PROJECT NAME	**Rufford Ford, Rufford Lane, Nottingham**		
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1. INTRODUCTION

Instruction

1.1 BWB Consulting Ltd ("BWB") has been appointed by Via East Midlands Ltd ("the Client") to provide highway design and transport planning advice in respect of potential traffic calming schemes at Rufford Ford on Rufford Lane in Nottinghamshire.

Background Information and Report Purpose

1.2 The ford has become a national destination with a large following on social media that has encouraged drivers to come from all over the country to repeatedly drive through the ford often at excessive speeds with spectators stood in the road filming the events. This anti-social behaviour created highway safety problems and disruption along this part of Rufford Lane that led directly to a request from Nottinghamshire Police to the County Council to close the highway to motor vehicles in December 2022.

1.3 Following the temporary closure, Via East Midlands carried out a Feasibility Report to investigate several options for the future of the ford which included traffic calming as well as other technical solutions and considered the impact of a full and permanent closure.

1.4 In December 2023, after consideration of the Feasibility Study, the then Cabinet Member for Transport and Highways approved the commencement of a public consultation on the option of a permanent closure. This option was considered the only financially feasible one that would guarantee ending the anti-social behaviour at the ford. The consultation closed in January 2024 and in the intervening period, the Council has been considering in detail the comments received.

1.5 Several respondents raised the option of traffic calming as their preferred solution that would in their opinion slow the vehicles crossing the ford to a safe speed whilst ensuring the route remains open to all vehicles.

1.6 As a result of the above, the purpose of this Technical Note is to advise on potential traffic calming options with the aim of mitigating the impacts of anti-social driving behaviour. It should be noted that, whilst the potential schemes aim to influence driver behaviour, there is a risk that anti-social behaviour will continue due to drivers which are intent on driving through the ford at speed. There is the possibility that some drivers may look to damage or vandalise any equipment that is put in place if it would allow them to continue as before.

Site Location

1.7 The Site is located at Rufford Ford, which is on Rufford Lane in North Nottinghamshire, bordering the northern frontage of the wider Rufford Country Park Estate. The ford is formed where Rainworth Water crosses the carriageway to the north of Rufford Country Park. Rufford Lane is a single carriageway road with a lane in each direction and a posted 30 mph speed limit. Rufford Lane provides access to a number of residential dwellings as well as commercial businesses and visitor attractions, such as Rufford Mill, Rufford Park Golf & Country Club, Sherwood Castle Holiday Forest and a number of farm buildings. The location of the site is illustrated in **Figure 1**.

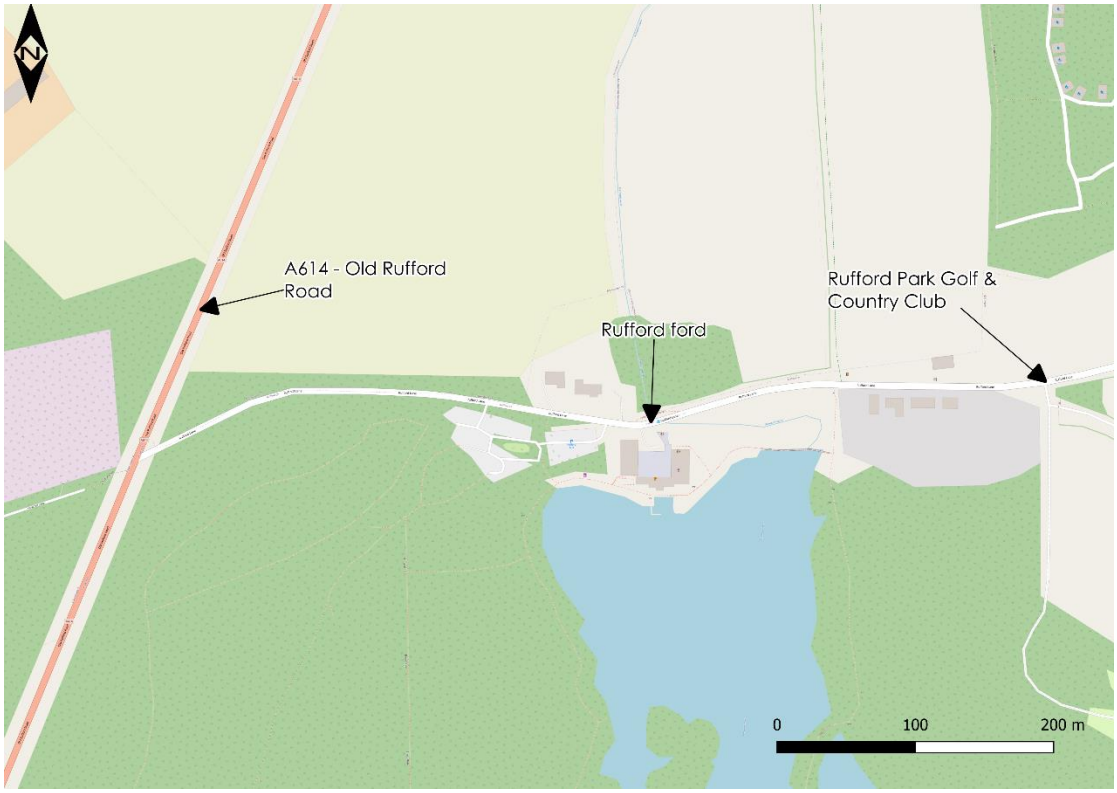


Figure 1: Site Location

1.8 A site visit was carried out on Friday 15th August 2025 between 0900 and 1100 hours when the weather conditions were fine and dry. The purpose of the visit was to review the existing layout of the ford and conditions along Rufford Lane to inform the design options in this Technical Note.

2. SITE HISTORY

Site Closure

2.1 In 2020, a local student began recording and posting on various social media platforms, vehicles traversing the ford. On some occasions, the videos included vehicles which became damaged, or stranded, as they traversed the ford. The videos quickly gained a significant online following, with over 20,000 separate videos and several million total views to date. The main driving factors of this online presence were the dangerous driving behaviour exhibited in the videos, showing vehicles driving at high speeds

though the ford whilst a significant crowd of spectators stood in close proximity, or completely within, the carriageway. This attracted more people, some travelling considerable distances to either record their own videos or participate in crossing the ford at speed or in an unusual way (such as reversing at speed).

2.2 By 2022, the number of those filming and conversely those wishing to be filmed, had risen dramatically. Driving behaviour at the site had deteriorated considerably, with vehicles driving repeatedly at inappropriate speeds through the ford whilst actively being filmed by content creators. In a bid to outcompete other creators, spectators would regularly stand within the carriageway, severely jeopardising road safety. Whilst the police began attending in an attempt to control the situation, this was also filmed and attracted even greater attention to the site.

2.3 Local residents began to voice their complaints about the large crowds and anti-social behaviour at the site. Reports were also made regarding threatening behaviour from content creators filming at the site when confronted. Additionally, evidence was found of tampering with the waterways infrastructure in an attempt to manipulate the water level to a higher level, which risks localised flooding.

2.4 On the 22nd October 2022, a motorcyclist drove at high speed into the ford, the impact of which propelled the rider over the handlebars and onto the carriageway resulting in serious injury. Nottinghamshire Police subsequently advised the Council that the site had become a significant risk to highway safety. On the 2nd December 2022, Rufford Lane was temporarily closed to through traffic for an initial period of 18 months under the S14(b) of the Road Traffic Regulation Act.

2.5 The temporary closure has received complaints from members of the public, particularly form people who travelled this route to the Rufford Park Golf & Country Club. This has led to further anti-social behaviour with people ignoring the closures and continuing to drive through the ford, such as during Storm Babet in October 2023 when a farm worker drove directly over the concrete barriers and the video was subsequently uploaded to social media.

Options Previously Explored

2.6 Via East Midlands explored a number of permanent mitigation measures, including the construction of a bridge over the ford, installation of traffic calming, new signage, reduction in water flow and permanent closure of the route and transformation through a public realm scheme to entirely remove vehicular traffic.

2.7 The Feasibility Study identified 10 potential options highlighting the benefits and constraints of each one as well as associated costs.

2.8 The Feasibility Study concluded that, of the 10 potential options, the following two would entirely remove the risk of dangerous actions of drivers through the ford.

- Permanent closure of the ford. Implement a gated closure of Rufford Ford to public vehicle access, only allowing authorised vehicle access for maintenance or emergency vehicles at an estimated cost of £45,500. In addition, there is the potential that a full closure would allow for the delivery of a complete public

realm scheme involving landscaping the site and developing it as a local tourist attraction.

- Construction of a bridge over the ford. This would keep the route open to vehicles but prevent vehicles driving at speed through the ford, mitigating the present road safety risk. Initial cost estimates in excess of £1 million.

2.9 Whilst construction of a new bridge would both mitigate risk and keep the route open to the public, the likely costs meant this was not a feasible option for the Council to implement. In addition, a bridge proposal in place of the ford that in effect gives Rufford its name, is likely to encounter significant local heritage issues. Subsequently, closure of the through route to public vehicles was deemed the most appropriate and cost-effective solution for completely removing the highway safety risk.

Public Response

2.10 To support the complete closure of the route, a Traffic Regulation Order (TRO) was proposed that would prohibit access through the ford for motor vehicles. Two formal stages of consultation were undertaken; first with key stakeholders such as local representatives, the emergency services, public transport operatives and residents adjacent to the proposed restriction. This was undertaken between 20th December 2023 and 27th January 2024. Following this, the second stage of consultation with the general public took place between 5th February 2024 and 4th March 2024. Once all stages of consultation were complete, a total of 219 responses were received, 25 in support of the closure and 194 in opposition.

2.11 Responses in favour of the proposals of a permanent closure were received from stakeholders such as the Police, Nottinghamshire Fire and Rescue, Rufford Parish Council, Newark Sherwood District Council and several local residents. Key concerns, which resulted in such parties supporting the proposal, arise from the highway safety risk imposed on all users, including vulnerable users, by the dangerous driving behaviour being displayed. Residents living close to the ford had experienced significant levels of anti-social behaviour directly outside their properties prior to the closure and despite the impact it has on their local travel, they were wholly in support of a permanent closure.

2.12 Objections were typically received from a wider geographical area beyond Rufford Lane. A proportion of the objections were received from members of the nearby Rufford Golf club, who felt their journeys were unreasonably impacted as a result of the closure. In addition, residents in Ollerton objected as they felt that traffic through their town had increased as a direct consequence of the ford closure. Some objections appeared to misconceive the reason for the closure, assuming that the closure was solely a result of vehicles becoming stuck during periods of high water levels, rather than being closed to prevent dangerous driving behaviours.

3. POTENTIAL SOLUTIONS

Introduction

3.1 To address the specific comments from the public asking for traffic calming as a solution the following section builds on the initial work undertaken by Via and further explores potential options to re-open the ford to vehicular traffic combined with installing a scheme of traffic calming to address the historic issues with anti-social driving behaviour.

3.2 As detailed, the issues at the ford with anti-social behaviour are not typical driver behaviour. Drivers repeatedly traversed the ford in an exhibitionist manner designed to maximise content views on social media. This has been taken into consideration in the design of the traffic calming schemes

3.3 It should be recognised that any scheme which is to be introduced requires careful consideration of the setting adjacent to the historic Rufford Mill. Rufford Lane is a rural area, adjacent to a country park, which would not benefit from any 'urbanising' effect introduced with the implementation of any traffic calming scheme. Therefore, any potential solutions are suggested in a manner as to produce as minimal visual intrusion as possible.

3.4 Consideration has also been given to both the maximum and typical levels of flooding at the ford and the positioning of features without the risk of them being regularly submerged when the water levels are higher. However, where traffic calming options would have greater benefit being located in the area of flooding, this is highlighted, along with secondary measures to limit highway safety concerns during these times.

Design Considerations

3.5 The options presented below have been considered against guidance provided in the Department for Transport Local Transport Note 1/07 – Traffic Calming.

3.6 A key consideration in the design of any traffic calming scheme is the extent to which it should accommodate longer vehicles such as HGVs or agricultural vehicles. Solutions which accommodate longer vehicles often result in reduced benefits in terms of slowing speeds of lighter vehicles because they require longer straight sections and distances between adjacent traffic calming features. Therefore, the options presented in this Technical Note evaluate schemes which are suitable for all vehicles, alongside schemes which would only be navigable by cars and light vehicles.

3.7 This is on the basis that, whilst Rufford Lane is subject to a 7.5t weight restriction, it is used by a number of larger agricultural vehicles for access reasons. The conditions of Rufford Lane are however typical of a narrow country lane and there are alternative route options for such vehicles, noting that the lane has been temporarily closed for some time. This should therefore be considered in the traffic calming scheme ultimately adopted.

3.8 As discussed earlier, consideration is to be given to the maximum potential flood extent which could be experienced at the site, including whether any installed features should

be positioned beyond this extent. The boundary of this extent is defined by a 1 in 100 year event, adjusted for climate change, and is illustrated in **Figure 2**.

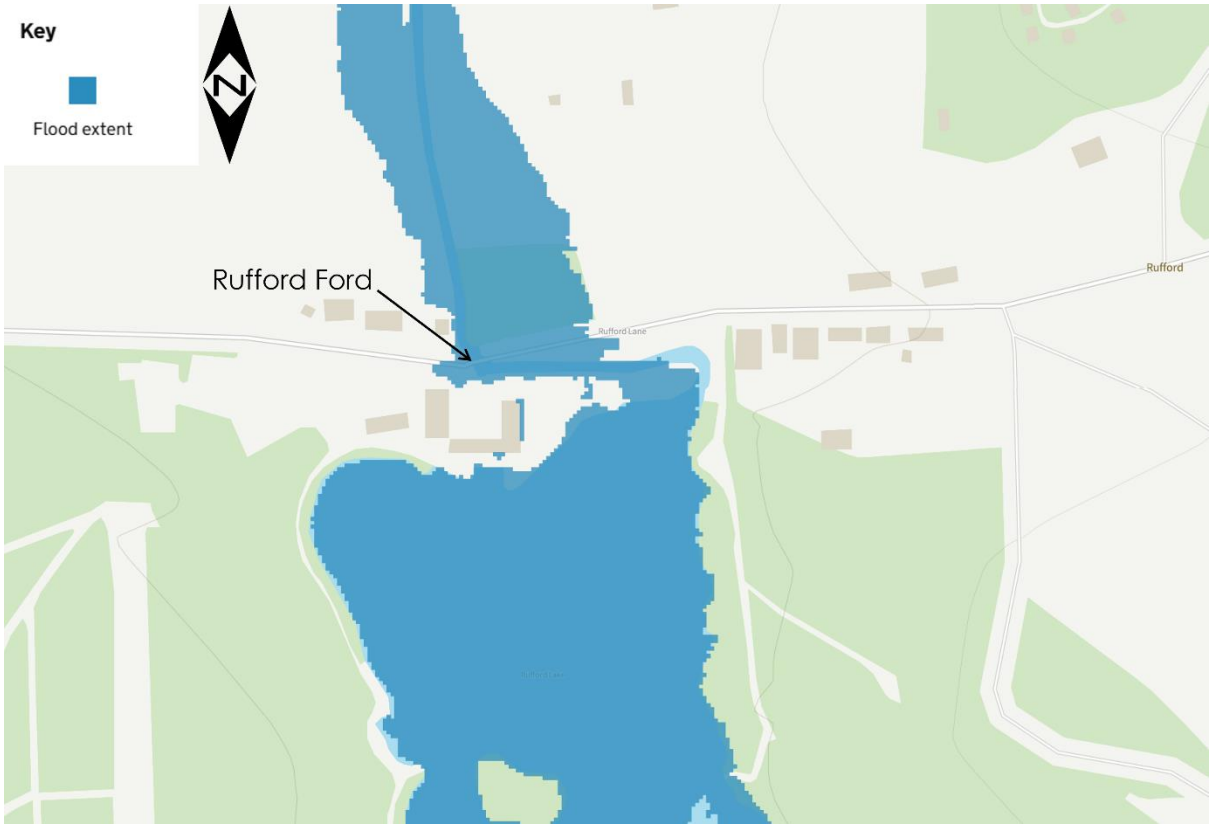


Figure 2: 1 in 100 year event, with climate change, flood extent (Gov.uk)

3.9 Placing any feature within this extent increases the likelihood of water damage and debris accumulation, raising long-term maintenance requirements. However, features positioned closer to the ford, maximises their effectiveness on driver behaviour immediately before the ford, improving safety at the most critical point.

3.10 In summary, both the design vehicle and flood resilience are fundamental considerations that apply to any potential traffic calming scheme. Subsequent sections of this report will evaluate specific measures, referencing these principles to assess how each option performs in terms of speed reduction, accessibility, and long-term suitability.

Option 1: Chicane Buildouts (Horizontal Deflection)

3.11 Option 1 considers the introduction of physical chicanes on either side of the ford, using a staggered build-out to narrow the carriageway to a single working lane. An example is shown in **Figure 3**.

Figure 3: Indicative example of a double build-out chicane

3.12 This arrangement requires opposing traffic to give way, with priority assigned to vehicles leaving the ford. In a typical setting with sufficient opposing traffic, the give-way arrangement forms part of the traffic-calming scheme and helps reduce average vehicle speeds. However, when opposing flows are low, drivers are often not required to give way and can pass through the chicane with little or no speed reduction, limiting the effectiveness of the measure. This underlines the importance of using a double build-out, as a single build-out is unlikely to achieve meaningful speed reduction on routes with low opposing flows, where vehicles may simply drive around the chicane without slowing. Traffic flow data along Rufford Lane has been obtained for a period of one

week in August and September 2022, prior to the closure. The average weekday two-way vehicle flows during both months are summarised in **Figure 4.**

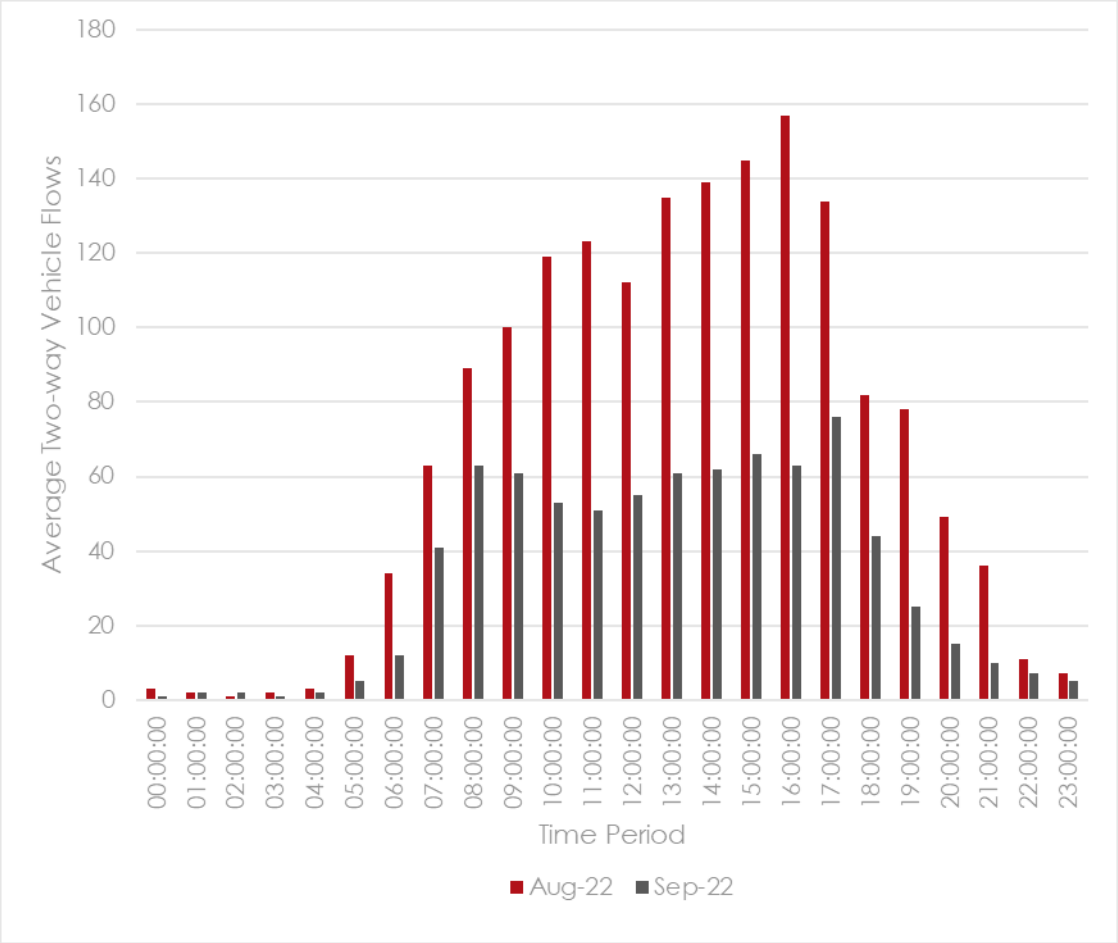


Figure 4: Average Two-way vehicle movements

3.13 The maximum number of vehicles recorded on Rufford Lane was on Monday 8th August 2022 at 1300 hours, where 205 two way vehicle movements were recorded. This equates to between 3 and 4 two-way movements per minute. Consequently, for the majority of times the chance of opposing flows meeting at the ford is relatively low.

3.14 In light of the traffic flow data, it is anticipated that a single chicane build out would result in vehicles adopting a 'racing line' and simply moving to the opposite side of the carriageway to reduce the deflection in their travel path. This highlights the importance of a double build-out, which will create a horizontal deflection even in the absence of an opposing flow. This is even more important when considering the nature of the drivers visiting to create exhibitions and content for social media with a desire to travel at speed.

3.15 To support the chicane buildouts, 'give way' road markings and signage should be installed to clearly demonstrate to approaching vehicles that they should give way to vehicles exiting the ford. Advanced signage of the arrangement would be particularly beneficial on the westbound approach to the ford where visibility to the nearside kerb

is restricted due to the proximity of the bend and established vegetation, reducing forward visibility and the driver's ability to visually identify the chicane in advance.

3.16 It is recognised that the implementation of a chicane could introduce an 'urbanising effect' into an otherwise rural area. To negate this, planting could be incorporated within the build-out, to reduce the visual intrusiveness of the feature and better align with the rural setting of the site. Additionally, planting would act to reduce the forward visibility through the chicane somewhat, increasing uncertainty for the driver and return a greater speed reduction.

3.17 The geometry of any horizontal deflection feature directly influences the speed of vehicles travelling through it. The parameters with the greatest influence are stagger length, free view width, lane width and path angle[1]. These parameters are illustrated in Figure 5. Studies have been conducted by the Department for Transport to establish appropriate design criteria for chicanes and a summary of the findings is provided in **Table 1** and **Table 2**.

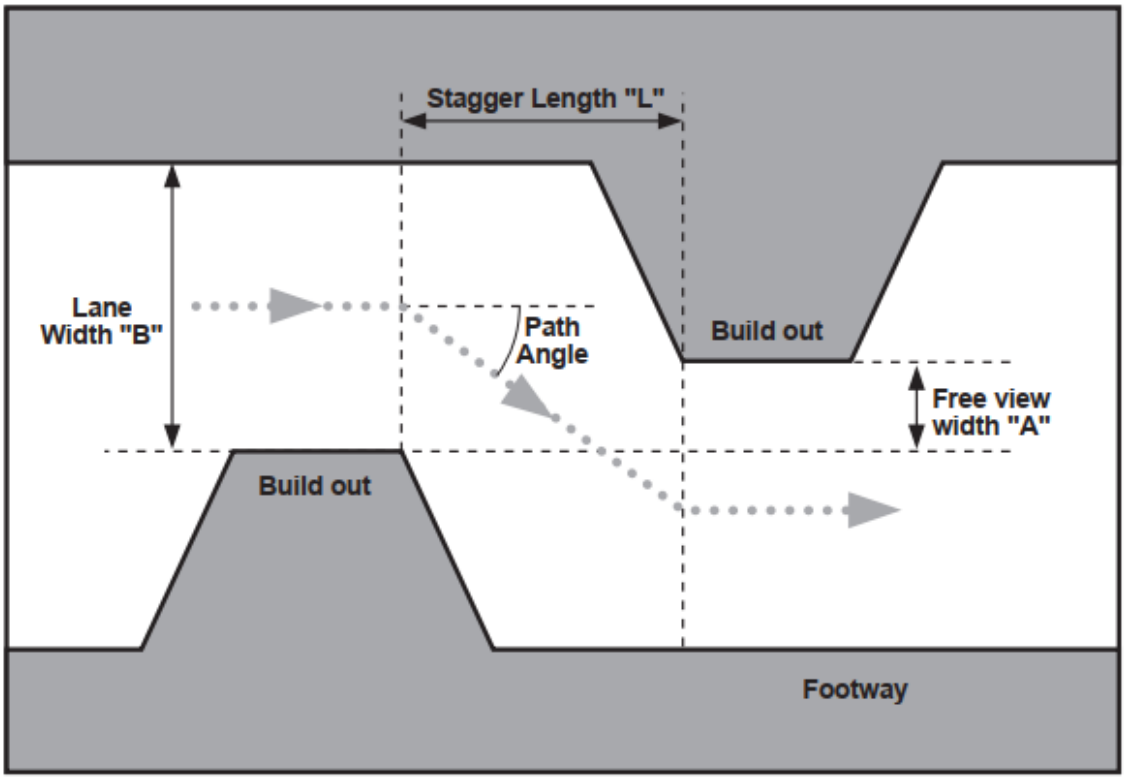


Figure 5: Chicane Geometry Parameters (Source: DfT LTN 01/07; Figure 6.5)

[1] TAL 09/94; Sayer I and Parry D I (1994). *Speed control using chicanes - a trial at TRL.* TRL Project Report PR 102. Transport Research Laboratory, Crowthorne

Table 1: Stagger length and car speeds (Source: DfT LTN 01/07; Table 6.1)

Lane width 'B' (metres)	Free view width 'A' (metres)	Stagger length 'L' to achieve required vehicle speed in chicane (metres)		
		15 mph	20 mph	25 mph
3.0	+1.0	6	9	14
	0.0	9	13	18
	–1.0	12	16	-
3.5	+1.0	-	-	11
	0.0	9	12	15
	–1.0	11	15	19
4.0	+1.0	-	7	9
	0.0	-	9	12
	–1.0	-	11	15

Table 2: Minimum stagger length for larger vehicles at very low speeds (Source: DfT LTN 01/07; Table 6.2)

Lane width 'B' (metres)	Stagger length 'L' needed for a free view width of 0.0 metre (metres)		
	Articulated lorry	Rigid lorry	Single deck bus
3.0	20	12	13
3.5	15	9	11
4.0	11	7	9

3.18 The mean speed of cars through the feature is dependent on the geometry of the chicane. However, an important consideration is whether the chicanes are required to accommodate longer vehicles such as HGVs or agricultural vehicles. A chicane geometry that allows HGV access, albeit at very low speeds, requires greater stagger space or lane width to accommodate their larger swept path, which in turn reduces the effectiveness of the chicane in moderating light vehicle speeds, particularly for lighter vehicles and where they have a deliberate intention on driving at high speed.

3.19 As part of the implementation of any chicane, the physical kerbed build-outs would be required to be clearly identified with reflective bollards to ensure visibility during hours of darkness. These would also act to identify the feature if it was to become submerged by flood water as they should extend beyond the surface of the water. In this setting, vehicles will be approaching the chicane directly head on and considering that the chicane might be placed in an area which could flood, it is deemed appropriate that a retroreflective self-righting bollard (RSRB) is provided rather than a mains powered internally illuminated bollard. A RSRB relies on its reflective finish and the headlights of oncoming vehicles to illuminate itself, which is most effective when vehicles approach at a low incident angle, which would be the case at Rufford Ford. Additionally, RSRB are simpler to install as they do not require a base unit and are simply bolted into the road surface. An example of a RSRB is provided below in **Figure 6**.

Figure 6: Example of Retroreflective self-righting bollard (RSRB)

3.20 The most effective siting of any chicane will be dependent on the design speeds that are to be achieved to deter anti-social behaviour. However, in light of the flooding issues and ensuring features are visible during times when water levels are higher requires consideration. Therefore, a number of variations of a double build-out chicane are provided and investigated further below:

i. **Option 1A** – Double build out chicane, beyond the maximum flooding extent and suitable for longer vehicles.

ii. **Option 1B** - Double build out chicane, beyond the maximum flooding extent and suitable for light vehicles only.

iii. **Option 1C** - Double build out chicane, within the maximum flooding extent and suitable for longer vehicles.

iv. **Option 1D** - Double build out chicane, within the maximum flooding extent and suitable for light vehicles only.

3.21 All Option 1 arrangements are illustrated in drawing **HRFN-BWB-HML-XX-DR-TR-0001-S2-P1**.

Option 1A

3.22 In regard to the chicane at the western side of the ford, the following geometry parameters have been evaluated:

i. 3 metres lane width

ii. Stagger length of 20 metres

iii. Freeview width of 0 metres.

iv. Located approximately 21 metres to the edge of the ford crossing when at a typical water level.

3.23 Using the DfT parameters, this arrangement it is expected to control vehicle speeds to circa 25 mph in an eastbound direction.

3.24 At the eastern side of the ford, the following geometry parameters have been considered:

i. 3 metres lane width

ii. Stagger length of 20 metres

iii. Freeview width of 0.3 metres.

iv. Located approximately 60 metres from the edge of the ford crossing when at a typical water level.

3.25 Similar to the chicane on the western side of the crossing, this arrangement would reasonably reduce vehicle speeds to circa 25 mph. However, due to shallow gradient profile of the carriageway, the features are positioned further away from the ford at circa 60 metres in order to be outside of the maximum flood extent. This provides a considerable distance for cars to accelerate back up towards the crossing, especially when driven by someone determined to build speed back up.

3.26 To give an initial understanding of potential vehicle speeds as they accelerate from the chicanes, the following kinematic equation has been applied:

$$v = \sqrt{u^2 + 2as}$$

3.27 This equation estimates the final speed (v) from the initial speed (u), the distance travelled (s), and an assumed constant acceleration (a). The typical acceleration rate of 3.83 m/s^2, derived from a standard vehicle accelerating from 0-60 mph in approximately 7 seconds. This acceleration rate is considered relatively high, but is representative of a driver that is intent on passing through the ford at speed as has historically occurred.

3.28 Therefore, within the 60 metres distance, it is estimated an average car could accelerate to speeds of circa 54 mph before they reach the ford, which may nullify the benefits of the chicane.

3.29 In summary, Option 1A would deliver a chicane with double build out that could accommodate all vehicles and is sited beyond the area of Rufford Lane which would be impacted as a result of a 1 in 100 year flood event. Whilst this would incur less maintenance costs; the positioning of the facility on the eastern side of the ford results

in a distance of 60 metres which poses a risk that vehicles could accelerate on approach to the ford at speeds of up to 54 mph.

Option 1B

3.30 Option 1B is similar to Option 1A but does not allow for longer vehicles to pass through, resulting in a tighter arrangement.

3.31 At the western side of the ford, the following geometry parameters have been evaluated:

i. 3 metres lane width
ii. Stagger length of 9 metres
iii. Freeview width of 0 metres.
iv. Circa 21 metres from the edge of the ford crossing when at a typical water level.

3.32 Using the DfT parameters, a feature of this arrangement will reduce mean vehicle speeds to circa 15 mph in an eastbound direction. It could be sited a short distance from the ford, reducing the likelihood of vehicles being able to accelerate on approach to the ford after the chicanes. This arrangement would not be suitable to accommodating HGVs.

3.33 However, the chicane on the northern side of the carriageway would be located opposite an existing gated access to the Rufford Mill car park. During the site visit, it appeared as though the access is unused, with vehicles accessing Rufford Mill via the main car park further west along Rufford Lane. It is therefore assumed that this option is still viable.

3.34 At the eastern side of the ford, the following geometry parameters have been evaluated:

i. 3 metres lane width
ii. Stagger length of 9 metres
iii. Freeview width of 0 metres.
iv. Circa 60 metres from the edge of the ford crossing when at a typical water level.

3.35 Similar to the western side, this would result in a mean speed of approximately 15 mph as vehicles travel through the chicane. However, the 60 metres distance to the ford could result in vehicles accelerating to a speed of circa 50 mph (slightly less than Option 1A as the starting speed after negotiating the chicanes would be slightly slower). Therefore, there is the same risk that whilst the feature will achieve a slower speed, there is still a considerable distance for vehicles to travel to reach the ford, which can be used to accelerate.

3.36 In summary, Option 1B would offer greater speed reduction due to its more restrictive geometry, particularly in the eastbound direction, but would restrict access for longer

vehicles. Similarly to Option 1A, this arrangement is sited outside the maximum flood extent of a 1 in 100 year event, reducing maintenance costs.

3.37 However, further consideration is needed on the impacts of the existing access to Rufford Mill car park on the western side of the ford. Further understanding would be required on the frequency of which this access is used.

Option 1C

3.38 Option 1C shows a scheme similar to Option 1A (allowing longer vehicles) but within the maximum flooding extent.

3.39 The most suitable positioning of the chicane ignoring the flood extent on the western side of the carriageway has been determined by the presence of the existing access to Rufford Mill. Vehicle tracking was used to understand the carriageway space needed to achieve the manoeuvres using a 7.5t box van which is considered representative of the largest delivery vehicle to Rufford Mill.

3.40 Considering the above, the following geometry parameters have been evaluated:

i. 3 metres lane width
ii. Stagger length of 20 metres
iii. Freeview width of 0 metres.
iv. Circa 10 metres from the ford crossing when at a typical water level.

3.41 As per Option 1A, this arrangement would restrict vehicle speeds to circa 25 mph whilst accommodating longer vehicles. As the chicane is sited within the flooding extent, the distance between the feature and the ford is reduced which limits drivers' ability to accelerate to higher speeds after the chicane. Furthermore, the existing accesses to Rufford Mill would remain accessible.

3.42 The chicane has been positioned 10 metres away from the assumed typical water level but would be submerged during times when water levels are higher. The suitability of this location would be clarified as part of any detailed design package.

3.43 At the eastern side of the crossing, the following parameters have therefore been evaluated:

i. 3 metres lane width
ii. Stagger length of 20 metres
iii. Freeview width of 1 metre.
iv. Circa 10 metres from the ford crossing when at a typical water level.

3.44 Similar to the outcomes discussed within Option 1A, this arrangement would ensure that the route remains viable to longer vehicles, albeit resulting in slightly higher design speeds. As the chicane is sited closer to the crossing, there is less distance for vehicles to accelerate towards the ford after the chicane. The traffic calming measure would

reduce vehicle speeds to approximately 25mph, within the proceeding 10 metres to the ford, vehicles could accelerate to a speed of approximately 30mph.

Option 1D

3.45 This option considers a chicane either side of the ford within maximum flooding extent and would accommodate light vehicles only. This reduces vehicle speeds as much as possible whilst being sited close to the ford to reduce the opportunity for vehicles to accelerate back up to speed again.

3.46 The following geometry has been considered for the chicane on the western side of the ford:

i. 3 metres lane width
ii. Stagger length of 9 metres
iii. Freeview width of 0 metres
iv. Circa 10 metres from the ford crossing when at a typical water level.

3.47 Similarly, the geometry of the chicane on the eastern side of the crossing is outlined below:

i. 3 metre lane width
ii. Stagger length of circa 9 metres
iii. Freeview width of -1 metres
iv. Circa 10 metres from the ford crossing when at a typical water level.

3.48 Chicanes in this location would achieve the greatest effect of reducing vehicle speeds compared to the other three options but would make the route inaccessible by HGVs. Importantly, access would be maintained to Rufford Mill. However, the arrangement would require a build out on the northern side of the carriageway, opposite the existing Rufford Mill car park access. Similar to Option 1C, the chicane impacts access to the car park but more predominantly for right turning movements out, although the manoeuvre is still achievable, confirmed by swept path analysis.

3.49 This arrangement would achieve mean vehicle speeds of circa 15 mph. Combined with the reduced distance to the crossing itself of only 10 or 15 metres, vehicles would only be able to accelerate up to speeds of circa 25 mph.

Summary

3.50 Option 1 considered chicanes with double build outs to reduce the carriageway to a single vehicle width on approach to the ford.. The following summarises the benefits and downfalls of each of the designs within Option 1.

- Consideration is given to the whether features should be sited within, or beyond, the potential extent of a 1 in 100 year flood event.

- Option1A and 1B sited beyond the flooding extent, result in circa 60 metres of carriageway on the eastern side of the ford that vehicles can use to accelerate back up to speeds of circa 54 mph on approach to the ford.
- Options 1C and 1D sited within the flooding extent limits the distance to the ford after the chicanes limiting the ability for vehicles to accelerate again, controlling speeds to circa 30 mph.
- Options 1A and 1C are suitable in accommodating HGV movements would achieve mean car speeds of circa 25 mph through the feature.
- Options 1B and 1D which adopted a more restrictive geometry accommodating light vehicles only, would achieve mean car speeds of circa 15 mph through the feature.
- Options 1B, 1C and 1D would require the build out on the western side of the ford to be sited opposite the Rufford Mill car park access. Whilst turning movements in and out by light vehicles would still be achievable, vehicles would be required to give way and hence consideration is required as to activity levels and the suitability of this.

3.51 Overall, it is identified that the most influential factor in determining mean vehicle speeds through the ford itself is the distance between the chicane and the ford. Therefore, it is considered that Options 1C and 1D are most suitable in achieving the desired speed reductions. However, given these options have the risk of being submerged during times when water levels are higher, secondary measures are considered necessary when the features are not visible. These secondary measures are considered later in this Technical Note.

3.52 Options 1C and 1D are likely to control vehicle speeds to between 25mph and 30mph. However, this is a design speed of a typical driver and there is a risk that drivers travelling to create social media content would take greater risk and exceed these speeds. There is a risk that the deflection could result in collisions should drivers try and drive in excess of the design speed.

Option 2: Speed Cushions - Vertical Deflection

3.53 A second traffic calming option has been considered in the form of vertical deflection using speed cushions. These were favoured over speed humps as they would induce less of an impact on cycle movements and the drainage of the carriageway. The installation of speed humps across the carriageway could create pooling of water, without additional drainage works.

3.54 Furthermore, the use of speed cushions would not prejudice longer vehicles and would ensure Rufford Lane remains accessible by all vehicles.

3.55 Data is provided within DfT LTN 1/07 on the effectiveness of speed cushions in reducing mean vehicle speeds. It states that the features which primarily influence average

speeds are width, length and height of the cushions. Guidance is also provided on the dimensions of speed cushions, which is provided below:

Table 3: Guidance on the dimensions of speed cushions (Source: DfT LTN 1/07, Table 4.1)

Measure	Dimensions
Height	75 mm maximum (65 mm if very narrow or short)
Length	1900 – 3700 mm
Width	2000 mm maximum
Width	1600 – 1700 (bus routes)
Width	1600 (fire/ambulance/minibus)
Width	1500 mm (high % of HGVs)
Ramps (on/off)	Not steeper than 1 in 8 Not steeper than 1 in 5 (curved ramps)
Ramps (side)	Not steeper than 1 in 4

3.56 As the aim of the traffic calming scheme is to deter dangerous driving behaviour, the dimensions that have been adopted aim to deliver the maximum speed reduction, although different dimensions are achievable. There is also evidence suggesting that the effectiveness of the cushions in reducing vehicle speeds can be improved by making the cushions appear more visible through the use of colour which contrasts the carriageway. However, this would also increase the visual intrusion and urbanising effect of the cushions in a rural area, which may be considered as a negative impact.

3.57 Data is provided within LTN 1/07 on the width of speed cushions and the resultant mean vehicle speeds, as illustrated below in **Figure 7**. This shows that the greater the width of the speed cushion, the slower the vehicle speeds. However, it is also explained that as speed cushions become wider and higher, the potential for disruptive ground vibrations is increased. There are multiple factors which determine the magnitude of the ground vibrations, such as soil types, vehicle loading, vehicle speed, vehicle suspension and the profile of the road surface. Further investigation would be required to determine the potential for disruptive ground vibrations and impacts on Rufford Mill in particular.

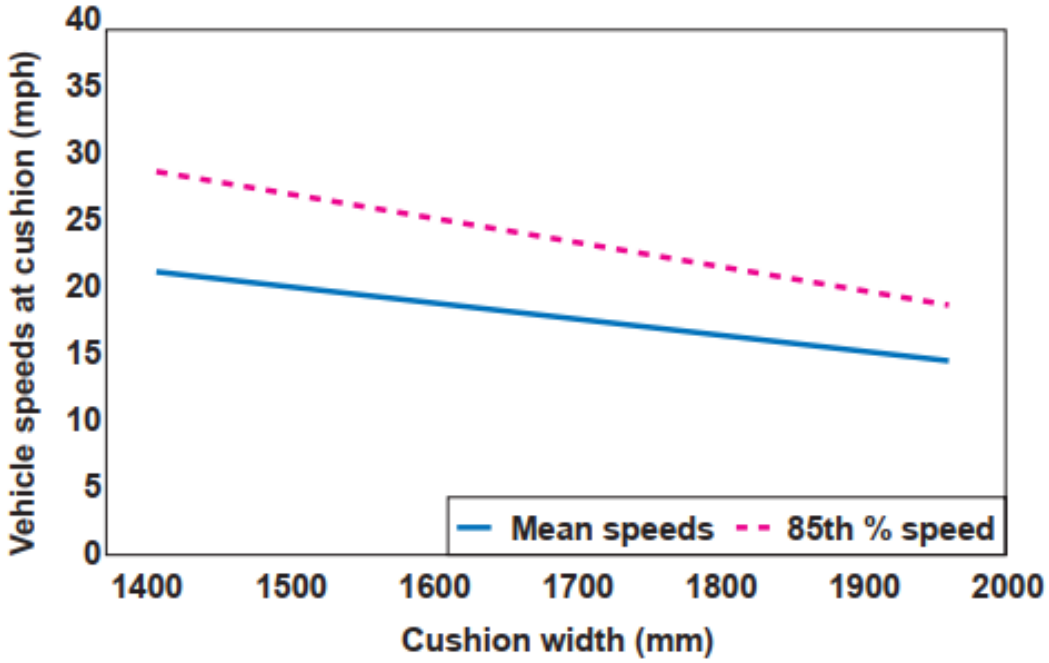


Figure 7: Relationship between width of speed cushions and resultant vehicle speeds (Source: DfT LTN 1/07, Figure 4.16)

3.58 The following options include a single build-out to locally restrict the carriageway to a single vehicle width, with vehicles travelling towards the ford being required to give way to those exiting the ford. Whilst a scheme could be delivered where only speed cushions are provided, one for each lane of the carriageway, the width of the carriageway on the western side of the carriageway would result in a gap of circa 1.6 metres or greater between the cushions. It is anticipated that drivers would then move to the centre of the carriageway to lessen the impact of the cushions, reducing their effectiveness. Therefore, this arrangement introduces a small element of horizontal deflection in the form of a kerbed build out, which when combined with the speed cushion, will aid in further restricting vehicle speeds.

3.59 Similar to Option 1, consideration has been given to whether the features should be installed within the maximum extent of a 1 in 100 year flooding event and the benefits and downfalls of siting the speed cushion closer to the ford and impacts when such feature is submerged when water levels are higher. The potential arrangement of this option is illustrated in drawing **RFN-BWB-HML-XX-DR-TR-0002-S2-P1**.

3.60 In any event, the dimensions of the features would remain the same and are below:

i. Maximum height of 75 mm
ii. Length of 2000 mm
iii. Width of 2000 mm
iv. Ramp gradient of 1 in 8 for the faces of the cushion and 1 in 4 for the sides.
v. Cushion sited adjacent a build-out to create a lane width of 3 metres

3.61 It is envisaged that by implementing speed cushions in tandem with a kerbed build out, creating a scenario where vehicles approaching the ford are required to give way, mean vehicle speeds could be reduced to circa 15 mph based on DfT guidance. However, it is recognised that there may not be sufficient opposing vehicle flows to enforce the give way nature of the feature. Additionally, not all vehicle types are affected equally by speed cushions. In particular, motorcycles which are able to bypass the cushions and those with a wider track or more accommodating suspension, such as 4x4's.

3.62 In regard to the possible positioning of the speed cushions on the eastern side of the ford, there are two potential options:

i. Beyond the maximum potential flooding extent. This would ensure that the speed cushion is never submerged beneath the water level and is clearly visible at all time, requiring less maintenance costs. However, this would create a circa 60 metres distance between the ford and the speed cushions. Assuming a vehicle was reduced to 15 mph, and they were to aggressively accelerate towards the ford, they could reach a speed of approximately 50 mph.

ii. Within the maximum flooding extent, positioned circa 10 metres away from the typical water level. A buffer of 10 metres is considered to prevent the cushion becoming submerged during normally occurring rainfall events or when the water level rises typically during the winter, improving highway safety and reducing maintenance costs. However, it would likely become submerged during a 1 in 100 year event. Assuming a vehicle was reduced to 15 mph, with only 10 metres to accelerate again, a theoretical maximum speed of 25 mph at the ford is achieved.

3.63 With regard to the speed cushion/narrowing on the western side of the ford, it has been located beyond the flooding extent between the car park access and the access to Rufford Mill. It is considered that this is the optimum location as it does not impede any access and is beyond the area which submerged in the event of a flood.

3.64 A high level cost estimate of this scheme was provided in the original Via report at circa £30,000.

3.65 To summarise:

- Speed cushions and narrowing provided in the arrangements detailed above, would reduce vehicle speeds to circa 15 mph for typical drivers.
- The use of speed cushions would ensure the route remains viable for longer vehicles
- Speed Cushions may not be as effective at reducing the speed of larger vehicles with a wider track, such as 4x4s, which are intent.
- The positioning of the speed cushions on the eastern side of the ford, beyond the potential flood extent, would allow vehicles to accelerate back up to speed before the ford, potentially nullifying the effect of the scheme
- If the features were installed within the flood area, they could realistically limit vehicle speeds to circa 25 mph through the ford.

- Potential for speed cushions to introduce disruptive ground vibrations in a sensitive rural area.

Combined Chicanes and Speed Cushions

3.66 There is the possibility to install both vertical and horizontal deflection in order to maximise speed reduction. There are a number of scenarios where these features could be combined within the delivery of any scheme, these are outlined below:

i. Speed Cushions implemented in support of a chicane which facilitates longer vehicles, such as Option 1A and 1C. A chicane which allows longer vehicles is not as effective at reducing the speed of cars, therefore, the addition of speed cushions would assist in reducing car speeds whilst accommodating all vehicles.

ii. Speed cushions could be installed after a chicane which is positioned beyond the maximum flood extent, such as Option 1A and 1B. This would provide benefit in restricting vehicles abilities to accelerate to higher speeds on approach to the ford. Although, this might not be as effective for large 4x4s which can pass over them without much impact.

iii. There is unlikely to be a material benefit to installing the speed cushions in combination with Option 1D because this option already has the most effect in reducing speeds and is located close to the ford. Option 1D is estimated to reduce car speeds to circa 15 mph and speeds would not be further reduced with the inclusion of speed humps.

3.67 A combination of chicanes and speed humps would likely have the most benefit where the feature are designed to accommodate longer vehicles, or are positioned beyond the maximum flood extent where a vehicle could accelerate back up to speed. However, there is a risk that speed humps will not assist in reducing the speed of 4x4 vehicles or motorcycles, particularly those deliberately travelling as speed to create content for social media.

Supplementary Measures

3.68 This section details a range of supplementary measures which could be implemented at Rufford Ford to aid in the reduction of vehicle speeds and mitigating the highway safety issues. These measures would likely be ineffective on their own and should be considered in conjunction with either Option 1 or Option 2, particularly for the options that would be submerged when water levels are higher.

Additional Signage

3.69 Hinge signage has been installed on both sides of the ford, displaying a red triangle warning message indicating the presence of the ford, or a yellow backed flood warning sign with a "Road Closed" message.

3.70 It is understood these signs are operated by the local residents who change the signage to display the flood warning when the water level rise to unsafe levels. The intention of

this dynamic signage is to alert drivers of the dangerous water level and that the ford is 'closed'.

3.71 This signage is provided at a number of places along both sides of the ford. To the east, immediately at the ford, hinge signs are installed on both sides of the carriageway, supported by a sign at the access to the Rufford Golf Course and at the junction of Rufford Lane and Newark Road. Similarly, to the west of the ford, signage is provided immediately at the ford on both sides of the carriageway, again at the access to Rufford Mill car park and within Rufford Lane after the junction with Old Rufford Road. The location of the signage currently in place is shown in **Figure 8**.

3.72 The earliest flip-signage informing drivers when the ford is closed, during periods where water levels are high, is on Rufford Lane itself. Therefore, vehicles will have already turned onto Rufford Lane before seeing the signage. During the site visit, a vehicle was observed entering Rufford Lane from Old Rufford Road and upon seeing the signs informing of the road closure ahead, began to turn around in the bell mouth of the Old Rufford Road/Rufford Lane junction. During this manoeuvre, the vehicle partially reversed into the carriageway on the A614 and created a highway safety hazard. This scenario could be repeated each time the ford is closed when water levels rise, creating a highway safety concern each time,

3.73 Considering this, advanced signage could be provided prior to Rufford Lane on Old Rufford Road and Newark Road, informing drivers earlier on. Potential locations of where these signs could be installed are also illustrated in **Figure 8**.

Figure 8: The location of existing and potential new hinge signage

3.74 Whilst the new signs could be provided in the same manner as those already installed (hinged signs), these require someone to physically open them. Therefore, there is an option to install Variable Message Signs (VMS) in conjunction with a monitoring system at the ford, automatically displaying the road closed message when the water levels reach a pre-determined height. This would negate the requirement for people to physically change the signs and makes it possible for the signs to be placed further away from the ford itself. However, VMS would incur a much greater cost which would need taking into account.

Gate Closures

3.75 Prior to the closure of the ford, a number of vehicles still attempted to travel through the ford when the water level was high. This caused vehicles to become stuck in the ford.

3.76 It is unclear whether this is occurring due to drivers simply ignoring the signage or whether pressure from spectators was causing drivers to continue to drive into the crossing during unsafe water levels. However, this created a scenario where vehicles were required to be recovered once water levels subsided.

3.77 Therefore, it is recommended that gates are installed alongside any traffic calming option installed within the extent of flood zone. This would allow the ford to be physically closed during times of significant flooding and preventing vehicles from being able to travel through the ford. It would also eliminate any safety concerns of vehicles striking the submerged infrastructure, which could incur further maintenance costs for repairs.

3.78 However, installing gates will create some operational challenges. Primarily, who is responsible for closing the gates would need to be established from the outset. Employing a management team would incur significant costs that would need taking into account. The form and durability of any gate would need consideration to avoid people trying to open it or physically damaging it with the intention of crossing the ford, which would increase maintenance costs.

3.79 As suggested above, additional signage would likely be required before Rufford Lane to warn drivers when the ford is closed. The most effective signage from an operational perspective would be VMS, however there would be a cost implication that would need considering.

4. TEMPORARY DESIGNS

4.1 Via East Midlands have expressed their interest in exploring how any potential traffic calming scheme could be implemented with temporary infrastructure as a 'trial run' to monitor the effectiveness before committing to permanent features. Therefore, a high level review of commercially available solutions is provided below.

4.2 Where kerbed build outs are shown, temporary bolt down traffic islands could be utilised to achieve the same effect, such as that shown in **Figure 9**.

Figure 9: Indicative example of temporary bolt down traffic island

4.3 These features would be a cheaper solution to install compared to permanent features.

5. SUMMARY OF OPTIONS

5.1 A tabulated summary of the potential solutions discussed thus far is presented below in **Table 4**.

Table 4: Summary of potential traffic calming solutions

Scheme	Sited within the extent of 1 in 100 year flood event?	Anticipated Vehicle Speeds through the feature	Distance from ford (at typical water level)	Potential speeds at the ford	High level cost estimate	Comments
Option 1A	No	25	60	54	£60,000 Includes for materials, build costs and associated signing and lining.	The least effective option
Option 1B	No	15	60	50		Route would become impassable by long vehicles
Option 1C	Yes	25	10	30		Reduces vehicle speeds to a somewhat acceptable level whilst keeping the route open for long vehicles.
Option 1D	Yes	15	10	25		Route would become impassable by long vehicles
Option 2	Yes	15	10	25	£30,000 Includes for 2x speed cushions, other materials, build costs and associated signing and lining	Likely that not all vehicle types would be equally restricted, with some vehicles still able to travel at dangerous speeds

6. SUMMARY AND NEXT STEPS

Summary

6.1 BWW Consulting Ltd has been instructed by Via East Midlands to provide highway design and transport planning advice in respect of potential traffic calming schemes at Rufford Ford on Rufford Lane in Nottinghamshire. The purpose of the potential traffic calming schemes are to allow the safe reopening of the Rufford Ford and address the dangerous and reckless driving behaviour which was occurring at the ford by members of the public.

6.2 The key conclusions are summarised below:

- Two traffic calming schemes have been considered. Option 1 includes the provision of a double build-out chicane either side of the ford, of which considerations were given to access for longer vehicles. Option 2 includes the provision of an offside speed cushion and associated kerbed build-out.
- Consideration was given to whether any scheme should be positioned within the area of the ford that could be flooded in a 1 in 100 year event.
- Whilst the geometry of each traffic calming scheme would achieve different speed reduction benefits, the primary factor which controlled vehicle speeds through the ford is the positioning of the traffic calming itself; with schemes positioned closer to the ford achieving a greater speed reduction.
- It is therefore recommended that any scheme is positioned as close to the ford as possible, such as Options 1C, 1D and 2. However, these schemes should be supported by additional measures such as advanced signage and gate closures during periods of high water levels, since the features would become submerged and present a potential highway safety risk of being struck by vehicles.
- Options 1D would achieve mean speeds of circa 25 mph at the ford but would render the route impassable by longer vehicles. If the route needs to remain open for larger vehicles, then Option 1C could be adopted which still achieves a respectable speed reduction to circa 30 mph at the ford.
- The provision of a double build-out chicane would restrict the speed of all vehicles. On the other hands, speed cushions might not achieve the same speed reduction effect equally across all vehicle types, with motorcycles and large 4x4s potentially able to continue unimpeded.
- There is opportunity to provide a scheme which combines the use of chicanes and speed cushions. This would be most effective for the options where chicanes are installed outside of the flood extent to keep vehicle speeds low on approach to the ford.
- There is scope to 'trial run' all of the schemes evaluated within this report using commercially available temporary infrastructure, such as bolt down traffic islands and bolt down speed cushions. This allows the Client to monitor the effectiveness of a scheme before committing to a permanent installation.

- Option 1D would achieve the greatest speed reduction of all vehicles, regardless of vehicle type.

6.3 The details have provided Via East Midlands with potential traffic calming scheme options at Rufford Ford and an assessment of their appropriateness in controlling vehicle speeds to deter the historic anti-social behaviour issues. BWB is happy to continue assisting Via East Midlands to achieve a solution that is acceptable to all key stakeholders and members of the public and the proposals progress further.

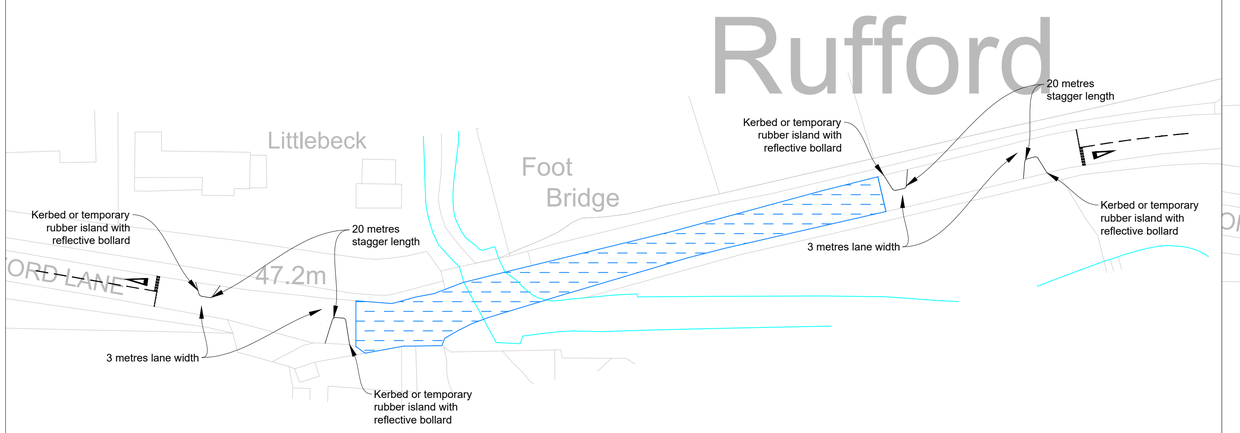
Next steps

6.4 Following the Clients review of the details in this Technical Note and a decision made as to the preferred scheme to take forward, it is recommended that the following next steps are undertaken.

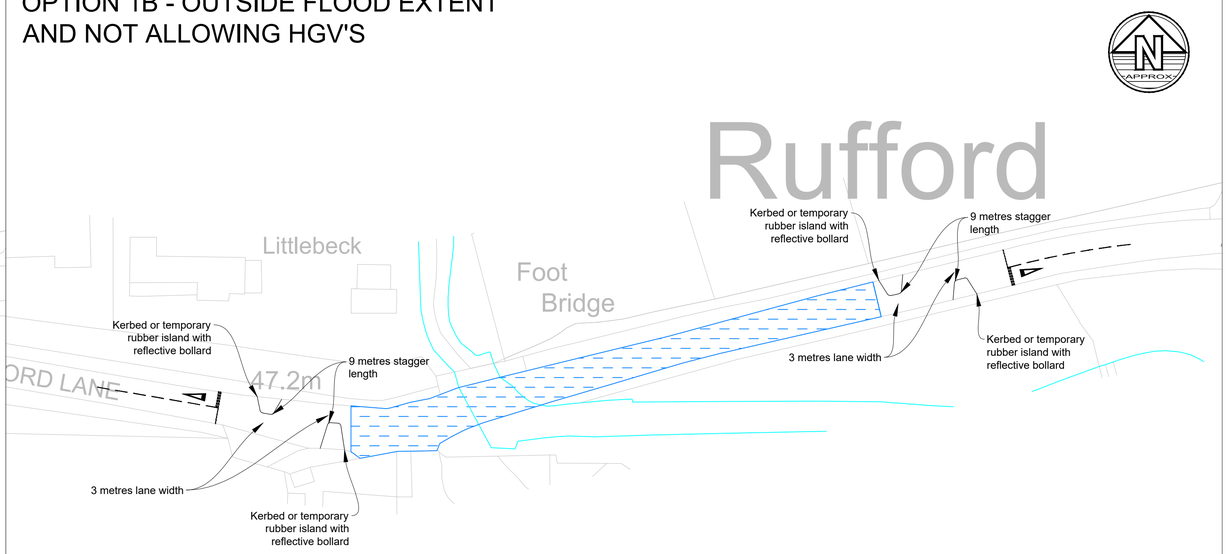
- A detailed design process undertaken of the preferred option and confirmation of accurate cost estimates. BWB can assist with this process if required.
- Commission a combined Stage 1 and Stage 2 Road Safety Audit of the preferred traffic calming scheme in accordance with GG119. Again, BWB can assist with this process, if required.
- Commission a ground borne vibration investigation to understand potential impacts on the nearby historic Rufford Mill, particularly if any scheme includes vertical traffic calming.
- Carry out a public consultation to receive feedback on the preferred traffic calming scheme.

DRAWINGS

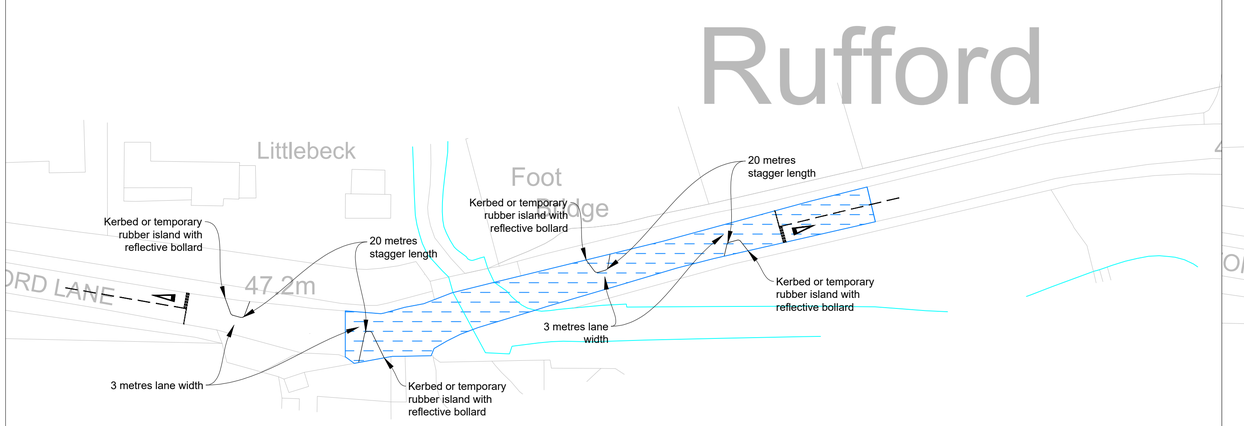
OPTION 1A - OUTSIDE FLOOD EXTENT AND ALLOWS HGV'S



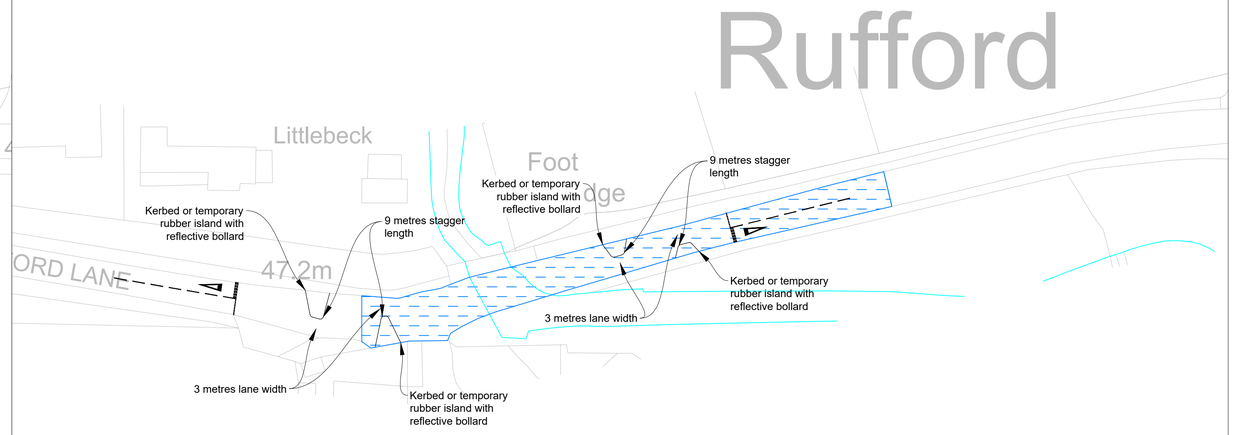
OPTION 1B - OUTSIDE FLOOD EXTENT AND NOT ALLOWING HGV'S



OPTION 1C - WITHIN FLOOD EXTENT AND ALLOWS HGV'S



OPTION 1B - WITHIN FLOOD EXTENT AND NOT ALLOWING HGV'S



Notes

1. Do not scale this drawing. All dimensions must be checked/ verified on site. If in doubt ask.
2. This drawing is to be read in conjunction with all relevant architects, engineers and specialists drawings and specifications.
3. All dimensions in millimetres unless noted otherwise. All levels in metres unless noted otherwise.
4. Any discrepancies noted on site are to be reported to the engineer immediately.

Key Plan

EXTENT OF A 1 IN 100 YEAR FLOOD EVENT

ISSUES & REVISIONS

Rev	Date	Details of issue / revision	Drw	Rev
P1	05.09.25	PRELIMINARY ISSUE	AG	AO

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Client: VIA EAST MIDLANDS LTD

Project Title: RUFFORD FORD, NOTTINGHAMSHIRE

Drawing Title: GENERAL ARRANGEMENT OF TRAFFIC CALMING OPTION 1 - DOUBLE BUILD OUT CHICANES

Drawn:	#2	Reviewed:	#2
BWB Ref:	255951	Date:	05.09.25
Scale@A1:	1:500		

Drawing Status: PRELIMINARY

Project - Originator - Zone - Level - Type - Role - Number: RFN-BWB-HML-XX-DR-TR-0001

Status: S2

Rev: P1

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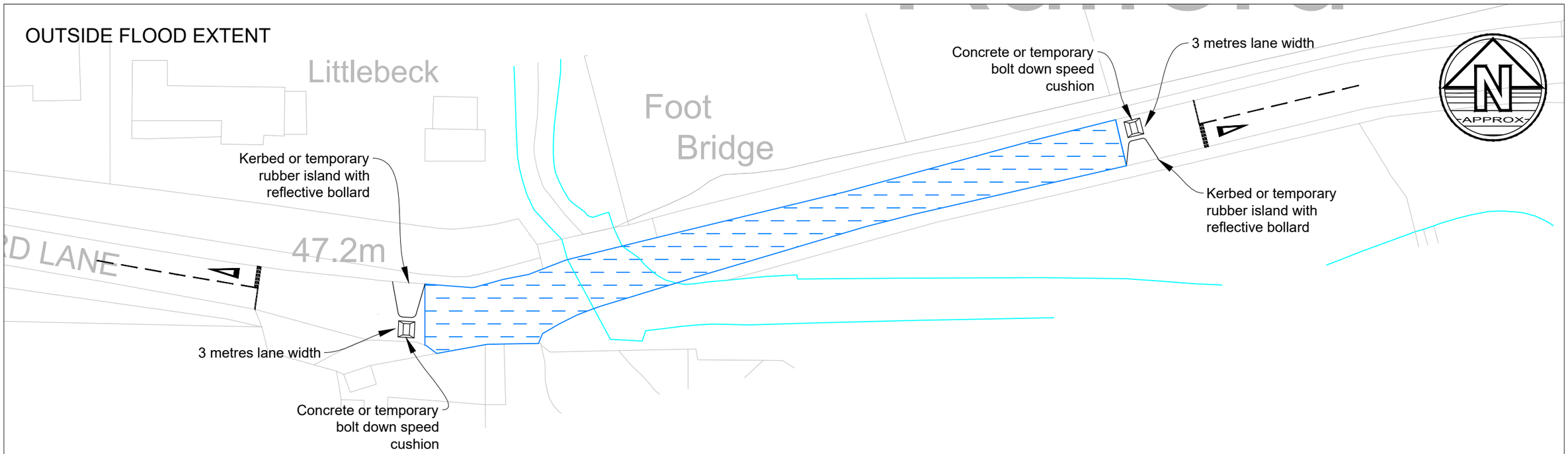
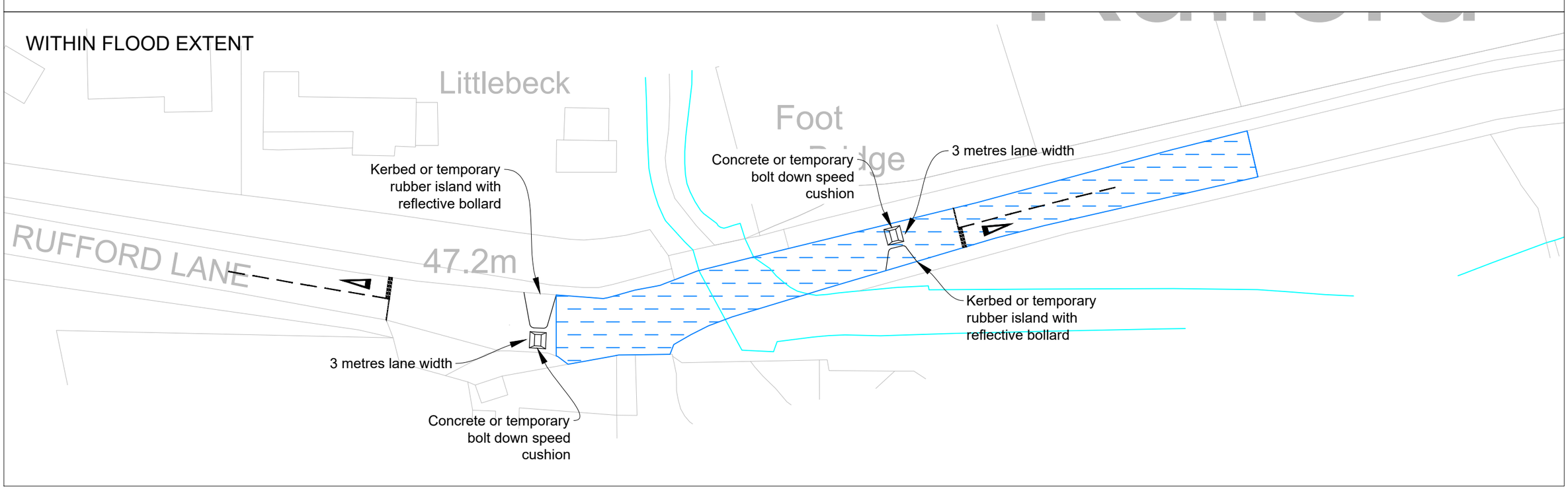
OUTSIDE FLOOD EXTENT



WITHIN FLOOD EXTENT



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Key Plan

EXTENT OF A 1 IN 100 YEAR FLOOD EVENT

Issues & Revisions

Rev	Date	Details of issue / revision	Drw	Rev
P1	05.09.25	PRELIMINARY ISSUE	AG	AO

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Client
VIA EAST MIDLANDS LTD

Project Title
RUFFORD FORD, NOTTINGHAMSHIRE

Drawing Title
GENERAL ARRANGEMENT OF TRAFFIC CALMING OPTION 2 - SPEED CUSHIONS

Drawn:	[redacted]	Reviewed:	[redacted]		
BWB Ref:	255951	Date:	05.09.25	Scale@A3:	1:500

Drawing Status
PRELIMINARY

Project - Originator - Zone - Level - Type - Role - Number	Status	Rev
RFN-BWB-HML-XX-DR-TR-0002	S2	P1

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