

Interim Advice Note

on

**Minor Improvements to Existing
National Roads**

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1. INTRODUCTION

unless it represents an initial phase of a phased improvement strategy.

- 1.1. The purpose of this Advice Note is to provide guidance for the identification and development of minor improvement schemes. It supersedes the UK Highways Agency TA 85/01, November 2001 and it should be used instead of NRA TD 9/05, Chapter 10. This Advice Note is primarily intended for the use on rural roads. If it is intended to apply it to an urban environment prior approval shall be sought from the NRA.
- 1.2. In addition this Advice Note should be used forthwith on all schemes for the management, improvement and maintenance of national roads currently being prepared. Design Organisations should confirm its application to particular schemes with the National Roads Authority by completing Application Form AF 1 (see Appendix A).

Definition of a Minor Improvement

- 1.3. The term “minor improvement” is used to indicate any works that are generally less than 2km in length or are less than the NRA threshold in cost.

Route Consistency

- 1.4. Route Consistency is of the utmost importance when designing for minor improvements on existing National Roads. The road standard should reflect the expectations of the users and should not provide any unforeseen situations to the driver. In general isolated sections that do not comply with the current NRA DMRB standards should be reviewed. However isolated sections of new road should not be designed to a standard that could lead to driver uncertainty, e.g. when the new section rejoins the existing road.

Cross-Section

- 1.4. The route strategy should be considered when selecting the cross-section for minor improvement works. It might not be feasible to provide a full cross-section in accordance with NRA TD 9 and NRA TD 27, for a minor improvement scheme,

2. DESIGN PRINCIPLES

Design Standards

- 2.1. When considering low cost minor improvements to existing National Roads, Designers may have difficulty in achieving NRA DMRB design criteria within the existing physical, economic or environmental constraints.
- 2.2. This Advice Note gives guidance on the appropriate design standard applicable to minor improvement works. Chapter 3 of this document categorises minor improvement works and gives guidance on the design speeds applicable to each category.
- 2.3. When a minor improvement to a section of the network is being considered, Designers may be faced with reduced options due to technical constraints, land availability, conflicting priorities and budget constraints. Experience has shown that in some cases, low cost minor improvement aimed at improving safety and making better use of the existing road network can often be highly cost effective, i.e. road markings, minor junction physical alterations, lower speed limits.
- intended to provide choice in meeting people's transport needs and this approach is based on: integration, safety, economy, environmental impact and accessibility.
- 2.5. The need for improvement schemes may also be related to a number of more specific aspects, such as: requirements of non-motorised road users (i.e. encourage cycling and walking), speed reduction (i.e. changes to road layout), driver behaviour (i.e. perception of road layout), improving route consistency (i.e. using similar minor improvements at particular hazard locations) and maintenance requirements (i.e. incorporate minor improvements into maintenance schemes)
- 2.6. The need for improvement schemes could also be related to accident statistics in the section of roadway under consideration. The primary accident type should be identified to assess if proposed improvement scheme improves occurrence of the primary accident cause. Depending on availability, accident statistics / reports should be analysed / reviewed for the previous five years. In Ireland more than 70% of all fatalities occur on rural roads, with 40% of these on national roads.

Data Gathering

- 2.4. Improvement schemes address deficiencies in one or more of three basic criteria: safety (i.e. accident statistics), capacity / operation (i.e. AADT, % HGV, % Overtaking), pavement condition and environmental aspects. In addition, improvement schemes should be considered as part of an integrated transport system which is
- 2.6 Fatalities on rural (non-motorway) roads can be attributed to six basic types of accidents as indicated in Table 2/1 below.

Primary Accident Type	Fatal Accident %	Injury Accident %
Single Vehicle Only	36	20
Head-On	22	20
Pedestrian	20	16
Angle	10	18
Rear End	4	16
Other	8	11

Table 2/1: Accident Type and Statistics (Source: Roads Collisions Facts, Ireland 2004)

- 2.7 In terms of capacity / operation the presence of large volumes of traffic on rural single carriageways may cause driver frustration, particularly where slow moving vehicles are encountered. This can lead to attempts to overtake at inappropriate locations, resulting in head-on collisions. Improvement in the flow of traffic may be achieved by making minor improvements to road layouts or better utilisation of existing road space. Improvement to overtaking opportunities when developing minor improvement schemes should be considered in developing the scheme (see NRA DMRB TD 9).

3. CATEGORISATION OF MINOR IMPROVEMENT SCHEMES

- 3.1. Minor improvement schemes will comprise one or more minor improvement measures, which may be combined in different ways to meet specific requirements. However it is essential that the Designer does not simply combine measures without considering the scheme as a whole.
- 3.2. Combinations of measures need to be assessed for their effect on each other, in order to avoid adverse consequences.
- 3.3. Minor improvement measures to an existing road may be applied locally, to a discrete section or to a whole route. It is essential that the Designer takes an overview of the improvement measure(s) within an appropriate route length (i.e. 2km) in order to avoid the introduction of a new problem either at the location of the improvement or elsewhere. Designers should appreciate the net effect of all elements of the layout, including retained existing detail, on the perceptions and behaviour of drivers, pedestrians, cyclists and equestrians.
- 3.4. For the purpose of this Advice Note minor improvement measures have been divided into three categories, as shown in Table 3/1. A minor improvement scheme may comprise a combination of these (or other) individual measures, i.e. Category 1 improvements could contain some elements of Category 2 and Category 3. Also Category 2 improvements could contain elements of Category 3.

Category 1	Category 2	Category 3
Horizontal Alignment, Vertical Realignment, Overtaking Sections, Climbing Lanes	Drainage	Edge Treatment (No Change to X-Section)
Carriageway Widening	Alterations to Superelevation, Crossfall or Adverse Camber	Overlay (No Change to Alignment)
Major Junction Improvements	Carriageway Widening (No Change to Horizontal)	Upgrading an Existing Signal Controlled Junction
	Vertical Alignment Only	Maintenance
	Junction or Road Closure & Junction Modification	
	Provision of Traffic Signals at New & Existing Priority Junctions (including Roundabouts)	

Table 3/1: Minor Improvement Category Types

Category 1 Minor Improvements

3.5. Category 1 Minor Improvements as outlined in Table 3/1, shall conform to the current standards and design speeds outlined in NRA TD 9. Category 1 Minor Improvements should, where possible, meet desirable minimum standards, however this may not be achievable in all instances and in such circumstances it may be necessary to consider Relaxations or Departures from Standard. The procedures set out in Paragraph 1.15 to 1.31 of NRA TD 9 should be used for considering options, recording relaxations and applying for Departures. These procedures should be applied for all remaining or proposed features, which are less than Desirable Minimum.

Category 2 Minor Improvements

3.6. Category 2 Minor Improvements as outlined in Table 3/1, should be designed to maintain the existing route consistency of the road taking into account the existing road geometry 2km either side of the proposed scheme.

Calculation of design speed

3.7. The design speed should then be calculated using the Alignment

Constraint and Layout Constraint as set out below.

3.8. Alignment constraint (A_c) measures the degree of constraint imparted by the road alignment, and is measured for single carriageways by:

$$A_c = 12 - \text{VISI}/60 + 2B/45$$

Where, VISI is the Harmonic mean visibility and is measured by:

$$\text{VISI} = 10^{2.46 + vw/25 - B/400}$$

Where, VW is the average width of verge, plus hard shoulder where provided (m, average for both sides of the road). Where an existing single carriageway contains sharp bends, frequent double continuous line sections, narrow verges etc then VISI can be taken as a value between 100 and 200m.

And where, B is the Bendiness, which is measured as the total angle the road turns through per kilometre length. It is important to realise that the design speed is not dependent on the radius of curvature of individual curves per se but on the total of degrees turned through per km bendiness (see figure 3/1) and that Bendiness should be

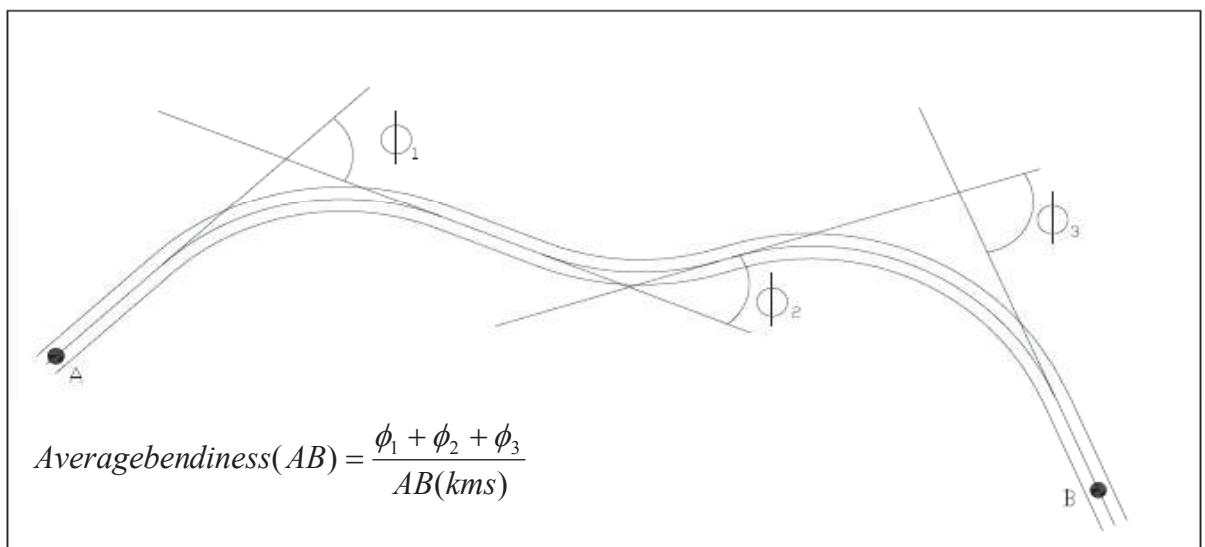


Figure 3/1: Bendiness

calculated as the average value over the section to be improved and 2km either side of the proposed scheme. The bendiness should be calculated using 1:2500 scale OS digital mapping.

3.9. Layout Constraint (Lc) measures the degree of constraint imposed by the road cross-section, verge width and frequency of junctions and accesses. Table 3/2 shows the values of Lc relative to cross section features and density of access, expressed as the total number of junctions, laybys and direct accesses (other than single field accesses) per km (see TD 41), over the distance of the Scheme and 2km either side, where:

- L = Low Access numbering up to 5 per km;
- M = Medium Access numbering 6 to 8 per km;
- H = High Access numbering 9 or more per km.

Carriageway width (ex. Hard strips)	6.0m		7.0m		7.3m	
	H	M	H	M	M	L
Degree of access and junctions						
With hard shoulders					21	19
With 3m verge (no hard shoulder)	29	26	25	23	23	21
With 1.5m verge (no hard shoulder)	31	28		27		
With 0.5m verge (no hard shoulder)	33	30				

Table 3/2: Layout Constraint, Lc km/h

3.9 The Design Speed is then derived from the ensuing Ac and Lc values using figure 3/2 below. The strategy for the continuous section of road however should be considered when determining Ac and the cross-sectional design.

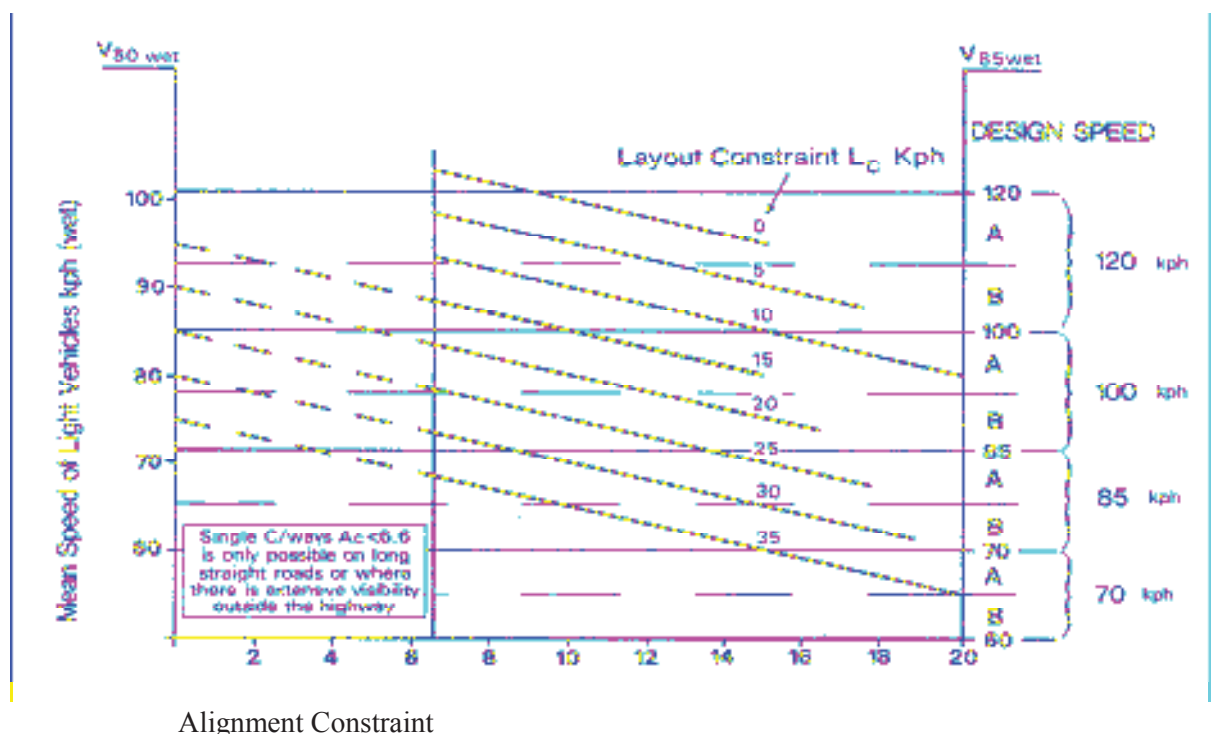


Figure 3/2: Design Speed

3.10 Relaxations and Departures for
Category 2 Improvements

Where the Desirable Minimum standards pertaining to the calculated design speed cannot be achieved, it may be necessary to consider Relaxations or Departures from Standard. The procedures set out in Paragraphs 1.15 to 1.31 of NRA TD 9 should be used for considering options, recording Relaxations and applying for Departures pertaining to the above Design Speed as calculated.

Categories 1 and 2: Designers should review the need for barriers and should design the positioning to comply with NRA TD 19/04. Designers should also review the operational characteristics of the existing barriers to comply with NRA TD 19/04.

3.16 Where the Desirable Minimum standards pertaining to safety barriers cannot be achieved, it may be necessary to consider Relaxations or Departures from Standard.

Category 3 Minor Improvements

3.11 Category 3 works do not contain any layout changes and therefore the use of current NRA DMRB standards are not applicable. See Table 3/1.

Junction Treatment

3.12 All accesses, excluding field accesses, affected by Category 1 and 2 Minor Improvements are to be reviewed in accordance with the current NRA DMRB using the appropriate design speed selected above.

Road Safety Audits

3.13 Road Safety Audits shall be performed as per NRA HD 19/04.

Signage

3.14 In considering any improvement, the designer should look at consistency of route standards. Where changes to route consistency occur, this should be reinforced by appropriate signing and lining.

Safety Barriers

3.15 The following conditions shall be complied with regards to the Categories of Minor Improvements as stated above:

4. DESIGN PROCEDURE

- 4.1 The objective of the design procedure is to achieve optimal value for money (taking all factors into account) within budget constraints. Having identified a need for an improvement scheme, the procedure should accord with good practice, following three basic steps;
- Step 1 Outline Application for Grant,
 - Step 2 Design
 - Step 3 Contract Documents

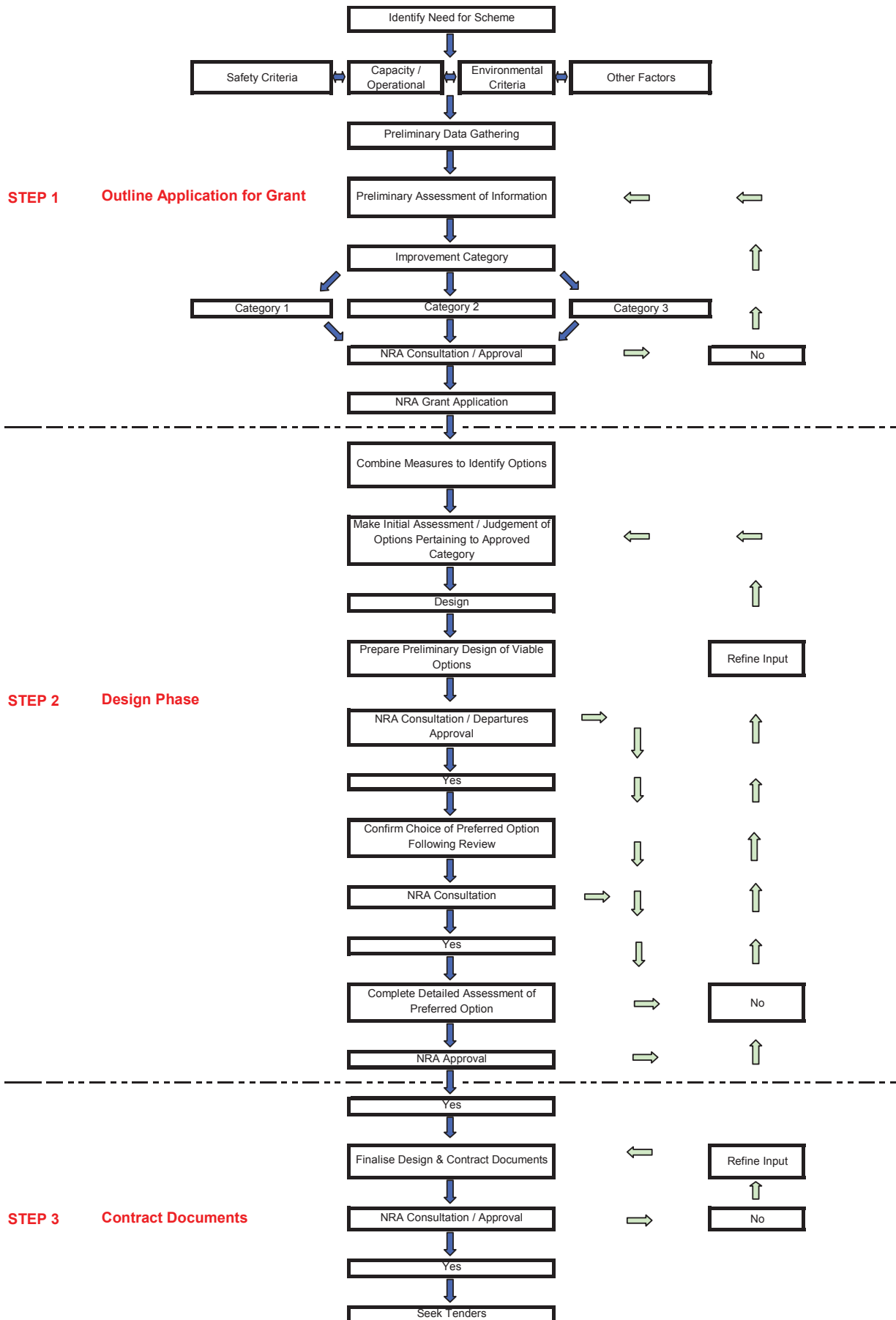
See Figure 4/1.

- 4.2 The basic design issues and constraints should be established following the collation of information relevant to the existing situation and proposed improvement. See Table 4/1 for list of probable data required. It should be noted that this list is non-exhaustive.

Pavement Condition	Safety	Consultation	Design Speed	Future Land Use	Capacity / Operational	Environmental Constraints	Local Constraints	Drainage	Other
IRI	Lighting	Statutory Undertakers	Speed Survey	County / Town Development Plan	Traffic Count Source	Site Visit	Accommodation Works	Cariageway Drainage	Map of Previous Improvements & Year carried out
SCRIM	Signing & Lining	Publically & Privately Owned Services	Road Type	Major Realignment / Bypass	NRA Traffic Figures	Archaeology	Site Visit	Watermain Leaks	FOSD
Visual	Accident Statistics	Overseeing Organisation	Carriageway Width	Zoning	AADT	Ecology	Domestic Access	Site Visit	SSD
FWD	Accident Analysis		Alignment Constraints (Ac)	Planning	% HGV		Kerbs & Footpaths		Location / Grid Reference
Core Samples	Horizontal & Vertical Alignment		Layout Constraints (Lc)		% Overtaking		Public Utilities		Route No.
Soft Spots	Low-Cost Accident Grant - Simultaneously		Horizontal & Vertical Alignment		NRA Website		Structures		Existing Signing & Lining
	High-Cost Accident Grant - Simultaneously		Individual Access Points				Water Courses		Mandatory Speed Limit
	Safety Barrier Requirements								

Table 4/1: Data Gathering

Figure 4/1: Design Procedure



APPENDIX A

Minor Improvement Scheme Grant Application Form – AF 1

NATIONAL ROADS
An tÚdarás um Bóithre



MINOR IMPROVEMENT SCHEME GRANT APPLICATION FORM - AF 1

Scheme Name

Speed Limit (kph) **Route No.** **Road Type**

Location

Start		End		Cross-Section	<input type="text"/>
Easting	Northing	Easting	Northing	Segment Length	<input type="text"/>
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>		

CURRENT CONDITION

Engineering	Scrim	IRI	FWD	Visual	FOSD	SSD *	Surface Type	Other
	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

Geometric Consistency (2Km either direction)	Route Consistency (Attach Info)		Bendiness	C/way Width	FOSD	SSD *	Alignment Constraint (Ac)	Layout Constraint (Lc)
	Yes	No						
	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

Safety	Accident Statistics (If Yes Attach Info)		Safety Schemes		Environmental Constraints	(If Yes Attach Info)	
	Yes	No	Yes	No		Yes	No
	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>		<input type="text"/>	<input type="text"/>

Capacity / Operational	AADT	% HGV	% Overtaking	Traffic Count Source	Structures	Yes	No
	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>		(Attach Info)	<input type="text"/>

Improvement Purpose

Category of Improvement (Tick Box)	CAT 1	CAT 2	CAT 3	Proposed Surface Type	Envisaged Programme (Tick Box)	Annual	Multi-Annual
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>		<input type="checkbox"/>	<input type="checkbox"/>

Construction (€)							
Prelims	Boundary Treatment	Drainage / Ducting	Earthworks	Pavements	Accom'ion Works	Ancillary Works	Design
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

Land Acq	Other	Cost Estimate	Total €	€/ m ²
<input type="text"/>	<input type="text"/>		<input type="text"/>	<input type="text"/>

APPENDIX B

Minor Improvement Scheme Grant Application Form – AF 1 – Explanatory Sheet

NATIONAL ROADS AUTHORITY
An tÚdarás um Bóithre Náisiúnta



EXPLANATORY SHEET

Main Heading	Sub Heading	Explanation
General	Type	If applicable as many existing roads do not comply with current NRA DMRB standards. See NRA DMRB TD 9, Table 1
	Segment Length	Length of proposed improvement works.
Engineering	SCRIM	Average Figure - Data can be obtained from NRA Website
	IRI	Average Figure - Data can be obtained from NRA Website
	FWD	Or any other NRA approved structural assessment.
	Visual	Windscreen and Walkover Surveys
	FOSD	Not required for Category 3 Improvements. For Category 2 Improvements. Attach information to Application Form. Data can be obtained from historical data or by manual surveys.
	SSD	Not required for Category 3 Improvements. For Category 2 improvements. Attach information to Application Form. Data can be obtained from historical data or by manual surveys.
	Cross-Section	Average Cross-section to be provided to include carriageway width, hard shoulder and verge width. More than one cross-section to be provided if cross-sections vary,
	Other	Existing features retained in the design that do not meet the requirements of the NRA DMRB. Any other information that the Local Authority would deem necessary to be included. This applies to Category 1 & 2 only. Some proposals may impinge upon proposed network changes and consultation should include NRA Structures / Signing and Lining / Safety to ensure that there is no conflict.
Geometric Consistency (2km either direction)	Route Consistency	2km either side of proposed segment.
	Bendiness	Not required for Category 3 Improvements. Refer to NRA DMRB TD 9, Chapter 10.
	FOSD	Not required for Category 3 Improvements. Refer to NRA DMRB TD 9, Volume 6.
	SSD	Not required for Category 3 Improvements. Refer to NRA DMRB TD 9, Volume 6. * To be reported with exception only, i.e. If there is a particular problem area that needs to be identified.
	Alignment Constraint (Ac)	The alignment constraint need only be calculated for Category 2 Minor Improvements. Refer to NRA DMRB TD 9, Chapter 10.
	Layout Constraints (Lc)	The layout constraint need only be calculated for Category 2 Minor Improvements. Refer to NRA DMRB TD 9, Chapter 10.
Environmental Constraints		Not required for Category 2 or 3 improvements.
Category of Improvement	Category 1, 2 or 3	See NRA TD 85/06 & NRA TD 9/06, Chapter 10.
Safety	Accident Statistics	What is the primary cause of accidents. Will the proposed improvement address the primary cause?
	Safety Schemes	Are any of the following safety measures under consideration for this site? a) Traffic calming b) Low cost remedial c) High Cost Remedial
Bridges / Structures		Inter alia the following should be identified: a) Are any bridges affected by proposed carriageway widening? b) Are any vertical clearances reduced due to pavement overlay? c) Is pavement thickness to be increased over any bridge decks – either beam / slab or masonry arch?

APPENDIX C

Completed Minor Improvement Scheme Grant Application Form – AF 1

NATIONAL ROADS AUTHORITY

An tÚdarás um Bóithre Náisiúnta



MINOR IMPROVEMENT SCHEME GRANT APPLICATION FORM - AF 1

Scheme Name N503 Overlay

Speed Limit (kph) 100 **Route No.** N503 **Road Type** S2

Location Waterloo Road, Dublin 4

Grid Reference <i>(Attach Location Map 1:50,000)</i>	Start		End		Cross-Section Attach
	Easting	Northing	Easting	Northing	
	10000	10000	30000	30000	

Segment Length (Km) 1.2 Km

CURRENT CONDITION

Engineering	Scrim	IRI	FWD	Visual	FOSD	SSD *	Surface Type	Other
	60	4	Attached	Attached	154	N/A	S.D.	Flooding

Geometric Consistency (2Km either direction)	Route Consistency <i>(Attach Info)</i>		Bendiness	C/way Width	FOSD	SSD *	Alignment Constraint (Ac)	Layout Constraint (Lc)
	Yes	No						
		✓						

Safety	Accident Statistics <i>(If Yes Attach Info)</i>		Safety Schemes <i>(If Yes Attach Info)</i>		Environmental Constraints	<i>(If Yes Attach Info)</i>	
	Yes	No	Yes	No		Yes	No
	✓			✓		✓ S.A.C.	

Capacity / Operational	AADT	% HGV	% Overtaking	Traffic Count Source	Bridges / Structures	Yes <i>(Attach Info)</i>	No
	5322	12.8%	40%	RT 620			✓

Improvement Purpose

IRI Value indicates relatively undulating road.
FWD Survey indicates a number of structurally deficient sections, however the geometric characteristics are adequate, hence the proposal is to provide an overlay commensurate with the structural analysis.
The horizontal alignment indicates some adverse camber which will be rectified in the overlay design utilising the appropriate design speed as determined from NRA TA 85/06.

Category of Improvement <i>(Tick Box)</i>	CAT 1	CAT 2	CAT 3	Proposed Surface Type	Envisaged Programme <i>(Tick Box)</i>	Annual	Multi-Annual
		✓				HRA	✓

Cost Breakdown	Construction (€)							
	Prelims	Boundary Treatment	Drainage / Ducting	Earthworks	Pavements	Accom'ion Works	Ancillary Works	Design
	9,198	9,198	15,330	21,462	177,828	30,660	24,528	18,396

Land Acq	Other	Cost Estimate	Total €	€/ m ²
0	0		€ 306,600	€ 35