

A417 Missing Link
TR010056

8.5 Cotswolds Conservation Board
Options Report

Planning Act 2008

APFP Regulation
Infrastructure Planning (Applications: Prescribed Forms and
Procedure) Regulations 2009

Volume 8

December 2021

Infrastructure Planning

Planning Act 2008

**The Infrastructure Planning
(Applications: Prescribed Forms
and Procedure) Regulations 2009**

A417 Missing Link

Development Consent Order 202[x]

Cotswolds Conservation Board Options Report

Regulation Number:	
Planning Inspectorate Scheme Reference	TR010056
Application Document Reference	8.5
Author:	A417 Missing Link

Version	Date	Status of Version
C01	December 2021	Deadline 1

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Executive summary

The Cotswolds Conservation Board (CCB) identifies two principal concerns:

- The overall impact of the scheme on the Cotswolds AONB
- The consideration of recommendations made by CCB relating to mainline alignment design, junction location and link road designs. These included:
 - Cut and cover tunnel between Crickley Hill and Shab Hill junction
 - Alternative Birdlip Link via Cowley junction AKA Birdlip Bypass.
 - Revised route for the A436 link to Shab Hill
 - Revised mainline vertical alignment and alternative junction arrangement at Shab Hill.

The response to the cut and cover tunnel design option is covered in a separate report however the assessment of the other design options has been undertaken. Whilst initially there were some apparent benefits to the options suggested, closer examination revealed overriding disbenefits which led to the conclusion that they should not be pursued further. In addition, the amendments made to the scheme since the 2019 and 2020 consultation amplified this further.

The proposed design option of Birdlip Bypass would use elements of the existing A417 between Cowley roundabout and Birdlip. The new sections of route would bypass Birdlip to the south, connecting the existing A417 to the existing B4070 south of Birdlip, and connect the existing A417 at Nettleton Bottom to the proposed A417 north of the existing Cowley roundabout.

It was concluded that compared to the revised B4070 link road that this proposal would perform poorly in particular in relation to safety, noise and journey times with Landscape and visual impacts slightly worse in terms of landscape impact.

The alternative route would also be longer and more costly, compared to the revised A417 Scheme, and would be unlikely to lead to an improvement in journey times.

Cowley and Birdlip Parish Council object to the CCB Birdlip Bypass proposals.

The relief road proposal submitted by CCB would not represent an improvement on the preliminary scheme design for the B4070 Birdlip link road, and therefore would not constitute a compelling reason for adoption.

CCB also suggested that Shab Hill junction should be relocated to the north of the scheme position with the mainline passing beneath the junction in cutting with the roundabouts, connecting link and A436 being constructed at grade. They also requested that Highways England should give further consideration to altering the alignment of the A436 link road to a lower contour line which could help to reduce the gradient of the link road and reduce landscape impact.

Both alternative proposals for Shab Hill junction and the A436 were evaluated however it was concluded that they would result in more negative impacts compared to the current proposals, in particular, in relation to earthworks volumes and cost.

Landscape and visual impacts have also been given due consideration and while the alternative proposal has potential to result in a reduction in visual impact in the vicinity of the Upper Churn Valley, the impacts on Crickley Hill, Ullen Wood, Birdlip Radio Station

and Rushwood Kennels would be significant and likely to be worse than the scheme proposals. On balance, the alternative A436 alignment and Shab Hill junction proposal would not offer a compelling reason for adoption.

1 Introduction

1.1 Purpose of this document

- 1.1.1 The purpose of this document is to record representations provided by Cotswolds Conservation Board (CCB) and the associated responses and actions from Highways England in relation to alternative design options suggested by CCB.
- 1.1.2 CCB is a key stakeholder on the scheme and a more detailed record of discussions with CCB is recorded in the Statement of Common Ground (Doc Ref HE551505-ARP-LSI-X_XX_XXXX_X-RP-ZL-000005).
- 1.1.3 In this report, where relevant, reference is made to other documents and reports which cover more thoroughly the subjects identified.
- 1.1.4 Where the scheme design has been revised since the design options were suggested the response takes appropriate account of this.

1.2 Scheme overview

- 1.2.1 The A417/A419 is a strategic route between Gloucester and Swindon that provides an important link between the Midlands/North and South of England. The route is an alternative to the M5/M4 route via Bristol. The section of the A417 near Birdlip, known as the 'Missing Link', forms the only section of single carriageway along the route and is located in the Cotswolds Area of Outstanding Natural Beauty (AONB).
- 1.2.2 In 2014, the Department for Transport (DfT) announced its five-year investment programme for making improvements to the strategic road network (SRN) across England. This scheme is one of more than 100 schemes identified as part of the first Road Investment Strategy (RIS1) 2015-2020^[i]. Funding for delivery of the scheme has been confirmed within the second Road Investment Strategy (RIS2)^[ii], which covers the period between 2020 and 2025 and was published on 11 March 2020.
- 1.2.3 This scheme to upgrade this section of the A417 to dual carriageway, in a way that is sensitive to the surrounding AONB, would help unlock Gloucestershire's potential for growth, support regional plans for more homes and jobs, and improve life in local communities.

1.3 Scheme vision and objectives

- 1.3.1 The scheme vision is for a landscape-led highways improvement scheme that will deliver a safe and resilient free-flowing road whilst conserving and enhancing the special character of the Cotswolds AONB; reconnecting landscape and ecology; bringing about landscape, wildlife and heritage benefits, including enhanced visitors' enjoyment of the area; improving local communities' quality of life; and contributing to the health of the economy and local businesses.
- 1.3.2 In order to deliver this vision, the following scheme objectives have been set:

^[i] Department for Transport (March 2015), Road investment strategy: 2015 to 2020, accessed 29 January 2020, <https://www.gov.uk/government/publications/road-investment-strategy-for-the-2015-to-2020-road-period>

^[ii] Department for Transport (March 2020), Road investment strategy: 2020 to 2025, accessed 11 March 2020, <https://www.gov.uk/government/publications/road-investment-strategy-2-ris2-2020-to-2025>

- **Safe, resilient and efficient network:** to create a high-quality resilient route that helps to resolve traffic problems and achieves reliable journey times between the Thames Valley and West Midlands as well as providing appropriate connections to the local road network.
- **Improving the natural environment and heritage:** to maximise opportunities for landscape, historic and natural environment enhancement within the Cotswolds AONB and to reduce negative impacts of the proposed scheme on the surrounding environment.
- **Community & access:** to enhance the quality of life for local residents and visitors by reducing traffic intrusion and pollution, discouraging rat-running through villages and substantially improving public access for the enjoyment of the countryside.
- **Supporting economic growth:** to facilitate economic growth, benefit local businesses and improve prosperity by the provision of a free-flowing road giving people more reliable local and strategic journeys.

1.4 Scheme description

- 1.4.1 The scheme would provide 3.4 miles (5.5km) of new, rural all-purpose dual carriageway for the A417. The new dual carriageway would connect the existing A417 Brockworth bypass with the existing dual carriageway A417 south of Cowley. The new dual carriageway would be completed in-line with current trunk road design standards. The section to the west of the existing Air Balloon roundabout would follow the existing A417 corridor, but to the south and east of the Air Balloon roundabout, the corridor would be offline, away from the existing road corridor.
- 1.4.2 The scheme would include a new crossing near Emma's Grove for walkers, cyclists and horse riders including disabled users, which would accommodate the Cotswold Way National Trail. A new junction would be incorporated at Shab Hill, providing a link from the A417 to the A436 (towards the A40 and Oxford), and to the B4070 (for Birdlip and other local destinations).
- 1.4.3 A new 37m wide multi-purpose crossing would provide essential mitigation for bats and enhancement opportunity of ecology and landscape integration. The public would also further benefit as the crossing would accommodate the Gloucestershire Way and provide an improved visitor experience.
- 1.4.4 A new junction would be included near Cowley, replacing the existing Cowley roundabout, making use of an existing underbridge to provide access to local destinations. The use of the existing underbridge would allow for all directions of travel to be made.
- 1.4.5 The current A417 between the existing 'Air Balloon roundabout' and 'Cowley roundabout' would be detrunked for its entire length. Some lengths of the existing road would be converted into a route for walkers, cyclists and horse riders including disabled users. Other sections would be retained as lower-class public roads, maintaining local access for residents. Some of the route would provide Common Land.

2 Statement of Common Ground (SoCG)

2.1.1 The SoCG is a comprehensive record of consultation and discussion held with CCB. A full list of consultation and correspondence with CCB is included in the SOCG. For further details refer to 'Statement of Common Ground with Cotswolds Conservation Board' (Doc Ref: HE551505-ARP-LSI-X_XX_XXXX_X-RP-ZL-000005).

2.1.2 The following table is a summary of the topics which are discussed in the SoCG.

Table 2-1 Summary of the topics considered within the SoCG

Overarching topic	Topic number	Topic
Background	1.	Principle of development
	2.	Consultation
	3.	Landscape-led approach
	4.	Policy and legislation (AONB)
Scheme design	5.	Crossings of the A417
	6.	Gradient change
	7.	Cowley junction
	8.	The realignment of the B4070 to Birdlip via Barrow Wake
	9.	Improvements for walking, cycling and horse riding including disabled users
	10.	Other engineering design
Relevant ES Chapter	11.	Assessment of Alternatives (Chapter 3 of the ES)
	12.	Environmental Assessment Methodology (Chapter 4 of the ES)
	13.	Cultural Heritage (Chapter 6 of the ES)
	14.	Landscape and Visual Effects (Chapter 7 of the ES)
	15.	Biodiversity (Chapter 8 of the ES)
	16.	Geology and Soils (Chapter 9 of the ES)
	17.	Materials Assets and Waste (Chapter 10 of the ES)
	18.	Assessment of Cumulative Effects (Chapter 15 of the ES)
Other topics	19.	Brockworth bypass to Shab Hill junction (including A436 link)
	20.	Shab Hill to Cowley junction (including Birdlip link road)

3 CCB Principal Concerns and Recommendations

3.1.1 Cotswolds Conservation Board (CCB) identified two principal concerns:

- The overall impact of the scheme on the Cotswolds AONB
- The consideration of recommendations made by CCB relating to alignment design aspects of the scheme including junction location, vertical alignment and the link road designs.

3.1.2 The overall impact of the scheme is discussed at length in the Environmental Impact Assessment (EIA). This is not therefore discussed in this paper.

3.1.3 During the preliminary design period, CCB identified a number alternative routes and link road options. These included:

- Cut and cover tunnel between Crickley Hill and Shab Hill junction
- Alternative Birdlip Link via Cowley junction AKA Birdlip Bypass.
- Revised route for the A436 link to Shab Hill
- Revised mainline vertical alignment and alternative junction arrangement at Shab Hill.

3.1.4 A brief summary of the requests is listed in Table 3-1 and copies of documents are included in Appendix B

Table 3-1 Cotswolds Conservation Board Requests Correspondence

Date	Method	Parties involved	Subject
31 May 2019	Letter	Cotswolds Conservation Board to Highways England	Request by CCB for HE to investigate the option for a section of bypass for Birdlip, taking the traffic from the Stroud - Painswick direction to the south of Birdlip to join the A417 at the Cowley junction. See Appendix B
April 2019	Letter	Highways England to Cotswolds Conservation Board	Highways England response to CCB Birdlip Bypass option. See Appendix B
November 2020	Letter	Cotswolds Conservation Board to Highways England	Response to 2020 Consultation

4 Cut and cover tunnel

- 4.1.1 In April 2019 CCB wrote to HE; highlighting earlier responses in 2018, questioning the lack of address to earlier concerns, the lack of any further consideration of tunnels.
- 4.1.2 In November 2019 CCB submitted its response to the A417 consultation, making 13 recommendations, including giving further consideration to a cut and cover tunnel instead of the proposed 1km long cutting.
- 4.1.3 The cut and cover tunnel is comprehensively discussed in a separate report. Refer to the 'Cut and cover tunnel feasibility study' (Doc Ref: HE551505-ARP-SGN-X_ML_A417_Z-RP-C-000001).

5 Alternative Birdlip Link

5.1 Summary of Alternative Birdlip Link timeline

- 5.1.1 In May 2019 CCB submitted a letter to Highways England investigate the option for a section of bypass for Birdlip
- 5.1.2 Highways England assessed these options at the time and responded via letter on 28 August 2019. The result of that assessment is shown below.
- 5.1.3 CCB proposed an option for a section of bypass for Birdlip, taking the traffic from the Stroud - Painswick direction to the south of Birdlip to join the A417 at a revised Cowley junction arrangement as shown in Figure 5-1.
- 5.1.4 It was suggested that the route would avoid the need for the B4070 link road connecting to the north end of Birdlip and crossing the High Wold to Shab Hill, thereby avoiding the village.

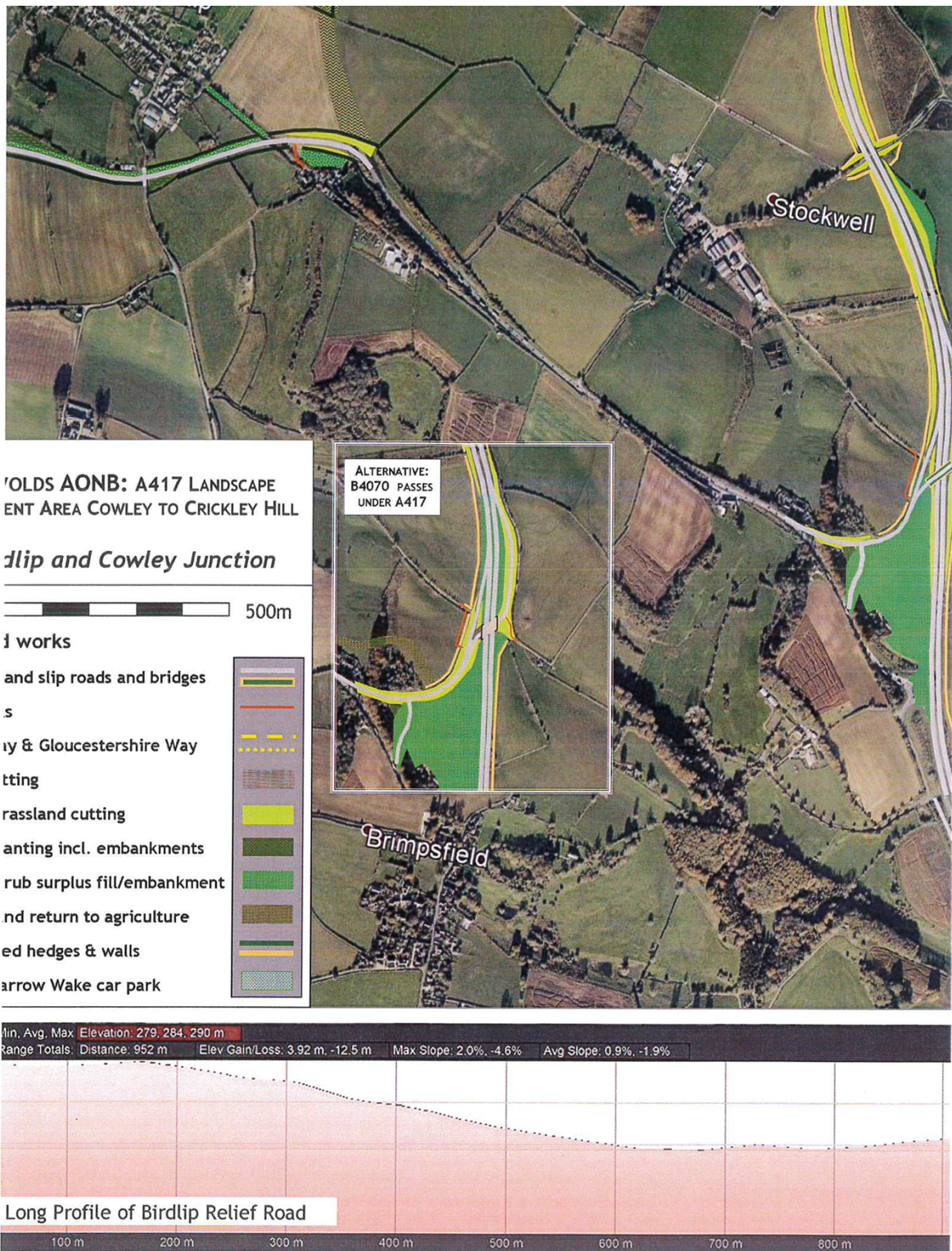


Figure 5-1 CCB Birdlip Bypass

5.2 A Summary of proposals

5.2.1 Route would:

- pass to the south of the village:
- be single carriageway road similar in character to existing local roads in terms of verges and landscaping
- follow the existing ground level at grade.
- Incorporate at grade crossroads and T junctions at minor roads (or mini roundabouts if essential).
- topsoil mounding to the north as noise barrier and limestone grassland and avoiding off site spoil disposal.
- minor planting in severed corners of fields.
- Shab Hill junction would be amended to remove the current Birdlip link road.

5.2.2 Cowley junction would be split between a northern element and a southern element

- northern element would serve as westbound merge and eastbound diverge and include connections to the Cowley access track diversion.
- The southern element would make use of the existing Cowley underpass and associated link roads to provide access to Birdlip for Cowley and Brimpsfield.

5.2.3 Perceived advantages over the current proposals included:

- Traffic through the centre of Birdlip would be reduced significantly
- Noise and air pollution levels in Birdlip would be reduced
- Quality of life in Birdlip would be enhanced
- a significant landscape and environmental gain in the wider landscape by not having the link route across to Shab Hill
- The Shab Hill junction arrangement would be simpler, freer flowing and delivered at a reduced cost
- Journey time would be the same or better than the current proposed route in Option 30 to Shab Hill

5.2.4 In terms of Traffic and economics CCB believed that there were overall benefits in their proposals.

5.2.5 CCB suggested that although the route for south bound traffic would be longer (4.6km rather than 2.85km) c.50% is 70mph dual carriageway compared with 100% c.40-50mph single carriageway with right-angled corners in the village: if average speeds are 40mph for the northern link as proposed and 45 and 60 for relief road via Cowley junction, journey times are very similar (around 4.2 to 4.4 minutes).

5.2.6 CCB pointed out that compared with a route coming from Cowley junction along present A417 to the link road north of Birdlip, that this option would be significantly shorter (1.7km) for traffic heading towards Painswick etc. than more circuitous 2.6km north of Birdlip - around 1.6 minutes saved.

5.2.7 Other points raised by CCB were:

- The length of new build would be c.860m compared to a 1 km link past the radio station.
- Although an extra south bound 'off' slip overbridge would be needed to reduce length of route at Cowley Junction, this could probably be combined with

accommodation bridge otherwise needed; by linking at Cowley rather than Shab Hill the main A436 junction can be designed as more free-flowing, with no extra roundabouts.

- It would remove most through traffic from Birdlip village with air quality and noise benefits, leaving only traffic to and from Birdlip itself or wanting to go to and from Cowley or Great Witcome using Birdlip Hill; and they too could be sent round to the south.
- It would reduce traffic impacting on the school in Birdlip.
- Additional benefits for Birdlip (heritage, visual and townscape).
- Benefits in achieving more than currently proposed for reclamation of A417 – noting knock-on benefits for disposal of surplus materials, habitat creation and returning land to agriculture.
- Removes all through traffic north of Birdlip: facilitating replacement Barrow Wake car park and its use as a starting point for walks at southern end of Birdlip to Crickley Escarpment Enhancement Area.
- Creates opportunities for further enhancement e.g. more open access land west of old road to Barrow Wake etc.

5.3 Appraisal of CCB Birdlip Relief Road Proposal

5.3.1 The appraisal of the Birdlip Relief Road proposal considered a range of factors including highway geometry, journey times, safety, cost and environmental impacts (e.g. noise, air quality, landscape) and compared them to the proposed B4070 Birdlip link road. Figure 5-2 shows an indicative layout of CCB proposals.

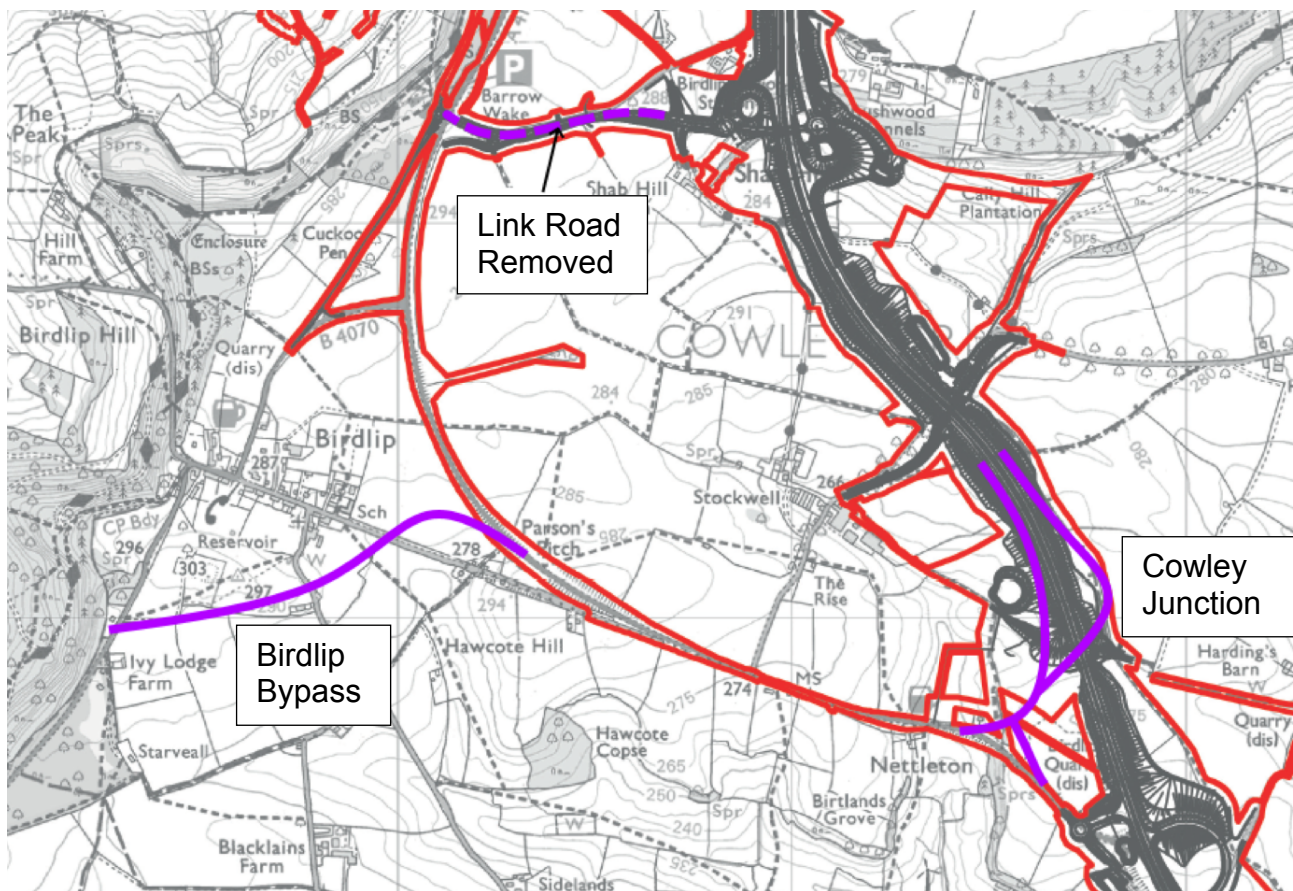


Figure 5-2 Indicative Plan of CCB Overall Proposals

Removal of West Shab Hill Connection (B4070 Birdlip link road)

- 5.3.2 Local journeys between Birdlip and Cheltenham currently use the existing B4070 and A417 via the Air Balloon roundabout.
- 5.3.3 To limit the adverse effect on local journeys, connectivity routes would generally need to be as close to the existing Air Balloon Roundabout as possible and continue to offer access to all current directions.
- 5.3.4 Shab Hill junction would provide this connectivity. It is grade separated and would include four slip roads offering full access to the A417 in both directions. It would also provide connectivity between Cheltenham and Birdlip via the underbridge and A436 link road.
- 5.3.5 Removing the western connection from Birdlip to Shab Hill junction would mean that northbound/westbound traffic from the B4070 Birdlip area would need to travel via Birdlip bypass and the Cowley junction which would add approx. 2.8km to the journey
- 5.3.6 Similarly removing the west connection to Shab Hill junction would mean that eastbound traffic from the B4070 Birdlip area would need to travel via the Cowley junction and use the new A417 to travel north and turn around a Shab Hill approx. 3.2km to the journey.
- 5.3.7 A modification to include a westbound diverge and eastbound merge would remove the 3.2km detour, however, this would be at additional cost and have more environmental impact.
- 5.3.8 It is concluded this proposal would increase journey times and would likely reduce the BCR.

Birdlip Bypass

- 5.3.9 To evaluate the proposals an outline design of the suggested alignment for the Birdlip bypass was undertaken. These are indicated in Figure 5-1 and Figure 5-3.



Figure 5-3 Outline Design of CCB Birdlip Bypass Proposal (Plan)

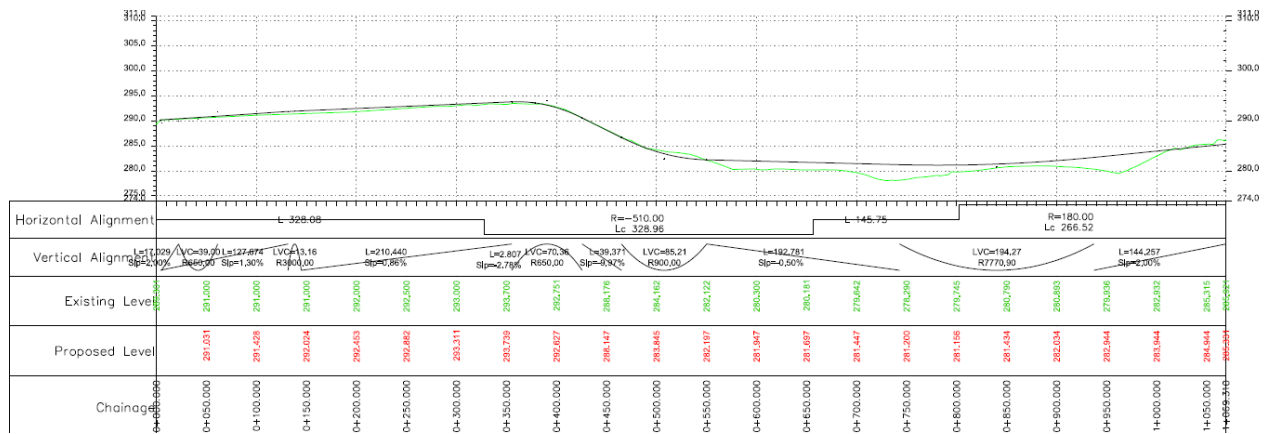


Figure 5-4 Outline Design of CCB Birdlip Bypass Proposal (Profile)

- 5.3.10 In order to assess the feasibility of the Birdlip bypass it was compared to baseline option presented for consultation in October 2019. An evaluation matrix was used to compare various aspects of the design. This is included in Appendix A.
- 5.3.11 In effect Birdlip already has a bypass in the form of the existing A417, however on occasion the B4070 is used as an alternative route to avoid congestion issues on the existing A417. The proposed A417 Missing Link Scheme would provide a reliable route for travellers therefore reducing the attractiveness of the route between Birdlip and Stroud or Brockworth.
- 5.3.12 Currently traffic on the B4070 passes through the western section of Birdlip, but has to negotiate some tight bends, characteristic of rural villages.
- 5.3.13 The road, known as Ermin Street, which passes the school and the majority of other properties in Birdlip in the easterly direction is currently a dead end having been stopped up during construction of the existing A417.
- 5.3.14 One of the benefits associated with the bypass would be the reuse of sections of the existing A417, however compared to the scheme proposals the alternative would require more construction and challenges still exist along the proposed offline sections.
- 5.3.15 It is suggested that the route should be designed as a single 2-way carriageway with at-grade junctions connecting to the local road network. Field accesses and other local access would also be required.
- 5.3.16 Whilst this is feasible the question arises as to whether this is appropriate. Providing at-grade priority junctions and regular accesses would constitute a level of risk which would need to be evaluated to ensure it would be tolerable.
- 5.3.17 The suggestion of mini roundabouts such as those indicated in Figure 5-5 is noted however these are only permitted in urban settings where the speed limit is less than 30mph.
- 5.3.18 A smaller normal roundabout would be more appropriate in rural settings however this would have a larger footprint and associated impact.

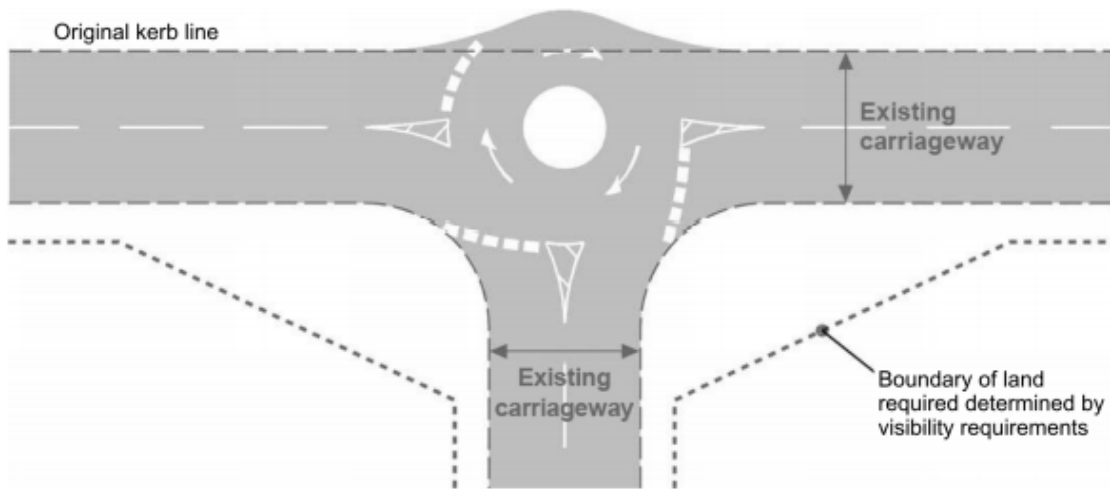


Figure 5-5 Example of Mini Roundabout

- 5.3.19 The design speed for this section of road would likely be in the region of 85kph and traffic speeds of 40-50mph would be expected so consideration of other safer junction layouts would be prudent. The minimum cross section width of pavement would be 6.8m however verge widths in the region of 2.5m would be required in addition and given the requirement for tight horizontal curvature additional widening would be required for visibility provided.
- 5.3.20 To achieve a tolerable level of safety the number of accesses would need to be limited or combined. It would be recommended to avoid the junction with the road between Birdlip and Brimpsfield and replace it with a bridge.
- 5.3.21 If, however, a junction was to be provided it would, based on estimated traffic levels indicated in Figure 5-6, likely need to be in the form of a ghost island junction to afford a level of safety for vehicles turning right. As a consequence, this would increase the footprint of the road and the associated impacts.

2-way AADT		<i>approximate values in pcus</i>
Option 1	Option 2	Location
4,800	0	Birdlip to Shab Hill link
4,400	300	B4070 between Shab Hill link and Birdlip Hill
0	4,300	Birdlip Bypass east of local road from Birdlip to Brimpsfield
0	3,600	Birdlip Bypass west of local road from Birdlip to Brimpsfield
100	800	Local road from Birdlip to Brimpsfield - north of Bypass
0	1,400	Local road through Stockwell and Cowley

Figure 5-6 Estimated Traffic

- 5.3.22 Overall, the route would present alignment challenges both horizontally and vertically to achieve a safe and compliant design. The horizontal and vertical curvature required to follow the suggested route would require several Departures from Standard (DfS) which would require justification in terms of safety.

5.3.23 An evaluation of the outline design of the suggested route compared to the requirements of the current highways design standards, the Design Manual for Highways and Bridges (DMRB) is indicated in Table 5-1 together with summary of the likely DfS that could be required.

5.3.24 The parameters associated with an 85kph design speed are indicated in Figure 5-7

Design speed kph	120	100	85	70	60	50	V2/R
Stopping sight distance (metres)							
Desirable minimum	295	215	160	120	90	70	-
One step below desirable minimum	215	160	120	90	70	50	-
Horizontal curvature (metres)							
Minimum R* with adverse camber and without transitions	2880	2040	1440	1020	720	520	5
Minimum R* with superelevation of 2.5%	2040	1440	1020	720	510	360	7.07
Minimum R* with superelevation of 3.5%	1440	1020	720	510	360	255	10
Desirable minimum R (superelevation 5%)	1020	720	510	360	255	180	14.14
One step below desirable Minimum R (superelevation 7%)	720	510	360	255	180	127	20
Two steps below desirable minimum radius (superelevation 7%)	510	360	255	180	127	90	28.28
Vertical curvature							
Desirable minimum* crest K value	182	100	55	30	17	10	-
One step below desirable min crest K value	100	55	30	17	10	6.5	-
Desirable minimum sag K value	37	26	20	20	13	9	-
Overtaking sight distances							
Full overtaking sight distance FOSD (metres)	-	580	490	410	345	290	-
FOSD overtaking crest K value	-	400	285	200	142	100	-
* Not recommended for use in the design of single carriageways (see Section 9)							
The V ² /R values shown above simply represent a convenient means of identifying the relative levels of design parameters, irrespective of design speed.							

Figure 5-7 Extract from the DMRB Standard CD 109

Table 5-1 Comparison of Design Parameters vs DMRB

Parameter	CCB Alignment	DMRB Equivalent (85kph)	Departure
Minimum Horizontal Radius	180m	180m (3 step relaxation)	No provided full SSD is available
Minimum Crest Curve	650m(K=6.5 approx.)	K=6.5(4 step relaxation)	Yes
Minimum Sag Curve	900m	K=9 (2 step relaxation)	Yes
Minimum SSD	50m	50m (5 step relaxation)	Yes
Max Gradient	10%	8% Max (10% is Departure)	Yes

5.3.25 Table 5-1 indicates the number of relaxations required to achieve the CCB alignment. These would in most cases represent Departures from Standard however certain amendments to the design could be made to reduce them however that would involve introducing large cuttings or embankments and wide verges to improve visibility.

5.3.26 The junction with the existing B4070 to the south of Birdlip would also present design challenges. The gradient of this section of the B4070 is steep which would not lend itself to provision of a safe junction arrangement without remodelling of the local topography. Steep approach gradients could lead to excessive speed when negotiating the junction.

5.3.27 A safe layout would likely involve provision of a roundabout however a ghost island priority junction may be an acceptable alternative. These are indicated in Figure 5-8. In either case this would involve removal of hedgerows and mature

trees and other impacts to achieve appropriate approach gradients and visibility requirements.

Environmental

- 5.3.28 The option has a number of impacts associated with it mainly relating to noise and landscape affects.
- 5.3.29 The potential to impact upon sensitive noise receptors due to potential for changes to traffic flows along the B4070 south of Birdlip and road alignment result in changes at noise sensitive receptors that are both currently affected and unaffected by road traffic noise. Residential dwellings within Birdlip village, located at their closest approximately 275m north of the option.
- 5.3.30 There is also a potential to alter traffic flows passing through Birdlip village. This may result in potential increases in traffic noise however the existing B4070 to the north of the Birdlip may experience reductions and traffic and associate noise. Overall there is potential for a minor worsening for noise sensitive receptors during construction and operation.
- 5.3.31 Both the design option and the scheme are located within the Cotswolds Area of Outstanding Natural Beauty (AONB).

Whilst both solutions would result in negative impacts upon landscape character on balance the option proposed would create an entirely new road and linear feature through the landscape, severing hedgerow/stonewalls and subdividing fields, changing the local field pattern and negatively impacting important landscape features.

- 5.3.32 The scheme and the alternative would have a similar negative effect on tranquillity, just in different part of the AONB. However, the alternative would reduce levels of tranquillity around Birdlip effecting the residents' amenity. It would also require earthworks, embankments and cuttings to achieve a suitable road alignment across the length of the bypass, compared to scheme.

Local Opposition

- 5.3.33 The Birdlip bypass option has also attracted opposition from Cowley and Birdlip Parish Council who do not support the proposals. A letter dated 28th July 2019 outlining their objections and concerns is included at Appendix D

Revised Cowley Junction

- 5.3.34 The revised Cowley junction arrangement would also present several design and safety challenges.
- 5.3.35 As indicated, a westbound merge and eastbound diverge would be required. The position of these would be too close to Shab Hill junction to enable a safe and compliant road layout to be provided. Standards require a minimum distance of 1km between and merge and a diverge to enable safe vehicle weaving manoeuvres. The suggested layout indicates a distance of less than 400m which would introduce safety issues associated with weaving traffic. Introducing the revised junction arrangement suggested by CCB would only increase this to around 700m. This would be difficult to justify.
- 5.3.36 The scheme provides in excess of 1.2km.

- 5.3.37 The layout with the merge and diverge, link to the A417 and Cowley access road links would also not represent value for money due to the additional length of link roads required, more complex structures and additional land required. Utilisation of the existing infrastructure at the existing Cowley roundabout would be more appropriate.

Revised A417 Scheme Proposals for the B4070 Birdlip Link Road

- 5.3.38 During the scheme 2019 consultation there were several objections to the route of the B4070 Birdlip link road presented including opposition of several landowners.
- 5.3.39 There were also calls to improve facilities, parking and accessibility at Barrow Wake and concerns about the proposed alignment of the B4070, which crossed the repurposed A417, and resulted in the loss of agricultural land. There were also concerns expressed regarding antisocial behaviour at Barrow Wake. CCB also objected to the affect the route would have an adverse effect on the High Wold
- 5.3.40 As a result of discussions with Gloucestershire County Council several amendments have be made to the B4070 link road.
- 5.3.41 The original proposals presented at the public consultation in Autumn 2019 provided a link which would cross the fields and tie in to the existing Birdlip junction. See Figure 5-8.

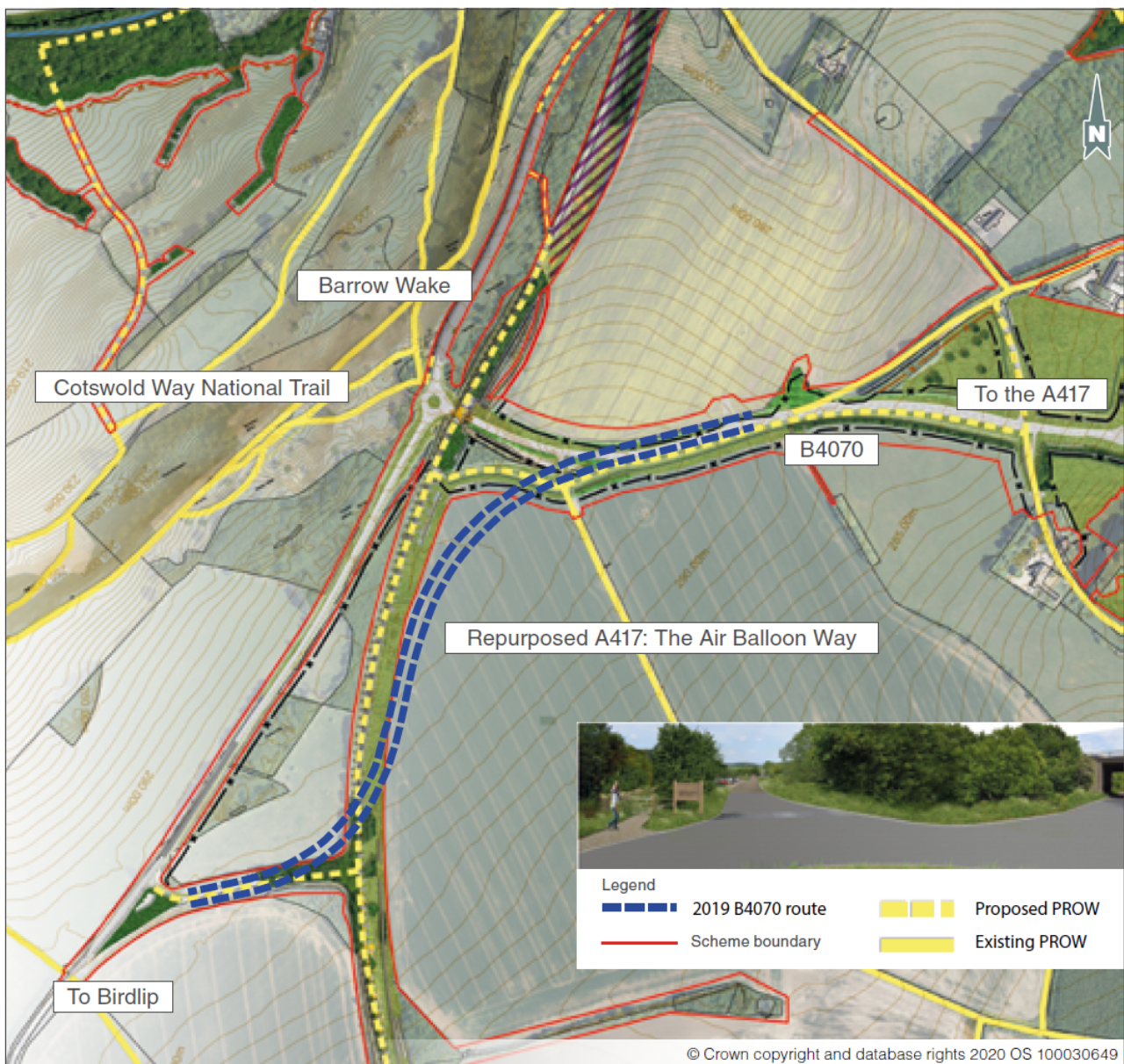


Figure 5-8 2019 B4070 Link Road compared to revised 2020 proposals

5.3.42 The revised alignment would follow the existing single track alignment and use the existing underpass near Barrow Wake to connect to the original alignment of the A417. This has several advantages:

- Removes the need for a Walking, Cycling and Horse-Riding crossing on the repurposed A417
- Helps regulate traffic speed on B4070
- Provides natural surveillance of Barrow Wake car park, helping to manage antisocial behaviour
- Discourages use by large goods vehicles
- Reduces visual intrusion across the high wold
- Reduces land take.
- Utilises existing infrastructure.
- 600m less additional carriageway

5.4 Summary and Conclusion

- 5.4.1 In summary, the relief road proposal would result in more negative impacts compared to the current Birdlip to Shab Hill link road, in particular in relation to safety, noise and journey times.
- 5.4.2 Landscape and visual impacts have been given due consideration and while the relief road proposal has potential to result in a reduction in visual impact over the original link road alignment, this is no longer the case and is worse in terms of landscape impact.
- 5.4.3 The current proposal for the Birdlip to Shab Hill link road would provide more convenient, safer access to Birdlip and destinations beyond and utilises existing infrastructure which reduces the need for a new highway in the landscape.
- 5.4.4 The alternative route would be longer and more costly, compared to the revised A417 Scheme, may have adverse landscape and other environmental impacts and would be unlikely to lead to an improvement in journey times.
- 5.4.5 On balance, the relief road proposal submitted by CCB does not represent an improvement on the preliminary scheme design for Birdlip to Shab Hill link road, and therefore would not constitute a compelling reason for adoption.

6 Alternative Shab Hill junction arrangement and A436 Alignment

6.1 A Summary of proposals

- 6.1.1 CCB recommended that Highways England considered relocating the proposed Shab Hill junction a few hundred metres further north. See Figure 6-1

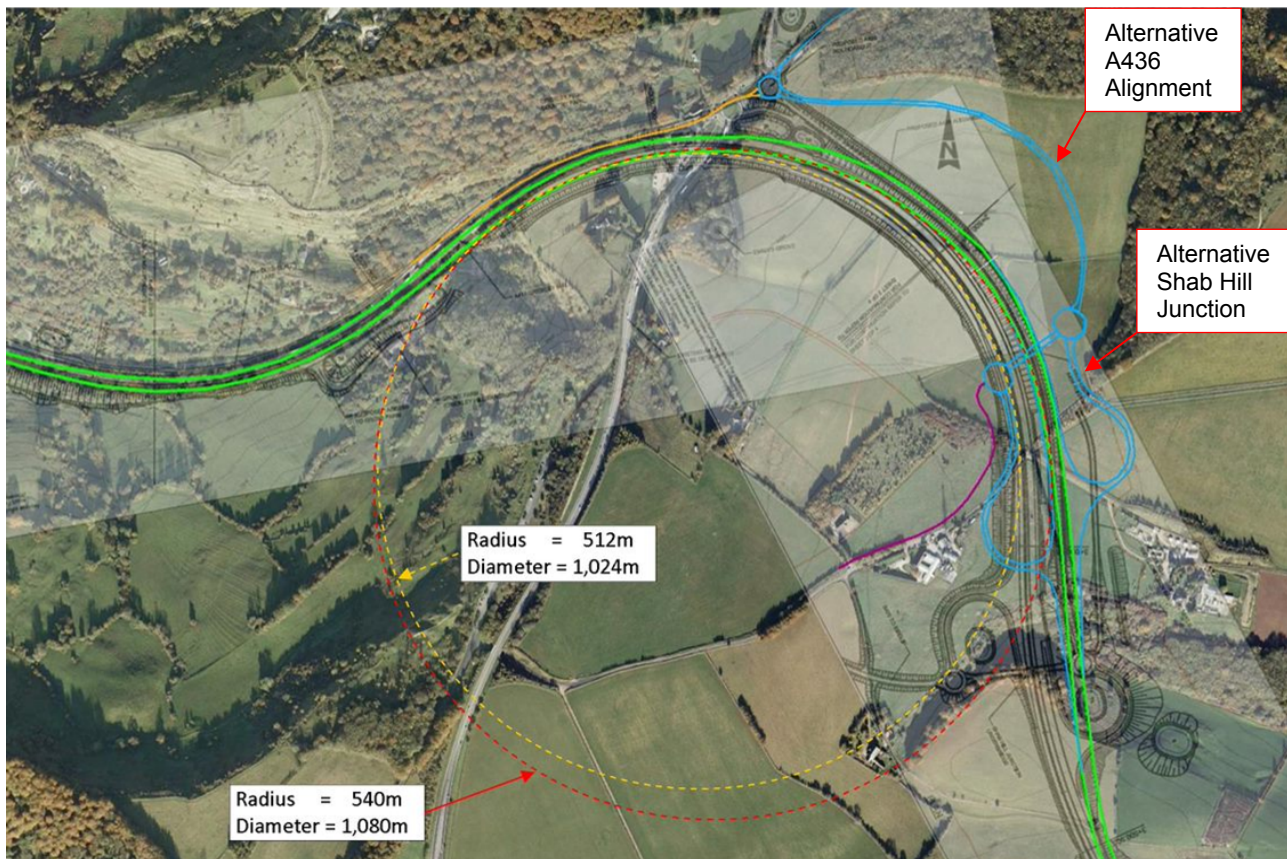


Figure 6-1 CCB Alternative Shab Hill Junction Arrangement and A436 Alignment

- 6.1.2 CCB suggested that the A436, the roundabouts and the road connecting the roundabouts could generally be close to existing ground levels, with the A417 passing underneath in the cutting (and emerging not much above ground level at the dry valley where the Shab Hill junction is currently proposed)
- 6.1.3 CCB believed that this design option would significantly reduce visual and noise intrusion at Shab Hill Farm and Rushwood Kennels; noise pollution and visual impacts on the wider landscape; and adverse impacts on the head of the Upper Churn Valley. It would also allow for shallower gradients of the A417 and for the Gloucestershire Way to more closely follow its current route and provide a more pleasant walking experience on this route.
- 6.1.4 CCB also requested that Highways England give further consideration to altering the alignment of the A436 link road to a lower contour line which could help to reduce the gradient of the link road. This reduced gradient could reduce the need for a crawler lane, which, in turn, could further reduce the visual impact.

6.2 CCB Alternative Junction Arrangement Proposal

- 6.2.1 The proposed Shab Hill junction lies within a complex topographical area of the AONB, with undulating hillside. Geotechnical and engineering issues and solutions have influenced the proposed vertical alignment of the A417 mainline and junction configuration.
- 6.2.2 In the DCO application preliminary design, Shab Hill junction would be located in a localised valley which would require filling, using excess excavated material won from other locations in the scheme resulting in an overall earthworks balance. To

mitigate the visual impact of this section of the route, landscape earthworks in the form of false cuttings would be provided. These landscape earthworks would act to provide visual screening and noise reduction.

- 6.2.3 Moving the junction north, so that the junction is in cut, would lead to a significant increase in excavated volumes requiring disposal off site. This would worsen the environmental impact and also increase cost considerably.
- 6.2.4 The relocation could also require the demolition of two properties, Birdlip Radio Station and Rushwood Kennels. Depending on precise location, it could also affect the setting of Emma's Grove and Ullen Wood.
- 6.2.5 The Gloucestershire Way Crossing was introduced to provide an ecological corridor giving connectivity between habitats for flora and fauna including bats. The relocation of Shab Hill junction would adversely affect these proposals.
- 6.2.6 It would be difficult to combine the crossing with the Shab Hill junction arrangement and provide an adequate level of ecological mitigation without a very wide, long likely skewed structure which would be prohibitively expensive.

6.3 CCB alternative A436 alignment proposal

- 6.3.1 Moving the alignment of the A436 link road, as suggested, would lead to a large increase in cutting depths and an associated increase in excavated volumes requiring disposal off site, significantly increasing the associated environmental impact of moving this volume of material.
- 6.3.2 The increased cutting depth and need for retaining walls would increase the landscape and visual impact of the alternative scheme, especially from views at several locations along the Cotswolds Way, at Barrow Wake and at Crickley Hill. Retaining walls would create a permanent visual effect from these locations compared to the proposed scheme. Landscape effects to the Escarpment landscape character type would be greater as a result of the increased width and dept of the cutting.
- 6.3.3 The relocation would also have an adverse effect on Ullen Wood ancient woodland, with the permanent loss of two separate areas of ancient woodland and the permanent impact to the woodland plant community (impact of nutrient nitrogen deposition) of the alternative road being situated closer to Ullen Wood.
- 6.3.4 The alternative scheme would increase the landscape impact by creating two separate road corridors in cutting, instead of one larger combined corridor as proposed. This would increase the overall footprint of the scheme and create a large area of islanded land.
- 6.3.5 It is acknowledged that there would be a reduced impact at Upper Churn Valley but this would be slight as the alternative scheme would still require large earthwork which would return the head of the valley, resulting in the permanent loss of the exposed geology and beech 'hanger' woodland. These impacts would be similar to those of the proposed scheme.

6.4 Feasibility of CCB alternative junction arrangement and A436 alignment proposal

- 6.4.1 To evaluate the proposals more thoroughly the suggested proposals and alignments were developed, in outline, in accordance with appropriate design

standards. Similar relaxations were applied to those used in the scheme design to ensure a robust comparison could be made with the scheme proposals.

- 6.4.2 The geometric parameters adopted were consistent with those used in the scheme design and are summarised in Table 6-1 however the gradients achieved in the CCB alternative would be an improvement on the scheme values.

Table 6-1 Comparative design parameters

Link	Design Speed	Min Horiz R	Min Crest K	Max Grad Scheme	Max Grad CCB
A417	120Kph	540m	182	8%	7%
A436	100kph	360m	100	8%	6%
Junction Links	70kph	50m	30	4%	4%

- 6.4.3 The plan/profile drawings HE551505-X_XX_XXXX_X-SK-C-000097 and 000098 in Appendix C, demonstrate the layout when designed in compliance with current highways design standards.

A417 Mainline

- 6.4.4 In assessing the feasibility of the mainline alignment, suggestions that shallower gradients could be used were investigated however this turned out to be counterproductive and would lead to increased cutting depths without any benefit in relation to the vertical elevation of the Shab Hill junction.
- 6.4.5 The increased cutting depth would also have an adverse landscape and visual impact. The impact would be comparable with the 2019 scheme which has since been modified to reduce the extent (width and depth) of the cutting and eliminate visually prominent retaining walls adjacent to Cold Slad Lane.
- 6.4.6 It is notable that even when adopting the 7% maximum vertical gradient that the earthwork footprint is considerable. This is accounted for by the increased depth of the mainline alignment required to provide an 'at grade' solution for Shab Hill junction roundabouts and overbridge.
- 6.4.7 It would be necessary to provide retaining walls up to 25m in height adjacent to Cold Slad Lane to maintain access for the residents of Cold Slad and to avoid impacting on the Crickley Hill Country Park and adjacent SSSI.
- 6.4.8 Due to the topography this would equate to cutting depths in excess of up to 25m on the approach to Shab Hill junction. This compares to a maximum of 15m for the scheme.

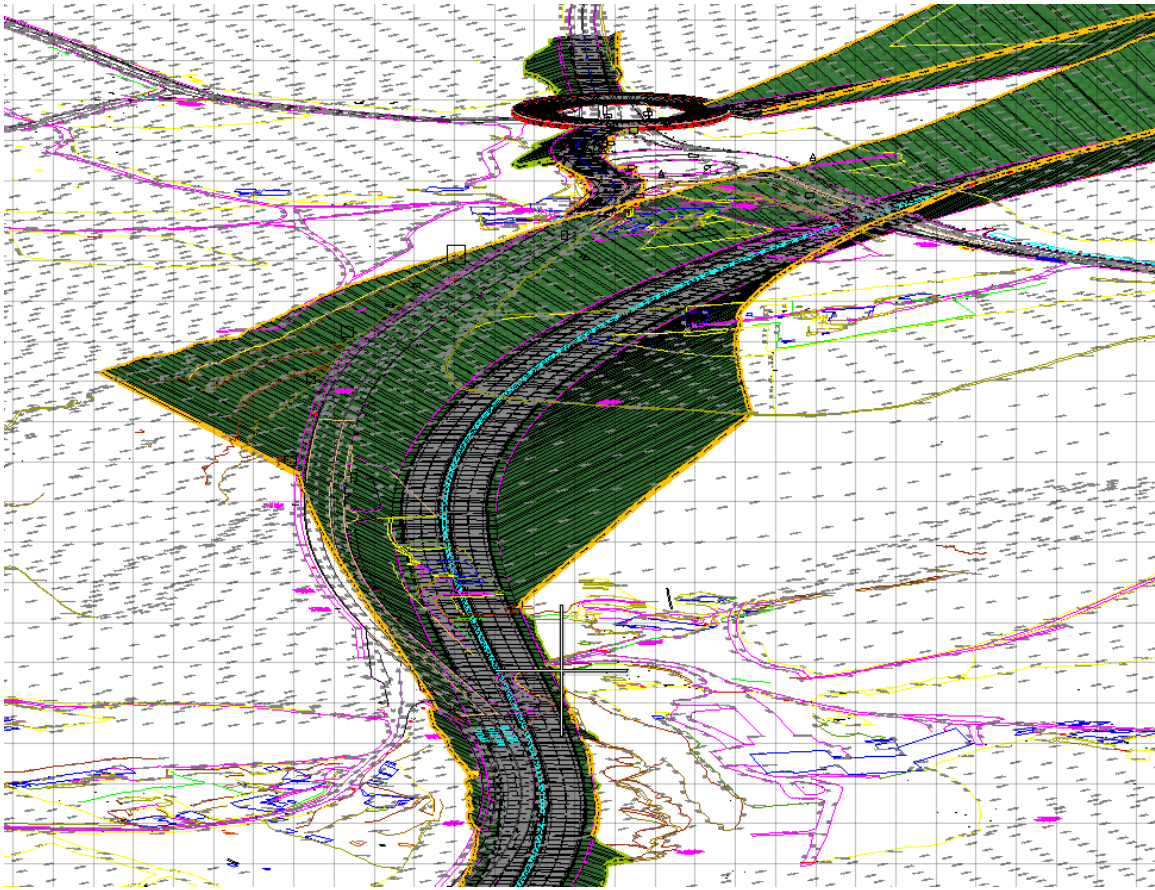


Figure 6-2 Extract from 3D design model illustrating CCB outline proposals (Image looking northeast shows A417 mainline to the west of Ullenwood junction)

A436 Link

- 6.4.9 The suggestion to alter the alignment of the A436 link road to a position at a lower contour line to reduce the gradient of the link road to remove the need for a crawler lane was investigated. Whilst a longer alignment would enable shallower gradient to be used these would not eliminate the recommendation to provide a climbing lane.
- 6.4.10 When using recommended parameters, the horizontal alignment would not 'hug' the fence line of Ullen Wood as suggested but would end up being positioned somewhere in the middle between Ullen Wood and the mainline A417 even when adopting available relaxations in curvature. The indicated alignment uses a radius of 360m which would require superelevation of 7%.
- 6.4.11 In adopting a more sweeping alignment there would be a significant adverse effect on Ullen Wood, in particular on the approach to Ullenwood roundabout where the earthworks would require removal of some of this ancient woodland. In addition to this there would also likely be the loss of ancient woodland on the southern corner of Ullen Wood due to earthworks associated with the alternative alignment. This would not be acceptable, and action would be required to avoid this.
- 6.4.12 Ullen Wood is an ancient woodland of national importance situated to the north east of the scheme adjacent to the existing A436. It is not possible to mitigate for the loss of trees in ancient woodland as they are irreplaceable features. The loss

of ancient woodland would be a permanent/irreversible impact that would negatively affect the key characteristics of this resource. The loss of ancient woodland would represent a major adverse impact in terms of ecology and landscape.

- 6.4.13 The operational phase of the current scheme has a significant adverse effect predicted for Ullen Wood Ancient Woodland, as increases in nutrient nitrogen deposition are predicted to be above 1% of the lower critical load (further details are provided in ES Chapter 5 Air quality). Moving the A436 link closer would exacerbate this and increase the area of degradation of woodland from nitrogen deposition.
- 6.4.14 The maximum cutting depth for the A436 link would be in the region of 20m however even though this is comparable with the scheme proposals the distance from the mainline would require a separate cutting to be excavated rather than contiguous cuttings, leading to a considerable increase in excavated volume. This would increase the overall footprint of the scheme, increasing the landscape and visual effects and create a large area of islanded land between the A417 mainline and the alternative A436.

Shab Hill Junction

- 6.4.15 To accommodate the layout suggested by CCB the overall footprint of Shab Hill junction would have a detrimental impact on Rushwood Kennels and McCarthy Systems at Birdlip Radio Station.
- 6.4.16 The slip roads would need to be constructed in deep cutting and would therefore need extensive earthworks. These would increase the footprint of the scheme, increasing the landscape and visual effects, and require the removal of irreplaceable ancient woodland at Ullen Wood.
- 6.4.17 The westbound slip roads would be close to Birdlip Radio Station which would need to be demolished unless significant retaining structures were to be provided.
- 6.4.18 The eastbound slip roads would be close to Rushwood Kennels which may also require partial demolition of some of the buildings. In addition, an access track would need to be provided to connecting the property into the eastern roundabout.

Earthworks

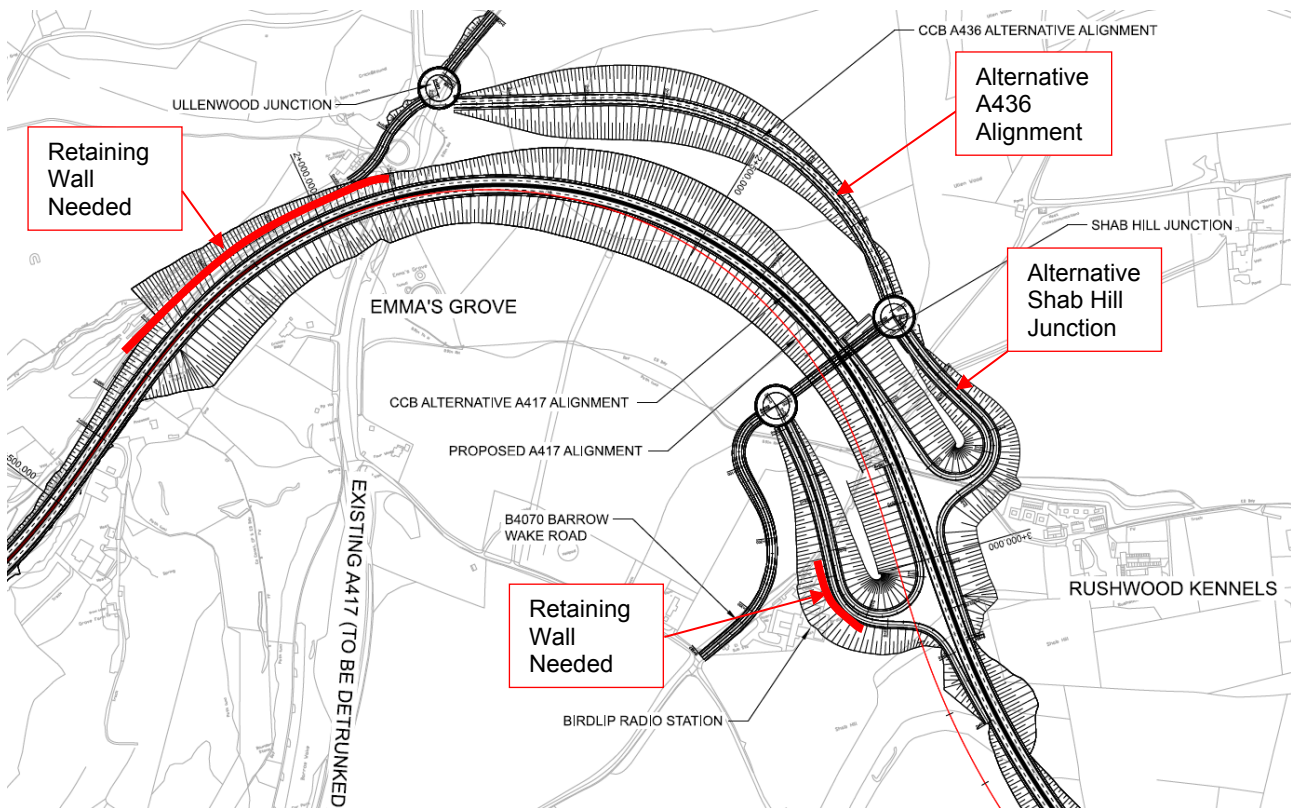


Figure 6-3 Outline Design Layout of CCB Proposals.

- 6.4.19 The extent of the cuttings required is demonstrated in Figure 6-3 and Figure 6-4. Whilst there would be options to reduce the extent of the earthworks this would likely involve retained earthwork solutions and/or engineered slopes. Indicative locations for most likely retaining wall requirements are shown in Figure 6-3.
- 6.4.20 Whereas the 2020 (8%) scheme proposals now offer a scheme balance of earthworks the proposed alternative offered by CCB would be worse than the 2019 (7%) route and result in a net export of material in excess of 1 million m² due to the increased cut in the vicinity of Shab Hill junction and the realignment of A436 which would require a separate cut. This would have an associated environmental and cost impact.

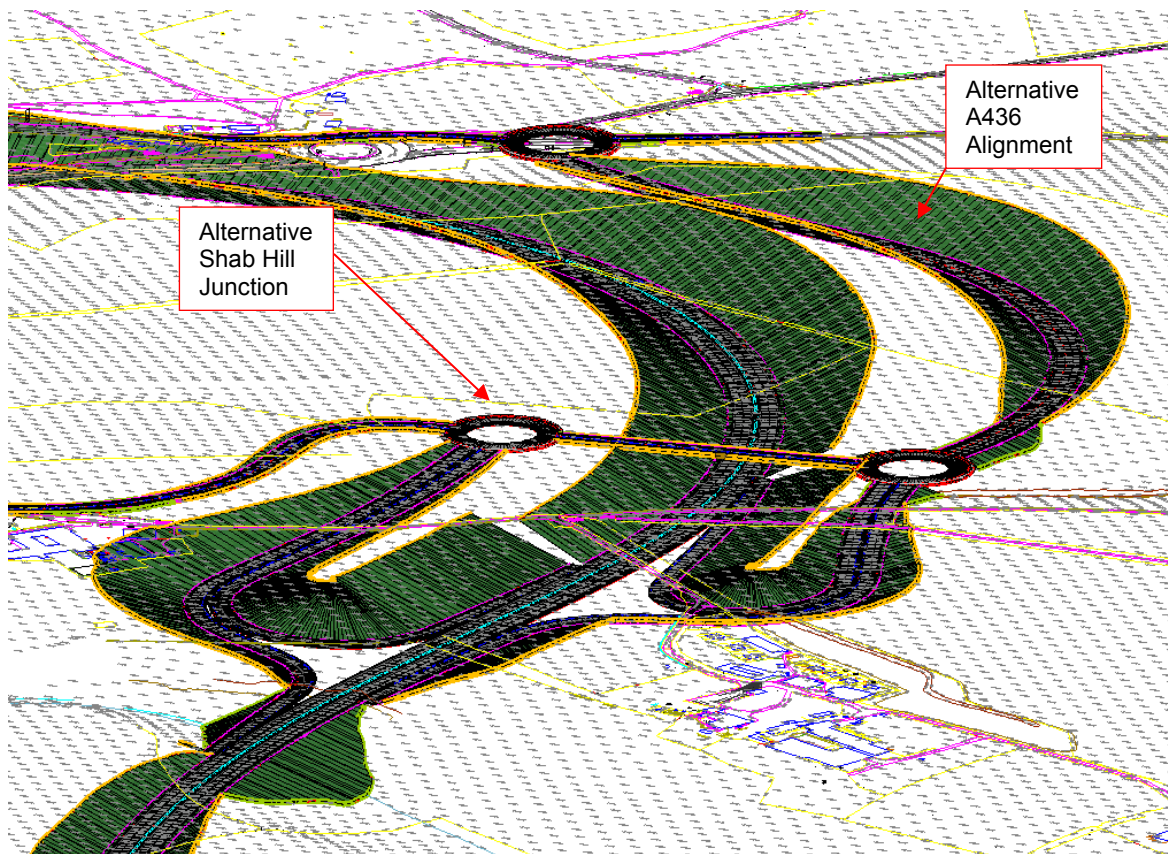


Figure 6-4 Extract from design model showing 3D aspect of CCB outline proposals

6.5 Summary and Conclusion



- 6.5.1 In summary, the alternative proposal for Shab Hill junction and the A436 would result in more negative impacts compared to the current proposals, in particular in relation to earthworks volumes and cost.
- 6.5.2 Landscape and visual impacts have been given due consideration and while the alternative proposal has potential to result in a reduction in visual impact in the vicinity of the Upper Churn Valley, the impacts on Crickley Hill, Ullen Wood, Birdlip Radio Station and Rushwood Kennels would be significant and likely to be worse than the scheme proposals.
- 6.5.3 On balance, alternative A436 alignment and Shab Hill junction proposal submitted by CCB does not represent an improvement on the DCO application design, and therefore would not constitute a compelling reason for adoption.

Appendices

Appendix A Option Appraisal Matrix- Birdlip Bypass

Figure A-1 Assessment Key

Major worsening	--
Minor worsening	-
Neutral effect	0
Minor improvement	+
Major improvement	++

Assessments of Options				
Option 1 - Base Case Option		Option 2 - Providing Birdlip Bypass - At grade option with direct access for laneways		
				
QUALITATIVE IMPACT DESCRIPTION and/or QUANTITATIVE ASSESSMENT	RATING	QUALITATIVE IMPACT DESCRIPTION and/or QUANTITATIVE ASSESSMENT		RATING

<p>Traffic:</p>	<p>This is the baseline case for the traffic(o)</p>	<p>0</p>	<p><u>Pros:</u></p> <ul style="list-style-type: none"> - Large reduction in trips through Birdlip (bypass intersection with local road from Birdlip to Brimpsfield means traffic to/ from Birdlip Hill still travels through Birdlip) - Some large local journey time benefits <p><u>Cons:</u></p> <ul style="list-style-type: none"> - Increase in traffic through Stockwell and Cowley (around 1/3 of rerouted Birdlip traffic) - Some large local journey time disbenefits - Net strategic journey time disbenefits <p><u>Flows:</u></p> <table border="1" data-bbox="1095 587 1921 831"> <thead> <tr> <th colspan="2">2-way AADT</th> <th rowspan="2">Location</th> </tr> <tr> <th>Option 1</th> <th>Option 2</th> </tr> </thead> <tbody> <tr> <td>4,800</td> <td>0</td> <td>Birdlip to Shab Hill link</td> </tr> <tr> <td>4,400</td> <td>300</td> <td>B4070 between Shab Hill link and Birdlip Hill</td> </tr> <tr> <td>0</td> <td>4,300</td> <td>Birdlip Bypass east of local road from Birdlip to Brimpsfield</td> </tr> <tr> <td>0</td> <td>3,600</td> <td>Birdlip Bypass west of local road from Birdlip to Brimpsfield</td> </tr> <tr> <td>100</td> <td>800</td> <td>Local road from Birdlip to Brimpsfield - north of Bypass</td> </tr> <tr> <td>0</td> <td>1,400</td> <td>Local road through Stockwell and Cowley</td> </tr> </tbody> </table> <p><u>Notes:</u></p> <ul style="list-style-type: none"> - Bypass intersects with B4070 via a priority T-junction - Bypass intersects with local road from Birdlip to Brimpsfield via a priority crossroads - Bypass crosses Roman Road above grade and does not intersect with it <p>Minor worsening due to net journey time disbenefits</p>	2-way AADT		Location	Option 1	Option 2	4,800	0	Birdlip to Shab Hill link	4,400	300	B4070 between Shab Hill link and Birdlip Hill	0	4,300	Birdlip Bypass east of local road from Birdlip to Brimpsfield	0	3,600	Birdlip Bypass west of local road from Birdlip to Brimpsfield	100	800	Local road from Birdlip to Brimpsfield - north of Bypass	0	1,400	Local road through Stockwell and Cowley	<p>-</p>
2-way AADT			Location																								
Option 1	Option 2																										
4,800	0	Birdlip to Shab Hill link																									
4,400	300	B4070 between Shab Hill link and Birdlip Hill																									
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100	800	Local road from Birdlip to Brimpsfield - north of Bypass																									
0	1,400	Local road through Stockwell and Cowley																									
<p>Economics</p>	<p>This is the baseline case for the economics(o)</p>	<p>0</p>	<p>High level assessment undertaken using weighted zone to zone time skims within the Affected Route Network. The largest journey time changes are experienced locally and by few trips. Small changes in journey time are experienced at a strategic level and by a greater volume of trips. Overall, Option 2 results in net strategic journey time increases</p>	<p>-</p>																							

<p>terms of effect on economics</p>		<p>O</p>	<p>Major worsening due to net journey time increases and associated monetary disbenefits (based on 60 year appraisal period)</p>	<p>--</p>
<p>Air quality: How does the option score in terms of effect on air quality</p>	<p>This is the baseline case for the air quality.</p>	<p>O</p>	<p>Option 2 is largely situated at a distance greater than 200m from residential receptors within Birdlip. As such, construction and operational impacts upon human (residential) receptors are not anticipated to be worsened when compared to Option 1. The option has the potential to affect the local air quality (nitrogen deposition) for biodiversity receptors (Knap House Quarry SSSI and Cotswold Commons and Beechwoods Site of Special Scientific Interest (SSSI)). Whilst the proposed bypass south of Birdlip would be located within 100m of the Knap House Quarry SSSI and Cotswold Commons and Beechwoods SSSI, the removal of the B4070 connection to Birdlip may result in reduced impacts upon the Crickley Hill and Barrow Wake SSSI. It is also noted that the option is unlikely to increase the potential impacts to the Birdlip AQMA. As such, on balance this option is considered neutral in comparison to Option 1.</p>	<p>O</p>
<p>Biodiversity: How does the option score in terms of effect on biodiversity</p>	<p>This is the baseline case for the biodiversity.</p>	<p>O</p>	<p>There are no new biodiversity receptors with potential to be affected by Option 2 beyond those already identified for the proposed scheme. However, Option 2 would be located in closer proximity to the Cotswold Beechwoods Special Area of Conservation (SAC) and Cotswold Commons and Beechwoods SSSI. Additionally, the option would be located within 100m of the Witcombe / Buckle Woods ancient woodland. However, the option would be situated at a greater distance from the Crickley Hill and Barrow Wake SSSI. This option would potentially result in impacts upon habitats (e.g. hedgerows) due to land take required. However, this would also be the case for Option 1 where hedgerows and field boundary vegetation would likely be affected also. Option 1 also offers the opportunity to re-purpose much of the existing A417 and plant additional woodland and habitat. As such, on balance there is considered to be a neutral effect overall.</p>	<p>O</p>
<p>Cultural heritage:</p>			<p>Option 2 has the potential to result in minor beneficial effects upon cultural heritage assets. The removal of the B4070 link has the potential to reduce</p>	

<p>How does the option score in terms of effect on cultural heritage</p>	<p>This is the baseline case for the cultural heritage.</p>	<p>O</p>	<p>the footprint of physical works required for the construction and operation of the proposed scheme. This is considered to result in a minor reduction upon setting impacts to the historic landscape and heritage assets. Additionally, if the Shab Hill junction roundabout reduces in size this also has the potential to reduce impacts upon the setting of heritage impacts. Equally, the introduction of a bypass south of Birdlip is not considered likely to result in significant impacts to heritage assets within Birdlip.</p>	<p>+</p>
<p>Climate and carbon: How does the option score in terms of effect on climate and carbon</p>	<p>This is the baseline case for the climate and carbon.</p>	<p>O</p>	<p>Option 2 is unlikely to materially alter the potential effects upon climate and carbon emissions. The effects upon climate change vulnerability, climate resilience and carbon emissions are not anticipated to change as a result of the introduction of the bypass south of Birdlip. As such, a neutral effect overall.</p>	<p>O</p>
<p>Landscape:</p>			<p>Both options are located within the Cotswolds Area of Outstanding Natural</p>	

<p>How does the option score in terms of effect on landscape and visual impact</p>	<p>This is the baseline case for the landscape and visual.</p>	<p>0</p>	<p>Beauty (AONB). Whilst both options would result in negative impacts upon landscape character on balance Option 1 has a slightly smaller negative effect as it will utilise existing roads with alternations to the width and alignment, compared to Option 2 which would create an entirely new road and linear feature through the landscape, severing hedgerow/stonewalls and subdividing fields, changing the local field pattern and negatively impacting important landscape features. Both options would have a similar negative effect on tranquillity, just in different part of the AONB. However, Option 2 would reduce levels of tranquillity around Birdlip effecting the residents amenity. Option 2 would also require earthworks, embankments and cuttings to achieve a suitable road gradient across the length of the bypass, compared to Option 1 which would mostly be at grade west of Shab Hill junction.</p>	<p>-</p>
<p>Visual: How does the option score in terms of effect on visual impact</p>	<p>This is the baseline case for visual.</p>	<p>0</p>	<p>There will be a slight long term negative effect on the residents of Birdlip as a result of the Option 2 route but this would be better than vehicles travelling through the village of Birdlip, impacting the visual amenity of the residents of Birdlip at close proximity, as with Option 1.</p>	<p>+</p>

<p>Material assets and waste:</p>	<p>How does the option score in terms of effect on material assets and waste</p> <p>This is the baseline case for the material assets and waste.</p>	<p>O</p>	<p>Option 2 is unlikely to materially alter the potential effects upon material assets and waste. In the context of the proposed scheme overall, the volume of construction waste generated is unlikely to change. As such, a neutral effect overall.</p>	<p>O</p>
<p>Noise:</p> <p>How does the option score in terms of effect on noise</p>	<p>This is the baseline case for the noise.</p>	<p>O</p>	<p>Option 2 has the potential to impact upon sensitive noise receptors. There is potential for changes to traffic flows along the B4070 south of Birdlip and road alignment to result in changes at noise sensitive receptors that are both currently affected and unaffected by road traffic noise. Noise sensitive receptors in relation to Option 2 are considered to be residential dwellings within Birdlip village, located at their closest approximately 275m north of the option. Therefore, there is potential to alter traffic flows passing through Birdlip village resulting in potential increases in traffic noise. As such, there is potential for a minor worsening for noise sensitive receptors during construction and operation.</p>	<p>-</p>
<p>Water environment :</p> <p>How does the option score in terms of effect on water and environment</p>	<p>This is the baseline case for the water environment.</p>	<p>O</p>	<p>Option 2 is considered unlikely to result in potentially new or different significant effects when compared to Option 1. The groundwater regime underlying Option 2 remains unchanged. The surface water conditions are not considered to alter as a result of Option 2. As such, a neutral effect overall.</p>	<p>O</p>
<p>Geology and soils:</p>			<p>This option would overlie the Salperton Limestone Formation and Fuller's Earth Formation, comprised of limestone and mudstone bedrock. Option 2</p>	

<p>How does the option score in terms of effect on geology and soils</p>	<p>This is the baseline case for the geology and soils.</p>	<p style="text-align: center;">○</p>	<p>would be located at a further distance to the southern extent of the Crickley Hill and Barrow Wake SSSI (with nationally important geological features) when compared to Option 1. However given that the proposed alignment along the existing A417 is immediately adjacent to the Crickley Hill and Barrow Wake SSSI, this option is unlikely to result in new or different effects. The Cotswold Commons and Beechwood SSSI, a site which overlies Jurassic limestones would be located in closer proximity to Option 2 than Option 1. However Option 2 is not considered to materially alter the potential effects upon geology and soils, given that the SSSI designation is in relation to biological features. As such, a neutral effect overall.</p>	<p style="text-align: center;">○</p>
<p>Population and human health: How does the option score in terms of effect on population and human health</p>	<p>This is the baseline case for the population and human health.</p>	<p style="text-align: center;">○</p>	<p>Option 2 is unlikely to result in new or different potential effects upon population and human health when compared to Option 1. This option would result in direct impacts to individual farm businesses and traffic management measures (i.e. temporary road closures) likely to result in increased driver stress for vehicle travellers. Road closures during construction connecting to Birdlip may also create severance for local communities (e.g. Birdlip). The operational regime of the option however may mean that traffic flows in Birdlip are improved. However, Option 2 is not expected to materially alter the potential effects upon population and human health. As such, a neutral effect overall.</p>	<p style="text-align: center;">○</p>
<p>Engineering: How does the option score in terms of effect on engineering</p>	<p>This is the baseline case for the engineering.</p>	<p style="text-align: center;">○</p>	<p>Option 2 is of similar engineering complexity, consisting of a similar length of at grade mainline carriageway and junction design and construction</p>	<p style="text-align: center;">○</p>
<p>Programme: How does the option score in</p>	<p>This is the baseline case for the programme.</p>		<p>Neutral effect.</p>	

terms of effect on programme		O		O
Cost Which option is provides best value for money	This is the baseline case for cost.		The Birdlip Bypass would be comparable in length and engineering complexity to the B4070 Shab Hill connection. The Shab Hill junction would still require four slip roads and a dumbbell junction with a crossing structure in order to provide full connectivity to the A436. The full value of the Shab Hill junction would not be realised in this alternative without the western connection.	
		O		O
Safety To pursue H&S risk elimination through design Safety in construction, operation and demolition.	This is the baseline case for safety.		The Birdlip Bypass would allow the motorist to avoid two tight bends from B4070 to A417 journey. In general the additional journey time experienced by A4050 to A417 traffic could enhance driver frustration. If at grade there would be steep gradients up to 10% present on the Birdlip Bypass in advance of the proposed junction with the north/south lane. Option 2 was result in additional traffic going through Nettleton, an area with substandard geometry and a 40mph speed limit.	
		O		-
Operational Safety Impact of proposal on operational safety (road user and road worker)	This is the baseline case for operational safety.		Motorists would have reduced opportunity to leave the A417 to the west. Existing lanes are severed by the Birdlip bypass and connection would be provided via cross roads. These crossroads would be in the vicinity of a steep 10% gradient and on an alignment which has substandard vertical geometry	
		O		-
Buildability				

	This is the baseline case for buildability.	O	Overall this option is shorter in length and has fewer tie ins to construct to existing roads, it should therefore should be easier and quicker to construct and minimises risk to workforce. Maintaining access to the retained residential property near Air Balloon Roundabout needs to be considered in the design.	+
Land	This is the baseline case for lands.	O	<p>The majority of Option 1 route uses the existing link road and as uses existing highway infrastructure. The new section of road in Option 2 runs predominantly along field boundaries, through agricultural land that appears to be used as a mixture of arable land, paddocks and rough grazing. Option 2 would engage with approximately 8 landowners compared with approximately 4 landowners on the baseline. As the land ownership situation is more fragmented for Option 2 this results in a minor negative outcome.</p> <p>Option 2 would result in a possible 3 additional Openreach diversions / protection required. Possibly 2 additional WPD diversions. 3 additional Gigaclear diversions / protection. 4 additional STW diversions. This would required validation with SU's.</p>	-
Option Recommendation (brief description of why option was selected)				
Designer's Recommendation		O	Overall, more assessment factors result in negative impacts compared to the current design proposal for the B4070 Shab Hill link. Landscape and visual impacts have been given due consideration and there is a positive visual impact but negative landscape impact. Arup do not feel this option is materially better than the current design and therefore should not be adopted	O
Highways England Decision		O	Highways England do not see a compelling reason to adopt this proposal. Option 1 will provide more convenient, safer access to Birdlip and destinations beyond and utilises existing infrastructure which reduces the need for a new highway in the landscape.	

Appendix B Correspondence with CCB in relation to Alternative designs

Table B-1 Correspondence from CCB

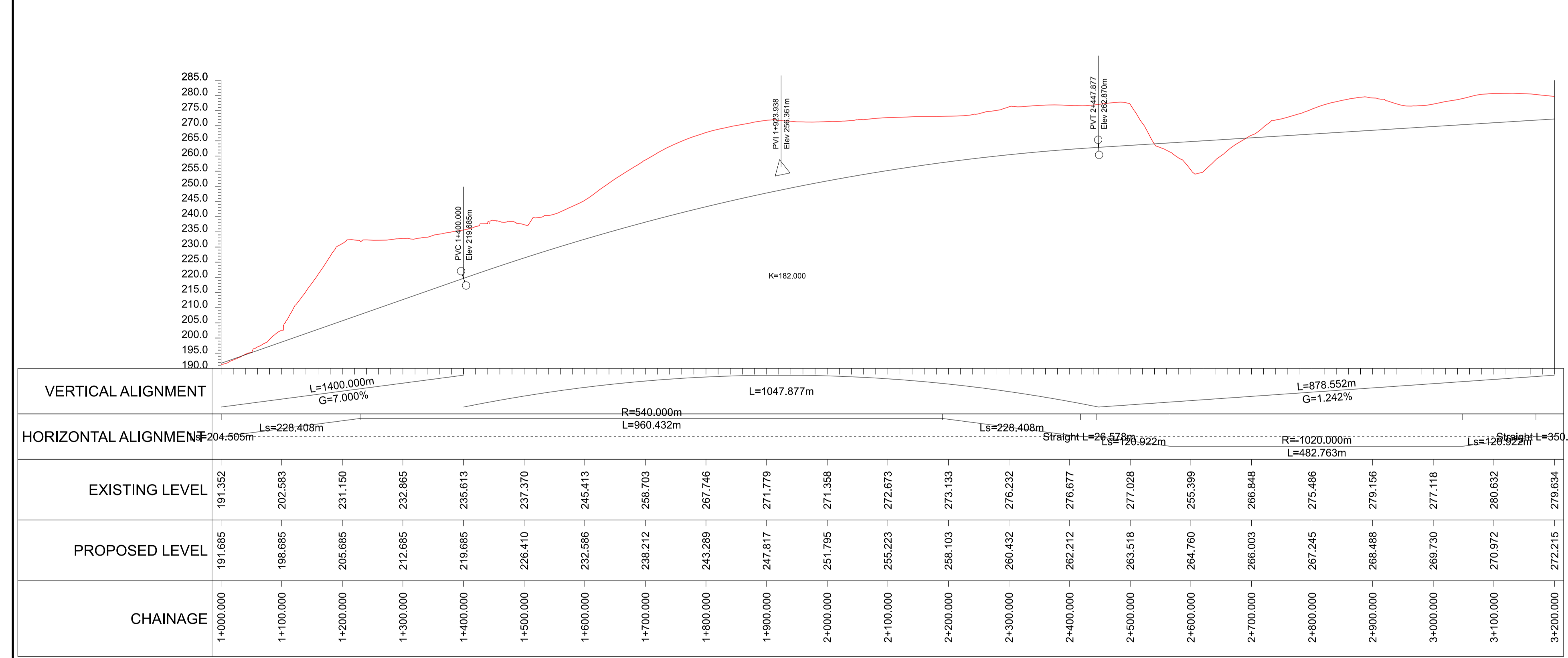
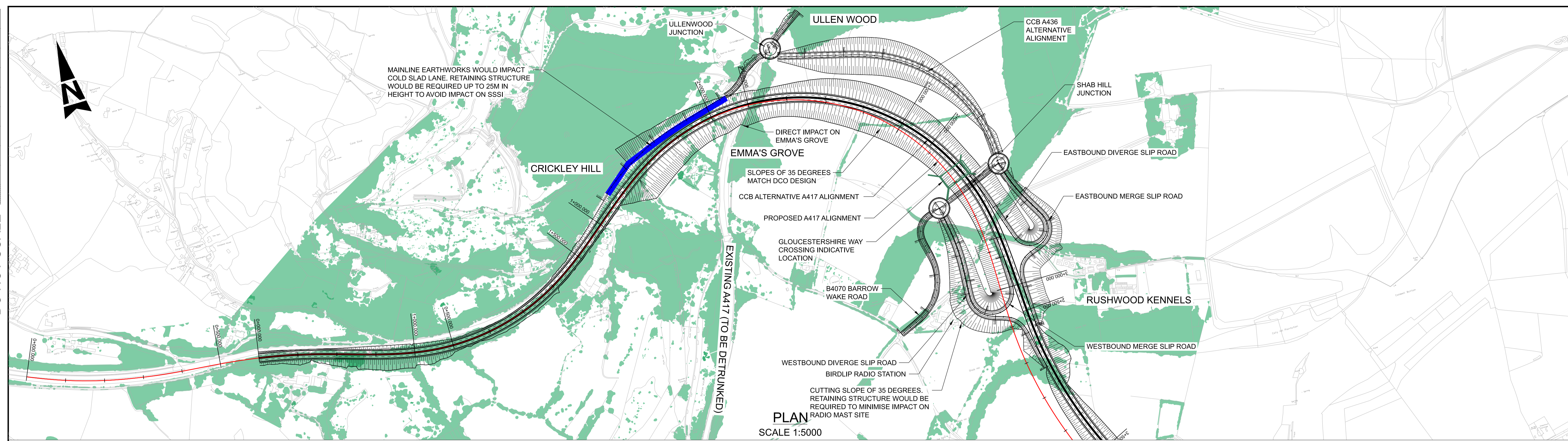
Date	Method	Parties involved	Subject
31 May 2019	Letter	Cotswolds Conservation Board to Highways England	Request by CCB for HE to investigate the option for a section of bypass for Birdlip, taking the traffic from the Stroud - Painswick direction to the south of Birdlip to join the A417 at the Cowley junction.
April 2019	Letter	Highways England to Cotswolds Conservation Board	Highways England response to CCB Birdlip Bypass option
November 2020	Letter	Cotswolds Conservation Board to Highways England	Response to 2020 Consultation

Appendix C CCB Alternative A436 Alignment and Shab Hill Junction Layout – Plan Profiles

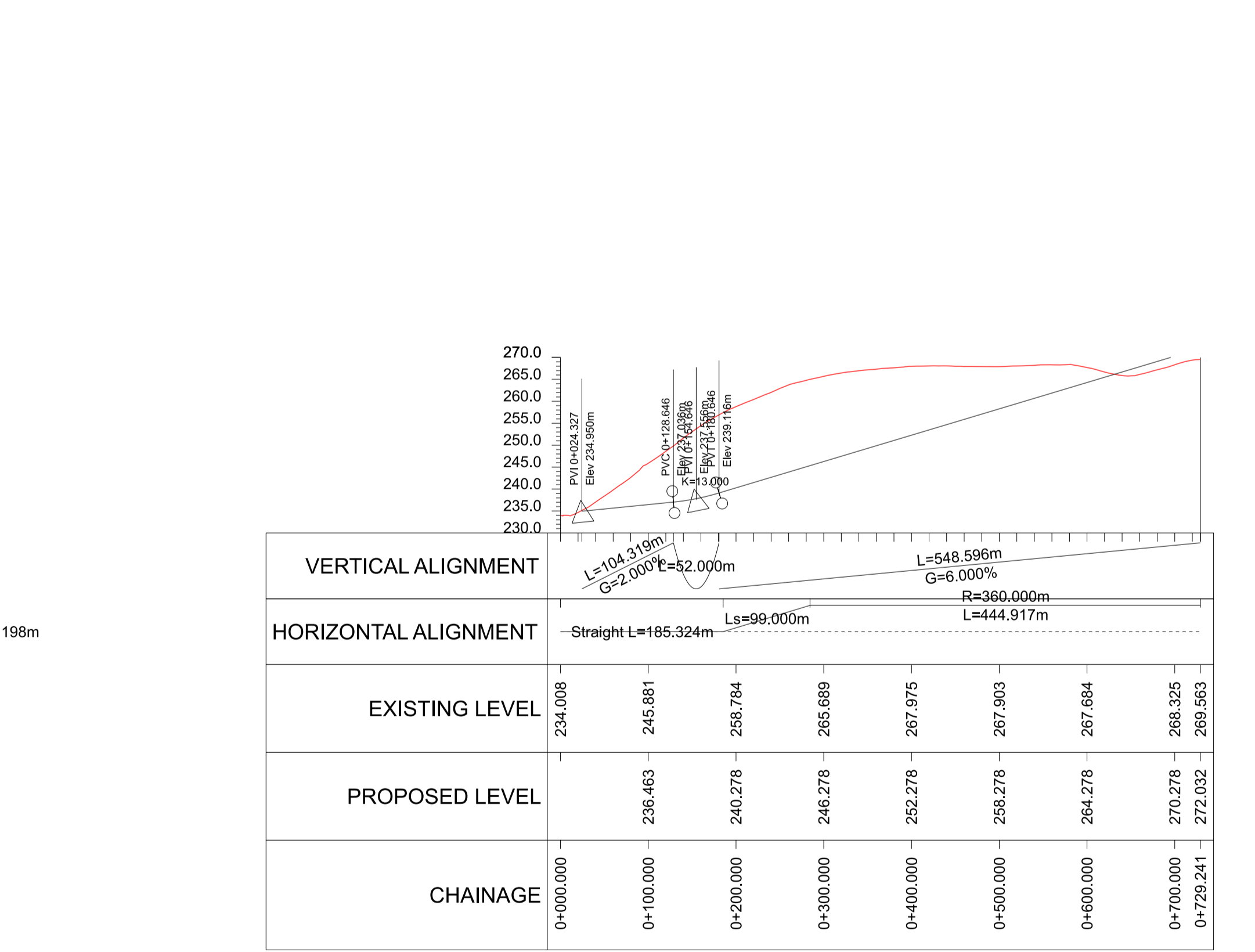
Table C-1 List of Drawings

Drawing Number	Report Table Heading	Rev
CCB Alternative Junction Layout	CCB Alternative Junction Layout, Sheet 1 of 2	P02
CCB Alternative Junction Layout	CCB Alternative Junction Layout, Sheet 2 of 2	P02

DO NOT SCALE



CCB ALTERNATIVE JUNCTION MAINLINE PROFILE
SCALE 1:5000H 1:250V



CCB ALTERNATIVE JUNCTION A436 PROFILE
SCALE 1:5000H 1:250V

VERTICAL ALIGNMENT	L=1400.000m G=7.000%		R=540.000m L=960.432m		L=1047.877m		L=878.552m G=1.242%																
HORIZONTAL ALIGNMENT	Ls=228.408m		L=26.578m		Ls=228.408m		Straight L=350.198m																
EXISTING LEVEL	191.352	202.583	231.150	232.865	235.613	237.370	245.413	258.703	267.746	271.779	271.358	272.673	273.133	276.232	276.677	277.028	275.486	279.156	277.118	280.632	279.634		
PROPOSED LEVEL	191.685	198.685	205.685	212.685	219.685	226.410	232.586	238.212	243.289	247.817	251.795	255.223	258.103	260.432	262.212	263.516	264.760	266.003	267.245	268.488	269.730	270.972	272.215
CHAINAGE	1+000.000	1+100.000	1+200.000	1+300.000	1+400.000	1+500.000	1+600.000	1+700.000	1+800.000	1+900.000	2+000.000	2+100.000	2+200.000	2+300.000	2+400.000	2+500.000	2+600.000	2+700.000	2+800.000	2+900.000	3+000.000	3+100.000	3+200.000

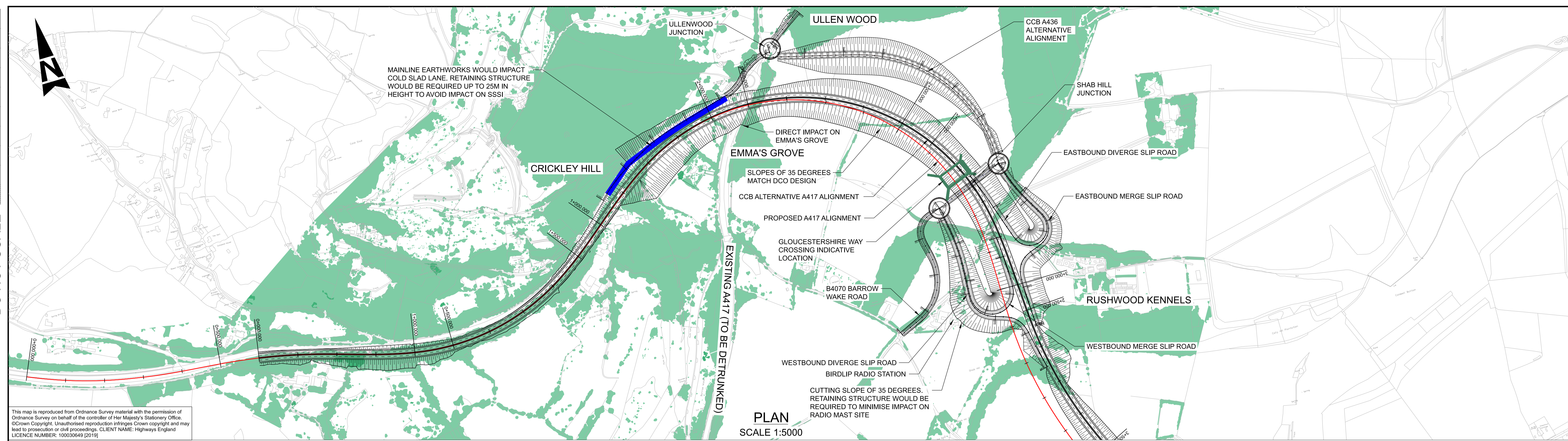
VERTICAL ALIGNMENT	L=104.319m G=2.000%		L=548.596m G=6.000%						
HORIZONTAL ALIGNMENT	Straight L=185.324m		Ls=99.000m						
EXISTING LEVEL	234.008	245.881	256.784	265.689	267.975	267.903	267.684	266.325	269.563
PROPOSED LEVEL	236.463	240.276	246.278	252.278	258.278	264.278	270.278	272.032	
CHAINAGE	0+000.000	0+100.000	0+200.000	0+300.000	0+400.000	0+500.000	0+600.000	0+700.000	0+729.241

NOTES
1. ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.
2. ONLY WRITTEN DIMENSIONS SHALL BE USED, DO NOT SCALE.

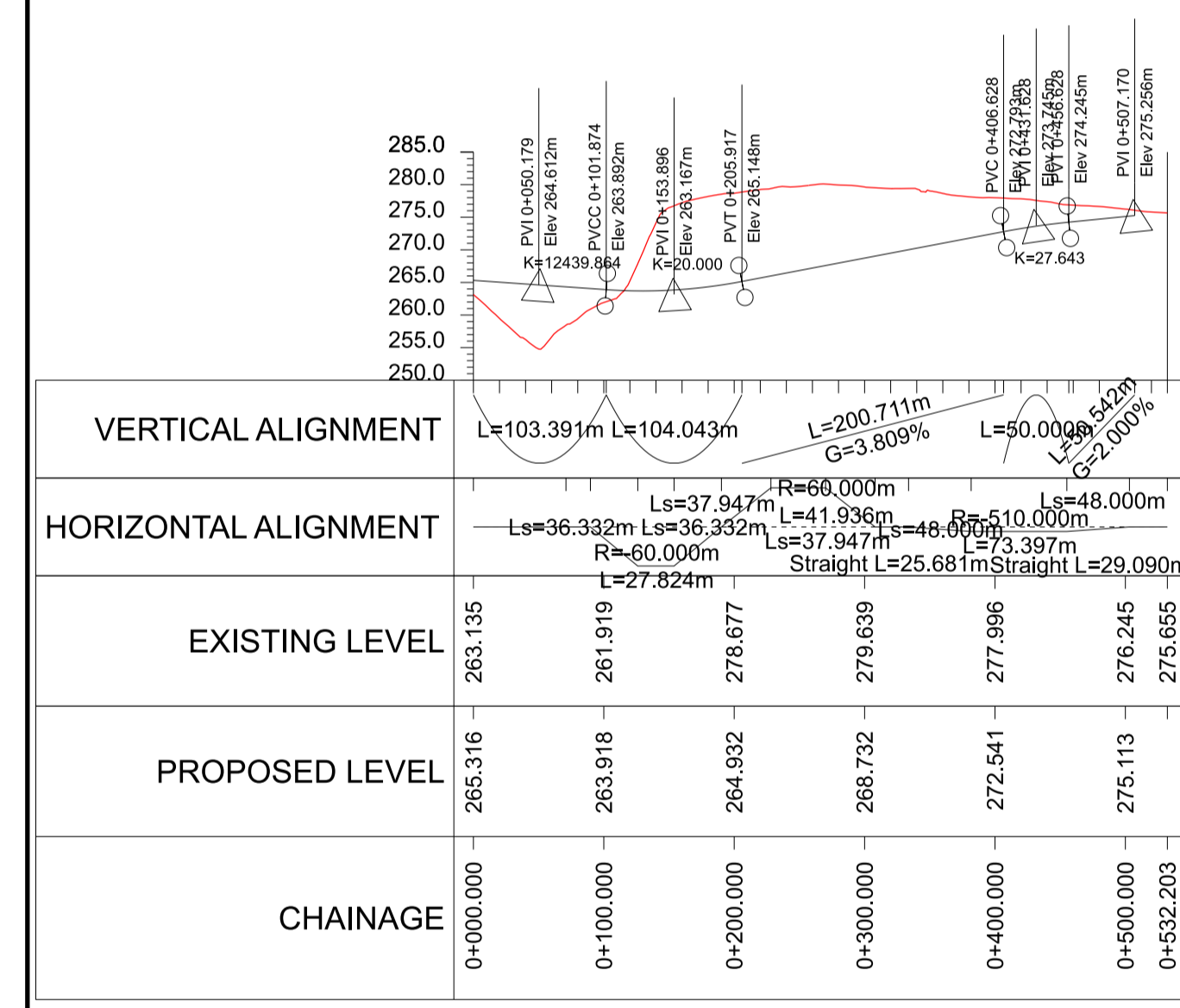
SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION			
IN ADDITION TO THE HAZARDS/RISKS NORMALLY ASSOCIATED WITH THE TYPES OF WORK DETAILED ON THIS DRAWING, NOTE THE FOLLOWING SIGNIFICANT RESIDUAL RISKS (REFERENCE SHALL ALSO BE MADE TO THE DESIGN HAZARD LOG).			
CONSTRUCTION			
NONE			
MAINTENANCE / CLEANING			
NONE			
USE			
NONE			
DECOMMISSIONING / DEMOLITION			
NONE			
Rev.	Date	Description	By Chk'd App'd Auth'd

Suitability	Drawing Status	Project Title			
S3	SUITABLE FOR REVIEW & COMMENT	A417 MISSING LINK			
		Drawing Title			
		CCB ALTERNATIVE JUNCTION ARRANGEMENT PLAN AND PROFILE SHEET 1 OF 2			
		Scale	By	Checked	Approved
		1:5000	DR	DA	CT
Client		Original Size	Date	Date	Date
		A1	30/07/21	30/07/21	30/07/21
		Drawing Number	Originator	Volume	Authorised
		HE551505 - A1	ARP	HGN	P02
		Location	Type	Role	Number
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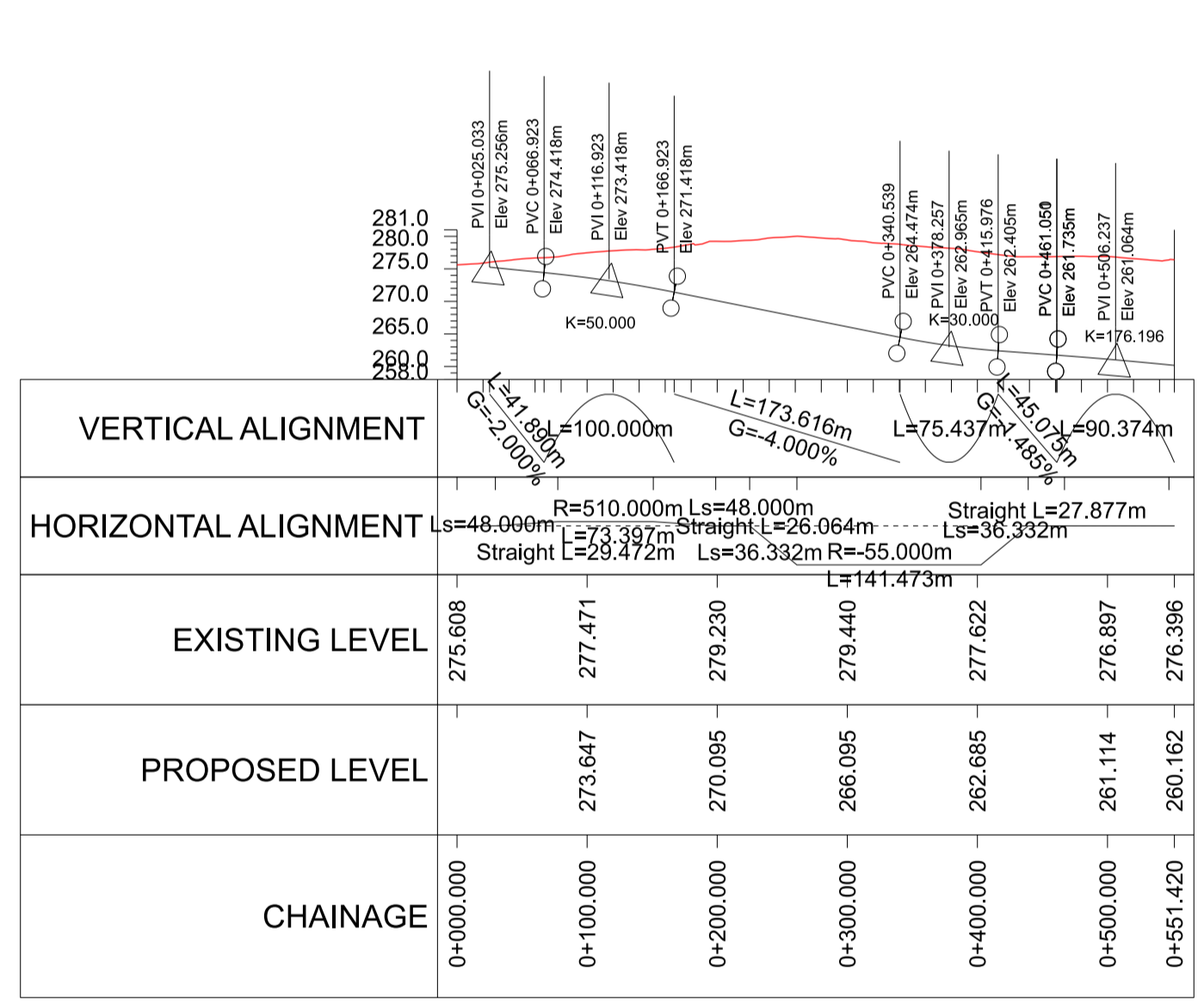
100
0 10
Millimetres
DO NOT SCALE



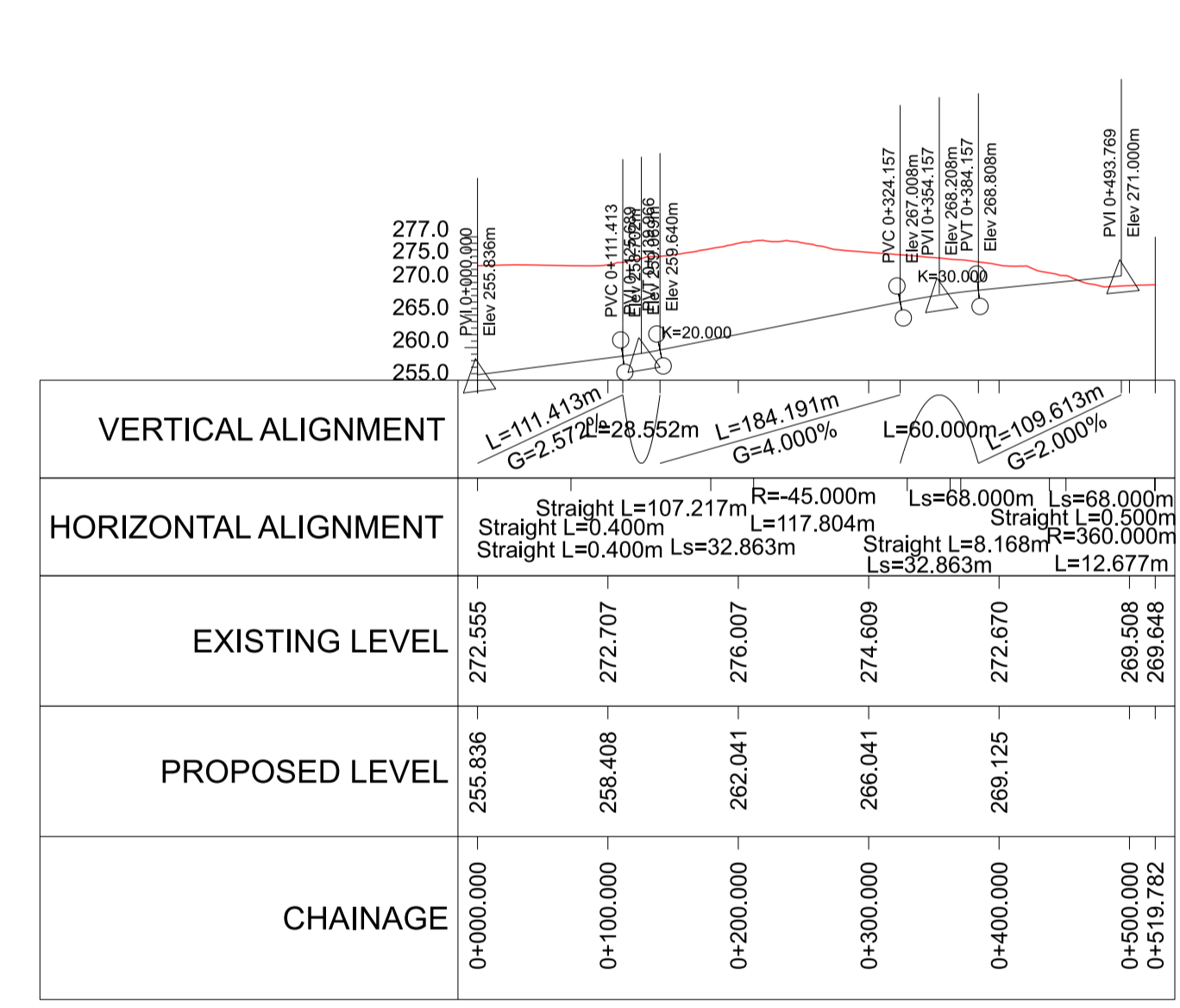
This map is reproduced from Ordnance Survey material with the permission of Ordnance Survey on behalf of the controller of Her Majesty's Stationery Office. Crown Copyright. Unauthorised reproduction infringes Crown copyright and may lead to prosecution or civil proceedings. CLIENT NAME: Highways England LICENCE NUMBER: 100030649 [2019]



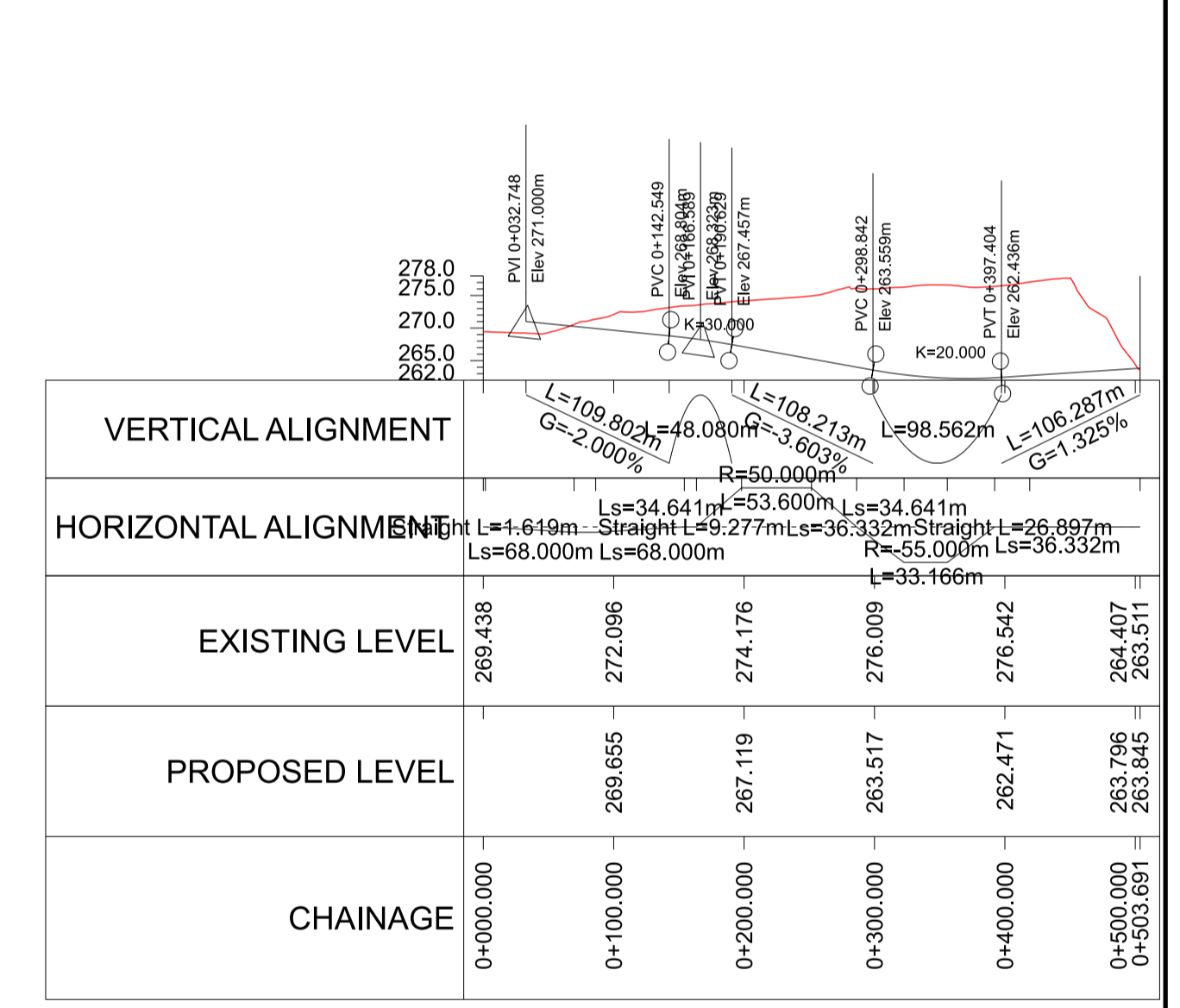
WESTBOUND DIVERGE SLIP ROAD PROFILE
SCALE 1:5000H 1:250V



WESTBOUND MERGE SLIP ROAD PROFILE
SCALE 1:5000H 1:250V



EASTBOUND DIVERGE SLIP ROAD PROFILE
SCALE 1:5000H 1:250V



EASTBOUND MERGE SLIP ROAD PROFILE
SCALE 1:5000H 1:250V

NOTES
1. ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.
2. ONLY WRITTEN DIMENSIONS SHALL BE USED, DO NOT SCALE.

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION

IN ADDITION TO THE HAZARDS/RISKS NORMALLY ASSOCIATED WITH THE TYPES OF WORK DETAILED ON THIS DRAWING, NOTE THE FOLLOWING SIGNIFICANT RESIDUAL RISKS (REFERENCE SHALL ALSO BE MADE TO THE DESIGN HAZARD LOG).

CONSTRUCTION	MAINTENANCE / CLEANING	USE	DECOMMISSIONING / DEMOLITION
NONE	NONE	NONE	NONE
P01	30/07/21	FOR INFORMATION	DR DA CT
P02	09/08/21	FOR INFORMATION	DR DA CT PB
Rev.	Date	Description	By Chk'd App'd Auth'd

Suitability Drawing Status
S3 SUITABLE FOR REVIEW & COMMENT

ARUP

highways
england

Project Title
A417 MISSING LINK

Drawing Title
CCB ALTERNATIVE JUNCTION ARRANGEMENT PLAN AND PROFILE SHEET 2 OF 2

Scale	By	Checked	Approved	Authorised
1:5000	DR	DA	CT	PB
Original Size	Date	Date	Date	Date
A1	30/07/21	30/07/21	30/07/21	09/08/21
Drawing Number	Originator	Volume	Revision	
HE551505 - ARP	HE PIN	HGN	P02	
X_XX_XXXX_X	-SK - C	-000098		
Location	Type	Role	Number	

Appendix D Letter from Cowley and Birdlip Parish Council

D.1 Letter from Cowley and Birdlip Parish Council objecting to CCB Birdlip Bypass Proposals

Cowley Parish Council

A417 Missing Link Team
Highways England
Temple Quay House
2 The Square
Temple Quay
Bristol BS1 6HA
For the attention of Michael Goddard

Cowley and Birdlip Parish Council
C/O Elaine Lavington – Clerk
Rose Cottage
Birdlip
GL4 8JL
Tel. 07941 258052
Email. coweypc@hotmail.co.uk

28th July 2019

Dear Michael

Re: 'Birdlip Relief Road Proposal'

Cowley and Birdlip Parish Council has received the A417 Missing Link Improvement Project Update dated 22nd July from the A417 Missing Link Team and we must advise you that we are extremely disappointed that you are giving consideration to the Birdlip Relief Road' idea, as proposed by the Cotswold Conservation Board, for inclusion in the scheme.

Overall we consider that the concept of the Birdlip Relief Road to be completely unnecessary as, in the context of the wider A417 Missing Link Scheme, the proposed Option 30 route will in itself become the 'Birdlip Relief Road' as it will deliver a significant reduction in vehicle congestion and rat running of traffic through Birdlip. Thus the proposal by the Cotswold Conservation Board will be an unnecessary waste of the funds within your already over pressurised budget.

Cowley and Birdlip Parish Council were first made aware of the proposal at a meeting we had with Nicholas Dummett of CPRE. This was presented using a pitch of 'Ridding Birdlip village of all but local traffic' and was described as a more environmentally friendly alternative to the 3 link road options which CPRE considered to be detrimental to the Cotswold AONB. Notwithstanding that the proposed Birdlip Relief Road would in itself traverse an arguably visually superior area of the AONB at the head of one of the 5 Stroud Valleys made famous by the author, Laurie Lee.

At the meeting we had with CPRE the Parish Council members made clear their overall horror with the proposal but, despite our protests, the Cotswold Conservation Board submitted (albeit late) their 3 Tunnel Proposals all containing the Birdlip Relief Road idea. Nevertheless we have examined in detail this proposal and, other than the photo shopped maps, we can see nothing other than a single line reference to the Birdlip Relief Road and no clear justification or statement as to its purpose.

The Parish Council has been approached by many local Birdlip villagers with many concerns with regard to the proposed relief road taken the assumption that the 3 alternative link roads would not be built and there would be no access to the relief road by traversing Birdlip High Street from West to East as obviously to do so would render the relief road superfluous and could increase the hazard of traffic passing the village school or the narrow road to Brimpsfield. All these concerns are contained in an appendix to this letter but we would like to highlight the following concerns:

1. The Birdlip Relief Road would split a historically mature, established and extremely vibrant community. We are surprised that you would consider this as we recall you stating that you would never consider splitting a community as a consequence of the A417 Missing Link scheme.
2. The principle aim of the relief road seems to be to divert traffic leaving the A417 and heading from Stroud away from Birdlip Village. However this will only serve to hasten the pressure on the narrow road network in the areas of Slad, Cranham, Painswick and Bisley. This simply moves the problem of traffic in Birdlip High Street further away which we believe is something that Highways England strive to avoid when developing infrastructure schemes. This is contrary to one of the principle aims of the A417 Missing Link scheme which is to encourage traffic to remain on the A417 and, in this case, to encourage road users to stay on the A417 and onto the M5 to access Stroud and surrounding areas.
3. Nearly all the Birdlip Villagers consulted raised a safety concern with the resultant increased use of the B4070 junction to Stroud at the top of Birdlip Hill. Traffic ascending Birdlip Hill will have to turn right to join the new relief road and traffic from Stroud will turn left to descend, with both actions not possible with two vehicles at the same time. This junction is extremely constrained in terms of any potential for improvement or modification. Any increased volume at this point would result in congestion in all three directions, again not curing the current problem of congestion in the village. Given that this proposal closes the current access route to the A417 this concern is compounded when you consider the effect of larger vehicles, farm traffic and emergency services plus the impact of the severe weather in winter given the altitude and the lack of any alternative routes.

We would welcome a chance to discuss this with you direct and we repeat our request for a meeting made in the emails from Deborah Lawrence on 20th June and my email of 8th July. Also I would welcome an explanation as to why such a major change to the Options 30 proposal is being considered by Highways England subsequent to both the Route Consultation and recently the EIA Scoping consultation. For the latter as a minimum I would expect a further round of consultation on the EIA scoping aspects should the Birdlip Relief Road need to be taken further.

Finally we sincerely hope that based on the details in this letter you abandon this ill-conceived proposal and do not include in the detailed design or the next round of consultation due this autumn

Yours sincerely

Julian Lavington

Julian Lavington

Chair to Cowley and Birdlip Parish Council

Cowley and Birdlip Parish Council

Appendix – Birdlip Relief Road Concerns from Local Residents

No.	Concern
1	Congestion because of back up on Stroud road to Birdlip will mean that the busy Royal George junction will result in traffic still using Birdlip high street and through Brimpsfield to the A417
2	Anti-Social sexual behavior at Barrow Wake/Shab Hill will increase as the view point will be more isolated
3	The new Birdlip Relief Road has not been consulted and included in the environmental scoping document
4	Segregating a well-established community been established 300 years plus
5	The traffic for local roads have a tortuous route which navigates the difficult Royal George junction safety issue and only Stroud traffic is bypassing Birdlip
6	Need to encourage Stroud traffic to use A417 and M5 not local roads
7	Pushes rat run traffic on to Painswick, Bisley, Cranham, and Sheepscombe
8	Road will encourage development east of Birdlip and next to new road
9	Will encourage lorries etc. to use local roads instead of using A417 and M5
10	The only access to the A417 for Stroud for Brockworth local traffic will be up Birdlip Hill and turning right at the Royal George on a dangerous junction that cannot be made safer due to the escarpment and listed buildings
11	Crosses Ermin Way which is a roman road and possible site of archaeological interest
12	At Royal George/B4070/Birdlip Hill junction traffic cannot term right and left at the same time
13	Emergency vehicles, delivery vehicles to Birdlip and Royal George and busses will all need to navigate Royal George junction from the A417
14	Weight limit at Royal George/Birdlip Hill junction is only 7.5 tonnes
15	Farmers accessing local area from A417 will have to use Royal George/Birdlip Hill junction
16	Cotswold way will be diluted by the new road and crossing Birdlip Hill
17	Business at end of Cirencester Road have not been considered

18	10 Houses and 2 businesses are effected
19	Access to sewage works at Birdlip has not been considered
20	Rushwood Kennels, business at radio station and other Barrow Wake/Shab Hill traffic will need to use Royal George/Birdlip Hill Junction
21	Increased noise, pollution and loss of green fields as a result of a new road
22	New road will start small then in 10 years will be a dual carriageway - where is the feasibility and long term route study?
23	If the relief road and the existing Brimpsfield lane become a cross roads junction, then Brockworth bound traffic from the A417 will turn right at this junction and go through Birdlip and head straight down Birdlip Hill avoiding the Stroud Road. Similarly, traffic from Brockworth to the A417 will also go through the main part of the village. Is the plan to divert Brimpsfield traffic to the Stroud Road and close the existing road to the village?
24	Under the proposal there will be only two roads into the Village. Stroud Road and Birdlip Hill at the George, and Brimpsfield Lane. None of these roads are suitable for heavy vehicles and negotiating the Royal George/Stroud junction would be extremely difficult for them. If the Existing Brimpsfield lane is closed we are reduced to one road into the village. In view of the difficulties in getting emergency vehicles into the village and the problems created by winter weather, one access road is just not viable
25	Isolating/cutting off part of village with double whammy of increasing proximity of new main relief road to 4 of these homes. (Pollution, noise, AONB?)
26	Relief road encourages Stroud access via Slad Road which is not sustainable (narrow and priority traffic calming in place already.)
27	Gold, Blue and Red options - very different to the proposed routes that went to public consultation. So have not been through Environmental Studies or consultation procedure. (As stated in letter response from Cotswold Conservation board)
28	Access to Ullenwood, Crickley Hill country park, and houses on Crickley Hill have not been considered, in fact appear to have been removed. This would mean potentially other new roads in the area would need to be considered - where existing roads could be used for local access only as A417 links already planned to be severed at Golden Hart and Air Balloon. (Money/cost of additional not yet considered roads, community, and opportunity for cycle use to link through to Cheltenham/Leckhampton??)
29	Centralised at junction originally indicated as solid black line on Route 30 map would encourage traffic away from Birdlip and link Birdlip to Cheltenham- due to new free flowing A417, without encouraging traffic down Birdlip Hill and up Shurdington Road, which would cause an increase in traffic would unlikely be sustainable. (New Large Housing development in Brockworth.)

30	Community access to the. brewery and use by dog walkers will be impeded
31	The new relief road shows a part of the existing A417 which is an accident blackspot with recent deaths. The community has been campaigning to close the existing A417 spine road as part of the A417 Missing Link design