ITS Group

Environment, Transport and Economy Department

Hampshire County Council

Fareham Local Plan

Local Junction Modelling Report

10th January 2022

CONTROL SHEET

Issued by: Hampshire Services
Economy, Transport and Environment
Hampshire County Council
Second Floor, EII Court West,
The Castle,
Winchester,
SO23 8UD

Client: Fareham Borough Council
Project: **Fareham Local Plan – Local Junction Modelling Report**
Title: Technical Report
Status: Final
Date: 10th January 2022

Document Production Record

Issue	Purpose/Status	Prepared by	Checked	Approved	Date
1.0	Draft for Client Review	JM	NW	NW	20.12.2021
1.1	Final	JM	NW	DM	10.1.2022

1. Introduction

1.1. This report has been produced by the ITS Group at Hampshire County Council (HCC) working as part of the HCC's Traded Services arm "Hampshire Services". The report has been commissioned by the client Fareham Borough Council in support of their Local Plan Strategic Transport Assessment.

1.2. Fareham Borough Council (FBC) has recently submitted its Local Plan (the Plan) for examination in public (EiP). Over the development of the Plan, Hampshire Services (HS) has supported FBC with technical transport support.

1.3. In 2020, a Strategic Transport Assessment was produced in support of the Draft Local Plan, which had a future year of 2037. This assessed the potential implications of the proposed potential allocations on the transport network.

1.4. Since then, there have been several changes to the growth scenario within the submitted Plan as a result of changes to proposed policies regarding both housing and employment. To provide updated information for EiP, FBC has commissioned:

- a technical transport note summarising the changes in allocations (produced in June 2021);
- a junction modelling report (this report); and
- an updated Strategic Transport Assessment (STA) due to be published in early 2022.

1.5. To get to this point, and in readiness for the Do Something model run of the STA, the following steps have been completed to date:

- Baseline and Do Minimum scenarios have been tested in the Sub-Regional Transport Model and compared to identify the impacts of the Local Plan growth on the highway network.
- These impacts have been reviewed to isolate any 'significant' or 'severe' impacts based on agreed criteria
- The 'significant' and 'severe' impacts have then been analysed in greater detail to identify where mitigation measures may need to be developed.
- Potential mitigation options have been discussed with the Highway Authority, for which a formal response has been received (see Section 2).
- Mitigation measures have been developed in line with the response from the Highway Authority

1.6. The mitigation measures will now be tested in a Do Something scenario in the Sub-Regional Transport Model before an updated Strategic Transport Assessment is published.

1.7. The purpose of this report is to set out the development of the potential highway capacity mitigation schemes to address issues raised through the Do Minimum model run.

2. Methodology

2.1. The South Hampshire Sub Regional Transport Model (SRTM) has been used to test the cumulative impact of the Local Plan traffic at a macro-level. From this high-level model, several junctions have been identified where the Local Plan traffic would produce a 'significant' (11 junctions) or 'severe' (8 junction) impact on capacity over the 2036 baseline situation[1] before mitigation. Further details on these junctions are included in the Fareham Local Plan – SRTM Strategic Modelling Report (October 2021).

2.2. Following more detailed assessment at each location, and application of thresholds (shown in Figure 1 below) developed by Hampshire Services and agreed by both National Highways and the Highway Authority, a reduced list of thirteen junctions/arms has been investigated.

Mitigation Thresholds

Junction approaches with delays of 10 seconds or fewer per vehicle are not considered to require mitigation at a strategic level, unless flows are very high, or queues are expected to block the preceding junction.

Vehicle flows are categorised as follows:

Flow through an arm (vehicles)		Level of flow
300	or under	Low
301	550	Medium
551	850	High
851	or over	Very High

Figure 2 Mitigation Thresholds

[1] The SRTM has set forecast years, and 2036 (as the closest available), has been used for the purpose of this work, and the forthcoming Strategic Transport Assessment.

Potential mitigation options

Approach

2.3. Demonstrating potential mitigation of the impact of traffic arising from development at these thirteen junctions is considered to be most important to the success of the Local Plan development strategy and they are the junctions most likely to require works at the strategic level to accommodate the Local Plan development proposals. The mitigation proposed seeks to address the impact of the Local Plan development only, as opposed to impacts resulting from background growth in traffic over the Local Plan period. It should be noted that the list of junctions that may require mitigation is not exhaustive and other junctions and links within the modelled area may also require improvements in further studies as the Local Plan is taken forward. Note that schemes are presented as potential mitigation schemes and any final scheme may differ to meet other needs.

Requirements of the Highway Authority

2.4. FBC has met with the Hampshire County Council as the Highway Authority to share the results of the modelling set out above and to seek common ground on the development of mitigation measures.

2.5. The Highway Authority is currently developing a new Local Transport Plan to bring its future approach in line with Hampshire's 2050 Vision and its declared Climate Emergency. This new Plan has a vision for:

"A carbon neutral and resilient transport system designed around people, which: supports health, wellbeing, and quality of life for all; connects thriving places; and respects Hampshire's unique environment." It has two key principles as follows:

- Significantly reduce dependency on the private car
- Create a high quality transport system that puts people first.

The work on the LTP4 to date demonstrates that the Highway Authority is aiming for lower car use, and higher use of active modes and public transport in future.

2.6. Through discussions with the Highway Authority in relation to this Local Plan STA, the Highway Authority has set out a clear direction for development of the mitigation measures, which aligns with the emerging LTP4. In an email dated 8th November 2021 from the Principal Transport Planner covering Fareham it is stated that:

- *HCC (the Highway Authority) supports a sequential approach to the solutions for mitigating highway impacts from local plan development (active travel, walking and cycling, public transport and finally highway capacity schemes). This is set out in the submission local plan (policy TIN2) and reiterated in the HCC/FBC Statement of Common ground. This sequential approach is in line with the emerging LTP4.*

- *Approach to A27 corridor and Newgate Lane corridor*
    - *where it is the main route to the Strategic Road Network (i.e. via Stubbington by pass to M27) then focus on junction improvements with the inclusion of walking and cycling measures e.g. Segensworth roundabout (ID35), A27 Southampton Road/Mill Lane (ID30) and Newgate Lane/Longfield Avenue (ID20)*
    - *where it is not the main route to Strategic Road Network then focus on providing walking and cycling measures e.g. A27 Bridge Road/Barnes Lane (ID58)and Bridge Road/Swanwick Lane (ID57).*
- *The A27 The Avenue/Redlands Lane junction is flagged in the modelling for capacity improvement but it has also been highlighted in HCC's Bus Service Improvement Plan for bus priority. The current junction does not prioritise the BRT buses entering/exiting Redlands Lane from A27. As this is in Fareham town centre the preference is for this junction to be treated not as a route to the strategic road route.*
- *On other roads the focus is on walking and cycling with urban realm improvements e.g. Bridge Street in Titchfield (ID31). This is to promote access by active travel modes to local centres.*

2.7. In response to request, and in recognition of the limitations of the Sub-Regional Transport Model, the following steps have been undertaken:

Walking and cycling measures

2.8. In recognition of the Highway Authority's focus on walking and cycling measures, measures from the Fareham Local Cycling and Walking Infrastructure Plan (LCWIP) (updated to reflect Local Transport Note 1/20) have been considered. These measures have been developed by the Highway Authority and are at concept stage, along with the rest of the LCWIP.

2.9. Measures for the LCWIP's core walking zones, and primary and secondary cycle routes will be prioritised by the Highway Authority for future development and delivery. Future site-specific transport assessments could seek to understand how these routes can serve their developments, how connections can be made, and, potentially, contributions made towards their delivery.

2.10. For junctions away from LCWIP's core walking zones and proposed primary and secondary cycle routes, LTN1/20[2] compliant options have been proposed, were relevant, for future consideration in site-specific transport assessments, but it is acknowledged that these would not be the initial focus of the Highway Authority in their own delivery programme.

2.11. Whilst designs based on these concepts could be tested in the SRTM, the SRTM does not support redistribution of traffic or mode shift specifically due to the attractiveness/improvements in site specific walking and cycling accessibility. Inclusion of these measures would therefore only serve to constrain highway capacity for motor vehicles and result in further negative impacts on the highway network without accounting for any mode shift towards walking and cycling that would occur. For this reason, walking

[2] Local Transport Note 1/20 – government's cycle infrastructure design guidance, released in 2020

and cycling measures are included in this report and the final STA, but will not be included in the SRTM Do Something model run.

2.12. It is understood that the Highway Authority will complete the Fareham LCWIP in Spring 2022 and seek to adopt it at that point.

2.13. Walking and cycling based mitigation measures are included in Appendix 1 with a summary of these considerations provided after the recommendations for each of the local junction modelling potential mitigation measures. Further information and context will be included in the updated STA in due course.

Public transport measures

2.14. As described in the Baseline/Do Minimum report, measures associated with bus improvements on the South-East Hants Rapid Transit (SEHRT) network have been included in the modelling work to date. Further details of schemes included can be found in the appendix of the Fareham Local Plan – SRTM Strategic Modelling Report (October 2021).

Highway capacity measures

2.15. Highway capacity measures can be successfully tested in the SRTM. Potential mitigation measures for the junctions that met the thresholds agreed between Fareham Borough Council and the Highway Authority are set out below.

2.16. The emerging Local Transport Plan (4) of the Highway Authority has a strong focus on reducing private car use. This, in line with the response from the Highway Authority to engagement so far suggests that the mitigation measures below should be considered only as a worst-case solution to the issues identified at each junction; active travel and public transport should be explored first; and tested by developers through the planning application process.

2.17. For some junctions (further details in Table 1), opportunities for improved capacity for motor vehicle traffic have been exhausted by the Highway Authority over the years and there are no further options available to consider within existing available land. These have been discussed with the Highway Authority and no objections have been raised to the current methodology, which is in line with the mitigation hierarchy outlined in Section 2.6.

2.18. It is also important to note that the mitigation presented in this report is to demonstrate that the level of development proposed is capable of mitigation – it is not intended to present a preferred package of works or to advocate specific junction designs. The final design solutions would be developed as and when the individual site proposals come forward to take account of any changes in traffic patterns and other infrastructure schemes coming forward in intervening years; and to ensure that inclusion of infrastructure for sustainable modes is considered.

3. Mitigation measures – highway capacity for motor vehicles

3.1.1. **Traffic data**

3.1.2. The traffic data used in the development of mitigation measures was obtained from the Sub Regional Transport Model (SRTM). The data was supplied by Systra who manage the SRTM. The Local Plan year tested in the SRTM is 2036 and the Do Minimum (DM) flow data (with Local Plan traffic) was analysed. This set of flow data has been used in local junction modelling in this report.

3.1.3. Where data was missing (not every arm of every junction is included in the SRTM), traffic surveys in neutral periods were undertaken to supplement the available data.

3.2. **Junctions**

3.2.1. As above, comparison of the Do Minimum model run outputs with the previously agreed thresholds resulted in thirteen junctions for further investigation. Of these, further work demonstrated that providing increased capacity for motor vehicles would either not be possible or would not be desirable for the Highway Authority. These junctions are set out in Table 1 along with reasons for their exclusion from the development of the mitigation package, and the Do Something model.

Table 1: Junctions excluded from further mitigation development

Junction number in SRTM	Junction name	Junction arm where capacity is exceeded	Severity	Reason for exclusion
24	B3334 Titchfield Road/Bridge Street	Bridge Street	Severe	The Highway Authority has a deliberate policy of constraining capacity at this junction to deter rat-running through Titchfield
31	Coach Hill/South Street/Bridge Street	Bridge Street	Severe	Mitigation in this location would encourage rat-running through Titchfield – see above
57	Bridge Road/Swanwick Lane	Bridge Road (N)	Severe	The Local Plan impact at this junction results in a 94% RFC on Bridge Road (N) in the AM peak which meets the threshold for mitigation. However, there is no land available for increased capacity. Changes to signals are unable to mitigate in this location. It can also be seen that in the PM peak, the RFC at this junction arm is projected to be higher, at 98%, in the Baseline scenario. The AM impact of the Local Plan is no worse than this projected situation. The lack of available land for mitigation supports the HA's approach that mode shift away from private car should be the priority here.

35	A27 Segensworth roundabout/Little Park Farm Road, Segensworth	A27 Southampton Road (S)	Significant	The Local Plan impact at this junction results in a 98% RFC on A27 Southampton Road (S) in the PM peak which meets the threshold for mitigation. However, there is no remaining capacity in this arm of the junction. It can also be seen that in the AM peak, the RFC at this junction arm is projected to be higher, at 100%, in the Baseline scenario. The PM impact of the Local Plan is no worse than this projected situation. The lack of any remaining capacity in this arm supports the HA's approach that mode shift away from private car should be the priority here.

3.2.2. To note, a second arm of junction 35 also meets the threshold and is considered below. In total, nine junctions have been considered for mitigation.

3.2.3. Of the nine remaining junctions identified; five have a significant impact and four a severe impact with the Local Plan (DM) 2036 flows applied. These have been assessed in greater detail with local junction modelling. The findings from the local modelling have been used to determine the mitigation measures required at the junctions with the aim to produce nil detriment to the junction's capacity performance.

3.2.4. The nine junctions are as follows:

Table 2 Junctions considered in mitigation package

Junction number in SRTM	Junction name	Junction arm where capacity is exceeded	Severity
18	A27 The Avenue/Redlands Lane/Gudge Heath Lane	A27 The Avenue (W)	Severe
30	A27 Southampton Road/Mill Lane, Titchfield	Mill Lane	Significant
29	A27 The Avenue/Highlands Road	Highlands Road	Significant
50	A27 Bridge Road/Coldeast Way/Ironbridge Crescent, Park Gate	A27 Bridge Road (E) and Ironbridge Crescent	Significant
28	A27 Southampton Road/Titchfield Hill, Titchfield	Titchfield Hill	Significant
37	Cartwright Drive/Whiteley Lane/Barnes Wallis Road, Segensworth	Cartwright Drive and Whiteley Way (N)	Severe
38	Cartwright Drive/Segensworth Road East	Segensworth Road	Severe
35	A27 Segensworth roundabout/Little Park Farm Road, Segensworth	Little Park Farm Road	Severe
56	A3051 Botley Road/Yew Tree Drive, Whiteley	Yew Tree Drive	Significant

3.2.5. The junctions have been modelled using industry standard software. Junction9 software has been used for modelling roundabouts and priority junctions; specifically, the Arcady module for roundabouts and Picady module for priority junctions. The traffic signal junctions have been modelled using Linsig3 software.

3.3. Development of the mitigation package

3.4. Junction 18: A27 The Avenue/ Redlands Lane/ Gudge Heath Lane, Fareham – signalised crossroads

3.4.1. Background

3.4.2. This is a four-arm traffic signal junction located to the west of Fareham town centre. It is positioned around 400 metres to the east of the Bishopsfield Road junction. Traffic movements are controlled by signals. The main road is A27 The Avenue which runs west-east. To the north is Gudge Heath Lane which links through to a large residential catchment area. Redlands Lane forms the southern arm and sits on the Eclipse rapid bus service route. A pedestrian controlled crossing is situated on the western arm across The Avenue.

3.4.3. A number of traffic movements are prohibited which are:

- Gudge Heath Lane is left turn only (ahead and right turn movements are banned)
- The Avenue west right turn is banned

3.4.4. In 2016 Hampshire County Council completed a capacity improvement scheme. This increased the number of lanes for ahead traffic on The Avenue east from one to two lanes. The objective was to alleviate the extensive congestion which occurred on this approach during the PM peak. Previously bus priority was introduced to the operation of the traffic signals to reduce waiting times for the Eclipse bus services approaching on Redlands Lane.

3.4.5. The Sub Regional Transport Model indicated that the Redlands Lane arm would be severely affected in capacity terms by the Local Plan traffic in 2036, changing from 83% ratio/flow capacity to 99%. In the AM it changed from 102% to 103%; the level of congestion would be worse than in the PM peak but the impact of the Local Plan growth did not meet the agreed threshold. The report has aimed to address capacity at this junction.

3.4.6. Option 1 – Optimised signal timings

3.4.7. The existing traffic signal junction has been modelled using Linsig3 software and the signals optimised to achieve the best capacity outcome for motor vehicles. The current signal staging arrangement has been tested which is:

- Stage 1 – A27 The Avenue ahead and left turn in both directions
- Stage 2 – A27 The Avenue east ahead, left and right turn; Gudge Heath Lane left turn
- Stage 3 – A27 The Avenue right turn; Gudge Heath Lane left turn; pedestrians across The Avenue west
- Stage 4 – Redlands Lane

3.4.8. The existing layout is shown in the Appendix diagram 1. The junction has been tested with the Local Plan (DM) 2036 traffic flows and the results are summarised in Table 3 below.

Table 3 Junction 18: Option 1

Option 1	2036 DM AM peak		2036 DM PM peak	
	DoS	MMQ	DoS	MMQ
Gudge Heath Lane	67.1%	9	56.9%	10
A27 eastbound Ahead and left	**90.0%**	**22**	89.4%	17
A27 eastbound ahead	**91.2%**	**24**	**90.5%**	**19**
Redlands Lane	**92.5%**	**22**	**97.1%**	**23**
A27 westbound ahead and left	77.4%	14	**96.3%**	**29**
A27 westbound ahead and right	88.7%	9.6	**95.3%**	**21**
Westbound exit lane 1	24.8%	2	33.3%	2
Westbound exit lane 2	19.4%	1	28.9%	1
Cycle time	120		120	
Practical reserve capacity (%)	-2.8%		-7.9%	

DoS – Degree of saturation (%) where this is 90% or greater the lane is at or over capacity (highlighted in bold red)

MMQ – Mean maximum queue length in vehicles

3.4.9. The results with 2036 Local Plan traffic (DM) traffic included indicate that the existing junction layout and operation cannot accommodate this flow. The models have been optimised to seek the best overall performance level. There are no improvement measures that can be made to the junction layout within the highway land constraints. There are also no measures or changes that could be made to the operation of the traffic signals to achieve any additional capacity.

3.4.10. Junction summary

3.4.11. In the 2036 AM peak both the A27 eastbound and Redlands Lane are over capacity. The 2036 PM peak indicates that both the A27 westbound and eastbound together with Redlands Lane would all be over capacity. Overall, the junction would be 2.8% and 7.9% over capacity in the DM 2036 AM and PM peaks respectively.

3.4.12. The Do Minimum Model run reported that in the AM peak, the junction was at over 100% capacity on Redlands Lane.

3.4.13. Previous work at this junction has maximised the available capacity within the highway boundary constraints. The traffic signals already operate under MOVA (Microprocessor Optimised Vehicle Actuation) which work to continuously optimise the signal timings to maximise their efficiency. There are no further capacity enhancements that are feasible.

3.4.14. It is concluded that no solution could be implemented which could accommodate the 2036 DM traffic flows within capacity at this junction. However, the results achieved through the modelling work above could achieve an improvement over the Baseline situation in the AM peak and improve, albeit marginally, on the PM impact on Redlands Lane.

3.4.15. Recommendation

3.4.16. It is recommended that the optimised signal timings used here in the local model are tested in the Do Something SRTM model run.

3.4.17. Considerations for public transport

3.4.18. The highway authority has specifically identified that this junction should prioritise bus movements in future. This option would not materially affect bus priority.

3.4.19. Considerations for active travel

3.4.20. This junction is part of proposed primary route 270 in the draft Fareham LCWIP. It also connects to proposed secondary route 275 on Gudge Heath Lane.

3.4.21. There is a reasonable level of crossing movements on the Gudge Heath Lane arm of the junction which is on main route between Fareham railway station/town centre and Fareham College to the west. No formal crossing facilities exist on this arm and users must cross during gaps in the traffic with the aid of a narrow central island. The pedestrian demand across Redlands Lane is much lower. No formal crossing exists across this arm either except for dropped kerbs and a central island. The provision of push-button controlled crossings on the Gudge Heath Lane and Redlands Lane arms would be beneficial to pedestrians and cyclists. Either crossing would require an all red to traffic stage to be included which would push the junction performance even further over capacity, although this assumption is based on no significant modal shift to walking and cycling.

3.4.22. If the main road approaches to the junction are made LTN1/20 compliant then a cyclops style junction could be considered, however, there are width constraints to connect the route into the side roads.

3.5. Junction 30: A27 Southampton Road/Mill Lane, Titchfield – signalised T junction

3.5.1. Background

3.5.2. This is a three-arm traffic signal junction which is located on the A27 Southampton Road north of Titchfield. The main road is the A27 Southampton Road which is a 2-lane dual carriageway which runs broadly east-west. Mill Lane is a single carriageway which joins from the north and links through to Funtley and Wickham further to the north. Traffic from Mill Lane can only turn left on to the A27. All arms have a 40mph speed limit. There is a pedestrian controlled crossing on the west side of the junction across Southampton Road. The signals operate under MOVA control which allows a high degree of responsiveness to changes in traffic flows.

3.5.3. The Sub Regional Transport Model (SRTM) indicated that Mill Lane would be significantly affected by the (DM) Local Plan traffic.

3.5.4. Option 1 – Optimised signal timings

3.5.5. The existing traffic signal junction has been modelled using Linsig3 software. The junction has been modelled based on the current staging arrangement and junction layout. The layout is shown in the Appendix diagram 2.

3.5.6. The current signal staging arrangement has been tested which is

- Stage 1 – A27 Southampton Road eastbound ahead and left; A27 Southampton Road eastbound ahead
- Stage 2 – A27 Southampton Road eastbound ahead and right turn; Mill Lane left turn

3.5.7. The 2036 Do Minimum AM and PM peak flows have been tested. The signal timings have been optimised to achieve the best set performance. The results for these flows are summarised below in Table 4.

Table 4 Junction 30: Option 1

Option 1	2036 DM AM peak		2036 DM PM peak	
	DoS	MMQ	DoS	MMQ
A27 Southampton Road eastbound left and ahead	75.1%	11	88.1%	33
A27 Southampton Road eastbound ahead	75.1%	11	88.1%	33
Mill Lane	76.6%	7	85.5%	15
A27 Southampton Road westbound ahead	72.7%	10	74.6%	15
A27 Southampton Road westbound ahead and right	74.1%	10	68.4%	10
Cycle time	59 secs		120 secs	
Practical reserve capacity (%)	17.5%		2.2%	

DoS – *Degree of saturation (%) where this is 90% or greater the lane is at or over capacity (highlighted in bold red)*

MMQ – Mean maximum queue length in vehicles

3.5.8. The above results show that the 2036 DM traffic flows can be accommodated based on the existing junction layout for both the AM and PM periods. The signal timings have been optimised in the modelling to accommodate the DM traffic within capacity. In the AM peak the timings have been optimised based on the 2021 average cycle time. While in the PM peak it has been necessary to increase the cycle time from the average 68 seconds to 120 seconds to ensure the junction operates with spare capacity. The 120 second cycle time would be acceptable and the existing MOVA control would dynamically alter to accommodate the 2036 DM flows.

3.5.9. Option 2 –Mill Lane widened to a two-lane approach

3.5.10. This option investigated enhancing the junction capacity in response to the findings from the SRTM model, as an alternative to Option 1.

3.5.11. This option has included an additional flared lane on the Mill Lane approach to the signal junction. The layout is shown in the Appendix diagram 3. The lane would extend around 35 metres back from the stop line. It would extend across a vehicle access to the adjacent Titchfield Mill public house car park. The ability for vehicles to enter and exit from this car park access would need to be considered further. It should be noted that the main car park access is located further to the north along Mill Lane before the widening would commence. This may give the opportunity to close or restrict access to the car ark access.

3.5.12. The results for the widening on Mill Lane have been modelled for the 2036 peaks Local Plan (DM) flows. For direct comparison purposes the cycle times have been kept the same as those used for the Do-Nothing option. The staging is also the same as the Do-Nothing option. The signal timings have been optimised to achieve the best set of results. These are summarised below in Table 5.

Table 5 Junction 30: Option 2

Option 2	2036 DM AM peak		2036 DM PM peak	
	DoS	MMQ	DoS	MMQ
A27 Southampton Road eastbound left and ahead	59.3%	8	81.6%	28
A27 Southampton Road eastbound ahead	59.3%	8	81.6%	28
Mill Lane	78.3%	5	77.7%	9
A27 Southampton Road westbound ahead	72.7%	10	74.6%	15
A27 Southampton Road westbound ahead and right	74.1%	10	80.7%	11
Cycle time	59 secs		120 secs	
Practical reserve capacity (%)	15.0%		10.3%	

RFC – Ratio of Flow to Capacity where a value of 0.85 or greater (highlighted in red) indicates the arm is over capacity

Queue – the maximum queue in vehicles predicted in the peak hour

3.5.13. The results indicate that the additional lane on Mill Lane would provide extra capacity. Based on the 2036 DM flows this option would easily operate within capacity in both peak periods.

3.5.14. Junction summary

3.5.15. Optimising the signal timings at the existing junction layout would be able be sufficient to accommodate the 2036 DM traffic flows and for the junction to operate within capacity. The DM flows would provide 2.2% spare capacity in the 2036 PM. No changes to either the operation of the signals or the junction layout would be necessary based on these flows. However, should traffic flows increase further under future runs of the SRTM the option exists to implement Option 2. This has the potential to accommodate around 10% extra traffic flow compared to the 2036 DM PM peak but could detract from the walking and cycling environment.

3.5.16. Recommendation

3.5.17. It is recommended that the existing signal junction layout and operation is retained.

3.5.18. Considerations for active travel

3.5.19. This junction is part of the proposed primary route 270 in the draft Fareham LCWIP.

3.5.20. The LCWIP will propose that a segregated east/west facility would be provided on the north side of the A27 to continue east of Mill Lane.

3.5.21. A pedestrian controlled crossing already exists across the west arm of the A27 at this junction. Future consideration could be given to providing a similar controlled crossing (upgraded to a toucan, so as to support cycling) on the Mill Lane arm. This would introduce an additional stage to the operation of the signals which would affect capacity. Given that the existing junction only has a small level of spare capacity in the 2036 PM peak, the inclusion of the extra lane on Mill Lane (Option 2) may be necessary to mitigate a controlled crossing on that arm.

3.6. **Junction 29: A27 The Avenue/Highlands Road, Fareham – signalised T junction**

3.6.1. Background

3.6.2. This is a three-arm traffic signal junction which is located on the A27 The Avenue on the west side of Fareham. The main road is the A27 The Avenue which is a 2-lane dual carriageway that runs east-west. Highlands Road is a single carriageway which joins from the north. The junction layout is shown in the Appendix diagram 4. The A27 arms have a localised speed limit of 30mph on the direct approaches which sits inside a 40mph speed limit along the corridor. The speed limit on Highlands Road is 30mph. There is a pedestrian controlled crossing on the west side of the junction across The Avenue. The signals operate under MOVA control which allows a high degree of responsive to changes in traffic flows.

3.6.3. The SRTM traffic data excluded any flows between the A27 east and Highlands Road. Therefore, current traffic flow data was obtained from the traffic signals for this movement and factored to 2036 using a TEMPro growth rate.

3.6.4. The Sub Regional Transport Model indicates that the Local Plan traffic would have a significant impact on the capacity of the Highlands Road arm.

3.6.5. Option 1 – Optimised signal timings

3.6.6. The existing traffic signal junction has been modelled using Linsig3 software. The junction has been modelled based on the current staging arrangement and junction layout.

3.6.7. The current signal staging arrangement has been tested which is

- Stage 1 – A27 The Avenue westbound ahead and A27 eastbound ahead and left turn
- Stage 2 – A27 eastbound ahead and right turn
- Stage 3 – Pedestrians across A27 west arm
- Stage 4 – Highlands Road

3.6.8. The baseline 2036 AM and PM peak flows have been tested. The Local Plan flows (DM) have also been tested on the existing layout. The timings have been optimised within the model. The results for these flows are summarised below in Table 6.

Table 6 Junction 29: Option 1

	2036 DM AM peak		2036 DM PM peak	
	DoS	MMQ	DoS	MMQ
A27 The Avenue eastbound ahead and left	85.6%	13	86.8%	13
A27 The Avenue eastbound ahead	66.6%	11	66.3%	12
Highlands Road	84.6%	22	86.7%	23
A27 The Avenue westbound ahead	65.1%	14	67.4%	15
A27 The Avenue westbound ahead and right	75.0%	4	74.1%	4
Cycle time	120 secs		120 secs	
Practical reserve capacity (%)	5.1%		3.7%	

DoS – Degree of saturation (%) where this is 90% or greater the lane is at or over capacity (highlighted in bold red)

MMQ – Mean maximum queue length in vehicles

3.6.9. The above results show that the 2036 DM traffic flows can be accommodated based on the existing junction layout for both the AM and PM periods. The signal timings have been optimised in the modelling to accommodate the DM traffic within capacity.

3.6.10. Junction summary

3.6.11. Optimising the signal timings at the existing junction layout would be able be sufficient to accommodate the 2036 DM traffic flows and for the junction to operate within capacity. No changes to either the operation of the signals or the junction layout would be necessary based on these flows.

3.6.12. Recommendation

3.6.13. It is recommended that the existing signal junction layout and operation is retained.

3.6.14. Considerations for active travel

3.6.15. The junction is the connector point of proposed two routes in the draft Fareham LCWIP: primary route 270 and secondary route 272.

3.6.16. At present, Highlands Road traffic volumes and speeds are not appropriate for mixed use traffic and would therefore not be suitable for all users.

3.6.17. The draft LCWIP will suggest that, depending on the routes leading to the junction a cyclops style junction or standard signalised junction with toucan crossings and cycle links could be considered.

3.6.18. The following comments relate to the local junction modelling only; i.e. retention of the existing layout.

3.6.19. A pedestrian controlled crossing is already located on the A27 west arm of this junction. It is a staggered arrangement given the total overall crossing distance (25 metres). Consideration could be given to providing a separate straight across phase for cyclists on this arm. This would require all traffic movements to be stopped and so would have an impact on the junction capacity.

3.6.20. An uncontrolled pedestrian crossing exists across the Highlands Road arm. An upgrade to a pedestrian/cyclist controlled crossing could be considered on this arm. With a dedicated left turn lane on the A27 west arm the use of a ‘hold the left’ signal arrangement could be considered. It would allow the Highlands Road crossing to appear for long periods during the dominant A27 traffic stage while the left turn traffic is held at red. However, this would require some localised carriageway widening on the A27 west arm to accommodate an island to provide the necessary signals to provide a safe arrangement.

3.7. Junction 50: A27 Bridge Road/Coldeast Way/Ironbridge Crescent, Park Gate- signalised crossroads junction

3.7.1. Background

3.7.2. This is a four-arm junction which is controlled by traffic signals. It is located on the A27 Bridge Road in Park Gate. The main road, A27 Bridge Road, runs west-east and carries the highest flows. To the south is Coldeast Way which is a cul-de-sac serving a residential area and medical facilities. On the north side is Ironbridge Crescent which serves a residential area. The existing layout is shown in the Appendix diagram 5.

3.7.3. The Sub Regional Transport Model (SRTM) highlighted that the Local Plan traffic (DM) would have a significant impact on congestion on the A27 Bridge Road (west) arm. The traffic modelling undertaken in this study indicates the opposite to the SRTM model with the capacity impacts occurring on A27 Bridge Road (east arm) and Ironbridge Crescent. The report focuses on mitigating the impact on these approaches.

3.7.4. Option 1 – Optimised signal timings

3.7.5. The existing traffic signal junction has been modelled using Linsig3 software. The current signal staging arrangement has been tested which is

- Stage 1 – A27 Bridge Road in both directions
- Stage 2 – Ironbridge Crescent
- Stage 3 – Coldeast Way

3.7.6. The existing layout which has been modelled is shown in the Appendix diagram 5. The signal timings have been optimised in the model to achieve the best set of results. The junction has been tested with the DM 2036 traffic flows and the results are summarised in below.

Table 7 Junction 50: Option 1

Option 1	2036 DM AM peak		2036 DM PM peak	
	DoS	MMQ	DoS	MMQ
A27 Bridge Road eastbound	54.8%	13	68.6%	19
Ironbridge Crescent	**102.5%**	**28**	**123.1%**	**62**
A27 Bridge Road westbound	**102.3%**	**45**	**120.8%**	**102**
Coldeast Way	85.1%	6	55.7%	3
Cycle time	120 secs		120 secs	
Practical reserve capacity	-13.9%		-36.8%	

DoS – Degree of saturation (%) where this is 90% or greater the lane is at or over capacity (highlighted in bold red)

MMQ – Mean maximum queue length in vehicles

3.7.7. The results indicate that the existing signal junction arrangement would fail in both 2036 AM and PM peaks with higher DoS' than identified in the SRTM model outputs. The arms which are over capacity are A27 westbound and Ironbridge Crescent. The significant

queuing on the A27 westbound arm is caused by vehicles waiting to turn right into Ironbridge Crescent blocking the A27 westbound ahead flow. The congestion on Ironbridge Crescent results from a large uplift in demand which the single lane is unable to accommodate.

3.7.8. Option 2 – A27 westbound right turn lane and Ironbridge Crescent widening

3.7.9. This option investigates capacity improvements to the A27 westbound and Ironbridge Crescent arms as those were identified in the Do Nothing modelling.

3.7.10. This layout (Appendix diagram 6) removes the existing pedestrian refuge on the A27 east arm which would enable a fully developed right turn lane to be provided on this approach. Currently there is a minimal storage for right turning vehicles within the junction (approximately 2 vehicles) before the ahead traffic is impeded. The layout would increase the available storage for right turning vehicles to 9 (4 within the junction and 5 on the approach). The layout would utilise the existing central hatched area but also require some localised carriageway widening to the north-east section of the A27. To increase capacity on Ironbridge Crescent this approach would be widened to provide a short two-lane flare to the junction. Carriageway widening would be required on the north-west corner of the junction. Both areas of carriageway widening are expected to be contained within the highway boundary although further assessment should be made.

3.7.11. The removal of the pedestrian refuge on the A27 east arm would have a detrimental effect on pedestrian facilities. The refuge provides one of the few places at which is cross over the A27 in the area. In mitigation this option includes a pedestrian controlled crossing in its place with the option of a new pedestrian-controlled crossing on the Ironbridge Crescent arm. It would mitigate against the removal of the small pedestrian refuge in the mouth of this arm. However, following the methodology for this report above, the preferred approach is still to seek measures to increase active travel, before looking at options for increasing highway capacity – a modal shift could reduce the need to provide more highway capacity.

3.7.12. The signal staging for this option would differ from the current arrangement. It includes a right turn indicative arrow stage to accommodate the increased demand from the A27 east into Ironbridge Crescent. An on-demand pedestrian stage is also included. As the appearance would be on demand in the absence of any pedestrian flow data several scenarios have been tested.

3.7.13. The signal staging for this option would be

- Stage 1 – A27 Bridge Road in both directions
- Stage 2 – A27 Bridge Road ahead and right turn indicative arrow into Ironbridge Crescent
- Stage 3 – Pedestrian stage (across A27 east and Ironbridge Crescent)
- Stage 4 – Ironbridge Crescent
- Stage 5 - Coldeast Way

3.7.14. The junction has been tested with the DM 2036 traffic flows and the results are summarised in Table 8 below.

Table 8 Junction 50: Option 2

Option 2	2036 DM AM peak		2036 DM PM peak	
	DoS	MMQ	DoS	MMQ
A27 Bridge Road eastbound	85.4%	19	**102.1%**	**45**
Ironbridge Crescent	81.8%	12	**101.1%**	**24**
A27 Bridge Road westbound	79.8%	21	**98.0%**	**29**
Coldeast Way	75.6%	5	55.7%	3
Cycle time	120 secs		120 secs	
Practical reserve capacity	10.1%		**-13.5%**	

Table 6

DoS – Degree of saturation (%) where this is 90% or greater the lane is at or over capacity (highlighted in bold red)

MMQ – Mean maximum queue length in vehicles

3.7.15. The above results indicate that the junction would operate well within capacity during the AM peak with the 2036 Do Minimum flows. In the 2036 PM peak under DM flows the junction would remain over capacity although it would perform much better than the Do Nothing option.

3.7.16. Further testing of the model has been completed for the 2036 PM peak (Do Minimum flows) to understand what the effect of the on-demand pedestrian stage would have on capacity. The actual pedestrian demand is unknown and so several scenarios have been tested. These include the appearance of the pedestrian stage typically every other cycle and every third cycle across the 2036 PM peak. For modelling purposes the appearances are averaged across the whole hour. On street it would not preclude the pedestrian stage from appearing during the stage in which it was demanded.

3.7.17. The results for the 2036 DM PM peak are contained in Table 9.

Table 9 Junction 50: Option 2

Option 2	2036 DM PM peak every second cycle		2036 DM PM peak every third cycle	
	DoS	MMQ	DoS	MMQ
A27 Bridge Road eastbound	90.6%	30	89.4%	29
Ironbridge Crescent	92.5%	16	88.9%	15
A27 Bridge Road westbound	91.4%	24	88.7%	23
Coldeast Way	55.7%	3	55.7%	3
Cycle time	120 secs		120 secs	
Practical reserve capacity	-2.7%		0.6%	

DoS – Degree of saturation (%) where this is 90% or greater the lane is at or over capacity (highlighted in bold red)

MMQ – Mean maximum queue length in vehicles

3.7.18. The above results show that should the pedestrian stage typically be demanded every other cycle in the 2036 PM peak (15 demands across the whole hour) the junction would be just over capacity at -2.7% practical reserve capacity. This offers a significant improvement compared with the Do Nothing option. However, should the pedestrian stage typically appear every third cycle (10 demands spread across the hour) that the junction would then operate within capacity with 0.6% spare capacity.

3.7.19. Junction summary

3.7.20. It is concluded that the existing traffic signal junction would be unable to accommodate the 2036 DM traffic flows and perform within capacity. This accords with the findings from the SRTM. Mitigation measures would be required and Option 2 provides a solution that could handle the 2036 DM traffic flows. The provision of on-demand pedestrian crossings at the junction may be necessary to mitigate the removal of refuges on the A27 east and Ironbridge Crescent arms. The inclusion of these facilities could have a marked effect on capacity in the 2036 DM PM peak. Previous knowledge of the junction would suggest that in the PM peak pedestrian activity across the A27 is low. It is considered that the modelling results towards the appearance of the pedestrian stage every second or third cycle would be more realistic. With the third cycle and Option 2 junction, the junction would operate just within capacity. Data and further assessment may be required for verification on pedestrian demand levels.

3.7.21. A further consideration would be to omit the on-demand pedestrian crossings from Option 2. Although not modelled the results for such an arrangement would improve the junction capacity further ensuring that it could accommodate the 2036 DM traffic flows. However, this would reduce pedestrian amenity.

3.7.22. Recommendation

3.7.23. It is recommended that Option 2 should be tested in the Do Something run. It is recommended that further assessment on the future pedestrian activity levels is undertaken to confirm the impact on the junction performance.

3.7.24. Considerations for active travel

3.7.25. This junction is part of the proposed primary route 270 of the draft Fareham LCWIP. The updated LCWIP will suggest that there are land constraints along this section of the A27, but that if the approaches to the junction are made LTN1/20 compliant then a cyclops style junction could be considered.

3.7.26. With regard to the layout considered for the SRTM Do Something model run; Option 2 replaces the existing uncontrolled pedestrian crossings, including centre refuges, with on-demand controlled crossings on the A27 east and Ironbridge Crescent arms. While there are no changes to the layouts on the remaining arms there is potential to also upgrade these facilities to on-demand crossings. This would have little impact on the junction performance or capacity compared with Option 1 as all traffic movements would be stopped regardless of which arm was demanded by pedestrians.

3.8. Junction 28: A27 Southampton Road/Titchfield Hill, Titchfield – partially signalised gyratory

3.8.1. Background

3.8.2. This is a gyratory system which sits on the A27 Southampton Road at Titchfield. The junction is currently undergoing significant changes to its layout as part of the Stubbington bypass scheme. The link between A27 west and B3334 Titchfield Road is being re-routed directly through the centre of the gyratory. This will be a 2-lane link which will be signal controlled together with the B3334 Titchfield Road entry. The B3334 Titchfield Road arm is being widened to 2 lanes in both directions. The existing eastern end of the gyratory will be removed. The layout of the Titchfield Hill arm is a two-lane entry which has individual lanes for left turning and ahead traffic. The western side of the gyratory is a wide single lane give way which joins the A27 eastbound. These arms will remain unchanged by the Stubbington bypass scheme. Changes associated with the Stubbington Bypass are already included in the SRTM model runs to date.

3.8.3. The Sub Regional Transport Model (SRTM) indicates that the Titchfield Hill arm would be significantly over capacity with the Local Plan traffic.

3.8.4. The gyratory has been modelled using Linsig3 software. The traffic signals at the A27/B3334 node have been modelled based on the proposed junction layout under construction for Stubbington bypass. The signal timings have been optimised to find the most appropriate timings for the 2036 DM traffic flows.

3.8.5. Option 1 – Optimised signal timings

3.8.6. The proposed partially signalised gyratory option has been tested which is based on the scheme currently being constructed under the Stubbington bypass scheme. The junction layout is shown in the Appendix diagram 7.

Table 10 Junction 28: Option 1

	2036 DM AM		2036 DM PM	
	DoS	MMQ	DoS	MMQ
A27 southbound	45.2%	8	57.7%	8
A27 westbound	**90.0%**	**26**	89.1%	16
B3334 Titchfield Road	88.4%	24	84.8%	11
Titchfield Hill	**139.5%**	**101**	80.8%	8
Western gyratory	**92.5%**	**14**	**156.9%**	**88**
Cycle time	120 secs		72 secs	
Practical reserve capacity	**-54.9%**		**-74.4%**	

DoS – Degree of saturation (%) where this is 90% or greater the lane is at or over capacity (highlighted in bold red)

MMQ – Mean maximum queue length in vehicles

3.8.7. The above results indicate that in both 2036 peaks the signalised part of the gyratory would operate at or below capacity with the DM traffic flows. In the 2036 AM peak Titchfield Hill would be considerably over capacity with a 139.5% Degree of Saturation together with the downstream section of the gyratory (western side of gyratory) with a 92.5% Degree of Saturation. In the 2036 PM peak the western side of the gyratory is shown to be far over capacity with a Degree of Saturation at 156.9%. It is the unsignalised sections of the gyratory that would push the whole junction over capacity.

3.8.8. Option 2 – two-lane give way entries

3.8.9. As stated in Option 1 the unsignalised give way entries are those that fail to operate within capacity. Option 2 investigates mitigation measures on these arms namely Titchfield Hill and the western gyratory. Titchfield Hill is currently a two-lane entry with the nearside lane designated for left turning vehicles only; the offside lane is designated for those joining the gyratory to travel east. This arrangement results in an unbalanced of assignment of the flows across the two lanes. Option 2 re-designates the nearside lane so that it can also be used by those joining the gyratory to travel east as well as those turning left. In Option 2 the western section of the gyratory has been designed as a two-lane section which continues to give way to the A27 eastbound. Effectively this increases the number of lanes available for the main traffic movement from Titchfield Hill from one to two lanes. A diagram for Option 2 is shown in Appendix diagram 8.

3.8.10. The introduction of two lanes giving way on the western section of the gyratory would need to be carefully designed to minimise any increased safety risks. This is due to potential visibility concerns resulting from the angle of drivers attempting to join and vehicles in the inside lane obscuring visibility. The uphill gradient of the A27 westbound and the multi-lane approach may also affect visibility and safety of drivers giving way at this location under a two-lane arrangement. Should Option 2 not be considered appropriate on safety grounds the introduction of signal control for this movement may need to be investigated.

3.8.11. Option 2 has been modelled based on the 2036 DM traffic flows and the results are below.

Table 11 Junction 28: Option 2

	2036 DM AM		2036 DM PM	
	DoS	MMQ	DoS	MMQ
A27 southbound	45.1%	8	58.1%	8
A27 westbound	88.2%	24	88.7%	16
B3334 Titchfield Road	88.4%	24	84.8%	11
Titchfield Hill	89.2%	8	62.4%	3
Western gyratory	60.3%	5	77.7%	7
Cycle time	120 secs		72 secs	
Practical reserve capacity	0.8%		1.5%	

DoS – Degree of saturation (%) where this is 90% or greater the lane is at or over capacity (highlighted in bold red)

MMQ – Mean maximum queue length in vehicles

3.8.12. The results for Option 2 indicate that it would fully operate just within capacity in both the 2036 AM and PM peaks under the DM traffic flows.

3.8.13. Junction summary

3.8.14. The current scheme under construction (Option 1) would not be able to accommodate the 2036 DM traffic flows without resulting in the Titchfield Hill and western gyratory arms being over capacity. Option 2 resolves these capacity issues and would be able to accommodate the 2036 DM traffic.

3.8.15. Recommendation

3.8.16. It is recommended that Option 2 should be tested in the Do Something run.

3.8.17. Considerations for active travel

3.8.18. The junction is within proposed primary route 270 of the draft Fareham LCWIP.

3.8.19. There is currently no cycle infrastructure at the junction. The Stubbington Bypass scheme will provide a shared use path on the east side of the B3334 leading to the junction and a link to Titchfield Hill. To the west of the Mill Lane junction there is a shared use path along the north side of the A27.

3.8.20. Consideration could be given to linking the proposed shared use path on the east of the B3334 with the proposed LCWIP primary route, with appropriate links and toucan crossings on the desire lines.

3.8.21. It is anticipated that a segregated east/west cycle facility would be provided on the north side of the A27, which would bypass the junction.

3.9. Junction 37: Cartwright Drive/Whiteley Lane/Barnes Wallis Road, Segensworth roundabout

3.9.1. Background

3.9.2. This is a four-arm roundabout located to the east of Segensworth. The western arm is Barnes Wallis Road which links through to the industrial area of Segensworth. Cartwright Drive, to the east, is a local distributor road which connects through to the main road network of the A27 to the south. Whiteley Lane north provides a link to the large residential area of Whiteley to the north and is one of a limited number of accesses serving that area from the south of the M27. On the southern arm Whiteley Way connects through to a mix of residential/office/industrial land use including the Office for National Statistics.

3.9.3. All approaches are single lanes with limited localised lane flaring at the roundabout entries. Whiteley Lane north does have a short flared lane. Cartwright Drive also has a short-flared lane at the roundabout entry and includes a central hatched area on its approach. There are footways on the Barnes Wallis Road, Whiteley Lane (south) and Whiteley Lane (north) but none on Cartwright Drive. The pedestrian facilities at the roundabout include dropped kerbs and use of the splitter islands on the Barnes Wallis Road and Whiteley Lane (south) arms.

3.9.4. The speed limit at the roundabout itself is 40mph. Shortly beyond the roundabout 30mph speed limits apply on the Barnes Wallis Road and Whiteley Lane (south) arms. Whiteley Lane to the north has a derestricted speed limit just beyond the roundabout.

3.9.5. Do-Nothing option

3.9.6. The existing roundabout geometry has not been tested given that the SRTM indicated that both Cartwright Drive and Whiteley Lane north were over capacity. The SRTM highlights that the Whiteley Lane (north) lane meets the threshold for mitigation. Cartright Drive does not meet the threshold, but, as will be seen in the analysis of junction 38, capacity issues on Cartright Drive are predicted to cause stacking back through to Segensworth Road East.

3.9.7. Option 1 – Increase flared lane lengths on Cartwright Drive and Whiteley Way north arms

3.9.8. The roundabout layout has been retained with increased localised flaring provided on the Cartwright Drive and Whiteley Way north approaches. The layout is shown in the Appendix diagram 8. On Cartwright Drive the existing single lane would be widened to formally provide two lanes for approximately 45 metres back from the give way line. The nearside lane would be used for traffic headed to Whiteley Lane (south) and Barnes Wallis Road while the offside lane would be for traffic turning right into Whiteley Lane (north). Some carriageway widening would be required to the southern grassed verge on Cartwright Drive which is likely to impinge on future ability to deliver the proposed LCWIP cycle route in this location.

3.9.9. Whiteley Lane north would be widened to provide 2 full lanes for around 50 metres on the approach to the give way line. Carriageway widening would be required on the west verge.

3.9.10. The Option 1 roundabout layout has been modelled using Junctions9 Arcady software.

3.9.11. The junction has been tested with the DM 2036 traffic flows and the results are summarised in Table 12 below.

Table 12 Junction 37: Option 1

	2036 DM AM peak		2036 DM PM peak	
	RFC	Max Queue	RFC	Max Queue
Whiteley Lane north	0.49	1	0.03	0
Cartwright Drive	0.64	2	0.26	0.5
Whiteley Lane south	0.03	0	0.17	0
Barnes Wallis Road	0.47	1	**1.04**	**40**

DoS – Degree of saturation (%) where this is 90% or greater the lane is at or over capacity (highlighted in bold red)

MMQ – Mean maximum queue length in vehicles

3.9.12. The results indicate that the localised widening on the Whiteley Lane north and Cartwright Drive arms would address the capacity issues identified in the SRTM. The roundabout would operate well within capacity in the 2036 DM AM peak. However, in the 2036 DM PM peak the Barnes Wallis Road arm would be considerably over capacity (1.04 RFC). However, this is not materially any different to the 2036 Baseline PM position from the SRTM where the figure is 1.05 for that arm.

3.9.13. If needed in the future, further options could be investigated to mitigate the level of congestion predicted on the Barnes Wallis Road arm in the 2036 PM peak. The first, following the approach to the wider STA, would be to reduce the number of motor vehicles trips associated with the Segensworth employment sites. The draft Fareham LCWIP has demonstrated that there are high number of short car trips made to these sites and therefore a high potential to shift to active modes, with the right supportive infrastructure in place. Failing that, potential highway capacity measures could investigate widening both the Barnes Wallis Road approach and the Cartwright Drive exit to two lanes. More significant mitigation measures may require the conversion of the roundabout to a signalised cross-roads junction.

3.9.14. Recommendation

3.9.15. It is recommended that Option 1 should be tested in the Do Something run.

3.9.16. Considerations for active travel

3.9.17. This junction is intended be part of LCWIP secondary route 271 in the future. Currently cyclists are on-road which does not comply with speeds/volumes acceptable for mixed traffic in LTN1/20.

3.9.18. To improve conditions for on-road cycling the existing normal roundabout could be reconfigured to make a compact roundabout. If roads leading to the junction are made LTN1/20 compliant then a Dutch style roundabout could be considered or parallel crossings on Barnes Wallis Rd and Whiteley Lane with links to connect the LCWIP secondary route.

3.10. **Junction 38: Cartwright Drive/Segensworth Road East - T junction, Segensworth**

3.10.1. Background

3.10.2. This is a three-arm priority T junction which is located to the east of Segensworth. The main road is Cartwright Drive which runs north-south. Segensworth Road East is the side arm which links through to Mill Lane in the east. The right turn movement from Cartwright Drive south into Segensworth Road East is prohibited. The junction is located on the fringes of a large industrial area and provides a link through to large residential areas at Titchfield Common and Whiteley. There is a 40mph speed limit on all arms of the junction.

3.10.3. The Sub Regional Transport Model (SRTM) highlighted that the Local Plan traffic (DM) would have a severe impact on congestion on the Segensworth Road. The report focuses on mitigating the impact on the Local Plan traffic on this approach.

3.10.4. Do-Nothing option

3.10.5. The existing priority T junction has not been modelled given that it has been identified in the SRTM model that DM traffic would have a severe impact.

3.10.6. Option 1 – Segensworth Road widened to two lanes – priority T junction

3.10.7. This option would retain the existing T junction arrangement but includes a flared left turn lane on Segensworth Road. No drawing has been included for this option. The objective of this option was to provide increased capacity on the side road.

3.10.8. Junctions9 Picady software has been used to model the priority junction. It has been tested with the DM 2036 traffic flows and the results are summarised in Table 13 below.

Table 13 Junction 38: Option 1

Option 1	2036 DM AM peak		2036 DM PM peak	
	RFC	Max Queue	RFC	Max Queue
Cartwright Drive southbound	0	0	0	0
Segensworth Road left turn	0.28	0.4	**1.07**	**22**
Segensworth Road right turn	0.83	4.1	**1.16**	**34**
Cartwright Drive northbound	0	0	0	0

RFC value over 0.85 indicates that approach is over capacity (highlighted in bold red)

3.10.9. The results indicate that while the junction would operate within capacity during the 2036 AM peak, the Segensworth Road arm would be considerably over capacity in the 2036 PM peak (RFC values of 1.16 and 1.07). This option would not provide a solution which would mitigate the 2036 DM traffic flows at this junction.

3.10.10. Option 2 – Cartwright Drive southbound and Segensworth Road widened to two lanes – priority T junction

3.10.11. This option develops Option 1 with the inclusion of an additional left turn lane on Cartwright Drive southbound. The layout is shown in the Appendix diagram 9. In the 2036 PM peak the Cartwright Drive left turn movement into Segensworth Road East is the dominant movement. The provision of a left turn lane effectively means that Segensworth Road traffic would no longer need to give way to it. Segensworth Road would be a two-lane approach to the junction.

3.10.12. Option 2 junction has been tested with the DM 2036 traffic flows using Picady software and the results are summarised in Table 14 below.

Table 14 Junction 38: Option 2

	2036 DM AM peak		2036 DM PM peak	
	RFC	Max Queue	RFC	Max Queue
Cartwright Drive southbound	0	0	0	0
Segensworth Road left turn	0.25	0	**0.92**	**7**
Segensworth Road right turn	0.74	3	**0.94**	**9**
Cartwright Drive northbound	0	0	0	0

RFC value over 0.85 indicates that approach is over capacity (highlighted in bold red)

3.10.13. Despite the removal of the main traffic flow for which Segensworth Road East would need to give way to, Option 2 does not provide a solution which would operate within capacity in the 2036 PM peak as both the left and right turn movements would have RFC values exceeding 0.85.

3.10.14. Option 3 – Signalised junction based on existing junction layout with Segensworth Road widened to two lanes

3.10.15. The previous two options have explored improvements to the existing priority junction. It is considered that these have exhausted the options available to retain a priority junction. Option 3 considers the signalisation of the junction which is based on the existing junction layout and retains the right turn prohibition on Cartwright Drive south.

3.10.16. The signal staging for this option is

- Stage 1 – Cartwright Drive both directions
- Stage 2 – Segensworth Road

3.10.17. The Option 3 junction has been tested with the DM 2036 traffic flows and the results are summarised in Table 15 below.

Table 15 Junction 38: Option 3

Option 3	2036 DM AM peak		2036 DM PM peak	
	DoS	MMQ	DoS	MMQ
Cartwright Drive southbound	61.4%	12	**111.0%**	**111**
Segensworth Road	73.7%	9	**112.0%**	**61**
Cartwright Drive northbound	74.0%	17	11.1%	2
Cycle time	120 secs		120 secs	
Practical reserve capacity	21.5%		**-21.4%**	

DoS – Degree of saturation (%) where this is 90% or greater the lane is at or over capacity (highlighted in bold red)

MMQ – Mean maximum queue length in vehicles

3.10.18. The results indicate that the signalisation of the existing layout does not prevent the junction from being over capacity (-21.4% practical reserve capacity) in the 2036 PM peak with DM traffic. It would operate well within capacity in the 2036 AM peak.

3.10.19. Option 4 – Signalised junction with Segensworth Road widened to two lanes

3.10.20. Given the results for Option 3 the signal option has been developed to test the introduction of an additional left turn lane on Segensworth Road. The layout is based on the Option 2 priority junction. The signal staging would be the same as Option 3 and the Cartwright Drive south right turn prohibition would be retained.

3.10.21. The Option 4 junction has been tested with the DM 2036 traffic flows and the results are summarised in Table 16 below.

Table 16 Junction 38: Option 4

Option 4	2036 DM AM peak		2036 DM PM peak	
	DoS	MMQ	DoS	MMQ
Cartwright Drive southbound	58.2%	12	**94.2%**	**43**
Segensworth Road	48.8%	5	**92.5%**	**16**
Cartwright Drive northbound	74.0%	18	9.6%	1
Cycle time	120 secs		120 secs	
Practical reserve capacity	21.5%		**-4.6%**	

DoS – Degree of saturation (%) where this is 90% or greater the lane is at or over capacity (highlighted in bold red)

MMQ – Mean maximum queue length in vehicles

3.10.22. Although the inclusion of an additional left turn lane on Segensworth Road East would provide a reasonable benefit compared with Option 3 in the 2036 PM peak, it would remain over capacity (-4.6% practical reserve capacity). In the 2036 AM peak Option 4 operates at a similar level to Option 3.

3.10.23. Option 5 – Signalised junction with Cartwright Drive southbound and Segensworth Road East widened to two lanes

3.10.24. A further development of a signal layout was tested based on the Option 2 priority junction layout. This layout is shown in the Appendix diagram 10. For comparison purposes an identical staging arrangement was tested for this option. The right turn prohibition on Cartwright Drive south would be retained.

3.10.25. The Option 5 junction has been tested with the DM 2036 traffic flows and the results are summarised in Table 17 below.

Table 17 Junction 38: Option 5

Option 5	2036 DM AM peak		2036 DM PM peak	
	DoS	MMQ	DoS	MMQ
Cartwright Drive southbound	43.4%	4	**93.8%**	**37**
Segensworth Road	66.0%	6	70.4%	11
Cartwright Drive northbound	68.0%	14	10.9%	1
Cycle time	100 secs		120 secs	
Practical reserve capacity	32.4%		**-4.2%**	

DoS – Degree of saturation (%) where this is 90% or greater the lane is at or over capacity (highlighted in bold red)

MMQ – Mean maximum queue length in vehicles

3.10.26. This option would be slightly over capacity in the 2036 PM peak (-4.2%) and would only provide a marginal improvement over the previous option 4. Under this option only Cartwright Drive southbound would be over capacity and then only in the PM peak. All other arms would operate within capacity in the 2036 peak periods.

3.10.27. Option 6 – Signalised junction with Cartwright Drive southbound and Segensworth Road East widened to two lanes including left turn signal

3.10.28. Option 6 has the same layout as the previous Option 5 (Appendix diagram 10). To address the one remaining arm that would be over capacity (Cartwright Drive southbound) the signal staging has been tested with a left turn filter signal running concurrently with traffic exiting Segensworth Road. Effectively this would allow the dominant Cartwright Drive left turn movement to run almost continuously. It should be noted that this layout would need to be checked to ensure that larger vehicles could turn left into and right out from Segensworth Road simultaneously.

3.10.29. The signal staging for this option is

- Stage 1 – Cartwright Drive both directions
- Stage 2 – Segensworth Road and Cartwright Drive southbound left turn

3.10.30. The Option 6 junction has been tested with the DM 2036 traffic flows and the results are summarised in Table 18 below.

Table 18 Junction 38: Option 6

Option 6	2036 DM AM peak		2036 DM PM peak	
	DoS	MMQ	DoS	MMQ
Cartwright Drive southbound	47.7%	4	79.1%	13
Segensworth Road	66.0%	6	79.8%	13
Cartwright Drive northbound	68.0%	14	10.1%	1
Cycle time	100 secs		120 secs	
Practical reserve capacity	32.4%		12.8%	

DoS – Degree of saturation (%) where this is 90% or greater the lane is at or over capacity (highlighted in bold red)

MMQ – Mean maximum queue length in vehicles

3.10.31. The introduction of a left turn filter signal on Cartwright Drive would provide a solution that operates within capacity in the 2036 PM peak. In the 2036 AM peak this option would perform virtually the same as Option 5 with a high degree of spare capacity.

3.10.32. Junction summary

3.10.33. It is concluded that the existing priority junction cannot accommodate the 2036 DM traffic flows even with changes to the layout. The introduction of signal control is required to enhance capacity on Segensworth Road. Even under signalisation the junction layout would need improving to provide two lanes on Segensworth Road and Cartwright Drive southbound. The signal staging would need to be maximised with the inclusion of a left turn filter signal on Cartwright Drive southbound to arrive at a solution which would operate within capacity to accommodate the 2036 DM traffic flows.

3.10.34. Recommendation

3.10.35. It is recommended that Option 6 is progressed at this location in the SRTM Do Something run.

3.10.36. Considerations for active travel

3.10.37. This junction is intended to connect the proposed secondary routes 271 and 344 in the draft Fareham LCWIP. Currently there is no cycle infrastructure north or east of the junction and these roads are not appropriate for mixed use traffic and therefore not be suitable for all users.

3.10.38. To the west, it is unclear if cycling is permitted on the path connecting Cartright Drive and Whiteley Lane. There is a prohibition of driving, but no shared use path signs. The link connects through to the residential/office/industrial area of Segensworth. In the future this link could be upgraded to an improved walking and cycling route.

3.10.39. Under Option 6 the opportunity would exist to consider a cycle phase/stage within the junction layout and operation of the signals. This would allow cyclists from the west to enter and cross the junction under signal control to travel east along Segensworth Road East. In the opposite direction cyclists from Segensworth Road East (either on-road or on a new provision, depending on the development of the LCWIP) could cross directly to the walking and cycling link to continue their onward westbound journey. A cyclops junction

could also be considered. These arrangements would need to be modelled and layouts developed.

3.11. **Junction 35: A27 Segensworth roundabout/Little Park Farm Road, Segensworth – signalised roundabout**

3.11.1. Background

3.11.2. Known as Segensworth roundabout this junction forms a major intersection in the Fareham highway network. It is a 7 arm partially signalised roundabout which connects several major routes. Four of the seven arms are signal-controlled and these include the M27 Junction 9 link road to the north and the A27 Southampton Road arms which go west towards Park Gate and south towards Fareham. Segensworth Road is the other signalised arm which is one way approach towards the roundabout and feeds in traffic from the Segensworth industrial area. All these arms have multiple lanes ranging from 2 to 4 lane entries on to the roundabout. The signals operate under SCOOT control. Barnes Wallis Road, in the northeast corner, is a one-way road leading away from the roundabout. The remaining two arms are uncontrolled and are considered to be more minor in nature. The southwest arm is Southampton Road which predominantly serves several retail premises. The final arm on the northwest corner of the roundabout is Little Park Farm Road. This is a single lane approach which flares out to two lanes at the roundabout entry. It serves the large industrial area of Segensworth West. The circulatory sections of the roundabout are mostly 4 lanes. The existing layout is shown in Appendix diagram 12.

3.11.3. The roundabout sits in a 50mph speed limit although 30mph speed limits apply to Little Park Farm Road, Barnes Wallis Road, Segensworth Road and Southampton Road shortly beyond the exits.

3.11.4. Option 1 – Optimised signal timings

3.11.5. The existing partially signalised roundabout has been modelled using Linsig3 software and the signal timings optimised. The existing junction layout and signal staging has been retained. Although the signal timings have been optimised the cycle times have been limited to those run under the current SCOOT control. The results for the 2036 DM peak periods are shown below.

Table 19 Junction 35: Option 1

	2036 DM AM		2036 DM PM	
	DoS	MMQ	DoS	MMQ
M27 link road	**111.0%**	**129**	**92.8%**	**20**
Circulatory (N)	86.6%	20	**91.4%**	**18**
Segensworth Rd	**90.3%**	**12**	89.3%	16
Circulatory (E)	73.1%	11	85.5%	19
A27 Southampton Rd (S)	**100.7%**	**52**	**90.3%**	**19**
Circulatory (S)	**118.3%**	**50**	84.1%	16
Old Southampton Rd	31.0%	1	17.9%	1
A27 Southampton Rd (W)	**99.9%**	**23**	**91.7%**	**16**
Circulatory (W)	**99.1%**	**41**	**91.4%**	**24**
Little Park Farm Road	**160.0%**	**119**	**99.8%**	**17**
Cycle time	80 secs		72 secs	
Practical reserve capacity	**-77.8%**		**-10.8%**	

DoS – Degree of saturation (%) where this is 90% or greater the lane is at or over capacity (highlighted in bold red)

MMQ – Mean maximum queue length in vehicles

3.11.6. The above results indicate that multiple arms would be over capacity in both 2036 AM and PM peaks with DM traffic. Of most note is Little Park Farm Road which would be significantly over capacity in the 2036 DM AM peak (160.0% Degree of Saturation) and in the 2036 PM peak to a slightly lesser extent (99.8%). This is much higher than predicted by the SRTM (109). The predicted maximum queues in the 2036 AM peak would be nearly 120 vehicles long (33 in the SRTM DM output).

3.11.7. Option 2 – Little Park Farm Road signalised

3.11.8. This option would signalise Little Park Farm Road and the adjacent section of the roundabout. Installing signals on this four-lane circulatory section would result in minimal storage capacity (around 20 metres) to hold stopped vehicles. This part of the roundabout carries some of the highest flows on the junction. Stopping traffic here would immediately lead to queues forming back beyond the exit into Little Park Farm Road, past the A27 Southampton Road (W) arm and back around to A27 Southampton Road (S) arm. This would result in excessive queuing around the entire circulatory leading to the junction locking up. For these reasons this option should be rejected. No modelling or drawing has been produced for this option.

3.11.9. Option 3 – Little Park Farm Road entry closed; traffic diverted via Telford Way on to A27 Southampton Road (W) arm

3.11.10. Given the degree to which Little Park Farm Road would be over capacity, this option investigates closing this entry on to the roundabout. Traffic would be diverted via Telford Way to join the A27 and approach Segensworth roundabout from the west. It should be noted that traffic would still be able to exit the roundabout into Little Park Farm Road. This option matches the aspirations of the Highway Authority by closing an uncontrolled give way entry on to the signalised roundabout.

3.11.11. This option has been modelled using Linsig3 software. The modelling is based on the existing junction layout except for the closure of the Little Park Farm Road entry. All traffic joining from Little Park Farm Road has been re-assigned to the A27 Southampton Road (W) arm in the model. The existing signal staging has been retained and for consistency the same cycle times have been used as per Option 1. The signal timings have been optimised to achieve the best set of results.

3.11.12. The results for the 2036 DM peak periods are shown below.

Table 20 Junction 35: Option 3

	2036 DM AM		2036 DM PM	
	DoS	MMQ	DoS	MMQ
M27 link road	**102.1%**	**46**	**90.7%**	**18**
Circulatory (N)	**97.6%**	**28**	81.1%	14
Segensworth Rd	84.9%	11	89.3%	16
Circulatory (E)	**92.0%**	**25**	74.7%	15
A27 Southampton Rd (S)	**105.7%**	**76**	**90.3%**	**19**
Circulatory (S)	**96.6%**	**17**	84.3%	16
Old Southampton Rd	27.1%	1	18.0%	1
A27 Southampton Rd (W)	**135.9%**	**145**	**149.0%**	**200**
Circulatory (W)	**103.0%**	**53**	**91.3%**	**24**
Little Park Farm Road	n/a	n/a	n/a	n/a
Cycle time	80 secs		72 secs	
Practical reserve capacity	**-51.0%**		**-65.6%**	

DoS – Degree of saturation (%) where this is 90% or greater the lane is at or over capacity (highlighted in bold red)

MMQ – Mean maximum queue length in vehicles

3.11.13. The above table indicates that transferring the Little Park Farm Road traffic on to the A27 Southampton Road (W) arm has resulted in a considerable reduction in capacity on that arm. The Degree of Saturation has increased from around 90-100% in Option 1 to between 135-150% under Option 3. The predicted level of queuing on the A27 Southampton Road (W) arm would increase by over 10-fold in the 2036 PM peak compared with Option 1.

3.11.14. Option 4 – Little Park Farm Road entry closed; A27 Southampton Road (W) arm widened to 3 lanes

3.11.15. Based on the findings of Option 3 above, this option investigates providing additional capacity on the A27 Southampton Road (W) arm. Currently this is a 2-lane entry and this option introduces an additional third flared lane on the roundabout approach. The flared lane would extend 120 metres back from the stop line and carry traffic headed to the M27 link road and Little Park Farm Road. Carriageway widening would be required extending across into the northern grassed verge area. The centre lane on this arm would be designated for traffic headed to M27 link road and Barnes Wallis Road. Further around the junction a minor change to the lane designations would be required on the northern circulatory section. Traffic headed towards A27 Southampton Road (S) would be re-assigned from the outside lane to the inner lane only. The inner lane would also be used by traffic headed to Barnes Wallis Road allowing both circulatory lanes to feed into this two-lane exit. An extract of a diagram showing the layout for Option 4 is in the Appendix diagram 13.

3.11.16. This option has been modelled using Linsig3 software. The modelling is based on the existing junction layout but with the Little Park Farm Road entry closed and an additional lane on A27 Southampton Road (W) approach. Like Option 3 all Little Park Farm Road has been re-assigned to the A27 Southampton Road (W) arm in the model. The existing signal staging has been retained and for consistency the same cycle times have been used as per Option 1. The signal timings have been optimised to achieve the best set of results.

3.11.17. The results for the 2036 DM peak periods are shown below.

Table 21 Junction 35: Option 4

	2036 DM AM		2036 DM PM	
	DoS	MMQ	DoS	MMQ
M27 link road	**97.0%**	**29**	88.0%	16
Circulatory (N)	79.5%	16	89.1%	18
Segensworth Rd	89.3%	12	86.2%	15
Circulatory (E)	70.1%	6	83.2%	17
A27 Southampton Rd (S)	**115.3%**	**141**	**90.2%**	**19**
Circulatory (S)	84.9%	14	87.4%	14
Old Southampton Rd	23.4%	1	17.8%	1
A27 Southampton Rd (W)	88.5%	15	89.2%	16
Circulatory (W)	**95.1%**	**28**	**94.2%**	**20**
Little Park Farm Road	n/a	n/a	n/a	n/a
Cycle time	80 secs		72 secs	
Practical reserve capacity	**-28.1%**		**-4.6%**	

DoS – Degree of saturation (%) where this is 90% or greater the lane is at or over capacity (highlighted in bold red)

MMQ – Mean maximum queue length in vehicles

3.11.18. The results indicate that the addition of a third lane on the A27 Southampton Road (W) arm would enable that approach to operate within capacity in both 2036 DM peaks.

3.11.19. It is recommended that Option 4 is progressed at this location in the SRTM Do Something run. Although some of the arms are still over capacity, it offers a significant improvement over the other options. This option also reduces the PM impact on the A27 Southampton Road (S) arm compared to the Do Minimum output, which did trigger the agreed threshold, however, it does result in a higher impact in the AM peak.

3.11.20. Considerations for active travel

3.11.21. No measures are proposed in the draft Fareham LCWIP here as routes to the north, south, east and west of this junction are proposed instead.

3.12. **Junction 56: Sweethills Crescent/ Yew Tree Drive**

3.12.1. As described above, although junction 56 meets the agreed threshold, it is not causing a capacity issue itself. The issue to resolve is caused by congestion at A3051 Botley Road/Yew Tree Drive, Whiteley – roundabout (junction 54), on the Yew Tree Drive arm, which is predicted to stack back to junction 56.

3.12.2. Junction 54: Botley Road/Yew Tree Drive roundabout

3.12.3. Background

3.12.4. This is a 4 arm roundabout that is located to the west of Whiteley. The main road, A3051 Botley Road, runs broadly north-south and links Park Gate to Botley. Yew Tree Drive is the side arm which joins from the east. It serves Whiteley and provides a main route into this large area of mixed residential and commercial use. The fourth arm serves a single residential property on the west side and for modelling purposes has been ignored due to the negligible demand on this arm.

3.12.5. Each arm is a single lane approach with negligible amount of flaring at the give way lines. All arms are situated within a 30mph speed limit. There is an uncontrolled pedestrian crossing on the Yew Tree Drive arm only which utilises the wide splitter island.

3.12.6. The Sub Regional Transport Model (SRTM) highlighted that the Local Plan traffic (DM) would have a significant impact on congestion on Yew Tree Drive, leading to stacking back through junction 56. The report focuses on mitigating the impact on the Local Plan traffic on this approach.

3.12.7. Do-Nothing option

3.12.8. The existing roundabout has not been modelled given that it has been identified in the SRTM model that DM traffic would have a significant impact.

3.12.9. Option 1 – Yew Tree Drive widened

3.12.10. Based on the findings of the SRTM this option investigates improving the capacity on the Yew Tree Drive arm. The carriageway would be widened into the southern verge area to formally provide two lanes for a distance of 20 metres back from the give way line. The nearside lane would be used by traffic turning left to travel south along Botley Road and the offside lane by those turning right to travel northwards.

3.12.11. This option has been modelled using Junctions9 Arcady software. It has tested with the DM 2036 traffic flows and the results are summarised in Table 22 below.

Table 22 Junction 56: Option 1

Option 1	2036 DM AM peak		2036 DM PM peak	
	RFC	Max Queue	RFC	Max Queue
Botley Road southbound	0.74	3	0.74	3
Yew Tree Drive	0.50	1	0.40	1
Botley Road northbound	0.77	3	0.66	2

RFC value over 0.85 indicates that approach is over capacity (highlighted in bold red)

3.12.12. Junction summary

3.12.13. The additional flared lane on Yew Tree Drive would accommodate the 2036 DM traffic levels in both the AM and PM peaks.

3.12.14. Recommendation

3.12.15. It is recommended that Option 1 is progressed at this location in the SRTM Do Something run.

3.12.16. Considerations for active travel

3.12.17. Yew Tree Drive and Botley Road are proposed as part of secondary route 342 of the draft Fareham LCWIP.

3.12.18. At junction 56, upgrading the existing uncontrolled crossings to parallel crossings would provide a benefit for cyclists and pedestrians.

3.12.19. At junction 54 the Fareham LCWIP will suggest that, if the approaches to the junction are made LTN1/20 compliant, then the junction could be converted to a fully signalised cyclops style junction or standard signalised junction with toucan crossings and cycle links.

3.13. **Overall summary**

3.13.1. It is recommended that the measures in Table 23 should be tested through the Do Something SRTM run to accommodate the 2036 Local Plan (DM) traffic flows within capacity.

3.13.2. Following the methodology set out in Section 2, these measures should be considered a worst-case option, and measures to enable active travel and public transport should always be considered first. Although these preferred measures cannot successfully be tested using the SRTM, they will be set out in more detail in the final STA, and LCWIP measures are included as Appendix 1.

Table 23 Mitigation to test in Do Something model

Junction number in SRTM	Junction	Mitigation measure
18	A27 The Avenue/Redlands Lane/Gudge Heath Lane	Option 1 – optimised signal timings
30	A27 Southampton Road/Mill Lane, Titchfield	Option 1 – optimised signal timings; retain existing signal junction layout and operation
29	A27 The Avenue/Highlands Road	Option 1 – optimised signal timings; retain existing signal junction layout and operation
50	A27 Bridge Road/Coldeast Way/Ironbridge Crescent, Park Gate	Option 2 with expectation that pedestrian phase called every third cycle
28	A27 Southampton Road/Titchfield Hill, Titchfield	Option 2 – 2-lane give way entries
37	Cartwright Drive/Whiteley Lane/Barnes Wallis Road, Segensworth	Option 1 - Increase flared lane lengths on Cartwright Drive and Whiteley Way north arms
38	Cartwright Drive/Segensworth Road East	Option 6 - Signalised junction with Cartwright Drive southbound and Segensworth Road East widened to two lanes including left turn signal
35	A27 Segensworth roundabout/Little Park Farm Road, Segensworth	Option 4 - Little Park Farm Road entry closed; A27 Southampton Road (W) arm widened to 3 lanes
56/54	54: A3051 Botley Road/Yew Tree Drive, Whiteley	Option 1 - Yew Tree Drive widened

4. Further actions

4.1. It should be noted that none of the mitigation measures have been subject to a Road Safety Audit. It is advised that the physical mitigation measures should have a stage 1 Road Safety Audit completed before progressing to any further stage of design. As above, the mitigation presented in this report is to demonstrate that the level of development proposed is capable of mitigation – it is not intended to present a preferred package of works or to advocate specific junction designs. The final design solutions would be developed as and when the individual site proposals come forward to take account of any changes in traffic patterns and other infrastructure schemes coming forward in intervening years; and to ensure that inclusion of infrastructure for sustainable modes is considered.

4.1.1. No cost estimates have been produced in this report. A further step would be to provide an outline cost estimate for the mitigation works.

5. Appendices

Appendix 1: Draft Fareham Local Cycling and Walking Infrastructure Plan – Junction Options for Fareham Local Plan Transport Assessment

Draft Fareham Local Cycling and Walking Infrastructure Plan - junction options for Fareham Local Plan Transport Assessment
Version: 1.0

AM							
ID	**Junction**	**Approach Arm**	**Junction Type**	**Existing Provision**	**Part of LCWIP?**	**Possible Measures**	**Comments**
38.1	Segensworth Road East / Cartwright Drive	Segensworth Road East	Priority	This is a priority junction with a 40mph speed limit. There is a shared use path on the western side of Cartwright Drive to the south of the junction. There is no cycle infrastructure or footways to the north of the junction or on Segensworth Road East.	Yes - connector point for secondary routes 271 and 344	The junction could be a fully signalised cyclops style junction or a stand alone toucan crossing with suitable links could be provided on Cartwright Drive to the south of the junction.	This junction is intended to connect secondary routes 271 and 344 in the future - currently there is no cycle infrastructure north or east of the junction and these roads are not appropriate for mixed use traffic and therefore not be suitable for all users. To the west, it is unclear if cycling is permitted on the path connecting Cartright Drive and Whiteley Lane. There is a prohibition of driving, but no shared use path signs.
58.3	A27 Bridge Road / Barnes Lane	Barnes Lane	Priority	This is a priority junction with a 30mph speed limit. There are advisory cycle lanes to the west of the junction. There is no cycle infrastructure on the A27 through the junction or in Barnes Lane.	Yes - connector point for primary route 270 and secondary route 341	Depending on the routes leading to the junction a fully signalised cyclops style junction or standard signalised junction with toucan crossings and cycle links could be considered.	Due to traffic volumes on the A27 a segregated cycle track will be required. Due to vehicle accesses a cyclops layout may not be feasible.

ID	Junction	Approach Arm	Junction Type	Existing Provision	Part of LCWIP?	Possible Measures	Comments
39.1	Southampton Road / Telford Way Roundabout	Southampton Road (W)	Roundabout	This is a normal roundabout within a 30mph limit. There is a shared use path on the southern side of Southampton Road and western side of Telford Road. There are no crossing facilities on the A27 and an uncontrolled crossing point on Telford Road.	Yes - primary route 270, and within the Swanwick Station Core Walking Zone	A toucan crossing could be provided on the western side to connect to the existing provision in Telford Way.	The existing shared use path on the southern side of the A27 bypasses the Telford Way junction. The draft LCWIP suggests exploring widening of the shared use path, and consideration of segregation from walking facilities.
37.2	Barnes Wallis Road / Whiteley Lane / Cartwright Drive	Whiteley Lane (N)	Roundabout	This is a normal roundabout within a 30mph limit. There is no existing cycle infrastructure at this junction.	Yes - secondary route 271	To improve conditions for on-road cycling the existing normal roundabout could be reconfigured to make a compact roundabout. If roads leading to the junction are made LTN1/20 compliant then a Dutch style rbt could be considered or parallel crossings on Barnes Wallis Rd and Whiteley Ln with links to connect the LCWIP secondary route.	Cyclists are currently on-road which does not comply with speeds/volumes acceptable for mixed traffic.

ID	Junction	Approach Arm	Junction Type	Existing Provision	Part of LCWIP?	Possible Measures	Comments
35.4	Segensworth Roundabout	Little Park Farm Rd	Signalised Roundabout	This is a large normal roundabout with a multi-lane circuit gyratory with a 50mph limit. There is no existing cycle infrastructure at this junction.	No	The strategy is for cyclists to avoid this junction.	There are no measures at the rbt and the strategy is to provide routes to the north and south.
24.2	B3334 Titchfield Road / Bridge Street	Bridge Street	Signalised Roundabout	This signalised junction will be reconfigured as part of the Stubbington bypass. A shared use path will be created on the eastern side of Titchfield Road with toucan crossings and links provided on the B3334 and Bridge Street.	Yes - secondary route 344	The proposed junction improvements provide a compliant segregated route for cyclists.	A 3.0m wide shared use path on the east side of B3334 Titchfield Lane with a toucan crossing to Bridge St will be provided as part of the Stubbington bypass.
57.1	Bridge Road / Swanwick Lane	Bridge Road (N)	Signalised Junction	This is a signalised junction in a 30mph limit. There is no existing cycle infrastructure at this junction.	Yes - connecting primary route 270 with secondary route 271	Depending on the routes leading to the junction a cyclops style junction or standard signalised junction with toucan crossings and cycle links could be considered.	At present, Swanwick Lane traffic volumes and posted speed limits are not appropriate for mixed use traffic and would therefore not be suitable for all users.

ID	Junction	Approach Arm	Junction Type	Existing Provision	Part of LCWIP?	Possible Measures	Comments
28.2	Titchfield Gyratory	A27 The Avenue	Gyratory	This a large gyratory within a 40mph speed limit. There is currently no cycle infrastructure at the junction. The Stubbington Bypass scheme will provide a shared use path on the east side of the B3334 leading to the junction and a link to Titchfield Hill. To the west of the Mill Lane junction there is a shared use path along the north side of the A27.	Yes - part of primary route 270	Consideration could be given to linking the proposed shared use path on the east of the B3334 with the proposed LCWIP primary route, with appropriate links and toucan crossings on the desire lines.	It is anticipated that a segregated east/west cycle facility would be provided on the north side of the A27, which would bypass the junction.
29.2	A27 The Avenue / Highlands Road	Highlands Road	Signalised Roundabout	This is a signalised junction in a 30mph limit. There is no existing cycle infrastructure at this junction.	Yes - connects primary route 270 with secondary route 272	Depending on the routes leading to the junction a cyclops style junction or standard signalised junction with toucan crossings and cycle links could be considered.	Highlands Road traffic volumes and speeds are not appropriate for mixed use traffic and would therefore not be suitable for all users.

ID	Junction	Approach Arm	Junction Type	Existing Provision	Part of LCWIP?	Possible Measures	Comments
15.3	Station Roundabout	West Street	Roundabout	This is a normal roundabout within a 40mph speed limit. There is a shared use path on the northern side of the roundabout which extends slightly into West Street. There are uncontrolled crossing points on Station Road and West Street.	Yes - primary route 270	Improvements could be made to the route around the north side of the rbt or a fully signalised junction/cyclops junction could be considered.	West St. currently has no cycle provision but there appears scope to provide a fully compliant LTN1/20 facility. Western Way has no cycle provision and is unsuitable for mixed traffic.
30.2	A27 Southampton Road / Mill Lane	Mill Lane	Signalised Roundabout	This is a signalised junction in a 40mph limit. There is a shared use path on the northern side of the A27 to the west of the junction and a toucan crossing on the A27. The SUP terminates at the toucan crossing.	Yes - primary route 270	Provision of a toucan crossing on Mill Lane to connect proposed east/west route.	It is anticipated that a segregated east/west facility would be provided on the north side of the A27 to continue east of Mill Lane.
38.3	Segensworth Road East / Cartwright Drive	Cartwright Drive (S)	Priority	See 38.1 above.	Yes - connector point for secondary routes 271 and 344		

ID	Junction	Approach Arm	Junction Type	Existing Provision	Part of LCWIP?	Possible Measures	Comments
4.5	A32 Gosport Road / Newgate Lane	Redlands Lane	Gyratory	This is a very busy gyratory on the A32 with a grade separated link to Newgate Lane. The speed limit is 30mph limit. There is no cycle infrastructure at this junction.	No	The strategy is for cyclists to avoid this junction.	There is currently no cycle provision on the A32 and it is unsuitable for mixed traffic due to high speeds and volumes. The current strategy is to provide routes to the east and west.
65.2	Highlands Road / Fareham Park Road	Fareham Park Road	Priority	This is a priority junction within a 30mph speed limit. There are advisory cycle lanes on Highlands Road. No cycle infrastructure on Fareham Park Road. There is a zebra crossing on Highlands Road to the east of the junction.	Yes - secondary route 272	There is little scope to improve the existing priority junction.	Consideration could be given to providing a segregated link between Gudge Heath Lane and Fareham Park Road with an appropriate crossing facility.
4.2	A32 Gosport Road / Newgate Lane	B3385 Newgate Lane	Gyratory	See 4.5	No		
20.3	Longfield Avenue / Newgate Lane	B3385 Newgate Lane (N)	Roundabout	This is a normal roundabout within a 40mph limit. There is a shared use path on both sides of Newgate Lane with uncontrolled crossings on all arms of the roundabout.	Yes - connecting secondary routes 271 and 346	The junction could be a fully signalised Cyclops style junction or standard signalised junction with toucan crossings and cycle links.	There is currently on cycle infrastrucure on Longfield Avenue and it is is not appropriate for mixed use traffic, so may not be suitable for all users. Davis Way is lightly trafficked and not a through route.

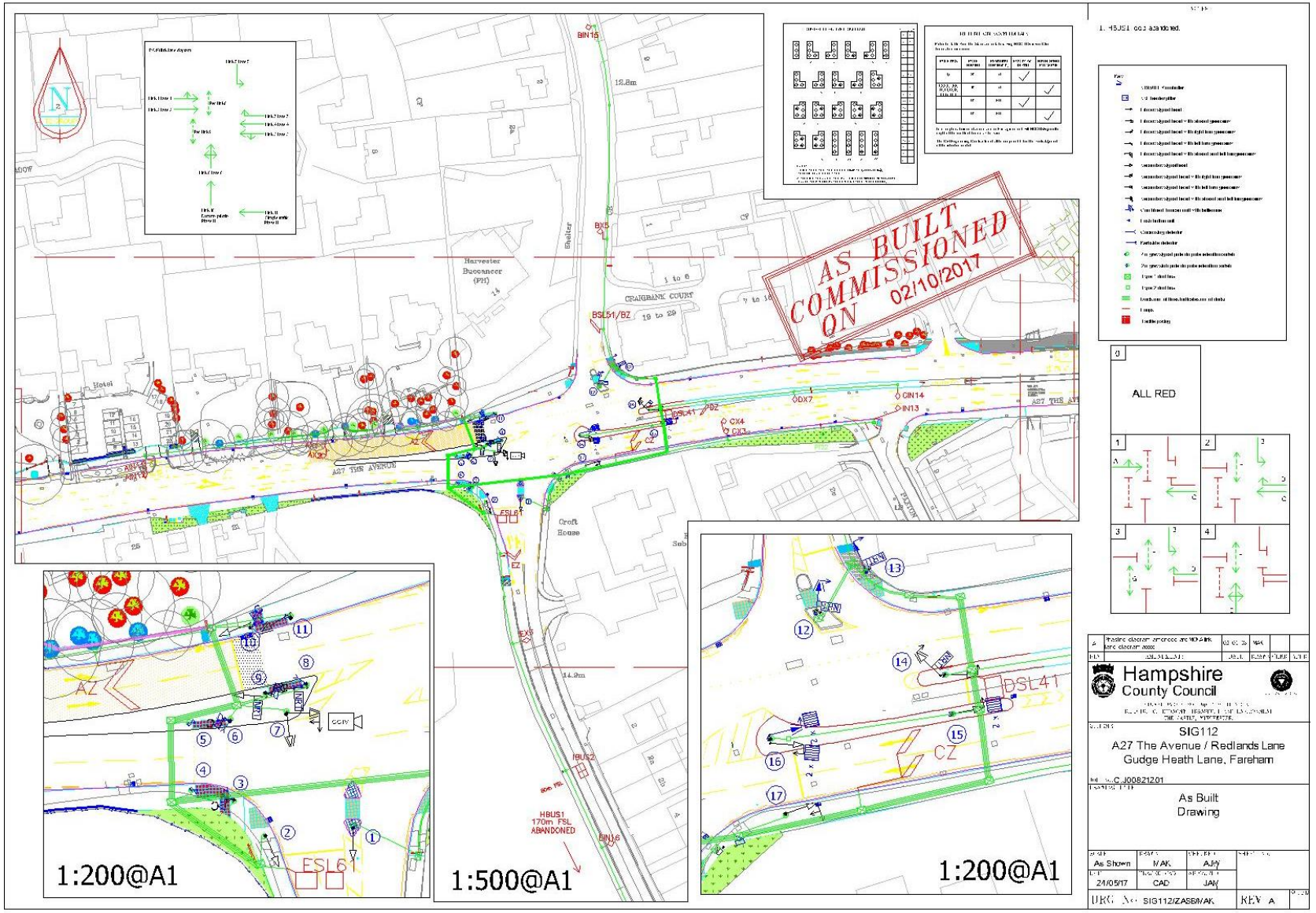
ID	Junction	Approach Arm	Junction Type	Existing Provision	Part of LCWIP?	Possible Measures	Comments
31.3	Coach Hill / South Street / Bridge Street	Bridge Street	Roundabout	This is a mini roundabout in a 30mph speed limit. South Street is 20mph to the north of the roundabout. There is no cycle infrastructure on the approaches to the roundabout. There are no designated pedestrian crossing points at the junction.	Yes	The mini roundabout could be retained if the approaches are made appropriate for mixed traffic.	The speed limit on all approaches should be reduced to 20mph to allow for mixed traffic. There is potential to consider a modal filter for Bridge Street.

PM							
ID	**Junction**	**Approach Arm**	**Junction Type**	**Existing Provision**	**Part of LCWIP?**	**Possible Measures**	**Comments**
18.2	A27 The Avenue / Redlands Lane / Gudge Heath Lane	Redlands Lane	Signalised junction	See 18.3 below.	Yes - part pf primary route 270 and connects to secondary route 275		
10.3	A32 / High Street / Wallington Way	Wickham Road (S)	Roundabout	A normal roundabout within a 30mph limit, but Wallington Way to the east is 40mph. There is a shared use path on the west side of Wickham Road and a segregated cycle track around the north side of the roundabout. These are connected by a toucan crossing on Wickham Road. There is an uncontrolled pedestrian crossing at the splitter island on Wallington Way.	Yes - part of secondary route 347	To improve conditions the existing normal roundabout could be reconfigured to a compact rbt. If roads leading to the junction are made LTN1/20 compliant then a Dutch style rbt could be considered or parallel crossings on all arms would improve connectivity.	Wallington Way would need to be reduced to a single lane in each direction to allow for a compact roundabout. Cyclists on Wickham Road (south) are currently on-road which does not comply with speeds/volumes acceptable for mixed traffic.

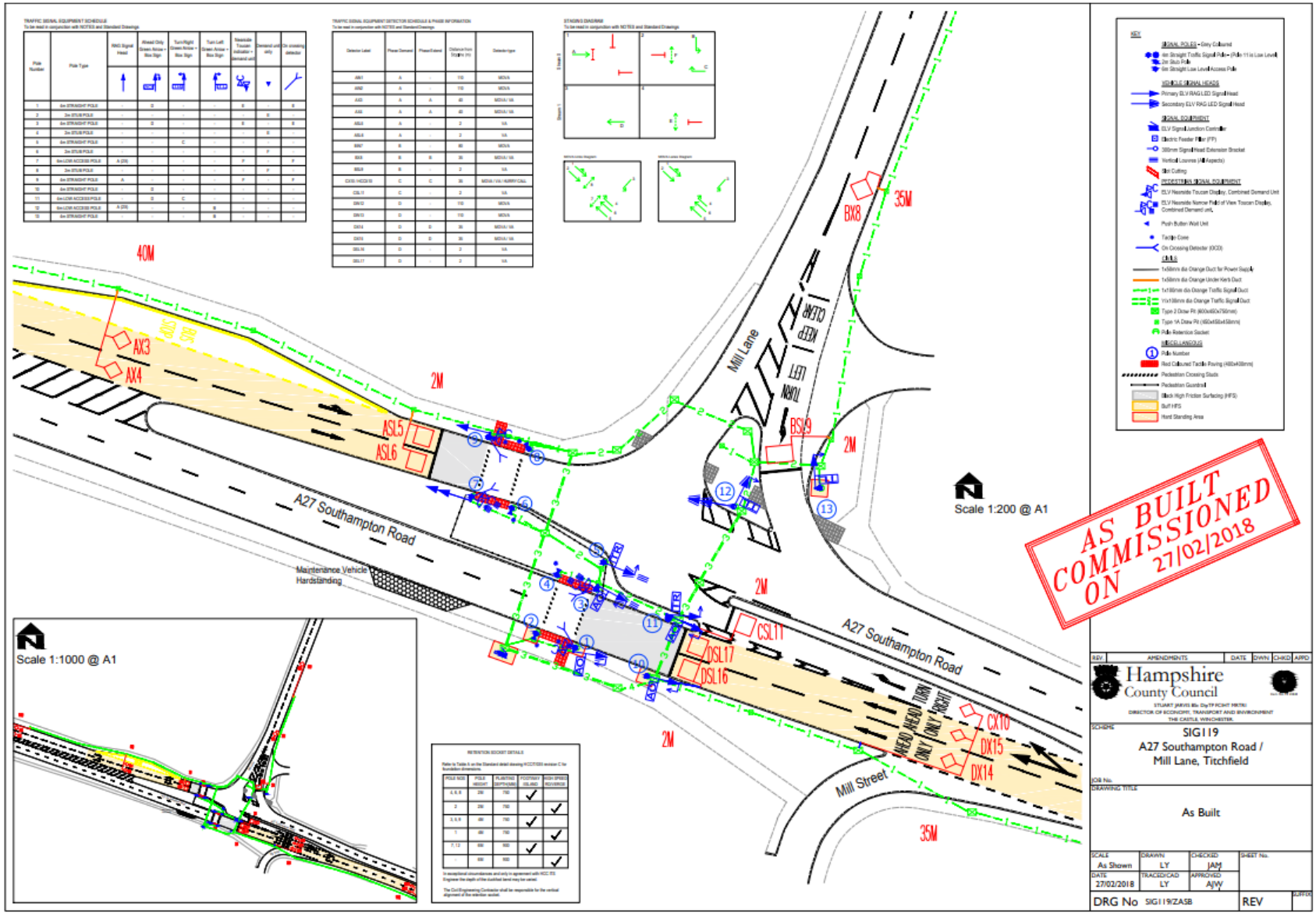
ID	Junction	Approach Arm	Junction Type	Existing Provision	Part of LCWIP?	Possible Measures	Comments
18.3	A27 The Avenue / Redlands Lane / Gudge Heath Lane	A27 The Avenue (W)	Signalised junction	A staggered signalised junction within a 30mph Speed limit. There is a shared use path along the A27, which is on the south side to the west of the junction and on the north side to the east of the junciton. There is a staggered toucan crossing on west side of junction. There is no cycle infrastructure on Redlands Lane and Gudge Heath Lane.	Yes - part pf primary route 270 and connects to secondary route 275	Provision of a toucan crossing on Gudge Heath Lane would improve the existing east/west route. If the main road approaches to the junction are made LTN1/20 compliant then a cyclops style junction could be considered, however, there are width contraints to connect route into side roads.	There is currently no cycle provision on Redlands Lane and Gudge Heath Lane so these are currently unsuitable for mixed traffic due to speeds/volumes.
24.2	B3334 Titchfield Road / Bridge Street	Bridge Street	Signalised Roundabout	See 24.2 above	Yes - secondary route 344		
28.4	Titchfield Gyratory	Titchfield Hill	Gyratory	See 28.2	Yes - part of primary route 270		
35.1	Segensworth Roundabout	A27 Southampton Rd (S)	Signalised Roundabout	See 35.4	No		
35.4	Segensworth Roundabout	Little Park Farm Rd	Signalised Roundabout	See 35.4	No		

ID	Junction	Approach Arm	Junction Type	Existing Provision	Part of LCWIP?	Possible Measures	Comments
50.3	A27 Bridge Road / Coldeast Way	A27 Bridge Road (W)		This is a staggered signalised junction within a 30mph speed limit. There is an uncontrolled pedestrian crossing on each arm of the junction. No cycle infrastructure on the A27 or the side roads.	Yes - part of primary route 270	There are land constraints along this section of the A27, but if if the approaches to the junction are made LTN1/20 compliant then a cyclops style junction could be considered.	There is currently no existing cycle infrastructure on the A27 or the side roads. Due to the traffic flows and speeds on the A27, protected space would be required for cycling.
56.3	Sweethills Crescent / Yew Tree Drive	Yew Tree Drive (E)	Priority	The junction of Sweethills Crescent with Yew Tree Drive is a priority junction within a 30mph speed limit. There is an existing shared use path along the north side of Yew Tree Drive and an uncontrolled crossing on Sweethills Crescent.	Yes - part of secondary route 342	The existing uncontrolled crossing could be upgraded to a cycle prioity crossing or parallel crossing.	The existing shared use path may not be LTN 1/20 compliant.
54.2	Botley Road/Yew Tree Drive	Yew Tree Drive	Roundabout	This is a compact roundabout within a 30mph limit. There is a shared use path on both side of Yew Tree Drive leading to the junction, but there is no cycle infrastructure on Botley Road.	Yes - part of secondary route 342	If the approaches to the junction are made LTN1/20 compliant then the junction could be a fully signalised Cyclops style junction or standard signalised junction with toucan crossings and cycle links.	Botley Road traffic volumes and speeds are not appropriate for mixed use traffic and would therefore not be suitable for all users.

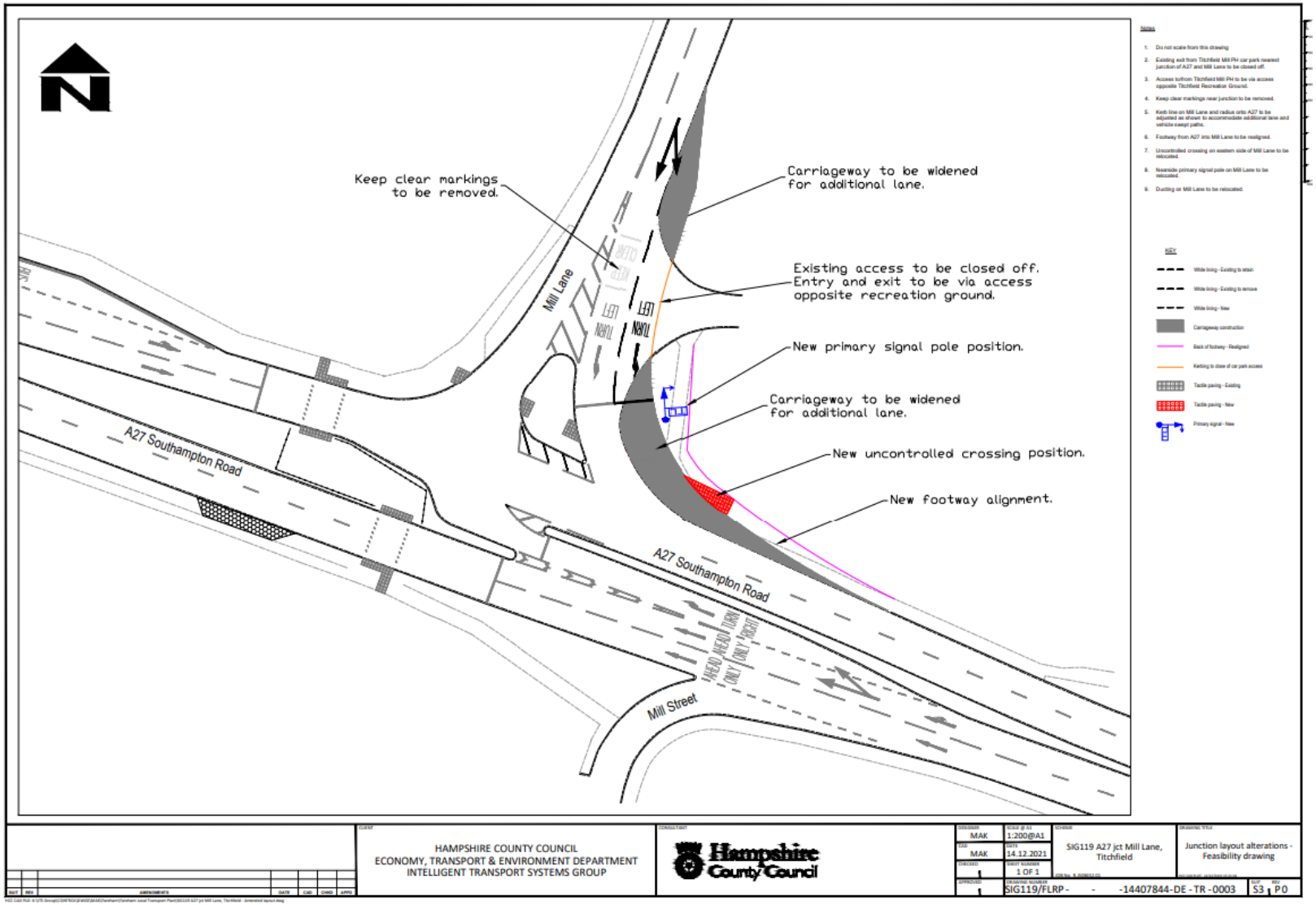
Appendix 2: Local junction modelling layouts



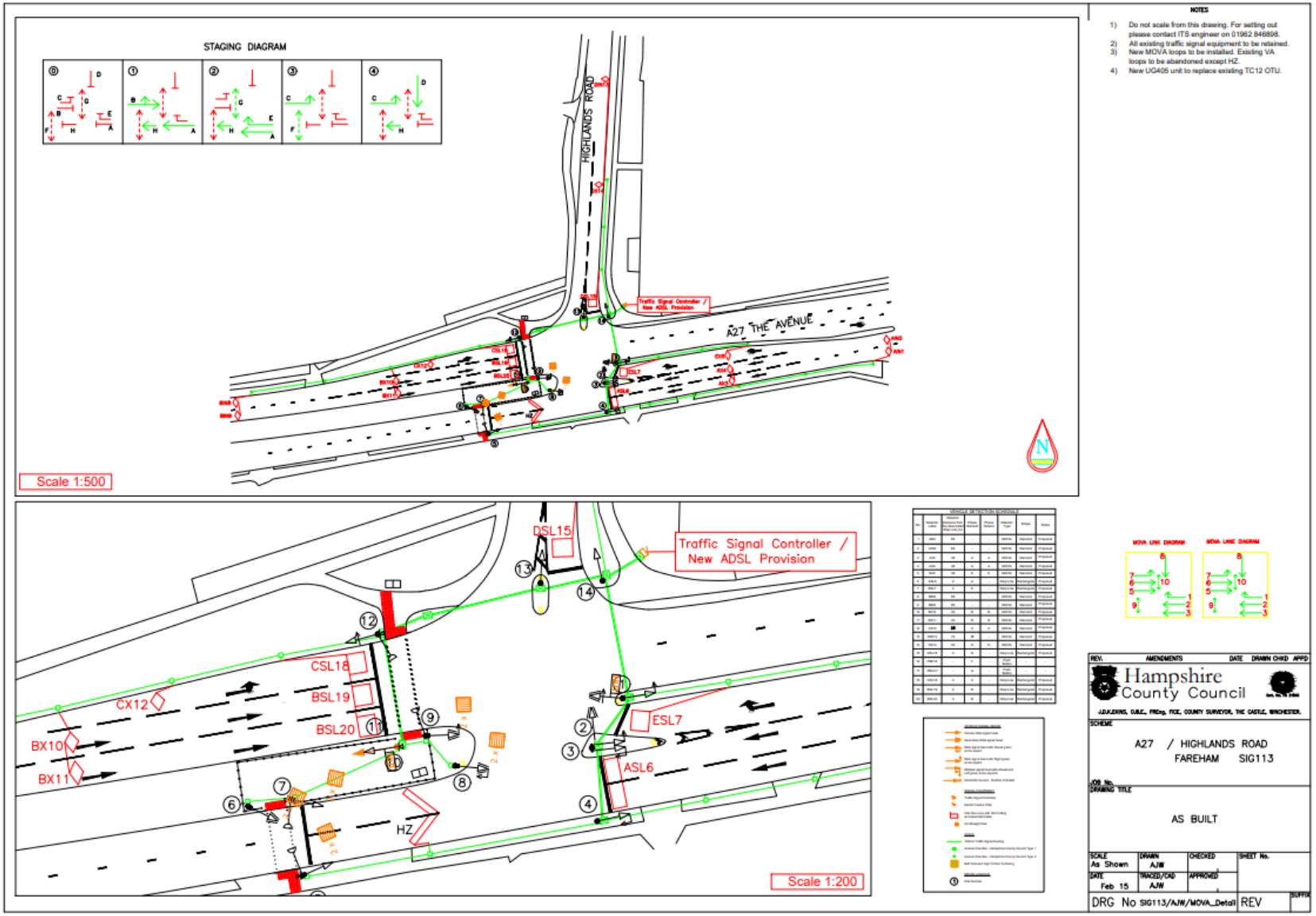
A27/The Avenue/ Gudge Heath Lane/Redlands Lane, Fareham – Option 1 (diagram 1)



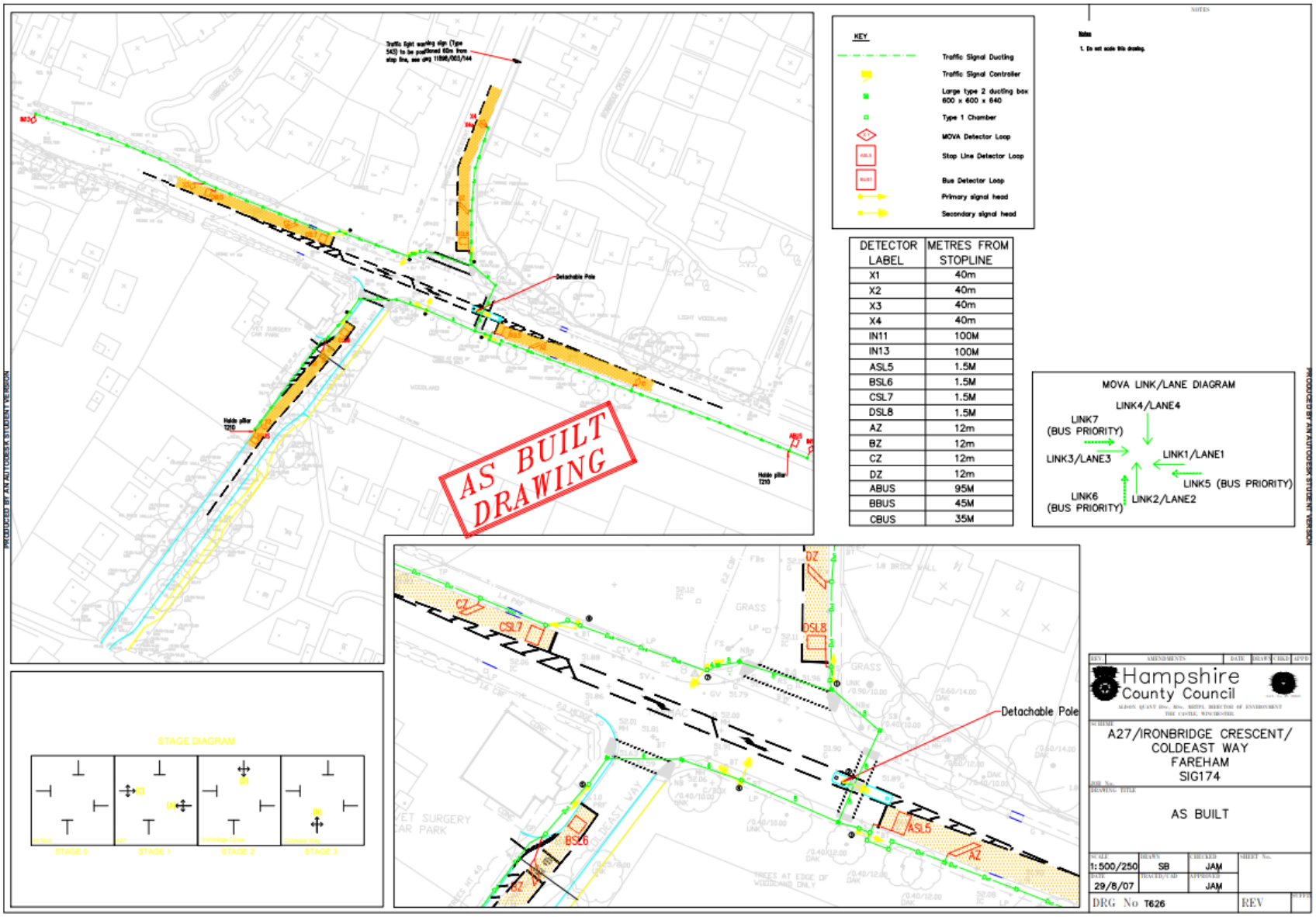
A27 Southampton Road/ Mill Lane, Titchfield - Option 1 (diagram 2)



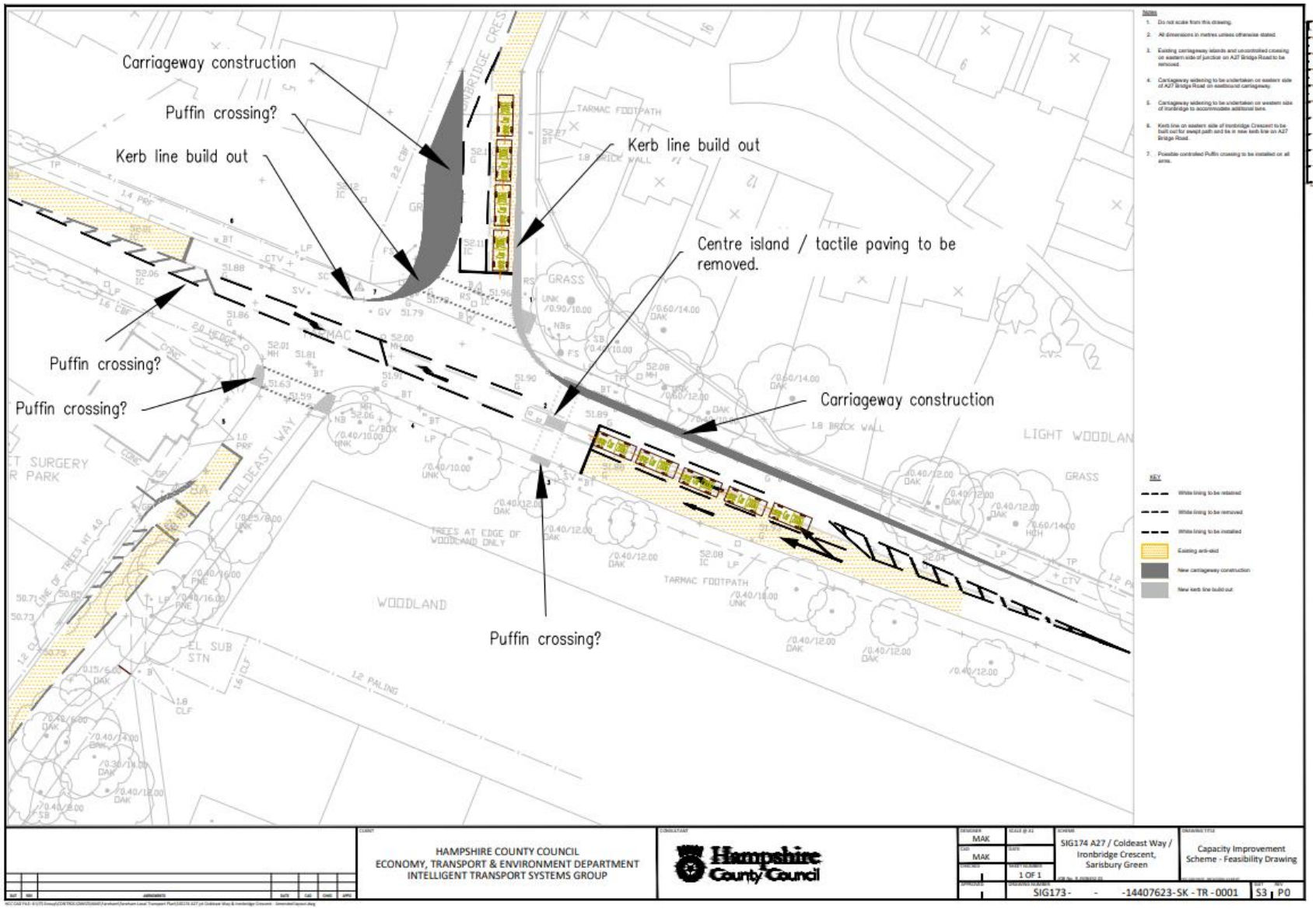
A27 Southampton Road/ Mill Lane, Titchfield – Option 2 (diagram 3)



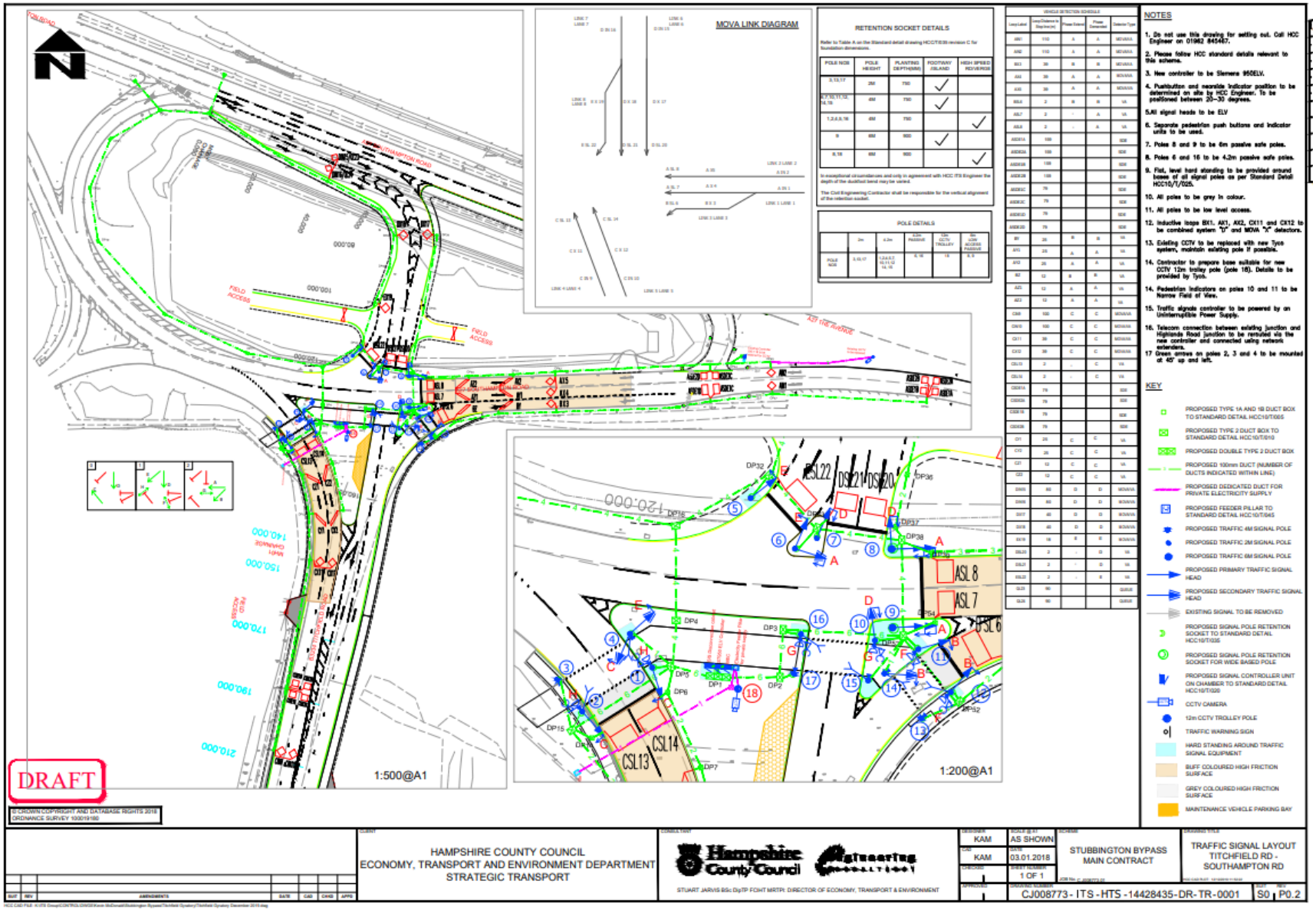
A27 The Avenue/ Highlands Road, Fareham - Option 1 (diagram 4)



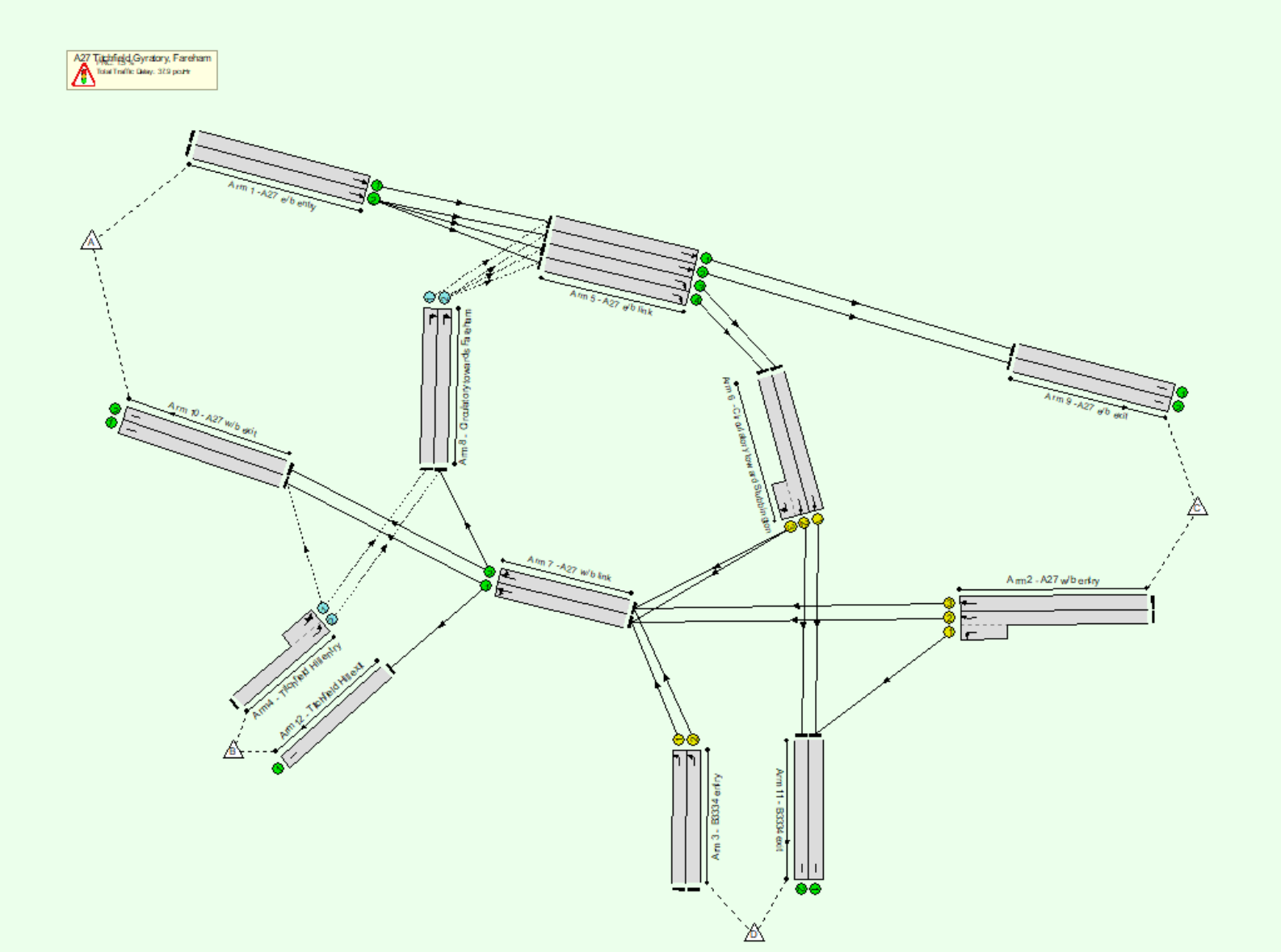
A27 Bridge Road/Ironbridge Crescent/ Coldeast Way, Park Gate - Option 1 (diagram 5)



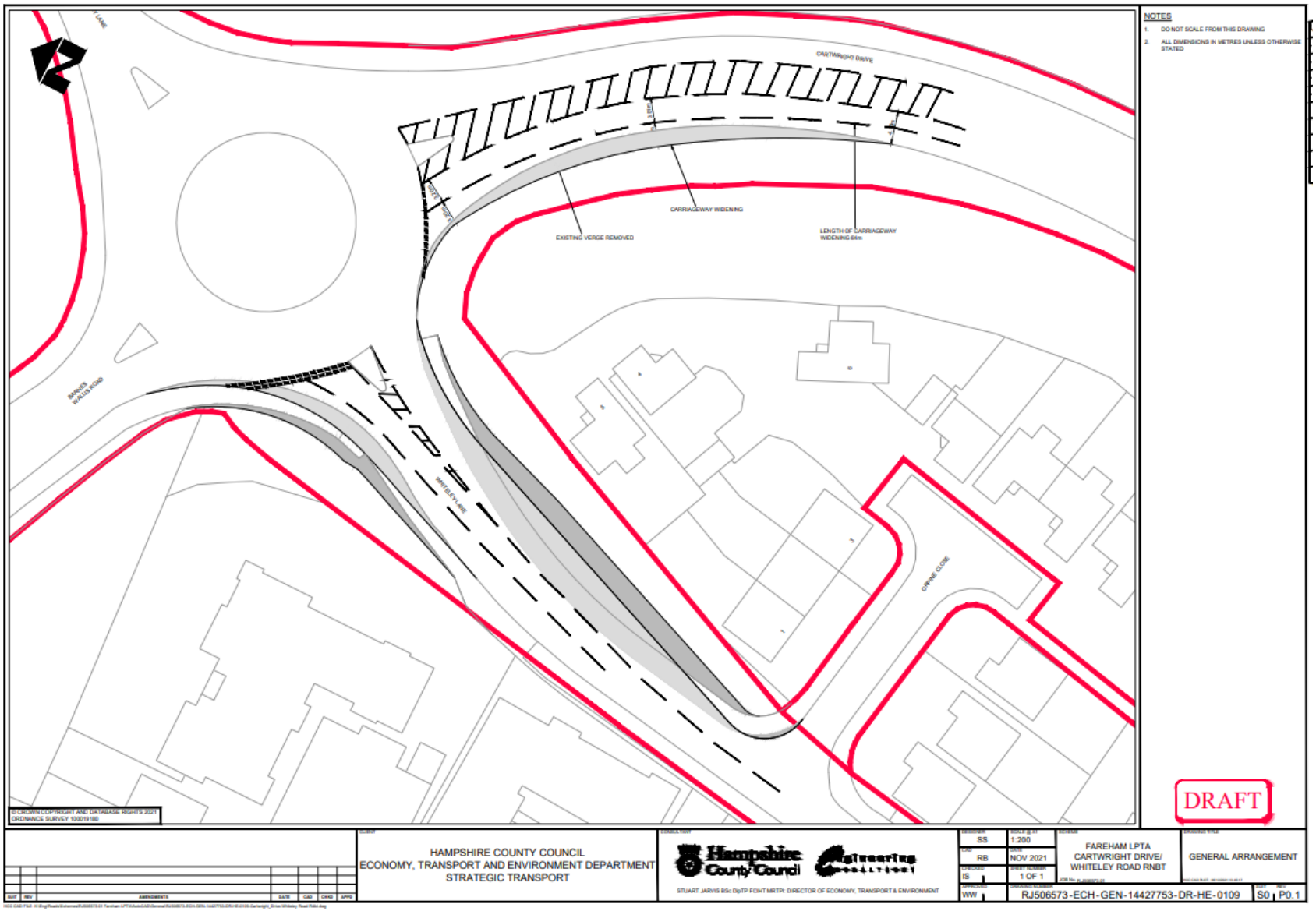
A27 Bridge Road/Ironbridge Crescent/ Coldeast Way, Park Gate - Option 2 (diagram 6)



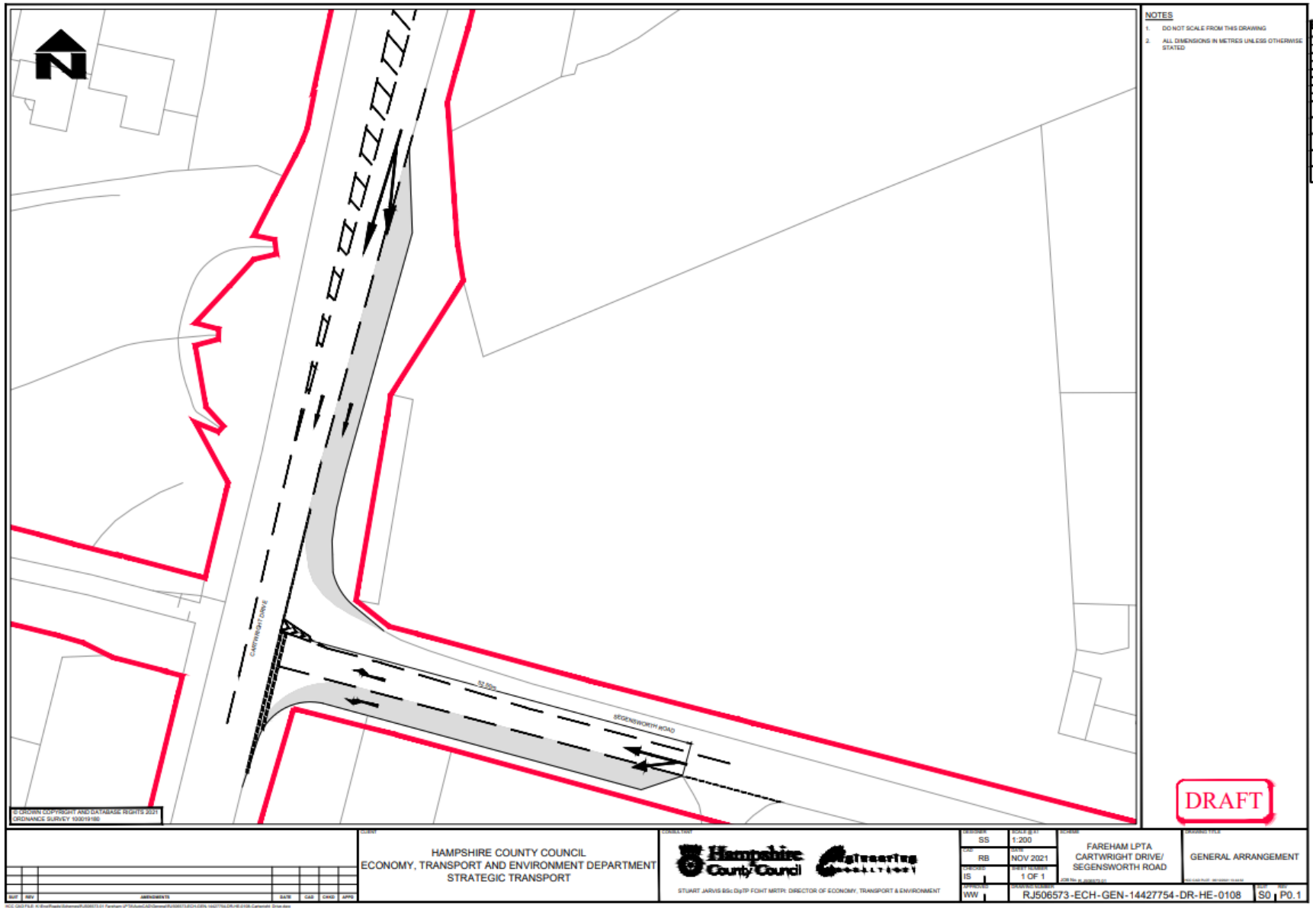
A27 Southampton Rd/B3334 Titchfield Road/ Titchfield Hill, Titchfield – Option 1 (diagram 7)



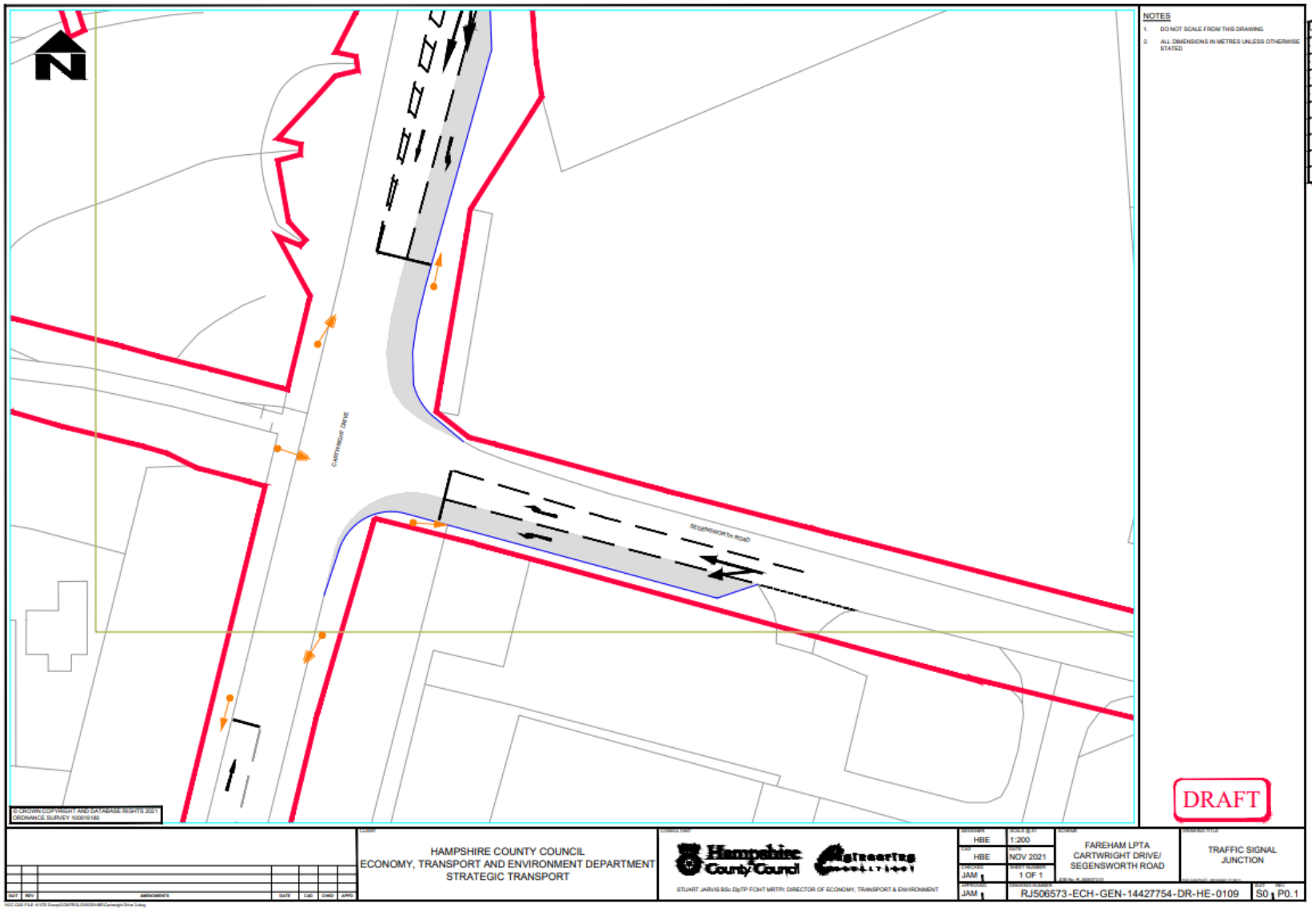
A27 Southampton Rd/B3334 Titchfield Road/ Titchfield Hill, Titchfield – Option 2 (diagram 8)



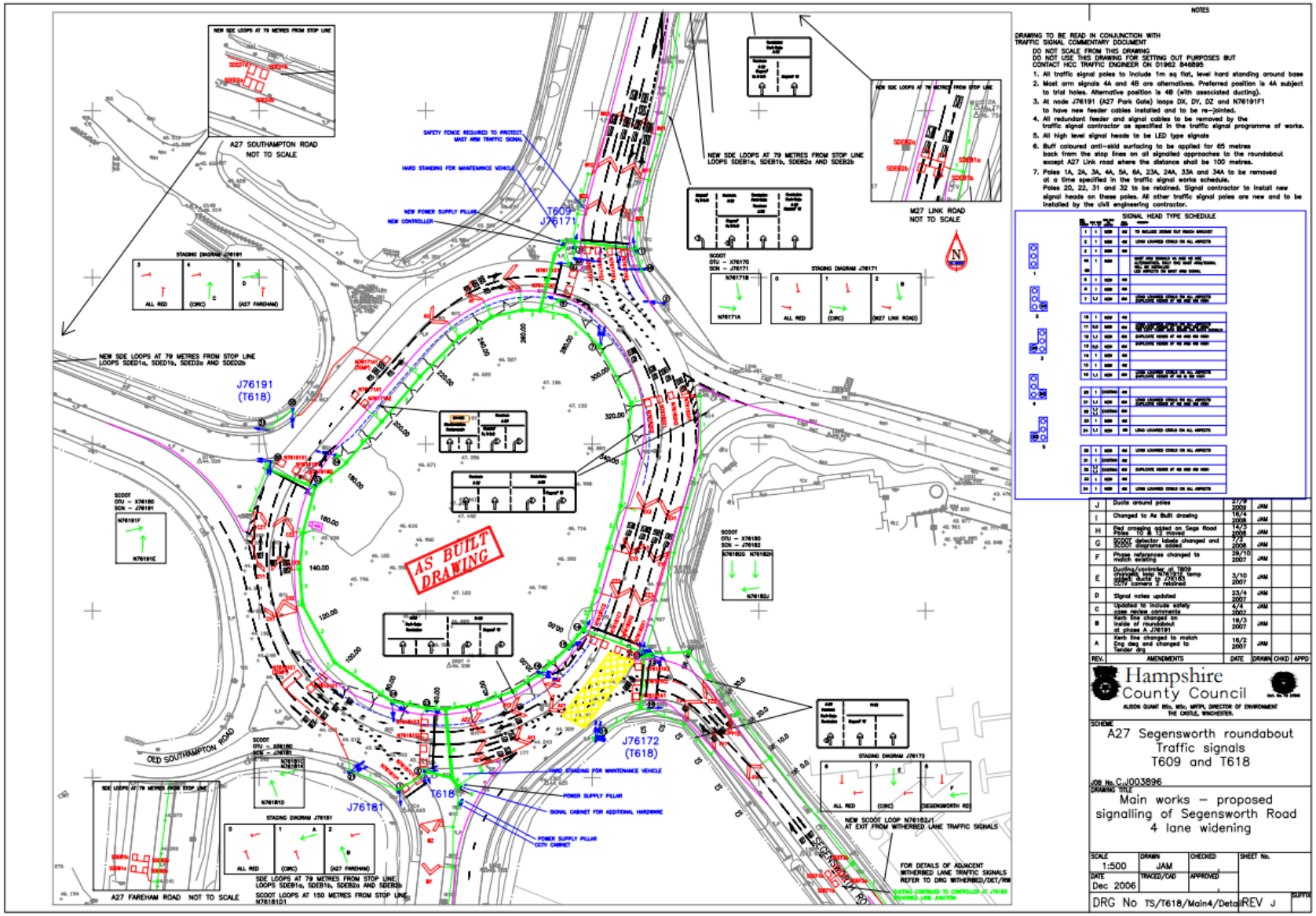
Cartwright Drive/Whiteley Lane/ Barnes Wallis Road, Segensworth – Option 1 (diagram 9)



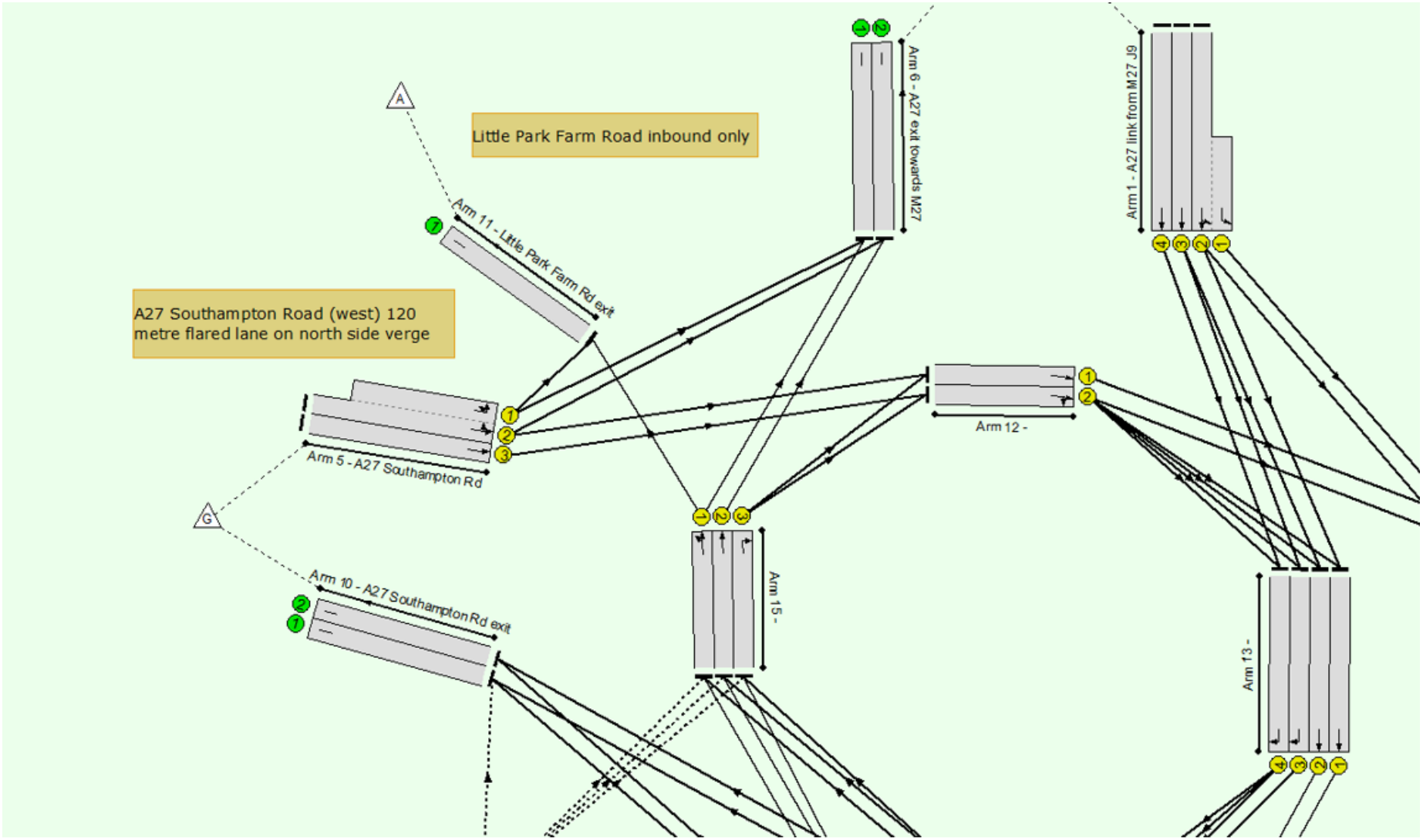
Cartwright Drive/ Segensworth Road, Segensworth – Option 2 (diagram 10)



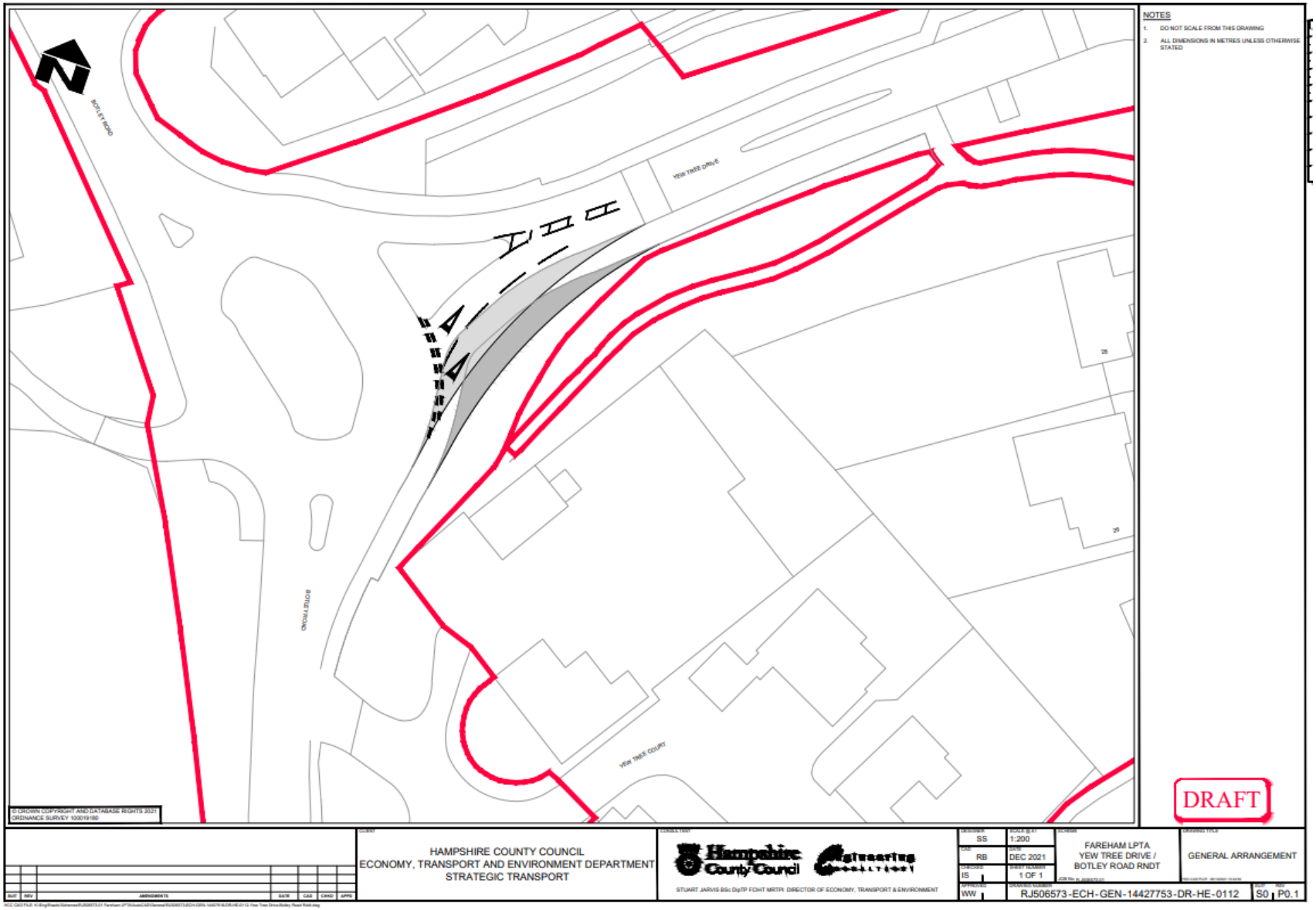
Cartwright Drive/ Segensworth Road, Segensworth – Options 5 and 6 (diagram 11)



A27 Southampton Rd/M27 link road/ Segensworth Rd, Segensworth – Option 1 (diagram 12)



A27 Southampton Rd/M27 link road/ Segensworth Rd, Segensworth – Option 4 (diagram 13)



Botley Road/ Yew Tree Drive, Park Gate – Option 1 (diagram 14)