Compiled by the Planning Policy, Projects & Heritage Team
at Brighton & Hove City Council

# Proposed Submission City Plan Part Two

# Transport Topic Paper

February 2020

Brighton & Hove City Council

# Contents

# Non-Technical Explanatory Introduction

## Context

The Brighton & Hove City Plan Part One (CPP1) was adopted in March 2016 and sets out the strategic policy framework to guide the new development required across the city to 2030. CPP1 sets the overall amounts of development to be planned for (e.g. housing, employment and retail) and the broad locations and Development Areas where new development will take place. It allocates key strategic sites and sets out strategic policies to guide future development including policies for urban design, transport, affordable housing, biodiversity and sustainability. This strategic framework is now part of the statutory Development Plan for Brighton & Hove.

Policy CP1 relates to housing delivery and states that "*the council will make provision for at least 13,200 new homes to be built over the plan period 2010 – 2030 (this equates to an annual average rate of provision of 660 dwellings).*" A number of large, strategic site allocations are included in CPP1 which cumulatively total 3,635 additional new homes.

During the preparation of CPP1 collaborative work was undertaken between the Highways Agency (now known as Highways England) and the city council and its transport modelling consultant. This included assessing the impact of the proposed amount of development on the strategic road network (SRN) and agreeing appropriate mitigation work where necessary to enable the SRN to accommodate the forecast extra traffic.

## City Plan Part Two

The role of the City Plan Part Two [CPP2] is to support the implementation and delivery of CPP1. It does this by building on the strategic policy framework set out in CPP1 by identifying and allocating additional development sites to provide housing above the 3,635 identified in CPP1 in order to meet the full housing target of 13,200, and sets out a detailed development management policy framework to assist in the determination of planning applications. It is consistent with the vision, strategy, objectives and strategic policies set out in CPP1; and it also covers the period to 2030. A series of housing and mixed-use site allocations are included through Policies H1, H2 and SSA1 – 7 so that the CPP1 strategy for accommodating development needs can be implemented. CPP2 does not significantly increase the planned amount of housing set out in CPP2, rather the site allocations provide more specific detail on where it will be located.

Consultation took place on a Draft CPP2 in summer 2018. The representation from Highways England (HE) requested confirmation that the cumulative impact of traffic that would be created by the housing development sites allocated in CPP2 on the SRN (in particular the junctions on the A27) had been included within the strategic modelling undertaken for CPP1. If it had, the junctions would be able to accommodate the future traffic levels once previously agreed mitigation work was implemented. If not, consideration of further appropriate mitigation may be required in order for HE to be satisfied that the

effects of the development proposed in CPP2 would not have an unacceptable impact on the operation of the SRN junctions.

### Technical Note

To address HE's representation a Technical Note was prepared by the council which sought to explain the basis of the assessment traffic generation changes resulting from the proposed levels of housing development in CPP2, and its forecast impacts on the A27 Trunk Road junctions within the vicinity of the city. It concluded that the volume of additional trips passing through the junctions in the AM and PM peak hours will not materially affect their capacity or safety, and therefore the previously agreed mitigation strategy and measures remain appropriate to address the forecast impacts.

The Technical Note was shared with Highways England who requested further clarity of the impact at each junction on the SRN.

## Transport Impact Analysis (Systra)

Having originally produced the Strategic Transport Assessments (STA) for CPP1 in 2012-14, SYSTRA was commissioned to undertake the additional assessment work requested by HE on behalf of the Council. Systra's report is reproduced in full in subsequent pages to this document to support the Proposed Submission City Plan Part Two.

In summary, the additional assessment undertaken has found that the change in anticipated trips at the A27 junctions is relatively low, with some reducing slightly. The revised designs for the junctions tested are generally able to mitigate the impacts of the revised traffic flows associated with CPP2, when compared to the results reported in the 2014 STA.

Dialogue with HE has been ongoing throughout the process to ensure that the revised assessments are robust. HE have confirmed that they are content that Systra's analysis reflects that dialogue and incorporates earlier feedback.

# A27 CPP2 TRANSPORT IMPACT ANALYSIS

## TECHNICAL NOTE

Brighton & Hove City Council

SYSTRA

# A27 CPP2 TRANSPORT IMPACT ANALYSIS

## TECHNICAL NOTE

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# 1. INTRODUCTION

## 1.1 Background

1.1.1 SYSTRA Ltd (SYSTRA) has been commissioned by Brighton and Hove City Council (BHCC) to provide input to the assessment of the transport implications associated with the implementation of the Council's latest strategic policy framework, known as City Plan Part Two (CPP2). As part of CPP2, the total amount of planned housing on the urban fringe of Brighton is proposed to reduce from the assumed 1,060 dwellings in CPP1 to just over 900, a reduction of 15% (160 dwellings).

1.1.2 Following the publication of CPP2 for consultation in July 2018, Highways England submitted a representation seeking confirmation of the likely cumulative impacts of the proposed development sites in order that it can be confident that the agreed Trunk Road junction mitigations designed to accommodate the implications of City Plan Part 1 (CPP1) remain valid. BHCC has produced a Technical Note setting out a methodology for assessing quantifying the traffic associated with the proposed housing changes in CPP2, and its forecast impacts on the A27 trunk road junctions. This document has been attached to this report in **Appendix A** for reference. Highways England has provided commentary on the proposed methodologies and requested changes and further clarity of the impact at each junction. Having originally produced the Strategic Transport Assessments (STA) for CPP1 in 2012-14, SYSTRA has therefore been commissioned to undertake the additional assessment work on behalf of BHCC.

## 1.2 Report Purpose

1.2.1 This document provides the outcomes of the work undertaken in response to the comments made by Highways England on the BHCC Technical Note, and sets out initial findings regarding the anticipated impacts at the A27 trunk road junctions.

1.2.2 As part of this work, SYSTRA has also undertaken a validation exercise of the mitigation schemes previously proposed for the A27 Junctions in 2012-14 to determine their suitability and compliance with updated design guidance. It should be noted however that the mitigations schemes previously proposed were for the purposes of high level feasibility only, and that any changes recommended in this document remain at this level of detail and will require further assessment work at a later date.

1.2.3 It is noted that tables within this report have been presented as per the previous STA reports, and so Junctions 9 and LinSig results are presented together to facilitate comparisons being made.

1.2.4 Where new mitigation has been proposed, proposed junction layout drawings are included in **Appendix B** of this report.

# 2. RESPONSES TO HIGHWAYS ENGLAND COMMENTS

## 2.1 Trip Generation

2.1.1 Highways England commented:

> *"Highways England is concerned that the AM Peak Hour trip rates and generation are low, especially when compared to the PM Peak Hour trip generation. Applied to the additional 479 dwellings in CPP2, this equates to a difference of 96 trips between peaks. As such and for robustness, we feel that it would be more appropriate for the PM Peak Hour trip rates to be used in reverse during the AM Peak Hour (i.e. 0.3 departures and 0.2 arrivals)"*

2.1.2 While it should be noted that these trip rates were used and accepted as part of the previous two STAs (2013 and 2014), SYSTRA has undertaken a sensitivity test based on the trip rates suggested by Highways England, as shown below:

**Table 1. Trip Rates Changes**

| Previous Residential Trip Rates | | | |
|---|---|---|---|
| AM Peak Hour | | PM Peak Hour | |
| Arrivals | Departures | Arrivals | Departures |
| 0.1 | 0.2 | 0.3 | 0.2 |
| **Revised Residential Trip Rates** | | | |
| AM Peak Hour | | PM Peak Hour | |
| Arrivals | Departures | Arrivals | Departures |
| 0.2 | 0.3 | 0.3 | 0.2 |

2.1.3 The revised trip rates above have been used for all subsequent assessments described in this report.

## 2.2 Trip Distribution

2.2.1 Highways England commented:

> *"Trip Distribution – Highways England notes that Scenario 1 has been assessed as it is considered more robust than Scenario 2. However, we are still concerned that the distribution in Scenario 1 underestimates the impact of the additional 479 dwellings in CPP2 and is unrealistic. This is for 2 reasons:*
>
> - *The impact has automatically been spread across 2 junctions, thereby potentially underestimating the impact of development trips at the nearest/most logical junction; and*
> - *The distribution in Table 4.1 automatically assumes that 50% would travel West and 50% travel East even though the routing may be illogical (for example, traffic from DA6 Hove Station travelling to the A293 junction to travel east when it would be more logical to travel to the A2038 junction to travel east).*

*As such, we request that the distribution exercise is revised to consider a more robust impact at the nearest/most logical single SRN junction. Where it is not obvious which is the nearest/most logical junction, we would accept the impact being distributed across 2 junctions but this should be proportionate and not necessarily 50:50. Similarly, once it has been determined how many development trips would impact a particular junction, they should be distributed logically and not just 50:50 East:West."*

2.2.2 SYSTRA has undertaken an assessment of the development trips using Scenario 1, but with 100% of the trips changing as a result of CPP2 using a single trunk road junction instead of two as requested. The junction chosen is the 'primary' trunk road junction identified in Appendix 3A of the BHCC Technical Note in the first instance, as this was believed to be chosen originally due to being the most logical/nearest SRN junction. The updated table from Appendix 3A is shown overleaf in **Table 2**.

Table 2. Revised Appendix 3A (BHCC Technical Note)

| Site | Ward | Net change in housing numbers between CPP1 and CPP2 | Net change in AM peak (departures) trip generation (x 0.3) | Net change in PM peak (arrivals) trip attraction (x 0.3) | 'Primary' Trunk Road junction for work-related trips to/from site | Impact on junction in AM peak hour (100%) | Impact on junction in PM peak hour (100%) |
|---|---|---|---|---|---|---|---|
| DA1 Central Seafront & Churchill Square | Regency | -20 | -6 | -6 | A23 (London Road) | -6 | -6 |
| DA2 Brighton Marina, Gas Works and Black Rock Sites | Rottingdean Coastal | -244 | -73 | -73 | B2123 (Falmer Road) (ESCC) | -73 | -73 |
| DA3 Lewes Road | Moulsecoomb & Bevendean | -285 | -86 | -86 | B2123 (Falmer Road) (ESCC) | -86 | -86 |
| DA4 New England Quarter and London Road (including SSA2 Combined Engineering Depot) | St Peter's & North Laine | 0 | 0 | 0 | A23 (London Road) | 0 | 0 |
| DA5 Edward Street & Eastern Road | Queen's Park | -88 | -26 | -26 | B2123 (Falmer Road) (ESCC) | -26 | -26 |
| DA6 Hove Station (including SSA4 Sackville Trading Estate) | Goldsmid | +264 | +79 | +79 | A2038 (King George VI Avenue) /Dyke Road Avenue | +79 | +79 |
| DA7 Toad's Hole Valley | Hangleton & Knoll | 0 | 0 | 0 | A2038 (King George VI Avenue) /Dyke Road Avenue | 0 | 0 |
| DA8 Shoreham Harbour and South Portslade | South Portslade | +35 | +10 | +10 | A293 Hangleton Link | +10 | +10 |
| Strategic Site Allocations outside of DAs | | | | | | | |
| *SSA1 Brighton General Hospital* | Hanover & Elm Grove | +200 | +60 | +60 | B2123 (Falmer Road) (ESCC) | +60 | +60 |
| *SSA3 Lyon Close* | Goldsmid | +300 | +90 | +90 | A2038 (King George VI Avenue) /Dyke Road Avenue | +90 | +90 |

| Site | Ward | Net change in housing numbers between CPP1 and CPP2 | Net change in AM peak (departures) trip generation (x 0.3) | Net change in PM peak (arrivals) trip attraction (x 0.3) | 'Primary' Trunk Road junction for work-related trips to/from site | Impact on junction in AM peak hour (100%) | Impact on junction in PM peak hour (100%) |
|---|---|---|---|---|---|---|---|
| Other development within the built-up area | Various | -116 | -35 | -35 | *Assumed split across all 5 junctions* | *-7 at each* | *-7 at each* |
| Within the urban fringe | Various | -158 | -47 | -47 | *Assumed split across all 5 junctions* | *-9 at each* | *-9 at each* |
| Small identified sites and Small windfall development | Various | +591 | +177 | +177 | *Assumed split across all 5 junctions* | *+35 at each* | *+35 at each* |
| **TOTAL** | | **+479** | **+143** | **+143** | | | |

2.2.3 The resultant changes to the table in Appendix 3B are set out below, which shows the cumulative effects of additional CPP2 development trip distribution on the corresponding identified 'primary' SRN junction.

**Table 3. Revised Appendix 3B (BHCC Technical Note)**

| | A293 Hangleton Link | | A2038 (King George VI Avenue) /Dyke Road Avenue | | A23 (London Road) | | Hollingbury/Ditchling Road (Carden Avenue/Coldean Lane) | | B2123 (Falmer Road) (ESCC) | |
|---|---|---|---|---|---|---|---|---|---|---|
| **SITE** | **AM** | **PM** | **AM** | **PM** | **AM** | **PM** | **AM** | **PM** | **AM** | **PM** |
| **Development Area** | | | | | | | | | | |
| DA1 Central Seafront & Churchill Square | 0 | 0 | 0 | 0 | -6 | -6 | 0 | 0 | 0 | 0 |
| DA2 Brighton Marina, Gas Works and Black Rock Sites | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -73 | -73 |
| DA3 Lewes Road | 0 | 0 | 0 | 0 | 0 | 0 | | | -86 | -86 |
| DA4 New England Quarter and London Road (including SSA2 Combined Engineering Deport) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DA5 Edward Street & Eastern Road | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -26 | -26 |
| DA6 Hove Station (incl. SSA4 Sackville Trading Estate) | 0 | 0 | +79 | +79 | 0 | 0 | 0 | 0 | 0 | 0 |
| DA7 Toad's Hole Valley | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DA8 Shoreham Harbour and South Portslade | +10 | +10 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Development Across the Rest of the City** | | | | | | | | | | |
| Strategic Site Allocations outside of DAs | | | | | 0 | 0 | | | | |
| *SSA1 Brighton General Hospital* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | +60 | +60 |
| *SSA3 Lyon Close* | 0 | 0 | +90 | +90 | 0 | 0 | 0 | 0 | 0 | 0 |
| Other development within the built-up area | -7 | -7 | -7 | -7 | -7 | -7 | -7 | -7 | -7 | -7 |
| Within the urban fringe | -9 | -9 | -9 | -9 | -9 | -9 | -9 | -9 | -9 | -9 |
| Small identified sites and Small windfall development | +35 | +35 | +35 | +35 | +35 | +35 | +35 | +35 | +35 | +35 |
| **TOTAL** | **+29** | **+29** | **+188** | **+188** | **-13** | **-13** | **+19** | **+19** | **-106** | **-106** |

2.2.4 As can be seen from the table above, the two most impacted junctions are still the A293 Hangleton Link and A2038 King George VI Avenue / Dyke Road Avenue, while the Hollingbury /Ditchling Road (Carden Avenue / Colden Lane) junction is impacted to a greater extent than previously identified in the BHCC Technical Note.

2.2.5 With regards to the comment on the way development trips are distributed through each identified SRN junction, SYSTRA has used the turning proportions from the original 2012 traffic surveys of each junction. This is considered to be the most robust way of determining whether development traffic would use the westbound or eastbound carriageways on the A27, and whether traffic would route to and from multiple non-strategic roads. The resultant distributions for each junction are set out below in **Table 4**.

Table 4. Revised Trip Assignment Assumptions compared to BHCC Technical Note

| | J1 – A27 / Falmer Interchange | J3 – A27 / Hollingbury Interchange | J4 – A27 / A23 Junction | J5 – A27 / King George VI / Devils Dyke Road Junction | J6 – A27 / A293 Junction Hangleton Link |
|---|---|---|---|---|---|
| **Total AM outbound** | **100%** of outbound traffic approaches the A27 via The Drove. | **75%** of outbound traffic approaches the A27 via Carden Avenue, and **25%** approaches from Crowhurst Road. | **100%** of outbound traffic approaches the A27 via London Road and the A23 junction. | **50%** of outbound traffic approaches the A27 via King George VI Avenue, while **50%** approaches from Dyke Road Avenue. | **100%** of outbound traffic approaches the A27 via the A293. |
| **AM outbound towards west** | **81%** of outbound traffic heads west on the A27 via the westbound on-slip road. | **34%** of outbound traffic heads west on the A27 via the westbound on-slip road. | **55%** of outbound traffic joins the A27 via the westbound on-slip road. | **17%** of outbound traffic heads west on the A27 via the westbound on-slip road. | **18%** outbound traffic heads west on the A27 via the westbound on-slip road. |
| **AM outbound towards east** | **19%** of outbound traffic heads east on the A27 via the bridge. | **66%** of outbound traffic heads east on the A27 via the bridge. | **45%** of outbound traffic heads east on the A27 via the bridge. | **83%** of outbound traffic heads east on the A27 via the bridge. | **82%** outbound traffic heads east on the A27 via the bridge. |
| **PM inbound from west** | **69%** of inbound traffic leaves the A27 via the eastbound off-slip road. | **53%** of inbound traffic leaves the A27 via the eastbound off-slip road. | **17%** of inbound traffic leaves the A27 via the eastbound off-slip road. | **22%** of inbound traffic leaves the A27 via the eastbound off-slip. | **25%** on inbound traffic leaves the A27 via the eastbound off-slip. |
| **PM inbound from east** | **31%** of inbound traffic leaves the A27 via the westbound off-slip road. | **47%** of inbound traffic leaves the A27 via the westbound off-slip road. | **83%** of inbound traffic leaves the A27 via the westbound off-slip road. | **78%** of inbound traffic leaves the A27 via the westbound off-slip road. | **75%** of inbound traffic leaves the A27 via the westbound off-slip road. |
| **Total PM inbound** | 100% of inbound traffic leaves the A27 and heads south on The Drove. | **64%** of inbound traffic leaves the A27 and heads south on Carden Avenue, while **37%** uses Crowhurst Road. | **100%** of inbound traffic leaves the A27 and heads south on London Road via the A23 junction. | **50%** of inbound traffic heads south on King George VI Avenue after leaving the A27, while **50%** uses Dyke Road Avenue. | **100%** of inbound traffic heads south on the A293 after leaving the A27. |

## 2.3 Impact/Mitigation

2.3.1 Highways England commented:

> *"While the above trip generation and distribution matters will need addressing, the results presented indicate an impact on junction arms that are already operating above capacity with no mitigation proposed (i.e. Table 4.2 - A293 northern roundabout southern arm in AM; A293 southern roundabout southern arm in AM; A293 northern roundabout western arm in PM; A293 southern roundabout eastern arm in PM; and Table 4.3 - A2038 southern roundabout eastern arm). Highways England considers that any additional trips that impact a junction that is operating overcapacity are deemed a severe impact. Therefore, where this is the case, as a minimum, Highways England would expect further mitigation to be proposed beyond that identified in the CPP1 to ensure that there is a "nil detriment" impact compared to the base scenario, and thus it may be necessary to update the modelling for the junctions impacted accordingly."*

2.3.2 It is understood that the 'base scenario' mentioned refers to the results of the June 2014 modelling results reported in the 2014 STA (Appendix E).

2.3.3 SYSTRA has therefore re-run the traffic models for each of the SRN junctions identified, using the updated trip generation and distribution methodologies described above. The following text summarises the work undertaken, the findings of the validation exercise of the previous mitigation schemes and the results of the modelling work undertaken of the CPP2 impact.

2.3.4 For comparative purposes, the modelling results tables include the results of the 2030 reference case scenario and the results of the previous mitigation schemes proposed in the June 2014 STA report. For the avoidance of doubt, these results have been reproduced in this report without change, and the 2030 reference case scenario is defined as:

> "*The 2030 base model plus committed developments and transport schemes plus the strategic development sites and urban fringe windfall/ sites noted in the updated City Plan. The level of economic and demographic growth has been controlled to TEMPRO3 growth rates."*

## 2.4 Junction 1 - A27 / Falmer Interchange

2.4.1 This junction is likely to see a reduction of 106 trips due to CPP2 in each peak period. It was identified in the 2014 STA that this junction would operate with a maximum degree of saturation of 100% in the 2030 'with mitigation' scenario, with all other arms being within capacity.

2.4.2 Given the reduction in trips associated with CPP2, it was anticipated that this junction would operate no worse than previously identified and that no further mitigation would need to be designed. The validation exercise of the previous mitigation scheme also found no major issues, albeit with some minor alterations to the junction geometries in the model which did not affect the scheme layout. For robustness, the geometries have been entered into the model and the flows associated with CPP2 entered, and the results are shown below in **Table 5** and **Table 6**.

Table 5. Junction 1 Northern Roundabout Results Comparison

| AM | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 2030 Design Year Reference Case | | | | June 2014 STA Report Mitigation | | October 2019 CPP2 Mitigation | |
| | Queue | Delay | RFC | LOS | MMQ | Deg Sat (%) | MMQ | Deg Sat (%) |
| **B2123 The Drove** | 0.56 | 3.89 | 0.35 | A | 13.9 | 85.0% | 12.3 | 83.8% |
| **A27 Eastbound Off-slip** | 91.19 | 205.41 | 1.13 | F | 16.4 | 78.0% | 17.5 | 81.3% |
| **Knights Gate Road** | 0.42 | 4.96 | 0.26 | A | 4.8 | 67% | 5.3 | 75.0% |
| **PM** | | | | | | | | |
| | 2030 Design Year Reference Case | | | | June 2014 STA Report Mitigation | | October 2019 CPP2 Mitigation | |
| | Queue | Delay | RFC | LOS | MMQ | Deg Sat (%) | MMQ | Deg Sat (%) |
| **B2123 The Drove** | 0.49 | 3.76 | 0.32 | A | 15.3 | 84.0% | 16.8 | 83.9% |
| **A27 Eastbound Off-slip** | 185.29 | 872.76 | 1.4 | F | 12.3 | 68.0% | 12.2 | 72.3% |
| **Knights Gate Road** | 28.59 | 204.67 | 1.1 | F | 11.6 | 76% | 10.5 | 66.6% |

2.4.3 As can be seen above, the modelling of the CPP2 flows and revised geometries resulted in an improvement to the performance of the northern roundabout, with both the AM and PM scenarios now being within capacity on all arms. The results of the modelling for the southern part of the junction are shown below.

Table 6. Junction 1 Southern Roundabout Results Comparison

| AM | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 2030 Design Year Reference Case | | | | June 2014 STA Report Mitigation | | October 2019 CPP2 Mitigation | |
| | Queue | Delay | RFC | LOS | MMQ | Deg Sat (%) | MMQ | Deg Sat (%) |
| **A27 Westbound off-slip** | 6.07 | 30.27 | 0.87 | D | 20.6 | 94.0% | 10.8 | 84.9% |
| **B2123 S** | 26.97 | 77.81 | 1.01 | F | 35 | 100.0% | 15.8 | 84.8% |
| **B2123 N** | 255.32 | 1470.23 | 1.66 | F | 26.3 | 90% | 14.3 | 81.8% |
| **PM** | | | | | | | | |
| | 2030 Design Year Reference Case | | | | June 2014 STA Report Mitigation | | October 2019 CPP2 Mitigation | |
| | Queue | Delay | RFC | LOS | MMQ | Deg Sat (%) | MMQ | Deg Sat (%) |
| **A27 Westbound off-slip** | 1.21 | 9.1 | 0.55 | A | 19.3 | 92.0% | 15.5 | 84.6% |
| **B2123 S** | 13.32 | 39.34 | 0.95 | E | 28.9 | 99.0% | 28.6 | 88.9% |
| **B2123 N** | 220.94 | 1257.01 | 1.62 | F | 29.7 | 86.0% | 10.5 | 49.5% |

2.4.4 The modelling for the southern roundabout also shows an improvement in both peak periods, with the roundabout now predicted to be within capacity with the CPP2 traffic flows. The southern B2123 arm is approaching capacity, at 88.9% saturation in the PM peak period only, however this is an improvement on what was reported for this arm in 2014.

2.4.5 It is therefore concluded that the mitigation scheme proposed in the previous STAs is likely to remain sufficient for the traffic associated with CPP2.

## 2.5 Junction 3 – A27 / Hollingbury Interchange

2.5.1 The assessment has found that this junction is likely to see an increase of 19 trips in each peak period as a result of CPP2, compared to the flows tested in the 2014 STA. It was identified in

the 2014 STA that this junction would be over capacity with the proposed mitigation in 2030, with a maximum degree of saturation of 178% on the southern roundabout in the PM Peak.

2.5.2 The design validation of the northern roundabout identified no issues or recommendations, however it was necessary to increase the number of lanes on the A27 off-slip road for a short section in order to provide additional capacity for the CPP2 flows.

2.5.3 The design validation of the southern roundabout identified a number of inconsistencies between the proposed junction layout and the modelling. SYSTRA sought to correct these inconsistencies within the same junction type, but this resulted in a decrease in the level of performance. An alternative design for the southern junction has therefore been developed incorporating a signalised crossroads with several of the junction approaches having split lanes (divided by traffic islands) in order to facilitate some traffic streams running simultaneously. The right turn movement from Carden Avenue South to Crowhurst Road has also been banned to enable this, however no flows were making this movement in any of the scenarios. The number of lanes on the bridge between the north and south roundabouts has also been increased from two to three. This has been completed by provision of narrow lanes between the existing kerb lines.

2.5.4 The results of the modelling of the revised mitigation scheme for the north and south junctions are shown in **Table 7** and **Table 8** below.

**Table 7. Junction 3 Northern Roundabout Results Comparison**

| AM | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 2030 Design Year Reference Case | | | | June 2014 STA Report Mitigation | | October 2019 CPP2 Mitigation | |
| | Queue | Delay | RFC | LOS | MMQ | Deg Sat (%) | MMQ | Deg Sat (%) |
| **Coldean Lane** | 19.37 | 69.16 | 0.99 | F | 20.5 | 79.0% | 20.4 | 90.1% |
| **Carden Ave** | 29.45 | 104.59 | 1.03 | F | 14.3 | 73.4% | 11.3 | 81.1% |
| **A27 Eastbound Off-slip** | 169.53 | 531.18 | 1.3 | F | 24.5 | 94% | 11.8 | 87.8% |
| **PM** | | | | | | | | |
| | 2030 Design Year Reference Case | | | | June 2014 STA Report Mitigation | | October 2019 CPP2 Mitigation | |
| | Queue | Delay | RFC | LOS | MMQ | Deg Sat (%) | MMQ | Deg Sat (%) |
| **Coldean Lane** | 334.17 | 334.17 | 1.17 | F | 30.2 | 90.1% | 128.5 | 119.5% |
| **Carden Ave** | 36.55 | 123.96 | 1.05 | F | 11.9 | 82.4% | 14.6 | 89.8% |
| **A27 Eastbound Off-slip** | 193.37 | 635.21 | 1.33 | F | 34.6 | 99.3% | 56.9 | 109.7% |

2.5.5 The modelling of the revised mitigation for the northern roundabout provides performance improvements in the AM peak, but worse results in the PM peak. The PM peak results are however improved on the reference case results overall, and do not result in queuing back on the A27 off-slip road in excess of storage capacity.

Table 8. Junction 3 Southern Roundabout Results Comparison

| AM | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 2030 Design Year Reference Case | | | | June 2014 STA Report Mitigation | | October 2019 CPP2 Mitigation | |
| | Queue | Delay | RFC | LOS | MMQ | Deg Sat (%) | MMQ | Deg Sat (%) |
| A27 Westbound Off-slip | 3.46 | 25.18 | 0.8 | D | 9.9 | 72.0% | 9.6 | 89.6% |
| Crowhurst Road | 1.58 | 22.66 | 0.6 | C | 55.3 | 108.0% | 7.0 | 85.5% |
| Carden Avenue S | 36.52 | 156.72 | 1.06 | F | 17.6 | 80% | 11.8 | 91% |
| Carden Avenue N | 7.21 | 16.82 | 0.89 | C | 1.6 | 74% | 13.6 | 94% |
| PM | | | | | | | | |
| | 2030 Design Year Reference Case | | | | June 2014 STA Report Mitigation | | October 2019 CPP2 Mitigation | |
| | Queue | Delay | RFC | LOS | MMQ | Deg Sat (%) | MMQ | Deg Sat (%) |
| A27 Westbound Off-slip | 2.81 | 27.91 | 0.76 | D | 13.3 | 85.0% | 21.3 | 102.3% |
| Crowhurst Road | 41.99 | 360.37 | 1.23 | F | 184.5 | 178.7% | 17.4 | 100.7% |
| Carden Avenue S | 27.1 | 151.02 | 1.11 | F | 15.1 | 83% | 12.9 | 97.4% |
| Carden Avenue N | 36.09 | 65.29 | 1.06 | F | 2.9 | 84.3% | 15.2 | 92.1% |

2.5.6 As with the northern roundabout, the revised mitigation for the southern roundabout demonstrates improved results in the AM peak period when compared to those reported in the June 2014 STA. While two of the arms in the PM peak are likely to be over capacity with the additional CPP2 traffic, the maximum degree of saturation is lower than reported in the 2014 STA, and does not result in queuing in excess of storage capacity on either the bridge between the north and south junctions, or the on/off slip roads, which was not achieved in the 2014 STA modelling results. Queuing has instead been held back on roads where there is less likely to be a safety issue.

2.5.7 The above modelling results demonstrate that a mitigation design is possible that provides comparable results to those in the 2014 STA, and an improvement against the reference case.

## 2.6 Junction 4 – A27 / A23 Junction

2.6.1 This junction is likely to see a decrease of 13 trips in each peak period as a result of CPP2. The mitigation proposed in the 2014 STA was shown to maintain the junction being within capacity in the 2030 scenario, with a maximum DoS of 91% on the northern roundabout.

2.6.2 The validation of the previous mitigation scheme identified that for the northern roundabout, the design proposed a departure from standards which SYSTRA do not believe is likely to be accepted with current design guidelines being applied. This related to the need for two lanes to merge on approach to the link bridge between the roundabouts. SYSTRA has therefore proposed an amended design which removes this departure, and this has been tested using the CPP2 traffic. The results of this modelling is shown below.

Table 9. Junction 4 Northern Roundabout Results Comparison

| | AM | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 2030 Design Year Reference Case | | | | June 2014 STA Report Mitigation | | October 2019 CPP2 Mitigation | |
| | Queue | Delay | RFC | LOS | MMQ | Deg Sat (%) | MMQ | Deg Sat (%) |
| **Bridge** | 1.34 | 3.5 | 0.56 | A | 17.9 | 87% | 14.4 | 64.3% |
| **A27 Eastbound Off-slip** | 44.85 | 329.25 | 1.21 | F | 6.5 | 67% | 10.4 | 62.2% |
| **Braypool Lane** | 0.09 | 7.38 | 0.08 | A | 0.2 | 11% | 0.2 | 6.5% |
| | PM | | | | | | | |
| | 2030 Design Year Reference Case | | | | June 2014 STA Report Mitigation | | October 2019 CPP2 Mitigation | |
| | Queue | Delay | RFC | LOS | MMQ | Deg Sat (%) | MMQ | Deg Sat (%) |
| **Bridge** | 1.86 | 4.19 | 0.65 | A | 17.3 | 91% | 9.4 | 71.5% |
| **A27 Eastbound Off-slip** | 98.05 | 836.57 | 1.74 | F | 4.1 | 70% | 7.8 | 80.8% |
| **Braypool Lane** | 0.06 | 8.36 | 0.06 | A | 0.1 | 8% | 0.1 | 5.3% |

2.6.3 As shown above, the amended mitigation scheme for the northern roundabout provides the required 'nil detriment' using the CPP2 traffic flows in comparison with the 2014 STA results.

2.6.4 With regards to the southern roundabout, the validation exercise of the proposed design (a signalised roundabout) found no necessary alterations. The previously designed mitigation is therefore considered to be suitable and has been tested using the CPP2 traffic flows as shown below.

Table 10. Junction 4 Southern Roundabout Results Comparison

| | AM | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 2030 Design Year Reference Case | | | | June 2014 STA Report Mitigation | | October 2019 CPP2 Mitigation | |
| | Queue | Delay | RFC | LOS | MMQ | Deg Sat (%) | MMQ | Deg Sat (%) |
| **A27 Westbound Off-slip** | 279.66 | 960.59 | 1.45 | F | 26.5 | 91% | 10.0 | 76.0% |
| **(Link Road)** | 5.51 | 11.36 | 0.84 | B | 38.7 | 93% | 36.3 | 91.5% |
| **Bridge** | 0.87 | 6.61 | 0.46 | A | 10.3* | 28.0% | 0.4 | 28.70% |
| | PM | | | | | | | |
| | 2030 Design Year Reference Case | | | | June 2014 STA Report Mitigation | | October 2019 CPP2 Mitigation | |
| | Queue | Delay | RFC | LOS | MMQ | Deg Sat (%) | MMQ | Deg Sat (%) |
| **A27 Westbound Off-slip** | 162.94 | 614.72 | 1.33 | F | 12.8 | 79.6% | 7.3 | 64.5% |
| **(Link Road)** | 4.76 | 9.98 | 0.83 | A | 22.5 | 83.2% | 22.1 | 82.8% |
| **Bridge** | 0.93 | 7.26 | 0.48 | A | 8.00 | 53.2% | 6.00 | 43.6% |

**This figure was reported incorrectly in the 2014 STA report, with a DoS of 28.70% aligning with a queue of 0.4 PCUs.*

2.6.5 The table above shows that the performance of the southern roundabout slightly improves using the CPP2 traffic flows, which is expected due to the reduction in trips. It is therefore

concluded that a scheme can be realised for Junction 4 which can accomodate the CPP2 traffic flows.

## 2.7 Junction 5 – A27 / King George VI / Devils Dyke Road Junction

2.7.1 This junction is impacted most by the change in trips associated with CPP2, at +188 in both peak periods. The mitigation scheme proposed in 2014 was shown to result in a maximum RFC of 1.17 on the southern roundabout in the 2030 scenario.

2.7.2 The validation exercise of the 2014 STA mitigation scheme for the northern roundabout part of the junction identified that the design would benefit from some minor amendments in line with recent design guidance. These geometry changes were made to the model, along with alterations to the signal times to optimise the roundabout.

2.7.3 Making the changes listed above generally resulted in improvements to the junction, such that even with the additional +188 trips associated with CPP2 at the junction, the results were similar to those reported in the 2014 STA. **Table 11** below shows this comparison.

**Table 11. Junction 5 Northern Roundabout Results Comparison**

| AM | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 2030 Design Year Reference Case | | | | June 2014 STA Report Mitigation | | October 2019 CPP2 Mitigation | |
| | Queue | Delay (s) | RFC | LOS | MMQ | DOS | MMQ | DOS |
| **Devil's Dyke Road North** | 3.68 | 132.05 | 0.84 | F | 1.7 | 52% | 2.5 | 58.3% |
| **Devil's Dyke Road South (link to 5B)** | 2.74 | 4.64 | 0.73 | A | 18.7 | 91% | 22.3 | 85.4% |
| **A27 Eastbound off-slip** | 119.19 | 1439.83 | 2.04 | F | 41.1 | 112% | 29.8 | 104.5% |
| **PM** | | | | | | | | |
| | 2030 Design Year Reference Case | | | | June 2014 STA Report Mitigation | | October 2019 CPP2 Mitigation | |
| | Queue | Delay (s) | RFC | LOS | MMQ | DOS | MMQ | DOS |
| **Devil's Dyke Road North** | 7.84 | 142.6 | 0.97 | F | 2.4 | 66% | 2.4 | 64.1% |
| **Devil's Dyke Road South (link to 5B)** | 1.5 | 3.1 | 0.6 | A | 15.6 | 93% | 13.8 | 85.9% |
| **A27 Eastbound off-slip** | 44.02 | 262.78 | 1.16 | F | 10.5 | 90% | 10.9 | 85.6% |

2.7.4 As can be seen above, using the amended geometries and signal timings on the roundabout results in improvements to all arms except Devil's Dyke Road North in the AM peak, when compared to the results reported in the 2014 STA. Furthermore, when compared to the 2030 2030 reference case, the revised mitigation provides significantly improved results.

2.7.5 Overall, the revised mitigation for the northern roundabout therefore demonstrates improved results when compared to those reported in the 2014 STA, and therefore CPP2 demonstrates 'nil detriment'.

2.7.6 An amended design has been developed for the southern roundabout to accommodate the additional traffic associated with CPP2, which includes widening of several of the roundabout exits and approaches. The results of this revised design are shown in **Table 12** overleaf.

Table 12. Junction 5 Southern Roundabout Results Comparison

| AM | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2030 Design Year Reference Case | | | | June 2014 STA Report Mitigation | | | | October 2019 CPP2 Mitigation | | | |
| | Queue | Delay (s) | RFC | LOS | Queue | Delay (s) | RFC | LOS | Queue | Delay (s) | RFC | LOS |
| Devil's Dyke Road | 0.47 | 3.25 | 0.32 | A | 0.6 | 3.54 | 0.37 | A | 0.60 | 3.40 | 0.36 | A |
| A27 Westbound off slip | 32.04 | 66.70 | 1.01 | F | 35.26 | 73.83 | 1.01 | F | 1.90 | 4.24 | 0.65 | A |
| Mill Road | 0.39 | 10.27 | 0.28 | B | 0.74 | 13.58 | 0.43 | B | 0.40 | 6.91 | 0.28 | A |
| Dyke Road | 116.63 | 302.68 | 1.18 | F | 108.61 | 281.96 | 1.17 | F | 8.90 | 22.85 | 0.91 | C |
| King George VI Ave | 7.73 | 24.64 | 0.90 | C | 11.02 | 34.10 | 0.93 | D | 32.50 | 82.93 | 1.02 | F |
| PM | | | | | | | | | | | | |
| | 2030 Design Year Reference Case | | | | June 2014 STA Report Mitigation | | | | October 2019 CPP2 Mitigation | | | |
| | Queue | Delay (s) | RFC | LOS | Queue | Delay (s) | RFC | LOS | Queue | Delay (s) | RFC | LOS |
| Devil's Dyke Road | 0.64 | 3.57 | 0.39 | A | 0.8 | 3.92 | 0.44 | A | 0.80 | 3.93 | 0.46 | E |
| A27 Westbound off slip | 39.60 | 81.28 | 1.02 | F | 55.38 | 109.46 | 1.05 | F | 3.00 | 5.95 | 0.75 | A |
| Mill Road | 7.86 | 70.13 | 0.93 | F | 20.61 | 154.34 | 1.06 | F | 4.50 | 37.07 | 0.83 | E |
| Dyke Road | 55.90 | 146.45 | 1.08 | F | 75.79 | 202.38 | 1.12 | F | 5.30 | 15.42 | 0.85 | C |
| King George VI Ave | 2.99 | 11.34 | 0.75 | F | 3.25 | 12 | 0.77 | B | 2.60 | 9.73 | 0.73 | A |

2.7.7 The revised mitigation scheme for the southern roundabout is shown to achieve 'nil detriment' in the PM peak period compared to the results shown in the June 2014 STA, and has a lower maximum RFC in the AM peak of 1.02. The affected arm is King George VI Avenue which is part of the local road network. Given that the overall junction performance is significantly better than previously reported, it is considered that the revised scheme is generally able to accommodate the additional flows associated with CPP2.

## 2.8 Junction 6 – A27 / A293 Junction Hangleton Link

2.8.1 This junction is expected to see a modest increase of 29 trips in each peak period as a result of CPP2. The testing of the mitigation proposed in the 2014 STA resulted in a maximum RFC of 1.15 in the 2030 scenario on the northern roundabout, which was found to increase to 1.16 when tested with the CPP2 flows.

2.8.2 Revised mitigation schemes have therefore been devised for the junction. This involved signalisation of both the northern and southern parts of the dumbbell junction, provision of three lanes in the underpass, and widening of selected approaches to the junction including the westbound A27 off-slip. The newly developed mitigation designs for both roundabouts provides the required 'nil detriment' when compared to the 2014 STA results. The results of the modelling assessment is shown below in **Table 13** and **Table 14**.

Table 13. Junction 6 Northern Roundabout Results Comparison

| AM | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 2030 Design Year Reference Case | | | | June 2014 STA Report Mitigation | | | | October 2019 CPP2 Mitigation | |
| | Queue | Delay | RFC | LOS | Queue | Delay | RFC | LOS | MMQ | Deg Sat |
| A293 (underpass) | 85.75 | 174.48 | 1.1 | F | 119.23 | 871.13 | 1.15 | F | 16.90 | 71.0% |
| A27 Eastbound Off-slip | 19.86 | 164.53 | 1.05 | F | 29.85 | 237.72 | 1.11 | F | 22.4 | 98.8% |
| Golf Club | 0 | 0 | 0 | A | 0 | 0 | 0 | A | 0 | 0% |
| PM | | | | | | | | | | |
| | 2030 Design Year Reference Case | | | | June 2014 STA Report Mitigation | | | | October 2019 CPP2 Mitigation | |
| | Queue | Delay | RFC | LOS | Queue | Delay | RFC | LOS | MMQ | Deg Sat |
| A293 (underpass) | 5.44 | 16.4 | 0.85 | C | 15.5 | 42.15 | 0.96 | E | 12.2 | 65.9% |
| A27 Eastbound Off-slip | 2.95 | 27.61 | 0.76 | D | 19.48 | 144.23 | 1.05 | F | 18.2 | 95.9% |
| Golf Club | 0.12 | 20.62 | 0.11 | C | 0.24 | 43.71 | 0.2 | E | 0.0 | 5.5% |

2.8.3 As can be seen above, the revised design would result in the northern part of the junction operating within capacity in both the AM and PM peak periods, with queuing within the available storage on the A27 slip roads. The maximum queue on the A293 underpass is at capacity, however it is likely to be possible to avoid blocking back through the junction through the use of a yellow box marking or a similar form of minor mitigation.

Table 14. Junction 6 Southern Roundabout Results Comparison

| AM | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 2030 Design Year Reference Case | | | | June 2014 STA Report Mitigation | | | | October 2019 CPP2 Mitigation | |
| | Queue | Delay | RFC | LOS | Queue | Delay (s) | RFC | LOS | MMQ | Deg Sat |
| A27 Westbound off-slip | 16.72 | 57.31 | 0.97 | F | 19.26 | 65.1 | 0.98 | F | 20.00 | 84.0% |
| A293 S | 69.95 | 120.07 | 1.06 | F | 95.78 | 157.97 | 1.09 | F | 15.8 | 92.9% |
| A293 (underpass) | 0.39 | 3.35 | 0.28 | A | 0.42 | 3.43 | 0.3 | A | 13.2 | 56.4% |
| PM | | | | | | | | | | |
| | 2030 Design Year Reference Case | | | | June 2014 STA Report Mitigation | | | | October 2019 CPP2 Mitigation | |
| | Queue | Delay (s) | RFC | LOS | Queue | Delay (s) | RFC | LOS | MMQ | Deg Sat |
| A27 Westbound off-slip | 40.98 | 116.35 | 1.05 | F | 57.38 | 158.68 | 1.08 | F | 19.8 | 91.0% |
| A293 S | 10.74 | 24.96 | 0.93 | C | 57.1 | 101.21 | 1.04 | F | 13.8 | 87.9% |
| A293 (underpass) | 0.4 | 3.36 | 0.29 | A | 0.49 | 3.57 | 0.33 | A | 7.4 | 91.9% |

2.8.4 The southern roundabout is also shown to operate within capacity in the both peak periods. The results are also improved on those reported in the June 2014 STA, and so 'nil detriment'

has been achieved. It is therefore considered that the junction is able to handle the additional trips without material impacts.

## 2.9 Traffic Data Validation

2.9.1 During subsequent discussions with Highways England, it was noted that the modelling undertaken for this report uses data originally developed in 2012, and as such, an additional exercise has been undertaken to compare the data with more recent surveys of trips on the A27 and its slip roads, to ensure the traffic flows remain fit for purpose.

2.9.2 Highways England's WebTRIS data has been interrogated for comparable traffic counts. Where traffic counts could be identified for arms and links included in the modelling, the average weekday counts for September 2019 has been compared with the September 2012 traffic survey data. The comparison is shown in **Table 15** below:

**Table 15. Data Validation Assessment**

| | 2012 Traffic Surveys | 2019 WebTRIS Flows | % Difference |
|---|---|---|---|
| **Junction 3 – A27 / Hollingbury Interchange** | | | |
| **Eastbound off-slip** | | | |
| **08:00-09:00** | 903 | 555 | -39% |
| **17:00-18:00** | 959 | 668 | -30% |
| **Junction 4 - A27 / A23 Junction** | | | |
| **Approach to Southern Roundabout from A23** | | | |
| **08:00-09:00** | 2180 | 2155 | -1% |
| **17:00-18:00** | 3246 | 2760 | -15% |
| **Junction 5 - A27 / King George VI / Devils Dyke Road Junction** | | | |
| **Westbound Off-slip** | | | |
| **08:00-09:00** | 1257 | 1168 | -7% |
| **17:00-18:00** | 1380 | 1351 | -2% |
| **Westbound On-slip** | | | |
| **08:00-09:00** | 384 | 325 | -15% |
| **17:00-18:00** | 399 | 352 | -12% |

2.9.3 As can be seen above, the analysis has found that 2019 traffic levels are generally lower than the trips used in the modelling from 2012. This suggests that the modelling undertaken is likely to be over-estimating the amount of vehicles using each junction in the 2030 scenario, meaning the junction modelling results are likely to be improved in reality. It is therefore considered that the data used is fit for purpose and the modelling work is robust.

# 3. CONCLUSION

3.1.1 The modelling assessment undertaken has found that the while the change in anticipated trips at the A27 junctions is relatively low, with some reducing slightly, the revised designs for the junctions tested are generally able to mitigate the impacts of the additional traffic flows associated with CPP2, when compared to the results reported in the 2014 STA. A summary of the outcomes is provided below:

**Junction 1** – The trips at this junction are reducing due to CPP2 and the mitigation proposed previously is now expected to enable the junction to operate within capacity in both peak periods with the CPP2 traffic flows.

**Junction 3** – The validation exercise of the 2014 mitigation identified some changes necessary alterations in line with current design guidance. The modelling of the amended design generally achieves better performance than the existing layout reference case, and successfully avoids excess queuing on the on/off slip roads and bridge between the north and south junctions, which was not achieved in the 2014 STA modelling results. The modelling results therefore demonstrate that a mitigation design is possible that provides comparable results to those in the 2014 STA, and an improvement against the reference case.

**Junction 4** – The validation of the previous mitigation scheme identified that for the northern roundabout, the design proposed a departure from standards which SYSTRA do not believe is likely to be accepted with current design guidelines being applied. The review of the southern roundabout found no necessary alterations. The revised mitigation scheme for the northern roundabout achieves 'nil detriment' compared to the 2014 STA results, and the performance of the southern roundabout slightly improves due to CPP2 causing a reduction in traffic flows at this junction.

**Junction 5** – The validation of the northern roundabout of Junction 5 found that the design would benefit from some minor amendments in line with recent guidance. The modelling of the CPP2 traffic on the slightly revised design found that A27 Eastbound off-slip is still likely to be over capacity in the AM peak, but would otherwise be within capacity at all times. Furthermore, the highest DoS is lower than previously reported in the 2014 STA and so 'nil detriment' has been achieved. Following the validation exercise, an amended design has been prepared for the southern junction which provides a lower maximum RFC than reported in the 2014 STA, meaning 'nil detriment' has also been achieved for this part of the junction.

**Junction 6** – Following the validation of the previous mitigation for this junction, revised mitigation schemes have been devised including signalisation of the northern and southern parts of the junction, provision of three lanes in the underpass and widening of selected approaches. The newly developed mitigation designs for both roundabouts provides the required 'nil detriment' when compared to the 2014 STA results.

3.1.2 It is therefore considered that a potential mitigation design exists for all of the junctions affected by the CPP2 traffic which achieves 'nil detriment' against the June 2014 STA results and the 2030 reference case.

## SECTION 1: BACKGROUND AND CONTEXT

The Brighton & Hove City Plan Part One [CPP1] was adopted in March 2016 and sets out the strategic policy framework to guide the new development required across the city to 2030. The CPP1 sets the overall amounts of development to be planned for (e.g. housing, employment and retail) and the broad locations and Development Areas where new development will take place.

It allocates key strategic sites and also sets out key strategic policies to guide future development including policies for urban design, transport, affordable housing, biodiversity and sustainability. This strategic framework is now part of the statutory Development Plan for Brighton & Hove.

Policy CP1 relates to housing delivery and states that "the council will make provision for at least 13,200 new homes to be built over the plan period 2010 – 2030 (this equates to an annual average rate of provision of 660 dwellings)." Strategic allocations are included in CPP1 which cumulatively total 3,635 additional new homes.

Policy CP1 sets out that delivery of new housing is to be in line with the following distribution:-

| **Area / Source of Supply** | **No. of new homes** |
|---|---|
| **Development Areas** | |
| DA1 – Brighton Centre and Churchill Square Area | 20 |
| DA2 – Brighton Marina, Gas Works and Black Rock Area | 1,940 |
| DA3 – Lewes Road Area | 875 |
| DA4 – New England Quarter and London Road Area | 1,130 |
| DA5 – Eastern Road and Edward Street Area | 515 |
| DA6 – Hove Station Area | 525 |
| DA7 –Toad's Hole Valley | 700 |
| DA8 – Shoreham Harbour | 300 |
| ***Development Area Total*** | 6,005 |
| **Development Across Rest of City:** | |
| Within the built-up area | 4,130 |
| Within the urban fringe | 1,060 |
| | |
| **Small identified sites** | 765 |
| **Small windfall development** | 1,250 |
| **TOTAL** | 13,210[1] |

During the preparation of CPP1 collaborative work was undertaken between the Highways Agency [HA] (now known as Highways England) and the city council and its modelling consultant, JMP.

### 2013 Strategic Transport Assessment

[1] The figures in the table total 13,210 dwellings against the policy target of at least 13,200 new homes.

Work was commissioned on a Strategic Transport Assessment [STA] after consultation in summer 2012. JMP started work on the STA in July 2012 following consultation on the draft City Plan (February to April). As part of the scoping for the STA, it was agreed that a Forecasting Report and Local Model Validation Report (LMVR) would be developed and submitted to the HA for agreement, and that individual models may also be required for more detailed analysis of the A27 Strategic Road Network [SRN] junctions. In December 2012, an officer meeting was held with the HA about the proposed mitigation strategy to be included in the modelling.

The HA was consulted as a key stakeholder and the following was discussed and agreed:

- evidence base
- trip rates
- development scenarios
- forecasting methodology
- examination of impacts on the Strategic Road Network (SRN); and
- scope for mitigation for the SRN.

The draft STA was agreed by the council in January 2013 with the submission City Plan, and finalised in May 2013. It should be noted that this initial STA was predicated on the lower housing target of 11,300 as per the Submission version of the CPP1. It is a critical part of the evidence base for the City Plan. It forecasts journeys under a number of time periods and scenarios to assess the impact of the development proposals in the City Plan. It demonstrates that the 2030 City Plan Mitigation Strategy will help to manage, alter or reduce journey patterns in the city and minimise and manage the impacts and flow of vehicular trips on the adjacent strategic road network.

In response to public consultation on the submission version of the City Plan, the Highways Agency submitted comments on 16 April 2013 raising concerns about the soundness of the City Plan (Appendix 1). Although the letter supported the overall strategy in the City Plan and confirmed joint working had taken place, it raised concerns about the need to see detailed modelling and junction layouts for the SRN junctions to demonstrate improvements could be undertaken. Further work was therefore undertaken by the council/JMP. The junctions tested were:-

- A293 (Hangleton Link)
- A2038 (King George VI Avenue)/Dyke Road Avenue
- A23 (London Road)
- Hollingbury/Ditchling Road (Coldean Lane)
- B2123 (Falmer Road) (within East Sussex [ESCC])

In April 2013, a meeting was held with the HA to review the detailed modelling work undertaken on the SRN junctions on behalf of the city council by JMP.

Following the meeting it was agreed that options for improving the capacity of the A27 Trunk Road junctions should be included in the final version of the STA and that the HA would confirm it was satisfied with transport evidence and mitigation

measures. The STA was amended and finalised and a further letter received from the Highways Agency (Appendix 1) confirming support for the City Plan.

**June 2014 STA Addendum post-Urban Fringe Study**

Modifications to the CPP1 agreed during the examination process resulted in an increase in the housing target to 13,200 dwellings.

The update to the May 2013 STA considered the impact of this increase in the housing target by approximately 1,900 units to 13,200 units based on:-

i) Windfall Allowance in first 10 years - approximately an additional 650 units; and
ii) Urban Fringe sites – the maximum expected was approximately 1060 additional units

The study objectives included:-

- understanding the transport impacts of the updated development strategy detailed in the City Plan Part 1 including potential highway and public transport impacts and associated constraints on travel; and
- identifying the level of additional mitigation required beyond that already proposed (if any).

The STA was revised and an Addendum was produced in 2014. The study concluded that the original mitigation strategy, including the A27 junction improvements developed in conjunction with the HA, had been tested further and demonstrated that the conclusions drawn for the May 2013 STA were still valid. Therefore, the package of junction improvements that had been identified and discussed with the HA would enable traffic to join or leave the A27 more efficiently, with no detrimental impact on the safety and efficiency of the mainline carriageway.

The HA confirmed that it supported the transport strategy in the City Plan; that it is satisfied there will be no harmful impact on Trunk Road junctions as a result of the strategy; and that the evidence underpinning the Plan in the STA is sound (Appendix 1). The HA was satisfied with the sustainability of the Spatial Strategy outlined in the City Plan and therefore that the Plan was sound.

**Conclusions**

Sufficient work on the mitigation measures was therefore undertaken at this stage of the planning process, and the assumptions and models used by the council to assess impacts and help define mitigation measures were fit for purpose. Furthermore, it was recognised that detailed transport and traffic studies for planning applications will be required when sites come forward, but the adopted CPP1 proposals were appropriate and deliverable, subject to funding contributions from third parties.

As such, the council was satisfied that the planned growth in the City Plan, including increased housing provision, could be delivered, subject to continued working with the HA (now HE) on the Trunk Road junction designs; and that the spatial strategy that underpins the City Plan is the most sustainable approach to accommodating growth within Brighton & Hove. The approach adopted by Brighton & Hove in

developing the City Plan was sound and consistent with the HA's view of best practice in ensuring that development, especially housing, is planned in a way that encourages more sustainable travel patterns and behaviours.

In considering the background to this work on CPP1 as it evolved over time, it is noted that there was some variation between the quantums of housing proposed for each site in the submission City Plan compared to that proposed within Draft City Plan in May 2012. The HA was satisfied at that time that the changes were unlikely to have an impact on the overall level of traffic utilising the SRN given that the changes only affected the city centre development allocations, and not the 'out of town' sites (Appendix 1).

## SECTION 2: CITY PLAN PART TWO

The role of the City Plan Part Two [CPP2] is to support the implementation and delivery of CPP1. It builds on the strategic policy framework set out in CPP1 by identifying and allocating additional development sites and sets out a detailed development management policy framework to assist in the determination of planning applications. It is consistent with the vision, strategy, objectives and strategic policies set out in CPP1; and it will cover the period up to 2030. A number of site allocations (e.g. for housing and mixed use sites) are included through Policies H1, H2 and SSA1 – 7 so that the CPP1 strategy for accommodating development needs can be implemented.

Table 2.1 below indicates the proposed changes in housing provision between CPP1 and CPP2. It should be noted that the total amount of planned housing on the urban fringe has reduced from the assumed 1,060 dwellings in CPP1 to just over 900, a reduction of 15% (160 dwellings).

Following the publication of CPP2 for consultation in July 2018, HE submitted a representation with specific reference to Policies H1 and H2 which focus on proposed housing development allocations, including the Urban Fringe (see CPP2 Table 5 - Residential Site Allocations, Table 6 - Mixed Use Site Allocations and Table 7 – Urban Fringe Allocations. HE has sought confirmation of the likely cumulative impacts of the proposed development sites in order that it can be confident that the agreed Trunk Road junction mitigations remain valid. If this is not considered to be the case, further consideration of appropriate mitigation may be required.

This document therefore explains the basis of the assessment of the changes in traffic generation of the proposed levels of housing development in CPP2, and its forecast impacts on the A27 Trunk Road junctions.

**Table 2.1 - Changes in Planned Housing Development**

| Area/Source of Supply | No. of new homes (City Plan Part One) | No. of new homes (City Plan Part Two)[2] | Difference |
|---|---|---|---|
| **Development Area** | | | |
| DA1 – Brighton Centre and Churchill Square Area | 20 | 0 | -20 |
| DA2 – Brighton Marina, Gas Works and Black Rock Area | 1,940 | 1696 | -244 |
| DA3 – Lewes Road Area | 875 | 590 | -285 |
| DA4 – New England Quarter and London Road Area | 1,130 | 1,130 | 0 |
| DA5 – Eastern Road and Edward Street Area | 515 | 427 | -88 |
| DA6 – Hove Station Area | 525 | 789 | +264 |
| DA7 – Toads Hole Valley | 700 | 700 | 0 |
| DA8 – Shoreham Harbour | 300 | 335 | +35 |
| **Development Area Total** | 6,005 | 5,667 | -338 |
| **Development Across the Rest of the City** | | | |
| Strategic Site Allocations outside of DAs | | | |
| *SSA1 – Brighton General Hospital* | 0 | 200 | +200 |
| *SSA3 - Lyon Close, Hove* | 0 | 300 | +300 |
| Other development within the built-up area | 4,130 | 4,014 | -116 |
| Within the urban fringe | 1,060 | 902 | -158 |
| **Small identified sites** | 765 | 2,606 | +591 |
| **Small windfall development** | 1,250 | | |
| **Other Development Total** | 7,205 | 8,022 | +817 |
| **OVERALL TOTAL** | 13,210 | 13,689 | +479 |

The information summarised above illustrates that the change in the amount of proposed, planned housing development is minimal overall (a 4% (479) increase in dwellings from the original quantum in CPP1). These figures include some clear increases and decreases in the distribution of development across the city. In

[2] Source – BHCC Housing Provision Topic Paper, 2018

addition to the previously identified Development Areas, there are 4 Strategic Site Allocations [SSAs], two of which are within the DAs (SSA2 - Combined Engineering Depot within DA4 New England Quarter and London Road, and SSA4 Sackville Trading Estate within DA6 Hove Station). The other two SSAs are SSA1 – Brighton General Hospital, and SSA3 - Lyon Close, Hove.

## SECTION 3 – ASSESSMENT OF CHANGES TO DEVELOPMENT PROPOSALS WITHIN CPP2

Most of the proposed changes in housing provision that are within the built-up area will be likely to be flats, to enable appropriate densities to be achieved. These developments will also generally include:-

- standard parking set at maximum levels and minimums for disabled driver parking (as defined within the council's Parking Standards for new development (SPD14));
- good access to sustainable and public transport (especially train stations for longer distance journeys e.g. Brighton and Hove); and
- Travel Plans and other associated travel reduction measures

Similar measures have been modelled within the original 2013, and 2014 Addendum, STAs and their combination will minimise the additional site-based, longer distance car-borne journeys that could pass through the Trunk Road junctions during the busy AM and PM weekday peak hour periods.

In addition, there are newly identified sites within the allocated CPP2 housing numbers that will include housing as part of mixed-use development, such as SSA1 and SSA3. This housing will form part of existing brownfield sites, and therefore there will be a net change in trip generation, including by car/vehicle, rather than a wholesale increase (which would only be the case if the site was 'greenfield'). For the purposes of this assessment, the gross increase in trips has been assessed. These sites will also provide a mix of local housing and local employment/community uses that will also minimise the likely generation of car/vehicular trips that could have an impact on the Trunk Road junctions.

To assess the proposed changes in the development set out in Table 2.1 above within the city, a high level, desktop assessment has been carried out. This assessment is considered to be proportionate, given the scale of change of the development quantum and therefore the likely impacts on the Trunk Road junctions. This assessment is set out in the following section.

In terms of the net changes that are proposed, the specific sites that will reduce in size by in excess of 200 units and therefore result in a reduction in vehicular trips passing through the Trunk Road junctions at peak times are as follows:-

- DA2 – Brighton Marina, Gas Works and Black Rock Area;
- DA3 – Lewes Road Area.

Those specific sites that that will increase in size by in excess of 200 units and therefore generate a likely increase in vehicular trips passing through the Trunk Road junctions at peak times are as follows:-

- DA6 – Hove Station Area

In overall terms, the quantum of planned housing development within the DAs will reduce by over 330 dwellings.

Regarding other sites, in addition to the newly allocated sites, SSA1 and SSA3, resulting in an additional 500 dwellings being allocated, there are other forecast

changes in housing which result in an additional total increase in dwellings of just over 800. The total net change across the city is therefore a forecast increase of nearly 480 dwellings across the city.

**Trip generation/attraction**

In order to provide a robust and consistent comparison with the work undertaken for the 2013 and 2014 STAs to support CPP1, the same trip generation levels have been used as calculated for the assessment of the additional Urban Fringe Sites. As stated in the 2014 STA Addendum (Section 3, Tables 3.2 and 3.3), 2011 journey to work census data for the city indicated that movement by car had decreased by 6% on average, when compared with 2001 data. When combined with TRICS data, it was concluded that residential trip rates would be the same or less than those used in 2013, and therefore the use of previous trip rates would present a worst case scenario in terms of assessing trip generation.

In summary, the average trip rates for car journeys from residential development per dwelling (rounded to 1 decimal place) used in the 2014 STA Addendum were as follows.

| **AM Peak Hour** | | **PM Peak Hour** | |
|---|---|---|---|
| Arrivals | Departures | Arrivals | Departures |
| 0.1 | 0.2 | 0.3 | 0.2 |

To help illustrate the forecast trip generation from larger numbers of dwellings, the following trip rates for car journeys from residential development based on the 2014 STA addendum would be as follows, including the largest, single net increase in residential development of +300 (SSA3-Lyon Close, Hove).

| **Number of dwellings** | **AM Peak Hour** | | **PM Peak Hour** | |
|---|---|---|---|---|
| | **Arrivals** | **Departures** | **Arrivals** | **Departures** |
| 1 | 0.1 | 0.2 | 0.3 | 0.2 |
| 10 | 1 | 2 | 3 | 2 |
| 20 | 2 | 4 | 6 | 4 |
| 30 | 3 | 6 | 9 | 6 |
| 40 | 4 | 8 | 12 | 8 |
| 50 | 5 | 10 | 15 | 10 |
| 100 | 10 | 20 | 30 | 20 |
| 150 | 15 | 30 | 45 | 30 |
| 200 | 20 | 40 | 60 | 40 |
| 300 | 30 | 60 | 90 | 60 |

2011 Census data also indicate the proportion of journeys to work undertaken by different forms of transport including driving a car or van, and the distance travelled (including bands of 10km-30km (6.2 miles-18.6 miles) and 30km+ (18.6 miles+)) for each ward. These data are summarised in Appendix 2.

Examples of destinations which are employment centres within the Greater Brighton City Region and help approximately illustrate the extent of these distances by road from the city centre include:-

- 13km/8 miles – Shoreham and Lewes
- 19kms/12 miles – Burgess Hill and Worthing
- 30kms/19 miles – Haywards Heath and Eastbourne

Journeys of 30km+ would include a much wider range of many more destinations over a much wider area within the south-east, or beyond.

**Assessment of impacts**

The implications of the proposed CPP2 development levels have been considered using a number of factors or criteria. These have included:-

- Checking local traffic flows trends at sites where the council has ATC sites. For example, in the west, King George VI Avenue – 16 Hour AADTs have not changed between 2015 and 2018, and Old Shoreham Road (west of Hangleton Link Road) 16 Hour AADT has reduced by 1300 between 2015 and 2018.
- Assessing [DA] sites' proximity to the five Trunk Road junctions and therefore the likelihood of additional traffic generation through them.
- Assuming housing will primarily generate outbound AM peak hour trips and inbound PM peak hour trips, a proportion of which could be expected to pass through the Trunk Road junctions
- Assuming that the inbound AM and outbound PM peak hour trips generated by housing will predominantly be associated with local activity, rather than longer distance, strategic trips
- Adopting trip generation characteristics and patterns, as established within the 2013 STA and the 2014 Addendum
- Assessing the likely distribution of trips from the sites to the Trunk Road junctions based on one or two ('primary' and secondary') junctions – those being the closest to each site and therefore most likely to be used to access the Trunk Roads to travel west, east or north.

The likely basis on which additional trips generated by the CPP2 proposals may have an impact on the A27 SRN Trunk Road junctions has been assessed by using the following additional assumptions:-

1) calculating the likely change in trip generation from each site that includes a change in development quantum between CPP1 and CPP2, utilising trip generation calculations that were established within the STAs produced for CPP1; and
2) assuming that any journey to work trip in excess of 10km would need to access the Trunk Road network.

To provide a robust and comparative assessment, two scenarios have been assessed:-

1) identifying the two nearest junctions to the site (as the 'primary' and secondary' junctions) that would be used to access the Trunk Road and assigning all the net changes in trips equally (50:50) between those two junction(s), with reference to the forecast distribution of development trips as set out in Appendix E of the original CPP1 STA; and

2) assigning all the net changes in trips equally between all five junctions that would be used to access the Trunk Road.

The first scenario is considered to be the most realistic in terms of assessing likely impacts (Appendix 3B). The second scenario includes an alternative, broader, but more uniform distribution of trip patterns across all of the Trunk Road junctions in order to provide a basis for comparison (Appendix 3C).

The results of this scenario testing assessment are considered to be a worst case scenario and therefore provide a robust assessment because:-

1) the city is approximately 6.5kms (4 miles) deep (south to north) and 13kms (8 miles) wide (east to west) and therefore some journeys by car from housing sites within the city could exceed 10kms (6 miles)) but may not leave the city and therefore would not access the Trunk Road via any of the five junctions. Examples could include Saltdean to Hove or Rottingdean to Portslade.

2) journeys in excess of 10kms from those sites which are more central within the city (and therefore further from the A27 Trunk Road) will have access to more alternative east-west routes such as the A259 and the A270, especially in the west of the city, may not all use the Trunk Road junctions to reach their destinations because more route options are available;.

The outcome and conclusions of these assessments are summarised in the following section of this report and outline the likely impacts of the proposed CPP2 housing allocations on the peak hour capacity and operation of the five Trunk Road junctions serving the city.

## SECTION 4: CONCLUSIONS

This high level, strategic, robust and proportionate assessment has enabled the net changes in trip generation resulting from changes in housing allocations and distribution between CPP1 and CPP2 to be evaluated. Two trip distribution scenarios have been tested, of which Scenario 1 is considered to be the most robust.

Appendices 3A and 3B within this report indicate that, when compared to the development proposals within the adopted CPP1, the three junctions to the north and east of the city:-

- A23 (London Road)
- Hollingbury/Ditchling Road (Carden Avenue/Coldean Lane)
- B2123 (Falmer Road) (within East Sussex [ESCC])

are likely to experience reductions or minimal increases in trips passing through them as a result of the proposed CPP2 housing development allocations. The capacities and performance of these junctions, and therefore the mitigation schemes agreed for them, are therefore unlikely to be significantly affected by the CPP2 proposals.

Appendices 3A and 3B also show that, when compared to the development proposals within the adopted CPP1, the Trunk Road junctions which are most likely to be used by additional, longer distance trips leaving (in the AM peak hour) and returning to (in the PM peak hour) the city from the proposed CPP2 allocations of housing are:-

- A293 (Hangleton Link)
- A2038 (King George VI Avenue)/Dyke Road Avenue

Further assessment of these two junctions has therefore been undertaken in order to assess the impacts of the additional trips resulting from the proposed CPP2 allocations of housing. The likely increases in vehicle trips that will occur in the AM and PM peak hours approximately amount to an average 1 additional vehicle per minute joining the Trunk Road in the AM peak hour, and an average of almost 2 vehicles per minute in the PM peak hour leaving the Trunk Road.

In the AM peak hour, all additional trips are assumed to approach the Trunk Road junctions via a single local road. At the A293 (Hangleton Link) junction this will be via the A293. At the A2038 (King George VI Avenue)/Dyke Road Avenue junction, this will be via the A2038 (King George VI Avenue).

In the PM peak hour, the additional trips that return to the city and pass through the Trunk Road junctions to join the local road network are assumed to be split 50:50 between a western and an eastern approach to the junction. These assumptions are summarised in the Tables 4.1 below.

**Table 4.1 – Trip Assignment Assumptions**

| | **A293 (Hangleton Link)** | **A2038 (King George VI Avenue)/Dyke Road Avenue** |
|---|---|---|
| **Total AM outbound** | 100% of trips approach A27 from A293 Hangleton Link Road northbound and enter southern roundabout | 100% of trips approach A27 from A2038 (King George VI Avenue) northbound and enter southern roundabout |
| **AM outbound towards west** | 50% of trips join A27 via the westbound on-slip road | 50% of trips join A27 via the westbound on-slip road |
| **AM outbound towards east** | 50% approach northern roundabout on A293 under bridge and join A27 Road via the eastbound on-slip road | 50% approach northern roundabout on Devil's Dyke Road over under bridge and join A27 via the eastbound on-slip road |
| **PM inbound from west** | 50% of trips approach junction via A27 eastbound off-slip road and enter northern roundabout | 50% of trips approach junction via A27 eastbound off-slip road and enter northern roundabout |
| **PM inbound from east** | 50% of trips approach junction via A27 westbound off-slip road and enter southern roundabout | 50% of trips approach junction via A27 westbound off-slip road and enter southern roundabout |
| **Total PM inbound** | 100% of trips leave A27 and join A293 Hangleton Link Road southbound | 100% of trips leave A27 and join A2038 (King George VI Avenue) southbound |

Based on the trip generation figures calculated in Appendix 3B, the trips that will enter the Trunk Road junctions in the AM and PM peak hours are outlined below. The RFCs/Degrees of Saturation that were outputs from the models used to produce the 2014 STA Addendum are also shown in the Tables 4.2 and 4.3 below.

**Table 4.2 – Trip Assignment for A293 (Hangleton Link) junction**

| A293 (Hangleton Link) | | | | |
|---|---|---|---|---|
| **Direction** | **Number of additional trips** | **Junction with A27** | **Junction arm entry** | **RFC in 2014 STA Addendum (Appendix E)** |
| **AM outbound towards west (50%)** | +38 | Southern roundabout | - | - |
| **AM outbound towards east (50%)** | +38 | Northern roundabout | A293 northbound under bridge | 1.15 |
| **Total AM outbound (100%)** | +76 | Southern roundabout | A293 northbound | 1.09 |
| | | | | |
| **PM inbound from west (50%)** | +57 | Northern roundabout | A27 eastbound off-slip road | 1.05 |
| **PM inbound from east (50%)** | +56 | Southern roundabout | A27 westbound off-slip road | 1.08 |
| **Total PM inbound (100%)** | +113 | Southern roundabout | A293 southbound | - |

For the A293 (Hangleton Link Road) junction, the assessment indicates that there could be some further, minor reduction in capacity on the local approach roads over and above that calculated in 2014. This is a result of up to one additional vehicle per minute on average passing through each arm of the junction in the AM and PM peak hours. Although all four entry arms to the junction that have been assessed are forecast to have an RFC over 1.00 in the 2014 Addendum, the effects associated with the CPP2 housing development proposals on the operation of the junction are expected to be negligible, over and above that which has already been assessed and agreed.

**Table 4.3 – Trip Assignment for A2038 (King George VI Avenue)/Dyke Road Avenue**

| A2038 (King George VI Avenue)/Dyke Road Avenue | | | | |
|---|---|---|---|---|
| **Direction** | **Number of additional trips** | **Junction with A27** | **Junction arm entry** | **Degree of saturation/RFC in 2014 STA Addendum (Appendix E)** |
| **AM outbound towards west (50%)** | +35 | Southern roundabout | - | - |
| **AM outbound towards east (50%)** | +35 | Northern roundabout | Devil's Dyke road northbound over bridge | 0.52 |
| **Total AM outbound (100%)** | +70 | Southern roundabout | A2038 northbound | 0.93 |
| | | | | |
| **PM inbound from west (50%)** | +52 | Northern roundabout | A27 eastbound off-slip road | 0.90 |
| **PM inbound from east (50%)** | +52 | Southern roundabout | A27 westbound off-slip road | 1.05 |
| **Total PM inbound (100%)** | +104 | Southern roundabout | A2038 southbound | - |

For the A2038 (King George VI Avenue)/Dyke Road Avenue junction, the assessment indicates that there may be some small, further reduction in capacity over and above that calculated in 2014 additional as a result of up to one additional vehicle per minute on average passing through each arm of the junction in the AM and PM peak hours. Three out of the four entry arms to the junctions that have been assessed have an RFC/Degree of saturation of less than 1.00, and therefore the overall impact of the CPP2 housing development proposals is expected to be minimal, over and above that which has already been assessed and agreed.

## Conclusions

Further work will still be required as planning applications for individual sites come forward. Where junction mitigation measures include traffic signals, the technology utilised will be 'intelligent' in terms of ensuring that demands for vehicle and people movement are detected and therefore managed efficiently in order to minimise congestion and delay.

However, in overall terms it is concluded that this assessment has demonstrated that the volume of additional trips passing through the Trunk Road junctions in the AM and PM peak hours will not materially affect the capacity or safety of the Trunk Road

junctions within the vicinity of the city, and therefore the previously agreed mitigation strategy and measures remain appropriate to address the forecast impacts.

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08 April 2013

Dear Liz

**BRIGHTON & HOVE SUBMISSION CITY PLAN PART ONE**

Thank you consulting the Highways Agency (HA) on the Brighton & Hove Submission City Plan Part One, February 2013.

As I am sure you are aware, the HA, on behalf of the Secretary of State for Transport, is responsible for managing and operating a safe and efficient Strategic Road Network (SRN), i.e. the Trunk Road and Motorway Network in England. In the case of Brighton and Hove this relates to A27, A23 and associated junctions.

We previously commented on the Brighton & Hove Draft City Plan in correspondence dated July 2012. Since commenting on the City Plan, we have also been working in conjunction with your transport consultants to develop and agree the transport evidence base methodology to help ensure that it is fit for purpose and sufficiently assesses the impact of City Plan allocations on the SRN.

Our comments on the Draft City Plan and combined Transport Assessment (TA) are outlined below. I recognise that the TA / evidence base queries may need to be directed to your transport consultant and we are happy to continue to work with them moving forward.

**Submission City Plan**

Spatial Distribution of Development – Table 3: Summary of Development Proposals

The City Plan summarises the proposed quantum of housing, new employment floorspace and new retail floorspace. We note that there is some variation between the quanta of housing proposed for each site in the submission City Plan compared to that proposed within Draft City Plan May 2012.

We are satisfied however, that the changes are unlikely to have an impact on the overall level traffic utilising the SRN given that the changes only affect the city centre development allocations and not the out of town ones.

DA 7 – Toads Hole Valley

As noted within previous correspondence, the development site at Toads Hole Valley is likely to generate a significant number of trips on the A27 given its proximal location to the A27 / Devils Dyke junction. Our concern in particular is that the A27 off slips could experience increased levels of queuing as a consequence of the development site which could pose a significant safety risk if the queues were to reach back to the mainline.

Since the May 2012 consultation, Policy DA 7 has been strengthened with the addition of point 'Q' which outlines a requirement for developers to work with the HA to improve the operational performance of the A27 in this location. Whilst this policy addition is welcomed it remains unclear as to whether an improvement can be delivered to mitigate the impact. This is discussed further below.

Policy DA7 (para 3.90) also mentions the possibility of an informal Park and Ride. As you may be aware, we have previously raised concerns about a Park and Ride in this location given their propensity to attract trips to the SRN. Any plans would therefore require a detailed investigation to be undertaken outlining the impact before we would be in a position to comment on the feasibility of a Park & Ride at Toads Hole Valley.

Infrastructure Delivery Plan

The Infrastructure Delivery Plan (IDP) states that to facilitate development at Toads Hole Valley an improvement to the A27 / Devils Dyke junction will be required. A preliminary design of the improvement has not however been provided and therefore it is unclear whether or not an improvement at the junction is feasible particularly given the increased level of queuing that would need to be accommodated (discussed below).

There is also an uncertainty around deliverability as we currently have no funding available meaning that the improvement would need to be developer funded and it is unclear whether the cost of the improvement would be prohibitive and risk the deliverability of the Toads Hole Valley site.

**Transport Assessment**

Strategic Modelling

A technical review of the TA has been undertaken to determine whether the Strategic SATURN modelling has been undertaken in accordance with the agreed methodology.

We are broadly content with the strategic modelling although the following points of clarification / information are requested:

- The mitigation scenario includes improvements to 5 SRN junctions. Clarification is requested as to what type of improvements are modelled at the junctions

- 2030 Volume/Capacity plots for the Consented scenario are requested as they were missing from the TA

- Detailed plots are requested for each SRN junction to show v/c in addition to those in Appendix F (with/without City Plan development) showing flow numbers. This will help us to understand more fully the impact of City Plan sites

ARCADY modelling

The strategic modelling concludes that many of the SRN junctions will be over capacity in the future year before City Plan development is added with slip road queues potentially reaching to the mainline.

ARCADY models have been constructed to assess the impacts in more detail. Please find our comments on the ARCADY models below:

- The geometric parameters used within a number of the models are not consistent with measurements taken during the review. It is unclear if this is a consequence of the calibration process but further detail is requested including a CAD plan of each of the junctions detailing where the measurements were taken from.

- The validation is generally good although certain models validate better than others with queues on occasion being underestimated. Should the models be used to inform junction improvement designs, efforts will need to be made to improve the validation.

- Validation queue data is missing for some arms of the A27 / A293 junction

- The flows used within the modelling are consistent with the turning movements provided with the exception of the A27 / Devils Dyke junction which shows small variations. We understand that this is the consequence of vehicle to PCU conversion during the modelling process.

Modelling results

The modelling results indicate that a number of the junctions including the A27 at Falmer, A27 / Carden Avenue and A27 / A23 are expected to queue back to the mainline A27 as a consequence of future year growth and committed development.

The A27 / Devils Dyke (north roundabout) results are particularly concerning given that City Plan traffic is modelled to significantly exacerbate the queuing. The results for the A27 East Bound Off-Slip are summarised below:

| **AM** | | | |
|---|---|---|---|
| **Scenario** | **RFC** | **Queue (PCUs)** | **Delay (s)** |
| Base | 1.27 | 54.95 | 375.65 |

| | | | |
|---|---|---|---|
| Consented | 1.56 | 73.4 | 614.97 |
| Consented + City Plan | 2.04 | 119.19 | 1439.83 |
| **PM** | | | |
| Base | 0.76 | 3.03 | 25.09 |
| Consented | 1.02 | 16.71 | 128.06 |
| Consented + City Plan | 1.16 | 44.02 | 262.78 |

Having measured the storage capacity on the EB off-slip, the results indicate that the inclusion of City Plan traffic will result in queues reaching the mainline A27 that would not otherwise be present.

This would represent a significant safety risk which is unacceptable and reinforces the need for the junction to be improved prior to the development site coming forward.

Mitigation

In order to mitigate the impact of City Plan traffic, a number of the junctions including the A27 / Devils Dyke north roundabout have been modelled in LinSig to understand how they would operate with signals.

The results indicate that all the junctions would operate significantly better under signal control but a review of the modelling highlights a number of concerns with the signalisation of the junctions in their current alignment.

We have provided detailed comments on the signalised junction modelling below.

**A27 / Falmer Interchange North Roundabout**

The supplied ARCADY models indicate that, by 2030, there will be capacity problems on the north and west arms. In particular, the A27 eastbound off-slip would suffer from very long queues, which would probably back onto the main carriageway.

*Signal Methodology*

The LinSig model proposes signalling all three entry arms. It is not clear, however, whether or not the existing roundabout is to be signalled, or a signalled cross roads implemented.

The following main issues with the model have been identified.

*Main Issues*

If the roundabout were to be retained, the lack of opposing circulatory signals would allow vehicles to circle the roundabout and conflict with traffic still entering, on green, from the original entry. It is, therefore, unlikely that retention of the roundabout is intended.

If a signalled crossroad is proposed, it is not clear if the stage sequence, running each arm separately, would be the most efficient method of control. The relatively high right turn from the south, however, would indicate that this would be the case.

In the model, traffic from lanes 1 and 2, on the Knight's Gate Road and A27 eastbound off-slip is being allowed to discharge into the single lane exit to The Drove over-bridge. Even if such a short merge were practicable, long merge queues, although transient in nature, would cause significant congestion at the upstream junction. Running the model with single lane discharges from each arm into the over-bridge, however, results in the junction having insufficient capacity in both peak periods.

The flared lane on The Drove entry is only about 15 metres long and not 30 metres, as specified in the model. Reducing the flare length to 15 metres causes additional capacity problems on this arm.

**A27 / Falmer Interchange South Roundabout**

The ARCADY models predict severe capacity problems, particularly on The Drove (north) arm. These queues would be long enough to reach across the over-bridge and cause severe congestion at the north junction.

*Signal Methodology*

It would appear from the LinSig model that the existing roundabout has been removed and a signalled T-junction implemented. The left turn from The Drove over-bridge, which bypasses the roundabout via a free-flow lane, would be included in the signalled stopline.

*Main Issues*

It has been assumed that the northbound, lane 2 right turn into the A27 westbound on-slip, will have a 4 PCU storage area in front of the stopline. This may be somewhat optimistic and 2 PCUs may be more realistic.

The change from Phase A (The Drove (north) to E (The Drove (south) indicative right arrow should have a 3 second intergreen.

A cycle time of 117 seconds is required in the PM peak, to allow the junction to operate within capacity. This tends to lead to long maximum queues, which in the case of The Drove (north) arm, could reach back to the north junction.

**A27 / Carden Avenue North Roundabout**

The ARCADY models predict 2030 capacity problems on all three arms. The A27 eastbound off-slip would appear to be the worst in all scenarios.

*Signal Methodology*

From the submitted model, the intention appears to be to convert the north roundabout to a signalled T-junction.

*Main Issues*

A number of issues have been identified which will have an impact on the performance of the junction:

- The indicative right turn arrow phase (D) has not been allocated to the A27 off-slip lane 2.
- The phase change C (Coldean Lane) to D should have a 3 second intergreen.
- Queues on the Carden Avenue over-bridge could be long enough to reach back to the south junction.

**A27 / A23 PATCHAM INTERCHANGE North Roundabout**

The 2030 ARCADY models predict capacity problems on the A27 eastbound off-slip entry only.

*Signal Methodology*

It appears from the model layout, that the intention is to retain the existing roundabout and signalise the A27 off-slip entry. Braypool Lane will continue to operate as a give-way entry.

In principle, this solution could improve capacity at the A27 off-slip entry. The following main issues, however, have been identified with the model.

*Main Issues*

Two lanes are permitted to turn right from the off-slip stopline, to the single lane over-bridge. There may be difficulties in accommodating the merge given the proximity of the bridge structure. If this movement were a single lane only, however, the A27 off-slip would have insufficient capacity.

The over-bridge northbound approach flare of 22 metres would appear to be impracticable, given the proximity of the bridge structure and would likely need to be reduced.

If the over-bridge stopline were retained at the current give-way line position, there would be no internal signal to prevent conflict with U-turning traffic from Braypool Lane.

The A27 eastbound on-slip appears to be a single lane exit and yet two lanes discharge to it from the over-bridge. It is unclear if it is proposed to widen a section of the on-slip and clarification is requested.

The model results predict that even with the flared entry and two lane discharge to the A27 on-slip, the over-bridge would have excessive queues which would cause congestion at the south roundabout.

**A27 / A23 PATCHAM INTERCHANGE South Roundabout**

The 2030 ARCADY models predict capacity problems and very long queues, on the A27 westbound off-slip entry.

*Signal Methodology*

The model layout indicates the intention to retain and signalise the roundabout, using a separate stage stream for each of the three entry nodes.

The dedicated free-flow left turn from the Link Road to the A27 westbound on-slip will be removed and signalled with the roundabout entry stopline. A flared lane is also proposed on the A27 westbound off-slip entry.

*Main Issues*

The U-turn from the Link Road (south) has been disallowed in the model. When it is 'allowed' using the LinSig 'Route List View', the Link Road (south) entry has limited capacity and suffers from DoS values of up to about 98%.

The circulatory lane at the A27 off-slip node has excessive queues which would block back to the upstream over-bridge node. This is exacerbated when the Link Road U-turn mentioned above is allowed.

**A27 / King George VI / Devils Dyke Road**

The ARCADY model results indicate that there will be capacity problems, particularly on the A27 eastbound off-slip. It would seem that the main cause of this is the heavy right turn movement from the Devil's Dyke Road over-bridge arm.

*Signal Methodology*

The LinSig model proposes retaining the roundabout and signalling all three entry arms. The model results appear to show that entry DoS values and queues would be reduced to acceptable levels during the AM peak period, as a result of signalling the existing layout.

*Main Issues*

Given the restricted stacking room at the internal stoplines, excessive queues prove to be a problem in the model. Thus, in the AM peak period, queues of about 22 PCUs are predicted in circulatory lane 1 at the A27 off-slip node, equivalent to about 126 metres. This queue would back up through the Devil's Dyke Road (south) entry and, when added to those stopline queues (11.5 PCUs), would create queues nearly 200 metres long across the over-bridge. This would be more than enough to block back into, and cause congestion within, the south roundabout.

Similarly, in the PM peak, long queues are predicted at the Devil's Dyke Road (north) circulatory stopline, equivalent to about 100 metres in length. These queues would not only prevent traffic leaving by the Devil's Dyke exit, but would also cause congestion at the upstream A13 off-slip node.

In practice, therefore, the proposed roundabout could not accommodate the modelled flows and it is likely that congestion would be caused at the south roundabout, whilst queues would probably still reach back to the A27 eastbound main carriageway.

Some lane widths used to derive saturation flows seem unfeasibly narrow (e.g. 2.2 metres). The Devil' Dyke Road south U-turn movement has also been disallowed in the Route List View.

The 90 second cycle time is long, particularly for a small roundabout. Although it would appear to give more capacity, it would also make it more difficult to restrict the circulatory queues to reasonable lengths.

The flows appear to have been assigned using the delay based assignment option. On roundabouts, entry lane balancing is usually more appropriate

Mitigation Conclusion

The main problems identified with the LinSig models are associated with proposals to signalise some roundabouts with small ICDs (e.g. 40 metres). Because of the limited stacking room, this inevitably creates difficulties with avoiding excessive circulatory queues. Since LinSig cannot model upstream congestion caused by these queues, the model results for some of the roundabout entries are, as a result, very optimistic. Unfortunately, there appears to have been no attempt to limit any of these excessive queues in the models. In order to do so, this would effectively reduce green time at some upstream entries and thus worsen their capacity performance.

Whilst it is appreciated that not all of the junctions are proposed for mitigation within the City Plan it is clear, from the earlier assessment, that the A27 / Devils Dyke junctions will need improvement to facilitate the development at Toads Hole Valley and make it deliverable in transport terms.

The mitigation modelling at this junction does not, at present, provide any certainty that mitigation can be provided to manage down the excessive queues particularly given the geographical constraints between the A27 and the National Park. It is recognised that the design of any improvement will largely be the responsibility of the developer but in

order for us to take a view on the site's deliverability we will need to be satisfied that an engineering solution can be found.

**Conclusion**

Whilst we are satisfied with the City Plan policies and welcome the requirement for an improvement of the A27 / Devils Dyke junctions to be provided prior to the development coming forward, a number of concerns remain with respect to the site's deliverability. The ARCADY modelling indicates that the existing layout cannot accommodate City Plan traffic and the mitigation modelling of the junction has a number of problems and does not provide certainty that an improvement can be implemented.

In order for us to be satisfied that the site is deliverable in transport terms and therefore that the City Plan is sound, it will need to be demonstrated that a junction improvement that suitably mitigates the impact of City Plan traffic at the A27 / Devils Dyke junctions (north and south) is feasible.

Until such time that an indicative layout and associated modelling has been reviewed we will remain unsure of the deliverability of Toads Hole Valley in transport terms and as such the soundness of the Plan will remain in doubt.

Yours sincerely

**Keith Jacobs**
NDD Asset Development Team - Sussex
Email: keith.jacobs@highways.gsi.gov.uk

HIGHWAYS AGENCY

Our ref: HA/4/KJ/1537
Your ref: .....

Planning Strategy
Brighton and Hove City Council
Hove Town Hall
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HOVE BN3 3BQ

Keith Jacobs

Wing 4C
Federated House
London Road
Dorking RH4 1SZ

Direct Line: 01306 878219

Fax: 01306 878147

17 May 2013

Dear Liz,

**BRIGHTON & HOVE SUBMISSION CITY PLAN PART ONE**

The purpose of this letter is to provide an update on the HA's position with respect to the Brighton & Hove City Plan. As you are aware, we submitted a letter dated 08 April 2013 which raised concerns regarding the junction modelling and the viability of mitigation at the A27 / Devils Dyke Road roundabout.

Following the submission of the response, further information has been provided and it is therefore necessary to provide an update on our latest position in advance of the Examination in Public.

Mitigation and Modelling

The HA has been working closely with Brighton & Hove City Council and consultant's JMP during the development of the transport evidence base for the City Plan. The approach has been very successful with each step of the modelling being agreed in turn before being used to assess City Plan development scenarios.

The Transport Assessment and associated ARCADY and LINSIG models, which assessed the impact of development on the A27 junctions to the north of Brighton, were reviewed as part of the 08 April response. The review was undertaken without the benefit of seeing the proposed junction improvement designs as these were not supplied in time to meet the consultation deadline. As a consequence, the review highlighted several problems with respect to the mitigation at the A27 / Devils Dyke north roundabout in particular. The Toads Hole Valley development site adjacent to the A27 is dependent on mitigation being provided at the Devils Dyke junction and, as such, the conclusion was made that the deliverability of Toads Hole Valley was uncertain due to the evidence base not providing a viable improvement.

Following the submission of the 08 April response, junction improvement plans together with updated modelling files were submitted to the HA for review. The plans have been reviewed in conjunction with the modelling files and we are now satisfied that the

preliminary junction improvement proposed at the A27 Devils Dyke junction is suitable for the purposes of the City Plan and mitigates the impact of development traffic.

Further detail will be required at detailed design stage and a review will also be required to check compliance with the Design Manual for Roads and Bridges and assess the need for any departures from standard. In accordance with the Infrastructure Delivery Plan, the expectation is that the improvement at the A27 Devils Dyke junction will be implemented prior to occupation of Toads Hole Valley. It will be important therefore, for Brighton & Hove, the developers and the HA to work together to develop the design moving forward.

City Plan Soundness

Following the review of the additional information provided, we are now satisfied with the sustainability of the Spatial Strategy outlined in the City Plan and therefore that the Plan is sound.

Sufficient work on the mitigation measures has been undertaken at this stage of the planning process, specifically that the impact of Toads Hole Valley can be mitigated to avoid detriment to the A27 and the models used by Brighton & Hove to assess impacts and help define mitigation measures are fit for purpose.

Further more detailed studies for planning applications will be required. However the proposals put forward at this stage of the plan making process are appropriate and deliverable subject to funding contributions from third parties.

As such we are satisfied that the Plan can be delivered, subject to working with the HA to develop improvement designs moving forward and that the spatial strategy that underpins the City Plan is the most sustainable approach to accommodating growth within Brighton & Hove. The approach adopted by Brighton & Hove in developing the City Plan is sound and consistent with the Agency's view of best practice in ensuring that development is planned in a way that encourages more sustainable travel patterns and behaviours

I hope that the above has been helpful but should you have any queries please do not hesitate to contact me.

Yours sincerely

**Keith Jacobs**
NDD Asset Development Team - Sussex
Email: Keith.Jacobs@highways.gsi.gov.uk

**APPENDIX 2**

**2011 CENSUS DATA – DISTANCE TRAVELLED TO WORK BY CAR/VAN**

| 2011 ward | All categories: Method of travel to work | Driving a car or van to work | Travelled 10km to less than 30km by car/van | Travelled 30km and over by car/van | Total travelled 10km+ to work by car/van | %age of those driving 10km+ to work by car/van |
|---|---|---|---|---|---|---|
| E05002420 : Brunswick and Adelaide | 8,953 | 1,512 | 318 | 390 | 708 | 47 |
| E05002421 : Central Hove | 7,667 | 1,688 | 380 | 407 | 787 | 47 |
| E05002422 : East Brighton | 10,655 | 2,002 | 303 | 295 | 598 | 30 |
| E05002423 : Goldsmid | 12,262 | 2,708 | 567 | 600 | 1,167 | 43 |
| E05002424 : Hangleton and Knoll | 10,177 | 3,504 | 584 | 401 | 985 | 28 |
| E05002425 : Hanover and Elm Grove | 13,127 | 2,431 | 549 | 401 | 950 | 39 |
| E05002426 : Hollingdean and Stanmer | 12,374 | 2,472 | 410 | 290 | 700 | 28 |
| E05002436 : Hove Park | 7,450 | 2,651 | 459 | 366 | 825 | 31 |
| E05002427 : Moulsecoomb and Bevendean | 13,816 | 2,821 | 423 | 303 | 726 | 26 |
| E05002428 : North Portslade | 7,362 | 3,106 | 476 | 351 | 827 | 27 |
| E05002429 : Patcham | 10,096 | 4,059 | 674 | 460 | 1,134 | 28 |
| E05002430 : Preston Park | 11,481 | 2,792 | 636 | 497 | 1,133 | 41 |
| E05002431 : Queen's Park | 12,176 | 1,661 | 359 | 305 | 664 | 40 |
| E05002432 : Regency | 8,826 | 944 | 209 | 237 | 446 | 47 |
| E05002433 : Rottingdean Coastal | 10,062 | 3,284 | 569 | 463 | 1,032 | 31 |
| E05002435 : South Portslade | 6,892 | 2,325 | 384 | 245 | 629 | 27 |
| E05002434 : St. Peter's and North Laine | 16,001 | 1,857 | 439 | 399 | 838 | 45 |
| E05002437 : Westbourne | 7,301 | 1,845 | 382 | 426 | 808 | 44 |
| E05002438 : Wish | 6,780 | 2,038 | 360 | 365 | 725 | 36 |
| E05002439 : Withdean | 10,423 | 3,555 | 724 | 565 | 1,289 | 36 |
| E05002440 : Woodingdean | 6,911 | 2,787 | 393 | 322 | 715 | 26 |
| | | | | | | |
| *Sources - ONS Nomis 2011 Census data (https://www.nomisweb.co.uk/census/2011)* | | | | | | |

**APPENDIX 3A**

**CPP2 RESIDENTIAL DEVELOPMENT SITE NET TRIP GENERATION/ATTRACTION CHANGE S AND DISTRIBUTION**

| Site | Ward | Net change in housing numbers between CPP1 and CPP2 | Net change in AM peak (departures) trip generation (x 0.2) | Net change in PM peak (arrivals) trip attraction (x 0.3) | 'Primary' Trunk Road junction for work-related trips to/from site | Estimated impact on junction in AM peak hour (50%) | Estimated impact on junction in PM peak hour (50%) | 'Secondary' Trunk Road junction for work-related trips to/from the site | Estimated impact on junction in AM peak hour (50%) | Estimated impact on junction in PM peak hour (50%) |
|---|---|---|---|---|---|---|---|---|---|---|
| **Development Area** | | | | | | | | | | |
| DA1 Central Seafront & Churchill Square | Regency | -20 | -4 | -6 | A23 (London Road) | -2 | -3 | B2123 (Falmer Road) (ESCC) | -2 | -3 |
| DA2 Brighton Marina, Gas Works and Black Rock Sites | Rottingdean Coastal | -244 | -49 | -73 | B2123 (Falmer Road) (ESCC) | -25 | -37 | A23 (London Road) | -24 | -36 |
| DA3 Lewes Road | Moulsecoomb & Bevendean | -285 | -57 | -86 | B2123 (Falmer Road) (ESCC) | -29 | -43 | Hollingbury/Ditchling Road (Carden Avenue/Coldean Lane) | -28 | -43 |
| DA4 New England Quarter and London Road (including SSA2 Combined Engineering Depot) | St Peter's & North Laine | 0 | 0 | 0 | A23 (London Road) | 0 | 0 | A2038 (King George VI Avenue) /Dyke Road Avenue | 0 | 0 |
| DA5 Edward Street & Eastern Road | Queen's Park | -88 | -18 | -26 | B2123 (Falmer Road) (ESCC) | -9 | -13 | A23 (London Road) | -9 | -13 |
| DA6 Hove | Goldsmid | +264 | +53 | +79 | A2038 (King | +27 | +40 | A293 Hangleton | +26 | +39 |

| Site | Ward | Net change in housing numbers between CPP1 and CPP2 | Net change in AM peak (departures) trip generation (x 0.2) | Net change in PM peak (arrivals) trip attraction (x 0.3) | 'Primary' Trunk Road junction for work-related trips to/from site | Estimated impact on junction in AM peak hour (50%) | Estimated impact on junction in PM peak hour (50%) | 'Secondary' Trunk Road junction for work-related trips to/from the site | Estimated impact on junction in AM peak hour (50%) | Estimated impact on junction in PM peak hour (50%) |
|---|---|---|---|---|---|---|---|---|---|---|
| Station (including SSA4 Sackville Trading Estate) | | | | | George VI Avenue) /Dyke Road Avenue | | | Link | | |
| DA7 Toad's Hole Valley | Hangleton & Knoll | 0 | 0 | 0 | A2038 (King George VI Avenue) /Dyke Road Avenue | 0 | 0 | A293 Hangleton Link | 0 | 0 |
| DA8 Shoreham Harbour and South Portslade | South Portslade | +35 | +7 | +10 | A293 Hangleton Link | +7 | +10 | - | 0 | 0 |
| **Development Across the Rest of the City** | | | | | | | | | | |
| Strategic Site Allocations outside of DAs | | | | | | | | | | |
| *SSA1 Brighton General Hospital* | Hanover & Elm Grove | +200 | +40 | +60 | B2123 (Falmer Road) (ESCC) | +20 | +30 | Hollingbury/Ditchling Road (Carden Avenue/Coldean Lane) | +20 | +30 |
| *SSA3 Lyon Close* | Goldsmid | +300 | +60 | +90 | A2038 (King George VI Avenue) /Dyke Road Avenue | +30 | +45 | A293 Hangleton Link | +30 | +45 |
| Other development within the built-up area | Various | -116 | -23 | -35 | *Assumed split across all 5 junctions* | *-5 at each* | *-7 at each* | - | | |
| Within the urban fringe | Various | -158 | -32 | -47 | *Assumed split across all 5 junctions* | *-6 at each* | *-9 at each* | - | | |

| Site | Ward | Net change in housing numbers between CPP1 and CPP2 | Net change in AM peak (departures) trip generation (x 0.2) | Net change in PM peak (arrivals) trip attraction (x 0.3) | 'Primary' Trunk Road junction for work-related trips to/from site | Estimated impact on junction in AM peak hour (50%) | Estimated impact on junction in PM peak hour (50%) | 'Secondary' Trunk Road junction for work-related trips to/from the site | Estimated impact on junction in AM peak hour (50%) | Estimated impact on junction in PM peak hour (50%) |
|---|---|---|---|---|---|---|---|---|---|---|
| Small identified sites and Small windfall development | Various | +591 | +118 | +177 | *Assumed split across all 5 junctions* | *+24 at each* | *+35 at each* | - | | |
| **TOTAL** | | **+479** | **+95** | **+143** | | | | | | |

**APPENDIX 3B**

**SCENARIO 1 - CUMULATIVE EFFECTS OF ADDITIONAL CPP2 DEVELOPMENT TRIP DISTRIBUTION ON 'PRIMARY' AND 'SECONDARY' TRUNK ROAD JUNCTIONS**

| | A293 Hangleton Link | | A2038 (King George VI Avenue) /Dyke Road Avenue | | A23 (London Road) | | Hollingbury/Ditchling Road (Carden Avenue/Coldean Lane) | | B2123 (Falmer Road) (ESCC) | |
|---|---|---|---|---|---|---|---|---|---|---|
| **SITE** | **AM** | **PM** | **AM** | **PM** | **AM** | **PM** | **AM** | **PM** | **AM** | **PM** |
| **Development Area** | | | | | | | | | | |
| DA1 Central Seafront & Churchill Square | 0 | 0 | 0 | 0 | -2 | -3 | 0 | 0 | -2 | -3 |
| DA2 Brighton Marina, Gas Works and Black Rock Sites | 0 | 0 | 0 | 0 | -24 | -36 | 0 | 0 | -25 | -37 |
| DA3 Lewes Road | 0 | 0 | 0 | 0 | 0 | 0 | -28 | -43 | -29 | -43 |
| DA4 New England Quarter and London Road (including SSA2 Combined Engineering Deport) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DA5 Edward Street & Eastern Road | 0 | 0 | 0 | 0 | -9 | -13 | 0 | 0 | -9 | -13 |
| DA6 Hove Station (incl. SSA4 Sackville Trading Estate) | +26 | +39 | +27 | +40 | 0 | 0 | 0 | 0 | 0 | 0 |
| DA7 Toad's Hole Valley | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DA8 Shoreham Harbour and South Portslade | +7 | +10 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Development Across the Rest of the City** | | | | | | | | | | |
| Strategic Site Allocations outside of DAs | | | | | 0 | 0 | | | | |
| *SSA1 Brighton General Hospital* | 0 | 0 | 0 | 0 | 0 | 0 | +20 | +30 | +20 | +30 |
| *SSA3 Lyon Close* | +30 | +45 | +30 | +45 | 0 | 0 | 0 | 0 | | |
| Other development within the built-up area | -5 | -7 | -5 | -7 | -5 | -7 | -5 | -7 | -5 | -7 |
| Within the urban fringe | -6 | -9 | -6 | -9 | -6 | -9 | -6 | -9 | -6 | -9 |
| Small identified sites and Small windfall development | +24 | +35 | +24 | +35 | +24 | +35 | +24 | +35 | +24 | +35 |
| **TOTAL** | **+76** | **+113** | **+70** | **+104** | **-22** | **-33** | **+5** | **+6** | **-32** | **-47** |

CHECK

Total net change in AM peak hour trips = +76+70-22+5-32 = +97 (+2 due to rounding)

Total net change in PM peak hour trips = +113+104-33+6-47 = +143

**APPENDIX 3C**

**SCENARIO 2- CUMULATIVE EFFECTS OF ADDITIONAL CPP2 DEVELOPMENT TRIP DISTRIBUTION ON ALL TRUNK ROAD JUNCTIONS**

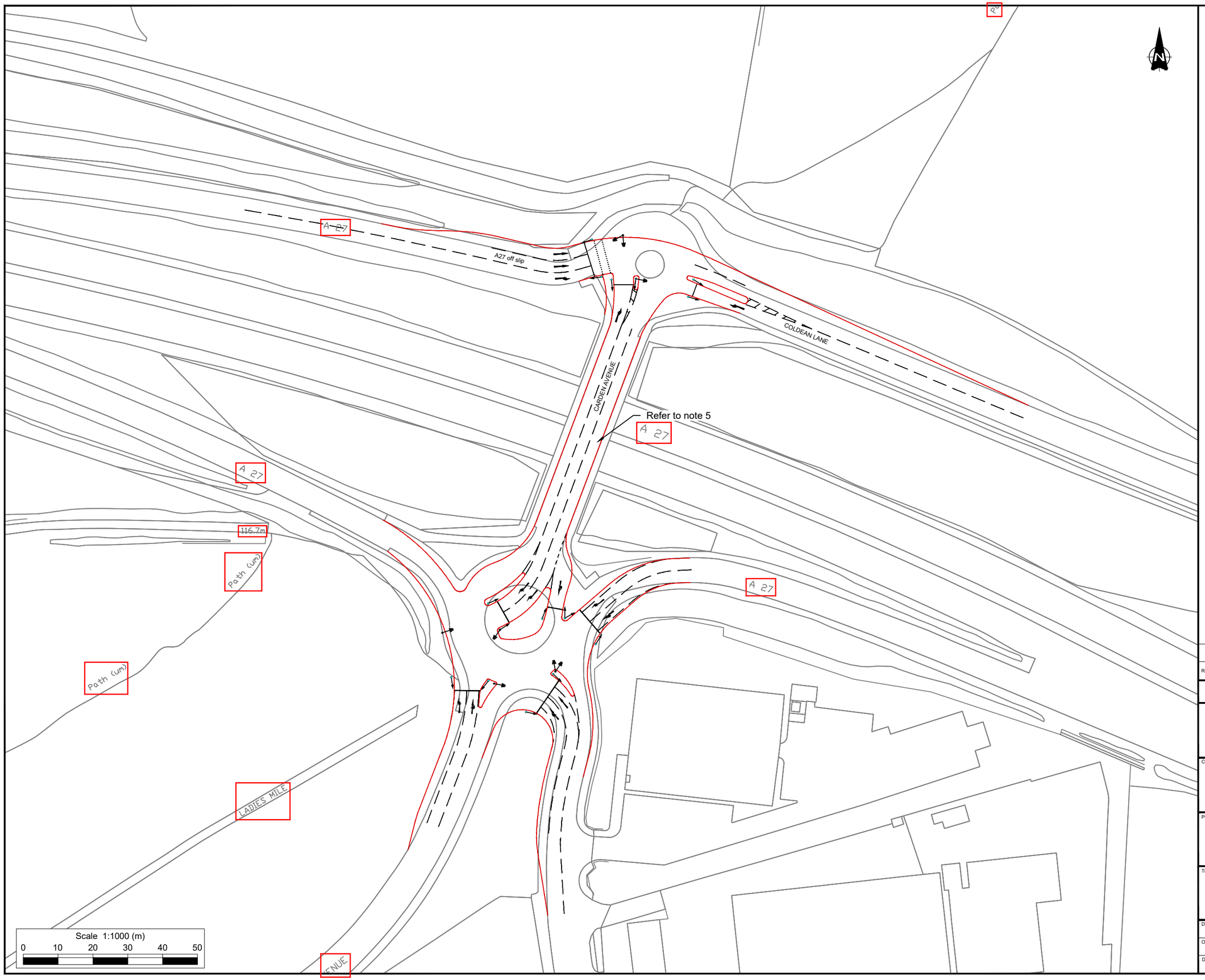
| | A293 Hangleton Link | | A2038 (King George VI Avenue) /Dyke Road Avenue | | A23 (London Road) | | Hollingbury/Ditchling Road (Carden Avenue/Coldean Lane) | | B2123 (Falmer Road) (ESCC) | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Site** | **AM** | **PM** | **AM** | **PM** | **AM** | **PM** | **AM** | **PM** | **AM** | **PM** |
| **Development Area** | | | | | | | | | | |
| DA1 Central Seafront & Churchill Square | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 |
| DA2 Brighton Marina, Gas Works and Black Rock Sites | -10 | -15 | -10 | -15 | -10 | -15 | -10 | -15 | -10 | -15 |
| DA3 Lewes Road | -11 | -17 | -11 | -17 | -11 | -17 | -11 | -17 | -11 | -17 |
| DA4 New England Quarter and London Road (including SSA2 Combined Engineering Deport) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DA5 Edward Street & Eastern Road | -4 | -5 | -4 | -5 | -4 | -5 | -4 | -5 | -4 | -5 |
| DA6 Hove Station (incl. SSA4 Sackville Trading Estate) | +11 | +16 | +11 | +16 | +11 | +16 | +11 | +16 | +11 | +16 |
| DA7 Toad's Hole Valley | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DA8 Shoreham Harbour and South Portslade | +2 | +2 | +2 | +2 | +1 | +2 | +1 | +2 | +1 | +2 |
| **Development Across the Rest of the City** | | | | | | | | | | |
| Strategic Site Allocations outside of DAs | | | | | | | | | | |
| *SSA1 Brighton General Hospital* | +8 | +12 | +8 | +12 | +8 | +12 | +8 | +12 | +8 | +12 |
| *SSA3 Lyon Close* | +12 | +18 | +12 | +18 | +12 | +18 | +12 | +18 | +12 | +18 |
| Other development within the built-up area | -5 | -7 | -5 | -7 | -5 | -7 | -5 | -7 | -5 | -7 |
| Within the urban fringe | -6 | -9 | -6 | -9 | -6 | -9 | -6 | -9 | -6 | -9 |
| Small identified sites and Small windfall development | +24 | +35 | +24 | +35 | +24 | +35 | +24 | +35 | +24 | +35 |
| **TOTAL** | **+20** | **+29** | **+20** | **+29** | **+19** | **+29** | **+19** | **+29** | **+19** | **+29** |

CHECK

Total net change in AM peak hour trips = +20+20+19+19+19 = +97

Total net change in PM peak hour trips = +29+29+29+29+29 = +145 (+2 due to rounding)

# Appendix B – Proposed Junction Mitigation Scheme Layout Drawings




Notes:

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2. All dimensions are shown in metres unless otherwise stated.
3. Layout based on Ordnance Survey MasterMap, © Crown Copyright 2018. All rights reserved. Licence number 100022432.
4. Drawings have been developed in order to indicate a level of mitigation required. Not to be used for any other purpose.
5. A structural assessment will be required to confirm the viability of 3 lanes on the existing structure.

Key:

- Proposed kerb
- Proposed road marking
- Proposed primary signal
- Proposed secondary signal

| Rev | Date | Revision details | Drawn | Check. | Review | Approv |
|---|---|---|---|---|---|---|
| | | | | | | |



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Client

**Brighton & Hove City Council**

Project

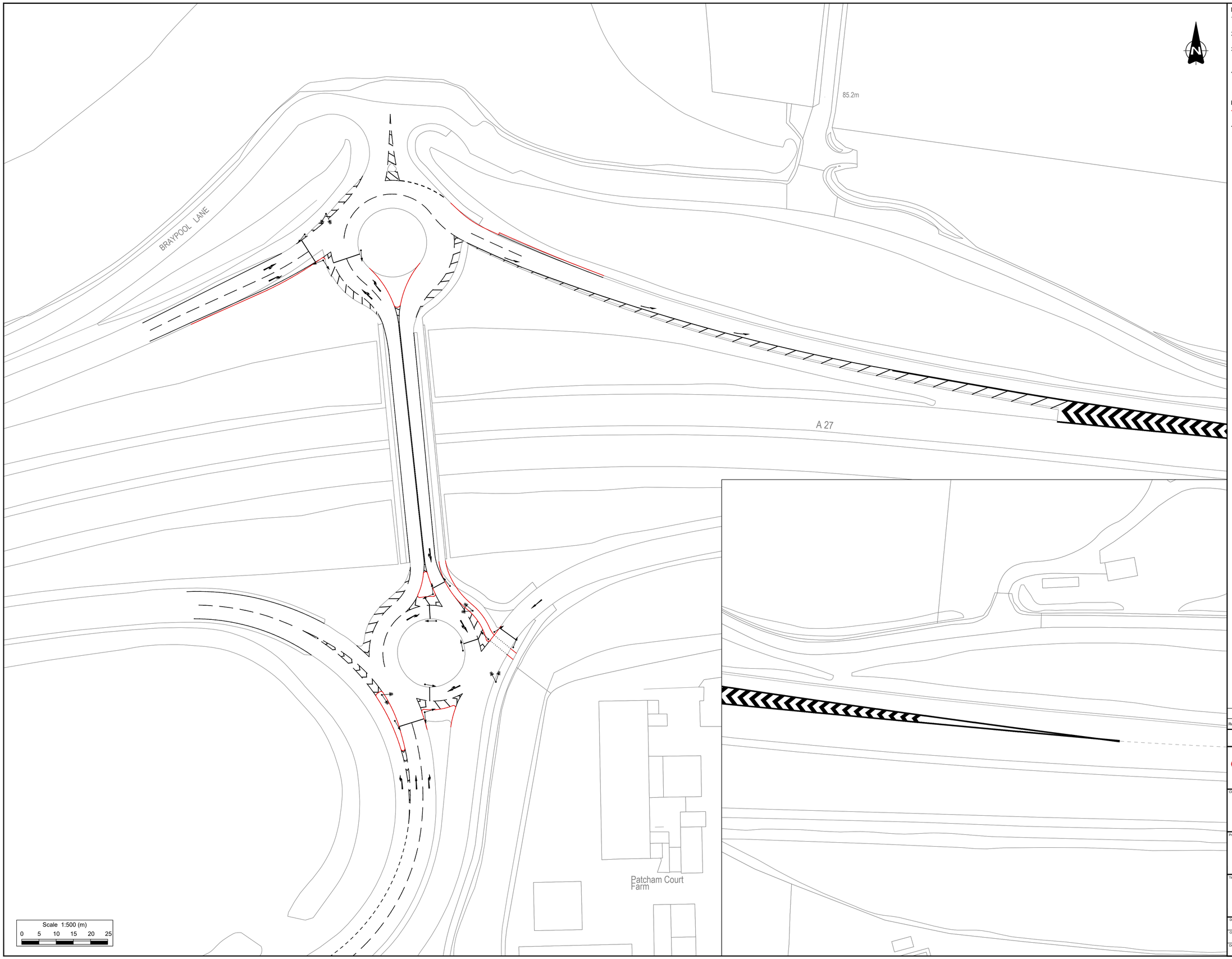
**BHCC A27 City Plan**

Title

**Junction 3 - Carden Avenue Proposed Arrangement**

| Drawn | Checked | Checked | Approved |
|---|---|---|---|
| DH | DC | DC | JG |
| **Original drg. size** | **Date** | **Scale** | **Drawing Status** |
| A3 | 11/11/2019 | 1:1000 | Approval |

Drawing Number: 109418-dwg-04 Rev. A0




Notes:

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2. All dimensions are shown in metres unless otherwise stated.
3. Layout based on Ordnance Survey MasterMap, © Crown Copyright 2018. All rights reserved. Licence number 100022432.
4. Drawings have been developed in order to indicate a level of mitigation required. Not to be used for any other purpose.

Key:

- Proposed kerb
- Proposed road markings
- Proposed primary signal
- Proposed secondary signal

| Rev | Date | Revision details | Drawn | Check. | Review | Approv |
|---|---|---|---|---|---|---|
| | | | | | | |



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Client: **Brighton & Hove City Council**

Project: **BHCC A27 City Plan**

Title: Junction 4 - Patcham Interchange
Proposed Arrangement

| Drawn | Checked | Reviewed | Approved |
|---|---|---|---|
| DH | DC | DC | JG |

| Original drg. size | Date | Scale | Drawing Status |
|---|---|---|---|
| A1 | 05/11/2019 | 1:500 | Approval |

Drawing Number: 109418-dwg-01 Rev. A0

Notes:

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4. Drawings have been developed in order to indicate a level of mitigation required. Not to be used for any other purpose.

Key:

- Proposed kerb
- Proposed road marking
- Proposed primary signal
- Proposed secondary signal

Scale 1:1000 (m)
0 10 20 30 40 50

| Rev | Date | Revision details | Drawn | Check. | Review | Approv |
|---|---|---|---|---|---|---|
| | | | | | | |



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Client
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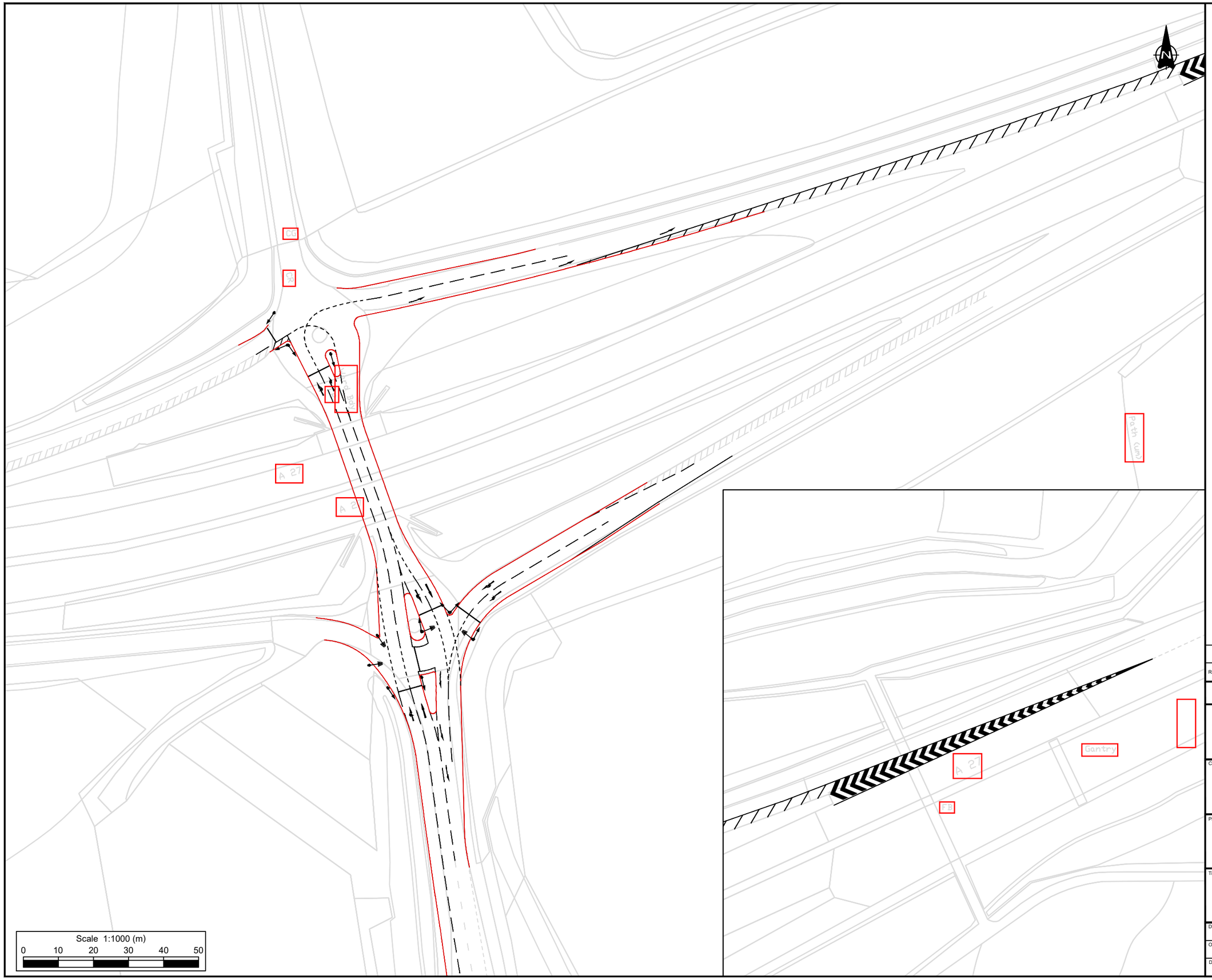
Project
**BHCC A27 City Plan**

Title
**Junction 5 - Devils Dyke**
**Proposed Arrangement**

| Drawn | Checked | Checked | Approved |
|---|---|---|---|
| DH | DC | DC | JG |
| **Original drg. size** | **Date** | **Scale** | **Drawing Status** |
| A3 | 05/11/2019 | 1:1000 | Approval |
| **Drawing Number** | | | **Rev.** |
| 109418-dwg-02 | | | A0 |




Notes:

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2. All dimensions are shown in metres unless otherwise stated.
3. Layout based on Ordnance Survey MasterMap, © Crown Copyright 2018. All rights reserved. Licence number 100022432.
4. Drawings have been developed in order to indicate a level of mitigation required. Not to be used for any other purpose.

Key:

- Proposed kerb
- Proposed road marking
- Proposed primary signal
- Proposed secondary signal

| Rev | Date | Revision details | Drawn | Check. | Review | Approv |
|---|---|---|---|---|---|---|



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Client

**Brighton & Hove City Council**

Project

**BHCC A27 City Plan**

Title

**Junction 6 - A27 & A293**
**Proposed Arrangement**

| Drawn | Checked | Checked | Approved |
|---|---|---|---|
| DH | DC | DC | JG |
| Original drg. size | Date | Scale | Drawing Status |
| A3 | 05/11/2019 | 1:1000 | Approval |
| Drawing Number | | | Rev. |
| 109418-dwg-06 | | | A0 |

Brighton & Hove
City Council