

Guidelines for Assessing Locations for New Roadside Utility Poles

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Abstract

This document describes the guidelines and the process for selecting the locations to site NBI poles on the public thoroughfare and the site specific data set to be assembled to support an application for a Section 254 licence for the placement of a pole

References

- SDMG_NTD_001_Technical_Design_Rules
- SDMG_NTD_002_NBI_LLD_Design_Data_Model
- PRG_NTD_001_NBI_Physical_Logical_Inventory_Naming_Convention
- WIG_NTD_001_Design_Survey_Scope

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Document Control

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D0.2.4	Feedback from Design, Field & DP's	Liam O'Brien		5/11/20
D0.3	Additional Feedback from Design, Field, DP's & L.A.'s – Some clarification on data compilation	Liam O'Brien		1/12/20
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1 Introduction

1.1 Document Purpose

Objectives

This document considers the road safety aspects of the erection of poles within the existing roadside verge in the context of National Broadband Ireland’s (NBI) design, deployment, and operation of its telecommunications network under the National Broadband Plan (NBP).

This document has been prepared by NBI for the purposes of setting out a guideline methodology for its survey and design teams to assist in assessing the suitability of a location at which a new pole is proposed.

The document is intended to inform the selection and evaluation of pole locations which are submitted to Local Authorities as part of an application for consent to erect above ground infrastructure.

The guidelines relate to rural roads of non-National classification only, with design speeds up to 80km/h.

1.2 National Broadband Plan

The NBP rollout programme is a key enabler of government strategy across a number of policy areas. Covering 96% of Ireland’s land mass, the Intervention Area now includes over 544,000 premises including newly built premises in the Intervention Area since the contract was awarded. It will bring high-speed broadband with a minimum download speed of 500Mbps to around 23% of Ireland’s population, including 69% of farms, through approximately 140,000 km of fibre cable, 1.6 million poles, and over 15,000 km of underground duct networks

The NBP will ensure that all people and businesses have access to high-speed broadband, no matter where they live or work. Once completed, all parts of Ireland will have access to a modern and reliable broadband network, capable of supporting the communications, information, education, and entertainment requirements of current and future generations.

The recent Covid pandemic has reinforced the need for access to high speed-broadband in rural areas and so has brought an increased imperative for the rapid rollout of the NBP network. Long-term working and living arrangements are being altered as a result of the Covid pandemic, including in ways that will facilitate more balanced regional development. The positive benefits of these changes will, however, only be fully realised if high-speed broadband services are available in the areas to which people wish to move.

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Project Phases

From an infrastructure perspective the NBP consists of two distinct phases.

The **Network Deployment phase** is expected to take up to seven years and comprises the Design and Construction of the fibre network to facilitate the availability of high speed-broadband to the 544,000 premises in the Intervention Area (i.e. those premises which are served by the NBP).

The **Network Connections phase** of the project commences as soon as the first premises is passed by the NBP network and is available for customer connections. This phase runs for at least the 25 years of the NBP contract and provides for the connection of customers and the operation & maintenance of the network.

Infrastructure Preference

The NBP has been designed as a fibre-to-the-home (FTTH) network, meaning that each premises within the Intervention Area will be connected with individual, directly connected fibre-optic cables. The NBP has been designed to achieve its objectives in a cost-effective manner, as the State is providing funding to the project through the provision of significant levels of public subsidy. Because of this, a key objective of the project is to manage the cost to the State by using the most cost-effective network deployment strategies.

This value-for-money imperative drives key design principles underpinning the NBP network deployment. In particular, it requires, where available, the re-use of existing infrastructure and, in situations where new infrastructure must be deployed, that the most cost-effective deployment solutions are employed.

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1. Reuse of existing infrastructure

Under State Aid rules, the use of existing infrastructure is mandated where such infrastructure is available. Additionally, making the maximum possible usage of existing infrastructure in rolling out new high-capacity broadband networks was specifically envisioned by the European Commission in its Broadband Cost Reduction Directive (BCRD), which was transposed into Irish law as the Broadband Cost Reduction Regulations (SI No. 391 of 2016).

The NBP network design makes substantial use of existing telecommunications infrastructure assets including overhead infrastructure (poles) and underground infrastructure (ducts) currently owned or managed by Open eir and or enet. The high-level design undertaken by NBI suggests that up to 90% of the network route can be constructed using existing infrastructure during the Network Deployment phase.

In terms of pole infrastructure, while approximately 1.6 million poles are required to complete the project, including the Network Deployment phase during years 1-7 and the subsequent Network Connections phase over the full 25 years, only 17% of the total pole infrastructure are new poles. The split between new and existing pole infrastructure is shown in Figure 1 below.

It is worth noting that a significant percentage of the new Network Connection poles will be located in private property where they serve a single premises, reducing the number of instances of new pole infrastructure being located in the verge of public roadways.

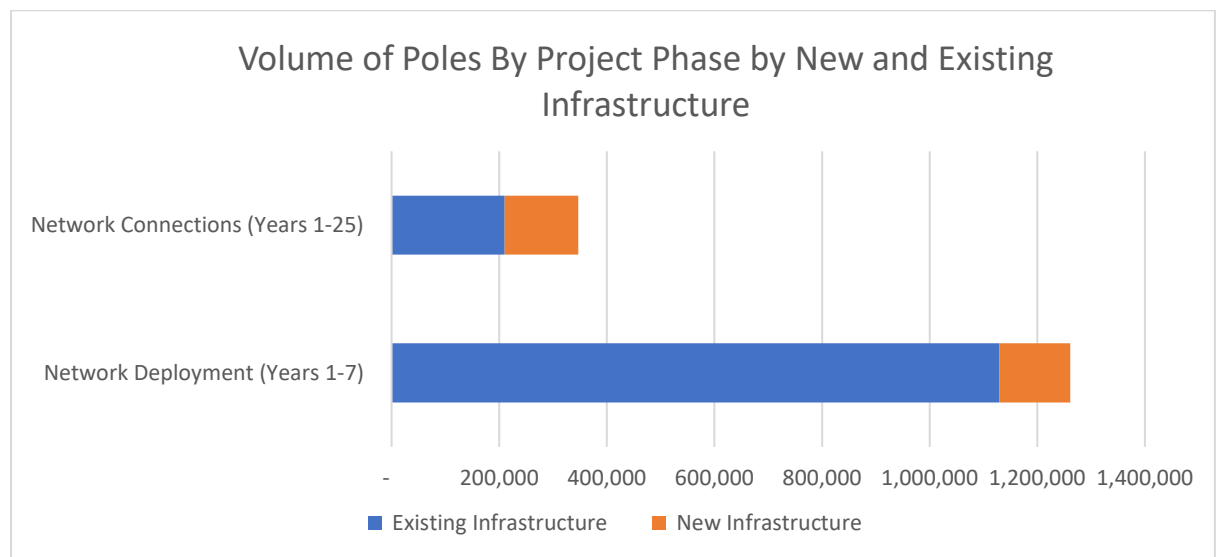


Figure 1 Volume of Poles By Project Phase by New and Existing Infrastructure

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2. Cost-effective deployment of new infrastructure

A key driver of cost within the project is the installation of new infrastructure where existing poles and ducts are not available. The construction of overhead infrastructure is significantly more cost-effective than the installation of new underground infrastructure. It is at least five times more expensive to install underground infrastructure per metre of route than it is to deploy a new pole route, with the potential to add in excess of €300 million to the project costs. Such use of public funds would not be in line with the required value-for-money principles that underpin the NBP project. For this reason NBI has prioritised the placement of new overhead infrastructure relative to the construction of new, more expensive underground routes.

The figures below highlight the percentage splits between overground and underground infrastructure during both the Network Deployment and Network Connections phase of the project. This reflects the significant above ground infrastructure which is already in-situ across rural Ireland today and which is available for re-use by NBI.

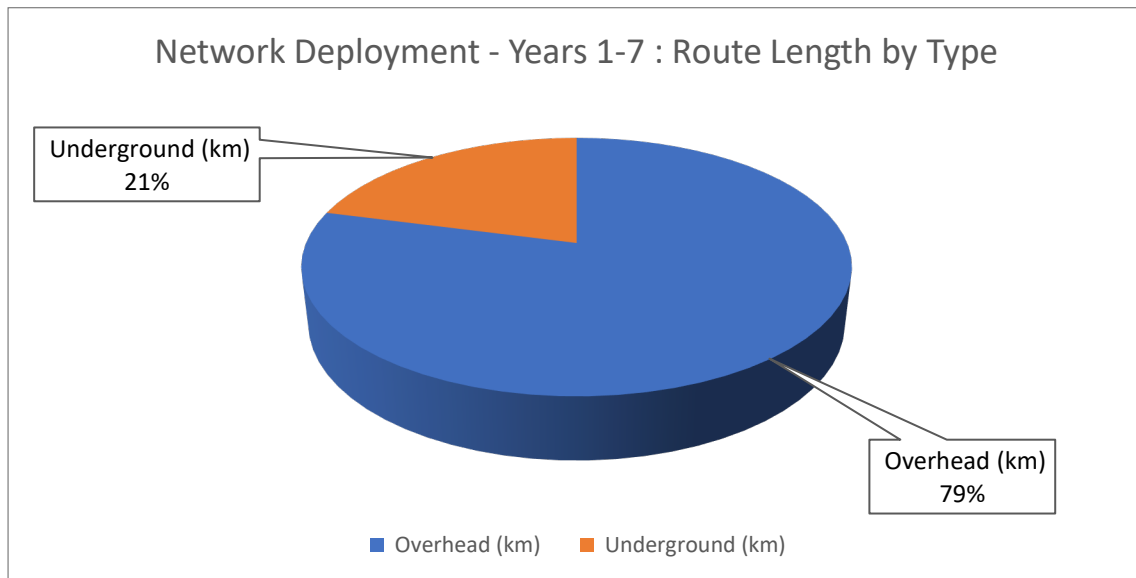


Figure 2 Network Deployment (Years 1-7) Route Length by Type

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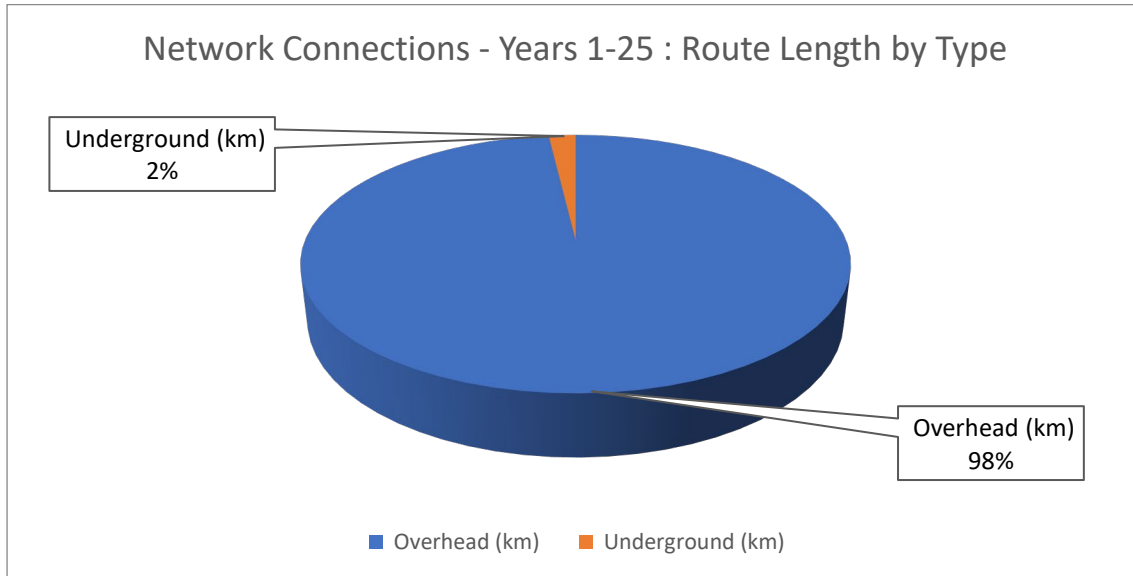


Figure 3 Network Connections (Years 1-25) Route Length by Type

Road Safety

The established preference for utilities is to locate any infrastructure serving more than one customer in a public space (i.e. the roadway verge) to facilitate access for operations and maintenance purposes. Having regard to the principles described above - Reuse of Existing Infrastructure and the Cost Effective Installation of New Infrastructure - NBI has developed these Guidelines to ensure that road safety is the primary driver of the actual placement of overhead infrastructure when placed within the verge of public roadways and that its designers have taken account of all necessary road safety aspects of pole placement in their design choices. In doing so, the object has been to strike a balance between the required value-for-money objectives of the NBP project (i.e. deploy overground infrastructure where possible) and other appropriate policy aims relating to the installation of overhead infrastructure.

The purpose of these Guidelines is to clarify NBI’s proposed design choices from a road safety perspective for the placement of overhead infrastructure and to inform local authorities and other interested parties in this regard.

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Rural Network

The NBP project is predominantly but not exclusively a rural initiative. These Guidelines relate to rural roads of non-National classification only.

Infill

In the majority of cases NBI pole placements are in-fill in nature. That is, they comprise singular or short runs of single digit pole placements required to transition between existing pole infrastructure or to secure an end customer connection in a situation where no existing overhead infrastructure is in place. Figure 4 Sample Deployment Area - Existing and Proposed Pole Infrastructure below illustrates the in-fill nature of a typical deployment area pole placement. In assessing any proposed new pole location the existence of the existing pole infrastructure will be considered and whether the proposed alternative location introduces a new hazard.

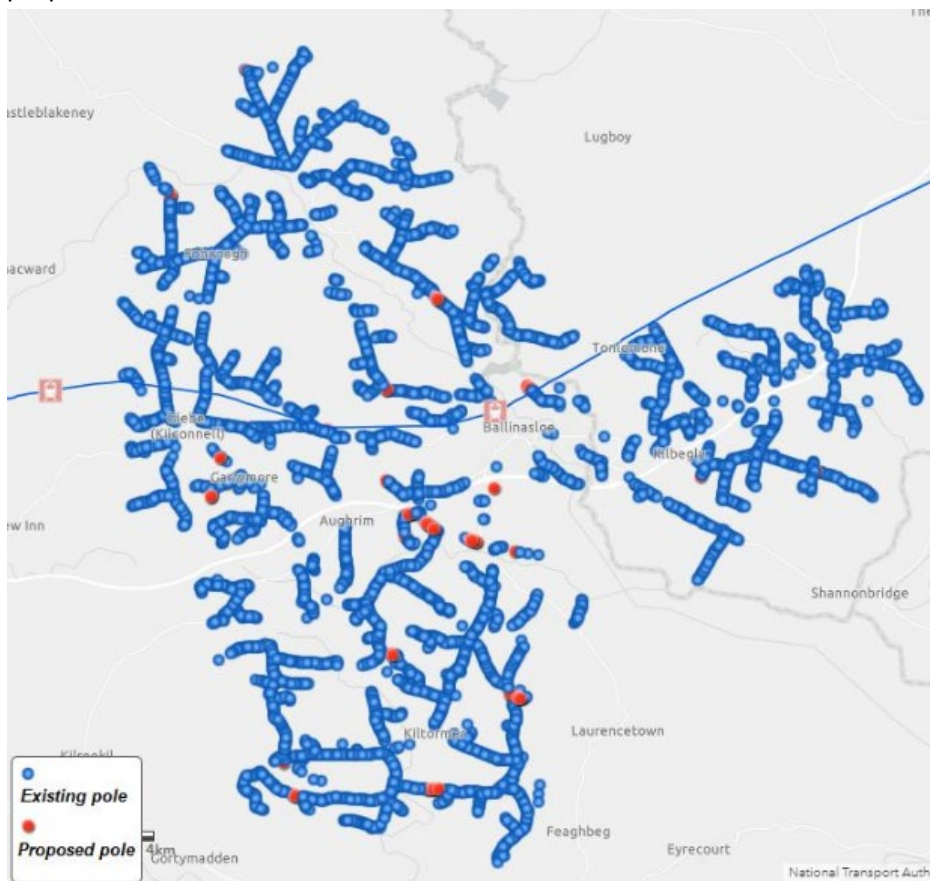


Figure 4 Sample Deployment Area - Existing and Proposed Pole Infrastructure

Other Considerations

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While other considerations, including those relating to planning and the environment, are considered in choosing a pole location, they are outside the scope of this document.

Any safety or traffic control issues related to construction works are excluded from this document and compliance with statutory obligations and local authority licence conditions and directions will be required.

Additionally, the undertaking of works on public roads would be by reference to TII Publications noted below within the context of the Government's stated value-for-money objectives and having regard to the non-National and predominantly rural areas served by the NBP:

- DN-GEO-03030 Guidance on Minor Improvements to National Roads
- DN-GEO-03036 Cross Sections and Headroom
- GE-STY-01024 Road Safety Audits
- DN-REQ-03034 The Design of Road Restraint Systems
- DN-REQ-03079 Design of Road Restraint Systems for Constrained Locations
- Guidance on the Potential Location of Overground Telecommunications Infrastructure on Public Roads.
- Disability Guidance
- Forgiving Roadsides
- Road Safety Audits
- Safety Barriers

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1.3 Development of the Guidelines

The established preference for utilities is to locate any infrastructure serving more than one customer in a public space to facilitate access for operations and maintenance purposes. Applications for licences for above ground infrastructure fall under the Planning and Development Act 2000, specifically Section S254 which provides for the ‘licencing of appliances and cables, etc.’ on public roads.

Following engagement with local authorities in relation to the issue of road opening licences for the initial Deployment Areas being constructed by NBI it was found that there was a need to develop a nationally applicable process which could facilitate the volume of above ground licence applications required under the NBP on an equivalent basis to the process for seeking road licences for below ground infrastructure via the Road Management Office’s online MRL system.

This process – including the selection by NBI and subsequent review by the relevant local authority – is intended to be as objective and repeatable as possible given the scale and the required speed of deployment of the NBP network. It is also intended to facilitate a desk-based assessment using available information and resources to objectively determine the suitability of a proposed location for a new pole.

It is intended that the road safety considerations in relation to pole locations would form part of the proposed S254 licence application and ensure a consistent licencing regime across all participating local authorities.

An initial draft of these Guidelines was presented to the Land Use & Transport working group for review in September 2020. In addition to considering the feedback from the working group a trial was initiated with Cavan County Council to cover NBI’s deployment area Reference No. 25 which covers an area to the North East of Cavan.

The purpose of the trial was threefold:

- 1) To validate the application of the guidelines in the field;
- 2) To provide real world learnings for the process in terms of issues encountered in the field, and
- 3) To inform the nature and extent of the information required by a Local Authority in any subsequent licence application.

This document is a working document and is intended to be updated on foot of learnings over the course of NBI’s Network Deployment and subsequent Network Connections.

The document also aids collection of data that will support a licence application to a Local Authority for the locating of new pole infrastructure.

NBI is appreciative of the assistance provided by the RMO, LGMA, CCMA and Local Authorities in accelerating this process to facilitate the Government objectives set out in the National Broadband Plan.

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2 Road Safety Risk

2.1 Collision Likelihood

The following infographics provide information on the likelihood of pole collisions.

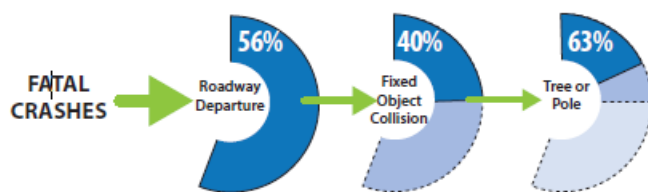


Figure 5 Relationship of roadside tree and utility pole crashes to all fatal crashes (US)

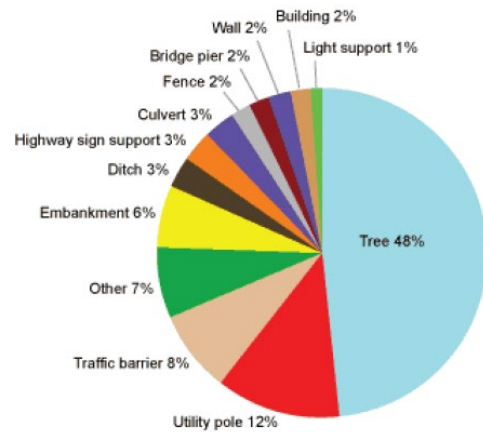


Figure 6 Percentage distribution of fixed object crash deaths (EU)

A report for the National Roads Authority of Ireland, *Contributory Factors Analysis for Road Traffic Collisions*, November 2012, states that pole collisions in the period 2007 to 2010 accounted for 117 out of a total of 6,934 injury collisions, i.e. 2% approximately. These figures relate to National roads and should be considered in the context of wider margins, designated clear zones in many cases but also higher speeds and traffic volumes.

The factors that affect the likelihood of pole collisions are:

- The number of roadside poles
- The lateral offset to the poles
- Roadway factors such as alignment, cross-section and gradient
- Traffic speed

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A collision rate for poles can be predicted by use of the US nomograph shown in Figure 7 Nomograph to Determine the Number of Pole Crashes per Mile per Year Based upon the Average Daily Traffic, Pole Density and Average Pole Offset.

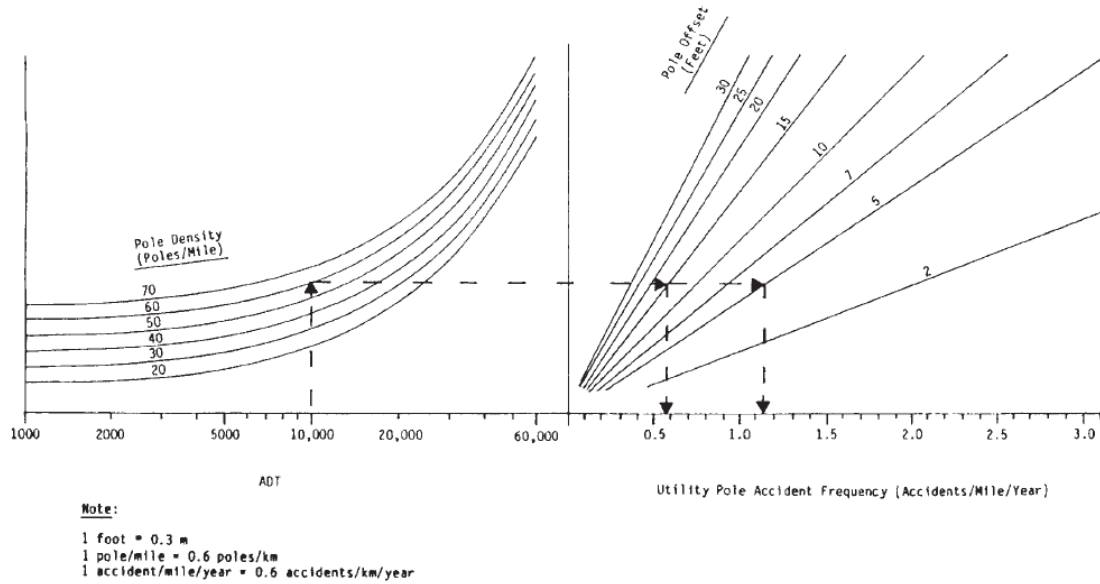


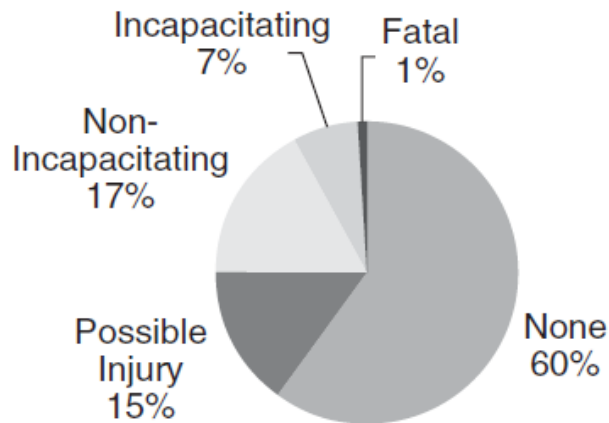
Figure 7 Nomograph to Determine the Number of Pole Crashes per Mile per Year Based upon the Average Daily Traffic, Pole Density and Average Pole Offset.

For example, given an ADT of 10,000 vehicles per day, a pole density of 60 poles per mile, and an average pole offset of 5 feet, the expected number of crashes is 1.15 pole crashes per mile per year, or a crash every 50 years or so with any one pole.

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2.2 Collision Severity

Because of the structural strength and small vehicle contact area of utility poles, these crashes tend to be severe.



Crashes with all poles, including utility poles
Source: GES 1999

Figure 8 Distribution of Maximum Severity for Pole Crashes (US)

The NRA 2012 report *Contributory Factors Analysis for Road Traffic Collisions* records an Average severity of 0.16 FWIs (Fatalities plus Weighted Injuries) for pole collisions in the period 2007 to 2010 (the severity range was 0.118 to 0.416). FWI = Fatalities + (0.1 x serious injuries) + (0.01 x minor injuries)

In Ireland in 2011, 2% of all recorded injury collisions on the network, and approximately 5% of all fatal collisions, were with poles.¹ Pole collisions are therefore more severe than the average collision.

The factors that affect severity of pole collisions are:

- Stiffness of the pole
- Traffic speed
- Lateral offset
- Whether front or side impact collision.

¹ Reference required.

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3 Traffic Speed

The increase in crash severity as speed increases is based on the fact that energy increases in proportion to speed squared.

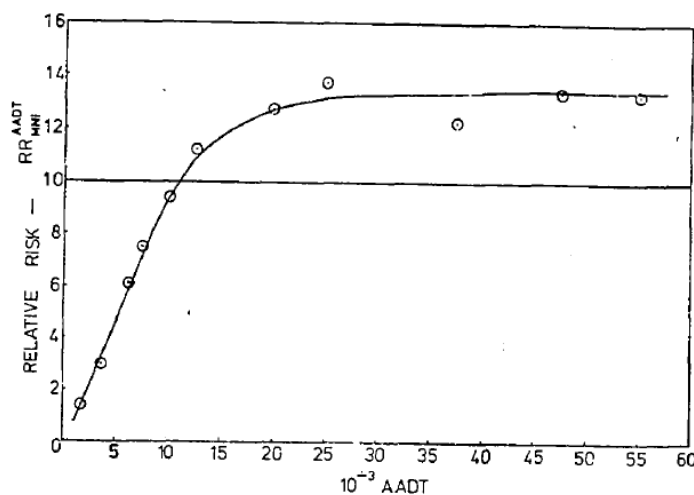
Higher severity outcomes are related to higher speeds as highlighted in the US data below.

Speed Limit	Percent
50 Km/h or less (30 mph or less)	12%
55 – 60 Km/h (35 – 40 mph)	19%
70 – 80 Km/h (45 – 50 mph)	17%
90 Km/h or greater (55 mph or greater)	48%
No Limit or Unknown	4%
Total	100%

Table 1 Deaths in Roadside Crashes, 2003 (US)

4 Traffic Volume

The increase in crash severity as speed increases is based on the fact that energy increases in proportion to speed squared.



In the volume range that relates to non-National roads the relationship between pole collisions and AADT was found by this Australian study to be linear.

Figure 9. Unweighted relative risk versus AADT-MNI data group

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5 Offset

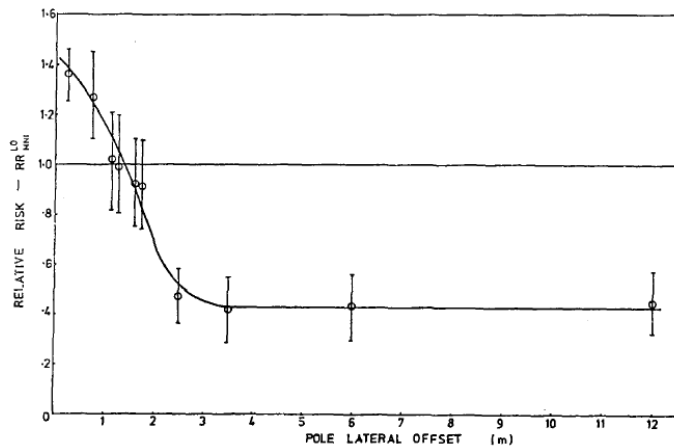


Figure 10 Relative Risk Versus Pole Lateral Offset

Lateral offset of poles is a major determinant of the frequency and severity of pole crashes.

The graph shown in Figure 10 Relative Risk Versus Pole Lateral Offset based on an Australian study indicates significant benefit in achieving an offset of more than 3m on major routes (generally higher-speed).

The US document “BARRIER GUIDE for Low Volume and Low Speed Roads - Publication No. FHWA-CFL/TD-05-009 November 2005” provides the following guidance.

“Low speed conditions, defined as 70 km/h or less, are not commonly associated with roadside crashes. In fact, the risk of death or serious injury in roadside crashes drops significantly as vehicle speeds are reduced. The probability of serious crashes can be estimated by the energy expended in a crash. The energy expended in a crash is an exponential relationship to velocity or speed. Significantly less energy is expended in low speed crashes compared to high speed crashes. Also, drivers in low speed situations are more likely to regain control of their vehicle and avoid a roadside crash than in a high-speed situation.”

Table 2 in the US publication² (‘US Table 2’) includes a range of offsets, depending on the nature and extent of hazard and road conditions to be used to determine what potential hazards should be considered for barrier warrants. While not a design standard serves it provides a useful guide to the minimum offsets to be considered.

The ‘US Table 2’ uses increasing Average Daily Traffic figures (ADTs) coupled with Operating Speed as the basis for increasing offsets. In adapting the US methodology for use in a desk-based assessment of offsets under the NBP, the use of Road Classifications rather than ADT has been proposed. The use of ADT information as the basis for assessing the increasing probability of road safety issues was deemed to be impractical as this information is not available for many of the roadways which NBI will be assessing.

² BARRIER GUIDE for Low Volume and Low Speed Roads - Publication No. FHWA-CFL/TD-05-009 November 2005

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For the avoidance of doubt *Table 2 Guidance Offsets for Locating Poles* below is limited to Regional and Local roads only in a rural setting. It does not apply to National roads or urban areas.

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Operating speed ³	Road Classification	Guidance Offset based on Road Cross Section Assessment with No Mitigation ⁴ .		
		Flat ⁵	Fore slope (FILL)	Backslope (CUT)
Up to 40 km/hr	Local Tertiary	1.2 m	1.5 m	1.2 m
	Local Secondary	1.5 m	2 m	1.2 m
	Local Primary	2 m	2.5 m	1.5 m
	Regional	-	-	-
40 to 49 km /hr	Local Tertiary	1.5 m	2 m	1.5 m
	Local Secondary	2 m	2.5 m	1.5 m
	Local Primary	2.5 m	3 m	2 m
	Regional	3 m	3.5 m	2.5 m
50 to 59 km/hr	Local Tertiary	2 m	2.5 m	2 m
	Local Secondary	2.5 m	3 m	2 m
	Local Primary	3 m	3.5 m	2.5 m
	Regional	3.5 m	4 m	3 m
60 to 69 km/hr	Local Tertiary	2.5 m	3 m	2.5 m
	Local Secondary	3 m	3.5 m	2.5 m
	Local Primary	3.5 m	4 m	3 m
	Regional	4 m	4.5 m	3.5 m
70 to 79 km/hr	Local Tertiary	3 m	3.5 m	3 m
	Local Secondary	3.5 m	4 m	3 m
	Local Primary	4 m	4.5 m	3.5 m
	Regional	4.5 m	5 m	4 m
80 km/hr & greater	Local Tertiary	3.5 m	4 m	3 m
	Local Secondary	4 m	4.5 m	3.5 m
	Local Primary	4.5	5 m	4 m
	Regional	5 m	5.5 m	4.5 m

Table 2 Guidance Offsets for Locating Poles

³ NBI is continuing to develop its Operating Speed assessment methodology and has commissioned further research to validate the output from the Google mapping assessment of driving times vis a vis the 85 percentile Operating Speed.

⁴ Where appropriate mitigation is available a reduction in the off-set of up to 50% can be made.

⁵ For use with slopes ranging from flat to inclined upwards at 1:4

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Where ADT information is available the following table sets the correlation between Road Classification and ADT.

Road Classification	ADT
Local Tertiary	< 750
Local Secondary	750 - 1500
Local Primary	1500 - 6000
Regional	> 6000

Table 3 Road Classification / ADT Matrix

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6 Road Layout Risk Factors

While many recorded pole collisions are random, a large portion are associated with features such as bends, junctions and other locations of increased hazard. Just 10% of road factors are common to 50% of pole collisions. In developing these Guidelines NBI has sought to identify the significant hazards which should be avoided when assessing a location for new pole infrastructure.

6.1 Bends

Studies suggest that curved roadways accounted for 38% of utility pole crashes and 59% of the fatalities.⁶

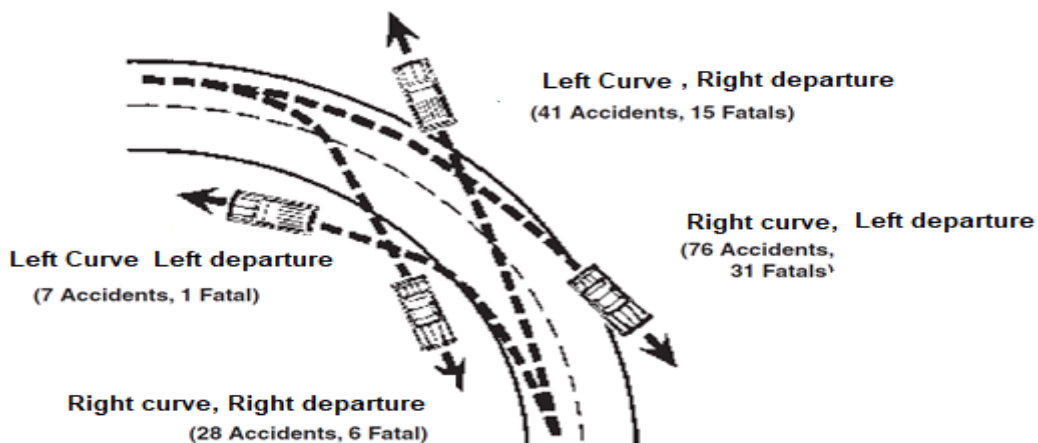


Figure 11 Curve Direction and Crash Frequency. Source: O'Day, 1979 (adapted)

⁶ Reference Required

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The outside of the bend is the greater hazard in the study shown in *Figure 11 Curve Direction and Crash Frequency*. Source: O'Day, 1979 (adapted) while the inside of a bend experiences fewer collisions.

An initial assessment of placing a pole on the outside of a bend would indicate that a pole placement should be avoided. However, in the majority of cases NBI pole placements are in-fill in nature. That is, they comprise singular or short runs of single digit pole placements required to transition between existing pole infrastructure or to secure an end customer connection in a situation where no existing overhead infrastructure is in place.

In assessing any proposed new pole location the following elements should be considered by the Designer:

- 1) The 85th Percentile speed of the road approaching the bend
- 2) The collision history database and whether the location⁷
- 3) The existence of the existing pole infrastructure and whether the proposed alternative location introduces a new hazard.

⁷ <https://www.rsa.ie/RSA/Road-Safety/RSA-Statistics/Collision-Statistics/Ireland-Road-Collisions/>

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6.2 Junctions



The area within 8 metres of a junction has a disproportionate number of roadside collisions. An Australian study recorded 32% of pole collisions at intersections.

Secondary collisions with poles can occur at junctions where the primary collisions are associated with turning manoeuvres at the junctions.

It is recommended that new poles are not located within 10 metres of a junction.

Location of poles opposite the intersection at T-Junctions is to be avoided.

Sight lines leading up to junctions is also represents a road safety issue. Where a pole is located leading to a junction then the pole should be located at the maximum available distance from the junction and at the maximum available offset.

Sightlines should also be considered in the context of entrances to properties when assessing the maximum available distance from the entrance and at the maximum available offset.

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6.3 Road Narrowing's

Poles are hazards in situations where drivers are required to brake due to a sudden reduction in the width of the cross-section. Lane drops and lane narrowing's are two such examples. Such locations should be avoided when considering pole placements.

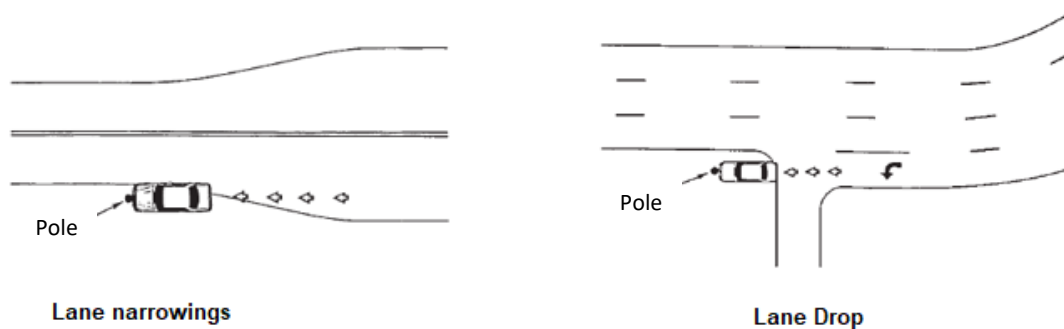


Figure 12 Lane Narrowing and Lane Drop

6.4 Collision History

While the collision history of a road section is not in itself a risk factor, it may still be indicative of the potential for increased road safety risk and it might suggest that the location may not be suitable for new poles. Collisions on the non-national road network are much less frequent than on the National road network, however any location that has a history of repeated injury collision should be avoided where possible. Where the designer is in doubt as to the suitability of a location because of collision history they should consult with the relevant Local Authority.

A collision history of Irish roads is available at the Road Safety Association website.⁸ An example of a Road Collision query is shown in *Figure 13 Sample RSA Road Collision Search* below.

⁸ <https://www.rsa.ie/RSA/Road-Safety/RSA-Statistics/Collision-Statistics/Ireland-Road-Collisions/>

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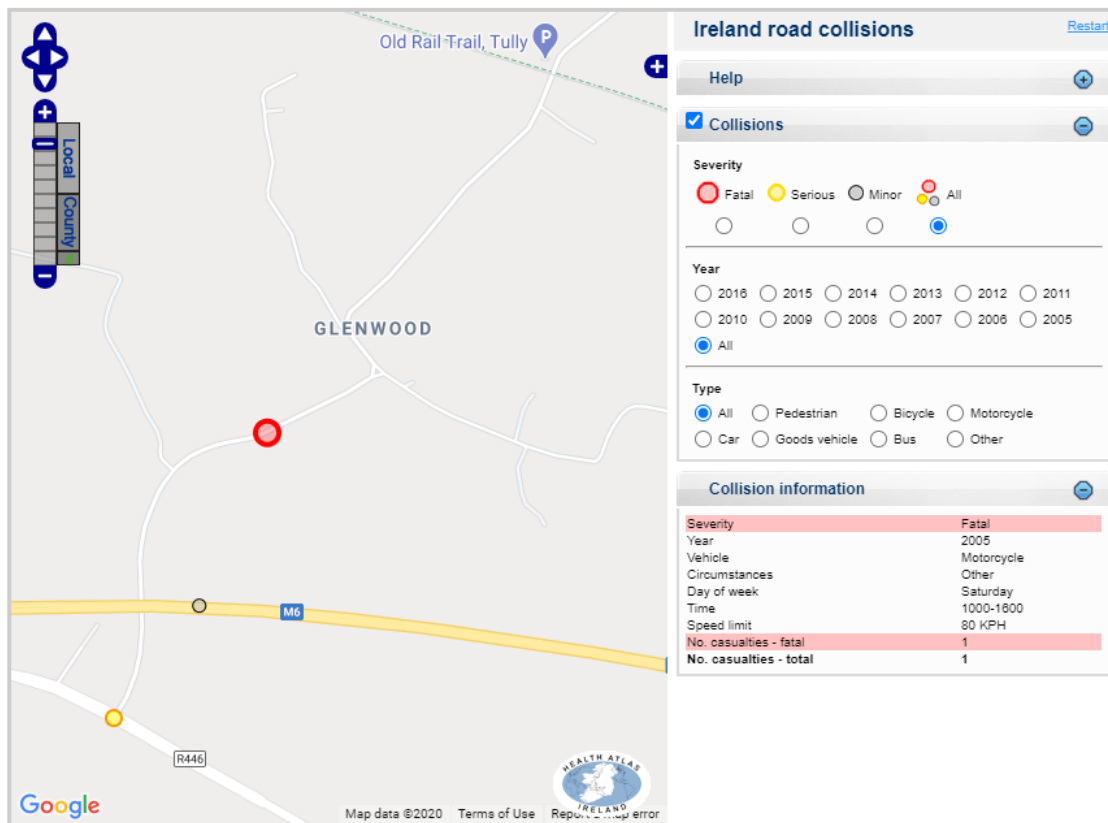


Figure 13 Sample RSA Road Collision Search

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6.5 Mitigation

Section 2.2 above (Collision Severity) highlights the contribution of the small vehicle impact area of utility poles to the severity of collisions. Mitigation from a direct impact with a pole can reduce this factor significantly and facilitate a reduced offset requirement from those set out in *Table 2 Guidance Offsets for Locating Poles* above. Mitigation can be achieved by locating the pole within/beside an existing roadside feature (which may itself be an existing hazard such as wall pier) or by locating the pole within a bank or similar which provides a re-directional or deceleration opportunity in the event of a collision.

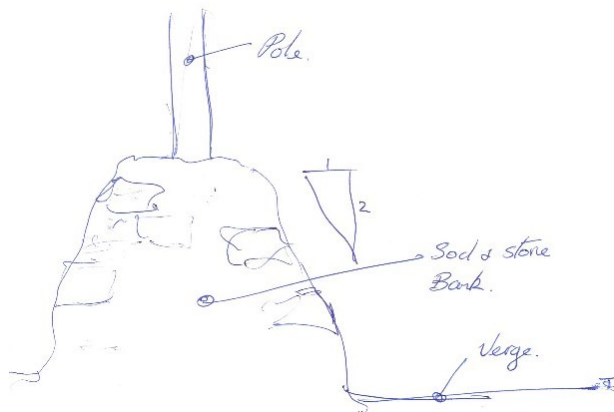


Figure 14 Cross Section of a Pole Incorporated into a Re-directional Feature

Figure 14 Pole Incorporated into a Re-directional illustrates a situation in which a utility pole can be incorporated within an existing roadside re-directional feature such that an errant vehicle would not be expected to collide directly with the pole.

In practice these features relate to roadside banks into which a pole could be integrated. Figure 14 Pole Incorporated into a Re-directional illustrates a cross-section of such an integration.

Learning from the trial conducted in Cavan highlighted some situations where shielding did not apply, including:

- 1) placement of a pole directly in front of a wall did not qualify as a mitigation, unless protected by a pier or similar;
- 2) placement of a pole within a hedge did not constitute mitigation as the vegetation was not sufficient to alter the direction of travel of a vehicle;
- 3) Re-directional or deceleration was typically via roadside banks rather than stand-alone features.

Where mitigation is provided by an existing hazard, the potential removal of the hazard at some point in the future should be considered as this may also necessitate the relocation of the pole location. The nature of the hazard and the traffic conditions at the specific location will determine the likelihood of the hazard having to be moved at a future date.

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7 Proposed Methodology

Based on the road safety considerations discussed above, the following approach should be taken when assessing the suitability of a location for the placement of new pole infrastructure:

- 1) Avoid placing poles at hazardous locations (this is to counteract the 50% of collisions that occur at such locations);
- 2) Poles should be erected at the maximum available offset available where this is greater than that highlighted in *Table 2 Guidance Offsets for Locating Poles*;
- 3) Notwithstanding guidelines 1) and 2) above, and noting the in-fill nature of the NBI new pole infrastructure, where a new pole is being added to an existing line of poles the new pole may be located in line with these poles such that the spatial relationship of the existing pole network to the road profile is not altered;
- 4) Where the guidelines indicate that the location of a pole is not feasible, alternative solutions will be required, which may include underground infrastructure or use of private wayleaves;
- 5) Poles should be erected at maximum spacings to limit their number;
- 6) Where possible, designers should avoid siting poles on both sides of the road such that they would leave no option for safe evasive action by a driver;
- 7) Table 4 Assessment Methodology for Locations of NBI Poles below and the flowchart in Figure 15 Flowchart for Assessing Suitability of Locations for New NBI Poles sets out the Design Decision Matrix which should be used by a designer in assessing the suitability of a location for new pole infrastructure.

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Table 4 Assessment Methodology for Locations of NBI Poles

Ref	Overall Description	Sub-Description 1	Sub-Description 2	Action	Rationale	Comments
1	Hazardous Location Check	Outside of bend	Bend of radius below des. min. in TII Standards	Move poles to inside of the bend	40% of collisions on curves	In an in-fill situation consider consulting with road collision database
2		Junctions		No poles within 10m of a junction quadrants Avoid T-junctions Maximise sight lines	30% of collisions at intersections	
3		Down grade	Steep roads with gradients > TII standard	Poles on upgrade side of the road only		
4		Road narrowing	Where carriageway narrows or shoulder / strip ends	No poles at narrowing's		A narrowing is not the roadway / verge either side of an entrance
5		Lane drop	e.g. end of acceleration lane or end of climbing lane	No poles at lane drop		
6	Collision Location	One or more collisions of any type at the location		Avoid location if possible (consult if not).	Drivers exposed to collision risk take evasive actions leading to increased likelihood of pole collisions.	If omitting poles at the location seems unwarranted, confer with the Local Authority.
7	Pole Layout	Poles on both sides of the road		Poles on one side of road only	One side of the road should be free to allow the driver to take safe evasive action.	
8		Pole spacing		Maximise pole spacing / cable span		40-50m is the standard spacing between poles. Pole span can be increased up to 70m if required
9		Guy wires		Avoid use of guy wires		Further assessment of guy wires is required

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NBI Pole Location Guidelines

Ref	Overall Description	Sub-Description 1	Sub-Description 2	Action	Rationale	Comments
10	Offset	Verge width exceeds the Table 2 offset		Subject to the minimum offset erect the pole at the boundary.	This deals with second (random) 50% of collisions	Offset measured from road edge. Example of boundary positioning: where Table 2 offset is 2m but boundary is 3.2m, pole located at boundary, not 2 m.
11		Verge width is less than as set out in Table 2 of these Guidelines	Pole can be incorporated within an existing permanent hazard of equal severity ranking such that it does not increase risk	Subject to the minimum offset (adjusted by up to 50%) erect the pole where shielded by or aligned with the existing hazard	Direct impact mitigated by integration with existing hazard of equivalent or greater risk	Consideration to be given to likelihood of existing hazard being removed in due course
12			Pole can be incorporated behind or in a permanent feature including a bank that would re-direct or decelerate an errant vehicle such that it would mitigate a direct impact with the pole	Subject to the minimum offset (adjusted by up to 50%) erect the pole behind or within (as appropriate) the re-directional or deceleration feature	Errant vehicle will be redirected or decelerated prior to a pole collision	Consideration to be given to likelihood of existing hazard being removed in due course
13	Other options if standard pole within verge is not feasible	Passive pole		Erect at boundary	Risk reduction	Passive pole unavailable at reasonable cost
14		Undergrounding			Risk removal	
15		Wayleave / easement				Risk reduction by relocation
16	Operational Check					If poles are struck, safety should be reviewed, and pole relocated if advisable

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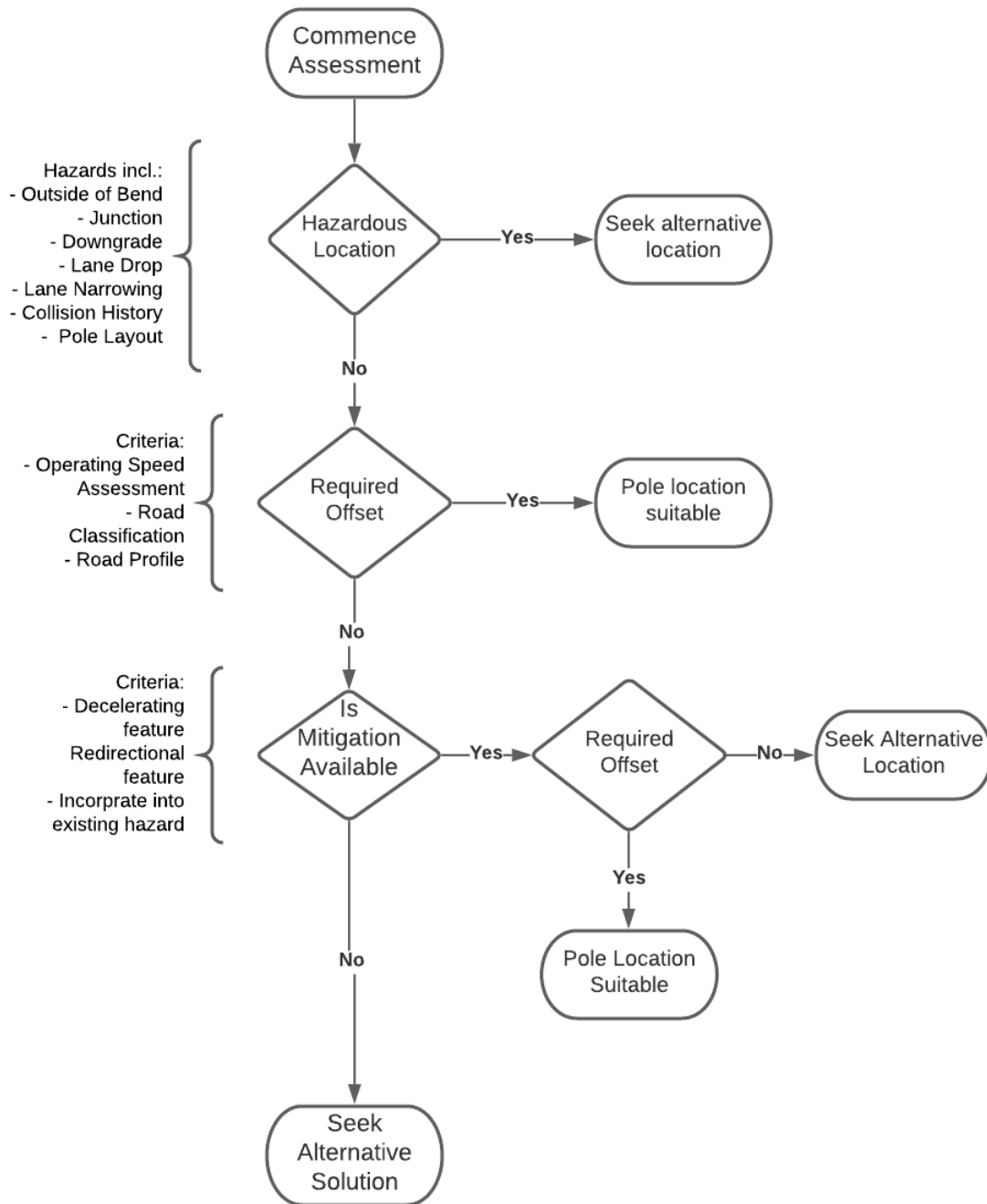


Figure 15 Flowchart for Assessing Suitability of Locations for New NBI Poles

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8 Data Compilation

- **Operating Speeds**

Reliable and repeatable operating speed can be calculated using Google Navigation. The selected location may be sampled upstream and downstream to measure the distance covered in full two-minute samples. The resulting speed represents an average over the route based on the Google Navigation database of driver history and includes start/end of journey correction factors. The sample needs to be corrected to provide an 85% percentile operating speed. Ongoing assessment and field verification is required over time to assist in developing these correction factors.⁹

NBI commissioned research into the correlation between this Google distance/time result through Roadplan and IDASO. The research showed a consistent relationship between Googles distance/time and 85th percentile speed represented by a factor of 1.25. The 1.25 factor is therefore applied by NBI to each Google distance/time calculation to ensure arrive at an objective assessment of the 85th percentile speed.

Short road lengths such as side roads, lanes and other primarily Local Tertiary short-distance routes on which speeds are constrained at very low levels are assessed at 30km by default. Individual assessments based on Google Navigation does not produce meaningful data due to low sample volumes while the roads themselves are low volume, low speed due to their nature and location.

- **Site Photographs**

To assist in the assessment of Local Authority licence applications photographs of each proposed pole location are to be taken. A minimum of two photographs are to be provided showing 1. the pole location from the driving direction and 2. the proposed location.

Where relevant the photograph should also provide sufficient visibility of the pole surroundings to provide a context for the location.

The pole location should be marked by a cone at the roadside and a 2-metre red/white ranging rod at the proposed offset location.

⁹ NBI is continuing to develop its Operating Speed assessment methodology and has commissioned further research to validate the output from the Google mapping assessment of driving times vis a vis the 85 percentile Operating Speed.

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9 Alternative Options

On a section of road for which use of the methodology would suggest that new poles should not be erected, alternative options may include:

- Redesign to avoid the need for the route;
- Relocating to private property;
- Installation of new underground infrastructure.

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10 Other Design Standards

Transport Infrastructure Ireland (TII) standards are applicable to National Roads and are also used in the assessment and design of rural non-national road schemes.

Standard DN-GEO-03036: Cross Sections and Headroom of May 2019 describes the principles of Forgiving Roadsides and the requirements for Clear Zones to be provided in the design of new road schemes so that a driver who leaves the carriageway can stop safely or regain control of the errant vehicle. New roads are therefore provided with wide verges.

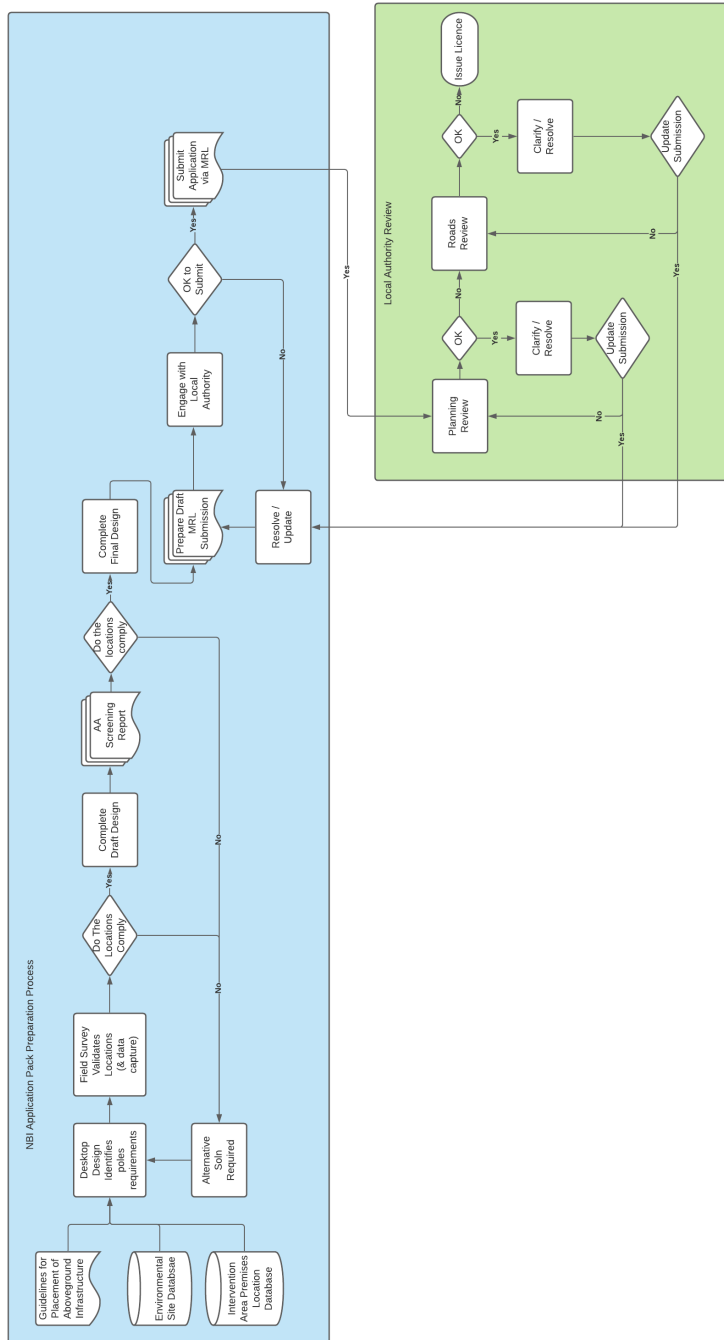
However, most non-national roads, and indeed many national ones, have not been designed to modern standards and do not have wide verges. TII publication DN-REQ-03079, Design of Road Restraint Systems for Constrained Locations (Online Improvements, Retrofitting and Urban Settings) recognises this fact and provides guidance on the situations in which road restraints systems should be provided to protect motorists from existing hazards.

This standard contains a risk assessment methodology, and a pole (i.e. wooden poles or posts with a cross-sectional area of > 25,000mm²) is classified as a high-risk hazard. However, the standard recognises that protecting an existing pole entails cost and, given that poles are not frequently struck, the expenditure might not be warranted. Under the standard, a pole located within 2m of the carriageway edge of a 100km/h national road does not require protection when the risk of collision is low, even though the corresponding Clear Zone dimension is 8m.

The standard relates to the retrofitting of barriers, but does not specifically provide guidance on the insertion of new hazards into existing verges and it has little detail relating specifically to low speed low volume roads.

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Appendix 1 Process Flow






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Appendix 2 Sample Locations



The following images represent sample of pole locations encountered during the course of NBI’s survey and S254 application process. They should be referenced as guidelines in the field.

Ref	Photo	Narrative
1		<ul style="list-style-type: none"> • This regional road carries more traffic at a greater operating speed. • The location qualified on all measures. • The location achieved its required offset 4.0m from the running edge of the carriageway. • The actual pole location is set to the maximum available to not introduce a point hazard.
2		<ul style="list-style-type: none"> • The location qualified on all measures. • The location achieved its required offset 2.0m from the running edge of the carriageway.



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Ref	Photo	Narrative
3		<ul style="list-style-type: none"> • The location qualified on all measures. • The location achieved its required offset 2.0m from the running edge of the carriageway. • To not introduce a point hazard or interfere with the improved sight lines the pole is set to the maximum offset.
4		<ul style="list-style-type: none"> • The location qualified on all measures. • The location achieved its required offset 2.0m from the running edge of the carriageway. • The running edge of the carriageway is defined by the Tii as the yellow line (if available or from the nearest edge of the trafficked lane).
5		<ul style="list-style-type: none"> • Note the pole integration into the existing hedge row. • Note the existing pole in the background. • The new cable network will have to cross diagonally at this location.


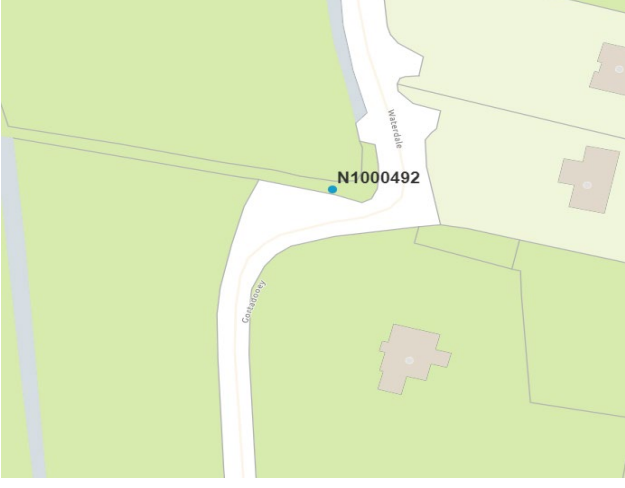
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Ref	Photo	Narrative
6		<ul style="list-style-type: none"> • This example is a typical “in fill” location where at a point in the past a pole stood and was left decay. • Note the existing pole location at a reduced offset.
7		<ul style="list-style-type: none"> • The operating speed was measured here at 74 kph • That determined an offset of 4.0m (cross section in backslope) • 2m was available to a buildable location • Appropriate mitigation was available by locating the pole in the existing roadside bank • The bank is determined to provide a re-directional or a deceleration opportunity in the event of a collision.

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Ref	Photo	Narrative
8		<ul style="list-style-type: none"> • The operating speed was measured here at 68 kph. • That determined an offset of 3.5m. • 3m was available to a buildable location. • Appropriate mitigation was available by locating the pole in the existing roadside bank. • The bank is determined to provide a re-directional or a deceleration opportunity in the event of a collision.
9		<ul style="list-style-type: none"> • The operating speed was measured here at 65 kph. • That determined an offset of 3.0m. • 2.7m was available to a buildable location. • Appropriate mitigation was available by locating the pole in the existing roadside bank. • The bank is determined to provide a re-directional or a deceleration opportunity in the event of a collision.

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Ref	Photo	Narrative
10		<ul style="list-style-type: none"> • The pole location presented as good at the survey stage. • On feedback from applications it as been determined that these locations – setbacks at entrances to improve sight lines are predominantly private and thus need a private wayleave opposed to following the s254 application process.
11		<ul style="list-style-type: none"> • The example given shows a pole on the outside of the bend travelling northerly • This would suggest it should be avoided • On assessment its determined that speed has reduced to navigate the bend • The location is mitigated in this zone as it is not directly in the run off path.

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Appendix 3 OH T1 Application



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