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# 3.4 Environmental Statement Appendix 10.3 Landscape and Visual Study Area

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# Development Consent Order 202x

## 3.4 ENVIRONEMENTAL STATEMENT
## APPENDIX 10.3 LANDSCAPE AND VISUAL STUDY AREA

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# 10.3 Study Area

## 10.3.1 Introduction

10.3.1.1 This appendix sets out the process for determining the landscape and visual study area for the assessment of the Project.

10.3.1.2 In accordance with *Design Manual for Roads and Bridge (DMRB) LA 107 Landscape and visual effects (DMRB LA 107)* (Highways England, 2020)[1] and the *Guidelines for Landscape and Visual Impact Assessment, Third Edition (GLVIA3)* (Landscape Institute and Institute of Environmental Management and Assessment, 2013)[2], the purpose of the study area is to identify the geographic area across which significant landscape and visual effects have the potential to occur due to the Project.

10.3.1.3 Whilst the study area for the Project has been assessed holistically, the following sections set out the assessment of the study area for each of the Project's individual sections, as illustrated on Figure 10.3 Zone of Theoretical Visibility (ZTV 7km) and ES Figure 10.4 Zone of Theoretical Visibility (ZTV 3km) and Viewpoints. Whilst the theoretical visibility for the A1(M) Junction 53 Scotch Corner section is included within these Figures, this part of the Project was scoped out of the landscape and visual impact assessment (LVIA) due to the Project remaining within the existing highways boundary and proposing very minor modifications to lane markings and associated infrastructure; thereby negating the potential for significant landscape or visual effects. Therefore, there is no assessment narrative on the study area for the A1(M) Junction 53 Scotch Corner within this appendix.

10.3.1.4 As an overview of the process for determining the study area for each of the Project sections (and to avoid repetition) the following sections are set out based on the following stages:

- Stage 1: Generating Zones of Theoretical Visibility (ZTV) to compare the theoretical visibility of the Project road alignment (at 0m) with that of a 4.7metre (m) tall vehicle on the Project road alignment (4.7m) . With reference to Figure 10.3 Zone of Theoretical Visibility (ZTV 7km) the Stage 1 ZTVs extended 7km from the Project alignment. This distance was assessed as proportionate, as beyond 7km from the Project, professional judgement assessed that the distance, intervening features and existing context of the A66 would negate the potential for significant adverse landscape or visual effects. With reference to Appendix 10.8, which sets out the ZTV methodology, the Stage 1 ZTVs were based on the existing landform only and did not include existing vegetation or existing buildings. This was to accord with *DMRB LA 107* and *GLVIA3*, so that the ZTVs represent a 'bare-earth' model. Whilst the 'bare-earth' ZTV is 'unrealistic', in that it does

[1] Highways England (2020) Design Manual for Roads and Bridges LA 107 Landscape and Visual Effects
[2] Landscape Institute and Institute of Environmental Management and Assessment (2013) Guidelines for Landscape and Visual Impact Assessment, Third Edition

not model existing vegetation or buildings, it provides a 'worst-case' scenario and is a precautionary approach in the assessment of the study area and the likely extent of visibility. The Stage 1 ZTVs were derived from a Digital Terrain Model (DTM), using Light Detection and Ranging (LiDAR) data, which provided a three-dimensional representation of the landform, based upon a series of points every five metres ('5m DTM').

- Stage 2: Following the generation of the Stage 1 ZTVs and analysis of the landscape features across the geographic extent of the theoretical visibility was undertaken via initial desk-based reviews of published landscape character assessments, relevant studies, policies and fieldwork. This enabled the identification of relevant designations, key landscape features, recreation routes and publicly accessible areas. The purpose of the initial fieldwork was to review the Stage 1 ZTVs and to make on-site assessment of the likely visibility of the construction and operation phases of the Project. This allowed for the decision as to whether the study area should remain at 7km, or needed to be expanded or reduced, whilst remaining representative and proportionate to the Project. The fieldwork assessments on the potential impacts and effects used the same methodology as per the final Environmental Statement (ES) LVIA to ensure continuity, as well as being based on professional judgement.
- Stage 3: The Stage 2 work concluded that the 7km study could be reduced to 3km for the assessment overall, with some visual receptor locations retained beyond 3km in response to Stakeholder requests. With reference to Zone of Theoretical Visibility (ZTV 3km) and Viewpoints, the ZTVs from Stage 1 were revised across the smaller 3km study area by including existing woodland and buildings derived from a 2m Digital Surface Model (DSM), i.e. a series of points every 2m ('2m DSM'). By undertaking a more refined analysis in comparison to the 7km ZTVs which used a 5m DTM, the 2m DSM modelling enabled a more focused analysis in a revised comparison between the theoretical visibility of the Project with vehicles, in comparison to the existing A66 with vehicles, so as to inform the subsequent fieldwork to a greater degree than the initial fieldwork undertaken for the 7km ZTVs.
- Stage 4: Following the above stages, a conclusion on the visual areas of search across the 3km was made to inform the subsequent fieldwork and the final selection of visual receptors, viewpoints and photomontages for the ES LVIA. This stage also included retaining the locations beyond 3km as requested by Stakeholders.

10.3.1.5 The following sections should be read in combination with ES Figure 10.3: Zone of Theoretical Visibility (ZTV 7km) (Application Document 3.3) which illustrates the 7km DTM modelling and Figure 10.4: Zone of Theoretical Visibility (ZTV 3km) and Viewpoints, which illustrate the 3km DSM modelling.

### 10.3.2 M6 Junction 40 to Kemplay Bank

10.3.2.1 With reference to Figure 10.3: Zone of Theoretical Visibility (ZTV 7km), M6 Junction 40 to Kemplay Bank is located to the south of Penrith. The Order Limits extend across the southern edge of Penrith in the north, situated between 160 metres (m) Above Ordnance Datum (AOD) and 130m AOD, and the River Eamont in the south, which flows across the landscape between 150m AOD and 130m AOD.

10.3.2.2 To the north of Penrith, the landform is undulating across the northern part of the study area, rising steeply across Beacon Hill and Great Blendow, whilst remaining low lying adjacent to the course of River Petteril.

10.3.2.3 Across the eastern part of the study area the landform is similarly undulating, rising from the planting of River Eamont and the River Eden, to form elevated land across Whinfell Hill and Edenhall.

10.3.2.4 In addition to the River Eamont, there are numerous watercourses flowing across the southern part of the study area, including the River Leith and the River Lowther. These secondary watercourses form a complex pattern of undulating landform and narrow valley systems across the landform which generally rises in elevation above 300m AOD southwards from the River Eamont, across Askham Fell, within the Lake District National Park and World Heritage Site (WHS).

10.3.2.5 Across the western part of the study area the pattern of landform remains undulating, falling from Penrith before rising towards Newbiggin, at 230m AOD and elevated land at Greystoke.

#### Stage 1: 7km ZTVs comparing the theoretical visibility of the Project road alignment with that of vehicles

#### 7km ZTV Project road alignment

10.3.2.6 With reference to ES Figure 10.3: Zone of Theoretical Visibility (ZTV 7km) (Application Document 3.3), across the northern part of the study area, the theoretical visibility of the Project road alignment extends adjacent to the M6 and A66 before becoming more intermittent across the southern part of Penrith. The theoretical visibility increases across rising land in the northern part of Penrith and across Beacon Hill. There is theoretical visibility to the north-west of Penrith, across rising land towards Newton Reigny. Across land to the immediate north of Penrith, the theoretical visibility is limited extent, with substantial areas of 'no' visibility.

10.3.2.7 Across the eastern part of the 7km study area, the theoretical visibility is similarly concentrated to within close proximity to the north of the Project road alignment and the plains of the River Eamont, due to the rising and more elevated land which extends eastwards from Penrith, across Whinsfield to Edenhall. There is also theoretical visibility across elevated land between the River Eamont and the A686, as well as at Edenhall, around Skirwith and towards the edge of the 7km study area.

10.3.2.8 To the south of the Project alignment, the theoretical visibility extends consistently to the south of the Project and to the south-east edge of the 7km study area. The theoretical visibility extends more intermittently across the rising land within the Lake District, being aligned to the river valleys, such that the theoretical visibility across the National Park is concentrated across elevated areas of landform, whilst the lower lying areas of the National Park are not covered by the ZTV.

10.3.2.9 Across the western part of the 7km study area, the theoretical visibility is concentrated to within close proximity of the Project road alignment and elevated land between Newbiggin and Stainton, as well as to the north of Newbiggin and across elevated land on the alignment of the B5288. The ZTV demonstrates that there is not theoretical visibility across the western edges of the 7km study area, except for around Great Blencow.

## 7km ZTV Project alignment with vehicles

10.3.2.10 With reference to ES Figure 10.3: Zone of Theoretical Visibility (ZTV 7km) (Application Document 3.3), the theoretical visibility of vehicles on the proposed Project reflects that of vehicles on the Project road alignment overall.

10.3.2.11 There is some additional theoretical visibility across the southern parts of Penrith, as well as across the more elevated northern parts of Penrith and to the west of Beacon Hill. The most notable area of additional visibility is around Catterlen, which is situated in an elevated position at around 180m AOD.

10.3.2.12 The theoretical visibility also mirrors that of the Project road alignment across the eastern part of the study area, as well as towards the edge of the 7km study area at Skirwith, with only very localised additional visibility from vehicles at Whinsfield.

10.3.2.13 The elevated land across the southern part of the 7km study area results in the theoretical visibility of vehicles on the proposed Project extending to the edge of the 7km study area, whilst being closely aligned to the river valleys, like the theoretical visibility of the road alignment. There is minor additional theoretical visibility within the National Park, at Soulby and Newtown. There is also additional theoretical visibility to the south of the Project, between the existing A66 and Sockbridge.

10.3.2.14 Across the western part of the 7km study area, the theoretical visibility of vehicles on the Project is mirrors that of the Project road alignment, with no areas of additional theoretical visibility within the 7km study area.

## Stage 2: Initial desk-based review and fieldwork of 7km area

10.3.2.15 The Stage 1 ZTVs demonstrated that the theoretical visibility of the Project road alignment and with vehicles would extend across rolling farmland to the north of Penrith, Beacon Hill, the River Eamont river corridor and the uplands of the Lake District National Park and World Heritage Site (WHS).

10.3.2.16 The ZTVs also demonstrated theoretical visibility from National Cycle Network (NCN) no.7 and no.71, to the north and east of Penrith respectively, including Wetheriggs Country park. Theoretical visibility was also suggested from numerous Public Rights of Way (PRoW) across the study area, and parts of Dalemain Registered Park and Garden (RPG) in the western part of the study area and Lowther Castle RPG in the southern part of the study area. Other heritage assets included Mayburgh Henge Scheduled Monument.

10.3.2.17 The initial fieldwork confirmed that the Project road alignment and vehicles would be visible from within close proximity to the existing A66 from locations to the immediate north of the Order Limits, although not to the extent suggested by the ZTV due to intervening vegetation and buildings. Contrary to the ZTV, the Project would not be visible from across the northern part of Penrith to the same extent, due to the density of buildings. The Project would be visible from parts of Beacon Hill, although views were filtered by the density of the intervening vegetation. The Project would not be visible from beyond 3km to the north of the alignment due to the combination of the intervening undulating landform and vegetation patterns.

10.3.2.18 From the east, the fieldwork confirmed that the Project would be visible from close range locations, including from parts of Wetheriggs Country Park due to the intermittent roadside vegetation and along the River Eamont corridor. However, in contrast to the theoretical visibility, the vegetation patterns reduced views from the valley sides and the localised ridgeline to the immediate east of the River Eden, which rises up to 152m AOD screened potential views of the Project from the remainder of the study area, beyond 3km.

10.3.2.19 From the southern parts of the study area, the visibility of the Project would be less than indicated by the ZTVs due to the density of the intervening vegetation. The flatter landform to the south of the River Eamont did enable views of the Order Limits from around Sockbridge, due to the alignment of the existing A66 being in a slightly elevated position. However, from within the Lake District National Park and WHS, the potential for views of the Project was reduced by the intervening vegetation and distance, such that whilst the ZTV indicated theoretical visibility, professional judgement determined that there would not be the potential for significant adverse effects.

10.3.2.20 From the western part of the study area, the density of the roadside vegetation and the localised changes in landform negated potential views of the Project from beyond Redhills. The distance from the Project also negated the potential for significant adverse effects from Stainton, Newbiggin and the edge of the Lake District National Park and WHS

## Stage 3: 3km ZTVs to inform fieldwork and the identification of visual receptors

### 3km ZTV

10.3.2.21 ES Figure 10.4: Zone of Theoretical Visibility (ZTV 3km) and Viewpoints (Application Document 3.3) demonstrates that across the northern part of the study area, the Project with vehicles would be visible from the southern edge of Penrith, intermittently across Penrith before being concentrated across the southern edge of Beacon Hill, like the existing A66 with vehicles. The ZTV demonstrates 'new' visibility of the Project from within close proximity to the existing A66 and M6 roundabout and at the northern edge of the 3km study area, adjacent to Salkeld Road.

10.3.2.22 Across the eastern part of the study area, the theoretical visibility of the Project with vehicles extends intermittently across a narrow tract of elevated land to the edge of the 3km study area. There is 'new' visibility of the Project adjacent to the River Eamont, extending between Frenchfield Farm, the sewage work and Honeypot, as well as elevated land at Whinsfield.

10.3.2.23 Across the southern part of the 3km study area, the theoretical visibility is concentrated to the south of Penrith, extending across the M6 to Yanwath, with very localised areas of 'new' visibility in proximity to the motorway and Yanwath. The theoretical visibility then remains consistent across elevated land between Clifton Dykes and Stockbridge, extending to the edge of the 3km study area and land within the National Park and WHS.

10.3.2.24 Across the western part of the study area, ES Figure 10.4: Zone of Theoretical Visibility (ZTV 3km) and Viewpoints (Application Document 3.3) demonstrates that the theoretical visibility is far less in comparison to the remainder of the 3km study area. There is a narrow tract of theoretical visibility extending between Newton Rigg and the River Eamont, which also includes consistent areas of 'new' visibility. There is some very localised and small scale theoretical visibility and 'new' visibility at the edge of the 3km study area, around Hoghouse Hill and Stainton.

## Stage 4: Conclusion of study area for assessment

10.3.2.25 From the above stages, the 3km study area for the assessment of landscape and visual effects for M6 Junction 40 to Kemplay Bank was considered to be proportionate to identify the likely significant landscape and visual effects.

10.3.2.26 This was due to the buildings across Penrith and elevated land across Beacon Hill negating views of the Project from beyond 3km to the north of the Order Limits.

10.3.2.27 Similarly, the local ridgelines across the undulating landform to the east of Order Limits negated views of the Project from beyond 3km.

10.3.2.28 To the south of the Order Limits the rising landform did enable views from beyond 3km, but the combination of distance and intervening vegetation was assessed as negating the potential for significant adverse effects.

10.3.2.29 This included scoping out views from the National Park and WHS due to the distance and that the composition of the existing views already included the A66.

10.3.2.30 From the west of the study area, the roadside vegetation and undulating landform negated views of the Project from beyond the Order Limits, with the composition of views already including the A66.

10.3.2.31 Within the 3km study area, the final area for the assessment of visual receptors was focused upon:

- 2.5km to the north of the Project, to cover rising land across Penrith and the ridgeline across Beacon Hill.
- 0.5km to the east of the Project, to cover the plains of the River Eamont.
- 2.5km to the south of the Project, to cover rising land across Askham Fell.
- 0.2km to the west of the Project, to cover the road corridor and the immediate land uses.

### 10.3.3 Penrith to Temple Sowerby

10.3.3.1 With reference to ES Figure 10.3: Zone of Theoretical Visibility (ZTV 7km) (Application Document 3.3). The Penrith to Temple Sowerby part of the Project is located to the east of Penrith, at the transition between the valley formed by the Rivers Eden.

10.3.3.2 The Order Limits extend to the north and south of the existing A66, including to parts of the River Eamont to the north and the lower slopes of Whinfell Hill to the south.

10.3.3.3 The existing A66 extends across the valley side to the south of the River Eamont and River Eden, such that the Order Limits are situated between 130m AOD and 140m AOD.

10.3.3.4 To the north of the Order Limits, the landform falls towards the River Eamont, which flows across the landscape at approximately 120m AOD. To the north of the river, the landform rises, to form a series of undulating localised high points and a tract of elevated land between Penrith and the River Eden, extending up to 160m AOD.

10.3.3.5 To the east of the Order Limits, there is a complex pattern of landform due to several watercourses and their associated valley systems. The landform falls from the Order Limits towards the River Eden, then rises across Temple Sowerby, which is situated around 115m AOD, forming part of a localised ridgeline which extends to Kirkby Thore, similarly situated at around 115m AOD. The landform falls to the north and south of these villages, due to the watercourses, before rising across Newbiggin Moor and Hill Top.

10.3.3.6 To the south of the Order Limits, the landform rises across Whinfell Hill, extending up to 200m AOD, before falling towards the River Leith, situated at 125m AOD. Center Parcs is situated across this falling landform, on the southern slopes of Whinfell Hill. To the south of the River Leith, the landform rises across Windrigg Hill, extending above 300m AOD, to cover land within the Lake District National Park and WHS.

10.3.3.7 To the west of the Order Limits, the landform is undulating across the plains of the River Eamont, before rising gradually across Penrith and land within the Lake District National Park and WHS.

## Stage 1: 7km ZTVs comparing the theoretical visibility of the Project road alignment with that of vehicles

## 7km ZTV Project road alignment

10.3.3.8 ES Figure10.3: Zone of Theoretical Visibility (ZTV 7km) (Application Document 3.3) demonstrates that across the northern part of the study area, the theoretical visibility of the Project road alignment extends consistently across the plains and valley sides of the River Eamont, before becoming concentrated to the upper parts of the valley sides of the River Eden, extending to Langwathby and Inglewood Bank, at the edges of the 7km study area.

10.3.3.9 Across the eastern part of the 7km study area, ES Figure 10.3: Zone of Theoretical Visibility (ZTV 7km) (Application Document 3.3) demonstrates that the theoretical visibility extends across the undulating landform to the eastern side of the River Eden, before reducing across lower lying land. The theoretical visibility is then consistent across elevated land between Milburn and the extent of the 7km study area, forming the lower slopes of Great Dun Fell and the edges of the North Pennines Area of Outstanding Natural Beauty.

10.3.3.10 Across the southern parts of the study area the theoretical visibility of the Project road alignment is consistent to the south of the Project, before becoming more intermittent across the south-east part of the study area due to the elevated landform across Whinfell Hill which reduces the visibility across the remainder of the study area. The theoretical visibility does extend across the south-west part of the study area, due to elevated landform around Lowther and across parts of the Lake District National Park and WHS.

10.3.3.11 Across the western part of the 7km study area, ES Figure 10.3: Zone of Theoretical Visibility (ZTV 7km) (Application Document 3.3) demonstrates that the theoretical visibility of the Project road alignment extends consistently to the edge of Penrith and across elevated land between Penrith and Newbiggin, as well as in proximity to Newton Reigny, to the west of Penrith. To the north-west of Penrith there are substantial areas of 'no' theoretical visibility.

## 7km ZTV Project alignment with vehicles

10.3.3.12 In respect of the proposed Project alignment with vehicles, ES Figure 10.3: Zone of Theoretical Visibility (ZTV 7km) (Application Document 3.3) demonstrates that the theoretical visibility reflects that of the Project road alignment across the northern part of the study area overall. There is additional visibility at Inglewood Bank and Langwathby towards the edge of the 7km study area, at Whinsfield to the east of Penrith and in locally in proximity to the Project.

10.3.3.13 The theoretical visibility of vehicles also mirrors that of the Project road alignment across the eastern part of the study area overall, covering land between Temple Sowerby and Kirkby Thore, as well as the lower slopes of Great Dun Fell. There is additional theoretical visibility across the elecated sides of the River Efen Valley and the rising land towards the AONB, although this additional theoretical visibility is consolidated to areas of visibility relating to the Project road alignment only.

10.3.3.14 Across the southern part of the study area, ES Figure 10.3: Zone of Theoretical Visibility (ZTV 7km) ) (Application Document 3.3)demonstrates that like the Project road alignment, the theoretical visibility remains to the extent of the 7km study area and within parts of the National Park and WHS. There is additional theoretical visibility between Eamont Bridge and Clifton, as well as at Great Strickland. Like the theoretical visibility of the Project road alignment only, the theoretical visibility is reduced across the southern part of the study area by elevated landform at Whinfell Hill.

10.3.3.15 Across the western part of the study area, the theoretical visibility of the Project with vehicles mirrors that of the Project road only. There is very small increase in the extent of theoretical visibility of vehicles on the Project road alignment around Newton Reigny, but overall the theoretical visibility remains aligned with that of the Project road alignment.

## Stage 2: Initial desk-based review and fieldwork of the 7km study area

10.3.3.16 The Stage 1 ZTVs demonstrated that the theoretical visibility of the Project would extend across the River Eamont river corridor, to Penrith and elevated land extending adjacent to the River Eden. The theoretical visibility would also extend to the uplands of the Lake District National Park and WHS.

10.3.3.17 The ZTV also demonstrated theoretical visibility from Lowther Castle RPG in the southern part of the study area. Other heritage assets included Brougham Castle Scheduled Monument. There are few PRoW across the study area, but the theoretical visibility covered routes between the existing A66 and the River Eamont, as well as part of NCN no.70.

10.3.3.18 The fieldwork confirmed the theoretical visibility to the north of the Project, with views of vehicles on the existing A66 from the lower lying plains of the River Eamont. However, the extent of visibility was less

than that suggested by the ZTV due to the roadside hedgerows and intervening vegetation. The Project would also be visible from the elevated valley sides adjacent to the River Eden, including from near Culgaith. However, unlike the ZTV, views would be negated from the north of the River Eamont, due to the elevated and undulating landform, in combination with the woodlands around Whinsfield and Edenhall. There were also no PRoWs to the north of the River Eamont, such that recreational receptors would not be present in this part of the landscape. Similarly, to the north of Edenhall and beyond 3km from the Order Limits, the existing A66 was not visible and therefore the Project would not be visible..

10.3.3.19 From the eastern parts of the 7km study area, the potential visibility of the Project was far less than indicated by the ZTV. This was due to the vegetation patterns across the plains of the River Eden, in combination with the relatively low lying position of settlements, such as Temple Sowerby and recreational routes across the plains. The density of roadside vegetation adjacent to the land across the more elevated land within the eastern part of the study area also negated views, particularly around Milburn and across Cross Fell.

10.3.3.20 From the south of the study area, the density and height of woodland across Whinfell Hill screened views of the existing A66 and therefore the Project from the south-east part of the study area, confirming the ZTVs. The existing vegetation also largely screened views of the existing A66, and therefore the Project, from between the existing A66 and Whinfell Hill, such that similarly the visibility was less than indicated by the ZTV.

10.3.3.21 From the south-west part of the study area, the extent of visibility was substantially reduced by the intervening vegetation and the more localised undulating landform in comparison to the ZTVs. From between the 6km to 7km distances from the Project, including within the Lake District National Park and WHS, the Project was at such distance that professional judgement determined that there would not be significant adverse effects and the area was scoped out of the assessment.

10.3.3.22 From the western part of the study area, the fieldwork confirmed the ZTV, with views of the Project from elevated parts of Penrith, but from the west of the city, neither the Project nor the existing A66 were visible. From beyond 1km of the existing A66, the visibility of the Project was less than suggested by the ZTV due to the intervening vegetation and from Penrith the distance to the Project was assessed as negating the potential for significant adverse effects, due to the composition of the view already consisting of vehicles and road infrastructure..

## Stage 3: 3km ZTVs to inform fieldwork and the identification of visual receptors

10.3.3.23 3km ZTV With reference to ES Figure 10.4: Zone of Theoretical Visibility (ZTV 3km) and Viewpoints (Application Document 3.3), to the north of the Project, the theoretical visibility extends consistently towards the River Eamont, before becoming more intermittent across the eastern

edge of Penrith and between Beacon Hill and Slatequarry Wood. ES Figure 10. 4: Zone of Theoretical Visibility (ZTV 3km) and Viewpoints (Application Document 3.3) indicates 'new' areas of visibility adjacent to the River Eamont, extending between Frenchfield Farm and Winderwatch. There is also 'new' localised visibility adjacent to the A686, between Penrith and the edge of the 3km study area. There is far more limited theoretical visibility between the A686 and the River Eden, due to the density of the intervening woodland.

10.3.3.24 Across the eastern part of the study area, ES Figure 10. 4: Zone of Theoretical Visibility (ZTV 3km) and Viewpoints (Application Document 3.3) demonstrates that the theoretical visibility is limited in proximity to the River Eden and towards Temple Sowerby. There is theoretical visibility from more elevated land around Culgaith and 'new' visibility to the north of Temple Sowerby.

10.3.3.25 In relation to the southern part of the study area, ES Figure 10.4: Zone of Theoretical Visibility (ZTV 3km) and Viewpoints (Application Document 3.3) demonstrates that the theoretical visibility is concentrated between the existing A66 and the northern slopes of Whinfell Hill, with the density of the woodland and rising landform reducing the theoretical visibility to the south of the hill. There are several areas of 'new' visibility between the existing A66 and Whinfell Hill, extending to Ash Hill, which forms the western bank of the River Eden. The theoretical visibility extends to the south-west edge of the study area, although the extent of visibility is more intermittent, being concentrated to the north of Clifton. ES Figure 10. 4: Zone of Theoretical Visibility (ZTV 3km) and Viewpoints (Application Document 3.3) also demonstrates that this south-west part of the study area also includes 'new' visibility between Whinfell Hill and Clifton.

10.3.3.26 Across the western part of the study area, the theoretical visibility is concentrated adjacent to the existing A66 and between the southern edge of Penrith and Yanwath. There is localised 'new' visibility in proximity to the M6 and A66 roundabout, but the theoretical visibility across the remainder of Penrith is very limited.

## Stage 4: Conclusion of study area for assessment

10.3.3.27 From the above stages, the 3km study area for the assessment of landscape and visual effects for Penrith to Temple Sowerby was considered to be proportionate to identify the likely significant landscape and visual effects.

10.3.3.28 This was due to elevated and wooded land between Beacon Hill and the River Eden negating views of the Project from beyond 3km to the north of the Order Limits.

10.3.3.29 Similarly, the local ridgelines across the undulating landform to the east of Order Limits, including across the eastern side of the River Eden, negated views and likely significant adverse effects of the Project from beyond 3km from the east.

10.3.3.30 To the south of the Order Limits the rising landform across Whinfell Hill substantially reduced the visibility from across the south-east part of the study area. From across the south-west part of the study area, the combination of distance and intervening vegetation negated the potential for significant adverse effects from the National Park and WHS.

10.3.3.31 The ZTVs demonstrates theoretical visibility from across Clifton Dykes and Clifton, but from the fieldwork, from beyond these areas, the distance and existing context of vehicles on the A66 were assessed as negating the potential for significant adverse effects.

10.3.3.32 From the west of the study area, the roadside vegetation and undulating landform negated views of the Project from beyond the eastern edge of Penrith.

10.3.3.33 Within the 3km study area, the final area for the assessment of visual receptors was focused upon:

- 0.5km to the north of the Project, to cover land falling towards the River Eamont.
- 2km to the east of the Project, to cover elevated land around Culgaith.
- 2km to the south of the Project, to cover land around Clifton Dykes.
- 0.2km to the west of the Project, to cover the plains of the River Eamont.

### 10.3.4 Temple Sowerby to Appleby

10.3.4.1 Temple Sowerby to Appleby is situated within a broad valley, formed by the River Eden, which flows across the central part of the study area, from the south of Temple Sowerby to the centre of Appleby, and situated between 90m AOD and 110m AOD.

10.3.4.2 To the north of the River Eden, the pattern of landform is varied, rising gradually across Temple Sowerby and Kirkby Thore, situated at around 115m AOD, whilst rising steeply to the north of Appleby, to form a localised ridgeline at around 155m AOD. From this ridgeline, the landform then falls towards the Route Beck and Long Marton. The landform then continues to rise across all of the northern part of the study area, between the settlements of Milburn, Dufton, Newbiggin and Marton Moor, extending up to 187m AOD. This elevated landform is incised by numerous small rivers ('becks'), which create localised variation in the landform via areas of steeply sided valleys. To the north of these settlements the landform rises very steeply to across Cross Fell, to form an elevated ridgeline with a number of individual peaks, including Grumpy Hill at 412m AOD and Dufton Pike at 481m AOD.

10.3.4.3 Across the eastern part of the study area, the landform rises steeply from the River Eden, extending up to 500m AOD across the lower slopes of Burton Fell, to the east of Hilton and 184m AOD across Strutforth Hill, to the south of Warcop.

10.3.4.4 Across the southern part of the study area, the landform rises gradually from the River Eden, to form an undulating landscape at around 180m AOD, before falling towards numerous watercourses, including the River Lyvennet. From the River Lyvennet, the landform then rises across to Newby, at 180m AOD and up to 292m AOD across Maulds Meaburn Moor, to the south of Appleby.

10.3.4.5 The western part of the study area is characterised by rising landform to the west of the River Eden, including across Slate Hill and Whinfell Hill, which extends up to 210m AOD, before falling towards the River Eamont and the River Leith.

## Stage 1: 7km ZTVs comparing the theoretical visibility of the Project road alignment with that of vehicles

## 7km ZTV Project road alignment

10.3.4.6 ES Figure 10.3: Zone of Theoretical Visibility (ZTV 7km) (Application Document 3.3) demonstrates that the theoretical visibility of the Project road alignment extends across the rising and elevated land within 3km to the north of the Project, between Kirkby Thore, Long Marton and Brampton. Within the valleys and lower lying land adjacent to the watercourses are localised areas of 'no' visibility. The theoretical visibility to the north of Appleby is also far less in comparison to that within the 3km distance from the Project road alignment. Beyond 3km from the Project alignment, the theoretical visibility extends to the north of Milburn and Knock, across the slopes of rising land within the North Pennines AONB, covering elevated land across Knock Pike and Dufton Pike, whilst there is 'no' theoretical visibility from within the valleys.

10.3.4.7 Across the eastern part of the 7km study area, Figure 10.3: Zone of Theoretical Visibility (ZTV 7km) demonstrates that the theoretical visibility is very limited between Hilton and Great Ormside, due to the lower lying valley and valley sides. There is theoretical visibility across more elevated land to the north of Hilton, across Little Fell and to the south of Great Ormside, extending to the edge of the 7km study area.

10.3.4.8 ES Figure 10.3: Zone of Theoretical Visibility (ZTV 7km) (Application Document 3.3) demonstrates that across the southern part of the study area, the theoretical visibility covers most of the valley floor and rising valley sides within a 3km distance of the Project. Between the 3km and 7km distances the theoretical visibility is more intermittent, being concentrated around Kings Meaburn, Morland and Newby, but extends to the edge of the 7km study area at Sleagill, including across Maulds Meaburn and parts of the Yorkshire Dales National Park.

10.3.4.9 Across the western part of the 7km study area, the theoretical visibility of the Project road alignment extends across slopes and summit of Whinfell Hill, intermittently across the elevated ridgeline of the River Eden valley, around Culgaith and across the rising land around Newby. There is also theoretical visibility between Temple Sowerby and around Melkinthorpe.

## 7km ZTV Project alignment with vehicles

10.3.4.10 ES Figure 10.3: Zone of Theoretical Visibility (ZTV 7km) (Application Document 3.3) demonstrates that there is additional theoretical visibility of vehicles on the Project alignment between Temple Sowerby, Kirkby Thore, Long Marton and Brampton, due to the re-alignment of the road. This additional theoretical visibility of vehicles on the Project also extends between the 3km to 7km parts of the study area, including around Milburn and Knock. The visibility across the more elevated land at the 7km boundary of the study area remains as per the ZTV for the theoretical visibility of Project road alignment only.

10.3.4.11 Across the eastern part of the study area, there is localised additional theoretical visibility from vehicles on the Project alignment to the east of Appleby and along the valley floor in comparison to theoretical visibility of the Project road alignment. However, overall there is very limited theoretical visibility from across the valley floor. The theoretical visibility from the north of Hilton and to the south of Sandford is slightly greater than that of Project road alignment only, although the theoretical visibility remains extending to the 7km boundary of the study area.

10.3.4.12 From across the southern part of the study area, ES Figure 10.3: Zone of Theoretical Visibility (ZTV 7km) (Application Document 3.3) demonstrates that the theoretical visibility of vehicles on the Project alignment reflects that of Project road alignment overall. There is some localised additional theoretical visibility from around Morland, Newby and Sleagill.

10.3.4.13 Within the western part of the study area, the theoretical visibility of vehicles on the Project alignment also reflects that of the Project road alignment. There is some localised additional theoretical visibility from around Whinfell and Malkinthorpe.

## Stage 2: Initial desk-based review and fieldwork of the 7km study area

10.3.4.14 From the desk based review, the 7km ZTVs demonstrated the potential for views of the Project from parts of the Yorkshire Dales National Park, across the southern part of the study area and the North Pennines AONB within the north-east part of the study area. Relevant historic assets across the study area included Appleby Castle Scheduled Monument. The theoretical visibility also extended across NCN no.68 and 71, parts of the 'Pennine Journey' and 'Pennine Way' long distance trail and numerous PRoW.

10.3.4.15 The fieldwork confirmed that the Project would be visible from elevated land across the northern part of the study area, including beyond the 7km study area, to Great Dun Fell, up to 9km from the Project. However, with this increased distance, the potential for significant adverse effects was assessed as being negated, due to the Project forming a very small part of a panoramic view, which already consisted of the existing A66. However, to capture this visibility and respond to Stakeholder comments, it was considered appropriate to include a view from Great Dun Fell.

10.3.4.16 From the eastern part of the study area, the fieldwork confirmed the limited visibility demonstrated by the ZTVs. This was due to the existing buildings across Appleby, undulating landform and vegetation screening views towards the Project.

10.3.4.17 From the southern part of the study area, the fieldwork demonstrated that the visibility of the Project would be substantially less than that suggested by the ZTV due to the density of the intervening vegetation, particularly woodland adjacent to the River Eden. From beyond 3km from the Project, the Project would either not be visible or the distance was assessed as negating the potential for significant adverse effects.

10.3.4.18 From the western part of the study area, the fieldwork demonstrated that the visibility of the Project would be substantially less than that suggested by the ZTV due to the vegetation, particularly that adjacent to the River Eden. In addition, the rising landform to the west of the river, including across Slate Hill, formed a local ridge line, such that from beyond 3km, the Project would either not be visible, or the distance and existing context of views of the A66 would negate the potential for significant adverse effects.

## Stage 3: 3km ZTVs to inform fieldwork and the identification of visual receptors

10.3.4.19 3km ZTV ES Figure 10.4: Zone of Theoretical Visibility (ZTV 3km) (Application Document 3.3) and Viewpoints demonstrates that there is theoretical visibility of vehicles on the Project across the northern part of the 3km study area. This includes to the north of Kirkby Thore; to the east of Temple Sowerby; between the existing A66, Long Marton and the edge of the 3km study area, and between the existing A66 and Brampton. There is also substantial 'new' visibility of vehicles between the Project and the railway line, due to the proposed alignment of the Project. Similarly, there is substantial 'new' visibility of vehicles across elevated land extending to the edge of the 3km study area, between Milburn and Dufton.

10.3.4.20 Across the eastern part of the study area, the theoretical visibility of vehicles on the Project remains localised to within close proximity to the existing A66 and Appleby. However, there is 'new' theoretical visibility between the existing A66, Appleby and the River Eden. There is also 'new' theoretical visibility towards the edge of the 3km study area, covering undulating and rising land towards Flakebridge Wood.

10.3.4.21 ES Figure 10.4: Zone of Theoretical Visibility (ZTV 3km) and Viewpoints (Application Document 3.3) demonstrates that from across the southern part of the study area, the theoretical visibility of the Project with vehicles covers most of the valley floor, such that there are very few areas of 'new' visibility and where present, these are localised across the valley floor. Beyond the valley floor, the theoretical visibility extends across the rising landform, from Bolton to the edge of the 3km study area, with areas of 'new' visibility around the perimeter of most of the theoretical visibility of the existing A66.

10.3.4.22 Across the western part of the study area, the 3km ZTV suggests that the theoretical visibility extends consistently to the west of the River Eden and across Slate Hill, before becoming reducing due to the density of woodland across Whinfell Hill., There is 'new' theoretical visibility of vehicles on the Project to the north of Slate Hill and Whinfell Hill, extending adjacent to the existing A66.

## Stage 4: Conclusion of study area

10.3.4.23 From the above, the 3km study area for the assessment of landscape and visual effects for Temple Sowerby to Appleby was considered to be proportionate to identify the likely significant landscape and visual effects.

10.3.4.24 This was due to professional judgement assessing that from elevated locations across the northern part of the study area, the reduced visibility from beyond 3km and the existing context of the A66 and settlements negated the potential for significant adverse effects.

10.3.4.25 From the eastern part of the study area, the extent of buildings, undulating landform and vegetation cover screened views of the Project from beyond Appleton.

10.3.4.26 From across the southern part of the study area, the Project would be visible from across the rising land to the south of the River Eden; however, with increased distance from the Project, the potential for significant adverse effects was reduced. In combination with the intervening vegetation, from beyond 3km, professional judgement assessed that there would not be significant effects and views from the Lake District and Yorkshire Dales National Parks were scoped out.

10.3.4.27 From the western part of the study area, the rising and wooded landform across Slate Hill resulted in no visibility of the Project.

10.3.4.28 Within the 3km study area, the final area for the assessment of visual receptors was focused upon:

- 3km to the north of the Project, to cover rising and elevated land to the north of Kirkby Thore and Long Marton.
- 0.5km to the east of the Project, to cover the edge of Appleby.
- 3km to the south of the Project, to cover rising land to the south of the River Eden, extending to Cliburn.
- 3km to the south of the Project, to cover land across Slate Hill, to the west of the River Eden.

10.3.4.29 To demonstrate longer distance views in response to Stakeholder comments, the following locations were also included within the assessment from beyond the 3km:

- Dufton Pike, 5.2km to the north of the Project.
- Great Dun Fell, 9km to the north of the Project.

### 10.3.5 Appleby to Brough

10.3.5.1 With reference to Figure 10.3: Zone of Theoretical Visibility (ZTV 7km) Appleby to Brough is situated across the northern slopes of the River Eden valley, at the transition between the broad valleys and rising land which forms the foothills, scarps and high plateau of Warcop Fell.

10.3.5.2 The River Eden flows across the central part of the study area between approximately 130m AOD and 150m AOD. To the north of the river, the landform rises towards the existing A66, Coupland and the northern edge of Warcop at around 150m AOD. The landform also rises from the River Eden across Great Musgrave and Brough, forming a tract of undulating and elevated land due to numerous unnamed watercourses which flow between the existing A66 and the river. To the north of the existing A66 the landform rises steeply to form a series of hills between Warcop and Brough, including Walk Mill, at 193m AOD and Bale Hill, at 201m AOD. The landform continues to rise across the northern part of the study area, rising steeply to the north of Brough, across Middle Fell and Long Fell, extending to around 620m AOD, forming the lower slopes of Warcop Fell.

10.3.5.3 Across the eastern parts of the study area there is complex pattern of undulating landform, formed by numerous watercourses which flow between Brough and Stainmore, including the Augill Beck, the Argill Beck and the River Belah. The landform there rises steeply to the north of the existing A66, across Dummah Hill, at 337m AOD, Stainmore Common and Cotherstone Moor. The landform also rises steeply to the south of the existing A66, to form a localised ridge line around 290m AOD at Leonards Cragg, before falling towards the Argill Beck. From the Argill Beck the landform then rises southwards across South Stainmore, extending up to 522m AOD at Moudy Mea.

10.3.5.4 Across the southern part of the study area, the landform rises from the River Eden to form a series of hills between Great Ormside and Kirkby Stephen, including Stutforth Hill at 184m AOD, to the north of Soulby. To the south of these villages the landform then rises steeply across numerous fells within the Yorkshire Dales National Park.

10.3.5.5 Across the western part of the study area, the River Eden forms a valley which extend across Appleby to Bolton. To the west of the valley the landform is elevated and undulating, rising up to 172m AOD to the south of Appleby, before falling towards the Hoff Beck. From this beck the landform rises up to 2092m AOD across Maulds Meaburn Moor, forming part of the Yorkshire Dales National Park.

#### Stage 1: 7km ZTVs comparing the theoretical visibility of the Project road alignment with that of vehicles

#### 7km ZTV Project road alignment

10.3.5.6 ES Figure 10.3: Zone of Theoretical Visibility (ZTV 7km) (Application Document 3.3) demonstrates that the theoretical visibility of Project road alignment is concentrated between Coupland Beck and Warcop due to

the rising landform and hills in close proximity to Project. There is limited theoretical visibility across most of the remaining 2km distance from this part of the Project, until 3km from the Project when there is theoretical visibility of the Project road alignment across Long Fell, to the east of Hilton. In contrast, the theoretical visibility of the Project road alignment extends consistently 2km to the north of Brough, before becoming more intermittent due to the undulating landform. Beyond 4km from the Project, there is theoretical visibility to the north of Murton, with theoretical visibility from Murton Pike and Little Rundale Tarn, at the extent of the 7km study area. The ZTV across the northern part of the study area includes land within the North Pennines AONB.

10.3.5.7 Across the eastern part of the study area, the theoretical visibility is similarly concentrated around Brough and elevated land within 3km of the Project. Beyond the 3km, there is very limited theoretical visibility of the Project road alignment to the north of the existing A66 (within the North Pennines AONB), with localised visibility across Lartington High Moor. There is a greater extent of theoretical visibility to the south of the existing A66, extending to South Stainmore and Barras.

10.3.5.8 ES Figure 10.3: Zone of Theoretical Visibility (ZTV 7km) (Application Document 3.3) demonstrates that from across the southern part of the study area there is a consistent theoretical visibility of the Project road alignment across the River Eden valley floor and elevated land. This theoretical visibility extends to the 7km boundary of the study area and across the Yorkshire Dales National Park, between Drybeck, Great Ashby and Crosby Garrett.

10.3.5.9 Across the western part of the study area, the theoretical visibility of the Project road alignment is intermittent towards Appleby. There is theoretical visibility between Appleby and Maulds Meaburn, from elevated land, including within the Yorkshire Dales National Park.

## 7km ZTV Project alignment with vehicles

10.3.5.10 ES Figure 10.3: Zone of Theoretical Visibility (ZTV 7km) (Application Document 3.3) demonstrates that there is an increase in the theoretical visibility of vehicles on the proposed Project in comparison to the Project road alignment. The main increase in theoretical visibility is across the northern part of the study area, particularly to the east of Hilton and between Hilton and the 7km edge of the study area. Like the theoretical visibility of the Project road alignment, there is limited theoretical visibility to the east of West Fell, across the north-east part of the study area, between the 3km and 7km distances from the Order Limits.

10.3.5.11 Across the eastern part of the study area the theoretical visibility of vehicles on the proposed Project reflects that of the Project road alignment overall. There is slight additional theoretical visibility of vehicles on the proposed Project across elevated land to the east of North Stainmore, including across Pucks Hill and Great Knipe.

10.3.5.12 ES Figure 10.3: Zone of Theoretical Visibility (ZTV 7km) (Application Document 3.3) demonstrates that from across the southern part of the study area, the theoretical visibility of vehicles on the proposed Project mirrors that of the Project road alignment overall. There is some localised additional theoretical visibility in close proximity to Warcop, across the valley floor and in proximity to Soulby. Like the theoretical visibility of the Project road alignment, the theoretical visibility of vehicles on the proposed Project also extends across parts of the Yorkshire Dales National Park.

10.3.5.13 Across the western part of the study area there is an increase in the theoretical visibility of vehicles on the proposed Project in comparison to that of the Project road alignment between Coupland Beck and to the north of Appleby. The theoretical visibility to the south of Appleby, extending to the edge of the 7km study area reflects that of vehicles on the existing A66.

## Stage 2: Initial desk-based review and fieldwork of the 7km study area

10.3.5.14 As noted above, from the desk-based review, the theoretical visibility of the Project covered parts of the Yorkshire Dales National Park (across the southern part of the study area) and the North Pennines AONB (across the northern and eastern parts of the study area). The ZTVs also covered numerous PRoW across elevated land, parts of NCN no.68 and no.79 and parts of the Pennine Journey adjacent to the River Eden and the southern part of the study area. Relevant heritage assets within the study area included Appleby Castle Scheduled Monuments, but this was not covered by the ZTVs.

10.3.5.15 From across the northern part of the study area, the fieldwork confirmed that the Project would be visible from elevated land as far as the 7km study area. However, the visibility was less than suggested by the ZTV due to intervening vegetation and buildings. With increased distance from the Project the potential for significant adverse effects was also assessed as being substantially reduced. However, due to the extent of elevated land and Stakeholder requests for a view from Murton Pike, a viewpoint from this location was taken forwards into the ES assessment.

10.3.5.16 In relation to the eastern part of the study area, the fieldwork confirmed that the Project would not be visible from the east of Brough in contrast to the limited visibility depicted by the ZTVs. This was due to the undulating landform, vegetation cover and distance.

10.3.5.17 From the southern part of the study area, the fieldwork confirmed that the visibility of the Project would be substantially less than that indicated by the ZTV. This was due to the density and extent of woodland, particularly between the River Eden and the boundary of the Yorkshire Dales National Park. In addition, with increased distance from the Order Limits, the potential for significant adverse effects was also assessed as being reduced, such that there would neither be significant adverse effects from the National Park or beyond 3km from the Project.

10.3.5.18 From the western part of the study area, the fieldwork confirmed that the visibility of the Project would be substantially less than that indicated by the ZTV. This was due to the undulating landform, vegetation at Coupland Beck and vegetation adjacent to the River Eden. In combination with increased distance, the Project would not be visible from the western part of the study area as suggested by the ZTV.

## Stage 3: 3km ZTVs to inform fieldwork and the identification of visual receptors

### 3km ZTV

10.3.5.19 ES Figure 10.4: Zone of Theoretical Visibility (ZT 3km) and Viewpoints (Application Document 3.3) demonstrates that from across the 3km study area, the more detailed ZTV mapping results in a reduced theoretical visibility across the northern part of the study area in comparison to that indicated by the 7km study area ZTV. The reduction in the theoretical visibility is mainly to the north of Warcop and across the AONB, but like the 7km ZTV, the theoretical visibility extends across elevated land between Brough and the east of Hilton. There is 'new' theoretical visibility across the rising land to the immediate north of the Project alignment and to the north of Warcop, as well as in proximity to Hilton, at the 3km edge of the study area.

10.3.5.20 Across the eastern part of the 3km study area, the buildings in Brough and vegetation cover concentrate the theoretical visibility to the west of the B6276, within the AONB and between Church Brough and Leacett Lane. There is very localised 'new' theoretical visibility at Brough and to the east of the B6276.

10.3.5.21 From the southern part of the study area, ES Figure 10. 4: Zone of Theoretical Visibility (ZTV 3km) and Viewpoints (Application Document 3.3) also demonstrates that theoretical visibility of the existing A66 was reduced in comparison to the 7km ZTV. There was reduced visibility around Musgrave Lane and Warcop due to screening from buildings, but the theoretical visibility remains concentrated across elevated land to the extent of the 3km. There is very localised additional theoretical visibility in proximity to Bleatarn, which is situated across Mill Hill and to the south of Warcop. There is also very limited 'new' theoretical visibility from across the southern part of the study area.

10.3.5.22 From across the western part of the study area, the theoretical visibility of the existing A66 is localised to within close proximity to the existing A66 and the lower lying valley floor between Ormside and the River Eden. In contrast to the 7km ZTV mapping, the theoretical visibility is less across the western part of the study area, due to the density of the vegetation across the landscape, but there is 'new' theoretical visibility between the existing A66 and the north-west edge of the study area.

## Stage 4: Conclusion of study area for assessment

10.3.5.23 From the above stages, the 3km study area for the assessment of landscape and visual effects for Appleby to Brough was considered to

be proportionate to identify the likely significant landscape and visual effects. However, one additional location beyond the 3km study area was also included to address Stakeholder comments.

10.3.5.24 The 3km study area was assessed as proportionate because the rising landform and intervening vegetation to the immediate north of the A66 screened views would screen views of the Project for receptors beyond 0.5km.

10.3.5.25 From beyond 3km, the distance and fact that the composition of views already included vehicles on the A66 was assessed as negating the potential for significant adverse effects.

10.3.5.26 From beyond 0.5km to the east of the Project, the Project would not be visible due to the lower lying position of the Project within an undulating landscape and the density of the intervening vegetation.

10.3.5.27 From the south of the study area, beyond 2km to the south of the Project, the combination of distance, undulating landform and intervening was assessed as negating the potential for significant adverse effects.

10.3.5.28 From the western part of the study area, beyond 0.5km of the Project, the proposed Project would not be visible due to being situated within a low-lying position in relation to the intervening landform and vegetation.

10.3.5.29 Within the 3km study area, the final area for the assessment of visual receptors was focused upon:

- The ridgeline and undulating landform within 0.5km of the existing A66 and elevated land across the AONB, extending to the full extent of the 3km study area, including around Hilton.
- Within 0.5km of the eastern edge of the Project, to cover the western edge of Brough, land within the AONB and the River Eden valley floor.
- Elevated land up to 2km from the Project across the southern part of the study area, covering land across the River Eden and in proximity to Ormside.
- Within 0.5km of the western edge of the Project to cover elevated land around Coupland Beck.

10.3.5.30 The additional viewpoint included to address Stakeholder comments beyond the 3km study area was:

- Murton Pike, 5.1km to the north of the DCO Project boundary.

## 10.3.6 Bowes Bypass

10.3.6.1 With reference to Figure 10.3: Zone of Theoretical Visibility (ZTV 7km), the Bowes Bypass part of the Project is situated within the mid Greta Valley, which is a narrow valley, with the River Greta meandering across the valley floor.

10.3.6.2 Across the northern part of the study area, the landform rises very steeply from the River Greta to the southern edge of Bowes, before transitioning to a more consistent rising gradient across the village,

which is situated around 285m AOD. The landform continues to rise to the north of Bowes, forming localised ridgelines at Tute Hill, at around 330m AOD, and localised high points, including Crag Hill, at around 300m AOD. From these ridgelines, the landform falls towards the Deepdale Beck, before rising across Cotherstone Moor, at around 400m AOD, at the northern edge of the study area.

10.3.6.3 In the eastern part of the study area, there are several large scale quarries, where excavations and changes to terrain have altered the underlying pattern of the valley landform. Kilmond Quarry, to the south of the existing A66, is in an elevated position, at around 311m AOD and in combination with elevated land to the north of the existing A66 forms a ridgeline across the eastern part of the study area.

10.3.6.4 Across the southern part of the study area, the landform is undulating as its rises steeply from the valley floor, at around 250m AOD, to Sleightholme Lane, situated around 320m AOD. The hamlet of Gilmonby is situated in a relatively low lying position, around 260m AOD, to the south of Bowes. To the south of Sleightholme Lane, the landform continues to rise across Gilmonby Moor and Scargill Low Moor, culminating at a ridgeline at around 446m AOD, at the southern edge of the study area.

10.3.6.5 The landform across the western part of the study area reflects the underlying pattern of rising landform to the north and south of the River Greta. There is localised steeper sided landform adjacent to the Sleightholme Beck and many of the unnamed watercourses which converge with the River Greta.

## Stage 1: 7km ZTVs comparing the theoretical visibility of the Project road alignment with that of vehicles

## 7km ZTV Project road alignment

10.3.6.6 With reference to ES Figure 10.3: Zone of Theoretical Visibility (ZTV 7km) (Application Document 3.3), the theoretical visibility of the Project road alignment is predominantly concentrated to within a 1.3km area to the north of the Project, reflecting the rising landform across Tute Hill, which then forms a ridgeline at the transition between the Greta Valley and the Deep Dale Valley. From within the AONB, the theoretical visibility is localised to elevated land across Cotherstone Moor, 3.5km to the north-west of the Project. There is very limited theoretical visibility across the remainder of the northern part of the 7km study area overall, with no visibility from the western part of Barnard Castle and the River Tees valley.

10.3.6.7 ES Figure 10.3: Zone of Theoretical Visibility (ZTV 7km) (Application Document 3.3) demonstrates that the theoretical visibility of the Project alignment extends to within close proximity of the existing A66, to the 7km edge of the study area. The ZTV suggests theoretical visibility from across Timpton Hill and parts of Scargill Low Moor, as well as to the east of Barnard Castle and Rokeby Park.

10.3.6.8 ES Figure 10.3: Zone of Theoretical Visibility (ZTV 7km) (Application Document 3.3) demonstrates that the theoretical visibility extends consistently across the valley to the south of the Project, due to the overall pattern of rising landform across Gilmonby Moor. The ZTV suggests that the theoretical visibility does not extend across the River Greta and its immediate plains, due to being in a lower lying position, nor most of the Yorkshire Dales National Park, 3.8km to the south of the Project, due to the intervening undulating landform and localised ridgelines but does extend across parts of the AONB.

10.3.6.9 ES Figure 10.3: Zone of Theoretical Visibility (ZTV 7km) (Application Document 3.3) demonstrates that the theoretical visibility extends predominantly to the south of the existing A66 across the western part of the 7km study area, following the alignment of the valley landform, including across Bowes Moor, 6.5km from the Project. The elevated landform across Tute Hill negates theoretical visibility across the remainder of the north-west part of the study area.

## 7km ZTV Project alignment with vehicles

10.3.6.10 With reference to ES Figure 10.3: Zone of Theoretical Visibility (ZTV 7km) (Application Document 3.3) the theoretical visibility of the Project alignment with vehicles reflects that of the Project road alignment overall, remaining relatively localised across the northern part of the study area to areas of elveated landform within the AONB. There is some additional visibility adjacent to the A67.

10.3.6.11 Across the eastern part of the study area, the theoretical visibility of vehicles mirrors that of the Project road alignment, with only very localised additional visibility to the east of Barnard Castle.

10.3.6.12 Across the southern part of the study area, there is additional theoretical visibility from vehicles on the Project across the sides of the River Greta valley and elevated land within the AONB.

10.3.6.13 Similarly, across the western part of the study area, the theoretical visibility of vehicles mirrors that of the Project road alignment only, with very localised increases across Stainmore.

## Stage 2: Initial desk-based review and fieldwork of 7km area

10.3.6.14 The Stage 1 ZTVs demonstrated that the theoretical visibility of the Project would extend across the mid Greta Valley, covering parts of the North Pennines AONB, an Area of Higher Landscape Value bordering Bowes and most of Bowes Conservation Area. Whilst the southern extent of the study area was within the Yorkshire Dales National Park, the ZTV illustrated very limited theoretical visibility across the designation.

10.3.6.15 The ZTVs also indicated theoretical visibility from several important public rights of way to the north and south of the A66, including the Pennine Way and NCN no.70, along with routes adjacent to the River Greta and across the AONB to the south of the river.

10.3.6.16 The initial fieldwork confirmed that the Project would be visible from elevated land to the immediate north of the Project, although not to the extent suggest by the ZTV due to field boundary vegetation and established woodland adjacent to parts of the existing A66. Unlike the ZTV, the Project would not be visible from elevated parts of Cotherstone Moor, due to the extent of intervening vegetation, distance and localised undulating landform.

10.3.6.17 From the east of the Project, the fieldwork confirmed the visibility demonstrated by the ZTV in proximity to the Project and Bowes, including parts of the Area of Higher Landscape Value. Unlike the ZTV the Project would not be as visible from across the valley sides due to the density of field boundary vegetation and vegetation adjacent to the River Greta. From the road networks and intermittent settlements in proximity at Brignall and Scargill and Timpton Hill, the Project would either not be visible, due to the height of roadside hedgerows and intervening vegetation, or where visible, the distance would from the Project would not result in significant adverse effects.

10.3.6.18 From the south of the Project, the fieldwork confirmed that the Project would be visible from public rights of way across the south side of the Greta Valley, including to the south of Gilmonby and across parts of the North Pennines AONB.

10.3.6.19 Unlike the ZTV, the overall extent of visibility was reduced by the field boundary vegetation and vegetation adjacent to the River Greta.

10.3.6.20 From the western parts of the study area, the fieldwork confirmed that the visibility of the Project would be far less than indicated by the ZTVs. This was due to the density of the vegetation adjacent to the River Greta and Sleightholme Brook and the field boundaries extending southwards from the existing A66, across the valley sides.

10.3.6.21 In conclusion, the fieldwork determined that the study area could be reduced from the initial 7km to a 3km area, as beyond 3km significant effects would not occur due to the distance, intervening vegetation and the context of the existing A66 and associated vehicles already within the view.

## Stage 3: 3km ZTVs to inform fieldwork and the identification of visual receptors

## 3km ZTV

10.3.6.22 With reference to ES Figure 10.4: Zone of Theoretical Visibility (ZTV 3km) and Viewpoints (Application Document 3.3), the theoretical visibility across the 3km study area extends 500m to the north of the existing A66, to border Clint Lane, with some very localised intermittent visibility to the north-east of Clint Lane. This includes some 'new' visibility from adjacent to the A66 and around North Thornberry. There is no theoretical visibility to the north of the Greta Valley and Deep Dale Valley ridgeline.

10.3.6.23 ES Figure 10. 4: Zone of Theoretical Visibility (ZTV 3km) and Viewpoints (Application Document 3.3) demonstrates that across the eastern part of the 3km study area, the theoretical visibility is concentrated between the A67 and the A67 to Kilmond Quarry, before becoming reducing between the quarry and West Roods. At the eastern edge of the study area there is theoretical visibility at Boldron, including 'new' visibility across the village and intermittently across parts of Timpton Hill.

10.3.6.24 Across the southern part of the study area, Figure 10.4: Zone of Theoretical Visibility (ZTV 3km) and Viewpoints demonstrates a reduction in the theoretical visibility along the north side of the River Greta in comparison to the 7km ZTV, due to the density of existing vegetation, such that the concentration of visibility is predominantly to the south of river, extending from Gilmonby to Gilmonby Moor. The ZTV also demonstrates more intermittent visibility across the North Pennines AONB, with localised areas of 'new' visibility in proximity to Farewell, across Scargill Low Moor and parts of Gilmonby Moor.

10.3.6.25 From the west, ES Figure 10. 4: Zone of Theoretical Visibility (ZTV 3km) and Viewpoints (Application Document 3.3) demonstrates that there is no theoretical visibility along the lower lying parts of the River Greta, due to the density of the existing vegetation and the localised changes in landform derived from the 2m DSM in compared to the 5m DTM of the 7km ZTVs. There is also very intermittent theoretical visibility adjacent to the existing A66, with some areas of 'new' visibility at Bovegill. The main concentration of visibility is across the valley sides of the Sleightholme Beck.

## Stage 4: Conclusion of study area for assessment

10.3.6.26 From the above stages, the 3km study area for the assessment of landscape and visual effects was considered to be proportionate to identify the likely significant landscape and visual effects.

10.3.6.27 This was due to the rising land to the north of the Project forming a localised ridgeline along Clint Lane, such that there would be no visibility of the Project from the remainder of the northern part of the study area.

10.3.6.28 From across the eastern part of the study area, the elevated landform across Kilmond quarry negated any visibility of the Project from Boldron or parts of Timpton Hill.

10.3.6.29 From across the southern part of the study area, the rising landform did enable views of the Project, but with increased distance and the existing context of views of the A66, professional judgement concluded that there would not be significant adverse effects from beyond 3km.

10.3.6.30 From the western part of the study area, the density of the intervening vegetation and buildings within Bowes screened views of the majority of the Project. The potentially visibility of the western part of the Project was also reduced by intervening vegetation, which with increased distance from the Project negated the potential for significant adverse effects from beyond 3km.

10.3.6.31 Within the 3km study area, the final area for the assessment of visual receptors was focused upon:

- 1.5km to the north of the Project, to reflect the rising land across Tute Hill and the ridgeline formed by the transition between the Greta Valley and Deep Dale Valley.
- 3km to the east of the Project, to cover the Area of High Landscape Value and rising landform across Timpton Hill.
- 3km to the south of the Project, to cover rising land across the south side of Greta Valley and land within the North Pennines AONB.
- 1.5km to the west of the Project, to cover the undulating valley sides of the Greta Valley.

## 10.3.7 Cross Lanes to Rokeby

10.3.7.1 With reference to Figure 10.3: Zone of Theoretical Visibility (ZTV 7km) Cross Lane to Rokeby is situated within an area of undulating landform, which rises from the River Greta in the eastern part of the study area to elevated land across Kilmonds, in the western part of the study area.

10.3.7.2 The River Tees flows across the study area at approximately 135m AOD. To the north of the river the landform rises gradually towards Westwick Road and the southern edge of Barnard Castle at approximately 160m AOD. The landform then rises steeply between Westwick Road and the A67 in the northern part of the study area, situated across a ridgeline, at approximately 200m AOD. To the north of the A67 the landform falls across Westwick Moor, to the northern edge of the study area.

10.3.7.3 To the south of the River Tees, the landform rises consistently towards the existing A66, which is located across a localised ridgeline, ranging between 140m AOD in proximity to Greta Bridge, to around 210m AOD at Cross Lanes.

10.3.7.4 To the south of the existing A66 the landform falls towards the Tutta Beck, a narrow watercourse flowing between Kilmond quarry and Greta Bridge.

10.3.7.5 From the Tutta Beck, the landform then rises consistently across the southern part of the study area across Tutte Hill and Timpton Hill to form a ridgeline broadly along the alignment of Brignall Lane, at around 250m AOD.

10.3.7.6 From Brignall Lane, the landform falls steeply towards the meandering course of the River Greta, which is situated around 160m AOD. The River Greta flows beneath the existing A66 at Greta Bridge, to converge with the River Tees at the northern edge of Rokeby Park.

10.3.7.7 To the south of the River Greta, the landform rises across Bank Hill, Chapel Hill and Eggmartin Hill to form a ridgeline along the alignment of Chapel Lane and Barningham, at the southern edge of the study area.

10.3.7.8 Kilmond quarry is in the western part of the study area and forms a localised ridgeline line, extending to the north and south of the existing A66. To the west of the quarry the landform falls towards Bowes.

10.3.7.9 In the eastern part of the study area, to the east of the River Greta, the landform remains undulating and low lying, at around 140m AOD, before rising towards Smallways, situated around 160m AOD at the eastern edge of the study area.

## Stage 1: 7km ZTVs comparing the theoretical visibility of the Project road alignment with that of vehicles

### 7km ZTV Proposed road alignment

10.3.7.10 ES Figure 10.3: Zone of Theoretical Visibility (ZTV 7km) (Application Document 3.3) demonstrates the theoretical visibility of the Project road alignment extends consistently 0.5km to the north of the Project, across falling land, before becoming more intermittent towards the River Tees, due to the undulating landform. The main areas of theoretical visibility are between Boldron and Strartforth, including parts of the A67 and Rokeby Park.

10.3.7.11 To the north of the River Tees the theoretical visibility extends predominantly across the eastern part of Barnard Castle, 2.5km to the north of the Project, and rising land to the north of the River Tees, culminating around the A67, which follows the alignment of a ridgeline. The theoretical visibility also extends to the north of Barnard Castle, across Langley Dale and elevated land across Woodland Fell, covering the full extent of the 7km study area.

10.3.7.12 ES Figure 10.3: Zone of Theoretical Visibility (ZTV 7km) (Application Document 3.3) demonstrates that the theoretical visibility across the east of the 7km study area covers most the land between the River Tess and the Project, due to its low lying position within the study area. The exception is the river itself, which is predominantly illustrated as an area of 'no' theoretical visibility.

10.3.7.13 ES Figure 10.3: Zone of Theoretical Visibility (ZTV 7km) (Application Document 3.3) demonstrates that the theoretical visibility extends consistently 0.5km to the south of the Project, across rising land. The ridgeline 0.75km to the south of the Project, across Timpton Hill theoretically negates visibility extending along the River Greta, whilst the ZTV suggests visibility extends to Brignall, 1.5km to the south of the existing A66 and to the south of Greta Bridge. The ZTV suggests that the Project road alignment is not visible from lower lying land along the floor of the remainder of the Greta Valley, nor Scargill or land between the River Greta and Low Lane. The theoretical visibility is indicated to the south of Low Lane, extending across Barningham Moor and elevated parts of Scargill High Moor, at the full extent of the 7km study area, including part of the AONB.

10.3.7.14 Figure 10.3: Zone of Theoretical Visibility (ZTV 7km) demonstrates that the theoretical visibility across the western part of the 7km study area is limited by the ridgeline across Kilmonds, such that the extent of visibility is very localised to the Project and the A67 to the north of the existing A66, whilst extending to the edge of the 7km study area and parts of the AONB at the 7km extent of the study area.

## 7km ZTV Project alignment with vehicles

10.3.7.15 With reference to ES Figure 10.3: Zone of Theoretical Visibility (ZTV 7km) (Application Document 3.3), the theoretical visibility of vehicles remains consistent with that of the Project road alignment within 0.5km to the north of Project, before becoming increasing towards Barnard Castle and elevated land at Woodland Fell.

10.3.7.16 The theoretical visibility is also consistent with that of the Project road alignment across the eastern part of the study area, remaining visible from most of the low lying land across the 7km and with very minor additional theoretical visibility in proximity to the River Tees.

10.3.7.17 Across the southern part of the 7km study area, the theoretical visibility of the Project with vehicles mirrors that of the Project road alignment overall. There is minor localised additional theoretical visibility around at Greta Bridge.

10.3.7.18 Likewise, the elevated ridgeline at Kilmonds in the western part of the study area negates the theoretical visibility across most of the wider 7km landscape within the north-west part of the study area. There is additional theoretical visibility in the south-west part of the study area, across elevated land within the AONB.

## Stage 2: Initial desk-based review and fieldwork

10.3.7.19 The Stage 1 ZTVs demonstrated that the theoretical visibility of the Project extended across parts of the North Pennines AONB in the north-west and south-west parts of the 7km study area. Most of the theoretical visibility extended across an Area of Higher Landscape Value. To the north of the Project, the theoretical visibility extended across most of Rokeby Park, a Registered Park and Garden, along with the Church of St Mary and to Barnard Castle.

10.3.7.20 The main recreational routes across the study area included the Teesdale Way, adjacent to the River Tees and NCN nos. 70 and 165, to the west and east of Barnard Castle.

10.3.7.21 In proximity to the A66 there were several PRoW to the north of the road, whilst there were very few between the A66 and the River Tees. To the south of the River Greta there is an extensive network of PRoW across the moors.

10.3.7.22 The initial fieldwork confirmed that the Project would be visible from within 0.5km to the north of the alignment as indicated by the ZTVs, although the overall extent of visibility was lessened by the existing vegetation patterns, which include woodlands and field boundary hedgerows and trees.

10.3.7.23 The visibility of the Project would be substantially less than indicated by the ZTVs to the north of the River Tees due to the density of the vegetation cover and localised changes in landform.

10.3.7.24 Similarly, the Project would not be visible from across the central and northern parts of Barnard Castle as suggested by the ZTVs due to the buildings, although there was the potential for views from the east of the town, 2.5km from the Project.

10.3.7.25 To the east of Barnard Castle, the combination of distance and vegetation either screened the potential for views of the Project, or where visible, the distance and context of the existing vehicles on the A66 was assessed as negating the potential for significant effects.

10.3.7.26 From the east of the study area, the fieldwork confirmed that the Project would not be visible as suggested by the ZTVs. This was primarily due to the density of vegetation across the rural landscape.

10.3.7.27 From the south of the study area, the fieldwork confirmed that the Project could be visible within 0.5km of the alignment and from elevated land towards Brignall, 1.5km from the Project. The fieldwork also confirmed that the ridgeline across Timpton Hill would screen views from the remainder of the Greta Valley. To the south of the River Greta, the combination of distance and context of the existing vehicles on the A66 was assessed as negating the potential for significant effects.

10.3.7.28 From the west of the study area, the fieldwork confirmed that the combination of the ridgeline across Kilmond and vegetation patterns would negate views of the Project from the west of Boldron and that the likely visibility would be consolidated to within close proximity of Cross Lanes.

10.3.7.29 In conclusion, the fieldwork determined that the study area could be reduced from the initial 7km to a 3km area, as beyond 3km significant effects would not occur due to the distance, intervening vegetation and the context of the existing A66 and associated vehicles already within the view.

## Stage 3: 3km ZTVs to inform fieldwork and the identification of visual receptors

10.3.7.30 3km ZTV With reference to ES Figure 10.4: Zone of Theoretical Visibility (ZTV 3km) and Viewpoints (Application Document 3.3), the theoretical visibility across the 3km study area to the north of the existing A66 remains generally consistent in close proximity to the A66, covering the Church of St Mary, fields and the southern edge of Rokeby Park. The theoretical visibility then becomes more intermittent beyond 0.5km to the north of the existing A66 due to the density of vegetation, with no theoretical visibility between the Thorsgill Beck and the River Tees. To the north of the River Tees, the theoretical visibility is concentrated to the eastern edge of Barnard Castle rather than within the town. There is 'new' visibility adjacent to the B6277 and at Rokeby House, within Rokeby Park. There is also very localised 'new' visibility to the north of the River Tees, at the eastern edge of Barnard Castle, although this is indicated within areas of theoretical visibility.

10.3.7.31 Across the eastern part of the 3km study area, the theoretical visibility is negated to the south of the River Tees by the woodland across Rokeby Park. There is intermittent visibility to the north of the A66, extending to Green Lane and Little Hutton Lane to the edge of the 3km study area, with 'new' visibility in proximity to Thorpe and Newsham Grange.

10.3.7.32 From the southern part of the study area, ES Figure 10. 4: Zone of Theoretical Visibility (ZTV 3km) and Viewpoints (Application Document 3.3) demonstrates theoretical visibility consistently from within close proximity of the A66 and the rising land across Timpton Hill to Brignall. The theoretical visibility is more intermittent in proximity to Greta Bridge, but there are several areas of 'new' visibility to the south of the village. There is also localised 'new' visibility at Brignall and to the south of Brignall Lane.

10.3.7.33 Across the western part of the study area, ES Figure 10. 4: Zone of Theoretical Visibility (ZV 3km) and Viewpoints (Application Document 3.3) demonstrates that the theoretical visibility extends to the western edge of Boldron and across Timpton Hill, before becoming intermittent across Kilmond Wood. The theoretical visibility is then concentrated at the western edge of the 3km study area, at Kilmond. There is very limited theoretical visibility to the north of Boldron and Kilmond quarry, with none indicated to the north of the A67. There is 'new' visibility indicated across the southern part of Boldron, across parts of Timpton Hill and at the western edge of the study area, at Kilmond.

### Stage 4: Conclusion of study area for assessment

10.3.7.34 From the above stages, the 3km study area for the assessment of landscape and visual effects for Cross Lanes to Rokeby was considered to be proportionate to identify the likely significant landscape and visual effects.

10.3.7.35 This was due to the undulating and wooded landform to the north of the existing A66 substantially reducing the potential for views of the Project to the north of the River Tees and the distance from the Project negating views from the north of the Barnard Castle.

10.3.7.36 Across the eastern part of the study area, the density of the woodland across Rokeby Park and the rural landscape negated views of the Project from the east of Greta Bridge.

10.3.7.37 The rising land across the southern part of the study area enabled views from a range of locations, but the wooded ridgeline across Brignall and Timpton Hill negated views of the Project from beyond 2km.

10.3.7.38 Similarly, the undulating landform across the western part of the study area negated the potential for views of the Project from the west of Kilmonds.

10.3.7.39 Within the 3km study area, the final area for the assessment of visual receptors was focused upon:

- 3km to the north of the Project, covering Barnard Castle and rising land to the north of the River Tees.
- 0.5km to the east of the Project, to cover Greta Bridge.

- 2km to the south of the Project, to cover Brignall and rising land across Timpton Hill.
- 0.5km to the west of the Project, to cover rising land across Kilmonds.

### 10.3.8 Stephen Bank to Carkin Moor

10.3.8.1 With reference to Figure 10.3: Zone of Theoretical Visibility (ZTV 7km) Stephen Bank to Carkin Moor is situated within a study area characterised several narrow valleys, which results in a complex pattern of undulating landform, with the existing A66 situated across several localised ridgeline.

10.3.8.2 The main valley is located across the central part of the study area, in a north-west to south-east orientation, between Newsham, at 170m AOD and Gilling West, at 100m AOD. Numerous watercourses flow across this valley floor, including the Dalton Beck, Holme Beck and Gilling Beck.

10.3.8.3 To the north of this main valley floor, the landform to form a ridgeline with a number of localised high points, including Stephen Bank, at 163m AOD, Sorrowful Hill, at 150m ADO and Diddersly Hill, at 209m AOD and which forms part of Gatherley Moor.

10.3.8.4 From this ridgeline, the landform falls towards the Hutton Beck, Caldwell Beck and Aldborough Beck, which flow across the northern part of the study area between 130m and 100m.

10.3.8.5 Localised variation in this pattern of landform results from smaller watercourses flowing from the ridgeline to the valley floor. These includes the Mains Gill, which forms a shallow and very gently undulating valley between Carkin Moor and the Holme Beck, via Mainsgill Bridge. There are also several large watercourses at quarries and within the grounds of Forcett Park.

10.3.8.6 To the south of the main valley floor, the landform rises, often very steeply, across Gayles Moor and High Moor, to form a an elevated ridgeline ranging between 390m AOD and 250m AOD across the southern part of the study area.

#### Stage 1: 7km ZTVs comparing the theoretical visibility of the Project road alignment with that of vehicles

#### 7km ZTV Project road alignment

10.3.8.7 With reference to ES Figure 10.3: Zone of Theoretical Visibility (ZTV 7km) (Application Document 3.3), the theoretical visibility of the Project road alignment is predominantly concentrated to within 1.5km of the north of the Project, extending to the southern edge of East Layton. To the north of East Layton, there is very limited theoretical visibility , being concentrated to the north of Eppleby, 5.8km from the Project. There is also theoretical visibility adjacent to the A67, on the north side of the River Tees, at the 7km extent of the study area.

10.3.8.8 ES Figure 10.3: Zone of Theoretical Visibility (ZTV 7km) (Application Document 3.3) demonstrates that the theoretical visibility of Project road alignment across the eastern part of the study area is localised to close range locations adjacent to the A66 at Jagger Lane, Moor Road and between Gilling West and the A1(M), at the edge of the 7km extent. There are substantial areas of 'no' visibility to the east of the Project.

10.3.8.9 ES Figure 10.3: Zone of Theoretical Visibility (ZTV 7km) (Application Document 3.3) demonstrates that the theoretical visibility across the southern part of the 7km study is consistent across the valley floor towards Ravensworth, 1.5km to the south of the A66. To the south of the Ravensworth the theoretical visibility remains consistent between Dalton, Gayles and Kirby Hill, 3.5km to the south of the A66, before becoming more intermittent across Gayles Moor, at the edge of the 7km study area. The theoretical visibility does not extend to the Yorkshire Dales National Park.

10.3.8.10 ES Figure 10.3: Zone of Theoretical Visibility (ZTV 7km) (Application Document 3.3) demonstrates that the theoretical visibility across the western part of the 7km study area extends towards Barningham, 3.5km to the west of the Project. There is no theoretical visibility across lower lying land within the Greta Valley. The ZTV illustrates theoretical visibility to the south of Brignall, across rising land from the valley floor at the edge of the 7km study area. There is also localised visibility in proximity to Greta Bridge, extending to the edge of the 7km study area

## 7km ZTV Project alignment with vehicles

10.3.8.11 With reference to ES Figure 10.3: Zone of Theoretical Visibility (ZTV 7km) (Application Document 3.3), the theoretical visibility of the Project with vehicles reflects that of the Project road alignment between East Layton and West Layton, with additional theoretical visibility to the north of West Layton. There is also an increase in the theoretical visibility of the Project with vehicles to the north of Eppleby and to the south of Wycliffe in comparison to the Project road alignment. To the north of the River Tees, the theoretical visibility reflects that of the Project road alignment overall, with only very localised additional theoretical visibility towards the river.

10.3.8.12 Across the eastern part of the study area, the theoretical visibility of the Project with vehicles reflects that of the Project road alignment overall, with additional visibility extending around Gilling West.

10.3.8.13 The theoretical visibility of the Project with vehicles also reflects that of the Project road alignment across the southern part of the study area, extending almost consistently to elevated landscape between Dalton, Gayles and Kirby Hill, before becoming more intermittent across towards the 7km edge of the study area. There is additional theoretical visibility to the south of the Project, from across the valley floor.

10.3.8.14 Across the western part of the study area there is some additional theoretical visibility to the north of Smallways and to the north of Greta Bridge in comparison to the Project road alignment. The theoretical visibility across the remainder of the western part of the study reflects that of the Project road alignment.

## Stage 2: Initial desk-based review and fieldwork

10.3.8.15 The Stage 1 ZTVs demonstrated theoretical visibility from across the north-west edge of the study area, between Overton and the A67, which is within an Area of Higher Landscape Value.

10.3.8.16 The southern edge of the study area is within the Yorkshire Dales National Park, but no theoretical visibility was indicated across the designated landscape. Forcett Hall RPG, to the north of East Layton and Aske Hall RPG, to the south of Gilling West, were also illustrated as areas of theoretical visibility.

10.3.8.17 There was an extensive network of PRoW across the study area, including routes between the A66 and East Layton, West Layton and Ravensworth. Long distance routes were the Teesdale Way, adjacent to the River Tees, in the northern part of the study area. NCN no.715 was also on the north of the river. There were also a number of routes across elevated land in the southern part of the study area.

10.3.8.18 The initial fieldwork confirmed that to the north of the Project would be visible to varying degrees between the A66, West Layton and PRoW to the south of East Layton, reflecting the ZTVs. However, from East Layton and across the northern part of the study area, the density of the vegetation and undulating landform screened the potential visibility of the Project, such that it was assessed that there would not be the potential for significant adverse effects.

10.3.8.19 From the east of the study area, the fieldwork confirmed that the actual visibility of the Project would be substantially less than that suggested by the ZTVs. This was due to the density of the vegetation patterns and undulating landform, such that it was assessed that there would not be any visibility of the Project from around Gilling West and the A1(M) and the potential for significant effects would be from close to the Project only.

10.3.8.20 From the south of the study area, the fieldwork confirmed that the Project had the potential to be visible from Ravensworth and elevated land to the south of Dalton and Kirby. From longer distance locations across the southern part of the study area, including the National Park, the distance from the Project and the density of intervening vegetation were assessed as negating the potential for significant effects.

10.3.8.21 From the west of the study area, the fieldwork confirmed that the Project had the potential to be visible from Newsham, but not from across the remainder of the study area, due to the undulating landform and density of the vegetation. There were no views of the Project from Hutton Magna and to the north of the A66, due to the intervening landform and vegetation.

10.3.8.22 In conclusion, the fieldwork determined that the study area could be reduced from the initial 7km to a 3km area, as beyond this distance significant effects would not occur due to the distance, intervening vegetation and the context of the existing A66 and vehicles already within the view.

## Stage 3: 3km ZTVs to inform fieldwork and the identification of visual receptors

### 3km ZTV

10.3.8.23 With reference to ES Figure 10.4: Zone of Theoretical Visibility (ZTV 3km) and Viewpoints (Application Document 3.3), the theoretical visibility of the Project extends across West Layton and to the edge of East Layton in the northern part of the study area. There is some localised 'new' theoretical visibility between West Lane and East Layton, to the east of Moor Lane and to the west of Collier Lane, extending to the edge of the 3km study area at Little Hutton, to the north of the Caldwell Beck.

10.3.8.24 Across the eastern part of the study area, the theoretical visibility of the Project is intermittent to the immediate north of the A66 and concentrated to between the existing A66 and the western part of Warrener Lane. There is no theoretical visibility towards the boundaries of the 3km study area at Melsonby. There is 'new' theoretical visibility across Didderley Hill and parts of Gatherley Moor, extending to Carkin Grange.

10.3.8.25 Across the southern part of the study area, ES Figure 10. 4: Zone of Theoretical Visibility (ZTV 3km) and Viewpoints (Application Document 3.3), demonstrates that the theoretical visibility is consistent across the 3km study area, extending across most of the valley and rising landform between Gilby and Kirby. There is very little 'new' visibility, with only localised areas in proximity to Newsham and East Browson.

10.3.8.26 In the western part of the study area, ES Figure 10. 4: Zone of Theoretical Visibility (ZTV 3km) and Viewpoints (Application Document 3.3), demonstrates that the theoretical visibility is intermittent to the north and south of the existing A66, but extends to the edge of the 3km study area, covering Newsham and Hutton Magna, with 'new' visibility at Newsham Grange, in proximity to the existing A66.

## Stage 4: Conclusion of the study area for assessment

10.3.8.27 From the above stages, the 3km study area for the assessment of landscape and visual effects was considered to be proportionate to identify the likely significant landscape and visual effects.

10.3.8.28 This was due to the rising and wooded landform to the north of the existing A66 which culminated in a ridgeline at East Layton, negating views from the north of the village or due to distance the ability for significant adverse effects.

10.3.8.29 The undulating landform across Gatherly Moor and between the existing A66 and Gilling West also negated the potential for views of the Project and the potential for significant adverse effects.

10.3.8.30 From across the southern part of the study area, the Project would be visible from elevated land to the edge of the 3km study area, but beyond 3km, professional judgement determined that the combination of distance and the existing context of the A66 would negate the potential for significant adverse effects.

10.3.8.31 From the western part of the study area, the intervening vegetation and undulating landform reduced the visibility of most of the Project boundary, except for that across Stephen Bank. From beyond 3km, the combination of distance and the existing context of the A66 would negate the potential for significant adverse effects.

10.3.8.32 Within the 3km study area, the final area for the assessment of visual receptors was focused upon:

- 1.5km to the north of the Project, to cover West Layton, East Layton and intervening land. The density of woodland and undulating landform beyond 1.5km would either screened views of the Project, or the distance would negate the potential for significant effects, given the context of views of the existing A66.
- 0.5km to the east of the Project, to cover land between Warrener Lane and Forcett Lane. The undulating landform, distance and intervening vegetation were assessed as negating the potential for significant effects from beyond 0.5km.
- 3km to the south of the Project, to cover elevated and rising land across Kirby Hill.
- 2km to the west of the Project, to cover Newsham and Smallways. Beyond 2km the intervening landform and vegetation patterns were assessed as negating the potential for significant effects.

## 10.3.9 Study Area and Fieldwork Conclusions

10.3.9.1 A series of ZTVs were generated across a 7km study area, based upon the Project road alignment and the Project road alignment with 4.7m tall vehicles. These ZTVs were based on the existing surrounding landform only, so as to provide a ‘worst case’ and precautionary approach in line with industry guidance in modelling the theoretical visibility of the Project. The 7km distance was assessed as propionate for the ZTVs, as from beyond 7km, the distance from the Project, the context of the existing A66 and intervening features was assessed as negating the potential for significant landscape or visual effects.

10.3.9.2 With reference to Figure 10.3: Zone of Theoretical Visibility (ZTV 7km), the theoretical visibility of both the Project road alignment and with vehicles for each of the Project sections was broadly consistent with one another, with minor areas of additional theoretical visibility from the vehicles due to their increased height from elevated areas of land, mainly to the north of Temple Sowerby to Appleby and around Barnard Castle. Whilst there was additional theoretical visibility of vehicles in comparison to the proposed road alignment to the east of Scotch Corner, this part of the Project was scoped out of the assessment due to the type and scale of works within the existing road corridor being assessed as not resulting in significant effects.

10.3.9.3 An initial desk-based review was undertaken for the 7km study area, which identified that the ZTVs covered statutory designated landscapes, areas of higher landscape value, conservation areas and settlements. There were also several long-distance routes and national trails, along with an extensive network of PRoW covered by the ZTVs.

10.3.9.4 Initial fieldwork was undertaken from across the 7km ZTV via visiting publicly accessible locations. The fieldwork concluded that in reality, many of the locations identified by the ZTVs would have no visibility of the construction or operation of the Project. This was due to the intervening vegetation, buildings and localised changes in terrain (i.e. the 'reality on the ground') not captured by the 5m DTM ZTV modelling.

10.3.9.5 Where the Project was considered to be visible, professional judgement considered that the potential for significant effects would not extend beyond 3km from the Project overall. This was because the intervening vegetation and distance sufficiently softened or screened views to limit any potential significant effects, particularly in the context of the composition of views already including the A66 and vehicles.

10.3.9.6 Therefore, from the initial fieldwork, the 7km study area was reduced to a 3km study area and confirmed with Stakeholders via the Technical Working Groups (TWG), as set out in the ES LVIA Chapter, section 10.4. For Temple Sowerby to Appleby and Appleby to Brough three viewpoint locations from beyond the 3km study area were included to specifically address Stakeholder comments resulting from these TWG.

10.3.9.7 The 7km ZTVs were then revised for to focus on the smaller 3km study area, using more detailed digital surface modelling, which included the existing trees and buildings within the landscape. This enabled a more refined comparison between the geographic areas from which the existing A66 with vehicles and the Project with vehicles would be visible.

10.3.9.8 With reference to Figure 10.4: Zone of Theoretical Visibility (ZTV 3km) with Viewpoints, the theoretical visibility of the existing A66 and the Project were consistent overall. There was minor additional theoretical visibility of the Project in comparison to the existing A66 from the south of Penrith and more notable additional theoretical visibility to the north of Temple Sowerby to Appleby (due to the re-alignment of the road around Kirkby Thore).

10.3.9.9 The 3km ZTVs were then used to determine the subsequent fieldwork and to inform the identification of receptors, viewpoints and photomontages for the final ES LVIA.

## 10.3.10 References


- Highways England (2020) Design Manual for Roads and Bridges LA 107 Landscape and Visual Effects
- Landscape Institute and Institute of Environmental Management and Assessment (2013) Guidelines for Landscape and Visual Impact Assessment, Third Edition