

Air Quality Valuation Summary Worksheet

Broughton Bypass Air Quality appraisal

Summary Assessment

	Central estimate	Lower estimate	Upper estimate
Present Value of change in PM ₁₀ concentrations:	£131,624	£68,978	£149,567
Present Value of change in NO _x emissions:	-£19,251	-£14,998	-£21,872
Total value of change in air quality: £NPV	£112,372	£53,980	£127,695

Note: All Monetary Values are in 2010 Prices and Values. Positive values reflect a net benefit (ie air quality improvement)

Quantitative Assessment

"Net Total Route Assessment" (opening year) for PM ₁₀ :	-42
Change in NO _x emissions over 60 year appraisal period:	25

Qualitative Comments:

NO_x emissions are predicted to increase due to increased vehicle flows and distance travelled due to the scheme. There are no roads predicted exceed the EU Limit Value.
Exposure to PM₁₀ is predicted to decrease as a result of the scheme.

Worksheet 2 - Regional Air Quality

Option name Broughton Bypass

Opening year 2017

Forecast year 2032

		Without scheme		With scheme		Change in emissions	
		Opening year	Forecast year	Opening year	Forecast year	Opening year	Forecast year
NOx emissions in tonnes per year	Areas not exceeding limit values	137.1	56.5	140.3	56.5	3.2	0.0
	Areas exceeding limit values	0.0	0.0	0.0	0.0	0.0	0.0

Qualitative comments: NOx emissions are predicted to increase, but there are no EU Limit Value Exceedences

Data Sources: EFT 6.0.2, DMRB 1.03c dispersion equation, Defra BG maps, Defra NOxtoNO2 v3.1

PM10, SUMMARY OF ROUTES: THE AGGREGATED TABLE	0-50m	50-100m	100-150m	150-200m	0-200m
	(i)	(ii)	(iii)	(iv)	(v=i+ii+iii+iv)
Total properties across all routes (min)	756	626	647	555	2584
Total properties across all routes (some)	752	628	655	549	2584
Do-minimum PM10 assessment across all routes	11471.50	9425.80	9585.50	8161.20	Total assessment PM10 (I): 38644.00
Do-something PM10 assessment across all routes	11378.90	9448.00	9700.90	8074.40	Total assessment PM10 (II): 38602.20
Net total assessment for PM10, all routes (II-I)					-41.80
Number of properties with an improvement					1167
Number of properties with no change					182
Number of properties with a deterioration					1235

Reference Sources:

Emission calculations were undertaken using Defra's Emission Factor Tool Kit 6.0.2

Quantitative Measures:

The traffic data were provided by Jacobs.
Air quality would be improved (reduced pollution concentrations) at 1167 properties; and

Assessment Scores:

Air quality would be deteriorated (increased pollution concentrations) at 1235 properties.

-41.80

Qualitative Comments:

The proposed scheme is anticipated to lead to an improvement in air quality (exposure to PM10 concentrations) overall.

The proposed scheme leads to a decrease in annual mean PM10 concentrations at 20m from the road centre of at least 1 ug/m3.

The proposed scheme is not anticipated to affect air quality within AQMAs declared for PM10.

The Defra PCM model indicates that there are no properties in exceedance of the PM10 EU Limit in the DM or DS scenarios.

NO₂, SUMMARY OF ROUTES: THE AGGREGATED TABLE	0-50m	50-100m	100-150m	150-200m	0-200m
	(i)	(ii)	(iii)	(iv)	(v=i+ii+iii+iv)
Total properties across all routes (min)	756	626	647	555	2584
Total properties across all routes (some)	752	628	655	549	2584
<i>Do-minimum</i> NO₂ assessment across all routes	14441.80	10765.40	9122.10	7198.20	Total assessment NO₂ (I): 41527.50
<i>Do-something</i> NO₂ assessment across all routes	14125.90	10724.80	9190.10	7111.80	Total assessment NO₂ (II): 41152.60
Net total assessment for NO₂, all routes (II-I)					-374.90
<i>Number of properties with an improvement</i>					1249
<i>Number of properties with no change</i>					0
<i>Number of properties with a deterioration</i>					1335

Emission calculations were undertaken using Defra's Emission Factor Tool Kit 6.0.2

Reference Sources:

The traffic data were provided by Jacobs.

Air quality would be improved (reduced pollution concentrations) at 1249 properties; and

Quantitative Measures:

Air quality would be deteriorated (increased pollution concentrations) at 1335 properties.

Assessment Scores:

-374.90

Qualitative Comments:

The proposed scheme is anticipated to lead to an improvement in air quality (exposure to NO₂ concentrations) overall.

The proposed scheme leads to more increases than decreases in annual mean NO₂ concentrations at 20m from the road centre of at least 1 ug/m³.

The proposed scheme is anticipated to improve air quality within an AQMA declared for NO₂, with 16 properties removed from exceedence of the annual mean Air Quality Objective.

The Defra PCM model indicates that there are no properties in exceedence of the NO₂ EU Limit in the DM or DS scenarios.

No. of households experiencing 'without scheme' & 'with scheme' noise levels (given in dB_{Leq}) in 15th Year After Opening

	With scheme	<45	45-47.9	48-50.9	51-53.9	54-56.9	57-59.9	60-62.9	63-65.9	66-68.9	69-71.9	72-74.9	75-77.9	78-80.9	81+
Without scheme															
<45		0	0	0	0	0	0	0	0	0	0	0	0	0	0
45-47.9		0	0	0	0	0	0	0	0	0	0	0	0	0	0
48-50.9		0	0	49	5	0	0	0	0	0	0	0	0	0	0
51-53.9		0	0	0	507	3	0	0	0	0	0	0	0	0	0
54-56.9		0	0	0	24	814	14	0	0	0	0	0	0	0	0
57-59.9		0	0	0	0	25	377	2	0	0	0	0	0	0	0
60-62.9		0	0	0	0	1	16	193	7	0	0	0	0	0	0
63-65.9		0	0	0	0	0	2	10	78	5	0	0	0	0	0
66-68.9		0	0	0	0	0	0	4	16	71	5	0	0	0	0
69-71.9		0	0	0	0	0	0	0	15	10	47	1	0	0	0
72-74.9		0	0	0	0	0	0	0	0	3	12	11	0	0	0
75-77.9		0	0	0	0	0	0	0	0	0	0	0	2	0	0
78-80.9		0	0	0	0	0	0	0	0	0	0	0	0	0	0
81+		0	0	0	0	0	0	0	0	0	0	0	0	0	0

**Net Present Value of Noise of Proposal
(60 Year Period)**

£759,028

*positive value reflects a **net benefit** (i.e. noise reduction)

Estimated Population Annoyed (Do-Minimum):

796

Estimated Population Annoyed (Do-Something):

778

**Net Noise Annoyance Change in 15th Year After
Opening (no. of people):**

-19

*positive value reflects an **increase** in people annoyed by noise

Traffic Data Sources:

Traffic data provided by Jacobs Traffic team

Population Data Sources:

2001 Census

Assumptions:

Methods provided within CRTN plus additional guidance within HD 213/11 - Rev 1 (DMRB) used to predict noise levels

Noise level predicted for all residential properties located within the 'Calculation Area' as defined by HD 213/11 - Rev 1 (DMRB).

Assessment scores:

19 fewer people annoyed with the scheme in place

Qualitative Comments:

APPRAISAL - Greenhouse Gases

Proposal Name: Broughton Bypass

Present Value Base Year: 2010

Current Year: 2015

Proposal Opening year: 2017

Project (Road/Rail or Road and Rail): Road

Overall Assessment Score:

Net Present Value of Carbon dioxide Emissions of Proposal (£):

-£2,300,764

(60 Year Period)

*positive value reflects a net benefit (i.e. CO2E emissions reduction)

Quantitative Assessment:

Change in Carbon dioxide Emissions over 60 year appraisal period (tonnes):
(between 'with scheme' and 'without scheme' scenarios)

49,768

Of which Traded

0

Change in Carbon dioxide Emissions in Opening year (tonnes):
(between 'with scheme' and 'without scheme' scenarios)

1,626

Qualitative Comments:

Scheme leads to an increase in CO2 emissions of approximately 3%, across the final two 5-year carbon budget reporting periods. This increase is due to increased vehicle flows and distance travelled due to the scheme. All emissions are non-traded, and rail emissions have not been considered in this assessment.

Sensitivity Analysis:

Description:

Upper Estimate Net Present Value of Carbon dioxide Emissions of Proposal (£):

-£3,508,177

Lower Estimate Net Present Value of Carbon dioxide Emissions of Proposal (£):

-£1,093,352

Data Sources:

Emission calculations were undertaken using Defra's Emission Factor Tool Kit 6.0.2.

The traffic data were provided by Jacobs.

The traffic model, in line with economic guidance, assumes linear growth between our opening year of 2017 and 2032 and no further growth thereafter.

TAG Landscape Impacts Worksheet

	Step 2	Step 3				Step 4
Features	Description	Scale it matters	Rarity	Importance	Substitutability	Impact
Pattern	This landscape is characterised by an undulating lowland farming landscape around the 40m contour level. A medium to small scale field pattern with generally low, well maintained hedgerows with hedgerow trees, which becomes slightly more enclosed south of Whittingham Lane where higher hedgerows and greater extents of woodland in become more dominant. Throughout, the shallow valleys are intermittently defined by trees and larger wooded areas. Field ponds and depressions are a common and distinctive feature.	This type of pattern is common but important at a local scale.	This pattern is regionally and locally common.	The pattern has high local importance due to the relative proximity to the conurbation and pressure from the road network.	Agricultural field pattern is substitutable.	The new road across open countryside will further complicate the pattern and break up its continuity over the length of the study area especially as it crosses Blundell Brook. Lighting will have an urbanising effect on the open countryside. However, the pattern is already disrupted by roads and residential ribbon development making unspoiled areas more valuable. Landscape mitigation proposals will help reduce disruption to pattern. Overall there will be a moderate adverse impact .
Tranquillity	Broughton is a built environment located in the developed A6 corridor north of Preston. The M6 motorway runs roughly parallel one mile to the east and M55 roughly one mile to the south. This corridor is notable for moderate to low levels of tranquillity afforded to it. In contrast, public rights of way, local roads and rural areas outside the transport/residential corridor have a greater degree of tranquillity.	Tranquillity matters at a local, regional and national level.	Tranquillity is influenced locally and regionally by local conurbations and transport infrastructure making it relatively scarce.	Where pockets of tranquillity exist they will be important as tranquillity is becoming a rare and dwindling resource.	It would not be possible to substitute tranquillity as the detractors will still remain.	The new road scheme in the rural landscape will cause a further depletion in the level of tranquillity and will have a moderate adverse impact .

Features	Description	Scale it matters	Rarity	Importance	Substitutability	Impact
Cultural	Historically, the area has been influenced by the road network as Broughton developed on the old crossroads and is notable for the number of post-medieval dwellings. Notable views from Broughton north of the crossroads towards the Forest of Bowland AONB. Parkland landscapes around Barton Hall and Brooklands alter the overall agricultural pattern. Listed buildings, including the prominent St John the Baptist C of E Church, add a maturity to the landscape. (refer to Cultural Heritage Worksheet)	These features matter at a regional and local level	Regionally and locally common.	Nationally, this feature is not of great importance. Regionally and locally the cultural resource is important and gives the area distinctiveness.	Not replicable due to the established nature and cultural significance established over long periods.	The road scheme will not have a direct impact on cultural resources but would alter to context of the resource. There would be a slight adverse impact .
Land cover	Predominantly pastoral landscape with well maintained hedgerows or high hedgerows with hedgerow trees. Small maturing woodlands, establishing tree belts and mature residential grounds and boundaries provide for a diverse land cover. The lime tree avenue leading to the church is a locally distinctive feature. The well managed wooded areas which surround Barton Hall were originally part of Barton Park, the parkland setting for the Lodge. These wooded areas and other individual trees are now designated with Tree Preservation Orders. Vegetation along Blundell Brook's banks provides a dense wooded feature particularly the southern part of the study area.	This type of land cover matters at a local level.	Nationally, regionally and locally common.	Low importance nationally and regionally and high local importance.	Substitution would be attainable in the medium term to very long term. Local field pattern replicable 10-15 yrs. Mature trees and woodland greater than 100 years.	The scheme impacts on limited sections of the land cover resource. Landscape mitigation proposals would enhance land cover. There would be a Moderate adverse impact .
Summary of character	A regionally and locally common rural landscape, moderately influenced by modern infrastructure and housing development. The large conurbation of Preston extends to the M55 boundary just south of the study area. Landscape character of small to medium scale field pattern with mature hedgerow boundaries interspersed with woodland groups. Historical landscapes from post-medieval and post-industrial times evident at Barton Hall and the Church and surrounding buildings. Residential areas and roads are very significant.	The character matters at a regional level due to the cultural influence and at a local level because it contrasts with the urban nature of the road networks and influence of Preston.	Nationally, regionally and locally common.	Low national and medium regional importance. This character is important to local people.	The substitutability of the character is possible for some features (field boundaries) but will be irreplaceable for others (landform and land cover)	The road would be an uncharacteristic feature installed through the currently agricultural and residential area but it would not be an incongruous feature in the wider setting which has been influenced by a significant road network. The overall effects of the road would result in a moderate adverse impact on the character areas.

Reference Sources

Guidelines for Landscape and Visual Impact Assessment (GLVIA); 3rd Edition - Landscape Institute and Institute of Environmental Management and Assessment – Routledge 2013;	Interim Advice Note 135/10 Landscape and Visual Effects
Assessment, Highways Agency, October 2010;	National Planning Policy Framework (NPPF) Chapter 7: and Enhancing the Natural Environment;
Requiring Good Design, Chapter 8: Promoting Healthy Communities, Chapter 11: Conserving	
Lancashire County Council Broughton Bypass Environmental Statement 2000;	
Central Lancashire Local Development Framework;	
Lancashire County Council Website;	Preston
Local Plan 2004 (Saved Policies);	Natural
England Landscape Character Assessment: Volume 2 Northwest;	A
Landscape Strategy for Lancashire Landscape Character Assessment;	
Campaign to protect Rural England Information Relating to Tranquillity;	
Tree Survey BS5837:2012;	Other
Specialists involved in the development of the 2013 Environmental Statement;	Lancashire County Council
Broughton Bypass, Environmental Statement 2013, chapter 5, 'Landscape and Visual Impact'.	

Step 5 - Summary Assessment Score

Moderate adverse effect

Qualitative Comments

The site area comprises undulating pasture farmland and includes mature woodland, hedgerows with hedgerow trees. The scheme will significantly affect landscape character by passing through / adjacent to mature woodland and hedgerows and locally important non-designated cultural heritage sites. This effect will be partially reduced by mitigation planting. Furthermore the scheme would affect the tranquillity of this large rural area. The scheme will also have an adverse effect on the landscape character due to lighting at junctions that will have a minor urbanising effect to the open countryside.

TAG Townscape Impacts Worksheet

Features	Step 2	Step 3					Step 4
	Description	Scale it matters	Rarity	Importance	Substitutability	Changes in Without-scheme case	Impact
Layout	The Village is focused around the crossroads of the A6 Garstang Road, Whittingham Lane and Woodplumpton Lane comprising two storey post-medieval buildings closely packed together and have a more rural established character. Extending from the crossroads are modern period public houses, garages and private dwellings which all combine in a linear development. Away from the crossroads properties are fronted by gardens with newer residential estates located north of Woodplumpton Lane and Whittingham Lane. D'Urton Lane is a narrow winding country lane with original farming settlements and residential housing in the lee of Church Hill, which also screens the lane from the M55.	This layout matters at a regional and local level. This village pattern is typical in a rural setting and ribbon development is more unusual giving the area a sense of place.	In this rural context, the village setting is not rare. However, the ribbon development is more scarce.	This pattern is important locally, only.	Substitution is not practical.	Searches of the planning approvals indicate that no significant changes to the townscape are foreseen.	The road layout would not alter the townscape layout but would alter the townscape character.
Density and mix	The village centre buildings are small and density is high. Mix of uses varies between small local shops and larger businesses, located centrally within Broughton. Away from the crossroads properties are generally set within larger gardens/grounds which gives a lower density, mix is less varied away from the centre.	This density and mix matters at a local and regional level.	In this rural context, this type of layout is common nationally, regionally and locally.	This density and mix is important at a regional and local level.	Substitution is not practical.	As above	The proposed road would not directly affect the density. Effects to viability and vitality of mix would not be affected.
Scale	Village buildings and residential properties have an appropriate scale in relation to the townscape. The Preston Marriot Hotel complex has a large scale in relation to its surroundings however, screening limits this impact.	This scale matters at a local and regional level.	In this rural context this is not uncommon locally and regionally.	This scale is important at a regional and local level.	Substitution is not desirable	As above	The road proposals would not directly affect the scale.
Appearance	The village centre comprises a generally harmonious combination of smaller well kept, rendered and painted buildings comprising shops and houses set tight against back of footway. These are combined with modern infrastructure: petrol stations, signage and three-laned road infrastructure.	This appearance matters at a local and regional level.	In this rural context, the village appearance is not rare. However, the ribbon development is more scarce.	The appearance is important at a regional level and is important at a local level to give a local sense of place.	Substitution is not desirable	As above	Reduction of traffic volumes within the village resulting from the proposed scheme would likely give a moderate beneficial impact to the appearance of the townscape. In addition a reduction in signage within Broughton centre could improve the visual appearance.

Features	Description	Scale it matters	Rarity	Importance	Substitutability	Changes in Without-scheme case	Impact
Human interaction	Human interaction takes place via shops, petrol stations however it is suppressed by the existing A6 as the existing road environment (busy, dangerous, noisy) is not conducive to interaction.	Human interaction matters greatly at a local level and matters at a regional level. Existing adverse effects are experienced directly at a local level due to traffic and therefore have a greater significance for this factor at a local level.	It is not rare for human interaction to be suppressed by trunk roads. However, it is uncommon for this level of disruption to human interaction in the countryside.	The level of interaction is important at a local level and supports a number of small local businesses.	Substitution is not desirable	As above	The impact of the scheme is likely to have a moderate beneficial impact as human interaction is likely to become easier with reduced traffic movement.
Cultural	Close grain of the village centre comprising post-medieval buildings traditionally focused around the crossroad. Away from the small village centre modern buildings alter the character which becomes more open grained and slightly larger scale.	The cultural effects matter at a local and regional level.	In this rural context, the village cultural reference is not rare. However, the ribbon development is more scarce.	Locally high level of importance which helps sustain this local cultural centre; regionally medium level of importance.	Substitution would be economically unviable.	As above	There is unlikely to be a change to either historical or contemporary cultural features of the town.
Land use	Townscape is dominated by residential properties. There are a small number of commercial properties including two petrol stations, a public house and a tool hire shop.	Land use matters at a local and regional level.	This combination of land use is not rare within the rural context.	This type of land use has a high importance locally and medium importance regionally	Substitution is not desirable	As above	The main townscape will remain unaltered. However, impacts to a small number of residential properties will result in a minor adverse impact to land use.

Summary of character	Close grained village centre comprising well maintained group of post-medieval buildings, focussed around the village crossroads contrasting with more open grain modern ribbon developments extending out from the centre. The busy road environment dominates, both in scale and character the village resource.	This built character matters principally at a local level where it provides a local sense of place and matters to a lesser extent at a regional level. The post-medieval characteristic matters at local level whereas the modern characteristic matters but is not necessarily desirable.	This character is not rare locally, regionally or nationally.	The post-medieval townscape is an Undesignated Heritage Asset and as such has a high level of importance at a regional level. The modern townscape may be important for local people for the sense of place.	Substitution is not desirable	As above	The townscape is likely to become calmer and more harmonious as a result of the bypass. The reduction in traffic would have a moderate beneficial impact.
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Reference Sources

<p>Guidelines for Landscape and Visual Impact Assessment (GLVIA); 3rd Edition - Landscape Institute and Institute of Environmental Management and Assessment – Routledge 2013; Interim Advice Note 135/10 Landscape and Visual Effects Assessment, Highways Agency, October 2010;</p> <p>Framework (NPPF) Chapter 7: Requiring Good Design, Chapter 8: Promoting Healthy Communities, Chapter 11: Conserving and Enhancing the Natural Environment;</p> <p>Lancashire County Council Broughton Bypass Environmental Statement 2000;</p> <p>Development Framework;</p> <p>Preston Local Plan 2004 (Saved Policies);</p> <p>Landscape Character Assessment: Volume 2 Northwest;</p> <p>Landscape Character Assessment;</p> <p>Tranquillity;</p> <p>Other Specialists involved in the development of the 2013 Environmental Statement.</p> <p>Council Broughton Bypass Environmental Statement 2013, chapter 5, 'Landscape and Visual Impact'.</p>	<p>National Planning Policy</p> <p>Central Lancashire Local</p> <p>Lancashire County Council Website;</p> <p>Natural England</p> <p>A Landscape Strategy for Lancashire</p> <p>Campaign to protect Rural England Information Relating to</p> <p>Tree Survey BS5837:2012;</p> <p>Lancashire County</p>
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Summary Assessment Score

Moderate Beneficial

Qualitative Comments

The townscape incorporating Broughton village and D'Urton Lane being bypassed by the scheme comprises residential areas, gardens, infrastructure associated with the suburban landscape that is close to most of the route. This has local and regional importance and will provide moderate benefits to the local population from the reduction in traffic and removal of signage which would reduce landscape impacts and visual impacts.

Broughton Bypass: Historic Environment AST worksheet

Feature	Broughton Bypass	Scale it matters	Significance	Rarity	Impact –
Form	<p>Assets impacted by the proposed route consist of:</p> <p>The possible line of a Roman road.</p> <p>Cropmarks and geophysical anomalies of medieval or post medieval field systems and ridge and furrow ploughing, as well as associated marl pits;, and 7 roads, tracks or lanes with medieval or post medieval origins; the earthwork remains of a medieval moated site and the base of a medieval cross.</p> <p>Sixteen historic farmhouses and cottages primarily of 18th /19th century date; a gate lodge; a 19th century road bridge, a mile-stone, and the historic core of Broughton Village.</p> <p>Five Historic Landscape Types (HLTs), dominated by agricultural and settlement HLTs: (Ancient enclosure, post-medieval enclosure and modern settlement HLTs).</p>	Local to National	<p>One Grade II* Listed Building of National significance protected by legislation: Parish Church of St John the Baptist.</p> <p>Archaeological remains associated with the possible Roman road and Old Hall earthworks and, 6 Grade II Listed Buildings, and the Ancient Enclosure HLT are of Regional significance.</p> <p>The form of other undesignated sites is of Local significance.</p>	<p>Structures designated as Grade II* Listed Buildings are rare nationally.</p> <p>Ancient Enclosure HLT is rare at a Regional level.</p> <p>The types of undesignated sites are common Locally.</p>	<p>A large impact during construction on the setting of one Grade II* listed Building. Moderate Impacts during construction on 1 archaeological remains asset, and on the setting of 2 grade II Listed Buildings and 1 undesignated historic building. Slight impacts during construction on 4 archaeological remains, on the setting of 10 historic buildings, and on the Ancient Enclosure HLT. Neutral impacts during construction on 18 archaeological remains, 14 historic buildings, and 4 HLTs.</p> <p>Impacts during operation will be mitigated by archaeological investigation and earthwork survey, historic building recording and photographic recording, and mapping of historic landscape elements.</p> <p>A moderate impact during operation on the setting of one Grade II* Listed Building. Slight impacts on the setting of 1 archaeological remains asset and 9 historic buildings, and on the Ancient Enclosure HLT. Neutral impacts during operation on the setting of 7 historic buildings and 4 HLTs.</p> <p>Impacts during operation on setting will be mitigated through the use of landscape planting.</p>

Feature	Broughton Bypass	Scale it matters	Significance	Rarity	Impact –
Survival	<p>Good survival of historic buildings, dating from 18/19th centuries, although some heavily modernised.</p> <p>Moderate survival of three cropmark sites which may be partly truncated by later field boundaries.</p> <p>Five HLTs affected survive in moderate condition.</p> <p>Unknown survival for some forms of undesignated archaeological remains such as some cropmark sites.</p>	Local to National	<p>One Grade II* Listed Building of National significance protected by legislation: Parish Church of St John the Baptist.</p> <p>Archaeological remains associated with the possible Roman Road and Old Hall earthworks and, 6 Grade II Listed Buildings, and the Ancient Enclosure HLT are of Regional significance.</p> <p>Other undesignated assets are of Local significance.</p>	<p>Structures designated as Grade II* Listed Buildings are rare nationally.</p> <p>Ancient Enclosure HLT is rare at a Regional level.</p> <p>The types of undesignated sites are common Locally</p>	<p>A large impact during construction on the setting of one Grade II* listed Building. Moderate Impacts during construction on 1 archaeological remains asset, and on the setting of 2 grade II Listed Buildings and 1 undesignated historic building. Slight impacts during construction on 4 archaeological remains, on the setting of 10 historic buildings, and on the Ancient Enclosure HLT. Neutral impacts during construction on 18 archaeological remains, 14 historic buildings, and 4 HLTs.</p> <p>Impacts during construction will be mitigated by archaeological investigation and earthwork survey, historic building recording and photographic recording, and mapping of historic landscape elements.</p> <p>A moderate impact during operation on the setting of one Grade II* Listed Building. Slight impacts on the setting of 1 archaeological remains asset and 9 historic buildings, and on the Ancient Enclosure HLT. Neutral impacts during operation on the setting of 7 historic buildings and 4 HLTs.</p> <p>Impacts during operation on setting of heritage assets will be mitigated through the use of landscape planting.</p>

Feature	Broughton Bypass	Scale it matters	Significance	Rarity	Impact –
Condition	<p>Historic buildings generally heavily modernised, but well-managed and maintained in good condition.</p> <p>Unknown condition of archaeological remains assets. Potential erosion from modern agriculture.</p> <p>Potential for continued erosion of rural HLTs due to modern agriculture.</p>	Local to National	<p>One Grade II* Listed Building of National significance protected by legislation: Parish Church of St John the Baptist.</p> <p>Archaeological remains associated with the possible Roman Road and Old Hall earthworks and, 6 Grade II Listed Buildings, and the Ancient Enclosure HLT are of Regional significance.</p> <p>Other undesignated assets are of Local significance.</p>	<p>Structures designated as Grade II* Listed Buildings are rare nationally.</p> <p>Ancient Enclosure HLT is rare at a Regional level.</p> <p>The types of undesignated sites are common Locally</p>	<p>A large impact during construction on the setting of one Grade II* listed Building. Moderate Impacts during construction on 1 archaeological remains asset, and on the setting of 2 grade II Listed Buildings and 1 undesignated historic building. Slight impacts during construction on 4 archaeological remains, on the setting of 10 historic buildings, and on the Ancient Enclosure HLT. Neutral impacts during construction on 18 archaeological remains, 14 historic buildings, and 4 HLTs.</p> <p>Impacts during construction will be mitigated by archaeological investigation and earthwork survey, historic building recording and photographic recording, and mapping of historic landscape elements.</p> <p>A moderate impact during operation on the setting of one Grade II* Listed Building. Slight impacts on the setting of 1 archaeological remains asset and 9 historic buildings, and on the Ancient Enclosure HLT. Neutral impacts during operation on the setting of 7 historic buildings and 4 HLTs.</p> <p>Impacts during operation on setting of heritage assets will be mitigated through the use of landscape planting.</p>

Feature	Broughton Bypass	Scale it matters	Significance	Rarity	Impact –
Complexity	<p>Unknown complexity for Roman activity. Cropmarks, earthworks and geophysical survey evidence indicate the complexity of the development of the current landscape in the medieval and post medieval periods.</p> <p>With the exception of the group centred on the Parish Church of St John the Baptist, the historic buildings are not generally complex consisting of one or two phase structures mostly of post-medieval date with some modernisation.</p>	Local to National	<p>The complexity of the relationships between the Grade II* Listed Parish Church of St John the Baptist, 5 Grade II Listed Buildings and other undesignated buildings within the village are of Regional to Regional to Local significance.</p> <p>The inter-relationships between the Ancient Enclosures HLT, archaeological remains assets, such as cropmarks and earthworks and historic farm houses and, cottages are of Local significance.</p>	<p>The earthworks associated with the Old Hall moated site are complex and rare within a Regional context. The Old Hall site also has a range of interrelationships with other archaeological remains assets which are not rare on a Local or Regional scale.</p> <p>The general lack of complexity displayed by the majority of historic buildings means that the built heritage is not rare on a Local or Regional level.</p>	<p>Moderate impacts during construction leading to the removal of two former field boundaries indicated by geophysical anomalies and the partial removal of others.</p> <p>Moderate impacts on Ancient Enclosure HLT would affect its complexity.</p> <p>Moderate and Slight impacts on the setting of historic buildings, including the Grade II* Listed Parish Church of St John the Baptist could reduce an understanding of their relationships.</p>

Feature	Broughton Bypass	Scale it matters	Significance	Rarity	Impact –
Context	<p>The context of the Roman landscape associated with the line of the possible Roman road is lost.</p> <p>Cropmarks, earthworks and geophysical survey evidence for former field boundaries and ridge and furrow, as well as abundant marl pits are evidence how the modern landscape developed during the medieval and post-medieval periods. Many of the undesignated historic buildings are post-medieval agricultural-related structures which add to the understanding of the landscape development.</p> <p>The group of designated historic buildings centred on the Grade II* Listed Parish Church of St John the Baptist are situated in the historic core of the medieval and post medieval settlement and include a range of structures that are often lost from villages..</p>	Local to National	<p>The interrelationships between the group of designated historic buildings centred on the Grade II* Listed Parish Church of St John the Baptist means their context within the village is still understandable and of Local to Regional significance.</p> <p>The inter-relationship between the Ancient and Post-Medieval Settlement HLT and</p> <p>The inter-relationship between Ancient Enclosure HLT and the settings of historic buildings contributes to their Regional and Local significance.</p>	<p>Structures designated as Grade II* Listed Buildings are rare nationally.</p> <p>Ancient and Post-Medieval Settlement and Ancient Enclosure HLTs are rare at a regional level.</p> <p>The types of undesignated sites are common Locally.</p>	<p>Construction would remove archaeological remains associated with former field boundaries and other medieval and post medieval agricultural assets. The construction may also remove archaeological remains associated with the Roman Road.</p> <p>Moderate impacts on the setting of designated and undesignated historic buildings due to the introduction of a new road into their rural setting. Removal of two undesignated historic buildings.</p> <p>Construction will sever elements of the Ancient Enclosure HLT leading to a Moderate impact.</p> <p>Impacts during construction will be mitigated by archaeological investigation and earthwork survey, historic building recording and photographic recording, and mapping of historic landscape elements. Impacts during operation on setting of heritage assets will be mitigated through the use of landscape planting.</p>
Period	<p>Evidence for activity during the Roman period in the form of the line of the Roman Road.</p> <p>Crop marks and geophysical survey evidence for former field boundaries and ridge and furrow earthworks, as well as abundant marl pits preserve evidence of medieval and post-medieval agricultural systems. Post medieval and modern periods represented by designated and undesignated historic buildings.</p>	Local to National	Most features widespread on a Regional and Local level.	<p>Roman Roads are rare on a Regional level.</p> <p>Majority of sites are post-medieval and not rare.</p>	Impacts are spread across Roman, medieval, post-medieval and modern time periods.

Reference Source(s): Broughton Bypass: Environmental Scoping Report (Jacobs 2012), Broughton Bypass Cultural Heritage Desk-Based Assessment (Jacobs 2013), and Broughton Bypass Environmental Statement (Jacobs 2013).

Summary assessment score: Moderate adverse overall

Qualitative comments: Based on the Scoping Report and Cultural Heritage Desk-Based Assessment, and Environmental Statement. There would be physical impacts on 22 archaeological remains, 2 undesignated structures and 5 Historic Landscape Types. The remaining impacts are on setting, including that of one Grade II* Listed Building and 6 Grade II Listed Buildings. The predicted impacts include moderate adverse impacts on the setting of 1 archaeological remains asset, 1 Grade II* Listed Building and two Grade II Listed Buildings. Slight adverse impacts are predicted for 4 archaeological remains, 9 designated and undesignated historic buildings, and 1 HLT. Slight Beneficial impacts during operation are predicted on the setting of 2 undesignated historic buildings. The potential for the presence of unknown archaeological remains has been assessed to be Low.

Broughton Bypass - Biodiversity

Area	Description of feature/ attribute	Scale (at which attribute matters)	Importance (of attribute)	Trend (in relation to target)	Biodiversity and earth heritage value	Magnitude of impact ¹	Assessment Score ²
Statutory designated sites (within 500m of the route)							Neutral
There are none within 500m but there are four Local Nature Reserves (LNR) within 5km of the route (there are no other Statutory sites other than LNRs)	Hills and Hollows (3km southeast) Grange Valley (4km southeast) Pope Land Open Space (5km southeast) Fishwick Bottoms (5km southeast)	Regional (designated under National Parks and Countryside Act 1949 as amended by NERC, 2006)	Medium	Stable	Medium	Neutral	Neutral
Non-Statutory designated sites (within 500m of the route)							Neutral
There are none within 500m but there are six Biological Heritage Sites (BHS) within 3km of the route	Lancaster Canal (1km northwest) Mason's Wood (1.5km southeast) Haighton Park & Fulwood Park Woods (2.5km south east) Cottam Hall Brickworks (3km	Local	Medium importance at a local level	Stable	Medium	Neutral	Neutral

¹ Impact magnitude assessed with mitigation at 15 years operation

² Significance of residual impact with mitigation assumed at 15 years operation

Area	Description of feature/ attribute	Scale (at which attribute matters)	Importance (of attribute)	Trend (in relation to target)	Biodiversity and earth heritage value	Magnitude of impact ¹	Assessment Score ²
	southeast) Haighton House Mire (3km southeast) Sandy Brook (3km south-southwest)						
Designated habitats (within 500m of the route)							Slight adverse – neutral
Deciduous Woodland	Total of 20 areas of woodland within 500m of footprint. One strip of woodland adjacent to the A6 in the north falls within or is close to the proposed underpass. This woodland has connection with ancient woodland and contains ancient woodland indicator species. Nesting bird, badger, bat, amphibian, and invertebrate habitat. <i>Local BAP Habitat Action Plan (HAP)</i> <i>NERC 2006 Habitat</i>	Local to Regional	Medium	Declining	Medium	Minor negative	Slight adverse

Area	Description of feature/ attribute	Scale (at which attribute matters)	Importance (of attribute)	Trend (in relation to target)	Biodiversity and earth heritage value	Magnitude of impact ¹	Assessment Score ²
	<i>of Principal Importance</i>						
Hedgerows – species-rich (crossed by footprint)	A total of 14 crossed by footprint Nesting bird and invertebrate habitat. <i>Local BAP (HAP)</i> <i>NERC 2006 Habitat of Principal Importance</i>	Local	Low (but contribute valuable habitat links across the landscape)	Declining	Medium	Minor negative	Slight adverse
Hedgerows - species-poor (crossed by footprint)	11 crossed by footprint Nesting bird and invertebrate habitat. <i>Local BAP (HAP)</i> <i>NERC 2006 Habitat of Principle Importance</i>	Local	Low (but contribute valuable habitat links across the landscape)	Stable-widespread common habitat	Low	Neutral	Neutral
Running Water	There are three watercourses within 500m of the footprint Blundell Brook (crossed by footprint), a tributary to Dean Brook (outfalls) and Barton Brook (no crossing) Habitat for aquatic invertebrate, water vole, nesting bird (kingfisher) and otter.	Local	Low	Stable, widespread, common habitat	Medium	Minor negative	Slight adverse

Area	Description of feature/ attribute	Scale (at which attribute matters)	Importance (of attribute)	Trend (in relation to target)	Biodiversity and earth heritage value	Magnitude of impact ¹	Assessment Score ²
	<p><i>Local BAP (HAP)</i></p> <p><i>NERC 2006 Habitat of Principle Importance</i></p>						
Standing Water	<p>65 standing water features (ponds and ditches) within 500m which will be retained. 2 ponds are immediately adjacent to the road footprint (Ponds 8 and 9).</p> <p>Habitats for aquatic invertebrates, amphibians and water vole.</p> <p><i>Local BAP (HAP)</i></p> <p><i>NERC 2006 Habitat of Principle Importance.</i></p>	Local	Low	Declining	Medium	Minor negative (risk of damage and pollution during works).	Slight adverse
Traditional Orchard HAP	<p>Not within footprint but within 500m.</p> <p>Habitat for nesting birds, invertebrates and bats.</p> <p><i>Local BAP (HAP)</i></p> <p><i>NERC 2006 Habitat of Principle Importance</i></p>	Local	Low	Declining	Medium	Neutral	Neutral

Area	Description of feature/ attribute	Scale (at which attribute matters)	Importance (of attribute)	Trend (in relation to target)	Biodiversity and earth heritage value	Magnitude of impact ¹	Assessment Score ²
Arable Fields	Cropped land; none within footprint, although possible it will change with field rotations <i>Local BAP (HAP)</i>	Local	Negligible	Common, widespread habitat	Low	Neutral	Neutral
Semi-improved neutral grassland	Grassland with variety of plant species. Not within footprint but within 500m. Ground nesting bird, amphibian and invertebrate habitat. <i>Local BAP (HAP)</i>	Local	Low	Common, widespread habitat	Low	Neutral	Neutral
Non-designated habitats (within 500m of the route)							Neutral
Amenity grassland	Playing fields, intensively managed public open spaces, etc. Small amount within footprint.	Local	Negligible	Common, widespread habitat	Negligible	Neutral	Neutral
Improved grasslands	Intensively managed grasslands of very low botanical diversity. Much of the footprint covers this habitat.	Local	Negligible	Common, widespread habitat	Negligible	Neutral	Neutral

Area	Description of feature/ attribute	Scale (at which attribute matters)	Importance (of attribute)	Trend (in relation to target)	Biodiversity and earth heritage value	Magnitude of impact ¹	Assessment Score ²
Marshy Grassland	One area of waterlogged ground dominated grass species. Not within footprint but within 500m. Amphibian terrestrial habitat.	Local	Low	Common, widespread habitat	Medium	Neutral	Neutral
Scrub	Minimal scattered scrub within 500m; none within footprint. Nesting bird, amphibian & small mammal habitat.	Local	Negligible	Common, widespread habitat	Negligible	Neutral	Neutral
Tall ruderal	Areas of tall ruderal vegetation. 1 small area to the south within 500m but none within footprint. Habitat for nesting birds, amphibians and invertebrates.	Local	Negligible	Common, widespread habitat	Negligible	Neutral	Neutral
Subsidiary habitats (within 500m of the route)	See below						Slight adverse
Mature broad-leaved trees	Approximately up to 12 trees will be lost to the footprint of the road. There are many individual trees located within 500m.	Local	Medium	Common, widespread habitat	Medium	Minor negative	Slight adverse

Area	Description of feature/ attribute	Scale (at which attribute matters)	Importance (of attribute)	Trend (in relation to target)	Biodiversity and earth heritage value	Magnitude of impact ¹	Assessment Score ²
Legally protected species	See below						Slight adverse – neutral
Great crested newt (GCN)	<p>Surveys completed in 2013 identified a maximum population of 6 GCN.</p> <p>There is terrestrial habitat available, including ponds, woodland, hedgerows and semi-improved, neutral grassland.</p> <p><i>NERC 2006 Species of Principal Importance</i></p> <p><i>European protected species</i></p>	Local	High – common in the UK but rare in Europe. UK populations are of importance in EU context.	Declining throughout Europe due to loss of habitat.	Medium	Neutral	Neutral
Badger	It is unlikely that there is a population in the survey area as no records were returned by the local badger group within 500m of the route and only one badger was observed during a bat survey by Jacobs' ecologists on the outer edge of the survey area.	Local	Low	Common, widespread species	Low	Neutral	Neutral

Area	Description of feature/ attribute	Scale (at which attribute matters)	Importance (of attribute)	Trend (in relation to target)	Biodiversity and earth heritage value	Magnitude of impact ¹	Assessment Score ²
	<p>No badger setts were recorded during the 2012 badger survey.</p> <p><i>Protection under The Badgers Act (1992)</i></p>						
Barn owl	<p>Two sightings of barn owl within 500m of the footprint and evidence of occupation at 1 farm within 500m during the 2013 surveys. One record of barn owl within 5km.</p> <p>Suitable habitat is available along hedgerows, field margins and woodland edge.</p> <p><i>Schedule 1 of the Wildlife and Countryside Act (as amended) 1981</i></p>	Local	Medium	Declining	Medium	Minor negative (mortality)	Slight adverse
Bats	<p>Common pipistrelle roosts and a brown long-eared roost have been identified in fifteen buildings.</p> <p>6 species of foraging bats have been seen across the whole survey area (including Common pipistrelle, soprano</p>	Local	Medium	Declining	Medium	Minor negative Four buildings with low conservation status bat roosts would be demolished	Slight adverse

Area	Description of feature/ attribute	Scale (at which attribute matters)	Importance (of attribute)	Trend (in relation to target)	Biodiversity and earth heritage value	Magnitude of impact ¹	Assessment Score ²
	<p>pipistrelle, brown long-eared, noctule, Daubenton's and an unknown <i>Myotis</i> species.</p> <p><i>Local BAP</i></p> <p><i>NERC 2006 Species of Principal Importance</i></p> <p><i>European protected species</i></p>						
Breeding birds	<p>Suitable habitat was recorded within 500m (including footprint, i.e. trees/hedges) 20 species of birds were confirmed to be breeding within 500m of the footprint; a further 25 probable and 8 possible breeding species. Of these, four species were of high conservation concern, 20 of moderate concern, 8 NERC species, and 2 Local BAP species.</p> <p>Suitable habitats in the area include woodland, semi-improved neutral grassland,</p>	Local	Low	Declining (certain species, such as farmland birds)	Low	Neutral	Neutral

Area	Description of feature/ attribute	Scale (at which attribute matters)	Importance (of attribute)	Trend (in relation to target)	Biodiversity and earth heritage value	Magnitude of impact ¹	Assessment Score ²
	<p>waterbodies and private gardens.</p> <p><i>Local BAP</i></p> <p><i>NERC 2006 Species of Principal Importance</i></p> <p><i>All birds, nests and eggs are protected under Wildlife and Countryside Act (as amended) 1981</i></p>						
Wintering birds	<p>Suitable wintering bird habitat is present within 500m and 60 common species were recorded within 500m of the footprint. This included 9 species of high conservation concern, 16 of moderate concern, 10 NERC species and 2 Local BAP species.</p> <p>Suitable habitats in the area include woodland, semi-improved neutral grassland, waterbodies and private gardens.</p> <p><i>Local BAP</i></p>	Local	Low	Declining (certain species, such as farmland birds)	Low	Neutral	Neutral

Area	Description of feature/ attribute	Scale (at which attribute matters)	Importance (of attribute)	Trend (in relation to target)	Biodiversity and earth heritage value	Magnitude of impact ¹	Assessment Score ²
	<p><i>NERC 2006 Species of Principal Importance</i></p> <p><i>All birds, nests and eggs are protected under Wildlife and Countryside Act (as amended) 1981</i></p>						
Brown hare	<p>5 sightings of brown hare were located within 500m during the 2012 Jacobs surveys. There are suitable habitats in the area including, grassland, hedgerows and woodland.</p> <p><i>Local BAP</i></p> <p><i>NERC 2006 Species of Principal Importance</i></p>	Low	Low	Declining	Low	Neutral	Neutral
Otter	<p>Otter are present within 500m of the footprint but not within the footprint.</p> <p><i>Local BAP</i></p> <p><i>NERC 2006 Species of Principal Importance</i></p> <p><i>European protected species</i></p>	Local	Medium	Increasing, now widespread in UK	Medium	Neutral	Neutral

Area	Description of feature/ attribute	Scale (at which attribute matters)	Importance (of attribute)	Trend (in relation to target)	Biodiversity and earth heritage value	Magnitude of impact ¹	Assessment Score ²
Reptiles	<p>One record of a slow worm within the footprint at St John the Baptist church yard, but no evidence of reptiles was found during the Jacobs surveys, Limited habitat suitability within 500m due to agricultural intensification</p> <p><i>Local BAP</i></p> <p><i>NERC 2006 Species of Principal Importance</i></p>	Low	Low	Declining	Negligible	Neutral	Neutral
Other notable fauna							Neutral
Common Toad	<p>Recorded in typical numbers for the locality during the Jacobs 2012 surveys.</p> <p>Suitable habitats include waterbodies, woodland, hedgerows and gardens.</p> <p><i>NERC Species of Principal Importance</i></p>	Local	Low	Stable	Low	Neutral	Neutral

Area	Description of feature/ attribute	Scale (at which attribute matters)	Importance (of attribute)	Trend (in relation to target)	Biodiversity and earth heritage value	Magnitude of impact ¹	Assessment Score ²
Common Frog	<p>Recorded in typical numbers for the locality during the Jacobs 2012 surveys.</p> <p>Suitable habitats include waterbodies, woodland, hedgerows and gardens.</p>	Low	Low	Stable	Low	Neutral	Neutral
Smooth Newt	<p>Recorded in typical numbers for the locality during the Jacobs 2012 surveys.</p> <p>Suitable habitats include waterbodies, woodland, hedgerows and gardens.</p>	Low	Low	Stable	Low	Neutral	Neutral
European hedgehog	<p>2 incidental sightings of hedgehogs were made during the Jacobs 2012 surveys associated with residential and farm dwellings within 500m of the footprint. There is also suitable habitat including hedgerows, woodland, gardens and farmland within 500m</p> <p><i>Local BAP</i></p>	Low	Low	Declining	Low	Neutral	Neutral

Area	Description of feature/ attribute	Scale (at which attribute matters)	Importance (of attribute)	Trend (in relation to target)	Biodiversity and earth heritage value	Magnitude of impact ¹	Assessment Score ²
	<i>NERC 2006 Species of Principal Importance</i>						

Reference Sources: Environmental Statement (Chapter 6) (Jacobs, 2013), Specialist technical reports (Phase 1 habitat survey, individual species/habitat reports) (Jacobs, 2013), NERC Act 2006, Local Biodiversity Action Plans, Lancashire Environmental Records Centre, Multi-Agency Geographic Information for the Countryside (MAGiC) website.

Summary Assessment Score: Effects range from slight adverse to Neutral; overall Neutral.

Qualitative Comments:

The impacts that are predicted to occur are likely to be removed or reduced during the design process by firstly avoidance of the impacts and where that is not possible, minimised by the implementation of appropriate mitigation and compensation measures, i.e. habitat creation/enhancement.

There are no statutory or non-statutory sites within the footprint or within 500m of the footprint; however, there are six Biological Heritage Sites and four Local Nature Reserves within 5km, the nearest being the Lancaster Canal which is 1km northwest. None of these sites will be directly or indirectly affected by this Scheme.

The predominant habitats through which the route would pass are improved grasslands and associated field boundaries (hedgerows with some mature trees). A designated broadleaved woodland (NERC 2006 Habitat of Principal Importance and a local BAP priority habitat), which contains a limited number of ancient woodland indicators in the ground flora, would be disturbed by a proposed underpass; this habitat is considered to be of Regional value; consequently, this would have a moderate adverse effect on this habitat at construction reducing to slight adverse with mitigation 15 years after construction. A further undesignated woodland falls within the footprint, however, this habitat is associated with gardens and is replaceable. A small number of mature trees would be lost; which are located along field boundaries, water courses, adjacent to ponds and within gardens within the footprint. Mitigation measures address these losses and consequential effects such as the severance of commuting routes and foraging for small mammals, barn owls, bats, amphibians and a slight reduction in the nesting opportunities for local bird communities and the roosting opportunities for bats in the locality.

There are a total of 25 hedgerows that are crossed by the Scheme footprint, of these 14 are species-rich and 11 are species-poor; the route is likely to cause slight adverse effects through habitat fragmentation and severance for associated flora and fauna at construction, reducing to neutral after 15 years. Appropriate habitat creation would compensate for any loss and improve existing hedgerow within redline boundary.

There is a slight adverse effect predicted for barn owls in the area due to the increased risk of mortality with the introduction of a new road. This would be mitigated by appropriate habitat management to discourage barn owls from roadside habitat.

No ponds would be lost to the Scheme but there will be fragmentation of core terrestrial habitat for a small population of GCN in the centre of the scheme, There is also a risk of damaging/polluting ponds adjacent to the scheme including a GCN pond. A moderate adverse effect in the short-term due to risk of damage to GCN breeding pond during construction, with no adverse effects by 15 years after construction when the mitigation to be developed under an EPSL would be fully effective. It is anticipated that there is potential beneficial effects on the GCN population in the longer term.

TAG Water Environment Impacts Worksheet

Description of study area/ summary of potential impacts	Key environmental resource	Features	Quality	Scale	Rarity	Substitutability	Importance	Magnitude	Significance		
Changes in water quality resulting from new highway drainage discharge points from the proposed Broughton Bypass	Transport and dilution of waste products	Watercourse	<u>Blundel Brook</u> : Five discharge consents identified through Envirocheck: four for final / treated effluent and one for tertiary treated public sewage. Receives surface water runoff from the A6 (Garstang Road), D'Urton Lane, M55 and M6.	Local	Medium	None	High	Negligible	Insignificant		
			<u>Tributary of Dean Brook</u> : No discharge consents identified through Envirocheck. Receives surface water runoff from Pinewood Avenue, Willow Tree Avenue and Whittingham Lane.	Local	Common	None	Medium	Slight adverse	Insignificant		
			<u>Barton Brook</u> : No discharge consents identified through Envirocheck. Receives surface water runoff from the A6 (Garstang Road), Whittingham Lane, Woodplumpton Lane and M6.	Local	Medium	None	High	Negligible	Insignificant		
			<u>Boundary open watercourse</u> : No discharge consents identified through Envirocheck. Receives surface water runoff from Whittingham Lane.	Local	Common	Limited	Medium	Slight beneficial	Insignificant		
			<u>Blundel Brook</u> : WFD classification of ecological quality is 'moderate'.	Local	Medium	None	Medium	Slight beneficial	Insignificant		
		<u>Tributary of Dean Brook</u> : Ecological quality not classified. 'Moderate' equivalent assumed.	Local	Medium	None	Medium	Slight adverse	Insignificant			
		<u>Barton Brook</u> : WFD classification of ecological quality is 'moderate'. Designated as a salmonid fishery.	Regional	Scarce	None	Very High	Negligible	Low significance			
		<u>Boundary open watercourse</u> : Ecological quality not classified. 'Moderate' equivalent assumed.	Local	Medium	None	Medium	Slight beneficial	Insignificant			
		Flooding from loss of floodplain storage	Conveyance of flood flows	Floodplain	<u>Blundel Brook floodplain</u> : Localised floodplain, outside of developed area.	Local	Medium	Limited	Low	Negligible	Insignificant
					<u>Blundel Brook floodplain</u> : Receives water from a number of un-named tributaries. Drains a moderate catchment.	Local	Medium	None	High	Negligible	Insignificant
<u>Tributary of Dean Brook</u> : Minor watercourse draining surrounding land.	Local				Common	None	High	Negligible	Insignificant		
Flooding from increased surface runoff											

Reference Sources

Broughton Bypass Volume 2: Environmental Statement, June 2013

Summary Assessment Score

Neutral

Qualitative Comments

Impacts on the water environment would range in magnitude from negligible to slight beneficial or slight adverse. In terms of significance, of the eleven identified impacts, ten would be insignificant. The eleventh impact would be on the biodiversity of Barton Brook, where the high importance of the resource means that an impact of negligible magnitude is considered to be of low significance.

TAG Physical Activity Impacts Worksheet (Basic)

	Pedestrians (i)	Cyclists (ii)	Equestrians and Others (iii)
Numbers affected (a)	No Data Available		
Change in journey time in minutes (b)			
Combined impact (c=a*b)			

Reference Source

- Department for Transport, Traffic Analysis Guidance (TAG), TAG Unit A4.1 Social Impact Appraisal – Physical Activity Impacts;
- Department for Transport, TAG Unit A5.1 Active Mode Appraisal;
- Design Manual for Roads and Bridges Volume 11, Section 3, Part 8 – Pedestrians, Cyclists, Equestrians and Community Effects, June 1993; and,
- Broughton Bypass – Environmental Statement, Vol 2: Main Statement (2013).

Summary Assessment Score

No Data Available.

Qualitative Summary: Slight Beneficial.

Qualitative Comments

In the absence of quantitative data, an economic value of changes to health with and without the scheme cannot be provided. However, a summary of potential impacts on health, pedestrians and cyclists in line with TAG Unit A4.1 Social Impact Appraisal – Physical Activity Impacts is provided.

The NMU network surrounding the scheme principally comprises of nine public footpaths, one cycleway, two nearby bridleways and a number of minor side roads with footways. Currently the primary physical activities undertaken within the study area are walking and cycling. In particular, footpaths Broughton FP4 and FP5 and Barton F25 have been described by the Ramblers' Association Preston Group as being heavily used. Furthermore, the Lancashire County Council Cycle Officer has advised that Guild Wheel cycleway is well used.

Pedestrian movements in Broughton are along the A6 Garstang Road with a lesser movement along Whittingham Lane and Woodplumpton Lane. Many of the pedestrian movements are made by children attending Broughton Business and Enterprise College. The majority of the cycle movements in Broughton are along the A6 Garstang Road where there are cycle lanes on both sides of the road, north of Broughton.

The proposed route would sever a small number of Public Rights of Way (PRoW). Temporary closures would be required for Barton FP25 and Broughton FP4 during construction, and three public footpaths (Broughton FP4, FP5 and Barton FP25) would have part of their route stopped up, with permanent diversions to provide alternative connections during operation. These diversions will result in slightly increased journey length and generally reduced visual amenity as a result of their close proximity to the new bypass. The severance of these PRoWs in the operational phase could therefore have an insignificant adverse impact on physical activity as it could dissuade NMUs from using the network.

As part of the bypass, Barton FP25 would be diverted along the eastern side of the road, along the verge. This would then join the existing footway on the diverted section of Whittingham Lane. On this section of Whittingham Lane there would also be a cycleway. A combined footway and cycleway signal controlled crossing, (using a Toucan crossing), would be provided for the footway and cycleway on the diverted section of Whittingham Lane. At the northern end of the bypass, at the A6 Garstang Road Roundabout junction, the existing cycleway and footpath would be crossed by the bypass. A new cycleway would be included around the western and eastern sides of the roundabout junction, which would connect to the existing cycleway to the north of the junction along Garstang Road. This new cycleway around the junction would also connect to a new section of cycleway to the south, along Garstang Road through Broughton Village.

A new open non-signalised crossing would be located to the east of the Garstang Road Roundabout junction, to allow both cyclists and pedestrians to cross the bypass, in order to join the new section of cycleway and footway. A connection between the 'Guild Wheel' cycle route on the A6 Garstang Road and the stopped up D'Urton Lane would be provided through the provision of the toucan crossing described above and a new section of cycleway. In addition, the eastern end of D'Urton Lane would be restricted for through traffic, which would potentially reduce the flows of traffic along the cycle route. This has the potential to greatly increase the amenity value of the study area for NMUs as it provides new facilities for their use as well as increasing accessibility of the existing facilities. This may also encourage cyclists to travel further and encourage a modal shift from driving due to improved connectivity and accessibility, thus having a moderate beneficial effect on physical activity.

Once the bypass has been built restrictions will be placed on the main A6 Garstang Road between the new A6 Garstang junction and new D'Urton Lane junction through Broughton village. Restrictions would significantly reduce the traffic flow through this section. This would reduce the likelihood of conflict for NMUs. With less traffic there would be improved amenity value with improved views, safety and air quality. Children attending Broughton Business and Enterprise College and Broughton in Amounderness C of E Primary School would feel safer walking or cycling to school. NMUs would therefore experience a long-term significant beneficial effect as a result of the additional restrictions. Overall, NMUs would experience significant long-term beneficial effects as a result of improved connectivity, improved safety and improved amenity along the A6 and side roads. These effects outweigh the long-term insignificant adverse effect of stopping up and diverting some of the PRoWs resulting in a long-term insignificant

beneficial impact.

The overall beneficial effects on the NMU network are likely to encourage physical activity, primarily through encouraging walking and cycling throughout the study area by reducing road traffic and improving connectivity. For each new walking or cycling trip, which arises as a result of the proposed scheme, there would be health benefits to each individual undertaking the journey, having a beneficial effect on physical activity and associated health benefits, including reductions in short-term absence from work. No data is available to monetise these effects on the scheme.

TAG Journey Quality Impacts Worksheet

Factor	Sub-factor	Better	Neutral	Worse
Traveller Care	Cleanliness		✓	
	Facilities		✓	
	Information		✓	
	Environment	✓		
Travellers' Views	-		✓	
Traveller Stress	Frustration	✓		
	Fear of potential accidents	✓		
	Route uncertainty	✓		

Reference Source

- Department for Transport, Traffic Analysis Guidance (TAG), TAG Unit A4.1 Social Impact Appraisal – Journey Quality Impacts;
- Design Manual for Roads and Bridges Volume 11, Section 3, Part 9 – Vehicle Travellers, June 1993; and,
- Broughton Bypass – Environmental Statement, Vol 2: Main Statement (2013).

Summary Assessment Score

Moderate beneficial.

As the number of travellers affected exceeds 500 and slightly less than 10,000 the assessment is likely to be moderate beneficial.

Qualitative Comments

Summary

Overall the improvement in traveller stress due to a reduction in driver frustration, fear of accidents and journey uncertainty as well as the improvement in NMU facilities would result in a moderate beneficial impact on journey quality. The insignificant adverse impact on travellers views would be balanced out by the improved views along the A6 Garstang Road after opening and would not have an effect on this assessments summary of Moderate beneficial

Traveller Care

Road users

There would be a neutral effect on journey distances as current access to facilities in Broughton will remain. There would be no additional facilities nor any change to the quality or condition of existing facilities. Cleanliness and information will also remain the same. There would be an improvement to the environment for the facilities within Broughton with the expected reduction in traffic through the centre of the village. The new route will reduce congestion in Broughton by diverting vehicle travellers away from A6 Garstang Road and the village centre as they utilise the new bypass. In addition new sections of footway and cycleway will be provided around the Garstang Road Roundabout junction and tying in to existing facilities. Once the bypass has been built restrictions will be placed on the main A6 Garstang Road between the new A6 Garstang junction and new D'Urton Lane junction through Broughton village. Restrictions would significantly reduce the traffic flow through this section. This would reduce the likelihood of conflict for NMUs. With less traffic there would be improved amenity value with improved views, safety and air quality. As a result slight improvements in journey

quality are expected in comparison to existing cycling and pedestrian movements on the road with live traffic. Thus this would lead to a beneficial impact on traveller care through improving the environmental factors of the journey.

Whilst the volume and composition of traffic are very important determinants of amenity, other factors, such as footpath width, distance from traffic, barriers between pedestrians and vehicle traffic, and the quality of any street furniture and planting, should also be taken into consideration in the assessment.

Public Transport

After the bypass opens, there would only be slight changes to the routes of buses via the new roundabout junctions. The route of bus no. 40 and 41 would change, coming along the A6 Garstang Road from Broughton Village travelling to Broughton roundabout. For this route, the buses would need to take a left hand turn at the junction with the lower section of the bypass, travel up to the D'Urton Lane roundabout, pass around the roundabout and then follow the bottom section of the bypass towards Broughton roundabout. This diversion to the bus route would increase the journey length. The route of bus no. 4 would also change as a result of the new bypass. Coming from Broughton village the bus would need to use the Whittingham Lane junction rather than travelling straight along Whittingham Lane, this would only slightly increase the journey length.

As a result of the scheme, one bus stop along Whittingham Lane would be affected by the footprint of the road as it would be located too close to the Whittingham Lane junction and will be moved.

The route changes, increased journey length and impact on bus stops are thought to have a long term insignificant adverse impact on bus users. Also, there will be no changes to cleanliness or information associated with public transport

Travellers' Views

For the new route, cutting and bunding would restrict views into the surrounding countryside to occasional views. Along the Broughton bypass between the A6 and Whittingham Lane views would be limited short distance to the south by earth bunding and existing vegetation. Views in a north-easterly direction would be open towards the Forest of Bowland where existing vegetation allows. Views for travellers approaching Whittingham Lane junction would be restricted either side by vegetation and acoustic barriers flanking the residential boundaries.

Views for travellers at Whittingham Lane junction would become more extensive in a southerly direction. Loss of roadside trees and hedgerows as field boundaries would open views to the farmland and across the flat rural landscape to vegetation flanking the A6 and the woodland belt planting surrounding the Preston Marriot Hotel. Views would be available towards the buildings associated with the private hospital complex across the Blundel Brook valley.

On entering the cutting towards Blundel Brook in a southerly direction views would become more confined to the north and south but would remain open towards the opposite valley side and private hospital complex. Views in a northerly direction from Blundel Brook across the bridge structure would be short distance limited by existing vegetation, rising topography and embankments. Longer distance views towards Whittingham Lane would open up as travellers come out of the cutting.

Through the Blundel Brook valley and at D'Urton Lane junction views north for all traveller directions would be restricted acoustic fencing, screening the Parish Church. The acoustic fencing would obscure views of the Church of St. John the Baptist. Views south and east for both sets of travellers would be open towards rural properties flanking each side of D'Urton Lane and the M55 on embankment. Views for travellers in a southerly direction nearing the M55 would be of a new busy traffic junction accentuated by the opened up views due to demolition of residential buildings east of the M55 junction 1 roundabout. Views for travellers accessing or exiting the M55 at Junction 1 would experience open views along the new bypass following loss of roadside hedgerows and hedgerow trees.

Views of travellers along the A6 Garstang Road would improve as a result of the dramatic reduction in traffic levels and there would be localised changes in views where Garstang Road junction and D'Urton Lane junctions.

Overall, although there would be a change in the character of the views, the quality of views would remain unchanged. Travellers on the local road network would in general experience insignificant changes in views after the scheme opens. Therefore, the effect on travellers' views from the road would generally be an insignificant adverse impact, the exception are views along the A6 Garstang Road after opening.

Travellers Stress

Frustration

As vehicles are prevented and discouraged from using the existing A6 Garstang Road, many vehicles would

have to use the new bypass which would reduce the traffic on the existing road network. This would help to reduce congestion on the local roads which improves journey time for vehicle travellers and reliability of public transport services operating along these routes and would therefore reduce frustration for both drivers and public transport users. As a consequence, it is concluded that frustration would reduce as a result of the do something scenario. This would provide an insignificant beneficial impact.

Vehicle traveller frustration would reduce as a result of the scheme.

Route Uncertainty

The route has been designed with fewer junctions and has fewer side roads compared to the existing A6 Garstang Road which would reduce the uncertainty of where to go. Signs would be installed to design standards which would also reduce route uncertainty. This would provide an insignificant beneficial impact.

During the construction phase, a traffic management plan and site traffic management plan would be implemented to minimise any increase in stress caused by the road works. This would include temporary short-term diversions and temporary signage.

Route uncertainty would reduce as a result of the scheme.

Fear of accidents

As the new bypass is located away from local side roads and settlement there would be fewer cars pulling out and fewer NMU's. NMU's and buses are not encouraged to utilise the new bypass, instead improvements have been made to the existing A6 Garstang Road therefore fewer NMUs will be on the bypass. With fewer cars pulling out and people around this will reduce the fear of accidents for vehicles travelling along the bypass. This would provide an insignificant beneficial impact.

The reduction of traffic flow through Broughton village centre would also reduce the fear of accidents.

Fear of accidents would reduce as a result of the scheme.

TAG Severance Impacts Worksheet

Change in Severance	Population Affected			
	Broughton	Barton	Sharoe Green/ Greyfriars	Total Affected
Large negative				
Moderate negative				
Slight negative				
Neutral		< 200	< 400	< 600
Slight positive	< 200			< 200
Moderate positive				
Large positive				

Reference Source

- Department for Transport, Traffic Analysis Guidance (TAG), TAG Unit A4.1 Social Impact Appraisal – Severance Impacts;
- Department for Transport, TAG Unit A4.2 Distributional Impact Appraisal - Distributional Impacts of Severance;
- Design Manual for Roads and Bridges Volume 11, Section 3, Part 8 – Pedestrians, Cyclists, Equestrians and Community Effects, June 1993; and,
- Broughton Bypass, Environmental Statement, 2013.

Summary Assessment Score

The road may cause some slight adverse effects to pedestrian users walking to/from Broughton from Fulwood and Barton.

Overall Slight beneficial impact would be seen – Through incorporation of appropriate mitigation measures all people wishing to make pedestrian movements will be able to do so. On balance it is likely that current severance to pedestrian users walking to/from Broughton to/from Barton and Fulwood would be reduced as a result of the scheme due to the reduced congestion by moving traffic away from local roads in and around Broughton.

In the absence of quantitative data, the summary assessment score is based on the assumption that daily footfall from each location is likely to be less than 200 pedestrians, with the exception of Sharoe Green and Greyfriars which are larger than the other surrounding settlements, for these communities we have assumed more than 400 pedestrians.

Due to a lack of data, Severance Distributional Impacts have been considered in the qualitative section only.

Qualitative Comments

Without the scheme, no current hindrance to movements in the locality of the scheme is noted.

The community closest to the scheme and most likely to be affected by construction and operation of the

new bypass is Broughton, which has a range facilities including shops; post office; hotels; sports facilities; schools restaurants and petrol stations. There are a number of additional communities in close proximity to the scheme that could be impacted by the new road, namely Barton and the Wards of Sharoe Green and Greyfriars in the Preston suburb of Fulwood. The largest of these communities is Greyfriars located south of the M55, west of A6 Garstang Road with a population of 6,404 (2011 census). Sharoe Green, situated south of the M55, east of the A6 is of similar size with a population of 6,279. Broughton has a population of 1,722, and Barton has the smallest community of the four with 1,150 people.

The NMU network surrounding the scheme principally comprises of nine footpaths, one cycleway, two nearby bridleways and a number of minor side roads with footways. A limited amount of usage data was obtained from the Ramblers' Association Preston Group. They stated that Broughton Footpath 4, Broughton Footpath 5 and Barton Footpath 25 were heavily used. The proposed route would sever a small number of Public Rights of Way (PRoW). Temporary closures would be required for Barton FP25 and Broughton FP4 during construction, and three public footpaths (Broughton FP4, FP5 and Barton FP25) would have part of their route stopped up, with permanent diversions to provide alternative connections during operation. These diversions will result in slightly increased journey length and generally reduced visual amenity as a result of their close proximity to the new bypass. The severance of these PRoWs in the operational phase could therefore dissuade NMUs from using the network. As a result a slight adverse effect is recorded for pedestrians using the PRoW network within Broughton.

The Guild Wheel is a designated circular cycle route opened in 2012 running 21 miles around Preston. The route follows Broughton Bridleway 2, linking onto Broughton FP1, crosses the A6 Garstang Road at the pelican crossing before running south down a shared use footway along the A6 Garstang Lane before turning west along D'Urton Lane. The route links to the Sustrans National Cycle Route 6 further along D'Urton Lane. The Lancashire County Council Cycle Officer advised that their initial thoughts were that it is well used and occasionally promotion days are held where hundreds of cyclists could use the route in one day. The connection of the Broughton bypass with A6 Garstang would sever D'Urton Lane and therefore would have a slight adverse effect on cyclists.

During construction of the bypass there may be a temporary increase in community severance due to traffic management and road diversions, which would cause a minor adverse impact. These minor adverse impacts to the local communities from the movement of construction traffic would be mitigated through the implementation of a traffic management plan. This would determine defined routes for the construction traffic, away from the local communities. Therefore the adverse impacts would cease upon completion of the scheme when there would be a decrease in community severance.

The majority of pedestrian movements in Broughton are along the A6 Garstang Road with a lesser movement along Whittingham Lane and Woodplumpton Lane. Many of the pedestrian movements are made by children attending Broughton Business and Enterprise College coming from residential areas in the surrounding communities. The school children travelling from the south of Broughton to join up with the existing A6 Garstang Road would experience beneficial impacts when travelling through Broughton due to the reduced congestion, however for many of them they would be a need to cross the new bypass which could cause an adverse impact to their journey due to fear of potential accidents.

These potential severance adverse impacts could be mitigated by implementing measures through design. Mitigation measures include installation of five new crossings for pedestrians and cyclists (two toucan crossings and three open crossings); new sections of cycleway and footway across the A6 Garstang Road junction, Whittingham Lane and junction, D'Urton Lane and junction; and diversions provided for all affected footpaths to avoid severance at the points where they are stopped up. The new sections of cycleway, along with reducing the traffic flow on various roads will improve the journey quality for NMUs, thus encouraging people to utilise these routes and undertake these journeys. This would therefore have a beneficial impact on severance.

Overall the scheme is considered to have a beneficial impact on community severance between Broughton and the surrounding communities. The bypass would reduce traffic flows through Broughton thereby reducing the disturbance from road traffic and encouraging the surrounding communities to travel to Broughton to utilise the facilities. As a result, people travelling from the surrounding communities of Barton and Fulwood to access the current facilities within Broughton would experience a beneficial impact due to the reduced congestion. The scheme would therefore result in a slight beneficial impact on severance.

Distributional Impact Appraisal Matrix

	Distributional impact of income deprivation					Are the impacts distributed evenly?	Key impacts - Qualitative statements (example below)
	0-20%	20-40%	40-60%	60-80%	80-100%		
User benefits	✓	✓✓	✓✓	✓✓	✓✓✓	No	All income groups receive user benefits from the scheme. Quintile 5 benefits the most.
Noise	Neutral	Neutral	Neutral	Neutral	✓✓✓	Yes	Only Quintile 5 is affected by change in noise. The impact is large beneficial.
Air quality	x x x	x x x	Neutral	x x x	✓✓✓	No	Quintile 5 is the only quintile which receives beneficial impact in both NO2 and PM10 concentrations. Quintiles 1, 2 and 4 receive large adverse impact and quintile 3 is not affected.
Affordability	x x	x x	x x	x x	x x	Yes	All quintiles receive moderate adverse impact.
Accessibility	N/A	N/A	N/A	N/A	N/A		

AST entry											
Impact	Social groups						User groups				Qualitative statement (including any impact on residential population AND identified amenities)
	Children & young people	Older people	Carers	Women	Disabled	BME	Pedestrians	Cyclists	Motor-cyclists	Young male drivers	
Noise	x										There will be an increase in noise levels for one primary school in the affected area. Therefore, children are expected to receive a slight adverse noise impact as a result of the scheme.
Air Quality	Neutral										Negligible improvement in air quality for children.
Accidents	Neutral	Neutral					Neutral	✓	Neutral	✓	Young male drivers and cyclists are expected to benefit from the scheme due to forecast reduction in number of accidents along the routes with high proportion of cyclist and young male drivers casualties.
Security	N/A	N/A		N/A							
Severance	✓	N/A	N/A		N/A						Children attending Broughton Business and Enterprise College and travelling on foot from south of Broughton are expected to benefit from reduced congestion on A6 Garstang Road.
Accessibility	N/A	N/A	N/A	N/A	N/A	N/A					