

Examination of the Stevenage Borough Local Plan 2011-2031 Hearing Statement prepared by Lichfields on behalf of GlaxoSmithKline (GSK)

**Stage 3 of Hearing Sessions: Matter 18 - Additional
Questions relating to specific sites**

EC1/1 GSK/Stevenage Bioscience Catalyst

GSK

15 February 2017

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1.0 Introduction

Background

1.1 This Hearing Statement has been prepared by Lichfields on behalf of GlaxoSmithKline (GSK) in relation to Matter 18 and specifically the following questions:

- 1 Could the GSK site accommodate more than the target provided in the plan and
- 2 Could the GSK Site accommodate a wider range of uses?

1.2 Lichfields previously submitted representations on behalf of GSK in relation to the draft Stevenage Local Plan in February 2016. These are attached at Appendix 1 to this Statement for ease of reference and are summarised below.

1.3 The 2016 representations:

- 1 Explain how the 'Stevenage GSK and Bioscience Catalyst' campus (SGBCC) site has been developed to accommodate GSK, the Stevenage Bioscience Catalyst (Phase 1) and the Gene and Cell Therapy Catapult (currently under construction);
- 2 Provide general support for draft Policy SP3 which encourages the continued development at the SGBCC;
- 3 Challenge the 'target floorspace provision' of 50,000sqm of B1(b) with ancillary uses set out in Policy EC1/1 on the basis that this figure simply reflected the residual available floorspace under the extant outline planning permission (Ref: 05/00621/OP and as amended 09/00314/FPM) (the 'OPP') and not the actual capacity of the SGBCC site; and
- 4 Challenge the allocation of the SGBCC site for Class B1(b) with ancillary uses as the aforementioned extant OPP is an open Class B1 permission thus providing flexibility that is needed by GSK to bring forward employment development at the SGBCC site consistent with their vision to create a major life sciences hub at Stevenage.

1.4 It is noted that in Stevenage Borough Council's response (August 2016) to the above representations that no amendment was proposed to draft Policy EC1/1 as it had not been demonstrated in their view that the site could accommodate a greater level of floorspace than identified in draft Policy EC1/1.

General Comments

1.5 More generally, we would comment that:

- 1 Policy EC1/1 contains sufficient information in our view on our client's site subject to confirming that (a) 50,000 sqm is not a cap or ceiling for new floorspace at the SGBCC site and (b) employment uses are not restricted to Class B1(b) and ancillary;
- 2 There is an extant OPP which allows new employment floorspace to be brought forward under Class B1 as reserved matters. There is no impediment therefore to the principle of further substantive employment floorspace coming forward at this time when a need is identified by GSK; and
- 3 There are no other constraints on Class B1 development coming forward at the SGBCC site save the need for improvements at the Gunnels Wood Road/Broadhall Way junction which are discussed below in greater detail.

1.6 The GSK site is therefore a deliverable and available employment site which can make a major contribution to the employment needs of the Borough.

2.0

Matter 18: Could the GSK site accommodate more than the target provided in the plan?

Background to Extant OPP

2.1

The GSK Stevenage site benefits from an OPP for 60,000 sq.m GEA of Class B1 Office space granted in April 2009 on the site outlined in red below in Figure 2.1. This permission also includes consent for 1,200 car parking spaces.

Figure 2.1 Red Line area for OPP



Source: Lichfields

2.2

This permission is saved i.e. it is extant by virtue of the fact that it is part implemented through the construction of the new access from the motorway roundabout and the Northern Link Road on the northern part of the site.

2.3

It should be noted that there have already been two 'draw-downs' on the OPP as a consequence of developments brought forward by the Stevenage Bioscience Catalyst (SBC) and the Gene and Cell Therapy Catapult (G&CTC) as explained below.

2.4

The first phase of the SBC, although outside the OPP site, includes 10,750 sqm GEA and 182 car park spaces. GSK entered into a Section 106 agreement (as part of the SBC planning permission) not to exceed the OPP level of floorspace and car parking when bringing forward any development pursuant to the OPP when combined with the SBC floorspace and car parking. This section 106 agreement and the floorspace/car parking cap also applies to the G&CTC site (as it lies within the OPP site – see below at Figure 2.2).

Figure 2.2 SBC and G&CTC Sites



Source: Lichfields

- 2.5 The G&CTC scheme, which is currently under construction, includes 7,287 sqm GEA of floorspace and 142 car parking spaces.
- 2.6 The G&CTC proposals when combined with the SBC first phase therefore total 18,037 sqm GEA and 324 car parking spaces. **This leaves some 41,923 sq.m GEA and 876 spaces that can be brought forward under the OPP.**
- 2.7 Outline permission was also granted on 23rd August 2011 for 3,556 sq.m GEA of office floorspace on the site of the former Yorkon buildings on the north east part of the GSK site. This permission ran for 5 years and therefore lapsed in 2016. However, there remains an opportunity for GSK to re-apply for this level of floorspace.
- 2.8 The residual floorspace that can be brought forward under the OPP and renewing the above permission would thus provide 45,479 sqm of B1 space. The target of 50,000 sqm thus reflects the above as is evidenced by para 6.2 in the preamble to draft Policy EC1 which states:

“The future phases of the Bioscience Catalyst will ‘draw down’ on existing permissions that exist across the site. These allow for more than 50,000 sqm of new floorspace”.

Conclusions

- 2.9 It is evident therefore that:

- 1 the 50,000 sqm ‘target floorspace provision’ simply reflects permissions granted and not the actual capacity of the GSK site; and
- 2 In any event the OPP site (see Figure 2.1 above) only covers part of the SGBCC i.e. only the northern half of the EC1/1 allocation and thus takes no account of the opportunity for intensification of the southern part of the site.

GSK Masterplanning

- 2.10 To assist with establishing the potential capacity of the SGBCC site for the next 10 to 15 years GSK instructed master planners the PM group to prepare an indicative masterplan.
- 2.11 The key objective of this exercise was to encourage alliances between the different occupiers through creating a stimulating environment based around a centrally landscaped street, supported by active frontages, which encourages movement north to south.
- 2.12 We attach at Appendix 2 an extract from this masterplanning exercise (for indicative purposes only) which illustrates:
- 1 The Cell Therapy Catapult (now G&CTC) building under construction;
 - 2 Potential buildings that could accommodate the future expansion of the Stevenage Business Centre;
 - 3 How GSK could expand both in terms of new build and through extensions of existing buildings;
 - 4 Additional car parking to serve the expansion of the SGBCC site;
 - 5 A new internal access road off Norther Link Road (in-only); and
 - 6 A central north/south pedestrian link to encourage movement between GSK and other occupiers on the SGBCC.
- 2.13 Including the G&CTC building this confirms that circa 60,750 sqm new floorspace can be achieved on the OPP site alone within buildings mostly 2 to 3 storeys in height.
- 2.14 A further 30,000 sqm can be created through adding 4 storey extensions to existing GSK buildings to the south (identified as Zone A, B and C) through a more efficient use of this part of the site.
- 2.15 In total therefore this masterplanning exercise confirms that some 90,750 sqm of additional employment space can be accommodated on the SGBCC site.

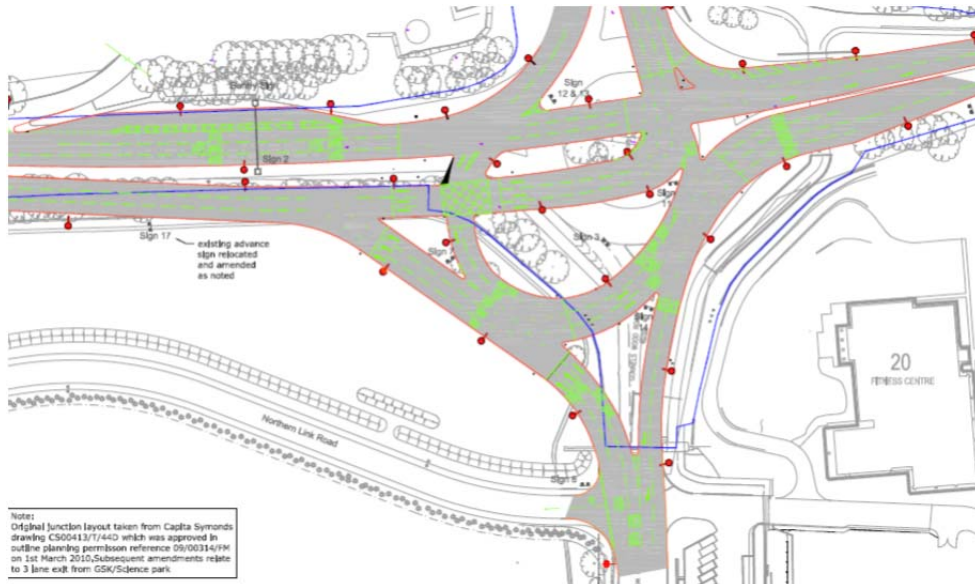
Assessing Transport Implications

- 2.16 In order to assess the need for junction improvements to accommodate the above level of new floorspace i.e. 90,750 sqm GSK instructed transport consultants TPP to prepare a Transport Assessment (TA2017). This is attached at Appendix 3 to this Statement.
- 2.17 This confirms that:
- 1 As part of the Section 106/278 Agreement associated with OPP it will be necessary to bring forward a 'Final Roadworks' scheme following the occupation of an additional 18,600 sqm of additional floorspace. The Final Roadworks scheme which currently has formal approval is shown at Figure 2 of the TA2017. The Stevenage Bioscience Catalyst and G&CTC Building together will provide 18,037 sqm and hence the next substantive development at the SGBCC site is likely to need the implementation of this highway scheme;
 - 2 A minor modification to the 'Final Roadworks' scheme (identified as the Final Roadworks 2017) has been investigated and discussed with the County Council, and this is shown at Figure 5 of the TA2017 (reproduced at Figure 2.3 below). Hertfordshire County Council has agreed that this form of junction provides the best solution when compared with other more simple junction layouts;
 - 3 This modification consists of the addition of a short length of third lane westbound on Broadhall Way immediately to the west of the main GSK exit (utilising land under GSK's

control) which will improve the performance of the junction. An additional benefit is that this will enable further development to take place beyond the 60,000 sqm consented under the OPP; and

- 4 Even with a further 90,750 sqm (in addition to what was occupied in 2014) there would be substantial reserve capacity at this junction once the Final Roadworks 2017 are completed.

Figure 2.3 Final Roadworks 2017



Source: TPP

Conclusions

- 2.18 In summary, the masterplanning and transport assessments confirm therefore that an additional 90,750 sqm of employment floorspace can be accommodated at the SGBCC site beyond what was in occupation in 2014.
- 2.19 **We would suggest therefore that the ‘target floorspace provision’ set out in Policy EC1/1 should be increased to 90,750 sqm, including the G&CTC scheme which is currently under construction.**
- 2.20 If the Inspector concludes on the balance not to accept this modification we would suggest that as an alternative additional text should be added to para 6.2 after “50,000 sqm of new floorspace” as follows:

“...Initial masterplanning and transport assessments suggest that this site may accommodate at least up to 90,750 sqm of B1 floorspace. Any floorspace proposed beyond the existing permissions would need to be the subject of a fresh planning application...”

3.0 **Matter 18: Could the GSK Site Accommodate a Wider Range of Uses?**

3.1 The focus for GSK is to create a major research and development hub at the SGBCC site which is internationally recognised as a world leader in drug discovery and medicine development.

3.2 Hence the likely uses that will come forward, and which GSK will seek to attract, will be under Class B1 or ancillary to this class. For this reason the OPP is an open Class B1 permission to ensure there is flexibility in the uses that are permissible within this use class.

3.3 The potential for conference centres, hotel accommodation for SGBCC visitors, lecture halls and other services e.g. ancillary retail and Class A3 space to serve staff and visitors may well be explored as part of future improvements to serve the on-site population. However, these uses will be ancillary and will be related to the primary use of the site.

Conclusions

3.4 Given the above we would suggest that:

- Uses at the SGBCC should remain focussed on Class B1 and ancillary uses; and
- Given that OPP is in fact an open Class B1 use it is inappropriate for Policy EC1/1 to allocate this site for Class B1(b) use. This should be amended to read “*Class B1 with ancillary uses*”.

**Appendix 1: Representations dated
16.02.2106 prepared by Lichfields on
behalf of GSK in relation to draft Stevenage
Local Plan**

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Date 16 February 2016
Our ref 14187/DG/DP/10860992v1
Your ref

Dear Sir/Madam

Representations on behalf of GSK in relation to Draft Stevenage Local Plan

We enclose representations on behalf of our client, GlaxoSmithKline (GSK) in relation to the current draft Local Plan consultation.

Background

The Stevenage GSK and the Bioscience Catalyst Campus is developing as a major life science and research and development (R&D) hub. Having occupied the site since 1995, GSK recently announced that Stevenage was to become one of only two major R&D hubs, with a vision to be internationally recognised as a world leader in drug discovery and medicine development. Separately, the Bioscience Catalyst Campus continues to expand with the opening of the Incubator and the Cell and Gene Therapy Catapult (CGT) Manufacturing Centre, which is currently under construction.

The Campus accommodates Stevenage Bioscience Catalyst (SBC) which provides a centre for early-stage biotechnology companies; in particular small to medium-sized biotech and life sciences start-ups who gain access to GSK expertise, networks and scientific facilities. The SBC is the result of a partnership between GSK, the Department of Business, Innovation & Skills, the Wellcome Trust, the East of England Development Agency and the Technology Strategy Board. GSK provided land, facilities and investment totalling almost £11m to help build and launch the campus. Phase 1 of the SBC opened in February 2012.

Most recently, the launch of the Apollo Therapeutic Fund, a world first, which will see £40m of investment from three global pharmaceutical companies (AstraZeneca, GlaxoSmithKline, Johnson & Johnson Innovation) and the technology transfer offices of three world-leading universities (Imperial College London, University of Cambridge and UCL) joining forces based within the Bioscience Catalyst.



The GSK Stevenage site also will accommodate the UK Cell and Gene Therapy Manufacturing Centre, which is expected to open in 2017. This will be owned and operated by the CGT and will manufacture the late phase clinical trial and commercial supply of advanced therapeutic medicinal products including cell and gene therapies. Cell therapy involves introducing cells into the body that will grow and replace damaged tissue. This facility has also attracted Government and Hertfordshire LEP funding.

It is evident from the above that the Campus has developed into a major life sciences centre for a number of occupiers, which GSK has encouraged to facilitate 'open innovation'. The key to the site's future success lies in ensuring that the town planning framework allows flexibility in future development proposals. To this end the Campus benefits from an outline planning permission (OPP) for 60,000 sqm GEA of open Class B1 floorspace, including an upgrade of the Gunnels Wood Road/Broadhall Way roundabout following occupation of more than 18,600 sqm GEA of the OPP. This permission has been part implemented to allow SBC and the CTC to develop at the Campus. Future phases of development for any of the three parties may utilise the OPP or be the subject of fresh planning applications.

It is important that the context of the Local Plan provides positive encouragement for this growth of the Campus, which helps to add high quality employment to Stevenage, building upon its location in the London to Cambridge Innovation Corridor.

Comments on Draft Local Plan

As a stated '**Vision**'; it is helpful to see that the Local Plan seeks to support the GSK Stevenage site. Para 4.19 states:

"Gunnels Wood is the largest employment area in the county. It is the home of both very large inter-continental businesses and small local companies. We plan for the remodelling of this area to make it a destination fit for modern business. The Bio-Science Catalyst and the Cell Therapy Catapult, now under construction, evidence the considerable potential that the business community sees in Stevenage: we aim to tap into that potential and support it."

Policy SP3 is also positive and in this respect is welcomed by GSK. **Para c** of this policy states that the Council will:

"Continue to remodel Gunnels Wood to meet modern requirements and provide a high quality and attractive business destination. This will include the continued development of the Bioscience Catalyst at the south of the employment area."

However, this text should be reworded to make reference to the 'Stevenage GSK and Bioscience Catalyst Campus' rather than the 'Bioscience Catalyst' as SBC is only one of the occupiers of the GSK site. The same comment applies to **para 5.21** which states:

"At the southern end of the employment area, the first phases of the Bioscience Catalyst - an international facility for research and development - have been delivered. Land for future phases will continue to be safeguarded."

Policy EC1/1 references the Campus as the "GSK / Stevenage Bioscience Catalyst" site and provides a target allocation of 50,000 sqm GEA of B1(b) with ancillary uses.



Firstly, we would again comment that the Campus should be referred to as the 'Stevenage GSK and Bioscience Catalyst Campus' to reflect there are a number of occupiers on the site. Secondly, whilst it is noted that the policy makes clear that "*planning permission will be granted where proposals fall within the specified use classes and, individually or cumulatively, meet or exceed the target floorspace provision*" it is important that the 50,000 sqm reference is not taken as a cap or threshold to the wider Campus. It is assumed that the 50,000 sqm reference reflects in broad terms the residual quantum of floorspace unimplemented from the OPP. However, there would be no justification to defining an arbitrary cap without any evidence base to support this. GSK believes that the Campus can accommodate significantly more than this level of floorspace.

We would suggest therefore that the preamble at **para 6.8** should explicitly recognise that the Stevenage GSK and Bioscience Catalyst Campus has potential to accommodate a greater level of floorspace than identified in policy EC1/1 subject to meeting the other policies in the Local Plan.

The pre-ambles should also reference the 'Stevenage GSK and Bioscience Catalyst Campus' rather than the 'Bioscience Catalyst'.

Lastly, we are concerned that **Policy EC1/1** seeks to only allow Class B1 (b) and ancillary uses. As stated above the OPP is an open Class B1 permission and maintaining flexibility within the B1 use class is important to allow GSK to bring forward further development at the Campus. We would suggest therefore that the reference in Policy EC1/1 should be to Class B1 space.

The amendments suggested above will allow the Stevenage GSK and Bioscience Catalyst Campus site to continue to be developed for life science focussed R&D and therefore should be reflected in the next version of the Stevenage Local Plan.

We would be grateful if you acknowledge receipt of these representations.

Yours faithfully

A handwritten signature in blue ink that reads 'Dennis Pope'.

Dennis Pope
Planning Director

**Appendix 2: Extract from GSK Stevenage
Masterplan prepared by PM Group (for
illustrative purposes only)**

Site Massing- Overall Masterplan



**Appendix 3: Gunnels Wood Road,
Stevenage Transport Assessment 2017
prepared on behalf of GSK by TPP**



Gunnels Wood Road, Stevenage TRANSPORT ASSESSMENT 2017

30384/D09d
February 2017



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|---|--|

1 INTRODUCTION

1.1 This Transport Assessment provides a summary of recent traffic work relating to the GSK campus. For ongoing purposes it effectively replaces the Transport Assessment and Supplementary Transport Assessment produced by Capita Symonds in December 2005 and June 2008 respectively, which were based on traffic data collected in 2001-2004.

1.2 The purpose of this new document (the "TA 2017") is to set out the traffic justification for:

- A space allocation of more than 50,000 m² in the Stevenage Local Plan, for which GSK will be represented at the EIP in March 2017;
- a minor modification that is proposed to the "Final Roadworks" scheme, to allow for a third westbound lane in Broadhall Way to the west of the main GSK exit;
- implementation of the "Final Roadworks" scheme by means of a section 278 agreement; and
- a possible future planning application for a further floorspace as an addition to the 60,000 m² already consented under the 2010 Outline Planning Permission.

1.3 Most of the content of this report has been discussed with the highway authority Hertfordshire County Council (HCC) during the last two years. The forthcoming Examination in Public of the Stevenage Local Plan has made it sensible to summarise the outcome of these discussions in a single document that can be referred to as further development on the GSK campus proceeds.

2 HISTORICAL BACKGROUND 2005-2015

- 2.1 In December 2005 GSK applied for planning consent for 60,000 m² of B1 space on land available within the GSK campus (see Figure 1, at the end of this report). The new floorspace was envisaged as an expansion of the existing GSK facility, which is predominantly research space, but full B1 use was included in the application to provide flexibility for the future.
- 2.2 Discussions with the highway authorities to agree an acceptable highways layout took place in 2006-2008, and were not straightforward. The present entrance to GSK off the roundabout at the junction of Gunnels Wood Road and Broadhall Way (the "GSK Roundabout") has limited capacity. The proximity of the railway bridge to the east and the A1(M) junction to the west limits the options that are available for improving the capacity in a simple way.
- 2.3 Eventually it was agreed that the only practical long-term solution would be to remove one of the movements from the GSK Roundabout, from west to south. This would only be possible if a new direct access could be provided into the GSK campus from the A1(M) roundabout. This would require signalisation of the A1(M) roundabout. Highways Agency's approval for this was duly obtained, with support from HCC.
- 2.4 The agreed Final Roadworks scheme to enable the 60,000 m² development is shown at Figure 2. As well as the new direct access into GSK from the motorway roundabout, the Final Roadworks include the signalisation of the GSK Roundabout using a layout that makes it practical to ban the right turn into the GSK.
- 2.5 An Interim Roadworks scheme was also agreed (Figure 3), to enable the occupation of up to 18,600 m² in advance of the re shaping and signalisation of the GSK Roundabout. The Interim Roadworks have now been constructed. In parallel with this, GSK agreed to grant leases to third parties who would carry out this initial stage of development, which is now known as Stevenage Bioscience Park.
- 2.6 Part of the 18,600 m² has now been built, and detailed planning consent has been granted for most of the remainder (15/00323/FPM), bringing the total consented to 18,037 m². Before any further development can take place it will therefore be necessary to implement the Final Roadworks.

3 CONCEPT REVIEW 2015-2016

- 3.1 In view of the time that had elapsed since the original traffic study carried out for GSK by Capita Symonds, it was considered sensible to review the layout concept of the Final Roadworks before progressing their construction. This review was carried out by TPP in 2015-2016, in close liaison with HCC who were themselves reviewing strategic highway options for the wider area.
- 3.2 A particular point that it was agreed needed review was the detailed layout of the re-shaped GSK Roundabout. The layout included in the agreed Final Roadworks scheme is a relatively complex one. Similar layouts are in successful use elsewhere (Figure 4) but simpler layouts are preferred if possible.
- 3.3 At the time of the original Capita Symonds study, one of the constraints identified was that the land immediately to the northwest of the GSK Roundabout was already allocated for the Arlington Business Park and was therefore not available for highway purposes. A decade later this land still remained undeveloped and was for sale, so it was decided to check whether a simpler layout might be possible if this land were used.
- 3.4 After extensive study it was concluded that the Final Roadworks concept remains the optimum layout for improving the capacity of the GSK Roundabout. HCC have also agreed that this form of junction provides the best solution in comparison with other simpler junction layouts. This conclusion would still apply even if land were purchased from the Arlington site; the most critical traffic movement conflicts occur in places where the use of Arlington land would not assist. Another key factor identified was that unless the layout makes it practical to eliminate one of the turning movements (west to south), the junction would have to handle a higher total throughput; this would inevitably make it harder to find an acceptable solution. It is to be noted that the original Final Roadworks layout has been approved by HCC as part of the consented OPP.
- 3.5 The detailed results of this concept review were summarised in a note produced in February 2016, reference 30384/D/07a, copies of which were shared with HCC. In this TA 2017 document, the calculations for the preferred layout are included, but not those for the rejected options.
- 3.6 In the course of the review, TPP concluded that the Final Roadworks scheme would operate significantly more efficiently if a third lane were added to a short

length of the westbound carriageway of Broadhall Way, immediately to the west of the exit from GSK. This would provide a consistent width through the junction for east to west traffic. The adjusted layout is shown on Figure 5 (the "Final Roadworks 2017" scheme).

- 3.7 A further advantage of adding this short extra length of third lane is that it would enable some further development on the GSK campus beyond the 60,000 m² now consented, if required in the future. It would be much simpler to include this third lane in the construction contract for the Final Roadworks than to add it later; the additional carriageway area is only 436 m².
- 3.8 The remainder of this TA 2017 is based on the assumption that this minor adjustment will be adopted, as shown on Figure 5. The small amount of additional land required is within GSK's control. A minor material amendment (MMA) to the planning consent for the Final Roadworks will be required. The adjustment will also be reflected in the section 278 agreement that will be needed to implement the Final Roadworks 2017 scheme.
- 3.9 Also shown on the Final Roadworks 2017 plan is a suggested adjustment of the signing on the motorway roundabout, to show GSK as a destination in addition to the "Science Park" wording. Once the right turn movement is removed from the GSK Roundabout, the new entrance off the motorway roundabout will be the sole entry to the campus from the motorway for drivers destined for GSK as well as for the Bioscience Park. The Capita Symonds 2008 Supplementary TA conclusions included the following statement, which remains fully valid:
- "5.7 To make the layout work, it will be essential that the signing on the A1(M) roundabout lists GSK as a main local destination. This additional signing is included on the plans of proposed highway works."

- 3.10 For the original Capita Symonds study, the methodology used to test road layouts was to survey existing traffic flows, add a growth factor based on national forecasts, and then add the predicted development flows. The resulting combined flows were then applied to each junction to check whether or not it worked satisfactorily. However the national growth forecasts subsequently proved to be inaccurate; there was a major economic recession, and for a while overall traffic flows actually fell.
- 3.11 For the concept review, a different approach was therefore adopted. First, predicted flows were produced for an amount of development which GSK felt might reasonably be accommodated on the campus in the longer term, which was estimated at 90,750 m² beyond what was in occupation in 2014. These were added to the latest flows observed in 2014, and the resulting reserve capacity for growth in general traffic was then calculated. The Final Roadworks 2017 scheme was the one that gave the largest reserve capacity for general growth.
- 3.12 The concept review did not revisit the design of the motorway roundabout. The capacity of this was improved when the Interim Roadworks scheme was built, and is now at the optimum that can reasonably be provided within the constraints imposed by the existing motorway bridges within the junction. It is possible that more fundamental improvements could be provided as part of Highways England's proposed upgrading of the A1(M), but this is outside the scope of this TA 2017. In any event it should be remembered that GSK development related trips will form only a small proportion of the traffic through the motorway roundabout (between 3.5% and 5% with the full 60,000 m² development, using the figures in Capita Symonds 2008 Supplementary Transport Assessment).

4 EXISTING TRAFFIC FLOWS

- 4.1 A turning movement survey of the GSK Roundabout, undertaken in October 2014, has been used as a basis for flows assigned to the capacity model for the junction layout. The worst case flows for the morning peak (Wednesday 15th October) and evening peak (Tuesday 14th October) have been used. A partial check on the relevance of these flows was undertaken in November 2015 when a vehicle count of the entry and exit flows to the site was conducted. The average weekly flows associated with the site were almost unchanged between the two periods.
- 4.2 In order to input the traffic flows into the analysis model they have been converted into Passenger Car Units (pcu) where a normal car would be 1pcu and a large lorry would be 2.3pcu.
- 4.3 The existing turning flows are set out in Tables 4.1 & 4.2 below.

Table 4.1 – 2014 AM peak hour flows (pcu)

To From	Gunnels Wood Road (north)	Broadhall Way A602 (east)	GSK/Science Park access	Broadhall Way A602 (west)
Gunnels Wood Road (north)	119	183	308	1199
Broadhall Way A602 (east)	307	0	155	601
GSK/Science Park access	16	10	0	11
Broadhall Way A602 (west)	1162	455	392	0

Table 4.2 – 2014 PM peak hour flows (pcu)

To From	Gunnels Wood Road (north)	Broadhall Way A602 (east)	GSK/Science Park access	Broadhall Way A602 (west)
Gunnels Wood Road (north)	32	389	25	1147
Broadhall Way A602 (east)	254	4	17	803
GSK/Science Park access	109	147	0	375
Broadhall Way A602 (west)	675	1207	1	5

5 DEVELOPMENT FLOWS

- 5.1 The total trip generation of the GSK campus is dependent on the density of floor space occupation. This has been increasing over the years, as more efficient use is made of the space available. It is therefore sensible to relate the increase in peak hour flows resulting from any new development to the expected increase in site population rather than to the increase in floor space.
- 5.2 The actual site population on any given day will be less than the nominal site population of people based at the site. There will be day to day variations, depending on the time of year and day of the week. For consistency the figures that follow are based on the nominal site population including people allocated seats and also people not allocated specific seats ("hot desking"), regardless of whether or not they are directly employed by GSK.
- 5.3 The overall density of occupation in 2004 was approximately 65 m² per person. By 2014 this had risen to 50 m² per person. The density of occupation of the new space now being built as Stevenage Bioscience Park was originally expected to be 40 m² per person (the Capita Symonds study assumed 1,500 people occupying 60,000 m²) but it is now expected to be in the region of 30 m² per person – this being the actual occupation density of the initial phase. Fortunately the trip rates agreed between Capita Symonds and HCC in 2008 effectively assumed an occupancy in the range 1,997 to 2,312 people, so the traffic calculations included a sufficient reserve to cater for the higher actual density that is occurring.
- 5.4 The resulting peak hour flows to and from the campus are as follows in Table 5.1. All flows are in vehicles per hour, for AM peak 0800-0900 and for PM peak 1700-1800. The entry flows include arrivals via the new entrance from the motorway roundabout.

Table 5.1 – Campus peak hour flows

Site population	AM in	AM out	PM in	PM out
	Based on 2004 observed population			
2274	642	30	93	605
Rate per person actual:	0.282	0.013	0.041	0.266
	Based on 2014 observed population (includes SBC phase1)			
3527	855	37	36	639
Rate per person actual:	0.242	0.010	0.010	0.181
	2014 Observed population + 90,750 m ² @ 30 m ² per person			
6552	1638	98	98	1441
Rate per person assumed:	0.250	0.015	0.015	0.220

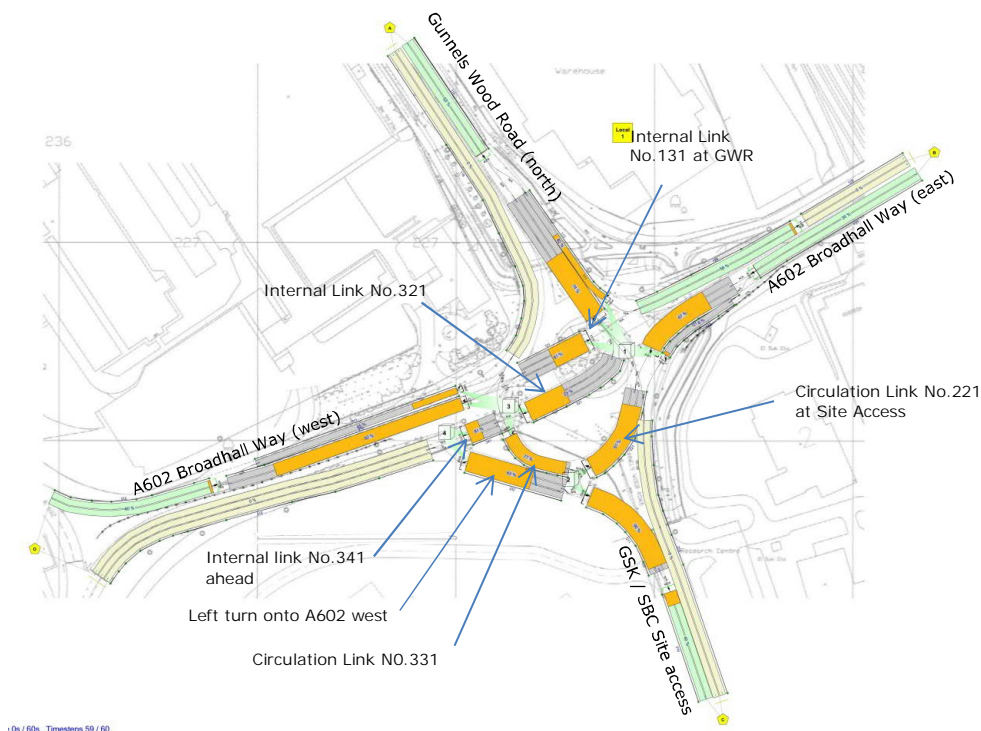
- 5.5 The figures from 2004 included in the above table show the success that GSK have had since then in spreading their times of departure in the evening peak. This peak spreading will have been encouraged by the current difficulties experienced in leaving the site onto the unsignalled GSK Roundabout. A higher evening exit rate per person has therefore been adopted for the future situation, by which time there will be traffic signals at this exit.
- 5.6 The foregoing calculations include no allowance for possible future reductions in car mode share, nor for further intensification of floorspace occupation. Neither of these factors can be predicted with any great certainty, but they will tend to cancel each other out. GSK and other occupiers of the campus operate active Travel Plans with a view to reducing car travel, but the practicality of this is much dependent on the areas from which future workers on the site are drawn.
- 5.7 From a traffic generation point of view, employment is generally the most peak hour intensive type of land use. In the event that other land uses were introduced onto the campus as an alternative to employment, possibly for facilities ancillary to the main bioscience use, they would be likely to generate less traffic in the peak for a given floorspace. In the event that other land uses were to be considered in the future, a formal check will be required to check that the overall traffic generation is still acceptable, but in principle traffic is unlikely to become a constraint.

6 JUNCTION CAPACITY CALCULATIONS

6.1 A computer model of the Final Roadworks 2017 layout (including widened westbound carriageway) has been created using TRANSYT15. This is a transport industry recognised program used to model the capacity and function of signal junctions. It is particularly relevant when modelling groups of signal junctions in close proximity to one another as occurs with a signalised roundabout such as the Final Roadworks 2017 layout.

6.2 A TRANSYT model gives two main output factors for determining how well the junction being tested is performing. The first is Degree of Saturation (DoS) which is provided for each arm or link within the junction being modelled. An acceptable maximum level of operation is generally taken to be a DoS value of 90% although values up to 100% can sometimes be considered. If an arm of the junction has a DoS of over 90% then performance would be said to be unacceptable. The second output factor that is used to determine effective performance is number of vehicles queueing at the stop line. This is particularly important at signalised roundabouts or gyratory systems where an excessive queue length on an internal circulation arm can block operation of the junction by preventing other traffic movements from passing through the junction.

6.3 An extract from the TRANSYT15 model shows the junction layout below.



6.4 Appropriate traffic flows have then been compiled and applied to the TRANSYT model. The existing traffic flows have been factored by 30% as an estimate of the background growth which could be accommodated alongside the traffic flows from an enlarged campus. These have been added to the traffic predicted to occur as a result of increasing the campus floor area by 90,750 m² (as shown in Table 5.1) and the combined figures are shown below in Tables 6.2 & 6.2. It should be noted that in terms of vehicle movements during the peak hour, one generated staff vehicle movement can be said to equal one pcu and this has been assumed in the analysis.

6.5 It should also be noted that as the proposed junction does not permit a right turn movement from the west, all traffic arriving from the A1 Junction 7 and wishing to enter the site, will enter the campus via the link from the signals at Junction 7.

Table 6.1 – Combined AM peak hour flows (pcu)

From \ To	Gunnels Wood Road (north)	Broadhall Way A602 (east)	GSK/Science Park access	Broadhall Way A602 (west)
Gunnels Wood Road (north)	155	238	590	1559
Broadhall Way A602 (east)	399	0	297	781
GSK/Science Park access	42	26	0	29
Broadhall Way A602 (west)	1511	592	0	0

Table 6.2 – Combined PM peak hour flows (pcu)

From \ To	Gunnels Wood Road (north)	Broadhall Way A602 (east)	GSK/Science Park access	Broadhall Way A602 (west)
Gunnels Wood Road (north)	42	506	57	1491
Broadhall Way A602 (east)	330	5	39	1044
GSK/Science Park access	249	336	0	856
Broadhall Way A602 (west)	878	1569	0	7

6.6 The key results from the TRANSYT model are indicated in the table below and full output is provided in Appendix A.

Table 6.3 – TRANSYT15 results for 90,750m² development and 30% background growth

Link or road	AM peak		PM peak	
	DoS %	Queue (pcu)	DoS %	Queue (pcu)
A1072 Gunnels Wood Road (north)- ahead and right.	71	24	74	21
A1072 Gunnels Wood Road (north)- left turn.	25	2	82	9
Internal link (No. 131) at Gunnels Wood Road (north)	35	5	81	10
A602 Broadhall Way (east) through movement.	72	18	67	19
A1072 Gunnels Wood Road (GSK/SBC site)	12	2	90	23
Circulation link (No. 221) at site access	49	9	61	15
Left turn onto A602 Broadhall Way (west)	47	17	63	16
Internal link (No. 341) ahead at left turn from site.	45	7	81	3
A602 Broadhall Way (west) left turn	69	7	45	4
A602 Broadhall Way (west) ahead	55	12	92	29
Circulation link (No. 331) at A602 Broadhall Way (west)	63	10	77	10
Internal link (No. 321) at circulation link (No. 331).	21	12	23	12

6.7 It can be seen from these results that with 30% increase in background traffic the junction's performance during the AM peak period is acceptable. In the PM peak the western approach on A602 Broadhall Way is just over capacity although the queueing is not extensive. The exit from the campus has, at 90% DoS, also reached the desirable maximum.

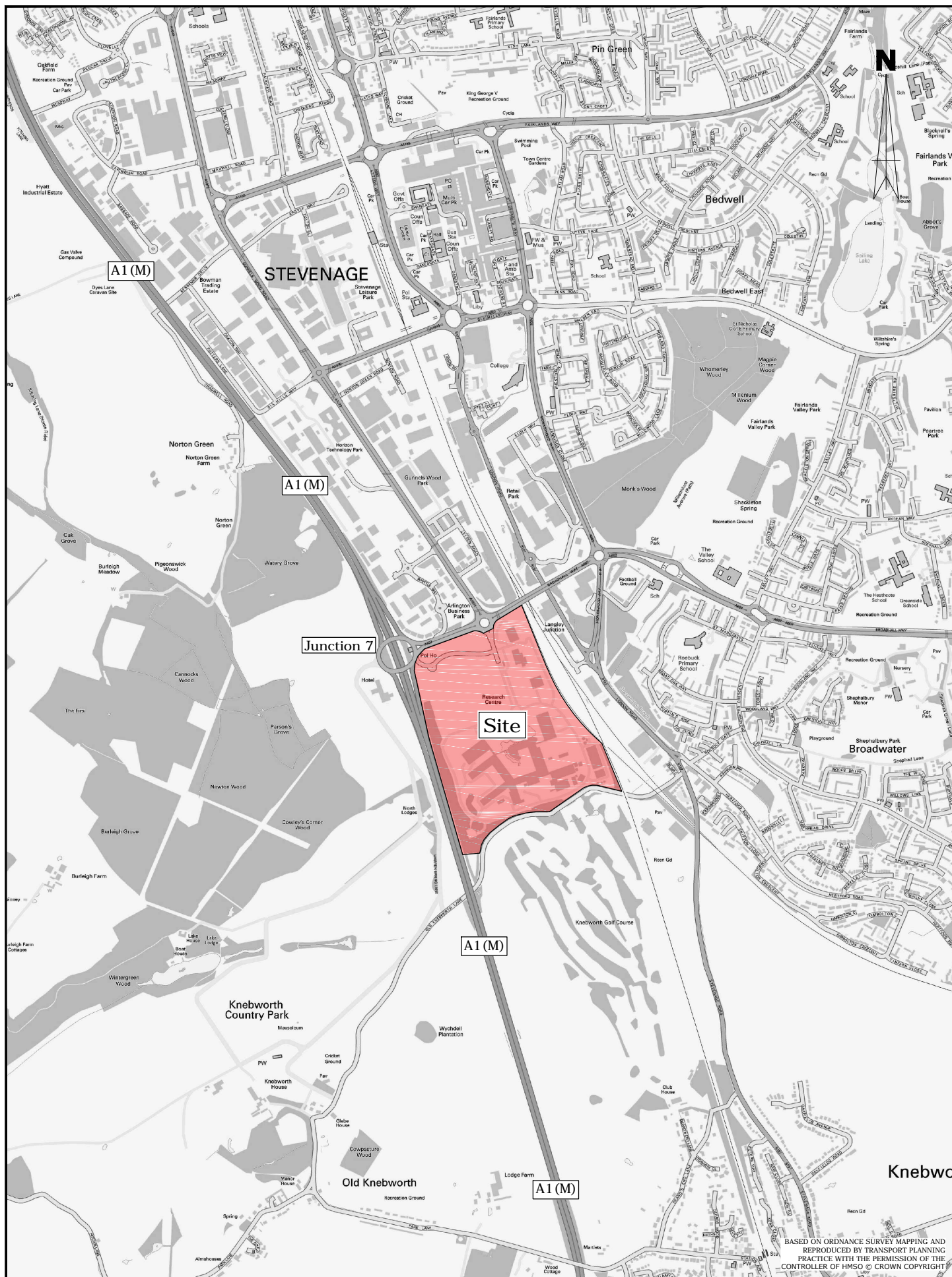
6.8 Queueing on the internal link roads is within the length of the links thereby avoiding blocking back across upstream junctions.

- 6.9 Therefore it can be concluded that with a campus population of 6552, there will be reserve capacity for an increase of 30% in the non-GSK flows compared with those measured in 2014 and confirmed in November 2015.
- 6.10 As a sensitivity check, we have tested the effect of more jobs being provided on the GSK campus through further intensification of floorspace use in the future. If 10% more jobs were provided, giving a total of 7207 on the site, this would reduce the reserve capacity for other traffic in the evening peak to 25%. In the morning peak, the extra trips would have little effect on the reserve capacity of the GSK Roundabout because the only movements affected are non-critical ones. The limiting movement would still be the right turn from Broadhall Way (east) to Gunnels Wood Road, which would not be affected by the change in entry flows to GSK.

7 SUMMARY

- 7.1 It has been confirmed that the optimum long term solution for improving the GSK Roundabout at the junction of Gunnels Wood Road and Broadhall Way is still the "Final Roadworks" scheme produced by Capita Symonds in 2008.
- 7.2 The performance of the Final Roadworks scheme can be improved by a minor modification, which is the addition of a short length of third lane westbound on Broadhall Way immediately to the west of the main GSK exit. This modified "Final Roadworks 2017" scheme is shown at Figure 5.
- 7.3 This minor modification would enable further development to take place on the GSK campus beyond the 60,000 m² already consented. GSK's estimate of what might reasonably be fitted on to the site is a further 90,750 m² beyond what was in occupation in 2014. With the addition of traffic from the full 90,750 m² to the base flows measured at the GSK roundabout in 2014, there would still be a reserve capacity of 30% to cater for an increase in non-GSK traffic through the junction.
- 7.4 This non-GSK campus related traffic remains by far the greatest component, so a substantial public benefit will arise from the construction of the Final Roadworks.
- 7.5 The Final Roadworks 2017 scheme includes an adjustment to the signing from the motorway, to include GSK as a signed destination in addition to the "Science Park" destination. This will become essential once the right turn into the GSK campus off Broadhall Way is banned following completion of the Final Roadworks 2017.
- 7.6 If the total number of jobs on the campus rose by a further 10% as a result of further intensification in floorspace occupation, the reserve junction capacity would then be reduced to 25% in the evening peak but would remain at 30% in the morning peak.
- 7.7 Occupiers of the GSK campus have Travel Plans in place, which aim to keep the proportion of trips by car to a minimum. These Travel Plans will continue to be updated at intervals.

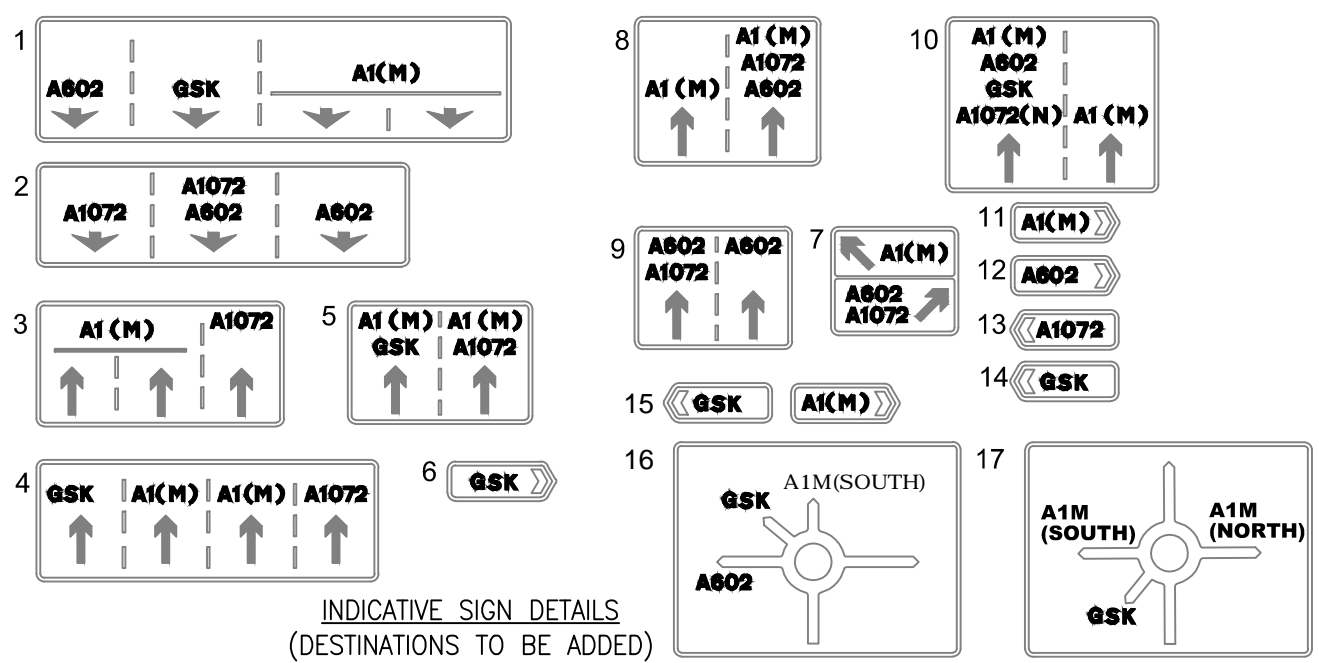
Figures



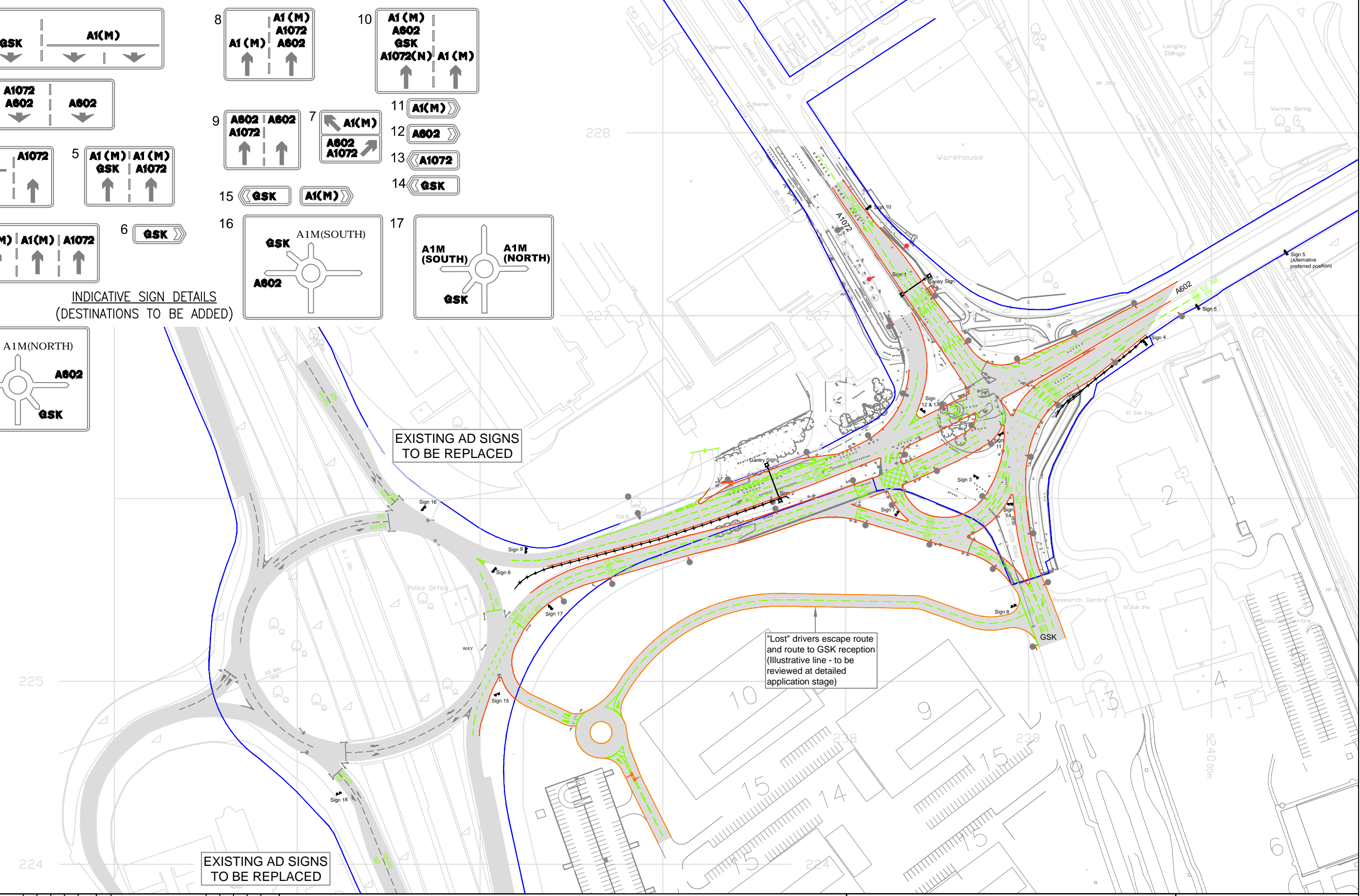
Location Plan

Figure 1

Figure 2
Final Roadworks
agreed July 2008
-drg CS 00413/T/44 C



INDICATIVE SIGN DETAILS
(DESTINATIONS TO BE ADDED)



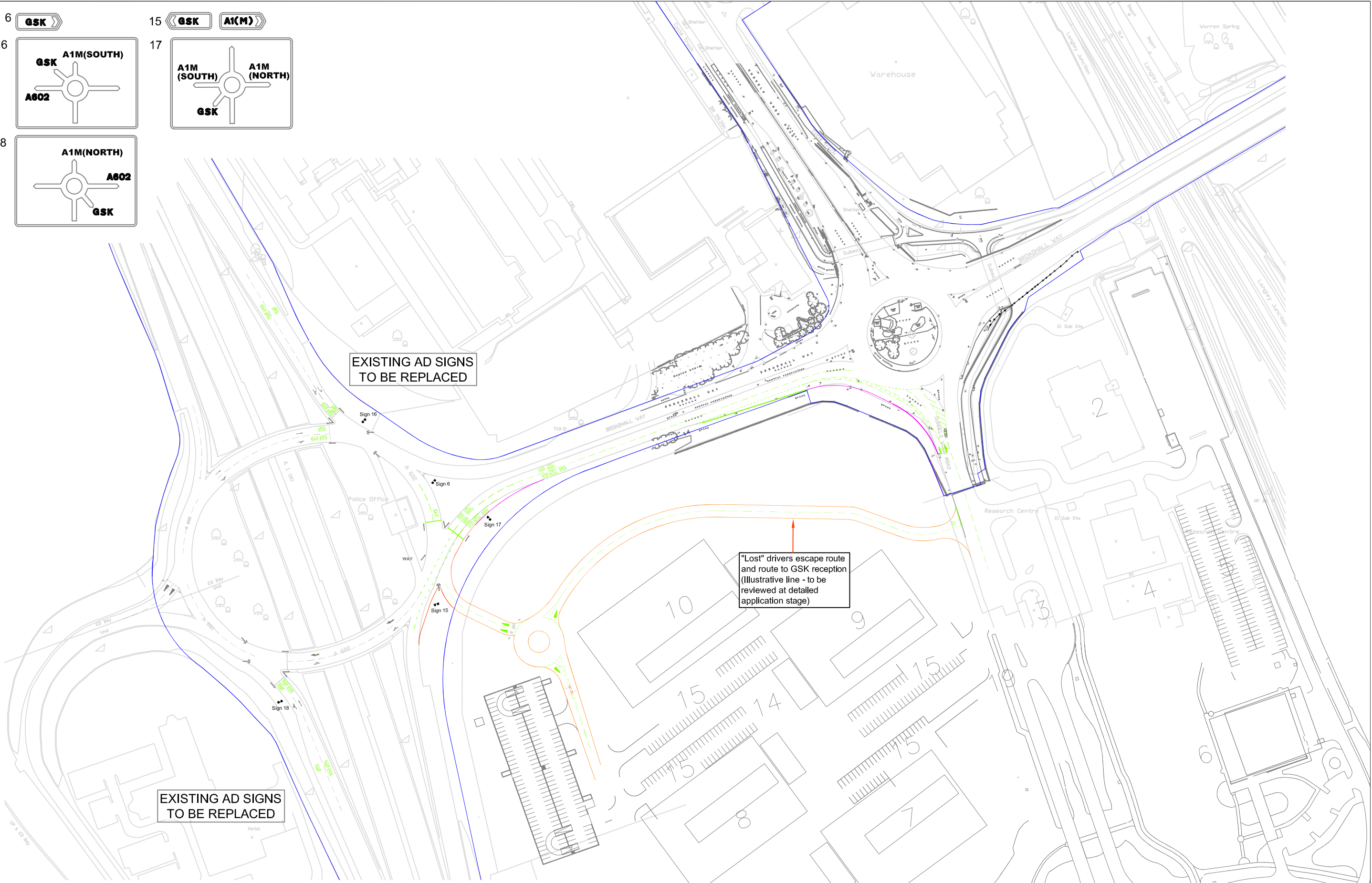
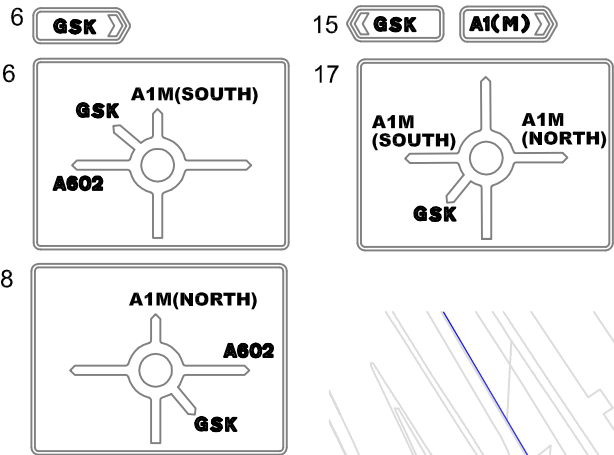
REV	DE	DR	CH	PA	DATE	REV	DE	DR	CH	PA	DATE	NOTES
A	Amendments in response to safety audits DC7/550/2008 & DC7/52/2006	NR			11/4/08							
B	Parapet added on to central reserve.	TC			29/05/08							
C	Sign 9 amended.	TC			13/06/08							

EXTENDED CARRIAGEWAYS OVER SUBWAYS TO BE CHECKED FOR STRUCTURAL SUITABILITY

- KEY:
- Means of access forming part of the application
 - (for illustrative purposes) Works associated with Means of Access but not forming part of the application.
 - New roadmarks
 - Highway boundary (existing)
 - Extended or New Barrier
 - Lighting columns (exact location to avoid obscuring signal heads)

GLAXOSMITHKLINE, STEVENAGE						GLAXOSMITHKLINE	
NORTH SITE DEVELOPMENT FINAL HIGHWAY LAYOUT (60,000 m ²)						CAPITA SYMONDS DEVELOPMENT TRANSPORT AND INFRASTRUCTURE	
DESIGNED BY SJC		DRAWN BY MLS		CHECKED BY JARP		PASSED BY JARP	
DATE 03/08		DATE 03/08		DATE 03/08		DATE 28 March 08	
SCALES @ A1 SIZE 1:1000				ISSUE STATUS PRELIMINARY			
DRAWING NUMBER CS 00413/T/44						REV. C	

Figure 3
Interim Roadworks
agreed July 2008
-drg CS 00413/T/43 A



REV	DE	DR	CH	PA	DATE	REV	DE	DR	CH	PA	DATE
A					11/04/08						

NOTES
EXTENDED CARRIAGEWAYS OVER SUBWAYS TO
BE CHECKED FOR STRUCTURAL SUITABILITY

- KEY:
- Means of access forming part of the application
 - (for illustrative purposes) Works associated with Means of Access but not forming part of the application.
 - Temporary kerbline for interim stage
 - New roadmarks
 - Highway boundary (existing)
 - Extended or New Barrier
 - Lighting columns (exact location to avoid obscuring signal heads)

GLAXOSMITHKLINE, STEVENAGE					
NORTH SITE DEVELOPMENT INTERIM HIGHWAY LAYOUT (18,600m ²)					
DESIGNED BY SJC	DRAWN BY MLS	CHECKED BY JARP	PASSED BY JARP	SCALES @ A1 SIZE 1:1000	ISSUE STATUS PRELIMINARY
DATE 03/08	DATE 03/08	DATE 03/08	DATE 28 March 08		

GLAXOSMITHKLINE

CAPITA SYMONDS
DEVELOPMENT TRANSPORT AND INFRASTRUCTURE
Capita Symonds Limited
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Tel: +44 (0)20 7870 9300 Fax: +44 (0)20 7870 9399

DRAWING NUMBER
CS 00413/T/43

REV.
A

Figure 4
Examples of complex
signalled junctions

Final Roadworks design

Requires a “cut-through” across central island of signalised roundabout

Looks complex on plan, but such tailor-made layouts exist elsewhere and do work well

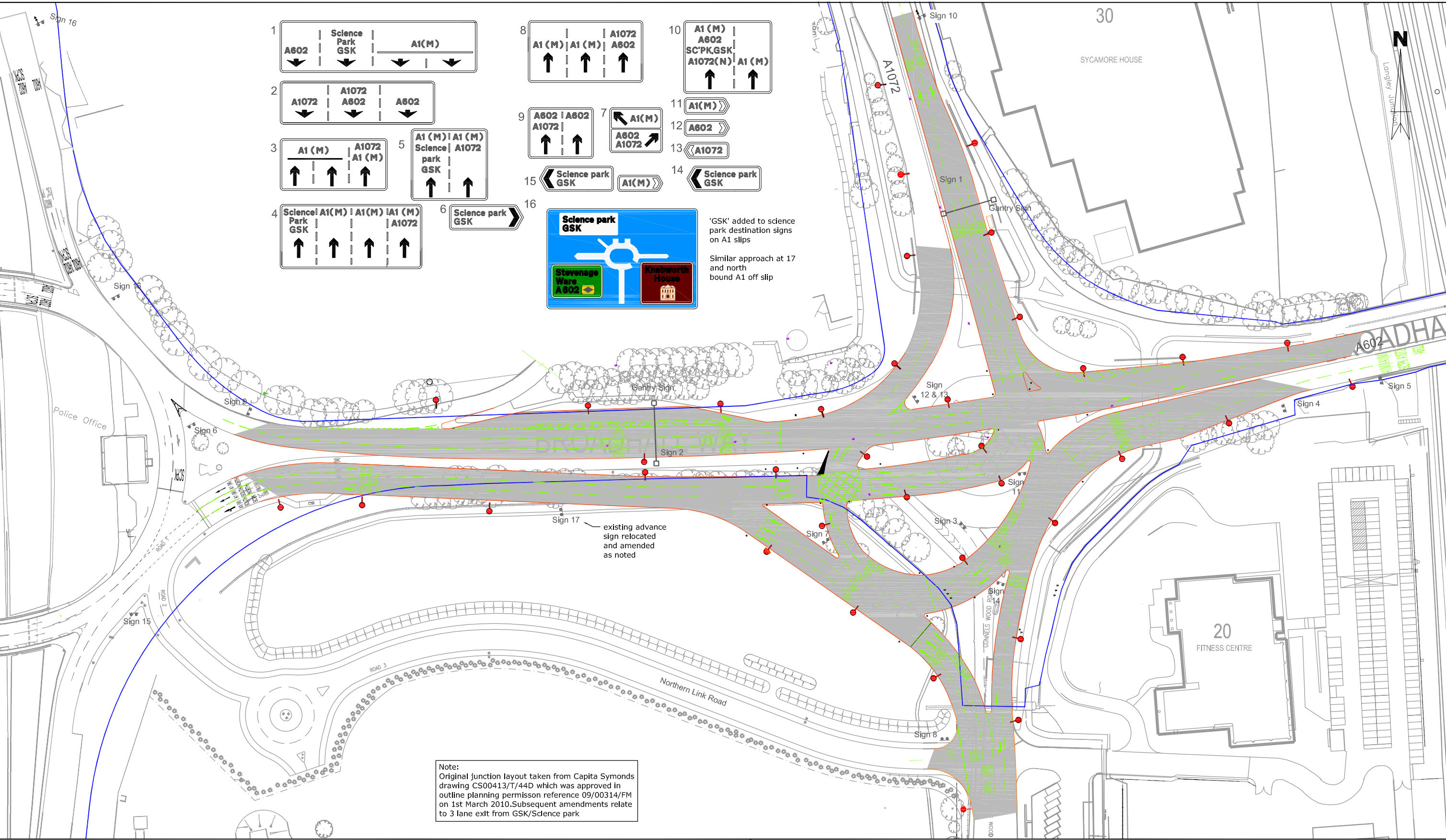
Requires careful signing

Figure 4
Examples of complex signalised junctions



Figure 5
Final Roadworks 2017
TPP drg -
30384/AC/011 B

T:\30000_Projects\30384 Stevenage\ACAD\011_B.dwg



EXTENDED CARRIAGEWAYS OVER SUBWAYS TO BE CHECKED FOR STRUCTURAL SUITABILITY

- Means of access forming part of the application
- (for illustrative purposes) Works associated with Means of Access but not forming part of the application.
- New roadmarks
- Highway boundary (existing)
- Lighting columns (exact location to avoid obscuring signal heads)

This drawing has been prepared for planning purposes and should not be used for construction. It should be read in conjunction with TPP e-mail of 26/01/17.

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GSK STEVENAGE

FINAL ROADWORKS LAYOUT - 2017

(3 lanes at GSK exit)

SCALE @ A3	1:1250	DATE	DRAWN BY	CHECKED
0 10 20m		26/01/17	LD	RJS

TRANSPORT PLANNING PRACTICE

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London, EC1M 6EL
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DRAWING NUMBER	REV
30384/AC/011	B

Appendix A

TRANSYT15 results
Final Roadworks 2017
with development of
90,750m² and 30%
background growth

TRANSYT 15	
Version: 15.1.0.3631 [] © Copyright TRL Limited, 2017	
For sales and distribution information, program advice and maintenance, contact TRL: Tel: +44 (0)1344 770758 E-mail: software@trl.co.uk Web: http://www.trlsoftware.co.uk	
The users of this computer program for the solution of an engineering problem are in no way relieved of their responsibility for the correctness of the solution	

Last run: 15/02/2017 12:19:50

Analysis Set used for last run: A3 - Final Roadworks 2017 - Scenario G AM peak + 30%

Filename: A602-GWR Final Scheme+XtraLane.t15

Path: T:\30000_Projects\30384 Stevenage\Transyt

Report generation date: 15/02/2017 12:21:09

» Network Diagrams

« A3 - Final Roadworks 2017 - Scenario G AM peak + 30% *: D3 - 90,750m2 site AM peak + 30%*

» Network Options

» Local OD Matrix - Local Matrix: 1

» Signal Timings

» Traffic Stream Results

» Network Results

Network Diagrams



(untitled)

Cycletime 0s / 60s , Timesteps 59 / 60

A3 - Final Roadworks 2017 - Scenario G AM peak + 30% *, D3 - 90,750m2 site AM peak + 30%*

Diagram produced using TRANSYT 15.1.0.3631

A3 - Final Roadworks 2017 - Scenario G AM peak + 30% *: D3 - 90,750m2 site AM peak + 30%*

Network Options

Network Timings

Network Cycle Time (s)	Restrict To SCOOT Cycle Times	Time Segment Length (min)	Number Of Time Segments	Modelled Time Period (min)
60		60	1	60

Signals Options

Start Displacement (s)	End Displacement (s)
2	3

Advanced

Phase Minimum Broken Penalty (£)	Phase Maximum Broken Penalty (£)	Intergreen Broken Penalty (£)	Starting Red-with-Amber (s)
10000.00	10000.00	10000.00	2

Traffic Options

Traffic Model	Vehicle Flow Scaling Factor (%)	Pedestrian Flow Scaling Factor (%)	Cruise Times Or Speeds
Platoon Dispersion (PDM)	100	100	Cruise Speeds

Advanced

Resolution	DOS Threshold (%)	Cruise Scaling Factor (%)	Use Link Stop Weightings	Use Link Delay Weightings	Exclude Pedestrian Links	Random Delay Mode	Type of Vehicle-in-Service	Type Of Random Parameter	PCU Length (m)	Calculate results for Path Segments
1	90	100	✓	✓		Complex	Uniform (TRANSYT)	Uniform (TRANSYT)	5.75	

Normal Parameters

Dispersal Type	Dispersal Coefficient	Travel Time Coefficient
Default	35	80

Normal Traffic Types

Name	PCU Factor
Normal	1.00

Bus Parameters

Name	PCU Factor	Dispersion Coefficient1	Dispersion Coefficient2	Acceleration (ms ^[-2])	Travel Time Coefficient1	Travel Time Coefficient2
Bus	1.00	70	15	0.47	30	85

Tram Parameters

Name	PCU Factor	Dispersion Coefficient1	Dispersion Coefficient2	Acceleration (ms ^[-2])	Travel Time Coefficient1	Travel Time Coefficient2
Tram	1.00	0	0	0.47	100	100

Pedestrian Parameters

Dispersal Type	Dispersal Coefficient	Travel Time Coefficient
Default	35	80

Optimisation Options

Enable Optimisation	Auto Redistribute	Optimisation Level	Enable Out Profile Accuracy
✓	✓	Offsets And Green Splits	✓

Advanced

Optimisation Type	Hill Climb Increments	OUTProfile Accuracy	Use Enhanced Optimisation	Auto Optimisation Order	Optimisation Order
Hill Climb (Fast)	15,40,-1,15,40,1,-1,1	50,50,5,5,0.5,0.5,0.05,0.05		✓	

Economics

Vehicle Monetary Value Of Delay (£ per PCU-hr)	Vehicle Monetary Value Of Stops (£ per 100 stops)	Pedestrian Monetary Value Of Delay (£ per Ped-hr)
14.20	2.60	14.20

Local OD Matrix - Local Matrix: 1

Normal Input Flows (PCU/hr)

From	To				
		A	B	C	D
	A	155	238	590	1559
	B	399	0	297	781
	C	42	26	0	29
	D	1511	592	0	0

Bus Input Flows not shown as they are blank.

Tram Input Flows not shown as they are blank.

Pedestrian Input Flows not shown as they are blank.

Locations

OD Matrix	Location	Name	Entries	Exits
1	A	(untitled)	110/1	119/1
1	B	(untitled)	120/1	129/1
1	C	(untitled)	210/1	219/1
1	D	(untitled)	310/1	319/1

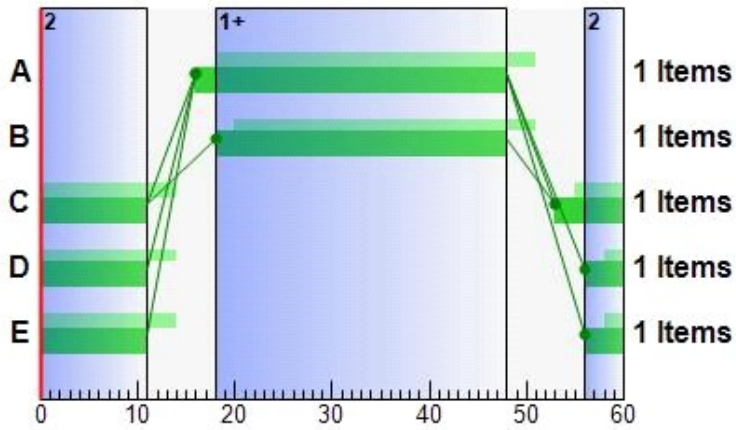
Normal Paths and Flows

OD Matrix	Path	Description	From Location	To Location	Path Items	Allocation Type	Normal Calculated Flow (PCU/hr)
1	1		A	A	110/1,111/1,221/1,331/1,119/1	Normal	155
1	2		A	D	110/1,111/1,221/1,332/1,319/1	Normal	780
1	3		A	C	110/1,111/1,219/1	Normal	590
1	4		A	D	110/1,111/1,321/1,341/1,319/1	Normal	780
1	5		A	B	110/1,113/1,128/1,129/1	Normal	238
1	6		B	A	120/1,121/1,221/1,331/1,119/1	Normal	399
1	7		B	D	120/1,121/1,221/1,332/1,319/1	Normal	781
1	8		B	C	120/1,122/1,219/1	Normal	297
1	9		C	B	210/1,211/1,331/1,131/1,128/1,129/1	Normal	26
1	10		C	A	210/1,211/1,331/1,119/1	Normal	42
1	11		C	D	210/1,211/1,332/1,319/1	Normal	29
1	12		D	A	310/1,311/1,119/1	Normal	756
1	13		D	B	310/1,312/1,131/1,128/1,129/1	Normal	592
1	14		D	A	310/1,312/1,119/1	Normal	756

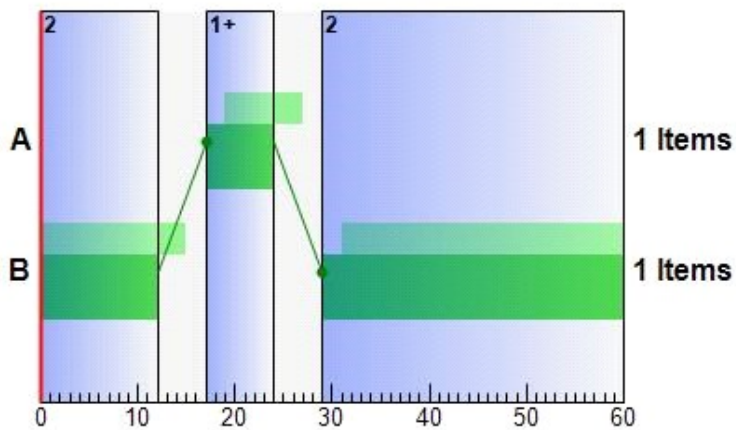
Signal Timings

Network Default: 60s cycle time; 60 steps

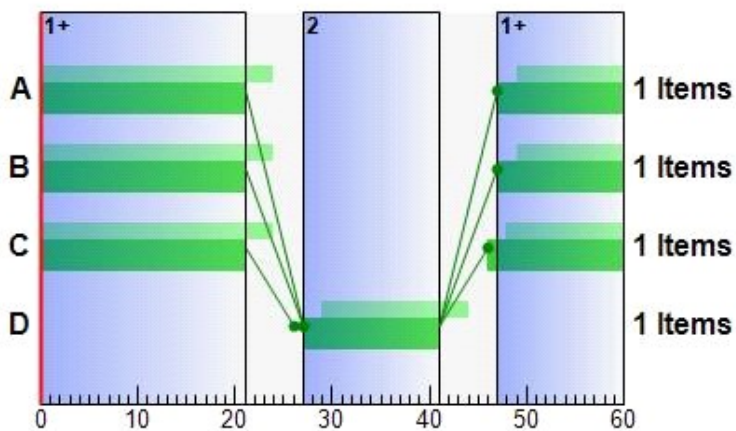
Phase Timings Diagram for Controller Stream 1



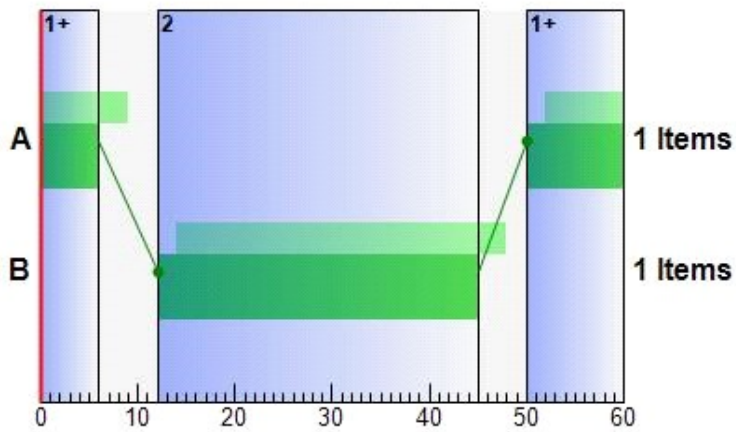
Phase Timings Diagram for Controller Stream 2



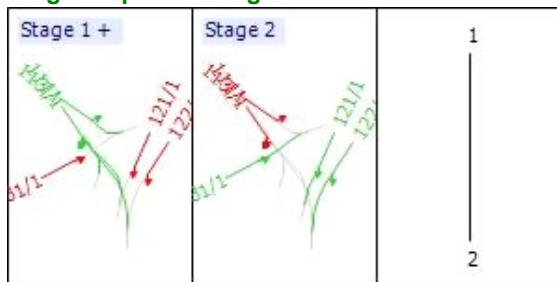
Phase Timings Diagram for Controller Stream 3



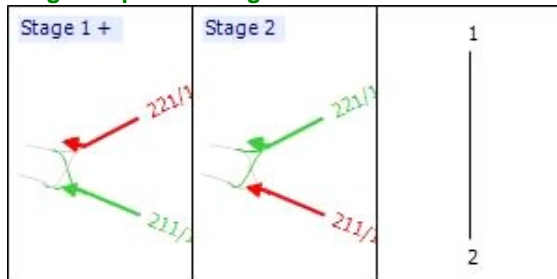
Phase Timings Diagram for Controller Stream 4



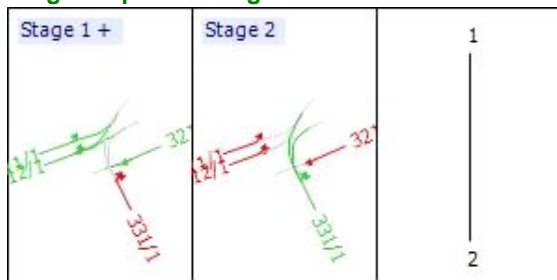
Stage Sequence Diagram for Controller Stream 1



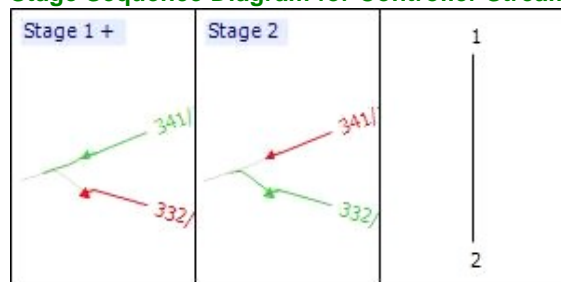
Stage Sequence Diagram for Controller Stream 2



Stage Sequence Diagram for Controller Stream 3



Stage Sequence Diagram for Controller Stream 4



Traffic Stream Results

Traffic Stream Results: Vehicle Summary

Time Segment	Arm	Traffic Stream	Degree Of Saturation (%)	Practical Reserve Capacity (%)	Calculated Flow Entering (PCU/hr)	Calculated Sat Flow (PCU/hr)	Actual Green (s (per cycle))	Mean Delay Per Veh (s)	Mean Max Queue (PCU)	Utilised Storage (%)	Weighted Cost Of Delay (£ per hr)	Weighted Cost Of Stops (£ per hr)	Performance Index (£ per hr)
08:00-09:00	110	1	62	44	2543	4070	60	0.74	0.52	0.75	7.38	0.00	7.38
08:00-09:00	111	1	71	26	2305	5886	32	11.36	23.26	55.38	103.27	44.31	147.58
08:00-09:00	113	1	25	262	238	1854	30	8.67	2.16	15.43	8.14	3.86	12.00
08:00-09:00	119	1	0	Unrestricted	2108	Unrestricted	60	0.00	0.00	0.00	0.00	0.00	0.00
08:00-09:00	120	1	36	148	1477	4070	60	0.25	0.10	0.15	1.47	0.00	1.47
08:00-09:00	121	1	72	24	1180	6121	15	22.85	17.45	67.11	106.36	33.45	139.81
08:00-09:00	122	1	58	54	297	1908	15	24.03	4.20	35.01	28.15	8.07	36.22
08:00-09:00	128	1	21	328	856	4070	60	0.12	0.03	0.09	0.40	0.00	0.40
08:00-09:00	129	1	0	Unrestricted	856	Unrestricted	60	0.00	0.00	0.00	0.00	0.00	0.00
08:00-09:00	131	1	35	159	618	6175	18	10.09	4.53	24.77	24.61	8.47	33.08
08:00-09:00	210	1	2	3676	97	4070	60	0.01	0.00	0.00	0.00	0.00	0.00
08:00-09:00	211	1	12	643	97	6005	7	23.28	1.41	5.87	8.91	2.71	11.62
08:00-09:00	219	1	0	Unrestricted	887	Unrestricted	60	0.00	0.00	0.00	0.00	0.00	0.00
08:00-09:00	221	1	49	85	2115	5933	43	1.88	8.90	49.43	15.72	9.92	25.64
08:00-09:00	310	1	52	74	2104	4070	60	0.47	0.28	0.88	3.92	0.00	3.92
08:00-09:00	311	1	69	31	756	1884	34	12.28	7.24	40.23	36.62	24.31	60.93
08:00-09:00	312	1	55	64	1348	4210	34	8.55	11.81	32.81	45.49	38.08	83.56
08:00-09:00	319	1	0	Unrestricted	2370	Unrestricted	60	0.00	0.00	0.00	0.00	0.00	0.00
08:00-09:00	321	1	21	328	780	6175	35	11.64	11.57	38.58	35.82	8.49	44.31
08:00-09:00	331	1	63	42	622	3934	14	19.65	9.38	93.77	48.20	6.81	55.01
08:00-09:00	332	1	47	92	1590	5996	33	6.39	17.06	81.26	40.05	11.65	51.70
08:00-09:00	341	1	45	102	780	6175	16	1.17	7.05	88.17	3.61	0.83	5.34

Network Results

Run Summary

Analysis Set Used	Run Start Time	Run Finish Time	Modelling Start Time (HH:mm)	Network Cycle Time (s)	Total Network Delay (PCU-hr/hr)	Highest DOS (%)	Item with highest DOS	Number of oversaturated items	Percentage of oversaturated items (%)	Item with worst signalised PRC	Item with worst unsignalised PRC	Item with worst overall PRC	N	C
A3 - Final Roadworks 2017 - Scenario G AM peak + 30%	15/02/2017 12:19:48	15/02/2017 12:19:50	08:00	60	36.49	72.29	121/1	0	0	121/1	110/1	121/1		

Network Results: Vehicle Summary

Time Segment	Degree Of Saturation (%)	Practical Reserve Capacity (%)	Calculated Flow Entering (PCU/hr)	Actual Green (s (per cycle))	Mean Delay Per Veh (s)	Weighted Cost Of Delay (£ per hr)	Weighted Cost Of Stops (£ per hr)	Performance Index (£ per hr)
08:00-09:00	72	24	26024	866	5.05	518.12	200.96	719.97

Network Results: Pedestrian Summary

Time Segment	Degree Of Saturation (%)	Calculated Flow Entering (Ped/hr)	Actual Green (s (per cycle))	Mean Delay Per Ped (s)	Weighted Cost Of Delay (£ per hr)	Performance Index (£ per hr)
08:00-09:00	0	0	0	0.00	0.00	0.00

Network Results: Queues And Blocking

Time Segment	Max Queue Storage (PCU)	Excess Queue Penalty (£ per hr)	Wasted Time Total (s (per cycle))
08:00-09:00	827.56	0.89	35.70

TRANSYT 15	
Version: 15.1.0.3631 [] © Copyright TRL Limited, 2017	
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Last run: 15/02/2017 12:21:59

Analysis Set used for last run: A4 - Final Roadworks 2017 - Scenario G PM peak + 30%

Filename: A602-GWR Final Scheme+XtraLane.t15

Path: T:\30000_Projects\30384 Stevenage\Transyt

Report generation date: 15/02/2017 12:23:21

» Network Diagrams

« A4 - Final Roadworks 2017 - Scenario G PM peak + 30% *: D4 - 90,750m2 site PM peak + 30%*

» Network Options

» Local OD Matrix - Local Matrix: 1

» Signal Timings

» Traffic Stream Results

» Network Results

Network Diagrams



(untitled)

Cycletime 0s / 60s , Timesteps 59 / 60

A4 - Final Roadworks 2017 - Scenario G PM peak + 30% *, D4 - 90,750m2 site PM peak + 30%*

Diagram produced using TRANSYT 15.1.0.3631

A4 - Final Roadworks 2017 - Scenario G PM peak + 30% *: D4 - 90,750m2 site PM peak + 30%*

Network Options

Network Timings

Network Cycle Time (s)	Restrict To SCOOT Cycle Times	Time Segment Length (min)	Number Of Time Segments	Modelled Time Period (min)
60		60	1	60

Signals Options

Start Displacement (s)	End Displacement (s)
2	3

Advanced

Phase Minimum Broken Penalty (£)	Phase Maximum Broken Penalty (£)	Intergreen Broken Penalty (£)	Starting Red-with-Amber (s)
10000.00	10000.00	10000.00	2

Traffic Options

Traffic Model	Vehicle Flow Scaling Factor (%)	Pedestrian Flow Scaling Factor (%)	Cruise Times Or Speeds
Platoon Dispersion (PDM)	100	100	Cruise Speeds

Advanced

Resolution	DOS Threshold (%)	Cruise Scaling Factor (%)	Use Link Stop Weightings	Use Link Delay Weightings	Exclude Pedestrian Links	Random Delay Mode	Type of Vehicle-in-Service	Type Of Random Parameter	PCU Length (m)	Calculate results for Path Segments
1	90	100	✓	✓		Complex	Uniform (TRANSYT)	Uniform (TRANSYT)	5.75	

Normal Parameters

Dispersal Type	Dispersal Coefficient	Travel Time Coefficient
Default	35	80

Normal Traffic Types

Name	PCU Factor
Normal	1.00

Bus Parameters

Name	PCU Factor	Dispersion Coefficient1	Dispersion Coefficient2	Acceleration (ms ^[-2])	Travel Time Coefficient1	Travel Time Coefficient2
Bus	1.00	70	15	0.47	30	85

Tram Parameters

Name	PCU Factor	Dispersion Coefficient1	Dispersion Coefficient2	Acceleration (ms ^[-2])	Travel Time Coefficient1	Travel Time Coefficient2
Tram	1.00	0	0	0.47	100	100

Pedestrian Parameters

Dispersal Type	Dispersal Coefficient	Travel Time Coefficient
Default	35	80

Optimisation Options

Enable Optimisation	Auto Redistribute	Optimisation Level	Enable Out Profile Accuracy
✓	✓	Offsets And Green Splits	✓

Advanced

Optimisation Type	Hill Climb Increments	OUTProfile Accuracy	Use Enhanced Optimisation	Auto Optimisation Order	Optimisation Order
Hill Climb (Fast)	15,40,-1,15,40,1,-1,1	50,50,5,5,0.5,0.5,0.05,0.05		✓	

Economics

Vehicle Monetary Value Of Delay (£ per PCU-hr)	Vehicle Monetary Value Of Stops (£ per 100 stops)	Pedestrian Monetary Value Of Delay (£ per Ped-hr)
14.20	2.60	14.20

Local OD Matrix - Local Matrix: 1

Normal Input Flows (PCU/hr)

	To				
		A	B	C	D
	A	42	506	57	1491
	B	330	0	39	1044
	C	249	336	0	856
	D	878	1569	0	0

Bus Input Flows not shown as they are blank.

Tram Input Flows not shown as they are blank.

Pedestrian Input Flows not shown as they are blank.

Locations

OD Matrix	Location	Name	Entries	Exits
1	A	(untitled)	110/1	119/1
1	B	(untitled)	120/1	129/1
1	C	(untitled)	210/1	219/1
1	D	(untitled)	310/1	319/1

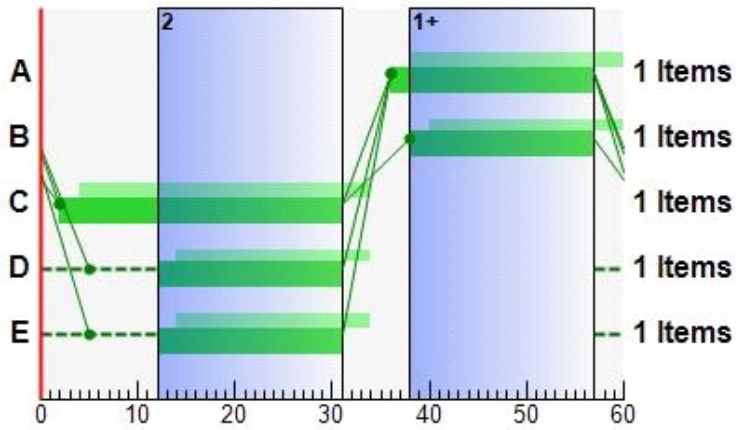
Normal Paths and Flows

OD Matrix	Path	Description	From Location	To Location	Path Items	Allocation Type	Normal Calculated Flow (PCU/hr)
1	1		A	A	110/1,111/1,221/1,331/1,119/1	Normal	42
1	2		A	D	110/1,111/1,221/1,332/1,319/1	Normal	746
1	3		A	C	110/1,111/1,219/1	Normal	57
1	4		A	D	110/1,111/1,321/1,341/1,319/1	Normal	746
1	5		A	B	110/1,113/1,128/1,129/1	Normal	506
1	6		B	A	120/1,121/1,221/1,331/1,119/1	Normal	330
1	7		B	D	120/1,121/1,221/1,332/1,319/1	Normal	1044
1	8		B	C	120/1,122/1,219/1	Normal	39
1	9		C	B	210/1,211/1,331/1,131/1,128/1,129/1	Normal	336
1	10		C	A	210/1,211/1,331/1,119/1	Normal	249
1	11		C	D	210/1,211/1,332/1,319/1	Normal	856
1	12		D	A	310/1,311/1,119/1	Normal	439
1	13		D	B	310/1,312/1,131/1,128/1,129/1	Normal	1569
1	14		D	A	310/1,312/1,119/1	Normal	439

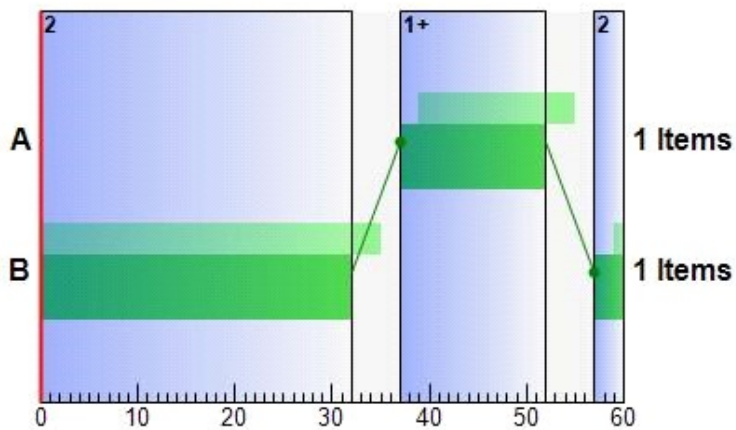
Signal Timings

Network Default: 60s cycle time; 60 steps

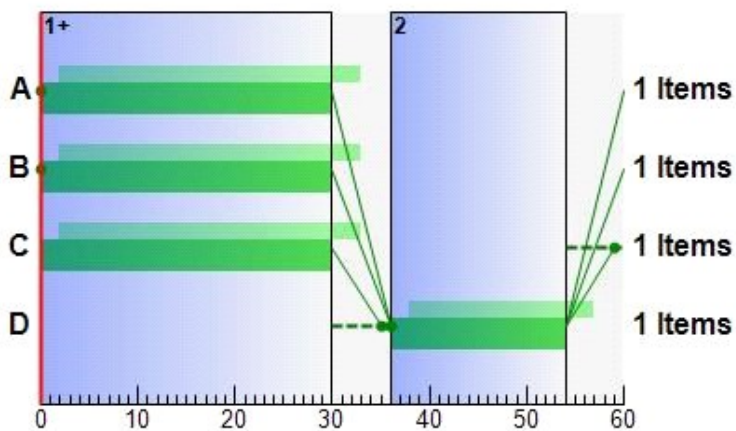
Phase Timings Diagram for Controller Stream 1



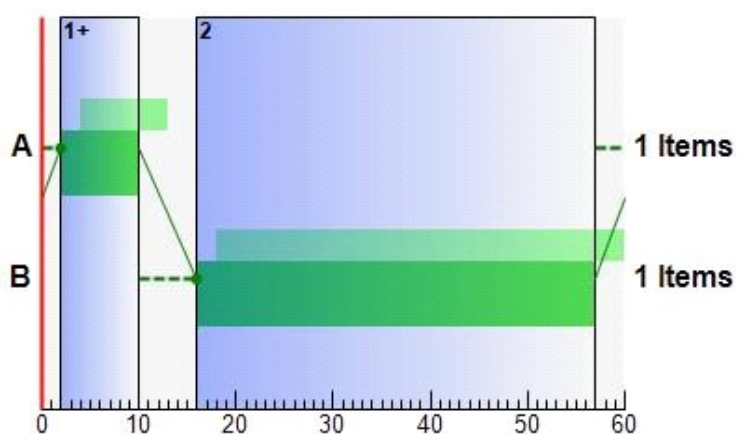
Phase Timings Diagram for Controller Stream 2



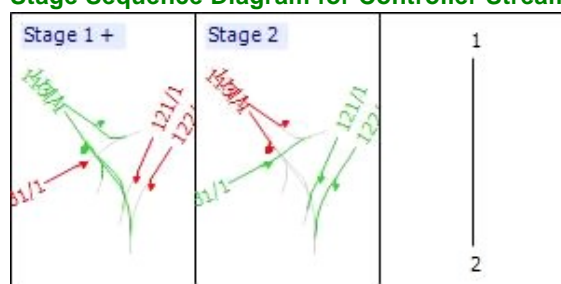
Phase Timings Diagram for Controller Stream 3



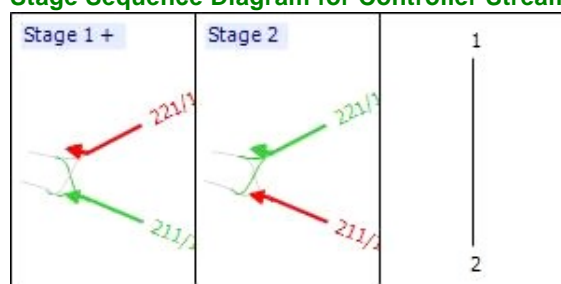
Phase Timings Diagram for Controller Stream 4



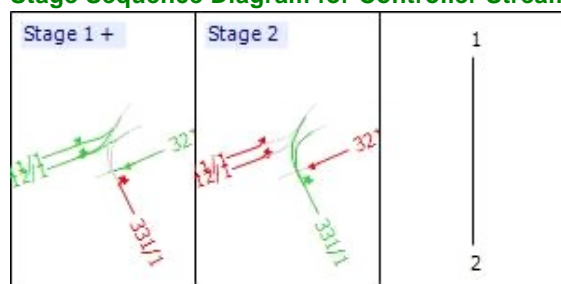
Stage Sequence Diagram for Controller Stream 1



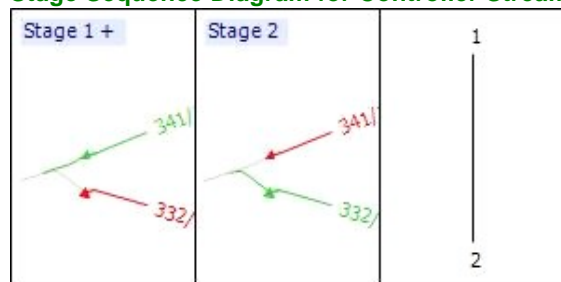
Stage Sequence Diagram for Controller Stream 2



Stage Sequence Diagram for Controller Stream 3



Stage Sequence Diagram for Controller Stream 4



Traffic Stream Results

Traffic Stream Results: Vehicle Summary

Time Segment	Arm	Traffic Stream	Degree Of Saturation (%)	Practical Reserve Capacity (%)	Calculated Flow Entering (PCU/hr)	Calculated Sat Flow (PCU/hr)	Actual Green (s (per cycle))	Mean Delay Per Veh (s)	Mean Max Queue (PCU)	Utilised Storage (%)	Weighted Cost Of Delay (£ per hr)	Weighted Cost Of Stops (£ per hr)	Performance Index (£ per hr)
17:00-18:00	110	1	52	75	2097	4070	60	0.47	0.27	0.39	3.88	0.00	3.88
17:00-18:00	111	1	74	22	1591	5886	21	18.82	21.13	50.31	118.09	39.89	157.98
17:00-18:00	113	1	82	10	506	1854	19	30.92	8.49	60.68	61.71	15.91	77.62
17:00-18:00	119	1	0	Unrestricted	1499	Unrestricted	60	0.00	0.00	0.00	0.00	0.00	0.00
17:00-18:00	120	1	35	159	1413	4070	60	0.24	0.09	0.13	1.31	0.00	1.31
17:00-18:00	121	1	67	34	1374	6121	19	19.01	18.42	70.84	103.04	35.44	138.47
17:00-18:00	122	1	6	1368	39	1908	19	13.85	0.44	3.63	2.13	0.84	2.97
17:00-18:00	128	1	59	52	2411	4070	60	0.64	0.43	1.34	6.10	0.00	6.10
17:00-18:00	129	1	0	Unrestricted	2411	Unrestricted	60	0.00	0.00	0.00	0.00	0.00	0.00
17:00-18:00	131	1	81	11	1905	6175	29	8.20	9.97	51.69	61.59	17.10	78.69
17:00-18:00	210	1	40	126	1441	4070	60	0.67	4.13	11.89	3.79	1.99	5.78
17:00-18:00	211	1	90	0	1441	6005	15	30.43	22.69	94.54	172.98	43.41	216.39
17:00-18:00	219	1	0	Unrestricted	96	Unrestricted	60	0.00	0.00	0.00	0.00	0.00	0.00
17:00-18:00	221	1	61	48	2162	5933	35	4.95	14.83	82.39	42.19	14.36	56.55
17:00-18:00	310	1	60	50	2447	4070	60	0.67	0.45	1.45	6.43	0.00	6.43
17:00-18:00	311	1	45	100	439	1884	30	10.66	3.97	22.07	18.45	13.55	32.00
17:00-18:00	312	1	92!	-3	2008	4210	30	22.67	28.90	80.29	179.53	94.37	273.90
17:00-18:00	319	1	0	Unrestricted	3392	Unrestricted	60	0.00	0.00	0.00	0.00	0.00	0.00
17:00-18:00	321	1	23	285	746	6175	30	9.77	12.13	40.42	28.74	8.83	37.57
17:00-18:00	331	1	77	17	957	3934	18	13.94	9.47	94.74	52.62	6.86	59.47
17:00-18:00	332	1	63	43	2646	5996	41	4.18	15.81	65.88	43.61	12.00	55.62
17:00-18:00	341	1	81	12	746	6175	8	12.95	2.91	41.57	38.10	2.15	40.25

Network Results

Run Summary

Analysis Set Used	Run Start Time	Run Finish Time	Modelling Start Time (HH:mm)	Network Cycle Time (s)	Total Network Delay (PCU-hr/hr)	Highest DOS (%)	Item with highest DOS	Number of oversaturated items	Percentage of oversaturated items (%)	Item with worst signalised PRC	Item with worst unsignalised PRC	Item with worst overall PRC	N	C
A4 - Final Roadworks 2017 - Scenario G PM peak + 30%	15/02/2017 12:21:57	15/02/2017 12:21:59	17:00	60	66.50	92.31	312/1	1	5	312/1	310/1	312/1		

Network Results: Vehicle Summary

Time Segment	Degree Of Saturation (%)	Practical Reserve Capacity (%)	Calculated Flow Entering (PCU/hr)	Actual Green (s (per cycle))	Mean Delay Per Veh (s)	Weighted Cost Of Delay (£ per hr)	Weighted Cost Of Stops (£ per hr)	Performance Index (£ per hr)
17:00-18:00	92!	-3	33767	854	7.09	944.29	306.69	1250.99

Network Results: Pedestrian Summary

Time Segment	Degree Of Saturation (%)	Calculated Flow Entering (Ped/hr)	Actual Green (s (per cycle))	Mean Delay Per Ped (s)	Weighted Cost Of Delay (£ per hr)	Performance Index (£ per hr)
17:00-18:00	92!	0	0	0.00	0.00	0.00

Network Results: Queues And Blocking

Time Segment	Max Queue Storage (PCU)	Excess Queue Penalty (£ per hr)	Wasted Time Total (s (per cycle))
17:00-18:00	830.55	0.00	90.78



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