8.3 Step 2b & 2c: Identification of Social Groups and Amenities in the Affected Area

Figure 8-2 shows the income quintiles in the air quality impact area at LSOA level. Details of the income quintiles are given in Chapter 5. As can be seen on Figure 8-2, all five income quintiles are present in the area of impact.
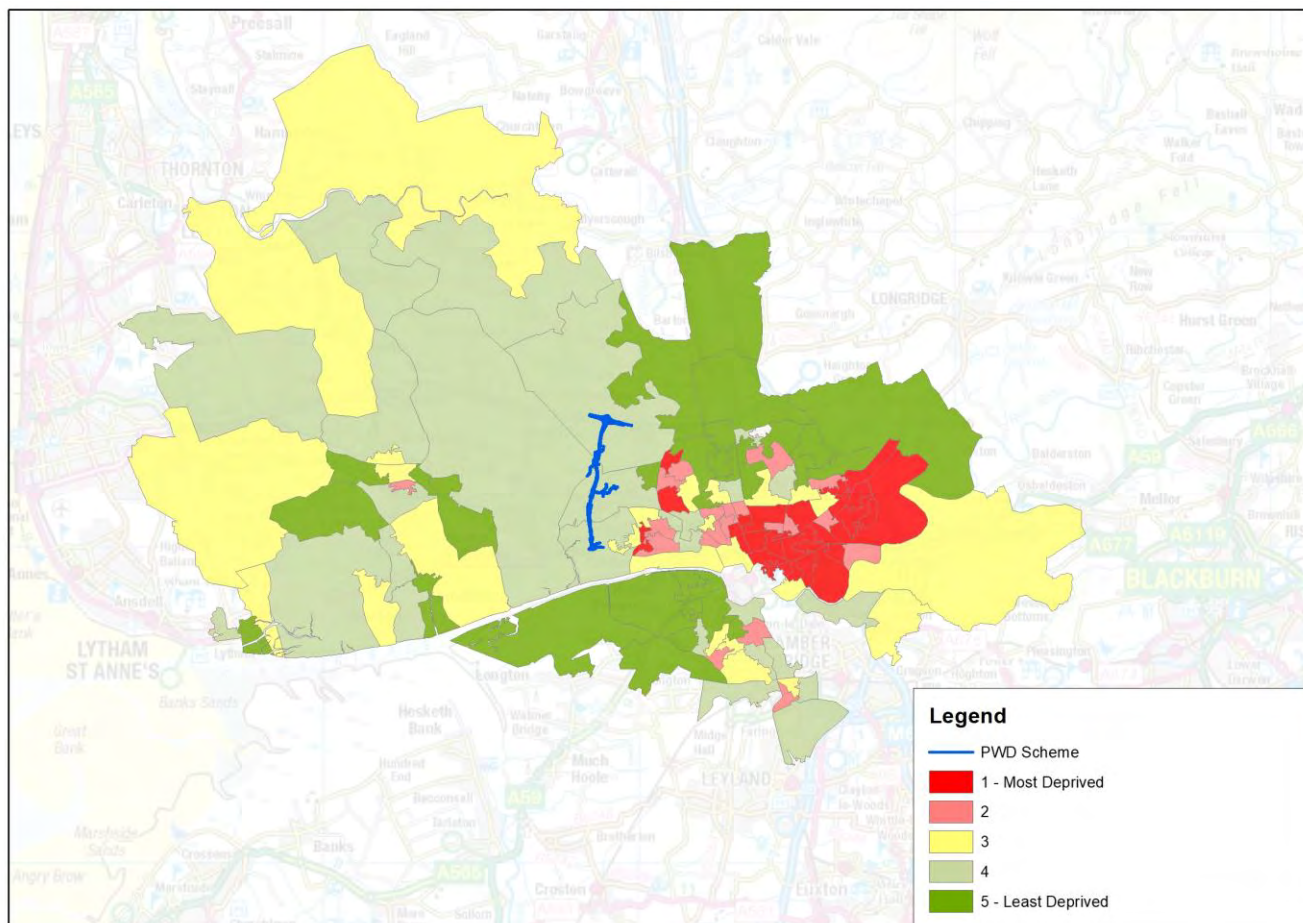

Figure 8-2: Income Quintiles in Air Quality Affected Area

The sensitive receptors in the affected area such as schools and hospitals can be seen in Figure 8-3. Other places where children and elderly people could spend time, have not been considered for proportionality reasons due to the large number of such places and a small overall impact of the scheme on air quality.

Figure 8-3: Sensitive Receptors and Amenities within Air Quality Affected Area

8.4 Step 3a: Core Analysis of Impacts

The DI assessment for the air quality indicator requires the identification of the number of properties in each income quintile which are expected to experience an increase, decrease or no change in air quality.

The TAG air quality assessment provides the number and location of receptors and therefore estimated population (assuming 2.35 residents per household) experiencing an increase or decrease in NO_2 and PM_{10} as a result of the scheme in the Opening Year (2022).

Using the spatial join function in GIS each affected receptor has been assigned to the corresponding LSOA and to the income quintile that the LSOA falls within. The results are presented in Appendix E. In line with the guidance the number of 'winners' and 'losers' in each income group has been calculated along with the proportion of the affected population of each group in the total population in the impact area.

The assessment score for each income group is dependent on how the income group result (net number of 'winners' compared to 'losers') compares to the overall impact and to the proportion of the group in the total population.

The results of DI assessment for NO_2 and PM_{10} are shown in Table 8-1 and Table 8-2 respectively.

Table 8-1 demonstrates that 9,455 properties are forecast to experience an improvement in NO_2 values as a result of the scheme. A total of 4,754 properties are expected to experience deterioration and 1,197 properties

will not experience any change. Therefore, there is an overall NO$_2$ improvement with 4,701 net 'winners' across the area of impact.

As can be seen in Table 8-1 the scheme in terms of NO$_2$ is beneficial for quintiles 2, 4 and 5. Incomes groups 2 and 5 scored a greater percentage of 5% than the proportion of the group in the total population and therefore receive a large beneficial score for NO$_2$. Income group 4 is moderately beneficial, while income group 3 is slightly adverse and income group 1 is moderately adverse.

	IoD Income Domain					Total
	Most deprived ⟵⟶ Least deprived					
	1 (0-20%)	2 (20-40%)	3 (40-60%)	4 (60-80%)	5 (80-100%)	
Number of properties with improved air quality [A]	431	2,541	1,355	3,138	1,990	9,455
Number of properties with no change in air quality [B]	162	320	107	486	122	1,197
Number of properties with worse air quality [C]	727	515	1,369	1,426	717	4,754
Number of net winners / losers [D] = [A] – [C]	-296	2,026	-14	1,712	1,273	-
Total number of winners / losers across all groups [E] = ∑[D]						4,701
Net winners/losers in each area as percentage of total [F] = [D] / [E]	-6%	43%	0%	36%	27%	
Share of total population of study area	8.6%	21.9%	18.4%	32.8%	18.4%	
Assessment	✗✗	✓✓✓	✗	✓✓	✓✓✓	

Table 8-1: Summary of Air Quality (NO$_2$) DI Analysis

The overall impact for PM$_{10}$ across the affected area is shown to be beneficial for all the quintiles. Income groups 4 and 5 account for the largest proportions of net 'winners' / 'losers' and therefore they are awarded a large beneficial score. Income group 2 is presented to be moderate beneficial in terms of PM$_{10}$ followed by income group 1 and 3, which were received a slight beneficial score.

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	IoD Income Domain					Total
	Most deprived ⟵⟶ Least deprived					
	1 (0-20%)	2 (20-40%)	3 (40-60%)	4 (60-80%)	5 (80-100%)	
Number of properties with improved air quality [A]	137	755	606	1,567	1,082	4,147
Number of properties with no change in air quality [B]	1,120	2,562	1,880	3,180	1,642	10,384
Number of properties with worse air quality [C]	63	59	345	303	105	875
Number of net winners / losers [D] = [A] – [C]	74	696	261	1,264	977	-
Total number of winners / losers across all groups [E] = ∑[D]						3,272
Net winners/losers in each area as percentage of total [F] = [D] / [E]	2%	21%	8%	39%	30%	
Share of total population of study area	8.6%	21.9%	18.4%	32.8%	18.4%	
Assessment	✓	✓✓	✓	✓✓✓	✓✓✓	

Table 8-2: Summary of Air Quality (PM_{10}) DI Analysis

Out of 19 schools in the area of impact 9 will experience improvement in NO_2 air quality as a result of the scheme whilst 7 schools will be negatively impacted. PM_{10} levels are expected to worsen at just 1 school while levels are expected to improve at 5 schools. An assessment score of Neutral has therefore been awarded for Children.

There are 2 hospitals within the air quality impact area. Both are expected to experience worsening of NO_2 air quality, while PM_{10} . levels are expected to increase at one hospital while remaining the same at another. Therefore, Slight Adverse score has been awarded for Older People.

9.   Distributional Impact of Accidents

9.1   Introduction

It is stated in TAG A4.2 that most transport-related accidents, injuries and deaths occur on the road network. Vulnerable groups (in terms of their accident risk) include children and older people (as pedestrians), cyclists, motorcyclists and young male drivers. There is also a strong link between deprivation and road accidents where children from the most deprived background are five times more likely to be involved in a fatal road accident than those from the least deprived. Therefore, the DI assessment of accidents focuses on the vulnerable groups outlined above and the deprived groups.

9.2   Step 2a: Confirmation of Areas Impacted by the Intervention

The COBALT assessment undertaken as part of the scheme's economic appraisal and reported in the Economic Assessment Report (EAR) (January 2019) has been used as the basis of the DI analysis. The overall affected area for the Accident Indicator is therefore the area covered by the COBALT network. The COBALT network is shown in Figure 9-1.
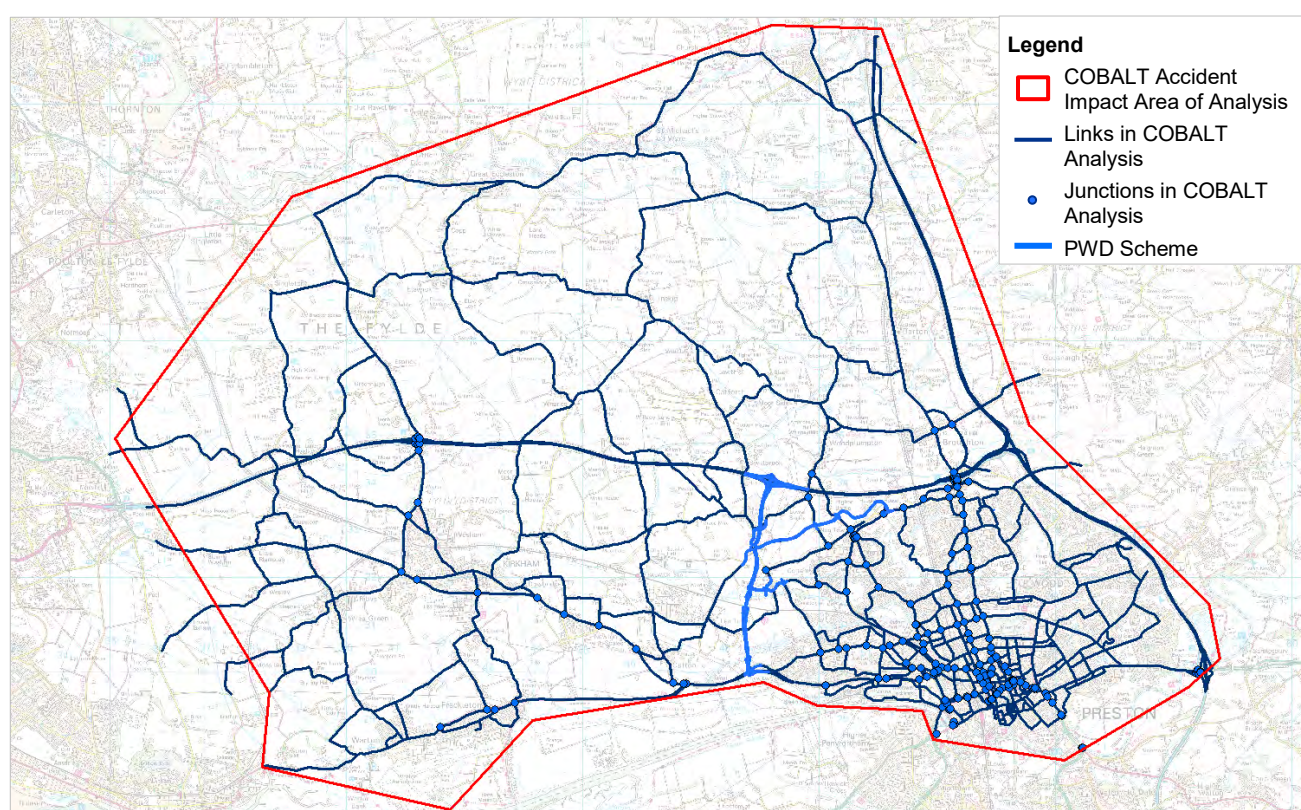

Figure 9-1: Impact Area for the Accident Indicator

9.3   Step 2b: Identification of Social Groups in the Impact Area

In the case of intervention on the road network TAG guidance recommends to undertake the analysis of deprivation statistics because there is evidence that people living in more deprived areas are more vulnerable to accidents on the road network.

The income segmentation based on the 2015 Indices of Income Deprivation at the LSOA level has been used to identify the most deprived areas in the accidents impact area. Figure 9-2 shows the income quintiles in the accidents impact area at LSOA level.
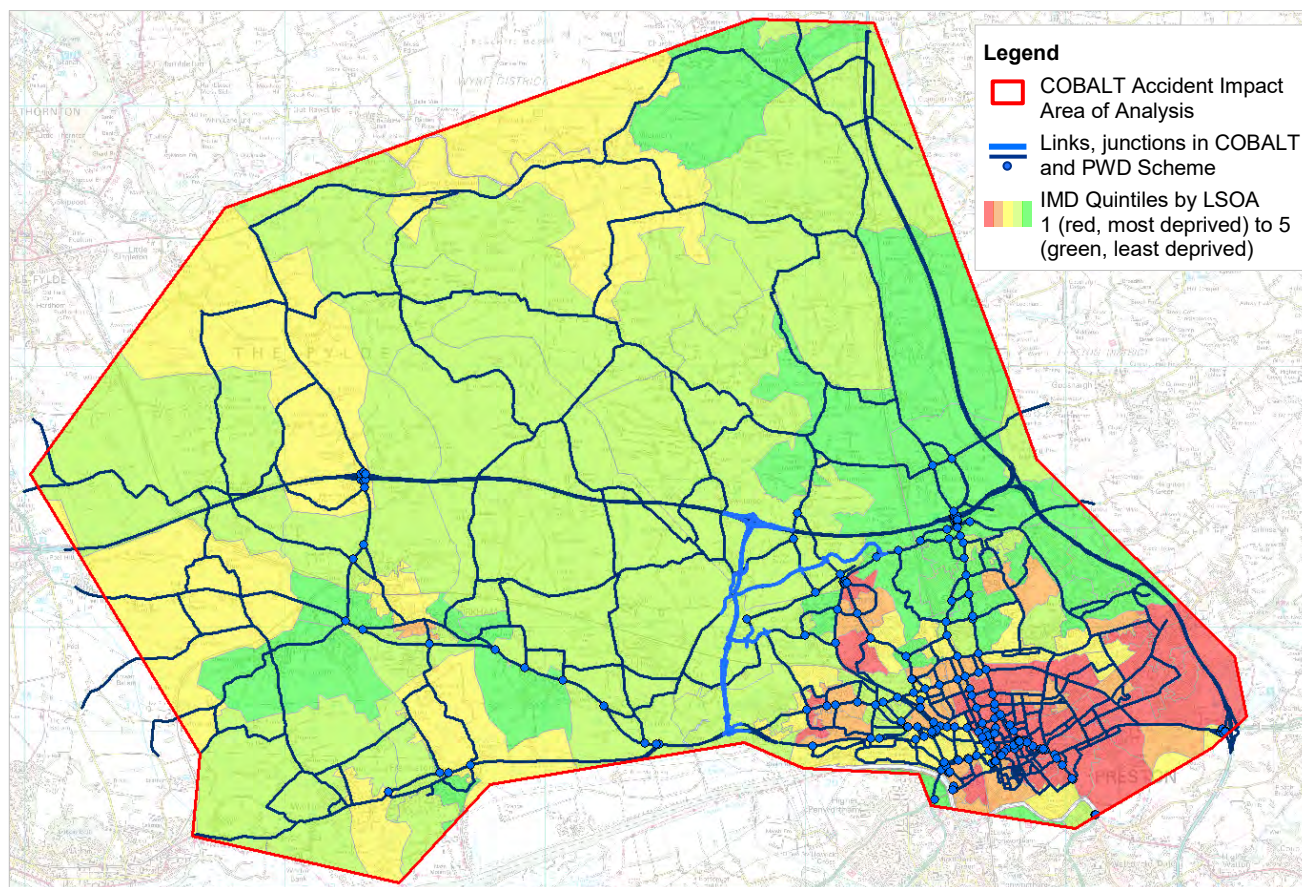
Figure 9-2: LSOAs within the Accident Impact Area classified by income quintiles

Complementary, TAG guidance suggests identifying potential vulnerable groups living in the area. To ensure a proportionate approach, this exercise has been done through the identification of amenities in the impact area in section 9.4.

9.4   Step 2c: Identification of Amenities in the Affected Area

The concentration of vulnerable groups within the area of impact may be explained by amenities which attract representatives of different vulnerable groups. TAG unit A4.1 in section 5.3 considers the following vulnerable groups: children, older people, young males (as drivers), pedestrians, cyclists and motorcyclists.

In order to identify amenities in the affected area attracting children, older people and young male drivers, the Ordnance Survey Address Point Data has been used, selecting the following type of amenities:

- Play areas, schools, nurseries and child care homes/services attracting children.
- Hospitals, nursing homes, rest homes and retirement homes attracting older people.
- Universities, high schools, youth centres and sports centres attracting young male drivers.

The selection of these amenities has been reviewed and complemented through a desktop research exercise.

Figure 9-3 shows the identified attractions for children, older people and young male drivers in the area. These attractions are used to inform the analysis in step 3.
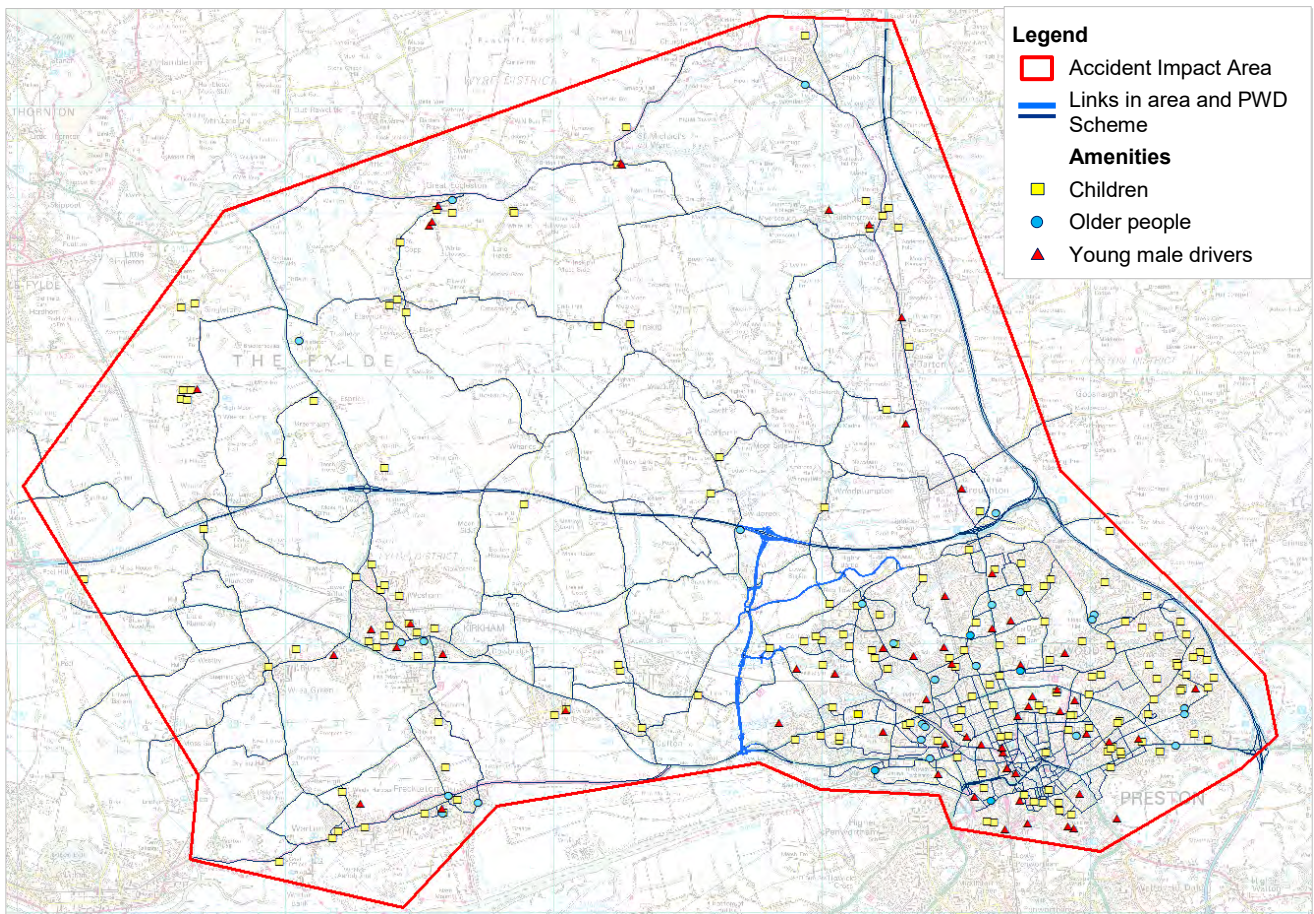
Figure 9-3: Amenities attracting children, older people and young male drivers within Accident Impact Area

Main cycling routes (national, regional or local) in the area have been considered as amenities attracting cyclists. The routes adjacent to the analysed network links have been identified (and classified based on whether the links have a segregated cycle lane or not) through a desktop research exercise and are shown in Figure 9-4.
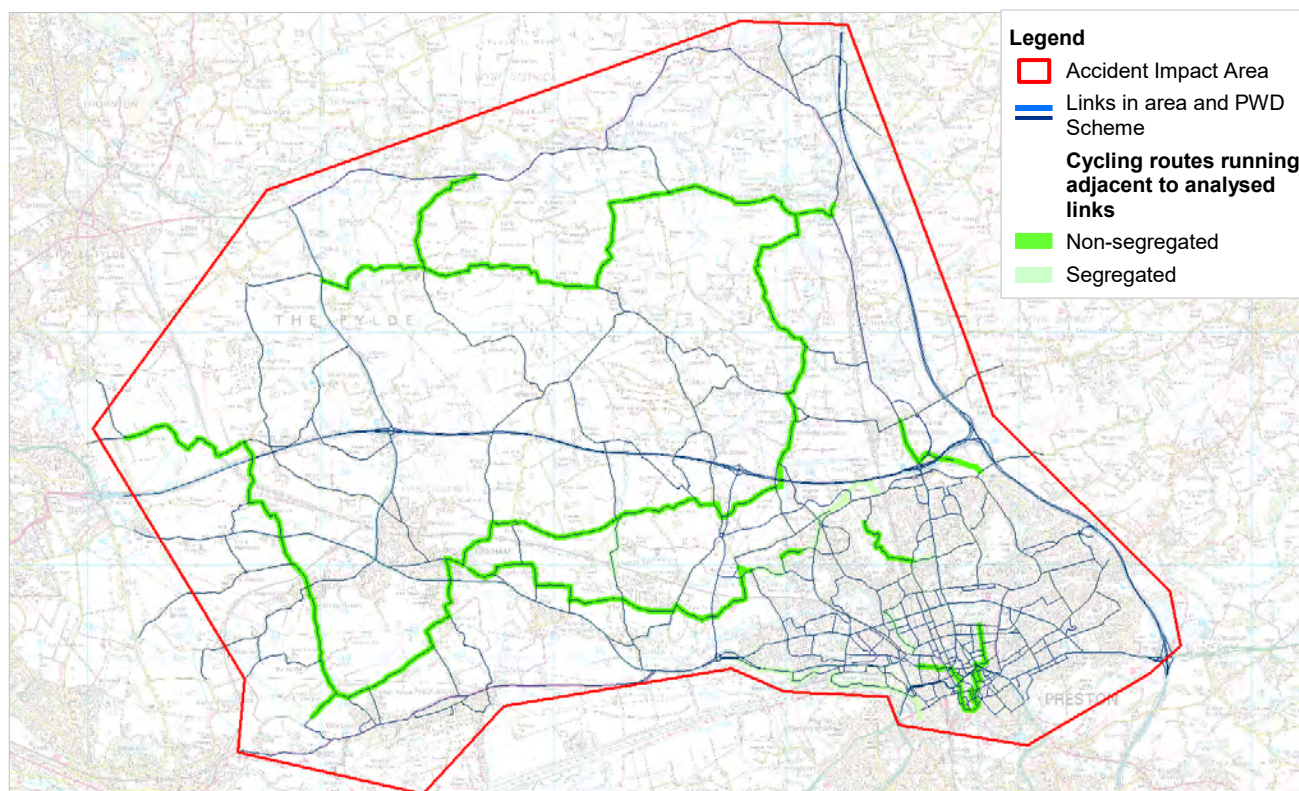
Figure 9-4: Cycling routes running adjacent to analysed links within Accident Impact Area

No specific amenities attracting pedestrians and motorcyclists have been identified. When assessing distributional accident impacts of the PWD scheme for these groups, the analysis has been done based on the concentration of observed casualties.

9.5   Step 3a: Core Analysis of Impacts

The TAG guidance suggests a proportionate approach to the DI appraisal for accidents. As stated in the guidance, a detailed assessment should only be undertaken for those links where there are over 50 casualties on each affected link over 5 years. Based on HA guidance, this is equivalent to 7 accidents per year. Hence, if the number of accidents on the affected links is not more than 35 over a 5 year period a qualitative assessment is recommended.

Analysis of the STATS19 casualty data for years 2010 to 2014 showed that none of the affected links and junctions shown in the area of impact had more than 35 accidents over a 5 year period and therefore no detailed appraisal of accidents indicator was required. As recommended, a qualitative assessment was undertaken instead.

To inform this qualitative assessment, vulnerable group casualties within the affected area were analysed, using STATS19 casualty data. In line with WebTAG, clusters of potential vulnerable groups that are casualties on the road network have been identified by comparing the proportion of casualties of each vulnerable group in the cluster area with the national average, obtained also from STATS19 casualty data. The impact of the scheme on vulnerable groups was qualitatively assessed using the forecast change in numbers of accidents, obtained from the COBALT analysis for the areas where identified clusters are located.

Results of the qualitative analysis per each vulnerable group are described in the subsequent sections of this chapter.

9.5.1 Accident Impacts on Children

Amenities attracting children identified in Step 2 have been plotted in GIS together with the casualties among individuals younger than 16 years old (Figure 9-5).
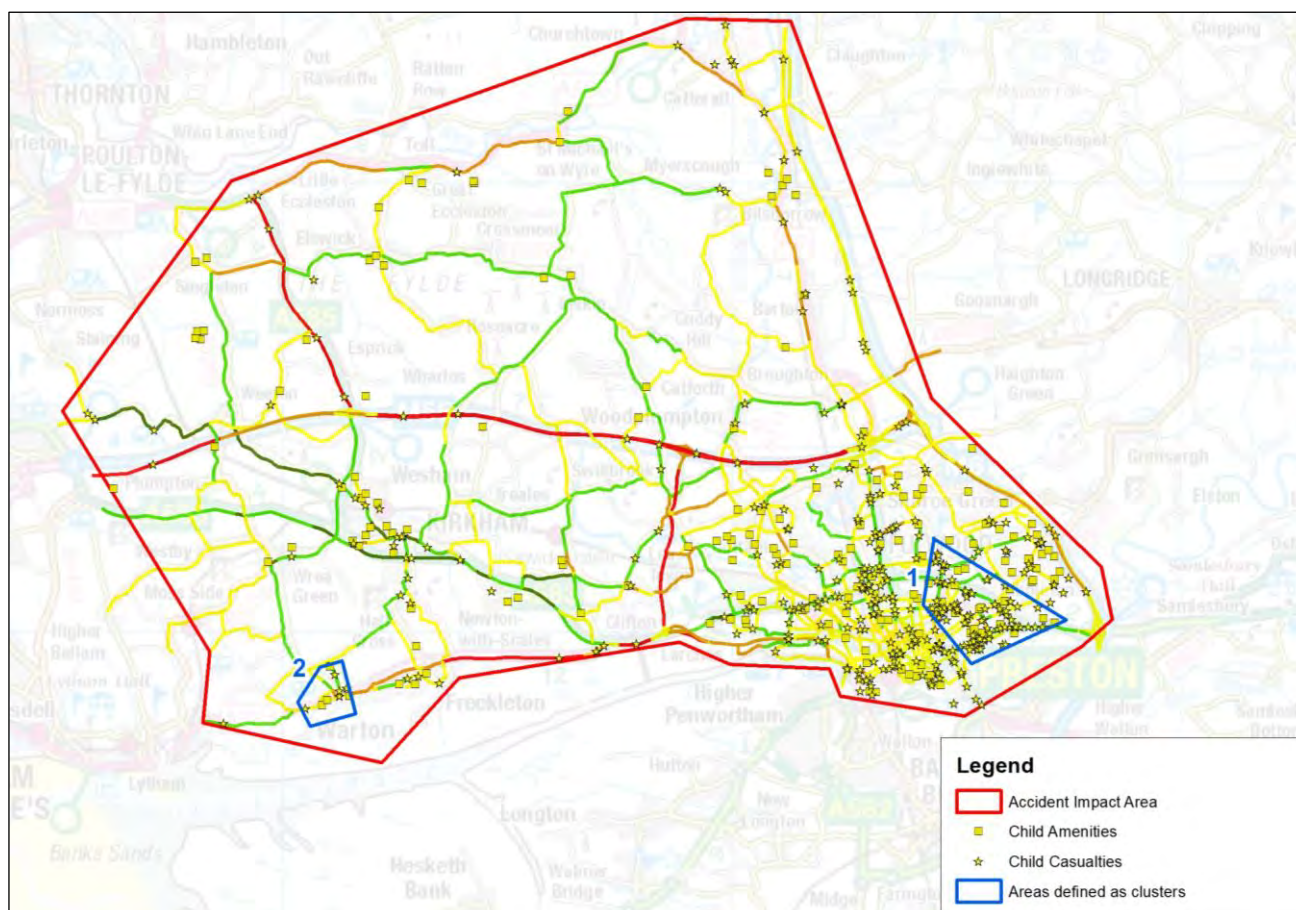

Figure 9-5: Child casualties and amenities in the Accident Impact Area

As demonstrated in Figure 9-5 there are two clusters in the area of impacts where the proportion of child casualties is significantly higher than the national average and are close to amenities attracting children. Table 9-1 shows the proportions of child casualties and the impact of the scheme on road safety in each cluster.

Table 9-1: Clusters of children that are casualties on the road and forecasted impact of the scheme

Area	Proportion of child casualties	Impact of the scheme
National Average	9.0 %	N/A, only for comparison purposes
Average in Study Area	10.2 %	
Children Cluster 1	19.1 %	Beneficial
Children Cluster 2	30.4 %	Neutral

Figure 9-6 shows that within both clusters there are links with an increase and decrease in accidents as a result of the scheme. Given that the majority of the links within the clusters will benefit from the introduction of the scheme, the overall impact is considered to be slightly beneficial for children.