E. Project Section D Assessment Factor Tables: Environmental Considerations

Assessment Sheet - Environmental Considerations

Reference Case	***Alignment 8***
Alignments Key	**Alignment 8** **Tempsford to Cambourne South** **Alignment 9** **Tempsford to Cambourne North - A428** **Alignment 7** **Tempsford to Cambourne North** **Alignment 1** **St Neots South Option A to Cambourne North - A428** **Alignment 3** **St Neots South Option A to Cambourne North** **Alignment 5** **St Neots South Option B to Cambourne North** **Alignment 2** **St Neots South Option A to Cambourne South - A428** **Alignment 4** **St Neots South Option A to Cambourne South** **Alignment 6** **St Neots South Option B to Cambourne South**

ID	Consideration	Qualitative indicators	Judgement									Justification
			Alignment 8	Alignment 9	Alignment 7	Alignment 1	Alignment 3	Alignment 5	Alignment 2	Alignment 4	Alignment 6	
14.1	Agriculture, Forestry and Soils	Best and most versatile agricultural land Soil disturbance Land holdings Commercial Forestry	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Minor improvement	Minor improvement	Minor improvement	The Reference Case is likely to impact approximately 50 farm holdings (based on available information), of which two would be likely to experience a major adverse impact from the construction of the scheme. Alignment 9 is likely to impact approximately 39 farm holdings (based on available information), of which one would be likely to experience a major adverse impact from the construction of the scheme. Based on the length of Alignment 9, it would require more agricultural land compared to the Reference Case. This limits any improvement associated with a reduction in farm holdings affected by Alignment 9. This option is considered to be neutral. Alignment 7 is likely to impact approximately 42 farm holdings (based on available information), of which two would be likely to experience a major adverse impact from the construction of the scheme. Based on the length of Alignment 7, it would require more agricultural land compared to the Reference Case. This limits any improvement associated with a reduction in farm holdings affected by Alignment 7. This option is considered to be neutral. Alignment 1 is likely to impact approximately 35 farm holdings (based on available information), of which one would be likely to experience a major adverse impact from the construction of the scheme. Based on the length of Alignment 1, it would require more agricultural land compared to the Reference Case. This limits any improvement associated with a reduction in farm holdings affected by Alignment 1. This option is considered to be neutral. Alignment 3 is likely to impact approximately 40 farm holdings (based on available information), of which two would be likely to experience a major adverse impact from the construction of the scheme. Based on the length of Alignment 3, it would require more agricultural land compared to the Reference Case. This limits any improvement associated with a reduction in farm holdings affected by Alignment 3. This option is considered to be neutral. Alignment 5 is likely to impact approximately 42 farm holdings (based on available information), of which one would be likely to experience a major adverse impact from the construction of the scheme. Based on the length of Alignment 5, it would require more agricultural land compared to the Reference Case. This limits any improvement associated with a reduction in farm holdings affected by Alignment 5. This option is considered to be neutral. Alignment 2 is likely to impact approximately 40 farm holdings (based on available information), of which two would be likely to experience a major adverse impact from the construction of the scheme. Based on the length of Alignment 2, it would require a broadly similar amount of agricultural land as the Reference Case. This option is considered to be a minor improvement overall. Alignment 4 is likely to impact approximately 39 farm holdings (based on available information), of which two would be likely to experience a major adverse impact from the construction of the scheme. Based on the length of Alignment 4, it would require a broadly similar amount of agricultural land as the Reference Case. This option is considered to be a minor improvement overall. Alignment 6 is likely to impact approximately 40 farm holdings (based on available information), of which two would be likely to experience a major adverse impact from the construction of the scheme. Based on the length of Alignment 6, it would require a broadly similar amount of agricultural land as the Reference Case. This option is considered to be a minor improvement overall. It should be noted that the Reference Case crosses a number of smaller, less commercial holdings, primarily located north of Bedford, north of Tempsford, and between Kingston and Great Eversden. These may potentially be considered lower sensitivity, which means on balance, the reduction in the number of holdings impacted in each option compared to the Reference Case would only bring about a minor improvement. It has been assumed that all land affected by the various options is of the same agricultural land quality, as limited detailed Agricultural Land Classification (ALC) data are available for any of the route options.

ID	Consideration	Qualitative indicators	Judgement									Justification
			Alignment 8	Alignment 9	Alignment 7	Alignment 1	Alignment 3	Alignment 5	Alignment 2	Alignment 4	Alignment 6	
14.2	Air Quality	Dust deposition Proximity to sensitive receptors Vehicle movements	Neutral	Neutral	Minor improvement	Major improvement	Major improvement	Minor improvement	Minor improvement	Major improvement	Minor improvement	For the purposes of the air quality appraisal, it has been assumed that the Scheme will operate using diesel-powered trains. This assumption does not preclude other methods of propulsion from being adopted. The main considerations for the air quality appraisals have been whether any air quality management areas (AQMA) would be affected by each option, location and number of residential properties close to the alignment, total volume of earthworks required and location of any sensitive ecological sites. The Reference Case (Alignment 8) is likely to impact on residential properties in Roxton, Tempsford, Abbotsley, Caxton, Great Cambourne and Crow End. No AQMAs are likely to be impacted by this option. Alignment 9 brings the alignment closer to residential properties in Highfields. Overall, there will be slightly more properties impacted from this alignment, but a slightly lower volume of earthworks required compared to the Reference Case. No AQMAs are likely to be impacted by this option. Overall, Alignment 9 is considered to be neutral in relation to air quality compared to the Reference Case. Alignment 7 brings the alignment closer to residential properties in Highfields, but overall there will be less properties impacted from this alignment and a lower volume of earthworks required compared to the Reference Case. No AQMAs are likely to be impacted by this option. Overall, Alignment 7 is considered to be a minor improvement in relation to air quality compared to the Reference Case. Alignment 1 brings the alignment closer to residential properties both in Highfields and Chawston, but overall there will be significantly less properties impacted from this alignment and a lower volume of earthworks required compared to the Reference Case. No AQMAs are likely to be impacted by this option. Overall, Alignment 1 is considered to be a major improvement in relation to air quality compared to the Reference Case. Alignment 3 brings the alignment closer to residential properties both in Highfields and Chawston. Overall, there will be significantly less properties impacted from this alignment and a much lower volume of earthworks required compared to the Reference Case. No AQMAs are likely to be impacted by this option. Overall, Alignment 3 is considered to be a major improvement in relation to air quality compared to the Reference Case. Alignment 5 brings the alignment closer to residential properties both in Highfields and Chawston. Overall, there will be less properties affected from this alignment, but a larger volume of earthworks required compared to the Reference Case. No AQMAs are likely to be impacted by this option. Overall, Alignment 5 is considered to be a minor improvement in relation to air quality compared to the Reference Case. Alignment 2 brings the alignment closer to residential properties on the A1 in Chawston. Overall there, will be less properties impacted from this alignment, but a larger volume of earthworks required compared to the Reference Case. No AQMAs are likely to be impacted by this option. Overall, Alignment 2 is considered to be a minor improvement in relation to air quality compared to the Reference Case. Alignment 4 brings the alignment closer to residential properties on the A1 in Chawston, but overall there will be significantly less properties impacted from this alignment and a lower volume of earthworks required compared to the Reference Case. No AQMAs are likely to be impacted by this option. Overall, Alignment 4 is considered to be a major improvement in relation to air quality compared to the Reference Case. Alignment 6 brings the alignment closer to residential properties on the A1 in Chawston. Overall, there will be less properties impacted from this alignment, but a larger volume of earthworks required compared to the Reference Case. No AQMAs are likely to be affected by this option. Overall, Alignment 6 is considered to be a minor improvement in relation to air quality compared to the Reference Case.

ID	Consideration	Qualitative indicators	Judgement									Justification
			Alignment 8	Alignment 9	Alignment 7	Alignment 1	Alignment 3	Alignment 5	Alignment 2	Alignment 4	Alignment 6	
14.3	Climate	GHG emissions	Neutral	Minor improvement	Minor improvement	Major improvement	Major improvement	Major improvement	Major improvement	Major improvement	Major improvement	Alignment 9 results in an increase to track length required and therefore an increase to GHG emissions compared to the Reference Case. Alignment 9 results in a decrease to the bridge and viaduct areas required compared to the Reference Case which in turn results in a decrease to the associated GHG emissions. Alignment 9 results in a significant decrease to the GHG emissions associated with earthworks. Overall, Alignment 9 results in a slightly lower carbon footprint (approximately 6% saving) and therefore a minor improvement compared to the Reference Case. Alignment 7 results in an increase to track length required and therefore an increase to GHG emissions compared to the Reference Case. Alignment 7 results in a decrease to the bridge and viaduct areas required compared to the Reference Case which in turn results in a decrease to the associated GHG emissions. Alignment 7 results in a slight increase to the GHG emissions associated with earthworks. Overall, Alignment 7 results in a slightly lower carbon footprint (approximately 6%) and therefore a minor improvement compared to the Reference Case. Alignment 1 results in an increase to track length required and therefore an increase to GHG emissions compared to the Reference Case. Alignment 1 results in a decrease to the bridge and viaduct areas required compared to the Reference Case which in turn results in a decrease to the associated GHG emissions. Alignment 1 results in a significant decrease to the GHG emissions associated with earthworks. Overall, Alignment 1 results in a lower carbon footprint (approximately 32% saving) and therefore a major improvement compared to the Reference Case. Alignment 3 results in an increase to track length required and therefore an increase to GHG emissions compared to the Reference Case. Alignment 3 results in a decrease to the bridge and viaduct areas required compared to the Reference Case which in turn results in a decrease to the associated GHG emissions. Alignment 3 results in a significant decrease to the GHG emissions associated with earthworks. Overall, Alignment 3 results in a slightly lower carbon footprint (approximately 16% saving) and therefore a major improvement compared to the Reference Case. Alignment 5 results in an increase to track length required and therefore an increase to GHG emissions compared to the Reference Case. Alignment 5 results in a decrease to the bridge and viaduct areas required compared to the Reference Case which in turn results in a decrease to the associated GHG emissions. Alignment 5 results in a slight decrease to the GHG emissions associated with earthworks. Overall, Alignment 5 results in a lower carbon footprint (approximately 27% saving) and therefore a major improvement compared to the Reference Case. Alignment 2 results in an increase to track length required and therefore an increase to GHG emissions compared to the Reference Case. Alignment 2 results in a decrease to the bridge and viaduct areas required compared to the Reference Case which in turn results in a decrease to the associated GHG emissions. Alignment 2 results in a significant decrease to the GHG emissions associated with earthworks. Overall, Alignment 2 results in a lower carbon footprint (approximately 20% saving) and therefore a major improvement compared to the Reference Case. Alignment 4 results in a slight increase to track length required and therefore a slight increase to GHG emissions compared to the Reference Case. Alignment 4 results in a decrease to the bridge and viaduct areas required compared to the Reference Case which in turn results in a decrease to the associated GHG emissions. Alignment 4 results in a significant decrease to the GHG emissions associated with earthworks. Overall, Alignment 4 results in a lower carbon footprint (approximately 14% saving) and therefore a major improvement compared to the Reference Case. Alignment 6 results in a slight increase to track length required and therefore a slight increase to GHG emissions compared to the Reference Case. Alignment 6 results in a decrease to the bridge and viaduct areas required compared to the Reference Case which in turn results in a decrease to the associated GHG emissions. Alignment 6 results in a decrease to the GHG emissions associated with earthworks. Overall, Alignment 6 results in a lower carbon footprint (approximately 27% saving) and therefore a major improvement compared to the Reference Case. To understand the true impact of earthworks on GHG emissions, the entire route for each option needs to be considered and sections not looked at in isolation to allow the cut/fill balance to be assessed accurately. For example, a fill surplus in one part of the route could be balanced by a fill deficit in another part of the route, which would likely be beneficial to GHG emissions as it would reduce the need for off-site haulage. Option 4 of the Hauxton Section and Option 1 for the Bedford Section have been selected as the preferred routes in those sections for the purposes of the earthworks assessment. Earthworks volumes and emissions are presented here for the Core Section Option plus Hauxton Section Option 4 and Bedford Section Option 1. GHG emissions reported capture the embodied impact of the construction material only for track, bridges and viaducts. The assessment was based on track length and bridges/viaduct area (m2) only. Plant emissions, transport/logistics or other elements such as maintenance or end-of-life was not included as this level of detail was not available at this design stage. The impact on operational carbon emissions has not been assessed at this stage.
		Embodied GHG emissions (Cradle to End of Construction)										
		Operational GHG emissions										
sed	Community	Residential properties	Neutral	Minor improvement	Minor improvement	Minor improvement	Minor improvement	Minor improvement	Neutral	Neutral	Neutral	The Reference Case (Align 8) is expected to require eight residential property demolitions and has the potential to result in amenity or isolation impacts on the very sensitive Disabilities Trust care home on Graze Hill. The Reference Case would also impact on a number of lower sensitivity community facilities, and will cross 57 PRoW, which are assumed to be diverted. All options are expected to require residential demolitions (based on the earthworks footprint +10m): - Reference Case: 8 properties, the majority of which are located around Broadway, Bourn (7) with 1 isolated property near Sandy. - Alignment 9: 3 properties, 2 properties at Two Potts Farm and 1 isolated property near Eynesbury Hardwick - Alignment 7: 3 properties, 2 properties at Two Potts Farm and 1 isolated property near Sandy. - Alignment 1: 4 properties, 2 properties at Two Potts Farm, 1 property to the south of Little Barford and 1 isolated property near Eynesbury Hardwick. - Alignment 3: 3 properties, 2 properties at Two Potts Farm and 1 property in Wilden - Alignment 5: 4 properties, 2 properties at Two Potts Farm, 1 property in Wilden and 1 property to the south of Little Barford. - Alignment 2: 9 properties, the majority of which are located around Broadway, Bourn (7) with 1 isolated property near Eynesbury Hardwick and 1 property in Wilden - Alignment 4: 8 properties, 7 located around Broadway, Bourn and 1 property in Wilden. - Alignment 6: 9 properties, 7 properties located around Broadway, Bourn, 1 property in Wilden and 1 property to the south of Little Barford. In terms of potential demolitions, Alignment 7, 5, 1, 9 and 3 are considered to represent a minor improvement on the Reference Case, with other options being neutral. All options have the potential to result in amenity or isolation impacts, particularly during construction, at a very sensitive community facility, Disabilities Trust care home on Graze Hill, which provides residential care and support for adults with autism and learning difficulties. All options have the potential to result in amenity impacts to a number of community facilities which are a of a lower sensitivity to construction or operational impacts. This is expected to be neutral for all options. No information on routes specifically promoted for recreation is available, however between 51 and 77 PRoW are crossed with all options. All crossed PRoW are assumed to be diverted. Based on the level of information available, this is expected to be a neutral for all options. Overall, Alignments 7, 5, 1, 9 and 3 considered to represent a minor improvement on the Reference Case, with other options being neutral.
		Community facilities										
		Recreational facilities										
		Open space and PRoW										

ID	Consideration	Qualitative indicators	Judgement									Justification
			Alignment 8	Alignment 9	Alignment 7	Alignment 1	Alignment 3	Alignment 5	Alignment 2	Alignment 4	Alignment 6	
######	Ecology and biodiversity	Protected and notable species Biodiversity Net Gain	Neutral	Minor worsening	Minor worsening	Minor improvement	Minor improvement	Neutral	Major improvement	Major improvement	Major improvement	The Reference Case (Alignment 8) involves a large overlap with the Impact Risk Zone (IRZ) to the Weaveley and Sand Woods SSSI, risking an indirect impact to the interests of the site, and further indirect impacts to a high number of ancient (or potentially ancient) woodland sites (within 50m of those sites). It involves a relatively low impact to mapped priority habitat areas, both in terms of extent of impact and number of sites. Alignment 9 involves no overlap with SSSI IRZs, slightly reduced indirect impacts to ancient (or potentially ancient) woodland sites, but relatively higher impacts to mapped priority habitat areas, including impacts to the highest number of priority areas (of all Options), representing a minor worsening to the Reference Case. Alignment 7 involves the same (large) overlap with the IRZ and (high) indirect impacts to ancient (or potentially ancient) woodland sites. It also involves a relatively higher impact to mapped priority habitats, both in terms of extent of impact and number of sites, and therefore represents a minor worsening compared to the Reference Case. Alignment 1 involves no overlap with SSSI IRZs, no indirect impact to ancient (or potentially ancient) woodland sites, but relatively higher impacts to mapped priority habitat areas, representing a minor improvement to the Reference Case. Alignment 3 involves no overlap with SSSI IRZs, indirect impacts to just one ancient (or potentially ancient) woodland site, but relatively higher impacts to mapped priority habitat areas, representing a minor improvement to the Reference Case. Alignment 5 involves a reduced overlap with the Weaveley and Sand Woods SSSI IRZ, indirect impacts to fewer ancient (or potentially ancient) woodland sites, but a relatively higher impact to mapped priority habitat areas. On balance, it is neutral compared to the Reference Case. Alignment 2 involves no overlap with SSSI IRZs, no indirect impact to ancient (or potentially ancient) woodland sites, and slightly lower impacts to mapped priority habitat areas. Minor impacts are likely to the boundary of the Cambourne Nature Reserve (but these can be mitigated and compensated locally). This Option represents a major improvement to the Reference Case. Alignment 4 involves no overlap with SSSI IRZs, indirect impacts to fewer ancient (or potentially ancient) woodland sites, and low impacts to mapped priority habitat areas (comparable to Reference). Minor impacts are likely to the boundary of the Cambourne Nature Reserve (but these can be mitigated and compensated locally). This Option represents a major improvement to the Reference Case. Alignment 6 involves a reduced overlap with the Weaveley and Sand Woods SSSI IRZ, indirect impacts to fewer ancient (or potentially ancient) woodland sites, and slightly lower impacts to mapped priority habitat areas. Minor impacts are likely to the boundary of the Cambourne Nature Reserve (but these can be mitigated and compensated locally). This Option represents a major improvement to the Reference Case.
######	Electromagnetic Interference	Proximity to sensitive receptors										Insufficient detail at this stage of the design to complete assessment factors
######	Equalities	Disproportionate impacts (refer to the Social Impact considerations as part of the *Environmental impacts and opportunities* factor)										Insufficient detail at this stage of the design to complete assessment factors
######	Health	Neighbourhood quality										Insufficient detail at this stage of the design to complete assessment factors
		Access to services, health and social care										
		Access to green space and physical activity										
		Social capital										

ID	Consideration	Qualitative indicators	Judgement									Justification
			Alignment 8	Alignment 9	Alignment 7	Alignment 1	Alignment 3	Alignment 5	Alignment 2	Alignment 4	Alignment 6	
######	Historic Environment	Built Heritage Buried Archaeology Historic Landscape	Neutral	Major improvement	Minor improvement	Major improvement	Minor improvement	Major improvement	Minor improvement	Minor improvement	Minor improvement	There is little difference between all route options in terms of the quantity of impacts on known non-designated heritage assets which includes both buried archaeology and above-ground non-designated assets. The qualitative impacts (the types of non-designated features) however are more complex but still overall do not differ greatly between the options. With regards to designated (protected) sites which include both buried archaeology and above-ground heritage: The Reference Case (Alignment 8) comes in close proximity to a larger number of designated assets in comparison to all other options (except for the number of Scheduled Monuments within 1km in Alignment 2). It passes within 250m of three Scheduled Monuments (SMs), and has earthworks in an archaeologically sensitive area at Tempsford. The alignment comes within 500 metres of ten conservation areas, of which an area of 662150m2 fall with in the 500 metres. This includes; Bourn – Village & Hall, Caldecote, Harlton, Kingston, Toft, Bedford, Roxton, Great Barford, Tempsford, Abbotsley. Concentrations of listed buildings are focused in these areas. It also passes through the complex heritage resource area of the Bourn Valley, which includes a higher density of heritage resource than the alternative alignment options which branch north of Cambourne and re-align south of Toft. These resources include buried archaeology, built heritage and the conservation areas of Bourne, Caldecote and Kingston. Alignment 9 is in close proximity to significantly fewer Listed Buildings and SMs than the Reference Case. It avoids the complex heritage resource area of the Bourn Valley (by routing north of Cambourne) which provides additional improvement. A further additional benefit is that the alignment is north of, and in parallel to, the A428 which reduces the likelihood of additional setting impacts to Listed Buildings and SMs in the vicinity as fewer assest would be impacted. The alignment passes within 500 metres of six conservation areas totaling 474,762m2; considerably less than the Reference. This includes; Harlton, Toft, Bedford, Roxton, Great Barford, Tempsford. Whilst similar to the Reference Case in the western section, Alignment 9 avoids the archaeologically sensitive area north of Tempsford, also resulting in an improvement. Overall this represents a major improvement compared to the Reference Case. Alignment 7 is in close proximity to fewer Listed Buildings and SMs than the Reference. It avoids the complex heritage resource area of the Bourn Valley, making it less likely to come across further unknown (non-designated) features but is the only option which remains within 250m of three SMs which the Reference Case also does. The alignment passes within 500 metres of seven conservation areas totaling 448,853m2; considerably less than the Reference. This includes: Harlton, Toft, Bedford, Roxton, Great Barford, Tempsford, and Abbotsley. It also has planned earthworks in the archaeologically sensitive area north of Tempsford. Overall this represents a minor improvement compared to the Reference Case. Alignment 1 is in close proximity to significantly fewer Listed Buildings and SMs than the Reference Case. It avoids the complex heritage resource area of the Bourn Valley (by routing north of Cambourne) which provides additional improvement. The alignment passes within 500 metres of three conservation areas totaling 251,452m2; significantly less than the Reference. These conservation areas are; Harlton, Toft and Bedford. Furthermore, the alignment is north of, and in parallel to, the A428 which reduces the likelihood of additional setting impacts to Listed Buildings and SMs in the vicinity as fewer assets would be impacted. Overall this represents a major improvement compared to the Reference Case. Alignment 3 is in close proximity to significantly fewer listed buildings and SMs and has the benefit of avoiding the complex heritage resource area of the Bourn Valley (by routing north of Cambourne). The alignment passes within 500m of three conservation areas totaling 251,445m2; significantly less than the Reference. This includes Harlton, Toft and Bedford. However Abbotsley Conservation Area, is slightly over 500 metres away from the alignment and could also experience some setting impacts. However, despite the low m2 of conservation areas potentially affected, the number of listed buildings within 1km of the alignment remain high – although still considerably lower than the Reference. Overall this represents a minor improvement compared to the Reference Case. Alignment 5 is in close proximity to significantly fewer Listed Buildings and SMs than the Reference Case. It avoids the complex heritage resource area of the Bourn Valley (by routing north of Cambourne) which provides additional improvement. The alignment passes within 500m of four conservation areas totaling 324,393m2; significantly less than the Reference. This includes: Harlton, Toft, Abbotsley and Bedford. Overall this represents a major improvement compared to the Reference Case. Alignment 2 is north of and in parallel to the A428 resulting in passing closer to fewer Listed Buildings than the Reference Case and reduces the likelihood of additional setting impacts to Listed Buildings and SMs in the vicinity as fewer assets would be impacted. However, on its diversion to the south of Cambourne, at Elitsley, it comes within 8m of a SM ("Pastures Farm - Moated site at Pastures Farm" NHLE# 1019177 and "Dovecote to the North East of Caxton Pastures Farmhouse" - NHLE# 1163004) which is likely to cause some setting impacts to the designated asset. Despite coming closer to this particular SM and coming in close proximity to slightly more SMs overall than the Reference Case, due to the benefits of keeping north via St Neots in the western section this option avoids the heritage sensitive areas at Tempsford and Roxton. The alignment passes within 500m of six conservation areas totaling 464,734m2; considerably less than the Reference. This includes: Bourn – Village & Hall, Caldecote, Harlton, Kingston, Toft and Bedford. Alignment 2 represents a minor improvement compared to the Reference Case. Alignment 4 is in close proximity to fewer Listed Buildings and SMs than the Reference Case. Like the Reference Case, it passes through the complex heritage resource area of the Bourn Valley. Whilst planned earthworks occur in archaeologically sensitive areas, these are all comparable in nature to those earthworks planned for the Reference Case. The alignment passes within 500m of six conservation areas totaling 464,741m2; considerably less than the Reference. This includes: Bourn – Village & Hall, Caldecote, Harlton, Kingston, Toft and Bedford Overall this represents a minor improvement compared to the Reference Case. Alignment 6 is in close proximity to fewer Listed Buildings and SMs than the Reference Case. Like the Reference Case, it passes through the complex heritage resource area of the Bourn Valley. Whilst planned earthworks occur in some archaeologically sensitive areas, these are all comparable in nature to those earthworks planned for the Reference Case. The alignment passes within 500m of seven conservation areas totaling 537,689m2; less than the Reference. This includes: Bourn – Village & Hall, Caldecote, Harlton, Kingston, Toft, Abbotsley and Bedford Overall this represents a minor improvement compared to the Reference Case.

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			Alignment 8	Alignment 9	Alignment 7	Alignment 1	Alignment 3	Alignment 5	Alignment 2	Alignment 4	Alignment 6	
14.10	Land Quality	Designated Sites Land contamination Mining/mineral resources	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Reference Case (Alignment 8): the superficial geology comprises glacial till/diamicton (Oadby Member) underlain by Mudstones (Peterborough Member, Kellaway and West Walton/Oxford Clay Formations), passing eastwards onto the Lower Greensand, Gault Formation and Grey Chalk. Alignment 9: the BGS (British Geological Survey) mapping shows isolated areas of artificial (made) ground, north of Wyboston and at Tempsford. These are likely to be small pits for gravel extraction, although the backfill is unknown. The scale of these areas mean that they are not likely to be a significant risk. Alignment 9 intersects an area of filled ground referred to as the Eversden/Eltisley landfill (2.4 ha approx.), licensed in 1993. Additional research indicates that this area was not a commercial waste site but connected to an agricultural use and that it is now closed and the ground reinstated. On this basis, this option is considered to be neutral. Alignment 7: the superficial geology comprises glacial till/diamicton (Oadby Member) underlain by Mudstones (Peterborough Member, Kellaway and West Walton/Oxford Clay Formations), passing eastwards onto the Lower Greensand, Gault Formation and Grey Chalk. This option is considered to be neutral. Alignment 1: the BGS (British Geological Survey) mapping shows isolated areas of artificial (made) ground, north of Wyboston and at Tempsford. These are likely to be small pits for gravel extraction, although the backfill is unknown. The scale of these areas mean that they are not likely to be a significant risk. Alignment 1 intersects an area of filled ground referred to as the Eversden/Eltisley landfill (2.4 ha approx.), licensed in 1993. Additional research indicates that this area was not a commercial waste site but connected to an agricultural use and that it is now closed and the ground reinstated. On this basis, this option is considered to be neutral. Alignment 3: the superficial geology comprises glacial till/diamicton (Oadby Member) underlain by Mudstones (Peterborough Member, Kellaway and West Walton/Oxford Clay Formations), passing eastwards onto the Lower Greensand, Gault Formation and Grey Chalk. This option is considered to be neutral. Alignment 5: the superficial geology comprises glacial till/diamicton (Oadby Member) underlain by Mudstones (Peterborough Member, Kellaway and West Walton/Oxford Clay Formations), passing eastwards onto the Lower Greensand, Gault Formation and Grey Chalk. There are two historical landfills (small pits) shown in the area of the river terrace gravels, to the north of Roxton at Little Barford. This option is considered to be neutral. Alignment 2: the BGS (British Geological Survey) mapping shows isolated areas of artificial (made) ground, north of Wyboston and at Tempsford. These are likely to be small pits for gravel extraction, although the backfill is unknown. The scale of these areas mean that they are not likely to be a significant risk. Alignment 2 intersects an area of filled ground referred to as the Eversden/Eltisley landfill (2.4 ha approx.), licensed in 1993. Additional research indicates that this area was not a commercial waste site but connected to an agricultural use and that it is now closed and the ground reinstated. On this basis, this option is considered to be neutral. Alignment 4: the superficial geology comprises glacial till/diamicton (Oadby Member) underlain by Mudstones (Peterborough Member, Kellaway and West Walton/Oxford Clay Formations), passing eastwards onto the Lower Greensand, Gault Formation and Grey Chalk. To the immediate north and west of Abbotsley, there are also superficial deposits of alluvium and river terrace deposits. The gravel deposits are likely to constitute Mineral Safeguarded Areas (MSA) although this option is still unlikely to constitute an impact, owing to the small area of MSA likely to be affected, in comparison to the total area of MSA. This option is considered to be neutral. Alignment 6: the superficial geology comprises glacial till/diamicton (Oadby Member) underlain by Mudstones (Peterborough Member, Kellaway and West Walton/Oxford Clay Formations), passing eastwards onto the Lower Greensand, Gault Formation and Grey Chalk. There are two historical landfills (small pits) shown in the area of the river terrace gravels, to the north of Roxton at Little Barford. This option is considered to be neutral. Information on MSAs has not be available to inform this appraisal.
14.11	Landscape and Visual	Landscape character Views	Neutral	Neutral	Neutral	Minor improvement	Major improvement	Major improvement	Neutral	Minor improvement	Minor improvement	Reference Case. Landscape: The reference case (Alignment 8) has relatively high impacts upon landscape character, due to direct impacts upon woodland and overall character at Brickhill Country Park, the River Great Ouse valley and indirect impacts upon the character of Roxton Park. Visual: this alignment has some very high visual effects, including upon residents in Renhold, Roxton and Crow End, it also forms moderate impacts upon a number of settlements including those to the South of Cambourne; Caxton, Caldecote, Great Cambourne, Lower Cambourne and Kingston. Alignment 7, 2 and 9 - neutral combined landscape and visual impacts in comparison to the reference case. Landscape: Alignment 7 and 9 have similar levels of landscape impact to the reference case, including impacts upon Brickhill Country Park, the River Great Ouse valley and indirect impacts upon the character of Roxton Park. They have marginally higher landscape impacts due to loss of woodland on the North of Cambourne alignment (All Angels Park and trees lining Bourne Brook) which would impact upon local landscape character. Alignment 2 has notably less landscape impacts in comparison to the reference case due to not impacting on any landscape designations and on only a few woodlands. Visual : Overall Alignment 7 and 9 have a similar number of visual impacts in comparison to the reference case, though they do both have very high visual impacts upon Highfields Caldecote, settlement close to Renhold and Roxton. Alignments to the north of Cambourne have fewer visual impacts compared to those to the south. Alignment 2 has far greater visual impact than the reference case, forming very high visual impacts upon Chawston due to the A1 viaduct. It also a causes moderate impacts at Caxton, Caldecote, Great Cambourne, Lower Cambourne and Kingston due to the South of Cambourne alignment and forms additional visual impact upon Eltisley. Alignment 6, 4 and 1 - minor improvements in comparison to the reference case. Landscape: these options have notably fewer landscape impacts than the reference case. This is due to avoiding impacts upon landscape designations at Brickhill Country Park, the River Great Ouse valley and indirect impacts upon the character of Roxton Park. North of Cambourne, for Alignment 1 does however result in some areas of woodland loss in addition to the reference case (All Angels Park and trees lining Bourne Brook). Visual: these options all have similar levels of visual impact as the reference case, though upon different receptors. All these options form very high visual effects upon Chawston due to the A1 viaduct. Alignment 6 and 4 result in very high visual impact upon Crows End, to the South of Cambourne. Alignment 5 and 3 - major improvement in comparison to the reference case. Landscape: these options have far less landscape impact than the reference case, with no impacts upon designated landscapes. However, due to the alignment to the north of Cambourne this results in some areas of woodland loss in addition to the reference case (All Angels Park and trees lining Bourne Brook). Visual: Alignment 5 and 3 do give rise to very high visual impacts upon Chawston and Highfields Caldecote, due to the A1 viaduct. However, elsewhere both these Options result in less visual impact than the reference case. This is partly due to there being relatively few visual impacts to the north of Cambourne compared to south of Cambourne.
14.12	Major Accidents and Natural Disasters	Environmental impact of unplanned events (refer to events considered in the Resilience Assessment)										Insufficient detail at this stage of the design to complete assessment factors.

ID	Consideration	Qualitative indicators	Judgement									Justification
			Alignment 8	Alignment 9	Alignment 7	Alignment 1	Alignment 3	Alignment 5	Alignment 2	Alignment 4	Alignment 6	
14.13	Noise and Vibration	Residential Non-residential	Neutral	Neutral	Neutral	Minor improvement	Minor improvement	Minor improvement	Minor improvement	Minor improvement	Minor improvement	Reference Case (Alignment 8): Without any mitigation, this alignment has the potential to create adverse impacts at the following communities: Clapham East, Clapham Park Wood, Woodlands Park, Mowsbury, Ravensden North-west, Ravensden South, Ravensden Church End, Woodend Lane, Bedford Road, Roxton, Abbotsley, Caxton, Lower Cambourne, Great Cambourne, Crow End, Caldecote, Kingston and Little Eversden. With appropriate mitigation, the communities subject to potential adverse noise impacts would reduce to: Ravensden Church End, Woodend Lane, Bedford Road and Crow End. Alignment 9: Without any mitigation, this alignment has the potential to create adverse impacts at the following communities: Clapham East, Clapham Park Wood, Woodlands Park, Mowsbury, Ravensden North-west, Ravensden South, Ravensden Church End, Woodend Lane, Bedford Road, Roxton, Wintringham, Wintringham Hall, Cambourne North, Upper Cambourne, Highfields, Highfields Court, Little Eversden. With appropriate mitigation, the communities subject to potential adverse noise impacts would reduce to: Ravensden Church End, Woodend Lane, Bedford Road, Wintringham Hall, Highfields, Highfields Court. Alignment 9 is rated as neutral relative to the Reference Case, due to the similar numbers of dwellings potentially affected. Alignment 7: Without any mitigation, this alignment has the potential to create adverse impacts at the following communities: Clapham East, Clapham Park Wood, Woodlands Park, Mowsbury, Ravensden North-west, Ravensden South, Ravensden Church End, Woodend Lane, Bedford Road, Roxton, Abbotsley, Cambourne North, Upper Cambourne, Highfields, Highfields Court, Little Eversden. With appropriate mitigation, the communities subject to potential adverse noise impacts would reduce to: Ravensden Church End, Woodend Lane, Bedford Road, Highfields, Highfields Court. Alignment 7 is rated as neutral relative to the Reference Case, due to the similar numbers of dwellings potentially affected. Alignment 1: Without any mitigation, this alignment has the potential to create adverse impacts at the following communities: Clapham East, Bedford East, Clapham Park Wood, Woodlands Park, Graze Hill, Ravensden North-west, Lower Grange / Sunderland Hill, Wilden, Chequers Hill North, Wilden East, Duck's Cross, South Brook, Colesden, Spinney Road, Chawston, Chawston East, Wintringham, Wintringham Hall, Cambourne North, Upper Cambourne, Highfields, Highfields Court, Little Eversden. With appropriate mitigation, the communities subject to potential adverse noise impacts would reduce to: Graze Hill, Lower Grange / Sunderland Hill, Colesden, Spinney Road, Chawston, Wintringham Hall, Highfields, Highfields Court. Alignment 1 is rated as a minor improvement relative to the Reference Case, due to the slightly smaller number of dwellings potentially affected. Alignment 3: Without any mitigation, this alignment has the potential to create adverse impacts at the following communities: Clapham East, Clapham Park Wood, Woodlands Park, Graze Hill, Ravensden North-west, Lower Grange / Sunderland Hill, Wilden, Chequers Hill North, Wilden East, Duck's Cross, South Brook, Colesden, Spinney Road, Chawston, Chawston East, Wintringham, Abbotsley, Cambourne North, Upper Cambourne, Highfields, Highfields Court, Little Eversden. With appropriate mitigation, the communities subject to potential adverse noise impacts would reduce to: Graze Hill, Lower Grange / Sunderland Hill, Colesden, Spinney Road, Chawston, Highfields, Highfields Court. Alignment 3 is rated as a minor improvement relative to the Reference Case, due to the slightly smaller number of dwellings potentially affected. Alignment 5: Without any mitigation, this alignment has the potential to create adverse impacts at the following communities: Clapham East, Clapham Park Wood, Woodlands Park, Graze Hill, Ravensden North-west, Lower Grange / Sunderland Hill, Wilden, Chequers Hill North, Wilden East, Duck's Cross, South Brook, Colesden, Spinney Road, Chawston, Chawston East, Abbotsley, Cambourne North, Upper Cambourne, Highfields, Highfields Court, Little Eversden. With appropriate mitigation, the communities subject to potential adverse noise impacts would reduce to: Graze Hill, Lower Grange / Sunderland Hill, Colesden, Spinney Road, Chawston, Highfields, Highfields Court. Alignment 5 is rated as a minor improvement relative to the Reference Case, due to the slightly smaller number of dwellings potentially affected. Alignment 2: Without any mitigation, this alignment has the potential to create adverse impacts at the following communities: Clapham East, Clapham Park Wood, Woodlands Park, Graze Hill, Ravensden North-west, Lower Grange / Sunderland Hill, Wilden, Chequers Hill North, Wilden East, Duck's Cross, South Brook, Colesden, Spinney Road, Chawston, Chawston East, Wintringham, Wintringham Hall, Caxton, Lower Cambourne, Great Cambourne, Crow End, Caldecote, Kingston, Little Eversden. With appropriate mitigation, the communities subject to potential adverse noise impacts would reduce to: Graze Hill, Lower Grange / Sunderland Hill, Colesden, Spinney Road, Chawston, Wintringham Hall, Crow End. Alignment 2 is rated as a minor improvement relative to the Reference Case, due to the slightly smaller number of dwellings potentially affected. Alignment 4: Without any mitigation, this alignment has the potential to create adverse impacts at the following communities: Clapham East, Clapham Park Wood, Woodlands Park, Graze Hill, Ravensden North-west, Lower Grange / Sunderland Hill, Wilden, Chequers Hill North, Wilden East, Duck's Cross, South Brook, Colesden, Spinney Road, Chawston, Chawston East, Wintringham, Abbotsley, Caxton, Lower Cambourne, Great Cambourne, Crow End, Caldecote, Kingston, Little Eversden. With appropriate mitigation, the communities subject to potential adverse noise impacts would reduce to: Graze Hill, Lower Grange / Sunderland Hill, Colesden, Spinney Road, Chawston, Crow End. Alignment 4 is rated as a minor improvement relative to the Reference Case, due to the slightly smaller number of dwellings potentially affected. Alignment 6: Without any mitigation, this alignment on its current horizontal alignment has the potential to create adverse impacts at the following communities: Clapham East, Clapham Park Wood, Woodlands Park, Graze Hill, Ravensden North-west, Lower Grange / Sunderland Hill, Wilden, Chequers Hill North, Wilden East, Duck's Cross, South Brook, Colesden, Spinney Road, Chawston, Chawston East, Abbotsley, Caxton, Lower Cambourne, Great Cambourne, Crow End, Caldecote, Kingston, Little Eversden. With appropriate mitigation, the communities subject to potential adverse noise impacts would reduce to: Graze Hill, Lower Grange / Sunderland Hill, Colesden, Spinney Road, Chawston, Crow End. Alignment 6 is rated as a minor improvement relative to the Reference Case, due to the slightly smaller number of dwellings potentially affected.

ID	Consideration	Qualitative indicators	Judgement									Justification
			Alignment 8	Alignment 9	Alignment 7	Alignment 1	Alignment 3	Alignment 5	Alignment 2	Alignment 4	Alignment 6	
14.14	Planning	Committed developments Safeguarded/ allocated areas	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	The Reference Case impacts no applications and no allocations. Alignment 6 and 4 also impact no applications and no allocations, and so are assessed as neutral. Alignment 2 impacts no applications but does impact one allocated site. This impact is on the edge of the allocation only and would not mean that the site could not be developed. Therefore this option is assessed as neutral. Alignment 7, 5 and 3 impact two applications – one which has permission for 140 homes off Highfields Road in Highfields Caldecote, and one which is awaiting a decision for a new village including approximately 3500 homes, employment land and associated village social infrastructure. Each Option will impact the edge of both of these applications, and most of the development could be delivered unimpeded by the Option and so is assessed as neutral. Alignment 9 and 1 impact two applications - one which has permission for 140 homes off Highfields Road in Highfields Caldecote, and one which is awaiting a decision for a new village including approximately 3500 homes, employment land and associated village social infrastructure. Each Option will impact the edge of both of these applications, and most of the development could be delivered unimpeded by the Option. In addition the Options impact only the edge of one allocation, which would not mean that the site could not be developed. Therefore these options are as assessed as neutral.
14.15	Socio-economics	Impact on local businesses from construction Impact on local businesses in operation										Insufficient detail at this stage of the design to complete assessment factors.
14.16	Traffic and Transport	Vehicle movements Highway network Public transport network (refer to Transport User Benefit factor) Non-motorised users Waterways and canals										Information related to vehicle movements, non motorised user movement and movement along waterways and canals are not available at this time. Impacts on permanent and temporary offline highway and PRoW diversion are provided elsewhere in this appraisal.
14.17	Waste and Materials	Excavated material Demolition material and waste Construction waste										Insufficient detail at this stage of the design to complete assessment factors.

ID	Consideration	Qualitative indicators	Judgement									Justification
			Alignment 8	Alignment 9	Alignment 7	Alignment 1	Alignment 3	Alignment 5	Alignment 2	Alignment 4	Alignment 6	
14.18	Water Resources and Flooding	Surface water Groundwater Flood Water Framework Directive	Neutral	Minor improvement	Minor improvement	Major improvement	Minor improvement	Major improvement	Minor improvement	Minor improvement	Minor improvement	The Reference Case (Alignment 8) has a relatively long crossing of the River Great Ouse flood plain, crosses an area of flood risk area at Tempsford and crosses a groundwater Source Protection Zone (SPZ) south of Cambourne. Alignment 9 has a similar alignment to the Reference Case at the River Great Ouse crossing and Tempsford but by routing via A428 and Cambourne North it avoids the groundwater SPZ. This represents a minor improvement compared to the Reference Case. Alignment 7 avoids the groundwater SPZ which represents a minor improvement compared to the Reference Case. There would be a flood risk associated with this option. Alignment 1 has a shorter crossing of the River Great Ouse flood plain and routes via St Neots South Option A via the A428 which has reduced flood risk by being located nearer the sub catchment divide. Alignment 1 routes via the A428 and north of Cambourne and avoids the groundwater SPZ. This represents a major improvement compared to the Reference Case. Alignment 3 has a shorter crossing of the River Great Ouse flood plain and routes via St Neots South Option A and then continues on the northern side of Abbotsley where it runs adjacent to Abbotsley Brook, crossing multiple tributaries. Alignment 3 routes north of Cambourne and avoids the groundwater SPZ. This represents a minor improvement compared to the Reference Case. Alignment 5 has a shorter crossing of the River Great Ouse flood plain and routes via St Neots South Option B which has reduced flood risk by being located nearer the sub catchment divide. Alignment 5 routes north of Cambourne and avoids the groundwater SPZ. This represents a major improvement compared to the Reference Case. Alignment 2 has a shorter crossing of the River Great Ouse flood plain and routes via St Neots South Option A via the A428 which has reduced flood risk by being located nearer the sub catchment divide. Alignment 2 crosses a groundwater SPZ. This represents a minor improvement compared to the Reference Case. Alignment 4 has a shorter crossing of the River Great Ouse flood plain than the Reference Case. Alignment 4 routes via St Neots South Option A and then continues on the northern side of Abbotsley where it runs adjacent to Abbotsley Brook, crossing multiple tributaries. Alignment 4 crosses a groundwater SPZ. This represents a minor improvement compared to the Reference Case. Alignment 6 comprises of a shorter bridge span of the River Great Ouse and routes via St Neots South Option B which has reduced flood risk by being located nearer the sub catchment divide. Alignment 6 also crosses water courses which are significantly smaller. Alignment 6 routes south of Cambourne and crosses a groundwater SPZ. This represents a minor improvement compared to the Reference Case.

Assessment Sheet - Environmental Considerations

Reference Case	***Alignment 8***	
Alignments Key	**Alignment 8**	**Tempsford to Cambourne South**
	Alignment 9	**Tempsford to Cambourne North - A428**
	Alignment 7	**Tempsford to Cambourne North**
	Alignment 1	**St Neots South Option A to Cambourne North - A428**
	Alignment 3	**St Neots South Option A to Cambourne North**
	Alignment 5	**St Neots South Option B to Cambourne North**
	Alignment 2	**St Neots South Option A to Cambourne South - A428**
	Alignment 4	**St Neots South Option A to Cambourne South**
	Alignment 6	**St Neots South Option B to Cambourne South**

ID	Consideration	Qualitative indicators	Suggested (not exhaustive) quantitative indicators to assist in making judgement									
			Measure	Alignment 8	Alignment 9	Alignment 7	Alignment 1	Alignment 3	Alignent 5	Alignment 2	Alignment 4	Alignment 6
14.1	Agriculture, Forestry and Soils	Best and most versatile agricultural land	Area in BMV Grade 1 (m²)	Data not available at this stage.								
			Area in BMV Grade 2 (m²)									
			Area in BMV Grade 3a (m²)									
		Soil disturbance										
		Land holdings	No. of land holdings (total)									
		Commercial Forestry	Area of commercial forestry (m²)									
14.2	Air Quality	Dust deposition	Area in AQMA (m²)	0	0	0	0	0	0	0	0	0
		Proximity to sensitive receptors	Number of schools within 1km	35	41	40	41	40	40	36	35	35
			Number of schools within 250m	0	0	0	0	0	0	0	0	0
			Number of hospitals within 1km	0	0	0	0	0	0	0	0	0
			Number of hospitals within 250m	0	0	0	0	0	0	0	0	0
			Number of green/open spaces/play areas within 250m	3	4	3	3	4	3	3	4	3
		Vehicle movements		Data not available at this stage.								
14.3	Climate	GHG emissions	Embodied material GHG emissions (tCO2-e)	239,524	226,466	225,816	162,930	199,384	160,511	191,704	213,078	174,135
		Embodied GHG emissions (Cradle to End of Construction)	Length of track (m)	37937	42034	41429	41649	42048	41541	39773	38556	38049
			GHG emissions of track (tCO2-e)	24,660	27,324	26,930	27,073	27,332	27,003	25,854	25,063	24,733
			Plan area of bridges and viaducts (m²)	124588	112886	115010	76762	99098	75154	94837	108667	84684
			GHG emissions of bridges and viaducts (tCO2-e)	214,864	199,142	198,886	135,857	172,052	133,508	165,850	188,015	149,402
			Steel and concrete material usage	Data not available at this stage.								
			Volume of earthworks - cut (m³)	2,448,758	2,978,771	1,532,110	3,120,367	2,212,519	3,903,568	4,038,723	3,341,255	4,817,250
			Volume of earthworks - fill (m³)	4,863,628	4,259,590	5,493,079	3,891,894	4,213,802	4,434,321	3,946,210	3,743,512	3,738,204
			Volume of earthworks - reuse (m³)	1,530,462	1,953,144	1,000,071	2,031,022	1,374,295	2,356,843	2,509,883	2,021,335	2,885,603
			Volume of earthworks - imported (m³)	918,296	1,025,627	532,040	1,089,345	838,224	1,546,726	1,528,841	1,319,920	1,931,648
			Volume of earthworks - disposal off-site (m³)	7,218,381	7,045,076	6,908,477	6,814,292	6,312,145	8,216,635	7,813,016	6,987,542	8,459,402
		Operational GHG emissions	Track gradient	Data not available at this stage.								
			Power demand	Data not available at this stage.								
			Area of land with carbon sink capacity enhancement	Data not available at this stage.								
14.4	Community	Residential properties	Number of residential properties within 500m	1578	1596	1381	1110	978	1027	1250	1176	1224
		Community facilities	Clashes with community facilities + 50m buffer	0	0	0	0	0	0	0	0	0
		Recreational facilities	Clashes with recreational facilities + 50m buffer	0	0	0	0	0	0	0	0	0
		Open space and PRoW	Number of PRoWs crossed	57	64	51	69	61	55	77	67	61
			Clashes with Open Space	0	0	0	0	0	0	0	0	0

ID	Consideration	Qualitative indicators	Suggested (not exhaustive) quantitative indicators to assist in making judgement									
			Measure	Alignment 8	Alignment 9	Alignment 7	Alignment 1	Alignment 3	Alignment 5	Alignment 2	Alignment 4	Alignment 6
14.5	Ecology and biodiversity	Protected and notable species Biodiversity Net Gain	Area within 5km of Special Areas of Conservation (m²)	670822.18	668766.46	668621.15	668621.06	668626.59	668621.02	670822.18	670822.18	670822.18
			Clash with Site of Special Scientific Interest (SSSI) + 100m	0	0	0	0	0	0	0	0	0
			Clash with Ancient Woodland + 10m buffer	0	0	0	0	0	0	0	0	0
			Clash with Ancient Woodland + 50m buffer	8	5	8	0	1	2	0	1	2
			Clash with Priority Habitat	9	22	18	17	19	16	9	10	7
			Loss of Priority Habitat (m²)	38520.26	111771.67	115509.13	106079.06	116606.1	110198.9	34923.31	39352.39	33275.07
			Area within 250m of Ancient Woodland (m²)	210,087.70	138,088.41	210,020.56	87,742.23	97,914.07	218,441.78	87,742.23	97,980.46	218,507.10
			Clash with Local Designated Site + 100m buffer	4	3	4	4	4	4	4	4	4
			Area in SSSI Impact Zone (m²)	358093.18	0	358093.18	0	0	269905.63	0	0	269905.73
			Loss of trees (by TPO, Ancient, Veteran) + 15m buffer to points	2	5	2	3	0	0	3	0	0
14.6	Electromagnetic Interference	Proximity to sensitive receptors	Sum of distance to impacted receptors (m)	Insufficient detail at this stage of the design to evaluate								
			Number of impacted receptors requiring mitigation									
14.7	Equalities	Disproportionate impacts (refer to the Social Impact considerations as part of the *Environmental impacts and opportunities* factor)		Insufficient detail at this stage of the design to evaluate								
14.8	Health	Neighbourhood quality	Number of residential properties impacted	Insufficient detail at this stage of the design to evaluate								
		Access to services, health and social care	Number of community facilities/buildings impacted									
		Access to green space and physical activity	Number of PRoW crossed/impacted									
			Number of open spaces impacted									
		Social capital	Number of settlements/villages/neighbourhoods impacted									
14.9	Historic Environment	Built Heritage Buried Archaeology Historic Landscape	Number of Scheduled Monuments within 1km	12	11	8	10	7	7	14	11	11
			Clashes with Scheduled Monuments + 250m buffer	3	2	3	1	1	1	2	1	1
			Number of Listed Buildings within 1km	232	160	169	146	157	151	212	220	214
			Clashes with Grade I listed building + 250m buffer	0	0	0	0	0	0	0	0	0
			Number of non designated assets impacted	79	79	77	71	68	72	73	70	74
			Area in Registered Park and Garden (m²)	0	0	0	0	0	0	0	0	0
			Area in Historic Battlefield (m²)	0	0	0	0	0	0	0	0	0
			Area in Conservation Area (within 500m) (m²)	662150.2	474762.8	448853.8	251452.2	251445	324393.2	464734.5	464741.3	537689.5
14.10	Land Quality	Designated Sites	Area in designated site (m²)	0	0	0	0	0	0	0	0	0
		Land contamination	Area in historical landfill (m²)	0	0	0	0	0	0	0	0	0
			Area in landfill (m²)	0	0	0	0	0	0	0	0	0
		Mining/mineral resources	Area in Mineral Safeguarded Area (m²)									

ID	Consideration	Qualitative indicators	Suggested (not exhaustive) quantitative indicators to assist in making judgement									
			Measure	Alignment 8	Alignment 9	Alignment 7	Alignment 1	Alignment 3	Alignment 5	Alignment 2	Alignment 4	Alignment 6
14.11	Landscape and Visual	Landscape character Views	Length on viaduct	Data provided within Whole Life Costs								
			Length in cutting									
			Length on embankment									
			Designated landscapes impacted	1	1	1	0	0	0	0	0	0
			Number of viewpoints located within settlements in the Zone of Theoretical Visibility	16	14	13	16	15	15	19	17	17
			Number of nationally or regionally designated PRoW crossed/impacted	3	3	3	3	3	3	3	3	3
14.12	Major Accidents and Natural Disasters	Environmental impact of unplanned events (refer to events considered in the Resilience Assessment)		Insufficient detail at this stage of the design to evaluate								
14.13	Noise and Vibration	Residential	Approximate amount of indicative potential noise mitigation (in linear one-sided route metres) likely to be required to mitigate noise to communities (smaller is better)	15600	12500	12200	9700	7300	8500	13000	10700	11800
			Number of communities which – despite the mitigation assumed above – may still potentially experience likely significant effects (smaller is better)	One (houses on Broadway, just north of Bourne)	One (northern end of Caldecote)	One (northern end of Caldecote)	One (northern end of Caldecote)	One (northern end of Caldecote)	One (northern end of Caldecote)	One (houses on Broadway, just north of Bourne)	One (houses on Broadway, just north of Bourne)	One (houses on Broadway, just north of Bourne)
			Where noise barriers may not be provided, the number of residential dwellings within 75m of the alignments, who may potentially be subject to LAeq or Lmax SOAEL exceedances	5	5	6	7	6	8	6	5	7
		Non-residential	Considering mitigation assumed above, number of non-residential receptors such as schools, hospitals, prized outdoor spaces, which may potentially experience a likely significant effect (name individual receptors).	Noise impacts to non-residential receptors have not been assessed at this stage, mainly because the a sufficiently-developed picture of community assets near the proposed routes is not yet complete and will be developed through engagement and non-statutory consultation.								
14.14	Planning	Committed developments	Number of committed developments impacted	0	2	2	2	2	2	0	0	0
		Safeguarded/ allocated areas	Number of safeguarded/allocated areas impacted	0	1	0	1	0	0	1	0	0
14.15	Socio-economics	Impact on local businesses from construction	Number of businesses impacted	Insufficient detail at this stage of the design to evaluate								
		Impact on local businesses in operation	Number of businesses impacted									
14.16	Traffic and Transport	Vehicle movements		Information related to vehicle movements, non motorised user movement and movement along waterways and canals are not available at this time. Impacts on permanent and temporary offline highway and PRoW diversion are provided elsewhere in this appraisal								
		Highway network	Number of A-roads crossed									
			Number of B-roads crossed									
			Number of minor roads crossed									
		Public transport network (refer to Transport User Benefit factor)										
		Non-motorised users	Number of PRoW crossed/impacted									
		Waterways and canals	Number of watercourses crossed									
14.17	Waste and Materials	Excavated material	Net volume of excavated material exported (m^3)	Insufficient detail at this stage of the design to evaluate								
		Demolition material and waste	Tonnage of demolition material - recyclable (t)									
			Tonnage of demolition material - non-recyclable (t)									
		Construction waste	Tonnage of construction waste (t)									
14.18	Water Resources and Flooding	Surface water	Number of watercourses crossed	86	84	73	80	77	66	93	89	79
		Groundwater	Area in Source Protection Zone 1 (m^2)	0	0	0	0	0	0	0	0	0
			Area in Source Protection Zone 2 (m^2)	0	0	0	0	0	0	0	0	0
			Area in Source Protection Zone 3 (m^2)	175038.97	0	0	0	0	0	174925.44	174967.82	175145.37
		Flood	Area in Flood Zone 1 (m^2)	3088073.01	3375072.63	3296131.2	3461876.69	3412683.14	3594023.8	3417545.01	3205822.88	3384555.56
			Area in Flood Zone 2 (m^2)	102797.29	82084.68	108051.62	43769.95	48561.02	45368.15	38520.35	43281.65	40118.92
			Area in Flood Zone 3 (m^2)	80993.09	61461.78	77622.9	30982.96	33396.73	31487.55	34353.15	36766.92	34857.66
		Water Framework Directive										

E. Project Section D Assessment Factor Tables: Design Considerations

Master Assessment Sheet - Design

Reference Case	***Alignment 8***	
Alignments Key	**Alignment 8**	**Tempsford to Cambourne South**
	Alignment 9	**Tempsford to Cambourne North - A428**
	Alignment 7	**Tempsford to Cambourne North**
	Alignment 1	**St Neots South Option A to Cambourne North - A428**
	Alignment 3	**St Neots South Option A to Cambourne North**
	Alignment 5	**St Neots South Option B to Cambourne North**
	Alignment 2	**St Neots South Option A to Cambourne South - A428**
	Alignment 4	**St Neots South Option A to Cambourne South**
	Alignment 6	**St Neots South Option B to Cambourne South**

Factor ID	Factor	Supporting Considerations	Judgement									Justification
			Alignment 8	Alignment 9	Alignment 7	Alignment 1	Alignment 3	Alignment 5	Alignment 2	Alignment 4	Alignment 6	
Business Case and Customers												
1	Transport user benefits	Overall judgement based on Supporting Considerations:	Neutral	Minor worsening	Minor worsening	Minor worsening	Minor worsening	Minor worsening	Neutral	Neutral	Neutral	The overall time saving scoring is the determining factor in the transport user benefits at this design stage. The mode shift benefits are based on high level qualitative assessment of the proximity to existing users. One of the prime objectives of EWR is the development of new communities so therefore mode shift of existing users is not considered to be as influential in this Assessment Factor for this decision.
		Time savings (overall, considering factors 6 to 9)	Neutral	Minor worsening	Minor worsening	Minor worsening	Minor worsening	Minor worsening	Neutral	Neutral	Neutral	Input from rows 6-9 (whereby the most significant indicator is journey time whereby if there is more than 1 minute additional time compared to the reference case the alignment is scored as minor worsening)
		Mode shift benefits (of current trips in the area, not those from new trips from new developments which are covered in Factor 2)	Neutral	Minor worsening	Minor worsening	Neutral	Neutral	Neutral	Minor improvement	Minor improvement	Minor improvement	Mode shift considers only the existing communities, and hence takes no consideration into how much greater mode shift benefits could be realised as future growth across the corridor takes hold. Generally: Cambourne South (Alignment 8, 2, 4 and 6) stations perform slightly better than Cambourne North (Alignment 9, 7, 1, 3 and 5) stations. Cambourne North station is separated from Cambourne by the A428 which slightly reduces connectivity for active travel options. This is mitigated in part through proposal to provide new foot & cycle bridge over the A428. Cambourne North also positions the station much further from Caxton discouraging this existing community from active travel to the station. Cambourne North does have better connectivity to proposed A428 (shorter access road). St Neots station (Alignments 1-6) options perform better than Tempsford station (alignment 7-9) options. St Neots stations are closer to St Neots and thus more accessible by bike and also provides a minor improvement for PT (bus) users as closer to St Neots so improved journey time. Tempsford stations are closer to the Tempsford community but St Neots stations are closer to a larger number of properties overall. In addition St. Neots stations have better connectivity to proposed A428 (shorter access road). St Neots South Option A stations (alignment 1-4) perform slightly better than St Neots South Option B (alignment 5 and 6) as they are closer to the existing community, and a slightly larger number of properties overall. Overall, alignments which serve the combination of St Neots and Cambourne South stations are a minor improvement to the reference case (which serves Tempsford and South Cambourne). Alignments which serve both Tempsford and North Cambourne are a minor worsening.
2	Contribution to enabling housing and economic growth including best serving areas benefitting from developable land	Overall judgement based on Supporting Considerations: Wider economic impacts (under fixed and variable land use scenarios allowing for changing land use and impacts of dependent development) Total potential houses enabled Regeneration (For station location decisions only)	Neutral	Minor improvement	Minor improvement	Minor improvement	Minor improvement	Minor improvement	Neutral	Neutral	Neutral	The MCHLG commissioned master planning report suggested that there were far fewer delivery risks associated with Cambourne North development than Cambourne South, with no significant difference between number of houses realised between the two. This suggests that Cambourne North would be a slightly better option for housing and therefore all options with Cambourne North have been assigned Minor Improvement. There is very little between St Neots and Tempsford in terms of housing numbers and delivery risks, so this has been assigned neutral. These are based on qualitative information, and a quantitative assessment has not been made at this stage.

Factor ID	Factor	Supporting Considerations	Judgement									Justification
			Alignment 8	Alignment 9	Alignment 7	Alignment 1	Alignment 3	Alignment 5	Alignment 2	Alignment 4	Alignment 6	
3	Capital costs	Overall judgement based on Supporting Considerations:	Neutral	Neutral	Neutral	Minor improvement	Neutral	Neutral	Neutral	Neutral	Minor improvement	Up front costs were the determining factor in the overall judgement for capital cost. Programme risk will be better understood as the construction programme is developed further and at this stage there is too much uncertainty to influence the overall determination. Although there are instances of worsening in programme risk, this is not deemed significant enough to change the overall capex score. There is no differentiation in cost risk at this stage.
		Up front cost to implement scheme	Neutral	Neutral	Neutral	Minor improvement	Neutral	Neutral	Neutral	Neutral	Minor improvement	Alignments 2 to 5 and 7 & 9 are deemed cost neutral in comparison to Alignment 8, with Alignments 7 & 9 showing virtually nil difference (falling within the accuracy at this stage). Alignments 6 and 1 showing a minor capital cost improvement over reference case. These cost differences are expected to be more than 10% lower than the cost of the reference alignment. The estimated spot cost figures represent the CAPEX order of magnitude costs for the core section. This is based upon the engineering design for non statutory consultation. Excluded from these figures are operation & maintenance costs, land and property, risk and any inflation beyond 2019. A simplified QCRA was undertaken for each alignment option to establish risk ranges around the spot estimate. The QCRA assessed estimating uncertainty and a selection of key risks for each alignment to determine the overall risk exposure. Use of the ranges and including risk in the costs results in the same assessments as for the spot cost and did not change the assessment of the alignments from that found for the up front cost without risk.
		Cost risk	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	No significant differentiators have been identified for cost risk between options. A comprehensive cost risk workshop has not been held at this stage and this Consideration is based on qualitative considerations. There are significant earthwork volumes for all options. There is an opportunity that fill material can be imported at a reduced cost - closing the gap in cost difference. Equally there is an opportunity for more suitable material to be won from excavations, which increases the cost benefit of options. At this stage, both issues are unknown and cancel each other out. Alignments 6, 5 and 2 encounter more excavation works, which inherently carry more risk. The additional excavation material offsets the fill import required however. Some alignments are more likely to encounter weaker geology. Alignments 9, 1 and 2 avoid the area of exposed Ampthill clay. However, based on the level of information at this stage, there is uncertainty about the geology encountered along all routes. Subsequently this is not sufficient to be a determining factor for differentiation when weighed up against the other issues listed. Risk that the cost benefit of all options, over the reference case, for viaducts cannot be achieved to the extent stated above; refinement of design would inform complexity of each viaduct type. In summary, cost risk is broadly comparable for all options based on level of design done having not refined earthwork slopes, not carried out full utility searches or detailed geological surveys. Any changes to cost rates and volumes risks will affect all options and are expected to be broadly comparable across options.
		Programme risk	Neutral	Minor worsening	Minor worsening	Neutral	Neutral	Neutral	Minor improvement	Minor improvement	Minor improvement	There are 4 main factors that have been considered in assessing programme risk: - Earthwork volumes/ Cut fill balance - Amount of structural work - Route length (indicating total amount of work) - Utility Outages At this stage the greatest risk identified is sourcing materials and bringing them to site. Interface with the A428 was identified as a risk but this is offset against the opportunity for delivery of materials. All options interface with the ECML. A1: Neutral. This option has a shorter total length of structures and less earthworks than the reference case. This is countered by the route being longer and having 1 more complex structure. 6no utility outages required (5 x gas and 1 x electric) A2: Minor improvement. This option has less earthworks and less structural work than the reference case. This is still considered a minor improvement despite the route being marginally longer and having 2 additional complex structures. 6no utility outages required (5 x gas and 1 x electric) A3 - Neutral. This option has a similar fill import requirement to the reference case and a longer alignment. It has a shorter overall length of structures but 2 more complex structures. 6no outages required (5 x gas and 1 x electric) A4: Minor improvement. This option has less earthworks and less structural work than the reference case. This is still considered a minor improvement despite the route being marginally longer and having 1 more complex structure. 6no utility outages required (5 x gas and 1 x electric) A5: Neutral. The route is longer than the reference case and has 2 more complex structures, including a cut and cover structure under the A428. This is countered by a shorter overall length of structures and smaller earthworks. 6no utility outages required (5 x gas and 1 x electric) A6: Minor Improvement. Smaller fill import, less structural work and similar route length to the reference case. This option does have 1 more complex structure including a cut and cover structure under the A428. 6no utility outages required (5 x gas and 1 x electric) A7: Minor worsening. Although this option has a shorter length of structures, this is countered by the overall length of the route, greater volume of earthworks than the reference case and 1 additional complex structure. 5no utility outages required (4 x gas and 1 x electric) A9 - Minor worsening. This option has less earthworks and a shorter overall length of structures. This is countered by a longer route length and additional complexity with 2 more complex structures than the reference case. Two of these crossing are under existing roads (the A428 and B1046) requiring traffic management. 5no utility outages required (4 x gas and 1 x electric) Scoring has been limited to minor as there is nothing deemed substantially different and no show stoppers have been identified. The range is of the order of 9months between the worst (A8) and the best (A6).N22

Factor ID	Factor	Supporting Considerations	Judgement									Justification
			Alignment 8	Alignment 9	Alignment 7	Alignment 1	Alignment 3	Alignment 5	Alignment 2	Alignment 4	Alignment 6	
4	Operating costs	Ongoing costs incurred in the delivery of the train service e.g. staff, stations, signalling & electrical control centre, rolling stock lease, energy	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	This is neutral at this stage of design. High level modelled monetisable differences in opex, based purely on track length, are not of a significant magnitude to be considered significant differentiators from a business case perspective. The maximum difference in track length between options is approximately 4.1km with the shortest core section alignment length at 37.9km (Alignment 8). The difference in length is approx. 11%. Costs differences are expected to be less than £100M based on the SOBC cost split between capital cost, operating cost, and maintenance & renewal cost (70%, 15%, 15%) which is not deemed to be differentiating at the level of accuracy currently.
5	Overall affordability	Overall judgement based on Supporting Considerations:	Neutral	Neutral	Neutral	Minor improvement	Neutral	Neutral	Neutral	Neutral	Minor improvement	Overall affordability scores are a combination of the considerations under the heading. Significant differentiation was only identified in capital costs, which also forms part of the whole life cost.
		Whole Life Cost (in financial terms, not including revenue, economic benefits or wider costs/incomes), comprising:	Neutral	Neutral	Neutral	Major improvement	Neutral	Neutral	Neutral	Neutral	Minor improvement	Whole life cost has not been calculated at this stage. However, whole life cost is a summation of the capital cost, operating cost, maintenance cost and renewal costs. Amongst these, capital cost is the only consideration that presents differentiation between options and hence is the driver for the determination of the WLC consideration.
		Capital costs (autopopulates from Factor 3)	Neutral	Neutral	Neutral	Minor improvement	Neutral	Neutral	Neutral	Neutral	Minor improvement	This row auto populates from the Up front costs consideration. A capital cost has not been calculated at this stage.
		Operating costs (autopopulates from Factor 4)	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	This row auto populates from the operating cost (Factor 4)
		Maintenance costs	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Maintenance costs have not been calculated at this stage. A qualitative assessment has been undertaken using quantitative factors. At this stage the assessment covers civils assets only and does not account for the differences in systems cost. Track parameters such as alignment length and curvature are expected to be the predominant factors that influence the maintenance costs. At this stage options have been scored neutral as differences in maintenance cost are not expected to be a significant differentiator. Costs differences are expected to be less than £100M based on the SOBC cost split between capital cost, operating cost, and maintenance & renewal cost (70%, 15%, 15%) which is not deemed to be differentiating at the level of accuracy currently. Options which cross areas of weaker geology (see geotechnics tab) may require more maintenance. However this has not been included in the maintenance cost scores as the aspiration is for this to be mitigated.
		Renewal costs (based on expected life)	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Renewal costs have not been calculated at this stage. A qualitative assessment has been done using quantitative factors. At this stage the assessment covers civils assets only and does not account for the differences in systems cost. The structures are expected to be the predominant factor that influences the renewal cost. At this stage options have been scored neutral as differences in renewal cost are not expected to be a significant differentiator. Costs differences are expected to be less than £100M based on the SOBC cost split between capital cost, operating cost, and maintenance & renewal cost (70%, 15%, 15%) which is not deemed to be differentiating at the level of accuracy currently.
		End of life costs										Excluded pre-assessment as assumed to be non-differentiating at this stage. May become relevant at product or material selection.
		Fare revenue										Excluded pre-assessment as assumed to be proportional to Factor 1 (Transport User Benefits) for design considerations.
		Non-fare revenue (from e.g. station shops, surplus renewable energy generation)										level of detail is insufficient for this to be a differentiator at this time
		Wider / non-EWR costs and incomes (e.g. impact on non-EWR TOC revenues)										level of detail is insufficient for this to be a differentiator at this time
		Likelihood of obtaining third party funding contributions (arising from e.g. proximity of station locations to developable land)	Neutral									Options are not scored because information at this stage would be speculative. General point, locating the stations to maximise development potential increases the likelihood of leveraging contributions from developers in theory.

Factor ID	Factor	Supporting Considerations	Judgement									Justification
			Alignment 8	Alignment 9	Alignment 7	Alignment 1	Alignment 3	Alignment 5	Alignment 2	Alignment 4	Alignment 6	
Network Capability												
6	Short distance connectivity to support commuting travel into key employment hubs (current and future)	Generalised journey times (i.e. 'door to door' and including interchanges) for: Cambourne to Milton Keynes Cambourne to Cambridge South of St Neots / North of Sandy to Milton Keynes South of St Neots / North of Sandy to Cambridge	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	This factor has been scored neutral across all options as they have the same connections at the fringes. The journey time within the Bedford to Cambridge section is considered in factor 7. The door to door journey times for different station options have not been calculated at this stage
7	Short distance passenger services	Bedford to Cambridge journey time (station to station)	Neutral	Minor worsening	Minor worsening	Minor worsening	Minor worsening	Minor worsening	Neutral	Neutral	Neutral	Potential journey time differences are as follows: Alignment 9: Eastbound +01:52; Westbound +01:52 Alignment 7: Eastbound +01:53; Westbound +01:36 Alignment 1: Eastbound +01:38; Westbound +01:36 Alignment 3: Eastbound +01:50; Westbound +02:09 Alignment 5: Eastbound +01:51; Westbound +01:40 Alignment 2: Eastbound +00:25; Westbound +00:43 Alignment 4: Eastbound -00:01; Westbound +00:07 Alignment 6: Eastbound +00:01; Westbound -00:02 Minor worsening has been scored where journey time increases are greater than 1 minute. This is based on a high level value of a minute analysis estimates the impact on transport user benefits and revenues per extra minute of journey time added.
8	Rail passenger connectivity to existing mainlines	Ease of interchange with MML Ease of interchange with ECML Ease of interchange with WAML	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	All options neutral. Same/similar ECML platform layouts at each location; same level difference between EWR and ECML platforms.
9	Long distance passenger services	Strategic consideration of the extent to which EWR facilitates long distance passenger services beyond Oxford to Cambridge	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Bedford to Cambridge journey time differences are sufficiently small that it is unlikely to effect interchange opportunities at Cambridge hence scored neutral across all options. ECML stations all assume the same platform arrangement with the same level difference between EWR and ECML. Skew platforms do not affect ease of interchange, where EWR crosses ECML on a skewed structure.
10	Satisfying existing and future freight demand	Potential to meet freight demand, as anticipated by the freight industry, through active provision for freight paths	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Schematic does not show any differentiation between options. Freight loops can be accommodated on all options and are away from major settlements. Al gradients and curvature within normal design values.

Factor ID	Factor	Supporting Considerations	Judgement									Justification
			Alignment 8	Alignment 9	Alignment 7	Alignment 1	Alignment 3	Alignment 5	Alignment 2	Alignment 4	Alignment 6	
Railway Operations												
11	Performance	Overall judgement based on Supporting Considerations:	Neutral	Neutral	Neutral	Minor improvement	Neutral	Neutral	Minor improvement	Neutral	Neutral	Minor improvement has been scored in the overall judgement where benefits have been identified in both reliability and resilience factors
		Maintainability - ease of undertaking routine inspections and maintenance of the infrastructure without affecting service to customers (e.g. distance of higher maintenance asset from access point, need for possessions, ability to use single line working) and the frequency of maintenance activities which are likely to affect service to customers. (The basis for this consideration must be consistent with the basis for the maintenance cost consideration, which evaluates differentiating assets regardless of the impact of the associated maintenance activities on operational performance).	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	The maintenance access design has not been completed at this stage but no blockers to maintenance access have been identified. In the following options S&C is located further from the station which would lengthen the single line running during perturbation moves. This will have a negative impact on the journey time when single line running perturbation moves are in operation. - Alignment 9 the S&C on one side of the ECML station is greater than 2km from the station - Alignment 6, alignment 4 and alignment 8 (reference case) the S&C on one side of the Cambourne station is greater than 2km from the station The length in flood plain could also affect maintainability as during a flood scenario it may not be possible to access certain infrastructure. All options have a shorter length in floodplain than the reference case (flood risk tab). At this stage it was judged that none of the identified differentiators are sufficient enough to result in a different score.
		Rolling stock reliability - likelihood of failure occurring	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Considered to be neutral as design for all options is within normal design values for track so unlikely to be a differentiator for causes of rolling stock failure.
		Infrastructure reliability - likelihood of failure occurring	Neutral	Minor improvement	Neutral	Minor improvement	Neutral	Neutral	Minor improvement	Neutral	Neutral	At this stage of design key differentiators in infrastructure reliability are likely to be the following: - Geology: A428 alignments 9, 1 and 2 avoid the area of exposed Ampthill clay. There will be mitigation in place to reduce the risks of crossing weaker geology, e.g. slacker side slopes, but risks will remain higher than areas in better geology. North of Cambourne alignments also cross better geology than South of Cambourne alignments but the Ampthill clay is a bigger risk and subsequently was the determining factor in the score. In the weaker geology small ground movements are more likely. More significant mitigation at design stage would need to be undertaken and more frequent inspection and maintenance of the track and track geometry would be required. - Siphons: Alignment 7 has the fewest siphons. Alignments 6, 9, 1 and 2 have significantly more. - Pumping: Alignment 9 requires 1 pumping station at the A428 C&C structure - Track characteristics: Considered neutral. All options have the same operational schematic. Geology was judged to be the determining factor for infrastructure reliability. The flooding and pumping were not considered as significant as unplanned events are assessed under resilience.
		Operational resilience of EWR - refer to separate Resilience tab for details of how to assess resilience to various events	Neutral	Minor worsening	Neutral	Minor improvement	Minor improvement	Minor improvement	Minor improvement	Minor improvement	Minor improvement	Resilience assessment includes unplanned events. Alignments 6, 5, 4, 1, 2, 3 and 9 are improvements because of the reduced length in floodplain. Alignments 9, 1 and 2 also avoid the area of exposed Ampthill Clay. The difference is not considered sufficient for a major improvement score. Alignment 9 is however judged as a worsening overall because it has pumped drainage. If pumping fails in an unplanned event there is a low spot on the alignment that will not drain.
		Operational resilience of Wider Rail Network - refer to separate Resilience tab for details of how to assess resilience	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	No differatiators were identified in operational resilience
12	Alignment with wider railway strategy / infrastructure	Overall judgement based on Supporting Considerations:										level of detail insufficient to be differentiator at this stage
		Technology and customer expectations - extent to which the option uses or enables latest and emerging technology and is aligned to customer expectations at entry into service										level of detail insufficient to be differentiator at this stage
		Wider rail network strategy - alignment to new and emerging strategic changes in the rail sector										level of detail insufficient to be differentiator at this stage
		Flexibility to adapt to future changes in Climate beyond the scenarios that the constructed infrastructure is designed to accommodate										level of detail insufficient to be differentiator at this stage
		Flexibility to adapt to future changes in Passenger Demand if different to the projections used in the design basis										level of detail insufficient to be differentiator at this stage
		Flexibility to adapt to future changes in Freight Demand if different to the projections used in the design basis										level of detail insufficient to be differentiator at this stage

Factor ID	Factor	Supporting Considerations	Judgement									Justification
			Alignment 8	Alignment 9	Alignment 7	Alignment 1	Alignment 3	Alignment 5	Alignment 2	Alignment 4	Alignment 6	
13	Safety risk (construction and operation)	Overall judgement based on Supporting Considerations:	Neutral	Neutral	Neutral	Minor improvement	Neutral	Minor improvement	Minor improvement	Minor improvement	Minor improvement	Minor improvement has been scored in the overall judgement where benefits have been identified in both aspects of safety risk; construction, operation and maintenance.
		Safety risk (construction) - risk (likelihood and consequence) of harm to workforce and public during construction, based on the expected residual risk in the design i.e. a measure of the mitigation effort possible or required by the construction team	Neutral	Neutral	Neutral	Minor improvement	Neutral	Minor improvement	Minor improvement	Minor improvement	Minor improvement	Within this Assessment Factor, no significant safety risks have been identified that would prevent any of the alignments from progressing. There are 3 main influences that have been considered in assessing construction risk: - Earthwork volumes/ Cut fill balance: a greater number of vehicle movements has greater risk to workers and public. - Total length of structures: working at height is a high risk activity - Route length: the longer the route is the more construction work The length in floodplain is also a construction risk consideration however it was not thought it would change the rating compared to the other considerations. Alignment 7 and 8 will also require works around Sewage Treatment works and National Grid Pressure Reduction Station but this will not change the rating. Alignment 1: Minor improvement. Less earthworks than the reference case and a shorter total length of structures. This is still considered an improvement despite a longer route length and 1 more complex structure. Alignment 2: Minor improvement. Less earthworks and less structural work. The route length is longer but it is still considered an improvement. Alignment 3: Neutral. Similar earthworks, alignment length and complex structures but less overall length of structures Alignment 4: Minor improvement. Less earthworks and less structural work than the reference case. The route length is longer but it is still considered an improvement. Alignment 5: Minor improvement. Less earthworks than the reference case and a shorter total length of structures. This is still considered an improvement despite a longer route length and 2 more complex structures, one of which is under the A428 requiring traffic management. Alignment 6: Minor improvement. Less earthworks (smaller fill import though there is a larger total volume of earthworks), similar route length and less structural work. There is one additional complex structure with a crossing under the A428 requiring traffic management. Alignment 7: Neutral. More earthworks than the reference case and longer overall length of the route. This is countered by a shorter length of structures Alignment 9: Neutral. This option has less earthworks and a shorter overall length of structures than the reference case. This is countered by a longer route length and higher structural complexity than the reference case with two crossings under roads (A428 and B1046) requiring traffic management. The differentiation is not because of higher risk activities but because the probability is higher due to the volume of work.
		Safety risk (operations and maintenance) - risk (likelihood and consequence) arising from all in-service hazards, including the unplanned events considered when assessing operational resilience, based on the expected residual risk in the completed works i.e. a measure of the mitigation effort possible or required by the O&M team	Neutral	Minor improvement	Neutral	Minor improvement	Minor improvement	Minor improvement	Minor improvement	Minor improvement	Minor improvement	Within this Assessment Factor, no significant safety risks have been identified that would prevent any of the alignments from progressing. At this stage of design key differentiators in safety risk are likely to be the following: - Length in flood plain causing undermining of track by flood water, maintenance access across flood zones and evacuation in to flood areas: Alignment 8 has a greater length in flood zone that the other options. Alignments 6, 5 and 1 have significantly shorter lengths in floodplain and alignments 4, 2, 9 and 3 show minor improvements. - Geology: Alignments 9, 1 and 2 avoid the area of exposed Ampthill clay. There will be mitigation in place to reduce the risks of crossing the weaker geology but risks will remain higher than areas in better geology. - Vehicle incursion on to the operational railway has not been investigated at this time as the highway alignments have not been developed. However, the risk is expected to be higher in the A428 Alignments 1, 2 and 9 though it is expected that this will be mitigated. Overall all options are considered an improvement compared to reference case (Alignment 8) and Alignment 7

Factor ID	Factor	Supporting Considerations	Judgement									Justification
			Alignment 8	Alignment 9	Alignment 7	Alignment 1	Alignment 3	Alignment 5	Alignment 2	Alignment 4	Alignment 6	
Environment and Society												
14	Environmental impacts and opportunities	Overall judgement based on Supporting Considerations:	Neutral	Minor improvement	Minor improvement	Major improvement	Major improvement	Major improvement	Major improvement	Major improvement	Major improvement	*Scores are based on overall environmental assessment considerations*
		Environmental Assessment considerations: *Refer to the Environment Assessment Sheet and record the overall judgement here*	Neutral	Minor improvement	Minor improvement	Major improvement	Major improvement	Major improvement	Major improvement	Major improvement	Major improvement	See environmental assessment
		Severance (As defined by DfT TAG)	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Severance is scored as neutral because the assumption is that the PRoW will not be permanently closed and instead will be diverted. Therefore, the increase in severance will be broadly balanced by the relief of severance. There are no clashes with community facilities, recreational facilities or open space.
		Physical activity, health and well-being (As defined by DfT TAG. For station decisions only.)										level of detail insufficient to be differentiator at this stage. A station design has not been completed and further information is needed on the development potential to know how stations will be placed in the community
		Accessibility (As defined by DfT TAG. For station decisions only.)										level of detail insufficient to be differentiator at this stage. A station design has not been completed and further information is needed on the development potential to know how stations will be placed in the community
		Option and non-use values (As defined by DfT TAG. For station decisions only.)										level of detail insufficient to be differentiator at this stage. A station design has not been completed and further information is needed on the development potential to know how stations will be placed in the community
		Community benefits from station facilities for non-rail passengers (For station decisions only.)										level of detail insufficient to be differentiator at this stage. A station design has not been completed and further information is needed on the development potential to know how stations will be placed in the community
Local Plans												
15	Consistency with Local Plans	Impacts on and opportunities to support the Local Plans prepared by the Local Planning Authority	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	The assessment of each alignment considers consistency with the following local plans: Bedford Borough Local Plan 2030 (January 2020), Central Bedfordshire Local Plan 2035: Pre-submission (January 2018), Huntingdonshire's Local Plan to 2036 (May 2019), South Cambridgeshire Local Plan (September 2018), and Greater Cambridge Local Plan (early stages of preparation). Considering the overall visions described in each of the four local plans, all alignments are generally consistent. These visions include support for sustainable development, investment in public transport, delivery of high quality infrastructure, preservation of landscape, and channelling growth into compact development. The local plans also have geographically specific requirements. On balance all of the alignments perform as well as the reference case alignment in terms of consistency with the local plans. For this reason, they are all judged to be neutral. Factor 15 does not consider severance or conflicts related to allocated land and extant or pending planning permissions as these are dealt with in other assessment factors.