Norfolk County Council

NORWICH WESTERN LINK

Distributional Impact Appraisal

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Norfolk County Council

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Distributional Impact Appraisal

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CONTENTS

TABLES

FIGURES

1 INTRODUCTION

1.1 INTRODUCTION

1.1.1. This Distributional Impact Appraisal report has been developed as part of the Outline Business Case for the Norwich Western Link scheme (NWL) and has been prepared on behalf of Norfolk County Council (NCC) for consideration by the Department for Transport (DfT).

1.2 SCHEME LOCATION

1.2.1. The NWL is located to the east of Norwich and seeks to provide a link between the A47 in the south and the A1067 in the north. The location is shown in Figure 1-1. The scheme comprises:

- A dual carriageway road, including a viaduct over the River Wensum and associated floodplain;
- A tie in to the junction with the A47;
- An "at grade" junction with the A1067;
- Dualling of a section of the existing A1067 between the proposed NWL roundabout and existing A1270 roundabout;
- A bridge carrying the NWL over Ringland Lane;
- New pedestrian crossing points, green bridges and bat underpasses where deemed to be required;
- Diversion and extension of existing Public Rights of Way and field paths to create a coherent joined up network; and
- Surface water drainage - principally infiltration basins, sediment forebays and associated carrier drains/ channels.

1.2.2. The scheme also includes landscaping, planting, ancillary works, environmental mitigation work and Biodiversity Net Gain measures and a wider network of cycle-friendly route options where traffic relief from the NWL enables improved cycle priority.

Figure 1-1 - Scheme Location

1.3 OVERVIEW OF DISTRIBUTIONAL IMPACT APPRAISAL APPROACH

1.3.1. Distributional impacts (DI) considers the variance of transport intervention impacts across different social groups. The appraisal considers both beneficial and adverse impacts on the different social groups that might be affected, against the following indicators:

- User Benefits;
- Noise;
- Air Quality;
- Accidents;
- Security;
- Severance;
- Accessibility; and
- Affordability.

1.3.2. The appraisal has been undertaken in accordance with Transport Appraisal Guidance (TAG) Unit A4.2: Distributional Impact Appraisal. The appraisal process consists of 3 major steps.

- Screening Process – identification of likely impacts for each indicator;
- Assessment – identification of impact area, social groups and amenities; and
- Appraisal of impacts – analysis of impacts, full appraisal and input into Appraisal Summary Table (AST).

1.3.3. The assessment and Appraisal steps are split down further into separate sub steps as shown in Figure 1-2.

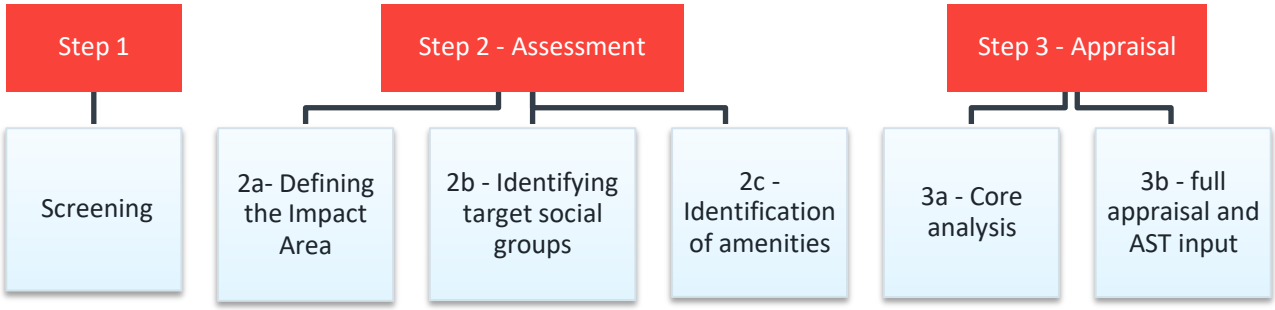

Figure 1-2 –TAG Distributional Impact Process

1.4 STRUCTURE OF THIS REPORT

1.4.1. The structure of this report reflects the stages in Web-based Transport Analysis Guidance (TAG) guidance.

- Chapter 2 outlines the first step in the analysis – Screening;
- Chapter 3 sets out the second step – Assessment;
- Chapter 4 details the third step – Appraisal; and
- Chapter 5 summarises the assessment.

2 STEP 1 SCREENING PROCESS

2.1 INTRODUCTION

2.1.1. The first step in the process involves undertaking initial screening to identify the likely impacts of the NWL against the key indicators specified in TAG Unit A4.2.

2.2 APPROACH

2.2.1. Each indicator has been assessed individually using the TAG screening proforma. The output of this assessment determines whether the intervention needs to be assessed further. Consideration has been given to:

- Whether there might be positive or negative impacts on different social groups;
- If changes to scheme design can mitigate any potential negative impacts; and
- How dispersed the impact is likely to be, to understand is the scale of the impact is disproportionate to the potential impact.

2.2.2. The completed screening proforma is include in Appendix A. At this stage, previously anticipated impacts (based on the SOBC assessment) have been used to determine whether the indicator should be progressed to Step 2. The screening considered extent and dispersion of the likely impact across social groups and geographical area.

2.2.3. A summary of the outcomes and decision on whether to progress to the next step is include in Table 2-1.

Table 2-1 – Initial Screening

Impact Area	Conclusion	Next Step
User Benefits	There are likely to be beneficial impacts with respect to journey time, based on the SOBC TUBA analysis.	Proceed to Step 2
Noise	The SOBC assessment estimated minor impacts both adverse and beneficial with respect to a change in road traffic generated noise levels.	Proceed to Step 2
Air Quality	The SOBC assessment indicated adverse impacts for air quality and greenhouse gases emissions	Proceed to Step 2
Accidents	The new link is likely to attract traffic currently using low standard rural routes and congested urban routes. The new link will have reduced number of junctions and will be designed to current standards.	Proceed to Step 2
Security	There is no planned change to public transport waiting/interchange facilities with the scheme.	Do not proceed to step 2
Severance	The new link is likely to sever existing PROWs.	Proceed to Step 2
Accessibility	There is no planned change to public transport services routing or timings or provision with the scheme.	Do not proceed to step 2

Impact Area	Conclusion	Next Step
Affordability	The scheme will have an impact on car fuel and non- fuel operating costs, only. As a result of rerouting it is expected that there will be changes to these costs. For car fuel and non-fuel operating costs, the outputs from TUBA can be used, and indicate positive benefits. The remaining areas of affordability (parking charges, road user charges, public transport fares and concession availability) are not affected by the scheme.	Proceed to Step 2

3 STEP 2 ASSESSMENT

3.1 INTRODUCTION

The broad impact areas of the transport intervention are identified in Step 1. Step 2 investigates these impacts in more detail to confirm where both spatial impacts will be experienced, and where socio-economic, social and demographic characteristics need to be further considered.

3.2 STEP 2A: AREAS IMPACTED BY THE INTERVENTION

The area impacted by the NWL will vary for each indicator. The largest area is that covered by the transport model and the study area as shown in Figure 3-1.

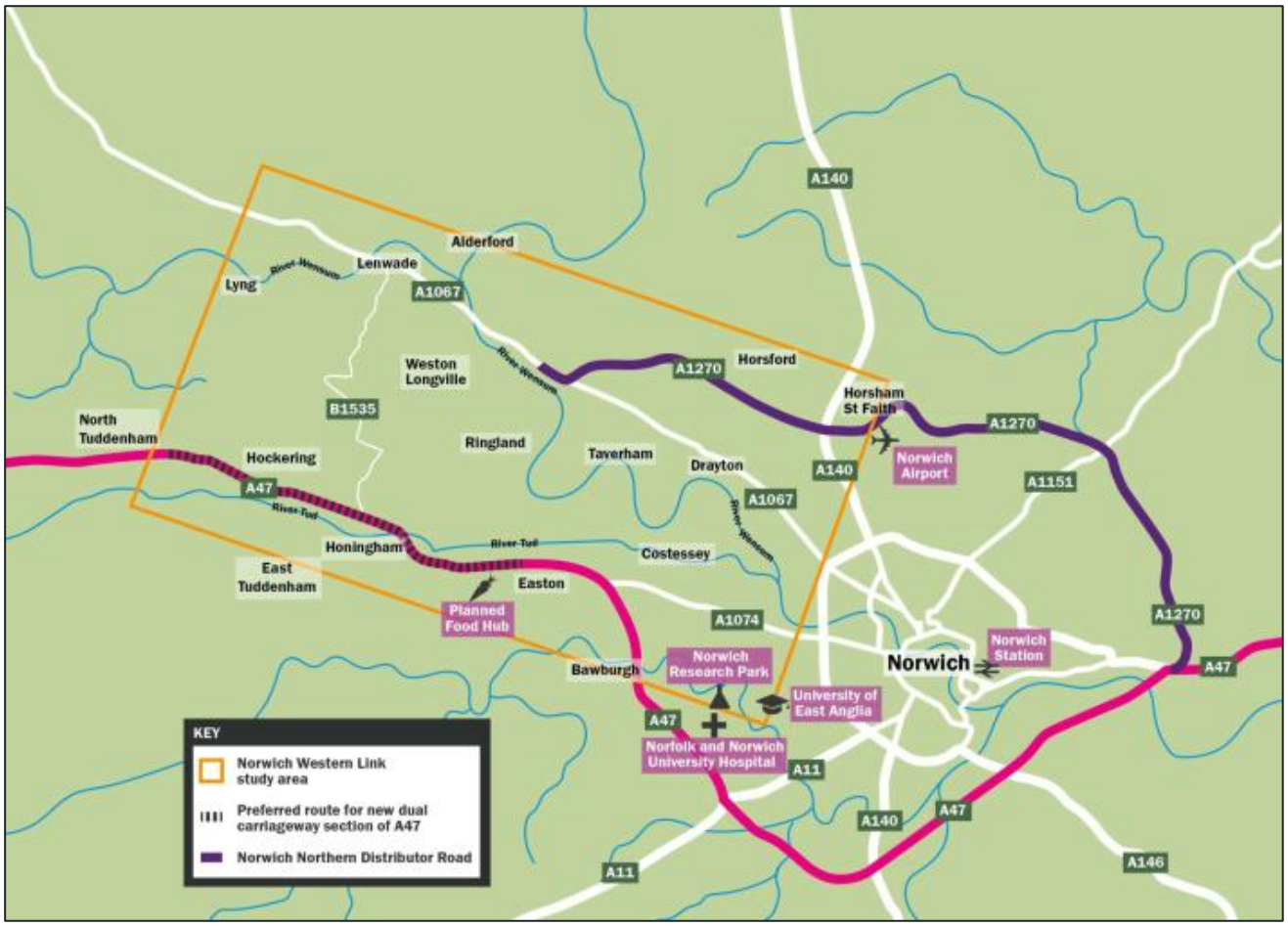

Figure 3-1 - NWL Study Area

Source: About the Norwich Western Link, Location Map (Norfolk County Council)

USER BENEFITS

3.2.1. The impact area is defined as the area in which the transport intervention will result in changes to the cost of travel for users (non-business) of the transport network. This is the area represented by the transport model.

3.2.2. Tests have been undertaken to establish the area impacted by changes in user costs for consideration of using a core modelled area (as set out in section 6.3 of the EAR). This showed that the impacts are spread across the sectors with the highest impacts occurring in those sectors closest to the scheme.

NOISE

3.2.3. The impact area for a highway scheme is defined in DMRB LA111 for operational noise impacts. The approach to defining the impact area is set out as follows:

- An area within 600m, from the carriageway edge, of new road links or road links physically changed or bypassed by the scheme;
- An area within 50m of other road links with potential to experience a short term (opening year) basic noise level change of more than 1dB(A) as a result of the scheme.

3.2.4. The Noise impact/study area is shown in Figure 3-2.

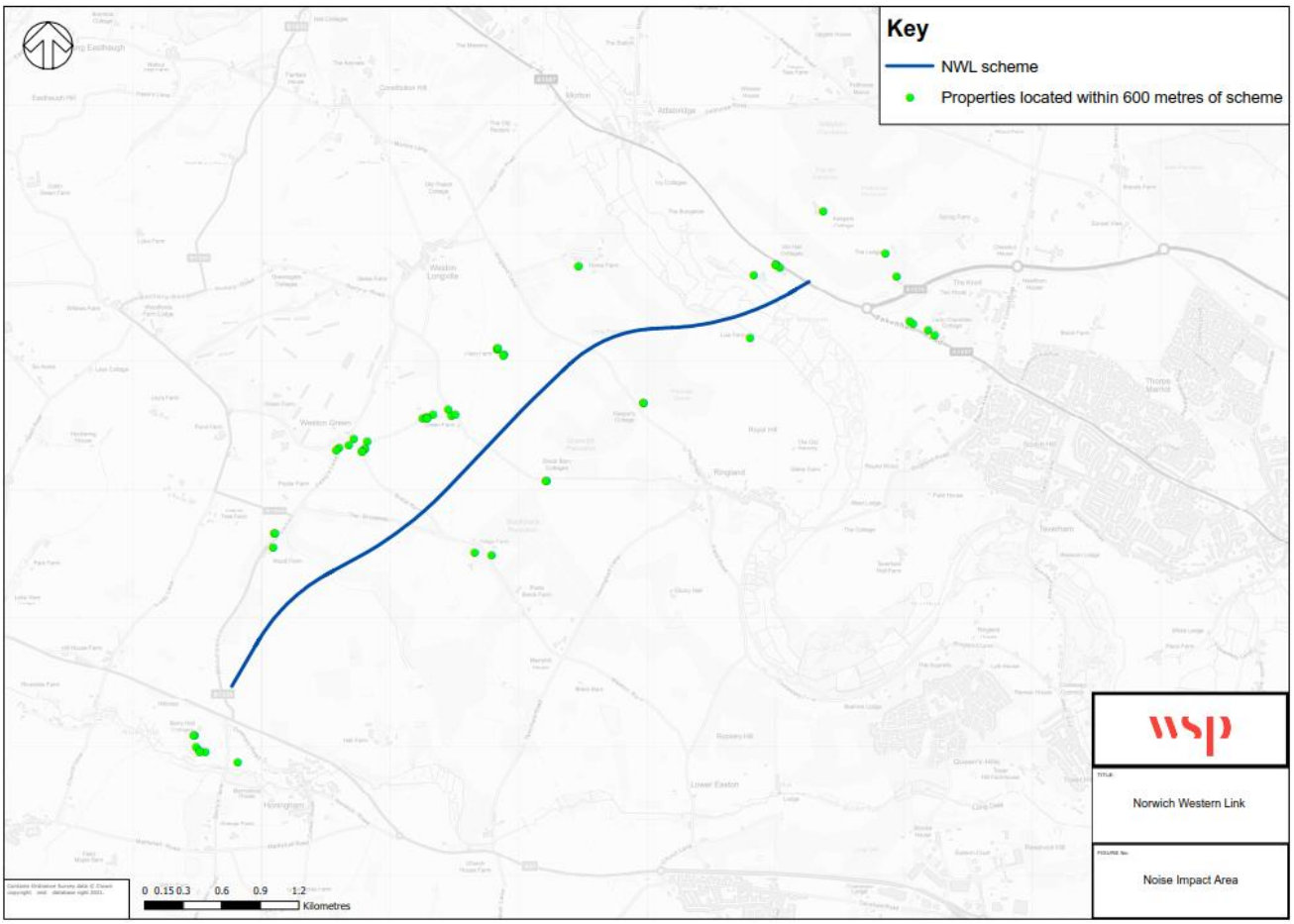

Figure 3-2 - Noise Impact Area

AIR QUALITY

3.2.5. The impact area for a highway scheme is defined in DMRB LA105 for air quality impacts. The approach to defining the air quality impact area is set out as follows:

- Identify any roads where:

- road alignment will change by 5 m or more; or
- daily traffic flows will change by 1,000 AADT or more; or
- Heavy Duty Vehicle (HDV) flows will change by 200 AADT or more; or
- A change in speed bands.

- Identify all existing and planned properties where people might experience a change in local air quality, near the affected roads.

3.2.6. The air quality impact areas are shown in Figure 3-3.

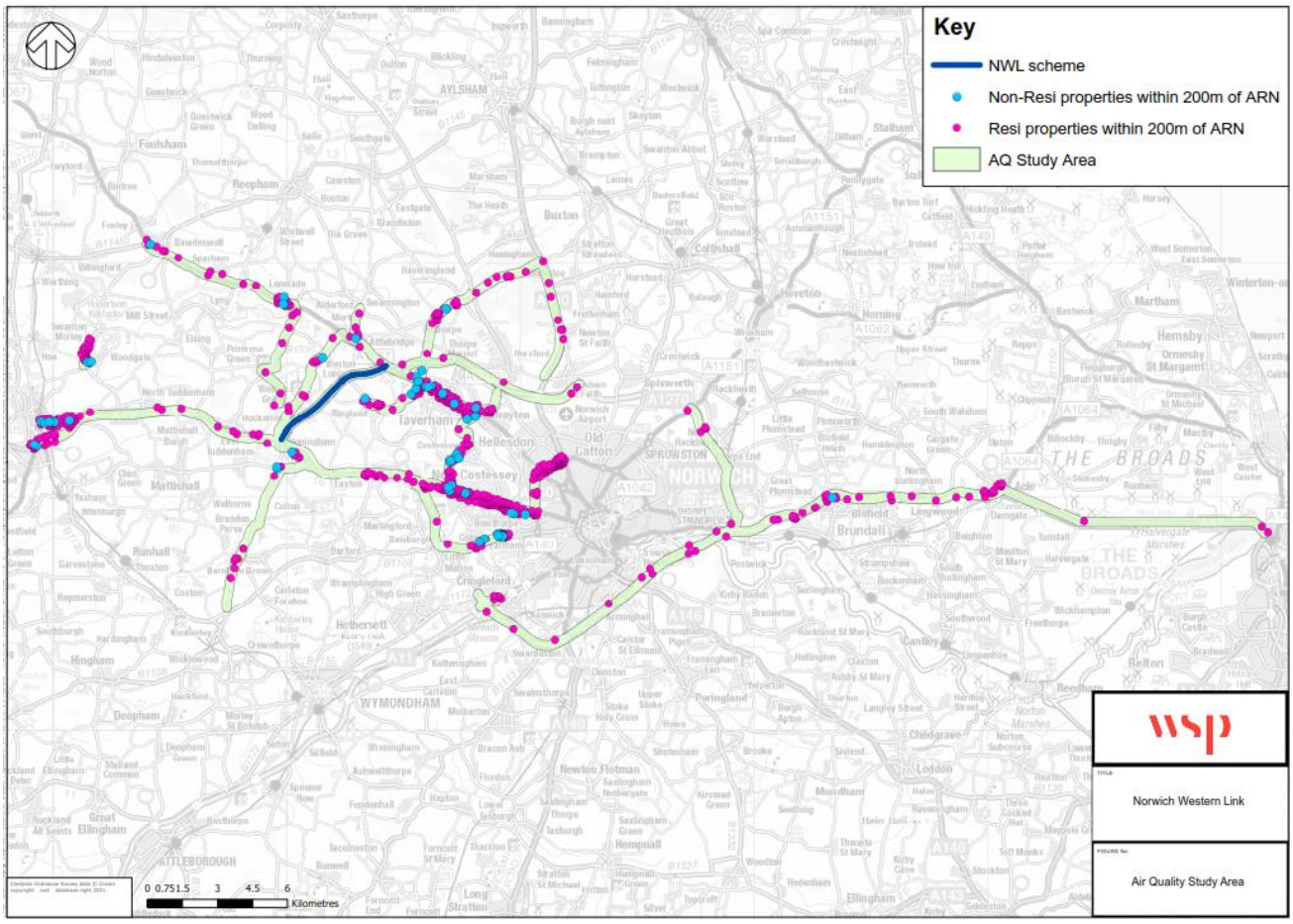

Figure 3-3 – Air Quality Impact Area

3.2.7. The study area above shows the affected road network for air quality analysis, covering a significant area of roads within Norfolk. In addition, residential properties and non-residential properties (schools, medical centres, community centres and care homes) within 200 metres of the affected roads are also presented.

ACCIDENTS

3.2.8. The impact area for accidents is set out in TAG Unit A4.2, and covers:

- Any roads which display a change in accident rates between the Do Minimum and Do Something scenarios, in particular any roads which display a change in traffic volume of >10%.

3.2.9. The analysis will look primarily at impacts on children and older people (both particularly as pedestrians), young males, motorcyclists and the more deprived population, to ensure that all accident impacts on those groups, adverse or beneficial, are accounted for in the appraisal.

SEVERANCE

3.2.10. The impact area has been defined in line with TAG Units A4.1 and A4.2, and covers:

- Any areas where there is a change in community severance due to the intervention, in particular any roads which display a change in traffic volume of >10%.

AFFORDABILITY

3.2.11. The impact area is the same as that considered for User Benefits.

3.3 STEP 2B: IDENTIFICATION OF SOCIAL GROUPS IN THE IMPACT AREA

3.3.1. This step identifies:

- The transport users that will experience changes in generalised travel costs;
- The people living in areas who may experience impacts of the intervention; and
- People travelling in areas identified as likely to be affected by the intervention.

3.3.2. Analysis of the characteristics of people in the area likely to be affected has been taken by mapping social characteristics at Lower Super Output Area (LSOA) levels. Table 3-1 shows the groups of people that need to be identified in the analysis for each indicator.

Table 3-1 – Socio-demographic analysis for DIs

Dataset/ Social Group	User Benefits	Noise	Air Quality	Accidents	Security	Severance	Accessibility	Affordability
Income Distribution	✓	✓	✓				✓	✓
Children: proportion of population aged <16		✓	✓	✓	✓	✓	✓	
Young Adults: proportion of population aged 16-25				✓			✓	
Older People: proportion of population aged 70+		✓		✓	✓	✓	✓	
Proportion of Population with a disability					✓	✓	✓	
Proportion of population of Black and Minority Ethnic (BME) origin					✓		✓	
Proportion of households without access to a car						✓	✓	
Carers: proportion of households with dependent children.							✓	

Source: TAG Unit A4.2 Table 2

The majority of these social groups have been defined using the 2011 Census data, the only exception is the Income distribution which is obtained from the Income Deprivation domain of the English Indices of Deprivation (IoD) 2015.

The impact area sits across four local authorities within Norfolk, these are:

- Norwich City Council;
- Broadland District Council;
- South Norfolk District Council; and
- Breckland District Council.

3.3.3. Norwich covers the city and will reflect the more urban characteristics of the population, whereas the other three areas are mostly rural and will reflect the rural characteristics.

INCOME DISTRIBUTION

3.3.4. The Index of Multiple Deprivation (IMD) is an overall relative measure of deprivation constructed by combining seven domains of deprivation according to their respective weights. The income deprivation domain is one of the seven domains, it measures the proportion of the population experiencing deprivation relating to low income. The definition of low income used includes both those people that are out-of-work, and those that are in work but who have low earnings (and who satisfy the respective means tests). The income deprivation index is a proxy measure for the most vulnerable groups as it considers those living in areas ranked highest in terms of income deprivation.

3.3.5. The deciles are calculated by ranking the 32,844 LSOAs in England from most deprived to least deprived and dividing them into 10 equal groups. LSOAs in decile 1 fall within the most deprived 10% of LSOAs nationally and LSOAs in decile 10 fall within the least deprived 10% of LSOAs nationally.

3.3.6. The deciles are aggregated together to form quintiles, so decile 1 and 2 sit within Quintile 1, therefore Quintile 1 is the most deprived while Quintile 5 is the least deprived, Figure 3-4 illustrates the income deprivation deciles across the study area.

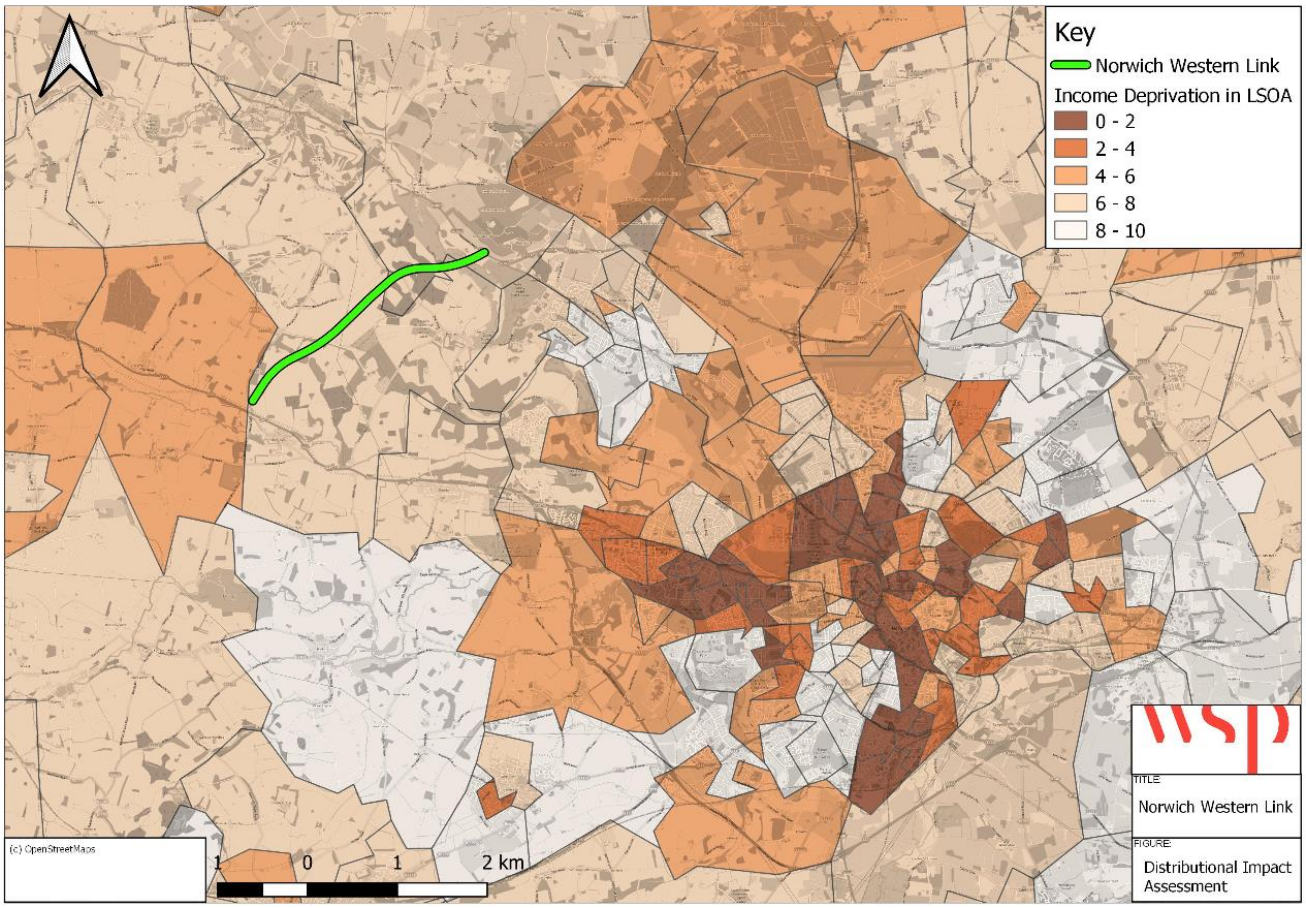

Figure 3-4 - Indices of Deprivation Income Domain by LSOA

3.3.7. As illustrated in Figure 3-4, the LSOAs that fall into the lowest deciles are located in the urban area, to the east of the NWL scheme.

3.3.8. Table 3-2 shows the proportion of the LSOAs by income domain quintile nationally as well as in Norfolk and in the Impact Area which is defined as the four local authority areas of Breckland, Broadland, North Norfolk and Norwich.

Table 3-2 - Income Quintiles in the Impact Area

Quintile	Description	No. of LSOAs	% of LSOAs	Nationally %	Norfolk %
1	0 – 20%	39	12.7%	20%	12.5%
2	20 – 40%	46	15.0%	20%	14.3%
3	40 – 60%	100	32.7%	20%	34.2%
4	60 – 80%	83	27.1%	20%	26.4%
5	80 -100%	38	12.4%	20%	12.5%
Total		**306**			

3.3.9. The highest proportion of the population in the impact area are in the 40 – 60 % deprived quintile, with Quintile 4 (60 – 80%) accounting for the second highest proportion of the population. This is similar to the results for Norfolk. Looking at the four areas separately, Norwich has 40% of its LSOAs with the most deprived income quintile, with 23% in the second most deprived income quintile. The rural authorities have low numbers of LSOAs that fall within the most deprived income quintiles, less than 20% in Quintiles 1 and 2. The majority of the LSOAs in these rural authorities are in income Quintiles 3 and 4 (40 – 80%), on average this accounts for 70%.

CHILDREN

3.3.10. The 2011 Census data was utilised to determine the proportion of the population in each LSOA that are children (under 16 of age). Figure 3-5 shows the proportion of children within each LSOA within the study area.

Figure 3-5 – Proportion of population who are under 16

3.3.11. The analysis indicates that the study area has a lower proportion of children (15.3%) when compared to Norfolk (15.8%) and the national average (17.6%). When looking at the authorities individually both Breckland and Broadland have a higher proportion of children than Norfolk at 16.5% and 15.9% respectively, while North Norfolk and Norwich are below the Norfolk average at 13.5% and 15% respectively.

YOUNG ADULTS

3.3.12. The 2011 Census data was utilised to determine the proportion of the population in each LSOA that was classed as a young adult (aged 16 to 25). Figure 3-6 shows the proportion of young adults within each LSOA within the study area.

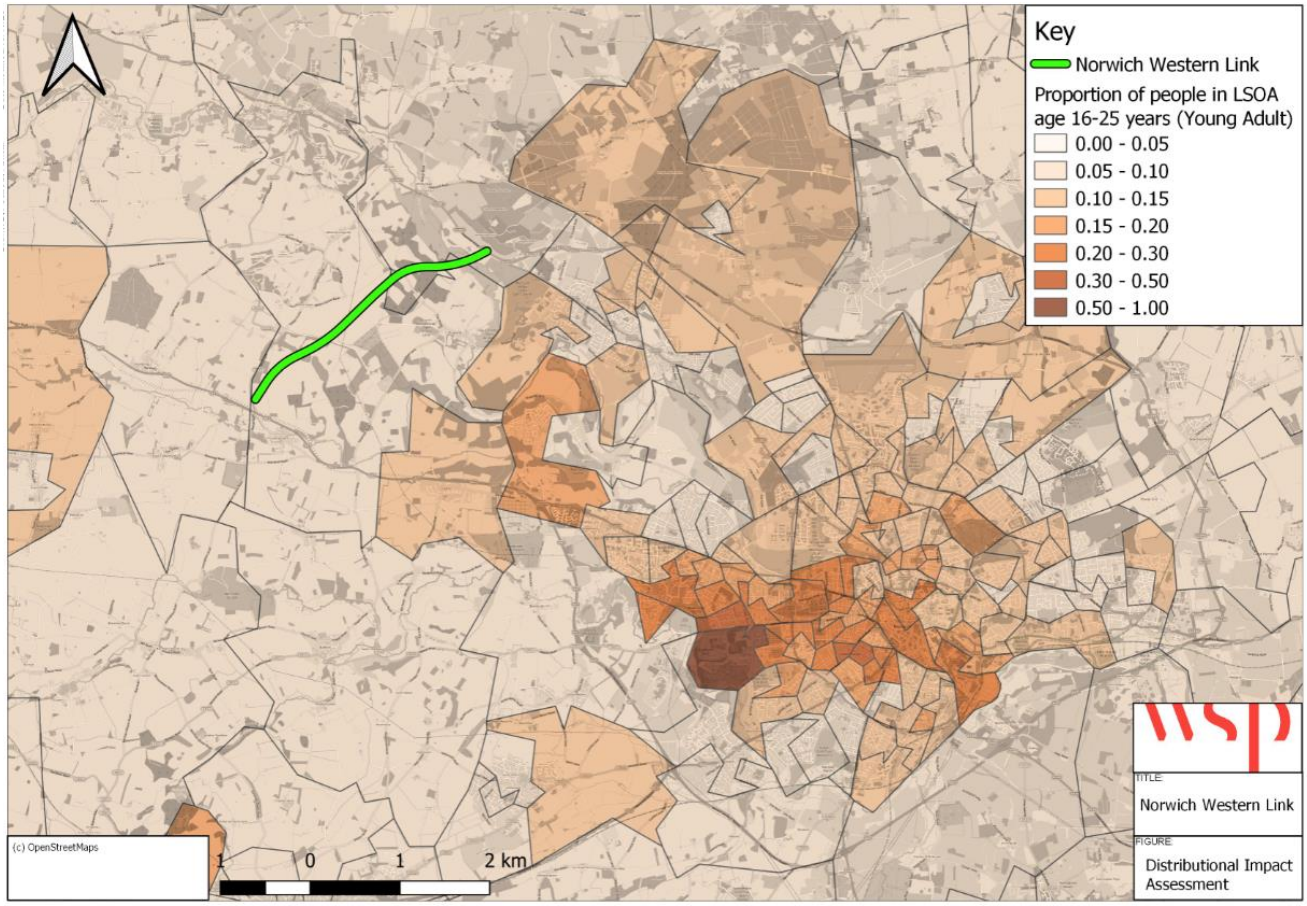

Figure 3-6 – Proportion of population who are young adults

3.3.13. The analysis indicates that the study area has a higher proportion of young adults (12.7%) than the Norfolk average (11.9%) but this is lower than the national average of 13.2%. When viewed individually the proportion of young people within Norwich is significantly higher than both the Norfolk and English average at 19.3% while the other three authorities have a lower proportion of young adults at 11.3% in Breckland, 9.7% in Broadland and 9.4% in North Norfolk. This indicates that the rural areas have a much lower number of young adults resident in the area compared to the urban area on Norwich.

OLDER PEOPLE

3.3.14. The 2011 Census data was utilised to determine the proportion of the population in each LSOA that was classed as older people (70+). Figure 3-7 shows the proportion of older people within each LSOA within the study area.

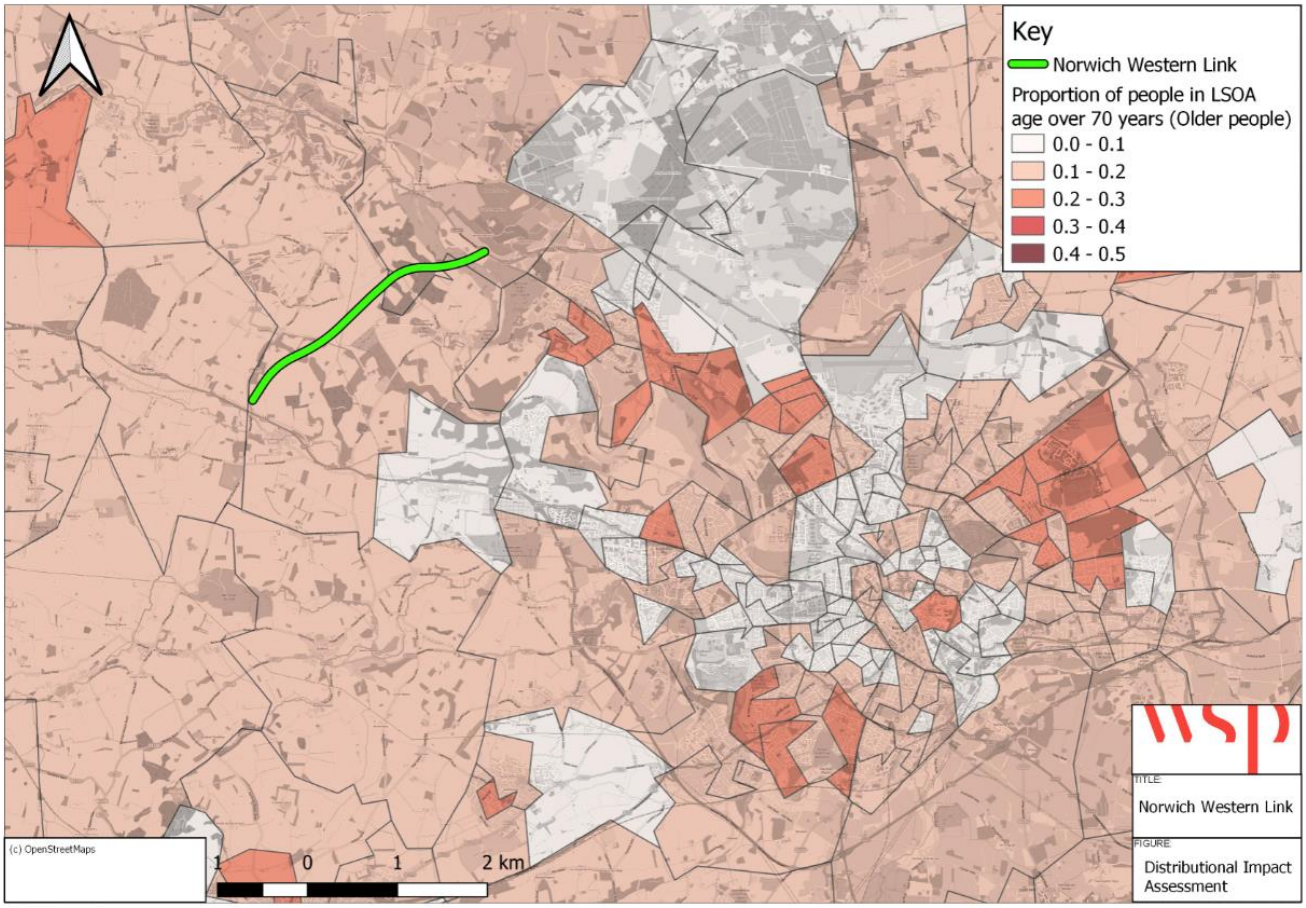

Figure 3-7 – Proportion of population who are older people

3.3.15. The analysis indicates that the study area has the same proportion of the population who are older (14.4%) as Norfolk, both of these are higher than the national average which is 10.9%. Looking at the four local authorities individually, North Norfolk's proportion is significantly higher at 19.4% while Norwich's is lower at 10.1% which is below the national average. Both Breckland and Broadland have levels similar to the Norfolk average at 14.3% and 14.9% respectively. This reflects the findings of the strategic case showing that the study area and Norfolk have an increased level of older people residents in the area when compared nationally.

PROPORTION OF PEOPLE WITH A DISABILITY

3.3.16. The 2011 Census data was utilised to determine the proportion of the population in each LSOA that was classed as having a disability. Figure 3-8 shows the proportion of people with a disability within each LSOA within the study area.

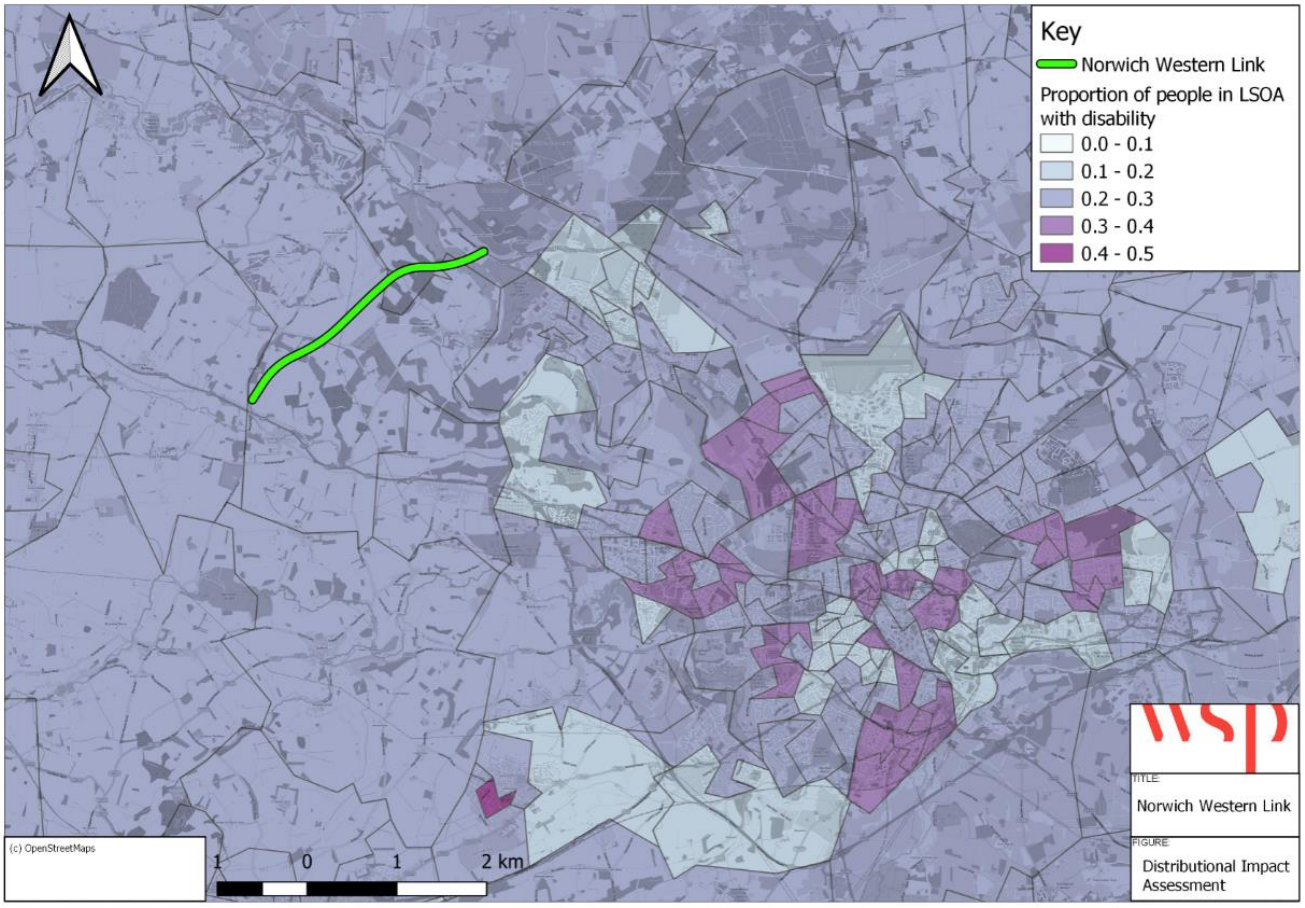

Figure 3-8 – Proportion of population with a disability

3.3.17. The analysis indicates that study area has a similar level of the proportion of the population with a disability as Norfolk (26.8% and 27%). Both of these are higher than the national average which is 25.9%, but not significantly. When viewed at local authority level, North Norfolk has a higher proportion of the population at 29.4% whilst the other three authorities' proportions are lower than the Norfolk average at 26.6% for Breckland, 25.3% for Broadland and 26.2% for Norwich. North Norfolk also had the highest proportion of population over 70 and these two results could be linked.

PROPORTION OF PEOPLE OF BME ORIGIN

3.3.18. The 2011 Census data was utilised to determine the proportion of the population in each LSOA that was classed as being as Black or Minority Ethnic (BME) origin. Figure 3-9 shows the proportion of BME origin within each LSOA within the study area.

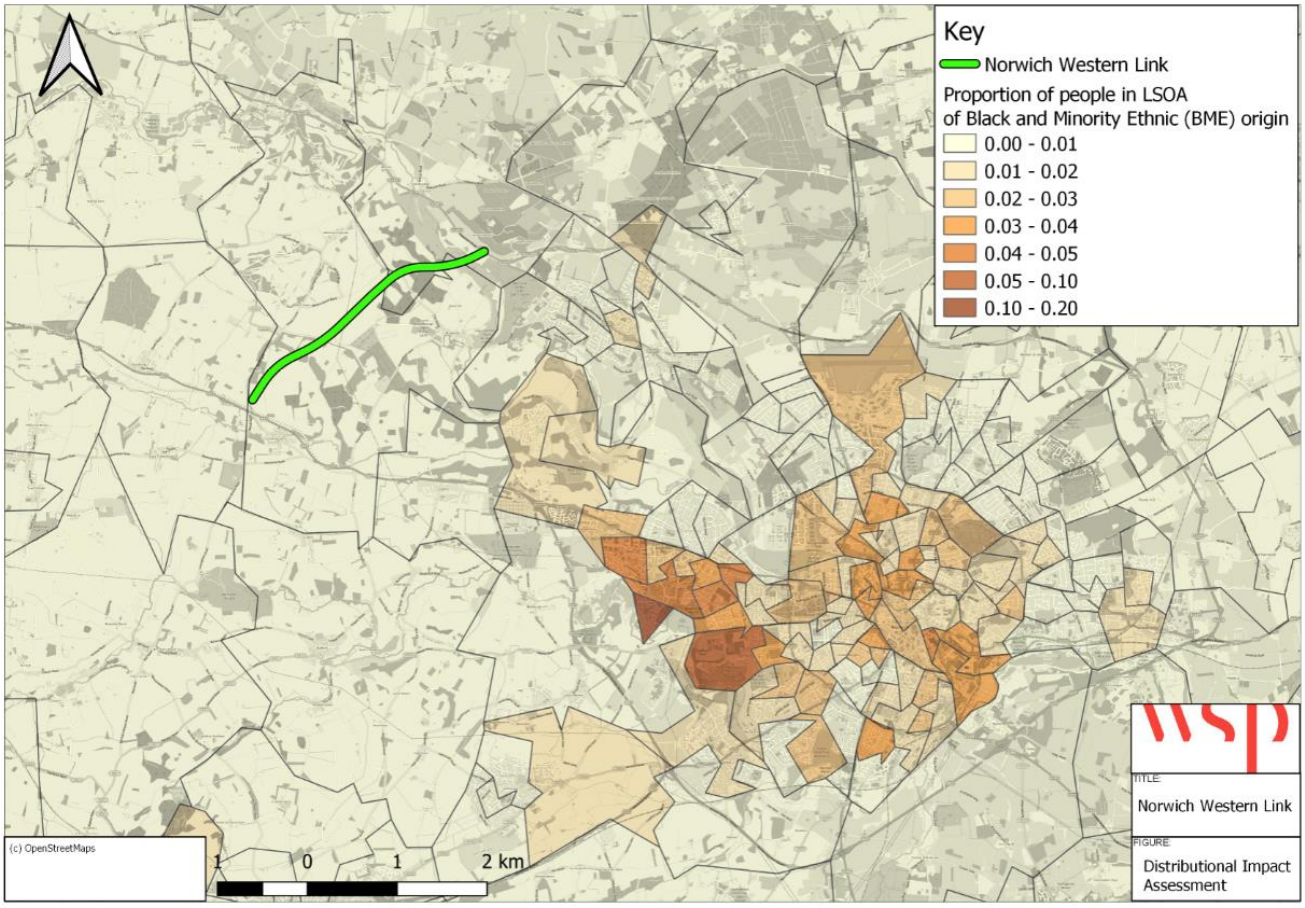

Figure 3-9 – Proportion of population Black or Minority Ethnic origin

3.3.19. The analysis indicates that the study area has a lower proportion (4%) of the population who are classed as of BME origin than the national average (14%), although it is broadly similar to the Norfolk levels (3.5%). When looking at the local authorities individually Norwich has a proportion which is significantly higher than the Norfolk average at 9.2%, although this is still well below the national average. The other three authorities have levels below the Norfolk average with Breckland at 2.6%, Broadland at 2.3% and North Norfolk the lowest at 1.4%.

PROPORTION OF HOUSEHOLDS WITHOUT ACCESS TO A CAR

3.3.20. The 2011 Census data was utilised to determine the proportion of the population in each LSOA that was classed as not having access to a car. Figure 3-10 shows the proportion of people without access to a car within each LSOA within the study area.

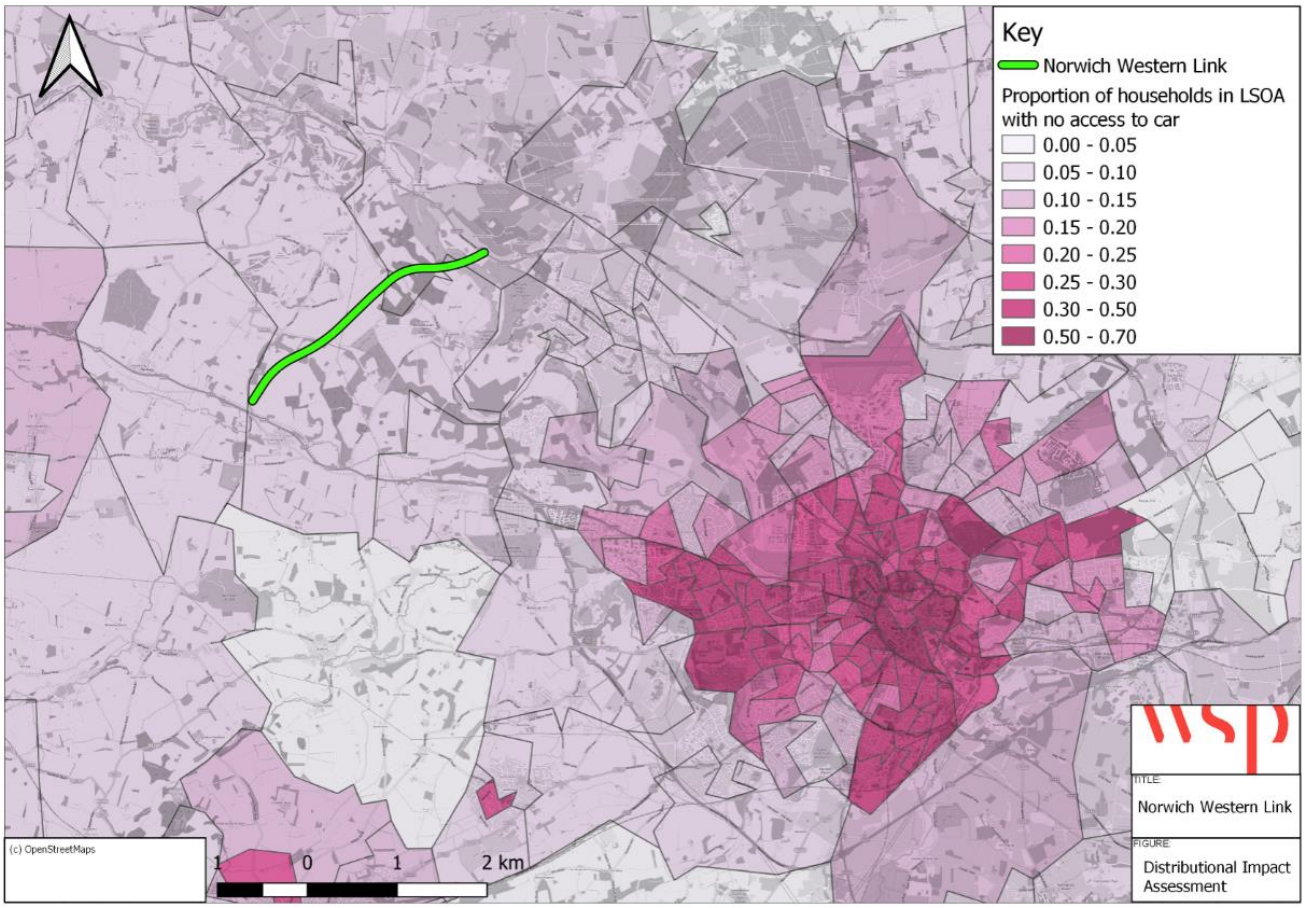

Figure 3-10 – Proportion of population without access to a car

3.3.21. The analysis indicates that the proportion of the population in the study area without access to a car (19.7) is higher than the Norfolk average (18.8%) but lower than the national average (25.6%). Looking at the local authorities individually Norwich's proportion is significantly higher (33.4%) than both the Norfolk and national average, the other three authorities have lower levels at 15.5% for Breckland, 11.4% for Broadland and 16.2% for North Norfolk. This reflects the more rural nature of these three authorities and possible reduced provision of public transport within these areas.

PROPORTION OF HOUSEHOLDS WITH DEPENDENT CHILDREN.

3.3.22. The 2011 Census data was utilised to determine the proportion of the population in each LSOA that was classed as having dependent children. Figure 3-11 shows the proportion of people with dependent children within each LSOA within the study area.

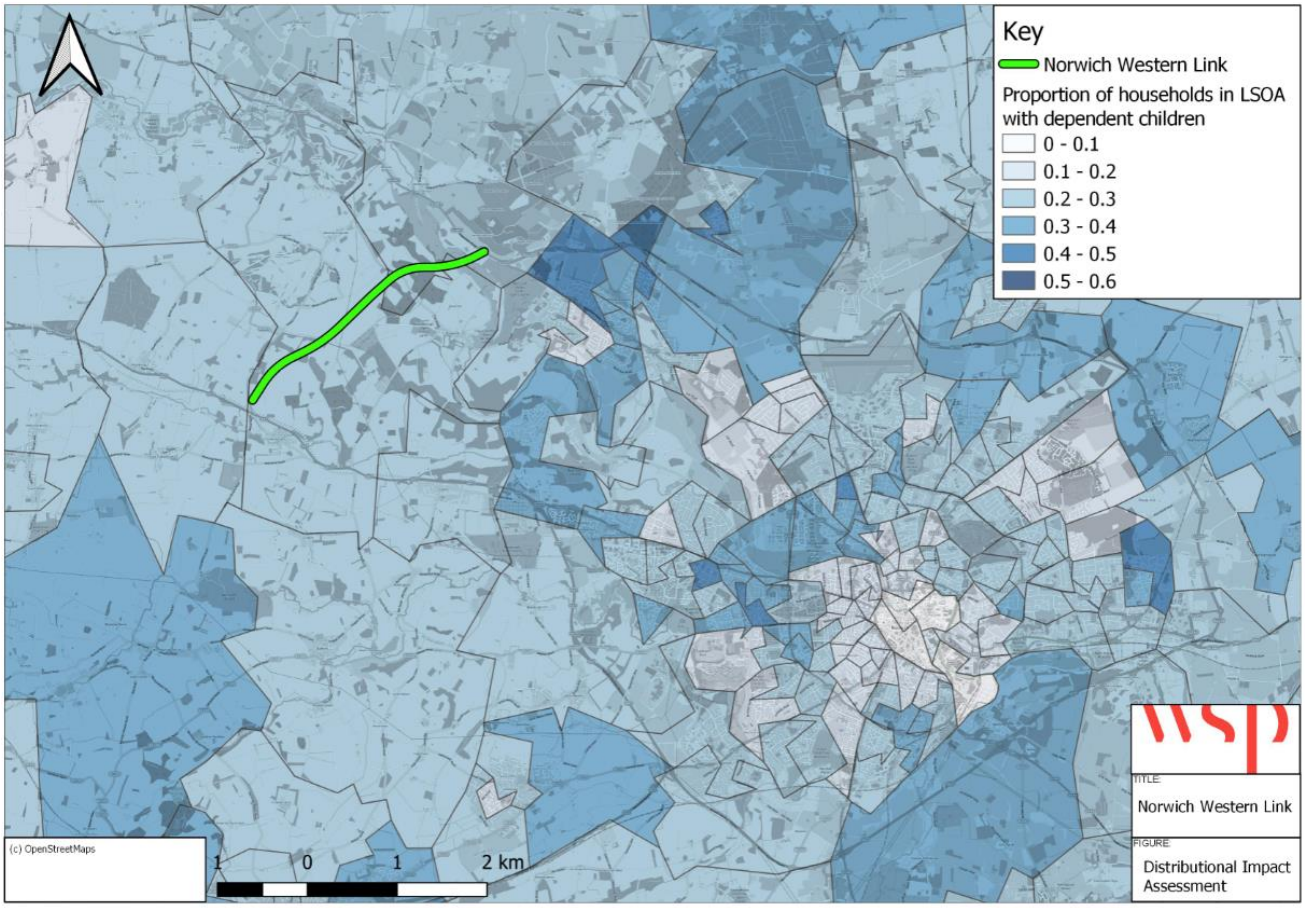

Figure 3-11 – Proportion of households with dependent children

3.3.23. The analysis indicates that the proportion of households with dependent children within the study area (24.5%) is broadly similar to the Norfolk average (25.3%) and lower than the national average (29.1%). Examining the results for each local authority shows that North Norfolk and Norwich have the lowest proportions at 20.7% and 23.3% respectively which are both lower than the Norfolk average, whilst Breckland and Broadland have proportions of 27.4% and 26.3% respectively which are both higher than the Norfolk average. All four authorities have proportions below the national average. This reflects the analysis conducted for the age composition of the population.

3.4 STEP 2C: IDENTIFICATION OF AMENITIES IN THE IMPACT AREA

3.4.1. This step identifies what trip attractors/amenities are within the impact area. Using desktop analysis, the local amenities which are likely to be used by the identified social groups for each DI indicator will be identified. This includes:

- Schools/nurseries;
- Playgrounds;
- Parks and open spaces;
- Hospitals;
- Care homes/day centres; and
- Community centres.

3.4.2. The trip attractors/amenities are shown in Figure 3-12.

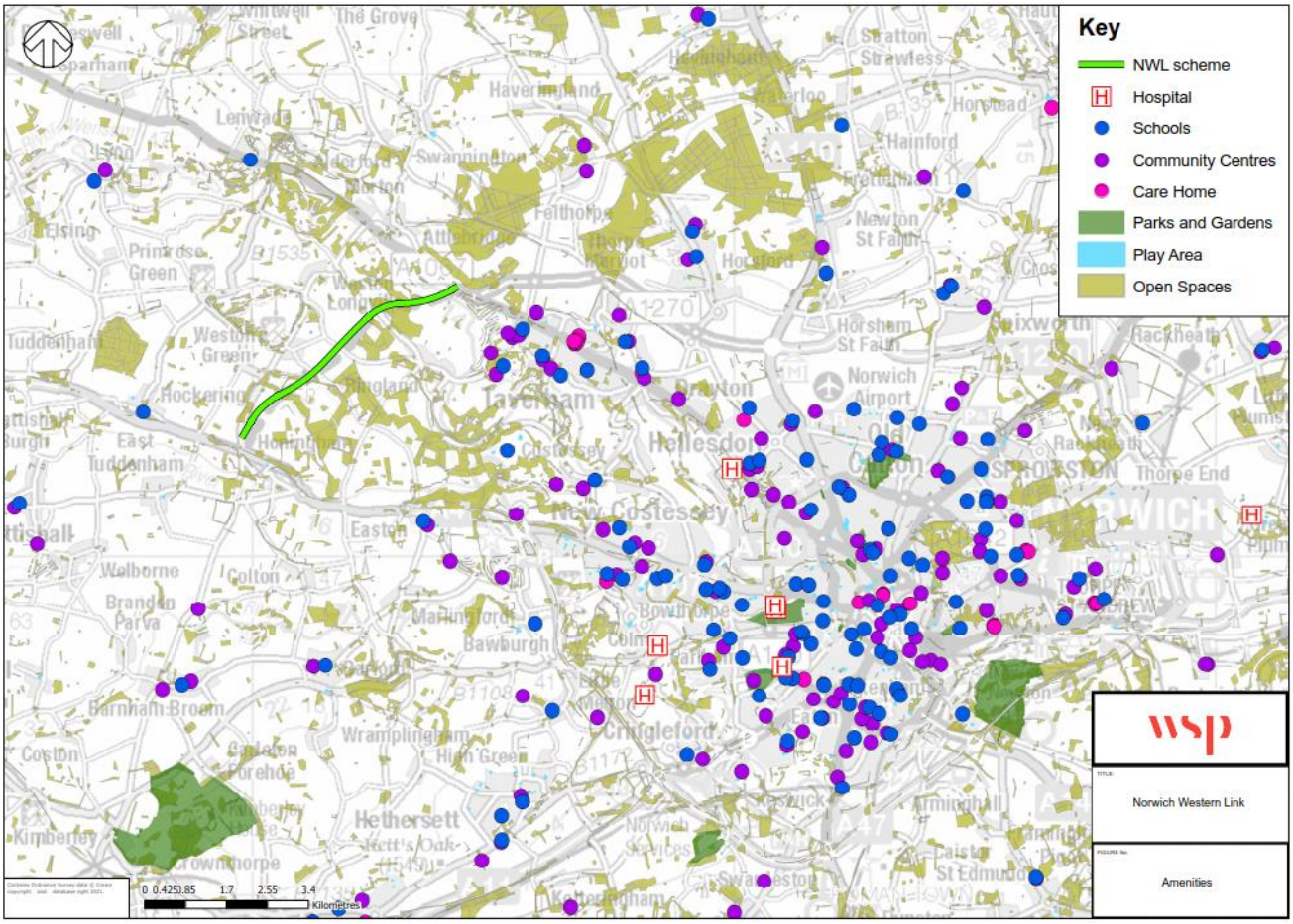

Figure 3-12 – Amenities in the impact area

3.4.3. The figure demonstrates that the majority of amenities (hospitals, schools, care homes and community centres) are located to the east of the NWL scheme, with a significant number of these trip attractors in the urban area of Norwich. In contrast, the opposite trend is demonstrated for parks and open spaces; these are spread out within the study area and are more prominent in rural areas rather than the urban area of Norwich.

3.5 STEP 2 OUTPUT SUMMARY

3.5.1. The assessment output summary is set out in Table 3-3.

Table 3-3 – Assessment (Step 2) Output summary

Social group and amenities indicators			User Benefits	Noise	Air Quality	Accidents	Security	Severance	Accessibility	Affordability	Local Authority	County	England
Resident population in the impact Area	Income Distribution Quintiles	0-20%	12.3	0	4.9					12.3	12.0%	12..5%	20.1%
		20%-40%	12.8	0	6.7					12.8	12.6%	14.3%	20.0%
		40%-60%	26.6	17.4	19.5					26.6	27.0%	34.2%	20.0%
		60%-80%	31.3	82.6	52.3					31.3	31.6%	26.4%	20.0%
		80%-100%	17.0	0	16.5					17.0	16.9%	12.5%	19.9%
	Children <16			17.8	18.3						16.1%	15.8%	17.6%
	Young People				11.6						12.7%	11.9%	13.2%
	Older People			9.5							13.3%	14.4%	10.9%
	People with a disability										25.7%	27.0%	25.9%
	Black Minority Ethnic										4.2%	3.5%	14.0%
	No Car Households										18.5%	18.8%	25.6%
	Households with dependent children										25.8%	25.3%	29.1%
	Indicator population in the impact area		542,961	7,182	813,552					542,961	511,661	857,888	56,075,912

Social group and amenities indicators		User Benefits	Noise	Air Quality	Accidents	Security	Severance	Accessibility	Affordability	Local Authority	County	England
Amenities present within the impact area	Schools / Nurseries		✓	✓	✓							
	Playgrounds		✓	✓	✓							
	Parks and open Spaces			✓	✓							
	Hospitals			✓	✓							
	Care homes / Day Centres		✓	✓	✓							
	Community Centre		✓	✓	✓							

TAG Unit A4.2

4 STEP 3 APPRAISAL

4.1 INTRODUCTION

4.1.1. This step sets out the assessment of the impact of the scheme on each indicator's social groups. This step covers the core analysis of impacts which provides an assessment score for each indicator and each of the social groups.

4.1.2. A qualitative assessment has also been undertaken for each relevant indicator which has been summarised in the DI appraisal matrix table and the AST entries.

4.2 USER BENEFITS

4.2.1. The methodology used for the Distributional Impacts Assessment of User Benefits follows DfT's TAG unit A4-2 guidance. The input data used for the assessment is based on the zone-to-zone correspondence outputs of TUBA. All trips that are classified as having a business purpose within the TUBA output are excluded from the subsequent analysis in accordance with the TAG guidance

4.2.2. The TUBA outputs are aggregated from Origin-Destination pairs to benefits/disbenefits per zone. The default methodology used is to allocate all benefits and disbenefits in the AM peak to the origin zone as the majority of trips will be outbound trips to work. The reverse then is used for the PM peak hour where the benefits and disbenefits are allocated to the destination zone. In the Inter-peak hour, the benefits and disbenefits are averaged and allocated to both the origin and destination zones. This process is repeated for all years of the analysis included within the TUBA output.

4.2.3. Income segmentation data is provided at a number of standardised geographies and therefore the zonal data within the TUBA outputs must be converted ('reaggregated') to align with one of these geographies so comparisons can be made. The chosen geographical scale was Lower Super Output Areas (LSOAs) as this was recommended by the TAG guidance as an appropriate scale of analysis and in addition is the lowest level geography that the income segregation data used is available at.

4.2.4. This methodology uses Index of Multiple Deprivation (IMD) (2019) Income Domain at LSOA geography as a proxy for income as it was produced more recently than the Census 2011 income data.

4.2.5. The process followed is:

- The benefits or disbenefits associated with each LSOA are allocated to the corresponding IMD Income Domain quintile;
- The benefits and disbenefits are summed for each quintile;
- The proportion of the total benefits and disbenefits are calculated for each quintile;
- The proportion of the local population that falls within each quintile is calculated;
- Each quintile is graded according to the grading system given in Table 8 of the guidance.

Table 4-1 – User Benefits Distribution Analysis

	IMD Income Domains £m Most deprived areas ← →least deprived areas				
	Quintile 1 0-20%	Quintile 2 20-40%	Quintile 3 40-60%	Quintile 4 60-80%	Quintile 5 80-100%
Total Benefits	2.54	9.03	30.20	37.68	18.74
Share of User Benefits %	2.6	9.2	30.8	38.4	19.1
Share of Population in impact area %	12.3	12.8	26.6	31.3	17.0
Assessment	✓	✓	✓✓✓	✓✓✓	✓✓✓

4.2.6. The distribution of user benefits across the quintile areas is not even with the majority of impacts favouring those in the least deprived income quintiles. Those in income quintile 4 (second least deprived income quintile) experience a higher than expected proportion of benefits whereas those in the most deprived areas (quintile 1 and to a lesser extent quintile 2) experience a smaller than expected proportion of benefits.

4.3 NOISE

4.3.1. The screening looked at the likely impact of the scheme on noise levels at properties adjacent and in close proximity to the proposed NWL scheme. The screening process identified that the change in traffic levels on the road network was likely to lead to changes in noise levels for residents. The noise assessment considers the impact of noise on LSOAs analysing income deprivation, children and older people.

4.3.2. Noise appraisal has been undertaken using the results from the noise model. During operation, potential noise impacts will be due to changes in traffic movements giving rise to a change in the distribution of vehicle trips and therefore noise. The noise impact area has been defined as those properties adjacent or in close proximity to the NWL scheme.

4.3.3. The noise appraisal looks to compare the changes in noise (decibels) between the Future Year Do-Something scenario against the Future Year Do-Minimum scenario, illustrated in Figure 4-1.

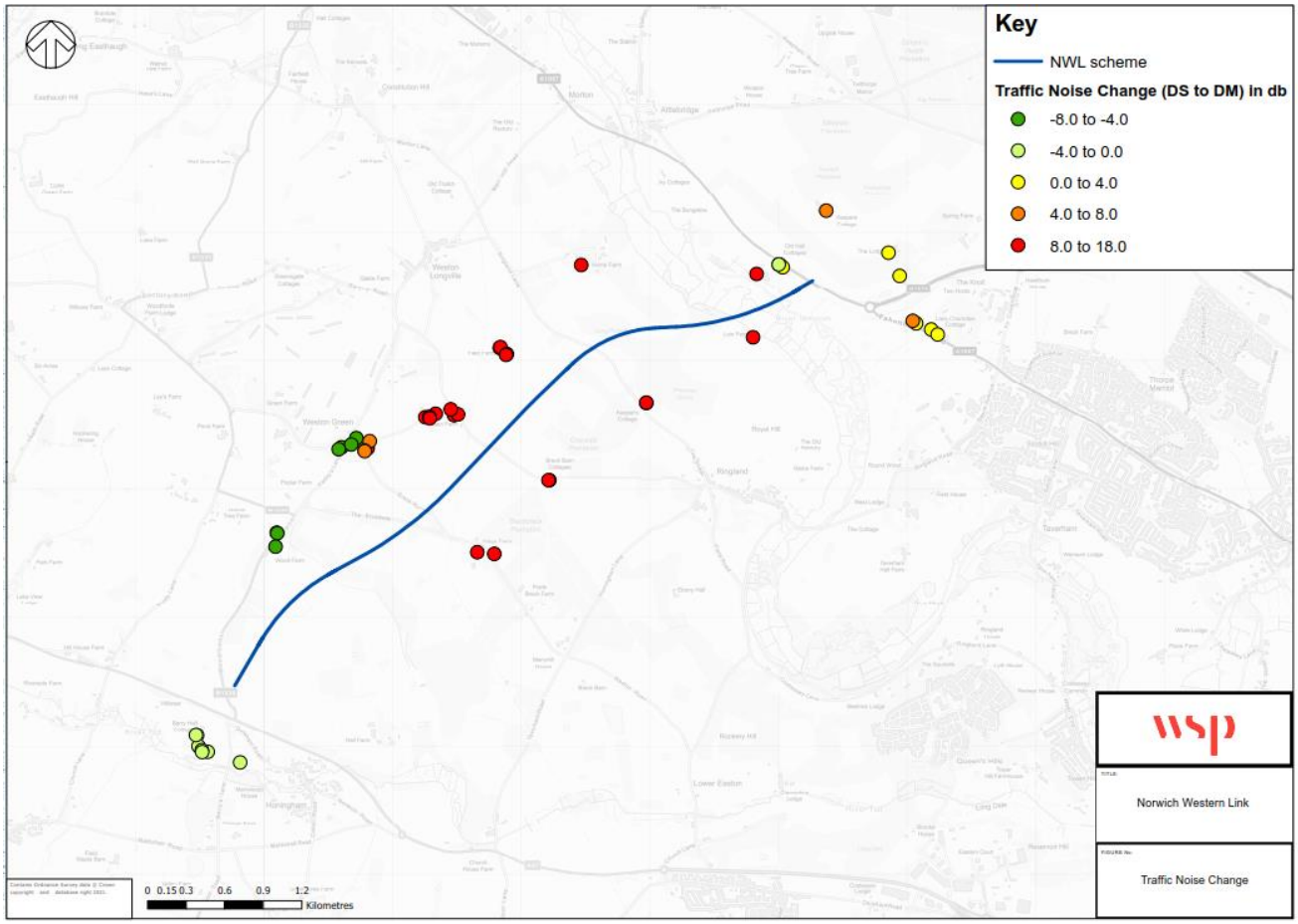

Figure 4-1 - Traffic noise change in dB at properties nearby to the NWL scheme

4.3.4. Figure 4-1 demonstrates that the highest increase in noise levels (8 to 18 decibels) are in the immediate scheme area, whereby properties adjacent to the east and west of the proposed NWL scheme are forecast to experience this level of increase in noise.

4.3.5. Properties to the south of the scheme (Honingham area) and west of the scheme (B1535 Wood Lane) are forecast to experience noise level reductions by 0 to -8 decibels. To the north east of the scheme, the impact of noise levels are anticipated to vary between -4 and +8 decibels.

DEPRIVATION

4.3.6. Of the properties affected by the noise change adjacent or in close proximity to the proposed NWL scheme, these are predominantly located in LSOAs in quintile 4 (60-80%), with a small number of properties in quintile 3 (40-60%). This is demonstrated in Figure 4-2.

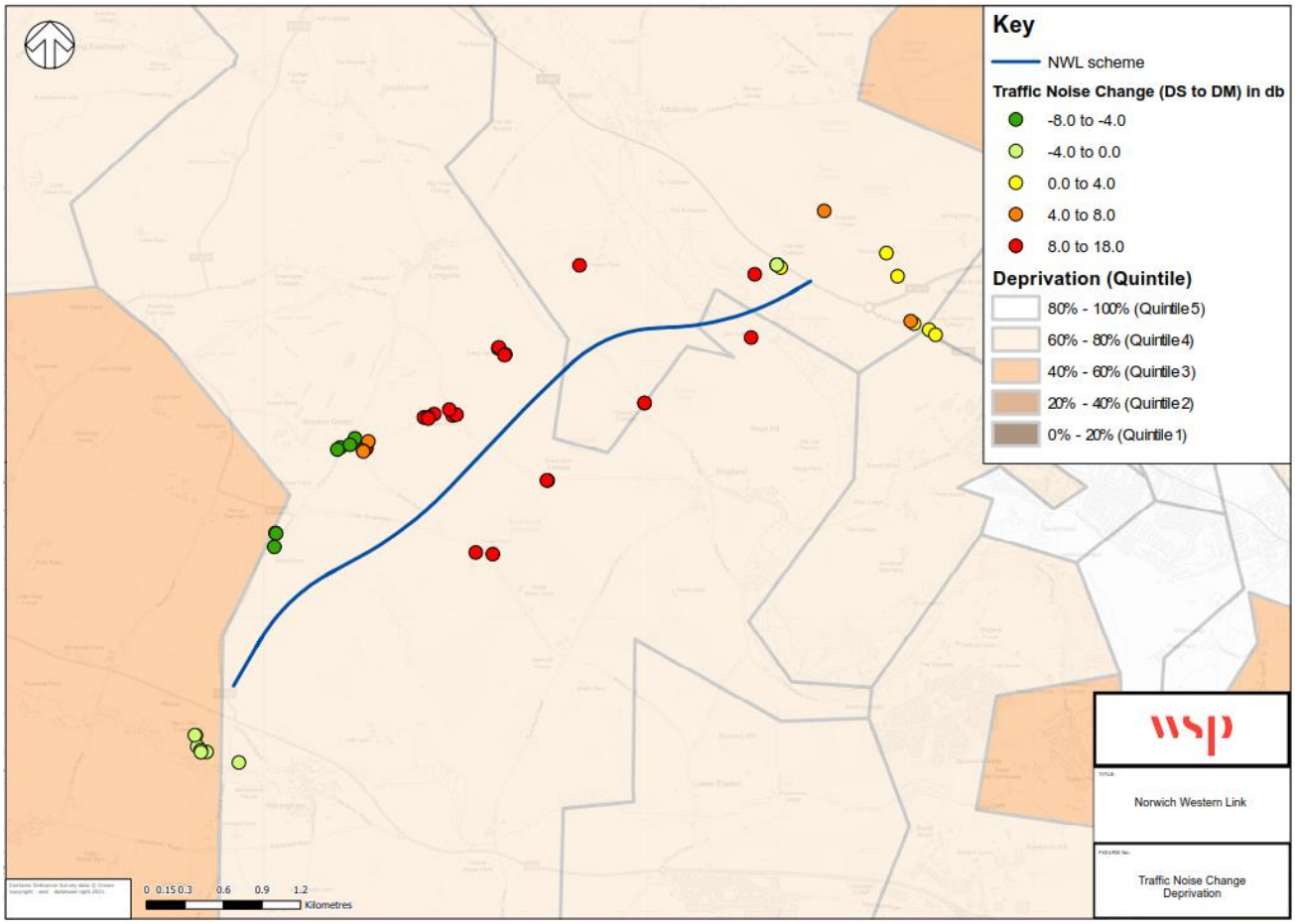

Figure 4-2 - Traffic noise change in dB with deprivation decile by LSOA

4.3.7. As aforementioned, LSOAs in decile 1 (quintile 1) fall within the most deprived 10% of LSOAs nationally and LSOAs in decile 10 (quintile 5) fall within the least deprived 10% of LSOAs nationally. Therefore, no properties impacted in this noise assessment are within areas that have higher than average levels of deprivation (such as quintiles 1 and 2); as such, the noise impact on the most deprived LSOAs is neutral.

CHILDREN

4.3.8. Of the properties affected by the noise change adjacent or in close proximity to the proposed NWL scheme, these are located in LSOAs with the proportion of children being between 10% and 20%. This is presented in Figure 4-3.

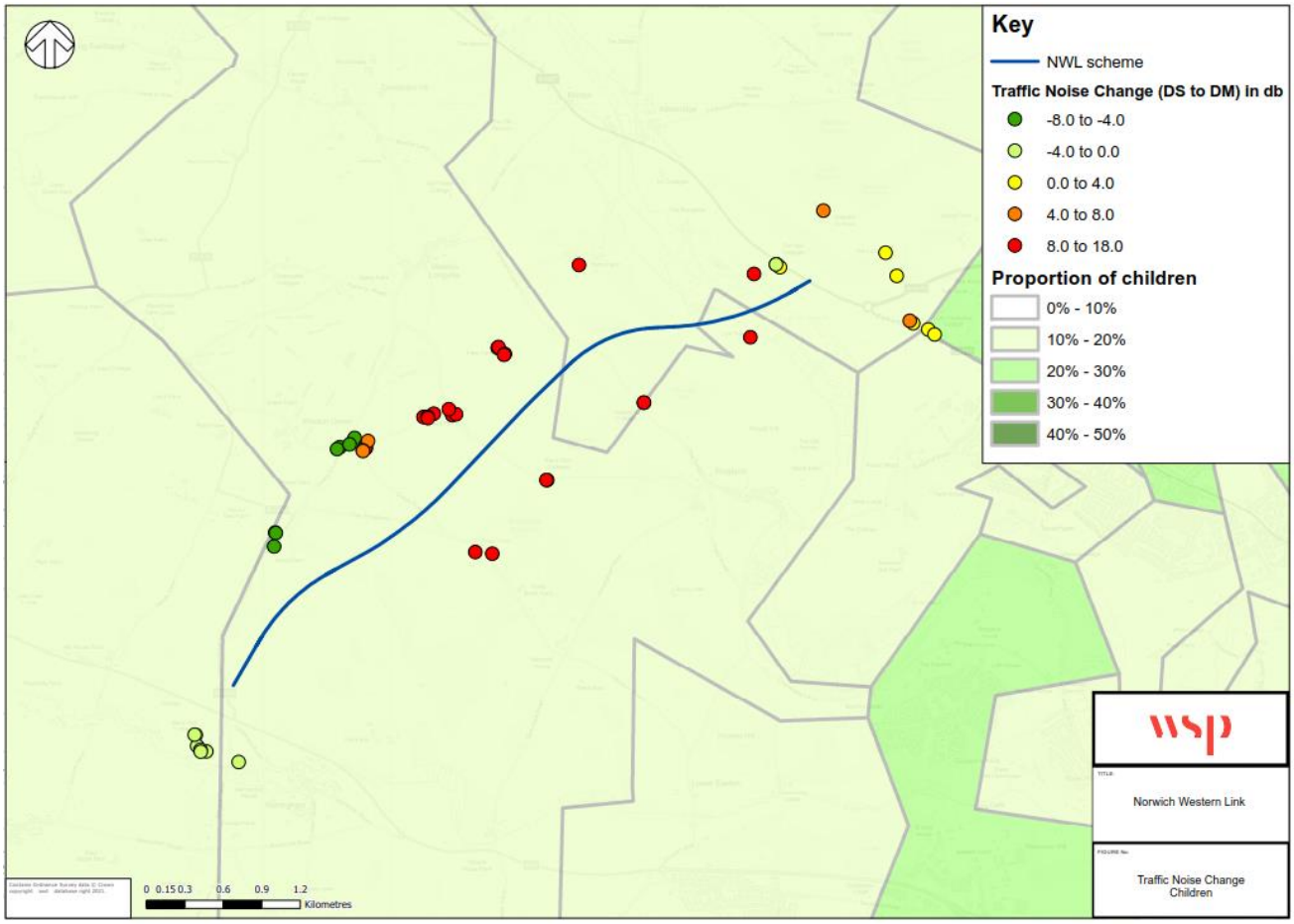

Figure 4-3 - Traffic noise change in dB with children proportions by LSOA

4.3.9. The national average for the proportion of children (under 16) is 17.6% and the LSOAs with properties analysed for noise impact are in the 10% to 20% range. Therefore, the impact of noise on LSOAs with disproportionately high proportions of children is neutral.

OLDER PEOPLE

4.3.10. Of the properties affected by the noise change adjacent or in close proximity to the proposed NWL scheme, these are located in LSOAs with the proportion of older people being between 10% and 20%. This is demonstrated in Figure 4-4.

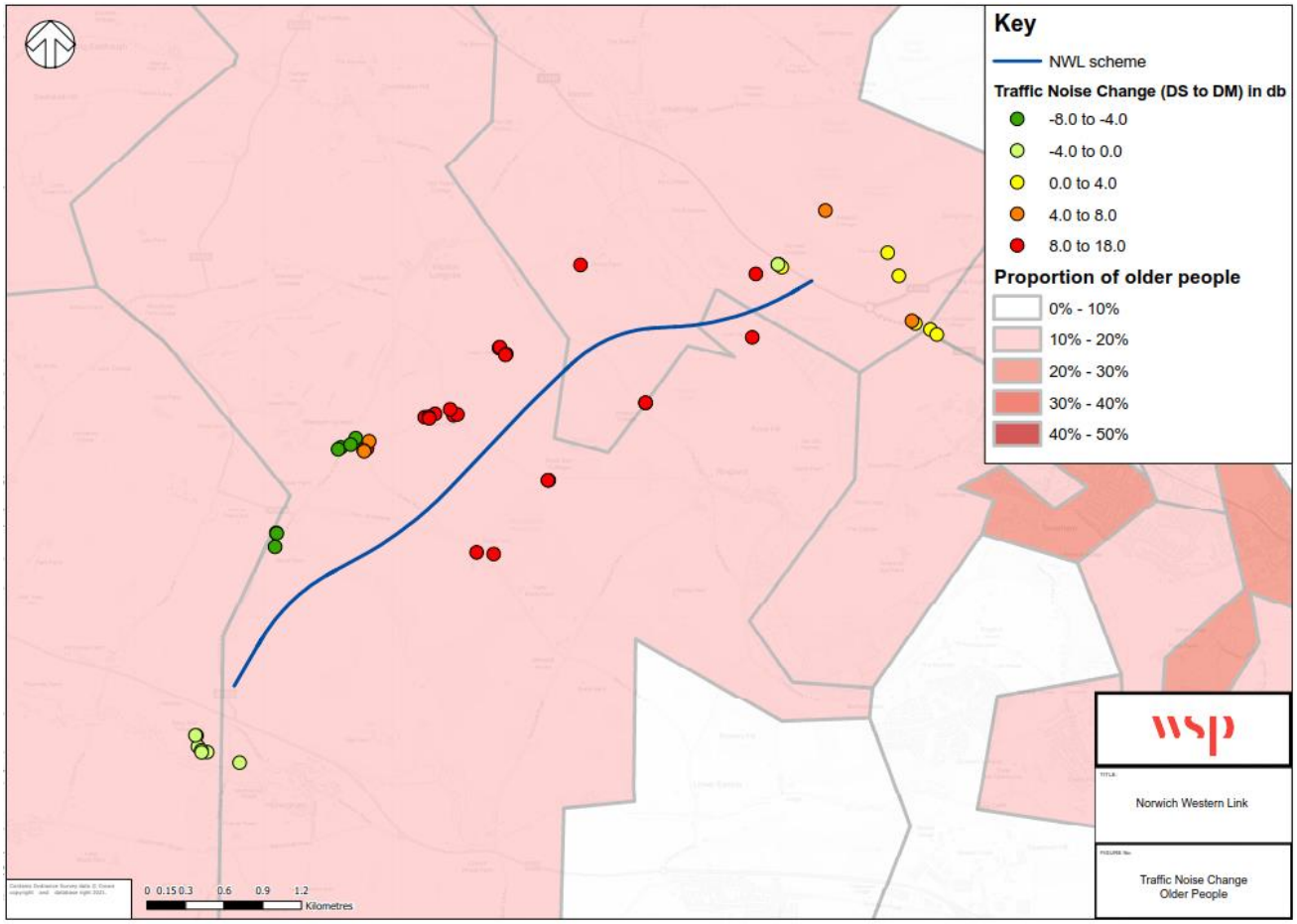

Figure 4-4 - Traffic noise change in dB with older people proportions by LSOA

4.3.11. The national average for the proportion of older people is 10.9% and the LSOAs with properties analysed for noise impact are in the 10% to 20% range. Therefore, the impact of noise on LSOAs with disproportionately high proportions of older people is neutral.

AMENITIES

4.3.12. A desktop exercise was undertaken to identify the amenities present within the area analysed for noise impact. The amenities located in the area analysed for noise impact include:

- Schools;
- Community centres;
- Play areas; and
- Care homes.

4.3.13. Assessment was conducted by comparing the impact of the nearby properties to the scheme with the relative location of identified amenities. Figure 4-5 demonstrates that the scheme is not located in the immediate vicinity of any amenities.

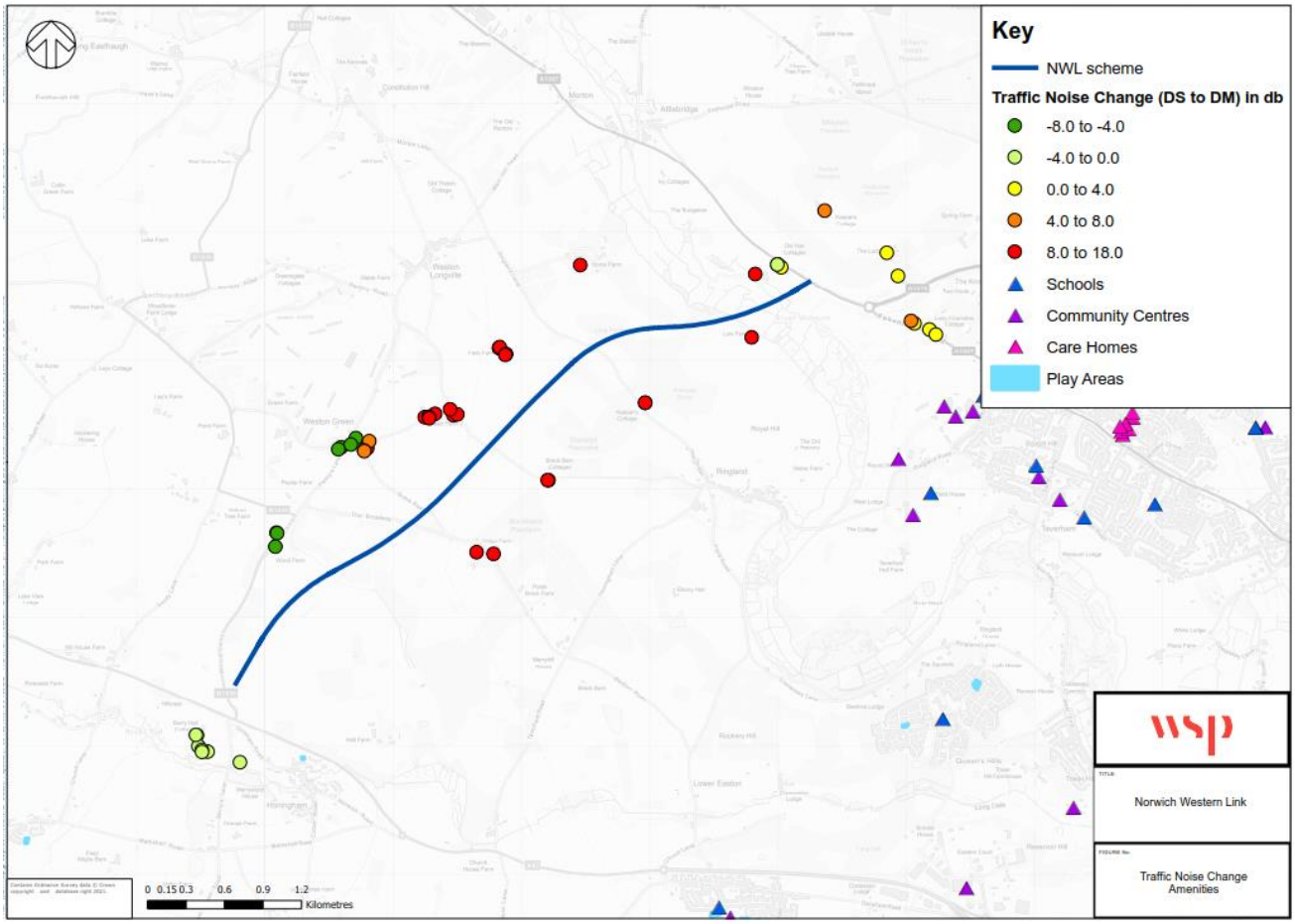

Figure 4-5 - Traffic noise change in dB with amenities

4.3.14. The figure demonstrates that the scheme is not located in the immediate vicinity of any amenities, with the closest schools, community centres and care homes located to the east.

4.3.15. As the scheme is not located in the immediate vicinity of any amenities, a light touch approach was conducted in relation to any changes in the surrounding areas. Due to the distance of any amenities to the scheme, there is deemed no adverse impact to specific amenities in the surrounding area.

4.3.16. Overall, it is forecast that highest increase in noise levels (8 to 18 decibels) are in the immediate scheme area at properties adjacent to the east and west. However, noise levels are also forecast to reduce to the south and west of the scheme.

4.3.17. It is also demonstrated that the noise impact on deprivation, children and older people is deemed neutral as the proportions in the impact area are average or low in comparison to national averages. Therefore, there is not a disproportionate impact on these groups.

4.3.18. Table 4-2 sets out a summary of the noise impact analysis for the five quintiles of deprivation.

Table 4-2 - Noise and Deprivation Analysis

	IMD Income Domain Most deprived areas ← →least deprived areas				
	Quintile1 0-20%	Quintile 2 20-40%	Quintile 3 40-60%	Quintile 4 60-80%	Quintile 5 80-100%
Properties within 600m of scheme	0	0	6	46	0
% proportion of properties assessed	0%	0%	11.5%	88.5%	0%
Number of LSOAs	0	0	1	3	0
Assessment	-	-	✓	××	-

4.3.19. The table above summarises that noise impacts are experienced by those properties in the middle-income quintiles. Residents living in the three LSOAs that are quintile 4 (properties adjacent and north east of the scheme) are forecast to experience disbenefits. However, residents in in the LSOA that is quintile 3 (properties to the south west of the scheme) are forecast to experience noise benefits.

4.4 AIR QUALITY

4.4.1. TAG Unit A4.2 sets out that air quality has a strong distributional impact and that air quality impacts are likely to occur where an intervention results in changes to traffic flows or speeds or where the physical gap between people and traffic is altered.

4.4.2. The screening looked at the likely impact of the scheme on air quality in the impact area using analysis of changes the air pollutants NO_2 and $PM_{2.5}$ by comparing the future year (2040) do-something scenario against the future year do-minimum scenario. Consideration of air quality impacts has taken into account amenities (such as schools and playgrounds) where children are likely to spend time and also areas of deprivation.

4.4.3. Firstly, Figure 4-6 and Figure 4-7 demonstrate the changes in NO_2 and $PM_{2.5}$ respectively, comparing the 2040 do-something scenario with 2040 do-minimum scenario. These have been mapped to clearly demonstrate the changes in air pollutants, before overlaying amenity and deprivation layers on subsequent maps.

4.4.4. Figure 4-6 presents the difference in NO_2 levels comparing do-something to do-minimum.

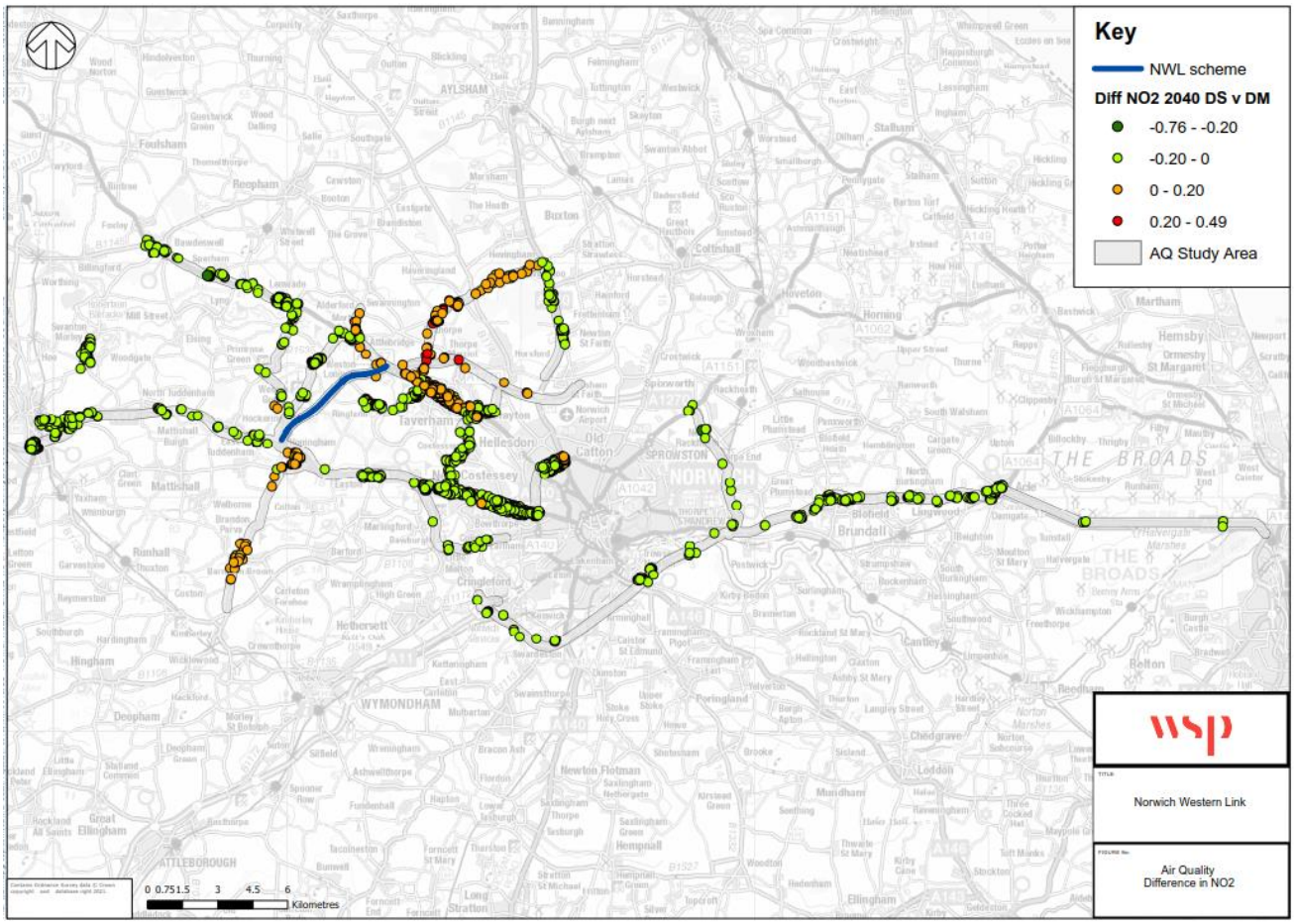

Figure 4-6 - Difference in NO2 (2040 DS v DM)

4.4.5. The figure demonstrates that overall, NO_2 levels in the air quality impact area are forecast to reduce. To the south of the NWL scheme, improvements to NO_2 levels are forecast along the A47 and Dereham Road between the scheme and Norwich city centre; and to the north west of the scheme,

NO_2 levels are forecast to reduce along the A1067. In addition, NO_2 levels are predicted to reduce on the parallel roads to the NWL scheme, such as the B1535 and in the Ringland and Costessey areas. Further to the east, NO_2 levels are also forecast to reduce on Boundary Road and the A140; as well as the A47 to the east of Norwich city centre.

4.4.6. Nevertheless, there are some areas whereby NO_2 levels are forecast to increase. These include roads to the north east of the scheme including the A1067, the A1270, Fir Covert Road and Shortthorn Road. To the south, NO_2 levels are forecast to increase at Mattishall Road, Bell Road and Honingham Road.

4.4.7. A similar trend is forecast for the change in $PM_{2.5}$ levels, as demonstrated in Figure 4-7.

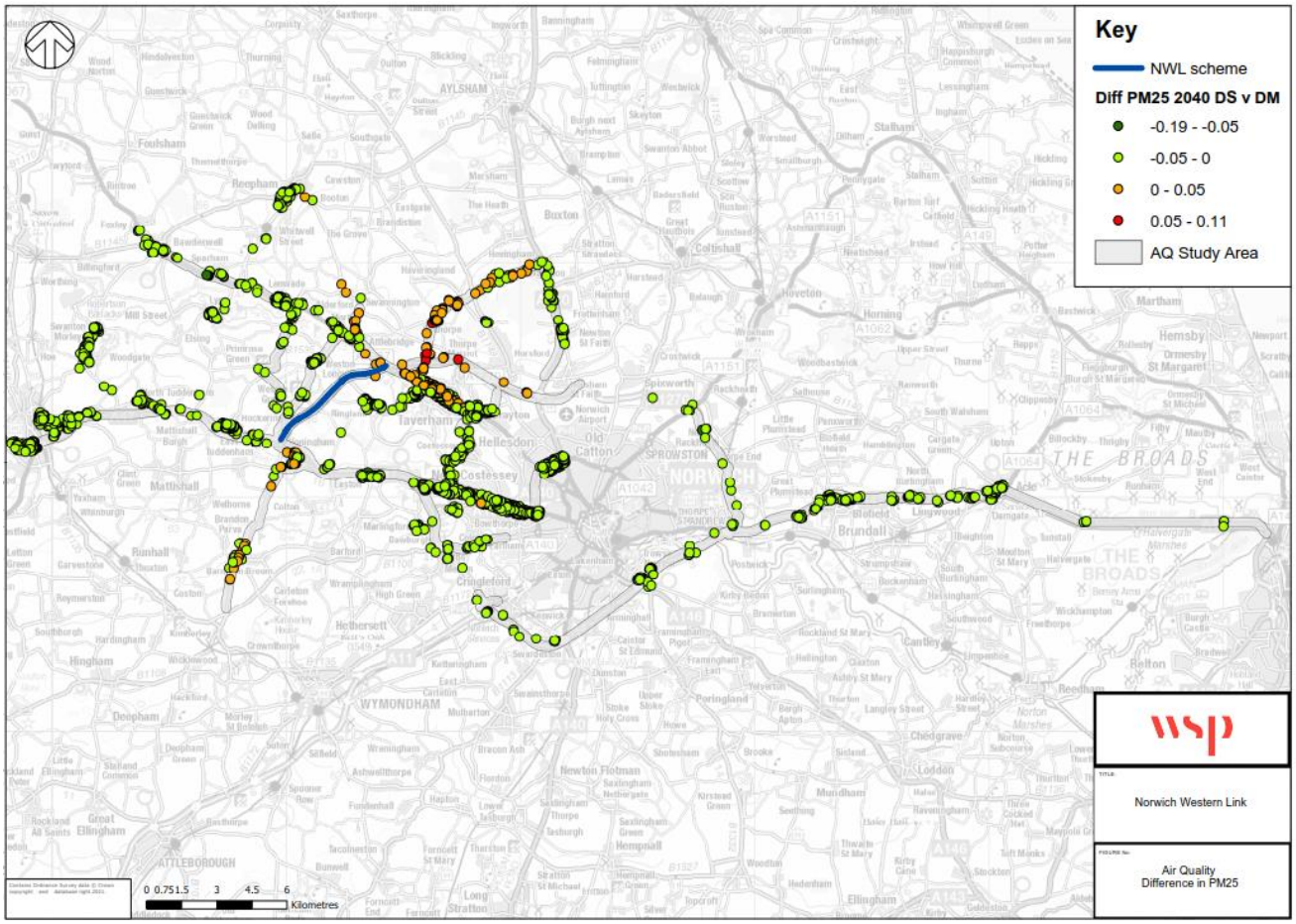

Figure 4-7 - Difference in PM 2.5 (2040 DS v DM)

4.4.8. Once again, Figure 4-7 demonstrates that overall, $PM_{2.5}$ levels are forecast to reduce. The trend of roads in the air quality impact area is comparable to the NO_2 analysis, with reductions in $PM_{2.5}$ along the A47, Dereham Road, the A1067 (to the west) and roads parallel to the NWL scheme; and increases in $PM_{2.5}$ along the A1067 (to the east) and A1270.

AMENITIES

4.4.9. Evidence suggests children are at more risk from air pollution, therefore this analysis of air quality focuses on amenities so that consideration is given to the changes in air quality experienced by children. In addition, consideration of care homes and hospitals as amenities have also been mapped.

4.4.10. Therefore, analysis has been undertaken to take into account the change in air pollutants mapped alongside the following non-residential properties (amenities) within 200 metres of the affected road network:

- Schools;
- Medical/dental facilities including hospitals;
- Care homes; and
- Community centres.

4.4.11. Figure 4-8 presents the difference in NO_2, overlaid with the amenities outlined above.

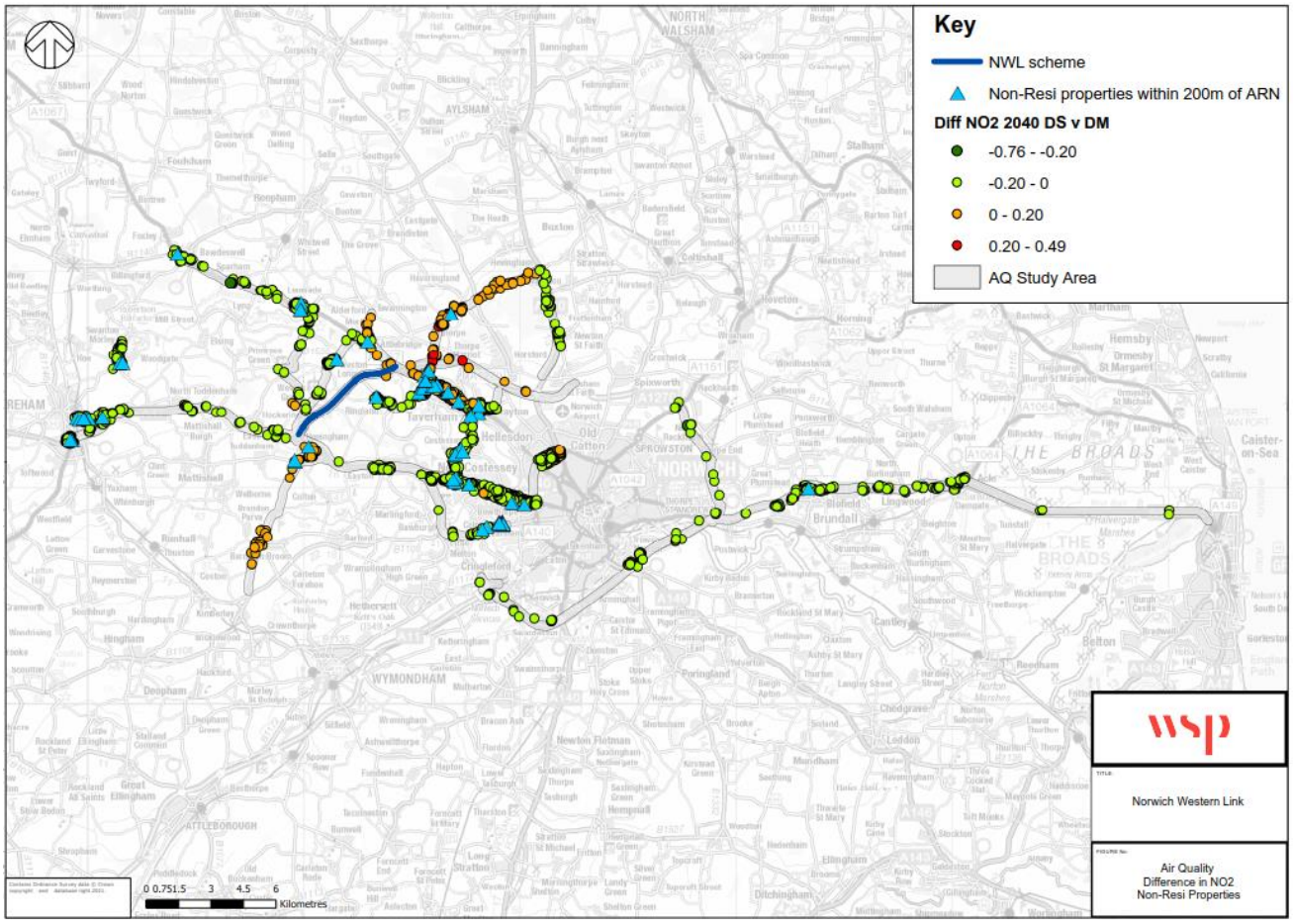

Figure 4-8 - Difference in NO2 (2040 DS v DM) and Non-Residential Properties (Amenities)

4.4.12. The figure demonstrates that the majority of mapped amenities fall within locations where there is forecast to be a reduction in NO_2 levels, such as Dereham, Costessey and Lyng. However, there are also amenities located in areas where NO_2 levels are forecast to increase, such as Felthorpe, Honingham and along the A1067 to the east of the NWL scheme.

4.4.13. Figure 4-9 presents the difference in $PM_{2.5}$, overlayed with amenities.

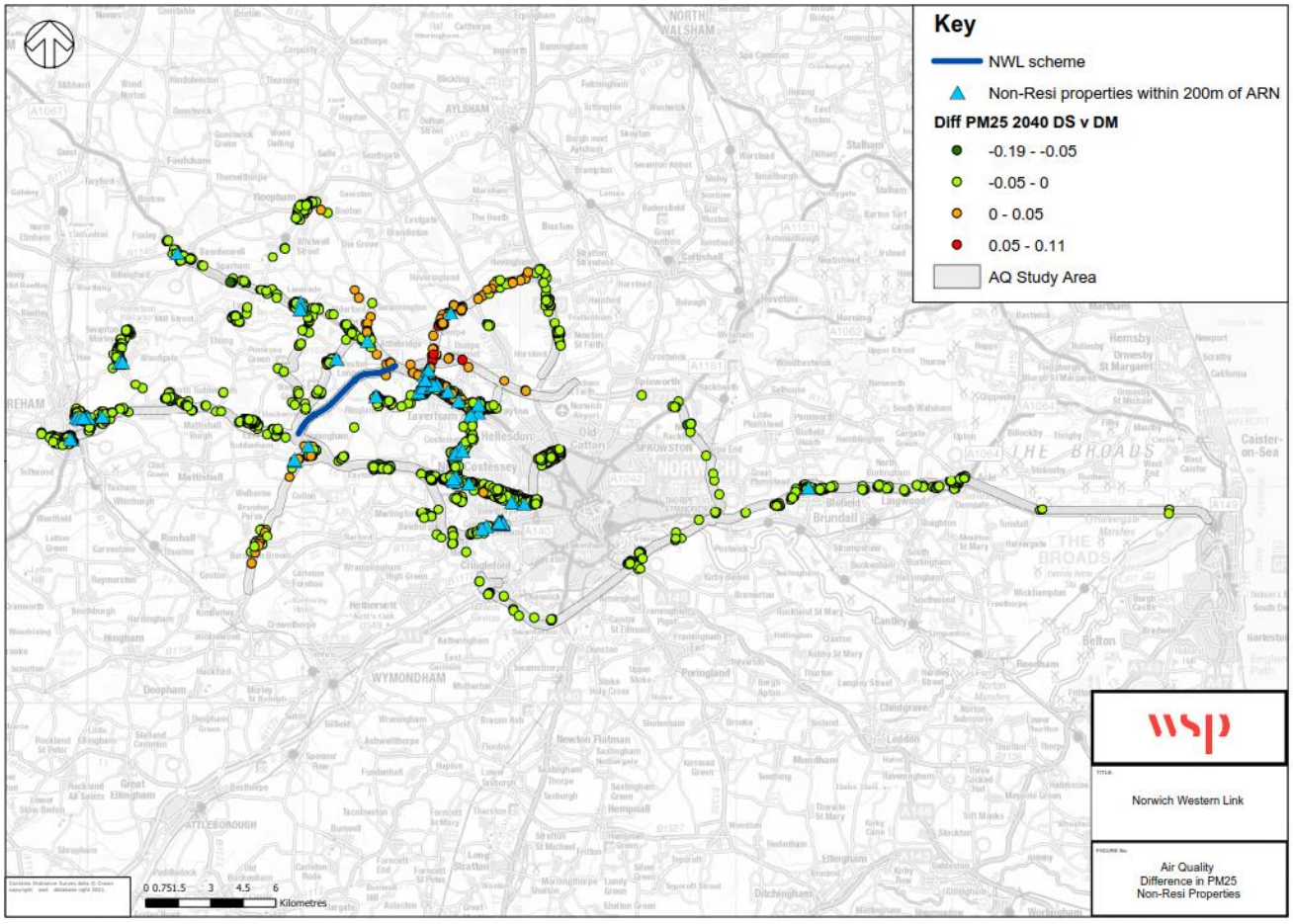

Figure 4-9 - Difference in PM2.5 (2040 DS v DM) and Non-Residential Properties (Amenities)

4.4.14. The change in $PM_{2.5}$ levels and impact on amenities is similar to the trend of NO_2 levels, whereby amenities will experience reductions or increases in levels dependent on location. To the west of the scheme and towards Norwich city centre, amenities are forecast to experience reductions in $PM_{2.5}$ levels, whereas locations south and north east of the NWL scheme are forecast to have increased levels of $PM_{2.5}$.

DEPRIVATION

4.4.15. It is important to also concentrate analysis of the changes in air quality on areas of high deprivation as health problems can often be exacerbated in deprived communities.

4.4.16. Figure 4-10 shows the difference in NO_2, overlaid with deprivation by LSOA.

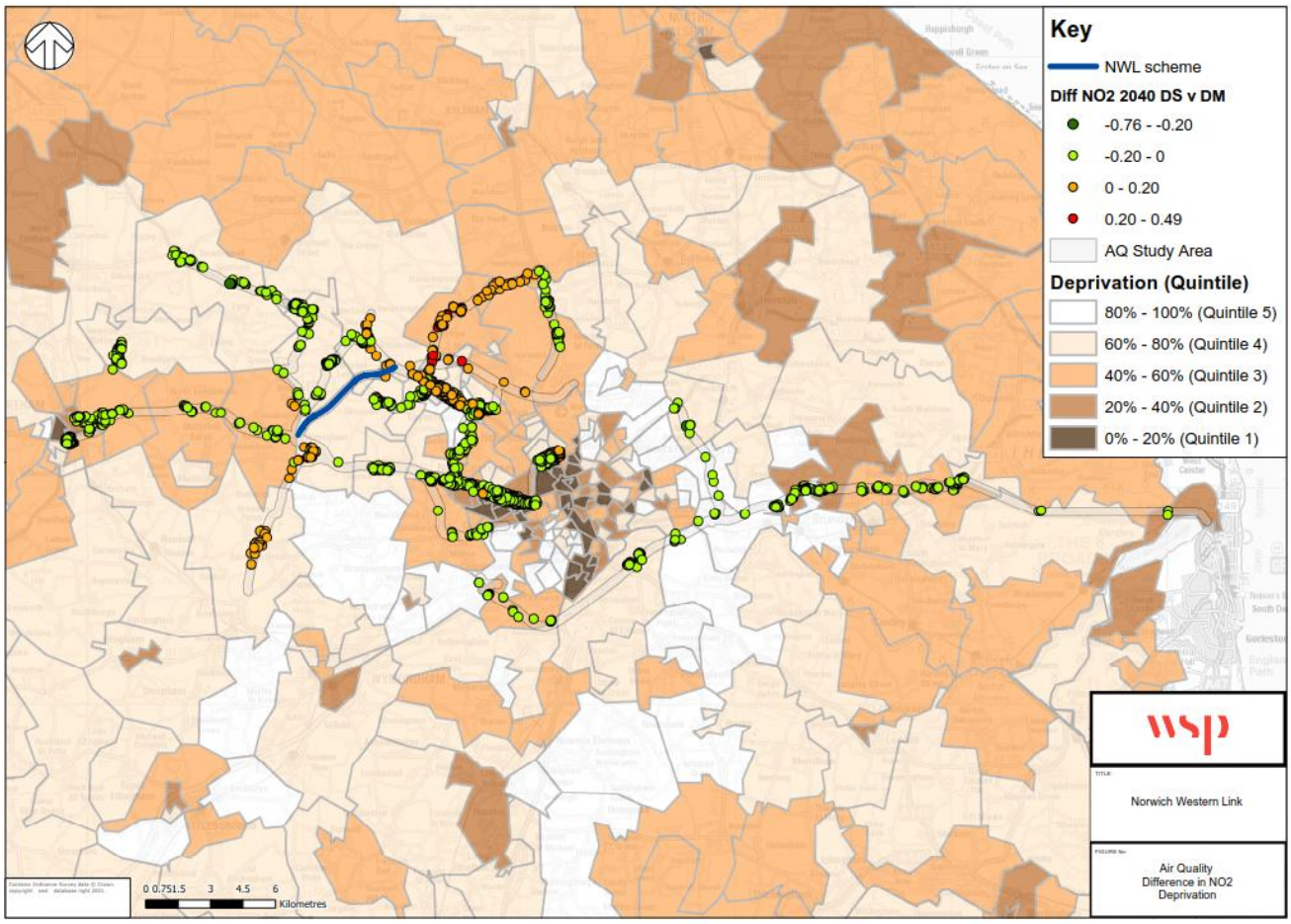

Figure 4-10 - Difference in NO2 (2040 DS v DM) and Deprivation by LSOA

4.4.17. As presented in the figure, the majority of the study area contains LSOAs with relatively low levels of deprivation. The study area mostly comprises quintiles 3, 4 and 5 (40% - 100%) and therefore demonstrates that the majority of changes in NO_2 occur on the affected road network in areas that do not have high levels of deprivation.

4.4.18. Higher levels of deprivation (quintiles 1 and 2) are found in Norwich city centre, with the main changes to NO_2 in this location to be a reduction, particularly when looking at Dereham Road which contains LSOAs with the lowest quintiles and sees a reduction in NO_2.

4.4.19. Where NO_2 levels are forecast to increase, these are in locations where LSOA deprivation falls within quintiles 3, 4 and 5. Therefore, even though NO_2 levels are forecast to reduce overall, where there are increases in NO_2 levels these are predominantly in areas that do not have high levels of deprivation.

4.4.20. Figure 4-11 demonstrates the difference in $PM_{2.5}$, overlayed with deprivation by LSOA.

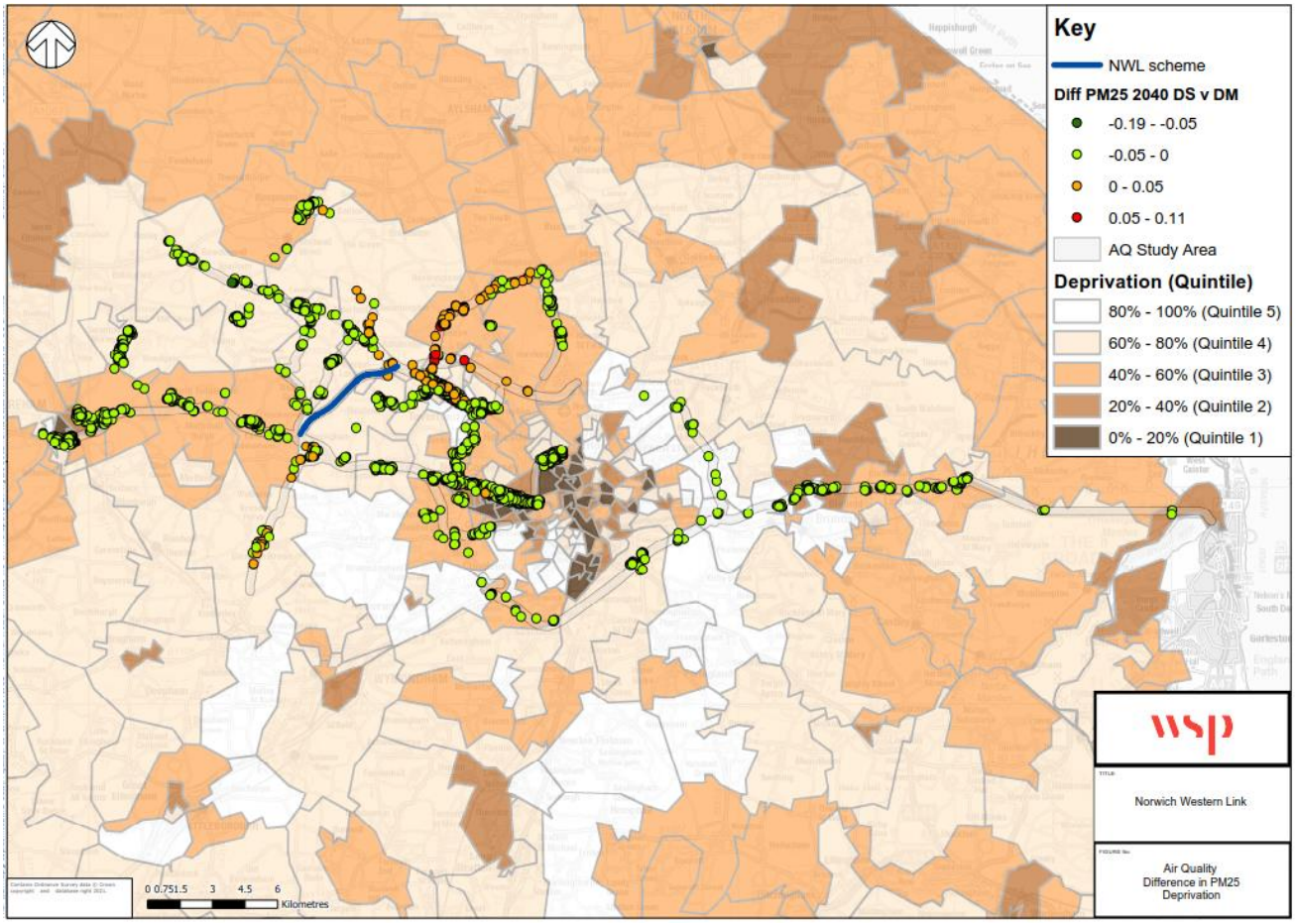

Figure 4-11 - Difference in PM 2.5 (2040 DS v DM) and Deprivation by LSOA

4.4.21. This figure presents a similar analysis to the changes in NO_2, whereby changes in $PM_{2.5}$ levels reduce on the Dereham Road which contains LSOAs with quintiles 1 and 2; and also that increases in $PM_{2.5}$ are mostly forecast in LSOAs that are quintiles 3, 4 and 5, thus demonstrating that these increases occur in areas that do not have high levels of deprivation.

4.4.22. As aforementioned, NO_2 and $PM_{2.5}$ levels are forecast to reduce overall in the study area, thus providing air quality benefits. In regard to air quality and deprivation, further analysis has been provided in Table 4-3 which sets out a summary of the air quality impact for the five quintiles of deprivation, analysing the change in NO_2 levels.

Table 4-3 - Air Quality and Deprivation Analysis

	IMD Income Domain Most deprived areas ← →least deprived areas				
	Quintile1 0-20%	Quintile 2 20-40%	Quintile 3 40-60%	Quintile 4 60-80%	Quintile 5 80-100%
Number of properties with improved air quality	325	270	578	761	182
Number of properties with no change in air quality	87	3	34	73	35
Number of properties with deteriorating air quality	1	4	116	357	122
Number of net winners / losers	324	266	462	404	60
Net winners/losers as a % of total	21%	18%	30%	27%	4%
Share of total population in the impact area	4.9%	6.7%	19.5%	52.3%	16.5%
Assessment	✓	✓	✓✓	✓✓	✓

4.4.23. The table demonstrates that air quality impacts are experienced across all quintiles of deprivation. Those in quintile 3 and 4 experience a higher proportion of air quality benefits than would be expected from an even distribution.

4.5 ACCIDENTS

ROAD NETWORK

4.5.1. Following the screening process for accidents, this chapter analyses the impact of the Norwich Western Link on safety, utilising modelled flows and accident data. Consideration has been taken whether the intervention causes significant changes (>10%) in vehicle flow, speed, HDV use or a significant change (>10%) in the number of pedestrians, cyclists or motorcyclists using the road network.

4.5.2. In this instance, vehicle flows were selected as the key consideration to analyse the impact of the NWL on safety and accidents. It is unlikely that the scheme will cause a significant change (>10%) in the number of pedestrians, cyclists or motorcyclists using the road network.

4.5.3. Figure 4-12 demonstrates the differences in Average Annual Daily Traffic (AADT) flows between the 2025 do something and the 2025 do minimum scenario, whereby changes in flow (>10%) are identified by green links (reduction in flows by >10%) and red links (increase in flows by >10%). Any links that do not have changes in flows by >10% are identified as the black links.

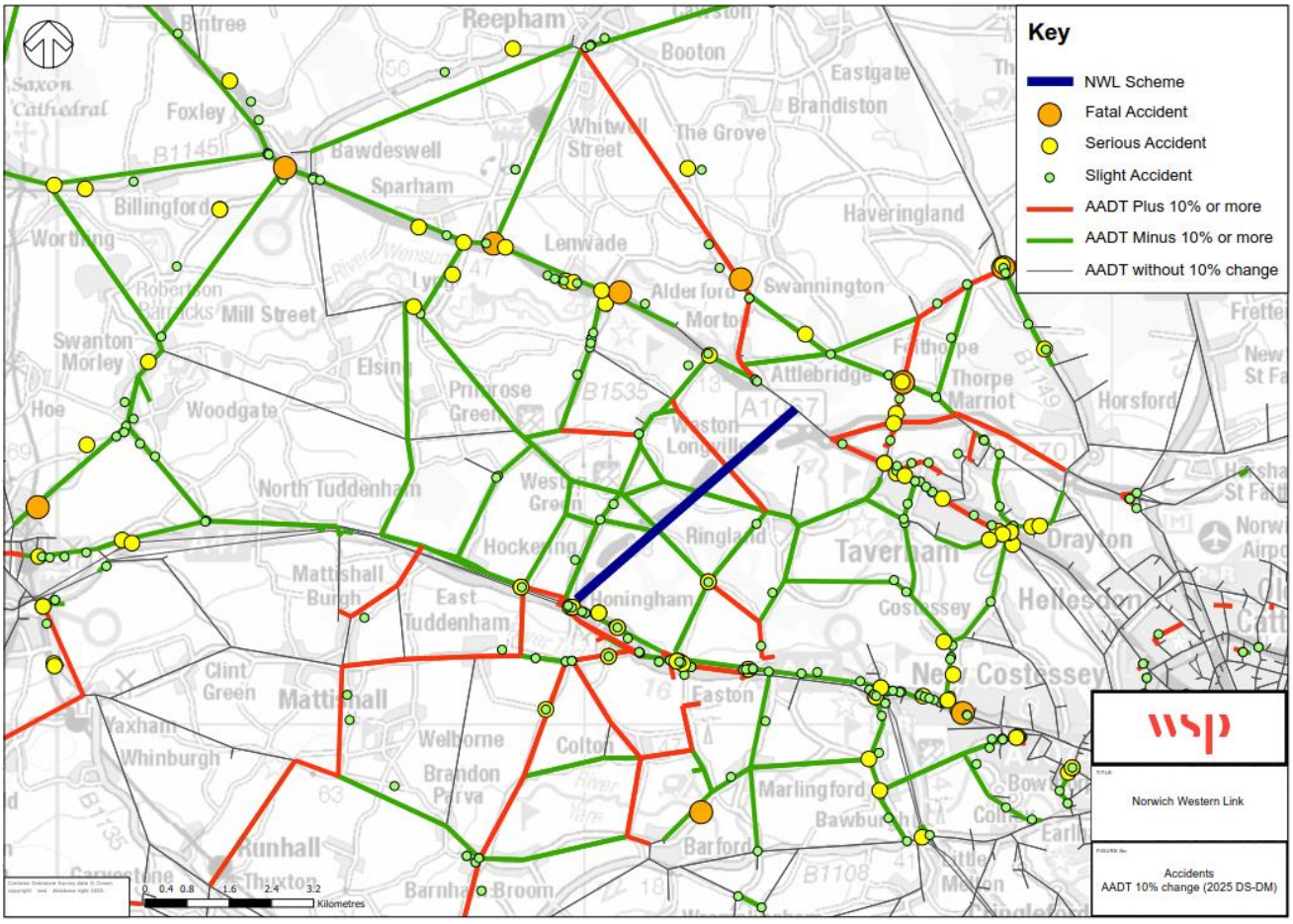

Figure 4-12 - Accidents and links with >10% AADT flow change

4.5.4. Figure 4-12 demonstrates that within the study area, there are significantly more links that have a >10% reduction in flows (green), in comparison to those links that have a >10% increase in flows (red).

4.5.5. It is noted that there is a significant number of links with >10% change in flows (both increase and decrease) situated in close proximity to the NWL scheme; with the number of links that do not have a >10% change in flows (black) gradually increasing as distance increases further afield from the NWL scheme.

4.5.6. Figure 4-12 demonstrates that the majority of parallel routes to the proposed NWL scheme, between the A47 and A1607, are forecast to have >10% reductions in flow when comparing 2025 Do Something with 2025 Do Minimum in the scheme opening year. Figure 4-12 also shows >10% reductions in flows along sections of the A47 and A1067. In contrast, there are some links, particularly at the northern and southern ends of the proposed scheme, which are forecast to have >10% in flows.

ASSESSMENT

4.5.7. Five-year accident data between 2015 and 2019, provided by Norfolk County Council, has also been mapped on Figure 4-12. Only accidents that occurred on links that have a >10% change (both increase and decrease) are presented on the map; therefore, all accidents that do not occur on links with a >10% have been removed, in order to clearly visualise accidents on links that do have a forecast >10% change.

4.5.8. The study area spans from Lyng in the west to the edge of Norwich city centre in the east; and includes key links such as the A47, A1067, A1270 and B1535.

4.5.9. The analysis will look primarily at impacts on children and older people (both particularly as pedestrians), young males, motorcyclists and the more deprived population.

APPRAISAL

4.5.10. As the number of casualties on the affected links is less than 50 over the five-year period a qualitative assessment has been undertaken.

4.5.11. Figure 4-12 demonstrates that significant reductions in traffic flows are anticipated along existing routes that are parallel to the proposed NWL scheme. The majority of parallel existing routes between the A47 and A1067 are forecast to have >10% reductions in flow when comparing do something with do minimum. These include the B1535, Sandy Lane, Heath Road, B1146, B1110, Taverham Road, Taverham Lane, Longwater Lane and Costessey Lane. To the south of the proposed NWL scheme, a section of the A47 is forecast to have a >10% reduction in flows. The A47 leads onto Dereham Road towards Norwich city centre, on which the modelling also forecasts a >10% reduction in flows along a significant section of the road. To the north west of the proposed NWL scheme, the A1067 between Morton on the Hill and Twyford is also anticipated to have >10% reduction in flows.

4.5.12. In contrast, there are some links which have a >10% increase in traffic flows when comparing the do something with the do minimum scenario. This includes sections of the A1270, A1067 and Shortthorn Road at the northern end of the NWL scheme. To the southern end of the proposed NWL scheme, links with >10% flows include Mattishall Road, Barnham Broom Road, Barford Road and Church Lane.

4.5.13. As visualised in Figure 4-12, there are nine fatal accidents mapped in the study area on links with a >10% change in flows. Three of these fatal accidents are where there is a >10% increase in flows and six fatal accidents where there is a >10% decrease in flows.

4.5.14. Casualty data was used to identify the number and proportion of vulnerable age group fatalities within the study area on affected links where there is a >10% increase in flows.

4.5.15. The casualty data showed that of the three fatal accidents on links where there is a >10% increase in flows in the study area, none were in the vulnerable age groups of children (under 16), young adults (16 to 25) or older people (over 70). However, of the three fatalities, one was on a pedal cycle and another was on a motorcycle.

4.5.16. The casualty data showed that of the six fatal accidents on links where there is a >10% reduction in flows in the study area, four were in vulnerable age groups; these being three young adults (16 to 25) group and one older person (over 70). Of the six fatalities, one was on a motorcycle and one was a pedestrian.

4.5.17. Casualty data was also interrogated for all accidents (slight, serious and fatal) on affected links with a >10% change. Overall, this identified that proportionately, pedestrian casualties accounted for 5% of all casualties on affected links, with 95% of casualties being driver/rider or passenger. The proportion of pedestrian casualties is lower than the national rate (14.2% 2019 figures). In terms of age groups, under 16s accounted for 6% of casualties; young adults accounted for 26% of casualties; and older people accounted for 9% of casualties. Both the children (under 16) and older people proportions are lower than the national figures, 8.9% for children and 14% for older people, while the proportion of young adults is higher than the national figures (17.6%).

4.5.18. In addition, vehicle data was analysed for all accidents on affected links with a >10% change. The analysis identified that of all vehicles involved in accidents on the affected links, 8% were motorcycles and 6% were pedal cycles. Cars made up a significant proportion of the vehicles involved in accidents (74%), with goods vehicles and vans representing the second highest proportion of vehicles involved in accidents (10%). The remaining 2% represented other vehicles such as bus, horse ridden and taxi.

4.5.19. Table 4-4 sets out the analysis summary for vulnerable social groups and networks users in the study area.

Table 4-4 – Summary Analysis - Accidents

Vulnerable group/user	Overall analysis
Children (under 16)	Slight Benefit
Young adults (16-25)	Moderate Benefit
Older People (over 70)	Slight Benefit
Pedestrians	Slight Benefit
Cyclists	Slight Benefit
Motorcyclists	Slight Benefit

4.5.20. Figure 4-13 demonstrates the accidents and change in flows by >10%, as well as the deprivation quintiles in the study area.

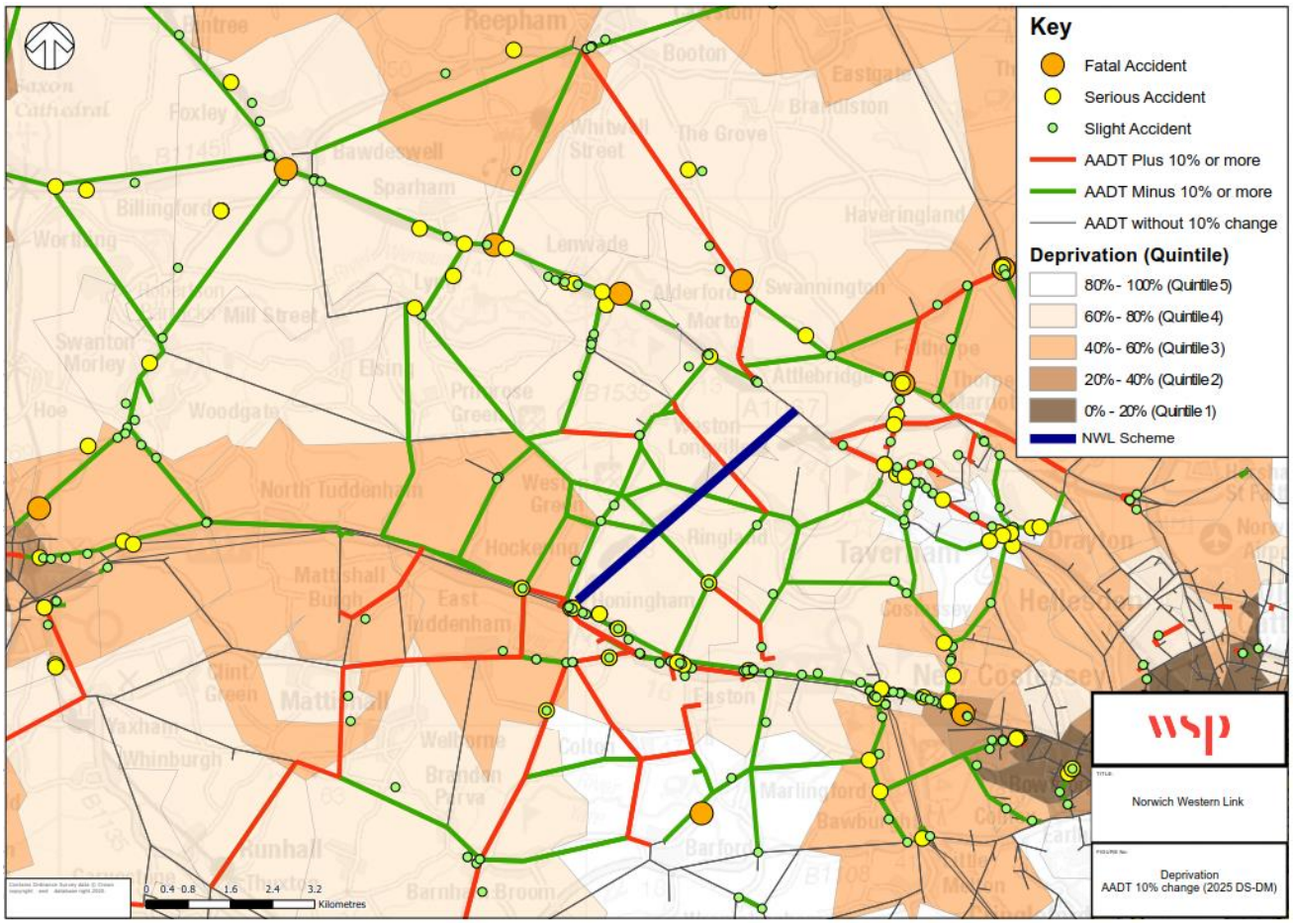

Figure 4-13 - Accidents with deprivation by LSOA with link flow change

4.5.21. Of the links with a >10% increase in flows, only a short section of A1067 Fakenham Road to the east of the northern end of the NWL scheme has a significant cluster of accidents (both slight and serious).

4.5.22. However, this does not correlate with deprivation; as this cluster of accidents on the A1607 is located in the Taverham area which has low levels of deprivation, as shown in Figure 4-13. Furthermore, the majority of the study area falls within quintiles 3 to 5, demonstrating lower levels of deprivation. The three fatal accidents, as well as the significant majority of accidents on links with >10% increase in flows are also not located in areas of high deprivation.

4.5.23. Of the links with a >10% reduction in flows, there are clusters of accidents (slight, serious and fatal) on the A47, Dereham Road and the A1067 (to the west of the northern end of the NWL scheme).

4.5.24. Overall, it is noted that more clusters of accidents are located on links with a >10% reduction in flows when compared with links with a >10% increase in flows.

4.5.25. Based on the qualitative appraisal undertaken none of the affected links have accidents including significant numbers or proportions of vulnerable groups or network users in their casualties apart

from young adults. As such the impact of the NWL scheme on these groups and users is likely to be slight.

4.5.26. As there are more links forecast to experience decreases in flow rather than increases the overall assessment for the affected links is beneficial, therefore the overall analysis is slight beneficial. As such, there is deemed to be no adverse impact on specific amenities in the surrounding area.

4.6 SEVERANCE

SCREENING AND ASSESSMENT

4.6.1. Severance is defined in TAG as the separation of residents from facilities and services they use within their community, caused by significant changes in transport infrastructure which impede pedestrian movement or present a physical barrier to movement.

4.6.2. The NWL scheme will increase highway capacity and improve journey times on the road network, any barriers to movement that may be caused as a result of the scheme will be mitigated. There are forecast changes to traffic flows on roads within the study area apart from the NWL, any roads with an increase or decrease of >10% in flows have been analysed in this section.

APPRAISAL

4.6.3. The focus for this stage was a light touch approach of severance in the study area based on LSOA social groups with reference to the scheme.

4.6.4. As aforementioned, the study area surrounding the scheme contains relatively low proportions of children and young adults, with slightly higher proportions of older people.

4.6.5. In relation to black and minority ethnic groups, these proportions are low in the areas immediately adjacent to the scheme, with the proportion increasing towards the east and Norwich city centre. The proportion of these groups is below or in line with the national average.

4.6.6. The severance assessment covers the following in more detail:

- Proportion of people under 16 (children) by LSOA and >10% link flow change;
- Proportion of people between 16-25 (young adult) by LSOA and >10% link flow change;
- Proportion of people over 70 (older) by LSOA and >10% link flow change;
- Proportion of people with a disability by LSOA and >10% link flow change;
- Proportion of black and minority ethnic people by LSOA and >10% link flow change; and
- Proportion of people with no car by LSOA and >10% change.

Children

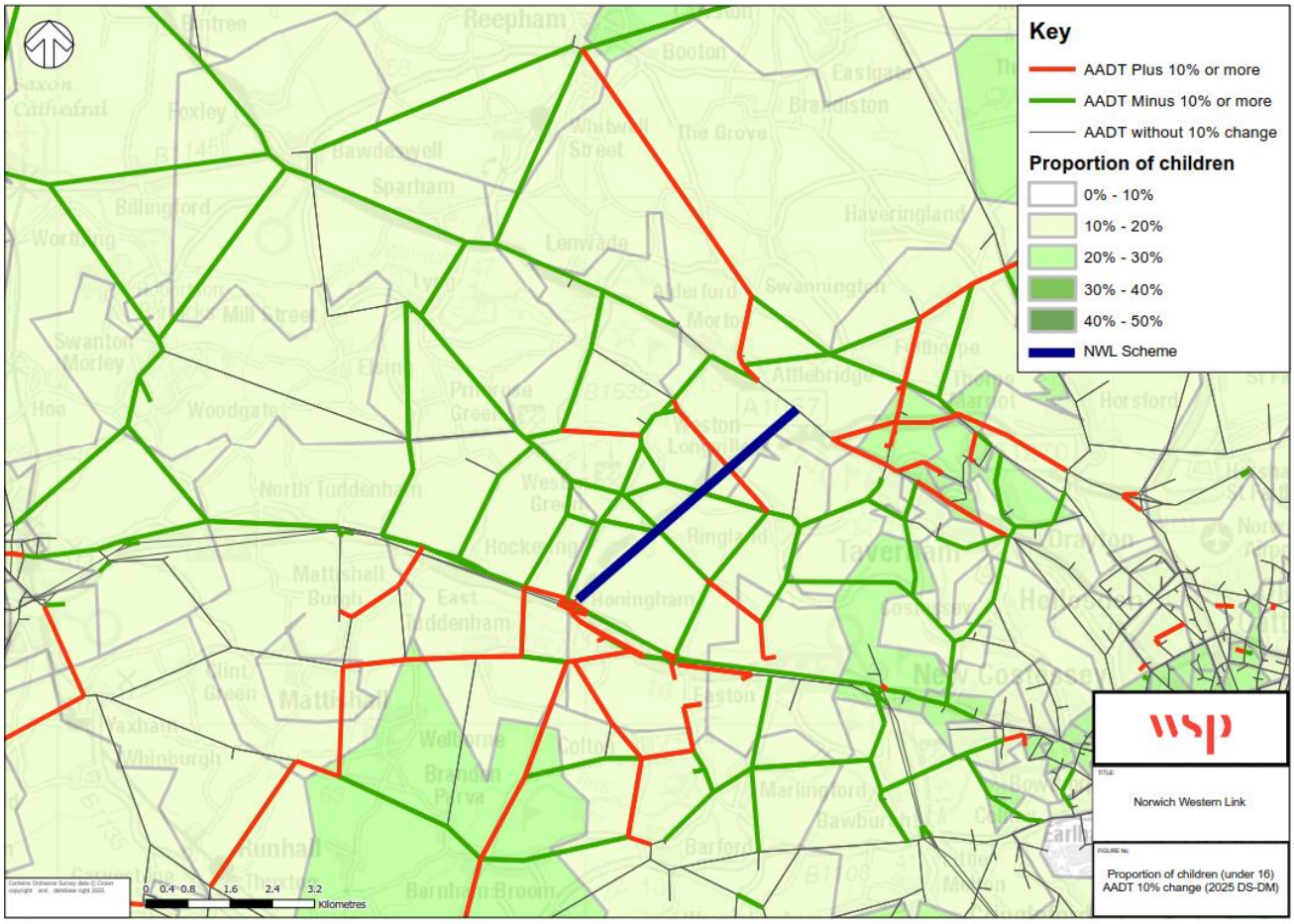

Figure 4-14 - Proportion of people under 16 (children) by LSOA and link flow change

4.6.7. Figure 4-14 shows that the affected roads are in areas with a low proportion of children, with the majority of LSOAs in the study area having children proportions between 10-20%. All of the study area contains children proportions of 30% or less, and overall have lower than the national average when comparing proportions of children.

4.6.8. As such, in areas where flow changes are present, they are not deemed to have a significant impact for this particular social group, as the majority of LSOAs have low proportions of children and no LSOAs have a significantly above national average proportion of children.

Young adults

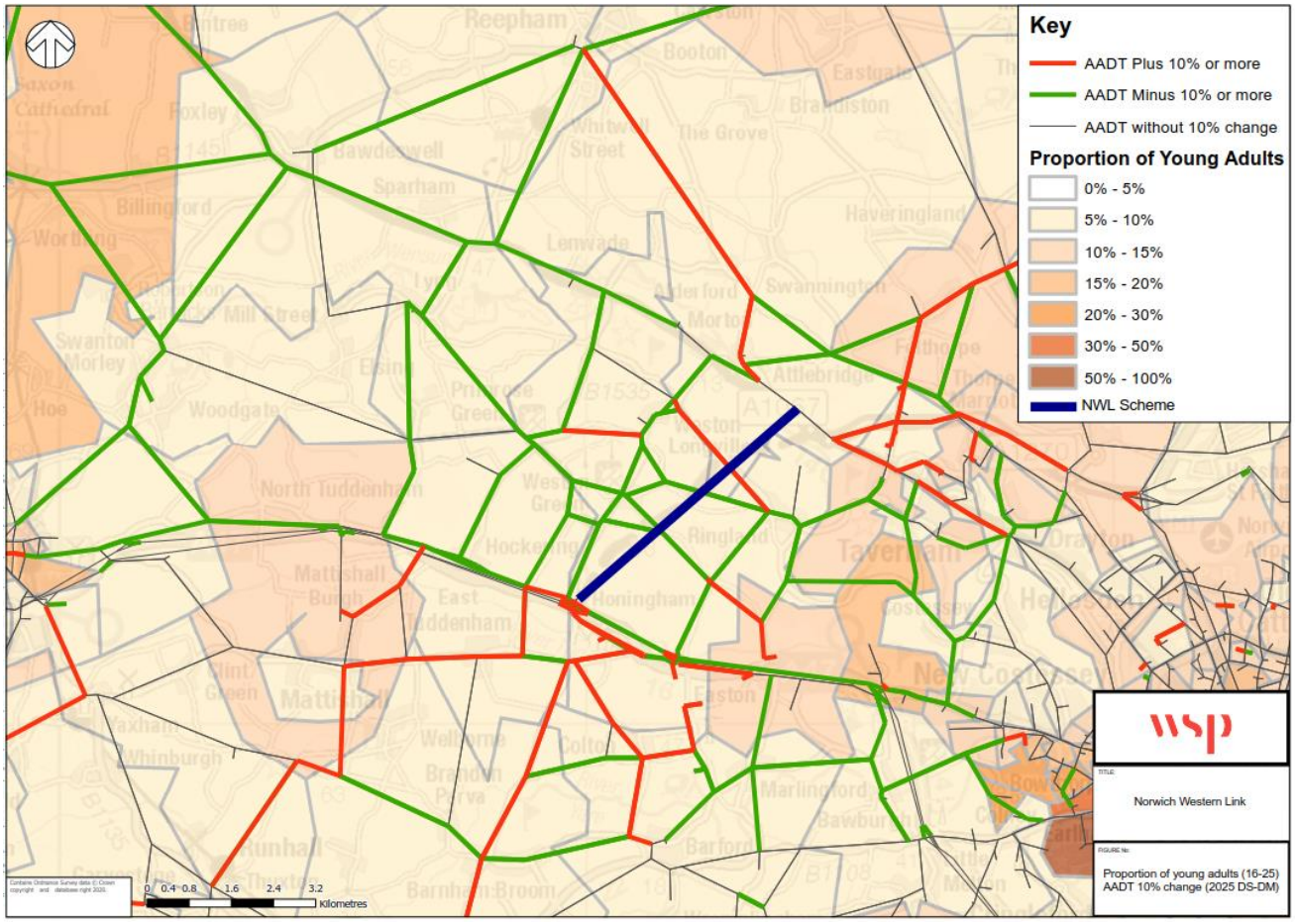

Figure 4-15 - Proportion of people between 16-25 (young adults) and link flow change

4.6.9. Figure 4-15 shows that there is a relatively low proportion of young adults in the study area, with the majority of the study area having a proportion of young adults between 5% and 20%. Directly adjoining the NWL scheme, the LSOAs have a proportion of young adults between 5% and 10%. However, the eastern section of the study area, which contains the urban area of Norwich, has a higher proportion of young adults, with proportions up to 50%. This is an area by the University of East Anglia. The study area contains roads which are forecast to have changes of flows of more than 10%, both increases and decreases, with the majority of the affected roads located in areas where the proportion of young adults is under 15%.

4.6.10. The significant majority of traffic flow changes of >10% are in LSOAs with lower than average proportions of young adults, therefore they are not deemed to have changed significantly for this particular social group.

Older People

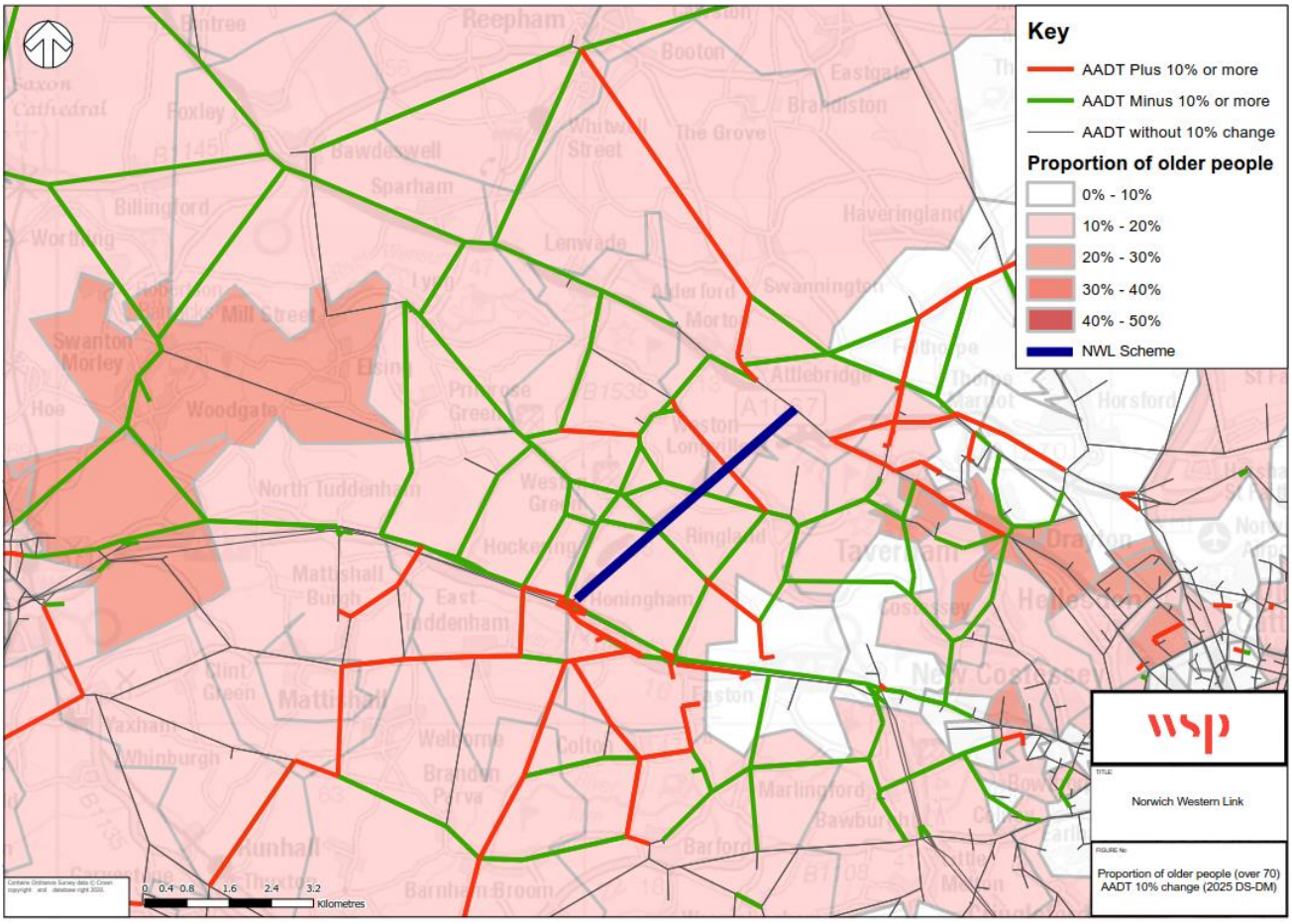

Figure 4-16 - Proportion of people over 70 (older) by LSOA and link flow change

4.6.11. Figure 4-16 shows that the area contains a higher proportion of older people in comparison to children and young adult proportions. Figure 4-16 demonstrates more variation in LSOAs, with proportions ranging from under 10% through to 40%, with the majority of the study area having LSOAs with 10% to 20%. With the national average being 10.9%, this demonstrates that the majority of the study area has LSOAs with a higher than average proportion of those over 70.

4.6.12. The majority of link flow changes in LSOAs with higher proportions of older people are where the links are forecast to have a >10% decrease in flows, particularly to the west of the NWL scheme. Therefore, the change is likely to be slightly beneficial for this particular social group.

Proportion of people with a disability

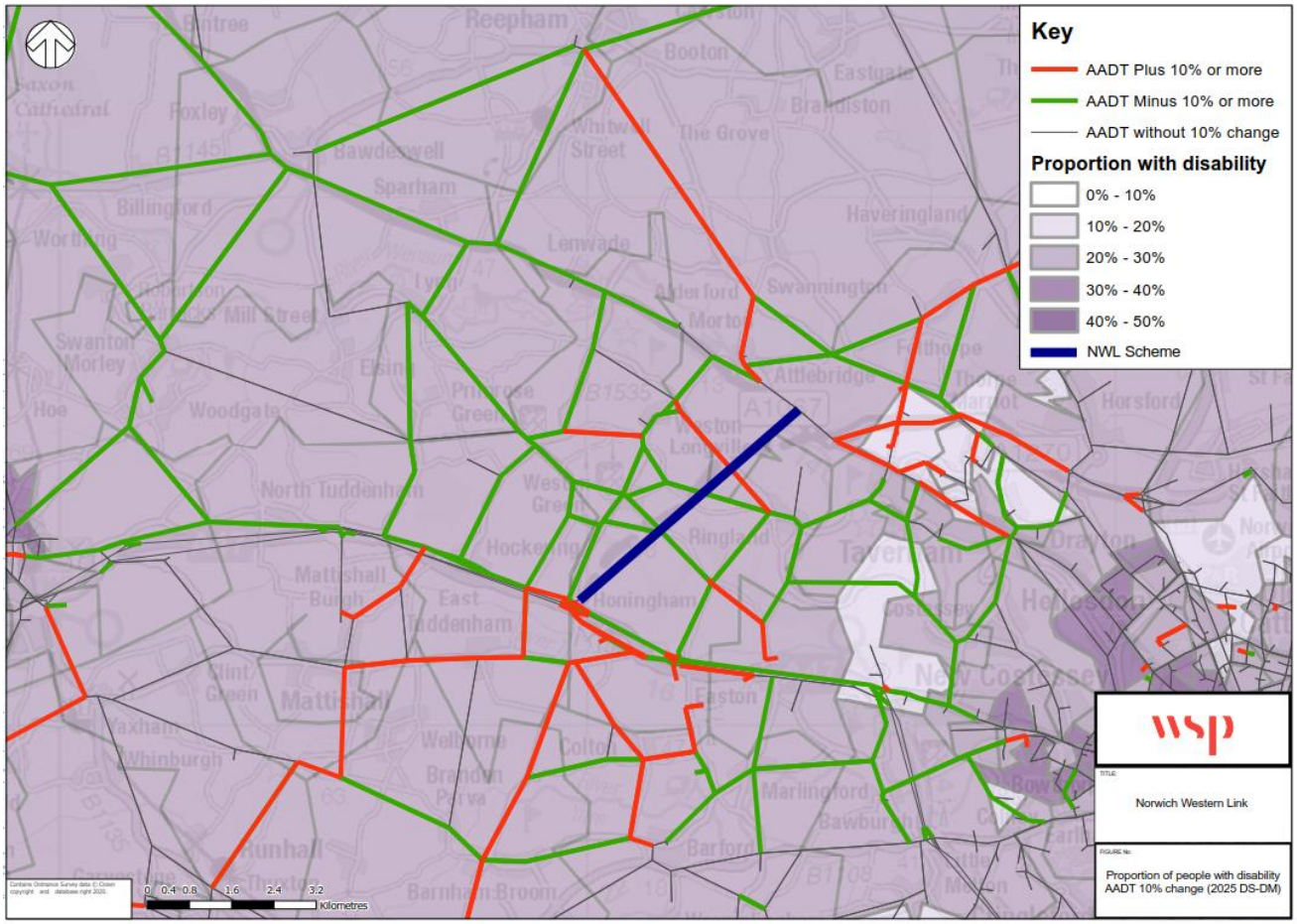

Figure 4-17 - Proportion of people with a disability by LSOA and link flow change

4.6.13. Figure 4-17 shows the area has a majority of LSOAs with the proportion of people with a disability in the 20% to 30% range, which is around the national average. There are some areas where the proportion of people with a disability is in the range 30% to 40%, these are located in the urban area of Norwich. There are also areas to the west of the scheme where the proportion is low, less than 10%, these are located on the outskirts of the urban area of Norwich.

4.6.14. Overall, in areas where link flow changes are present, they are not deemed to have had a significant effect on severance for this particular social group.

Proportion of people with BME origin

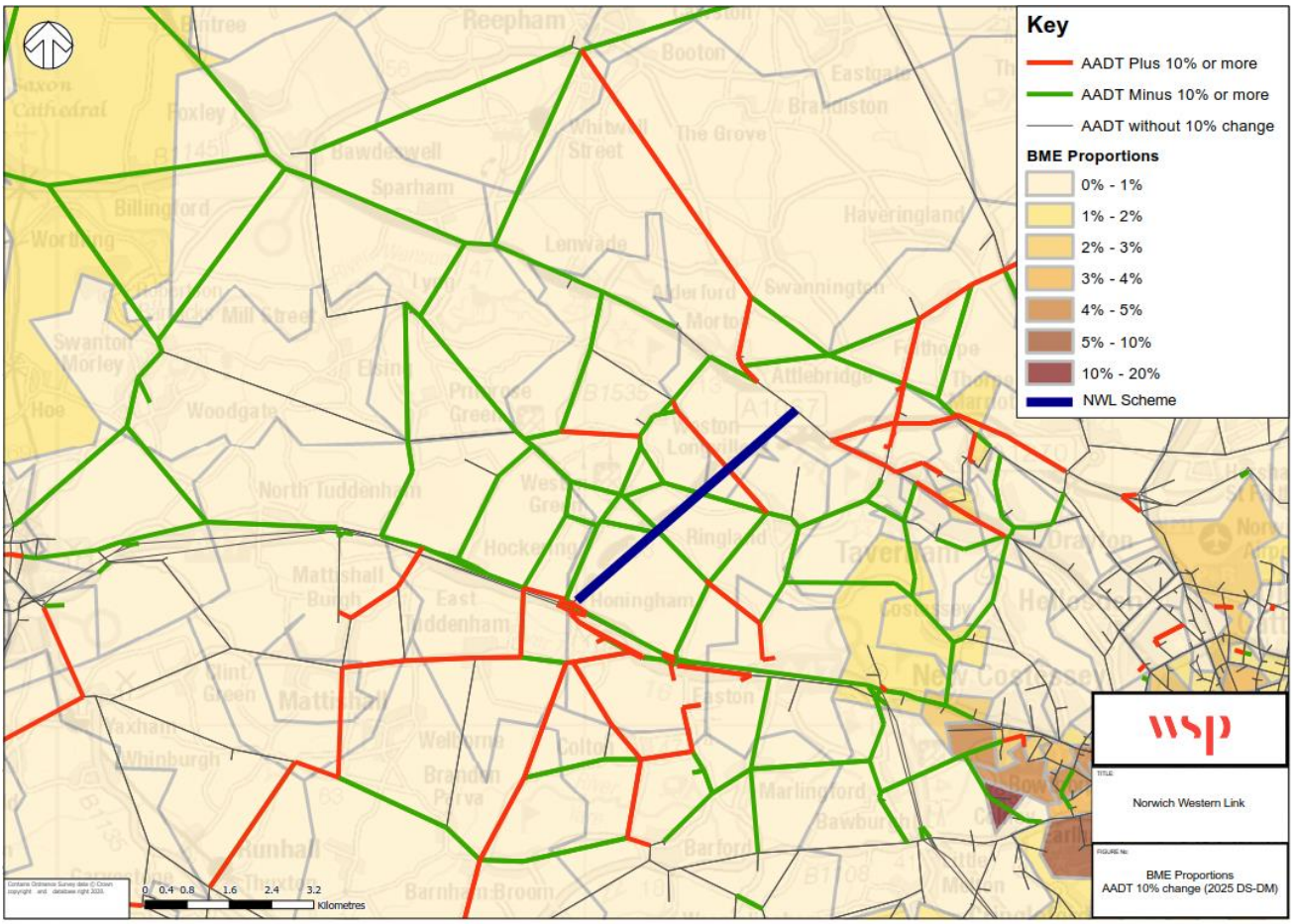

Figure 4-18 - Proportion of black and minority ethnic people by LSOA and link flow change

4.6.15. Figure 4-18 shows that the majority of LSOAs in the study area have a relatively low proportion of people with a black or minority ethnic origin compared to the national average. Norfolk as a whole also has low proportions of BME (3.5%). The majority of the study area has proportions of 2% or less, with Norwich containing LSOAs of mostly 5 to 10%, with some LSOAs with proportions up to 20%.

4.6.16. Overall, it is deemed the majority of affected roads are in areas with low proportions of BME, therefore they are not deemed to have a significant impact on severance for this particular social group.

Proportion of people without access to a car

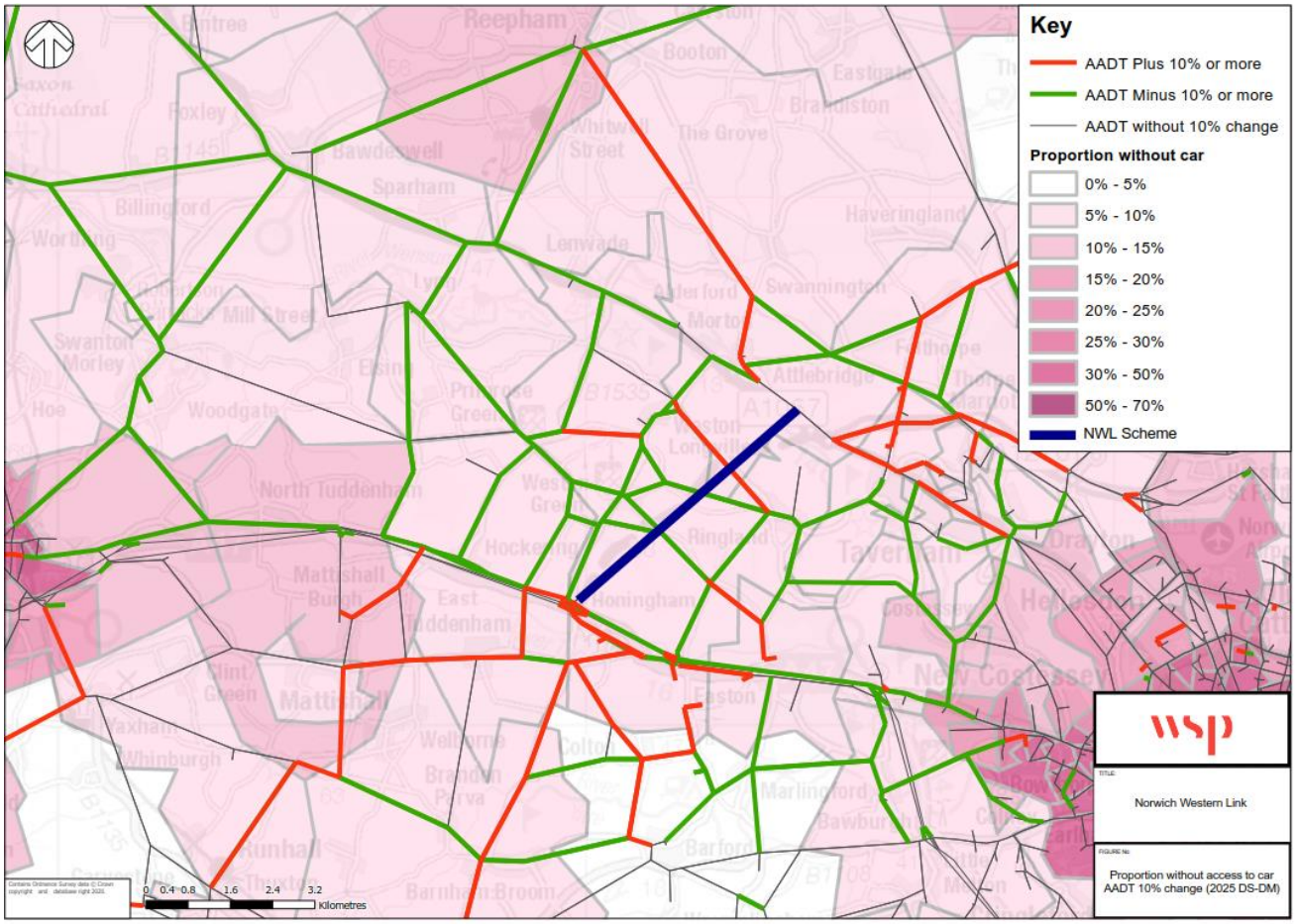

Figure 4-19 - Proportion of people with no car by LSOA and link flow change

4.6.17. Figure 4-19 shows that the study area has LSOAs which vary from under 5% in proportion to 70% when relating to the proportion of people without access to a car. Overall, the majority of the study area has proportions of 20% or less which do not have access to a car, which is lower than the national average of 25.6%.

4.6.18. Areas with a change in traffic flows of >10% care located in LSOAs with relatively low proportions of people without access to a car, the impacts are deemed neutral for this particular social group.

AMENITIES

4.6.19. As changes in severance were deemed neutral in the study area, there is deemed no adverse impact on specific amenities in the surrounding area. Amenities present consist of parks and open spaces, community centres, hospitals and schools.

4.7 AFFORDABILITY

4.7.1. The methodology used for the Distributional Impacts Assessment of Affordability follows DfT's TAG unit A4-2 guidance. The input data used for the assessment is based on the zone-to-zone correspondence outputs of TUBA for Fuel and Non-Fuel Vehicle Operating Costs. All trips that are classified as having a business purpose within the TUBA output are excluded from the subsequent analysis in accordance with the TAG guidance

4.7.2. The TUBA outputs are aggregated from Origin-Destination pairs to benefits/disbenefits per zone. The default methodology used is to allocate all benefits and disbenefits in the AM peak to the origin zone as the majority of trips will be outbound trips to work. The reverse then is used for the PM peak hour where the benefits and disbenefits are allocated to the destination zone. In the Inter-peak hour, the benefits and disbenefits are averaged and allocated to both the origin and destination zones. This process is repeated for all years of the analysis included within the TUBA output.

4.7.3. Income segmentation data is provided at a number of standardised geographies and therefore the zonal data within the TUBA outputs must be converted ('reaggregated') to align with one of these geographies so comparisons can be made. The chosen geographical scale was Lower Super Output Areas (LSOAs) as this was recommended by the TAG guidance as an appropriate scale of analysis and in addition is the lowest level geography that the income segregation data used is available at.

4.7.4. This methodology uses Index of Multiple Deprivation (IMD) (2019) Income Domain at LSOA geography as a proxy for income as it was produced more recently than the Census 2011 income data.

4.7.5. The process followed is:

- The benefits or disbenefits associated with each LSOA are allocated to the corresponding IMD Income Domain quintile;
- The benefits and disbenefits are summed for each quintile;
- The proportions of the total benefits and disbenefits are calculated for each quintile;
- The proportion of the local population that falls within each quintile is calculated;
- Each quintile is graded according to the grading system given in Table 8 of the guidance.

Table 4-5 – Affordability Distribution Analysis

	IMD Income Domains £m Most deprived areas ← →least deprived areas				
	Quintile1	Quintile 2	Quintile 3	Quintile 4	Quintile 5
Total Benefits	9.24	3.34	4.94	4.96	2.06
Share of User Benefits %	37.7	13.6	20.1	20.2	8.4
Share of Population in impact area %	12.3	12.8	26.6	31.3	17.0
Assessment	✓✓✓	✓✓✓	✓	✓	✓

4.7.6. The distribution of affordability related to vehicle operating costs across the quintile areas is not even with the majority of impacts favouring those in the most deprived income quintiles. Those in income quintile 1 (most deprived income quintile) experience a higher than expected proportion of benefits whereas those in the least deprived areas (quintile 4 and 5) experience a smaller than expected proportion of benefits.

5 SUMMARY

5.1.1. The DI appraisal is summarised in the Appraisal Matrix shown in Table 5-1.

5.1.2. The AST entry is summarised in Table 5-2.

Table 5-1 - Distributional Impact Appraisal Matrix

	Distributional impact of income deprivation					Are the impacts distributed evenly?	Key impacts - Qualitative statements
	0-20%	20%-40%	40%-60%	60%-80%	80%-100%		
User Benefits	✓	✓	✓✓✓	✓✓✓	✓✓✓	No	The distribution across the quintile areas is not even with the majority of impacts favouring those in the least deprived income quintiles. Those in income quintile 4 (second least deprived income quintile) experience a higher than expected proportion of benefits whereas those in the most deprived areas (quintile 1 and to a lesser extent quintile 2) experience a smaller than expected proportion of benefits.
Noise			✓	××		No	Noise impacts are experienced by those in the middle income quintiles. Residents living in quintile 4 experience noise disbenefits while residents in quintile 3 experience noise benefits.
Air Quality	✓	✓	✓✓	✓✓	✓	No	Air quality impacts are experienced across all quintiles. Those in quintile 3 and 4 experience a higher proportion of air quality benefits than would be expected from an even distribution.
Affordability	✓✓✓	✓✓✓	✓	✓	✓	No	The distribution across the quintile areas is not even with the majority of impacts favouring those in the most deprived income quintiles. Those in income quintile 1 (most deprived income quintile) experience a higher than expected proportion of benefits whereas those in the least deprived areas (quintile 4 and 5) experience a smaller than expected proportion of benefits.
Accessibility						N/A	N/A

TAG Unit A4.2

Table 5-2 – AST Entry

Impact	Social Groups						User Groups				Qualitative statement
	Children & Young People	Older People	Carers	Women	Disabled	BME	Pedestrians	Cyclists	Motorcyclists	Young Male Drivers	
Noise	×										Children and young people experience noise disbenefits
Air Quality	✓										Children and young people experience air quality benefits
Accidents	✓	✓					✓	✓	✓	✓	All relevant social groups and user groups experience accident benefits
Security	-	-		-	-	-					N/A
Severance	✓	✓	✓		✓						All relevant social groups and user groups experience severance benefits
Accessibility	-	-	-	-	-	-					N/A

TAG Unit A4.2

Appendix A

SCREENING PROFORMA

Distributional Impact Appraisal Screening Proforma

Scheme description:
Norwich Western Link, provision of a new dual carriageway linking the A47 and the NDR to the west of Norwich.

Indicator	(a) Appraisal output criteria	(b) Potential impact (yes / no, positive/ negative if known)	(c) Qualitative Comments	(d) Proceed to Step 2
User benefits	The TUBA user benefit analysis software or an equivalent process has been used in the appraisal; and/or the value of user benefits Transport Economic Efficiency (TEE) table is non-zero.	Yes, Positive	There are likely to be beneficial impacts with respect to journey time, based on the SOBC TUBA analysis.	Yes
Noise	Any change in alignment of transport corridor or any links with significant changes (>25% or <-20%) in vehicle flow, speed or %HDV content. Also note comment in TAG Unit A3.	Yes, Unknown	The SOBC assessment estimated minor impacts both adverse and beneficial with respect to a change in road traffic generated noise levels.	Yes
Air quality	Any change in alignment of transport corridor or any links with significant changes in vehicle flow, speed or %HDV content: • Change in 24 hour AADT of 1000 vehicles or more • Change in 24 hour AADT of HDV of 200 HDV vehicles or more • Change in daily average speed of 10kph or more • Change in peak hour speed of 20kph or more • Change in road alignment of 5m or more	Yes, Negative	The SOBC assessment indicated adverse impacts for air quality and greenhouse gases emissions	Yes

Indicator	(a) Appraisal output criteria	(b) Potential impact (yes / no, positive/ negative if known)	(c) Qualitative Comments	(d) Proceed to Step 2
Accidents	Any change in alignment of transport corridor (or road layout) that may have positive or negative safety impacts, or any links with significant changes in vehicle flow, speed, %HGV content or any significant change (>10%) in the number of pedestrians, cyclists or motorcyclists using road network.	Yes, Unknown	The new link is likely to attract traffic currently using low standard rural routes and congested urban routes. The new link will have reduced number of junctions and will be designed to current standards.	Yes
Security	Any change in public transport waiting/interchange facilities including pedestrian access expected to affect user perceptions of personal security.	No impact	There is no planned change to public transport waiting/interchange facilities with the scheme.	No
Severance	Introduction or removal of barriers to pedestrian movement, either through changes to road crossing provision, or through introduction of new public transport or road corridors. Any areas with significant changes (>10%) in vehicle flow, speed, %HGV content.	Yes, Unknown	The new link is likely to sever existing PROWs.	Yes
Accessibility	Changes in routings or timings of current public transport services, any changes to public transport provision, including routing, frequencies, waiting facilities (bus stops / rail stations) and rolling stock, or any indirect impacts on accessibility to services (e.g. demolition & re-location of a school).	No impact	There is no planned change to public transport services routing or timings or provision with the scheme.	No

Indicator	(a) Appraisal output criteria	(b) Potential impact (yes / no, positive/ negative if known)	(c) Qualitative Comments	(d) Proceed to Step 2
Affordability	In cases where the following charges would occur; Parking charges (including where changes in the allocation of free or reduced fee spaces may occur); Car fuel and non-fuel operating costs (where, for example, rerouting or changes in journey speeds and congestion occur resulting in changes in costs); Road user charges (including discounts and exemptions for different groups of travellers); Public transport fare changes (where, for example premium fares are set on new or existing modes or where multi-modal discounted travel tickets become available due to new ticketing technologies); or Public transport concession availability (where, for example concession arrangements vary as a result of a move in service provision from bus to light rail or heavy rail, where such concession entitlement is not maintained by the local authority[1]).	Yes, Positive	The scheme will have an impact on car fuel and non-fuel operating costs, only. As a result of rerouting it is expected that there will be changes to these costs. For car fuel and non-fuel operating costs, the outputs from TUBA can be used, and indicate positive benefits. The remaining areas of affordability (parking charges, road user charges, public transport fares and concession availability) are not affected by the scheme.	Yes

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