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

Transport Topic Paper

May 2021

Brighton & Hove
City Council

Contents

1. Context

1.1 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 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.

1.2 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.

1.3 During the preparation of CPP1 collaborative work was undertaken between the Highways Agency (HA) (now known as Highways England (HE)) 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. Correspondence from Highways England dated 17 May 2013, prior to the examination of the Plan, concluded that:

> "*[The HA] are satisfied with the sustainability of the Spatial Strategy outlined in the City Plan [Part One] and therefore that the Plan is sound. Sufficient work on the mitigation measures has been undertaken at this 'stage of the planning process… 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 is sound and consistent with the Agency's view of best practice in ensuring development is planned in a way that encourages more sustainable travel patterns and behaviours."*

1.4 Modifications to the CPP1 agreed during the examination process resulted in the Plan's housing target increasing by 1,900 units to 13,200 dwellings based on:-

i) Windfall Allowance in first 10 years - approximately an additional 650 units; and
ii) Urban Fringe sites – an allowance of 1060 additional units.

1.5 The impacts of this increase on the Strategic Road Network were considered through an Addendum to the Strategic Transport Assessment published in June 2014. The HA confirmed that it continued to support the transport strategy in the City Plan; that it was satisfied there will

be no harmful impact on Trunk Road junctions as a result of the strategy; and that the evidence underpinning the Plan is sound.

1.6 The City Plan Part One was subsequently found sound by the appointed inspector and adopted by the council in March 2016.

2. City Plan Part Two

2.1 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 on strategic sites in CPP1 to assist in meeting the minimum 13,200 housing target set out in CPP1 Policy CP1, 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 – 4 so that the CPP1 strategy for accommodating development needs can be implemented. CPP2 does not significantly increase the planned amount of housing in CPP1, rather the additional site allocations provide more specific detail on where it will be located.

2.2 Consultation took place on a Draft CPP2 in summer 2018. The representation from Highways England relating to Polices H1 (Housing Sites and Mixed-Use Sites) and H2 (Housing Sites – Urban Fringe) included a requirement 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 so, the previously agreed junction mitigation work would be able to accommodate the future traffic levels. If not, further consideration of 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.

2.3 CPP1 is an adopted part of the development plan and will remain so irrespective of the outcome of the CPP2 examination process. The strategic approach of the City Plan as a whole is therefore not open to challenge or debate at the current time and the housing target set out in Policy CP1 of a minimum of 13,200 homes over the Plan period remains unchanged.

2.4 The issue therefore in addressing the concerns of Highways England is whether the spatial distribution of the proposed housing development site allocations in CPP2, together with the relatively modest anticipated increase in overall housing supply affects the conclusions of the previous work to such an extent that the previous conclusions now become invalid - i.e. that satisfactory mitigation of the effect on the SRN junctions can no longer be achieved. The work

2.5 Dialogue has been ongoing with HE since the Draft Plan consultation in 2018 in an to attempt to reach agreement that HE's concerns have been resolved. During this period the Proposed Submission CPP2 was subject to consultation under Regulation 19 in autumn 2020. In their response to the Regulation 19 consultation with regard to this issue, HE reiterated their previous representation and noted that collaborative work was ongoing with the council.

3. BHCC Technical Note

3.1 To address HE's representation on the Draft CPP2 a Technical Note was prepared by BHCC in August 2019 which sought to explain the traffic generation changes expected from the proposed levels of housing development in CPP2, and its forecast impacts on the A27 SRN junctions.

3.2 The Technical Note concluded that 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.

3.3 The Technical Note was shared with Highways England who requested further clarity of the impact at each junction on the SRN. It has been included as Appendix 1 to this Topic Paper.

4. Further Dialogue with Highways England

4.1 Having originally produced the Strategic Transport Assessments (STA) for CPP1 in 2012-14, consultants Systra were commissioned to undertake the additional assessment work required to address HE's concerns on behalf of the Council. The '*A27 Transport Impact Analysis – Technical Note*' was produced and supplied to HE in January 2020 and was published in full to support the Proposed Submission City Plan Part Two. It is included as Appendix 2 of this Topic Paper. The modelling undertaken covers five junctions along the A27 in Brighton & Hove, these are:

- Junction 1- Falmer Interchange
- Junction 3 – Hollingbury Interchange/Carden Avenue
- Junction 4 – Patcham Interchange
- Junction 5 - Devils Dyke interchange
- Junction 6 – A27/A293 Interchange

The locations of these junctions are illustrated in Figure 1 below.

Figure 1: A27 Junction Locations

4.2 The analysis found that the change in anticipated trips at the A27 junctions due to the proposals in CPP2 is relatively low, with some reductions observed, and that 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[1].

4.3 HE confirmed that they were content that Systra's analysis incorporated their feedback on earlier drafts of the Technical Note. However, following further review by HE's consultants Atkins, a number of further technical changes to the modelling were requested. A series of exchanges between BHCC/Systra and HE/Atkins followed during 2020 and 2021 as attempts were made to resolve outstanding technical queries in the modelling to HE's satisfaction.

4.4 The dialogue and recommendations at each stage during this period between HE and the council are very technical and do not lend themselves to full reproduction, however exchanges are summarised in Table 2. Full transcripts of the dialogue available to the inspector on request.

Table 2: Summary of dialogue between BHCC and HE following the production of the Systra Technical Note (January 2020)

Dialogue	Date	Summary of Conclusion/Outcome
Atkins/HE response to Systra's Transport Impact Analysis	28/2/20	The review of the modelling process led to a request for a series of detailed technical amendments to the modelling relating to all five junctions. It was recommended that these amendments were undertaken with the revised results presented to HE for consideration.
Systra Response to Atkins' Comments	4/3/20	SYSTRA accepted that many of the changes recommended by Atkins are compliant with best practice and in some cases would result in worsening performance results at the affected A27 junctions. However it was considered that the amendments requested were unlikely to change the conclusions of the original Technical Note submitted in January 2020 (i.e. that the revised designs for the junctions tested are generally able to mitigate the impacts of the revised traffic flows associated with CPP2). It was therefore considered that the modelling already undertaken was suitable for the purposes of this stage of Plan preparation.
Email from HE to BHCC	3/4/20	Atkins advised that at least two of the junction models were borderline in terms of capacity and so at these junctions if Atkins' previously recommended changes would reduce performance, this would compound an already strained situation. Some of the issues raised in the response of 28/2/20 may not be material, however others would be, particularly where the modelling indicated that a junction would operate close to capacity. As such, HE requested a more accurate depiction of each of the models and the junction arms likely to experience delay. Request made that the modelling be updated in line with the recommendations of Atkins last review.

[1] See conclusion at paragraph 3.1.1. of Appendix 2 of this Topic Paper.

Dialogue	Date	Summary of Conclusion/Outcome
Email from Systra/BHCC to HE	10/6/20	Systra maintained that the modelling work undertaken is sufficiently robust for this stage of the Plan-making process, for the reasons summarised below. In all of the junctions tested, the proposed mitigation provides improvements on both the 2030 Design Year reference case scenario and the results which Highways England approved in 2014 to such as degree that making all of the changes Atkins have suggested will not result in different outcomes. A junction which Atkins are referring to as 'borderline' (i.e. closest to capacity in the future year (2030)) is Junction 3 (Hollingbury Interchange). However, significant congestion is identified in the PM peak scenario only, and the changes to the models which Atkins have suggested at this junction are relatively minor. This junction was also accepted by Highways England in 2014 as having some arms over capacity in 2030, and so making further minor changes would not drastically alter the level of performance already expected and accepted. If the junctions were to be re-modelled in line with Atkins' requests, it should be noted that this would not actually provide 'an accurate depiction' of the junction's performance (as defined by Atkins) due to the historic data that are available to use. This outcome could only be achieved by obtaining up-to-date survey data which is not currently possible due to the impact of the COVID-19 pandemic. As a result of this, and the fact that these junctions will be modelled to a greater level of detail in the future, it is considered reasonable to conclude that undertaking this additional modelling task is not absolutely necessary, cost effective or appropriate at this time. Request made to HE to accept the modelling undertaken <u>in principle</u>, on the basis of the above explanation and an understanding that future modelling work will need to be undertaken at a later date, as is standard practice on highways schemes. This approach would confirm that HE is willing to accept that CPP2's traffic impact will ultimately be manageable at the SRN junctions (as was previously accepted for CPP1 following the work undertaken within the 2013 and 2014 Strategic Transport Assessments) for the purposes of the City Plan process.
HE/Atkins response	1/7/20	The previously highlighted issues have the potential to change the modelling outputs and therefore the conclusions reached at four of the junctions, leading to the conclusion that the modelling is not acceptable in its current form and should be updated at 3 of the junctions (J3 Hollingbury Interchange; J5 Devils Dyke; and J6–A27/A293 Junction), and should potentially be updated at a 4th junction (J4-Patcham Interchange). Therefore, HE still has associated concerns and requests that this matter is reconsidered.

Dialogue	Date	Summary of Conclusion/Outcome
Meeting	3/11/20	A meeting took place to discuss the outstanding points of disagreement.
Email from HE to BHCC	6/11/20	Further to the meeting on 3/11/20, HE/Atkins undertook an internal review of the previous modelling reviews sent on 28/2/20 and 1/7/20, particularly with regard to the concerns around the modelling J4-Patcham Interchange and J5-Devils Dyke Rd. The review confirmed that the issues raised previously are significant enough for Highways England to be concerned about the accuracy of the results presented for J3, J4, J5 and J6.
HE consultation response at Reg. 19 stage	23/11/20	"*Highways England is continuing to liaise with Brighton and Hove City Council and their transport consultants Systra with regard to the supporting Transport Evidence Base. With regard to the Transport Topic Paper submitted, whilst Highways England has accepted the methodology, we have expressed concerns with the modelling undertaken that are still to be resolved. Until the outstanding matters relating to the modelling are resolved, Highways England is not able to accept the Transport Assessment in support of the City Plan Part 2 and therefore the CPP2 itself. Accordingly, we are not satisfied that CPP2 will not have a detrimental impact on the Strategic Road Network (the tests set out in DfT Circular 02/2013, particularly paragraphs 9 & 10, and MHCLG NPPF2019, particularly paragraphs 108 and 109).*"
BHCC/Systra response to 6/11 email	21/1/21	A further Technical Note with modelling updated as requested by HE was provided. The analysis of the updated modelling demonstrated that feasible mitigation designs exist for all of the junctions which could sufficiently accommodate the traffic levels associated with CPP2, with performance levels generally improved on those previously accepted by HE. It was therefore considered that an acceptable mitigation design exists for all of the junctions which achieves 'nil detriment' against the June 2014 STA results and the 2030 reference case.
HE/Atkins response	10/2/21	In relation to the models for junctions J4, J5 and J6, it is likely that these amendments will result in a reduction in the efficiency of the junctions which is why certainty is required that the proposed junction mitigations are still fit for purpose. In addition, the proposed mitigation outlined for J3 Carden Avenue did not appear to be sufficient to cope with the proposed traffic demand and necessitates further mitigation/consideration. Request that the Atkins report is reviewed, the further requested amendments are undertaken, and the revised modelling results and any further mitigation required presented to Highways England for further consideration.
BHCC/Systra response	24/2/21	An updated version of the Technical Note from January 2021 was provided which demonstrates that all additional changes requested in Atkins' February 2021 review have been applied and provided in the updated modelling results.

Dialogue	Date	Summary of Conclusion/Outcome
		The analysis of the updated modelling continued to demonstrate that feasible schemes exist for all of the junctions which represent satisfactory mitigation of CPP2's traffic impact upon the SRN, with performance levels generally improved on those previously accepted by HE in their 2014 review. The changes requested by Atkins did not alter any of the conclusions previously drawn in terms of the overall performance of the proposed mitigation schemes, and the proposed schemes represent the best options which are available within the various acknowledged constraints to the HE and BHCC road networks. Issues relating to safety and deliverability of the proposed schemes were addressed to a level which is considered to be suitable for the purpose of Highways England's response to the City Plan examination. With regards to the mitigation for J3 Carden Avenue, the modelling demonstrated that a suitable arrangement is possible which ensures the safe operation of both A27 slip roads, with improved performance on the A27 eastbound off-slip compared to the results provided by SYSTRA in January.
HE/Atkins response	17/3/21	Systra's revised modelling for the proposed scenarios indicates that: • J3 Carden Avenue - three of the local roads operate overcapacity while the A27 westbound offslip operates at 97.6% which is over the recommended 90% threshold. The current non-optimised modelling is deemed unrealistic as the Degree of Saturation (DoS) and queue results for the local network greatly exceed capacity thresholds. Addressing this issue with optimisation subsequently causes significant impact to the SRN particularly on the A27 westbound off-slip. Therefore, the proposals for this junction do not appear appropriate. • J4 Patcham Interchange - The AM modelling has two links that operate over the recommended 90% DoS threshold and one link that exceeds 100% DoS. The PM peak modelling has two links that exceed 100% DoS. • J5 Devils Dyke - The AM modelling indicates two links that operate over the recommended 90% DoS threshold and one link that exceeds 100% DoS. The PM modelling has two links that exceed the 90% recommended DoS threshold. • J6 A27 & A293 - The degree of saturation values in the two modelled scenarios are all within the recommended 90% DoS threshold Overall, junction comparisons with the June 2014 STA modelling are as folows: • J3 performs worse, particularly on the southern part of the junction. • J4 has a mixture of links that perform better and worse.

Dialogue	Date	Summary of Conclusion/Outcome
		• J5 performs better. • J6 performs better The concerns expressed will need further consideration.

5. Conclusions

5.1 As can be seen from the above summary of ongoing dialogue, extensive, detailed technical work has been undertaken over a considerable period to positively address HE's concerns and to seek to resolve them to their satisfaction. It has not been possible to resolve all issues - HE maintains concerns related to the performance of Junction 3 and to a more limited extent Junction 4 compared with the June 2014 STA modelling, as summarised in the final row of Table 2 above. The council does not consider it appropriate to delay the plan-making process further given the volume of work that has already been undertaken on this issue and the limited areas of outstanding disagreement.

5.2 The council remains confident that the work undertaken by Systra provides robust evidence that feasible junction amendment schemes exist for all junctions which represent satisfactory mitigation of the traffic impacts of the site allocation proposals within CPP2 upon the Strategic Road Network, with performance levels generally improved on those previously accepted by Highways England in their 2014 review of the CPP1 evidence base.

5.3 The council is therefore seeking to agree a Statement of Common Ground with HE to clearly identify areas of agreement and the remaining points of concern.

Appendix 1: City Plan Part 2 Strategic Transport Assessment: Technical Note (August 2019)

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[2]

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

[2] 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)[3]	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 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.

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

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.

Appendix 2: Systra A27 CPP2 Transport Impact Analysis (January 2020)

A27 CPP2 TRANSPORT IMPACT ANALYSIS

TECHNICAL NOTE

SYSTRA

A27 CPP2 TRANSPORT IMPACT ANALYSIS

TECHNICAL NOTE

IDENTIFICATION TABLE	
Client/Project Owner	BHCC
Project	A27 CPP2 Transport Impact Analysis
Type of Document	Technical Note
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APPROVAL

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1a	Author	Peter May	Consultant	28/10/2019	Updated Draft including completed Table 4.
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	Approved	Jamshid Soheili	Director	19/11/2019	

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. 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.

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.

2.4 Junction 1 - A27 / Falmer Interchange

2.4.1 This junction has been shown to be 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 is anticipated that this junction will operate no worse than previously identified and that no further mitigation will need to be designed. The validation exercise of the previous mitigation scheme also found no major issues, albeit with some minor alterations to the model which did not affect the scheme layout. It is therefore concluded that the mitigation scheme proposed in the previous STAs is likely to be 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 in the 2030 'with mitigation' scenario, with a maximum degree of saturation of 179% on the southern roundabout in the PM Peak. A comparison of the results for the CPP2 traffic applied to the mitigation scheme proposed in the 2014 STA is shown overleaf in **Table 5 and Table 6**.

Table 5. Junction 3 Northern Roundabout Results Comparison

	AM							
	Existing Layout - Reference Case				June 2014 STA		October 2019 CPP2	
	Queue	Delay	RFC	LOS	MMQ	Deg Sat (%)	Deg Sat (%)	MMQ
Coldean Lane	19.37	69.16	0.99	F	20.5	79.0%	20.5	79.1%
Carden Ave	29.45	104.59	1.03	F	14.3	73.4%	14.8	74.2%
A27	169.53	531.18	1.3	F	24.5	94%	19.9	87.3%
PM								
	Existing Layout - Reference Case				June 2014 STA		October 2019 CPP2	
	Queue	Delay	RFC	LOS	MMQ	Deg Sat (%)	Deg Sat (%)	MMQ
Coldean Lane	334.17	334.17	1.17	F	30.2	90.1%	30.2	90.1%
Carden Ave	36.55	123.96	1.05	F	11.9	82.4%	12.3	82.2%
A27	193.37	635.21	1.33	F	34.6	99.3%	34.6	99.3%

2.5.2 As can be seen above, the negligible change in traffic flows has no material effect on the results of the northern roundabout junction, with the arm with the highest degree of saturation becoming no worse, and therefore no further mitigation is considered to be required. Furthermore, the review of the mitigation scheme proposed in the 2014 STA (Signalised T-Junction) identified no necessary changes.

Table 6. Junction 3 Southern Roundabout Results Comparison

AM								
	Existing Layout - Reference Case				June 2014 STA		October 2019 CPP2	
	Queue	Delay	RFC	LOS	MMQ	Deg Sat (%)	MMQ	Deg Sat (%)
A27 E	3.46	25.18	0.8	D	9.9	72.0%	9.9	72%
Crowhurst Road	1.58	22.66	0.6	C	55.3	108.0%	57.8	109.5%
Carden Avenue S	36.52	156.72	1.06	F	17.6	80%	18.3	82.2%
Carden Avenue N	7.21	16.82	0.89	C	1.6	74%	1.5	74.2%
PM								
	Existing Layout - Reference Case				June 2014 STA		October 2019 CPP2	
	Queue	Delay	RFC	LOS	MMQ	Deg Sat (%)	MMQ	Deg Sat (%)
A27 E	2.81	27.91	0.76	D	13.3	85.0%	13.3	84.8%
Crowhurst Road	41.99	360.37	1.23	F	184.5	178.7%	186.3	180.7%
Carden Avenue S	27.1	151.02	1.11	F	15.1	83%	15.0	82.4%
Carden Avenue N	36.09	65.29	1.06	F	2.9	84.3%	3.0	85.0%

2.5.3 The CPP2 flows have a greater impact on the southern roundabout of Junction 3, with the worst performing arm (Crowhurst Road) increasing from 179% to 181% DoS.

2.5.4 The design validation of the southern roundabout identified a number of inconsistencies with the proposed junction layout and the modelling. SYSTRA sought to correct these inconsistencies within the same junction type, but this resulted in significantly worse 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 bridge between the north and south junctions has also been altered to provide 3 narrow lanes within the existing kerb lines.

2.5.5 The results of the modelling of the north and south junctions are shown in **Table 7** and **Table 8** below, along with the June 2014 Mitigation and reference case results for comparison.

Table 7. Junction 3 Northern Roundabout Revised Results Comparison

AM								
	Existing Layout - Reference Case				June 2014 STA		October 2019 CPP2	
	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	169.53	531.18	1.3	F	24.5	94%	11.8	87.8%
PM								
	Existing Layout - Reference Case				June 2014 STA		October 2019 CPP2	
	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	193.37	635.21	1.33	F	34.6	99.3%	56.9	109.7%

2.5.6 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, and do not result in queuing back on the A27 off-slip road in excess of storage capacity.

Table 8. Junction 3 Southern Roundabout Revised Results Comparison

AM								
	Existing Layout - Reference Case				June 2014 STA		October 2019 CPP2	
	Queue	Delay	RFC	LOS	MMQ	Deg Sat (%)	MMQ	Deg Sat (%)
A27 E	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								
	Existing Layout - Reference Case				June 2014 STA		October 2019 CPP2	
	Queue	Delay	RFC	LOS	MMQ	Deg Sat (%)	MMQ	Deg Sat (%)
A27 E	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%

2.5.7 As per 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 at local roads approaching the junction.

2.5.8 The above modelling results demonstrate what is considered to be the optimal design and signal timings for the junction, and are generally considered to be comparable to the 2014 results.

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							
	Existing Layout – Reference Case				June 2014 STA		October 2019 CPP2	
	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								
	Existing Layout – Reference Case				June 2014 STA		October 2019 CPP2	
	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 (Signalised Roundabout) found no necessary alterations. The previously designed mitigation is therefore considered suitable and able to cope with the trips associated with CPP2.

Table 10. Junction 4 Southern Roundabout Results Comparison

AM								
	Existing Layout – Reference Case				June 2014 STA		October 2019 CPP2	
	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%
A27 North	0.87	6.61	0.46	A	10.3*	28.0%	0.4	28.70%
PM								
	Existing Layout – Reference Case				June 2014 STA		October 2019 CPP2	
	Queue	Delay	RFC	LOS	MMQ	Deg Sat (%)	MMQ	Deg Sat (%)
A27 Westbound	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%
A27 North	0.93	7.26	0.48	A	8.00	53.2%	6.00	43.6%

**This figure appears to have been reported incorrectly in the 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 manage 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 1.12 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 corrections 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								
	2013 Reference Case				June 2014 STA Mitigation		Oct 2019 CPP2	
	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								
	2013 Reference Case				June 2014 STA Mitigation (with corrected geometries)		Oct 2019 CPP2	
	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 reference case which demonstrates the modelling for the existing layout with development traffic (albeit without the additional CPP2 traffic), the revised mitigation provides significantly improved results.

2.7.5 Overall, the revised mitigation for the northern roundabout is therefore considered to demonstrate 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 which includes widening of several of the roundabout exits and approaches. This has been found to provide a decrease in maximum RFC when compared to the 2014 modelling in both peak periods, as shown overleaf.

Table 12. Junction 5 Southern Roundabout Results Comparison

AM												
	2013 Reference Case				June 2014 STA Mitigation Runs				Oct 2019 CPP2 Runs			
	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												
	2013 Reference Case				June 2014 STA Mitigation Runs				Oct 2019 CPP2 Runs			
	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 scheme is generally able to handle the additional flows associated with CPP2, while improving on the results previously reported.

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 1.20 in the 2030 scenario on the northern roundabout, which was found to increase to 1.22 with the CPP2 flows.

2.8.2 Revised mitigation schemes have been devised for both the northern and southern roundabouts. For the northern roundabout, this involved signalisation and geometric alterations to the northbound and eastbound approaches. For the southern roundabout, this includes the widening of the entry and exit arms on the east and southern arms of the junction and the increasing of the flare length on the southern (A293) approach. 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										
	2013 Reference Case				June 2014 STA Mitigation				October 2019 CPP2	
	Queue	Delay	RFC	LOS	Queue	Delay	RFC	LOS	MMQ	Deg Sat
A293 (Bridge)	85.75	174.48	1.1	F	119.23	871.13	1.15	F	1.3	73.0%
A27 Eastbound Off-slip	19.86	164.53	1.05	F	29.85	237.72	1.11	F	26.3	102%
Golf Club	0	0	0	A	0	0	0	A	16.1	62.1%
PM										
	2013 Reference Case				June 2014 STA Mitigation				October 2019 CPP2	
	Queue	Delay	RFC	LOS	Queue	Delay	RFC	LOS	MMQ	Deg Sat
A293 (Bridge)	5.44	16.4	0.85	C	15.5	42.15	0.96	E	0.8	60.2%
A27 Eastbound Off-slip	2.95	27.61	0.76	D	19.48	144.23	1.05	F	12.5	83.9%
Golf Club	0.12	20.62	0.11	C	0.24	43.71	0.2	E	11.7	59.3%

2.8.3 As can be seen above, while the A27 Eastbound Off-slip continues to operate above capacity in the AM Peak, the degree of saturation is lower for the arm than previously reported in 2014. The mitigation scheme also demonstrates improved performance in the PM peak period.

Table 14. Junction 6 Northern Roundabout Results Comparison

Southern Roundabout												
AM												
	2013 Reference Case				June 2014 STA Mitigation Runs				Oct 2019 CPP2 Runs			
	Queue	Delay	RFC	LOS	Queue	Delay	RFC	LOS	Queue	Delay	RFC	LOS
A293 (Bridge)	16.72	57.31	0.97	F	19.26	65.1	0.98	F	2.1	7.06	0.67	A
A27 Eastbound Off-slip	69.95	120.07	1.06	F	95.78	157.97	1.09	F	140.5	269.87	0.15	F
Golf Club	0.39	3.35	0.28	A	0.42	3.43	0.3	A	0.5	3.72	0.31	A
PM												
	2013 Reference Case				June 2014 STA Mitigation Runs				Oct 2019 CPP2 Runs			
	Queue	Delay (s)	RFC	LOS	Queue	Delay (s)	RFC	LOS	Queue	Delay (s)	RFC	LOS
A293 (Bridge)	40.98	116.35	1.05	F	57.38	158.68	1.08	F	2.8	8.53	0.74	A
A27 Eastbound Off-slip	10.74	24.96	0.93	C	57.1	101.21	1.04	F	81.8	141.63	1.08	F
Golf Club	0.4	3.36	0.29	A	0.49	3.57	0.33	A	0.5	3.92	0.35	A

2.8.4 The northern roundabout is expected to operate within capacity in the AM peak period, but is over capacity on the A27 Eastbound off-slip in the PM peak period. The results are however better than reported in the June 2014 STA, and so 'nil detriment' is considered to be achieved.

2.8.5 The revised mitigation for the southern junction results in the junction operating within capacity in the AM peak, while the highest RFC in the PM peak is no worse than previously reported in the 2014 STA. It is therefore considered that the junction is able to handle the additional trips without material impacts.

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 2014. 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 considered to be sufficient.

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 design is therefore considered to be the optimal layout for the junction, and is comparable to the performance previously reported in the 2014 STA.

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 northern roundabout of this junction is able to cope with the additional traffic associated with CPP2 in both peak periods, with the highest DOS being no worse than previously reported. Following the validation exercise, an amended design has been prepared for the southern junction achieves 'nil detriment' compared to the results reported in the 2014 STA.

Junction 6 – Following the validation of the previous mitigation for this junction, revised mitigation schemes have been devised including signalisation of the northern roundabout. 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 all of the junctions affected by the CPP2 traffic have been shown to operate no worse than previously reported in the June 2014 STA.

Appendix A – New Junction Mitigation Scheme Layout Drawings