SERVICE PROVIDER INFORMATION

SUBJECT: **AREA MANAGEMENT MEMO No. 129/10**

Lane Restrictions at Barrier Repairs
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Area Management Memo 129/10

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Lane Restrictions at Barrier Repairs

1. Introduction

This Area Management Memo (AMM) 129/10 instructs Service Providers to adopt the revised matrix and guidance this memo in place of that provided in AMM68/06 (NMM 3.7.3) for the assessment and prioritisation of repairs to barriers following barrier strikes.

2. Background

AMM68/06 (NMM 3.7.3) has provided Service Providers with a risk based approach to the management of Category 1 safety barrier repairs. The main aim of AMM68/06 being to 'strike a more appropriate balance between the risks posed by the damaged barrier to road users and the risks posed to road workers and road users when repairs are made'. Prior to issue of AMM68/06 the Trunk Road Maintenance Manual imposed a 24 hour rule for Category 1 safety fence/barrier repairs.

The 2007 Road Worker Safety Action Plan Review of Service Providers' Operations suggested that AMM68/06 could be developed further, to provide greater flexibility for Service Providers to programme minor repairs. In response to this and a growing concern that AMM68/06 was not reducing road worker exposure to live traffic, a review of AMM68/06 and of Service Providers' approaches to implementing the document was undertaken

The review process was steered by key personnel from the Highways Agency, including NDD West Midlands Region (representing those responsible for managing the implementation of AMM68/06), VR&TTM Team technical specialists and the National Health & Safety Team, and consulted with:

- TRL (who prepared the background work for the original AMM68/06),
- a selection of Service Providers (responsible for the day-to-day application of AMM 68/06).

The review found that whilst AMM68/06 provides a sound basis for assessing road user safety risk associated with striking an unrepaired barrier, there were areas where this coould be improved. It recommended supplementary guidance for the application of AMM68/06 to reconcile conflicts between, the existing suite of documents and the approaches and internal guidance adopted by the Service Providers for responding to the risk assessment score following a barrier strike. The review further recommended that this guidance should be developed immediately and issued to the Service Providers to ensure a consistent interpretation is applied across the HA infrastructure.

3. Information and Guidance

The probability factors in the *existing* Annex A table cover the following issues:

- The volume of traffic flow
- The length of the gap if the barrier has been flattened
- The length of extensive damage if the barrier remains standing
- Whether damage is minor if the barrier remains standing
- Accident history at the site
- Proximity to major junctions or tight curves.

The severity factors in the *existing* Annex A table cover the following issues:

- If a feature that is protected by the barrier could cause a secondary accident if damaged
- If the system is protecting third parties (such as a central reserve barrier protecting vehicles on the opposite carriageway)
- Percentage of HGVs in the traffic flow
- Traffic speeds.

The Risk Assessment Matrix (Annex A in AMM68/06) has been amended and additional guidance provided on interpreting the results.

3.1. Revisions to the Risk Assessment Matrix

The description of the extent of damage has been reworded so that it characterises either the length of actual damage to an untensioned barrier, or the length of the tensioned sections affected where a tensioned barrier has been struck. This is to highlight the fact that a loss of tension jeopardises the integrity of the whole tensioned section, not just the location of the visible damage.

The degree of barrier damage has been separated out and added as an additional severity factor. The existing damage classifications of ‘barrier flattened’ or ‘barrier standing’, have been retained but the category of minor damage has been removed.

The following changes have been made to the Risk Assessment Matrix:

- Restructuring the table to make it easier to complete as a working record.
- Adding boxes to the risk assessment table to record:
    - Date, location, nature and scale of damage,
    - Parts required to repair damage, i.e. number of rails and posts,
    - Date/time parts can be made available,
    - Date/time of permanent repair,
    - Description of hazards and 3rd parties protected by the barrier.
- Replacing the ‘Barrier standing, extensive damage 5m’ etc factors with ‘length of barrier affected' factors that reflect just the probability of

hitting a sub-standard barrier rather than mixing this with the severity of the damage,

- The 'Barrier flattened' category has been retained, but relocated to the severity section where it is most appropriate,
- Updating and improving the presentation of the examples to reflect the new scoring table,
- Removing the unused intermediate high, medium, low scoring classifications for probability and severity,
- Adding a table to record the prioritisation given to the damaged barrier whilst waiting for permanent repair.

<u>These changes will not significantly alter the risk assessment scores generated</u>, but make the process more transparent.

It is not appropriate to significantly alter the risk scoring at present because we have no basis for resetting the scores; Service Providers consulted report that the current scoring aligns with their perceptions of the risks.

However, an additional sub-category for lengths of barrier affected greater than 80m has been included to give better discrimination of the probability of repeat strikes on sub-standard barrier.

The 'Barrier flattened' category has not been removed; in effect there are now two categories of damage. Given the emphasis in the supplementary guidance (at 3.3 below) for treating risk scores as the basis for prioritising repairs, it is valid to retain this element in the risk scoring so that responding first to the certain risk of an absent barrier is prioritised over the uncertain risk from a sub-standard barrier that remains standing.

Risk is a combination of the probability of an accident occurring and the severity of that accident should it occur. The Risk Assessment Matrix at Annex A should be used to record the factors that can affect the risk at a site and assess the associated risk levels and repair priorities for category 1 damage. The scores from the table for the risk factors for a particular incident location should be added to give an indication of the risk as high, medium or low. The Supplementary Guidance at 3.3 summarises the appropriate initial response and prioritisation of permanent repairs to damaged barrier based on the risk level.

3.2. Definitions of Risk Levels

High Risk Sites: Where the aggregate score for an incident is ≥ 24 points then the location is classed as high risk (high consequence and probability) and some immediate mitigation measure should be considered, ideally repair to the barrier within 24hrs. It is important to ensure that both the resource and barrier stock is available to ensure this can happen. If this is not possible then the most appropriate mitigation measure must be taken, this may be in the form of lane closure (or hard shoulder closure) and temporary speed limit. It should be noted that a lane closure, whilst it may provide some mitigation due to the additional distances to be travelled by an errant vehicle, is not a

substantive protection and may be little difference from close coning of a site. At peak times a lane closure can cause associated congestion and accidents and public dissatisfaction and ideally should not be used if no work is to be carried out. Another solution if repair cannot take place promptly is to install a temporary barrier; this can offer an overall lower risk solution. If a temporary barrier is required, it may be preferable to locate it adjacent to the damaged section to allow full lane usage and then relocate it when works need to be carried out.

The solution should ensure that the resultant risk at the site is as low as is reasonably practicable to the road users, any maintenance operatives and any 3rd parties that may be affected. The probability of an accident increases the longer the site is left but this increase in risk needs to be balanced against immediate repair during peak times and road worker safety if carrying out the repairs at night / in poor weather when maintenance operatives are most vulnerable.

The solution will depend on the length of time to repair/replace the affected system.

Medium Risk Sites: Where the aggregate score for an incident is between 23-13, the risk is medium and the probability of a secondary incident is much reduced. The aim should still be to repair the barrier as quickly as possible but this may be in excess of 24hrs. If immediate repair cannot be carried out, appropriate mitigation until this can occur may include; fully cone the gap, advance warning and/or advisory speed limit signs when left to await repair works (this will reduce the severity of an incident). A full lane closure in this situation could increase the overall risk by increasing the risk of associated accidents due to increased congestion.

Low Risk Sites: Where the aggregate score for an incident is <13 then the site is classed as low risk (the probability and severity are both low). Examples are, the central reserve barrier has minor damage over a small section or a short section of verge barrier is damaged. Immediate repair may offer little benefit and mitigation may include coning the gap only or may include no action until traffic is low.

3.3. Supplementary Guidance on Responding to Total Risk Scores

Table 1: Suitable Responses to Risk Assessment Matrix Scores

Phase	Potential Action	Suitability of Potential Actions to Total Risk Scores		
		<13 (Low Risk)	13-24 (Medium Risk)	>24 (High Risk)
Initial Response	Immediate Permanent Repair	Preferred[1] if TM has been set out to deal with the incident provided repair to barriers with higher risk scores elsewhere are not jeopardised, parts are available and significant congestion is not caused.		Required[1] if TM has been set out to deal with the incident[2] and parts are available. Acceptable if TM has to be set out specifically, provided it is not at times of peak flow.
	Leave lane/hard shoulder closures and/or speed restrictions in place until repairs can be made	Not acceptable	Acceptable, provided the repair is given priority over other medium risk repairs and a critical lane[3] is not closed.	Acceptable, only if a critical lane[3] is not closed.
	Fully/close cone the gap	Not acceptable because of the risks from cones being scattered compared to risks of the damaged barrier	Acceptable, provided they are set out before the site of the incident is re-opened[4] and the repair will be made within 7 days[5].	
	Install Temporary barrier[6]	Not required	Acceptable[7] if repair can't be made within 24 hours	
	Advance warning signs	Permissible on verge		
	No immediate repair or mitigation	Permissible	Not acceptable if the damage will not be repaired within 24 hours	
	Marker cone the gap	Permissible only as means of identifying the location of damage to maintenance crews. To be placed in the hard shoulder, unless placed in the central reserve before the incident is cleared.		
Completion of Repairs	Permanent repair within 24 hours	Acceptable if it can be done outside of peak flow provided repairs to barriers with higher risk scores elsewhere are not jeopardised	Preferred if it can be done outside of peak flow provided repairs to barriers with higher risk scores elsewhere are not jeopardised	Required if it can be done outside of peak flow
	Permanent repair within 7 days	Preferred if resources and materials are available, provided repairs to barriers with higher risk scores elsewhere are not jeopardised	Required if resources and materials are available, provided repairs to barriers with higher risk scores elsewhere are not jeopardised	Permissible only on grounds of resource and material constraints.
	Permanent repair after 7 days	Permissible only on grounds of resource and material constraints, provided: 1 risk assessment and mitigation measures have been reviewed and updated as necessary, and 2 repairs to barriers with lower risk scores elsewhere are not given higher priority		

[1] Lane closures and/or speed restrictions must be used as necessary to ensure road worker safety.
[2] Avoids risks of setting out TM again later.
[3] A critical lane is a lane which needs to remain open to satisfy predicted traffic demand, and, if closed, would lead to over saturation of the remaining carriageway capacity.
[4] To save road workers having to cross live traffic lanes, but do not delay the incident clearance solely to place marker cones.
[5] Due to the increasing risk of cones being scattered.
[6] May be implemented as an initial response or later in the repair.
[7] Use temporary barrier decision tool to help make the decision.

The potential actions listed in the second column should be considered in descending order down the table. The meanings of the terms used to describe suitability are summarised in the table 2.

Table 2: Meaning of terms describing suitability of responses to Risk Assessment Matrix Scores

Priority for Action	Meaning
Required	Must be done if resources and materials are available, unless there are extenuating circumstances
Preferred	Should be done unless there are good grounds
Acceptable	Can be done if required or preferred approaches have been ruled out
Permissible	A low priority and should not be chosen instead of required, preferred or acceptable approaches.
Not acceptable	Must not be done unless there are extenuating circumstances

4. Instruction

Service Providers must adopt this revised matrix (and it's supplementary guidance) in place of that provided in AMM68/06 (NMM 3.7.3) for the assessment and prioritisation of repairs to barriers following barrier strikes.

Annex A
The Risk Assessment Matrix

Date, location, nature and scale of damage*.	Parts required to repair damage, i.e. number of rails and posts	Date/time parts can be made available
		Date/time of permanent repair

Description of hazards and 3rd parties protected by the barrier

	Risk Factor	Risk Factor Scores	Applicable factors**	Allocated score
	Probability Factors			
1	High traffic flow: >30k/carriageway/day	3		
2	- - - : 20-30k/carriageway/day	2		
3	- - - : <20k/carriageway/day	1		
4	Length of barrier affected >80m***	5		
5	Length of barrier affected 50-80m***	3		
6	Length of barrier affected <50m***	2		
7	Accident history at site/location - High	5		
8	Accident history at site/location - Medium	3		
9	Accident history at site/location - Low	1		
10	Location near a major junction or tight curve	3		
	Probability Score			
	Severity Factors			
11	Feature behind barrier would be vulnerable (e.g. weak structure) and if struck could cause a secondary incident	2		
12	System used to protect 3rd parties, i.e. (central reserve barrier, bridge approach over road/rail, embankment near school etc)	5		
13	Barrier flattened: gap >20m	5		
14	- - : gap 5-20m	3		
15	- - : gap <5m	2		
16	HGV Flow: High (>15%)****	3		
17	- - : Average (12-15)****	2		
18	- - : Low (<12%)****	1		
19	Traffic speeds: Cars – Ave ≥120kph (75mph)	3		
20	- - : Cars – Ave 80-120kph (50-75mph)	2		
21	- - : Cars – Ave <80kph	1		

	(50mph)			
	Severity Score			
	Total Risk Score (Probability + Severity scores)			
	Risk Classification*** (high ≥24, medium 13-23, low <13)			

***** Take photos at the location if possible to record damage and record features at the location (and attach to the form) these may be useful to help prioritisation decisions.

****** Tick those that apply

******* This is the total length of barrier affected by category 1 damage and rendered sub-standard, rather than just the length of the visible damage. For untensioned barrier, the total length affected is the minimum before and after lengths of barrier specified in Table 3-1 TD19 plus the length of visible damage. For other types of barrier, such as tensioned barrier, it may be necessary to consult manufacturer's recommendations to establish the affected length; this is likely to be the length of the tensioned sections.

******** Note: quite often freight/HGV flow is highest off-peak and therefore this should be taken into consideration.

********* High if aggregate score ≥24, medium if aggregate score between 13 and 23, low if aggregate score <13.

Table 3-1 from TD19 for minimum lengths of barrier

Safety Barrier Containment Level	MINIMUM "full height" lengths of safety barrier1	
	In advance of hazard	Beyond hazard
Normal (N2 or N2)	30 m	7.5 m
Higher (H1 or H2)	30 m	10.5 m
Very High (H4a)	45 m	18 m

The table below should be used to record the prioritisation given to the damaged barrier whilst waiting for permanent repair.

Timescale from occurrence or detection of damage	**Priority position relative to other damaged barriers (x^{th} out of y)**	**Number of outstanding damage barriers at time**		
		High risk	**Medium risk**	**Low risk**
At time of occurrence or detection				
After 24 hours				
After 2 days				
After 3 days				

After 4 days				
After 5 days				
After 6 days				
After 7 days				
Beyond 7 days				

Examples of Completed Risk Assessment Matrices:
Example (A)

Date, location, nature and scale of damage*.	**Parts required to repair damage, i.e. number of rails and posts**	**Date/time parts can be made available**
4 panels of a central reserve barrier on a busy motorway are flattened and the gap is approx 25m (normally only occurs when there is a cross over accident). The HGV usage is average. There are no other hazards in the central reserve, no accident history.		**Date/time of permanent repair**
Description of hazards and 3rd parties protected by the barrier		

	Risk Factor	**Risk Factor Scores**	**Applicable factors****	**Allocated score**
	Probability Factors			
1	High traffic flow: >30k/carriageway/day	3	✓	3
2	- - - : 20-30k/carriageway/day	2		
3	- - - : <20k/carriageway/day	1		
4	Length of barrier affected >80m***	5		
5	Length of barrier affected 50-80m***	3	✓	3
6	Length of barrier affected <50m***	2		
7	Accident history at site/location - High	5		
8	Accident history at site/location - Medium	3		
9	Accident history at site/location - Low	1	✓	1
10	Location near a major junction or tight curve	3		
	Probability Score			7
	Severity Factors			
11	Feature behind barrier would be vulnerable (e.g. weak structure) and if struck could cause a secondary incident	2		
12	System used to protect 3rd parties, i.e. (central reserve barrier, bridge approach over road/rail, embankment near school etc)	5	✓	5
13	Barrier flattened: gap >20m	5	✓	5
14	- - : gap 5-20m	3		
15	- - : gap <5m	2		
16	HGV Flow: High (>15%)****	3		
17	- - : Average (12-15)****	2	✓	2
18	- - : Low (<12%)****	1		
19	Traffic speeds: Cars – Ave ≥120kph (75mph)	3		
20	- - : Cars – Ave 80-120kph (50-75mph)	2	✓	2

21	- - : Cars – Ave <80kph (50mph)	1		
	Severity Score			14
	Total Risk Score (Probability + Severity scores)			21
	Risk Classification********** (high ≥24, medium 13-23, low <13)			medium

Example (B)

Date, location, nature and scale of damage*.	**Parts required to repair damage, i.e. number of rails and posts**	**Date/time parts can be made available**
4 panels of a central reserve barrier on a busy motorway are flattened and the gap is approx 25m. The HGV usage is high. There are no other hazards in the central reserve; the site has had 2 previous accidents.		
		Date/time of permanent repair
Description of hazards and 3rd parties protected by the barrier		

	Risk Factor	**Risk Factor Scores**	**Applicable factors****	**Allocated score**
	Probability Factors			
1	High traffic flow: >30k/carriageway/day	3	✓	3
2	- - - : 20-30k/carriageway/day	2		
3	- - - : <20k/carriageway/day	1		
4	Length of barrier affected >80m***	5		
5	Length of barrier affected 50-80m***	3	✓	3
6	Length of barrier affected <50m***	2		
7	Accident history at site/location - High	5	✓	5
8	Accident history at site/location - Medium	3		
9	Accident history at site/location - Low	1		
10	Location near a major junction or tight curve	3		
	Probability Score			11
	Severity Factors			
11	Feature behind barrier would be vulnerable (e.g. weak structure) and if struck could cause a secondary incident	2		
12	System used to protect 3rd parties, i.e. (central reserve barrier, bridge approach over road/rail, embankment near school etc)	5	✓	5
13	Barrier flattened: gap >20m	5	✓	5
14	- - : gap 5-20m	3		
15	- - : gap <5m	2		
16	HGV Flow: High (>15%)****	3	✓	3
17	- - : Average (12-15)****	2		
18	- - : Low (<12%)****	1		
19	Traffic speeds: Cars – Ave ≥120kph (75mph)	3		
20	- - : Cars – Ave 80-120kph (50-75mph)	2	✓	2
21	- - : Cars – Ave <80kph (50mph)	1		
	Severity Score			15
	Total Risk Score (Probability + Severity scores)			26
	Risk Classification*** (high ≥24, medium 13-23, low <13)			high

Example (C)

Date, location, nature and scale of damage*.	**Parts required to repair damage, i.e. number of rails and posts**	**Date/time parts can be made available**
2 panels of a central reserve barrier on a busy motorway are damaged and the area is approx 10m. The HGV usage is average. The location is near a junction; the site has had no previous accidents.		
		Date/time of permanent repair

Description of hazards and 3rd parties protected by the barrier

There is a weak bridge support upstream of damaged system

	Risk Factor	**Risk Factor Scores**	**Applicable factors****	**Allocated score**
	Probability Factors			
1	High traffic flow: >30k/carriageway/day	3	✓	3
2	- - - : 20-30k/carriageway/day	2		
3	- - - : <20k/carriageway/day	1		
4	Length of barrier affected >80m***	5		
5	Length of barrier affected 50-80m***	3		
6	Length of barrier affected <50m***	2	✓	2
7	Accident history at site/location - High	5		
8	Accident history at site/location - Medium	3		
9	Accident history at site/location - Low	1	✓	1
10	Location near a major junction or tight curve	3	✓	3
	Probability Score			9
	Severity Factors			
11	Feature behind barrier would be vulnerable (e.g. weak structure) and if struck could cause a secondary incident	2	✓	2
12	System used to protect 3rd parties, i.e. (central reserve barrier, bridge approach over road/rail, embankment near school etc)	5	✓	5
13	Barrier flattened: gap >20m	5		
14	- - : gap 5-20m	3		
15	- - : gap <5m	2		
16	HGV Flow: High (>15%)****	3		
17	- - : Average (12-15)****	2	✓	2
18	- - : Low (<12%)****	1		
19	Traffic speeds: Cars – Ave ≥120kph (75mph)	3		
20	- - : Cars – Ave 80-120kph (50-75mph)	2	✓	2
21	- - : Cars – Ave <80kph (50mph)	1		
	Severity Score			9
	Total Risk Score (Probability + Severity scores)			18
	Risk Classification*** (high ≥24, medium 13-23, low <13)			medium

Example (D)

Date, location, nature and scale of damage*.	**Parts required to repair damage, i.e. number of rails and posts**	**Date/time parts can be made available**
2 panels of a verge barrier on a busy motorway are damaged, and the area is approx 10m. The HGV usage is average.. The site has had 1 previous accident.		**Date/time of permanent repair**

Description of hazards and 3rd parties protected by the barrier

There is a signpost that is exposed (but if struck would cause no secondary incident).

	Risk Factor	**Risk Factor Scores**	**Applicable factors****	**Allocated score**
	Probability Factors			
1	High traffic flow: >30k/carriageway/day	3	✓	3
2	- - - : 20-30k/carriageway/day	2		
3	- - - : <20k/carriageway/day	1		
4	Length of barrier affected >80m***	5		
5	Length of barrier affected 50-80m***	3		
6	Length of barrier affected <50m***	2	✓	2
7	Accident history at site/location - High	5		
8	Accident history at site/location - Medium	3	✓	2
9	Accident history at site/location - Low	1		
10	Location near a major junction or tight curve	3		
	Probability Score			7
	Severity Factors			
11	Feature behind barrier would be vulnerable (e.g. weak structure) and if struck could cause a secondary incident	2		
12	System used to protect 3rd parties, i.e. (central reserve barrier, bridge approach over road/rail, embankment near school etc)	5		
13	Barrier flattened: gap >20m	5		
14	- - : gap 5-20m	3		
15	- - : gap <5m	2		
16	HGV Flow: High (>15%)****	3		
17	- - : Average (12-15)****	2	✓	2
18	- - : Low (<12%)****	1		
19	Traffic speeds: Cars – Ave ≥120kph (75mph)	3		
20	- - : Cars – Ave 80-120kph (50-75mph)	2	✓	2
21	- - : Cars – Ave <80kph (50mph)	1		
	Severity Score			4
	Total Risk Score (Probability + Severity scores)			11
	Risk Classification*** (high ≥24, medium 13-23, low <13)			low