HOW TO PREPARE A BLACK SPOT NOMINATION

Outline

The Black Spot program is a vital mechanism to assist Western Australia to meet the casualty reduction targets set out in the National and State Road Safety Strategies.

The Black Spot program in Western Australia enables Local Governments to make both ‘Reactive’ and ‘Proactive’ nominations by applying the following approaches:

- Reactively identifying and treating crash problems using existing crash history; or
- Proactively identifying potentially hazardous locations on the basis of a formal Road Safety Inspection.

This document has been prepared to assist Local Governments to prepare successful Black Spot nominations and to ensure submissions meet the Black Spot Program Guidelines and Project Criteria.

This document should be read in conjunction with the CARS manual and the Black Spot Programme Guidelines.

A step-by-step process has been set out in this document to guide users through the Black Spot application process to ensure applicants select appropriate locations, identify prominent crash types and select cost-effective treatments.

Further information about the fundamental principles of the treatment of crash locations can also be found in Austroads Guide to Road Safety Part 8: Treatment of Crash Locations.
Identify a Crash Location

1. Log in to Main Roads Reporting Centre, access the Crash page then go into CARS and select a location from the (Prequalified for Black Spot Funding) lists.

   ![Crash Analysis Reporting System](image)

   The scope of the crash analysis area can be modified, however ensure that after any modifications, selected locations still meet the Black Spot Program - Crash Criteria otherwise they will not qualify for funding.

Conduct a Detailed Crash Analysis

2. Go to the Reports menu in Main Roads Reporting Centre by accessing the Crash page and then selecting the Reports page and run a Detailed Crash History ensuring that the report is saved as a *.csv file:

   ![Reports](image)

   Detailed crash reports saved as a *.csv file include LAT / LONG geographic location information. This allows users to map crashes, which can be generated on any GIS or other mapping system. There are a number of open source GIS mapping resources available online.

   This is important because it allows crash locations to be related to other geographic features to assist relating road elements to recorded crash locations.

3. A collision or stick diagram plan should then be created using the crash details provided in the detailed crash report. Stick diagrams should incorporate the following crash attributes to assist identifying crash patterns:
   - Crash severity;
   - RUM code;
   - Date and time;
   - Light and surface conditions; and
   - Directions of travel and vehicle types.
An example of a collision or stick diagram plan is provided in Appendix A. Stick diagram plans should be used to assist determining predominant crash types.

If you do not have access to a mapping system, stick diagrams should be created regardless to gain a better understanding of crash types, directions of travel and site conditions to assist determining predominant crash types.

4. Investigators should then refer to the available crash reports using CARS to identify general trends.

5. It is very important that a summary of the crash analysis is prepared using Crash Analysis Form [CAF1] Appendix B to assist identifying any crash patterns, where the focus should be placed on casualty crashes (casualty crashes include: fatal crashes, hospital severity crashes and medical severity crashes). The Crash Analysis Form [CAF1] Appendix B must be completed prior to investigating potential cost-effective treatments.

**Site Inspection**

6. Conduct a site inspection referring to the results of the crash analysis to identify possible road elements that may have contributed to crash causation or crash severity, and start to consider potential treatments to identified crash problems.

Reference should be made to Appendix C - Austroads Guide to Road Safety Part 8: Treatment of Crash Locations extract Tables 4.2 and 4.4 to 4.7 when conducting a site inspection to assist identifying road environmental factors related to predominant crash types.
Select Appropriate Cost-Effective Crash Treatments

7. Refer to the Crash Reduction Factors (CRF) spreadsheets available in the ‘Countermeasures’ page in CARS and also refer to the Austroads Road Safety Engineering Toolkit for further information about countermeasure selection, to assist identifying cost-effective treatments for any predominant crash types identified.

Crash reduction factors (CRFs) are the expected percentage reduction (or increase) in casualty crashes. E.g. a CRF of 0.3 means an expected crash reduction of 30% for the corresponding RUM code crash type from selecting a particular treatment. Alternatively a CRF of -0.1 means an expected crash increase of 10%.

8. Select feasible cost-effective countermeasure(s) in CARS that treat the predominant crashes identified in the Crash Analysis Form [CAF1] Appendix B.

9. If you are unable to identify an appropriate treatment, consider other alternatives, such as:
   - Refer back to the extents of your crash investigation area and consider altering the extents. This may introduce further crashes which could change the scope of the project and provide alternative treatment options.
   - If you are unable to identify a suitable cost-effective crash treatment, you should refer back to the list of prequalified locations in CARS and determine if there is an alternative location with a crash problem that could be treated by a cost-effective treatment.
Check Project Scope

Assuming that you have identified a treatment that provides an expected crash reduction as per the Crash Reduction Factors (CRF) spreadsheets, complete the following steps:

10. Check whether the scope of your project is correct:
   - If your project location encompasses a section of road or an intersection where there has been changes to any road elements within the 5 year crash period being considered, and the changes could have potentially influenced the current crash history, these locations should not be progressed. Such locations should continue to be monitored for subsequent Black Spot programs.

11. Check that the proposed treatment location still meets the crash criteria:
   - If you have altered the extents of the investigation area considered, you must check that the proposed project area still meets the Black Spot Program – Project Criteria (Page 4). Remember if your selected location does not meet the crash criteria it will not qualify for funding.

Further information is also provided in Appendix D of typical examples of historic Black Spot nominations where insufficient crash analysis has been undertaken or incorrect countermeasures are selected that has resulted in nominations being unsuccessful.
Perform a BCR Calculation

12. Select your location in CARS.

13. The ‘Crash Cost Saving Category’ must be altered to reflect the speed environment in which the proposed treatment location occurs. A road environment with a speed limit 80 km/h or greater must be defined as ‘Nature – Open Road’ and road environments with a speed limit 70 km/h or less must be defined as ‘Nature – Built Up’. However, the ‘Year’ and ‘Discount Rate’ fields’ should remain the default values and must not be changed. You need to complete this step prior to selecting countermeasures, as changing these fields afterwards can affect the accuracy of your BCR calculation.

14. To enter a countermeasure, click on the ‘Add Countermeasure’ button, select a countermeasure from the drop-down list, and enter approach leg(s) to which the treatment is applied.

15. There are default capital expenditure and operating expenditure values applied to each countermeasure, however if you have an estimate for the proposed project these costs should be updated.
16. Steps 14 and 15 should also be completed for any additional countermeasures.

17. To ensure the BCR value is correctly calculated, make sure that all of the values have been entered correctly (you may need to press the Enter key after the last value you entered).

18. If the proposed treatment is not available in the list of countermeasures, you will need to conduct a manual BCR calculation. Instructions on how to do this are available through the online Road Safety Engineering Course which is available on the Main Roads WA / IPWEA Road Safety Audit Portal: www.road-safety-audit-wa.org under the ‘Training and Development’ tab.

19. Finally, check that the calculated BCR meets the applicable Black Spot Program – Project Criteria (Page 4). If it does not meet the criteria it will not qualify for funding.

**Potentially Hazardous Locations**

Local Governments who may not have locations on their road network that meet the ‘Crash Criteria’ or ‘BCR Criteria’ requirements set out in the Black Spot Program – Project Criteria (Page 4) may elect to take a proactive approach to treating potentially hazardous locations on the basis of a formal Road Safety Inspection.

It is very important for all nominations based on a formal Road Safety Inspection that selected treatments reflect the recommendations presented in the Road Safety Inspection report. All proposed treatments must also be effective and applicants should refer to the Crash Reduction Factors spreadsheet in CARS to ensure that all proposed treatments address the crash risks identified in the Road Safety Inspection report.

**Nomination Form Submission**

Prior to submission of a Black Spot nomination you must ensure:

- The above process has been followed;
- A Crash Analysis Form [CAF1] has been completed and submitted for all nominations;
- Main Roads is consulted for any proposals that involve changes to traffic signals;
- All proposals accommodate all vehicle types permitted to use the road;
- All proposals meet standards, guidelines, Codes, Acts and warrants;
- There are no inconsistencies in the costs provided on the nomination form; and
- All nominations meet the Black Spot Program Guidelines.
APPENDIX A

STICK DIAGRAM PLAN
APPENDIX B

CRASH ANALYSIS FORM [CAF1]
CRASH ANALYSIS FORM [CAF1]

**Location:** Give Way Controlled T-Intersection of North Street and West Street, City of Perth

<table>
<thead>
<tr>
<th>Crash History Period:</th>
<th>2012 - 2017</th>
<th>Total No. Reported Crashes:</th>
<th>32</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Casualty Crashes: (Severity: fatal / hospital / medical)</td>
<td>14</td>
<td>Number of KSI Crashes: (KSI: Killed or Seriously Injured)</td>
<td>3</td>
</tr>
</tbody>
</table>

**Crash Summary:** (produce a crash summary using the crash information provided in the detailed crash report, grouping crashes by crash type also identifying crash severity, directions of travel and conditions at the time of each crash)

- **17 Crashes involving vehicles failing to give way:**
  - 13 Crashes involving northbound vehicles on North Street failing to give way to westbound vehicles on West Street, all occurring in the dry, 8 occurring during times of darkness, 1 resulting in a fatality, 2 resulting in hospital severity, 5 resulting in medical severity and 5 resulting in major property damage;
  - 3 Crashes involving eastbound right turning vehicles failing to give way to westbound vehicles, 2 occurring during times of darkness, 1 resulting in medical severity and 2 resulting in major property damage; and
  - 1 Crash involving a vehicle exiting a driveway on West Street failing to give way to a westbound vehicle resulting in minor property damage.

- **10 Rear end crashes:**
  - 7 Crashes involving northbound vehicles on North Street, 4 resulting in medical severity of which 2 occurred during times of darkness and 4 of which occurred in the wet;
  - 2 Crashes involving westbound vehicles occurring at daytime in the dry on West Street resulting in property damage; and
  - 1 Eastbound crash on West Street at daytime involving a stationary right turning vehicle resulting in property damage.

- **2 Off path crashes:**
  - 1 Crash involving a northbound motorcycle on North Street and 1 crash involving a westbound vehicle on West Street, both errant vehicles did not collide with any roadside objects and both crashes occurred at daytime in dry conditions resulting in minor property damage.

- **2 Parking manoeuvre crashes:**
  - 2 Crashes involving vehicles exiting car parking spaces at daytime, 1 westbound on West Street and 1 southbound on North Street both resulting in minor property damage.

- **1 Pedestrian crash:**
  - 1 Pedestrian crash involving a pedestrian walking with traffic eastbound on West Street being struck by an eastbound bicycle resulting in medical severity.

**Predominant Crashes:** (identify the prominent crash patterns by referring to the details of the crash summary)

- **Crashes involving vehicles failing to give way:**
  - There is a pattern of 13 northbound vehicles on North Street failing to give way to westbound vehicles on West Street, 1 resulting in a fatality, 2 resulting in hospital severity and 5 resulting in medical severity.

- **Rear end crashes:**
  - There is a pattern of 7 northbound rear end crashes, 4 of which occurred in the wet and 4 which resulted in medical severity.

- **Darkness crashes:**
  - There is a pattern of 12 intersection crashes that occurred during times of darkness, 10 crashes involving vehicles failing to give way and 2 rear end crashes.
APPENDIX C

AUSTROADS GUIDE TO ROAD SAFETY PART 8: TREATMENT OF CRASH LOCATIONS - TABLES 4.2 AND 4.4 TO 4.7
APPENDIX D

TYPICAL EXAMPLES OF UNSUCCESSFUL NOMINATIONS
Examples of previous nominations where insufficient crash analysis has been conducted resulting in unsuccessful Black Spot nominations:

Example 1:
A road length shows 11 night-time crashes. The nomination proposed to upgrade lighting along the route, which provided a high BCR. However, the detailed crash information shows 10 of the crashes occurring at one of the intersections which has sufficient lighting. Hence upgrading lighting will only address a single crash, with a correspondingly low BCR.

Example 2:
A road length shows 7 pedestrian crashes. The nomination proposed to install pedestrian refuges and/or upgrade footpaths. However, the detailed crash information shows 4 of the crashes occurred at fully signalised intersections with traffic signal controlled pedestrian crossing facilities, 1 occurred at an existing pedestrian refuge island and 1 involved a turning vehicle colliding with a pedestrian crossing a side street. Installing more pedestrian refuges and upgrading the footpaths will only affect the one remaining existing crash, with a correspondingly low BCR.

Example 3:
A road length shows 2 off-road crashes in a curve. The nomination proposed is to install curve warning signs with advisory speed drop tags at a specific curve that has not been signed. When analysing the detailed crash data it becomes apparent that there have not been any crashes recorded at this specific curve; they occurred elsewhere along the road. The remaining curves in the length of road already have appropriate signs; hence there is no reduction in the existing crashes and BCR = 0.

Example 4:
A proposal to install RRPMs, but only on curves. The only countermeasure available in CARS is RRPMs, which applies the reduction factors to all the relevant crashes along the full length, therefore giving an inflated BCR if there are crashes not recorded as occurring on curves.

Example 5:
A proposal to reconstruct the superelevation on curves. However, CARS includes all RUM21 crashes in the calculations, even those in the straight sections; thereby possibly inflating the BCR.

Examples of previous nominations where incorrect countermeasures are selected resulting in unsuccessful Black Spot nominations:

Example 1:
Installing one or more new lighting poles on a road that already has some lighting is an ‘upgrade’, not ‘new lighting where none previously’. If a road length has a long section of unlit road as well as a lit section, then the 2 sections need to be calculated separately; one for new lighting and the other for an upgrade.

Example 2:
Applying multiple similar countermeasures, such as new shared path and upgrade existing path to a length of road results in ‘double dipping’ as CARS will apply the reduction factors of both countermeasures to all pedestrian crashes. Each section of road (path) needs to be calculated separately.

Example 3:
Installing flush (or partly flush) medians but using “Median on existing road” or “Pre-deflection nibs at existing roundabout” will result in a nomination being unsuccessful. This is because CARS calculates a BCR on the assumption the medians are raised and that the relevant movements are physically prevented or controlled.