



North Essex Rapid Transit System (RTS)

Stage 1 Options Technical Note

July 2019

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1 Introduction

Essex Highways has been commissioned by Essex County Council (ECC) to undertake Design Stage 1 (Problem Identification) and Stage 2 (Scheme Identification) of A120/ A133 and Rapid Transit System (RTS) scheme. For this project route selection has been agreed to be part of Design Stage 1. This note outlines the options developed for the RTS and provides:

1. A short summary of the routes considered.
2. Details of the sifting process of the initial options for the RTS route.
3. A summary of the advantages and disadvantages of these initial options.
4. Recommendations to what should to be discounted from / progressed to Design Stage 2.

The RTS is an element of the Housing Infrastructure Funding (HIF) bid that was submitted on 22 March 2019. In addition to the RTS, a strategic link road between the A120 and the A133 has also been proposed. Details of the link road and associated options can be found in a separate report found in Appendix L – Rapid Transit for North Essex – from Vision to Plan.

The RTS route is to connect the Tendring Colchester Border Garden Community (TCBGC), which is part of the North Essex Garden Community (NEGC) (including Park and Choose sites), with Essex University, Hythe Railway Station, Colchester Town Railway Station, the Town Centre, Colchester North Railway Station, Colchester Hospital and the existing Park and Ride site which also serves the Community Stadium.

The vehicles which will service the route is also still being investigated, both for this route and the wider network. These options have been considered in a separate report found in Appendix L – Rapid Transit for North Essex – from Vision to Plan.

Initially the route was divided into 4 sections (A through D) as identified in the Stage 1 Options Drawing Key, each section presents different opportunities or challenges. An overview of the options for sections A, B and C can be found in Appendix A – Stage 1 Options Drawing – B355363A-RTS-HGN-SW-SK-001B.

The location of the RTS stops with regard to the route is very important – the provisional RTS stop locations have also been shown on the drawing provided in Appendix A – Stage 1 Options Drawing – B355363A-RTS-HGN-SW-SK-001B for consideration along with the route.

Section D is the RTS routing within the NEGC, however, until the NEGC Master Plan emerges the interaction with the remainder of the route and the existing network cannot be finalised. Therefore, this element has been held in abeyance until the NEGC Master Plan develops.

The remaining 3 sections, their associated considered options and recommendations for options to be developed further are detailed throughout this report.

2 Section A

Section A covers the existing route of Park & Ride buses between Colchester's Park & Ride Terminal, north of the A12 Junction 28, and North Hill. Section A does not have options associated with the route location. However, there are 3 options being investigated for the format of infrastructure to be provided along the Northern Approach Road section. The infrastructure will utilise land allocated for a Rapid Transit System after the original construction of the Northern Approach Road. Along the remainder of Section A, bus priority infrastructure operates.

The common route and features of Section A are:

- A 1000 space existing Park & Ride facility north of the A12, with access shared with adjacent services and a fast food outlet.
- A12 overbridge connecting the existing grade separated 'dumb-bell' junction with the A12 (Junction 28).
- The use of existing bus lanes alongside Via Urbis Romanae and improved movement through the roundabout with Axial Way and the junction with the A134 Sudbury Road.
- Upgrades to the Mill Road / Northern Approach Road junction to allow the dedicated movement of buses through / across the junction.
- Upgrades to the Northern Approach Road / Bruff Close junction to allow the dedicated movement of buses through / across the junction.

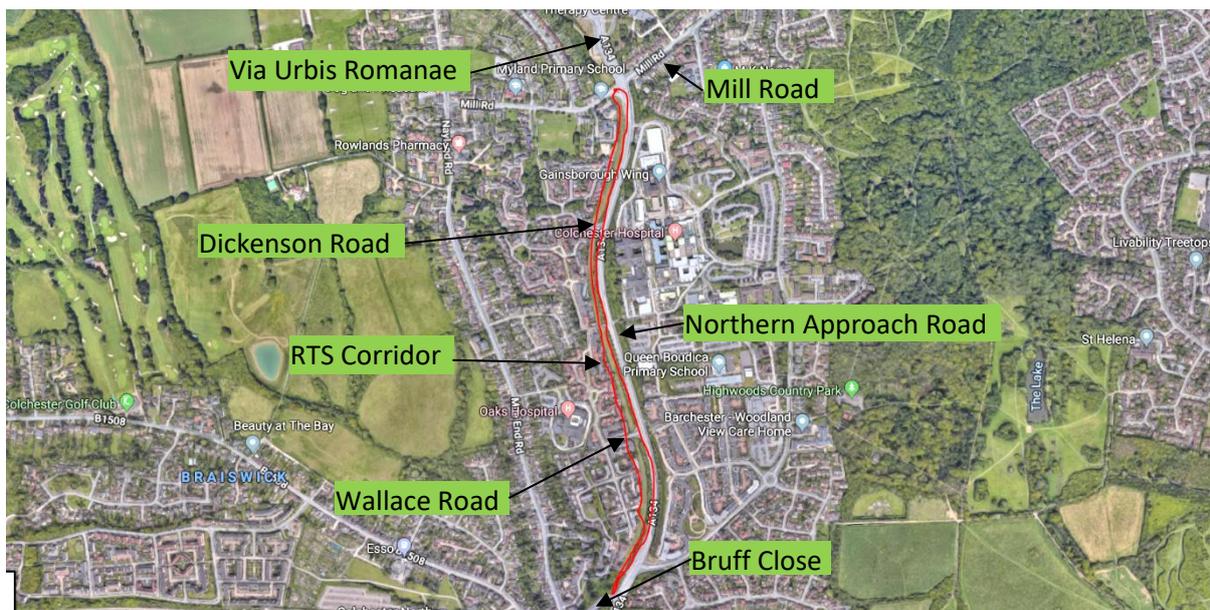


Figure 1 - Ariel View of Northern Approach Road with RTS Corridor Highlighted in Red

- Upgrades to bus facilities along Bruff Close, an existing dedicated bus facility.
- The use of existing southbound bus lanes / bus gates between the North Station Roundabout and the Albert Roundabout. Northbound there is no bus gate due to access requirements between the Albert Roundabout and Essex Hall Roundabout. Further upgrades to existing bus infrastructure to be explored.
- The use of North Station Road with the possible inclusion of a one-way system for all traffic and a contraflow RTS lane southbound towards the town centre.

- The use of the southbound bus gate and the northbound bus lane at Middleborough, leading into the start of Section B.

For the Northern Approach Road portion of section A there is the benefit of a land strip to the immediate west of the Northern Approach Road from the junction with Mill Road to the Junction with Bruff Close. This was always intended for use by a RTS and this foresight by the planner’s results in a great opportunity to provide excellent infrastructure. This available land, along with the existing provisions, has resulted in alternate routes not being considered.

2.1 Options Considered

From the junction with Axial Way to the junction with Mill Road, Section A has existing good-quality bus infrastructure, consisting of nearside dedicated bus lanes alongside Via Urbis Romanae. As this infrastructure operates effectively in prioritising the movement of existing Park & Ride buses along the northern part of Section A, this infrastructure will be able to accept RTS vehicles and continue to prioritise public service vehicles.

As discussed above the location for this section of the route is largely fixed, however, 3 layout variants for the infrastructure adjacent to Northern Approach Road have been considered:

Section A - Option 1 - Segregated Western RTS Route is the layout previous designed and agreed upon, being associated with the original construction of the Northern Approach Road. This option provides a remote RTS route separate from the existing highway. This option has the benefit of both planning approval and a significant Section 106 contribution.

Section A - Option 2 - Nearside RTS Route replicates the layout to the north of Northern Approach Road, along Via Urbis Romanae, where nearside bus lanes have been provided to both the north and south bound carriageways.

Section A - Option 3 - Segregated Eastern RTS Route requires the relocation of the existing



Figure 2 - Via Urbis Romanae

carriageway further west, into the land strip and the provision of a two way segregated RTS lane on the eastern side. The main benefit of this arrangement is removal of the RTS route conflict with the side roads of Wallace Road and Dickenson Road.

Typical cross sections for each option can be found in Appendix B – Section A Northern Approach Road Cross Sections Drawing – B355363A-RTS-HGN-SA-SK-001.

A brief summary of some of the advantages and disadvantages have been provided in matrix format on the following page.

The planning permission and S106 contribution are a significant factor in deciding on the preferred option and this issue has been explored in a dedicated technical note which can be found in Appendix C – Technical Note on Consenting: Proposed Rapid Transit Route – Section A - B355363A-RTS-EAC-SA-TN-001.

2.2 High Level Assessment

Table 1 - Section A High Level Assessment

Section / Options	Section A - Option 1 - Segregated Western RTS Route	Section A - Option 2 - Nearside RTS Route	Section A - Option 3 - Segregated Eastern RTS Route
Summary	Segregated remote RTS route separate from the existing highway, located to the west of the Northern Approach Road.	Nearside RTS lanes on both the north and south bound carriageways.	Two way segregated RTS lane abutting relocated Northern Approach Road carriageway on the eastern side.
General	<p>Advantages:</p> <ul style="list-style-type: none"> Planning permission already in place. Section 106 contributions safe. Connection at Mill Road junction partially constructed. Existing hedge planting can be retained. Level difference between RTS route and existing carriageway can be retained. Can be constructed off line so limited effect on existing network during construction. Limited amendments to Mill Road Junction and connection to Bruff Close. Already designed. <p>Disadvantages:</p> <ul style="list-style-type: none"> Conflicts with side roads (Wallace Road and Dickenson Road) and all associated footways/cycleway. Traffic signals required (Circa £1m). Both RTS and main route delayed by introduction of signals along Northern Approach Road. Difficult to access RTS stops along section and potential severance concerns. RTS vehicles located closer to properties than other options. Proximity to 'ancient' trees near Bruff Close. 	<p>Advantages:</p> <ul style="list-style-type: none"> Contiguous with northern facilities. Greater separation from properties. Retention of eastern drainage system. <p>Disadvantages:</p> <ul style="list-style-type: none"> Conflicts with side roads still present. Significant excavation required. Risk of losing S106 funding. Risk of planning permission being denied. Risk of land purchase to accommodate RTS stops. Significant risk of delay to programme resulting in delivery of the scheme beyond the HIF bid time constraint. Existing crossings points' width significantly increased. Traffic delays during construction. Loss of existing hedgerow. RTS system required to mix with regular traffic along portions of length. Significant amendments at Mill Road junction required. 	<p>Advantages:</p> <ul style="list-style-type: none"> Conflict with two side roads removed and therefore significantly improved safety for all user groups. Reduced severance for residential properties/footways/cycleways to the east. Reduced capital and revenue expenditure as two less signalised junctions, associated with side roads, are required. Improved efficiency for carriageway and RTS route as no delays introduced arising from moving alongside the Northern Approach Road. <p>Disadvantages:</p> <ul style="list-style-type: none"> Significant excavation required. Risk of losing s106 funding. Risk of planning permission being denied. Risk of land purchase to accommodate RTS stops. Significant risk of delay to programme resulting delivery of the scheme beyond the HIF bid time constraint. Traffic delays during construction. Loss of existing hedgerow. Significant amendments at Mill Road junction required.

2.3 Summary

Option 1 (Segregated Western RTS Route) has the most advantages and the least disadvantages overall and therefore this option is recommended be progressed to Stage 2.

Option 2 (Nearside RTS Route) has less advantages than both Option 1 and 3. It is therefore recommended that it is discounted at this stage.

Option 3 (Option 3 Segregated Eastern RTS Route) appears to provide a good engineering solution. However, engineering is not the only factor to be considered. It is likely that this option significantly delays the programme of delivery and therefore runs the risk of missing the March 2024 deadline as stipulated under the HIF bid. The Planning report, provided in Appendix C – Technical Note on Consenting: Proposed Rapid Transit Route – Section A - B355363A-RTS-EAC-SA-TN-001, has also been carefully considered and therefore based on significant risk of delay to the programme and associated risks for new planning application in relation to this option, it is recommended that it is discounted at this stage.

3 Section B

Section B continues the route from Middleborough and travels through Colchester's Town Centre, extending eastward out towards The University of Essex. Options in the Town Centre are largely limited to the existing infrastructure, this is due to the historic street scape, existing access requirements and one-way working. However, these elements will be further reviewed at Stage 2 of the design process and will be considered along with the Colchester Transport Strategy.

The RTS is likely to service the High Street, therefore this portion of route is common to all Section B options. A peak hour restriction is being considered at the western end of the High Street to reduce congestion for RTS services using the High Street.

There are 5 route options which were considered for this section, however, all have the following common features:

- Existing historic town centre with many listed buildings and little or no opportunity to provide additional carriageway.
- Limited on street and disabled parking.
- Some existing bus infrastructure.

The specifics of each options are detailed below:

3.1 Options Considered

A drawing highlighting the route options through the town centre associated with Section B can be found in Appendix D – Stage 1 Section B Options Drawing – B355363A-RTS-HGN-SB-SK-001.

Section B – Option 1 - Hythe Level Crossing utilises the existing bus route through the Town Centre, heads eastbound along the High Street and Southbound along Queen Street, with the westbound RTS route utilising Osborne Street and Head Street. Once southeast of the Town Centre the route uses the A134 Magdalen Street between St Botolph's Roundabout and The Hythe, before following the Hythe Station Road bus lane into Greenstead Road. At Greenstead Roundabout engineering solutions will be explored to provide dedicated RTS facilities across Greenstead Roundabout / Colne Causeway.



Figure 3 - A134 Magdalen Street Looking West



Figure 4 - Hythe Level Crossing

Section B – Option 2 - East Gates Level Crossing utilises East Hill, east of the High Street and continues along East Street and over East Gates level crossing to Greenstead Road, before following Greenstead Road until Greenstead Roundabout. At Greenstead Roundabout engineering solutions will be explored to provide dedicated RTS facilities across Greenstead Roundabout / Colne Causeway.



Figure 5 – East Gates Level Crossing

Section B – Option 3 - Rail Route utilises the existing bus route through the Town Centre, eastbound along the High Street and Southbound along Queen Street, with the westbound RTS route using Osborne Street and Head Street. Once southeast of the Town Centre the route runs adjacent to the existing rail line between Colchester Town and the Hythe, before following the Hythe Station Road bus lane into Greenstead Road. At Greenstead Roundabout engineering solutions will be explored to provide dedicated RTS facilities across Greenstead Roundabout / Colne Causeway.



Figure 7 - View from Brook Street Bridge Looking East



Figure 6 - Existing Rail Crossing of River Colne

Section B – Option 4 - Southern Route utilises the existing bus route through the Town Centre, eastbound along the High Street and Southbound along Queen Street, with the westbound RTS route using Osborne Street and Head Street. Once southeast of the Town Centre the route would head southeast along Military Road and Old Heath Road, before utilising Recreation Road, an existing dead-end road. A new section of road would need to be constructed to link Recreation Road to the western end of Colne Causeway. The route would then use Hythe Quay to reach Hythe Station Road bus lanes and onwards to Greenstead Road and Greenstead Roundabout. At Greenstead Roundabout engineering solutions will be explored to provide dedicated RTS facilities across Greenstead Roundabout / Colne Causeway.

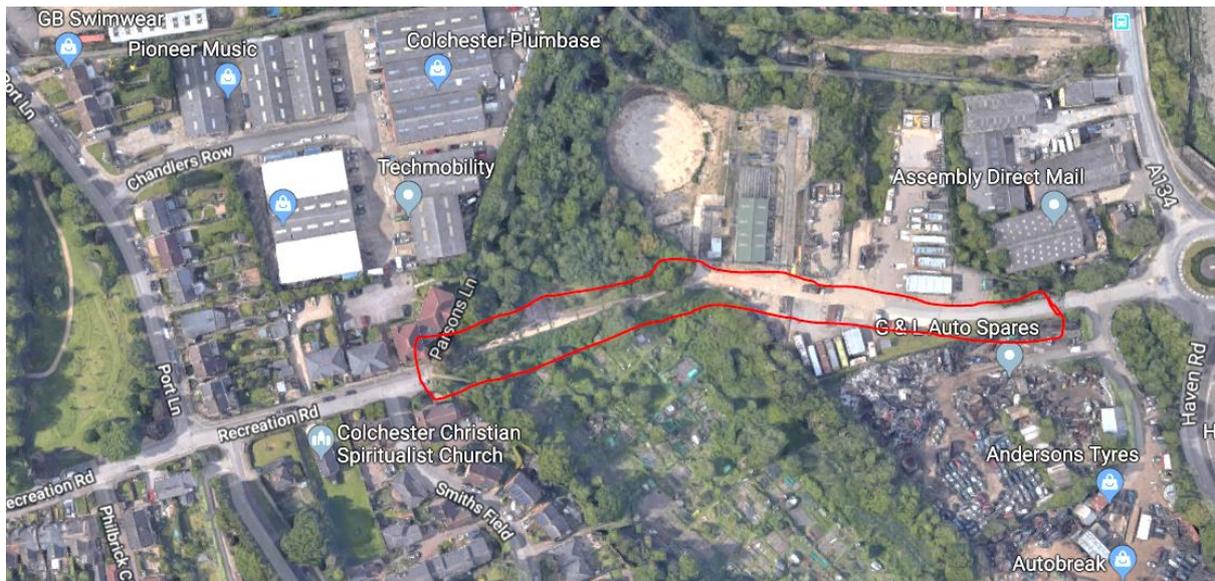


Figure 8 - Section Where New Link Would Be Required

Section B – Option 5 - St Andrews Avenue utilises East Hill, east of the High Street and continues along East Street to the Ipswich Road Junction, before heading north to the A133 / A1232 Ipswich Road / St Andrews Avenue Junction. The route would then head east towards Greenstead Roundabout. At Greenstead Roundabout engineering solutions will be explored to provide dedicated RTS facilities across Greenstead Roundabout / Colne Causeway.



Figure 9 - St Andrews Avenue

All 5 options have been carefully considered, and the advantages and disadvantages have been summarized in a matrix format on the following page.

3.2 High Level Assessment

Table 2 – Section B High Level Assessment

Section / Option	Section B – Option 1 - Hythe Level Crossing	Section B – Option 2 - East Gates Level Crossing	Section B – Option 3 - Rail Route	Section B – Option 4 - Southern Route	Section B – Option 5 St - Andrew Avenue
Summary	Town Centre to Greenstead Roundabout via A134 Barrack Street and Hythe Hill	Town Centre to Greenstead Roundabout via East Hill, East gates level crossing and Greenstead Road	Town Centre to Greenstead Roundabout via route adjacent to the existing rail link between Colchester Town Station and Hythe Station and Greenstead Road	Town Centre to Greenstead Roundabout via Military Road, Recreation Road and Hythe Quay	Town Centre to Greenstead Roundabout via East Hill, Ipswich Road and St Andrew's Avenue
General	<p>Advantages:</p> <p>Most direct and shortest route. Route identified in HIF Bid. Potential to by-pass Greenstead Roundabout and improve the pedestrian crossing/pinch point outside Tesco.</p> <p>Disadvantages:</p> <p>Significant congestion at peak hours compounded by level crossing. Would require at least one RTS gate to improve reliability, this may be poorly received. Potential associated traffic congestion (residential areas/rat runs) from implementation of RTS gates. Limited scope for further improvement along the route due to heavy residential use. Significant amendments required to Elmstead Road junction/Tesco pedestrian crossing – objections likely. On-street parking restrictions required to ensure a reliable route. There is little alternative for residents here. Businesses would need to be consulted regarding delivery options. Brook Street crossroads is already very sensitive to traffic and would need careful management.</p>	<p>Advantages:</p> <p>Avoids the heavily congested A134 eastbound. Uses existing Ipswich Road (south) and A133, which are high-capacity roads. Potential to by-pass Greenstead Roundabout and improve the pedestrian crossing/pinch point outside Tesco.</p> <p>Disadvantages:</p> <p>Has to pass Hythe/East Road level crossing – potential for significant delay during peak periods. Potential car parking/congestion on Greenstead Road. Significant amendments required to Elmstead Road junction/Tesco pedestrian crossing – objections likely.</p>	<p>Advantages:</p> <p>Direct uninterrupted route between Hythe and Town Centre. Existing corridor would cause no additional disruption. Potential to by-pass Greenstead Roundabout and improve the pedestrian crossing/pinch point outside Tesco.</p> <p>Disadvantages:</p> <p>Alongside operational railway line, would require considerable land purchase/embankment engineering, and retaining structures for existing gardens. Any construction works would need to be in compliance with Network Rail's working conditions and programme. Land does not belong to ECC, so CPO and Planning would be required with possible residential properties requiring demolition. Several bridges and underpasses will need replacement. Including the crossing of the River Colne. Vegetation clearance would remove environmental screening. Amendments to St Botolphs Roundabout proposals required, including adding signals for buses exiting the Town Railway Station area. Maintenance access would need to be maintained for Network Rail (or a new access provided). Screening fence and Road Restraints Systems would need installing to remove potential for impact and confusion of rail signals to buses and vice versa. If Network Rail remove the rail, then Essex will have substantial liability from adoption of the bridges. Significant amendments required to Elmstead Road junction/Tesco pedestrian crossing with objections likely. Potential for significant additional cost associated with major stats diversions.</p>	<p>Advantages:</p> <p>Avoids the heavily congested A134. Increases catchment area for RTS. Potential to improve the pedestrian crossing/pinch point outside Tesco.</p> <p>Disadvantages:</p> <p>Requires creation of new link road between Recreation Road and Depot Road/the western end of Colne Causeway. May require amendments to signal timings at Magdalen St/Military Road junction, affecting existing traffic flows/patterns. Land does not belong to ECC. Land may be hazardous (scrap yard next door). Increasing catchment area may detract from the intended nature of the RTS as being heavily associated with the NEGC. Existing Haven and Lathe bridges in the Hythe area are unattractive due to peak hour congestion and lack of existing dedicated bus facility. RTS would need to run north to Hythe Station Road with the potential for delay at the level crossing. Significant amendments required to Elmstead Road junction/Tesco pedestrian crossing with objections likely. Potential for significant additional cost associated with major stats diversions.</p>	<p>Advantages:</p> <p>Direct route from High Street, avoiding Queen Street. Avoids the heavily congested A134. Provides extra capacity on the A133 while keeping within the existing footprint. Uses A133 with no on-road parking and plenty of available width for extra lanes or dedicated RTS facilities. Hamburger arrangement at Greenstead Roundabout would remove RTS vehicles from the circulatory. Additional lanes on A133 Clingoe Hill would have little additional impact on queue lengths/congestion.</p> <p>Disadvantages:</p> <p>Would require signals to be installed on westbound A133 Clingoe Hill or across entire carriageway width to facilitate connectivity. Vegetation clearance would be required on Greenstead Roundabout which is subject to Tree Preservation Order. Drainage along Clingoe Hill would need to be upgraded. Physical works would be required to Greenstead Roundabout, which could potentially be disruptive to passing traffic. Potential for significant additional cost associated with major stats diversions.</p>

3.3 Summary

Section B – Option 1 - Hythe Level Crossing - A dedicated Technical Note on this option can be found in Appendix E – RTS Section B - Option 1 - Hythe Level Crossing. It details some of the engineering obstacles that would be encountered along this section.

The level crossing is a significant issue associated with this option. With 107 trains per day utilising the crossing – each requiring an average 2 minute closure along the route. This results in an estimated 214 minutes of wait time at the level crossing throughout the day, with level crossing closures concentrated around the peak times.

The remainder of the option 1 route is generally on residential streets. They are already congested and present very little opportunity road space reallocation to RTS, or even RTS priority measures. It is expected that a RTS associated traffic restriction would be required, which is likely to generate resistance and objections from residents and business owners.

Despite these issues the route is viable with regards to implementation. However, the limited opportunity for key infrastructure that will improve the RTS journey time and reliability will likely discount this option. It is recommended that this route is taken forward to the next design stage to explore whether it can meet the goals of the RTS.

Section B – Option 2 - East Gates Level Crossing - A dedicated Technical Note on this option can be found in Appendix F – RTS Section B - Option 2 - East Gates Level Crossing. It details some of the engineering obstacles that would be encountered along this section.

The level crossing is a significant issue associated with this option. With 147 trains per day utilising the crossing – each requiring an average 2 minute closure along the route. This results in an estimated 297 minutes of wait time at the level crossing throughout the day, with level crossing closures concentrated around the peak times.

The remainder of the option 2 route is generally on residential streets. They are already congested and present very little opportunity for road space reallocation to RTS, or even RTS priority measures.

Despite these issues the route is viable with regards to implementation, however, the limited opportunity for key infrastructure that will improve the RTS journey time and reliability will likely discount this option. It is recommended that this route is taken forward to the next design stage to explore whether it can meet the goals of the RTS.

Section B – Option 3 - Rail Route - A dedicated Technical Note on this option can be found in Appendix G – RTS Section B – Option 3 - Rail Route. It details some of the engineering obstacles that would be encountered along this section.

This route was also investigated in 2010 by Mouchel Rail and a report entitled ‘East Colchester Rapid Transit Link investigations into Placing a RTS Adjacent to the Colchester Town Rail Spur’ was produced as a result of this investigation. This detailed further restrictions arising from running an RTS adjacent to existing and operational rail infrastructure. This document has also been provided as Appendix A in the RTS Section B - Option 3 - Rail Route report, and therefore can be found within Appendix G – RTS Section B – Option 3 - Rail Route of this report.

Although initially this route would appear to provide a corridor suitable for RTS there are a number of site constraints along the route which would present significant and costly obstacles to its implementation. To add to these engineering issues the lack of land ownership, and therefore development rights, would further increase the cost and difficulty of implementation. Much of the existing track is also well screened by established trees, many of which would be lost if the route was implemented, exposing adjacent housing to both the railway line and RTS.

Given these issues it is recommended that this option is not progressed at this time as it would be unachievable within the timescales and budgets imposed by this project. However, this could present a viable option for future improvements to the RTS, and therefore the land should continue to be safeguarded and future developments in the locality should not obstruct this aspiration.

Section B – Option 4 - Southern Route - A dedicated Technical Note on this option can be found in Appendix H – RTS Section B - Option 4 - Southern Route. It details some of the engineering obstacles that would be encountered along this section.

The issues include land purchase requirements, access requirements and extensive static diversions in conjunction with the fact that the route is significantly longer than other options and not without site restrictions or congestion.

Given these issues, it is recommended that this option is not progressed any further and discounted.

Section B – Option 5 - St Andrew Avenue - A dedicated Technical Note on this option can be found in Appendix I – RTS Section B – Option 5 - St Andrews Avenue. It details some of the engineering obstacles that would be encountered along this section.

This report concludes that this option presents the most opportunities for improvement to the existing network and therefore potential for journey time / reliability measures along a RTS route and it is recommended that this option be taken forward to the next design stage.

It is therefore recommended that options 1, 2 & 5 are progressed to the next design stage and associated public consultation.

4 Section C

Section C covers the area between Greenstead Roundabout and the proposed TCBGC. There are 3 options considered for this section of the route with the specifics of each detailed below:

4.1 Options Considered

Section C – Option 1 (University) utilises existing roads within Essex University’s grounds which have existing bus gates and ANPR barrier systems. These are private roads and agreements with the University will be required to facilitate their use as part of the RTS. East of the University new road construction would be required to allow dedicated access into the NEGC by crossing the A133 Elmstead Road. Details of new infrastructure and upgrades to existing, roads to be utilised and stop location(s) are all subject to ongoing negotiations with the university and the NEGC Master Plan.

Section C – Option 2 (A133) is to install RTS lanes along the A133 (configuration and extent to be determined) between Greenstead Roundabout and the proposed junction with the A120 / A133 link road. This will provide a link into the TCBGC. The location and details of this junction with the NEGC are still to be decided and subject to the NEGC Master Plan. A typical cross section of this option has been provided in Appendix J – Section C Option 2 A133 / Clingoe Hill Cross Sections Drawing – B355363A-RTS-HGN-SC-SK-001.

Section C – Option 3 (Direct) makes direct access into the southwestern area of the NEGC via infrastructure which is still to be determined. The location and details of this access into the NEGC are still to be decided and subject to the NEGC Master Plan.

4.2 Summary

The University of Essex is a major stakeholder in this portion of the RTS route, therefore a meeting was held on 20th June between ECC, Jacobs and representatives from the university. The options were discussed along with the construction programme.

It was agreed that the proposals in this area were to be phased, with Option 2 (A133) initially developed to provide patronage from a Park & Choose off the A120 / A133 link road whilst the NEGC is developed. Option’s 1 and 3 should develop in conjunction with the NEGC Master Plan to ensure when patronage from the developing community increases, there is suitable infrastructure in place. As there is intention for the link road to be implemented before the RTS infrastructure is constructed, this approach would seem to fit well with the construction plan.

It is therefore recommended that all 3 options are taken forward to the next Stage.

There may also be further options which emerge from the Master Plan, for example a spur from the A133 allowing RTS vehicles to service the university via the Knowledge Gateway. These options will also be considered in the later design stages.

5 Section D

Section D covers the RTS routing within the TCBGC. However, until the NEGC Master Plan emerges, the interaction with the remainder of the route and the existing network cannot be finalised. Therefore this element has been held in abeyance until the NEGC Master Plan develops.

6 Other Considerations

6.1 Environmental Implications

As well as the engineering considerations detailed in the previous pages, the environmental implications have also been considered and a dedicated technical note produced. This can be found in Appendix K – Environmental Risk Assessment. This report identifies high level environmental concerns for all sections and options.

7 Conclusions

For Section A, it is recommended that Option 1 to be taken forward and Options 2 and 3 to be discounted.

For Section B, it is recommended that three options are progressed to the next design stage and associated public consultation, these are:

- Option 1 (Hythe Level Crossing)
- Option 2 (East Gates Level Crossing)
- Option 5 (St Andrews Avenue)

For Section C, a phased approach is recommended that initially makes use of the A133 whilst the NEGC is under construction. Later, when patronage increases directly from the NEGC, further route options and associated infrastructure will be explored which may also service the University of Essex.

The Stage 1 sifting has clearly discounted some options and the process has led to preferred routes being identified for the client's agreement for progression to Stage 2, where engineering measures and resulting benefits to journey times / reliability can be investigated.