Review of Pedestrian Crossing Guidance LTN 1/95

Final Report

Prepared for

Scottish Road Research Board

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Contents

1. Introduction

CH2M was appointed by the Scottish Road Research Board to undertake a review of Local Transport Note 1/95: *The Assessment of Pedestrian Crossings* (DMRB TA 68/96: *The Assessment and Design of Pedestrian Crossings*). The study identified issues raised by stakeholders on the guidance and input into the development of an improved assessment.

The approach overall was one of close co-operation with the key stakeholders in Scotland who would implement revised guidance. These stakeholders were made up of Trunk Road Operating Companies (Operating Companies) and local authorities. Information was gathered on current practices and the issues that this generated. Ideas were invited on how to improve the guidance to establish a consistent, evidenced based common approach to the future assessment of pedestrian crossing provision.

By including the key stakeholders in the decision-making process, the study sought to generate the best ideas from the experts in the field and achieve buy in to the study recommendations. This will assist in establishing a structured and evidence based decision making process to determine whether a crossing is required and if so, the most appropriate type. The decision-making process should be based on a consistent approach and, as a consequence, be used to defend the finding to install or not install crossings.

The key tasks of the study are set out below.

Literature Review

A short literature review, including guidance and other assessment processes, to identify any practices that may be considered by the study.

Information Gathering on Current Practice

A review of current practices by key stakeholders in Scotland in the assessment of pedestrian crossing provision. A questionnaire captured the methodology of assessments as currently undertaken and invited comments on the issues.

A review of a sample of controlled pedestrian crossings assessments implemented in recent years was undertaken to further inform the study on current practice and to appraise consistency between the methodologies applied.

Workshop

The key stakeholders attended a workshop where current practices were reviewed. The key objective of the workshop was to identify best practice from the stakeholders' feedback and obtain buy in to a consistent and quantifiable method of assessment.

Findings, Conclusions and Recommendations

The final task involved preparation of a report detailing the findings of the study including a review of the consultation and stakeholders' feedback. The study finishes with conclusions and recommendations.

2. LTN 1/95: Overview

2.1 Introduction

This section reviews *LTN 1/95: The Assessment of Pedestrian Crossings,* the guidance used in the UK for assessing the need for a pedestrian crossing.

2.2 LTN 1/95: The Assessment of Pedestrian Crossings

LTN 1/95 provides an assessment method to guide the provision and type of 'standalone' pedestrian crossings. This Note supersedes TA 52/87: *Design Consideration for Pelican and Zebra Crossings*, which set out an assessment method based on PV^2 values. The historic PV^2 guidance determined the requirement for a crossing based on the relationship between the number of pedestrians and number of vehicles.

The assessment method in LTN 1/95 is in two parts: The Site Assessment and an Option Assessment. The aim of the methodology is to provide decision makers with a framework to provide a clear record of the grounds for any decisions.

For the Site Assessment as much information as possible should be gathered. It is suggested that surveys be undertaken approximately 50 metres either side of the site, although the exact length is subject to site conditions and maybe several 100 metre lengths if there is no one specific crossing place proposed. Information to be recorded includes: carriageway/ footway type and widths, pedestrian/ vehicle flow and composition, average crossing time, difficulty of crossing, local public transport provision, vehicle to pedestrian visibility (and vice versa), accident records, lighting provision and surrounding land usage. An example of a Site Assessment Record is given in Appendix B of LTN 1/95.

The Site Assessment informs the Option Assessment to consider the type of actions required. These include: do nothing, traffic management (e.g. refuge island or footway build out), zebra crossing or signal controlled crossing. Further factors not considered in the Site Assessment, such as cost and representations, may inform the Option Assessment. An example of the Option Assessment Framework is included in Appendix C of LTN 1/95.

The criteria for the provision of traffic signal controlled pedestrian crossings in LTN 1/95 can be subject to different interpretations resulting in an inconsistency in provision across the network.

Historic guidance to determine the requirement for a crossing was dependent on the level of pedestrians and vehicles. Other criteria such as sufficient gaps in traffic flow for pedestrians have also been applied. There are also instances of pedestrian crossings supplied on an ad hoc basis based on perceived need in the vicinity (school children, disabled and elderly pedestrians etc.).

The inconsistent provision of pedestrian crossings can lead to external pressure to provide crossings where engineering judgement does not merit provision.

3. Literature Review

3.1 Introduction

This section reviews guidance and other assessment processes, to identify any practices that could be considered by the study.

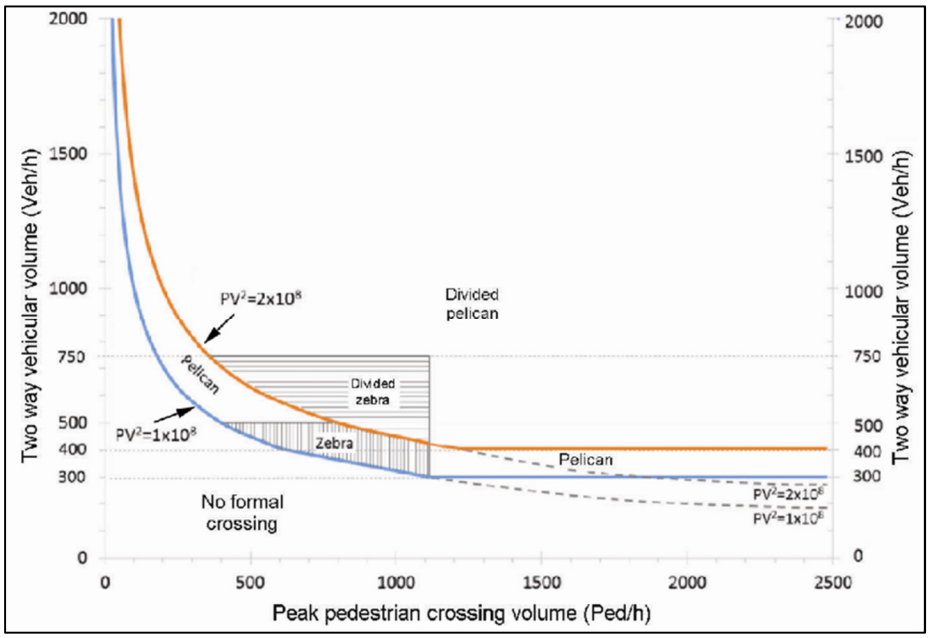
3.2 United Kingdom

3.2.1 TA 52/87 – Design Considerations for Pelican and Zebra Crossings (DoT, 1987)

This document was the predecessor of the current LTN 1/95 guidance. TA 52/87 outlined the threshold values for the PV^2 assessment. Where V is the two-way hourly flow of vehicles and P is the number of pedestrians crossing 50m either side of the site.

An average of the four highest PV^2 values would then be assessed against the threshold values to determine the level of pedestrian provision that should be considered. Although this document has now been superseded for over two decades, many local authorities still use this assessment to some degree to provide justification for a pedestrian crossing.

The PV^2 graph below shows the zone between $1x10^8$ and $2x10^8$ that a controlled facility should be considered. According to a research paper, '*Re-Examination of PV^2 Criteria for Determining Pedestrian Crossing Warrants*' (Jain, Rastogi, 2017) a number of local authorities in UK have modified the original warrant criteria to address the inflated values to reflect the larger volumes of vehicles (and pedestrians) during peak periods on the roads.



PV^2 Based Pedestrian Crossing Facility Graph [DfT: 1987]

3.2.2 TA 91/05: Provision for Non-Motorised Users (DMRB: Vol.5 Section 2 Part 4, 2005)

The TA 91/05 advice note specifies guidance on trunk road pedestrian facilities, including crossings at junctions. Consideration for Non-Motorised Users (NMUs) should be considered at all stages during the design and this note highlights that there is no single correct solution for the provision of NMU facilities, with much depending upon local issues and the ultimate objective of the scheme. The document shares the concept of 'hierarchy of provision' as detailed in LTN 1/04 *Policy, Planning and Design for Walking and Cycling.*

The objective of this hierarchy is to ensure that the needs of the most vulnerable road users are considered without directly giving priority to pedestrians and cyclists in every location. Hence, traffic reduction should be considered first as this not only will improve provisions for NMUs but also will have wider network benefits.

	Pedestrians	**Cyclists**
Consider First	Traffic reduction	Traffic reduction
	Speed reduction	Speed reduction
⋮	Reallocation of road space to pedestrians	Junction treatment, hazard site treatment, traffic management
	Provision of direct at-grade crossings	Redistribution of the carriageway bus lanes, widened nearside lanes etc,
⋮	Improved pedestrian routes on existing desire lines	Cycle lanes, segregated cycle tracks constructed by reallocation of carriageway space, cycle tracks away from roads
Consider Last	New pedestrian alignment or grade separation	Conversion of footways/footpaths to unsegregated shared-use cycle tracks alongside the carriageway

3.2.3 HD 42/17: Walking, Cycling and Horse-riding Assessment and Review (DMRB: Vol. 5 Section 2, 2017)

This document replaces the HD 42/05 *Non-Motorised User Audits Note*. The process in this document is the responsibility of the designer and not an external auditor. Its purpose is to set out the procedures required to implement walking, cycling and horse riding opportunities for highway schemes from the earliest stage of the design process to allow for opportunities to improve and/or add NMU provisions throughout.

The process consists of two parts, The Assessment Stage and the Review Stage.

The first part is to review current NMU provisions/ conditions. This includes the assessment of local policies and strategies, collision data, key trip generators, public transport provisions, traffic and pedestrian surveys, stakeholder engagement and consideration for all user groups.

The second part is the ongoing review of user opportunities throughout the scheme up until construction stage. It is a continuous review of the previous reports, ensuring that opportunities identified at the Assessment Stage have been considered and implemented, where achievable.

3.2.4 Designing Streets (Scottish Government, 2017)

Designing Streets was the first policy document for street design in Scotland. It sets out a policy that street design should meet six qualities: distinctive, safe and pleasant, easy to move around, welcoming, adaptable and resource efficient.

This provides a framework that local authorities should follow when designing streets and consideration should first and foremost be given to pedestrian users, and, therefore, by aligning pedestrians to the six

framework qualities listed above. The result may be to consider a controlled crossing if informal crossings will not provide sufficient provision.

3.3 Ireland

3.3.1 Pedestrian Crossing Specification and Guidance, (NRA, April 2011)

Transport Infrastructure Ireland, which formed as a merger of the National Road Authority (NRA) and the Rail Procurement Agency (RPA) uses guidance which was created by the previous NRA.

The guidance is very similar to the United Kingdoms. The approach taken considers more numerous factors in assessing the need for a crossing through 'on-site surveys' and 'pedestrian and traffic surveys'.

This current guidance supersedes previous guidance from 1981 which based the need for crossings only on pedestrian and traffic flow (PV^2) and accident data. This guidance was contained in RT206 Warrants for Pedestrian Crossing Facilities. Accordingly, the warrants in RT206 are superseded by the criteria and procedures set out in Chapter 2 of the Pedestrian Crossing Specification and Guidance.

However, a PV^2 value may still be used as an additional means of justification or used as a way of ranking number of different possible crossing sites in priority order.

3.4 Australia and New Zealand

3.4.1 Planning and Designing for Pedestrians: Guidelines (Department of Transport Western Australia, 2011)

This document discusses walking strategies in Western Australia (WA) and the guidelines were collaborated with input from many stakeholders including Departments of Transport, Planning, Disability Services Commission, Main Roads WA, WA Local Government Association, Public Transport Authority, The Royal Automobile Club of WA and the Institute of Public Works Engineering Australia WA.

For a signalised controlled crossing, a set of thresholds are set out that if any of the stated conditions exist then a crossing can be warranted. These conditions are primarily based on vehicle numbers and pedestrian numbers of specific time periods. However, this document states that pedestrian and vehicle delay should be considered along with the location and demographic of road users who will use the crossing.

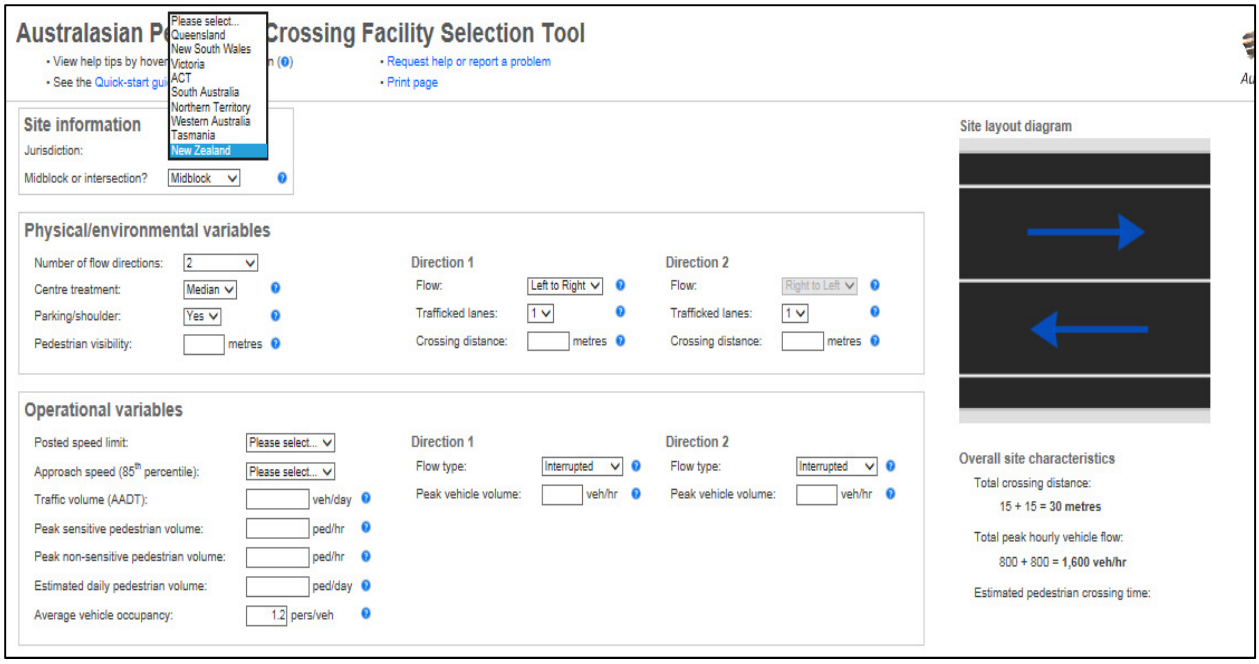
3.4.2 Australasian Pedestrian Facility Selection Tool [V1.2] (Austroads Research Report AP-R472A-17, 2017)

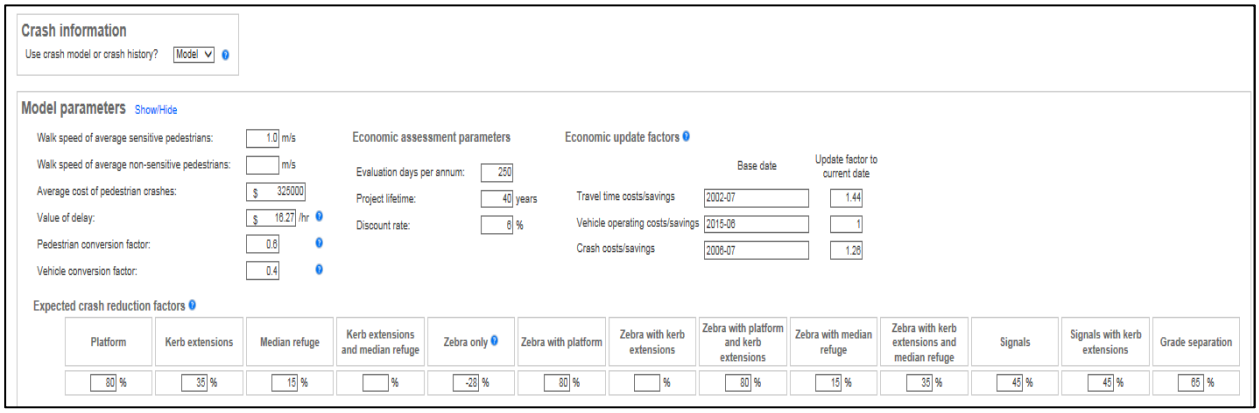
Austroads is the Association of Australian and New Zealand Road Transport and Traffic Authorities. They publish guidelines, codes of practice and research reports that promote best practice and address the many challenges that face operating companies in providing a common approach to operations and aim to implement these solutions across Australia and New Zealand. The assessment webtool is a product of one of these research projects (NS 1912) and is fully documented in the research report '*Development of the Australasian Pedestrian Crossing Facility Selection Web Tool*.' Access to the tool is here: Austroads Pedestrian Facility Selection Tool

The Pedestrian Facility Selection Tool is designed to help Australian and New Zealand practitioners select the most appropriate type of pedestrian crossing.

By entering various site variables into the tool including physical, environmental, operational and accident history, the tool evaluates these and presents each potential option with a Benefit Cost Ratio (BCR). This tool can be used to assess both mid-block and intersections.

Screenshots of the tool are shown below.





The tool requires you to select the jurisdiction for which you are assessing the pedestrian crossing, as the tool will reflect the standards for the different states in Australia and New Zealand. The Site Assessment part of tool is broken down into:

- Physical and Environmental – This covers number of lanes, central reservations, crossing distance (carriageway width) and pedestrian visibility.
- Operational – This considers AADT and Peak Traffic for both vehicles and pedestrian numbers as well as the 85th percentile speeds on the road.
- Accident History – Historic accident information (specifically involving pedestrians) can be entered if it is available. Alternatively, the option to use a 'crash model' can be applied if this information is not available or it is believed that accidents are underreported.
- Model Parameters – Walking speeds are entered for sensitive and non-sensitive pedestrians. Default values have been given for value of delay, economic parameters and expected crash reduction factors for each available option and derived from the New Zealand Transport Agency Economic Evaluation Manual and Pedestrian Planning and Design Guide. These parameters change between jurisdictions and can be manually adjusted by the user.

Based on the inputs from the Site Assessment part of the tool, the Option Assessment page opens as below:

Feasible facilities

	Suitable for site?	Built parameters	Construction cost	Show in final output? Select all/none/feasible
Platform	Yes	Vehicle negotiation speed: Please select...	$	☑
Kerb extensions	Yes	Total crossing distance after treatment: metres	$	☑
Median refuge	Yes	Direction 1 crossing distance after treatment: metres Median refuge width: metres Direction 2 crossing distance after treatment: metres	$	☑
Kerb extensions and median refuge	Yes	Direction 1 crossing distance after treatment: metres Median refuge width: metres Direction 2 crossing distance after treatment: metres	$	☑
Zebra only	No	*No parameters*	$	☐
Zebra with platform	Yes	*Applies vehicle negotiation speed from **Platform** above*	$	☑
Zebra with kerb extensions	No	*Applies total crossing distance from **Kerb extensions** above*	$	☐
Zebra with platform and kerb extensions	Yes	*Applies vehicle negotiation speed from **Platform** and total crossing distance from **Kerb extensions** above*	$	☑
Zebra with median refuge	No	*Applies distances and refuge width from **Median refuge** above*	$	☐
Zebra with kerb extensions and median refuge	No	*Applies distances and refuge width from **Kerb extensions and median refuge** above*	$	☐
Signals	Yes	Signals activated by pedestrian call button? Please select... Delay before green pedestrian phase: seconds Pedestrian walk + clearance time: seconds Pedestrian platoon size: peds	$	☑
Signals with kerb extensions	Yes	*Applies parameters from **Signals** and total crossing distance from **Kerb extensions** above*	$	☑
Grade separation	Maybe	*N/a*	$	☑

For each option, parameters primarily regarding to pedestrian crossing length and delay (when signalised crossing is considered) are entered. An indicative construction cost will be required as the output of the tool is a Benefit Cost Ratio (BCR) which is equal to the (Total benefits)/ (Construction cost). The tool assumes construction is in the current financial year and does not include health benefits or attractiveness.

Outputs from the tool allow comparisons to be made for each suitable option: pedestrian and vehicle delays (time and costs), crash rates, and a BCR. This provides information to permit the user to make an informed decision on the most appropriate measure to implement:

	Suitable for site?	Pedestrian delay	Vehicle delay	Predicted crash rate	CSD	ASD	SISD
No facility		51 sec	0 sec	0.05 /year	197 m	73 m	127 m
Platform	No						
Kerb extensions	Yes	45 sec	0 sec	0.03 /year	188 m	73 m	127 m
Median refuge	Yes	10 sec	0 sec	0.02 /year	74 m	73 m	127 m
Kerb extensions and median refuge	Yes	10 sec	0 sec	0.02 /year	69 m	73 m	127 m

Pedestrian delay cost	Pedestrian delay saving	Vehicle delay cost	Crash cost	Safety saving	Total benefits	BCR
$ 128,000			$ 160,000			
$ 113,000	$ 15,000	$ 0	$ 104,000	$ 56,000	$ 71,000	2.2
$ 26,000	$ 103,000	$ 0	$ 70,000	$ 90,000	$ 192,000	6.2
$ 24,000	$ 104,000	$ 0	$ 70,000	$ 90,000	$ 194,000	4.1

3.5 USA

3.5.1 Manual on Uniform Traffic Control Devices; Part 4 Highway Traffic Signals Chapter 4C, (U.S. Department of Transportation, 2003)

The USA follows guidelines located within Chapter 4 of the Manual on Uniform Traffic Control Devices (MUTCD). This provides guidance on "warrants" for the installation of traffic signals.

Warrant 4, which relates to the installation of a pedestrian crossing, either at a mid-block or at a junction, should be considered if one of the following two criteria is met:

> A. The pedestrian volume crossing the major street at an intersection or midblock location during an average day is 100 or more for each of any four hours or 190 or more during any one hour; and
>
> B. There are fewer than 60 gaps per hour in the traffic stream of adequate length to allow pedestrians to cross during the same period when the pedestrian volume criterion is satisfied.

Where there is a divided street having a median of sufficient width for pedestrians to wait, the requirement applies separately to each direction of vehicular traffic.

The guidance recommends that before a decision to install a traffic control signal is made, there should be consideration to implement other measures, such as warning signs and flashers, school speed zones, school crossing guards, or a grade-separated crossing.

3.6 Canada

3.6.1 Pedestrian Crossing Control Manual for British Columbia (Ministry of Transportation and Highways, Second Edition, 1994)

The Pedestrian Crossing Control Manual for British Columbia (PCCMBC) is the guideline document for pedestrian crossing assessment in Canada, which uses the relationship between the number of pedestrians and the number of crossing opportunities that is equal to the number of accepted vehicular gaps.

Weightings are used in Canada to quantify vulnerable users. They use a system equivalent to the relationship between vehicles and Passenger Car Units (PCUs) known as Equivalent Adult Unit (EAU). EAU values are as follows:

Pedestrian Group	EAU Value
Adults	1
Seniors (>65)	1.5
Children (<12)	2
Physically Challenged	2

3.7 India

3.7.1 Guidelines for Pedestrian Facilities (Indian Road Congress: 103, 1988)

India follows guidelines in the Indian Road Congress Document (IRC: 103, 1988). The document was updated in 2012 but the threshold values have remained the same, and are the same as those previously used in TA52/87. The Indian assessment also indicates that other factors including vehicle speeds, pedestrian waiting times, and delay to vehicles should be considered but as these are "subjective" to the reviewer, they have no weighing on the final PV^2 value.

3.8 Summary

The table below summarises the variable factors considered in the pedestrian crossing assessment:

Criteria / Document	Ped Volume	Vehicle Volume	Vehicle Speed	Crossing Opportunity	Ped Delay	Vulnerable Users	Vehicle Delay	Number of Lanes	Proximity to Nearest Crossing	Accident History
LTN 1/95 (UK)										
NRA (IRL)										
MUTCD (USA)										
PCCMBC (CAN)										
(AUS & NZ)										
IRC 103 (IND)										

		Quantitative		**Qualitative**		**Not Assessed**

Although the table indicates that the LTN 1/95 takes into consideration all the above factors, they are primarily all on a qualitative basis. Whereas the other assessments use a quantitative method when the outputs can be compared alongside graphs, tables or threshold levels that determine the level of pedestrian provision that should be provided.

4. Questionnaire Methodology

A questionnaire was developed by CH2M following a series of Internal workshops and correspondence with Transport Scotland. The aim was to understand if local authorities and Operating Companies are using the current LTN 1/95 guidance as intended or if they use alternative methods, and if so what methods they use. It is important to understand the criticisms and weaknesses of the current LTN 1/95 guidance if recommendations and a standard approach is to be adopted going forward. The questionnaires were sent out in October 2017 via an email with a link to an online survey. The survey format was favoured as it was deemed a more user-friendly interface for the participants and less likely to have any transposition errors.

A request was also made for the Operating Companies to provide examples of crossing assessments for pedestrian facilities that have both been taken forward and are now implemented on street and those that did not justify a controlled facility.

5. Questionnaire & Responses

The questionnaire was sent to the three operating companies (Amey, Scotland TranServ and BEAR Scotland) and 24 out of the 32 local authorities for whom there were contact details. The Operating Companies and 14 local authorities responded. A response was also received by Transport Scotland.

The results from the questionnaire are set out below, note that **Question 1** asked the respondents name and organisation, only.

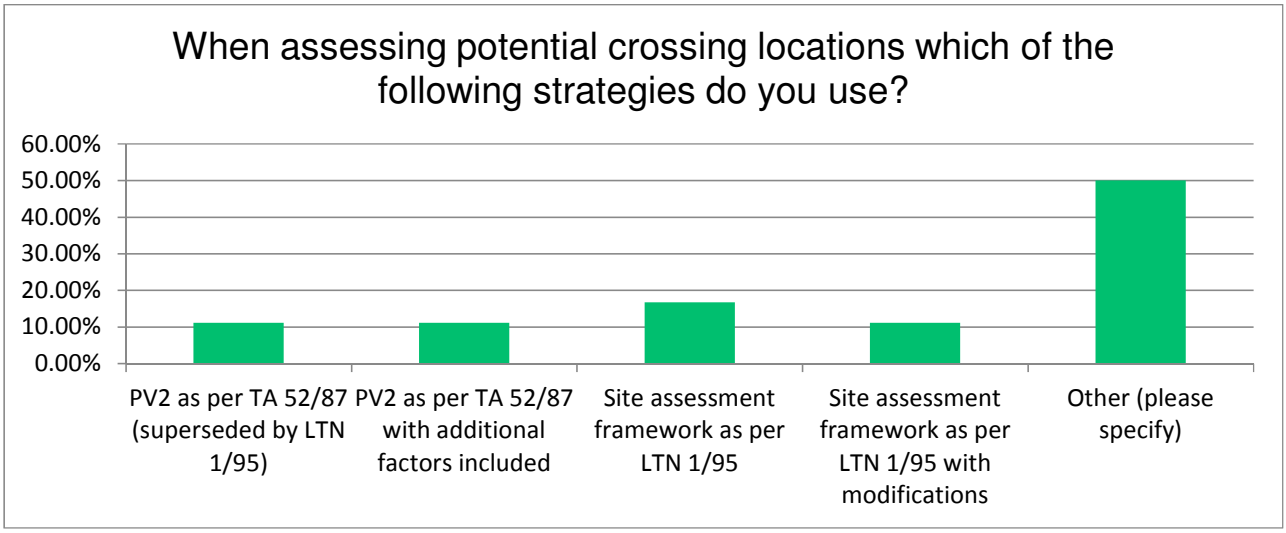
Question 2: *What three main criteria in the provision of a pedestrian crossings do you consider the most important*?

The responses below show that no two authorities/organisations have the same priority list when it came to pedestrian crossing assessment (note: response 7 & 8 were from the same authority, response 12 was anonymous).

Respondent No.	1	2	3
1	PV^2 and accidents	Vulnerable users e.g. children, elderly and disabled pedestrians	Trip ends
2	Pedestrian and other vulnerable user safety	Safety of other road users	Crossing demand
3	Connectivity and need	Pedestrian safety and numbers	Specific requirements of local vulnerable peds in area
4	Safety	Visibility	Accessibility
5	Volume of traffic - presence of sufficient gaps	Time taken to cross the carriageway - for users appropriate to location/area	Overall benefits - destinations/journey generators
6	Severance of pedestrians from amenities	Access for all users, particularly vulnerable users.	Reduction in injury accidents
7 & 8	Necessity	Suitability	Location
9	Safety	Location	Visibility
10	Pedestrian crossing volumes	Vehicle flow volumes	Traffic speeds
11	Number of peds crossing	Number of vehicles using the road	Existing road geometry
12	PV^2	Accident statistics	Schools
13	A safe location for pedestrians/cyclists to cross	A location most deserving, i.e. on a suitable desire lines.	The location does not create unnecessary delays
14	Existence of a pedestrian desire line (or latent demand)	Typical characteristic of probable user groups	Projected level of use
15	Vehicle speeds at proposed location.	Traffic volumes with sufficient crossing opportunities or not	Location - visibility and conspicuity.
16	Pedestrian demand	Pedestrian and vehicle safety	Cost
17	Reducing Accidents	Improving for vulnerable users	Integrating with Vehicle progression
18	Vulnerable pedestrians	Community/travel links	Accident record
19	Difficulty in crossing	Number of pedestrians crossing	Traffic flow
20	Pedestrian volume	Clear visibility of site	Traffic volume/speed

These results highlight that the prioritisation of the different criteria for assessing pedestrian crossings is not consistent across the Operating Companies and local authorities.

Question 3: *When assessing potential crossing locations which of the following strategies do you use?*



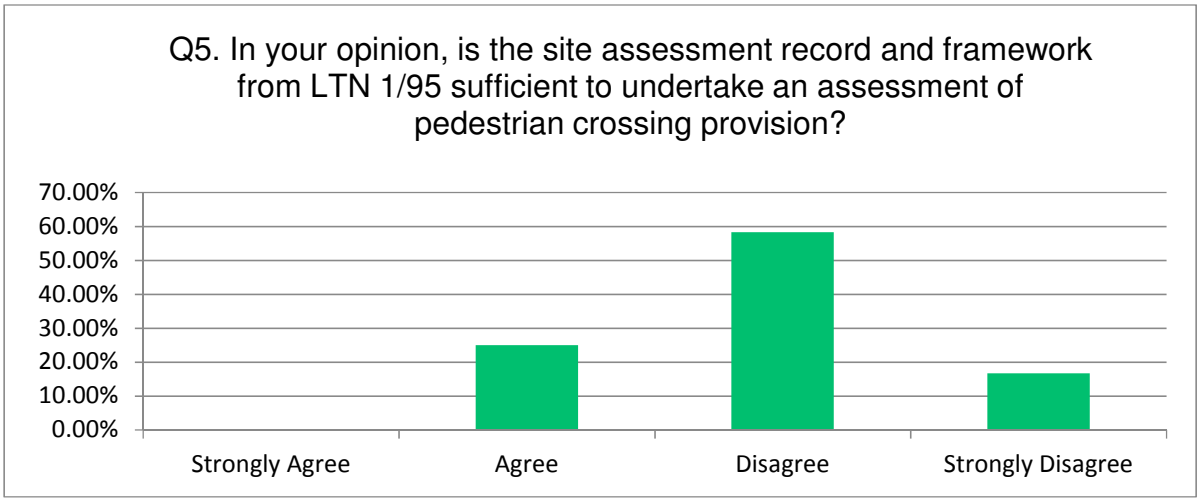
The results show that only three responses (15%) stated that they exclusively use the LTN 1/95 as intended, with the majority using their own procedures, which is generally a variation of the historic PV[2] and current LTN guidance.

Other documents referenced when assessing pedestrian crossings are Designing Streets, SCOTS Framework and reference to the report '*Pedestrian Perceptions of Road Crossing Facilities'* (SCOTS, 2000).

Question 4: *If the site assessment record and framework from LTN 1/95 is not used, how is the assessment undertaken to provide a level of assurance that supports and quantifies the recommendation and that the most appropriate solution has been chosen?*

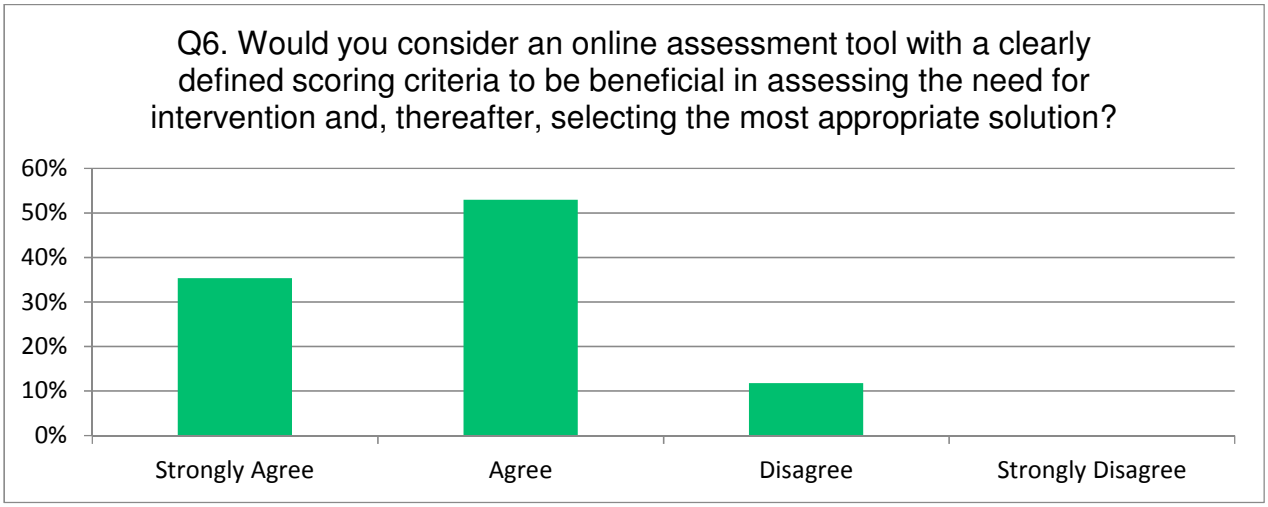
All respondents either did not answer this question or noted that they had detailed this information in the previous question comments.

Question 5: *In your opinion, is the site assessment record and framework from LTN 1/95 sufficient to undertake an assessment of pedestrian crossing provision?*



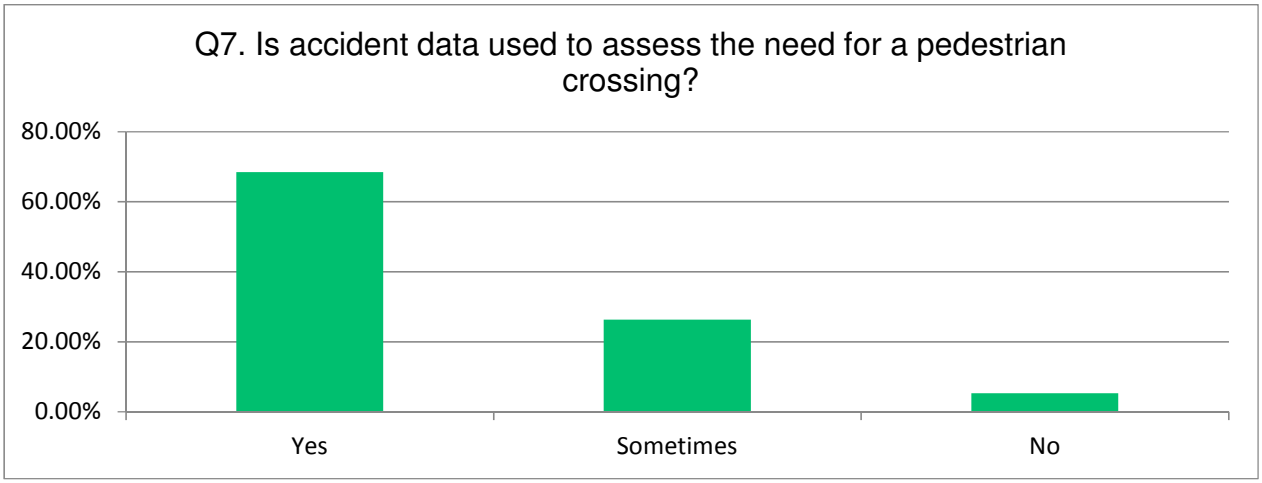
The majority of respondents disagreed or strongly disagreed that the current provision is sufficient to undertake an assessment of pedestrian crossing provision, there is clearly an opinion that it is not fit for purpose.

Question 6: *Would you consider an online assessment tool with clearly defined scoring criteria to be beneficial in assessing the need for intervention and, thereafter, selecting the most appropriate solution?*



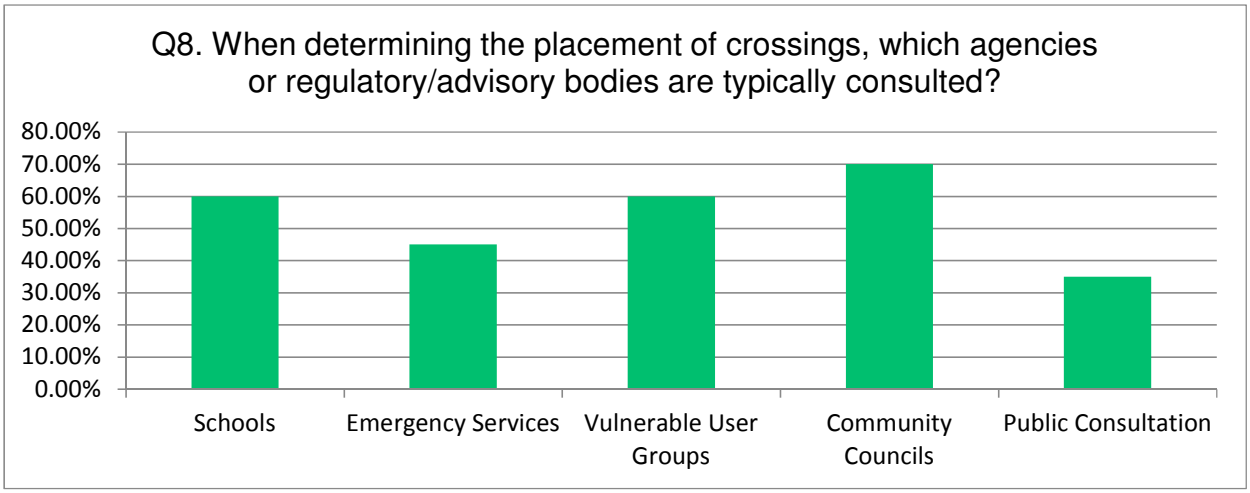
Results showed almost 90% of respondents would agree to using an online assessment tool to aid them in the decision process. This could be a tool similar to that developed by Austroads and used across Australia and New Zealand, as described in the literature review section of this report.

Question 7: *Is accident data used to assess the need for a pedestrian crossing?*



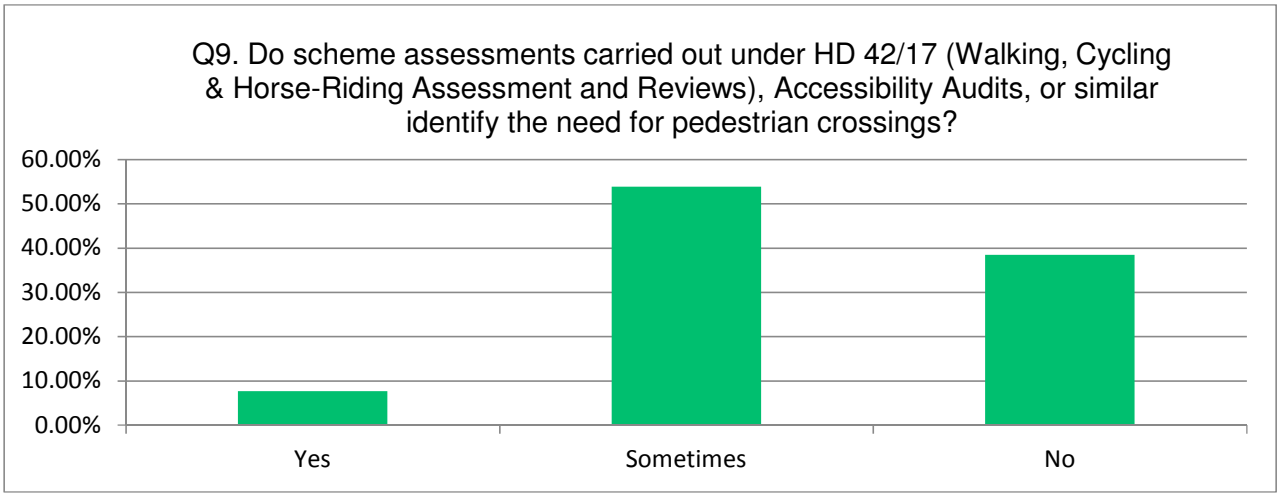
As shown, every response was either 'Yes' or 'Sometimes' when asked if accident data was used for assessing pedestrian crossings. It is therefore deemed a critical element when assessing a crossing. Similarly, the Austroads tool (as detailed in the literature review) considers accident data as a major criterion in the assessment.

Question 8: *When determining the placement of crossings, which agencies or regulatory/advisory bodies are typically consulted?*



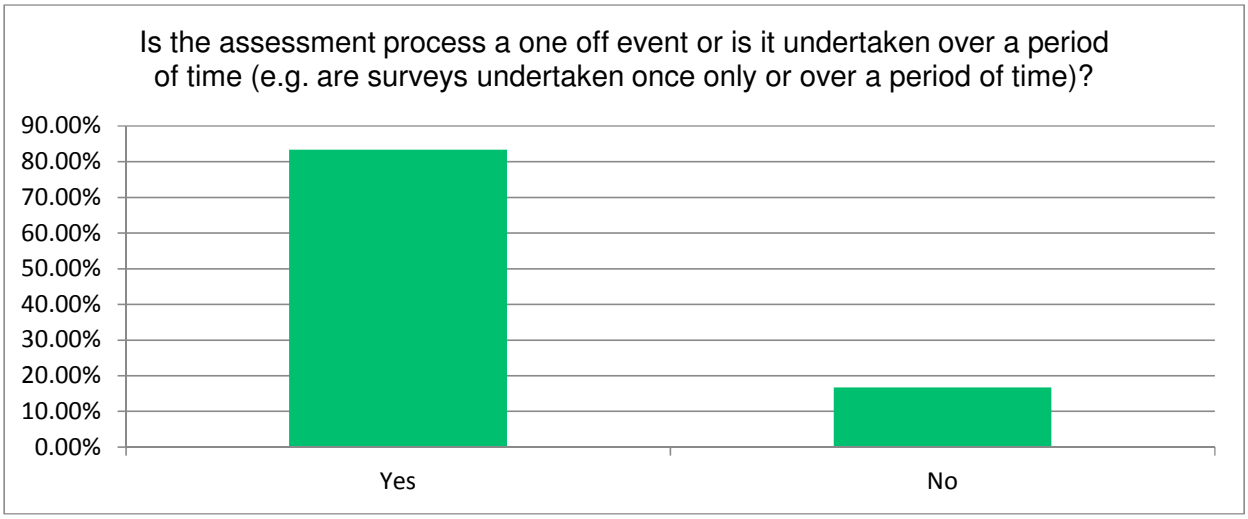
20% of respondents stated that they do not undertake any consultation process to feed into the assessment of a pedestrian crossing, with one affirming that consultation process is only carried out after a location has been identified, to allow for small local adjustments.

Question 9: *Do scheme assessments carried out under HD 42/17 (Walking, Cycling & Horse-Riding Assessment and Reviews), Accessibility Audits, or similar identify the need for pedestrian crossings?*



There is some linkage between HD 42/17 and the identification of the need for pedestrian crossings. However, five respondents replied that HD 42/17 did not input into this process.

Question 10: *Is the assessment process a one-off event or is it undertaken over a period of time (e.g. are surveys undertaken once only or over a period of time)?*



For approximately 85% of the local authorities the assessment process is considered a one-off event.

For the purposes of analysing and reporting Questions 11 to 15 have been grouped together as they were all either a Yes, Sometimes or No answer and visualising the responses on one graph will allow an easy comparison of the criteria.

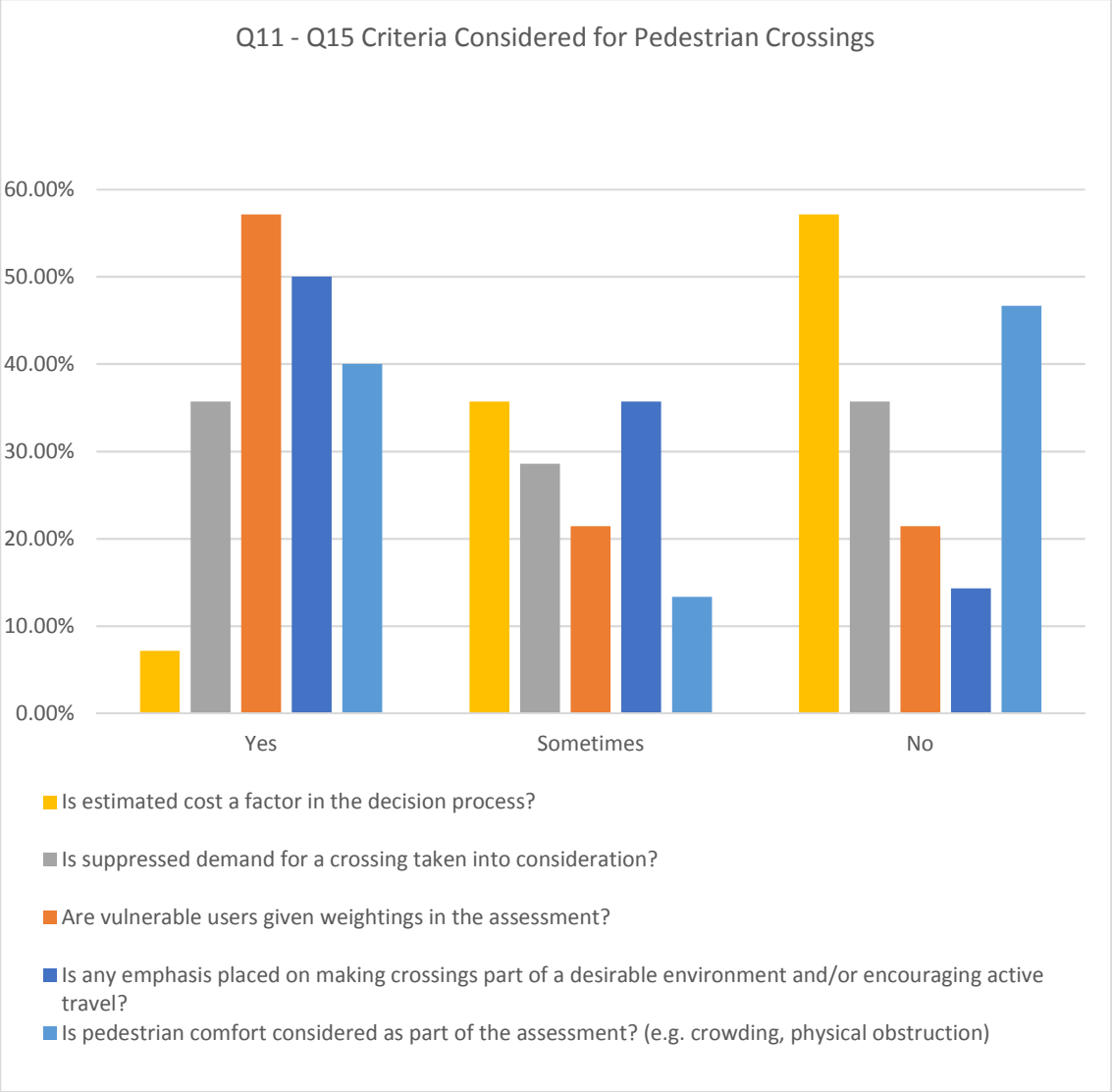
Questions 11: *Is estimated cost a factor in the decision process?*

Questions 12: *Is suppressed demand for a crossing taken into consideration?*

Questions 13: *Are vulnerable users given weightings in the assessment?*

Questions 14: *Is any emphasis placed on making crossings part of a desirable pedestrian environment and/or encouraging active travel?*

Questions 15: *Is pedestrian comfort considered as part of the assessment (e.g. crowding, obstructions)?*

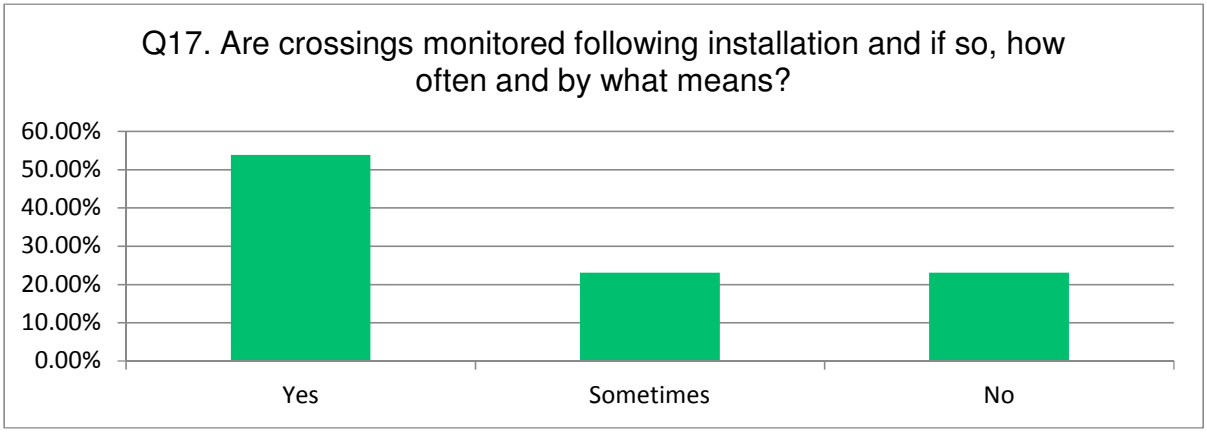


The results indicate that there is no consistent approach. One respondent's commented: "*this is especially an issue where two local authorities share the same stretch of road, and one council's assessment indicates the need for a crossing while the others does not*."

Question 16: *When assessing pedestrian delay, what is the maximum delay considered as acceptable to pedestrians* (In seconds)*?*

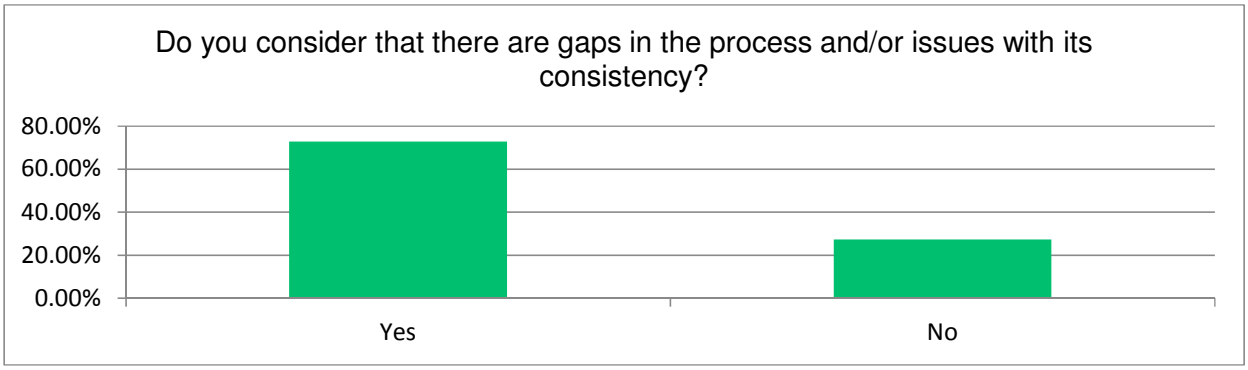
The responses indicate that this is generally site specific but a maximum waiting time between 20 – 60 seconds is considered at a midblock and 120 seconds at a junction based on site specific conditions. This is what would be expected based on standard industry guidelines to cycle times / pedestrian waiting times.

Question 17: *Are crossings monitored following installation and if so, how often and by what means?*



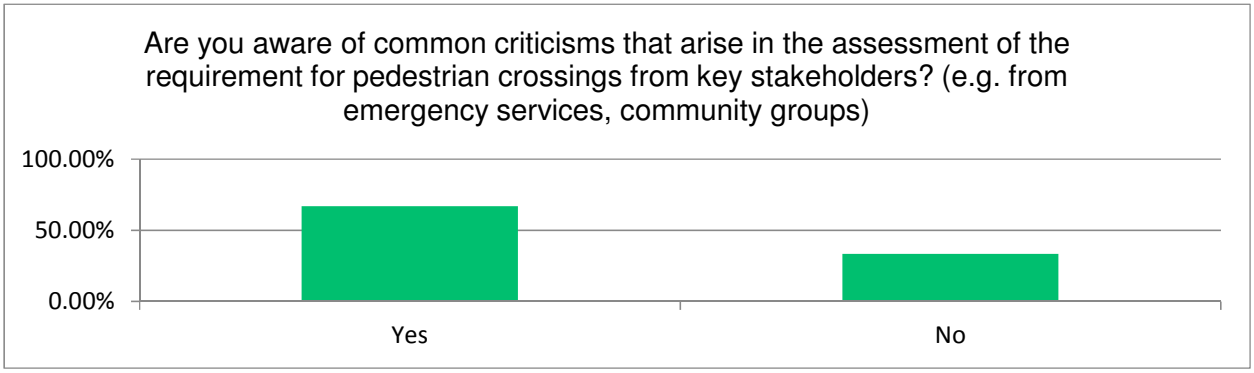
The responses suggest that only half of the crossings installed are then monitored post-commission. Those that are monitored are generally through remote monitoring, pedestrian surveys and/or public comments. There could be scope for further investigation into crossings that are no longer 'fit for purpose' and what assessment procedures were used to initially commission the site, i.e. PV^2, LTN 1/95 or other.

Question 18: *Do you consider that there are gaps in the process and/or issues with its consistency?*



There is a consensus that there are gaps in the process but approximately 25% of respondents disagreed.

Question 19: *Are you aware of common criticisms that arise in the assessment of the requirement for pedestrian crossings from key stakeholders? (e.g. from emergency services, community groups)*



Two thirds of respondents feel that there are gaps in the current LTN 1/95 process with common criticisms being the "subjective nature" of the assessment and the lack of a structured prioritisation. Respondents that use the PV^2 prefer it as it gives a definitive answer that could be taken forward to a decision and a simple means of comparing with other crossings. Also, it is not influenced by public and

political demands. However, other respondents contradict this as they have received criticism as they were perceived to be putting a numerical assessment before safety rather than considering other variables such as vehicle speeds, vulnerable users, and desire lines.

It is seen that whether LTN 1/95 or PV^2 is used respondents still receive criticism, generally when a crossing is deemed unnecessary but being requested by local communities. With two thirds of the respondents consulting these groups they evidently have a strong influence. The groups primarily involved are Schools, Vulnerable User Groups and Community Councils. Several responses stated that the Police are always consulted.

5.1 Summary

Except for three respondents, LTN 1/95 guidance is not used exclusively to assess pedestrian crossings. Most of the respondents use their own procedures, which is generally a variation of the historic PV^2 and current LTN 1/95 guidance. Within these procedures the criteria for assessing pedestrian crossings is not consistent. Further, there was no consistency in the consultations undertaken and the level of outside pressures being applied to the decision making process.

There was a recognition by the majority of the respondents that LTN 1/95 was not sufficient to undertake an assessment of pedestrian crossing provision. The use of an online assessment tool with clearly defined scoring criteria received strong support from the respondents.

6. Pedestrian Crossing Assessment Examples

6.1 Introduction

As part of a data gathering exercise, pedestrian crossing assessment reports were collected to ascertain current practice and to appraise consistency between them. Six assessment reports were supplied, four from Scotland Transerv and two from BEAR Scotland. Appendix A lists the reports.

The methodology applied to the assessments for each Operating Company is set out below followed by a summary.

No post-construction information was available for the pedestrian crossings and it was not possible to analyse the performance of the sites against the assessment methodology and to confirm their justification.

6.2 Scotland Transerv Assessment Methodology

6.2.1 Introduction

Four assessment reports were supplied. The assessments use the assessment framework set out in LTN 1/95, which is in two parts:

- The Site Assessment, and
- The Option Assessment.

Additionally, two of the assessments considered road user needs and road safety aspects in accordance with the Action Plan set out in Transport Scotland's '*Roads for All*' guidance document. One assessment considered installation and maintenance costs.

6.2.2 Site Assessments

Site assessments were undertaken in accordance with Appendix B of LTN 1/95 (summarised in section 2.2). Data was collected using site visits and video surveys. Vehicular speeds were measured via an automated traffic counter (ATC).

Crossing difficulty was assessed either by observation and engineering judgement or by using a manual assessment that employed a scale of 1 (no difficulty crossing at any time) to 5 (impossible to cross safely). The assessment was performed for able bodied pedestrians, under 16, elderly pedestrians, pedestrians with prams/ pushchairs, mobility impaired pedestrians and visually impaired pedestrians.

Latent demand was considered through representations from local community groups. These representations suggested that latent demand existed.

Only two sites reported an accident involving a pedestrian in the five-year period before the assessment. One site reported one accident and the other reported one serious and two slight accidents relating to pedestrians.

All four assessments recommended that improvements be made to the site on the following basis:

- Latent demand identified from representation by local communities.
- Improvements for vulnerable users.
- Improve linkage with local amenities.

Notwithstanding the recommendation to make improvements to the site, three of the assessments stated that there is no immediate road safety concern relating to the site.

6.2.3 Option Assessment and Recommendations

The option assessment sifted options based on buildability. Options deemed feasible to build were taken forward to an assessment matrix based on Appendix C of LTN 1/95. The options fell into the general groups below:

- Do nothing.
- Informal crossing (or improvements to existing informal crossing).
- Signalised crossing.
- Signalised junction.

Three of the four assessments recommended signalised crossings and one recommended a signalised junction.

Three of the assessments reiterated that there is no immediate road safety concern relating to the existing use of the current crossing facility. In these instances, the primary considerations in the recommendation were an improvement in the safety for vulnerable users and linkage between local amenities.

The fourth assessment did not identify an immediate road safety concern but did refer to Transport Scotland's Strategic Roads Safety Plan 2016 objective to improve accessibility for all and to create a culture of walking.

All assessments cited latent demand identified from representations as a factor in the recommendation to install a signalised crossing facility.

6.3 BEAR Scotland Assessment Methodology

6.3.1 Introduction

Two assessments were supplied by BEAR Scotland North East Unit. One assessment considered a single site (assessment report 1), the other considered three separate sites (assessment report 2). Whilst both reports broadly used the assessment methodology set out in LTN 1/95, it was noted that there were differences between the two assessment methodologies.

Due to the difference in assessment methodologies and for ease of reading, the following section considers the assent methodologies of each assessment report in turn.

6.3.2 BEAR Scotland Assessment Report No. 1

The report considered the installation of a signalised crossing only, so no option assessment was undertaken. The suitability of a signalised crossing was assessed using a judgement on certain considerations: vehicle speeds, elderly or disabled pedestrians, difficulty in crossing, specific cycling or equestrian needs, confusing traffic management, requirement to link to adjacent controlled crossings and pedestrian flows.

The report then assessed the impact of criteria using 'negative', 'minor negative', 'neutral', 'minor positive' and positive' as measures. The criteria assessed were: difficulty of crossing, vehicle delay, road capacity, representations, accident record, active travel policies and cost (both Installation and operating). It is not entirely clear why the assessments were split into these two forms.

Additionally, a PV^2 calculation was carried out to give an indicator for the need of a controlled crossings. Consideration was given to the potential latent demand from the other uncontrolled crossing points in the vicinity that may relocated to a controlled crossing at the sites under consideration. The estimate of latent demand was fed into the PV^2 calculation.

There were no accidents involving injury to pedestrians in the last assessment period.

The report concluded that based on the pedestrian crossing assessment, there was little justification for the provision of a signal controlled crossing facility. Further, it was noted that the PV^2 calculation did not identify the need for a signalised crossing. These factors taken together with the absence of pedestrian related accidents led the report to state that there was little justification in improving the existing road infrastructure.

6.3.3 BEAR Scotland Assessment Report No. 2

The second assessment report used option assessments for three sites. The options were appraised using a framework that detailed: difficulty of crossing, vehicle delay, road capacity, representations, installation and operating cost.

A further Assessment Framework considered the benefits and dis-benefits of the options considering: pedestrian safety, social inclusion, active travel, transport integration, project timescales, estimated costs and environmental Impact. This information was transposed into a numerical format to provide each option with a score to permit comparison between the options. As with Assessment report no. 1, it is not clear why the assessments were split into these two forms.

This report also used a PV^2 calculations on two of the three sites to give an indicator for the need of a controlled crossings. It is not entirely clear on why only PV^2 calculations were performed at two sites only.

There were no accidents involving injury to pedestrians in the last assessment period.

The report concluded that although there were no immediate safety concerns, improvements to the sites are justified with two of the three sites meriting the installation of a signalised pedestrian crossing based on the Assessment Framework scoring. The high cost of installation was referred to and at one location alternative non-signalised options were proposed.

6.4 Summary

No post-construction information was available for the pedestrian crossings and it was not possible to analyse the performance of the sites against the assessment methodology to confirm their justification. It is only possible to consider the consistency of the methods and the clarity of the decision making process.

Scotland Transerv carried out site and option assessments in close alignment to LTN 1/95 and concluded that there were no road safety concerns at the sites. Pedestrian crossings were justified by supplying improvements to vulnerable users and improved linkage. The perceived improvements were informed by consultations that identified latent demand.

BEAR Scotland applied a methodology broadly based on LTN 1 /95 and undertook Assessment Frameworks to quantify various criteria. The scoring of the frameworks and the criteria differed between the two reports considered. Further, BEAR Scotland undertook PV^2 calculations to inform the decision making process. The decision on whether or not to install a crossing was based on the PV^2 calculations, the Assessment Framework and the accident record.

It is clear that there was no common approach between the assessment methodologies applied by the two Operating Companies and in the case of BEAR Scotland, between the two reports considered.

7. Workshop

7.1 Introduction

A workshop was held at CH2M's office at City Park, Glasgow on the 21st February 2018, a list of attendees is included in Appendix B. The key objectives of the workshop were to:

- Capture stakeholders' views on best practice.
- Discuss issues related to the assessment of pedestrian crossing provision.
- Contribute towards a consensus on the development of a consistent method of assessment.

The workshop did not expect to identify a final assessment procedure.

The workshop was structured on a series of questions that generated discussion and debate amongst the attendees. An outline of the main discussion points is set out below. The main themes are discussed in turn followed by a summary of any conclusions.

7.2 Is LTN 1/95 sufficient to undertake an assessment of pedestrian crossing provision

7.2.1 Overview of discussion

The general view of the stakeholders was that LTN 1/95 does not provide robust guidance to assess the need for pedestrian crossings. The guidance is open to interpretation and does not provide evidence based results. Assessments cannot be benchmarked and are interpreted in a subjective manner. This can result in inconsistences between assessments.

There was some feeling that the guidance can be skewed towards providing crossings where one is not justified. As the criteria for a crossing is not clearly defined it is too easy to justify one on a single requirement (e.g. improving accessibility for all). There was also a view that the process lends itself to confirming what the assessor has pre-defined.

It was considered that the assessment does not provide sufficient supporting evidence to assist in dismissing challenges to a decision or recommendation.

It was, however, considered that LTN 1/95 provides a good methodology for record keeping and generating relevant site information. It can act as a good checklist for items to consider when assessing a site.

7.2.2 Summary of findings

LTN 1/95 does not provide robust guidance.

LTN 1/95 provides a good checklist for an assessment, only.

7.3 Does PV^2 or any other quantifiable method have a place in the assessment for a crossing?

7.3.1 Overview of discussion

Generally, there was support for quantified assessment criteria. It was considered that this provides guidance that is definitive and easily understood. It has the benefit that sites can be easily ranked and prioritised. Also, unlike LTN 1/95, it provides sufficient evidence to dismiss challenges to a decision or recommendation.

Many of the local authorities present use some form of quantified assessment methodology. Quantified assessments generally used a PV^2 methodology based on TA 52/87 or a modified PV^2 assessment considering other factors (e.g. accidents, difficulty in crossing etc.). It would be expected that any revised assessment that uses quantifiable criteria would include guidance on best practice (e.g. what walking speed should be applied).

Other methods that have been employed use a gaps analysis or a checklist based system.

There was a desire that an assessment methodology should retain some form of engineering judgement. It was thought that a number only based selection would not be acceptable to the public or elected representatives. Such a method could be perceived as too callous, ignoring unquantifiable considerations. There was some thought that the terminology 'PV^2' itself could have negative connotations for the public and a change of name may assist in gaining more acceptance (e.g. conflict ratio). There was also recognition that thresholds for assessment factors could vary across authorities to suit local conditions.

Whilst the difficulty in using a number based method only was recognised, it was considered its use does have a part to play in assisting decisions, possibly alongside a qualitative analysis.

A number based analysis could be of benefit in a sifting process.

There was some discussion on assessments that may fall under accident reduction schemes and that these would be subject to a different criterion.

7.3.2 Summary of Findings

A method of assessment that was quantified, at least in part, would be beneficial.

A number based assessment would be of use in a sifting process.

Engineering judgement should be retained as part of the decision making process.

7.4 What three criteria in the provision of a pedestrian crossings are considered the most important?

7.4.1 Overview of discussion

Attendees were invited to jot down the criteria that they consider to be the most important when considering the provision of a pedestrian crossing. The criteria listed included safety, pedestrian delay, road geometry, severance, conflict ratio and cost. This was compared to the response from the questionnaire that listed further criteria (see section 5 – Question 2). It was clear that there are many criteria and that views on their importance vary.

Some examples of assessments that used measurable criteria were presented. These included factors such as percentages of elderly people, unaccompanied school children, pedestrians with prams/ pushchairs, bicycles crossing plus road width, time to cross, vehicle speeds and community severance. Others used a check list approach.

The concept of buildability was raised with some examples discussed where crossings are justified but impractical.

CH2M used these alternative methods (including a PV^2 method based on TSA 52/87) to see what the outcome would be when compared with an assessment that used LTN 1/95 methodology and recommended a controlled crossing. A signalised crossing was not justified using these alternative methodologies. This disparity in the results highlights the point raised in section 7.2 about LTN 1/95 possibly being skewed towards providing crossings where one is not justified.

7.4.2 Summary of findings

There are many criteria and views on their importance vary. The identification of criteria for an improved assessment was beyond the scope of the workshop. The future criteria require agreement.

7.5 Should cost be part of the decision making process?

7.5.1 Overview of discussion

The stakeholders considered that cost should not be part of the decision making process for the suitability of a pedestrian crossing. The assessment should be a needs based assessment. The viability of budgets to install a crossing should be a separate issue and this is not the responsibility of the assessor to undertake or even consider.

Whilst many attendees acknowledged the pressure on budgets there were no examples where the cost of installing the crossing *per se*, influenced the decision making process.

There was some concern about the risk associated with the identification of the need for a crossing and the possible legal implications if one is not installed due to cost.

Some form of Benefit Cost Analysis would be useful as supporting evidence in the assessment, only.

Summary of findings

Cost should not be part of the assessment criteria.

7.6 Should weightings be applied for Vulnerable Users?

7.6.1 Overview of discussion

It was noted that many of the PV^2 based criteria used by local authorities include weightings. These include weightings for elderly and disabled pedestrians and young persons. Other groups could include pedestrians with pushchairs.

Latent demand for vulnerable users is often identified following consultations with communities. Weightings would require to be considered for this demand.

It was noted that weightings have been applied to the vehicular based factors by using positive weightings to HGVs, for example.

There was unanimous support for the use of weightings.

7.6.2 Summary of findings

Weightings for vulnerable users should be used in assessment criteria.

7.7 How should assessments consider latent demand?

7.7.1 Overview of discussion

Existing assessments often consider latent demand. Latent demand is easier to assess when the process is part of a development as this can be considered by a Transport Assessment. It is more problematic when there is no change in land use.

Latent demand is often identified after consultations with local communities. These discussions can identify latent demand for vulnerable users such as mobility or visually impaired pedestrians. It was suggested that in this could be investigated further by consultation with disability representative groups.

There was some scepticism that latent demand exists with some before and after surveys not identifying this demand.

There was no conclusion on how latent demand could be assessed. It would appear to be a concept that is difficult to quantify and more evidence is needed to understand it better.

7.7.2 Summary of findings

Latent demand could be considered where it is measurable (e.g. as part of development proposals).

7.8 Would an online assessment tool with clearly defined scoring criteria be beneficial for use in an assessment?

7.8.1 Overview of discussion

The *Austroads Pedestrian Facility Selection Tool* was presented with a live demonstration using nominal parameter values. It was highlighted that the Austroads tool is an example only and any Scottish/ UK tool would require to be developed for local conditions.

The Austroads tool, specifically called the "Australasian Pedestrian Crossing Facility Selection Tool", was developed to help practitioners select the most appropriate type of crossing based on walkability, safety and economic outcomes. The tool is used to assess the feasibility of different types of pedestrian crossing facilities depending on the site assessment variables entered in by the practitioner, such as the geometry, flows, speeds, etc. It also considers the sites historic safety performance (if available), or uses an in-built crash model to assess the safety implications of the various options that could be put forward. The pedestrian crossing facilities presented for consideration are as follows: platform, kerb extensions, median refuge, zebra crossing, traffic signals and grade separation.

The tool, unlike LTN 1/95, can be used to assess both mid-block and junction locations. However, the junction analysis option only allows one individual arm to be assessed at a time and therefore requires multiple analysis sets for a complete junction. It has also been developed to tailor for the local standards for each individual jurisdiction that have adopted its use.

The tool checks the feasibility of each option initially based on the site assessment inputs and rules out any options that do not meet the required standards within the jurisdiction being assessed (e.g. in Scotland, a Zebra Crossing would be ruled out if the 85th percentile speed exceeded 35mph or if located on a trunk road as per Transport Scotland standards). For each feasible option taken forward, the tool then evaluates pedestrian and vehicle delay, safe sight distances, pedestrian level of service and, using default economic parameters for the specified jurisdiction, calculates a benefit cost ratio. The practitioner can then use this data to determine what is the best solution to take forward at their site, maintaining the need for engineering judgement.

There was general agreement that an online assessment would be useful as a decision support tool. It could assist in simplifying the quantitative element of any assessment and help consistency of results. Overall, it would save time and provide a robust evidence base for the assessment.

7.8.2 Summary of findings

An online assessment tool would be beneficial.

7.9 Should the objective of the crossing influence the assessment procedure? Should emphasis be placed on making crossings part of a desirable pedestrian environment and/or encouraging active travel?

7.9.1 Overview of discussion

There was discussion on whether crossing assessment should be treated in isolation or as part of wider schemes. Generally, at present, most crossings are considered in isolation. It would be beneficial if crossings were considered as part of wider objectives. It was noted that processes should be in place that considers crossing needs and provision as part of a wider scheme and its objectives (e.g. TA process for planning applications, HD42/17 (*Walking, Cycling & Horse-Riding Assessment and Reviews*)). For crossings considered in isolation, wider consideration of land usage and crossing need could be considered. As part of this assessment, the installation of a pedestrian crossing may be a short to medium term solution only.

It was considered that the use of technology (e.g. Bluetooth surveys) could assist in obtaining data about pedestrian movements in an area. Such data would better inform the decision making process.

There was some discussion on the link between the need for the assessment of pedestrian crossings and other standards documents such as *Roads for All and* HD42/17. It was considered that the link between these documents should be stronger.

In some instances, crossings have been installed without any assessment undertaken (e.g. as part of a cycle network funded by others or safer routes to schools schemes). There was some discussion on the need for some form of assessment in these circumstances but there was also a recognition that assessments require time and resources and there can be an inclination to not undertake them if they are not required to justify the expenditure.

Some assessment methods based on PV^2 include a factor that considers the proximity of facilities such as schools, hospitals or care homes.

7.9.2 Summary of findings

There should be a stronger link between the crossing assessment methodology and land usage.

Assessment could make recommendations on the wider needs of the locality where the assessment is being performed.

7.10 How Much Influence Should Representations Have?

7.10.1 Overview of discussion

It was noted that some assessment methodologies include a factor for representations. Amongst the attendees, it was considered that representations should initiate the assessment process only but have no influence on the decision making process. Notwithstanding this, there were mixed views on the influence of representations. There was a view that some representations can bypass the assessment process and it was recognised that pressures can lead to crossings being installed where not justified.

It was considered that some communities are more forthcoming in making representations and mounting campaigns for a crossing to be installed and that this could be biased against disadvantaged areas.

It was recognised that representations can result in sites being appraised repeatedly. Some local authorities have a minimum period between assessments unless there has been some material change in the locality. It was considered that guidance on such a period would assist in undertaking assessments at repeat sites within a reasonable period.

There was some discussion on who should be consulted when undertaking an assessment (noting that it is a requirement to consult with the police). Whilst most authorities do undertake some form of consultation, it was noted that some do not and there is an inconsistency in approach. It was recognised that consulting with some groups such as disabled pedestrian representatives can be difficult as it can be hard to identify appropriate representatives, especially in rural areas. It was thought that community councils or similar groups are the best contacts for consultation.

7.10.2 Summary of findings

Representations should have no influence on the decision making process for the assessment of the need for pedestrian crossings.

Guidance should be given on the requirement for consultations.

7.11 Is the assessment process a one-off event or is it undertaken over a period of time?

7.11.1 Overview of discussion

Assessments are generally one-off events. As highlighted in section 7.10 assessments can be repeated because of continued representations and guidance on a minimum period between assessments would be useful.

7.11.2 Summary of findings

It would be beneficial for revised guidance to include for minimum periods before assessments at a site are repeated.

7.12 Can assessments be undertaken to justify the removal of crossings?

7.12.1 Overview of discussion

No attendee had experience of the removal of crossings. It was considered that removing crossings would be very difficult as local residents are unlikely to agree with this action, even if the crossing is lightly used. There were some examples discussed where land usage had altered over time resulting in a crossing no longer being justified.

It was recognised that some authorities in the UK have undertaken the removal of a crossing, either because of land usage change or as part of a wider environmental improvement scheme (e.g. shared space schemes). It was recognised that environmental improvement schemes may apply a different philosophy to crossing provision, such as the use of formal crossing points, and that an assessment under these projects may not be informative to the objectives of such schemes. Before and after monitoring would inform the need for a crossing and assist in the justification for the removal of a crossing.

7.12.2 Summary of findings

Assessments could be used to remove crossings, in principle.

7.13 Conclusions

The workshop was very constructive and there was broad agreement over many issues. The summary of findings from each item above are collected below:

- LTN 1/95 does not provide robust guidance.
- LTN 1/95 provides a good checklist for an assessment, only.
- A method of assessment that was quantified, at least in part, would be beneficial.
- A number based assessment would be of use in a sifting process.
- Engineering judgement should be retained as part of the decision making process.
- The identification of criteria for an improved assessment was beyond the scope of the workshop. The future criteria require agreement.
- Cost should not be part of the assessment criteria.
- Weightings for vulnerable users should be used in assessment criteria.
- Latent demand could be considered where it is measurable (e.g. as part of development proposals).
- An online assessment tool would be beneficial.
- There should be a stronger link between the crossing assessment methodology and land usage.
- Assessment could make recommendations on the wider needs of the locality where the assessment is being performed.
- Representations should have no influence on the decision making process for the assessment of the need for pedestrian crossings.
- Guidance should be given on the requirement for consultations.
- It would be beneficial for revised guidance to include for minimum periods before assessments at a site are repeated.
- Assessments could be used to remove crossings, in principle.

8 Report Summary

8.1 Objectives

The study undertook a review of Local Transport Note 1/95: *The Assessment of Pedestrian Crossings.* It identified issues raised by stakeholders on LTN 1/95 and the assessment of the need for pedestrian crossings in general and sought to input into the development of an improved assessment.

This would assist in the development of a structured and evidence based decision making process to determine whether a crossing is required and if so, the most appropriate type. The decision-making process should be based on a consistent approach and, as a consequence, be used to defend the finding to install or not install crossings.

8.2 Approach

There were three key stages in the study:

- LTN 1/95 Overview and Literature Review
    - A short literature review, including guidance and other assessment processes, to identify any practices that may be considered by the study.
- Information Gathering on Current Practice
    - A review of current practices by key stakeholders in Scotland to determine current practice in the assessment of pedestrian crossing provision. A questionnaire captured the methodology of the assessment as currently practiced. Also, a review of a sample of controlled pedestrian crossings assessments implemented in recent years was undertaken to ascertain current practice and consistency.
- Workshop
    - Key stakeholders attended a workshop on the 21st February 2018 where the views on best practice were captured and a consensus was explored for the development of a consistent method of assessment.

The following section summarises these tasks.

8.2.1 LTN 1/95 Overview and Literature Review

A review of LTN 1/95 concluded that the guidance could be subject to different interpretations resulting in an inconsistency in provision across the network. Further, the inconsistent provision of pedestrian crossings can lead to external pressure to provide crossings where engineering judgement does not merit provision. These conclusions were considered further at the workshop.

A literature review considered the assessment methodologies applied in Australia and New Zealand, Canada, USA, Ireland and India. The review found that the majority of these countries used quantitative methods of assessment. The factors considered in these assessments are summarised in the table in section 3.8

8.2.2 Questionnaire

A questionnaire was developed with the aim to understand if local authorities and Operating Companies are using the current LTN 1/95 guidance as intended or if they use alternative methods, and if so what methods do they use.

Section 5 gives a detailed breakdown of the questionnaire responses. In summary, except for three respondents, LTN 1/95 guidance is not used exclusively to assess pedestrian crossings. Most of the

respondents use their own procedures, which is generally a variation of the historic PV^2 and current LTN 1/95 guidance. Within these procedures, the criteria for assessing pedestrian crossings is not consistent. Further, there was no consistency in the consultations undertaken and the level of outside pressures being applied to the decision making process.

There was a recognition by the majority of the respondents that LTN 1/95 was not sufficient to undertake an assessment of pedestrian crossing provision. The use of an online assessment tool with clearly defined scoring criteria received strong support from the respondents.

8.2.3 Pedestrian Crossing Assessment Examples

Pedestrian crossing assessment reports were collected to ascertain current practice and to appraise consistency between them. Six assessment reports were supplied, four from Scotland Transerv and two from BEAR Scotland.

Scotland Transerv carried out site and option assessments in close alignment to LTN 1/95 and leaned heavily on considering improvements to vulnerable users and improved linkage between facilities. The perceived improvements were informed by consultations that identified latent demand.

BEAR Scotland applied a methodology broadly based on LTN 1 /95 but additionally carried out Assessment Frameworks to quantify various criteria. They also undertook PV^2 calculations. Decisions were based on the PV^2 calculations, the Assessment Framework and the accident record.

There was no common approach between the assessment methodologies applied by the two Operating Companies and in the case of BEAR Scotland, between the two reports considered.

8.2.4 Workshop

A workshop was held at CH2M's office at City Park, Glasgow on the 21st February 2018. The key objectives of the workshop were to:

- Capture stakeholders' views on best practice.
- Discuss issues related to the assessment of pedestrian crossing provision.
- Contribute towards a consensus on the development of a consistent method of assessment.

The full details of the findings of the workshop are detailed in section 7 but the main findings of the workshop can be condensed as:

- LTN 1/95 does not provide robust guidance but is useful as a checklist, only.
- Engineering judgement should be retained but a method of assessment that was quantified, at least in part, would be beneficial especially as part of a sifting process.
- Future criteria require further consideration but cost and representation should not be part of the assessment.
- Latent demand should be considered where it is measurable.
- An online assessment tool would be beneficial.
- There should be a stronger link between the crossing assessment methodology, land usage and the wider needs of the locality.
- Future guidance should include for advice on consultations, the minimum period between assessments and the removal of existing crossing facilities.

9 Conclusions and Recommendations

9.1 Conclusions

The study concludes:

- LTN 1/95 is open to interpretation and that this can lead to inconsistency in the provision of crossings across the network.
- Few Operating Companies and local authorities are applying LTN 1/95 solely as the basis of the pedestrian crossing assessment. This is mainly due to the perception that it does not provide sufficient evidence to support decisions. This has led to various alternative methods of assessments being applied across Scotland leading further to the inconsistency of crossing provision.
- There is strong support amongst practitioners for a revised assessment methodology to provide a consistent and robust guidance.
- Engineering judgement should be retained in the assessment process. However, a quantified number based element of the assessment would assist in informing the decision making process.
- There are varying quantified methods of assessments with different criteria considered. The details of a revised methodology require to be considered in detail. However, cost and representations should not be considered.
- The availability of an online tool would assist in the consistency of the application of assessment guidance.

9.2 Recommendations

It is recommended that pedestrian crossing assessment guidance be revised to be more structured and evidence based than LTN 1/95. The revised guidance should be developed in consultation with key stakeholders. The findings of this study can input into the development of the guidance.

APPENDIX A:
List of Pedestrian Crossing Assessment Reports received from Operating Companies.

Location	Roads Authority/ OC	Assessment Report Number	Assessment method	Site Assessment Results	Decision
A78 Anderson Memorial Park, Largs	Scotland Transerv	1	LTN 1/95	Not justified	Install a signalised crossing
A701 Village Hall, Locharbriggs	Scotland Transerv	2	LTN 1/95	Justified	Install a signalised crossing
A726 West Mains Roundabout, East Kilbride	Scotland Transerv	3	LTN 1/95	Justified	Install a signalised crossing
A78 Pedestrian Assessment Yerton Brae	Scotland Transerv	4	LTN 1/95	Justified	Install a signalised junction
A96 Elgin	BEAR Scotland	1	Modified LTN 1/95 with PV^2	Various Options Presented	Continue to monitor
A96 Forres Non-Motorised User Traffic Signal Controlled Crossing Assessment	BEAR Scotland	2	Modified LTN 1/95 with PV^2	Not justified	Continue to monitor

APPENDIX B:
Attendees of Workshop 21 February 2018, CH2M Offices, City Park, Glasgow

Organisation	Names
Aberdeen City Council	Donald Kinear
Angus Council	Joe Hawke
City of Edinburgh Council	Stacey Monteith
Clackmannanshire Council	Carlyn Fraser
Dundee City Council	Pete Coulson, Iain Black
East Renfrewshire Council	Dermot McGonigle
Glasgow City Council	John Sharkey
Inverclyde Council	Elaine Provan
Renfrewshire Council	Mairi Weatherill-beers, Laura Frankgate
South Lanarkshire Council	Omero Riccomini, Nicola Bell
BEAR Scotland North East	Alan Campbell, Kevin McKechnie
Scotland Transerv	Vince Tait
Amey	Jim Reid, Pat Shields
Transport Scotland	Derek Williamson, Alan Oliver, Cameron Fergusson
Cycling by Design Representative	Andrew Kelly (CH2M)
CH2M	Colm Smyth, James Thompson, Richard Hayes