
Decision Session – Cabinet Member for City Strategy 27 September 2011

Report of the Director of City Strategy

Water End/Clifton Green Junction: Options for Reinstating a Separate Left Turn Traffic Lane on the Water End Approach.

Summary

1. This report discusses the possible reinstatement of two traffic lanes on the Water End approach to the Clifton Green signals, as were in place before the cycling facilities were introduced. The physical constraints of the site are outlined and various options for reinstating a dedicated left turn traffic lane are developed and discussed. Since most options involve the removal of the existing on-road cycle lane, the report also includes ideas and proposals for alternative ways of facilitating cyclist movements between Water End and Water Lane. The report also includes some other ideas for altering the way the Clifton Green signals operate, with a view to increasing capacity and reducing traffic delays.

Recommendation

2. The Cabinet Member is recommended:

To note the contents of the report and decide if one of the options for reinstating two traffic lanes should be progressed or not, and if any of the additional ways of improving the operation of the traffic signals should be taken forward.

Reason: To balance various advantages and disadvantages linked to the options, with a view to achieving the best overall solution.

Background

3. The plan in **Annex A** shows the original layout, i.e. before the current scheme was implemented. Under this layout cyclists often had difficulty in riding past the queue of vehicles approaching the

Clifton Green traffic signals, particularly at the 'pinch point' adjacent to property number 17 Clifton Green, and regularly resorted to riding along the narrow footway to bypass vehicles in order to reach the advanced stop line (ASL). In addition, the very narrow central cycle feeder lane at 0.7 metres wide running in-between the adjacent traffic lanes, was neither wide enough nor long enough to provide any practical advantage for cyclists. The lane widths were sub-standard at around 2.4m, and just sufficient to accommodate cars and small vans. Access to the left turn lane was also often restricted by queuing back to the pinch point, but on average around 11 cars per cycle would be able to benefit from the left turn filter lane (7 on the filter and 4 on the full green), thereby increasing the overall capacity of the junction.

4. The plan in **Annex B** shows the current layout, which was implemented during the early part of 2009. The removal of the left turn traffic lane has enabled a 1.5m cycle lane to be provided all the way up to the ASL at the signals, alongside a single traffic lane that varies in width between 3.0m to 3.9m. This generally works well for cyclists, although it has been observed that a small number of motorists choose to go into the cycle lane and use it as a left turn traffic lane. Overall the scheme has been well received by cyclists, and numbers cycling along this route have increased significantly, effectively doubling in number from about 80 per hour in the AM peak before the improvements were implemented and around 160 per hour at the present time. For motorists, it was always acknowledged that there would be some increased delays and queue lengths due to the removal of the left turn lane, and it was expected that this would result in some wider traffic re-distribution, plus some choosing to cycle instead.
5. Since implementation, there have been complaints about increased traffic congestion on Water End as a result of losing the dedicated left turn traffic lane. The removal of the left turn effectively reduced the capacity of the Water End approach by 11 vehicles each change of the lights (30 changes per hour in the AM peak). This increased queue lengths and the time taken for traffic in the queue to discharge through the lights. Prior to the scheme a vehicle joining the back of the queue on Clifton Bridge (500m back) would take on average 6 minutes to clear the lights at Clifton Green, post scheme it takes over 10 minutes. For Westminster Road (at 350m) pre-scheme took on average 3.9 minutes or two changes of the lights, this increases to 7.1 minutes or four changes of the lights post scheme.

6. The strongest adverse reaction to the scheme has come from residents of the Westminster Road/ The Avenue area, which is now experiencing more through traffic than it did before (around 750 vehicles per day before, compared to about 1500 now). However, this is not considered to be particularly high when compared to other streets that provide alternatives to staying on the main roads. In response, local councillors instigated a Councillor Call for Action, and a Task Group was subsequently set up to conduct a review of the scheme.
7. The Task Group reported its findings and recommendations to the council's Executive on 6th July 2010, where the following resolutions were made:
 - "That Officers be requested, in line with the recommendations of the Task Group, to bring forward for public consultation proposals which would see a left turn general traffic lane provided at the Water End junction, **on the basis that such a proposal would also retain a discrete cycle lane or path**. It is recognised that such a project could have significant financial, conservation and road safety implications, all of which would have to be highlighted in any Officer report before a final decision on implementation could be made".
 - "That Officers be instructed to undertake, on a trial basis, the installation of chicanes on Westminster Road, with a view to establishing what effect they have on vehicle volumes and speeds".
8. In response, Officers developed the layout shown in **Annex C** as the best that could be achieved within the existing Highway boundary, and this was considered at the Executive Member for City Strategy Decision Session on 7th December 2010. The officer report highlighted that all the lane widths would be sub-standard, and the layout would require the removal of the strip of cobbles at the side of the footway, and a significant cutting back of the large mature hedges forming the front boundary of the adjacent houses to provide some additional carriageway space (see **Photo 1**).
9. In addition, the report noted that a road safety audit of the proposal had identified several areas of concern. It was also explained that this layout would not fully restore the left turn lane to its former length, but would still improve the traffic flow capacity of the junction, and would be especially advantageous in the morning

peak period when there is a higher proportion of drivers making the left turn.

10. The report also noted that consultation with interested parties had confirmed many of the known concerns over the existing scheme, particularly relating to traffic problems. However, it was highlighted that consultation had also generated many comments in support of retaining the existing layout, which included representations from cycling organisations, the Police, and the Ambulance Service.
11. Weighing everything up, Officers concluded - *“The implementation of the proposed scheme would bring about a small improvement to traffic flow at the junction, and would be welcomed by many people. However, it would not fully restore the previous situation, which could lead to some dissatisfaction with the outcome. Furthermore, many people are opposed to changing the current layout, and significant concerns have been raised, particularly in relation to the safety of cyclists and pedestrians. Officers consider that these safety matters cannot be resolved by amending the proposed scheme, and therefore on safety grounds retaining the existing layout is preferred.”*
12. The decision made the Executive Member on 7th December 2010 was to retain the current layout. At this meeting the proposed chicane trail in Westminster Road was also abandoned due to a lack of support from local residents (for this reason, the report does not discuss further possible measures for Westminster Road and The Avenue).
13. This decision was subsequently called in, resulting in a resolution by The Executive (Calling In) on 21 December 2010 requesting that Officers prepare a report for consideration at a future Decision Session on the consequences of reinstating the left turn lane, **without a cycle lane**, at the Water End/Clifton Green junction.
14. Whilst it would be quite simple to remove the existing cycle lane markings and restore a left turn traffic lane, it would not be straightforward to fully return the road layout to its original form. This is because cyclists coming from Clifton Bridge now approach the junction on an off-road path and currently re-join the carriageway via the build-out at the pinch point near the start of the Green. Furthermore, if this was to be removed, some alternative means of rejoining cyclists to the road would be required. Therefore, the next section of this report focuses on the design implications of options for reinstating a left turn lane in accordance

with the resolution. This is followed by an exploration of alternative ways of facilitating cyclist movements between Water End and Water Lane, plus some other ideas for altering the operation of the traffic signals to improve traffic flow.

Options for Reinstating a Left Turn Lane without a Cycle Lane

Option One – Retaining the cycle track build-out and splitter island

15. **General Description:** This option (see **Annex D**) restores the original traffic lane layout, but also retains the cycle track build-out, which addresses the problems cyclists used to face at the pinch-point. The proposal includes a short length of advisory cycle lane beyond the end of the cycle track ramp to give cyclists a degree of protection as they rejoin the carriageway (for at least ten metres beyond the cycle track ramp). **Annex D** shows the lane widths that are achievable, although it should be noted that both the left turn and right turn lanes approaching the junction would be sub-standard, which would create queues of tightly packed traffic and specific difficulties in accommodating larger vehicles that would be likely to encroach into other traffic lanes.
16. It should be noted that in the original layout, before the changes were implemented, that the left turn lane was only marked out on the carriageway surface for a distance of approximately 22 metres from the advance stop line, although traffic was sometimes able to queue in two lanes as far back as the pinch-point and perhaps on occasion slightly beyond. However, although the road markings would replicate the original layout, this option would also result in a shorter distance being available for left turners than was available previously (given the presence of the cycle track build-out), but as discussed below, would still produce reasonable benefits for traffic flow.
17. **Advantages:**
 - The main advantage of this proposal is that the traffic capacity of the junction would be increased. Between 3 and 4 vehicles would be able to make use of the filter each change of the lights with an additional 2 during the full green. This option restores approximately 55% of the capacity of the left turn filter lane. It would take on average 7 minutes to clear the lights from a vehicle joining the back of the queue on Clifton Bridge, and 5.4 minutes from Westminster Road.

- This layout would still enable cyclists to get reasonably close to the junction via the off-road facilities, and would be protected from traffic at the pinch-point, which was a particular problem for cyclists in the original layout (shown in **Annex A**).
- Because there would be no work required to remove the cycle track build-out, the risk of any damage to the existing water main (which was fractured during the construction of the current scheme and resulted in significant local flooding) would be significantly reduced.
- The short central cycle feeder lane in the original layout served very little practical purpose, as mentioned in paragraph 3 above, and could therefore be omitted. This would allow the traffic lanes to be widened slightly, closer to the junction.
- Retaining the splitter island would provide a benefit to pedestrians crossing the Water End junction mouth for accessing Clifton Green (where there is a gap in the boundary fencing). The splitter island also provides protection for cyclists waiting in the ASL box from vehicles turning right into Water End from Shipton Road.

18. ***Disadvantages:***

After rejoining the carriageway, cyclists would face significant difficulties and safety issues in moving forward from the build-out to access the ASL. These difficulties would vary depending upon the status of the signals ahead, as discussed below:

- **Whilst the signals are at full red**, traffic queues will be building up or will have already built up. Under these circumstances, cyclists could be blocked by traffic queuing in the left turn lane, or face danger from vehicles moving across their path to reach the left turn lane. In addition, if two traffic lanes have formed beyond any rejoining cyclists, then reaching the ASL would be extremely difficult, either on the nearside of vehicles in the left turn lane, or through the middle of the two lanes of queuing traffic.
- **When the left turn filter is on** cyclists would be able to follow any clearing vehicles in the left turn lane, and either turn left with the traffic, or enter the ASL before the right turn lane gets a green signal. However, the left turn filter signal would only be on for approximately 15 seconds before the full green signal for

Water End, which means that any benefits under this circumstance are infrequent and short lived.

- **When there is a full green signal** traffic will be flowing in the right turn lane with some traffic peeling off to enter the left turn lane. During this phase, cyclists rejoining the carriageway would need to avoid any vehicles that may want to turn across them to access the left turn lane, with the potential for dangerous vehicle conflicts. The majority of cyclists would also be attempting to seek a suitable gap in the traffic flow to move across into the right turn lane. This situation is considered to be the most difficult and hazardous for cyclists.
- The limited length of the left turn lane means that the entry to the lane is quite quickly blocked, so that the utilisation of the filter arrow is quite low at only 3 or 4 vehicles for each change of the lights. When the left filter comes on, these vehicles will clear in around 6 to 8 seconds, but there will be other drivers in the main traffic queue wanting to turn left who will see the left filter signal showing, but will be unable to progress forward to use it. This is likely to lead to some frustration and negative reaction to the layout. The Water End approach still has significantly less capacity than pre-scheme. It would require an additional 10 to 15 seconds of extra green time to restore this. Whilst indications are that some of this green is available in off-peak periods, it is not available during the peaks without causing severe adverse effect on other legs of the junction.

19. **Estimated Costs:** The costs involved in making the amendments to provide this layout would be relatively cheap, probably somewhere in the region of £10 to £12k. This includes all of the road marking changes and alterations required to amend the traffic signal equipment, but mainly to plane out the existing advisory cycle lane and reinstate a patch to restore the carriageway surface. Also, because no changes would be required in relation to the cycle track build-out, the risk of damaging the water main would be reduced.

Option Two – Retaining the cycle track build-out, but removing the splitter island

20. **General Description:** A variation on the Option One approach could see a retention of the cycle track build-out, whilst at the same time removing the splitter island at the junction mouth to

provide additional width for the two approach traffic lanes. This option is shown in **Annex E**.

21. **Advantages:** This option has all the advantages discussed previously in Option One above, although by removing the existing splitter island at the junction mouth, the available width left for vehicles could be increased slightly, thereby providing more room for all road users. **Annex E** shows the widths that would be achievable under these circumstances. Some further improvement in traffic flow is likely as a result of removing the splitter island, because with more space available, this makes both left and right turns easier to execute. However, the benefits would be small with less than one additional vehicle throughput every other change of the lights, or less than 15 vehicles/hour.

22. **Disadvantages:**

- Both the left turn and right turn lanes approaching the junction would still be sub-standard.
- Cyclists would still experience significant difficulties merging with motor traffic beyond this point, as previously discussed above in Option One.
- The removal of the splitter island would remove the physical protection currently given to cyclists waiting in the ASL whilst traffic turns right into Water End. The most significant risk would be from the right turning Park & Ride buses, but given their ability to negotiate the right turn manoeuvre without difficulty when the splitter island is in place, the risk of larger vehicles overrunning the ASL should be minimal. In addition, the edge of the ASL could be narrowed slightly in order to mitigate against this risk.
- On site observations show that pedestrians crossing here to access the opening to use Clifton Green use the splitter island to cross Water End in two stages (between traffic signal phases), often waiting in the 'shadow' of the island. If the splitter island were to be removed, this would make it very difficult for pedestrians to cross Water End at the junction.

23. **Estimated Costs:** Removing the splitter island would add approximately £5k to Option One, giving an estimated scheme cost in the region of £15 to £17k, subject to the water main not being damaged.

Option Three – Removing the cycle track build-out, but retaining the splitter island

24. **General Description:** A road layout very close to the original could be created by removing the cycle track build-out and returning cyclists to the carriageway earlier, where the road is wider, as shown in **Annex F** and **Photo 2**. This would practically restore the former left turn lane provision for motorists, but would also recreate all the former problems for cyclists that existed previously.
25. **Advantages:** Motor traffic approaching the junction would be able to form into two lanes earlier than the previously discussed options, given that more carriageway space would be available if the cycle track build-out was removed. This would consequently improve the flow of traffic through the junction. Between 5 and 6 vehicles would be able to make use of the filter each change of the lights with an additional 3 during the full green. This option restores 80% to 90% of the capacity of the left turn filter lane compared to the pre-scheme case. It would take on average 6.3 minutes to clear the lights from a vehicle joining the back of the queue on Clifton Bridge, and 4.4 minutes from Westminster Road. An additional green time of 6 to 10 seconds would be required to bring the capacity up to pre-scheme levels.
26. **Disadvantages:**
- In particular, cyclists would face significant problems at the pinch point (and just prior to it), where motorists seeking to squeeze into the start of the left turn lane would be likely to block their path.
 - Cyclists could also face two queues of tightly packed traffic beyond the pinch point (either stationary, or moving) and experience associated problems in reaching the junction, similar to those outlined above in paragraph 18.
 - For these reasons, many cyclists are likely to continue off-road by using the verge and/or footway and then drop back onto the carriageway at or close to the ASL, as they did with the original pre-scheme implementation layout (shown in **Annex A**). This would place pedestrians in conflict with cyclists on the already narrow footway, with the potential for either cyclists or pedestrians to be forced across the cobbled area and into the

carriageway, potentially into the path of vehicles in the left turn lane.

- The costs involved in removing the current cycle track build-out could be high, given that there would be a significant risk of damaging the very shallow water main that lies directly underneath. Armed with this knowledge, the build-out would of course be removed with great care, but it would be preferable not to risk disturbing the water main again.
- The Water End approach still has slightly less capacity than pre-scheme, although an additional 4 to 8 seconds of green would fully restore this. Indications are that this green time is available in off-peak and morning peak periods without causing adverse effect to other legs of the junction, but not available during the PM peak. The consequence being that it would not be possible to fully restore levels of queuing and delays back to pre-scheme levels.

27. **Estimated Costs:** Assuming that no damage was done to the water main, the costs involved in making the necessary amendments to provide this layout would be relatively cheap, probably somewhere in the region of £20 to £25k. This would include all of the road marking changes and alterations required to amend the traffic signal equipment, but mainly to plane out the existing advisory cycle lane and reinstate a patch to restore the carriageway surface. However, the risk of damaging the water main can not be ignored. If this was damaged again, then the costs for repair could run into tens of thousands of pounds, notwithstanding all the associated disruption that this would cause, and also the potential for the council's reputation to be damaged.

Option Four – Removing both the cycle track build-out and the splitter island

28. **General Description:** A possible improvement on Option Three could be created by removing the splitter island at the junction mouth to provide additional width for the two approach traffic lanes, as shown in **Annex G**.

29. **Advantages:** Motor traffic approaching the junction would be able to form into two lanes earlier than the previously discussed options, given that more carriageway space would be available if the cycle track build-out was removed. This would consequently improve the flow of traffic through the junction by a small amount.

Some further improvement in traffic flow is likely as a result of removing the splitter island, because with more space available, this makes both left and right turns easier to execute. However, the benefits are small with less than one additional vehicle throughput every other change of the lights (less than 15 vehicles/hour).

30. **Disadvantages:** The disadvantages for this option are similar to those outlined above in Option Three, but in addition:

- The removal of the splitter island would remove the physical protection currently given to cyclists waiting in the ASL whilst traffic turns right into Water End. The most significant risk would be from the right turning Park & Ride buses, but given their ability to negotiate the right turn manoeuvre without difficulty when the splitter island is in place, the risk of larger vehicles overrunning the ASL should be minimal. In addition, the edge of the ASL could be narrowed slightly in order to mitigate against this risk.
- On site observations show that pedestrians crossing here to access the opening to use Clifton Green use the splitter island to cross Water End in two stages (between traffic signal phases), often waiting in the 'shadow' of the island. If the splitter island were to be removed, this would make it very difficult for pedestrians to cross Water End at the junction.

31. **Estimated Costs:** Removing the splitter island would add approximately £5k to Option Three, giving an estimated scheme cost in the region of £25 to £30k, subject of course to the water main not being damaged.

Further Options?

32. Variations on the four layouts set out above could be achieved by removing the strip of cobbles at the edge of the footway. This footway currently varies between approximately 1.35m and 1.5m in width (not including the cobbles). Removing the cobbles would provide an additional 0.6m of carriageway space, which would enable slightly wider traffic lanes to be provided. This would ease traffic flow a little further, but would not be sufficient to overcome the fundamental problems cyclists would face, unless a dedicated cycle lane could be accommodated. Therefore, amended versions of the four options presented above have not been developed.

33. The idea of widening the road to enable a left turn traffic lane to be restored whilst retaining some form of on-road cycle lane, was the basis of the previous junction review, which took place in 2010. As explained in paragraph 8 above, Officers developed the layout shown in **Annex C** as the best that could be achieved. This offered limited traffic flow improvement, had many associated safety issues, and was consequently rejected at that time. However, it does present a feasible alternative to the four options presented above, which do not have a cycle lane. Therefore, a similar assessment for comparison purposes is set out below. This includes the layout shown in **Annex C**, plus a variation based on retaining the splitter island. For consistency with the descriptions of the four options without a cycle lane, the layout which retains the splitter island is presented first.

Option Five - Road widening to create additional space to re-introduce a left turn traffic lane plus the retention of an on-road cycle facility, whilst retaining the splitter island.

34. **General Description:** This layout (see **Annex H**) is based on removing the existing strip of cobbles running alongside the footway, plus severely trimming back the boundary hedge to the adjacent properties, to create additional road space for a central cycle 'feeder' lane to be accommodated between separate left and right turn traffic lanes. It also retains the existing splitter island.

35. **Advantages:**

- A continuous facility would be retained for cyclists all the way from the cycle track to the ASL.
- Calculations show that the short left turn lane would improve the traffic flow capacity of the junction, and would be especially advantageous in the morning peak period when there is a higher proportion of drivers making the left turn. On average, 2 vehicles would be able to make use of the filter lane, and a further 2 vehicles during the full green. This would restore approximately 40% of the capacity of the original filter lane.
- Retaining the cycle track build-out would protect cyclists from traffic at the pinch-point, which was a particular problem for cyclists in the original layout (shown in **Annex A**).

- Because there would be no work required to remove the cycle track build-out, the risk of any damage to the existing water main (which was fractured during the construction of the current scheme and resulted in significant local flooding) would be significantly reduced.
- Retaining the splitter island would provide a benefit to pedestrians crossing the Water End junction mouth for accessing Clifton Green (where there is a gap in the boundary fencing). The splitter island also provides protection for cyclists waiting in the ASL box from vehicles turning right into Water End from Shipton Road.

36. ***Disadvantages:***

- Both the left turn and right turn traffic lanes approaching the junction would be very sub-standard, and therefore cyclists are still likely to experience significant difficulties reaching the ASL, despite the provision of a continuous central cycle feeder lane. The most significant risk to cyclists is the potential for conflict with motor vehicles at the point where vehicles will have to cut across the cycle lane to enter the left turn filter lane. In addition, because of the narrow traffic lanes, there will be occasions when vehicles queuing or moving directly adjacent to the cycle lane may need to encroach into the cycle lane, thereby creating further potential conflict with cyclists.
- The short length of the left turn lane means that entry would quickly become blocked by vehicles queuing back in the main traffic lane. When the left filter signal comes on, the vehicles in the left turn lane (two on average) will clear in around 6 to 8 seconds, but there will be other drivers in the main traffic queue wanting to turn left who will see the left filter signal showing, but will be unable to progress forward to use it. This is likely to lead to some frustration and negative reaction to the layout.
- Although this layout would restore around 40% of the capacity of the original left turn traffic lane, it would require an additional 10 to 15 seconds of extra full green time to be allocated to the Water End approach to fully restore the lost capacity. Whilst indications are that some spare green time is available in off-peak periods, it is not available during the peaks without causing severe adverse effect on other legs of the junction.

37. **Estimated Costs:** This option would involve removing the cobbles to create additional carriageway width, which would not only involve the provision of a full carriageway construction in the area concerned, but would also require an area of carriageway re-profiling to smooth out the road camber. A new kerb alignment associated with these changes would also be required. In total, the implementation costs are estimated to be approximately £30k to £35k.

Option Six - Road widening to create additional space to re-introduce a left turn traffic lane, plus the retention of an on-road cycle facility, and removing the splitter island.

38. **General Description:** This layout (see **Annex C**) is also based on the idea of removing the existing strip of cobbles running alongside the footway, plus severely trimming back the boundary hedge to the adjacent properties, to create additional road space. However, this layout also removes the existing splitter island to provide slightly more generous traffic lane widths either side of the central cycle 'feeder' lane.
39. **Advantages:** The advantages for this option are similar to those outlined above in Option Five, but in addition:
- By removing the existing splitter island at the junction mouth, the available width left for vehicles could be increased slightly, thereby providing more room for all road users. **Annex C** shows the widths that would be achievable under these circumstances. Some further improvement in traffic flow is likely as a result of removing the splitter island, because with more space available, this makes both left and right turns easier to execute. However, the benefits would be small, with less than one additional vehicle throughput every other change of the lights, or less than 15 vehicles/hour.
40. **Disadvantages:** The disadvantages for this option are similar to those outlined above in Option Five, but in addition:
- The removal of the splitter island would remove the physical protection currently given to cyclists waiting in the ASL whilst traffic turns right into Water End. The most significant risk would be from the right turning Park & Ride buses, but given their ability to negotiate the right turn manoeuvre without difficulty when the splitter island is in place, the risk of larger

vehicles overrunning the ASL should be minimal. In addition, the edge of the ASL could be narrowed slightly in order to mitigate against this risk.

- In addition, on site observations show that pedestrians crossing here to access the opening to use Clifton Green will often use the splitter island to cross Water End in two stages (between traffic signal phases), normally waiting in the 'shadow' of the island. If the splitter island were to be removed, this would make it very difficult for pedestrians to cross Water End at the junction.

41. **Estimated Costs:** This option is the most expensive of all the options that have been considered, requiring all the works within Option Five plus the removal of the splitter island. Therefore, in total, the implementation costs are estimated to be approximately £35k to £40k.

Road Safety Audit

42. Road Safety Audits have recently been undertaken on the alternative layouts forming Options One to Four (i.e. **Annexes D, E, F, & G**). A road safety audit of the central cycle lane layout forming the basis of Options Five and Six (i.e. **Annexes H and C**) was carried out in 2010 as part of the previous junction review. The key safety concerns highlighted in the audits are summarised below:

Options One to Four

- For all four options the removal of the existing on-road advisory cycle lane would increase conflict between cyclists and motor vehicles.
- For the options which retain the build-out (i.e. Options One and Two) there would be conflict between cyclists leaving the cycle track ramp and motor vehicles moving into the left turn traffic lane.
- For the options which remove the build-out (i.e. Options Three and Four) cyclists would be on-road for much longer, resulting in increased exposure to motor traffic and potential conflicts, especially where the carriageway narrows at the 'pinch-point'.

- For the options which retain the splitter island (i.e. Options One and Three) the traffic lanes would be very narrow, which would lead to conflict between vehicles, and between cyclists and vehicles. Any proposal to create a short central cycle feeder lane is not recommended, as it would be too narrow to accommodate safe use by cyclists (it could also encourage left turning cyclists to adopt a poor road position). In addition, the very narrow traffic lanes could lead to increased cyclist usage of the footway, thereby leading to conflicts between cyclists and pedestrians.
- For the options which remove the splitter island (i.e. Options Two and Four) there would be reduced protection given to cyclists from potential conflicts with right turning traffic, especially buses and HGVs. In addition, this would remove the assistance that the splitter island provides for pedestrians crossing to and from The Green.

Options Five and Six

43. For both options:-

- There would be conflicts between cyclists and left turning traffic cutting across the central cycle lane.
- Traffic would regularly be queuing across the central cycle lane, resulting in obstruction and potential hazards for cyclists trying to move forward.
- Cyclists in the central lane would be moving between two closely spaced lines of traffic within sub-standard width traffic lanes, which is likely to lead to potential conflicts, especially if larger vehicles are present. This problem would be worse under Option Five due to the narrower traffic lanes.
- There will be increased risks to pedestrians from passing traffic due to the limited footway width and close proximity of the left turning traffic without the existing safer buffer provided by the strip of cobbles. This problem would be worse under Option Five due to the narrower traffic lanes.
- Some cyclists, especially those turning left, may choose to ride on the footway in preference to rejoining the carriageway, which would result in potential conflict with pedestrians and a risk from

passing traffic due to the limited footway width and close proximity of the left turning traffic (exacerbated by the removal of the existing strip of cobbles).

44. For just Option Six:-

- Option Six removes the splitter island, resulting in reduced protection for cyclists from potential conflicts with right turning traffic, especially buses and HGVs. In addition, this would remove the assistance that the splitter island provides for pedestrians crossing to and from The Green.

45. In summary, the safety auditors conclude that all of the proposals (i.e. Options One to Six) would be less safe than the current layout, especially for cyclists.

Alternative ways of facilitating cyclist movements between Water End and Water Lane.

46. Since all of the options outlined above have weaknesses, various alternative ideas for facilitating cyclist movements between Water End and Water Lane have been explored and are discussed below.

Could cyclists stay off-road all the way to the junction?

Convert the Footway to a Shared-Use Path

47. The existing footway opposite the Green is currently sub-standard for just pedestrian use, so it could not be considered for shared use, even if the cobbles were smooth paved and the hedges cut back. There would also be significant safety concerns over how cyclists would have to rejoin the carriageway at the ASL.

Form a Cycle Path over the Green

48. A cycle path over the Green, running between Water lane and the end of the one-way slip road has also been considered. Putting aside the legal issues and objections there may be to creating a surfaced cycle path over the Green, the main problems would be getting on and off the path at either end. This could possibly be made to work well for east to west movements (i.e. from Water Lane), but would be much more of a problem for movements in the opposite direction.

49. Firstly, cyclists approaching from Clifton Bridge would need to be able to cross to the opposite side of Water End to access the Green. This would either require a new signalised crossing facility, or use of the existing Puffin crossing, which would need to be converted to a Toucan. The latter would require a significant length of off-road cycle path to be created, and there would still be difficulties in crossing the end of the slip road. However, the biggest problem lies in getting cyclists back on to the road at the Water Lane junction. There would be a need to introduce a separate phase into the signals to enable cyclists to exit the Green safely, which would have a significant impact on the efficiency of the whole junction. Conditions are already critical in the peak periods and this additional demand would lead to increased delays and queue lengths for motorists. It would also be a very expensive solution to implement.

Could alternative routes be provided to avoid the need for cyclists on Water End to go through the Clifton Green signals?

50. For **left turn** movements the possibility of using an existing back alley, which runs to the side of the Almshouses and then along the rear of the houses opposite the Green, has been investigated previously. However, this was considered impractical and unattractive for cyclists to use, due to its very restricted width and personal security concerns.
51. For **right turns**, there is already the option of using Westminster Road and The Avenue as an alternative for some destinations. We have also previously looked at the feasibility of creating a contra-flow cycle facility along the slip road to allow cyclists to access the existing Pelican crossing on Clifton (which would need to be converted to a Toucan). This was quickly dismissed because such a contra-flow facility would require removal of all the existing on-street parking along the slip road (even loading/unloading would need to be banned), which is likely to be strongly resisted by local residents and businesses. There would also be problems in getting cyclists across Water End to join the facility, and at the other end to safely get over the Compton Street junction and to access the crossing facility on Clifton.
52. For **straight ahead** movements (the major movement, and key to the continuity of the Orbital Cycle Route) the only alternatives would be either turn left or right using one of the options discussed above, and then turn back towards the signalised junction to

access Water Lane. The “left turn first” option would of course also require a right turn to be made out onto Shipton Road at the end of the back alley, which would be extremely difficult to do without a separate signalised facility. The “right turn first” option would involve turning left on to Clifton at the end of the contra-flow cycle facility and then moving into the right hand traffic lane at the signals. The only alternative to this would be to use the Pelican (or Toucan) to cross Clifton and then cycle along Dead Man’s Alley, which provides a link through to Kingsway North. However, this alley is very narrow in places and is therefore considered unsuitable for carrying any significant levels of cycling activity. Personal security issues would also make it unsuitable to be part of the OCR.

Could the operation of the signals be altered to achieve improvements for road users?

53. As part of this study, full traffic, pedestrian and cycle surveys were undertaken (July 2011 7:00 hrs to 19:00 hrs) on a Thursday, Saturday and Sunday. Surveys were made at Clifton Green, Westminster Road, Salisbury Road and A59 / Boroughbridge Road. The survey results were used in the preparation of this report, but they will also allow an area-wide review of the signal timings to be made. Indications are that there is a significant potential for improvements to general vehicle flow to be achievable particularly on a Saturday mid-morning and during the weekday morning peaks. An element of queue relocation already occurs with the Salisbury Road traffic signals, effectively gating traffic onto the Clifton Green lights. This gating could be utilised to control the queue length on Water End. If the through-put at Salisbury Road heading east were matched to that at Water End, then the queue at Clifton Green could be minimised by being relocated to the Salisbury Road signals. The overall delay would remain the same, but the progress through the lights at Clifton Green would be far quicker – reducing the benefit of using Westminster Road. The constraint would be the amount of stacking space before the queue blocked back onto Boroughbridge Road.
54. Changing the pedestrian crossing over Water Lane to a Puffin arrangement would bring a small but useful benefit to traffic flows and pedestrian amenity (but at a cost of approximately £10 to 15k).
55. These measures could be implemented without the re-instatement of a filter signal, but they would not by themselves compensate for

the loss of the filter. The area wide review of signal timings could be undertaken with all options.

Could advance signals be provided prior to the junction, in order to manage traffic flows, whilst at the same time providing benefits for cyclists in being able to reach the ASL at the junction more easily?

56. Pre-signalling the Water End approach would involve installing a set of traffic signals set back from the main junction to hold traffic back, but allow cyclists to move forward towards the main stop line. It is the phasing of these lights with the main signals that gives the advantage to cyclists without overly impeding motorists. However, the difficulty with Water End is that in order to feed the restored filter with sufficient traffic to make it effective requires that the pre-signals open up a long time - up to 40 seconds - in advance of the main signals (this is based on a flow rate of each vehicle taking 2 seconds to pass a stop line, and with 20 vehicles required to fill up the reservoir, this equates to 40 seconds). Anything less reduces the benefit of reinstating the left turn filter lane and increases the danger for cyclists, because they would be running together with free moving traffic, which could at the same time be changing lanes.
57. The variability of the split of traffic between the left and right turn lanes also means that optimising the run-in at the start of the green signal in order to make best use of the filter and the run-out at the end of the green phase, so as to keep the reservoir traffic free (but not waste green time), would be difficult. The signal arrangement is generally more complex and would require signal equipment to be installed at a sensitive location, including on Clifton Green. Average queue lengths would increase for traffic under these circumstances. This type of arrangement can have benefits, but it is dependant upon site specifics. This arrangement is currently being considered for implementation on Holgate Road, but due to specific layout constraints, it is not deemed to be a feasible option for Water End due to the excessive amount of time that would be required, and the resultant high levels of queuing traffic as a consequence.

Next Steps

58. A decision is needed on the approach to be adopted so that more detailed design can be undertaken, and the preferred option(s) can

be formally submitted for internal and external consultation, including the emergency services, cycle user groups and relevant Members. Feedback would be reported to a future meeting with a view to a final decision being made.

Options

59. The options for the Cabinet Member to consider in relation to the reinstatement of a left turn traffic lane are summarised below:

Option 1 – retaining both the cycle track build-out and the splitter island, as shown in **Annex D**;

Option 2 – retaining the cycle track build-out, but removing the splitter island, as shown in **Annex E**;

Option 3 – removing the cycle track build-out, but retaining the splitter island, as shown in **Annex F**;

Option 4 – removing both the cycle track build-out and the splitter island, as shown in **Annex G**;

Option 5 – introducing a central cycle feeder lane between two traffic lanes, as shown in **Annex H**, retaining the splitter island;

Option 6 – introducing a central cycle feeder lane between two traffic lanes, as shown in **Annex C**, with the splitter island removed;

Option 7 – retaining the existing layout, as shown in **Annex B**.

Additional Measures

60. There are also some additional measures for the Cabinet Member to consider, as follows:

Measure A – Undertake an area-wide review of signal timings for weekdays and weekends for all options. This could include an element of queue relocation for all options short of the full filter lane restoration.

Measure B – Conversion of the pedestrian crossing over Water End to a Puffin style crossing facility.

Analysis

61. The current layout on the Water End approach to the Clifton Green junction works well for cyclists, and since the scheme was introduced, the number of people cycling along this route has increased significantly. Therefore, from a sustainable transport viewpoint, the current layout has been successful. In terms of road safety, the layout on the Water End approach is also considered to be working satisfactorily, since there has only been one relevant injury accident since the scheme was completed in April 2009. This involved a collision between a cyclist and a car just beyond the ASL on the Water Lane approach, and resulted in a slight injury to the cyclist. However, it should be noted that in the three years prior to the scheme being implemented there were no recorded injury accidents on this arm of the junction, and the doubling of cycling numbers inevitably increases the chances of an accident involving a cyclist occurring.

62. In comparing the six options presented above for reinstating a left turn traffic lane, several key issues need to be considered and balanced against each other:
 - Benefits to traffic flow – all the options will improve traffic flow, but to varying degrees.
 - Negatives for cycling – the four options which do not retain an on-road cycle lane will make it much more difficult for cyclists to make progress through the Clifton Green junction in busy traffic conditions, and will make the whole cycle route less attractive to use.
 - Road safety – all the options have potential safety issues.
 - Costs – the options vary in cost, but all should be affordable within the available budget allocation.
 - Public support – the various options will all be viewed differently by various road users, local residents, and other interested parties.

63. Of these issues, Officers are most concerned about the road safety implications of changing the existing layout. The safety audit process has highlighted many potential problems and reaches the conclusion that all the options would be less safe

overall than the existing layout. Officers consider that these safety matters cannot be fully resolved by amendments to the basic designs, and therefore on safety grounds retaining the existing layout in accordance with Option 7 is preferable.

64. Should the Cabinet Member be minded to pursue the reinstatement of a left turn traffic lane, Officers consider that Option One and Options Five or Six present the best compromise solutions. Option One is the favoured option of the four which do not retain a cycle lane, because this would still provide cyclists with protection from traffic at the pinch point, whilst providing a significant benefit to traffic flow through the junction from Water End. In addition, the retention of the splitter island reduces the risks to cyclists waiting in the ASL area, and pedestrians crossing at this location. Options Five and Six have the big advantage of maintaining continuity of the cycle route by having an on-road cycle lane. However, this would come at the expense of some additional safety concerns and a lower traffic capacity gain.
65. In considering Options Five and Six, it is worth noting that there are several existing examples in York of traffic signal junction layouts which incorporate a central cycle 'feeder' lane between two traffic lanes. The two that most closely resemble the proposed layout at Water End are on Clarence Street at its junction with Wigginton Road, and on Station Road at its junction with Station Rise. The Clarence Street example has similar traffic lane widths to those achievable at Water End, whereas the Station Road layout has significantly wider traffic lanes. Both of these sites have a good safety record, with no related injury accidents recorded over the last three years.
66. However, a crucial distinction between the two examples discussed above in comparison with the layouts shown in **Annexes C and H**, is that on Water End cyclists would be rejoining the carriageway from an off-road path shortly before reaching the point at which traffic would be able to move across the cycle lane to use the left turn lane. In both the Clarence Street and Station Road examples discussed above, cyclists are fully on road prior to the start of the left turn lane, which means that motorists are fully aware of the presence of on-road cyclists. Therefore, there is a concern that on Water End drivers may be less attentive to the presence of on-road cyclists as they seek to enter the left turn traffic lane, despite a short length of on-road cycle lane being

provided prior to the left turn lane commencing, in order to raise awareness of cyclists rejoining the carriageway.

67. There is an existing example where cyclists leave an off-road path before joining a central cycle feeder lane. This is at the junction of Water End and Boroughbridge Road. However, it does not closely resemble the proposed layouts shown in **Annexes C** and **H** for two important reasons. Firstly, the on-road cycle lane leading from the off-road path extends for a much greater distance than can be accommodated at Clifton Green. In addition, the on-road cycle lane does not form a continuous lead into a central cycle feeder lane - there is a long gap between the two, where cyclists are expected to move over when they can. The site has a good safety record, with no related injury accidents recorded over the last three years.
68. On the additional measures, both A and B offer the potential for general improvements at the junction, regardless of whether a left turn traffic lane is restored on Water End. It is therefore recommended that both are taken forward for more detailed assessment, with a view to Officers developing more detailed proposals for the Cabinet Member to consider.

Corporate Priorities

69. The proposed reinstatement of the left turn traffic lane would be a localised amendment to the overall Water End Cycle Scheme, and is thought unlikely to have a significant impact in relation to the council's Corporate Priorities. However, there is a significant risk that cyclists would find the new layout more intimidating, and some may choose to switch to alternative motorised forms of travel. There is also a risk of more accidents occurring. Therefore, the proposal does have some potential to impact negatively on the council's corporate aims relating to sustainability, safety, and health.

Implications

70. **Financial/Programme** – The Transport Capital Programme for 2011/12 currently includes a provisional budget of £40K for the possible reinstatement of the left-turn lane. Therefore, all options should be affordable, as long as there is no damage to the water main.

71. **Human Resources** – None.
72. **Equalities** – Pedestrian safety may be affected on that part of the footway on Water End, directly opposite The Green, if the existing layout were to be amended.
73. **Legal** – The council would need to go through legal proceedings if any alterations to Clifton Green (a registered Village Green) were proposed, or if any compulsory purchase of land adjacent to Clifton Green were pursued.
74. **Crime and Disorder** – Any cyclists that resort to riding on the footway as a result of the existing layout being amended would be committing an offence.
75. **Information Technology** – None.
76. **Property** – None.

Risk Management

Risk Category	Impact	Likelihood	Score
Organisation/Reputation	Medium (3)	Probable (4)	3x4=12
Physical	High (4)	Possible (3)	4X3=12

77. In compliance with the Council’s risk management strategy, the main risks in reinstating the left-hand lane that have been identified in this report are:
- The potential damage to the Council’s image and reputation if scheme proposals are not brought forward, especially in view of previous press coverage concerning traffic congestion on Water End and rat-running traffic using Westminster Road / The Avenue. Conversely, many people may also be unhappy if the current scheme is altered.
 - The physical risk of increased casualties linked to the proposed road layout changes.
78. Measured in terms of impact and likelihood, the risk scores have been assessed at less than 16, which means that at this point the risks need only to be monitored, as they do not provide a real threat to the achievement of the objectives of this report.

Contact Details:

Authors

Mike Durkin
Project Manager (Transport & Safety)
Tel No: (01904) 553459

Jon Pickles
Senior Engineer (Transport & Safety)
Tel No: (01904) 553462

Simon Parrett
Principal Transport Planner
Modeller
Tel No: (01904) 551631

Chief Officer Responsible for the report

Richard Wood
Assistant Director for Strategic Planning & Transport

**Report
Approved**



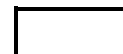
Date 12 September 2011

Specialist Implications Officer(s)

There are no specialist officer implications.

Wards Affected: Clifton

All



For further information please contact the authors of the report.

Background Papers:

“Called-In Item: Water End/Clifton Green Review – Reinstatement of Left-turn Traffic Lane and Chicane Trial”, a report to the meeting of the council’s Executive (Calling-In) on 21 December 2010.

“Water End/Clifton Green Review – Reinstatement of Left-turn Traffic Lane and Chicane Trial”, a report to the Decision Session – Executive Member for City Strategy on 7th December 2010.

“Cover Report – Water End Councillor Call for Action”, a report to the meeting of the council’s Executive on 6 July 2010.

“Cover Report – Water End Final Report”, a report to the Economic & City Development Overview & Scrutiny Committee on 17 May 2010.

“Water End – Proposed Improvements for Cyclists”, a report to the Executive Members for City Strategy and Advisory Panel on 20 October 2008.

Annexes:

- Annex A Plan showing “Clifton Green Junction, Water End – Original Layout (Pre Cycle Scheme)”.
- Annex B Plan showing “Clifton Green Junction, Water End – As Existing (Post Cycle Scheme)”.
- Annex C Plan showing “Clifton Green Junction, Water End – Reinstatement of Left Turn Lane With a Central Cycle Feeder Lane, Removing the Splitter Island”.
- Annex D Plan showing “Clifton Green Junction, Water End – Reinstatement of Left Turn Lane Retaining Cycle Track Build-out and Splitter Island”.
- Annex E Plan Showing “Clifton Green Junction, Water End – Reinstatement of Left Turn Lane Retaining Cycle Track Build-out, But Not Retaining Splitter Island”.
- Annex F Plan showing “Clifton Green Junction, Water End – Reinstatement of Left Turn Lane Removing Cycle Track Build-out, But Retaining Splitter Island”.
- Annex G Plan showing “Clifton Green Junction, Water End – Reinstatement of Left Turn Lane Removing Cycle Track Build-out and Splitter Island”.
- Annex H Plan showing “Clifton Green Junction, Water End – Reinstatement of Left Turn Lane With a Central Cycle Feeder Lane, Retaining the Splitter Island”.

Photographs:

Photo 1 & Photo 2