A585 Windy Harbour to Skippool Improvement Scheme

TR010035

6.17 Environmental Statement Chapter 17: Summary

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A585 Windy Harbour to Skippool Improvement Scheme

Development Consent Order 201[ ]

ENVIRONMENTAL STATEMENT CHAPTER 17: SUMMARY

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17 SUMMARY OF RESIDUAL EFFECTS

17.1 Introduction

17.1.1 This Chapter presents a summary in a tabular format of all effects identified on receptors presented in the Environmental Statement (ES) (document reference TR010035/APP/6.6-6.16) as a result of the Windy Harbour to Skippool Improvement Scheme during construction and operation. This Chapter also states whether an effect on a receptor is considered to be significant (beneficial or adverse) in terms of Environmental Impact Assessment (EIA).

17.1.2 In addition this Chapter outlines where monitoring is required of identified significant adverse effects. Where monitoring is required this is secured within the Record of Environmental Actions and Commitments (document reference TR010035/APP/7.3) which forms an appendix to the Outline Construction Environmental Management Plan (CEMP) (document reference TR010035/APP/7.2).

17.1.3 This section also brings together a summary of the health assessment undertaken within the ES.

17.2 Residual Effects

17.2.1 Table 17-1 presents all residual effects identified on receptors within the ES (document reference TR010035/APP/6.6-6.16).

Table 17-1: Residual Effects from ES topic chapters

Receptor	Residual Effect	Significant in terms of EIA?	Additional Monitoring Required?
Air Quality (document reference TR010035/APP/6.6)			
Construction Residual Effects			
Construction dust	Temporary effects due to fugitive emissions of dust during construction	No	N/A
Construction vehicle emissions	Temporary effects due to vehicle emissions during construction	No	N/A
Operation Residual Effects			
Mains Lane	The largest improvement in air quality is predicted at R6, located on Mains Lane close to the junction of Garstang Road East and Garstang New Road, which is to be altered to a roundabout as part of the Scheme. This is due to a reduction of traffic flows along Mains Lane due to re-routing of	No	N/A

Receptor	Residual Effect	Significant in terms of EIA?	Additional Monitoring Required?
	approximately 22,000 vehicles per day (including 6% HDVs).		
Lodge Lane	The largest adverse impact in air quality is predicted at receptors R3 and R24 due to their close proximity to the Scheme, in an area where there was previously no road, hence an increase in traffic emissions at these locations. The predicted NO_2 and PM_{10} concentrations at these receptors in the Opening Year with the Scheme are however well below the AQS Objectives of 40µg/m^3.	No	N/A
Chapel Street Air Quality Management Area (AQMA)	The highest predicted annual mean NO_2 concentration in the opening year with the Scheme is at R21 (29.6µg/m^3) which is located within the Chapel Street AQMA. The modelled NO_2 concentrations at this location show an exceedance of the AQS Objective in the Base Year, but fall below the AQS Objective in the Opening Year, with a small decrease as a result of the Scheme.	No	N/A
Cultural Heritage (document reference TR10035/APP/6.7)			
Construction Residual Effects			
Designated Heritage Buildings	Construction activity such as an increase in traffic within the surrounding	No	N/A

Receptor	Residual Effect	Significant in terms of EIA?	Additional Monitoring Required?
	area and noise and visual intrusion from construction activity has the potential to affect the setting of Singleton Conservation Area (CA2).		
	The setting of the Grade II listed Ice House at Singleton Hall (LB8) would also be impacted during construction. These temporary impacts would result from construction activity and comprise noise and potentially visual intrusion from within the draft order limits.	**Yes (adverse)**	No additional monitoring is required as residual effects would not be increased or reduced following any further visits post construction.
Non-designated archaeological remains - Prehistoric period (10,000BC-43AD)	Construction activities relating to the New Skippool Bridge Junction and the New Lodge Lane Bridge would result in the removal of the potential archaeological remains associated with both the Prehistoric finds scatter (159) and Bronze Age pottery respectively (145).	No	N/A
Non-designated archaeological remains - Roman period (43AD- 410)	Work within the draft order limits to the west of Skippool could result in the partial removal or impact to the possible Ribchester to Poulton-le-Fylde Roman Road (139).	No	N/A
	The proposed Scheme could have an impact to any potential archaeological remains associated to the known Romano-British settlements (112/193) to	**Yes (adverse)**	No monitoring required as resource would not be present following mitigation through preservation by record.

Receptor	Residual Effect	Significant in terms of EIA?	Additional Monitoring Required?
	the west of the Main Dyke at Moorfield Park. Work within the draft order limits to the north of Garstang Road would result in the direct loss of any archaeological remains related to these receptors.		
Non-designated archaeological remains - Medieval period (1066-1540)	Construction activities associated with the road and the new Lodge Lane Bridge would result in the partial removal of below ground archaeological remains associated with the historic field boundaries (62) to the south of Garstang Road.	No	N/A
	There is the potential for construction activity relating to the new road to impact the ridge and furrow (55) at Singleton Hall and its setting which is situated 230m to the south of the draft order limits.	No	N/A
Non-designated archaeological remains - Post-medieval period (1540-1901)	As a result of the construction of the new Skippool junction there would be a partial removal of the drainage ditch (140) at Skippool.	No	N/A
	Environmental mitigation area and the temporary site compound would result in the partial or complete removal of 2 areas of ridge and furrow which are located within the draft order limits to the north of Mains Lane (103) and within Singleton Estate (142)	No	N/A

Receptor	Residual Effect	Significant in terms of EIA?	Additional Monitoring Required?
	respectively.		
	Construction is likely to remove below ground archaeological remains associated with ridge and furrow (176, 177, 178) which was recorded to the south of Mains Lane.	No	N/A
	The 6 former clay pits (66, 68, 69, 70, 71, 169) recorded to the south of Garstang Road and to the west of Little Singleton would be partially or completely removed during construction of the new road and the new Lodge Lane Bridge. The clay pit to the north of Garstang Road (67) would be partially or completely removed by the location of the construction compound.	No	N/A
	The below ground remains associated with the structure (189) identified through aerial photographic analysis are likely to be removed during construction.	No	N/A
	Construction activity has the potential to impact the setting of the 2 railways at Poulton-le-Fylde (137, 138). These impacts are temporary and reversible and relate to a potential increase in construction traffic within the area.	No	N/A
Non-designated archaeological remains -	The rectilinear enclosure (190) at Skippool Marsh would be impacted by the construction of the	No	N/A

Receptor	Residual Effect	Significant in terms of EIA?	Additional Monitoring Required?
Unknown date	temporary site compound. These impacts could result in the partial or complete removal of the below ground archaeological remains associated with this receptor.		
	The former quarry pit to the west of Shard Road (166) would be impacted by the construction of the proposed environmental mitigation area. This impact could result in the partial or complete removal of this receptors and the below ground archaeological remains associated with it.	No	N/A
	The derelict structure which was identified during the archaeological walkover survey (160) would be impacted during construction of the new road. These impacts would result in the complete removal of this receptor and any associated below ground archaeological remains.	No	N/A
	The quarry scoop to the south of Mains Lane (186) at Skippool would be impacted by the construction of the new road. These impacts could result in the complete or partial removal of this low value receptor.	No	N/A
	The embankment to the south of Mains Lane (161), would also be	No	N/A

Receptor	Residual Effect	Significant in terms of EIA?	Additional Monitoring Required?
	impacted by construction. These impacts could result in the complete or partial removal of this receptor.		
	The areas of ridge and furrow which were identified to the north of Main Dyke (162, 163, 165, 175) would be impacted by the Scheme. These impacts could entail the complete or partial removal of these heritage receptors	No	N/A
	The potential rectilinear enclosure to the north of Garstang Road East (190) would be impacted during the construction of the new road. These impacts could result in the complete or partial removal of this heritage receptor.	No	N/A
	The covered aqueduct or embankment to the south of Garstang Road East (167) would be impacted during the construction of the new Poulton Junction and the new road. These impacts could result in the complete or partial removal of this receptor.	No	N/A
	The quarry pits to the south of Garstang Road (169) would be impacted during construction. These impacts could result in the complete or partial removal of these below ground archaeological remains.	No	N/A
	The potential hollow	No	N/A

Receptor	Residual Effect	Significant in terms of EIA?	Additional Monitoring Required?
	(184), quarry scoop (181), earthwork platform (168) and pond (191) within Singleton Park have the potential to be impacted during construction. These impacts would result in the removal of all or part of these receptors.		
	The former field boundaries (179 and 180) also located within Singleton Park and have the potential to be impacted during construction.	No	N/A
	There is the potential that construction would impact the setting of the former field boundary to the north of the draft order limits (183).	No	N/A
	The geoarchaeological assessment of the proposed Scheme identified a significant area of waterlogged peat deposits (196). The nature of the peat deposits in this area were deemed archaeologically significant and may have been historically exploited due to the available natural resources.	**Yes (adverse)**	No monitoring required as resource would not be present following mitigation through preservation by record.
Non-designated historic buildings - Post-medieval period (1540-1901)	The setting of the hexagonal red brick structure (170) within Singleton Park would be impacted during construction. These impacts would be a visual and noise intrusion alongside an increase in	No	N/A

Receptor	Residual Effect	Significant in terms of EIA?	Additional Monitoring Required?
	dust within the area.		
	The setting of several non-designated historic buildings (34, 132, 104, 38, 135) would be impacted during the construction phase. These impacts would be a visual and noise intrusion alongside an increase in dust within the area.	No	N/A
Non-designated Historic Landscapes	Construction of the proposed Scheme would impact the historic landscape character. These impacts would comprise the removal of historic land boundaries alongside a visual and noise impact to the overall character of the area.	No	N/A
	Construction activities would also impact the setting of Singleton Park (151). These impacts would be a visual and noise intrusion alongside an increase in dust within the area.	No	N/A
	Construction activity would impact the 19th century gardens at Bankfield House (152). These impacts would result in a change in the setting to the receptor due to visual and noise intrusions, alongside an increase in dust within the area.	No	N/A
Operation Residual Effects			
Designated	There is the potential for	No	N/A

Receptor	Residual Effect	Significant in terms of EIA?	Additional Monitoring Required?
Historic Buildings	the Scheme to cause noise intrusion on the setting of Singleton Conservation Area (CA2).		
	The setting of the Grade II listed Ice House at Singleton Hall (LB8) would also be impacted during operation. These impacts would result in visual and noise intrusion from traffic.	**Yes (adverse)**	No additional monitoring is required as residual effects would not be increased or reduced following any further visits post construction.
Non-designated archaeological remains - Medieval period (1066-1540)	Operation would result in an impact to the setting of ridge and furrow (55) that is recorded at Singleton Park.	No	N/A
Non-designated archaeological remains - Unknown date	The setting of a non-built archaeological receptor (183) has the potential to be impacted during operation with an increase in visual and noise intrusion.	No	N/A
Non-designated historic buildings - Post-medieval period (1540-1901)	The setting of 5 non-designated historic buildings (34, 132, 104, 38, 135) would be impacted during operation. These impacts would be a visual and noise intrusion.	No	N/A
Historic Landscapes	Operation of the proposed Scheme would impact the historic landscape character. These impacts would comprise a visual and noise impact to the overall character of the area.	No	N/A
Historic Landscapes-	Operation would also impact the setting of	No	N/A

Receptor	Residual Effect	Significant in terms of EIA?	Additional Monitoring Required?
Post-medieval period (1540-1901)	Singleton Park (151).		
	Operation would have a positive impact to the setting of the 19th century gardens at Bankfield House (152).	No	N/A
Biodiversity (document reference TR010035/APP/6.8)			
Construction Residual Effects			
SPA/Ramsar Site Species (pink-footed geese, lapwing, curlew, little-egret and the over wintering waterbird assemblage)	Although no construction works would take place within the SPA or Ramsar site boundary, there is the potential for indirect effects upon the qualifying bird species of the sites (*pink-footed geese, lapwing, curlew and little-egret)* which may be utilising habitats outside of the designated site which could be affected by the Scheme. These species may be temporarily disturbed / displaced during the construction phase as a result of visual and noise disturbance and displacement from foraging / roosting habitat. There is also the potential for impacts on the waterbird assemblage associated with changes in water quality as a result of construction works in the vicinity of the Main Dyke, which flows into the SPA/ Ramsar site	No	N/A
Wyre Estuary SSSI	Although no construction works would take place within the SSSI boundary, the potential	No	N/A

Receptor	Residual Effect	Significant in terms of EIA?	Additional Monitoring Required?
	for indirect effects upon the SSSI species has been considered.		
Wyre-Lune rMCZ	The Wyre-Lune rMCZ is partially within the draft order limits, however due to the works location direct physical loss, damage and pollution are considered unlikely to occur.	No	N/A
Skippool Marsh and Thornton Bank BHS	Works proposed in this location would not be within the BHS. Direct physical loss, damage and pollution is therefore considered unlikely to occur.	No	N/A
Shard Bridge Field Ditch BHS and River Wyre – Upper Tidal Section BHS	The Shard Bridge Field Ditch BHS and River Wyre – Upper Tidal Section BHS, are sufficiently distant from the Scheme that direct, or indirect, adverse effects are considered unlikely.	No	N/A
Coastal Saltmarsh and Mudflats	Due to the distance between the Scheme and these habitats, potential impacts have been scoped out of the detailed assessment.	No	N/A
Rivers – Skippool Creek	Skippool Creek passes beneath the western extent of the Scheme. Works proposed in this location would not be within Skippool Creek. Direct physical loss, damage and pollution is considered unlikely.	No	N/A
Deciduous Woodland	The deciduous woodland habitats to be permanently lost beneath the footprint of the	**Yes (adverse)**	Monitoring is proposed 5 years post construction as part of the

Receptor	Residual Effect	Significant in terms of EIA?	Additional Monitoring Required?
	scheme would total 6,287m^2 at the eastern extent of the Scheme. Given the permanent habitat loss, there would be fragmentation of the remaining woodland blocks either side of the Scheme at this location		landscape monitoring. This is secured within the Record of Environmental Actions and Commitments (REAC) (document reference TR010035/APP/7.3) appended to the Outline CEMP (document reference TR010035/APP/7.2).
Hedgerows	A total of 6,312m of hedgerow would be lost as part of the Scheme during the construction phase. Of which 2,091m would be temporarily lost in order to accommodate the construction phase activities. The remaining 4,221m of hedgerow would be permanently lost beneath the footprint of the completed Scheme	**Yes (adverse)**	
Ponds	Six ponds would be lost as part of the Scheme during the construction phase.	No	N/A
Rivers – Main Dyke	The Scheme crosses Main Dyke at 2 locations. The Scheme includes widening of the existing Mains Lane bridge. These proposals include upgrading of the bridge's 2 existing culverts to a single larger culvert with increase capacity for water flow. Works required at the western extent of the Scheme are largely associated with the establishment of soft landscaping on either side of the A586 Garstang Road and would not require	No	N/A

Receptor	Residual Effect	Significant in terms of EIA?	Additional Monitoring Required?
	invasive works within Main Dyke.		
Other Rivers	The Scheme would require 9 new watercourse crossings along the Scheme corridor and therefore and therefore has potential to result in direct habitat loss and severance of the existing network of drainage ditches within the survey area	No	N/A
Great Crested Newts	No confirmed great crested newt breeding ponds are anticipated to be lost or directly impacted during the construction phase. Terrestrial habitat areas along the route corridor would be impacted within the core sustenance zones. The potential for great crested newts to be killed during the construction phase is considered unlikely due to the small to medium sized populations which have been recorded and that they are present at a low density	No	N/A
Breeding Birds (Schedule 1 Species)	The majority of habitats to be lost comprise improved species poor grassland which is intensively managed and arable crop fields. All of which are of low suitability for use by barn owls. Although, a small proportion of the foraging habitat suitable for barn	No	N/A

Receptor	Residual Effect	Significant in terms of EIA?	Additional Monitoring Required?
	owl would be lost beneath the footprint of the Scheme, this only makes up a small amount of the available foraging habitat across the wider landscape within the typical home ranges of the barn owls confirmed as present.		
Breeding Birds (other notable species)	Construction activities have the potential to cause habitat loss (breeding and foraging) and disturbance to birds during the breeding season.	No	N/A
Bats	Four trees with bat roost potential would be lost beneath the footprint of the Scheme to accommodate the construction phase activities. An EPSL would be obtained from Natural England to permit the destruction of the confirmed common pipistrelle roost in Building B2 and B4. A small transitional common pipistrelle roost was also confirmed (B3) close to the draft order limits; therefore, construction activities in close proximity to this roost have potential to cause disturbance to the roost.	No	N/A
Otters	Although no resting sites or holts were identified, the construction phase activities have the potential to disturb otters	No	N/A

Receptor	Residual Effect	Significant in terms of EIA?	Additional Monitoring Required?
	using the watercourses.		
Badger	Construction works on Mains Lane would relate to the de-trunking of the road and therefore would be minor and restricted to the footprint of the existing road. Potential for disturbance to this sett is therefore considered unlikely.	No	N/A
Operation Residual Effects			
Deciduous Woodland	In the long-term, a net increase in the amount of woodland habitat along the Scheme corridor would be achieved and result in a long-term positive impact.	**Yes (beneficial)**	Monitoring is proposed 5 years post construction as part of the landscape monitoring. This is secured within the REAC (document reference TR010035/APP/7.3) appended to the Outline CEMP (document reference TR010035/APP/7.2).
Hedgerows	Overall, the permanent loss of 4,221m of hedgerows during construction is considered to be of medium-duration. There would be a short-term (5 to 10 years) negative effect as a result of the hedgerow loss.	No	N/A
Ponds	Although 3 ponds would be temporarily lost during the construction phase (and reinstated) and 3 ponds permanently lost, reinstated and / or replaced ponds would mean no net loss in the	No	N/A

Receptor	Residual Effect	Significant in terms of EIA?	Additional Monitoring Required?
	number of waterbodies present along the Scheme corridor.		
Rivers – Main Dyke	As a result of the new culvert, the structure would be able to carry a higher capacity of water. Therefore, the upgrade works to the existing culvert, which discharges into Main Dyke, would reduce inundation during periods of high water flow	No	N/A
Other Rivers	There would be a permanent loss of some of the ditch network along the Scheme corridor.	No	N/A
Great Crested Newts	Long-term habitat fragmentation due to the presence of the Scheme is probable, but culverts and mammal tunnels implemented for other species may also be used by newts, which would mitigate, to a certain extent, this fragmentation. Increased mortality, injury and / or disturbance as a result of the new highway may occur.	No	N/A
SPA / Ramsar Site Species (Pink-footed geese, lapwing, curlew and little egret)	Although there would be a slight increase in noise levels in fields adjacent to the new offline sections of the new road, this is countered by a decrease in noise levels in fields adjacent to the River Wyre (due to de-trunking of the existing A585 as part of the Scheme). Birds which choose to utilise fields adjacent to	No	N/A

Receptor	Residual Effect	Significant in terms of EIA?	Additional Monitoring Required?
	the new Scheme would experience an increase in noise levels, however, the relatively small numbers of birds currently utilising habitats near to the Scheme are habituated to a higher level of disturbance/displacement and are likely to become habituated to the new Scheme in the long-term		
Breeding Birds (Schedule 1 species)	As part of the landscape design and mitigation packages to be implemented for other species such as the creation of ponds and woodland planting mixes which are to also incorporate rides comprising semi-natural grassland, positive benefits and suitable habitats local enhancements would be provided for barn owls	No	N/A
Breeding birds (other notable species)	In the long term, the new landscape planting would contribute to a net increase in hedgerow and woodland habitats available thereby providing nesting and foraging opportunities.	**Yes (beneficial)**	Monitoring is proposed 5 years post construction as part of the landscape monitoring which would ensure new habitats are created for breeding birds. This is secured within the REAC (document reference TR010035/APP/7.3) appended to the Outline CEMP (document reference TR010035/APP/7.2).

Receptor	Residual Effect	Significant in terms of EIA?	Additional Monitoring Required?
Bats	Although some flight-lines (hedgerows) would be permanently severed in order to accommodate the scheme, the provision of oversized culverts/ safe crossing points would still ensure commuting routes are available. Noise, lighting and pollution from the Scheme has potential to displace bats from the area although mitigation and a sensitive lighting strategy would ensure any adverse effects from lighting would be avoided / kept to a minimum around junction areas.	No	N/A
Otters	Habitat fragmentation would be limited to a reduction in terrestrial habitat of low suitability lost beneath the footprint of the Scheme.	No	N/A
Badgers	Given the locations of the 2 setts, the Scheme is likely to result in habitat fragmentation. Fatalities due to RTAs are possible but unlikely to occur given the permanent badger-proof fencing that is to be installed along the Scheme corridor.	No	N/A
Landscape (document reference TR010035/APP/6.9)			
Construction Residual Effects			
Scheme-Level Landscape and Townscape Character	The construction phase of the Scheme would result in substantial change to the character of Main Dyke Farmland (LCA 4) and Singleton	**Yes (adverse)**	Monitoring would be undertaken through photography and reporting. This would be agreed with the relevant

Receptor	Residual Effect	Significant in terms of EIA?	Additional Monitoring Required?
	Enclosed Farmland (LCA 5), introducing a substantial new and uncharacteristic feature to these predominantly agricultural (albeit urban-edge in the case of LCA 4) landscape. This would result in the permanent and long-term loss of pastoral agricultural land, together with short-term loss to provide borrowpits, working areas, compounds, and stand-offs to facilitate safe working practices. In addition, there would be a loss of commonplace but notable hedgerow features and impacts on the local topography as the result of the bulk earthworks.		local planning authority. This is secured within the REAC (document reference TR010035/APP/7.3) appended to the Outline CEMP (document reference TR010035/APP/7.2).
	For Singleton Hall and Parkland (LCA6), the construction phase of the Scheme would again introduce a substantial uncharacteristic feature into a locally valued designed (but not designated) landscape. This would result in the permanent loss of valued woodland copses. These are notable landscape features which together with the loss of hedgerows and changes in the local topography and bulk earthwork activities, (as a result of the Scheme being in cutting), would result in substantial damage to the	**Yes (adverse)**	

Receptor	Residual Effect	Significant in terms of EIA?	Additional Monitoring Required?
	landscape character.		
	Construction activities at the western end of the application site would be clearly visible from the surrounding area, and these activities would clearly alter the perceived character of the TCA.	No	N/A
	The character of much of TCA5 would not be directly affected by the construction phase of the Scheme as the majority of the construction activities would take place to the south west of the TCA, between the urban edge of Skippool and Main Dyke. There would also be some visibility of construction activities from the western end of the TCA, close to the proposed junction between Mains Lane and the new road, and from the eastern end towards the proposed junction with Garstang Road East.	**Yes (adverse)**	Monitoring would be undertaken through photography and reporting. This would be agreed with the relevant local planning authority. This is secured within the REAC (document reference TR010035/APP/7.3) appended to the Outline CEMP (document reference TR010035/APP/7.2).
	As with TCA5, the character of TCA 7 would not generally be directly affected by the construction phase of the Scheme, with indirect or perceptual effects only experienced where construction activity would be more visible from the south and western edges of the TCA.	No	N/A

Receptor	Residual Effect	Significant in terms of EIA?	Additional Monitoring Required?
County-Level Landscape Character	Although the construction phase of the Scheme would introduce considerable amounts of temporary new activity to the landscape within the draft order limits, the Scheme itself would not introduce a completely new type of feature or element into the landscape character area as there are existing main roads and junctions already present in the locality	No	N/A
	Lying outside of the draft order limits, there would be no direct construction phase effects on the character of LCA18c: Wyre Marshes (LCT18: Open Coastal Marsh). However, the field survey and visual impact assessment has shown that there is unlikely to be discernible visibility of the Scheme from LCA18c.	No	N/A
	The construction of the Scheme is considered not to introduce a completely new type of feature or element into the overall landscape (LCA 15d).	No	N/A
National Character Area	At over 95 thousand hectares, the large size of the NCA combined with the relatively small scale of the Scheme means that construction phase effects on the overall landscape character of the NCA would be	No	N/A

Receptor	Residual Effect	Significant in terms of EIA?	Additional Monitoring Required?
	limited. However, considering the SEO's, there would be noticeable damage to existing features which are constituent elements of these opportunities.		
Visual Amenity	Significant adverse construction phase effects on local visual amenity would be experienced at 13 of the 21 representative viewpoints. Of these, 2 representative viewpoints would undergo very large adverse effects during the construction phase, with 10 viewpoints undergoing a large effect and 1 undergoing moderate adverse effects. All of the representative viewpoints where receptors would undergo significant adverse effects during the short-term construction phase are within 500m of the draft order limits, with many being within the draft order limits	**Yes (adverse)**	Monitoring would be undertaken through photography and reporting. This would be agreed with the relevant local planning authority. This is secured within the REAC (document reference TR010035/APP/7.3) appended to the Outline CEMP (document reference TR010035/APP/7.2).
Operation Residual Effects			
Scheme-Level Landscape and Townscape Character	At the start of the operational phase, the Scheme would maintain a substantial change to the character of LCAs 4 and 5 (Main Dyke Farmland and Singleton Enclosed Farmland), though by now without the effects on tranquility of the construction activities.	**Yes (adverse)**	Monitoring would be undertaken during the 5-year establishment period of the planting mitigation. This is secured within the REAC (document reference TR010035/APP/7.3) appended to the

Receptor	Residual Effect	Significant in terms of EIA?	Additional Monitoring Required?
			Outline CEMP (document reference TR010035/APP/7.2).
	Post-construction, the presence of the Scheme within LCA6 (Singleton Hall and Parkland) would continue to result in a major magnitude of impact and a large adverse effect on this locally important designed landscape.	Yes	N/A
	For the Skippool Bridge TCA (TCA3), the operational phase of the Scheme is assessed as having a negligible adverse magnitude of impact on the local townscape character as the character of the proposed light-controlled junction would not be fundamentally different to that of the existing roundabout at opening year.	No	N/A
	During the operational phase of the Scheme, the magnitude of change to the Mains Lane and Little Singleton TCAs (TCAs 5 and 7) would not noticeably alter from that at the completion of the construction phase.	**Yes (beneficial)**	Monitoring would be undertaken through photography and reporting. This would be agreed with the relevant local planning authority. This is secured within the REAC (document reference TR010035/APP/7.3) appended to the Outline CEMP (document reference TR010035/APP/7.2).

Receptor	Residual Effect	Significant in terms of EIA?	Additional Monitoring Required?
Night Time Effects on Scheme-Level Landscape and Townscape Character	It is considered that as a result of increased levels of light as a result of increased sources within the landscape that there would be slight damage to the existing night time character.	No	N/A
	VP 5, and VP 7 demonstrate a series of prominent lighting sources within the landscape of Mains Dyke Farmland (LCA 4), present on Mains Lane and Garstang Road East. VP 6 however demonstrates the low district brightness nature of the LCA which is influenced by light sources on its periphery. As a result of the Scheme there would be an increase in lighting sources on the edge of this LCA.	No	N/A
	VP 9, and VP 16 demonstrate a low district brightness landscape influenced by a series of prominent lighting sources along the existing Garstang New Road within Singleton Enclosed Farmland (LCA 5). As a result of the Scheme there would be an increase in lighting sources at the new junction however the nature of change would be barely noticeable when considered against the baseline condition.	No	N/A

Receptor	Residual Effect	Significant in terms of EIA?	Additional Monitoring Required?
	Singleton Hall and Parkland (LCA 6) as demonstrated by VP10 identifies a low district brightness landscape with limited sources of light. As a result, in the Scheme there is unlikely to be a noticeable alteration to the baseline condition.	No	N/A
	Skippool Bridge (TCA 3) as identified in VP 1 and VP 2 demonstrates the medium district brightness nature of this townscape, which is influenced by the prominent light sources along Mains Lane. As a result of the Scheme there would be a change in lighting sources arrangement however the new junction configuration would not alter the overall features prominence and therefore at worst it is considered there would be a barely noticeable change.	No	N/A
	As represented in VP 14, Little Singleton (TCA 7) which is considered a low district brightness landscape which would as a result of the Scheme not alter the overall notable lighting sources at the junction and therefore at worst it is considered there would be a barely noticeable change.	No	N/A
National	With extensive areas of	No	N/A

Receptor	Residual Effect	Significant in terms of EIA?	Additional Monitoring Required?
Character Area	existing urban development and a network of existing infrastructure, the operational phase of the Scheme is assessed as giving rise to no discernible change to the overall character of the NCA.		
Visual Amenity	By year 15 of Scheme operation, 14 representative viewpoints would continue to experience adverse effects on visual amenity. Of these, 6 would experience a significant effect.	**Yes (adverse)**	Monitoring would be undertaken during the 5-year establishment period of the planting mitigation. This is secured within the REAC (document reference TR010035/APP/7.3) appended to the Outline CEMP (document reference TR010035/APP/7.2).
People and Communities (document reference TR010035/APP/6.10)			
Construction Residual Effects			
Land-Use - Private Assets	Direct impacts on private assets as a result of the Scheme relate to permanent land-take. Two properties – West Wynds and The Beeches – would be demolished prior to the construction of the new Skippool Bridge.	**Yes (adverse)**	No monitoring required as asset will not be present
	Access to nearby local businesses, including the Skippool Service Station and the Singleton Lodge Country House Hotel, would be maintained during the duration of the	No	N/A

Receptor	Residual Effect	Significant in terms of EIA?	Additional Monitoring Required?
	construction period.		
	Indirect impacts on private assets may include changes in amenity for people who live and work in the vicinity of the Scheme. Such impacts could arise from construction activities (dust, construction traffic, noise levels and visual impacts).	No	N/A
Tourism	None of these facilities are directly impacted by the Scheme in terms of land-take. Visitor behaviour would only be affected adversely where the impact of the proposed development changes the number of visitors or their patterns of expenditure in a negative way. Changes to local amenity (primarily in terms of noise and visual impacts) experienced during the construction period may have an adverse effect.	No	N/A
Agricultural Land	There would be both temporary and permanent loss of agricultural land.	**Yes (adverse)**	This residual impact is a result of the land take required by the Scheme. Monitoring this effect would not be of any benefit.
	The construction of the Scheme would result in severance / loss of land, including land within agri-environment schemes.	No	N/A
Journey Length, Severance	Impacts on existing PRoW as a result of construction activities	No	N/A

Receptor	Residual Effect	Significant in terms of EIA?	Additional Monitoring Required?
and Amenity	would primarily relate to changes in amenity for users. One PRoW (Footpath 2 (Singleton)) would be severed by the Scheme. Community facilities have been identified within 500m of the Scheme. No direct impacts are anticipated in relation to access to community facilities as a result of Scheme construction.		
Vehicle Travellers – Driver Stress	During the construction of the Scheme, there would be a short-term increase in driver stress, because of temporary disruption to the road network and the need to travel through active road works. Impacts would be localised, with short-term delays which may lead to driver frustration and uncertainty.	No	N/A
Operation Residual Effects			
Tourism	The Scheme relocates the main road further from some receptors, but closer to others. Improvements to the local road network may have a beneficial effect on the wider visitor economy. Such improvements could be advantageous to local visitor destinations, such as the 3 caravan parks which are found in close proximity to the Scheme.	No	N/A
Agricultural Land	As land take and disruption to agricultural	No	N/A

Receptor	Residual Effect	Significant in terms of EIA?	Additional Monitoring Required?
	practices, with associated mitigation, occur during the construction phase, impacts during operation would be very limited.		
Journey Length, Severance and Amenity	In terms of severance, new and improved crossing facilities would improve connectivity, enhancing the permeability of the area. Footpath 2 (Singleton) would be severed as a result of the Scheme, requiring diversion from its existing route. The route would be increased in length by approximately 10 - 15m and would replace an existing uncontrolled crossing with a new footbridge (Grange footbridge) over Garstang New Road.	**Yes (beneficial)**	No additional monitoring required.
	The Scheme would bring about reductions in congestion throughout the area, which would lead to safety improvements for NMUs using adjacent footways and cycleways. Reductions in congestion throughout the area would also improve environmental conditions. A number of improvements are being considered for the sections of the existing route that would be bypassed and may include traffic calming measures, local junction improvements, changes	**Yes (beneficial)**	No additional monitoring required.

Receptor	Residual Effect	Significant in terms of EIA?	Additional Monitoring Required?
	to traffic signal priorities, crossing facilities and cycle routes.		
Vehicle Travellers – Views from the Road	For each of the sections assessed, each will experience views with frequent cuttings and structures, which are blocking the view, there will therefore be restricted views for each section.	No	N/A
Vehicle Travellers – Driver Stress	During operation, there would be a beneficial effect on driver stress throughout the area, as the majority of the routes will witness reductions in driver stress. In addition, as there will be significant reductions of traffic flow along Garstang Road and Mains Lane and additional cycleway / footway crossing provisions along this route, this will significantly improve the overall environment for pedestrians and cyclists.	**Yes (beneficial)**	No additional monitoring required.
Noise and Vibration (document reference TR010035/APP/6.11)			
Construction Residual Effects			
Health and quality of life	In terms of National policy (NN NPS, NPSE and NPPF) noise and vibration levels generated by the construction phase of the Scheme are predicted to remain below a SOAEL and as such would avoid significant adverse impacts on health and quality of life from noise as a result of the construction of the	No	N/A

Receptor	Residual Effect	Significant in terms of EIA?	Additional Monitoring Required?
	Scheme.		
Noise sensitive receptors	In terms of the EIA Regulations and likely significant environmental effects, the predicted construction noise levels at selected noise sensitive receptors during the construction phase of the Scheme are predicted to be below the threshold levels presented in BS5228 and as such would not be considered a likely significant environmental effect.	No	N/A
Residential dwellings	Levels of vibration from piling activities are predicted to range from negligible to slight adverse. A magnitude of slight adverse is defined, in terms of BS5228 as vibration being '*just perceptible in a residential environment'* and would be over a short duration as such would not be considered a likely significant environmental effect.	No	N/A
Operation Residual Effects			
Noise sensitive receptors located on the north of Mains Lane	Large reduction in road traffic noise predicted to occur at sensitive receptors already experiencing a road traffic noise above or near a SOAEL	**Yes (beneficial)**	No additional monitoring required.
Noise sensitive receptors located on Garstang New Road	Reductions in road traffic noise level with significant change to the existing acoustic contest due to the closure of Garstang New Road	**Yes (beneficial)**	No additional monitoring required.

Receptor	Residual Effect	Significant in terms of EIA?	Additional Monitoring Required?
Noise sensitive receptors located in the vicinity of Lodge Lane underpass	Large increase in road traffic noise to a level just below a SOAEL with adverse changes to the acoustic context with road traffic noise becoming more apparent	**Yes (adverse)**	No additional monitoring required.
Noise sensitive receptors located in the vicinity of Scheme tie-in with Main Lane	Large increase in road traffic noise to a level just below a SOAEL with changes to the existing acoustic context with road traffic noise becoming more apparent	**Yes (adverse)**	No additional monitoring required.
Noise sensitive receptors located in Moorfield Park Development	Large increase in road traffic noise to a level below a SOAEL with adverse changes to the acoustic context with road traffic noise becoming more apparent	**Yes (adverse)**	No additional monitoring required.
Noise sensitive receptors located on the south of Mains Lane	Although the increase in road traffic noise would be considered large, the increase would be between a LOAEL and SOAEL with the front façade (facing onto Mains Lane) of these properties experiencing a beneficial reduction of approximately the same magnitude as a result of the Scheme	No	N/A
Noise sensitive receptors located in Little Singleton	Magnitude of reductions in road traffic noise becomes less significant in the long term with no change to the acoustic context as road traffic noise is the existing dominant noise source	No	N/A
Noise sensitive	Magnitude of change not large enough to be	No	N/A

Receptor	Residual Effect	Significant in terms of EIA?	Additional Monitoring Required?
receptors located in Skippool	considered significant with no change to the existing acoustic context		
Noise sensitive receptors located in Little Poulton Lane, Moorway and The Spinney	Although magnitude of change would be considered large the absolute level with the Scheme would be in the region of a LOAEL for road traffic noise. Road traffic noise would not change the acoustic context at these noise sensitive receptors	No	N/A
Road Drainage (document reference TR010035/APP/6.12)			
Construction Residual Effects			
Surface and Groundwater Quality	The Scheme requires construction of new culverts, replacement of the existing Horsebridge Dyke culvert, a clear span river crossing of the Main Dyke, extensions to existing culverts crossings and the creation of cuttings, which could open pollution pathways to water receptors. Additional hazards arising from construction activities include the accidental release of floatable material, loss of material during storm events and mobilisation of contamination and migration into controlled waters, as well as the potential for the entrainment of fine sediment in runoff, which could increase siltation in receiving watercourses	No	N/A

Receptor	Residual Effect	Significant in terms of EIA?	Additional Monitoring Required?
	Localised and temporary change of Minor adverse magnitude is predicted for the water quality attributes of the Main Dyke, Horsebridge Dyke, Pool Foot Creek and those unnamed watercourses that would be crossed by the Scheme. These waterbodies would have construction works sites in close proximity and / or would be temporarily physically disturbed by construction works.	No	N/A
	Groundwater resources, in terms of their water quality attributes are assigned High importance given the Good WFD chemical status of the underlying groundwater body. It is considered there would be a Minor adverse magnitude of change (impact) on these baseline characteristics locally, in particular where the proposed Lodge Lane cutting is created.	No	N/A
Flood Risk	Throughout the construction phase along much of the Scheme, the greatest risk of flooding is linked to periods of heavy rainfall, when soils become saturated and runoff may pond in lower lying areas and collect in excavations. During more extreme events, which have a lower likelihood of	No	N/A

Receptor	Residual Effect	Significant in terms of EIA?	Additional Monitoring Required?
	occurring during the relatively short duration of the construction period, the Main Dyke and the tidal Wyre could also pose a source of flood risk to localised areas of the Scheme		
Groundwater / Hydrogeology	During construction it is expected that groundwater levels would be reduced in an area around the Lodge Lane bridge where the Scheme would be in cutting (called 'the area of influence'). Drawdown would be produced by infiltration of groundwater into a passive, longitudinal temporary drainage system installed within the cutting. At the cutting the drainage required during construction could lead to a localised draining of the saturated zone in the near surface Glaciofluvial deposits. The drawdown effects would be local to the cutting, with a predicted Minor magnitude of impact (partial loss of an aquifer but with no effects on groundwater dependent terrestrial ecosystems (GWDTE) or existing abstractions).	No	N/A
Abstractions and Discharges	A single licensed abstraction borehole, 18m deep, and with a small yield of 109 m3/d, is located 275m north of the eastern end of the	No	N/A

Receptor	Residual Effect	Significant in terms of EIA?	Additional Monitoring Required?
	Scheme at Windy Harbour Holiday Park. The abstraction site is 1.39km east of the easternmost location where drainage associated with construction of the Lodge Lane bridge and associated cutting would take place. No groundwater drawdown (lowering of groundwater levels) at the well would be caused, based on the calculations. Rainfall recharge to the Glaciofluvial Deposits would be locally reduced in the Lodge Lane cutting area.		
	A residual Negligible magnitude of change (impact) is predicted on the function of transporting and diluting waste water effluents in the Main Dyke and Wyre Estuary. This is because there would be no reduction in flow quantity in these watercourses during the construction of the Scheme and existing flow corridors would be maintained.	No	N/A
Operation Residual Effects			
Water Quality	During operation, road drainage, which could be contaminated by spills and leaks of oil and fuel, and by other materials deposited onto the drained surfaces such as road salts, would be	No	N/A

Receptor	Residual Effect	Significant in terms of EIA?	Additional Monitoring Required?
	discharged to surface watercourses. Furthermore, there is a risk that polluting materials may be spilt onto the road surface because of a road accident. These pollutants also have the potential to enter these watercourses and shallow aquifers.		
Flood Risk	With regard to flood risk impacts, the Scheme would create new impermeable areas of land cover and consequently generate higher rates and volumes of rainfall runoff, with the potential for increased surface water flood risk. Requirement for alterations to existing watercourse crossings and the creation of new culverts has the potential to impact on the flow conveyance and capacity of watercourses and flood risk from these sources	No	N/A
	Flood risk from Main Rivers has been assessed. Hydraulic modelling results show that, by removing an existing restriction to flow (a twin culvert) on the Main Dyke, the Scheme provides a flood risk benefit for areas upstream of the A585 crossing of the river.	**Yes (beneficial)**	No additional monitoring required.
	Minor increases in baseline flood levels are	No	N/A

Receptor	Residual Effect	Significant in terms of EIA?	Additional Monitoring Required?
	predicted downstream of the A585 along the Main Dyke to the Skippool tidal gates due to more water passing through the new clear span bridge. However, increases in flood depths are marginal and baseline flood extents would not be increased		
	Negligible magnitude effects are predicted on baseline flood risk linked to culverted ordinary watercourses and the proposed replacement of the Horsebridge Dyke culvert.	No	N/A
	During the 0.5% annual chance event, with the Scheme in place there is a reduction in flood risk to these properties, that are predicted to be prevented from flooding. This is because an increase in the vertical alignment of the Scheme at this location prevents water from overtopping the road and flowing into this area. Instead, more water pools behind the road embankment to the north and flows upstream (south) along the Horsebridge Dyke.	**Yes (beneficial)**	No additional monitoring required.
	Key mechanisms driving the changes in flood depths along the Main Dyke are an increase in tidal flows propagating upstream through the widened A585 bridge.	**Yes (adverse)**	Register for receipt of Environment Agency Flood Warnings and implementation of measures to safeguard road

Receptor	Residual Effect	Significant in terms of EIA?	Additional Monitoring Required?
	The magnitude of this change is assessed as Moderate Adverse.		users during an extreme tidal flood event. This is secured within the REAC (document reference TR010035/APP/7.3) appended to the Outline CEMP (document reference TR010035/APP/7.2).
	The key mechanism driving the changes in flood depths along the Horsebridge Dyke is also the increased flood flows on the Main Dyke through the widened A585 crossing. This in turn increases flood levels on the Main Dyke and restricts the volume of flow which can pass from the Horsebridge Dyke into the Main Dyke via the floodplain. Consequently, flood levels increase in the Horsebridge Dyke and a small increase in floodplain flood depths is observed.	**Yes (adverse)**	Register for receipt of Environment Agency Flood Warnings and implementation of measures to safeguard road users during an extreme tidal flood event. This is secured within the REAC (document reference TR010035/APP/7.3) appended to the Outline CEMP (document reference TR010035/APP/7.2).
Groundwater / Hydrogeology	Groundwater resources supported by the Glaciofluvial deposits have been classified as having Medium value. This is because the aquifer could provide water for industrial or agricultural use. At the proposed cutting the drainage required could lead to a localised draining of the saturated zone in the near surface.	**Yes (adverse)**	No additional monitoring required.

Receptor	Residual Effect	Significant in terms of EIA?	Additional Monitoring Required?
	The drawdown effects would be local to the proposed cutting and the magnitude of change is assessed as Minor to Moderate Adverse (partial loss of an aquifer but with no effects on GWDTEs or existing abstractions).		
	Commonplace at the local scale, ponds within the radius of influence (of Low value) could be affected if hydraulically connected to underlying Glaciofluvial deposits.	No	N/A
Human Health	The Scheme would result in significant effects in terms of reducing flood risk, that would be beneficial to the health and wellbeing of the local population.	No	N/A
Geology and Contaminated Land (document reference TR010035/APP/6.13)			
Construction Residual Effects			
Construction workers and residents	Construction workers and residents are considered to be of high value and assuming the appropriate mitigation is adopted, the magnitude of impact is considered to be negligible adverse.	No	N/A
Groundwater	Groundwater in the area of the SPZ2 is considered to be of high value and assuming the appropriate environmental design measures and mitigation are adopted, the magnitude of impact is considered to be	No	N/A

Receptor	Residual Effect	Significant in terms of EIA?	Additional Monitoring Required?
	negligible.		
	Groundwater in the areas outside the SPZ2 is considered to be of low value and assuming the appropriate mitigation measures are adopted, the magnitude of impact is considered to be negligible.	No	N/A
Surface Water	Surface water is considered to be of medium value and assuming the appropriate environmental design measures and mitigation are adopted, the magnitude of impact is considered to be negligible.	No	N/A
Operation Residual Effects – no effects predicted to occur during operation of the Scheme			
Materials (document reference TR010035/APP/6.14)			
Construction Residual Effects			
Material Resources	The implementation of mitigation measures would ensure the efficient use of material resources onsite. In addition, the recycling target would still be higher than the England and North West targets. It is unlikely that any materials would be sourced internationally, therefore, as a worse case it is assumed that >50 percent of materials would need to be sourced nationally (with other primary materials sourced at a lower geographic scale).	No	N/A

Receptor	Residual Effect	Significant in terms of EIA?	Additional Monitoring Required?
Waste	Inert waste arisings - leading to temporary reduction of waste management facilities capacity or permanent reduction to landfill capacity. There would be a surplus of 194,500 m^3 of excavated material deemed suitable for reuse onsite for general or granular fill. Any other inert waste from pavement excavation and demolition would also be reused onsite in the landscaping for the Scheme, when suitable.	No	N/A
	Non-hazardous waste arisings - leading to temporary reduction of waste management facilities. Approximately 3,772 m^3 of non-hazardous waste would arise from existing highways infrastructure. In addition, 516 m^3 would arise from the demolition of West Wynds main house, extension and garage, derelict barn south of Mains Lane, the Beeches main house, outbuildings and extension and the Skippool bridge.	No	N/A
	Hazardous waste arisings -leading to temporary occupation of waste management facilities capacity or permanent reduction of landfill capacity.	No	N/A
Operation Residual Effects – no effects predicted to occur during operation of			

Receptor	Residual Effect	Significant in terms of EIA?	Additional Monitoring Required?
the Scheme			
Climate (document reference TR010035/APP/6.15)			
Construction Residual Effects			
Carbon emissions	The carbon assessment from the Highways England Carbon Tool has indicated that the Scheme would result in emissions of approximately 691,115 tonnes of CO2e from the construction phase of the Scheme. This makes up 0.027% of the 4th carbon budget (2,544 million tonnes of CO2e).	No	N/A
	The carbon output from the materials is estimated to be 16,442 tonnes of CO2e. When compared to the 10% contribution from construction material resources to the annual UK emissions, this only contributes 0.04%.	No	N/A
	The carbon output from plant and equipment utilised throughout the construction phase, is estimated to be 6,132 tonnes of CO2e. This could potentially be reduced by implementing early engagement with the contractor to avoid double handling during earthworks.	No	N/A
Pavement	An increase in winter precipitation or a decrease in summer precipitation would result in a change in ground water level and soil moisture. This has the	No	N/A

Receptor	Residual Effect	Significant in terms of EIA?	Additional Monitoring Required?
	potential to affect the foundation settlement. In addition, it has the potential to generate larger ground movement and heave.		
	An increase in extreme temperatures has the potential to put the Scheme at risk from a greater degree of surface failure or deterioration. For example, for concrete pavements, thermal gradients have the potential to create uneven internal stresses which can then give rise to curling or warping, sometimes called hogging, of the slabs. These can be compounded by loading from passing traffic.	No	N/A
	Large changes in temperature have the potential to generate thermal contraction and expansion of the slabs which, if not taken into consideration at the design stage, can generate unacceptably large longitudinal internal stresses and excessive movements at joints.	No	N/A
	During extended periods of hot, sunny conditions, asphalt can remain workable for a considerable time, making it difficult to maintain profile during compaction and, in the case of hot rolled asphalt	No	N/A

Receptor	Residual Effect	Significant in terms of EIA?	Additional Monitoring Required?
	surface course with added pre-coated chippings; it may be difficult to achieve the required texture depth.		
Structures (including gantries)	An increase in extreme temperatures may require the use of more expensive components like joints, bearings, paint systems etc. Also, greater care would be required to set the gaps, to ensure that movement does not cause a problem. This may require rescheduling works to night or at specific times of the year. Small structures and road lighting columns should not be affected as the design standards require a reduced design life (30 years on average) and it is unlikely that climate change impacts would be present significant risks over this period.	No	N/A
	An increase in wind speed has the potential for minor structures to have to be designed larger, to withstand larger loads. The effect on the bridge should be minimal, as wind is rarely a dominant load. There is an increased risk of disruption to construction work (unable to operate in high winds).	No	N/A
	An increase in mean temperatures and extreme temperatures	No	N/A

Receptor	Residual Effect	Significant in terms of EIA?	Additional Monitoring Required?
	has the potential to lead to the requirement of stronger fill material and therefore increasing the quantities of excavated material becoming waste.		
	An increase in winter precipitation and a decrease in summer precipitation has the potential to change the ground water level. This could potentially lead to larger ground movement and heave. In addition, this could mean that additional drainage and stronger materials would be required.	No	N/A
	Increase in winter precipitation and decrease in summer precipitation has the potential to change the ground water level. This could potentially lead to the requirement of more robust foundations for increased settlement.	No	N/A
	An increase in extreme precipitation has the potential to lead to flooding.	No	N/A
	An increase in extreme precipitation has the potential to lead to the requirement of additional drainage, larger components and more extensive works.	No	N/A
	An increase in extreme temperature has the potential to lead to the requirement of larger bearings.	No	N/A

Receptor	Residual Effect	Significant in terms of EIA?	Additional Monitoring Required?
Drainage	The Scheme may require additional drainage, larger components and more extensive works to deal with an increase in extreme precipitation events.	No	N/A
	Risks to the design and construction of the Scheme's drainage assets include congestion and accidents, an increased risk of flooding, impacts the performance of the road, including congestion and incidents (safety).	No	N/A
Geotechnics	An increase in winter precipitation has the potential to result in increased erosion rates, most notably for valuable soil resources.	No	N/A
	Increased precipitation could increase risk to the earthworks stability resulting in the requirement of fill materials that are less susceptible to moisture such as Pulverised Fuel Ash and aggregate.	No	N/A
	An increase in extreme temperature and a decrease in summer precipitation has the potential to lead to reduction in soil moisture. Risks to compaction relate to the need for greater compactive effort being required with potential increased costs, delays etc.	No	N/A
	An increase in winter	No	N/A

Receptor	Residual Effect	Significant in terms of EIA?	Additional Monitoring Required?
	precipitation and extreme precipitation has the potential to change the ground water level.		
Signs and signals	An increase in extreme precipitation and wind speed has the potential to create wind loading risks for the signs and signals.	No	N/A
	An increase in winter precipitation and extreme precipitation has the potential to alter the performance of the road markings.	No	N/A
Technology	An increase in wind speed has the potential to create wind loading risks for the technology assets.	No	N/A
Soft estate	An increase in mean temperature and a decrease in summer precipitation has the potential to lead to longer growing season and a reduction in soil moisture.	No	N/A
Non motorised user (NMU) facilities	Increase in projected mean daily rainfall, especially in winter months could result increase safety risk of slips, trips and falls to construction workers.	No	N/A
	Increase in projected mean daily rainfall, especially in winter months could potentially result in the construction site flooding, excavations flooding during construction phase. Site roads may also become impassable through flooding.	No	N/A
	Water ingress to critical	No	N/A

Receptor	Residual Effect	Significant in terms of EIA?	Additional Monitoring Required?
	equipment, including traction power distribution sites, leading to signaling or other electronic equipment failures, requiring switch off or, possibly causing damage.		
Operation Residual Effects			
Carbon emissions	During the operation phase, emissions from the operational phase energy created from the lighting installed for the Scheme result in 54.839 tonnes of CO2e per annum. This is assuming, the use of LED for columns and that the lighting runs for 4,099 hours per year.	No	N/A
	During the operation phase the Scheme is estimated to cause an increase of 31,118 tonnes of CO2e in non-traded emissions and increase by 397,268 tonnes of CO2e in traded emissions over 60 years.	No	N/A
	An increase in traded emissions over 60 years would be caused primarily by an increase in traffic volume and flow along the route. Maintenance work undertaken as part of the Scheme would also increase carbon, but to a much lesser extent compared to the projected road transport emissions.	No	N/A

Receptor	Residual Effect	Significant in terms of EIA?	Additional Monitoring Required?
Pavement	Pavement has a typical design life of 40 years and could therefore be affected by changes in climate. An increase in mean daily rainfall rates has the potential to alter the moisture content of soils. This could lead to ground movements, soil settlement as well as expansion and contraction. This could also cause the Scheme's pavements and foundations to heave.	No	N/A
	For concrete pavements, thermal gradients have the potential to create uneven intern stresses which could then give rise to curling or warping, sometimes called hogging, or the slabs. These could be compounded by loading from passing traffic.	No	N/A
Structures (including gantries)	Increases in temperature have the potential risk of thermal actions (loads) applied to structure (e.g. leading to joint and bearing failure). Some structures have the potential to fail to operate within original design parameters. This could induce failures meaning additional works would then be required to strengthen them.	No	N/A
	Increases in precipitation rates could lead to premature deterioration rates for joints, bearings	No	N/A

Receptor	Residual Effect	Significant in terms of EIA?	Additional Monitoring Required?
	and surfaces. This would lead to increased traffic disruption.		
	An increase in the frequency and intensity of storms have the potential to cause increased loads on structures, overhead lines and lead to collapse.	No	N/A
	Increased precipitation has the potential to lead to flooding, deterring users from their journey.	No	N/A
Drainage	An increase in the frequency and intensity of rainfall and storm events could lead to an increase in particulates entering the drainage system. This may lead to localised flooding events, increase maintenance and increased land take for additional drainage assets.	No	N/A
	An increase in the mean daily rainfall could lead to an increased risk of pollution mobilisation from accidental spillages associated with the Project. This would increase the risk of releasing contaminates into the water environment.	No	N/A
Geotechnics	An increase in frequency and intensity of heavy rainfall and flooding events could cause collapse of embankments.	No	N/A
	Changes in mean temperatures and rainfall	No	N/A

Receptor	Residual Effect	Significant in terms of EIA?	Additional Monitoring Required?
	rates may impact soils reinstated for agricultural use. This has the potential to alter the productivity of the land.		
Signs and signals	An increase in the frequency and intensity of storm events could reduce the design life of a number of key assets such as signage, lighting, road surface and road markings. This could increase maintenance costs over the lifespan of the road.	No	N/A
	An increase in wind speed and in frequency of extreme wind events has the potential to affect the stability of the signs, which have a design life of 25 years (DMRB Standard BD 94/07).	No	N/A
	An increase in wind speed and in frequency of extreme wind events has the potential to affect the stability of the lighting columns as well as highway signage and fencing.	No	N/A
	Increase in precipitation and temperature have the potential to weather road markings and change performance.	No	N/A
Soft Estate	A decrease in mean rain fall may lead to drought tolerant trees could becoming more prevalent. This may cause a change in the landscape character of the area.	No	N/A

Receptor	Residual Effect	Significant in terms of EIA?	Additional Monitoring Required?
	An increase in mean temperature and precipitation may alter the growing characteristics such as soil properties and length of growing season. This may impact the species identified as part of the landscape strategy and thus alter the character of the landscape.	No	N/A
	An increase in precipitation and flooding has the potential to destroy plants in higher flood risk areas.	No	N/A
	Increased wind speed could lead to the loss of valued landscape features, opening up new views of the Project that were previously shielded.	No	N/A
Vehicle Restraint Systems	Steel Safety barriers have a design life of approximately 25 years. More frequent extreme weather and changes in temperature and precipitation may result in an increase in rate of deterioration of vehicle restraint systems.	No	N/A
End-users	An increase in the rate of deterioration of assets due to extreme weather events could lead to an increase the requirements for construction and maintenance workers as well as traffic officers working within the carriageway. Workforce may also have to work	No	N/A

Receptor	Residual Effect	Significant in terms of EIA?	Additional Monitoring Required?
	within dangerous conditions.		
	An increase in the frequency and intensity of storm events may discourage the use of non-motorised user facilities to complete journeys. This may lead to more users of the road.	No	N/A
	An increase in heavy rain could potentially lead to flooding and closures and diversions of footpaths.	No	N/A
	An increase in frequency and intensity of heavy rainfall, flooding and storm events could lead to a higher rate of vehicle collisions causing severe disruption to highway, major accident causing harm to highways users and adjacent receptors.	No	N/A
	An increase in temperature has the potential to increase the risk of more incidents due to: • Vehicles having broken down/overheated • A higher frequency of vehicle fires. • Smoke drifting across carriageways from wildfires. Heavy Good Vehicles (HGV) blow-overs and flying debris.	No	N/A

17.3 Summary of Health Assessment

17.3.1 Baseline figures suggest that the rate of deaths caused by respiratory diseases in the local area surrounding the Scheme are mostly higher than the national average. However, given that no significant effects are predicted to occur in terms of air quality this would result in no significant effects occurring on human health as a result of potential air quality effects in conjunction with the Scheme. The Scheme would result in an overall improvement to connectivity and therefore has the potential to help improve human health through increasing opportunities for walking and cycling thereby creating further opportunities for active lifestyles and exercise. This is likely to result in an increase in activity levels and could lead to beneficial effects on health through helping reducing existing levels of obesity in the area.

17.3.2 Short-term operational road traffic noise impacts at receptors located along Garstang New Road, Garstang Road west of Little Singleton and receptors located on the north of Mains Lane would be of beneficial significance with a number of 99 dwellings predicted to experience a beneficial change. All other receptors assessed were predicted to experience no significant effects. Long-term operational road traffic noise impacts would not be of beneficial significance at receptors located along Garstang New Road, Garstang Road west of Little Singleton and at receptors located on the north of Mains Lane with 78 dwellings predicted to experience a beneficial change. It is predicted that significant beneficial impacts would occur at 5 Noise Important Area's (NIAs) in the short -term and 3 NIA's in the long-term. Therefore, the overall operational effect from Noise and Vibration on population and human health is predicted to be slightly positive.

17.3.3 The Scheme would result in a reduction in flood risk upstream of the Main Dyke. This reduces the population to the potential exposure to flood waters. Mitigation would be in place to prevent any potential pollutants entering watercourses and therefore it is predicted that no significant adverse effects would occur on human health. As no significant effects were recorded in regards to geology and contaminated land, it is therefore predicted that no significant effects would occur on local human health as a result of the Scheme.