

CMBS-LT520-BB-TRAC-ZZ-RPT-H-0006

B8033 Bendiness Assessment

DATE:	06 May 2025	CONFIDENTIALITY:	
SUBJECT:	B8033 Bendiness Assessment Technical Note		
PROJECT:	Cambushinnie Braco Haul Track	AUTHOR:	ME
CHECKED:	SRA	APPROVED:	FY

INTRODUCTION

WSP has been appointed by Scottish and Southern Electricity Networks (SSEN) via Balfour Beatty to carry out design work at Braco, for a haul track serving the proposed Cambushinnie Braco Substation. The purpose of the proposed haul track is to provide access for construction traffic and delivery vehicles to the site of the substation. The haul track is proposed to leave the A822 south of the village of Braco, cross the Keir Burn, intersect with the B8033, and continue westwards until joining with the existing access track north of Gamekeeper’s Cottage.

Where the proposed Braco haul track meets the B8033 it creates a crossroads junction. Visibility is significantly reduced at this location due to a combination of numerous mature trees lining the verges of the B8033 and a sharp bend (approximately 70 degrees) on the B8033. This scenario creates a significant hazard for vehicles, introducing the risk of collisions when haul track traffic crosses the B8033. The location of the proposed B8033 junction is shown in Figure 1 below and on sketch CMBS-WSP-HGN-ZZ-SK-009 included within *Appendix A*.

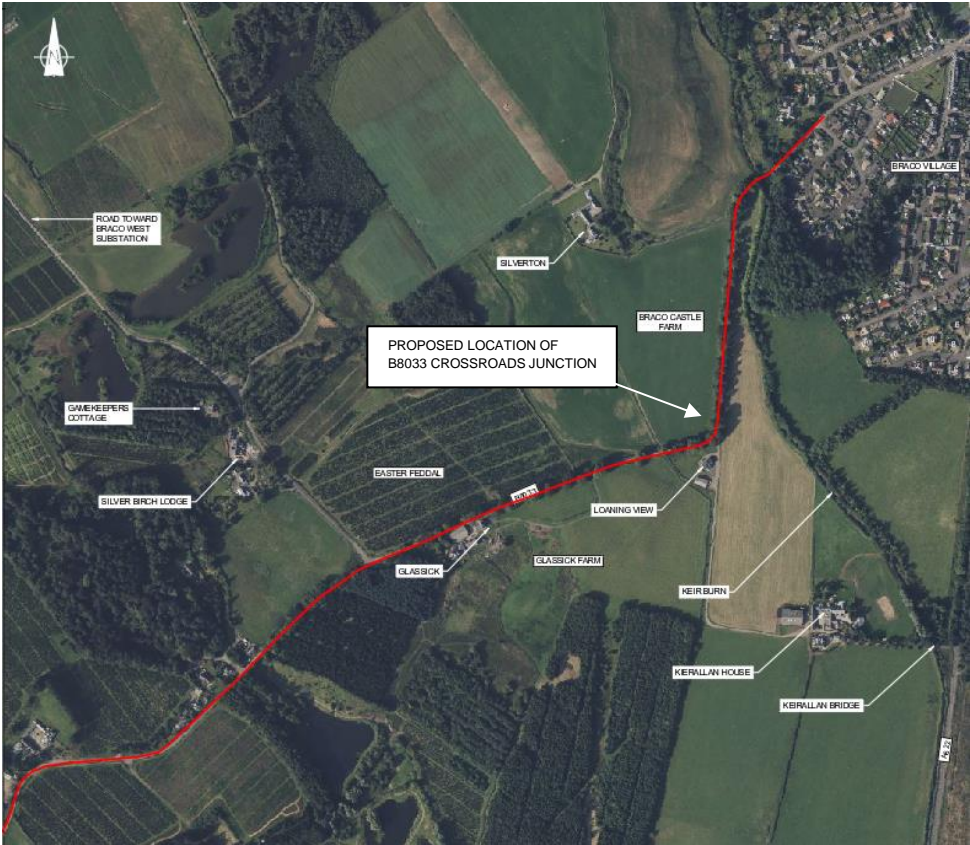


Figure 1: Location of B8033 junction and B8033 centreline (Satellite Source: Bing Maps)

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PURPOSE OF TECHNICAL NOTE

This technical note has been prepared to present the bendiness assessment that has been carried out along the B8033. This assessment will determine the appropriate design speed for the section of B8033 road where the crossroads junction is proposed. The assessment has been carried out for a minimum distance of 2km in accordance with DMRB CD 109 Chapter 2. Currently the posted speed limit along this stretch of the B8033 is 60mph (national speed limit) which results in a required Stopping Sight Distance (SSD) value of 215m in accordance with CD 109 Table 2.10.

The existing section of B8033 at the location of the proposed junction is rural in nature. There is significantly reduced junction visibility at the crossroads junction because of the existing bend on the B8033 and because of significant vegetation of the inside of the curve. A snapshot of the bend is shown in Figure 2 below.



Figure 2: B8033 Southbound at bend where proposed haul track crosses (Satellite Source: Google Maps)

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ASSESSMENT

In order to carry out the bendiness assessment, guidance has been taken from Chapter 2 of DMRB standard CD 109 – “Highway Link Design”. The sketch showing the location of the B8033 junction and the approximate geometry of the existing B8033 road is included within **Appendix A** of this document.

The design speed calculations are summarised below:

Alignment Constraint

- VW (verge width) = **0.5**
- B = Bendiness degrees/km: **154.1** (308.2/2)
- $\text{Log}_{10}\text{VISI} = 2.46 + \text{VW}/25 - \text{B}/400$

$2.46 + 0.5/25 - 154.1/400$
 $2.46 + 0.02 - 0.385$
 $\text{Log}_{10}\text{VISI} = 2.095$
 $\text{VISI} = 10^{2.095} = \mathbf{124.45}$

...Equation 2.8.2 of CD 109
- $\text{Ac} = 12 - \text{VISI}/60 + 2\text{B}/45$

$12 - 124.45/60 + 2(154.1)/45$
 $12 - 2.074 + 6.85$
 $\text{Ac} = \mathbf{16.78}$

...Equation 2.2b of CD 109

Layout Constraint

- Lc = **30** (taken from Table 2.3 of CD 109)

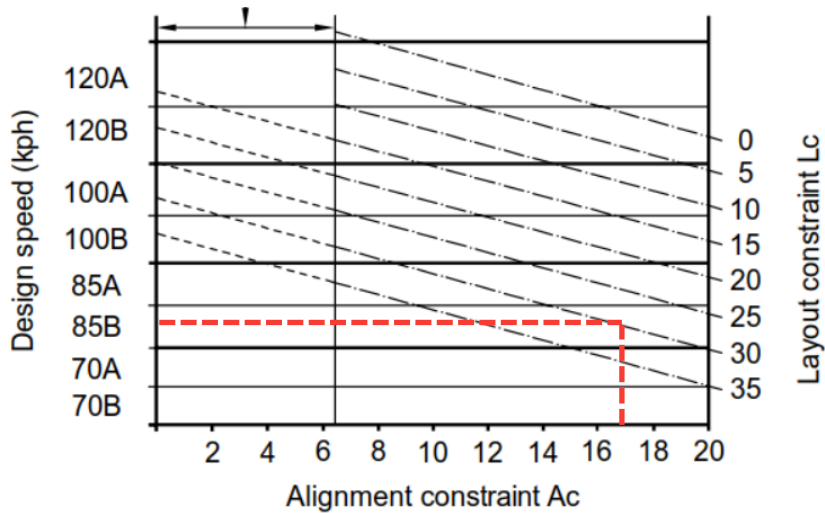


Figure 3: Fig:2.1 from DMRB CD109 Highway Link Design



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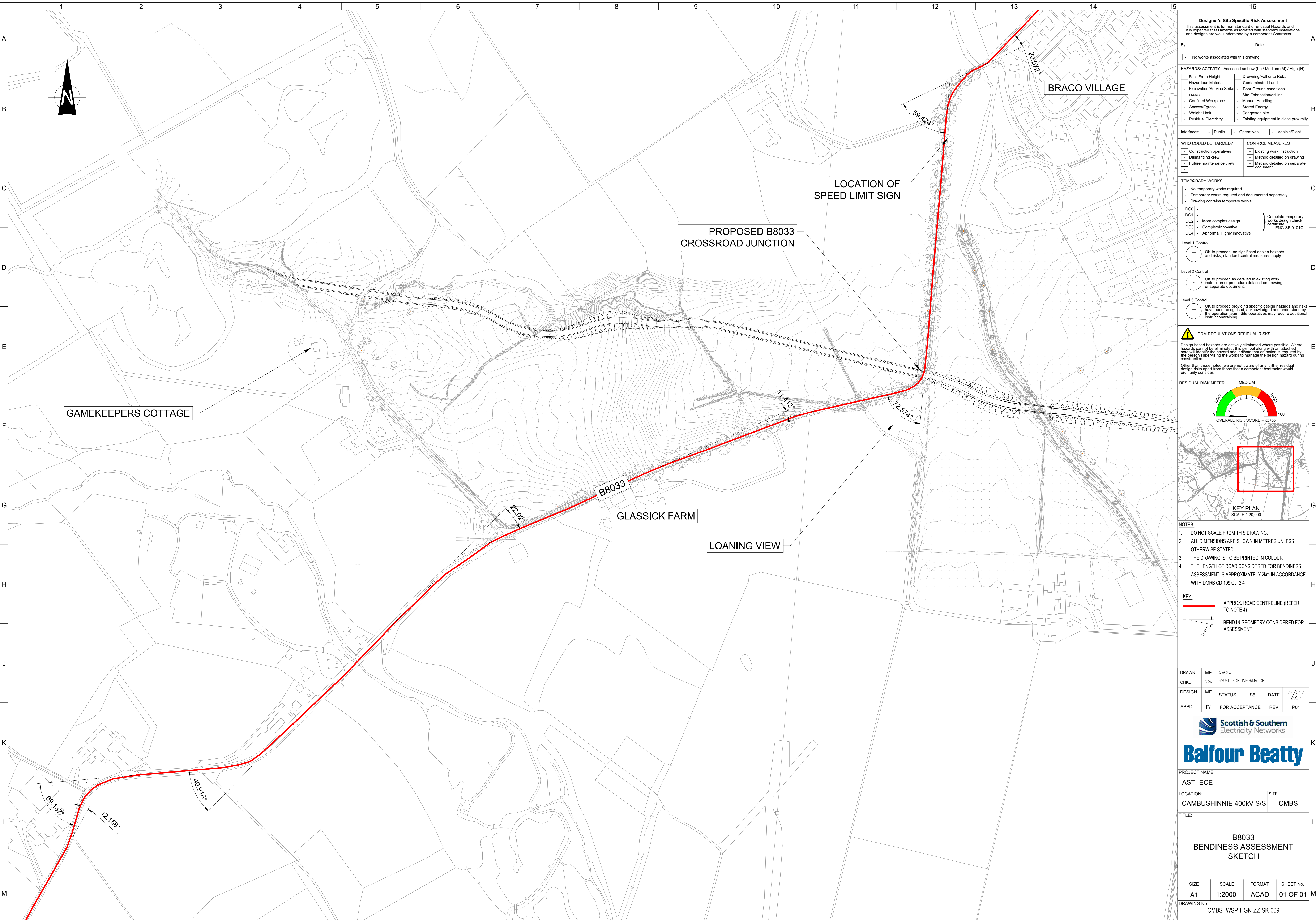
CONCLUSION

- **Design Speed:** Based on Figure 2.1 of CD 109, the design speed for the B8033 road at this specific location is determined to be 85B kph (50 mph).
- **Visibility Requirements:** At this design speed, the desirable minimum visibility (stopping sight distance) at/around the junction shall be 160m, as specified in Table 2.10 of CD 109.
- **Site Clearance Considerations:** Even the reduced visibility requirement of 160m on a 60mph carriageway will necessitate significant site clearance, including the removal of numerous mature Category 'A' trees on both verges of the proposed crossroads location. Given the environmental and practical implications of this clearance, it is recommended that traffic management measures, such as the implementation of temporary traffic signals be introduced at the B8033 junction to minimise loss of mature trees and associated habitat. These temporary traffic signals would be installed to allow slow-moving abnormal loads carrying sub-station equipment along the haul track to negotiate the crossroads safely with no risk of conflicts with vehicles using the B8033.



APPENDIX A

CMBS-WSP-HGN-ZZ-SK-009: B8033 BENDINESS ASSESSMENT SKETCH



Designer's Site Specific Risk Assessment

This assessment is for non-standard or unusual Hazards and it is expected that Hazards associated with standard installations and designs are well understood by a competent contractor.

By: _____ Date: _____

☐ No works associated with this drawing

HAZARDS/ ACTIVITY - Assessed as Low (L) / Medium (M) / High (H)	
<input type="checkbox"/> Falls From Height	<input type="checkbox"/> Drowning/Fall onto Rebar
<input type="checkbox"/> Hazardous Material	<input type="checkbox"/> Contaminated Land
<input type="checkbox"/> Excavation/Service Strike	<input type="checkbox"/> Poor Ground conditions
<input type="checkbox"/> HAVS	<input type="checkbox"/> Site Fabrication/drilling
<input type="checkbox"/> Confined Workpace	<input type="checkbox"/> Manual Handling
<input type="checkbox"/> Access/Egress	<input type="checkbox"/> Stored Energy
<input type="checkbox"/> Weight Limit	<input type="checkbox"/> Congested site
<input type="checkbox"/> Residual Electricity	<input type="checkbox"/> Existing equipment in close proximity

Interfaces: ☐ Public ☐ Operatives ☐ Vehicle/Plant

WHO COULD BE HARMED?	CONTROL MEASURES
<input type="checkbox"/> Construction operatives	<input type="checkbox"/> Existing work instruction
<input type="checkbox"/> Dismantling crew	<input type="checkbox"/> Method detailed on drawing
<input type="checkbox"/> Future maintenance crew	<input type="checkbox"/> Method detailed on separate document
<input type="checkbox"/>	<input type="checkbox"/>

TEMPORARY WORKS

- ☐ No temporary works required
- ☐ Temporary works required and documented separately
- ☐ Drawing contains temporary works:
 - DC0 -
 - DC1 -
 - DC2 - More complex design
 - DC3 - Complex/Innovative
 - DC4 - Abnormal Highly innovative

Complete temporary works design check certificate: ENS-SF-0101C

Level 1 Control ☐ OK to proceed, no significant design hazards and risks, standard control measures apply

Level 2 Control ☐ OK to proceed as detailed in existing work instruction or procedure detailed on drawing or separate document.

Level 3 Control ☐ OK to proceed providing specific design hazards and risks have been recognised, acknowledged and understood by the operation team. Site operatives may require additional instruction/training

CDM REGULATIONS RESIDUAL RISKS

Design based hazards are actively eliminated where possible. Where hazards cannot be eliminated, this symbol along with an attached note will identify the hazard and indicate that an action is required by the person supervising the works to manage the design hazard during construction.

Other than those noted, we are not aware of any further residual design risks apart from those that a competent contractor would ordinarily consider.

RESIDUAL RISK METER

LOW MEDIUM HIGH

OVERALL RISK SCORE = xx / xx

KEY PLAN
SCALE 1:20,000

NOTES:

- DO NOT SCALE FROM THIS DRAWING.
- ALL DIMENSIONS ARE SHOWN IN METRES UNLESS OTHERWISE STATED.
- THE DRAWING IS TO BE PRINTED IN COLOUR.
- THE LENGTH OF ROAD CONSIDERED FOR BENDINESS ASSESSMENT IS APPROXIMATELY 2km IN ACCORDANCE WITH DMRB CD 109 CL. 2.4.

KEY:

— APPROX. ROAD CENTRELINE (REFER TO NOTE 4)

BEND IN GEOMETRY CONSIDERED FOR ASSESSMENT

DRAWN	ME	REMARKS:
CHKD	SRA	ISSUED FOR INFORMATION
DESIGN	ME	STATUS S5 DATE 27/01/2025
APPD	FY	FOR ACCEPTANCE REV P01

Balfour Beatty

PROJECT NAME:
ASTI-ECE

LOCATION:
CAMBUSHINNIE 400KV S/S

SITE:
CMBS

TITLE:

B8033
BENDINESS ASSESSMENT
SKETCH

SIZE	SCALE	FORMAT	SHEET No.
A1	1:2000	ACAD	01 OF 01

DRAWING No.
CMBS-WSP-HGN-ZZ-SK-009

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