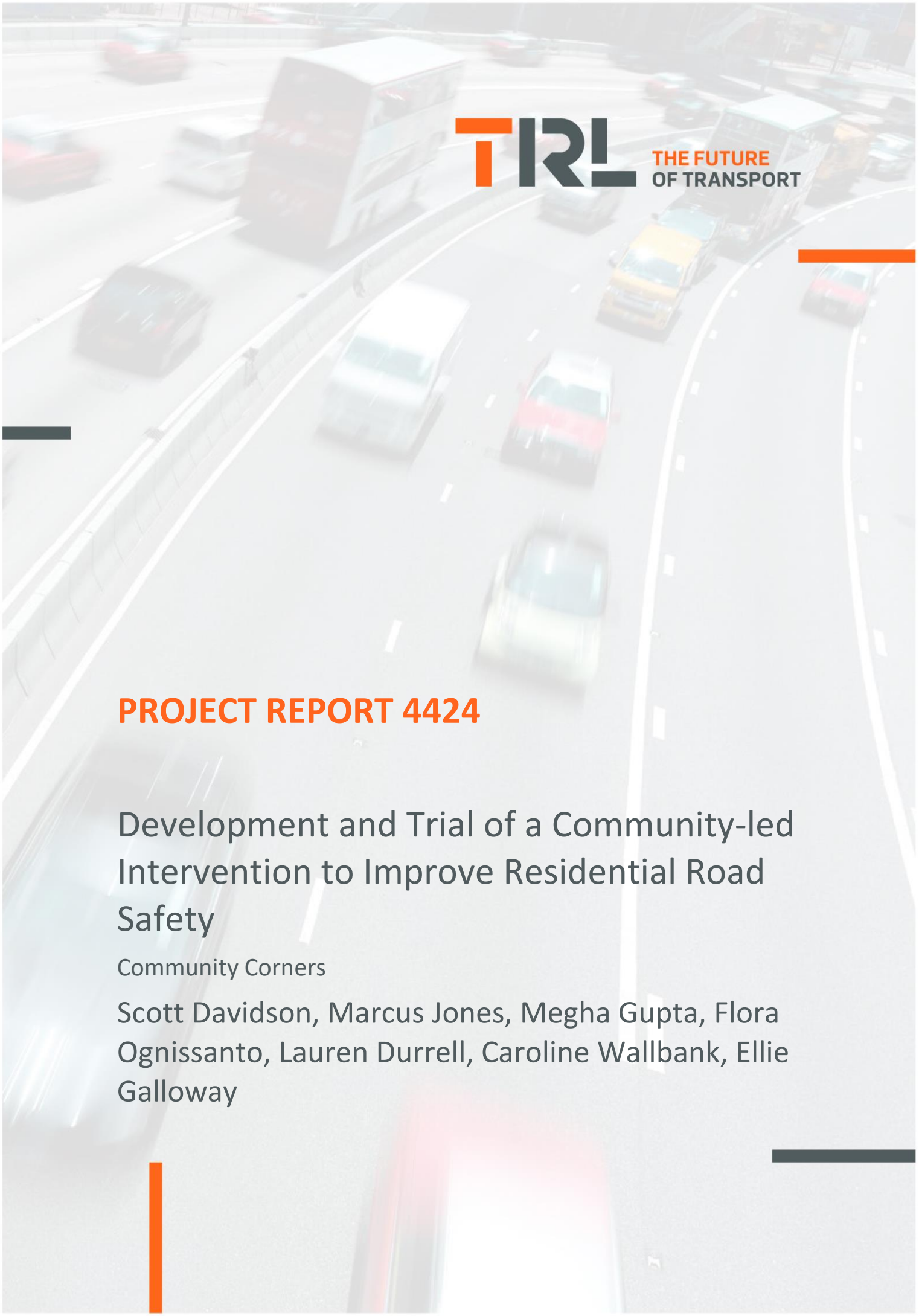

THE FUTURE OF TRANSPORT

PROJECT REPORT 4424

Development and Trial of a Community-led Intervention to Improve Residential Road Safety

Community Corners

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Executive Summary

TRL, through funding from the Road Safety Trust and Bristol City Council, has evaluated a community led intervention to reduce excessive speeding behaviour and high traffic volume in residential streets. This included evaluation of impacts on traffic speed and volume; and on the quality of life of the residents through perceived impacts on air quality, noise pollution and sense of community/ social cohesion.

Research published in scientific literature concludes that the appearance and design of a road can have a significant impact on driver behaviour, including speeding behaviour (Shinar, 2007). Community Corners involve the use of street furniture such as street planters, picnic benches and painting patterns on the residential streets to change the *'feel'* of a street from one of a well-defined highway designed primarily for cars, to an environment shared by drivers, community and cyclists and where families live, children play and people move around and socialise. The planters also create barriers to the line of sight of the drivers as well as physical obstructions which narrow the road, thus encouraging drivers to slow down.

The interventions involved designing campaign material and undertaking street recruitment. A campaign was launched involving Bristol City Council (BCC), local councillors, and social media to reach out to residents of Bristol. A total of 37 complete applications were received, which covered 26 streets. Of these, 10 were selected; some were rejected because there was no alternate route to take up the displaced traffic, or there were limitations of road width or impact on parking of these streets.

An inception workshop and tele-conference were used to brief residents on the project, project expectations and potential benefits. An initial round of street based consultation meetings were then held by residents and facilitated by TRL. From these residents of four streets expressed interest in selection of their streets as experimental streets for the project, these were Hillsdon Road, Ridgeway Road, Whitehall Avenue and Symington Road.

Residents of these streets then formed a constituted group to organise community consultation meetings and lead the scheme implementation. This included submitting an application for a street closure, procuring materials and equipment, assisting with traffic surveys and conducting resident surveys. Community leaders encouraged as many residents as possible to participate in the installation day. The designs agreed on for each street were submitted to BCC for prior approval.

Recruitment of control group streets proved challenging. However, following selection of experimental streets, it was concluded that two pairs of the experimental streets were sufficiently similar in character that they could be matched to one control street each.

Following the installation of street furniture each of the four streets was observed at different times during the day by TRL, primarily to ensure that there was no risk to vehicles traversing through planters placed on the street and that no major traffic obstruction/ congestion/ conflicts were occurring.

Evaluation of the scheme's effectiveness was carried out via pre and post intervention traffic surveys (volume, by manual counts, and speed, using a hand-held radar gun) and resident perception surveys on both experimental and control streets. These were three

months after the installation in order to give the road users time to adjust to the change and settle into any new long term patterns of driving behaviour.

Traffic Volume Survey Data Analysis

The traffic volume data showed a significant reduction in traffic volume on experimental streets compared with the control streets. Overall post-implementation of Community Corners, changes observed on various streets include:

- Reduction in traffic volume ranging from 18% to 50% at various times on Hillsdon Road.
- Reduction in traffic volume ranging from 21% to 39% on Ridgeway Road.
- Reduction in traffic volume ranging from 7% to 34% on Whitehall Avenue.
- Reduction in traffic volume ranging from 1% to 31% except for weekday evenings when it was observed to increase by 5% on Symington Road.

In comparison, control streets have been observed to exhibit a mixed trend, with traffic volume variation ranging from +15% to -9% on Northover Road and +20% to -17% on Reedley Road.

Traffic Speed Survey Data Analysis

Traffic Speed was observed to reduce significantly on all four experimental streets compared with the control streets. The mean speed observed on control streets varied between +1 mph to -1 mph in 'before' and 'after' measurements. In comparison, the Community Corners achieved average speed reductions of 1 to 13 mph on different streets. This is comparable with or better than the speed reductions achieved by more conventional measures found in the literature review: for example 3 mph (in case of rumble strips), 1-5 mph (central islands), and 2-4 mph (visual restrictions).

Significant results from Resident Perception Survey Analysis

The secondary parameters measured for the study included residents' perception on their community, environment on the street and safety perception. Although sample size limitations meant that statistically significant changes could not be observed for all parameters assessed, there was a positive trend in residents' perception of safety and environmental parameters on experimental streets. This implies that such schemes do help in bringing communities closer to work together and change the feel of such streets that residents feel safer to walk, cycle, drive or let their children out on the street.

1 INTRODUCTION

TRL, through funding and support from the Road Safety Trust and Bristol City Council (BCC), has undertaken research to design and test a low cost, community led intervention that has the potential to improve residential road safety. This research follows on from a small scale pilot project implemented in Bristol in 2015 funded by Bristol European Green Capital. This community-led pilot changed the 'feel' of four residential streets through painting entrances and traffic calming areas along with installing large planters and picnic benches on the highway. These packages of interventions were termed 'Community Corners' and:

- Create a physical barrier to high speed through prominent placement of street furniture in the road
- Change the 'feel' of the street from a dedicated highway to a more shared- use space with children and community present
- Reduce the driver's line of sight to encourage drivers to reduce their speed.

1.1 Background to the Project

Recent years have seen an increase in both the number of collisions and casualties occurring on the road network within Great Britain, particularly on built-up roads[1]. Between 2013 and 2014 on built-up roads there was a 9.1% increase in road fatalities, representing 72% of all road casualties in 2014, with the greatest increase seen in pedestrian fatalities (15.7% increase on built-up roads) (Department for Transport (DfT), 2015). In attempting to understand the causes of this increase, exceeding the speed limit was reported as a contributory factor for 16% of all fatal collisions (DfT, 2015), and data from the national database of injury collisions (STATS19) showed that between 2012 and 2014 speeding behaviour[2] was reported as a contributory factor in 7.5% of collisions on built-up roads, and for 12% of the casualties that were either killed or seriously injured as a result of collisions. In addition to its role as a contributory factor in the causation of collisions, speed also increases the severity of any injuries that may arise as a result, so the contributory factor measurements will understate the impact of excessive speed on injury.

Furthermore, pedestrians represent 25% of all fatalities in reported road crashes, despite accounting for only a small percentage of overall travel (DfT, 2015). The relationship between traffic volume and crashes is relatively complex but there is evidence to suggest that increases in traffic volume lead to a growing number of interactions between vehicles and pedestrians, increasing the likelihood of collisions between these two road user groups (DfT, 2015). In summary, the majority of traffic related injuries occur in built up areas, and speed and traffic volume are identified as significant contributory factors to these injuries.

Physical infrastructure interventions like traffic calming have been shown to be effective at reducing traffic speed and reducing casualties. In some traffic calmed areas injury crashes

[1] Built-up roads: Roads where the speed limit is 40mph or lower.

[2] 2 Speeding behaviour: collisions where exceeding the speed limit or driving too fast for conditions were recorded as a contributory factor.

have been reduced by 60 to 70% following speed reductions of 9mph (DfT 2007). However such schemes can be expensive to implement, intrusive and difficult to change following post-implementation experience. This project was therefore undertaken to evaluate a low cost method of mitigating these key risk factors in this context.

1.2 The origins of Community Corners

The concept of 'Community Corners', evolved from the Shared Space approach, although there are some important differences. Shared Spaces aim to create a more equitable balance between the needs of different street users. Typically this involves reducing forms of control and segregation with the intention of creating more cooperative relationships. However, every street has its own context, character and function and therefore shared space cannot have a set of prescribed rules or physical attributes, and is rather a responsive approach to the challenges and opportunities of a particular location. Thus, a shared space scheme on a residential street will be different from that on a highway.

A 'woonerf' in the Netherlands is a classic example of shared spaces where a residential street is designed such that it gives a feeling of social space, rather than a highway (Collarte, 2012). There has been a wide variety of Shared Space schemes implemented across the UK and Europe with a range of objectives including easing traffic flow and minimising delays; traffic calming; creating pedestrian priority; improving liveability; improving the sense of place and boosting economic vibrancy. Although road safety considerations are important, reducing casualties per se is rarely seen as a prime objective for schemes. There have also been a number of concerns raised about the implications of shared spaces on certain categories of vulnerable road users, in particular those with impaired vision, because of the lack of clear demarcation between pedestrian and vehicle spaces, and a lack of kerb lines for guidance.

Community Corners as a concept, has some similarities with shared spaces in residential areas, as many shared space schemes involve street furniture such as street planters, and painting patterns on the residential streets to change the feeling from a standard highway environment, to an environment shared by drivers, community and cyclists. The planters help in creating barriers to the line of sight of the drivers as well as a physical obstruction narrowing the road, thus, potentially encouraging drivers to slow down. Planters, and picnic benches help to give the street a community feel where residents can relax and the painted patterns gives the street the feel of an area where families live, children play and people move around and socialise. However, it is important to note that while Community Corners encourage shared use of road space, they do not involve the removal of the physical demarcation between the footway and the carriageway. Pedestrians can therefore choose to remain on the footway and avoid interactions with vehicles except at crossings.

This report includes a review of lessons learned from shared space schemes as well as other related approaches to managing traffic speed through changing the physical appearance of the street.

1.3 Aims & Objectives

The aim of the project was to research if a community led intervention of this type could improve on road safety by reducing excessive speeding behaviour and high traffic volume in residential streets. The project also aimed to evaluate potential secondary benefits, i.e. improving the overall quality of life of the residents of the selected streets through perceived improved air quality, reduced noise pollution and increased sense of community.

The project objectives were:

1. To develop and pilot a community led street design approach designed to reduce excessive speed and traffic volume in residential streets;
2. Evaluate the impact of the pilot.
3. Understand if 'street design' based on furniture and road painting can impact on traffic speed and volume on residential streets.
4. Understand if 'street design' based on furniture and road painting can improve social cohesion, and perceptions of traffic noise, air quality and "liveability" of streets for residents.

1.4 Methodology

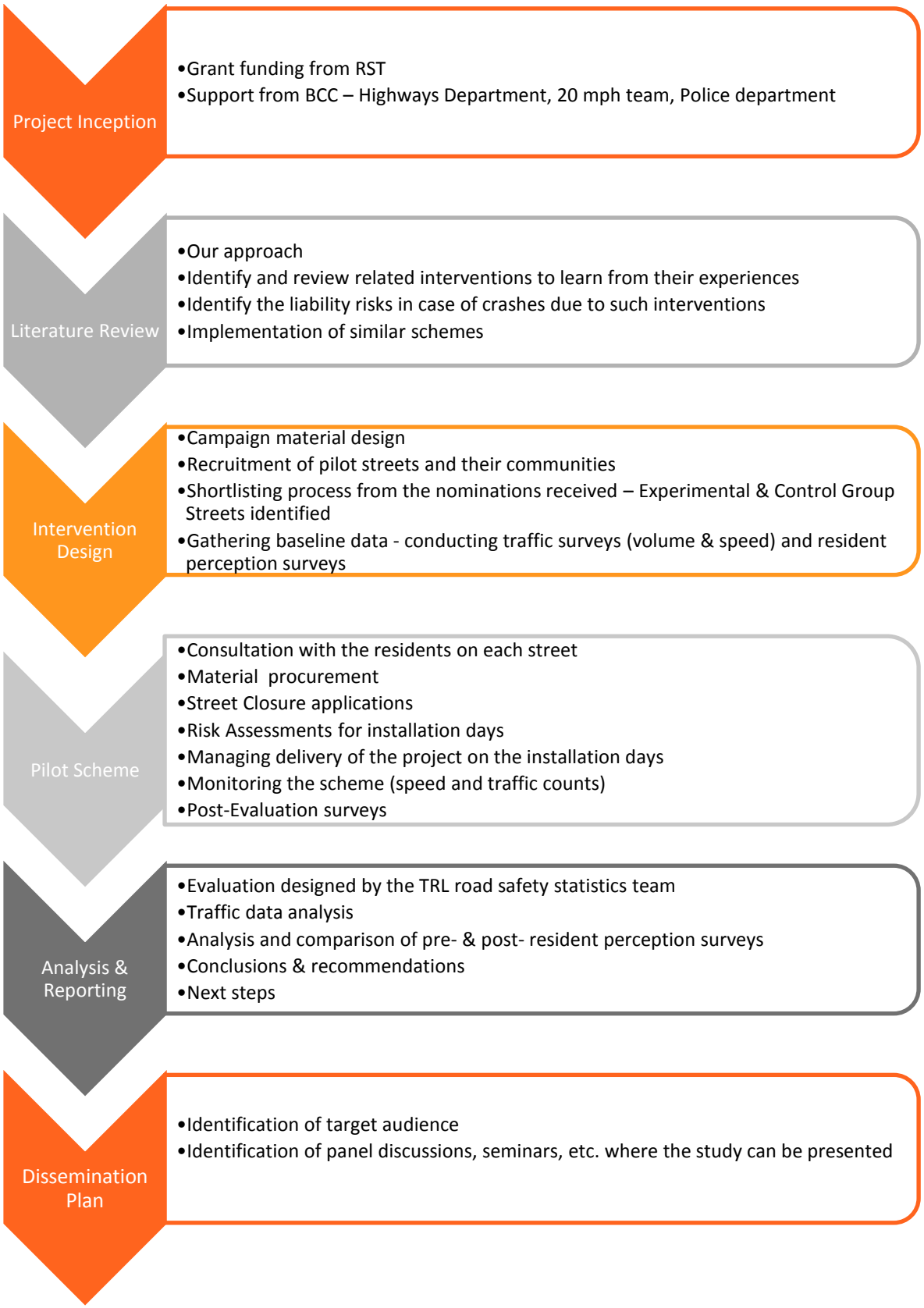

Figure 1-1: Study Methodology

2 LITERATURE REVIEW

2.1 Approach

2.1.1 Aims and Objectives for the Literature Review

The Literature Review updated the information that was available at the inception of the Bristol pilot study (2015) and was used to address the following research questions:

- What impact do roadway designs in residential environments have on traffic speed, volume or community perception of air quality, noise or community cohesion?
- What are best design principles of effective roadway design in residential environments?
- What impact do street planters being placed in the highway on residential streets have on traffic speed, volume or community perception of air quality, noise or community cohesion?
- What lessons can be learned from other approaches to speed reduction that can be applied to the implementation of Community Corners?

2.1.2 Sources

The review was able to draw upon a review previously undertaken by TRL for Main Roads Western Australia (February 2017- unpublished, cited in Karndacharuk et al, 2018) which summarised current best practice in implementing Shared Space in Europe. This review was undertaken using the TRL internal library, and literature was sourced from the Transport Research International Document (TRID) dataset, Science Direct and PubMed. As the scope of that review included shared space on high traffic flow roads and junctions, for the purpose of the current project attention was focused upon the conclusions most relevant to residential streets.

Additional information on the impact of residential on-street planters on traffic speed, volume or community perception of air quality, noise and community cohesion has been obtained via a parallel internet search of Google Scholar. The results for which are presented below.

Additional papers and background material were gathered from papers known to the study team and their contacts, including a recent review of shared space by CIHT (CIHT, 2018).

2.2 Influence of road design on driver behaviour

2.2.1 Traffic calming

The use of traffic calming using physical features to slow vehicles is widely known and there is good evidence of its effectiveness. DfT's Local Transport Note (LTN) 1/07 reviews a wide range of traffic calming interventions and provides guidance on their use.

On average each 1 mph reduction in mean vehicle speed results in an average crash reduction of 5%, varying according to the type and location of the traffic calming. The average reduction is 6% for urban roads with low average speeds (those most closely corresponding to the Community Corners trial sites). In some traffic calmed areas personal injury crashes have been reduced by 60–70% following speed reductions of about 9 mph. However, there is some evidence that if large traffic calming schemes cause traffic to move to other roads then crashes can increase in those areas.

Some examples of the impacts of different measures are summarised below:

- Road humps exist in various kinds and can have a large impact on speed, reducing average speeds to below 15-20mph, depending on design, height and spacing.
- Rumble strips achieve an average reduction of about 6% (3mph) in 85th percentile speeds.
- Chicanes reduce speed according the increase in path angle that they force. Path angles greater than 15 degrees reduce mean speeds at the chicane to less than 20mph, while angles of less than 10% allow speeds of over 25mph.
- Narrowing (e.g. central islands) can reduce speeds by between 1 to 5mph.
- Visual restrictions that obscure forward visibility across build outs can reduce speed by between 2 to 4 mph.

LTN1/07 mentions the use of planters in traffic calming schemes, but does not provide quantitative evidence on their impacts.

Downsides of these measures include:

- Very localised impacts, leading to speeding up between features.
- Noise because of acceleration between features.
- Potential damage to vehicles and discomfort.
- Problems for buses and emergency vehicles.
- Discomfort for cyclists, especially where narrowing encourage drivers to get too close to cyclists when passing.
- Cost.

LTN1/07 also discusses the benefits of supporting measures, such as revised signs and markings, and landscaping features and the use of design features like reduced sightlines; however these are covered in more detail in other sources.

2.2.2 Self-explaining roads/ psychological traffic calming

There is a significant amount of scientific literature which suggests that road design can have a significant impact on driver behaviour, including speeding behaviour (Shinar, 2007). For example, Martens and colleagues (1997) established that designing roads that give drivers a perception of the design speed of the road that matches the actual speed limit encourages drivers to choose appropriate speeds. By establishing this type of 'self-explaining road', drivers are less likely to feel that they are forced to drive at a speed

considered inappropriately low, and adopt a more appropriate speed voluntarily. This increases the likelihood of long term effects and reduces possible side effects of physically enforcing lower speeds (e.g. noise impacts of speed humps).

Creating a 'self-explaining' road can be difficult, but can be achieved through road design (Martens, Comte & Kaptein, 1997). Roadway design has been linked to both crash rates and driver behaviour, as it influences the level of safety felt by drivers (Ben-Bassat & Shinar, 2011). Speed is one of the behaviours affected by drivers' perception of road safety. For example, if a road has wide shoulders, wide lanes and low curvature, drivers are more likely to perceive higher levels of safety and security and consequently drive at a higher speed. However, narrowing lane width can reduce that sense of security, as it decreases the available space in which drivers could correct any changes to lateral positioning. This reduced sense of security can often lead to drivers adapting their speed to regain a greater sense of control over their driving (Ben-Bassat & Shinar, 2011). For example, the presence of on-street parking can lead to a shift in lateral positioning due to the reduced road width and presence of obstacles (e.g. cars) and consequently reduce speed.

In a trial of 'psychological' traffic calming reported by Kennedy (2005) a range of measures were used to encourage drivers to comply with a new 30mph limit on a road where the 85th percentile speed was above the 40mph limit that had previously applied. The main components were gateway features, small build outs with planting as part of parking bays, removal of the centre white line, some improved paving, buff surfacing and reduced height lighting columns appropriate for a minor road. Mean speed fell by 8mph and 85th percentile speed by 8 to 10mph, even though parking bays were underused, giving greater available passing space than was intended.

Increasing the density of information in a driver's visual periphery can help decrease driving speed. Increasing the complexity of a driving environment, through increased road-side furniture or reducing line of sight, for example, increases the levels of cognitive capacity required to drive to the same standard. A way to overcome this increased cognitive demand and the increased risk it may present, is to adapt one's driving behaviour to compensate, through reducing speed for example. The presence of obstacles near the side of the road is not sufficient, however, to reduce speed. The nature of the obstacles is important as reducing the line of sight too much or making the environment too complex could lead to an increase in collision risk (Edquist, Rudin-Brown & Lenné, 2012).

Guidance on the design of 'self-calming' roads is provided in Brodie (2001), a report for the Highways Agency and notes some design principles that are of particular relevance to the design of Community Corners:

- Consider the whole road environment: the driver responds to signals from the entire surrounding environment, not just the highway infrastructure.
- Respond to context: self-calming interventions should appear to be an intrinsic part of the streetscape.
- Ensure good readability/ legibility: drivers respond to a range of 'signals' when determining their speed, so design should present a consistent message on what is appropriate.

- Reinforce a sense of place- changing a 'sense of ownership' of space, i.e. from a vehicle domain to one where other users are present, should reduce the perceived appropriate speed.

The use of planters, street furniture and painting fulfils these requirements by sending a message about the use of the street as a place where people would be expected to linger, not just a vehicle corridor, in addition to their impacts on the geometry of the road.

2.2.3 Simplified streetscape

A TRL report for TfL (Quimby, A, and Castle, J (2006)) investigated a number of approaches to traffic management that might be regarded as 'simplifying' the streetscape. Conclusions particularly relevant to shared space were that pedestrians will treat a corridor as an ordinary road, and avoid walking along it, if:

- Traffic (other than bus) flow exceeds 50 vehicles per hour with an 85th percentile of speed of 30mph; or
- If traffic (other than bus) flow exceeds 100 vehicles per hour with an 85th percentile of speed of 25mph; or
- If traffic (other than bus) flow exceeds 200 vehicles per hour with an 85th percentile of speed of 20mph.

From the schemes that were studied by Quimby and Castle (2006) there are a few key elements that govern the success of the scheme. They include the following:

- The design of the scheme must be considered in a holistic manner and the scheme must be context specific, i.e. it should be suitable for the surrounding area and address the needs of the all user groups.
- Some physical changes to slow traffic are desirable and traffic speeds should be kept as low as possible.
- Vehicle flows should not exceed 90 vehicles per hour.
- The use of contrasting textures can help identify specific areas; however textures need to be used carefully as they can be unpleasant for some users, i.e. cyclists and the disabled.
- Allowances need to be made for the visually impaired.
- Consideration needs to be given as to how the scheme will operate at night e.g. if the scheme uses colours to identify different areas, are the colour differences apparent at night and are they altered by street lighting?

The principle that roads should be designed to encourage appropriate speeds, i.e. to be self-calming, is now reflected in DfT's guidance on the design of residential roads: Manual for Streets (DfT, 2007). This advocates tighter geometry (i.e. shorter turning radii), narrower carriageways and shorter sight-lines than was previously the case for streets designed using 'traditional' highway design guidance.

2.3 Lessons from implementing Shared Space

2.3.1 Current guidance

The primary current UK source of guidance[3] on shared-space in the UK is the DfT LTN 1/11 on Shared Space (DfT, 2011). This was based upon research undertaken by a team led by MVA (MVA, 2009) which included a literature review, site visits and discussions with local authorities that had implemented shared space schemes, and qualitative research with user groups. LTN 1/11 indicates general DfT support for the concept of shared space. It also makes the distinction between shared space and level surfaces; recommends protected 'comfort' space and adequate crossings and encourages stakeholder engagement and inclusive design. LTN 1/11 also clarifies that shared space does not represent a particular type of street but rather an outcome that can be achieved at different types of location if the conditions are right.

The key findings of LTN 1/11 are:

- There are a comparable number of casualties on shared space and conventional streets.
- Reducing the degree of segregation between users produces slower traffic and more pedestrians using the whole of the space.
- Slower traffic increases the likelihood that drivers will give way to pedestrians.

Definitions - LTN 1/11 introduces a helpful definition of Shared Space as "A street or place designed to improve pedestrian movement and comfort by reducing the dominance of motor vehicles and enabling all users to share the space rather than follow the clearly defined rules implied by more conventional designs."

"A design approach that seeks to change the way streets operate by reducing the dominance of motor vehicles, primarily through lower speeds and encouraging drivers to behave more accommodatingly towards pedestrians"

"A way of enhancing a street's sense of place while maintaining its ability to accommodate vehicular movement."

Distinction between shared-use and shared surface ('level surface') streets - LTN 1/11 also highlights an important distinction between 'shared-use' (a broader description about the character of the street) and 'shared surface streets' or 'a level surface', which omit conventional kerbs. As not all 'shared surfaces' will be shared by all types of user, the term 'level surface' is used to describe this feature. This is defined as "Level surface: A street surface with no level difference to segregate pedestrians from vehicular traffic."

'Comfort Space' - It should not be expected that pedestrians would share every part of a 'shared-space' scheme with motor vehicles, and LTN 1/11 also adopts the concept of 'comfort space', defined as "Comfort space: An area of the street predominantly for

[3] Following recommendations by CIHT, DPTAC and others it is likely that LTN 1/11 will be revised in due course.

See: www.gov.uk/government/publications/dptacs-position-on-shared-space/dptac-position-on-shared-space

pedestrian use where motor vehicles are unlikely to be present." A 'comfort space' provides the choice of a space without vehicles.

Shared space as an outcome - Shared space does not necessarily represent a particular type of street, but rather an outcome that can be achieved at different types of location if the conditions are right. LTN 1/11 recommends that "Shared space should not be pursued for its own sake", rather that it should only be pursued where sharing helps to deliver higher level objectives for the scheme.

How to encourage sharing - Sharing may be facilitated by, for example:

- Features and design geometry that encourage lower vehicle speeds (as vehicle speeds fall to 15mph there is a significant improvement in drivers' willingness to give way to pedestrians);
- removing any implied priority of vehicles over pedestrians in the carriageway;
- reducing demarcation between pedestrians and vehicular traffic; and
- introducing features not necessarily limited to the sides of the street, such as seating, public art and cafes, which encourage pedestrians to use the space.

Impact of traffic flow on success of schemes - Traffic flow has a significant impact on whether drivers give way to pedestrians and LTN 1/11 cites evidence that pedestrians will start to treat a space used by vehicles as "a road to be crossed rather than a space to occupy" at around 100 vehicles per hour, although this is not considered to be an upper limit as shared space schemes have been identified with much higher traffic flows. Where shared space is created, pedestrians should still be able to choose whether they interact with vehicles in shared space (for example through the provision of comfort spaces).

2.3.2 Responding to user concerns about shared space schemes

Shared space schemes have often attracted criticism from groups representing vulnerable road users, in particular those with impaired mobility. Particular difficulties include concerns about whether drivers will slow down sufficiently or give way to pedestrians at informal crossings and a lack of kerb line for visually impaired people to navigate with. These issues were considered in a review conducted by CIHT (2018) and, more recently, in a position paper issued by the Disabled Persons Transport Advisory Committee (DPTAC, 2018). Both CIHT and DPTAC have recommended that further research be undertaken, including more detailed evaluation of the impacts of existing schemes on disabled people. DPTAC recommends a 'pause' in the implementation of shared space schemes until this research is undertaken.

As has been previously noted, Community Corners differs fundamentally from many existing shared space schemes in that the footway has not been removed or carriageway levels changed. There is a clear distinction between footway and carriageway. Community Corners therefore provide an approach to encouraging greater 'sharing' of road space on residential streets that avoids the difficulties that arise when all the space is shared. It is therefore concluded that DPTAC's recommendations for pausing shared space schemes does not apply to Community Corners. Indeed, one of DPTAC's recommendations is that there needs to be a clear and agreed definition of 'shared space'. It is likely that Community Corners

would not fall within a revised definition. CIHT have proposed an alternative set of descriptions of approaches to street design, which would include elements of 'shared space':

a) Pedestrian prioritised streets

Streets where pedestrians feel that they can move freely anywhere and where drivers should feel they are a guest. Under current legislation, this does not give formal priority to pedestrians.

b) Informal streets

Streets where formal traffic controls (signs, markings and signals) are absent or reduced. There is a footway and carriageway, but the differentiation between them is typically less than in a conventional street.

c) Enhanced streets

Streets where the public realm has been improved and restrictions on pedestrian movement (e.g., guardrail) have been removed but conventional traffic controls largely remain).

In this hierarchy, Community Corners could be considered as examples of b) informal streets, where the basic infrastructure is unchanged, but the planters and street furniture used to reduce the differentiation and to encourage drivers to treat the carriageway as somewhere to expect pedestrians to be in.

2.4 Review of Impact of Street Planters on the Highway

The road furniture used in the pilot study in Bristol (2015) was designed to achieve speed reduction through the techniques described in the Literature Review above. To make the road 'self-explaining', the community painted the three entrances to the street and around all street furniture with a variety of high visibility designs (e.g. strawberries, sun rays, stars, designed patterns). They also placed 12 planters with hedging and variety of plants, and picnic benches in four parking places along the street. This changed the feel of the street to make it easier to identify its 'nature' as residential and containing children. The line of sight and road width was also modified using these planters. This created ambiguity in the drivers' experience of the road in priority and rules, subsequently encouraging drivers to slow down, whilst ensuring that the line of sight was not reduced to a dangerous extent.

For the purposes of this element of the literature review the research question was:

- What impact do street planters being placed in the highway on residential streets have on traffic speed, volume or community perception of air quality, noise or community cohesion.

There is considerable information regarding the design principles of using planting, either containerised or planted alongside highways, but limited data on the measured impacts of street planters actually positioned on the highway on residential streets.

A number of low cost, community supported interventions to increase shared use of road space have been trialled principally through the UK Home Zone initiative and the equivalent Woonerf principle from the Netherlands. More recently Sustrans have been involved in developing additional community shared street space schemes and have produced

Technical Note 31 providing information on the use of obstacles in the highway. A number of search results were screened out on the basis that they provided limited data relating to the impact of street planters on traffic speed, volume or community perception of air quality, noise or community cohesion. The references below provide the most relevant information in this respect:

2.4.1 Sustrans: Obstacles in the Carriageway Technical Information Note 31 (September 2012)

This technical note provides information on National street design guidance in respect of street planters, including reference to Section 7.4, page 88, of Manual for Streets in which guidance is given on achieving appropriate traffic speeds. These include:

- Physical features to create vertical and horizontal deflection.
- Street dimensions - narrower streets - keeping lengths short between junctions.
- Reduced forward visibility.
- Psychology and perception.

In terms of the last category, Psychology and perception, the guidance notes 'street features and human activity can have an influence on the speed at which people chose to drive.' The use of features such as trees and planters in the carriageway could achieve one or more of the above outcomes. For example, two community-made and maintained tree planters at the entrance to a residential street can form a visual and/or actual road narrowing, create horizontal deflection, reduce forward visibility and, through the bespoke character and style of the interventions, highlight the presence of people and likely pedestrian activity.

The technical note also highlights the legal restrictions and liabilities relating to the design and siting of obstacles on the highway including:

The Highway Act 1980: '137 Penalty for wilful obstruction. If a person, without lawful authority or excuse, in any way wilfully obstructs the free passage along a highway he is guilty of an offence and liable to a fine'. Sustrans advise that this piece of legislation is aimed at members of the public - 'if a person', rather than the highway authority.

Highway authorities place 'obstructions' in the highway all the time, e.g. for traffic calming, signage, traffic islands etc. It should also be noted that simply placing an object in the carriageway does not necessarily cause any obstruction to free passage. Tracking can and should be done to ensure vehicles are able to fit between and through obstacles. Also, objects can be shielded by other objects such as a build-out or parked cars.

In terms of liability for injury or damage, the Technical note highlights a statement from Highways Risk and Liability Claims, Institute of Civil Engineers (July 2009) 'The objective of the Highway Authority is to obtain the maximum benefits for the community. It is a task that is wholly different to that of minimising risk'. Further to this Sustrans highlight the fact that free-standing planters are relatively cheap to replace if damaged and are easier to move if the design needs to be adapted when compared with fixed traffic calming features such as a speed hump or kerb-build out. The Technical note identifies the implications of street planters on street drainage and the means to ensure that the planter can be seen adequately at night or in poor visibility.

The Technical note also provides case studies for two projects in the UK, the key points are summarised in the following sections.

2.4.2 Case Study 1: Beechcroft Road, Oxford (completed Summer 2010)

Beechcroft Road was a busy cut through in a residential area in Oxford. It suffered from inappropriate vehicle speed and inconsiderate footway parking. Residents were offered the opportunity to have speed humps but rejected that in favour of a scheme incorporating a painted pattern in the centre of the street, several free-standing planters and an on-street cycle rack. The scheme was developed in collaboration with the council's Highways department and Sustrans. The re-design was completed in the Summer of 2010, 66% of households engaged in the consultations for the scheme and it is reported that average speeds have been reduced from 21mph to 16mph. None of the planters have needed to be replaced or repaired. The planters look like stone and it is thought that this discourages drivers from getting too close to them and creates a psychological traffic calming effect.

The project has a community champion and local reports indicate that the atmosphere on the street has completely changed with eight street events taking place and drivers noticeably taking more care and consideration. As the planting has become more mature this has made damage to the planters less likely because they are more visible. They have also added to the traffic calming effect because they have a greater presence in the street, are more of an obstacle to navigate past and are more effective at reducing forward visibility.

2.4.3 Case Study 2: Ellacombe Road (completed 2009)

Ellacombe Road was a busy cut-through in a residential area in Torquay. It also suffered from excessive commuter parking. The street was nominated for the Sustrans 'DIY street project pilot' which enabled residents to re-design their streets to make them safer and more attractive. The final design introduced a one-way system with 'gateways' at each end, chicanes and a change in parking orientation to an 'echelon' layout using planters constructed from railway sleepers and masonry. No kerb upstand was provided as protection. The planters were then filled with plants by the residents which helped to create a verdant street character. Reflective strips were placed on all the planters to help drivers see the planters at night and a single bollard with a reflective strip was placed next to two planters which had previously been damaged by vehicles.

2.4.4 Case Study 3: Community-led street design Turnpike Lane Haringey (2010)

Community consultation with approximately 1000 households by Sustrans identified:

- High traffic speeds and rat running, with concerns over safety for pedestrians and cyclists.
- Walking/ cycling infrastructure disconnected and poor quality; underused public spaces.
- Anti-social behaviour concerns, with fly tipping and dog fouling an issue.
- Residents felt disempowered and disconnected from local decision-making.

The project took place between 2010 and 2012 to develop a high quality public space incorporating Infrastructure improvements and better lighting. This resulted in a more joined up and safer local walking and cycling network. The project included the planting of more than 40 trees, provision of electric car charging points, and installation of public art with drivers encouraged to reduce speed. The project noted a 23% increase in all traffic travelling 20mph or less and a 34% increase in the number of residents who felt the street was a place to socialise. A campaign group was set up with the objective of making additional improvements to the area.

2.4.5 Devon County Council - Traffic Calming Guidelines document (1982).

This contains a further case study for the Berlin, Moabit area-wide project. Moabit is an inner-city district of Berlin which at the time had a residential population of 30,000 and 7,000 people employed. Most of the streets are laid out in a grid pattern and are fairly broad. Moabit was selected as one of six Federal area-wide traffic calming demonstration areas in the mid 1980's. The scheme aimed to improve traffic safety, making walking and cycling easier, create more opportunities for neighbourhood recreation and improve the local environment. The 'slow speed' approach was adopted using the German standard sign which indicates a maximum speed equivalent to walking or running pace, equal priority for all road users and that children are allowed to play in the street. Physical measures were introduced to slow vehicle speed and to provide more space for pedestrians. The measures combined cushions, plateaux and carriageway narrowing, with measures placed 40 – 60 metres apart and in pairs to create better speed reduction effect. Carriageway constrictions were planted which together with other environmental treatment occupies more than 6000m^2 of former carriageway. Major efforts to involve the public at every stage including public meetings, information stands and a full-scale mock-up of the proposal created to obtain public opinion.

The scheme had a positive effect on road safety. The number of personal injury crashes reduced by 41%, deaths cut by 57%, serious injuries by 36% and slight injuries by 34%. Child injuries were cut by 69%. Crash reductions were more significant for pedestrians and cyclists than for car users. It was calculated that savings in crash costs in the first two years alone exceeded the entire capital cost of the scheme which was £1.8 million.

Average speed reduced by nearly 50% to 12mph with the 85th percentile value dropping from 31mph to 15 mph. Traffic noise reduced by 5dBA or more as a result of the reduction in traffic volume and slower driving.

The scheme proved popular with residents with some taking on sponsorship of planted areas and businesses have utilised additional space by renting areas for outdoor tables.

2.5 Summary

There is strong evidence that measures to reduce speed can deliver significant reductions in pedestrian casualties. Speed reduction measures can include:

- Physical traffic calming measures (usually retrofitted).

- ‘Psychological measures’ that involve changing the appearance of a road so that drivers are encouraged to drive at a lower speed than they would otherwise for the same geometry and road width etc.
- Designing for lower speeds, for example using narrower road widths and tighter turning radii, as recommended in Manual for Streets.
- Changing priorities or sharing road space between vehicles and pedestrians so that drivers expect to have to give way or stop when pedestrians are crossing or passing along at any point.

All these approaches are intended to create an improved pedestrian environment in which pedestrians are better able to make use of the street, whether simply through being able to cross more easily or through actually lingering on and making use of carriageway space in the case of full shared space schemes. In other words, they enable pedestrians to gain an increased ‘share’ of the utility and capacity of the street. Community Corners can be seen as a low cost method for implementing elements of all these approaches, but are not in themselves shared space scheme.

As LTN 1/11 notes, shared space should not be an objective in itself. Many of the benefits attributed to shared space schemes may be outcomes, like reduced traffic speeds and increased sharing itself, that arise from the combination of measures that usually form part of shared space schemes. These may include streetscape improvements, greater permeability and improved crossing opportunities, which do not necessarily have to be implemented with full sharing of space. Community Corners reflect this by retaining the pedestrian footway, which helps to overcome the concerns that have been raised by people with impaired vision.

Key lessons learned from the Literature Review and applied to the Community Corner trials are:

- Measures that change drivers’ perception of the street and its function are more effective at changing speeds than physical measures alone.
- There is limited experience of using street planters, but nonetheless there is some evidence that they may have an impact on traffic speed, volume and community perception of air quality, noise and community cohesion when incorporated into shared space schemes on residential highways.
- The presence of planters could be used both as physical features that change the width and geometry of the road, as experienced by drivers, and as a more subtle psychological tool that changes drivers’ perception of the function of the street even if it does not radically change its geometry.
- Involvement of the community is essential in planning shared space or any comparable scheme, to ensure local support and to make sure that the needs of vulnerable and disabled users in particular are taken into account.
- Effective stakeholder communications is essential.

3 INTERVENTION DESIGN

Following the completion of the Literature Review, an intervention framework was planned which involved:

- Design of campaign material
- Campaigning for street recruitment
- Nominations received
- Shortlisting process

3.1 Design of Campaign Material

Campaign material was designed by TRL's dedicated marketing department. A flyer was designed (See Annex 1 for example) requesting nominations from Bristol residents for their street if they were interested in participating in a research project exploring a method to potentially slowing and reducing traffic on their street. A brief survey link and QR code was provided in the flyer if any residents wanted to nominate their street. The street nomination form was designed to gather essential information for shortlisting. The survey form can be found in Annex 2.

The data gathered from the nomination survey form primarily helped our technical team to understand the nature and characteristics of the streets being nominated. For the successful implementation of scheme, it was also important to shortlist streets where there were highly motivated residents, who intended to solve issues related to traffic on their street and had the time and energy to devote to this project. The information sought from these nomination forms was:

- Section I – Information about the street
    - Name of the street;
    - Postcode;
    - Residents' perception on issues regarding traffic on their street;
    - Type of parking on the street;
    - Cycle tracks present, if any;
    - Speed limit on the street; and
    - Any crashes on the street that the resident making the application might be aware of.
- Section II – Information about the resident submitting the application
    - Name, Contact Details;
    - Whether they would be able to lead and denote time and energy to the project by engaging their neighbours, organizing consultation meetings on their streets,
    - If they felt their neighbours would be supportive; and

- If there was any neighbourhood action group already in place.

The data gathered from the nomination survey form informed us to the key nature and characteristics of the streets being nominated as well as the level of community commitment and leadership available on the street.

3.2 Campaign for Street Recruitment

The target for this research study was to recruit four experimental streets and sufficient control group streets to act as a baseline comparison. In order to recruit the streets, a campaign plan was designed, where we liaised with Bristol City Council (BCC) (Highways Department and 20 mph team), Avon and Somerset Police Team in Bristol, Local Councillors, and various other public groups in Bristol promoting Sustainability, Cycling, and Safety. In addition to the recruitment campaign, the Area Manager, Highways Department, collated BCC nominations from various employees within BCC based on knowledge of local transport issues and incidents. In total, 14 streets were suggested by council employees. Due to lack of any direct resident contacts on these streets, local councillors of these areas were contacted. Details are in section 3.2.2.

3.2.1 Inception Meeting with Bristol City Council

An inception meeting with BCC was held at the Council offices in November 2017 with the Area Manager, Highways, the Senior Road Safety Engineer Highways and Traffic BCC; Community Engagement Officer, 20 mph BCC, and the TRL project team. The agenda was to discuss the progress of the project, intervention design and implementation plan. BCC confirmed that they would be happy to be involved in the process of street shortlisting and design approvals on a sign off basis. Detailed minutes of the meeting are attached in Annex 3.

3.2.2 Liaising with Local Councillors

Bristol City has 34 wards and 69 councillors. A list of local councillors and their contact details was obtained from democracy.bristol.gov.uk. These local councillors were contacted via emails and subsequently via telephone calls. They were given a brief introduction to the project and the potential outcomes. Councillors were asked to nominate any street within their area where residents had been enthusiastic about reducing speed on their street or to reduce the volume of cut-through traffic on their streets. They were asked to encourage residents to nominate their streets via the nomination survey form.

Interest was shown by several local councillors, who wanted more information on the project. Several tele-conferences/video conference meetings were organized in the month of December 2017 with various local councillors explaining the scheme, how it could potentially improve traffic behaviour on residential streets and what was expected of resident groups for pilot scheme implementation. A number of subsequent street nominations were received as part of this exercise through the online survey link.

3.2.3 *Online Campaign*

An online campaign for the project was run via Facebook. A Facebook page was created for Community Corners, which hosted information regarding the project. This page was shared by 20 mph Bristol (BCC) on their Facebook page, Bristol Cycling Community, Road Safety, Sustainable Bristol, resident welfare associations in Bristol, Community Action Groups in Bristol and through personal Facebook networks in Bristol. The flyer prepared was shared on these groups' pages.

3.3 Nominations Received

As a result of suggestions from BCC, local councillors and online campaigning, a total of 98 applications were received from residents of 30 streets. Out of these 98 applications, 37 applications were complete in all respects, i.e. they contained complete information about:

- The street and its location
- Contact details of community commitment and community leaders.

These 37 applications covered 26 streets in Bristol, which were then analysed based on the shortlisting process as defined in Section 3.4 and Figure 3-1.

3.4 Shortlisting Process

The shortlisting process was undertaken in three stages:

3.4.1 *Shortlisting by our Technical Team*

Our transport experts studied each of the nominated streets in greater detail through Google Maps, Street View, and via information provided by the residents in each of the nomination forms. Few site visits were also planned, if there was any missing information to study the street characteristics in more detail. The major parameters considered while shortlisting any streets include:

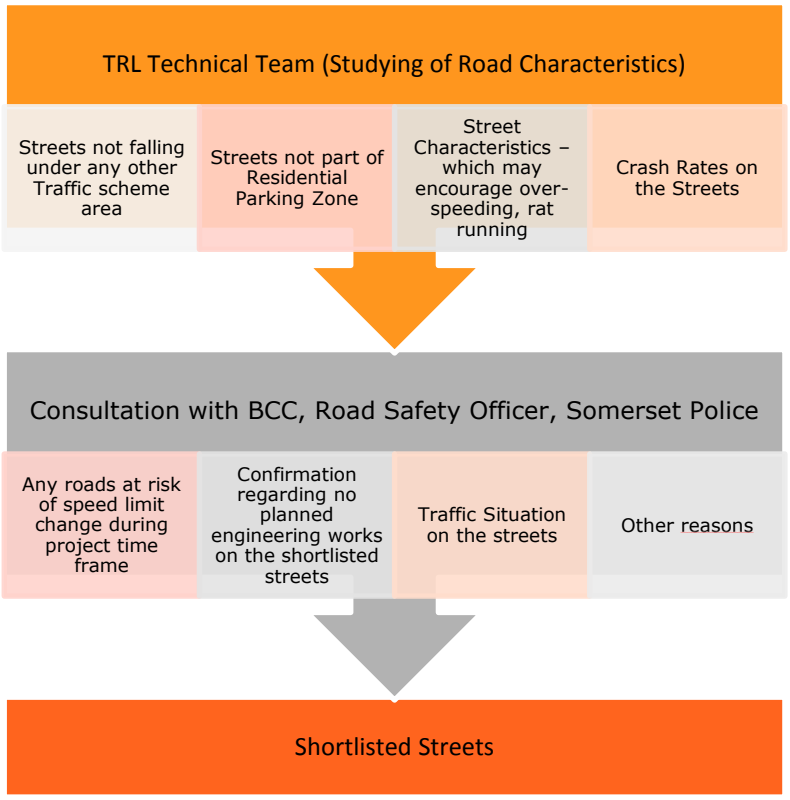

Figure 3-1: Street Shortlisting Process

i. Streets falling under any Traffic Scheme Area

ii. Streets part of residential parking zones

iii. Street characteristics which may encourage speeding, rat running

iv. Other street characteristics, for example, type of parking permitted, land use along the street, presence of cycle lanes, etc.

v. Crash rates on the streets.

Any street falling under an area with an ongoing or imminent traffic scheme by the Council or any other organization was not shortlisted for the project as other street changes would act as confounding factors to this research study.

Streets in residential parking zone (RPZ) areas were also excluded. Planters taking up a parking space within an RPZ would have reduced revenue for the Council parking department, presenting an additional barrier to scheme success or cost to scheme delivery.

Street inclusion criteria included:

- Road characteristics that may encourage excessive speeding, such as long straight roads with clear line of sight and few junctions, with clear demarcations and kerb lines, low parking levels, and good signage.
- Road characteristics that may encourage rat running or cut through traffic such as a street parallel to a major street with high traffic levels, traffic lights, pedestrian crossings or a street connecting two major streets that represents a perceived short cut.
- Characteristics like type of parking permitted on the street – streets with dense on-street parking on both sides of the road, or without driveways would be lowered in priority.
- Streets with commercial units or shops were excluded.
- Streets with cycle lanes were excluded as planters may have blocked cycle lanes

Of the 26 streets for which TRL had received complete applications, 14 streets were shortlisted based on the above criteria and were sent for an initial approval from BCC and Bristol and Somerset Police.

Of these 14 streets, BCC raised concerns about four streets not being viable for the Community Corners Scheme due to either no alternate route to take up the displaced traffic, limitations of road width or impact on parking of these streets due to nearby leisure spots. The BCC 20 mph Project Manager confirmed that none of the 14 streets were on Community Speed Watch Sites. The Road Safety Officer for Bristol and Somerset Police granted approval for all 14 streets.

The 10 streets were invited for an Inception Workshop in December 2017. Details of the workshop and subsequent pilot scheme delivery are detailed in the next chapter.

4 PILOT SCHEME IMPLEMENTATION

The pilot scheme implementation plan was drawn up for the shortlisted 10 streets. From these 10 shortlisted streets, eight streets had to be finalised for the project – four experimental streets and four control group streets. Representatives from all 10 of the shortlisted streets were invited to an Inception Workshop before finalising the final streets for the project. The Inception Workshop was aimed at giving details regarding the project, project expectations, and potential benefits. Following the Workshop, video conferences were held with residents of five shortlisted streets who could not make it to the inception workshop. An initial round of street based consultation meetings were then held by residents and facilitated by TRL. From this residents of four streets expressed interest in selection of their streets as experimental streets for the project and a resident of one street expressed interest in being a control group street. The remaining residents could not gather enough interest from their neighbours/residents or felt that they would not have enough time to devote to the project as was required and hence resigned from the project. The pilot scheme implementation plan has been summarised in Figure 4-1 below and is elaborated in sub-sections of this chapter.

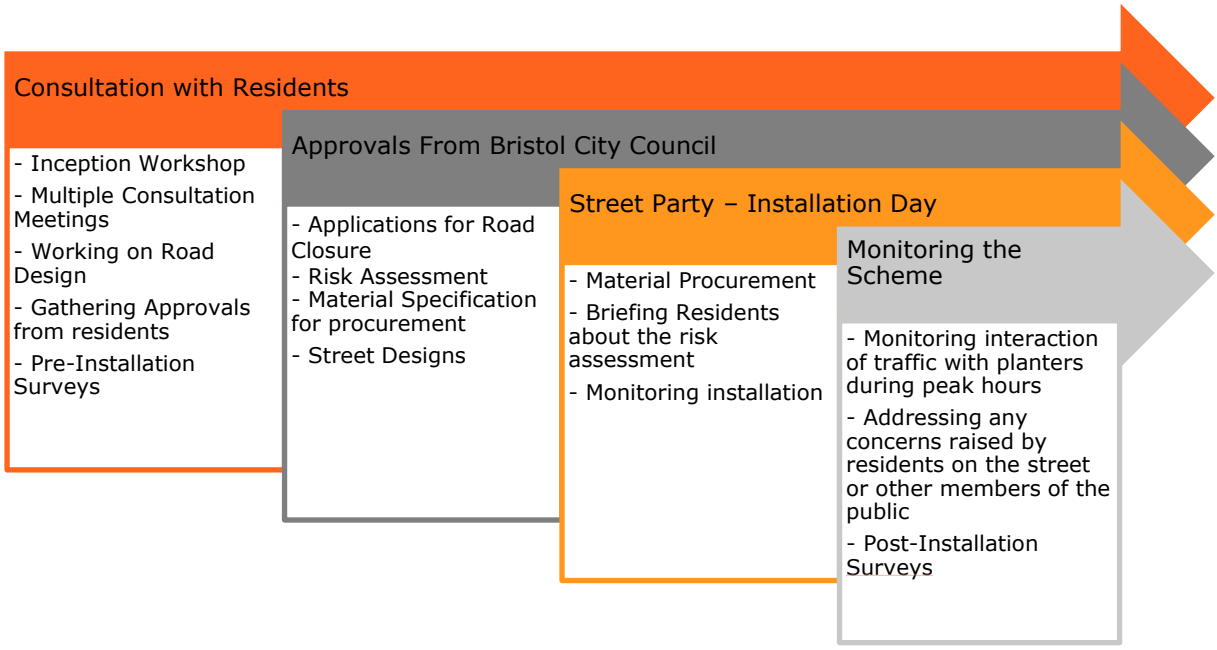

Figure 4-1: Pilot Scheme Implementation Plan

4.1 Consultation Process

4.1.1 Inception Workshop

The residents of 10 shortlisted streets were invited to an Inception Workshop on 7th December, 2017 at King's Centre, Bristol. The date was chosen based on a doodle poll results from the residents invited to the Workshop. Residents of five streets (Reedley Road, Hillsdon Road, Symington Road, Lake Road, Whitehall Avenue) attended the Workshop.

Web meetings were organised individually with residents of the remaining five streets (Ridgeway Road, Eastfield Terrace, Riverleaze, Ovendale Road, and Rosemary Lane East Park Drive) who could not attend the Inception Workshop. As a part of the Inception Workshop/web meeting, resident representatives of each street were briefed on:

i. What would a Community Corner constitute and what were the potential benefits?
ii. Research objectives of the project;
iii. An update about the street nomination and shortlisting process
iv. Examples of similar schemes being implemented elsewhere in the UK and Europe
v. Our expectations from the residents of Experimental and Control Group streets
vi. How TRL would help and support the residents.

The presentations given are included in Annex 4 of this report. A question and answer session followed the presentation. Detailed minutes of the Inception Workshop are attached in Annex 5.

4.1.2 First Round Street-wise Residents' Consultation

After the Inception Workshop, the representatives for each street who confirmed that they could devote time and energy to the Community Corners project consulted each house on their street regarding the project. The residents were provided with a draft template for a leaflet which they could use to get in touch with their neighbours and invite them to a first consultative meeting on their street.

The first full consultation was either organised at a resident's house or a local community space wherein resident representatives along with the support from the TRL team discussed the project with other residents on the street in greater detail. Several concerns were raised by other residents, which were either addressed by the resident representative or TRL experts. The representatives of each street were given a guidance document to prepare for any questions that they might face in such meetings. The guidance documents included a copy of the presentation from the Inception Workshop (Annex 4), a guide to overcoming objections by the residents, a template for a leaflet and a Residents' group constitution template (Annex 6).

Following this an informal voting process based on a simple majority vote was used to decide whether the residents on the street wanted to proceed with the project.

The streets where the majority of the residents were in favour of experimenting with Community Corners on their street were chosen as Experimental Streets. The streets where residents were not in favour, offered to be a part of the project as a control group street or backed out of the project altogether. The control group streets were finalised later, on the basis that they were representative of the road/traffic characteristics of the final experimental streets as detailed in Section 4.1.3.2.

4.1.3 Selection of Experimental and Control Group Streets

4.1.3.1 Experimental Streets

After the initial first round of street-wise resident consultation meetings, four of the 10 shortlisted streets wanted to proceed on the project as experimental streets. The four experimental streets finalised for the project were:

i. Hillsdon Road,
ii. Ridgeway Road,
iii. Whitehall Avenue, and
iv. Symington Road

Residents then:

- Formed a constituted group with a Chairman, Secretary and Treasurer to organise community meetings, lead the scheme implementation and set up a dedicated bank account for the group. TRL assisted the four groups with a draft copy of written constitution for the group (Annex 6). The bank account allowed the transference of funds allocated for procuring materials such as street planters, picnic benches, road paints, painting tools, and reflectors. This ensured clear community ownership of the street furniture from the beginning of the project.
- Organised an initial further street wide consultation meeting – this involved door knocking each house, spreading awareness about the scheme and inviting residents to a public meeting for discussions. These meetings were focused on addressing any specific resident concerns, designing the specific scheme for their street, i.e. identifying planter locations, identifying various places where they would like to paint murals on the road, finalising designs for road paintings. These meetings were attended by TRL, and the design guidelines were detailed for the residents by TRL.
- Submitted an application for Street Closure, six weeks in advance of the planned installation day. The highways team in BCC and the Highways Network Management Officer assisted TRL with the appropriate street closure application for each of the experimental streets.
- Procured street furniture, soil, plants, road paints, painting tools, and reflectors. TRL liaised with various companies to secure the required material at a subsidised cost. Each experimental street was provided with a purchase guide (Annex 7)
- Assisted TRL with conducting traffic speed and volume surveys on the street before and after the installation (after three months of installations). These included surveying the street on a regular weekday and one day during the weekend days during morning, afternoon and evening peak hours. The hours surveyed are specified in Table 4-1. The survey formats are attached in Annex 8 and Annex 9.

Table 4-1: Traffic Speed and Volume Survey Details

Day	Morning	Afternoon	Evening
Weekday (Monday – Thursday)	8:00 – 10:00 AM	1:00 – 3:00 PM	5:00 – 7:00 PM
Weekend (Saturday – Sunday)	9:00 – 11:00 AM	2:00 – 4:00 PM	6:00 – 8:00 PM

- Resident perception surveys were also conducted before and after the installations to explore residents' perceptions about air quality, noise quality, community feeling, and safety aspects on the street before and after the installations.
- On the installation day – community leaders encouraged as many residents on the street to participate in the installation process as possible.
- Maintenance of the planters on an ongoing basis.

4.1.3.2 Control Streets

When evaluating an intervention before and after installation, it is important that variations in behaviour over time are accounted for, such as effects relating to background trends in traffic. As a result, it is important to include data from control sites which are not subjected to a change in the analysis. This allows for temporal changes in behaviour between the 'before' and 'after' periods (i.e. the changes observed at control sites) to be isolated from any changes between 'before' and 'after' periods which result from the intervention (i.e. the changes observed at experimental sites).

Following the initial round of resident consultation meetings, only Reedley Road came forward to be a part of the project as a control group street. The residents of control group streets were initially expected to support the study through undertaking all of the evaluation required for their streets. Recruitment to control group streets proved challenging however, and in parallel TRL identified that two pairs of the experimental streets matched key criteria well, and that each pair could be matched to one control street. Following detailed discussions with Dr Marcus Jones (Technical Reviewer for the project) and Dr Shaun Helman (leading road safety researcher at TRL) it was agreed that we could reduce the planned control group streets from four to two with no impact on the robustness of the research. Client approval was sought before proceeding and agreed.

Reedley Road was finalised as the control group street corresponding to Whitehall Avenue and Symington Road. All these three streets share key characteristics on width, length and straightness, junction numbers and parking density and experience perceived reckless driving. Northover Street was chosen as a control street for Hillsdon Road and Ridgeway Road. All these three streets are short, have severe bends, and experience on-street parking with high volumes of cut through traffic.

The traffic surveys and the resident perception surveys mentioned in the previous section for experimental streets were conducted identically by TRL staff on control group streets to create a baseline.

4.1.4 Working with Experimental Streets

All experimental streets were finalised by January 2018. Multiple consultation meetings were planned on each of these streets by the residents, with a TRL technical lead present for each of these meetings. For each experimental street, at least two consultation meetings were organized and attended by residents on the street. The format for each meeting included a general discussion about the project, addressing any concerns that any resident might have; discussion on planter locations, and locations and design for painted patterns on the street. All four streets decided on the number and type of street furniture desired. The Street Closure Applications were initially planned for February 2018; which had to be postponed twice, the first time due to delays in the approvals process between TRL and BCC which pushed the planned street closures to March 2018. Three installations had to be further postponed due to severe weather conditions. The remaining installations finally took place in April-May, 2018 on the dates mentioned in Table 4-2.

Table 4-2: Experimental Streets – Community Corner Implementation Dates

S.No.	Experimental Street	Installation Date
1.	Symington Road	7th April, 2018
2.	Hillsdon Road	14th April, 2018
3.	Ridgeway Road	22nd April, 2018
4.	Whitehall Avenue	20th May, 2018

4.1.4.1 Symington Road

Symington Road residents struggled to secure multiple locations for planters due to objections from individual residents, and hence opted for a more conservative scheme, with two planters and two painted patterns at each end of the street (See Figure 4-2 and Figure 4-3). Residents directly affected by the position of the planter were consulted in person to confirm there were no issues regarding the installation of planters at the two particular locations.

Figure 4-2: Symington Road – Proposed Planter Locations and locations for painted patterns on the street

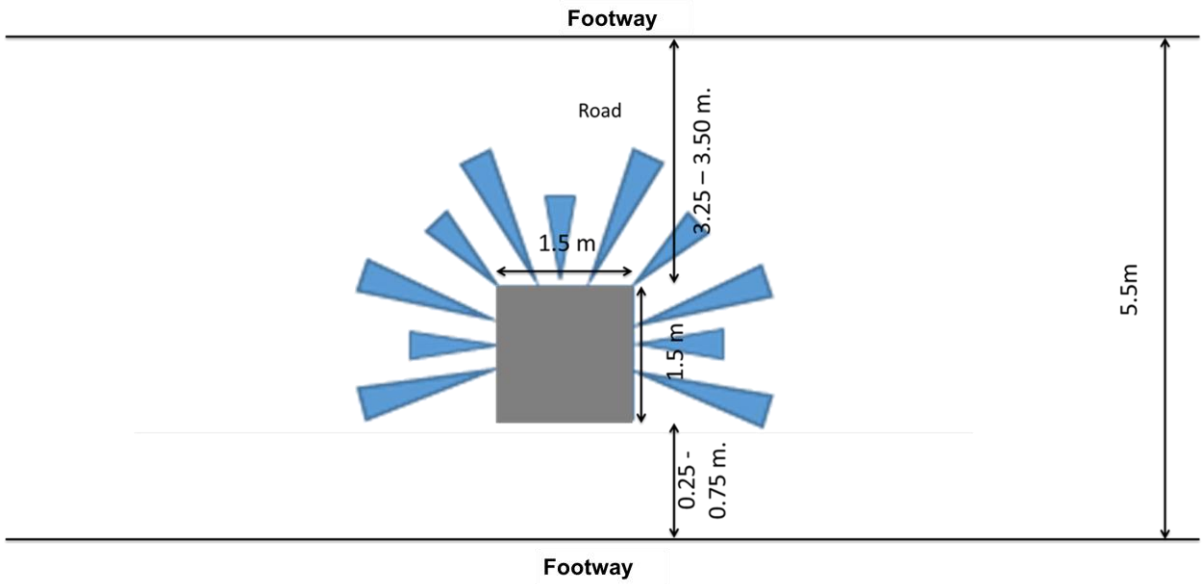

Figure 4-3: Symington Road – Design of Community Corner, Carriageway details

4.1.4.2 Hillsdon Road

Hillsdon Road and adjoining Southdown Road together formed a group to work on the project. Highly motivated and organised, residents raised few concerns, and opted for three planters and five painted patterns on the street (Details in Figure 4-4 and Figure 4-5). These painted patterns included two welcome mats on either end of the street, another two at the intersection of Hillsdon Road and Southdown Road and the last one near a planter.

Figure 4-4: Hillsdon Road – Proposed Planter Locations and locations for painted patterns on the street

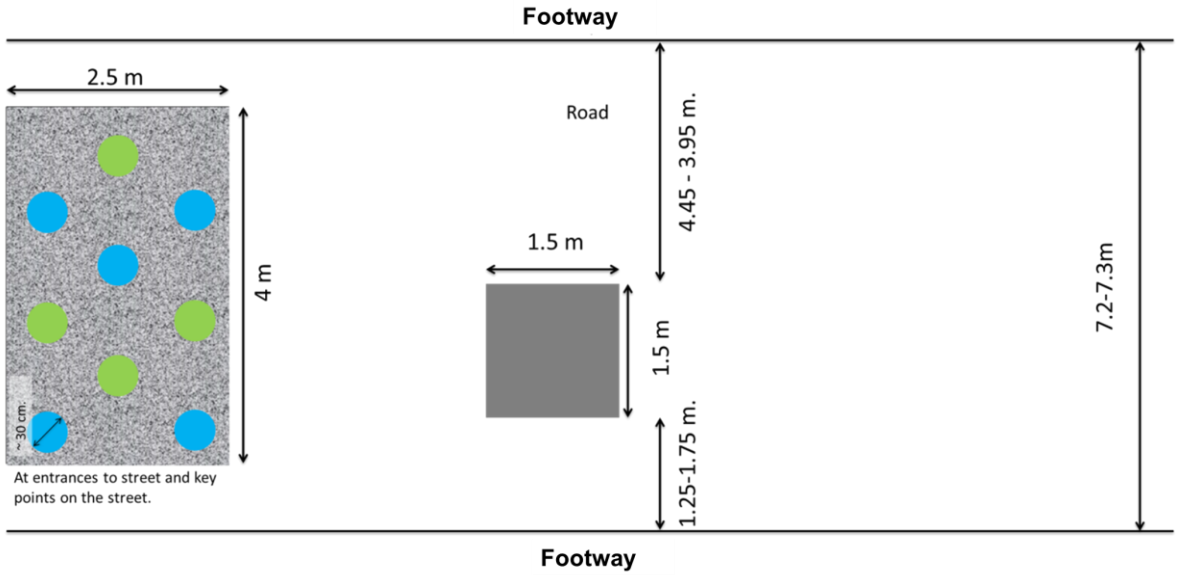

Figure 4-5: Hillsdon Road – Design of Community Corner, Carriageway details

4.1.4.3 Ridgeway Road

Ridgeway Road already has a 'Ridgeway Road Positive Action Group', the representatives of which took lead into delivery of the scheme on Ridgeway Road. A densely parked street meant planter location was a challenge, but ultimately secured with three planters placed conservatively in terms of distance from the kerb. The planter locations and painted patterns are present in Figure 4-6, Figure 4-7 and Figure 4-8 below.

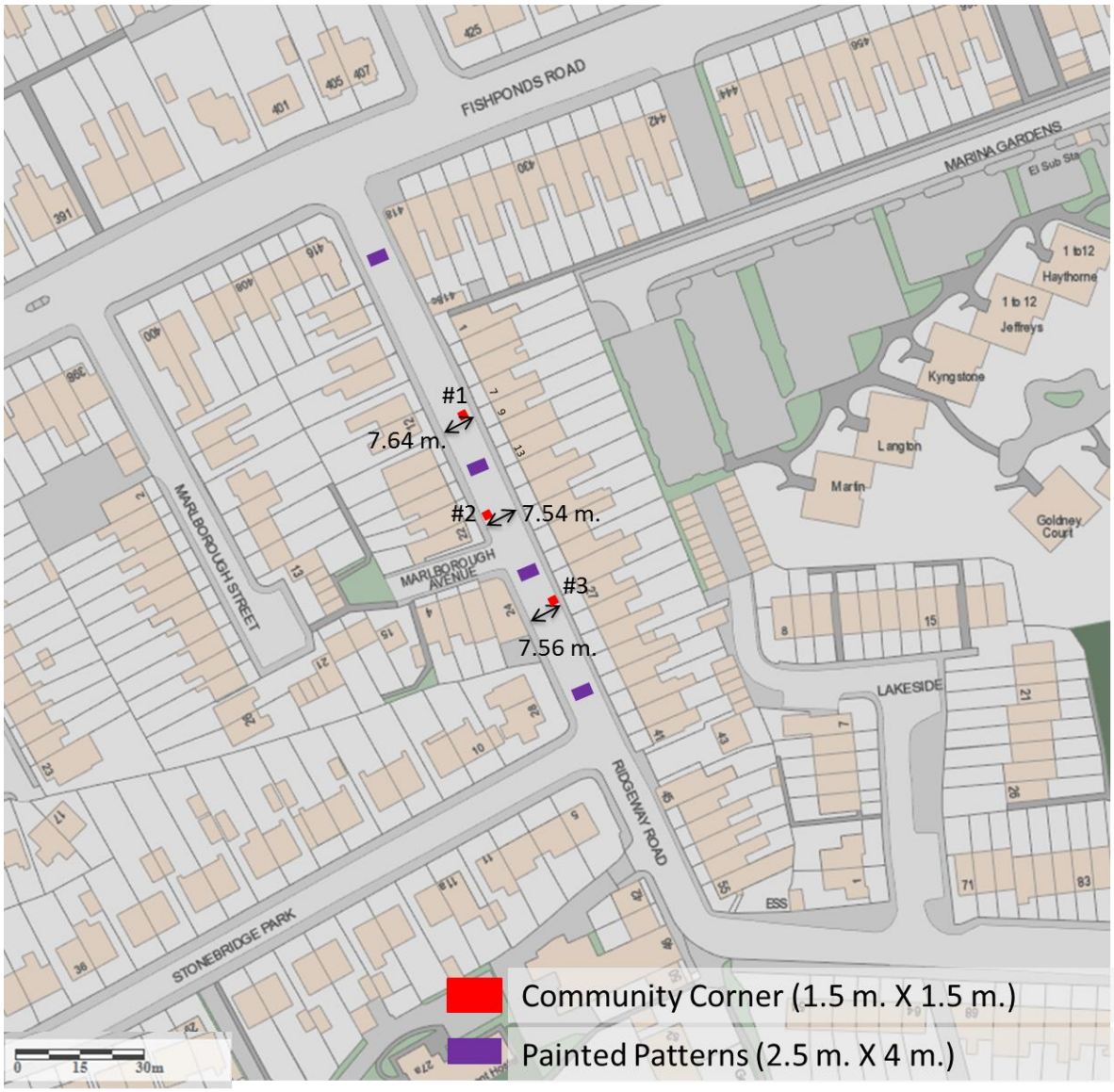

Figure 4-6: Ridgeway Road – Proposed Planter Locations and locations for painted patterns on the street

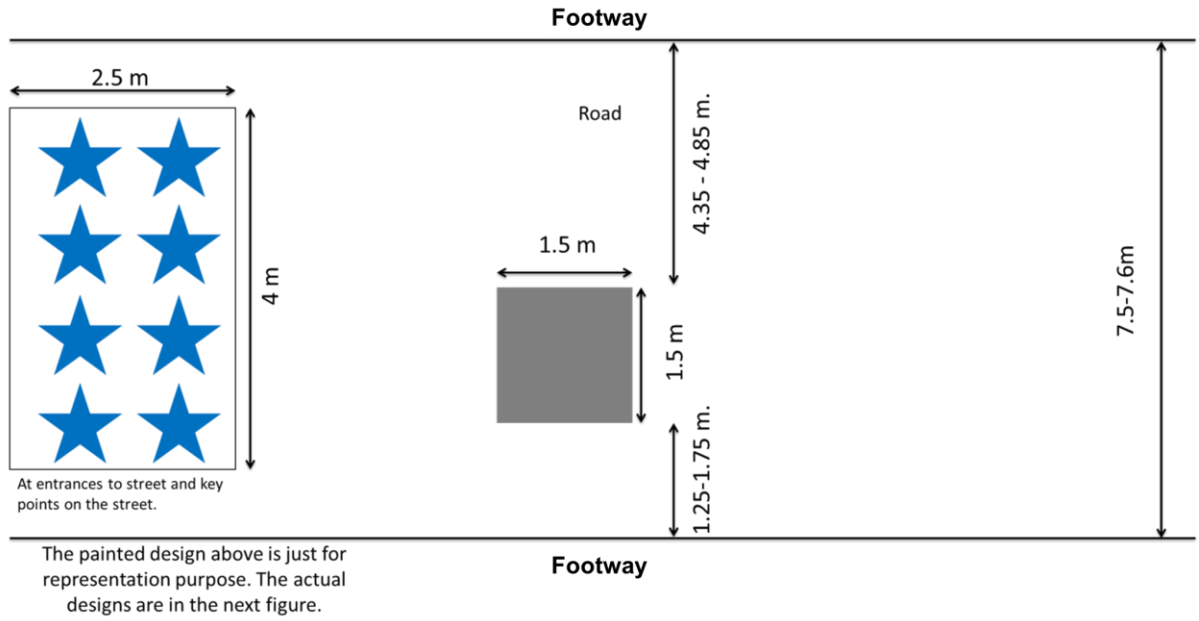

Figure 4-7: Ridgeway Road – Design of Community Corner, Carriageway details

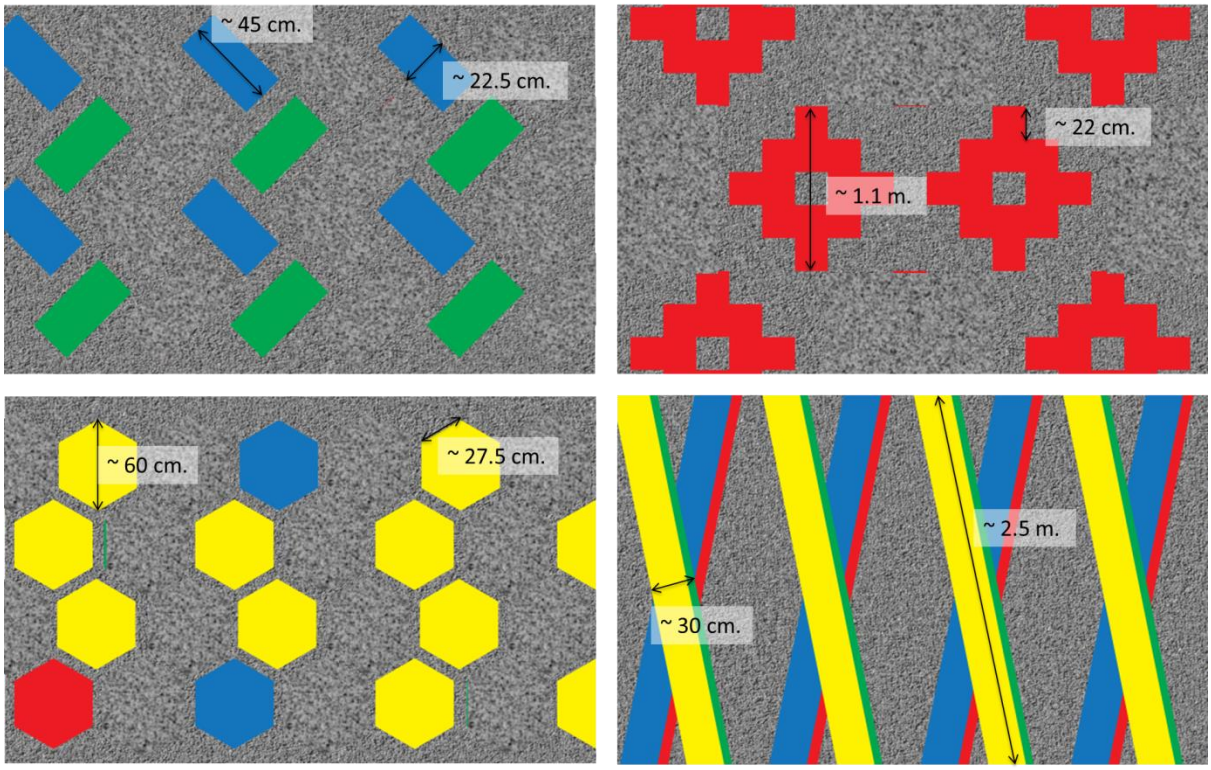

Figure 4-8: Ridgeway Road – Designs for painted patterns

4.1.4.4 Whitehall Avenue

Residents of Whitehall Avenue were very enthusiastic about the scheme, with a minimal number of residents opposing the scheme due to concerns regarding parking space. The resident group on the street got support for putting up four planters on the section of street between Whitehall Road and Snowberry Walk. Whitehall Avenue opted for a relatively

aggressive scheme with planters placed significantly away from the kerb and close together to form chicanes with prominent painting. The details are in Figure 4-9 and Figure 4-10 below.

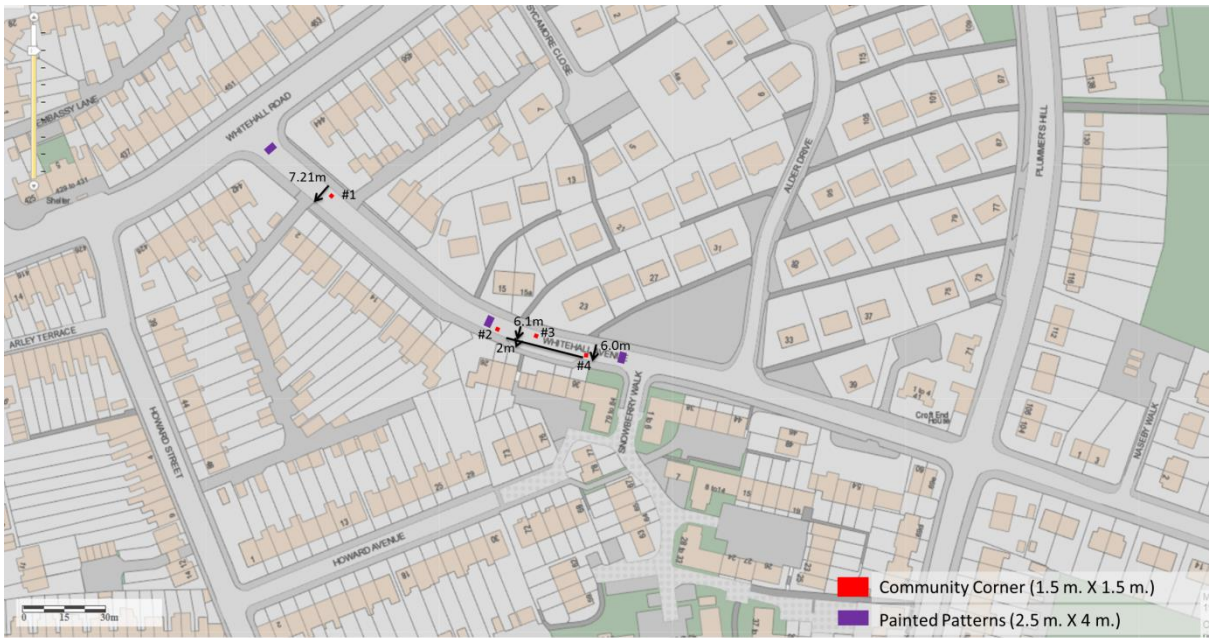

Figure 4-9: Whitehall Avenue – Proposed Planter Locations and locations for painted patterns on the street

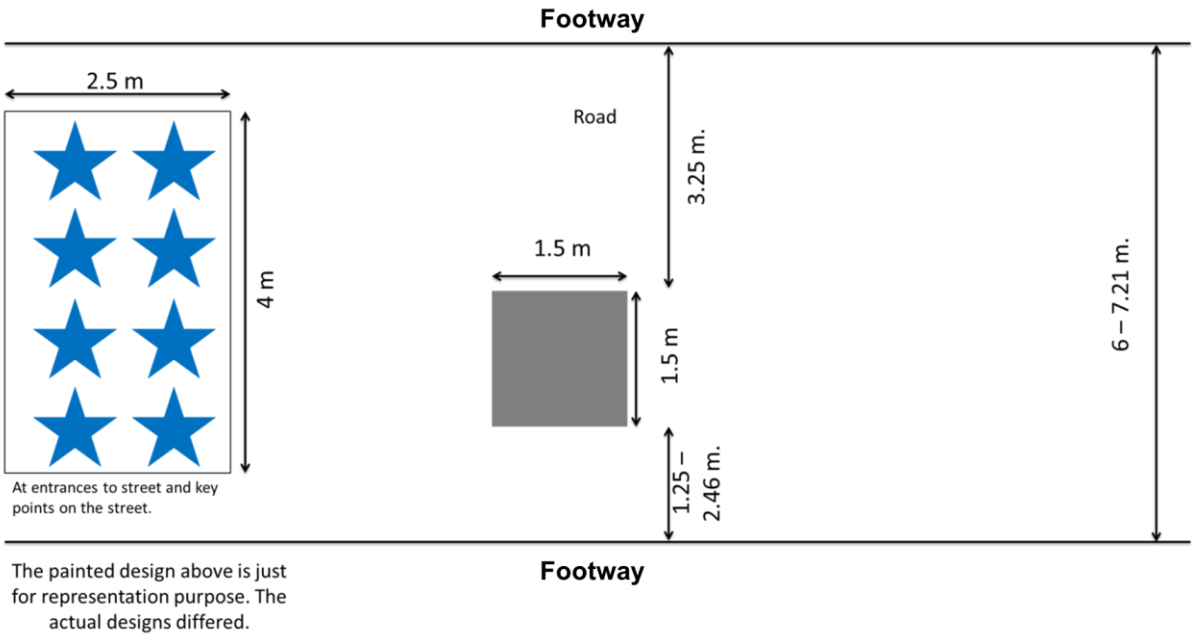

Figure 4-10: Whitehall Avenue – Design of Community Corner, Carriageway details

4.2 Approval Process – Bristol City Council

For approval of implementation of scheme on the experimental streets, BCC had the following pre-requisites which were met:

- Submitted package of designs;
- Support from the majority of the residents on the street; and
- Risk Assessments conducted by TRL for the Installation days on each street.

BCC provided support by reviewing the planter locations and commenting on each of these locations from road safety and accessibility perspectives. Some planter locations were adjusted following input from BCC and revised locations (as presented in Figure 4-2 to Figure 4-10 above) were approved by BCC.

BCC also reviewed the material specifications for planters, road paints and reflectors, in accordance with current Highway design guidance. The material specifications are included in Annex 11.

4.2.1 Support Levels on each street

Based on the consultation meetings and feedback from the resident groups the level of support on each street could be estimated to be approximately:

i. Hillsdon Road: 100%. Everyone we spoke to was very positive, no major concerns were raised by any resident

ii. Ridgeway Road: 100% in the direct vicinity between Stonebridge Park and Fishponds Road where the scheme was installed (every neighbour spoken to), 80% on full length of road.

iii. Whitehall Avenue: 75%. Whilst 90% of residents were in favour, multiple complaints were received from the adjoining housing scheme and wider area from drivers who used Whitehall Avenue as a cut through.

iv. Symington Road: 75%. There were 3-4 residents very vocally against the scheme as they had concerns primarily regarding parking.

4.2.2 Risk Assessments for each street

Detailed risk assessments were carried out tailored to the specific context of each street. A detailed risk assessment is present in tanAnnex 12. The risk assessment was further used to de-brief the residents before and on the installation days to warn them about the risks associated with moving and installing planters, handling toxic road paints, and other traffic related safety hazards.

4.3 Delivery of Community Corners

Following approval from BCC, TRL liaised with the suppliers and the residents' groups on each street on material procurement for the installation day. These installation days were monitored by TRL staff on all four experimental streets.

4.3.1 Installation Day

An installation day on each of these four streets started at 09.00 AM with a briefing session for half an hour for the residents focused on safety. This briefing session was conducted to

warn all the residents about potential risks identified in the risk assessment form for each street and the mitigation measures for each. This was followed by dividing the residents into groups responsible for installing planters, putting in the soil and plants, and road painting. The residents were also asked to sign the risk assessment forms and a media consent form allowing pictures taken during the day to be used in reporting and dissemination related to this project.

Picture 1: Residents putting plants in the planters on Hillsdon Road (Left) Planter with painted pattern on Symington Road (Right)

Picture 2: Residents fixing planter legs on Hillsdon Road (Left) Cookies and Hot Dog stand by children on Hillsdon Road (Right)

Picture 3: Residents hard at work while setting up planters on Ridgeway Road (Left), Whitehall Avenue Installation day Group picture with a planter (Right)

Picture 4: Residents painting murals on Whitehall Avenue (Left), Residents putting plants in the planters on Whitehall Avenue (Right)

4.4 Monitoring of Scheme

4.4.1 Monitoring Interaction of Traffic with Planters

Each of the four streets was observed at different times during the day post installation of street furniture by TRL. This was done primarily to ensure that there was no risk to vehicles traversing through planters placed on the street, and that no major traffic obstruction/ congestion/ conflicts were occurring.

4.4.2 Post Evaluation Surveys

The post evaluation surveys were undertaken three months after the installation in order to give the road users time to adjust to the change and revert to long term behaviour.

5 EVALUATION

5.1 Evaluation Design

Evaluation of the scheme's effectiveness was carried out via traffic surveys and resident perception surveys comprising of surveys before and after installation of the planters. Surveys were also carried out on two control group streets in order to assess the impact on experimental streets compared with the control group streets.

Figure 5-1: Evaluation Process

5.1.1 Traffic Volume and Speed Surveys

Traffic volume and speed surveys were conducted on all six streets (four experimental and two control group streets) on two days before and after installations. The surveys undertaken before installation were done in the months of March-April 2018 depending on residents' availability to survey their own streets. Surveys on control streets were conducted by TRL staff. The two days included one day representative of the traffic flow during weekdays, i.e. between Monday to Thursday and the second day was representative of the traffic flow during weekends, i.e. Saturday or Sunday. Surveys undertaken after installation were done either in June or September 2018. No surveys were conducted post 20th July until 2nd September, as school holidays would have skewed the data.

5.1.2 Resident Perception Surveys

The resident perception survey (attached in Annex 10) was undertaken primarily online via Smart Survey, where residents were provided with a link and QR code. The survey included items on:

i. Community
   - Social Cohesion
   - Neighbourhood Integration

ii. Environment
   - Maintenance
   - Street Design
   - Air Quality
   - Noise Levels
   - Open Space

iii. Safety

- Pedestrians
- Cyclists
- Drivers
- Children playing outside

iv. Demographics of residents participating – age group, gender and income levels.

5.1.3 Statistical comparisons

Throughout the evaluation, statistical tests were used to compare the magnitude of any change before and after the intervention between the control and experimental sites. P-values were used to determine the 'statistical significance' of these results. This value represents the probability of an effect being observed due to chance alone. A p-value of 0.05 (a common standard in the behavioural sciences) is used as the threshold for classifying a result as statistically significant; if the p-value is less than this threshold, it means that there is less than a 5% probability that an effect is observed due to chance alone, and therefore is likely to be an effect of the intervention.

The type of statistical test used depends on the type of data. The following tests are used in this report:

- Chi-squared tests to compare whether the distribution of a categorical variable (e.g. number of vehicles before and after the intervention) differs between the control and experimental sites.
- Analysis of Variance (ANOVA) to compare whether the change in 50th percentile speed between the before and after periods differs between the control and experimental sites.
- ANOVA to compare whether the change factor scores created from the survey data between the before and after periods differs between the control and experimental sites.
- ANOVA to compare whether the change in binary variables derived from the survey before and after periods differs between the control and experimental sites.
- Log-Linear analysis to test if the responses to categorical (or ordinal) survey questions from the before and after periods differs between the control and experimental sites.

5.2 Evaluation Results

For comparison of results, as stated in Section 4.3.1.2 the experimental street and their respective control group streets have been divided into two groups.

Group 1: The experimental streets are Hillsdon Road and Ridgeway Road, and their corresponding control group street is Northover Road.

Group 2: The experimental streets include Whitehall Avenue and Symington Road, and their corresponding control group street is Reedley Road.

5.3 Traffic Volume

Traffic volume was compared pre and post intervention between experimental and control group streets. The traffic volume surveys were conducted by the residents on each of the experimental streets and by TRL staff on control streets on two days during the week (one weekday and one day during the weekends). These surveys tried to capture all three peak timings morning, afternoon and evening peak hours. The survey timings are presented in Table 4-1 above. Figures 5-4 to 5-11 show the results of this comparison below.

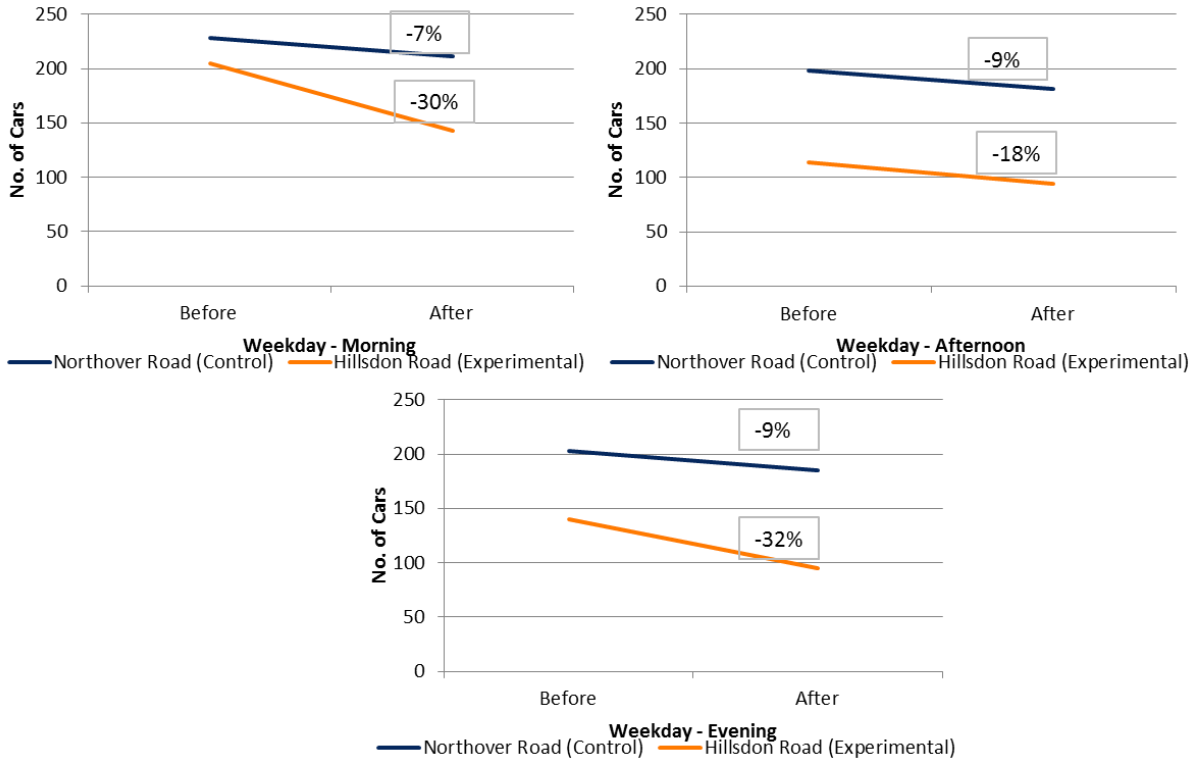

Figure 5-2: Traffic Volume Variation on Northover Road (Control) and Hillsdon Road (Experimental) before and after intervention –Weekday

Traffic volume changed on Hillsdon Road on a weekday morning, afternoon, and evening period by -30%, -18%, and -32% compared with -7%, -9% and -9% respectively on the control street over the same period and timeframes.

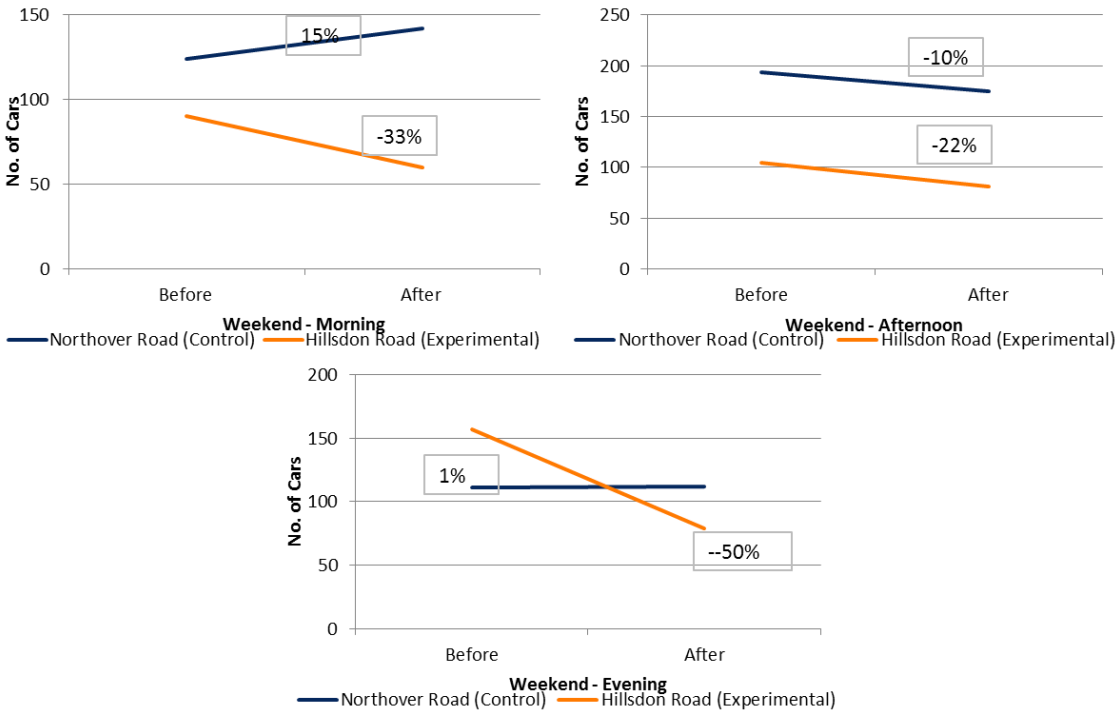

Figure 5-3: Traffic Volume Variation on Northover Road (Control) and Hillsdon Road (Experimental) before and after the scheme implementation – Typical Weekend

Traffic volume changed on Hillsdon Road at a weekend morning, afternoon, and evening period by -33%, -22%, and -50% compared with +15%, -10% and +1% respectively on the control street over the same period and timeframes.

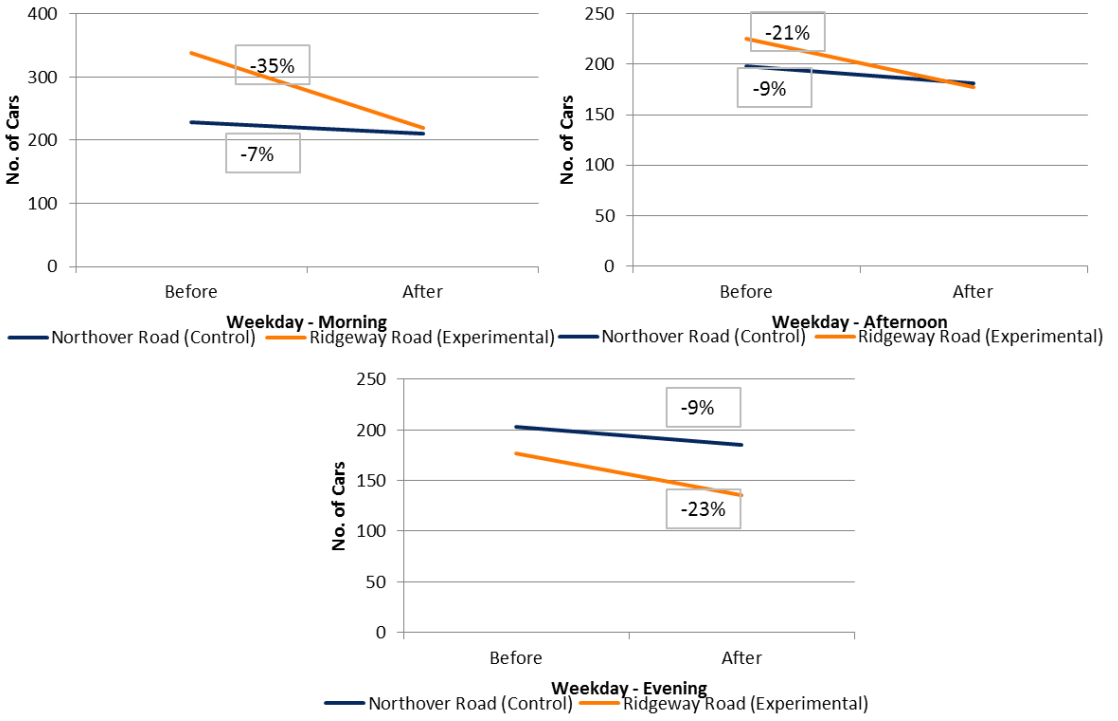

Figure 5-4: Traffic Volume Variation on Northover Road (Control) and Ridgeway Road (Experimental) before and after the scheme implementation – Typical Weekday

Traffic volume changed on Ridgeway Road at a weekday morning, afternoon, and evening period by -35%, -21%, and -23% compared with -7%, -9% and -9% respectively on the control street over the same period and timeframes.

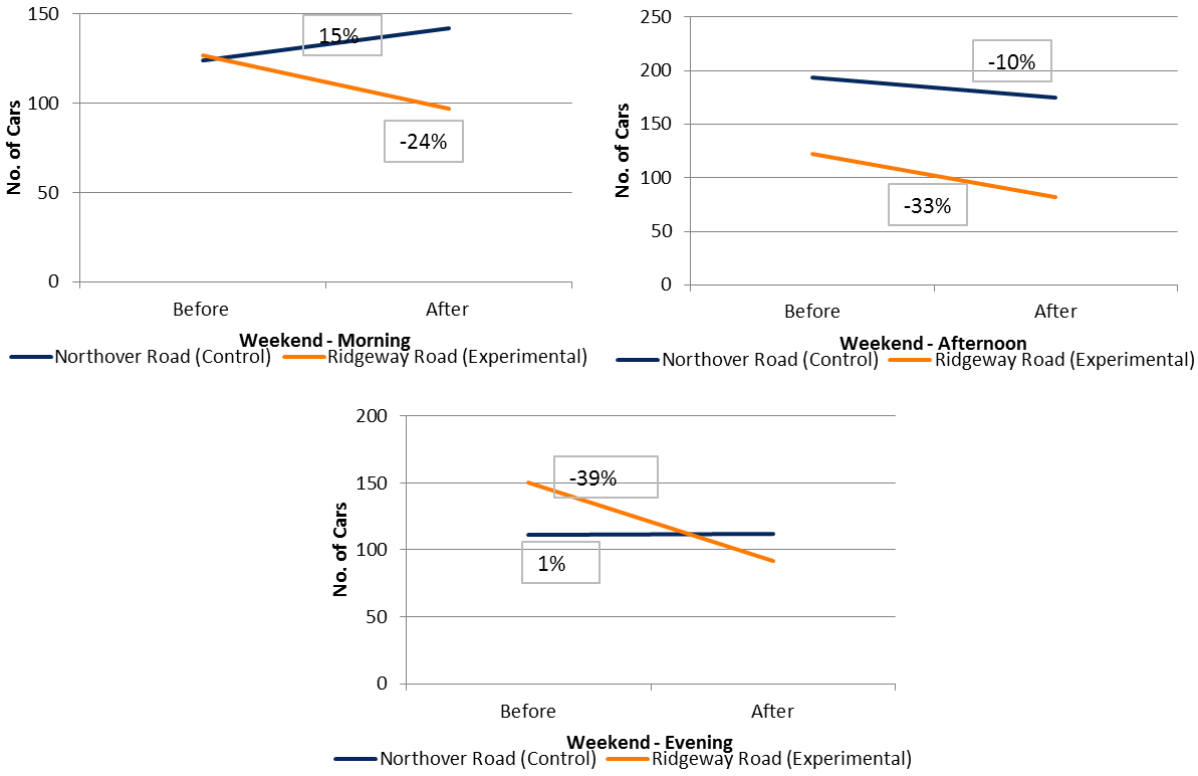

Figure 5-5: Traffic Volume Variation on Northover Road (Control) and Ridgeway Road (Experimental) before and after the scheme implementation – Typical Weekend

Traffic volume changed on Ridgeway Road on a weekend morning, afternoon, and evening period by -24%, -33%, and -39% compared with +15%, -10% and +1% respectively on the control street over the same period and timeframes.

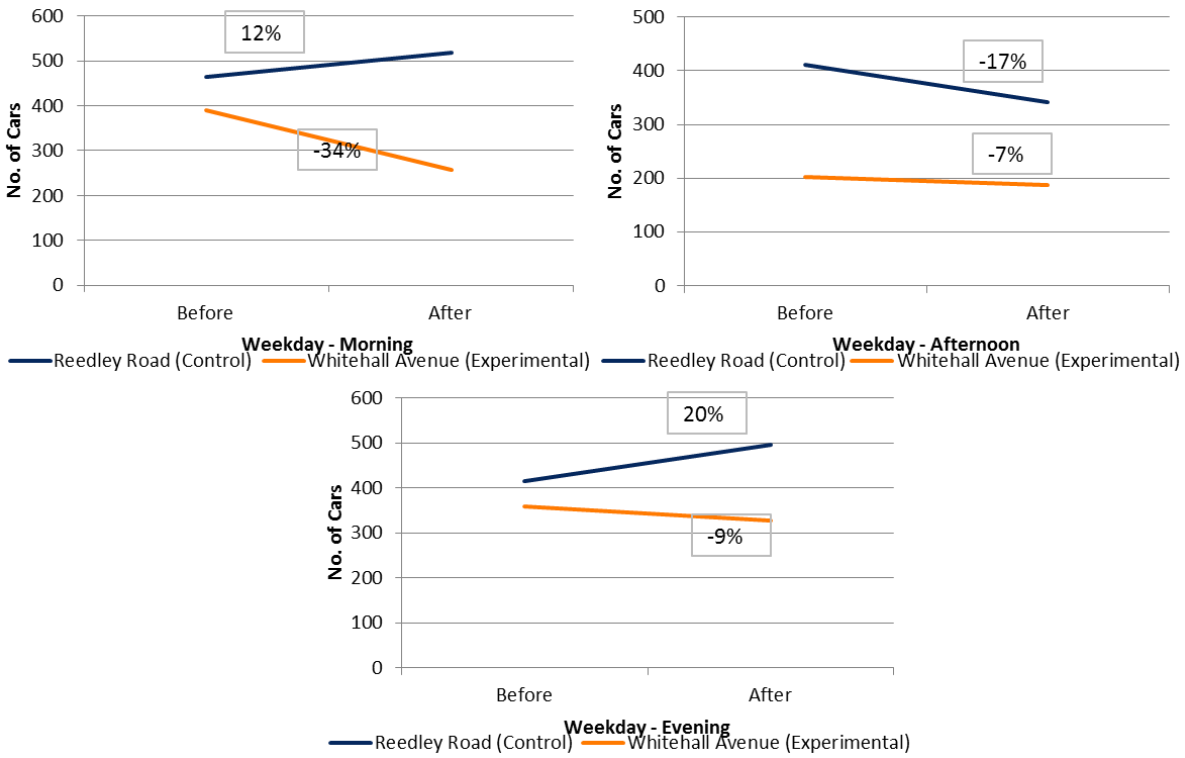

Figure 5-6: Traffic Volume Variation on Reedley Road (Control) and Whitehall Avenue (Experimental) before and after the scheme implementation – Typical Weekday

Traffic volume changed on Whitehall Avenue on a weekday morning, afternoon, and evening period by -34%, -7%, and -9% compared with +12%, -17% and +20% respectively on the control street over the same period and timeframes.

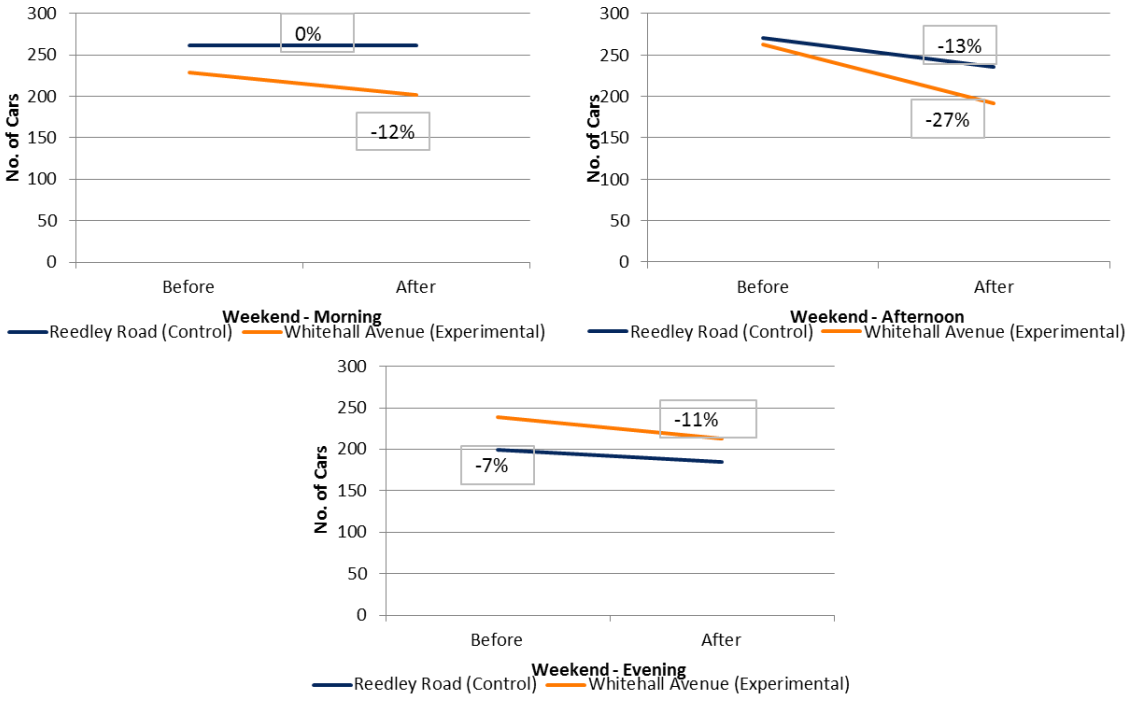

Figure 5-7: Traffic Volume Variation on Reedley Road (Control) and Whitehall Avenue (Experimental) before and after the scheme implementation – Typical Weekend

Traffic volume changed on Whitehall Avenue at a weekend morning, afternoon, and evening period by -12%, -27%, and -11% compared with 0%, -13% and -7% respectively on the control street over the same period and timeframes.

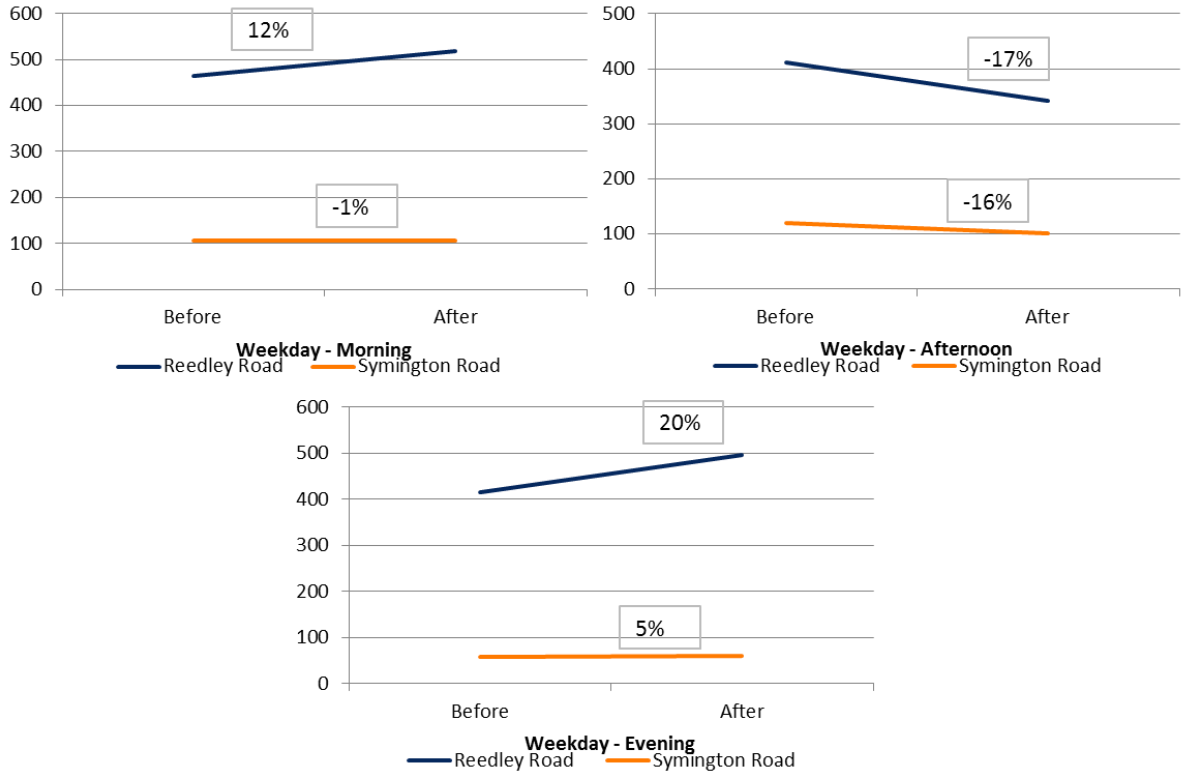

Figure 5-8: Traffic Volume Variation on Reedley Road (Control) and Symington Road (Experimental) before and after the scheme implementation – Typical Weekday

Traffic volume changed on Symington Road at a weekday morning, afternoon, and evening period by -1%, -16%, and 5% compared with +12%, -17% and +20% respectively on the control street over the same period and timeframes.

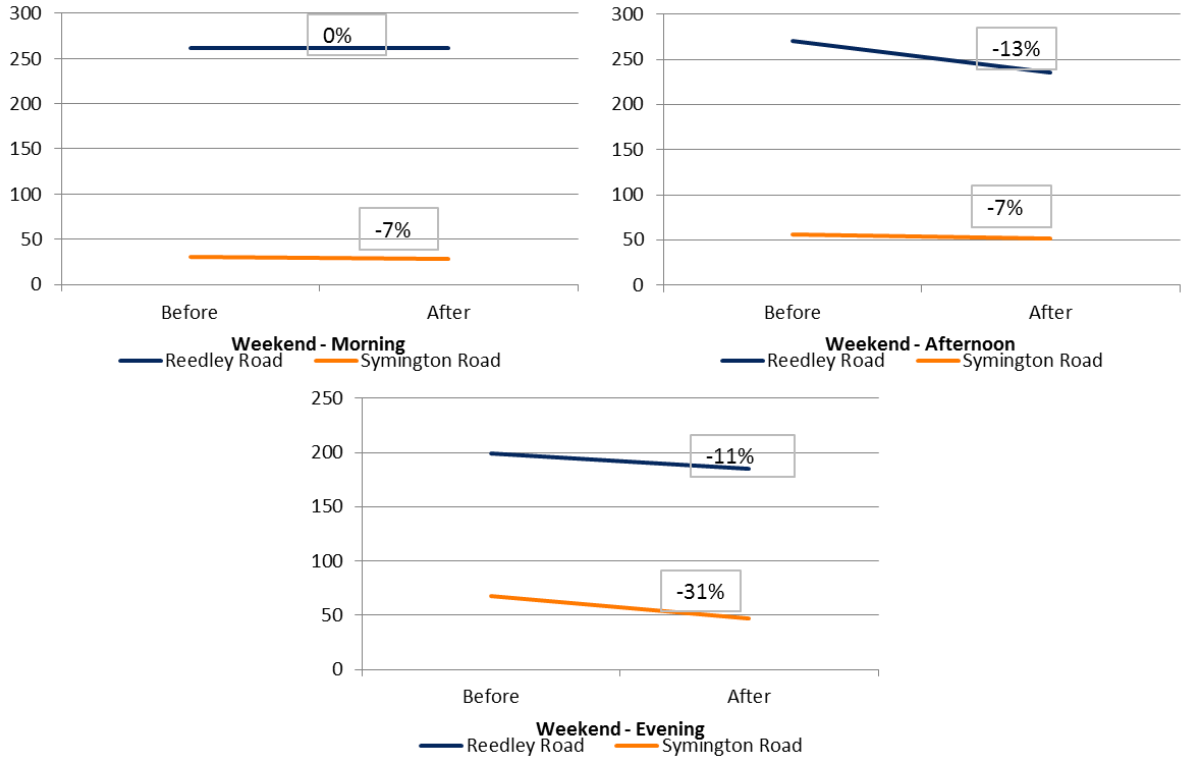

Figure 5-9: Traffic Volume Variation on Reedley Road (Control) and Symington Road (Experimental) before and after the scheme implementation – Typical Weekend

Traffic volume changed on Symington Road at a weekend morning, afternoon, and evening period by -7%, -7%, and -31% compared with 0%, -13% and -11% respectively on the control street over the same period and timeframes.

Of the twenty four comparisons in change of traffic volume pre and post intervention between experimental and control streets, twenty one of those show a larger reduction in traffic in the experimental than the control. Two of those show a larger reduction in traffic in the control than in the experimental. One of those shows an identical change in both experimental and control. To test whether these differences were statistically significant, a Chi-Squared test was conducted on the difference in pre-post traffic volume change between experimental and control streets. Table 5-1 shows the results.

Table 5-1: Results of the statistical tests on volume of traffic at each survey

		Group 1		Group 2	
Day of week	Time of Day	Northover Street compared to Hillsdon Road	Northover Street compared to Ridgeway Road	Reedley Road compared to Whitehall Avenue	Reedley Road compared to Symington Road
Weekday	Morning	**0.009**	**0.001**	**< 0.001**	0.194
	Afternoon	0.985	0.073	**0.037**	0.747
	Evening	0.065	0.105	**0.035**	0.625
Weekend	Morning	**0.007**	**0.022**	0.238	0.191
	Afternoon	0.626	0.098	**0.020**	0.906
	Evening	**< 0.001**	**0.008**	0.640	0.165

Significant results were obtained for ten of the 24 comparisons undertaken. Of these, nine show a significantly larger decrease in traffic volume in the experimental street compared with the control street pre and post intervention, and one result shows the opposite. Four of the significant results are from the most 'intensive' intervention in Whitehall Avenue, whilst the least 'intensive' intervention was the only street not to show any statistically significant impacts on traffic volume reduction when compared with the control street. These results suggest that sufficiently 'intensive' interventions may well have a significant impact on traffic volume in residential streets.

Summary – Traffic Volume Data Analysis

Table 5-2: Summary – Change in Traffic Volume of Experimental Streets after implementation

Day of week	Time of Day	Hillsdon Road	Ridgeway Road	Whitehall Avenue	Symington Road
Weekday	Morning	**-30%**	**-35%**	**-34%**	-1%
	Afternoon	-18%	-21%	**-7%**	-16%
	Evening	-32%	-23%	**-9%**	5%
Weekend	Morning	**-33%**	**-24%**	-12%	-7%
	Afternoon	-22%	-33%	**-27%**	-7%
	Evening	**-50%**	**-39%**	-11%	-31%

Table 5-2 summarises the percentage change in traffic observed on the experimental streets. The changes observed are quite varied based on the day of the week and different times during the day. The figures in bold in the table represent the changes which have been proven to be statistically significant as well. Overall post-implementation of Community Corners, changes observed on various streets include:

- Reduction in traffic volume ranging from 18% to 50% at various times on Hillsdon Road.
- Reduction in traffic volume ranging from 21% to 39% on Ridgeway Road.
- Reduction in traffic volume ranging from 7% to 34% on Whitehall Avenue.

- Reduction in traffic volume ranging from 1% to 31% except for weekday evenings when it was observed to increase by 5% on Symington Road.

As was stated in Section 4.1.3.2 (Control Streets); the major issue on Hillsdon Road and Ridgeway Road was traffic using the roads as a 'cut-through' to either avoid a traffic signal or traffic on a busier main road. Higher percentage decrease in traffic on these two streets does indicate that Community Corners helped in reducing the rat run or the cut-through traffic from these streets.

5.4 Traffic speed

Traffic speed was compared pre and post intervention between experimental and control group streets. Traffic speed surveys were conducted in parallel with the traffic volume surveys on two days each before and after the installation covering both weekday and weekend traffic during morning, afternoon and evening peak hours. The traffic speed surveys were conducted with a pocket radar Figure 5-10 to Figure 5-17 show the results of this comparison below. To offer greater granularity of analysis, we compared speeds for 50% and 85% of the slowest drivers.

On Hillsdon Road, there has been a significant reduction in 50th percentile observed during a weekday especially during the morning time period with 50th percentile speed reducing from 24 mph to 19 mph (See Figure 5-10). The highest 85th percentile speed observed at any point during the day was 28 mph which post implementation reduced to 21 mph.

Overall the maximum speed observed on Hillsdon Road reduced from 37 mph to 29 mph.

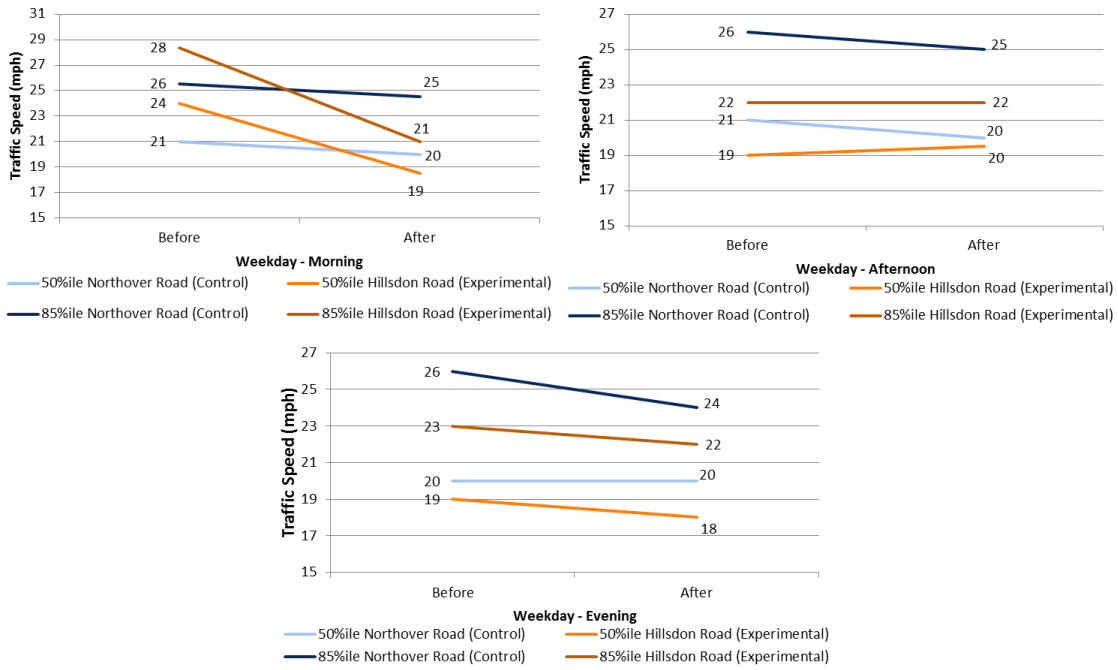

Figure 5-10: 50th and 85th percentile speeds observed on Hillsdon Road (Experimental) and Northover Road (Control Street) before and after scheme implementation – Typical Weekday

50th percentile traffic speed changed on Hillsdon Road at a weekday morning, afternoon, and evening period from 24mph to 19mph, 19mph to 20mph and 19mph to 18mph, compared with 21mph to 20mph, 21 mph to 20 mph and no change respectively on the control street over the same period and timeframes (see Figure 5-10).

> The planters are attractive and have helped reduced the speed of most vehicles that use the street.
>
> - Hillsdon Road Resident

85th percentile traffic speed changed on Hillsdon Road at a weekday morning, afternoon, and evening period from 28mph to 20mph, no change, and 23 mph to 22 mph, compared with 26mph to 25mph, 26 mph to 25 mph and 26 mph to 24 mph respectively on the control street over the same period and timeframes (see Figure 5-10).

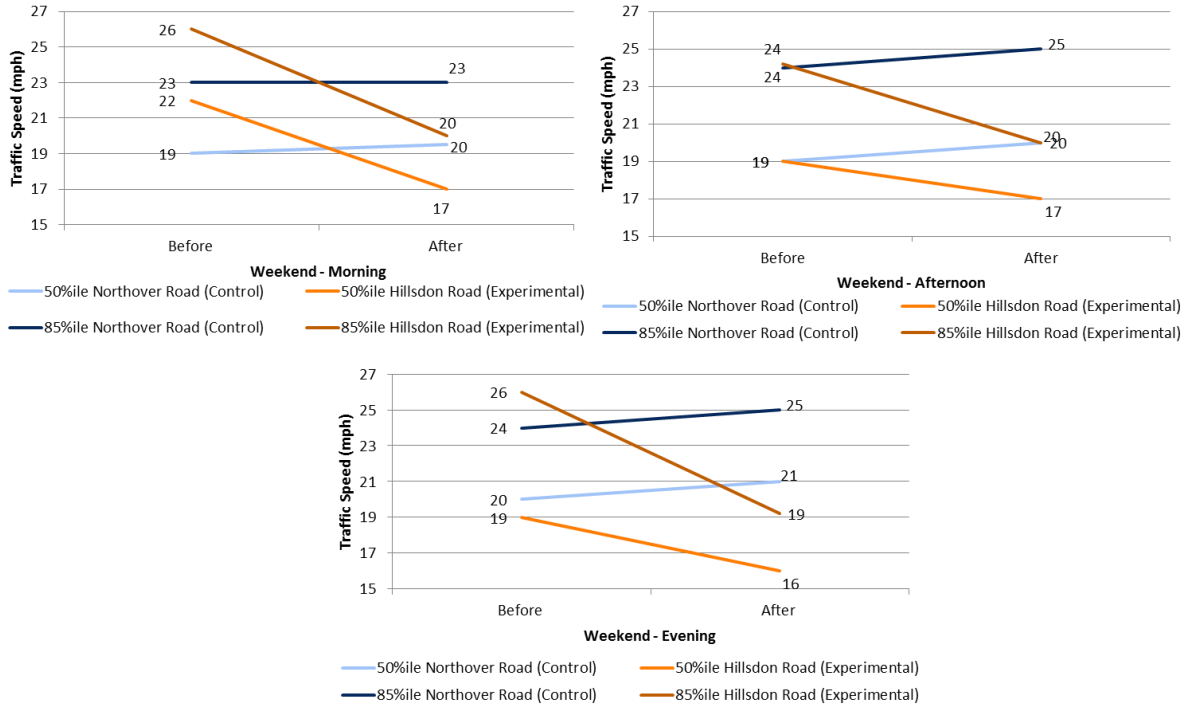

Figure 5-11: 50th and 85th percentile speeds observed on Hillsdon Road (Experimental) and Northover Road (Control Street) before and after scheme implementation – Typical Weekend

50th percentile traffic speed changed on Hillsdon Road at a weekend morning, afternoon, and evening period from 22mph to 17mph, 19 mph to 17 mph and 19 mph to 16 mph, compared with 19mph to 20mph, 19 mph to 20 mph and 20 mph to 21 mph respectively on the control street over the same period and timeframes (see Figure 5-11).

85th percentile traffic speed changed on Hillsdon Road at a weekend morning, afternoon, and evening periods from 26mph to 20mph, 24 mph to 20 mph, and 26 mph to 19 mph, compared with no change, 24 mph to 25 mph and 24 mph to 25 mph respectively on the control street over the same period and timeframes (see Figure 5-11).

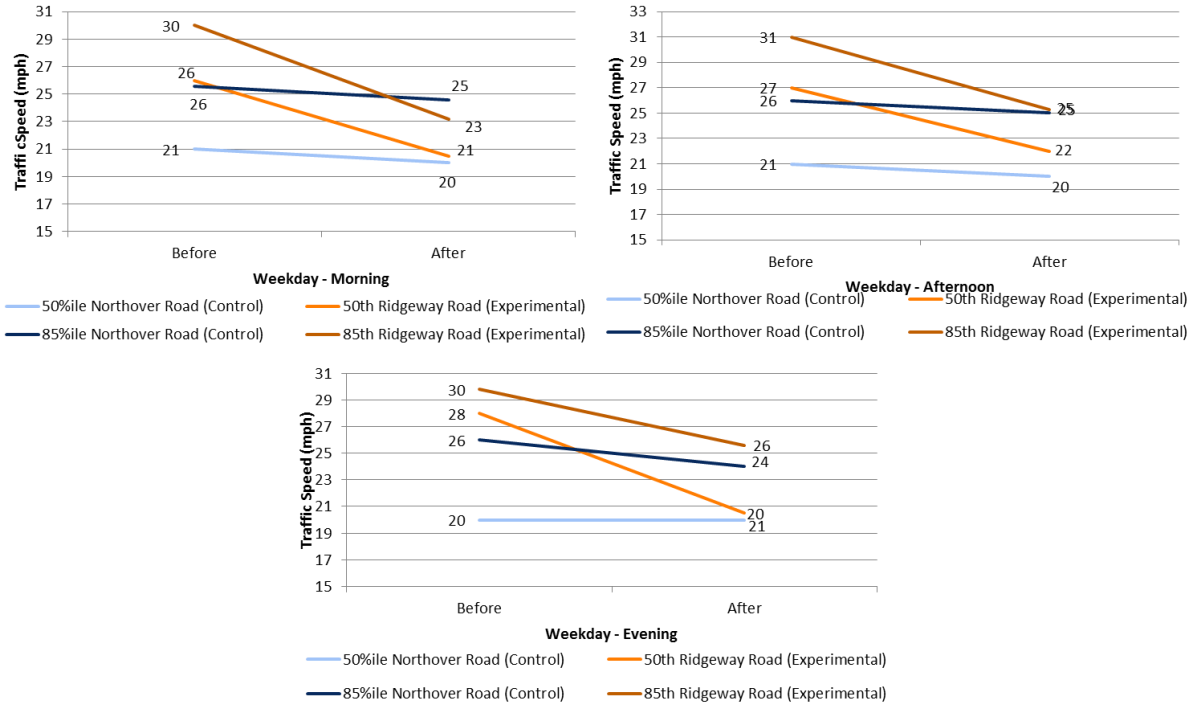

Figure 5-12: 50th and 85th percentile speeds observed on Ridgeway Road (Experimental) and Northover Road (Control Street) before and after scheme implementation – Typical Weekday

50th percentile traffic speed changed on Ridgeway Road at a weekday morning, afternoon, and evening period from 26mph to 21mph, 27 mph to 22 mph and 28 mph to 20 mph, compared with 21mph to 20mph, 21 mph to 20 mph and no change respectively on the control street over the same period and timeframes (see Figure 5-12).

85th percentile traffic speed changed on Ridgeway Road at a weekday morning, afternoon, and evening period from 30mph to 23mph, 31 mph to 25 mph, and 30 mph to 26 mph, compared with 26mph to 25mph, 26 mph to 25 mph and 26 mph to 24 mph respectively on the control street over the same period and timeframes (see Figure 5-12).

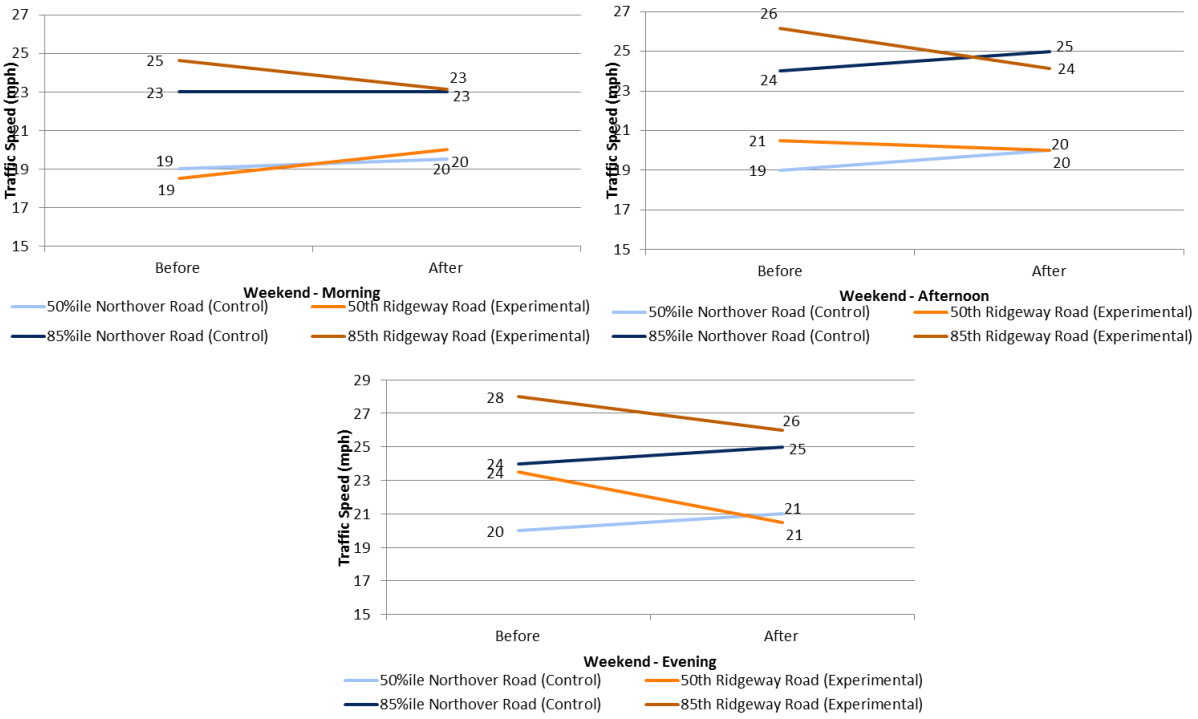

Figure 5-13: 50th and 85th percentile speeds observed on Ridgeway Road (Experimental) and Northover Road (Control Street) before and after scheme implementation – Typical Weekend

50th percentile traffic speed changed on Ridgeway Road at a weekend morning, afternoon, and evening period from 19mph to 20mph, 21 mph to 20 mph and 24 mph to 21 mph, compared with 19mph to 20mph, 19 mph to 20 mph and 20 mph to 21 mph respectively on the control street over the same period and timeframes (see Figure 5-13).

85th percentile traffic speed changed on Ridgeway Road at a weekend morning, afternoon, and evening periods from 25mph to 23mph, 26 mph to 24 mph, and 28 mph to 26 mph, compared with no change, 24 mph to 25 mph and 24 mph to 25 mph respectively on the control street over the same period and timeframes (see Figure 5-13).

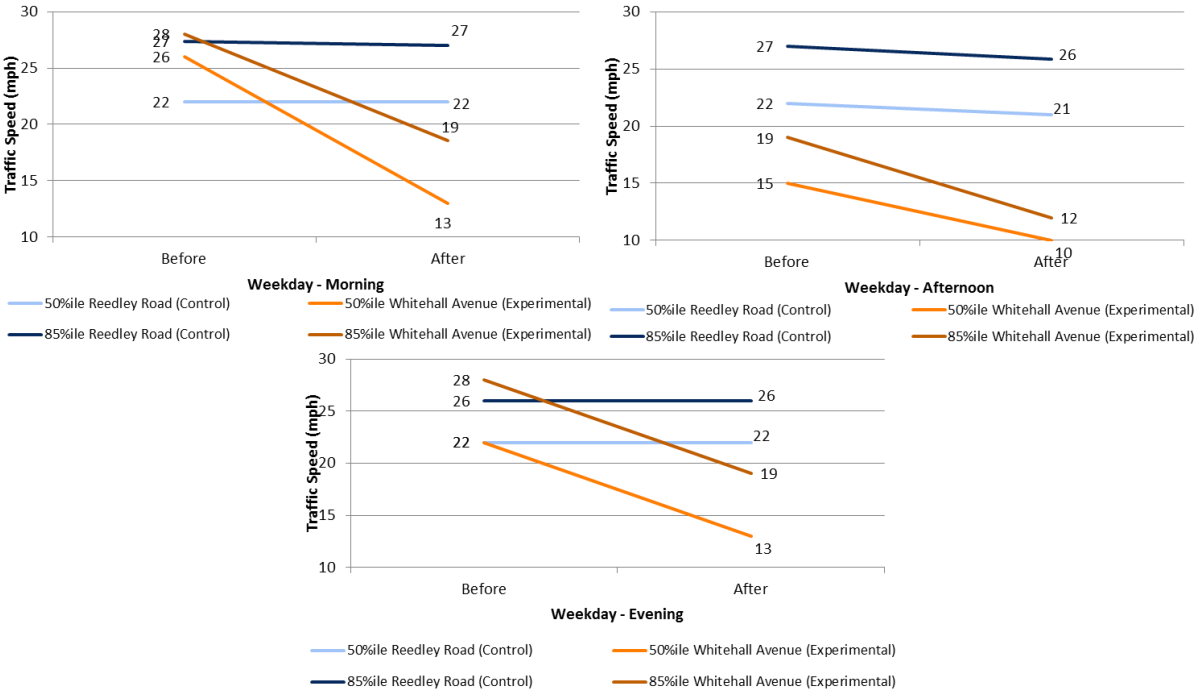

Figure 5-14: 50th and 85th percentile speeds observed on Whitehall Avenue (Experimental) and Reedley Road (Control Street) before and after scheme implementation – Typical Weekday

50th percentile traffic speed changed on Whitehall Avenue at a weekday morning, afternoon, and evening period from 26mph to 13mph, 15 mph to 10 mph and 22 mph to 13 mph, compared to no change, 22 mph to 21 mph and no change respectively on the control street over the same period and timeframes (see Figure 5-14).

Overall the maximum speed observed on Whitehall Avenue reduced from 41 mph to 24 mph.

85th percentile traffic speed changed on Whitehall Avenue at a weekday morning, afternoon, and evening period from 28mph to 19mph, 19 mph to 12 mph, and 28 mph to 19 mph, compared with no change, 27 mph to 26 mph and no change respectively on the control street over the same period and timeframes (see Figure 5-14).

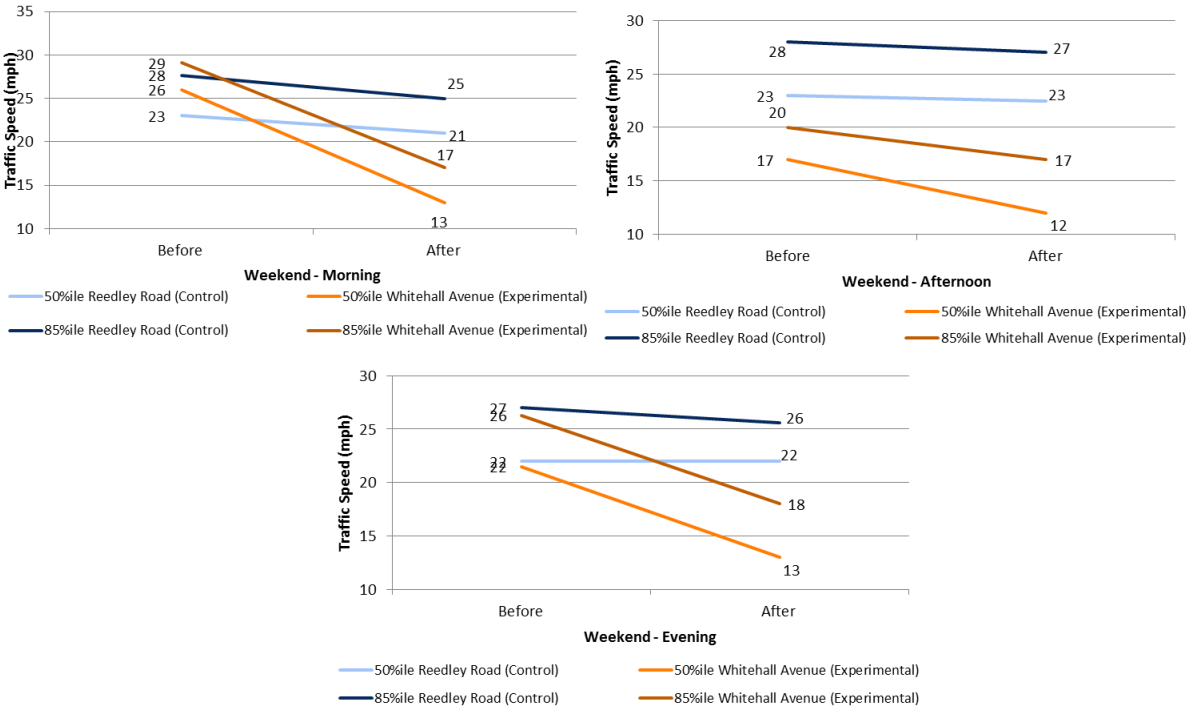

Figure 5-15: 50th and 85th percentile speeds observed on Whitehall Avenue (Experimental) and Reedley Road (Control Street) before and after scheme implementation – Typical Weekend

50th percentile traffic speed changed on Whitehall Avenue at a weekend morning, afternoon, and evening period from 26mph to 13mph, 17 mph to 12 mph and 22 mph to 13 mph, compared with to 23mph to 21mph, no change and no change respectively on the control street over the same period and timeframes (see Figure 5-15).

85th percentile traffic speed changed on Whitehall Avenue at a weekend morning, afternoon, and evening period from 29mph to 17mph, 20 mph to 17 mph, and 26 mph to 18 mph, compared with 28mph to 25mph, 28 mph to 27 mph and 27 mph to 26 mph respectively on the control street over the same period and timeframes (see Figure 5-15).

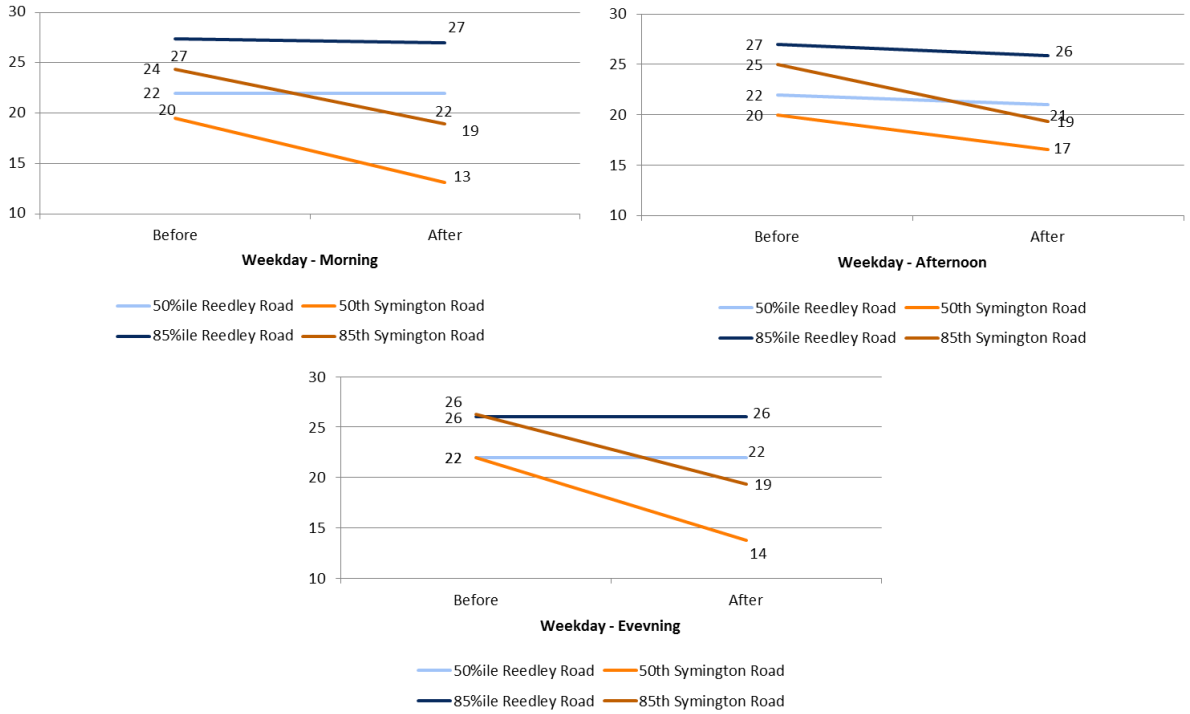

Figure 5-16: 50th and 85th percentile speeds observed on Symington Road (Experimental) and Reedley Road (Control Street) before and after scheme implementation – Typical Weekday

50th percentile traffic speed changed on Symington Road at a weekday morning, afternoon, and evening period from 20mph to 13mph, 20 mph to 17 mph and 22 mph to 14 mph, compared with no change, 22 mph to 21 mph and no change respectively on the control street over the same period and timeframes (see Figure 5-16).

Overall the maximum speed observed on Symington Road reduced from 45 mph to 35 mph.

85th percentile traffic speed changed on Symington Road at a weekday morning, afternoon, and evening period from 24mph to 19mph, 25 mph to 19 mph, and 26 mph to 19 mph, compared with no change, 27 mph to 26 mph and no change respectively on the control street over the same period and timeframes (see Figure 5-16).

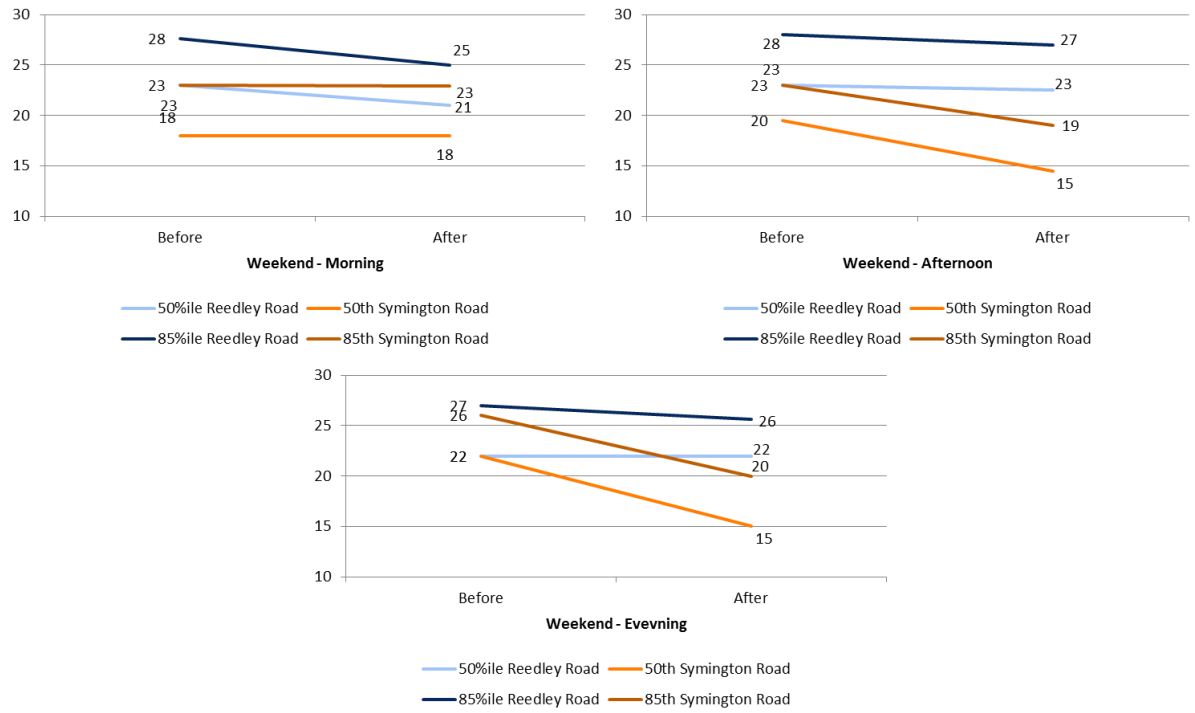

Figure 5-17: 50th and 85th percentile speeds observed on Symington Road (Experimental) and Reedley Road (Control Street) before and after scheme implementation – Typical Weekend

50th percentile traffic speed changed on Symington Road at a weekend morning, afternoon, and evening period from no change, 20mph to 15mph and 22 mph to 15 mph, compared with 23mph to 21mph, no change and no change respectively on the control street over the same period and timeframes (see Figure 5-17).

85th percentile traffic speed changed on Symington Road at a weekend morning, afternoon, and evening period from no change, 23 mph to 19 mph, and 26 mph to 20 mph, compared with 28mph to 25mph, 28 mph to 27 mph and 27 mph to 26 mph respectively on the control street over the same period and timeframes (See Figure 5-17).

Of the forty eight comparisons in the change of traffic speed pre and post intervention between experimental and control streets, forty two of those show a larger reduction in traffic speed in the experimental than the control. Six of those show a larger reduction in traffic speed in the control than in the experimental. To test whether these differences were statistically significant, an ANOVA was conducted on the difference in pre-post 50th percentile speed change between experimental and control streets. Table 5-3 shows the results.

Table 5-3: Results of the statistical tests on average speed at each survey

		Group 1		Group 2	
Day of week	Time of Day	Northover Street compared to Hillsdon Road	Northover Street compared to Ridgeway Road	Reedley Road compared to Whitehall Avenue	Reedley Road compared to Symington Road
Weekday	Morning	**< 0.001**	**< 0.001**	**< 0.001**	**< 0.001**
	Afternoon	0.408	**< 0.001**	**< 0.001**	**< 0.001**
	Evening	0.077	**< 0.001**	**< 0.001**	**< 0.001**
Weekend	Morning	**< 0.001**	0.613	**< 0.001**	**0.008**
	Afternoon	0.341	0.739	**< 0.001**	**0.003**
	Evening	**< 0.001**	**0.014**	**< 0.001**	**< 0.001**

Significant results were obtained for nineteen of the twenty four comparisons undertaken. Of these all show a significantly larger decrease in traffic speed in the experimental street compared to the control street pre and post intervention. Interestingly, significant traffic speed reductions were recorded across all measurements in both weekday and weekend times for the most 'intensive' intervention and 'least' intensive intervention, yet traffic volume did not show statistically significant reductions along Symington Road when compared with the control street. This suggests that the intervention may act upon speed independent of volume. For Ridgeway Road, significant reductions only happened during weekdays and for Hillsdon Road only in mornings and in the weekend evening. There may be an interaction here between traffic volume and traffic speed given the weekday effect in Hillsdon Road, but to statistically explore an interaction we would need to obtain a significantly greater sample size.

Whilst there are interesting nuances to these results, there is a clear suggestion that all interventions from least 'intensive' to the most 'intensive' have a significant impact on traffic speed in residential streets during at least some times during the week, with some interventions having substantial impacts at all times measured in this study.

Summary – Traffic Speed Data Analysis

Table 5-4 below summarises the change in 50th percentile speeds observed on our experimental streets before and after the scheme implementation. The major changes observed in traffic speed on different experimental streets are:

- Reduction of 50th percentile traffic speed by 1 to 5 mph on Hillsdon Road. The maximum 50th percentile speed observed on Hillsdon Road has reduced from 24 mph to 20 mph after implementation.
- Reduction of 50th percentile traffic speed by 1 to 7 mph on Ridgeway Road. The maximum 50th percentile speed observed on Ridgeway Road has reduced from 28 mph to 22 mph after implementation.

- Reduction of 50th percentile traffic speed by 5 to 13 mph on Whitehall Avenue. The maximum 50th percentile speed observed on Whitehall Avenue has reduced from 26 mph to 13 mph after implementation.
- Reduction of 50th percentile traffic speed by 3 to 8 mph on Symington Road. The maximum 50th percentile speed observed on Symington Road has reduced from 22 mph to 18 mph after implementation.

This shows that on an average, the 50th percentile speed observed on all experimental street post implementation is less than 20 mph except for at Ridgeway Road.

Table 5-5 below summarises the change in 85th percentile speed observed on experimental streets before and after the scheme implementation. The major changes observed include:

- Reduction of 85th percentile speed by 1 to 7 mph on Hillsdon Road. The maximum 85th percentile speed observed on Hillsdon Road has reduced from 28 mph to 22 mph after implementation.
- Reduction of 85th percentile speed by 2 to 7 mph on Ridgeway Road. The maximum 85th percentile speed observed on Ridgeway Road has reduced from 31 mph to 26 mph after implementation.
- Reduction of 85th percentile speed by 3 to 12 mph on Whitehall Avenue. The maximum 85th percentile speed observed on Whitehall Avenue has reduced from 29 mph to 19 mph after implementation.
- Reduction of 85th percentile speed by 4 to 7 mph on Symington Road. The maximum 85th percentile speed observed on Symington Road has reduced from 26 mph to 23 mph after implementation.

Whitehall Avenue was observed to have the maximum reduction in traffic speed with 85% of the vehicles now driving under the 20 mph speed limit. Overall, all streets whether with more intensive scheme design or with rather relaxed scheme design, have observed reductions in speeds post implementation of the scheme.

Findings from the Literature Review (Section 2.2.1, Pg. 7) suggested that average speed reduction from various measures was observed to be ranging from 3 mph (in case of rumble strips), 1-5 mph (central islands), and 2-4 mph (visual restrictions). On comparison, the low cost method tested for this study shows comparatively greater speed reduction with average speed reducing by 1 – 13 mph on different streets.

Table 5-4: 50th percentile speed observed on Experimental Streets (in mph)

Day of week	Time of Day	Hillsdon Road			Ridgeway Road			Whitehall Avenue			Symington Road		
		Before	After	Diff.	Before	After	Diff.	Before	After	Diff.	Before	After	Diff.
Weekday	Morning	24	19	**-5**	26	21	**-5**	26	13	**-13**	20	13	**-7**
	Afternoon	19	20	**1**	27	22	**-5**	15	10	**-5**	20	17	**-3**
	Evening	19	18	**-1**	28	21	**-7**	22	13	**-9**	22	14	**-8**
Weekend	Morning	22	17	**-5**	19	20	**1**	26	13	**-13**	18	18	**0**
	Afternoon	19	17	**-2**	21	20	**-1**	17	12	**-5**	20	15	**-5**
	Evening	19	16	**-3**	24	21	**-3**	22	13	**-9**	22	15	**-7**

Table 5-5: 85th percentile speed observed on Experimental Streets (in mph)

Day of week	Time of Day	Hillsdon Road			Ridgeway Road			Whitehall Avenue			Symington Road		
		Before	After	Diff.	Before	After	Diff.	Before	After	Diff.	Before	After	Diff.
Weekday	Morning	28	21	**-7**	30	23	**-7**	28	19	**-9**	24	19	**-5**
	Afternoon	22	22	**0**	31	25	**-6**	19	12	**-7**	25	19	**-6**
	Evening	23	22	**-1**	30	26	**-4**	28	19	**-9**	26	19	**-7**
Weekend	Morning	26	20	**-6**	25	23	**-2**	29	17	**-12**	23	23	**0**
	Afternoon	24	20	**-4**	26	24	**-2**	20	17	**-3**	23	19	**-4**
	Evening	26	19	**-7**	28	26	**-2**	26	18	**-8**	26	20	**-6**

5.5 Secondary Parameters – Resident Perception Surveys

5.5.1 Sample

Table 5-6 shows the number of responses for each street and time point. Ridgeway Road consistently had fewer responses than the other streets and Whitehall Avenue had a limited 'after' sample. This may impact the quality of the results and conclusions that can be drawn for these specific sites. % Sample indicates the number of responses versus the number of houses within the intervention street.

Table 5-6: Sample size by street and time point

Group	Street type	Street name	Time point				Total
			Before	% Sample	After	% Sample	
1	**Control**	Northover Road	31	23%	32	23%	63
	Experimental	Hillsdon Road	17	46%	31	84%	48
		Ridgeway Road	13	38%	19	56%	32
2	**Control**	Reedley Road	29	28%	42	41%	71
	Experimental	Symington Road	39	49%	30	38%	69
		Whitehall Avenue	25	44%	18	32%	43
Total			**154**		**172**		**326**

The age groups for each site and survey are shown in Figure 5-18.

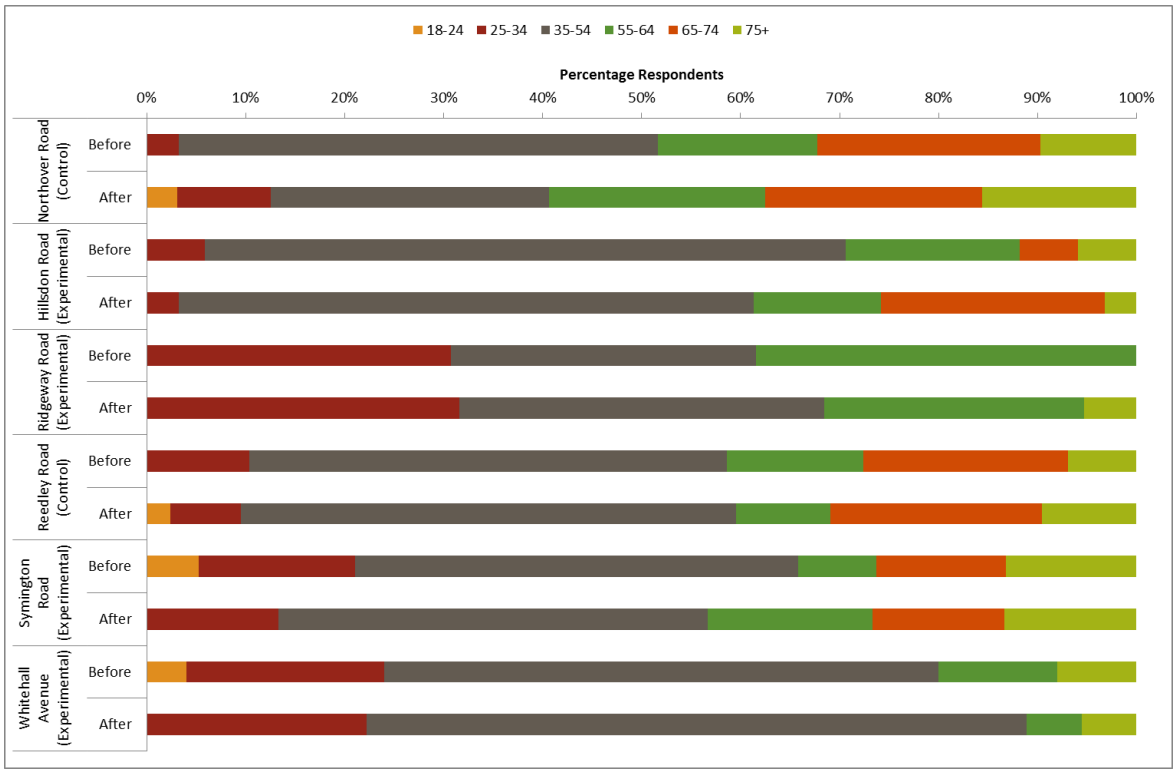

Figure 5-18: Proportion of respondents by age groups, street, and time point

One person from Symington Road did not provide demographic information. In general the demographics were similar in the before and after groups. The samples for Hillsdon and Northover Roads saw a slight increase in older age groups. Changes in demographics can influence some or all of the changes observed over time as people in different age groups may have different perceptions of their safety and community.

The sample breakdown by gender is shown below in Figure 5-19.

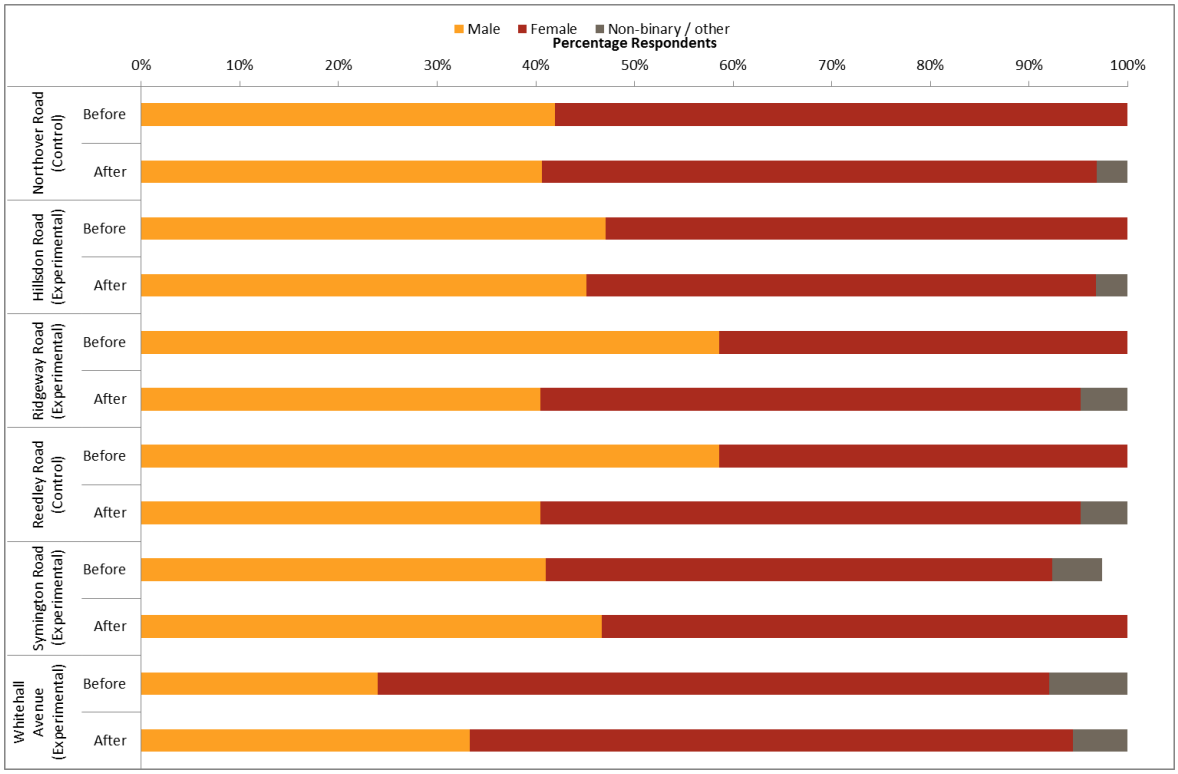

Figure 5-19: Proportion of respondents by gender, street, and time point

Most samples were roughly evenly split between males and females which stayed consistent over time. However, 59% of the Reedley Road respondents were male before the trial but this fell to only 40% after. Before the trial 24% of the Whitehall Avenue respondents were male and this rose to 33% for the 'after trial' survey. These shifts in demographic makeup may impact the result and may influence changes seen between the two time points as men may have different baseline perception of safety and community cohesion to women.

5.5.2 Community:

i. Creating meaningful factors

The survey included a number of questions about community and neighbourhood interactions and feelings. Instead of analysing each question separately, they have been reduced using factor analysis into a small set of more meaningful variables. Factor analysis is a data reduction technique which is used to reduce large numbers of related variables into a smaller set of unobserved variables called factors, which reflect most of the variability contained within the original data.

Question 8 (see Annex 10) asked respondents "How much they agree or disagree with the following statements?" Eight statements were shown for example, the first statement was "I often visit my neighbours in their homes". Only data from the before surveys was used in the factor analysis of this set of survey items[4]. The factor analysis of these items identified a single factor solution. This means that all of the items in question 8 measured the same underlying factor (or latent factor). The data met the analysis requirements (KMO = 0.850, Bartlett's Test for Sphericity[5] p[6] < 0.001, Determinant[7] = 0.021, Cronbach's α[8] = 0.869) and the solution explained over a half (53.0%) of the variance in the data. This factor can be explained as the social cohesion factor.

The factor analysis of survey question 14 also identified a one factor solution. The data met the analysis requirements (KMO = 0.803, Bartlett's test for Sphericity p < 0.001, Determinant = 0.052, Cronbach's α = 0.847) and the solution explained over a half (53.2%) of the variance in the data. This factor can be explained as the neighbourhood integration factor.

For each of these analyses, each survey item contributed an equivalent amount to the factor score calculations (i.e. there were not strongly dominant items). This meant that a pseudo-factor score could be calculated across the whole dataset (both the before and after data being included) by using the mean of the item scores for each respondent. This allowed scores to be easily compared between the before and after groups.

ii. Social cohesion

In order to understand the effect of the changes made to each street during the trial on perceptions of social cohesion, the reported changes for each street were compared against the changes reported at the control streets.

[4] Including 'after' data in the analysis would weaken the detection of any changes overtime in later analysis. The factor analysis is used to identify a response structure that can then be applied to all of the data.

[5] The KMO value and the Bartlett's Test for Sphericity are measures of that check the sampling adequacy (i.e. is the sample big enough or factor analysis). The sample is acceptable if the KMO is >0.6 and Bartlett's Test for Sphericity is significant.

[6] A p-value is a measure of statistical significance which tells us the probability of an effect being observed due to chance alone. The higher the p-value, the higher the probability that the effect observed can be explained by chance. P-values range from 0 to 1. e.g. a p-value of 0.05 (a common standard in the behavioural sciences) means that there is a 5% probability that an effect is observed due to chance alone.

[7] The determinant is used to detect multicollinearity in the data. This is where the variables are not independent from one another. The data is suitable for factor analysis if the determinant is >0.00001.

[8] Cronbach's alpha is a measure of internal consistency ("reliability"), i.e. the extent to which all the items in a test measure the same concept or construct. It is most commonly used to determine whether multiple Likert questions in a survey/questionnaire all reliably measure the same latent variable. Cronbach's alpha is a value between 0 and 1 where values of >0.7 are generally taken to indicate an acceptable level of consistency.

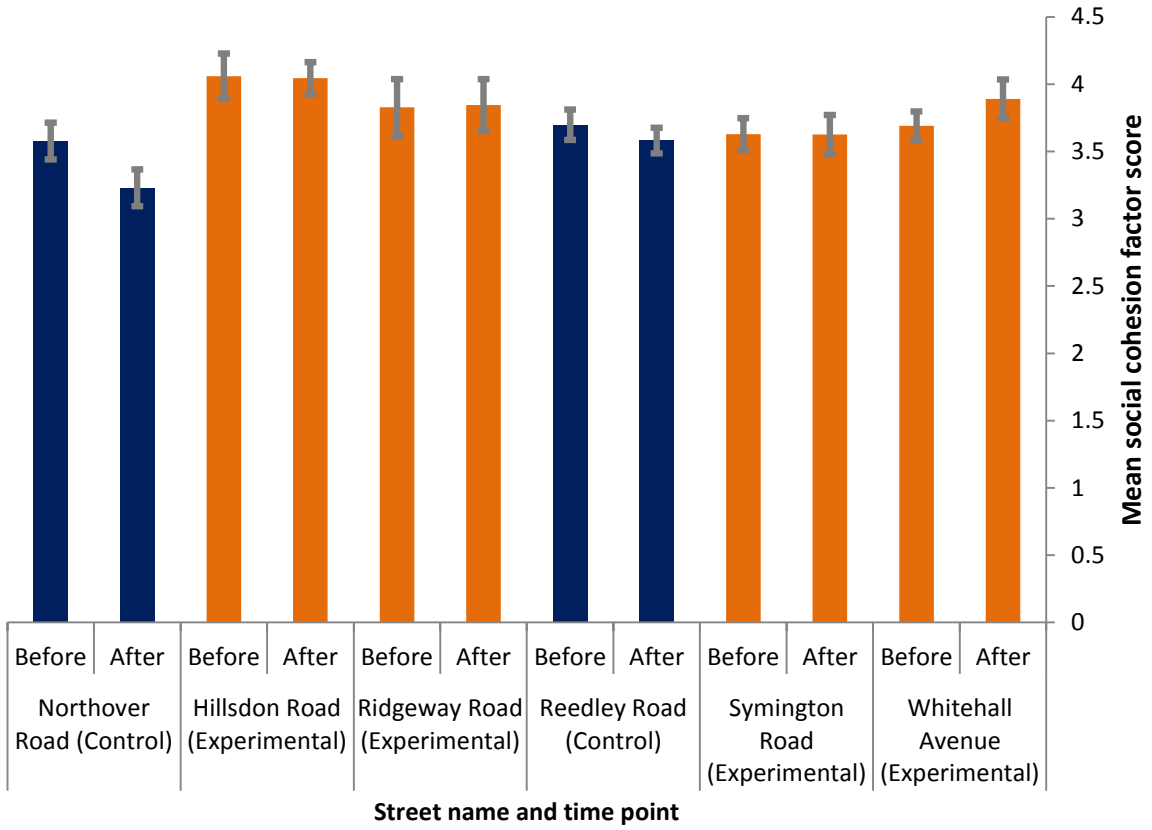

Figure 5-20: Social Cohesion scores by street and time point[9]

As shown in Figure 5-20, both of the control sites (Northover Road and Reedley Road) saw a decrease in the average social cohesion factor scores whereas the experimental sites either had consistent or increasing scores.

To test if these differences were significant, an ANOVA was used. As each different people responded to the survey before and after the trial, the test looks at differences between independent groups. It is possible that results may be due to individual differences of the people who responded before and after or due to the intervention itself.

Four key comparisons were made to explore the changes over time at each experimental street relative to the changes at the control streets:

- Northover Road (control) and Hillsdon Road (experimental) (p = 0.252)
- Northover Road (control) and Ridgeway Road (experimental) (p =0.296)
- Reedley Road (control) and Symington Road (experimental) (p =0.631)
- Reedley Road (control) and Whitehall Avenue (experimental) (p =0.179)

None of these comparisons found a statistically significant change in perception over time in the experimental groups relative to the control groups.

[9] The grey bars show the standard error in the data. The standard error increases with fewer responses and a larger variance in responses.

iii. Neighbourhood integration

In order to understand if the trial had an impact on the residents' perceptions of neighbourhood integration, we needed to compare the responses for each street to the responses from the control streets.

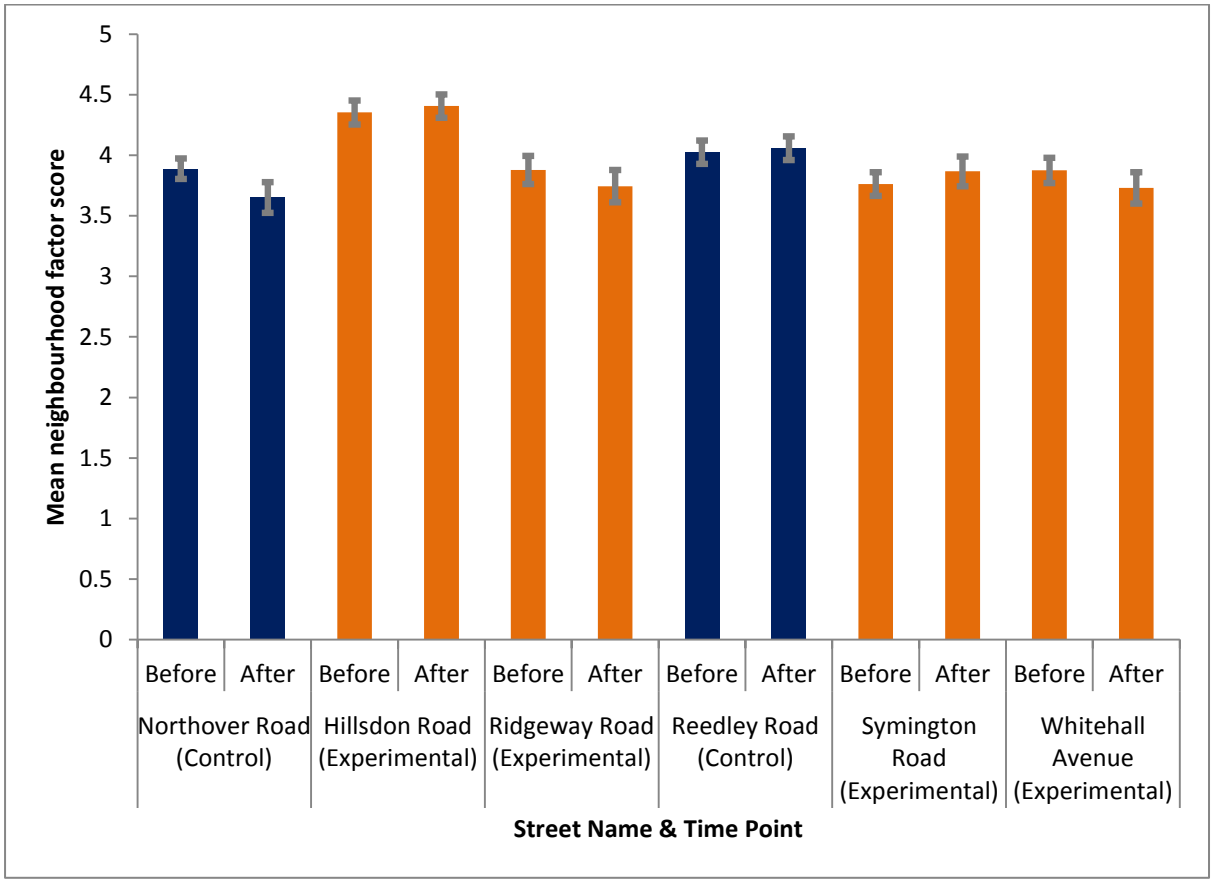

Figure 5-21: Neighbourhood integration score by street and time point[10]

As shown in Figure 5-21, the before and after neighbourhood integration factor scores are very similar before and after the trial. Looking at group 1 (Hillsdon and Ridgeway Road), the control street (Northover Road) showed a downward trend over time. However, looking at group 2 (Symington Road and Whitehall Avenue), the neighbourhood factor score remained stable at the control group but there was a small increase at Symington Road and a small decrease at Whitehall avenue.

An ANOVA was used to make four key comparisons (one for each experimental street):

- Northover Road (control) and Hillsdon Road (experimental) (p = 0.191)
- Northover Road (control) and Ridgeway Road (experimental) (p =0.687)
- Reedley Road (control) and Symington Road (experimental) (p =0.734)
- Reedley Road (control) and Whitehall Avenue (experimental) (p =0.430)

[10] The grey bars show the standard error in the data. The standard error increases with fewer responses and a larger variance in responses.

None of these comparisons found a statistically significant change in perception over time in the experimental groups relative to the control groups.

5.5.3 Environment:

i. Creating meaningful factors

Factor analysis was also performed on a set of survey questions relating to the environment (questions 4 to 9). The factor analysis was run on the 'before' data only. As shown in Table 5-7, a two factor solution was found. The data met the analysis requirements (KMO = 0.797, Bartlett's test for sphericity $p < 0.001$, Determinant = 0.037, factor 1 Cronbach's $\alpha = 0.927$, factor 2 Cronbach's $\alpha = 0.721$) and the solution explained over three quarters (76.2%) of the variance in the data. The two factors have been interpreted as "maintenance" and "design" based on the survey items that load onto each.

Table 5-7: Factor Analysis for environment section of Resident Perception Survey

	Factor	
	Factor 1: Maintenance	Factor 2: Design
Q7 Clean	0.927	
Q8 Neat	0.905	
Q9 Well Maintained	0.902	
Q5 Dull*		0.842
Q4 Attractive		0.766
Q6 Unplanned*		0.733
Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization		
Loadings <0.4 have been supressed * Data for these items was revered to match the direction of the factor scores		

Similarly to the community factor scores, a pseudo-factor score was calculated for the entire dataset using the mean of the component items.

ii. Maintenance

Figure 5-22 shows the results for the street maintenance factor score at each street and at each time point.

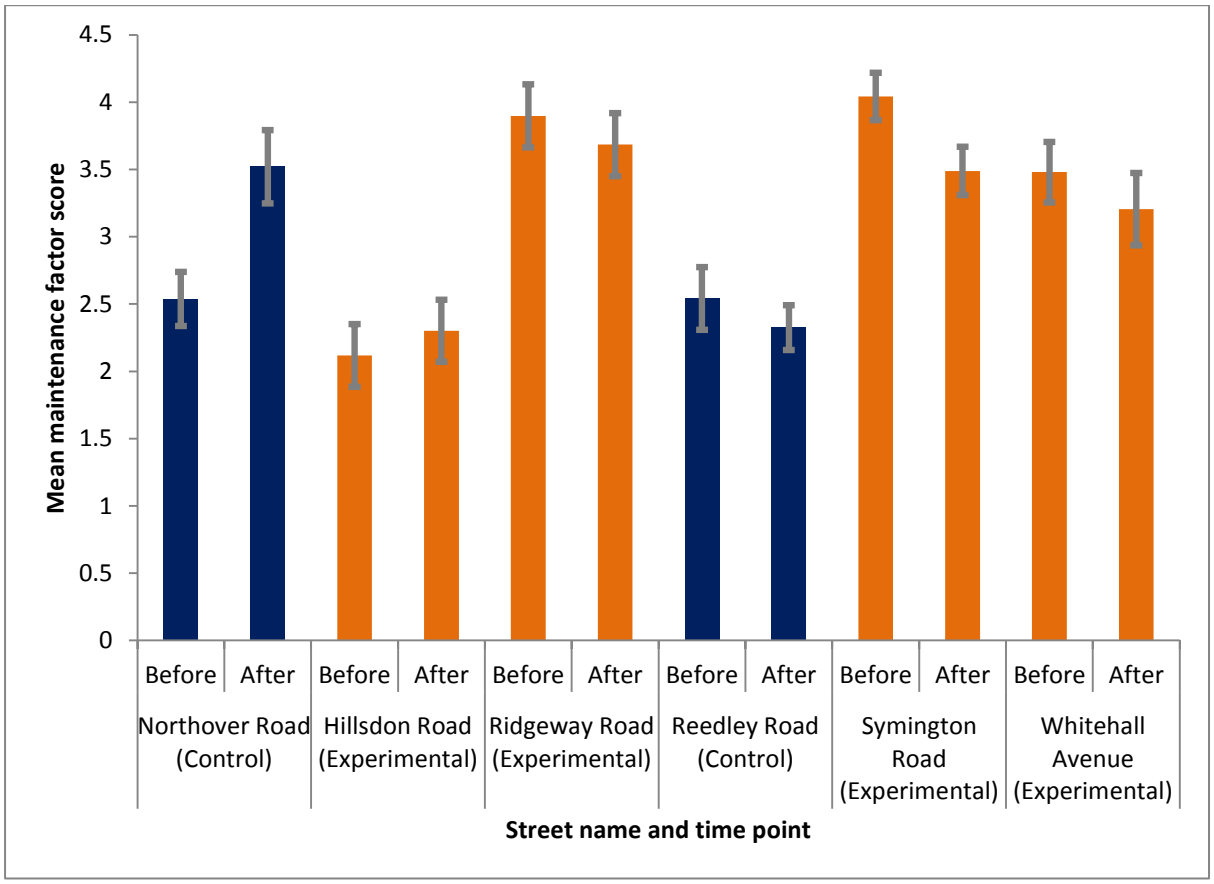

Figure 5-22: Maintenance factor score by street and time point

Slight changes were observed for the experimental streets and Reedley Road, but Northover Road (a control street) saw a large improvement in these scores. Similar to before, to test if these differences were significant, an ANOVA was used and four key comparisons were made (one for each experimental street):

- Northover Road (control) and Hillsdon Road (experimental) (p = 0.115)
- Northover Road (control) and Ridgeway Road (experimental) (p =0.029)
- Reedley Road (control) and Symington Road (experimental) (p =0.371)
- Reedley Road (control) and Whitehall Avenue (experimental) (p =0.891)

A significant decrease in the maintenance factor scores was seen over time relative to the changes to the control street at Ridgeway Road. However, the change over time at the street when not comparing it with the control data showed no significant change (p = 0.156) so this result could be just because of something happening at the control street during the trial, or a result of the different sample groups.

None of the other comparisons found a statistically significant change in perception over time in the experimental groups relative to the control groups.

iii. Design

Figure 5-23 shows the results for the street design factor score at each street and at each time point.

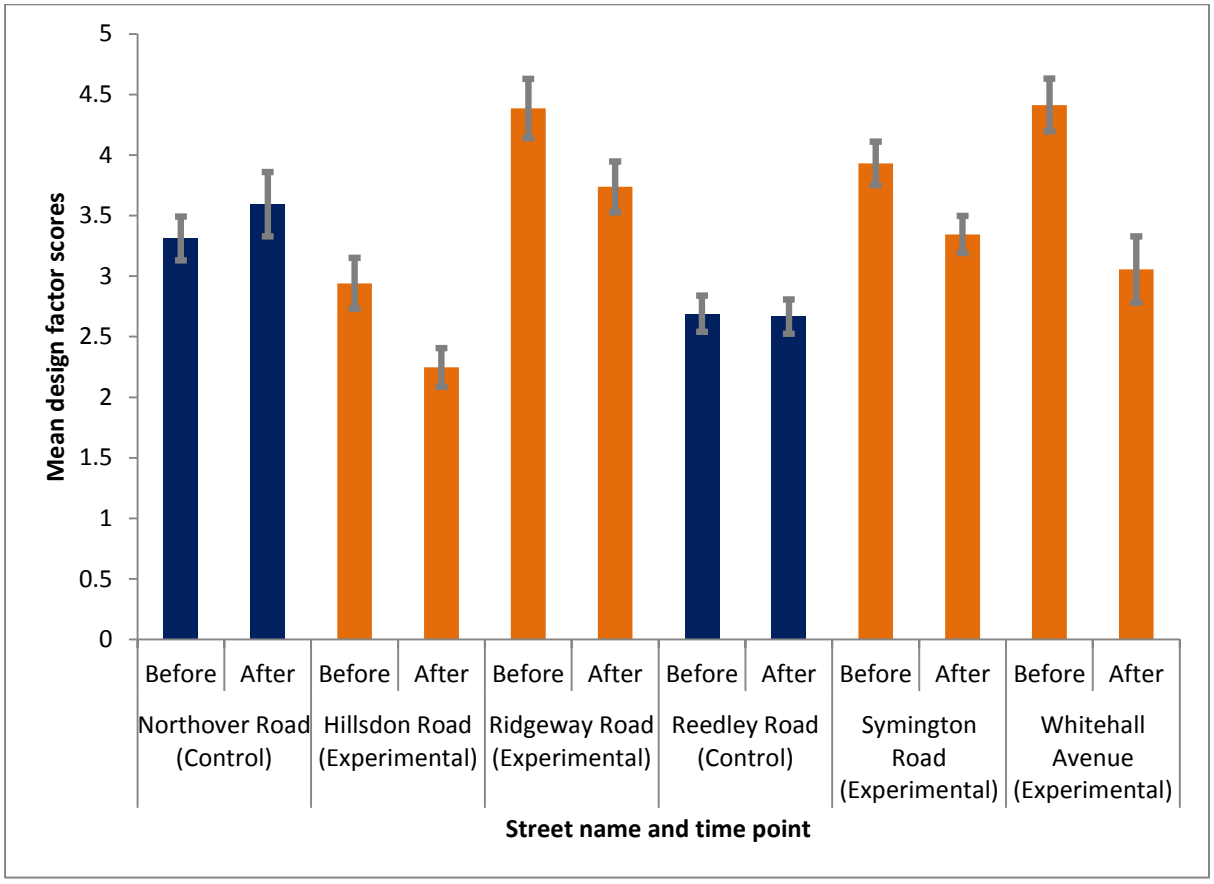

Figure 5-23: Street design factor scores by street and time point

A notable decrease was seen at each experimental site whereas the results for the control sites remained relatively stable. Statistical tests were conducted to see if any of these changes were significant relative to the changes at the control sites.

- Northover Road (control) and Hillsdon Road (experimental) (p = 0.030)
- Northover Road (control) and Ridgeway Road (experimental) (p =0.073)
- Reedley Road (control) and Symington Road (experimental) (p =0.084)
- Reedley Road (control) and Whitehall Avenue (experimental) (p =0.001)

Both Hillsdon Road and Whitehall Avenue saw a significant decrease in the design score over time relative to the changes at their control sites. This is an interesting result, given that qualitative feedback from 90%+ of participants was on how pleased they were with the planters and new look of their street. Further work is required with larger sample sizes to fully understand these results.

iv. Air quality

Figure 5-24 shows the responses to the question "How would you rate the air quality in your street?"

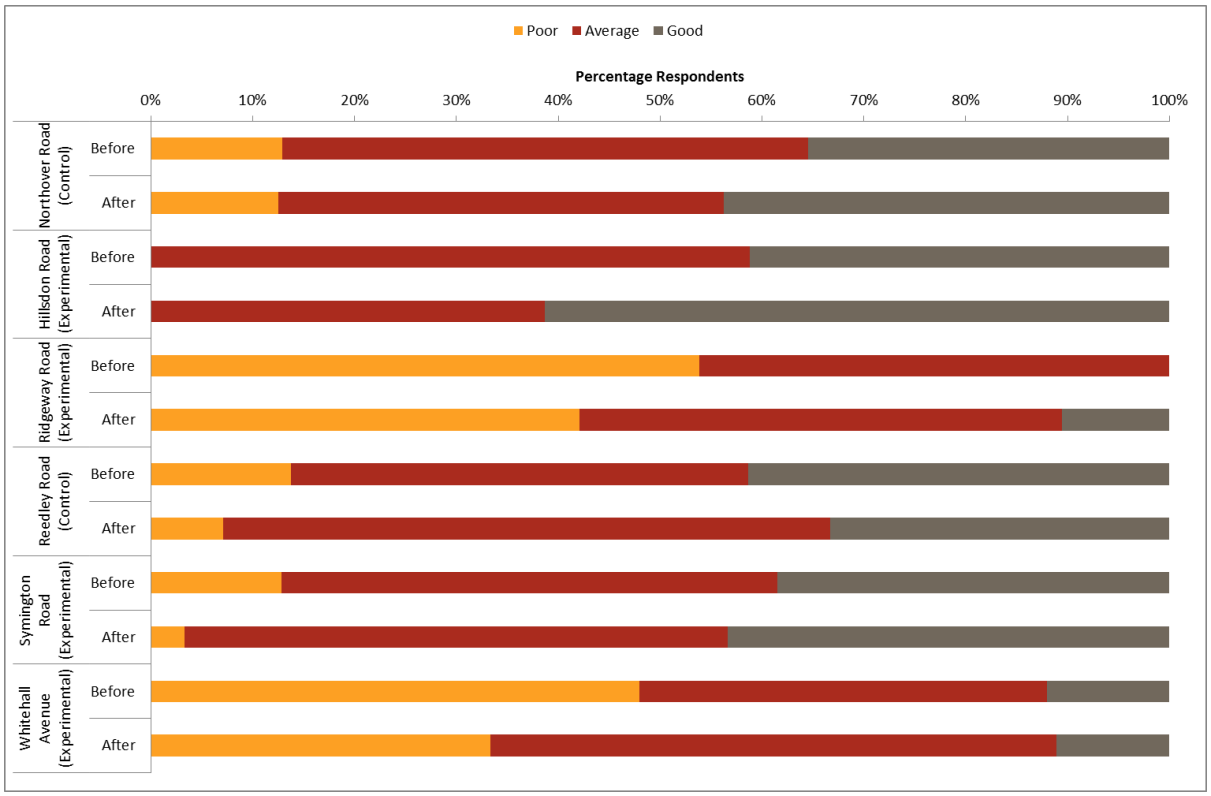

Figure 5-24: Air quality rating by street and time point

Small improvements were seen across the board (including control streets). The most improvement was seen at Hillsdon Road where around 20% more people said the air quality was 'good' after the trial than before. As majority of responses were 'average' the number of responses for the other two groups were too small for any statistical tests to be run.

v. Noise levels

Figure 5-25 shows the responses to the question "How would you rate the level of noise in your street?"

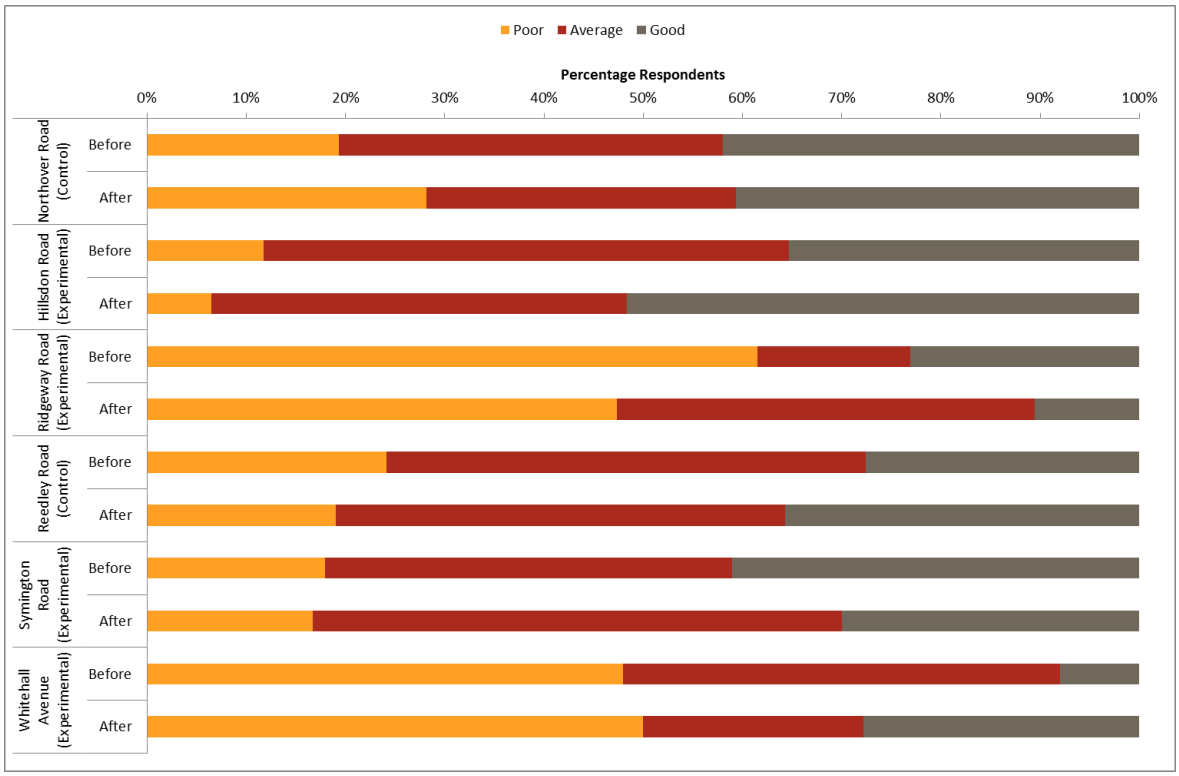

Figure 5-25: Noise level rating by street and time point

For Group 1, noise levels got worse at the control street but slightly better at both of the experimental sites.

Group 2 saw different results. Symington Road rated noise levels more negatively post intervention, particularly when compared with the improvement in the control site. Responses shifted slightly from 'average' to 'good' in Whitehall Avenue.

Three statistical tests were performed to see if these differences were significant (log-linear analysis[11]), however the data for Ridgeway Road did not meet the criteria and hence has not been analysed.

- Northover Road (control) and Hillsdon Road (experimental) (p = 0.319)
- Reedley Road (control) and Symington Road (experimental) (p =0.732)
- Reedley Road (control) and Whitehall Avenue (experimental) (p =0.885)

None of the tests found a significant three-way interaction between time, street (control and experimental), and noise level scores.

vi. Open spaces

Figure 5-26 shows the responses to the question "How satisfied are you with the amount of open space in your street?"

[11] Log-linear analysis is an analysis of frequencies which makes it suitable for categorical data such as the noise pollution variable. It tests if there are differences in frequencies across multiple variables (in this case time point, street, and noise pollution score).

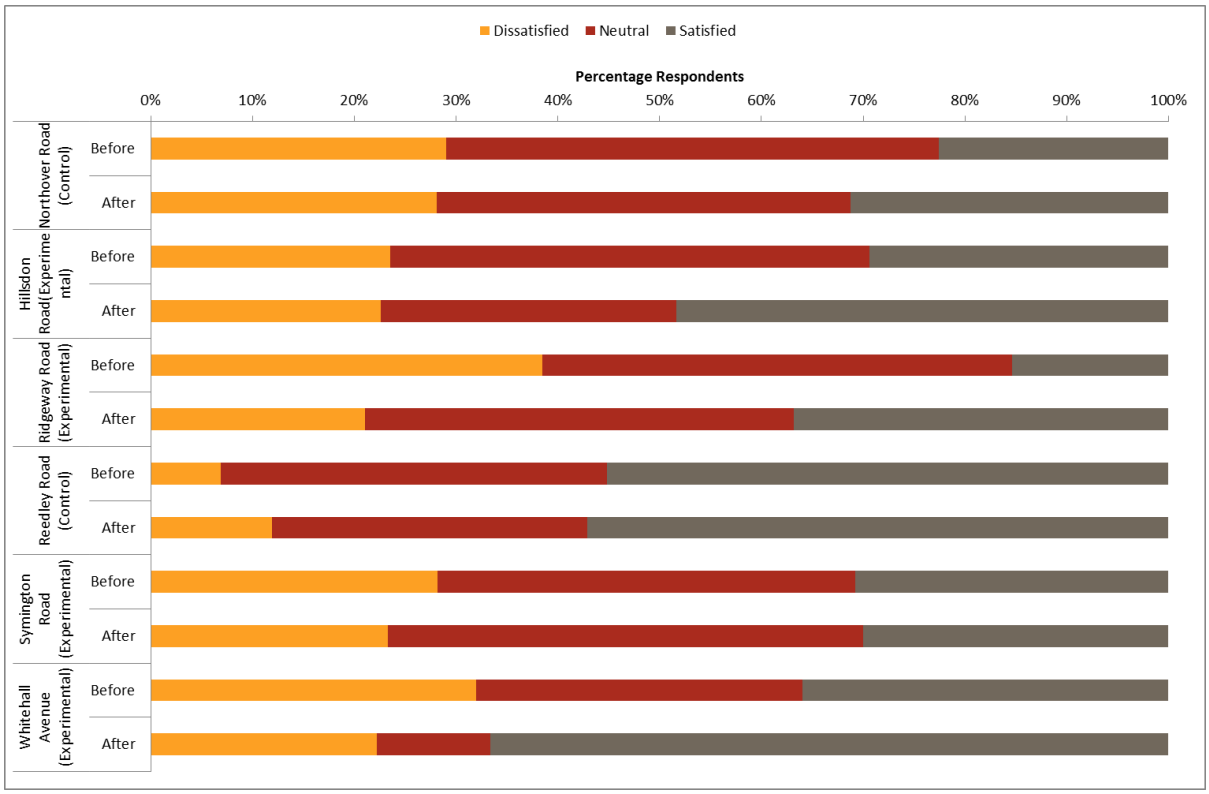

Figure 5-26: Rating of open spaces by street and time point

For the streets in Group 1, an improvement was seen across the board but particularly for the experimental streets. However, the three way interaction (which looks at whether there are any significant differences in the frequency of respondents in each group for each variable of interest) between time, street, and open space satisfaction was not significant for Hillsdon Road when compared with Northover Road (p = 0.967). The result was similar for Ridgeway Road (p = 0.410).

In Group 2, the results for the control street (Reedley Road) and Symington Road were consistent over time. No significant results for the three-way interaction between time, street, and open space satisfaction (p =0.449) were found. More responses indicated 'satisfied in 'post' than 'pre' in Whitehall Avenue, however due to low sample size a statistical comparison was not possible meaning any difference could potentially be due to chance.

5.5.4 Safety

The residents were asked the following three questions:

"In general, how safe or unsafe does the traffic speed in your street make you feel….

1. as a pedestrian?
2. as a cyclist?
3. as a driver?"

Responses were collected on a five point Likert scale from "Not at all safe (1)" to "Very safe (5)". For respondents who do not use these forms of transport, a "Not applicable" option

was also provided. Due to the low levels of responses at the extreme ends of each scale, the data were simplified into three groups “unsafe”, “neither safe nor unsafe” and “safe.

However, for some streets the sample sizes when broken down into the two time points were too small for robust statistical analysis to be conducted. Where this is the case, graphs and descriptive analysis has been included where a trend is indicated by the data.

i. Walking

Figure 5-27 shows the responses on feelings of safety when walking for each street and time point.

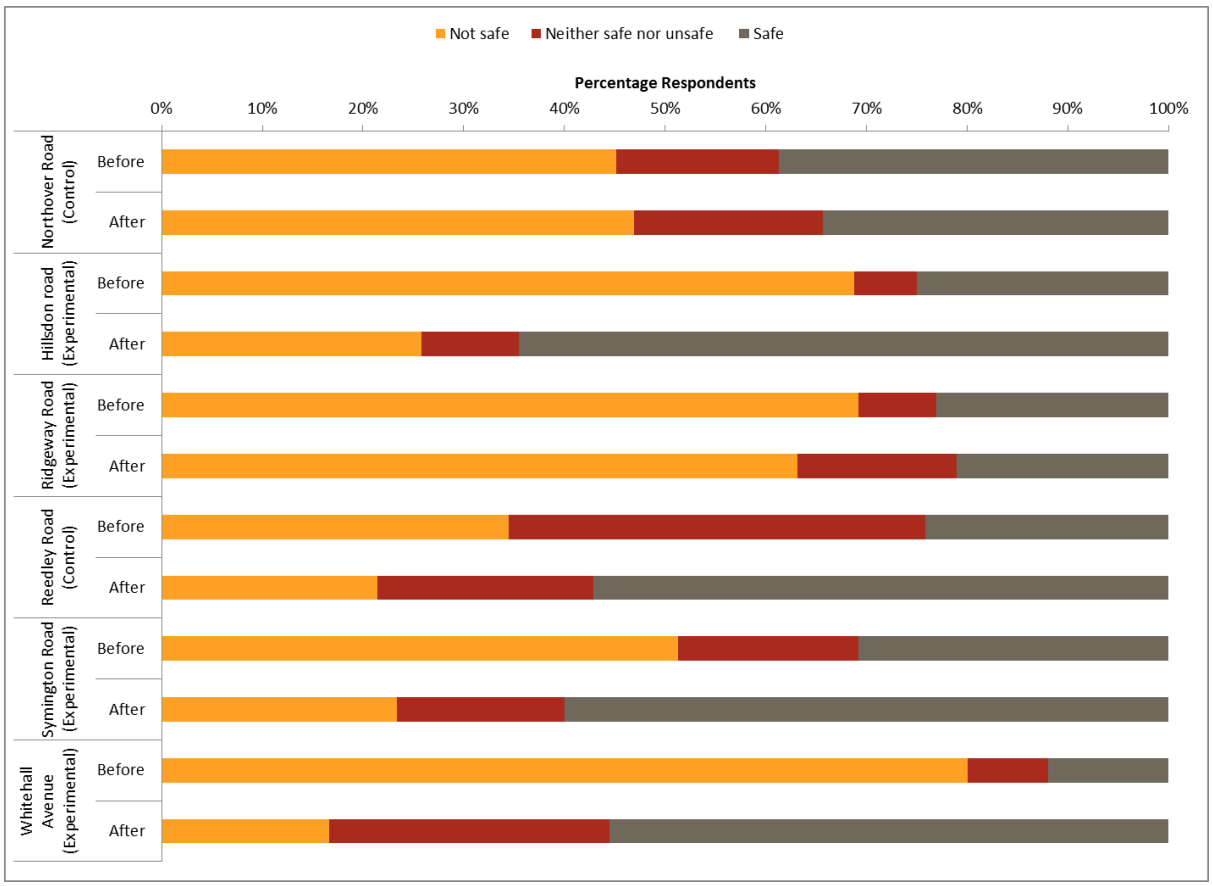

Figure 5-27: Pedestrian safety by street and time point

There was a marginally significant difference in pre-post difference in residents’ perception of safety between Hillsdon Road and the control street (p = 0.085).

No meaningful difference was found for responses in Ridgeway Road. The data for this street did not meet the requirements to perform a statistical comparison.

No significant difference between Symington Road and the control street was found for pre and post comparison of residents perception of safety (p = 0.520).

The data for Whitehall Avenue did not meet the requirements for performing a statistical comparison so it is unclear what if any impact the trial had on pedestrian safety along this street.

ii. Cycling

Figure 5-28 shows the responses on feelings of safety when cycling for each street and time point.

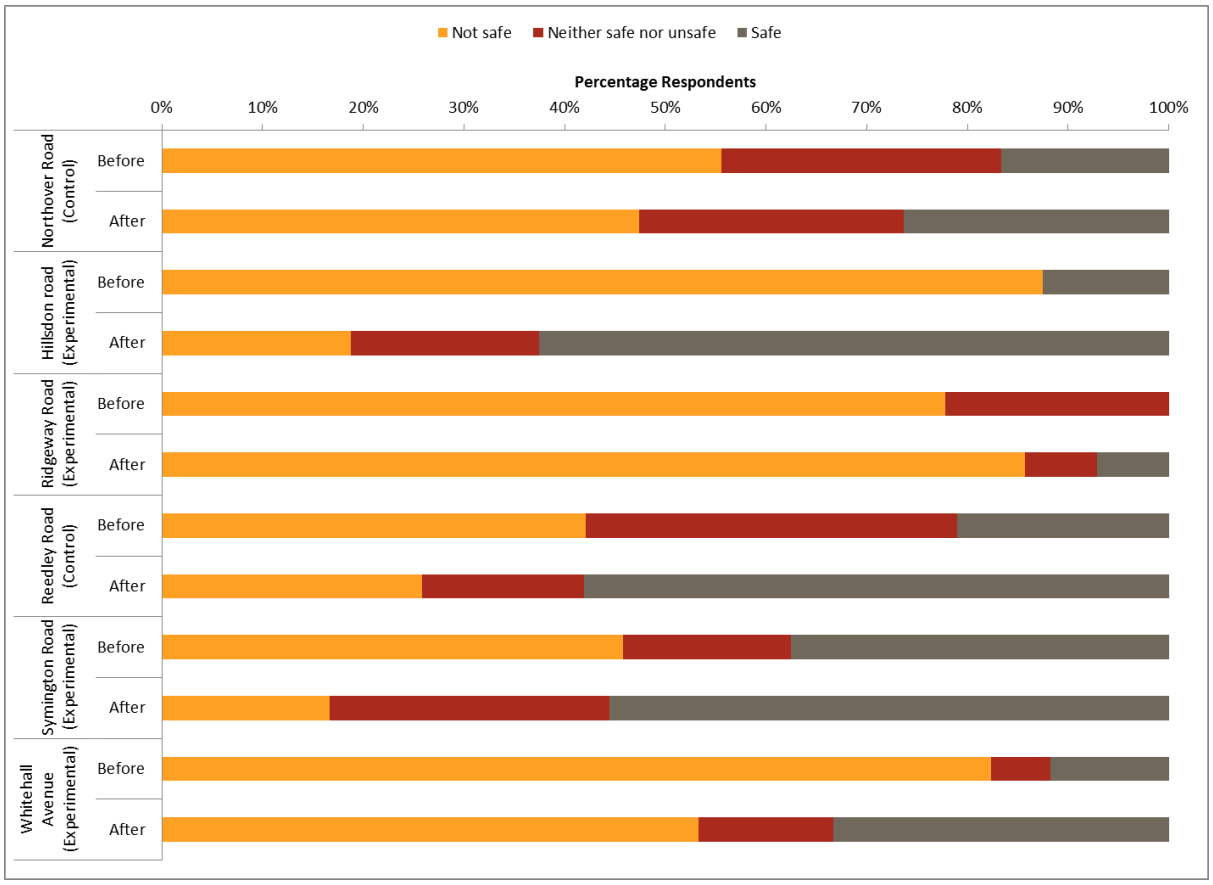

Figure 5-28: Cyclist safety by street and time point

At Whitehall Avenue, Ridgeway Road, and Hillsdon Road, there were too few people who responded to the questions about cyclists' safety to be analysed statistically i.e. there were not enough cyclists in these locations who answered the survey. The data suggest there may have been an improvement for Hillsdon Road although no clear change was observed for the other streets relative to the control streets.

Although Symington Road also saw an improvement in perception of cyclist safety between the two time points, the improvement was not substantially bigger than the improvement seen at the control street. This result suggests that the improvement may be unrelated to the trial.

iii. Driving

Figure 5-29 shows the responses on feelings of safety when driving for each street and time point.

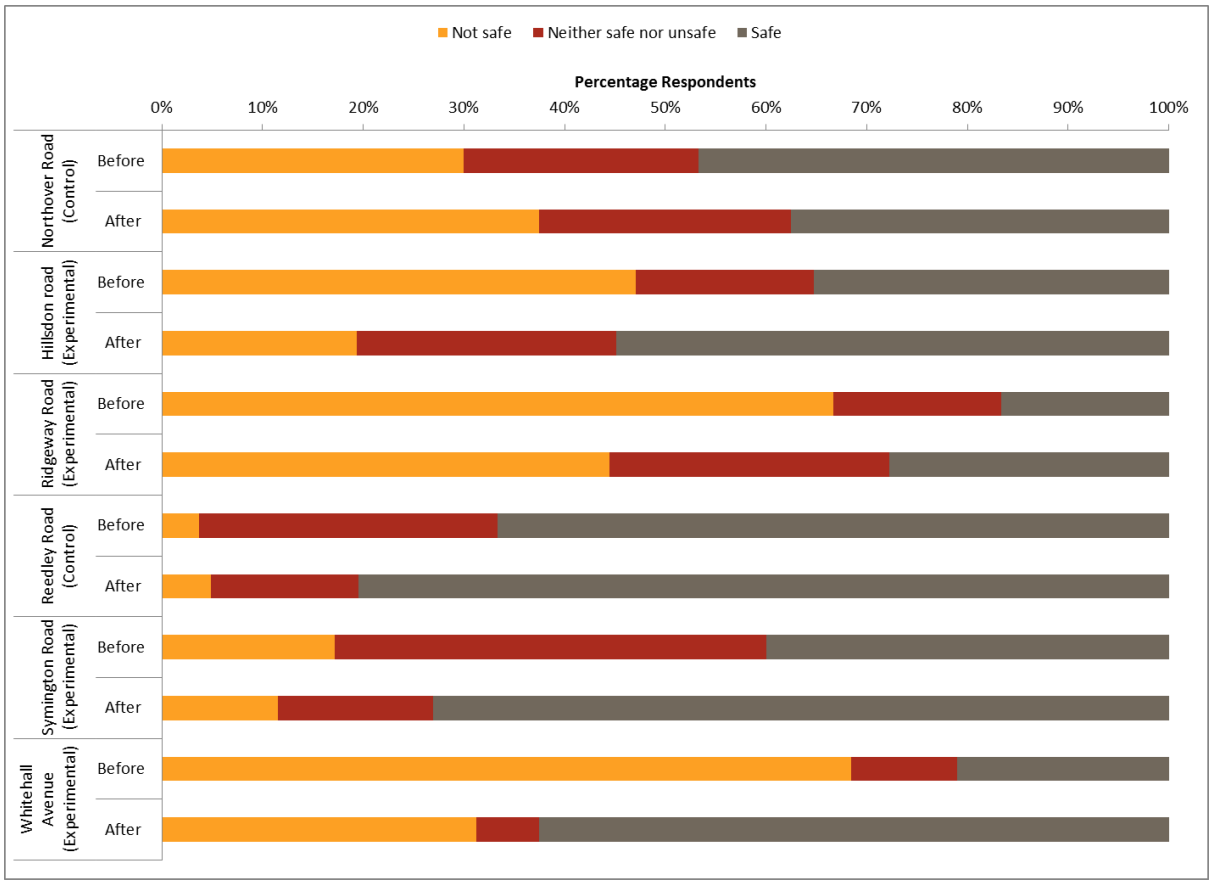

Figure 5-29: Driver safety by street and time point

Hillsdon Road saw an improvement in perceptions of driving safety relative to the control site. This result was borderline significant (p = 0.076) suggesting it could have been an effect of the trial. Ridgeway Road had a very similar result however it was not significant (p = 0.233). This may be because the change in responses from Ridgeway Road was between the 'not safe' and 'neither safe nor unsafe' option. There was no change in the proportion of residents who said they felt safe walking down their street.

Symington Road saw an improvement in perceptions of driving safety consistent with the improvement seen at the control site. This suggests that the trial may not have been related to this improvement. However, the data did not meet the criteria to perform statistical tests (too few groups had a frequency of less than 5).

Although there was a very small sample of drivers at time point 2 for Whitehall Road, the data suggests that perceptions of driver safety improved. This improvement also looks bigger than that seen at the control street (Reedley Road) suggesting the trial had the desired effect.

iv. Playing

Figure 5-30 shows the responses to the question "How safe or unsafe is it for children to play outside in your street?" for each street and time point.

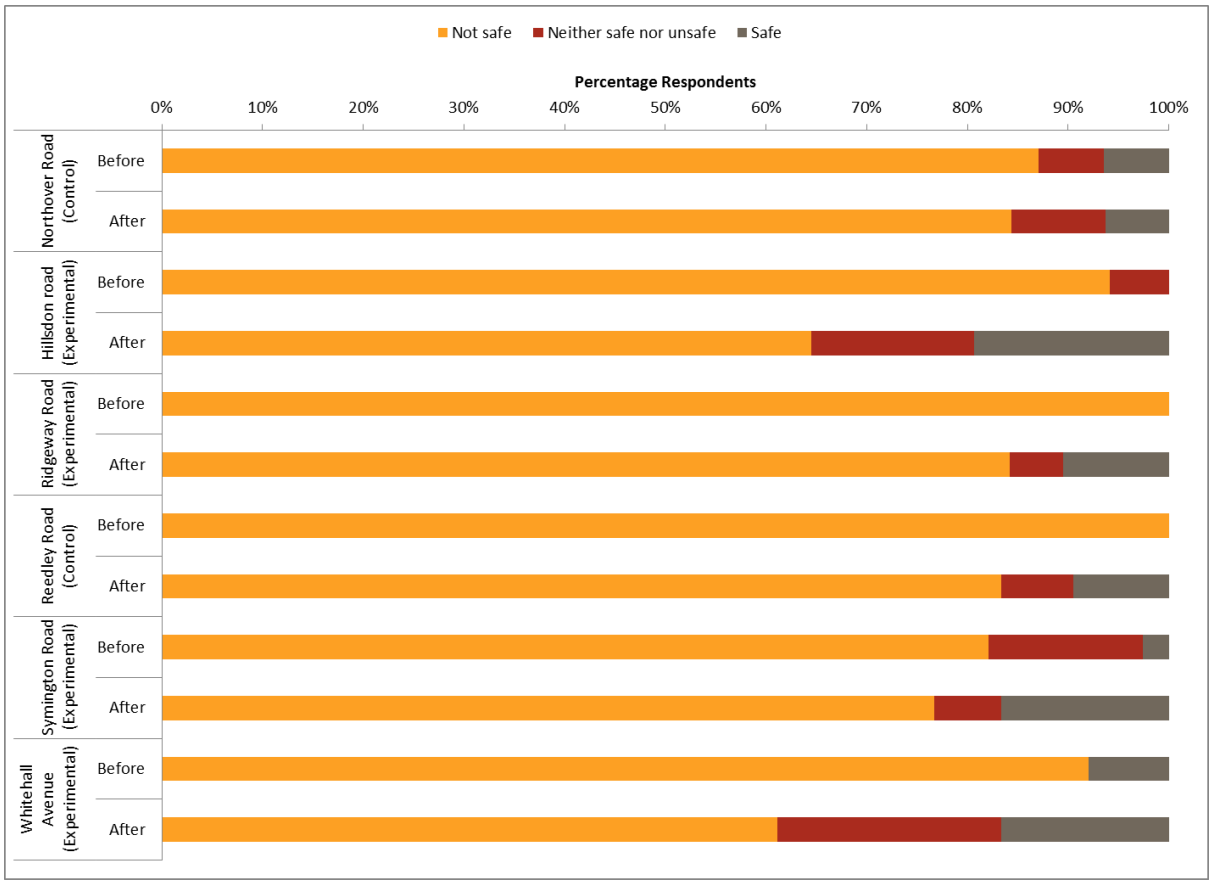

Figure 5-30: Safety rating for playing outside by street and time point

Due to the large number of small response groups (these were generally the 'neither safe nor unsafe' and 'safe' groups) no statistical comparisons could be made on this data. In general people did not think it was safe for children to play in any of the streets both before and after the trial. For Hillsdon Road there was a shift in a positive direction that was not seen at the control street (Northover Road). This could mean that the trial had a small positive impact on perceptions of safety at this street. Symington Road also became more positive but this change was replicated at the control street (Reedley Road). For the other streets the changes in were too small to evaluate.

5.5.5 Traffic speed

The residents were asked to indicate the impact of traffic speeds on their street on their decision to travel by foot, pedal cycle, and car. Responses were collected on a five point Likert scale from "never (1)" to "always (5)". Due to the low levels of responses at the higher ends of the scales, the data were converted to into binary variables for analysis (0=never, 1=sometimes).

i. Impact on walking

Figure 5-31 shows the responses to the question "How often does the traffic speed in your street impact your decision to travel by foot?"

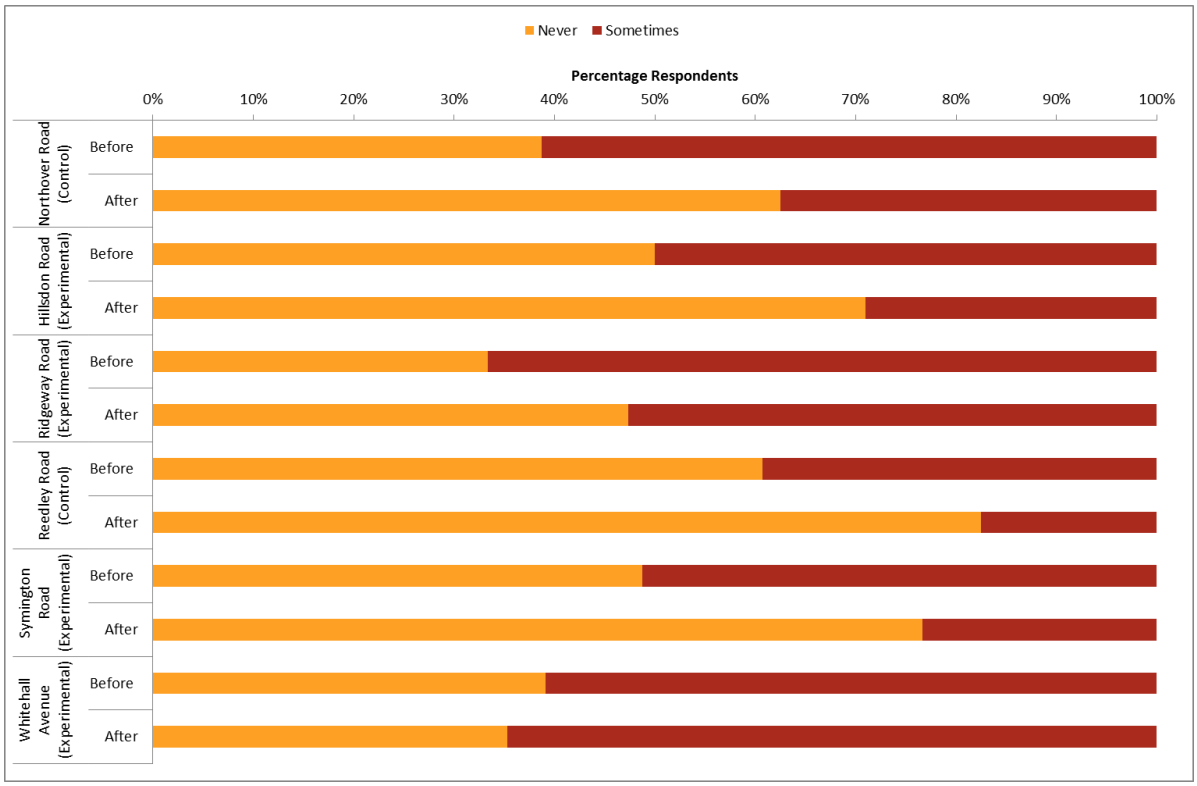

Figure 5-31: Rating for the impact of traffic speed on walking by street and time point

Although Hillsdon Road saw an improvement, with a higher proportion of 'never' responses after compared with before, this improvement was very similar to the control group which may mean that the changes at Hillsdon Road were not related to the trial. The results from an ANOVA[12] did not find a significant interaction (p = 0.885).

For Ridgeway Road, the results also saw an increase in terms of the proportion of people saying that the traffic speed in their street never impacts their decision to walk but again this increase was not significant in relation to the change at the control site (p = 0 662).

Similarly to Hillsdon Road, Symington Road saw an improvement very similar to the control group (p = 0.696) and hence did not have a significant result. Whitehall Avenue saw very little change in responses over time (p = 0.169).

Overall, these results suggest that the trial had very little or no positive impact on whether residents felt the traffic speed impacted their decision to walk. However, it is quite clear that it is very unlikely the trial had a negative impact on this outcome measure.

ii. Impact on cycling

Figure 5-32 shows the responses to the question "How often does the traffic speed in your street impact your decision to travel by bicycle?"

[12] As all variables included in the model were binary an ANOVA was suitable to detect changes and interaction between the variables.

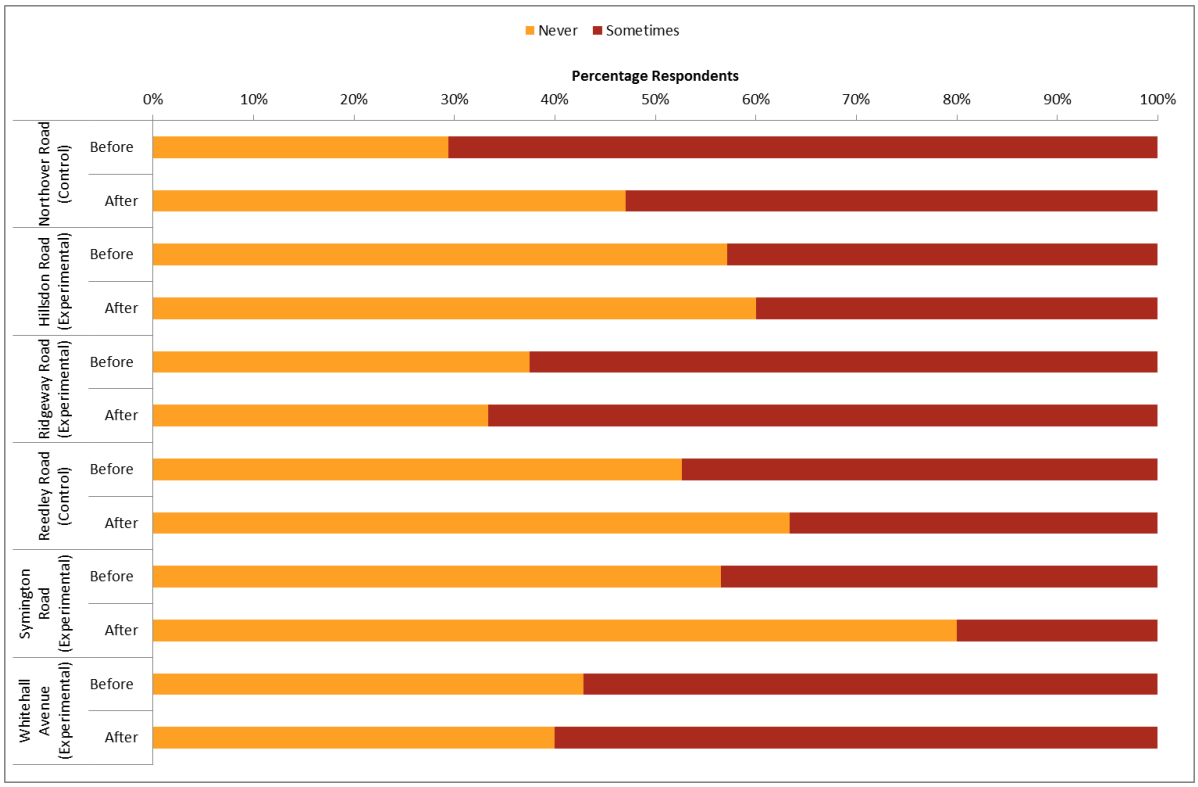

Figure 5-32: Rating for the impact of traffic speed on cycling by street and time point

Hillsdon Road had very similar responses at both time points suggesting that the trial did not change perceptions on the impact of traffic speed on choosing to cycle. A slight improvement was seen at the control street (Northover Road) which adds to this interpretation. Statistical tests (ANOVA) were also not able to detect a significant interaction between street (control and experimental) and time point for Hillsdon Road (p = 0.608).

The data for Ridgeway Road suggests that similarly to Hillsdon Road, no change in the impact of traffic speed cyclists was perceived by the street's residents due to the trial. Statistical tests confirmed that there were not significant changes over time relative to the changes at the control site (p = 0.445).

Symington Road had fewer 'sometime' responses 'after' compared with 'before'. This change was greater than that seen at the control street although it was not found to be significant (p= 0.556).

At Whitehall Avenue a small improvement very similar to the change at the control street was observed. This could mean that the trial had a positive effect but this is unlikely given the similar increase observed in the control data. The analysis did not find a significant difference between the responses over time for Whitehall Road relative to the control site (p = 0.571).

These results may be more reflective of the small number of people who typically choose to cycle regularly than a reflection on the trial. Overall they suggest the trial had little to no impact on where residents felt their decision to cycle was impacted by the traffic speed along their street.

iii. Impact on driving

Figure 5-33 shows the responses to the question "How often does the traffic speed in your street impact your decision to travel by car?"

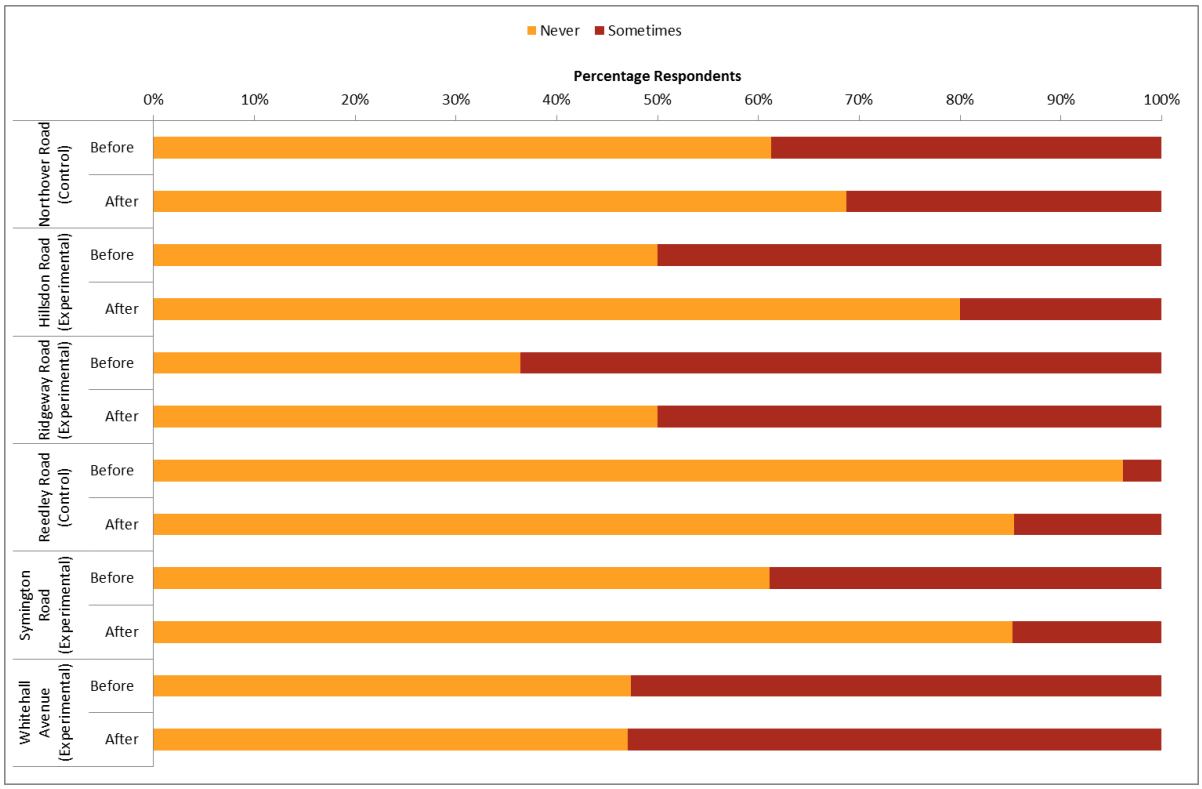

Figure 5-33: Rating for the impact of traffic speed on driving by street and time point

Hillsdon Road had substantially more people saying their decision to drive is never impacted by traffic speed after the trial. This improvement was bigger than that seen at the control site (Northover Road). However the interaction was not significant (p = 0.231).

However, for Ridgeway Road, the small improvement observed at this site was very similar to that seen at the control site. This suggests that the trial did not reduce the impact that traffic speeds had on residents' decisions to drive. This was found to be the case in the statistical tests which did not find a significant change over time at this site relative to the changes at the control site (p = 0.785).

For Symington Road, a large improvement was seen with a much higher proportion of respondents saying that their decision to drive is never impacted by traffic speeds. This is very different to the control site results where slightly fewer people said they were never impacted by traffic speeds. The ANOVA results found that the change in responses over time for Symington Road relative to Reedley Road were significant (p = 0.011). This strongly suggests that the planters had a positive effect on perceptions of driver safety.

There was very little difference in the responses for Whitehall Avenue for 'before' and 'after' although a decrease was seen at the control site which might suggest that the trial provided some benefit to the street (in other words the trial protected perceptions from the decreases seen elsewhere). However, the analysis did not find a significant difference over time for this street when compared with the changes at the control site (p = 0.521).

Unfortunately there were very few statistically significant results from the perception survey to draw conclusions from. This may be due to the small sample sizes collected by residents, or it may be that the trial has genuinely had little impact on these social and perceptual factors. Due to the extensive qualitative feedback we have received through the course of trials about the positive impact the trials had on social cohesion we suspect it is primarily due to sample size, but cannot draw conclusions without more robust analysis.

Summary of statistically significant results:

- The trial had an impact on social cohesion scores at Ridgeway Road: the analysis found a borderline significant improvement in social cohesion scores over time when compared with the control group.
- The trial had an impact on perception of street maintenance at Ridgeway Road: the analysis found a significant improvement in maintenance scores over time in comparison to the control group.
- All experimental streets saw at least a marginally significant decrease in design scores over time relative to the changes seen at the control sites. We are not clear on why this is the case, particularly due to the resident feedback as explained in Section 5.4.
- The trial improved perceptions of pedestrian and driver safety at Hillsdon Road: the analysis found borderline significant increases in 'safe' responses for these two measures in comparison to the control group.
- The trial improved perceptions of driver safety at Symington Road: the analysis found significant increases in 'safe' responses in comparison to the control group.

5.5.6 Quantitative Data Summary – Resident's Perception

Table 5-8 below highlights the trends observed on all streets. Based on the absolute data from the residents' perception survey, it can be concluded that:

- Residents' perceptions of social cohesion have either improved or not changed on experimental streets; while it has shown a negative trend on control streets;
- Residents' perceptions of air quality and noise levels on their street have certainly improved on experimental streets after scheme implementation compared with control streets;
- Residents' perceptions of the amount of open space have improved positively on all experimental streets (except for at Whitehall Avenue) compared with the control streets;
- Residents' perceptions of safety have increased on experimental streets, be it for walking, cycling, driving or letting their children out on the street compared with the control streets.

Table 5-8: Summary Table for Impacts of Community Corners on various parameters

Street		Northover Road	Hillsdon Road	Ridgeway Road	Reedley Road	Whitehall Avenue	Symington Road
Traffic		(+) 15% to (-) 9%	(-) 18 to (-) 50%	(-) 21 to (-) 39%	(+) 20% to (-) 17%	(-) 7 to (-) 34%	(-) 1 to (-) 31%
Speed	50th percentile Speed	(+) 1 to (-) 1 mph	(-) 1-5 mph	(-) 1-7 mph	0 to (-) 2 mph	(-) 5-13 mph	(-) 3-8 mph
	85th Percentile	(-)1 to (-) 2 mph	(-) 1-7 mph	(-) 2-7 mph	0 to (-) 3 mph	(-) 3-12 mph	(-) 4-7 mph
Community	Social Cohesion¥	--	No Change	+	-	No Change	++
	Neighbourhood Integration¥	-	+	-	+	+	-
Environment	Maintenance¥	+	+	-	-	-	-
	Design¥	+	-	-	No Change	-	-
	Perceived Air Quality*	+	++	+	-	++	+
	Perceived Noise Levels*	-	++	++	+	++	-
	Open Spaces*	+	++	++	-	-	++
Safety	While Walking¥	-	++	+	++	++	++
	While cycling¥	+	++	+	++	++	++
	While driving¥	-	++	++	+	++	++
	Children playing on the street¥	No Change	++	+	+	++	+

¥ + implies positive trend
- Implies negative trend

* + implies <10% positive trend in perception (either reduction in % of people voting for poor or increase in % of people voting for Good)
++ implies 10-20% positive trend in perception (either reduction in % of people voting for poor or increase in % of people voting for Good)
- implies <10% negative trend in perception (either reduction in % of people voting for poor or increase in % of people voting for Good)
-- implies 10-20% negative trend in perception (either reduction in % of people voting for poor or increase in % of people voting for Good)

5.5.7 Qualitative Summary

Throughout the course of the project, informal process evaluation was undertaken where lessons learnt were collected and qualitative feedback from residents and stakeholder partners recorded. The following section briefly highlights feedback from residents of the four experimental streets on intervention impacts:

Quotes from resident of Hillsdon Road:
"The impact of the street planters has been fantastic. Not only do they look great, adding colour and interest, they have most certainly reduced speeds on Hillsdon Road, and made people think twice about using it as a rat run. People have to drive carefully now, which has made the road far safer - and quieter too!"

ii. General Attractiveness of the street

Residents, frequently comment on "how beautiful the planters" look on their street. Most residents comment that the planters helped in making their street look more attractive, brought more greenery to the street and are pleasing to look at.

Quotes from residents of Ridgeway Road:
"I actually quite like seeing a bit of greenery and flowers in the planters. It makes the street look a little more attractive."

Quotes from residents of Ridgeway Road:
"Spotting the planters reminded me to check my speed, especially when the road was quiet and clear, otherwise I have accelerated without thinking."

i. Community Feel

Over 80% of residents on installation day fed back positively about the change in their street. Key themes included, getting to know neighbours better, being outside, impacting on traffic and collaboratively working with neighbours for the betterment of their street.

Quotes from residents on Whitehall *Avenue*
"I think they are brilliant …. The majority of people have been really friendly and really supportive. The planters look great and have been really effective at slowing the traffic and reducing the amount of traffic… It has made the street look more attractive and most people in the wider community have been really supportive of it."

iii. Safety

Some residents have also reported an increased perception in safety, commenting on reduced traffic volume, especially during rush hour and reduced traffic speed, which makes them feel e safe while walking or while taking their children out.

Quotes from residents on Whitehall *Avenue*
"The planters have greatly reduced the speed outside our house. Since the planters the rush hour traffic has drastically decreased so I feel safer getting kids into car for school. People do still speed but not as much. We like them."

5.6 Conclusions

i. Impact of 'street design' based on furniture and road painting on traffic speed and volume on residential streets.

Traffic on experimental streets has shown a decline in volume across all four streets post implementation of Community Corners. In comparison, control streets have been observed to exhibit a mixed trend, with traffic volume variation ranging from +15% to -9% on Northover Road and +20% to -17% on Reedley Road. This may be due to several factors like weather, routine fluctuation of traffic, etc. On the other hand, experimental streets have exhibited significantly larger percentage reduction in traffic volume which shows that schemes like Community Corners can reduce traffic volumes on the residential streets especially by reducing rat runners.

Traffic Speed was observed to reduce significantly on all four experimental streets compared with control streets. The 50th percentile speed observed on control streets varied between +1 mph to -1 mph at before and after time points. However, change in speeds before and after implementation of the scheme ranges between 1 – 13 mph.

- Whitehall Avenue, with the intensive scheme (Four planters installed on the street, standing a distance away from the kerb, forming chicanes, and six painted patterns) observed the maximum reduction in traffic speed with 50th percentile speed changing by up to 5-13 mph during various times of the day. These planters posed as barriers on the otherwise, long, straight and wide Whitehall Avenue and helped in reducing traffic speed. Traffic volume reduced between 7 – 34% at various times during the week. This indicates that reduction in speed on the street might have led certain drivers to find alternate routes.
- Hillsdon Road again had an intensive design of the scheme with three planters on Hillsdon Road and four painted patterns. Hillsdon Road residents had complaints about the cut through traffic trying to avoid traffic signals on the Falcondale Road. Post-implementation of the Community Corners, the traffic on the street reduced between 18% to 50% at various times during the week and the 50th percentile speed reduced by 1 – 7 mph.
- Ridgeway Road had a less intensive scheme compared with the two streets listed above. They installed three planters and four painted patterns, same as Hillsdon Road, however, the planters were placed quite close to the kerb as the street has considerable on-street parking. However, even with that the 50th percentile speed was observed to reduce by 1 – 7 mph and traffic reduction ranged between 21% to 39% during various times during the week, post-implementation of the Community Corners.
- Symington Road had the least intensive scheme with two planters at each end of the street and two painted patterns. Even then the 50th percentile speed reduced between 3 – 8 mph and traffic reduced by up to 31% (excluding one instance when it was seen to increase by 5%). This suggests that even low intensity schemes such as Symington Road can have a significant impact on traffic speed through changing the 'feel' of a street.

ii. Impact on Residents' Perceptions

The secondary parameters measured for the study included residents' perceptions of their community, environment on the street and safety perception. General trends showed a positive trend in residents' perception on safety and environmental parameters on experimental streets implying that such schemes do help in bringing Communities closer to work together and change the feel of such streets so that residents feel safer to walk, cycle, drive or let their children out on the street.

5.7 Process Evaluation

Delivery of this project has been exceptionally challenging, primarily due to the effort required from the community on installation, and time constraints of the Council in

supporting the project on top of an already intensive workload. Lessons learnt regarding the delivery process include:

- Installation of Planters etc. should occur during summer, outside the holiday period. As per the initial plan, the installations were planned for February-March 2018; which meant a lot of work by the residents during the Christmas period. This resulted in two streets backing out of the process as they could not devote time for the crucial initial consultative process required for the project. Weather also caused significant project delays (>2.5 months from weather alone).
- Design specifications for any street furniture should be carefully agreed with the furniture provider including, for example, whether it has legs, comes pre-assembled, will be delivered with crane to lift off lorry etc. Design specifications of all furniture, paint, plants etc. are included in Annex 11.
- Resident support on the street is critical the project will not succeed without exceptionally strong community commitment and energetic, resilient and determined community leaders from within the street. The effort required should not be under-estimated; neither should the resilience required as conflict from within the street is common. This approach will not work for every street, only for those with exceptionally committed residents, and a significant majority clearly on board to make change.
- Have a strong programme manager for the overall project to support the streets and facilitate the change. Without a facilitator who has a relationship with the Local Authority and can effectively support, coach and manage each street it is unlikely many streets would be able to achieve the change with sufficient consultation and following due process on their own. This need not require huge amounts of time, one manager facilitating four streets could manage this in 0.5 days per week average across an entire year, with a busy spell during a 1-2 month period of intervention installation.
- Provide sufficient time for responses from the Local Authority, this is likely to be additional to their core workload. Agree up front what is required from the Local Authority, what they need to sign off on intervention designs (in detail), communication methods and agreed response times. A basic service level agreement type approach may be helpful in setting expectations for all parties. Street closures can take in excess of 6 weeks to book, and design approvals can take over 8 weeks. Have a primary contact, and secondary contact for when the primary contact is unavailable.

6 DISSEMINATION PLAN

The results of the research study will be disseminated to multiple audiences, via different channels in order to share the evaluation results of this project. The dissemination plan is broken into a four step approach as shown in Figure 6-1.

Figure 6-1: Dissemination Plan

6.1 Information to be disseminated

The aim of the dissemination plan is to maximise the impact, visibility and credibility of this evaluation. A short version of this report will be produced highlighting the key impacts and outlining the process for delivery along with key lessons learnt. This will be the primary dissemination material. A PowerPoint will also be produced for use in aiding presentations at the relevant conferences targeted for dissemination.

6.2 Target Audience

The key audience for this research study would include:

- Councils – any borough, city, town council who wants to adopt a low cost method to reduce speeds on residential street as part of their aims regarding road safety targets. TRL works with several boroughs, councils and commissions through the UK on road safety projects, and many more on other transport related projects. Our teams will disseminate results of this study to relevant departments within Local Authorities across England who are responsible for residential streets, road safety on residential streets, and managing traffic on residential streets.
- Local Councillors / Resident Associations – motivated residents who are trying to resolve issues of rat running traffic on their street.
- Road Safety Officers within the police and Local Authorities.
- Research Organizations, such as universities and research institutes. The project's results will be disseminated to TRL's partner universities and research organizations for the purpose of promoting uptake of similar interventions and methods in other projects of similar nature. This might also provide an opportunity for stimulating discussion and peer review of the project results and activities, which will also help in promoting the work further that builds upon the key finding of the project.
- Professional bodies such as CIHT and CILT, who have their own effective dissemination networks through publications, newsletters, websites, and events, and often participate in policy making consultations and expert groups.

6.3 Medium of Dissemination

The outputs of this study shall be disseminated via the following channels:

- Email to current local authority contacts with short report attached, focused on road safety elements of Local Authorities.
- PowerPoint based presentation to key conferences.
- Full report published on TRL's website
- Social Media – TRL's marketing team will host the details of this project on our LinkedIn account immediately, spreading the word with over 7000 followers of TRL. Members of the team will push the report through the LinkedIn networks.

6.4 Dissemination Activities

6.4.1 Conferences, Seminars, Workshops

Attendance at and participation in conferences, seminars and workshops related to road safety will be targeted by TRL, in order to meet relevant stakeholders, other practitioners and disseminate the positive outcomes of this research study. A provisional list of conferences is listed below:

i. Smarter Travel,

ii. TRL Research Symposium

iii. National Road Safety Conference

iv. Highways UK

Appendix A References

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Quimby, A and Castle, J, (2006). A review of simplified streetscape schemes. PPR 292. TRL Ltd, January 2006. http://content.tfl.gov.uk/review-of-simplified-streetscape-schemes.pdf

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Sustrans - Obstacles in the Carriage-Way: Technical Note 31 (2012)

Sustrans project sheet – Community street design Beechcroft Road, Oxford

Sustrans project sheet - Community-led street design Turnpike Lane Haringey

Annex 1: Campaign Flyer

TRL THE FUTURE OF TRANSPORT

Road Safety Trust
Supporting Road Safety

Funding available for safer, quieter Bristol streets

TRL have funding available for four streets to design Community Corners within Bristol. Slow and reduce traffic on your street:

- Install planters and trees on the road
- Design street seating areas for rest, relaxation, play and dinners together.
- Paint permanent murals on roads to remind drivers kids live here
- Create street parties to bring your street together to redesign your road

What you need:

2 residents willing to spend time engaging neighbours, creating a residents group, and facilitating meetings. Re-designing a street will be challenging but rewarding!

Apply for funding here:
http://www.smartsurvey.co.uk/s/7KRP6/

Annex 2: Community Corners – Street Nomination Form

1. Nomination for Community Corners

Thank you for deciding to nominate your street for the Community Corners scheme. We would like to know about your street and understand issues on your street in order to design Community Corners which would help in making your street safer and quieter. There are a total of 15 questions and it shouldn't take more than 15-20 minutes of your time. Please note that all data is confidential and will only be used for the purposes of this project and will not be shared with any third parties for any reason.

2. Information about the Street

Please explain, in a few brief sentences why you think your street is the right street for Community Corners.

Name of your Street *

Postcode *

Are there any issues on your Street regarding traffic that you and your local community would like to resolve?

What type of Parking is permitted on your Street?

- ☐ On-street, Resident Permit Holder Parking Only
- ☐ On-Street Resident Permit Holder as well as Pay & Display
- ☐ Off-Street Parking only
- ☐ Other (please specify):

Please describe any issues regarding Parking on your Street.

Are there cycle tracks present on your Street? *

- [ ] Yes, both sides of the Street
- [ ] Yes, only on one side
- [ ] No

What is the speed limit on your Street?

- [ ] 20 mph
- [ ] 30 mph
- [ ] > 30 mph
- [ ] Unsure

Have you observed drivers speeding in your Street?

- [ ] Yes, frequently
- [ ] Yes, but rarely
- [ ] No

Have there been any accidents on your Street in the last year that you are aware of?

- [ ] Yes
- [ ] No
- [ ] Unsure

3. More Information about You

This information is required in order to have a point of contact for the shortlisting process. TRL will not share your personal details with any other 3rd parties.

Your Name *

Contact Details (Email Address & Phone Number) *

In thinking about the residents of your street, do you think there will be significant support, resistance or apathy towards a Community Corners scheme? Please explain.

Delivering Community Corners can take time. You'll need to engage your neighbours, hold a couple of residents meetings, attend a workshop with us and lead the installation one weekend with help from your neighbours. Do you have the time and energy to take this one, or if not, do you have a named person or person(s) who would?

Please list other residents who will support you/the lead in delivering Community Corners.

Annex 3: Minutes of the Meeting (Inception Meeting with Bristol City Council)

Client	Road Safety Trust and Bristol City Council
Project	Community Corners
Subject	Inception meeting
Date	16th November 2017
Venue	Bristol City Council, Town Hall
Attendees	Mark Sperduty (Area Manager, Highways, BCC) Catherin Boutwood (BCC) Lauren Curl (Community Engagement officer, BCC) Scott Davidson (Deputy Group manager, TRL) Megha Gupta (Consultant, TRL)

Discussion Points

No.	Outcome of Discussion
1	SD outlined project, noting it's very much in planning stages in terms of delivery though recruitment has been strong with 28 full applications and a further 34 partial applications. Project now on tight deadlines, with a hope to finish recruiting w/c 20th Nov, installation in January, and testing from February to April with the first workshop planned for w/c 04th December. Final report due Jun 2017.
2	LC had reached out local road safety aspects of police (Ins Justin French).
3	MG took group through progress to date and current status.
4	BCC happy to be involved on a sign off level basis, and as needed through project but no need to involve in every workshop and meeting. TRL will keep team in loop, with invites to all workshops – but no expectation/pressure on attendance.

Action Points

No.	Action Points
1	Further streets to be nominated by MS/ C/ LC by end of 29th Nov for inclusion
2	TRL to reach out to local councillors for nominations by similar date
3	TRL to check liability for installation event on street and ensure insurances are in place
4	Jack Terry would handle any TTRO's. Street closure application process would take about 6 weeks; therefore, there is a need to start this as soon as the streets are shortlisted.
5	MS to send split street photo's over
6	SW Action reduction group, and Road Safety GB to be included in any dissemination
7	TRL to share streets with LC – LC to feedback on any roads at risk of speed limit changes which would affect traffic speed before Jun 2017
8	TRL to share "summary of intervention" with MS for use with internal colleagues and working groups i.e. Transport delivery body)

No.	Action Points
9	TRL to consider conservation area status amongst factors in selecting target streets. Other factors to be considered shall include – Residential Parking Zones, Crash rate, any planned engineering works, and available parking bay/space along double yellow line.
10	TRL to share the furniture range from Broxap with BCC

Annex 4: Presentation – Inception Workshop with Shortlisted Streets

Agenda

- Introductions
- Introduction to the Project
- Update – Street Nominations, Shortlisting Process
- Examples – Images
- Expectations from Resident
- Q&A

the future of transport.

Introduction to the Project

Community Corners can involve anything like:

- Installing Planters and Trees on the Road;
- Street Seating areas for rest, relaxation, play, dinners together;
- Painted Murals on the roads

How we do this:

- Community Engagement – residents involvement and ownership are a must;
- Organising Street Parties – bringing residents together to re-design their streets; installing street furniture; painting roads

Benefits:

- **Reduced Speeds** – Community Corners can help in reducing traffic speed on the street and thus reduced accidents and fatalities
- **Cleaner and Greener Streets** – helps in making the street liveable and a safer place for your children to play, including reduction of harmful pollutants from exhaust fumes
- **Social Inclusion** – an ideal way of getting to know your neighbour and working together towards a better environment to live in

Aim of the **Research Project**

- To develop and pilot a community led street design approach designed to reduce excessive speed and traffic volume in residential streets
- Evaluate the impact of the pilot
- Understand if 'street design' based on furniture and road painting can impact on traffic speed and volume on residential streets
- Understand if 'street design' based on furniture and road painting can improve social cohesion, and perceptions of traffic noise, air quality and "livability" of streets for residents

Wider Aims that we are trying to achieve:

- Create a physical barrier to high speed through prominent placement in the road
- Change the driver's line of sight to encourage drivers to reduce their speed
- Change the 'feel' of the street towards a residential street full of children

To establish an evidence of Impact of such Interventions on speed and safety aspects on streets; to secure future funding and implementation in other parts of the city/country

Update – How we got here.. What's Next

Street Nominations

- Through FB campaign
- Inputs from Bristol City Council
  - Nominations from residents who might have raised complaints with them
- Inputs from Councillors

Shortlisting Process

- Streets not falling under any other Traffic scheme area
- Streets not part of Residential Parking Zone;
- Street Characteristics – which may encourage speeding;
- Accident Rates on the Streets;
- Inputs from BCC;
- Inputs from Road Safety Officer

the future of transport.

Examples

the future of transport.

Beechcroft Road, Oxford

- https://www.youtube.com/watch?v=WawJKtvVHKs

Expectations from Residents (experimental)

- Constitute Resident Group (Management committee, bank account).
- Resident engagement. (At least one community meeting – consultation).
- Procuring Street Furniture, soil, plants, paint, tools.
- Organizing Street Party/ Installation day:
  - *Getting TTRO (6 weeks in advance)*
- Street Design Process – what would your Community Corner(s) *(Street Design – Sign-off by Bristol City Council/HE)*
- Street Party/ Installation day:
  - Getting as many residents to participate
  - Install Street Closure Safety Signage; Street Furniture
  - Measure Speeds/Parking Surveys before and after Installations
- Ongoing maintenance/ movability/ damage to road.

TRL to Support – Part of 2nd Workshop

Residents to do on their own

TRL to Support – Part of 2nd Workshop

TRL will support by liaising with Broxap for procuring Street Furniture)

TRL to:
- Get TTRO;
- Help with Installation;
- Provide Survey Methodology, formats, speed guns
- Provide safety measures – HighViz Jackets

Expectations from Residents (control)

- Measure Speeds/Parking Surveys before and after Installations
- Survey residents perception of street/ air quality/ noise pollution etc.
- Join other streets workshops and street parties and meetings to learn from their mistakes for when you come to do your street!

Build the case for future funding through being involved in this project, engaging the residents, and creating the evidence base. We will point you towards potential funding pots at the end of the project.

Resident engagement

- What to expect/ how to do it.
- Overcoming objections
  - "We don't want change/ why should we allow this/ what right do you have".
  - There aren't enough parking spaces
  - It won't work
  - It's dangerous
  - It will attract drug-users/ alcoholics/ teenagers/ homeless
  - No-one will sit in it
  - Fire engines won't get through
  - Delivery trucks won't get through
  - You can't put it outside my house, it's my parking space.
- How the council react to complaints/ handling complaints.

TRL to Support – Part of 2nd Workshop

Residents to do on their own

TRL to Support – Part of 2nd Workshop

TRL will support by liaising with Broxap for procuring Street Furniture)

TRL to:
- Get TTRO;
- Help with Installation;
- Provide Survey Methodology, formats, speed guns
- Provide safety measures – HighViz Jackets

Funding, furniture and support

- 2 planters + 1 bench plus £250 per street.
- Total value of around £5 - 7k of furniture and funding.
- Support sourcing soil, plants, furniture, paint, signage.
- Speed Guns & training.
- Project materials and resources.
- Access to Bristol Highways department through TRL.
- Evidence base for future funding/ changes.

Annex 5: Minutes of Inception Workshop

Project	Community Corners
Subject	Introductory Workshop
Date	07th December 2017
Venue	Board Room, King's Centre, Bristol
Attendees	Mary Rivers (Reedley Road) Rigby Allen (Hillsdon Road) Nils Lindahl Elliot (Symington Road) Rachel Gibson (Symington Road) Simon Dunk (Symington Road) Zoltan Harkin (Lake Road) Jenny Winters (Whitehall Avenue) Michael George (Whitehall Avenue) Kelly Haskins (Whitehall Avenue) Sophia Wakefield (Whitehall Avenue) Scott Davidson (SD) (Deputy Group manager, TRL) Megha Gupta (Consultant, TRL)

Discussion Points

No.	Discussion Points
1.	SD gave an introduction to the project highlighting: • What are Community Corners and what are the benefits? • Research objectives of the project and the wider benefits to the Community • Update about Street Nominations, Shortlisting Process • Examples of Community Corners • Our expectations from the residents of Experimental Group Streets and from the residents of Control Group Streets
2.	Q&A i. Can the planters be made of any other material than wood? Yes, it can, budget pending. We have been liaising with Broxap (Street Furniture Provider). We can only use the furniture SD will provide links to for free. But if streets can access additional funding, then residents are free to look at the Broxap website and choose something that would fit in the budget. ii. How many Parking Spaces would be used if we install Community Corners? 1 Parking space per corner. Parking Surveys will be done before and after the implementation of community corners by the residents. Generally it is observed that there are vacant spaces on streets. iii. Who would be liable for if anyone gets hurt due to the planters installed? – During installation residents will sign a liability disclaimer so that neither TRL nor the council are liable for installation related crashes. After installation traffic related crashes will be treated like any other public space crashes so residents will not be liable. iv. Would a long street like Lake Road benefit from just 1 corner? This is not a yes/ no answer. Speeds are likely to reduce in the vicinity of the corner, but may reduce in other areas of the street too. You will get greater impacts, the greater number of these you install. TRL will help to look for alternate funding sources as well, to implement more such corners on the street. Meanwhile, 1 section on the street can be taken up for experiment. There are no set rules for appropriate length for 1 corner or for distance between 2 corners, however, TRL will support in identifying an appropriate section.

Action Points

No.	Action Points
1.	Action Points for TRL: i. Provide residents with list of immediate action points ii. Provide residents with leaflet on Community Corners which could be used by them while discussing this with their neighbours to gather support iii. Guidance material for the constituted group iv. Share details regarding street furniture that we have spoken with Broxap about
2.	Action Points for Residents: i. Gather maximum support from residents on the street – door knocking on each house; community meeting ii. Working towards forming a Constituted Group (With Chairperson, Secretary and Treasurer); setting up of a Bank Account

Annex 6: Guidance Documents for each street

i. Overcoming objections

The key thing in overcoming objections is to ensure the objector feels listened to and understood. The best way of doing this is to

- Listen patiently, don't interrupt, and show you're engaged.
- Ask questions to further your understanding of what they're concerned about.
- Repeat back in your own words what you think they're saying.

Once you've spent enough time (usually indicated by the person calming down, relaxing and opening to conversation) listening, then you're ready to persuade.

- Start persuading by acknowledging the persons worry, and that you do or have shared this concern too so you looked into it more.
- Note that nothing has been decided, and that this is community led meaning changes will only be made if residents want them. Re-assure that nothing will be forced on the residents. This step is about listening.
- Use soft tones, quietly spoken.
- Outline, gently what you've found/ been advised by TRL re the objection.
- Ask the person how they're feeling now.

The person will probably still have some reservation. You can acknowledge this, and use it to ask them to come along to the meeting, as we really want to make this a decision by the residents for the residents.

Specific objections:

- "We don't want change/ why should we allow this/ what right do you have".

Whether change happens or doesn't, there will be a group of people unhappy. We need to acknowledge different opinions, listen to everyone, and then go with what the majority of residents would like.

- There aren't enough parking spaces

We were worried about that too, so we checked. We did parking spaces counts x times this week and found x, y, z so actually we think it will be OK.

- It won't work

I thought the same, but TRL ran us through a few schemes like ones in the Netherlands, and then a few in Bristol which seem to have been really effective in reducing speeds. One in Stonebridge Park reduced speeds from 38mph to 23mph on average and stopped really massive trucks using the road as a shortcut.

- It's dangerous

It's been shown to reduce speeds, and is no different to a parked vehicle on the road in terms of being a physical barrier something could crash into. They're appropriately signed at night so they glow brightly in headlights.

- It will attract drug-users/ alcoholics/ teenagers/ homeless

That hasn't been the case in other community corners thus far.

- No-one will sit in it

That may be true, though the purpose is the change the feel of the street for drivers. There is one corner in Stonebridge Park which families regularly sit in to eat together with neighbours, and another is used by an elderly resident to sit and rest on her daily walk.

- Fire engines won't get through

The measurements are specifically set out to ensure fire engines get through no problem.

- Delivery trucks won't get through

Normal trucks (Bin Lorry size or less) will have no issue. It would be good to deter over-sized arctic lorries from coming down the street though?

- You can't put it outside my house, it's my parking space.

We will seek to put it in places where it's wanted, so if you don't that's OK, we'll do our best to avoid that.

ii. Leaflet Template for Resident's use

Potential changes to our street – (Name of the Street)

Dear neighbour, a number of residents have raised concerns about traffic speeds. They're concerned about the safety of the children on our road. We've come across some funding which may enable some changes to slow traffic down. Could you join us at 7pm on the 18th of December to chat about how we could improve our road together?

If the majority of residents would like to make some changes, then we'd seek to try to do so over the next couple of months.

Look forward to seeing you, best wishes, Fellow neighbours.

iii. Constitute of the Resident Group Template

CONSTITUTION OF THE (Name of the Resident Group)

1. Name

   The name of the group shall be "(enter name of the group)"

2. Aim

To continuously improve the quality of (enter name of the street) ("the street") for residents, specifically with reference to benefits for the health, well-being, happiness and social cohesion of the street's residents.

3. Objectives

The group will fulfil the aim by:

- Working together as residents regardless of age, length of residency in the street, ethnic origin, ability, sex, belief or political affiliation recognising the value of our many differences.
- Involving local people in improving the street.
- To carry out and promote both physical improvements to the street, and events within the street by working with statutory and non-statutory agencies.
- To raise funds and receive contributions where appropriate to finance the work.
- To publicise and promote the work where this contributes to the group's over-arching aim.
- Open bank accounts.
- Make rules and standing orders for categories of members and their rights.
- Take out insurance as necessary and appropriate.
- Organise meetings, training courses and events as necessary to support the improvement of the street.
- Work with similar groups and exchange information and advice with them.
- Take any action that is lawful, which would help it to fulfil its aims.

4. Membership

(a) Membership of (enter name of the group) shall be open primarily to (street name) residents only, and by exception to anyone who is interested in helping the group to achieve its aim and willing to abide by the rules of the group. Exceptions will be considered by the management committee on a case by case basis.

(b) Every member shall have one vote at general meetings.

(c) The Management Committee shall have the power to refuse membership to an applicant, where it is considered such membership would be detrimental to the aims, purposes or activities of the group.

(d) Registration and termination of membership.

- Any member of the association may resign his/her membership and any representative of a member organization or section may resign such position, by giving to the secretary of the association written notice to that effect.
- The Management Committee may, by resolution passed at a meeting thereof, terminate or suspend the membership of any member, if in its opinion his/her conduct is prejudicial to the interests and objects of the association, PROVIDED THAT the individual member or representative of the member organization (as the case may be) shall have the right to be heard by the General Committee before the final decision is made. There shall be a right of appeal to an independent arbitrator appointed by mutual agreement.

5. Management

(a) The (Name of the Group) Group shall be administered by a Management Committee of not less than three (3) people and not more than fifteen (15) members elected at the group's Annual General Meeting, Committee Members must be at least 18 years old.

(b) The officers of the Management Committee shall be:

- The Chairperson
- The Treasurer
- The Secretary

and such other officers the group shall deem necessary at the meeting.

(c) The Management Committee shall meet at least twice a year.

(d) At least three (3) Management Committee members must be present for the Management Committee meeting to take place.

(e) Voting at Management Committee meetings shall be by show of hands on a majority basis. If there is a tied vote then the chairperson shall have a second vote.

(f) Power to set up sub-groups and working parties as deemed necessary who shall be accountable to the committee.

6. Finance

(a) Any money obtained by the group shall be used only for the group.

(b) Any bank accounts opened for the group shall be in the name of the group.

(c) Any cheque issued shall be signed by at least two nominated signatures.

(d) The Management Committee will ensure that the group stays within the budget.

7. Committee Meetings

(a) The committee shall meet at least two (2) times each year.

(b) The quorum for a meeting shall be three (3).

(c) The committee shall be accountable to the members at all times.

(d) All meetings must be minuted and available to any interested party.

(e) All committee members shall be given at least seven (7) days' notice of a meeting unless it is deemed an emergency meeting.

8. Annual General Meeting

(a) The (Name of the Group) Group shall hold an Annual General Meeting (AGM) at not more than 15 month intervals.

(b) Where possible members shall be notified personally, otherwise notice will be deemed served by advertising the meetings in at least five public places giving at least 14 days' notice of the AGM.

(c) The business of the AGM shall include:

- Receiving a report from the Chairperson of the group's activities over the year.
- Receiving a report and presentation of the last financial year's accounts from the Treasurer on the finances of the group.
- Electing a new Management Committee and considering any other matter as may be appropriate at such a meeting.

(d) The quorum for Annual General Meeting shall be at least eight (8) persons of which no more than three (3) shall be committee members.

9. Alteration of the Constitution

(a) Proposals for amendments to this constitution, or dissolution (see Clause 11) must be delivered to the secretary in writing. The secretary in conjunction with all other officers shall then decide on the date of a forum meeting to discuss such proposals, giving at least four weeks (28 days) clear notice.

(b) Any changes to this constitution must be agreed by at least two thirds of those members present and voting at any general meeting.

10. Dissolution

The group may be wound up at any time if agreed by two thirds of those members present and voting at any general meeting. Any assets shall be returned to their providers, if they require it, or shall be passed to another group with similar aims.

11. Adoption of the Constitution

This constitution was adopted by the members present at the AGM held on:

(Date)

Signed:

(Chair)

(Secretary)

(Treasurer)

Annex 7: Purchase Guide

Street Planters

The street planters shall be provided by Broxap, and order placed by TRL, as listed below. Broxap will invoice each street based on the budget we've provided you with in the tables below. The tentative order delivery date as conveyed by Broxap is: 22nd Feb. for Symington Road and Hillsdon Road and 2nd March for Ridgeway Road and Whitehall Avenue. All you have to do is pay the invoice within 30 days once it arrives, we've done everything else. Scott will bring wood and tools on the day to fix legs to the planters to raise them from the road.

Reflectors

Scott has already had a discussion with Nibra about reflectors, please refer to his name and they'll know what to give you. The reflectors cost around £15/reflector plus VAT, and will be delivered for free to each street. Two reflectors per planter will have to be purchased by all streets. The resident association needs to speak with Michelle, contact details in the table below to finalise orders for their streets. Scott will bring a drill, screws and driver to attach the signs on the day.

Soil & Plants

Blaise Nursery is Bristol City Council's nursery. Individual streets should place their own orders with Blaise Nursery. One representative from your street, may have to visit Blaise Nursery and explain about the project and why you need soil and plants as we're having trouble getting hold of them by phone. They are aware of the project. Ask for Rod Pooley, he has agreed to provide soil and plants within the budget, to each street. He would like evidence of the Street Closure Order before confirming the order.

Road Paints & Tools

To avoid carriage costs, Hillsdon Road will buy all 4 colours. We will divide up so you all get 4 colours, and distribute to you. The paint (Adbruf Colourplus) to be bought by Hillsdon can be found at the link - http://www.adbruf.com/products/colourplus-paint-coloured-coating-system-for-car-parks-roads.htm . Scott will provide all the painting tools you need on the day with the exception of the templates you use to paint from. You can make these out of cardboard, or buy other template material from Bristol Scrapstore. If you explain the project, they will be able to advise on the most suitable material.

Hillsdon Road Budget

S.No.	Item	Quantity	Supplier	Budget (Hillsdon Road)	Contact Details
1.	Street Planters	3	Broxap	£606	Megha Gupta
2.	Reflectors	6	Nibra	£108	Michelle, Nibra - 07712 771330, sales@nibrasigns.co.uk
3.	Soil & Plants	$3m^3$ soil + Plants	Blaise Nursery	£195 (Soil); £90 (Plants)	Blaise Nursery (Each street to call/ visit the nursery) Email: rod.pooley@bristol.gov.uk. Tel: +44 1179224525.
4.	Road Paints	4 Barrels	Adbruf	£400	To be ordered online

Annex 8: Sample Format for recording Traffic Speed

Traffic Speed Survey (Before / After Installation)															
Name of the Street															
Day / Date	**Time of Day**	**Time**	**Vehicle Class**												
			Car								**LGV**		**MGV**	**HGV**	
Day 1 _____ _____ (Monday / Tuesday / Wednesday / Thursday) Date: _____	Morning	8:00 - 8:15													
		8:15 - 8:30													
		8:30 - 8:45													
		8:45 - 9:00													

Annex 9: Sample Format for recording Traffic Volume

Traffic Volume Count Survey Format (Before / After Installation)							
Name of the Street							
Day / Date	**Time of Day**	**Time**	**Vehicle Type**				
			Car	**Motorcycle**	**LGV**	**MGV**	**HGV**
Day 1 _____ (Monday / Tuesday / Wednesday / Thursday)	Morning	8:00 - 8:15					
		8:15 - 8:30					
		8:30 - 8:45					
		8:45 - 9:00					
		9:00 - 9:15					
		9:15 - 9:30					
		9:30 - 9:45					
		9:45 - 10:00					

Annex 10: Resident's Perception Survey Form

Community Corners Survey

This is a short survey about how you feel about your street.

We would be very grateful for your help with the survey (it should only take around 5-10 minutes) .

There are no right or wrong answers; we are interested in your thoughts and feelings.

This research is being carried out by TRL (the Transport Research Laboratory).

This survey is conducted in accordance with the Market Research Society Code of Conduct.

If you have any questions about the survey, you can email us at Megha.Gupta@trl.co.uk

Do you consent to take part in this survey?

☐ Yes

☐ No

What is the name of your street?

What is your house number (or name)?

Throughout the survey we will be referring to your 'community'.

By 'community' we mean the people living/working within your street.

First, we have a few questions about the environment in your street.

1. How would you describe your street?

Attractive	☐	☐	☐	☐	☐	☐	☐ Unattractive
Dull	☐	☐	☐	☐	☐	☐	☐ Colourful
Unplanned	☐	☐	☐	☐	☐	☐	☐ Planned
Clean	☐	☐	☐	☐	☐	☐	☐ Dirty
Neat	☐	☐	☐	☐	☐	☐	☐ Littered
Well maintained	☐	☐	☐	☐	☐	☐	☐ Poorly maintained

2. How satisfied are you with the amount of open space in your street?

Very dissatisfied	Quite dissatisfied	Neither satisfied or dissatisfied	Satisfied	Very satisfied
☐	☐	☐	☐	☐

3. How would you rate the level of **noise** in your street?

Very poor	Quite poor	Average	Quite good	Very good
☐	☐	☐	☐	☐

4. How would you rate the **air quality** in your street?

Very poor	Quite poor	Average	Quite good	Very good
☐	☐	☐	☐	☐

The next set of questions is about your Community.

5. How much do you agree with the following statements?

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
"I often visit my neighbours in their homes"	☐	☐	☐	☐	☐
"The friendships and associations I have with other people in my neighbourhood mean a lot to me"	☐	☐	☐	☐	☐
"If I need advice about something I could go to someone in my neighbourhood"	☐	☐	☐	☐	☐
"I believe my neighbours would help in an emergency"	☐	☐	☐	☐	☐
"I borrow things and exchange favours with my neighbours"	☐	☐	☐	☐	☐
"I would be willing to work together with others on something to improve my neighbourhood"	☐	☐	☐	☐	☐
"I rarely have a neighbour over to my house to visit"	☐	☐	☐	☐	☐
"I regularly stop and talk with people in my neighbourhood"	☐	☐	☐	☐	☐

6. How much do you agree with the following statements?

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
"Overall, I enjoy living in this neighbourhood"	☐	☐	☐	☐	☐
"I feel like I belong to this neighbourhood"	☐	☐	☐	☐	☐
"Given the opportunity, I would like to move out of this neighbourhood"	☐	☐	☐	☐	☐
"I plan to remain a resident of this neighbourhood for a number of years"	☐	☐	☐	☐	☐
"I like to think of myself as similar to the people who live in this neighbourhood"	☐	☐	☐	☐	☐
"Living in this neighbourhood give me a sense of community"	☐	☐	☐	☐	☐
"Overall, I think this is a good place to bring up children"	☐	☐	☐	☐	☐

These next questions are about safety in your neighbourhood

7. In general, how safe or unsafe does the traffic speed in your street make you feel…

	Not at all safe	Not very safe	Neither safe no unsafe	Quite safe	Very safe	N/A
As a pedestrian?	☐	☐	☐	☐	☐	☐
As a cyclist?	☐	☐	☐	☐	☐	☐
As a driver?	☐	☐	☐	☐	☐	☐

8. How often does the traffic speed in your street impact your decision to travel…

	Never	Not very often	Sometimes	Quite often	Always	N/A
By foot?	☐	☐	☐	☐	☐	☐
By bicycle?	☐	☐	☐	☐	☐	☐
By car?	☐	☐	☐	☐	☐	☐

9. How safe or unsafe is it for children to play outside in your street?

Not at all safe	Not very safe	Neither safe no unsafe	Quite safe	Very safe
☐	☐	☐	☐	☐

The next set of questions is about Community Corners.

How do you like the planters installed on your street? Do you think Community Corners have had any impact on your street?[13]

_____

_____

_____

_____

_____

And finally, a few questions about you.

10. What is your…

a) Age?

- ☐ 18-24
- ☐ 25-34
- ☐ 35-44
- ☐ 45-54
- ☐ 55-64
- ☐ 65-74
- ☐ 75+

b) Gender

- ☐ Male
- ☐ Female
- ☐ Non-Binary/Other

[13] This question wasn't included in the pre-installation survey questionnaire.

For controlled group streets, the question was slightly different - Have you noticed any planters installed on Hillsdon Road nearby?

o Yes

o No

If yes, what do you think about these? Would you like to see any similar scheme on your street for traffic calming?

- ☐ Prefer not to say

11. Please specify your average monthly Household Income

- ☐ <£20,000
- ☐ £20,000 - £30,000
- ☐ £30,000 – £50,000
- ☐ >£50,000

12. Do you have any disabilities or additional travel needs?

- ☐ Yes
- ☐ No

13. If yes, please specify

- ☐ Wheelchair user
- ☐ Mobility impaired
- ☐ Blind or partially sited
- ☐ Deaf or hard of hearing
- ☐ Learning disability
- ☐ Other
- ☐ Prefer not to say

Annex 11: Material Specification

Planter Specification

The planter specifications as provided by Broxap are:

- Timber planters, in European redwood
- 1500mm x 1500mm x 450mm high
- Complete with base
- Geotextile membrane
- Free standing

Subsequently as per instructions from BCC, these planters were fitted with legs, 450mm high.

Reflectors Specification

The reflectors were procured from Nibra Signs Pvt. Ltd. These were 3 mm Traffic Grade Aluminium Composite Signs – 500 x 300 mm – with holes drilled for fixing.

Road Paint Specification

The road paint procured from Adbruf ltd. was Colourplus, Slip Resistant Coloured Coating. The technical specifications for road paint as provided by Adbruf are:

Technical	
Specific Gravity	1.35
Flash Point (closed cup)	+5 °C
Spread Rate (Roller)	20-40m ^{2} /25kg
Spread Rate (Spray)	30-50m ^{2} /25kg
Tack Free @ 20°C	20 mins
Open to Traffic	2 hours
Skid Resistance Value (SRV)	≥ 55

tanAnnex 12: Example of Risk Assessment for a Street

HEALTH & SAFETY AND ENVIRONMENT RISK ASSESSMENT FORM

Assessment of Risk For:	Community Corner Installation (Street Party Day) on Hillsdon Road	Assessor(s):	Scott Davidson
Project Number / Title:	11224331 -- Community Corner	Assessment Date:	06/02/2018
Distribution List / Method:	Email to Resident Associations/Groups; Paper copies to be signed on the day of installation	Review Date:	

Project Team Health and Safety Briefings (if applicable):
Confirmation that a briefing has been carried out by the Project Manager (or deputy). Staff to indicate below that they are aware of the contents of this Assessment (by signature or electronic equivalent)
Place for physical signatures or electronic signatures: Name: Date:

1. Clearing out vehicles within the closed zone
2. A timed plan for vehicle entry (planters and crane and soil)
3. An assessment of people moving items (such as soil), understanding weight and risk and how to carry loads

Significant Hazards	Who / what is at risk?	How might they be harmed?	Existing Controls / Precautions	What else needs to be done?	By Whom?
RISK ASSESSMENT (row for each significant hazard):					
Traffic collisions specific to Hillsdon Road access junctions	*Local drivers & residents in vicinity*	*Through unexpected traffic behaviour (late braking/ turning) due to road closure forcing alternative route.*	*Clear signage will be used at both entrances to the road, which are clearly visible from both approaches (particularly downhill side as Hillsdon has one steep approach road). 2 residents at each entrance will also be in high visibility clothing and positioned very visibly at entrances.*	*Residents need to be briefed in the day to ensure early visibility at junctions for approaching traffic to avoid last minute or sudden unexpected traffic behaviour due to road closure.*	*TRL Project manager on site.*
Steepness of Hillsdon Road	*Residents and residents parked vehicles*	*Items rolling down the hill, or moving furniture/ soil etc. down steep slope e.g. wheel barrows of soil.*	*Heavy items and soil are to be dropped at the installation points to reduce the need for moving items. The lead resident is organising this with the furniture and soil providers. The installation will be dependent on favourable weather conditions i.e. will not be installed in snow, freezing temperatures or heavy rain.*	*Residents need to be briefed on the risks associated to the steep slope and ensure that any loads to be transported are kept to a minimum weight and distance and appropriately transported.*	*TRL Project Manager on site.*
Moving vehicles	*Survey participant, vehicle drivers and any third parties present,*	*Could be hit by a moving vehicle and suffer serious injury, possibly fatality.*	*Use footpaths and crossings (where provided) when on foot. If using other travel modes use dedicated spaces (e.g. cycle paths if cycling)* *Watch out for people reversing*	*Take extra care in poor light conditions, possibly wearing reflective clothing, portable lights. If cycling, use the rear and front lights.*	*Residents / TRL Staff present on the Street Party Day*

Significant Hazards	Who / what is at risk?	How might they be harmed?	Existing Controls / Precautions	What else needs to be done?	By Whom?
	such as, pedestrians, cyclists, etc.		*from driveways, and/or opening car doors.* *Avoid unnecessary distractions (e.g. using mobile phones, music earphones).*		
Around other pavement users, such as, scooter riders, etc.	*Survey participant and third parties*	*Risk of collision causing injury to people or damage to vehicles/ property*	*Remain aware of the surrounding environment at all times.* *Be aware of uneven or slippery pavements.* *Avoid unnecessary distractions, such as mobile phones and music earphones.*	*Remain vigilant when passing by doors of shops or similar where people could step out in front of you.*	*Residents / TRL Staff present on the Street Party Day*
Slips, Trips and falls	*Survey participant*	*Could result in a serious injury*	*Slow down over uneven ground or in areas where you could be bumped/ jostled* *Always wear appropriate footwear (flat, no sandals/ open toes) and clothing.* *If cycling or riding a scooter a helmet must be worn.* *Avoid unnecessary distractions, such as mobile phones and music earphones.*	*Look out for drain covers/ manholes/gratings etc. which could be particularly slippery*	*Residents / TRL Staff present on the Street Party Day*

Significant Hazards	Who / what is at risk?	How might they be harmed?	Existing Controls / Precautions	What else needs to be done?	By Whom?
Weather	*Survey participant*	*Frostbite, slips, trips & falls*	*Ensure you have sufficient warm and waterproof clothing (layers are preferable).*	*Suspend the survey and seek medical attention if you feel unwell.*	*Residents / TRL Staff present on the Street Party Day*
Petty crime	*Survey participant*	*Risk to personal safety if criminal is armed*	*Do not carry large amounts of cash/ expensive personal belongings. Ensure any personal items (swatches/ phones) are kept out of sight.*	*Assume any petty criminal is armed and comply with their demands. Report any crime as soon as possible.*	*Residents / TRL Staff present on the Street Party Day*
Travel around	*Survey participant*	*Possible risk to personal security (terrorism, crime, or aggression from members of the public)*	*Standard precautions as for everyday travel.* *Consider informing someone of your expected arrival times/ journey route.*	*The following steps should only be performed where/when it is safe to do so.* • *Comply with the aggressor.* • *Do not put yourself in un-necessary harm by challenging, aggravating or disobeying the aggressive person.* • *Remove persons from immediate danger if possible.* • *Exit the area through the closest, safe exit or confine yourself to a position of safety.*	*Residents / TRL Staff present on the Street Party Day*

Significant Hazards	Who / what is at risk?	How might they be harmed?	Existing Controls / Precautions	What else needs to be done?	By Whom?
				Call for assistance to report the incident.	
Laser gun	*Survey participant and third parties*	*Eye injuries*	*Do not point the laser beam at the eyes* *Use the laser gun exclusively for the assigned task* *Avoid pointing the beam at eyesight height* *Be aware of the people around you* *Do not let third parties handle the device*	*Follow the instructions provided during the handover of the device* *Ensure you have understood how to use the laser gun and the risks associated when not properly handled*	*Survey participant*
Community Corners implementation – handling material	*Survey participant and third parties*	*Serious injury is possible as consequence of a fall or other impacts*	*If physically involved in the realization of the street pockets:* • *Handle carefully the street furniture and any tool employed.* • *Use the appropriate tools* • *Follow any instructions provided with the street furniture (e.g. advice from*	*Residents will be briefed and trained on the installation of furniture, painting of roads, and working in the road before installation commences.* *TRL staff will be on site the entire time of installation, to guide installation.*	*TRL staff*

Significant Hazards	Who / what is at risk?	How might they be harmed?	Existing Controls / Precautions	What else needs to be done?	By Whom?
			the furniture retailer, manual instructions,…) • *Take extra care in proximity of curbs or other objects present on the scene (e.g., poles, sign posts, parked vehicles).* • *Be aware of the people surrounding you and other road users approaching* • *Avoid unnecessary distractions (e.g. using mobile phones).* • *Wear appropriate footwear and clothes* • *Wear Gloves when appropriate; and Hi visibility vest/jacket*		
Vehicle Entering Closed Area during set up	*Residents and members of the public participating in the use of the closed area*	*Crush injuries, head injuries, cuts and bruises, sprains and fractures, damage to equipment and other property*	*Road closed to allow for installation. Access to the road will be for residents or emergency access only. Planned diversion of traffic with suitable signage* *Two residents posted at each entry point to the street with appropriate signage for a temporary road closure and high viz.* *Make sure you have the correct*	*Should a driver enter the street without permission (though that would require driving through signs/ mounting footways/ driving at residents), the residents will immediately call other residents who are working on the installation to clear the road.*	*Residents Group Management team and TRL staff.*

Significant Hazards	Who / what is at risk?	How might they be harmed?	Existing Controls / Precautions	What else needs to be done?	By Whom?
			'highways materials and signs'. Appropriate signage as signed off by Bristol City Council for the temporary road closure for street parties will be used at all times. Provision of suitable and sufficient physical barriers to segregate vehicles and pedestrians and to physically deter/prevent vehicular access via junctions with the wider road network *Residential access traffic to be walked up the street by volunteer residents in high-vis vests.* *One of these residents will walk in front of any vehicle which requires access to the street until the vehicles destination point.* *Make a record of registration numbers for any infringements.* *Give sufficient notice to local residents and businesses/sports clubs/ schools etc. to allow for alternative arrangements as necessary* *Request residents cars usually parked in the area are moved*	*Should residents encounter aggression or confrontation they will move away from the situation and call the police immediately.* *Ensure adults are present at key points along length of street to help manage children when traffic being walked through.* *Should any emergency happen TRL staff will be present throughout the installation and street party and will call the appropriate emergency service.*	

Significant Hazards	Who / what is at risk?	How might they be harmed?	Existing Controls / Precautions	What else needs to be done?	By Whom?
			before event is due to be set up *Prevent the parking of other vehicles in the vicinity by use of signage and marshals* *Ensure that all contractors concerned are made aware of essential event details including where and when to access the area, park and deliver/offload and pick up on the day of the event.* *Provision and positioning of marshals to inform of temporary arrangements on the day of the event. Brief marshals in relation to emergency planning and escorting vehicles* *Arrange for marshals to escort any essential/emergency vehicular access and share plans with local residents and businesses etc.* *Ensure appropriate first aid provision is on site*		
Closure Location	*Residents and members of the public*	*Cuts and bruises, sprains and fractures, damage to*	*Confirm that the surface area to be used is suitable, if necessary arrange for remedial treatment or for a temporary surface to be used* *Make sure that any change in*	*Confirm that the surface area to be used is suitable, if necessary arrange for remedial treatment or for a temporary*	*Residents Group Management team*

Significant Hazards	Who / what is at risk?	How might they be harmed?	Existing Controls / Precautions	What else needs to be done?	By Whom?
		equipment and other property	*ground level is easily identifiable.* *Consider all physical features e.g. slopes and curbs when planning layout and setting up closure* *Ensure that the area is cleared of any stones, glass, animal faeces, rubbish etc. that could cause harm during the event* *Ensure that the event area is planned to avoid collision with permanent street furniture such as lamp posts and rubbish bins* *Make sure that any overhead services and street lights are identified during closure plan to ensure they are avoided by delivery vehicles or during the set up and use of event equipment* *If any ground disturbance is necessary, ensure that the location of buried services is identified and avoided* *Ensure that the road closure is not in the vicinity of hazardous or intrusive industrial or agricultural activities* *Consider the need to cut/trim any*	*surface to be used*	

Significant Hazards	Who / what is at risk?	How might they be harmed?	Existing Controls / Precautions	What else needs to be done?	By Whom?
			grass or vegetation in the vicinity shortly before the event *Check mobile phone reception in closure area*		
Closure Location - unauthorised people (e.g. members of the public) attempt to interfere with the works	*Residents and members of the public*	*Cuts and bruises, sprains and fractures, damage to equipment and other property*	*In the event that the emergency services are required, contact can be made via a resident's mobile phone.*	*In the event of public disorders the installation will be ceased until the quiet is restored*	*Residents Group Management team*
Substances Hazardous to Health	*Residents and members of the public*	*Skin effects – dermatitis, respiratory and/or eye irritation and possible burns*	*Confirm that the surface area to be used is suitable, if necessary arrange for remedial treatment or for a temporary surface to be used* *Make sure that any change in ground level is easily identifiable.* *Consider all physical features e.g. slopes and curbs when planning layout and setting up closure* *Ensure that the area is cleared of any stones, glass, animal faeces, rubbish etc. that could cause harm during the event* *Ensure that the event area is planned to avoid collision with*	*Outdoor event so solvent should not linger* *Ensure children are supervised by adults when around Abruf paint.* *Gloves to be worn by all when using spray chalk and planting plants / trees*	*Residents Group Management team*

Significant Hazards	Who / what is at risk?	How might they be harmed?	Existing Controls / Precautions	What else needs to be done?	By Whom?
			permanent street furniture such as lamp posts and rubbish bins *Make sure that any overhead services and street lights are identified during closure plan to ensure they are avoided by delivery vehicles or during the set up and use of event equipment* *If any ground disturbance is necessary, ensure that the location of buried services is identified and avoided* *Ensure that the road closure is not in the vicinity of hazardous or intrusive industrial or agricultural activities* *Consider the need to cut/trim any grass or vegetation in the vicinity shortly before the event* *Check mobile phone reception in closure area*		

Development and Trial of a Community-led Intervention to Improve Residential Road Safety

RPN4424