Road Safety Improvements in Charlwood Village Feasibility Report
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1.0 Introduction

2020 Consultancy has been commissioned by Charlwood & Hookwood Parish Council to undertake a feasibility study to establish the current issues with road safety and identify the most suitable improvements within the village of Charlwood, Surrey.

The study area is illustrated in figure 1 below and includes:
- Horley Road
- Ifield Road
- Lowfield Heath Road
- Norwood Hill Road
- Rectory Lane
- Stan Hill
- The Street

1.1 Background

Charlwood is a village and civil parish in the Mole Valley district of Surrey. It is immediately northwest of London Gatwick Airport, close west of Horley and north of Crawley. The village is centred on a large green, which includes a children's playground, and sports pitches. Charlwood has a small number of shops two pubs and a restaurant. The 2011 Census recorded a parish population of 2,326.

Charlwood & Hookwood Parish Council is intending to improve road safety within the village by exploring a number of measures to assist in speed reduction and driver behaviour. This in turn will improve road safety, the attractiveness of the village and increase the likelihood of sustainable forms of transport becoming more popular such as cycling and walking.

The feasibility report comprises of the following:
• Improvements to the 30mph/40mph speed limit terminal gateways along Norwood Hill Road, Russ Hill Road, Ifield Road, and Horley Road;
• 7.5 tonne weight restriction expect for access through village;
• New 30mph repeater signs with increased conspicuously and supporting 30 roundels on the road surface;
• Refresh all existing white line markings in the village
• Readjust edge of carriageway line to create narrower running lanes
• Improvements to footways including vegetation clearance to make walking more attractive
• Widen existing footway to create shared use path between Charlwood and Hookwood
• Footway accessibility improvements including tactile paving
• Formal parking restrictions
• Installation of pedestrian crossing
• Installation of street lighting and traffic calming in proximity of The Street
• Installation of two Vehicle Activated Signs
• Increase junction warning signage on approach to key junctions
• Junction redesign at Norwood Hill Road / Rectory Lane and The Street junction
• Junction redesign at The Street / Ifield Road junction

This report presents the feasibility study for the viability of the proposals and includes the following elements:
• Assessment of existing situation
• Feasibility design and evaluation
• Recommendations on the next steps to implement the scheme

2.0 Existing Situation

2.1 Traffic speed into and through Charlwood village
On all approaches into Charlwood village there is an existing 40mph speed limit. The 40mph and 30mph terminals are located sufficiently outside the village. However, traffic speed entering the village from all directions appears excessive and above the 30mph speed limit. Automatic Traffic Surveys (ATC) were commissioned to support this theory. The survey locations were chosen to determine traffic speed on the approach to the village centre and the centre itself. Norwood Hill Road was chosen to identify traffic speed from the north, Horley Road to identify traffic speed from the east, Ifield Road to identify traffic speed from the south, and Russ Hill Road / Rectory Lane to identify traffic speed from the west. A traffic survey was also included along The Street adjacent to the village green to identify the village centre speed. Figure 2 shows the locations of the surveys. The surveys were installed on Wednesday 29th August 2018 and were in-situ for seven days inclusive.
The results demonstrate that traffic speed is higher on the approach to the village centre compared to the village centre. This is expected as the approaches are less congested and closer to the 40mph speed limits on the outskirts. Traffic speed is greater from the south (average speed 36.1mph over both directions) and the east (average speed 36mph over both directions). Average speed approaching from the west is 35.5mph (over both directions) and 28.9mph from the north (over both directions). This means that the average speed is exceeding the 30mph speed limit in three of the four village approaches that were surveyed, which is concerning from a road safety perspective.

The average speed of traffic over both directions in the village centre is 29.5mph. If this data is compared to similar villages with the same characteristics as Charlwood demonstrates average speed in the centre in the region of 24mph-27mph. As the average speed is excessive on the approaches to Charlwood, it’s likely that average speed will be high through the village. Therefore, traffic calming measures are deemed necessary to address traffic speed in Charlwood.

Reviewing the ATC data in greater detail demonstrates some concerning findings that support the recommendation that traffic calming is required in Charlwood. 50% of traffic travelling east through the centre of Charlwood are exceeding the 30mph speed limit. This percentage means over 13000 vehicles are exceeding the speed limit in an eastbound direction over a seven-day period. 33% (8680 vehicles) are travelling in the region of 30mph-35mph; 12% (3210 vehicles) are travelling in the region of 35mph-40mph; and 3% (815 vehicles) are travelling in the region of 40mph-45mph. Perhaps even more concerning, 218 vehicles were travelling between 45mph-50mph, 62 vehicles were travelling between 50mph-55mph, 22 vehicles were travelling between 55mph-60mph, and 13 vehicles were travelling in excess of 60mph through the village centre.

The results are similar for westbound traffic through the village centre, although not as excessive as eastbound movement. 43% of traffic travelling west through the centre
of Charlwood are exceeding the 30mph speed limit. This percentage means over 12100 vehicles are exceeding the speed limit in a westbound direction over a seven-day period. 30% (8444 vehicles) are travelling in the region of 30mph-35mph; 10% (2759 vehicles) are travelling in the region of 35mph-40mph; and 2.6% (725 vehicles) are travelling in the region of 40mph-45mph. 153 vehicles were travelling between 45mph-50mph, 37 vehicles were travelling between 50mph-55mph, 20 vehicles were travelling between 55mph-60mph, and 14 vehicles were travelling in excess of 60mph through the village centre.

The results from the ATC surveys are summarised in tables 1 – 5 below. The full ATC data for all five sites can be viewed in Appendix A of this report.

<table>
<thead>
<tr>
<th>ATC Location</th>
<th>Traffic volume</th>
<th>Ave Traffic Speed</th>
<th>85th Percentile</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Street (EB)</td>
<td>26220</td>
<td>30.0mph</td>
<td>35.4mph</td>
</tr>
<tr>
<td>The Street (WB)</td>
<td>28149</td>
<td>28.9mph</td>
<td>34.5mph</td>
</tr>
<tr>
<td>Norwood Hill Road (NB)</td>
<td>18693</td>
<td>29.2mph</td>
<td>33.7mph</td>
</tr>
<tr>
<td>Norwood Hill Road (SB)</td>
<td>19410</td>
<td>28.5mph</td>
<td>34.4mph</td>
</tr>
<tr>
<td>Horley Road (EB)</td>
<td>25078</td>
<td>36.7mph</td>
<td>42.2mph</td>
</tr>
<tr>
<td>Horley Road (WB)</td>
<td>27759</td>
<td>35.3mph</td>
<td>40.8mph</td>
</tr>
<tr>
<td>Ifield Road (NB)</td>
<td>23821</td>
<td>36.0mph</td>
<td>41.7mph</td>
</tr>
<tr>
<td>Ifield Road (SB)</td>
<td>28886</td>
<td>36.2mph</td>
<td>41.6mph</td>
</tr>
<tr>
<td>Russ Hill Road (NB)</td>
<td>8888</td>
<td>35.4mph</td>
<td>42.4mph</td>
</tr>
<tr>
<td>Russ Hill Road (SB)</td>
<td>10424</td>
<td>35.6mph</td>
<td>42.1mph</td>
</tr>
</tbody>
</table>

Apart from the 600mm terminal signs as you enter the 30mph speed limit there is no measures in place to reduce traffic speed into the village. Therefore, excessive speed continues through the village. Although the footpaths in the village are generally at sufficient width, due to the excessive speed it feels very uncomfortable walking through the village, especially during peak periods where traffic volume is high. There have been a number of reported collisions on the approaches to the village, in particular along Horley Road from the Hookwood direction. This suggests that the speed of traffic isn't suitable for the conditions of the route.
2.2 Traffic volume and junction movements during peak periods

Concerns were raised about traffic volume and turning movements during peak periods i.e. between 7:30am-9am and 4:30pm-6pm. Therefore, our site assessment was extended into the evening peak period to understand traffic behaviour. It was noted during the site visit that traffic volume is extremely excessive for the village and it’s anticipated that the vast majority of this traffic is using Charlwood as a cut through to avoid traffic congestion on the strategic road network. This is supported by the ATC traffic surveys that were carried out, which demonstrate that on average 41% of the total traffic passing east through The Street each day occurred between 07:00am-9:00am and 17% of the total traffic passing east through The Street each day occurred between 16:00pm-18:00pm.

Traffic volume is less conventional for westbound traffic, with no peak traffic flow in the morning. This suggests that traffic approaching Charlwood from the east in the afternoon peak do not travel the same direction in the peak. However, the majority of traffic passes through the village from the west between 16:00pm-18:00 with an average of 27% of the total days traffic passing through during this period.

However, if both directions are combined the results demonstrate that on average 18.0% of a days traffic flow occur between 07:00am-09:00am and 21.8% of a days traffic flow occur between 16:00pm-18:00pm. This is because one direction has a lower figure each AM and PM peak which is expected due to tidal flow. This suggests that vehicles travelling through Charlwood undertake this journey on a frequent basis. This could be local traffic or commuter traffic.

The traffic volume data from the ATC sites on the approach to Charlwood village are broadly similar to the results from the village centre. Survey site 2 (Norwood Hill Road) demonstrate that on average 19.3% of a days traffic flow occur between 07:00am-09:00am and 21.8% of a days traffic flow occur between 16:00pm-18:00pm. Survey site 3 (Ifield Road) demonstrate that on average 15.7% of a days traffic flow occur between 07:00am-09:00am and 21.7% of a days traffic flow occur between 16:00pm-18:00pm. Survey site 4 (Horley Road) demonstrate that on average 17.0% of a days traffic flow occur between 07:00am-09:00am and 20.9% of a days traffic flow occur between 16:00pm-18:00pm. Survey site 5 (Russ Hill Road) demonstrate that on
average 18.9% of a day's traffic flow occur between 07:00am-09:00am and 21.9% of a day's traffic flow occur between 16:00pm-18:00pm.

As the ATC surveys were located to identify traffic travelling through the village centre as well as approaching the village centre from the north, east, south, and west, it is possible to gain a high-level understanding of origin and destination of traffic flow. Whilst this is no means accurate, a fair assumption can be made that a high proportion of traffic will be travelling through two sites. To confirm this assumption, it would be necessary to commission ANPR surveys at the same locations. However, it is felt that this isn’t necessary for this study. Figure 4 below shows a breakdown of traffic flow by direction and a percentage of this. The results demonstrate that the most common traffic movement is along Horley Road and Charlwood village centre.

Within the village there are two junctions that experience significant movement from all directions during peak periods. These junctions are Norwood Hill Road / Rectory Lane and The Street junction and The Street / Ifield Road junction. Due to the number of turning movements the junctions became very congested and busy with a number of near misses recorded as drivers attempted to pass through the village. There has only been one slight collision at these junctions. However due to the traffic volume and congestion it is expected that the majority of collisions that occur at these junctions wouldn’t be reported to the Police.
2.3 Pedestrian / vehicular safety at Norwood Hill Road / Rectory Lane and The Street junction

Norwood Hill Road / Rectory Lane and The Street junction is a very busy junction with numerous movements occurring, especially during peak periods. Traffic waiting to egress from Norwood Hill Road would often aggressively attempt to exit the junction causing traffic on Rectory Lane and The Street to brake sharply resulting in minor road rage incidents. What was more concerning is pedestrian safety at this junction. A number of pedestrians were recorded trying to cross the road in the vicinity of the junction. Due to the traffic volume pedestrians were waiting in excess of two minutes for a safe period to cross. Visibility for pedestrians is awful. Our site team attempted to cross the road as part of the site assessment and their views on the experience were that you take your life in your own hands. Restricted visibility doesn’t allow pedestrians to have a full sight of all directions. To achieve this level of visibility pedestrians are required to walk approximately 50-70m away from the junction.

2.4 Condition of footways through village

The condition of the footways in the village is poor in places with damaged surface, potholes and overgrown vegetation. In certain places the footway is almost impassable unless pedestrians are able to deviate around the footway using grass verges and the
carriageway which is a severe road safety risk. The existing condition of the footways is likely to result in less local residents choosing to walk to their destination. Those that do choose to walk have an increased chance of tripping on the damaged surface or hurting themselves as they attempt to avoid overgrown vegetation which may be obscuring additional trip hazards. It is felt that significant improvements are required with the footways to improve safety and encourage modal shift to active travel.

2.5 **Traffic speed approaching junctions / visibility of 30mph repeaters**

The signage and road markings through the village is poor in places with damaged signs and faded road markings potentially causing confusion to drivers approaching junctions. Erecting new signs and improving the conspicuously of existing advanced warning signs is likely to result in a reduced likelihood of vehicles overshooting junctions or braking sharply. There are a number of 30mph repeater signs located through the village as there is no street lighting. However, a number of these are not very visible due to the location, condition, and vegetation obstructing the signs. Whilst there are 30mph roundels to accompany the signs that are in better condition, it is felt that improving the conspicuously of these signs will result in better compliance with the 30mph speed limit.

![Figure 7 – View of Ifield Road approach to The Street](image)

2.6 **Safe crossing facilities for pedestrians**

There are currently no safe crossing facilities for pedestrians throughout the village. During the site assessment there were numerous pedestrians recorded trying to cross the road. This included vulnerable road users such as children going to school or the elderly walking to the shops. Due to the traffic volume and speed, particularly at peak periods it is felt that there should be at least one safe crossing facility. This could be either an uncontrolled crossing, or formal crossing such as zebra or signalised crossing. A formal crossing would provide greater safety to pedestrians and would also act as a method to slow down traffic in the village. A PVM² survey should be carried out to support the most effective type of crossing.
2.7 **Location of parked vehicles through village**

There are a number of locations within Charlwood where there is on-street parking such as The Street outside the shops and along Ifield Road. These locations can cause visibility issues, in particular along Ifield Road. During the site assessment there were as many as 12 vehicles parked along the same stretch of Ifield Road. This created severe difficulties for traffic approaching The Street / Ifield Road junction as it wasn’t possible to determine if any traffic was approaching due to the restricted visibility. There were a number of small road rage incidents where vehicles travelling south refused to give way to traffic travelling north in the opposite lane due to the parked vehicles. In some cases, the vehicles travelling northbound were forced to reverse. This created congestion in peak periods. It is unknown if all the on-street vehicles belonged to the frontages along Ifield Road. However, it is felt that some parking restrictions are required to alleviate this issue.
3.0 Accident Data

Accident data has been investigated as part of this feasibility study. Reviewing the crashmap website for a period of five years from 2013 to 2017 has demonstrated that there have been 16 collisions within the village. Two of these have been serious and 14 have been slight. Both serious collisions occurred on the same stretch of Horley Road, both involving two vehicles. There was also a slight collision recorded at the same part of Horley Road. It is recommended that as part of any road safety improvement scheme addressed by Surrey County Council, consideration is given to this site with a view for a more detailed investigation including analysis of the stats form to identify any likely patterns.

The remaining slight collisions involve one along Northwood Hill Road, two along Rectory Lane, four along The Street, two along Ifield Road, a further three along Horley Road, and one along Lowfield Heath Road. All four collisions that occurred along The Street involved junctions with three collisions at the junction of The Street and Lowfield Heath Road, and one at the junction of The Street and Ifield Road.

Details of the 16 collisions within the five-year period are shown below.

**Serious**

**Horley Road**

1. 22/07/2017 – Involving 2 vehicles with 3 casualties reported
2. 09/10/2014 – Involving 2 vehicles with 1 casualty reported

**Slight**

**Northwood Hill Road**

1. 19/08/2017 – Involving 2 vehicles with 1 casualty reported

**Rectory Lane**

1. 18/12/2016 – Involving 1 vehicle with 1 casualty reported
2. 20/02/2014 – Involving 3 vehicles with 1 casualty reported

**The Street**

1. 02/07/2017 – Involving 2 vehicles with 3 casualties reported
2. 26/10/2016 – Involving 2 vehicles with 2 casualties reported
3. 13/06/2016 – Involving 2 vehicles with 1 casualty reported
4. 17/03/2014 – Involving 2 vehicles with 2 casualties reported

**Ifield Road**

1. 13/03/2017 – Involving 1 vehicle with 1 casualty reported
2. 19/12/2014 – Involving 2 vehicles with 1 casualty reported
Horley Road

1. 14/07/2017 – Involving 3 vehicles with 3 casualties reported
2. 10/07/2015 – Involving 2 vehicles with 1 casualty reported
3. 09/12/2014 – Involving 2 vehicles with 3 casualties reported
4. 27/05/2014 – Involving 2 vehicles with 5 casualties reported

Lowfield Heath Road

1. 01/05/2013 – Involving 2 vehicles with 1 casualty reported

Five of the 16 collisions occurred in the year 2017. This equates to 31% of the total number during the five years. Three of 16 collisions occurred in the year 2016. This equates to 19% of the total number during the five years. One of the 16 collisions occurred in the year 2015. This equates to 6% of the total number during the five years. Six of the 16 collisions occurred in the year 2014. This equates to 38% of the total number during the five years. One of the 16 collisions occurred in the year 2013. This equates to 6% of the total number during the five years.

There is no sign of an increase or decrease in numbers of collisions each year. Table 6 below reveals the number of collisions each year over the five-year period.

<table>
<thead>
<tr>
<th>Year</th>
<th>No. of recorded collisions</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013</td>
<td>2</td>
</tr>
<tr>
<td>2014</td>
<td>7</td>
</tr>
<tr>
<td>2015</td>
<td>0</td>
</tr>
<tr>
<td>2016</td>
<td>5</td>
</tr>
<tr>
<td>2017</td>
<td>6</td>
</tr>
</tbody>
</table>

Table 6 – Collisions by year 2013-2017

Reviewing the collisions by time of year suggests there is a greater likelihood of collisions occurring in the summer. Seven out of the 16 recorded collisions occurred during the summer months, which equates to 44% of the total number. During the winter months there was four out of the 16 recorded collisions, which equates to 25% of the total number. Three out of the 16 recorded collisions occurred in the spring, which equates to 19% of the total number, and two occurred in the Autumn, which equates to 12% of the total number.

Due to the close proximity of Gatwick Airport, it is a fair assumption that during the summer months there are greater numbers of vehicles travelling through Charlwood, which will increase the likelihood of a collision occurring. This is exacerbated by the probability that the drivers do not have a good understanding of the road network and the possibility that they may be in a rush to get to the airport. Table 7 provides a breakdown of collisions over the four seasons.
Table 7 – No. of collisions by four seasons

Figure 10 provides the locations for collisions in Charlwood village.

Figure 10 – Locations of collisions between 2013-2017
4.0 Feasibility Design

4.1 Gateway treatment at 30mph terminals on approach to Charlwood
Speed entering Charlwood from all directions appeared excessive, meaning the introduction of the 30mph speed limit is being ignored. It is possible to redesign the 30mph terminal signs to create a more conspicuous gateway entry at all entrances to the village. Drivers are more likely to notice the terminal signs and it increases the likelihood of traffic speed reducing as vehicles enter the village.

4.1.1 A gateway treatment can vary in design, but average speeds can be reduced by approximately 1-3 miles per hour as vehicles enter the village. However, speed reductions of up to 5-6 miles per hour can occur within the first 20 metres of the gateway treatment which results in traffic speed being slower as vehicles enter the village rather than slowing down as they enter the village. There are no specific design requirements of gateway treatments providing the 30mph signs are clear and the correct dimensions (600mm in size and at least 2.1 metres above the ground).

4.1.2 The cost of gateway treatments can vary depending on the type of treatment implemented. The most common treatment is the construction of a gate arrangement which is usually in a white colour to contrast against the grass verge. Each gate is likely to cost approximately £1,000. Therefore, two sites is likely to cost approximately £4,000 as it’s important to have the gateway on both sides of the carriageway. Costs can increase depending on the materials used, design used, and where the delivery is from. It is also possible to install road markings to support the introduction of the new speed limit.

4.1.3 Red coloured surfacing can cause the speed limit to be much more visible when overlaying white roundels on the road surface. White road markings can be used to create virtual narrowings, which will cause traffic to slow down as the road appears to be narrower than it is. This can add a further 1-3mph average speed reduction on top of what can be achieved using the gateway treatment on its own. Installing coloured road surfacing and road markings is likely to add an additional £7,000 on top of the gateway treatment cost.

4.1.4 Implementing gateway treatments on all approaches to Charlwood village can be very effective in reducing traffic speed through the village. All entrances are suitable for a gateway treatment (although the design may need to be adapted for some entrances due to limited room available) and it’s expected to see a speed reduction of approximately 5 miles per hour on the approach to the village if the gateway treatment is combined with the road surfacing and road markings. Using our cost and effectiveness matrix this measure is given a rating of 9/10. Figure 11 and 12 below provides some examples of gateway treatments.
4.2 Implementation of 7.5 tonne weight restriction

During the inception meeting with Charlwood Parish Council they highlighted their concerns with the volume of Heavy Goods Vehicles (HGV) that travelled through the village as a cut through to avoid traffic congestion on the strategic road network. Therefore, as part of this study we paid particular attention to this. During the site assessment a number of HGVs passed through the village. Whilst it wasn’t possible to determine if they were accessing businesses, the ATC surveys were commissioned at locations to track HGV movement through the village. The results demonstrate that within a seven-day period, **686 vehicles** that would exceed a 7.5 tonne weight restriction passed through The Street in Charlwood village centre.

4.2.1 During the same period, **493 vehicles** that would exceed a 7.5 tonne weight restriction passed through the survey along Norwood Hill Road, **738 vehicles** that would exceed a 7.5 tonne weight restriction passed through the survey along Ifield Road, **603 vehicles** that would exceed a 7.5 tonne weight restriction passed through the survey along Horley Road, and **176 vehicles** that would exceed a 7.5 tonne weight restriction passed through the survey along Russ Hill Road. This suggests that the HGVs are using Charlwood as a cut through. Analysing the data further suggests these HGVs were travelling through the village at peak periods where traffic congestion is likely to be high.

4.2.2 Charlwood village isn’t suitable for the level of HGVs currently passing through. During the site assessment HGVs were recorded passing through junctions with difficulty causing regular traffic to mount pavements and take unusual action to avoid a collision. Therefore, it is considered essential that provisions are put in place to restrict HGV traffic to those that are required to access sites within the area. The most effective method to achieve this is through a 7.5 tonne weight restriction. This would cover the extents of the village and would require a Traffic Regulation Order. Within the order there would be exemptions such as those that require to access the area. A supplementary plate accompanying the signs would provide details of this.

4.2.3 Figure 13 below provides a plan showing the extents of the weight restriction, which covers the roads that access the village. The cost of implementing a weight restriction is low. The actual works only consist of new signage on posts at the start of the restriction. This proposal does include a TRO which requires a legal order and consultation so there will be a cost for this. Therefore, the total cost involved is likely
to be approximately £10,000-£15,000. Using our cost and effectiveness matrix this measure is given a rating of 9/10.

4.3 Installation of formal crossing along The Street
Traffic volume and speed seems excessive throughout Charlwood, in particular along The Street as the road is straight with good visibility. This causes significant issues for pedestrians as there isn’t any safe crossing facilities. During the site assessment numerous pedestrians attempted to cross The Street waiting upwards of 60-90 seconds during peak periods. Vulnerable road users including children and the elderly struggle even more. It is possible to implement a formal crossing to enable pedestrians to safely cross The Street to access the shops, public transport, the village green, and the school. The most suitable crossing is likely to be a zebra crossing depending on average traffic speed. This will give pedestrians the right of way. A zebra crossing will slow traffic down further, which has additional benefits for the village.

4.3.1 Implementing a zebra crossing will be a high cost measure. The usual process for implementing a zebra includes an assessment called a PVM² assessment where the number of pedestrian’s crossing over an hour is counted against the number of vehicle movements in both directions over an hour. The approximate cost of implementing a zebra crossing is £40,000-£50,000. There are a lot of variables that need to be considered such as lighting and ducting as well as locating the crossing. There is also design, consultation, and legal fees that are required for implementation. Therefore, the total cost involved is likely to exceed £75,000. The illumination would need further investigation as the village doesn’t have any street lighting.

4.3.2 There are logistical issues that will need to be addressed which may impact whether it’s possible for a zebra crossing to be implemented along The Street. The existing footway widths will need consideration and a suitable location that is away from junctions and driveways will also be important considerations. A zebra crossing
usually results in average speed reductions as much as 5mph in the direct vicinity as the majority of traffic reduces speed when approaching a crossing in case pedestrians start to cross the road. It is also likely that vehicles will reduce after the crossing as they are within the centre of the village. If a zebra crossing can be implemented along The Street our cost and effectiveness matrix of this measure is a rating of 8/10. Figure 14 below shows an example of a zebra crossing.

![Figure 14 – Example of zebra crossing](image)

### 4.4 Traffic calming with street lighting along The Street

Traffic speed along The Street is unlikely to be low enough to consider a 20mph zone and the nature of the road isn’t suitable, which means any vertical traffic calming will require street lighting not more than 38 metres apart from one another. The Department for Transports Local Transport Note 1/07 – Traffic Calming states that “The road hump regulations requirements for road lighting of road hump schemes, other than in 20 mph zones, are that the lighting should extend over the length of the road containing the humps. This must consist of at least three street lamps placed not more than 38 metres apart from each other, or the lighting should comply with the British Standard (BS 5489,1992).”

4.4.1 Therefore to consider physical traffic calming measures the scheme would need to incorporate street lighting. Although this is often objected to in rural environments there are additional road safety benefits other than increased visibility. Research suggests that street lighting can reduce collisions on the road by approximately 30% during the hours of darkness. Examples of physical measures include raised tables, priority systems, and road narrowings. Statistically, physical measures demonstrate greater speed reductions of approximately 7 miles per hour.

4.4.2 On initial inspection raised tables seem the most effective measure to include along The Street. The most suitable location for traffic calming would be between the junctions of Ifield Road and Lowfield Heath Road. It may be beneficial to include these junctions within the traffic calming design to create raised junctions. Figure 15 below provides an example of a raised junction. This reduces traffic speed on the approach to junctions and on the junction. It also increases accessibility for pedestrians at the junctions.
4.4.3 A further consideration is to implement the pedestrian crossing discussed in section 4.3 on a raised table to create a humped crossing. This results in traffic speed slowing down on the approach to the crossing regardless of whether pedestrians are waiting to cross. This can assist in drainage design and overcome difficult locations where dropped kerbs and driveways can cause difficulties siting the crossing. Alternatively raised tables could be constructed either side of the crossing which means traffic speed will be slower still upon reaching the crossing. Figure 16 provides an example of a humped crossing for effective traffic calming.

4.4.4 The cost of a raised table is depended on a number of factors such as the type used i.e. full width or channel to channel, the drainage requirements, and the size of the table top. The standard top is either 4 metres on a non-bus route or 6 metres on a bus route. Our recommendation for this site is 6 metres to reduce the impact on local residents and emergency services. The approximate cost for a raised table is £8-10k along with further costs for design, consultation, and legal fees for advertising the proposals. Costs are greater for raised junctions due to the greater vicinity of table top. Therefore, to provide an accurate estimate for this proposal is difficult due to unknown factors. However, for the purpose of this study implementing physical traffic calming measures along The Street is likely to cost in the region of £30,000-£50,000.

4.4.5 Implementing raised tables along The Street will be very effective in reducing traffic speed in the busiest part of Charlwood village. We anticipate a speed reduction of approximately 6-8mph depending on the type of raised tables used. Using our cost
and effectiveness matrix this measure is given a rating of **8/10**. Figure 17 below shows an example of a raised table.

![Figure 17 – Example of a raised table](image)

### 4.5 Refresh all existing white line markings

The road markings through the village have faded and are worn in places. The edge of carriageway markings is particularly worn in places. These markings can be useful in speed reduction as the width from the kerb can create a feeling that the road is narrower than it is. With faded markings the road can appear wider which is likely to be a contributor factor in traffic exceeding the 30mph speed limit. Junction markings are crucial to warn drivers to give way. All white markings in the village should be refreshed with the edge of carriageway marking readjusted as discussed below.

4.5.1 There is no design requirement for this proposal apart from the relocation of the edge of carriageway marking. Therefore, officer time should be minimal. There is unlikely to be much speed reduction from refreshing the road markings apart from the relocation of the edge of carriageway marking. However, it is likely to result in greater road safety in the village and may assist reduce the number of collisions, especially at junctions where a number of collisions have been recorded.

4.5.2 The cost of refreshing the white lines is low. The local highway authority may have maintenance funding available to carry this out and it may be on a programme of work. However due to the poor condition of some markings along with collisions potentially being reduced with the refreshment of the markings, this should be prioritised. The cost of refreshing the markings through the village is likely to be in the region of **£4,000 - £5,000**.

4.5.3 This proposal will be effective throughout the village and may improve road safety, particularly around key junctions. It may not result in a speed reduction apart from the relocation of the edge of carriageway markings. Using our cost and effectiveness matrix this measure is given a rating of **6/10**.
4.6 **Readjust edge of carriageway line to create narrower running lanes**

An edge of carriageway marking can be a useful method of reducing traffic speed. This is because the road marking creates a narrower feel to the carriageway which results in drivers feeling less confident at higher speeds, so their speed reduces to be within their comfort zone. Although there is an edge of carriageway marking through the village, it’s possible to readjust the marking to bring it further into the carriageway. This results in a visually narrower road width.

4.6.1 Readjusting the edge of carriageway road marking is considered a low-cost option. This should be done in conjunction with the refreshment of the white lines as described above. This proposal does not require any legal work or consultation to be undertaken. Guidance should be sought from Chapter 5 of the Traffic Signs Manual on the distances used, although no specific dimensions are listed. It is advised to be approximately 225mm to the edge of carriageway although this can be adjusted when needed. The approximate cost for this measure would be £5,000 - £6,000 assuming it’s carried out in conjunction with all white lining in the village.

4.6.2 Readjusting the edge of carriageway marking will likely result in a speed reduction through the village as drivers will feel that the road width is narrower and adjust their speeds accordingly. This is likely to yield a speed reduction of 2-3mph through the village. Using our cost and effectiveness matrix this measure is given a rating of 7/10. Figure 19 shows an example of a road with the edge of carriageway marking further into the road.
4.7 **Replace existing 30mph repeater signs with yellow backed signs**

There are 300mm 30mph repeater signs throughout the village as there is no street lighting. Without repeater signs and street lights a road is assumed to be the national limit for a single carriageway. However, the majority of the repeater signs are not conspicuous due to the size of the signs and their location (see figure 20). Vegetation obscures some of the signs and the condition is poor for the majority of signs. As a result of this drivers do not have a regular reminder of the speed limit. There are 30mph roundels to accompany the repeater signs, but these are traditionally less effective than repeater signs. To increase visibility and compliance the repeater signs could be replaced with yellow backed signs that will be more obvious to through traffic.

![Figure 20 – Examples of 30mph repeaters in Charlwood](image)

4.7.1 There is no speed enforcement signs, which suggests that there has been no enforcement undertaken recently and none planned in the future. As speed has been raised as a concern, it is recommended to lobby the local Roads Police Unit to request that Charlwood village is added to routine enforcement. There will be a requirement for camera warning signs to be installed before this can commence and it’s recommended to undertake this at the same time the new 30mph repeater signs are installed. This is a low-cost measure as the only cost is the manufacturing and installation of the signs. Some design time will be required although this will be minimal. This proposal is likely to cost in the region of £3,000 - £4,000.

4.7.2 There will almost certainly be a speed reduction with the installation of yellow backed 30mph repeater signs. There will be sufficient numbers through the village to reinforce the speed limit and providing greater conspicuously of the signs will target motorists in a more effective manner. Research carried out on the usage of yellow backed signs supports this theory. Implementing yellow backed repeater signs generates a score of 9/10 using our cost and effectiveness matrix system. Figure 21 below shows an example of a road with yellow backed repeater signs.
4.8 Footway accessibility improvements including tactile paving

Whilst Charlwood is a rural village, it’s within close proximity of a number of urban locations including Gatwick airport, Horley, and Crawley. These three locations are within distance for sustainable forms of transport to be used as an alternative to the private car including cycling and walking. However, the existing footways in the village are not up to the standard to promote active travel as a viable choice. There are a number of junctions that require pedestrians to give way to traffic. Some of these junctions are accessible for pedestrians including vulnerable road users including push chairs and the elderly with dropped kerbs and tactile paving.

4.8.1 However a number of these junctions are not at the required standard with dropped kerbs having a larger upstand that required and only one row of tactile paving instead of two rows. This may cause access difficulties for pedestrians with pushchairs, those using mobility scooters or those that are visually impaired. Therefore consideration should be given to improve the accessibility for all pedestrians with appropriate dropped kerb levels and increased tactile paving at junctions. Not all junctions will require improvements. Therefore, the cost shouldn’t be too high. Approximately £20,000-£30,000 will be required to improve footway accessibility from the west to east of the village.

4.8.2 Having carried out the site assessment there is a possibility that a new shared use footpath could be constructed from Charlwood village centre through to Hookwood and onto Horley or/and Gatwick airport. This proposal would need far greater investigation including a check on land ownership, road widths, footway widths, and drainage. Figure 22 below provides a plan with the route highlighted. The highlighted route is completely off-road and therefore likely to see high numbers of cyclists using the route including those that are less confident. This proposal would require both the accessibility improvements discussed in this proposal and the maintenance improvements discussed below to be implemented as well. To construct the full route highlighted would be a high cost measure, costing in the region of £500,000-£600,000.
4.8.3 This proposal may result in a slight speed reduction both in the village and outside the village. To construct the shared use route, it may be possible to narrow the existing carriageway in small areas whilst still ensuring the minimum carriageway width is maintained. Narrowing the carriageway is likely to see an average speed reduction of 1-2mph over the route length. The accessibility improvements will not result in a speed reduction within the village. Footway accessibility improvements generates a score of 6/10 using our cost and effectiveness matrix system. The shared use route generates a score of 5/10 using our cost and effectiveness matrix system although this is focused on road safety as oppose to active travel. Figure 23 below shows an example of the footway accessibility improvements that is required.

4.9 Implementation of parking restrictions along Ifield Road
It was noted during site assessment that there was a number of vehicles parking on-street along Ifield Road, causing a road safety risk due to the reduced visibility. There are no parking restrictions in-situ meaning vehicles can park here legitimately for as
long as required. There were approximately 10 vehicles parked on-street during the site assessment. However, a further 10 vehicles could park here, which would increase the road safety risk considerably. Therefore, implementing parking restrictions should be considered.

4.9.1 There are a number of waiting restrictions that can be considered at this location. No waiting at any time (double yellow lines) would prevent on-street parking at all times. This would be the recommendation based on a road safety perspective. However, this would almost certainly result in objection from local residents. Alternatively, no waiting at specific times (single yellow lines) could be implemented to cover a period of the day. This could be an inclusive time such as 9am till 5pm or at intervals such as 10am-12pm and 2pm-4pm. This would prevent all day parking. If local opinion is that the on-street parking is not from local residents a small restriction could be put in place i.e. 10am-11am. This would allow residents to park for the majority of the day but restrict commuters i.e. Gatwick airport workers.

4.9.2 A less intrusive proposal would be to implement small sections of waiting restrictions that allow vehicles to pull in and give way to oncoming traffic. This allows vehicles to remain on-street but ensures visibility isn’t restricted. This restriction can be no waiting at any time or no waiting at specific times. Implementing any formal waiting restriction requires a legal order and consultation. Therefore, the anticipated cost to implement waiting restrictions in Ifield Road is approximately £10,000-£15,000. Using our cost and effectiveness matrix this measure is given a rating of 9/10. Figure 24 provides an example of intermittent on-street waiting restrictions.

![Figure 24 – Example of intermittent on-street waiting restrictions](image)

4.10 **Installation of Vehicle Activated Signs**

There aren’t any existing Vehicle Activated Signs in Charlwood village. Vehicle Activated Signs are one of the most effective non-physical methods for slowing traffic in a specific location. There are a number of different types of Vehicle Activated Signs that range in cost but also provide different results. Signs that flash “Slow Down” are likely to see average speed reductions of 1-2mph. Signs that display the actual speed vehicles are travelling are likely to see average speed reductions of 3-4mph. However, the signs are most effective within the first two to three weeks where drivers are often surprised by the sign illuminating and reduce their speed accordingly. This is especially the case for the signs that display motorists speed as they travel past.
4.10.1 Installing Vehicle Activated Signs on the key approaches to Charlwood village will cause speed reductions where the signs are located. If the signs are not in the most effective location it is likely that traffic speed will increase. However, if the signs are positioned in the most suitable location traffic speed is more likely to remain low. Therefore, the siting of these signs is as crucial as the type of sign purchased. It is recommended to install the signs as close to the main village centre as possible. Figure 25 below provides our initial thoughts on potential locations for Vehicle Activated Signs within Charlwood.

![Figure 25 – Suggested VAS locations for Charlwood](image)

4.10.2 The cost is dependent on the type of sign purchased. Due to the nature of Charlwood village with high volumes of traffic and excessive speed, in particular during the summer months when the village is an attractive cut through to Gatwick airport, it is recommended to purchase the higher cost, greater effectiveness signs. Figure 26 provides an example of these types of Vehicle Activated Sign. These signs are likely to cost in the region of £10,000-£15,000 per sign. Therefore, the total cost will be approximately £30,000-£45,000. Using our cost and effectiveness matrix this measure is given a rating of 9/10.
4.11 **Increase junction warning signage on approach to key junctions**

Traffic speed through the village suggests there is little or no regard for potential traffic emerging from side roads, in particular Ifield Road and Lowfield Heath Road. Near misses were noted during the site visit when vehicles travelling in excess of 30mph were required to brake sharply due to vehicles egressing onto The Street from these junctions. In places visibility is more difficult due to obstructions such as overgrown vegetation and boundary walls.

4.11.1 There is very little junction warning signage in the village and the signs that are in-situ are obscured by vegetation and the condition of the signs are poor. Increasing the visibility of the signage may encourage drivers to slow down on the approach to junctions. Out of the 16 collisions that have occurred within Charlwood within five years, four have involved junctions. A lack of junction warning signage may be a contributory factor in some/all of these collisions. This proposal can be accompanied by a supplementary plate that can provide some description which increases conspicuously further still. Alternatively, there is justification for these signs to be erected on yellow backing boards as there has been four collisions. The cost of new junction warning signage including additional signage is a low-cost measure. This proposal is likely to cost in the region of £1,000 - £2,000.

4.11.2 There may be a slight speed reduction through the village as a result of increased visibility of junction warning signage. This is likely to be in the region of 1-2mph. However, the increase in signage is likely to reduce the possibility of collisions occurring at junctions. Further investigation of the Stats 19 form may support this assumption. Increasing the junction warning signage through the village generates a score of 8/10 using our cost and effectiveness matrix system.
4.12 Footway improvements including vegetation clearance

As discussed earlier in the report the condition of the footways within the village and approach to the village is poor. In particular overgrown vegetation, potholes, and trip hazards were noted throughout the site assessment, which is likely to have a negative impact modal shift to sustainable forms of transport. This includes public transport as local residents may feel uncomfortable walking to bus stops due to the condition of the footways.

4.12.1 Improvements to the footways across the village is unlikely to have a direct impact road safety. However, improving the condition of the footways including cutting back all vegetation, filling potholes, and resurfacing or patching areas where trip hazards exist may result in greater numbers of residents choosing sustainable forms of transport, reducing the number of vehicles on the road within the village. The cost involved in improving the condition of the footways in the village will be dependent on how many footways are chosen for improvement. Further investigation is required to gain a full understanding of this. To improve all footways to bring the standard to an acceptable level is likely to cost in the region of £15,000-£20,000.

4.12.2 This proposal will not result in a reduction to traffic speed as it doesn’t directly impact traffic. However, the proposal will improve the attractiveness of the village and will increase the possibility of modal shift occurring to sustainable forms of transport. As this proposal doesn’t directly impact road safety we have chosen not to provide a cost/effectiveness rating as it stands as a separate proposal to the others and comparison isn’t possible. Figure 28 and 29 provides some examples of the existing condition of footways within Charlwood village.
4.13 Junction redesign at The Street / Ifield Road junction

As discussed within this study, one of the most congested areas within the village is the junction of The Street and Ifield Road. Vehicle movements occur from all directions frequently with vehicles encroaching the road to negotiate the junction. This increases the likelihood of a collision occurring. It also appears that speed is excessive along The Street resulting in potential conflict at the junction. There is also concern that vehicles are approaching the junction at speed on Ifield Road due to lack of signage and driver behaviour as a result of the on-street parking.

4.13.1 Whilst further investigation would be required, one of the most effective solutions to resolve these issues is to implement a mini roundabout at this junction. As traffic manoeuvres seem fairly split across all possible junction movements, this would make this junction suitable for a mini roundabout. One of most common reasons mini roundabouts are not effective is when a certain movement across a junction has far greater traffic compared to the other arms of the junction. A mini roundabout would also control speed on all approaches especially The Street. Another reason mini roundabouts can be ineffective is when sufficient levels of deflection are not included within the design. If a vehicle can travel through the mini roundabout without a need to change course, this is a serious design risk and can increase the likelihood of collisions occurring as well as building up traffic on other arms in peak periods.

4.13.2 Figure 30 below provides a sketch drawing of how the mini roundabout could be constructed at the junction. There is a need for deflection to be built into the design for traffic travelling south east through the junction on The Street. It is important to identify the users of the roads to ensure sufficient width is maintained and swept path analysis is carried out to ensure all turning movements are made. It should be noted that this proposal is only likely to be suitable with the implementation of the weight limit as turning movements may be a problem. The design will require an overrun area outside of the roundabout dome which could be achieved through paving or paint. It would be necessary to have the appropriate illumination and advance warning signs in place to ensure vehicles are aware of the mini roundabout as they approach. It is likely that the design will require some of the village green to be used to ensure the widths are suitable as well as ensuring the footway is maintained. Land interest plans should be sought to check whether any land is required for dedication.

4.13.3 It will be a requirement to use the existing on-street parking bays outside Charlwood village store as part of the design. However there appears to be sufficient room off the carriageway for vehicles to use when accessing the shops. There is also additional on-street parking to the west of the junction. A mini roundabout is estimated to cost in the region of **£60,000-£75,000**. This doesn’t include any cost involved in land purchase which is an unknown at this stage. Using our cost and effectiveness matrix this measure is given a rating of **7/10**.
4.13.4 An alternative to a mini roundabout is to replace the Give Way markings at the junction of The Street and Ifield Road with a Stop line. This forces drivers to stop at the junction as oppose to creeping out that can be done using a Give Way marking. However, whilst creeping out isn’t permitted under a Stop line, its felt that this is still likely to occur. The cost of replacing a Give Way line with a Stop Line is far cheaper than a mini roundabout with the cost in the region of £5,000. Using our cost and effectiveness matrix the replacement of the Give Way line with a Stop line is given a rating of 7/10.

Figure 30 – Sketch of potential junction redesign The Street / Ifield Road
5.0 The Proposals

Table 1 shows a list of all 14 proposals along with the cost effectiveness rating for each proposal. This has been calculated by considering how effective the proposal will be at reducing traffic speed or improving road safety compared to the overall cost of implementation. If a proposal is low cost and highly effective it will score high. If a proposal is high cost and not effective it will score low.

If a proposal is high cost and fairly effective it will score around 5. If a proposal is low cost and fairly effective it will score around 6. Low cost proposals will score higher than high cost proposals that achieve the same level of effectiveness.

The highest rated proposals for Charlwood village are rated as 9/10. This is because they are low or fairly low cost and will be effective at reducing traffic speed. The lowest rated proposal is 6/10. This is because it is unlikely the proposal will result in a speed reduction although it is hoped there will be a reduction in collisions.

<table>
<thead>
<tr>
<th>Proposal</th>
<th>Cost Effectiveness Rating (out of 10)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gateway treatment at 30mph terminals on approach to Charlwood</td>
<td>9</td>
</tr>
<tr>
<td>Replace existing 30mph repeater signs with yellow backed signs</td>
<td>9</td>
</tr>
<tr>
<td>Implementation of parking restrictions along Ifield Road</td>
<td>9</td>
</tr>
<tr>
<td>Installation of Vehicle Activated Signs</td>
<td>9</td>
</tr>
<tr>
<td>Implementation of 7.5 tonne weight restriction</td>
<td>9</td>
</tr>
<tr>
<td>Installation of formal crossing along The Street</td>
<td>8</td>
</tr>
<tr>
<td>Traffic calming with street lighting along The Street</td>
<td>8</td>
</tr>
<tr>
<td>Increase junction warning signage on approach to key junctions</td>
<td>8</td>
</tr>
<tr>
<td>Junction redesign at The Street / Norwood Hill Road junction</td>
<td>8</td>
</tr>
<tr>
<td>Readjust edge of carriageway line to create narrower running lanes</td>
<td>7</td>
</tr>
<tr>
<td>Replace Give Way line with Stop line at The Street / Ifield Road junction</td>
<td>7</td>
</tr>
<tr>
<td>Refresh all existing white line markings</td>
<td>6</td>
</tr>
<tr>
<td>Footway accessibility improvements including tactile paving</td>
<td>6</td>
</tr>
<tr>
<td>Footway improvements including vegetation clearance</td>
<td>N/A</td>
</tr>
</tbody>
</table>

Table 3 – Prioritised proposals for Charlwood
6.0 Stakeholder Consultation

It will be necessary to carry out consultation with key stakeholders regardless of any options that are progressed. Key stakeholders include highway authority, local councillors, emergency services, and transport bodies such as bus and taxi. Some of the proposals also require consultation with the public. However, our recommendation is that consultation with local residents is carried out with all proposals to ensure adequate support.

Having carried out the feasibility report we have highlighted the three proposals that we consider to be the most effective or have the potential to be most effective at slowing traffic speed into and through the village of Charlwood and improve road safety for all road users. These have been prioritised and are shown below:

1. Gateway treatment at 30mph terminals on approach to Charlwood;
2. Installation of Vehicle Activated Signs;
3. Implementation of 7.5 tonne weight restriction.

As part of this feasibility report, Charlwood Parish Council have the opportunity to provide their comments and any recommendations they are particularly keen to see progressed further. There comments will be provided below once they have had the opportunity to discuss the feasibility report in detail.
7.0 Conclusion

In conclusion to this feasibility report, it has been highlighted that measures are required to reduce traffic speed on the approach and through the village of Charlwood. Reducing traffic speed will improve road safety for all road users. Charlwood Parish Council who commissioned this report have had their opportunity to provide comments on the recommendations stated and their comments can be found in section 5.4 of this report.

2020 Consultancy have listed all the possible measures that we believe can improve road safety and reduce traffic speed. It is now up to Charlwood Parish Council how to proceed with the work that has been carried out. The Appendices at the end of this report highlight the possible work that we can continue to have with the project. However, it is necessary to get the buy in from the highway authority to progress these measures.

7.1 Next Steps

Following on from the feasibility report, Charlwood Parish Council have the opportunity to provide any comments they wish to include as part of the project. Following this, the Parish Council then need to escalate the findings of this report to the highway authority, Surrey County Council and District Council, Mole Valley District Council. This is to gain the buy-in from the relevant key stakeholders including those who can provide funding for the measures taken forward. Without this support the Parish Council may need to fund measures themselves with approval from the highway authority. The majority of the measures included within this report require work to be carried out by the highway authority.

7.1.1 If the highway authority is happy to approve the Parish Council carrying out work on the highway or are willing to fund one or more of the proposals, the next stage will be to carry out detailed design of the proposal(s). This will then be consulted on with key stakeholders. Some of the proposals require Traffic Regulation Orders to be created and advertised. The work can then be carried out on site.

8.0 Appendices

Appendix A provides the results of ATC surveys that were undertaken as part of the feasibility study. There are also additional services we can undertake if the appropriate documents and data is provided. These are shown below.

Appendix B  Feasibility Design Drawings
Appendix C  Stage 1 Road Safety Audit
Appendix D  Feasibility Study Construction Cost Estimates
Appendix E  Stakeholder Consultation