

Priority Assessment of Integrated Transport Measures

Scheme Assessment Frameworks

Scheme Categories

The programme for Integrated Transport Measures is made up of basically two categories of scheme. Casualty Reduction Measures and Non-Casualty Reduction Measures. Within this broad distinction however, there are a number of different types of scheme as follows:

Crash Remedial Measures	CRM
Speed Limits	SPD
Interactive Speed Signs	ISS
Speed Cameras	SC
Traffic Calming	TC
Bus Priority Schemes	BUS
Cycle Schemes	CY
Footways	FY
Pedestrian Crossing Facilities	PXF
Traffic Management	TM
HGV Management	HGV

For each category of scheme a specific assessment criterion or scoring system has been devised. The system for each type of scheme is listed below. It is important to note that although the priority numbers calculated from these formulae or scores look similar, they are not necessarily directly comparable. The systems are used to rank schemes of the same type only.

CRM: (Crash Remedial Schemes)

CRMs are schemes whose major benefit is saving injuries. A CRM is a scheme which is designed specifically to reduce crashes at a particular location by the introduction of engineering measures. It may involve traffic management, pedestrian facilities or cycling facilities.

Casualty reduction measures can only take place at sites where there is a consistent pattern of crashes over a specified period (usually three years). It is nationally accepted that up to 80% of road crashes result solely from driver error, consequently unless the site under examination has at least 3 crashes with a consistent pattern of features, during a three year period, it is extremely unlikely that CRMs will have a reducing effect on the crash record at that site. If a remedial measure is not geared to a specific type of crash it is possible that despite the introduction of measures crash figures will rise over the next three years.

The Road Safety Team carry out detailed analysis of crash records and, if remedial works can be justified, produce a CRM report. A CRM scheme must have a report in order to be entered into the Small Improvements Programme.

The priority rating of a CRM is calculated according to its cost and the annual crash savings. The rating is thus calculated using the following equation:

$$\text{Priority Number} = \frac{(\text{current cost of crash (£69,270)} \times \text{number of crashes saved in 3 years}) \times 100}{\text{Scheme cost} \times 3}$$

CASUALTY REDUCTION MEASURES IMPLEMENTED IN 1997

District	Location	Before	After	CRM	Cost	Scheme
Ashford	A2070 Bad Munstereifel Rd/B2042 Romney Marsh Rd	9	8	787	35512	Anti skid, new signs
Ashford	A2070 Bad Munstereifel Rd/Oribtal Park	6	4	786	22056	Anti skid, new signs
Ashford	M20 Junction 10 (M20/A2070/A292)	29	15	785	114236	New signal control, anti skid
Ashford	A292 Hythe Road/Hunter Road & Sprotlands Ave	53	37	721	33712	Junctions highlighted with colour surface
Canterbury	A2050 Harbledown by-pass	10	8	747	13695	Traffic islands
Canterbury	High Street Herne Bay/Station Road	10	2	725	21862	One way order in side road, blip kerbs
Dover	A258 Ringwould village, Deal	16	7	507	2500	Extend 40 limit new & improved signs
Dover	A258 Dover Road/Ringwould Road	12	1	726	2758	New signs anti skid surfacing
Dover	A256 Barville Cross roads	11	0	549	102020	New roundabout, part of new A256
Dover	A258/Station Road	7	4	755	18213	Visibility improvements
Gravesham	B262 Perry Street	7	7	751	38851	blip kerbs
Maidstone	A20 King Street to Square Hill	27	20	722	37750	Anti skid surface
Maidstone	A274 Warmlake cross rds to High St. Sutton Valence	20	15	789	5650	Resurface and new signs
Maidstone	Dean Street/Workhouse Lane, East Farleigh	5	0	792	6780	Resurface and new signs
Maidstone	A229 Loose Road (Wheatsheaf to Cripple Street)	4	1	682	13140	Pedestrian refuges, hatch markings
Maidstone	A26 Tonbridge Rd (Queens Rd to Bower Mount Rd)	25	8	742	17740	Hatch marking, blip kerbs, refuges
Shepway	A260 Selsted bends	10	3	765	23243	Anti skid, new signs and lines
Swale	B2231 Brambledown, Isle of Sheppey	13	8	735	58553	New 40 limit, new lighting, resurface, new footpath, new signs
Thanet	A254 Ramsgate Road/College Road	9	5	716	16736	Pedestrian & right turn phase at signals
Thanet	A28 Canterbury Road George V Avenue, Margate	6	2	715	20000	Refuges and signs
Thanet	Dumpton Park Drive, Broadstairs	12	4	718	58711	Refuges, blip kerbs, lighting
Thanet	Northdown Rd from Zion Place to St Pauls Rd.	12	5	719	10858	Blip kerbs
Thanet	B2050 Manston Road	8	1	538	16000	Resurface and new signs
Thanet	A299 St Nicholas Roundabout	18	14	839	18177	New signs
Ton & Mal	Gleaming Wood Drive, Walderslade	5	12	824	93	Lane markings
Ton & Mal	A228 Seven Mile Lane/Martins Lane, Nettlestead	4	2	702	11000	Resurface & hatch marking
Tun Wells	A264 Langton Road/Rusthall Road	6	3	568	12976	Right turn facility
Tun Wells	A267 Frant Road (St Marks Rd to Warwick Park)	11	4	731	6500	Extend 30, Traffic calming, new signs
Tun Wells	A26 St Johns Rd/Queens Rd	15	8	780	6550	Shell grip
		380	208		745872	

20 mph Speed Limit Assessment Criteria

Assessment Factors for 20mph Zones.

Stage 1

Use of the tick box below will provide assessors with an immediate guide on the suitability of a scheme. If a proposed scheme includes any of the factors on the list the scheme should not be progressed.

Factor	If yes tick
Zero crash record in the area under study	
The introduction of the limit would produce an unenforceable length of speed limit either side of the new limit (minimum 800m circ. Roads 1/93).	
An assessment of speed on the roads within the area indicate that traffic calming measures would be required and:- a. It is known that there would be local opposition to the introduction of such. b. The road is "A" class c. One or more of the roads within the intended zone are regularly used by emergency service vehicles, or is part of the main route to a hospital or fire station.	
The area under study is greater than 1km square	

Stage 2: The Priority Crash Assessment Form.

The form set out below should be used to assess the schemes priority number..

Scheme Name:

District HU:

Crash Data for the 5 Year Period:

Crash type	Crash Factor	Score
Severity of all crashes in study area	Each Fatal crash = 5	
	Each Serious crash = 3	
	Each Slight crash = 1	
Child pedestrians and pedal cyclists	each injury = 3	
Other pedestrians and pedal cyclists	each injury = 2	
All other types	each injury = 1	
	Total Score	

Stage 3: Additional factors for assessing the priority of a 20mph zone.

The following information should be collected and placed in the form provided below. It will be used to choose between schemes with similar priority to ensure that the schemes with the highest crash savings potential are implemented first.

1. The area chosen should be compact.
2. Traffic flows.
3. High density housing with little or no off street parking facilities. The DETR's document "Tomorrow's Roads - Safer for everyone" states that - "children in the lowest socio-economic group (SEG) are five times more likely to be killed as pedestrians than their higher SEG counterparts". To assess this grouping the density of housing should be carefully considered. Schemes identified in these areas should be given a high priority.
4. Primary school within zone or nearby. Note shops or other attractions.
5. Current five year crash record of the chosen area includes children pedestrians and there is a 10 year history of child pedestrian serious and or fatal injuries.
6. Sites where 85th percentile speeds are below 24mph could be funded separately from the TRO budget.
7. Schemes which require traffic calming should not exceed £25,000. Schemes could be phased to keep costs below the figure.
8. Scheme will require local consultation, with Road Safety Education given a leading role with any school within the area or close by and with any local residents groups.
9. Schemes which have the potential to be turned into Home Zones should be encouraged.

20 mph Zone: Information Sheet

Scheme Name:

District HU:

Factor	Criteria	Information (example)	Comments
1	Size of Area	400m x 500m	
2	Traffic Flow (16 hour count)	1,500 vpd main road, 650 vpd side roads	
3	Housing Density	1890's terraces with on street parking	
4	Distance to Nearest School	650m	
4	Number and Type of Local Shops	2 Corner shops 1 Sub-Post Office, 1 Hairdressers	
5	10 year Child Pedestrian Injury Record	2 slight 1 serious (all male, under 10)	
6	Measure 85 th Percentile Speed	Main Road 31 mph	
7	Scheme Cost	£21,500	

Assessment Factors for 20mph Limits.

Stage 1

Use of the tick box below will provided assessors with an immediate guide on the suitability of a scheme. If a proposed scheme includes any of the factors on the list the scheme should not be progressed:

Factor	If yes tick
Zero crash record in the area under study	
The introduction of the limit would produce an unenforceable length of speed limit either side of the new limit (minimum 800m circ. Roads 1/93).	
An assessment of speed on the roads within the area indicate that traffic calming measures would be required and:- a. It is known that there would be local opposition to the introduction of such. b. The road is "A" class c. One or more of the roads within the intended zone are regularly used by emergency service vehicles, or is part of the main route to a hospital or fire station.	
The area under study is between 500m and 1,000m	
The current speed limit of the proposed scheme is above 30 mph	
The speed limit preceding the proposed scheme is 50 mph or greater	

Stage 2: The Priority Crash Assessment Form

The form set out below should be used to assess the schemes priority number.

Scheme Name: **District HU:**

Crash Data for the 5 Year Period: **to:**

Crash type	Crash Factor	Score
Severity of all crashes in study area	Each Fatal crash = 5	
	Each Serious crash = 3	
	Each Slight crash = 1	
Child pedestrians and pedal cyclists	each injury = 3	
Other pedestrians and pedal cyclists	each injury = 2	
All other types	each injury = 1	
Total Score		

Stage 3: Additional factors for assessing the priority of a 20mph Limit

The following information should be collected and placed in the form provided below. It will be used to choose between schemes with similar priority to ensure that the schemes with the highest crash savings potential are implemented first.

1. Length of speed limit should be short and compact. However the minimum recommended length for a 20 mph speed limit is 500m (TA 9/99). Although no maximum length is given a maximum of 1000m is suggested.
2. Length and nature of speed limits either side of the proposed limit.
3. Sites should include local shops and or primary school.
4. Schemes where there are no or limited lengths of footway (such as Cobham) should be noted.
5. Traffic flow should be light (under 8,000 vpd)
6. Sites where measured 85th percentile speeds are below 24mph could be funded separately from the TRO budget. Sites where speeds are above an 85th percentile of 24 mph will need some form of engineered traffic calming. Before proceeding with these schemes preliminary consultation would need to take place with the parish council to ensure that there would be local acceptance of the need for such measures which might include some street lighting.
7. The length of road under study should have a minimum five year record of 3 injury crashes. Sites where this includes pedestrians will achieve a higher priority.
8. Details of child pedestrian casualties over a ten year period should be included.
9. Schemes should not exceed £25,000.

20 mph Zone: Information Sheet

Scheme Name:

District HU:

Factor	Criteria	Information (example)	Comments
1	Size of Area	750m	
2	Speed Limit either side	500m south, 30 mph 700m north, 40 mph	
3	Shops (Describe)	1 local grocers shop and Post Office	
3	Primary School	No, but within 500m	
4	Details of Footways within scheme	None one side, part and substandard other side	
5	Traffic Flow	4,500 vpd	
6	Measure 85 th Percentile Speed	32 northbound, 33 southband	
6	Local support for Traffic Calming Measures	yes	
7	5 year Injury Record	0 fatal, 2 serious, 3 slight including 2 pedestrians.	
8	10 year Child pedestrian Injury Record	1 serious, aged 10 male, 7 years ago.	
9	Scheme Cost	£19,800	

IS: Interactive Speed Signs

A. Criteria for site selection

1. All sites are to be between 60 and 200m from the start of the posted speed limit sign.
2. The section of road between the posted sign and the interactive sign must be straight.
3. There must be sufficient footway or road side verge to install the sign (sign 900mm square).
4. There should be little or no vegetation between that will block the view of the sign or affect the working of the radar equipment.
5. There should be no significant natural or engineered feature within approximately 200m of the interactive sign which would effect vehicles speeds.
6. The sign should wherever possible not be intrusive to property and early consultation should be sought to see if objections are likely.
7. Average vehicle speeds should be at least 5mph above the posted speed limit in the area of the proposed sign.

B. Priority Rating Assessment for KCC expenditure

If the criteria for site selection are satisfied then the crash record and vehicle speeds shall be considered to determine relative priority. A poorer crash record and higher vehicle speeds will have a higher priority.

Speeds

As a minimum requirement a hand held speed check covering 100 vehicles off peak times should be carried out, where priority scores from above are the same or similar then the sites with greater speed would be given priority.

SC: Safety Cameras

The safety camera scoring system

1. Consider sections of road typically between 1.5 and 3km in length. Where possible changes in speed limit within the study area should be avoided although changes from 30 to 40mph are acceptable.
2. The length of road and the number of crashes (current 3 year period) are divided to give the crash rate per km.
3. The severity rate is achieved by scoring 5 points for each fatal crash, 3 points for each serious crash and 1 point for each slight crash.
4. Any crash where the crash reports suggests high speed as a factor are given 2 points. This would include crashes involving:-
 - a. single vehicle loss of control
 - b. overtaking moving vehicles
 - c. +ve breath tests
 - d. the crash description mentions excessive speed.

Shunt type crashes, unless speed is specifically mentioned do not score.

5. All pedestrian crashes are given 2 points.
6. All pedal cycle crashes are given 2 points.

Note

In 4, 5, and 6 above the maximum score for any crash is two points i.e. a high speed pedal cyclist hitting a pedestrian would only score 2 points not 6.

The scores are then added together to give a total score.

TC: Traffic Calming

The Priority Rating Formula

The priority number for traffic calming schemes using vertical deflections will be assessed using the following formula:-

Annual Accident Reduction =

$$\frac{0.8 (AP) + 0.5 (AO)}{3} = AAR$$

Where: AP = the number of pedestrian accidents in 3 years
AO = the number of other saveable accidents in 3 years
AAR = annual accident reduction

Benefits of reducing speeds expressed as a notional accident saving =

for 30 mph areas

$$\frac{(85^{\text{th}} \text{ percentile} - 30)}{10} \times 0.5 = SB$$

then

$$\frac{\text{Average cost of accident (AAR + SB)}}{\text{Estimated Scheme cost}} \times 100 = \text{PN (priority number)}$$

BUS: Bus Priority Schemes

Bus Priority schemes are evaluated according to an estimation of the time savings to bus passengers. This is valued using standard valuations of time, supplied by DTLR. The valuations of time reflect the cost of workers time to employers for those travelling during working time. They also value individuals own time. The priority number is the annual value of time savings to bus occupants minus the annual value of any extra time incurred by other road users all divided by the cost of the scheme and multiplied by 100. The following values for priority assessment are in use:

Value of Time:	for an average vehicle	£9.02 per hour
	for a bus of average occupancy	£56.39 per hour

If **patronage** numbers are known, use the following values instead:

per hour for the bus driver	£10.81
per hour for passengers not in work time	£3.62
per hour for bus passengers in working time	£121.24

Vehicle Operating Costs

For cars travelling at	30 mph	7.92p per mile	} Increase by 15% for average vehicle
	40 mph	7.94p per mile	
For buses travelling at	30 mph	47.86p per mile	
	40 mph	45.63p per mile	

For bus lanes, in addition to the formula above, the following principles are also applied.

Bus Lane Criteria

The Criteria

- the bus lane should be part of a route corridor strategy and must increase the number of people movement along that corridor;
- a bus lane should only be promoted if it is the most cost effective way to achieve the required benefit having considered alternative methods of bus priority or traffic management;
- there must be a minimum bus frequency of 6/hour during peak periods and peak period only operation should be considered;
- there must be at least an informal partnership between the Highway Authority, the District Council and the operator(s). For instance if KCC provides a bus lane the operator(s) should commit to specified frequencies, improved services and quality over a period of at least three years to ensure good use is made of the facility. Alternatively the operator may part or fully fund the facility;
- the bus lane must provide a measurable benefit in terms of:
 - total number of people movements (car and bus) increased per hour
 - time saving/person using the lane;
 - reliability of service journey time;designed to lead to an increase in bus usage;
- any disbenefit to other road users should be evaluated, minimised and clearly explained in any proposal;
- the bus lane will also be used by licensed hackney carriages, and cycles if of appropriate width, and consideration should be given to other users such as goods vehicles or high occupancy vehicles;
- there must be no detriment to safety for any category of highway user;
- there must be a commitment from the operator to monitor patronage and reliability, and from the Highway Authority to monitor journey times;
- the need for enforcement should be considered in any proposals.

CY: Cycling Schemes

A few cycle schemes may be prioritised as CRMs in cases where a clear reduction in casualties has been specifically identified. However, non-CRM schemes are proposed to be prioritised using the following formula. Priority rating = Crash Factor + Cycle Volumes Factor + Cost Factor + School Factor + Amenity Factor + Integration Factor.

Factor	Score	Description
Crash Factor (C)	0-10	Number of cycle crashes/km over the section of road for a 5 year period broken down into severity.) = none (slight) + 2 (serious + fatal) length of cycle route in km to a maximum score of 10.
Cycle Volumes am peak (V)	0-10	am peak cycle flows per hour. 100 cyclists = 10 points 50 cyclists = 5 points 0 cyclists = 0 points Pro rata in between
School (S)	0-4	Number of schools serviced per km Number of schools cycleway serves length of cycle route in km
Amenity/Recreation (A)	0-6	2 points if cycle route services major shopping areas 2 points if cycle route is recreational or services recreational areas (i.e., sports centres) 2 points if cycle route services major employment areas (i.e., industrial estates)
Strategic/Linking/Integration (I)	0-10	2 points if cycle route is defined in urban transport strategies and/or local plans as a locally important route 2 points if cycle route develops a strategic corridor (national or regional route) 2 points if cycle route is a strategic corridor and links with an existing cycleway 2 points if cycle route links two other existing cycleways 2 points if cycle route connects to a bus, rail or LRT Station.
Total	0-40	

$$\text{Cycle Number} = \frac{(C + V + S + A + I)}{\text{Cost of construction per metre}} \times 100$$

FY: Footway Schemes

Footway priority is calculated using a degree of risk, based around the following factors:

- V vehicle flow. All vehicles using the road over a 24 hour period. If 12 hour count (0700 - 1900) data should be factored up by 1.2.
- P pedestrian usage. Where there is no footway present, pedestrians should be counted walking on the verges and carriageway on both sides. Where a footway is currently provided on one side, pedestrians should only be counted on the side where no footway exists.
- L length. The total length of the proposed footway.
- S percentage of children. Pedestrians under the age of 16 are 2.5 times more likely to be involved in an accident. Therefore, if all pedestrians are under 16, a factor of 2.5 should be used, if all pedestrians are adults, a factor of 1 should be used. Values in between should be pro-rata, using the following equation $2.5 \text{ (fraction of children)} + 1 \text{ (fraction of adults)}$. **For example, if 50% of all pedestrians are children $2.5 (0.5) + 1(0.5) = 1.75$. If 75% of all pedestrians are children, $2.5 (0.75) + 1(0.25) = 2.125$.**
- B minimum visibility. Highway design standards recommend a sight distance of 100m for traffic travelling around 40 - 45 mph. Therefore, if the minimum sight distance is less than 100m, the visibility factor is increased to reflect the increased danger to pedestrians. **Therefore, if visibility is 100m or more, a factor of 1 is used, when this decreases to 10m, a factor of 2 should be used.**
- W deficient width. 7.5 metres is sufficient width for two lorries to pass and still leave room for a pedestrian to walk. Any shortfall increases the degree of risk. If the road is at least 7.5 metres wide, use a factor of 1. **Where there is a deficient width, use the following equation $(1 + \text{deficient width})$ (e.g., if road is 5 metres in width $(1 + 2.5)$). The maximum value of 3.5 has been adopted.**
- F existing footway. Where there is no existing footway, a factor of 1 should be used. Where there is an existing footway on one side then
 $F = 2 \times \frac{\text{road width}}{\text{Length}}$
- C cost of construction per metre

Then: **$M \text{ Number} = \frac{V \times P \times L \times S \times B \times W \times F}{C}$**

PXF: Pedestrian Crossing Facilities

The priority rating of a pedestrian crossing facility is based on the PV^2 value, adjusted for certain site factors and further adjusted for according to the cost of the scheme.

An initial twelve hour traffic survey (7.00 a.m. - 7.00 p.m.) will give the volume of traffic and the volume of pedestrians crossing the road within 50m of the possible crossing site. For each hour the volume of pedestrians crossing hour be multiplied by the square of the volume of traffic. The arithmetic average of the four highest PV^2 values should be calculated. If this figure is less than 0.2×10^8 , the following adjustment factors should be calculated:

E	percentage of elderly (E) pedestrians. If there are less than 15%, a factor of 1 should be used, if there are more than 15%, use the following calculation	<u>(100+E)</u> 115
C	percentage of unaccompanied children (C). If there are less than or equal to 15%, use a factor of 1. If there are more than 15%, use the following calculation:	<u>(100+C)</u> 115
P	percentage of pedestrians with prams/pushchairs or in wheelchairs. If there are more than 5%, use the following equation:	<u>(95+2P)</u> 105
W	width of road. If less than or equal to 7.3 metres, use a factor of 1. If more than 7.3 metres use the width divided by 7.3. If the road is already divided, use half the road width.	<u>W</u> 7.3
T	time spent crossing the road. If time is equal or less than 20 seconds, use a factor of 1 . If time is between 20 and 40 seconds, use 1.2 between 40 and 60, use 1.4 over 60 seconds, use 1.6	
S	vehicle speeds. If the 85th percentile is under 30 mph, use a factor of 1 if 30 - 40 mph, use 1.1 if over 40 mph, use 1.4	

Once the following factors have been calculated, they should be multiplied together

$$\text{adjustment factors} = (E \times C \times P \times W \times T \times S)$$

and then entered into the following equation:

$$\text{Priority Number} = PV^2 \times 10^{-8} \times \text{adj factors} \times \frac{\text{standard cost of crossing}}{\text{estimated cost}}$$

Standard cost	
Pedestrian Refuse Island	£5,000
Zebra Crossing	£12,000
Pelican or Puffin Crossing	£28,000
Toucan Crossing	£30,000

TM: Traffic Management Schemes

This category is for schemes which cannot be included in any of the other categories. This category includes **congestion relief, traffic calming (non-CRM), direction signing and amenity lighting** schemes. **The priority rating is zero.** Schemes entered into the bid under this heading should be submitted with a report summarising the benefits of their implementation.

HGV: Heavy Goods Vehicle Management Schemes

This category is for schemes involving traffic management (traffic calming, direction signing etc.) that are specifically targeted towards managing flows of Heavy Goods Vehicles. As with normal traffic management schemes the priority rating is zero. Schemes entered into the bid under this heading should be submitted with a report summarising the benefits of their implementation.