a review frequency of 2 years shall be applied with changes being captured in the change log in table 10 below:

Version Number	Summary of Amendment	Date
v1.00	First Draft of Document Created	July 2023

TABLE 10: CHANGE LOG

Appendix 1 – Examples of Commonly Identified Defects

The following section sets out information around the commonly found defects on the highway network. in all cases the process for establishing the risk will be dependent on the scale and situation of the defect in question. The following may be considered to assist inspectors in mitigating risk to road users following their risk assessment.

- Recording some of the defects can be useful for the development of future programmes of work, particularly preventative measures.
- If required, it may be necessary to either deploy warning signage or install temporary traffic arrangements to mitigate the immediate risk.
- Log repair requirements through Highway Worx to facilitate a defect response.

Defect Type	Pothole

Definition

An area of the carriageway or active travel way where material is lost creating an irregular vertical edge around a depressed area. This defect is often preceded by cracking and can present significant risks to both road users and the fabric of the surface.

Sample Images

Inspector Guidance

When considering the risk posed by the defect its placement across the highway is considered. It is also important to take into account the severity of the defect for different road users, powered two wheel and pedal cyclist users will find this defect more severe at lower dimensions than a car driver.

In the event that the inspector identifying the defect feels that further deterioration is likely prior to the next scheduled inspection, and this deterioration will result in a sufficient risk to highway users an appropriate response may be deployed.

In the event that the defect is stable, and unlikely to deteriorate to the point where the defect becomes higher risk, the resolution of the defect will be fed into a planned works programme.

Defect Type	Ironworks Defects

Definition

There are a range of defects which relate to ironworks. The highway network has a significant range of ironwork within the highway extent and whilst some is maintained by the Department of Infrastructure, many features are owned and managed by utilities undertakers.

The common defect types for ironworks in the carriageway are:

- Polished cover
- Rocking cover
- Sunken ironwork (frame)
- Sunken cover within frame
- Loss of Asphalt from around frame (Pothole)
- Cracking of Asphalt around frame (Pothole)
- Cracking of asphalt at cover slab

Sample Images

Inspector Guidance

Defects relating to ironworks represent a significant issue for all parts of the highway but is particularly prevalent within the carriageway asset across the island. There are a large number of failures around ironworks where the frame has become unseated, and cracking and potholes develop close to the frame.

If cracking is identified around the cover early recognition is recommended to ensure that the relevant frame owner can be contacted and works programmed before more severe defects develop, typically the cracking will begin around the frame surround as shown in the bottom left picture. Unchecked, this will develop into a more serious pothole defect as shown in the top left picture.

Reporting polished or sinking covers to the utilities company is important to mitigate future risk to users, particularly pedestrians, cyclists and powered two-wheel riders. Sinking covers can also negatively impact the integrity of the asset, so swift intervention can reduce the likelihood of further defect generation. It is understood that there are challenges around the identification of owners in some cases.

The Road Works and Events (Jersey) Law (2016) requires the relevant utilities company to take responsibility for a 500mm section around the perimeter of the frame, so early signs of defects should be reported to allow for works to be delivered before risks to users are presented.

Following the identification of a defect the inspector should raise an Ironworks (IW) defect on the Traffic Worx system and pass an instruction to the appropriate company to resolve the issue. It is important to log these defects under the ironworks defect category so that the scale of the issues derived from ironworks can be quantified more effectively.

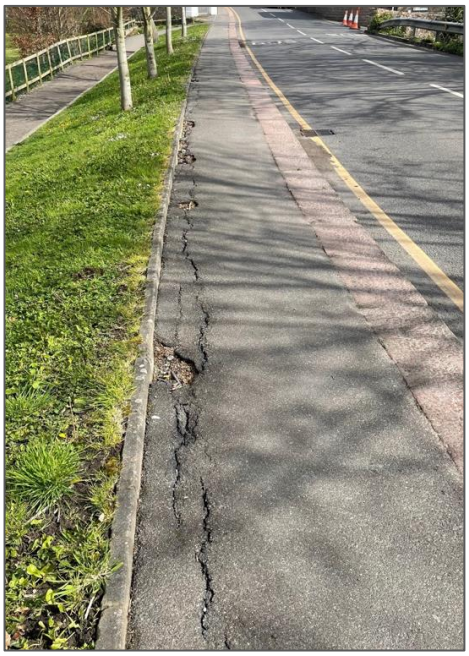
Defect Type	Linear Cracking

Definition

Linear Cracking can be found widespread or localised, within the examples below there is a widespread example of linear cracking likely related to underlying subsidence. Linear cracking may often be the symptom of a wider issue which may require address to prevent future re-occurrence.

It is not uncommon to encounter fine cracking in surface courses. This defect can remain in this state for some time before escalating into other defect types such as potholes. Cracking should be monitored as it allows water to enter the carriageway construction and cause further damage. The implementation of road surface treatments such as micro asphalt is often used to seal these cracks and prevent further damage.

Sample Images



Inspector Guidance

Linear cracks may be the symptom of a wider issue. In the example above right, the longitudinal crack is likely caused by the settlement of the embankment to the left of the image. This type of cracking can also be caused by underlying joints reflecting through the wearing course. A single crack may be fixed using a crack sealing system, but more than one crack will likely result in a deep patch being required.

Early stages of cracking may not be of particular risk to users; however, it is a good indicator that there are developing issues within the surface. As cracks widen, they may present some risk to pedal cycle users or pedestrians in footway assets.

When organising repairs for any defect type adjacent cracking should be removed to prevent instances where defects are ‘chased’ down a route. It may be appropriate to deliver over-banding to seal cracks to prevent the further development of more severe surface defects.

Defect Type	Crazing

Definition

Crazing can be identified in (usually) carriageway assets. The extents of these areas do vary, but as the area increases in size it represents more significant issues for both the safety of users and the fabric of the highway. The surface variation is often more hazardous to two-wheel users, particularly in bends.

Whilst it is not uncommon to encounter fine cracking in surface courses. This defect can remain in this state for some time before escalating into other defect types such as potholes. Cracking should be monitored as it allows water to enter the carriageway construction and cause further damage.

Sample Images

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Crazing is often the result of defects in underlying layers which transmit to the surface course, and due to the lack of flexibility of the surface course causes cracking. This usually indicates structural failures in the underlying foundation. In instances that are more serious traces of water are observed to have been forced upwards through the pavement and when this is observed, it is an indicator that a repair of significant depth will be required.

Early stages of cracking may not be of particular risk to users; however, it is a good indicator that there are developing issues within the surface. As cracks widen, they may present some risk to pedal cycle users.

The deterioration of cracking can lead to extensive pothole formation. When organising repairs for any defect type adjacent cracking should be removed to prevent instances where defects are ‘chased’ down a route. It is also likely that if ‘plug’ type repairs are delivered in areas where crazing is present future repairs will be required adjacent.

Defect Type	Fretting and Ravelling

Definition

Fretting and Ravelling occurs in aged pavement types where the binder breaks down and aggregate is released from the road surface. This defect commonly begins on surfacing joints. This defect type is often a result of the age of the carriageway wearing course and can be prevented by the timely intervention of road surface treatments.

Sample Images

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When considering fretting and ravelling the extent of the area needs to be considered along with its risk to users. The placement in the carriageway will be a key consideration of the priority of the defect, however there are cases where a timely intervention may arrest the defect. Early stages of the formation of these defects may be considered in the development of road surface treatment programmes.

Defect Type	Edge Damage/Deterioration

Definition

Edge damage is commonly found on those sections of the network where there are no kerbs presence or unsupported edges. This will tend to be those sections which are more rural in their character. In some cases, this defect type may be the result of vehicle overrun of the extent of the carriageway, but it may also be caused by water running along the carriageway edge.

Sample Images

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Similar to other carriageway related defects the placement of the edge damage is an important consideration in determining its safety implications. In addition, it is important to balance this against the likelihood of further deterioration as the result of an unsupported or weak carriageway edge.

In the event that there is evidence of frequent overrunning vehicles causing the issue it may be necessary to consider how to repair the defect in a way that mitigates the impact of future instances of the overrun.

Defect Type	Reinstatement Failure (Joint, Trench and Patches)

Definition

There are a range of reasons why reinstatements in the highway surfaces of the network may be required. These may be as a result of repairs delivered to repair road surfaces, or to reinstate following works to utilities apparatus.

There are a number of defects which may result in defect at these reinstatement points.

Sample Images

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In the event that defects are noted in reinstatements it will be necessary to check who installed it and when. In some cases, these issues may require address by a third party who has completed the work.

The defects are likely to be joint failure/opening or cracking within the patched area. Failures in reinstatement may be caused by a range of reasons such as cooling material or poor compaction.

Recording these instances is important to assist the service is developing an ongoing understanding of the frequency of these defects.

Defect Type	Surface Treatment Defects

Definition

Maintaining carriageways requires careful lifecycle planning to reduce the need to deliver reactive repairs. An important part of the current strategy to achieve this is to deliver road surface treatments in the form of micro asphalt to prolong the life of the underlying surface.

These surfaces can deteriorate in a range of ways, but delamination and stripping are particularly common.

Sample Images

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Surface delamination can often be traced back to an issue with the design or installation process or a lack of functioning drainage. The defect is rarely particularly deep unless an extreme example is found, but there is a differential is skidding resistance and a noticeable step which may cause particular issue of powered two wheel and pedal cyclist users. These defects would benefit from being fed into the wider team so that causation can be identified, and rectification delivered to avoid further defect and prevent re-occurrence in the future.

Surface stripping is often and age-related defect and presents in a similar way to ravelling where the binder begins to fail, and aggregate is lost. This is more challenging to repair without delivering extensive patching and in these cases, it is likely more economic to deliver a planned maintenance scheme.

Defect Type	Repair to Hoggin Paths

Definition

Some parts of the island's active travel network are constructed using Hoggin type paths. The construction of these routes is compacted stone with a dressing provided to resent a smooth wearing course. This type of construction is particularly susceptible to damage in wet conditions if water runs across the surface. This can create safety related hazards for active travel users.

Sample Images

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It is important that defects are raised before the risk to users requires rapid intervention. This ensures that an appropriate intervention can be delivered before the defect spreads into a more extensive repair.

The surface defects which occur as a direct and obvious consequence of water damage should be noted so the water damage to the infrastructure can be communicated to the drainage team to establish if the cause can be remedied to prevent re-occurrence.

There are limited scenarios where an urgent defect repair will be required for this defect type.

Defect Type	Loose, Rocking or Displaced Flags, Paviours or Kerbs

Definition

There are some areas of the highway network is surfaced with Flagstones or Paviours. These are generally located in and around St. Helier and these features can become loose and rock. A defect in these parts of the network is considered as a loose unit which is sufficiently unseated as to present an upstand which the inspector evaluates as a trip hazard.

Sample Images

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These areas are particularly susceptible to damage where there are frequent vehicle movements, primarily from larger vehicles, across them. The retail areas of St. Helier are an example of this as the deliveries to the retail premises often result in vehicles mounting the active travel ways. Additional sources of damage are following utility reinstatement where settlement of the reinstatement can occur, particularly where narrow trenches are excavated.

The severity of the defect will be dependent upon its position on the footway and the usage of the area.

Defect Type	Depression, Ruts and Changes in Level

Definition

Part of the carriageway or active travel way where there is a significant change of level, either above or below the surrounding surface level. These defects can be isolated or more widespread in the form of rutting in the wheel tracks. There is elevated risk in areas where there are higher flows of cyclists and motor cyclists or in the vicinity of pedestrian crossings.

Sample Images

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Minor defects may be considered for planned works or as part of a small patching programme. More severe defects will need to be addressed more swiftly, and in the event that the defect is severe enough to represent a significant risk to users an urgent repair or measures to make the site safe may be required.

Defect Type	Tree Root Damage

Definition

There are a large number of trees both within and adjacent to the highway network. The growth of these trees can cause damage to parts of the highway network as roots cause deformation to the surface. This can be particularly problematic in the carriageway, footway or cycleway assets as the level change can create a hazard as well as impacting the fabric of the highway.

Sample Images

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Where tree roots are identified as being responsible for sufficient damage to the highway surface to result in risk to highway users or resulting in escalating damage to the highway it will be necessary to programme a repair. The placement of the tree may require liaison with the adjacent property owner as the repair work may also require an element of work to the tree.

Defect Type	High Friction Surface Defects

Definition

High friction materials are used in areas where the risk is elevated. Generally, it has two uses across the network, the first is to improve the skid resistance of surfaces on the approach to features and junctions, for example pedestrian crossings. The second is to supplement road markings in high-risk areas such as infilling hatching or providing backing to road markings such as roundels or 'SLOW' markings.

Defects come in a number of forms such as:

- Delamination which is subject of a separate section in the guidance.
- Stripping, where the continuous wear of vehicle traffic over the surface wears the high friction surface leaving the underlying wearing course exposed.
- Reinstatements delivered which do not reinstate the High Friction Surface.

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It is important that defects are raised before the risk to users requires rapid intervention. The longevity of these repairs is influenced by the conditions that prevail when it is installed.

The example in the above left image was likely installed when the underlying carriageway was damp or had a build-up of dust or detritus that interfered with the adhesion of the epoxy.

The loss of the material results in a differential skidding resistance across the areas where the underlying courses are exposed compared to the intact areas.

There are limited scenarios where an urgent defect repair will be required for this defect type.

Defect Type	Ponding Caused by Non-Functioning Drainage

Definition

From time-to-time ponding may be encountered on carriageways and active travel ways. This is not only hazardous to road users as it can contribute to loss of control collisions, but also negatively impacts the fabric of the underlying construction. The water ingress contributes to accelerated cracking and can lead onto pothole formation. Whilst very minor instances of ponding may not warrant a particular response more severe instances should be identified.

Sample Images

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Whilst the inspection team has no direct access to resources to resolve these issues it is necessary to provide useful information to the Drainage Team on the performance of the asset. This in turn can be used to establish need, develop an appropriate intervention regime, track patterns to establish resilience and inform the Highways and Coastal Team on the investigation of surface damage ad defects.

In severe cases the resilience and/or safety of the highway may become compromised. In these situations, the Drainage Team should be contacted directly to ensure they are provided with sufficient information to assess the issues.

In many cases there may be no drainage present. In more severe examples it may be necessary to record the location to inform future improvement works.

Defect Type	Damaged Vehicle Restraint Systems

Definition

Vehicle restraint systems are used across the island to protect road users from features or topography which present a risk should a vehicle leave the road. These may be significant level changes, large features in the verge or adjacent watercourses. Establishing strikes in these assets is an important part of inspection to ensure that the system performs as intended in the event of a further strike.

Sample Images

Inspector Guidance

In the event that obvious damage is identified this should be passed onto the relevant team to ensure a more detailed inspection can be undertaken. In some cases, an inspection may result in an activity to remove the vegetation from a vehicle restraint system so that it can be viewed on subsequent inspection activities.

Defect Type	Damage to a Highway Structure

Definition

There are a range of highway structures on the island's network, the most significant of which are the Tunnel at Fort Regent and the Underpass on the A1 in St. Helier. Highway structures may become damaged through vehicle strikes or deterioration over time.

Some structures may be in third party ownership and retain land adjacent to the highway. It is important that damage to these structures is notified to landowners to ensure repairs can be organised to protect network resilience.

Sample Images

Inspector Guidance

Clear and obvious damage to structures should be recorded to allow a more detailed inspection to take place. This inspection will then recommend an action and the outcome of this should be fed back to the inspector to avoid repeat records being generated in the event of no further identified works.

In some cases, retaining walls which either protect or support the highway may be damaged and require third party involvement to repair. In these cases, it may be necessary to contact landowners via letter to inform them of their responsibilities.

Defect Type	Traffic Signage and Road Marking Defects

Definition

The Department for Infrastructure operates an in-house signing and lining and inspection process, and the Safety Inspection regime is complimentary to this.

Signage is an important part of the highway network as it both warns users of hazards and provides information for navigation to destinations. Signage defects may be dirty signs, signs which have been strike and fallen over, or those which are loose and rotate on the post. Anything which compromises the visibility of signage is considered a defect.

Worn road markings can occur quickly as they are overrun by traffic and some bends or junctions may be particular points where wear can be accelerated. All lining is designed to serve a specific purpose on the highway but items such as Slow markings are designed assist in the prevention of collisions.

Lining is considered to be in the early stages of wear when around 30% of the marking is considered lost.

Sample Images

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The signage inventory is inspected by a team which proactively inspects and then repairs signage across the network in a rotating way. As a result, the presence of signing defects is less likely, but more urgent situations can occur.

When evaluating risk in this asset group the type of signage is important for example hazard warning signage is important for conveying upcoming hazards to drivers and may warrant intervention if the issue is identified in the period between cycles of the signing teams.

When specific items of worn lining are noted as part of an inspection, the failing area should be notified to the lining team for inclusion in a programme. This will generally occur when lining wears beyond 30% but as with other aspects of the asset this will be considered based on the nature of the lining, character and usage of the area in question and the nature of any hazards.

This action specifically relates to road safety related markings such as Slow markings, Stop or Give Way markings or School Keep Clear Markings.

Defect Type	Damaged Street Furniture

Definition

In some cases, inspectors may identify street furniture which has become damaged that may constitute a risk to users. An example of this may be a damaged bench or a feature which has become loose. These defects will need to be considered in accordance with their intended purpose and the nature of the defect.

The island's network also has a significant amount of pedestrian guard railing. These features are often installed adjacent to pedestrian crossings to guide pedestrians to the crossing point. In some cases, these fences are installed with a specific pattern which allows drivers to see through them effectively.

Sample Images

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Upon noting a loose or damaged feature it will be necessary to evaluate it position in the highway and estimate the usage to provide a picture of risk. In most cases a make safe provision may be appropriate such as organising for the feature to be taped off or removed while a long-term repair can be delivered.

In the case of pedestrian guard railing, it is also necessary to consider any defamation which may constitute an additional risk to pedestrians, particularly if the available footway width is significantly compromised. In these situations, it may be appropriate to remove the damaged unit and barrier off the missing section, paying careful attention to the maintenance of sight lines for all users.

Appendix 2 – Examples of Make Safe Signage

In some cases, it may be necessary to install full traffic management such as guarding with 'give and take', the installation of temporary traffic signals, or in some cases the closure of a road to make a site safe pending the permanent solution to a defect which has emerged. However, there are some situations on lower risk categories that may benefit from warning signing being installed. The following examples illustrate these options.

In the cases of the Flood and Ice signs, when they are deployed the locations should be recorded. This information can be passed to the drainage teams who will be able to review the inventory in the area and identify any defects which may be exacerbating the issue of water on the highway. This is a good example of gathering data from day-to-day operation to feed into a risk-based approach to managing the network.

Sign	Where to Deploy	Why to Deploy	When to Remove
 **TSRGD Diag. No. 554A**	This sign is deployed at points on the network where flooding is identified. Generally, this will be during periods of heavy rainfall on the network.	It is important to warn road users of flooding on the network so that they can moderate their behaviour to reduce risks of injury from loss of control. The sign should be installed with accompanying Dia. 554.1 Sign 'Try your brakes'.	As soon as the flooding abates the signage should be removed. In all cases the location of the signage should be recorded to inform drainage operations to make sure that risk is mitigated as far as practicable.
 **TSRGD Diag. No. 554.2**	In some cases where drainage defects are unresolved, there may be water on the highway.	During periods of cold weather, the water may freeze on the carriageway or footway and create a froze road surface. Water often crosses on bends because of the profile changes of the carriageway which elevates risk to road users.	When the cold weather period has abated, or the defect is resolved. These kinds of defects should be prioritised according to the risk assessed.
 **TSRGD Diag. No. 556**	In situations where the road surface has suffered profile damage which may lead to a vehicle losing control when using the roads at normal speeds.	For situations such as sunken trenches, some other kind of subsistence. Generally, this should not be used to warn of potholes, unless there is a particularly severe impact to the road surface.	Upon the repair of the defect or installation of traffic management to remove the passage of road users over the defective area.
 **TSRGD Diag. No. 557**	In situations where the skidding resistance may have been compromised by a temporary hazard. The usual situation this may be deployed for would be a fuel or similar spillage.	It will not always be possible to clean up such spillages immediately and warning may be required to mitigate further risks to road users.	The signage must be removed as soon as the spillage is cleared, or the risk is judged to have abated. Swift recovery is required to prevent the sign from being overused and its impact reduced.

TABLE A2-1 – MAKE SAFE SIGNAGE EXAMPLES