



HIAM Skid Resistance Management Plan

2022

VERSION 2



SWINDON
BOROUGH COUNCIL

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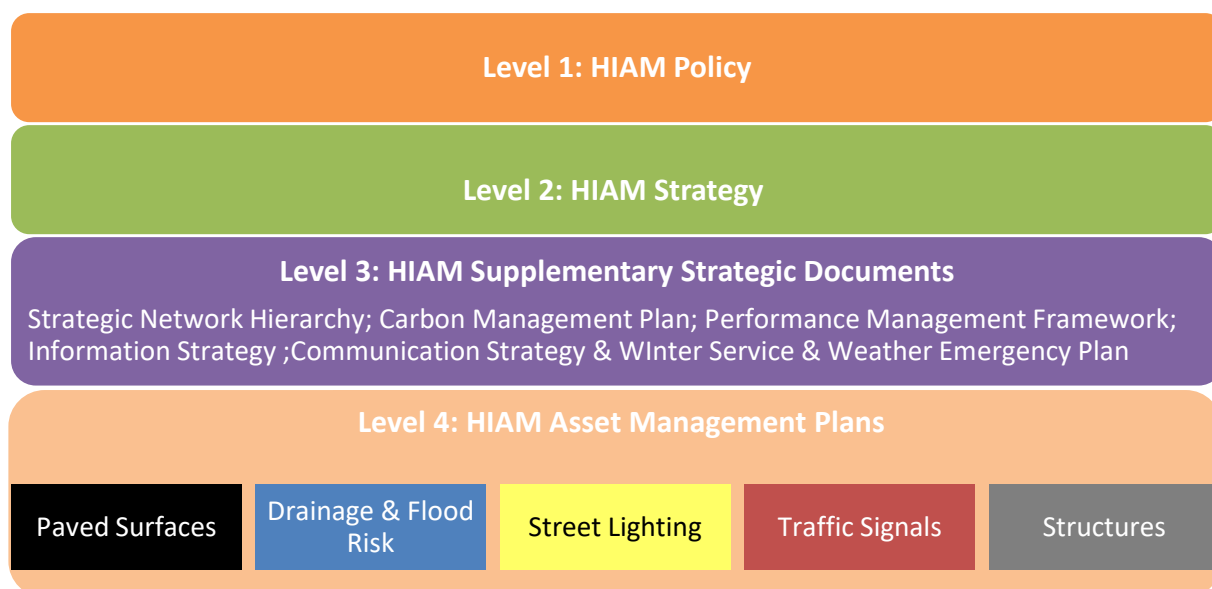
1.0 Context

The Vision for Swindon 2030 sets out how Swindon Borough Council (SBC) will shape the borough and deliver the growth to allow the community to prosper. To deliver the vision, SBC has developed a series of priorities and pledges, which enable officers to prioritise their work.

These priorities and pledges have been used to influence the Highway Infrastructure Asset Management (HIAM) Policy and Strategy, which have been approved by Cabinet and are available to view on the SBC website. These high-level documents are supported by a suite of Supplementary Strategic Documents (SSD's) which have an influence on the management of all asset groups and Asset Specific Operational; Inspection; Maintenance and Management Plans.

This HIAM Skid Resistance Management Plan is one of the key HIAM Asset Management Plans. A summary of the HIAM Asset Management Framework and status of this plan within the hierarchy of this suite of documents is illustrated in figure 1.

Figure 1: SBC HIAM Documents Suite - Hierarchy



2.0 Plan Statement

Maintaining the skid resistance of carriageway surfaces is critical to the effective management of carriageway assets. This document sets out a Management Plan to assess and manage skid resistance for highways within the Swindon Borough.

SBC has adopted the general principles of the National Highways (formerly Highways England) document HD28: Skid Resistance, within this Plan. This guidance, primarily developed for the national road network, has been adapted to suit local conditions, to:

- Manage the risk of skidding accidents in wet conditions so that this risk is broadly equalised across the road network;
- Categorise the network into sites with different potential for skidding accidents and to assign 'Investigatory Levels' for each site;
- Monitor the network on a regular basis to obtain a standardised measure of skid resistance;
- Identify sites where skid resistance is more than 0.10 CSC units below Investigatory Level, and/or where two or more wet skidding accidents have been identified, to determine an initial risk hierarchy of skid sites;
- Evaluate skid risk to determine a final risk hierarchy of sites;
- Make recommendations for surface improvement or other actions;
- Determine potential treatment options and budget costs where action is recommended;
- Install warning signs pending completion of surface improvement, where deemed necessary;
- Share the final risk hierarchy and any recommended actions with road safety engineers and cross-reference against the SBC Road Safety Strategy and pursuant plans;
- Consider skid risk against other network level risks and allocate budgets proportionate to the level of risk;
- Carry out surface improvement or other actions as required; and
- Remove any warning signs when resurfacing or other actions have been carried out.

Where skid resistance is referred to within this document it shall only relate to the provision of a level of skid resistance appropriate for 'normal' driving (i.e. in accordance with the Highway Code). SBC have a procedure for identifying and investigating collision data. This procedure has been taken into account as part of the HIAM Skid Resistance Management Plan.

3.0 Background and Purpose

The importance of efficient and effective highway maintenance and relevance to asset and network management has never been more widely recognised as acceptable standards of safety and serviceability have become increasingly more difficult to maintain.

The main purpose of highway maintenance is to ensure that the highway network remains suitable for the safe and convenient movement of people and goods. The Code of Practice document 'Well Managed Highway Infrastructure' defines this requirement in the following series of core objectives:

- **Network Safety**
 - Complying with statutory obligations; and
 - Meeting users' needs for safety.
- **Network Serviceability**
 - Ensuring availability;
 - Achieving integrity;
 - Maintaining reliability; and
 - Enhancing condition.
- **Network Sustainability**
 - Minimising cost over time;
 - Maximising value to the community; and
 - Maximising environmental contribution.

The maintenance of adequate levels of skidding resistance on running surfaces is an important aspect of highway maintenance, and one that contributes significantly to safety.

Under dry conditions road surfaces provide adequate friction to satisfy the demands of most road users for most manoeuvres. The skid resistance of a wet or damp road surface can be substantially lower than the same surface when dry, and is more dependent on the surfacing material. The objective of this HIAM Skid Resistance Management Plan is to manage the risk of skidding accidents in wet conditions so that this risk is broadly equalised across the road network. This is achieved by providing a level of skid resistance that is appropriate to the nature of the road environment at each location on the network.

This document outlines SBC's plan and procedures for monitoring and maintaining the skid resistance of the road network.

4.0 Overview

4.1 Relevant Standards

The relevant standards which have been utilised to compile this HIAM Skid Resistance Management Plan are listed below:

- The Highways Agency Standard HD28/15 'Skid Resistance' (July 2015);
- Well Managed Highway Infrastructure – A Code of Practice;
- CSS Guidance Note 'Skidding Resistance (County Surveyors Society, May 2005);
- The Design Manual for Roads and Bridges – Pavement Design and Maintenance (Vol 7); Surface Course Materials for Construction (CD236)
- SBC Road Safety Strategy.

4.2 Performance Indicators

The Department for Transport (DfT) requires Local Highway Authorities to report performance indicator data on skidding resistance on Principal Roads within their annual Single Data List (SDL) submission. SDL 130-03 requires the percentage of the Principal Road Network (A Class) at or below Investigatory Level (IL) to be reported.

4.3 Surface Course or Surface Treatment Design for New Works/Maintenance

Skidding resistance test results are used in conjunction with accident statistics; condition surveys and other factors to develop the most effective highway maintenance programme. As part of the design process for new surfacings or surface treatments, every highway maintenance scheme undertaken will need to provide 'a skidding resistance appropriate to the road and traffic at the site in question.'

This is achieved through a standard design process in accordance with the following documents:

- Design Manual for Roads and Bridges - Pavement Design and Maintenance (Vol 7); Surface Course Materials for Construction (CD236)

4.4 Policy and Procedure

The management process and procedure for skid resistance is defined within the following sections of this HIAM Skid Resistance Management Plan:

- Section 4.5 - The Network: The extent of the road network to which the Plan applies;
- Section 4.6 - Survey Equipment: The equipment used to test skidding resistance;
- Section 4.7 - Survey Methodology: The method chosen to provide an estimate of the skid resistance and the procedures to be followed for data collection;
- Section 5.0 - Investigatory Procedures: The approach to setting investigatory levels and the frequency of reassessment; risk assessment; desk study; site investigation and determining the sites requiring further investigation/treatment;
- Section 5.5 - Actions: The prioritisation and programming of treatment; and
- Section 6.0 - Recommendations: A summary of the recommended actions to be carried out annually to manage skid risk.

4.5 Road Network

SBC will measure the skidding resistance of all of the Classified Road network and those parts of the Unclassified Road network where the speed limit is greater than 40 mph on an annual basis.

This part of the carriageway network presents the highest risk to highway users and is most similar to the type of major road network sites managed by National Highways who prepared the guidance note HD28 upon which this plan is based. This extent of highway is accordingly considered appropriate to meet the objectives of network level Skid Resistance management described within this HIAM Plan.

4.6 Survey Equipment

A Sideway-force Coefficient Routine Investigation Machine (SCRIM) will be used to measure skidding resistance. Each survey will be carried out in accordance with HD28 and the SCRIM shall have an accreditation certificate from the annual Group Correlation Trial.

Other skid testing using different equipment may be carried out on a site-specific basis, as required. This may be using a Griptester (correlated to SCRIM values using the latest national correlation

method) or Pendulum skid resistance tester (BS EN 13036-4:2003), dependant on which is the most appropriate testing method.

4.7 Survey Methodology

SBC will determine the annual summer skid resistance, referred to as the Characteristic SCRIM Coefficient (CSC), by using the Single Annual Survey Method in accordance with HD28/15.

The Single Annual Survey Method uses measurements from the preceding three years to calculate a correction factor. The whole of the Network is tested once every year in each direction (nearside lane only for multiple lane carriageways) and the correction factor applied to make current values consistent with the long-term average, and seasonal changes.

Surveys will be carried out annually for the extent of the Network as defined in section 4.5.

5.0 Investigatory Procedures

5.1 Defining Investigatory Levels

Investigatory Levels (IL) are set in accordance with the guidance given in National Highways Design Manual for Roads and Bridges: Skid Resistance (HD28/15 – Vol 7, Sec 3) and any amendments.

The objective is to provide skidding resistance levels appropriate to the risk of skidding accidents at any given site.

This is achieved by setting an Investigatory Level for each site at, or below, which an investigation may be carried out to determine whether maintenance treatment is required. Investigatory Levels are set based on the Site Category of each location (figure 2 refers).

Figure 2: SCRIM Investigatory Levels (HD28/15 Table 4.1)

Site Category and Definition		IL for CSC Data (Skid data speed corrected to 50 km/h and seasonally corrected)						
		0.30	0.35	0.40	0.45	0.50	0.55	0.60
A	Motorway							
B	Non-event carriageway (one-way traffic)							
C	Non-event carriageway (two-way traffic)							
Q	Approaches to & across minor & major junctions, approaches to roundabouts & traffic signals							
K	Approaches to pedestrian crossings and other high risk situations							
R	Roundabout							
G1	Gradient 5-10% longer than 50m							
G2	Gradient $\geq 10\%$ longer than 50m							
S1	Bend radius $< 500\text{m}$ – carriageway with one-way traffic							
S2	Bend radius $< 500\text{m}$ – carriageway with two-way traffic							

Investigatory Levels are based on factors such as and the nature of the road environment, road geometry and the likelihood of accidents. The dark shading in **figure 2** indicates the range of Investigatory Levels that will be used for roads carrying significant traffic levels, whereas boxes with the light shading indicate the possible selection of a low Investigatory Level appropriate to low risk situations, where there are low traffic levels and a combination of good signing, visibility, geometry and a low incidence of accidents.

In this HIAM Skid Resistance Management Plan the default value of IL for the majority of sites will be taken from the risk bands in **figure 2** and will be the lower value where there are two risk levels, and the middle value where there are three.

In accordance with the further detailed guidance in Annex 5 of HD28/15 the default IL for a site in this Plan will differ from the above statement for the following category sites:

- Category Q sites with a speed limit of less than 50mph will be the lower of three risk levels;
- Category S1 & S2 sites with a bend radius greater than 100m **and** a speed limit of less than 50mph = site category changed to non-event category B or C as appropriate; and
- The minor road approach to a Category Q major/minor road junction will be the lower of three risk levels.

Investigatory Levels will be reviewed every three years for geometry and speed limit as part of the overall strategy to ensure that they remain appropriate for the where the road alignment, layout and/or speed limit may have been altered.

Specific sites may have their Investigatory Level revised at any time based upon site investigations, accident statistics and risk assessment.

5.2 Risk Assessment Process

The objective of the risk assessment process is to determine whether a surface treatment is justified to reduce the risk of accidents, specifically accidents in wet conditions or involving skidding; or whether some other form of action is required, or whether the site should be kept under review. The assessment is an important part of the operation of the HIAM Skid Resistance Management Plan. In conjunction with the process of setting Investigatory Levels, the objective is to promote effective targeting of treatments.

The risk assessment process consists of:

- An initial Desk Study to identify skidding risk sites on The Network and determine an initial risk hierarchy for Site Investigation
- A Site Investigation to evaluate risks and to determine a final risk hierarchy to prioritise risk decisions including site treatment priorities.

A flow chart for the risk assessment process is included at appendix 1.

5.3 Desk Study

During the Desk Study phase, data will be collated to identify the indicative skid risk of any section of The Network where the following conditions exist:

- Any site has a SCRIM Deficiency at, or below -0.1;
- Collision records identify two or more wet skidding collisions or incidents; and

In order to compare the risk present across the network, each site will be assigned an indicative risk score and ranked into an initial risk hierarchy to prioritise site investigations using the scoring system detailed in figure 3.

Figure 3: SBC HIAM Prioritisation of Site Investigations

Feature	Score
Accidents	
1 Wet Skid Accident	5
2 Wet skid Accidents	7
>2 Wet skid Accidents	9
SCRIM Deficiency	
SCRIM Deficiency > -0.1	4
SCRIM Deficiency -0.5 to -0.1	2
Texture depth (SMTD mm)*	
Texture less than 0.49mm (speed limit >40mph)	2
Texture less than 0.39mm (speed limit ≤ 40mph)	2
* Excludes lengths of High Friction Surfacing (HFS)	

The Desk Study uses an automated scoring system to identify risks and rank them into an initial risk hierarchy. To refine the data before sites progress to the Site Investigation phase, the initial risk

hierarchy will be analysed and sense checked by an Engineer. In certain circumstances, the Engineer may use engineering judgement to filter out sites where a Site Investigation is not warranted.

Similarly, they may increase or decrease the priority scores of sites. For example:

- The collision records may indicate that the incidents were primarily influenced by other factors such as driver impairment, behaviour or error rather than the road conditions;
- Some sites may have been treated since the data was collected;
- There may already be treatments planned for reasons of structural condition;
- Low texture depth is due to the presence of high friction surfacing or similar;
- The frequency of accidents; SCRIM Deficiency or Texture Depth may be exceptionally higher or lower than other sites with similar scores;
- The affected length may be unusually short to be practically treated (<50m) or unusually long; and
- The accident records may indicate that action aside from surface treatment needs to be taken by other teams, for example maintaining or improving drainage systems where highway flooding is cited as a causatory factor.

Once the initial risk hierarchy has been refined, any sites that remain in the hierarchy with a **risk score of 4 or more** (where the data indicates there to be a significant risk of skidding), will progress to the Site Investigation phase.

It is likely that SBC has insufficient budget or resources to be able to immediately carry out a Site Investigation for all sites recommended in the Desk Study each year. For this reason, sites with the highest priority for action in the initial risk hierarchy will be investigated first, subject to budget availability and approval.

If the Site Investigation phase is likely to be delayed and the risk is considered to be exceptional, warning signs may be recommended to be installed as an interim measure by the responsible Engineer. Sites where investigations are not able to be completed will be re-assessed and re-prioritised in the next Desk Study which is carried out.

5.4 Site Investigation

Where it is considered during the Desk Study that a Site Investigation is required, any risks identified will be evaluated in accordance with the general procedure in HD28. Site Investigations will involve:

- Reviewing the Investigatory Level;
- Collating various sources of condition data;
- Obtaining collision data (STATS 19);
- Assessing collisions in relation to site skidding resistance;
- Assessing sites with low skid resistance;
- Assessing site characteristics; and
- Reporting the outcome.

The decision whether action is recommended requires professional judgement, taking into account local experience; the nature of the site; the condition of the road surfacing and recent accident history. If successive Site Investigations show that action is not warranted at the current level of skid resistance then consideration could be given to lowering the Investigatory Level.

The risk decision may conclude that action is required if the skid resistance is more than -0.10 below the IL, and/or the accident history indicates there are two or more wet skid accidents that were likely to have been attributable to the condition of the road.

The decision maker will also consider whether low texture or other negative site characteristics are present in either of the above situations. Should a combination of factors apply, then the site is likely to receive a high priority for action in the final risk hierarchy. If the Site Investigation determines that neither of the above situations are true then the site will most likely be removed from the final risk hierarchy.

Higher priority for action may also be considered appropriate where the characteristics and usage of a site indicate that the risk is higher than that of other sites awarded the same score in the initial risk hierarchy, particularly if the skid resistance were to fall.

5.5 Actions

The final risk hierarchy and any actions recommended in the Site Investigation will be shared with road safety engineers and cross-referenced with the SBC Road Safety Strategy and pursuant plans to ensure that risk decisions take into account all factors affecting safe use of the network and are effective and consistent with local transport policy.

SBC are unlikely to have sufficient budget or resources to be able to immediately carry out all the actions identified in the Desk Study and Site Investigation. For this reason, sites with the highest priority for action in the risk hierarchy will be addressed first, subject to budget availability and approval.

In cases whereby it is determined that surface improvement is a necessary and proportionate response to the risk, the treatment selected will take into account factors other than skid resistance such as the structural condition and strategic importance of a road. Sites will be included in the following year's capital maintenance works programme in the order of the final risk hierarchy, subject to budget availability and approval.

Where surface improvement is not deemed to be a necessary or proportionate response to the risk, other actions may be recommended such as the erection of warning signs. If the surface improvement recommended in the Site Investigation will require a significant period for design; procurement or mobilisation, warning signs may be recommended as an interim measure.

Should warning signs be required, the signs shall be erected as soon as practicable. The signs will be the 'Slippery Road' warning sign (Traffic Signs Manual: Chapter 4, diagram 557) in connection with an appropriate supplementary plate (diagram 570).

Whereby surface improvement is deemed necessary, SBC will take due cognizance of the recommendations of ENG03/05. In areas of high horse usage, such as near stables, a surface dressing may be appropriate. With issues of early life skid resistance to new asphalt surfaces, the addition of quartzite grit during the initial rolling operation or retexturing by high-pressure water jetting may be recommended.

6.0 Recommendations

It is recommended that the following actions are carried out annually to manage skid risk as part of this HIAM Skid Resistance Management Plan:

- Commission SCRIM surveys in accordance with HD28 to extent of network described;
- Receive survey data fitted to Network from survey contractor;
- Process survey data to determine SCRIM Deficiency within one month of receiving data;
- Review SCANNER data to determine texture depths;
- Consult with Traffic Management team regarding collision analysis data, particularly for wet skid accidents from Collision Analysis Procedure (including supply of STATS19 data);
- Collate and present key information by means of a Desk Study to identify risks and determine an initial risk hierarchy.
- Share the Desk Study with Managers of other assets where the data indicates actions by others may reduce network risks; and
- Install warning signs as an interim measure pending completion of a Site Investigation where the data indicates the risk to be exceptional.

Depending on the outcomes of the Desk Study, the following additional actions may be required:

- Carry out formal Site Investigations to evaluate risks and to determine and prioritise actions;
- Make recommendations for surface improvement or other actions;
- Install warning signs pending completion of surface improvement where deemed necessary;
- Prioritise sites into a final risk hierarchy where action is recommended;
- Determine potential options and budget costs where action is recommended;
- Share the final risk hierarchy and any recommended actions with road safety engineers and cross-reference against the SBC Road Safety Strategy and pursuant plans.
- Consider skid risk against other network level risks and allocate budgets proportionate to the level of risk;
- Carry out surface improvement or other actions as required; and
- Remove any warning signs when resurfacing or other actions have been carried out.

7.0 Documentation

The following documents and information will be retained in order to demonstrate that the HIAM Skid Resistance Management Plan has been implemented (all information will be stored in the relevant financial year file folder in the UKPMS electronic folder on the shared asset management drive unless otherwise stated in brackets):

- Annual SCRIM records and plans showing sites of skidding deficiency (also held in PMS system);
- Annual texture depth records (from SCANNER surveys) showing sites of low texture depth (also held in PMS system);
- Accident statistics (also held centrally within ACCSMAP system);
- All records and recommendations/ outcomes from the Desk Study process;
- All records and recommendations for actions for sites subject to Site Investigation including, minutes of meetings, supplementary skid resistance testing results and accident statistics;
- Records of any departure from the standard Investigatory Levels defined within HD28/15 together for the reasons and evidence used to justify any departure;
- Records of three-yearly full network review of assigned site categories;
- Records of any treatment works determined from the annual skid resistance management process together with the justification for using the materials chosen;
- Records of locations of any permanent or temporary warning signs erected (and removal dates, where applicable);
- Records of any changes to the road and footway network;
- Records of any changes made to the survey methodology or frequency of surveys;
- Records of any changes to the method of remedial works prioritisation;
- Reasons for the type and location of any signs chosen to be erected; and
- List of any amendments made to this HIAM Skid Resistance Management Plan.

8.0 Glossary

CSC	Characteristic SCRIM Coefficient. The skid resistance value that has been corrected for 'within a year' and 'between year' seasonal variations and is obtained by multiplying the 10m SCRIM coefficients by the appropriate Equilibrium Correction Factor.
ECF	Equilibrium Correction Factor. The ESC divided by the Mean SC for an ECF area.
ESC	Equilibrium SCRIM Coefficient. The mean of the SC's over three years.
IL	Investigatory Level. This is the level of skid resistance at, or below, which site investigation is to be undertaken.
HIAM	Highways Infrastructure Asset Management
LA	Local Authority
LESC	Local Equilibrium SC. This represents the average skid resistance level for the locality over recent years. The LESC is the average SC, calculated for all valid 10m sub-section measurements in the defined locality over the three years that precede the current testing season.
SBC	Swindon Borough Council
SC	SCRIM Coefficient is a SCRIM reading that has been corrected for all factors except seasonal effects).
SCRIM	Sideways-Force Coefficient Routine Investigation Machine. An adapted lorry capable of measuring the skid resistance of a road surface.
SD	Scrim Deficiency. The difference between the CSC and the defined IL.

9.0 Bibliography

CIPFA Code of Practice on Transport Infrastructure Assets (2013)

County Surveyors Society Guidance Note: Skidding Resistance (May 2005)

HIAM Guidance (HMEP, 2013)

National Highways Standard HD28/15 'Skid Resistance' (July 2015)

National Highways: The Design Manual for Roads and Bridges – Pavement Design and Maintenance (Vol 7, 2015); CD236 Surface Course Materials for Construction

SBC Vision for Swindon 2030 (SBC, 2021)

SBC Local Plan 2026 (2015)

SBC Local Plan 2036 Draft Consultation Document (SBC, 2021)

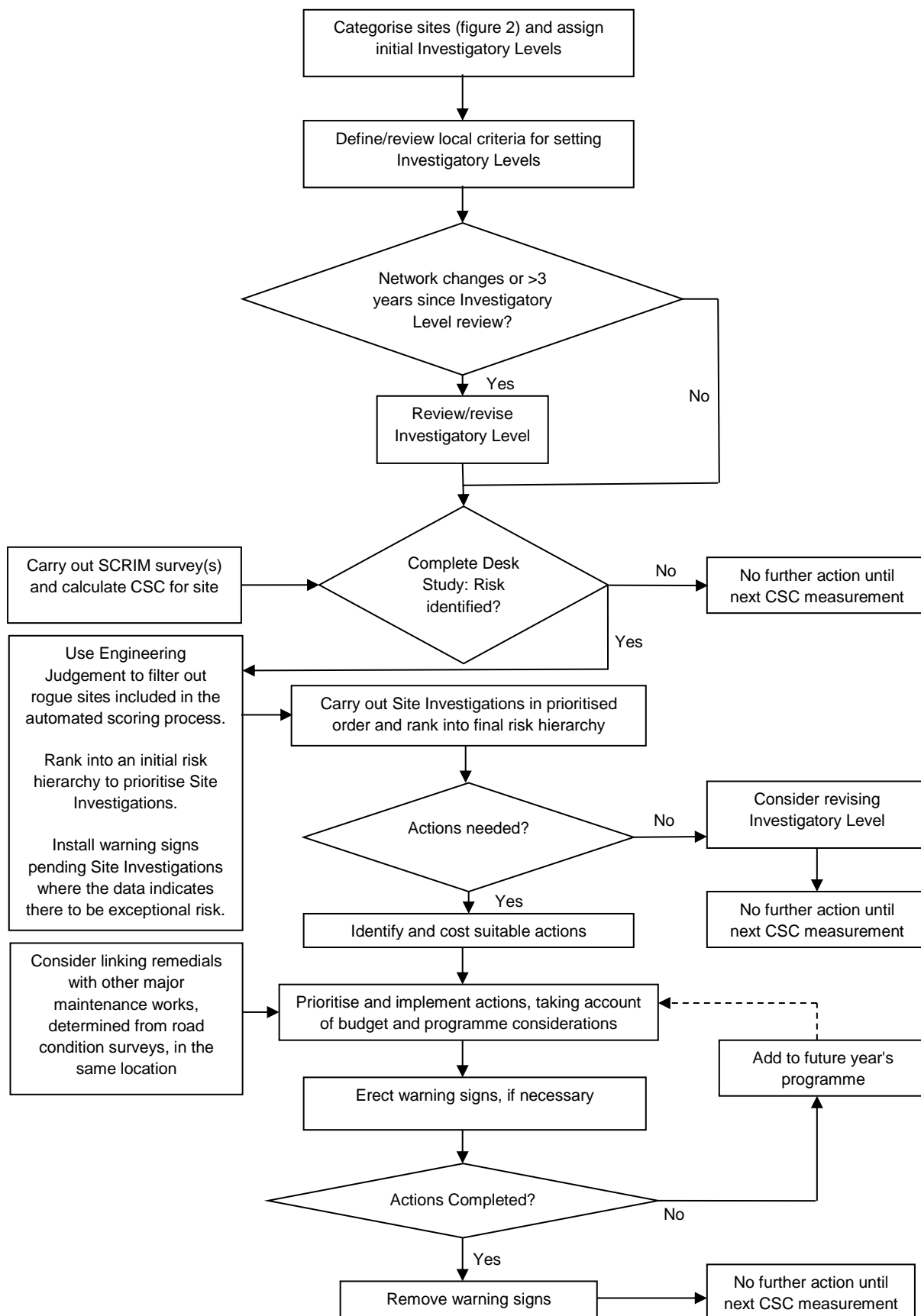
SBC HIAM Policy (2022)

SBC HIAM Strategy (2022)

SBC Road Safety Strategy (Draft 2021)

Well-Managed Highway Infrastructure – A Code of Practice (UKRLG CIHT, 2016)

Appendix 1: Identifying & Prioritising Sites



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Document Ref: HIAM/SRMP (Version 2)