



A120/A133 Link Road

Stage 2 Options Technical Report and
Preferred Route Recommendation
February 2020

Document Control Sheet

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Executive Summary

The A120/A133 Link Road is to run from the A120 to the A133 and is located at the border of Tendring and Colchester. It is part of the A120/A133 Link Road and RTS (Rapid Transit System) scheme that was granted Housing Infrastructure Funding (HIF) in August 2019.

The Link Road comprises a dual all-purpose (D2AP) carriageway with a grade separated junction at the A120 and at-grade junction at the A133.

During Stage 1 a number of options were initially generated and then tested against the scheme objectives. Some options did not meet these objectives and were eliminated at that stage. Options 1A, 1C, 1D and 3 were taken forward following the sifting exercise and further developed during Stage 2.

A non-statutory public consultation was undertaken between November 2019 and December 2019, where the above options were exhibited. In addition to the main link road options, two options for the A133 at-grade junction were developed and included as part of the consultation.

The potential A120 junction extents were identified but within this length of the A120 there are a small number of significant constraints including a petrol station, Waste Transfer Station and adjacent properties, Strawberry Grove wooded area, Turnip Lodge Lane (a protected lane) and overhead 132kV power lines.

The options were assessed against a number of criteria that included environment, engineering constraints, Stakeholders' feedback, number of properties affected and cost.

The initial assessment indicated that Option 1C was the best performing out of all the 4 options. However, there were certain constraints within this option such as cost, effect on Turnip Lodge Lane and long access road to the petrol station that isolated Strawberry Grove that required modification if it was going to be viable.

The assessment of A133 at-grade junction indicates that the Western option is better performing compared to the Eastern option.

Therefore, a variant of Option 1C has been developed that addresses some of the issues inherent with Option 1C. Option 1C Variant shares many of the features of Option 1C including the location of the grade separated junction at the A120. The main difference between Option 1C and Option 1C Variant are:

- The long access road to the petrol station south of Strawberry Grove has been removed. The new proposed access road to the petrol station now runs parallel to and alongside the A120 westbound on-slip. The new access road, however, might encroach into the northern edge of the Strawberry Grove;
- The proposed Option 1C Variant no longer passes through and severs Turnip Lodge Lane. To minimise the effect of the Link Road on this protected lane, Option 1C alignment has been moved slightly to the east in this area and the Link Road now passes through Turnip Lodge Lane/ Tye Road junction instead;

- The route then tracks south west to the Western at-grade roundabout at the A133, west of Blossomwood Cottage.

It is recommended that Option 1C Variant incorporating Western A133 at-grade junction to be taken forward to the Cabinet for approval as the Preferred Route.

1 Introduction

1.1 Introduction and the Housing Infrastructure Fund (HIF) bid.

Essex County Council bid successfully for HIF, a capital grant to deliver infrastructure and public transport measures to facilitate the Tendring Colchester Borders Garden Community (TCBGC), part of the North Essex Garden Communities (NEGC) concept.

The subject of this report is the major highway infrastructure element of the HIF bid - the proposed Link Road between the A120 in the north and the A133 in the south which will facilitate development of the site and be the primary means of access to it.

Whilst a layout for the Link Road was shown for illustrative purposes in the HIF bid, a number of alignment options have been generated and this report follows the technical optioneering of the sifted options with the aim of recommending a preferred option. Other disciplines' reports will feed into this study along with details of the non-statutory consultation exercise.

2 Objectives and Scope

2.1 Objectives

The proposed Link Road has two primary objectives:

- Provide connectivity and serve the Garden Community
- Provide additional capacity to relieve existing/future pressure on the A120 and A133.

2.2 Scope

The Garden Community is proposed to be sited between the A120 and A133 immediately east of Colchester, with a buffer zone between it and nearby village of Elmstead Market. The Link Road is to connect the A120 and A133 and provide the primary means of access to the development, and therefore be as closely associated with the Garden Community as possible.

2.3 Function of Road

The function and nature of the road was discussed in Working Group meetings between NEGC and Essex Highways and the agreed outcome was that the Link Road would initially:

- Facilitate the development and its growth, and serve as the primary highway access to the Garden Community, providing connectivity with the local as well as strategic road network. It will function alongside the proposed Rapid Transit System (RTS) to facilitate the movement of people into and out of the site;
- Act as a link road between the A120 and A133 and reduce congestion on these two roads, including maintaining traffic flows on the A120 below saturation limits following the Garden Community development;
- Be located such that it generally forms an eastern boundary to the residential allocation of the Garden Community;
- To have adequate capacity to accommodate the design traffic flows; and
- be subject to, as far as possible, a self-enforcing 50mph speed limit.

However, discussion also took place on the nature of the road changing in the future when its importance as a vehicular link is reduced and a high modal shift is achieved with utilisation of the RTS and other non-motorised options. This also formed part of a discussion with the Essex Highways Network Assurance and Road Safety Engineering teams.

2.4 Other considerations

All options, if possible, are to try to avoid encroachment into existing residential property boundaries. The options are to also avoid passing through Allen's Farm to allow its continued operation.

The Great Eastern Mainline Railway crosses the A120 approximately 370m west of the western edge of the TCBGC boundary. Impacting on the railway line and land, will add a significant amount of time and governance to the project, which is to be avoided. Therefore, this marks the westernmost limit of the site, and the lengths of the new A120 merge/diverge will be tied in prior to this point.

Approximately 1.5km southeast of the petrol station and on the southern side of the A120 is the Grade II* listed Elmstead Hall and the Grade I listed Church of St Anne and St Lawrence. The A120 enters a cutting when it passes these listed buildings approximately 220m to the north. Any construction between the A120 and these buildings will have an impact on the setting of these listed buildings. Also just west of this location is an accommodation and public right of way bridge over the A120 located close to the start of the A120 in cutting and hence this may be a suitable eastern extent of the scheme.

There are no grade-separated junctions currently along the A120 between the A12 and A133 but there are several overbridges. A desirable aim of the scheme is to construct slip roads/merge diverges away from overbridges to avoid the need for them to be replaced with larger span structures. If however the junction can be positioned at the same location as an existing overbridge, then at worst the demolition of an existing structure and construction of new may be required.

Adjacent to the A120, the Waste Transfer Station and adjacent premises (rereferred to in this document for simplicity as WTS) is to remain operating during and after construction even though a new access will need to be provided and the existing one closed due to the proximity of the new junction. It is apparent that the petrol station opposite is more significantly impacted by the options.

There is an approximately seven hectare flooded ex sand and gravel extraction pit southeast of Allen's Farm. If the road were to pass over or near to this it would involve a structure and hence significantly increase costs over typical road construction, so this is to be avoided.

There is no specific locational requirement for the Link Road junction with the A133 other than to place it in the vicinity of where shown on the Garden Community Concept Framework.

3 The Options

Please refer to Figure 1 for a schematic layout of the options.

3.1 Option 1

This option is broadly the one that was indicated on the HIF bid. Four variants of this option were drawn up with the location of the new A120 junction in the north being the significant difference between the four variants. The variants of this option are approximately 2km long.

The main features of this option are:

- Grade separated 'dumb-bell' junction with A120 located east of the A120 petrol station;
- At-grade roundabout junction with the A133 east or west of Blossomwood Cottages;
- Dual two-lane link road, 85kph design speed;
- Provision of new access roads to WTS and petrol station;
- Roughly north/south alignment, along the eastern edge of the Garden Community site.

The locations of the centre of each option's junction with the A120 and A133 are:

- Option 1A – The grade separated junction is positioned at Strawberry Grove Wood, approximately mid-way between the petrol station/WTS and the overhead power lines. This option joins the A133 at the western roundabout position;
- Option 1B – The grade separated junction is located at a point where overhead power lines cross the A120, on the basis of the power lines being buried as part of the development. This option joins the A133 at the eastern roundabout position;
- Option 1C – The grade separated junction is located east of overhead power lines crossing the A120. This option joins the A133 at the eastern roundabout position;
- Option 1D – The grade separated junction is located between the petrol station/WTS site and Strawberry Grove. This option joins the A133 at the eastern roundabout position.

3.2 Option 2

This is the most easterly option. Three variants of this option have been considered. Options 2A and 2B are approximately 2.6km whilst Option 2C is 2.1km.

The main features of this option are:

- Grade separated 'dumb-bell' junction with A120 with 1km weaving length to retained petrol station and WTS at-grade accesses;
- At-grade roundabout junction with the A133, with three potential locations;
- Dual two-lane link road, 85kph design speed;
- A120 junction located just north of St Anne and St Lawrence's Church and Elmstead Hall;
- The variants pass either side of the lake, but all are to the east of Allen's Farm.

No variants of this option were taken forward following the sifting exercise that was undertaken during Stage 2, prior to non-statutory consultation.

3.3 Option 3

Similar to Option 1, roughly north/south but veering to westward at the northern end. This option is approximately 2.4km long.

The main features of this option are:

- Grade separated 'dumb-bell' junction with A120 located west of the petrol station and WTS utilising the point at which Bromley Road crosses over the A120;
- At-grade roundabout junction with the A133 west of Blossomwood Cottages;
- Dual two-lane link road, 85kph design speed;
- Links to Bromley Road from A120 junction 'dumb-bell';
- Current access/egress to the petrol station closed and replaced with a new access road via a proposed Link Road intermediate roundabout;
- Access to WTS closed – new access off Bromley Road.

3.4 Option 4

This is the most westerly option. This option is also the longest at approximately 2.9 km.

The main features of this option are:

- Grade separated 'dumb-bell' junction with A120 located west of the petrol station and WTS utilising the existing position of the Springvalley Lane overbridge which would be removed and replaced on a different alignment;
- At-grade roundabout junction with the A133 west of Blossomwood Cottages;
- Dual two-lane link road, 85kph design speed;
- Additional roundabout junction with Bromley Road is required and the link to the petrol station also provided off this roundabout;
- Existing petrol station merge and WTS diverge removed. Access to WTS off Bromley Road.

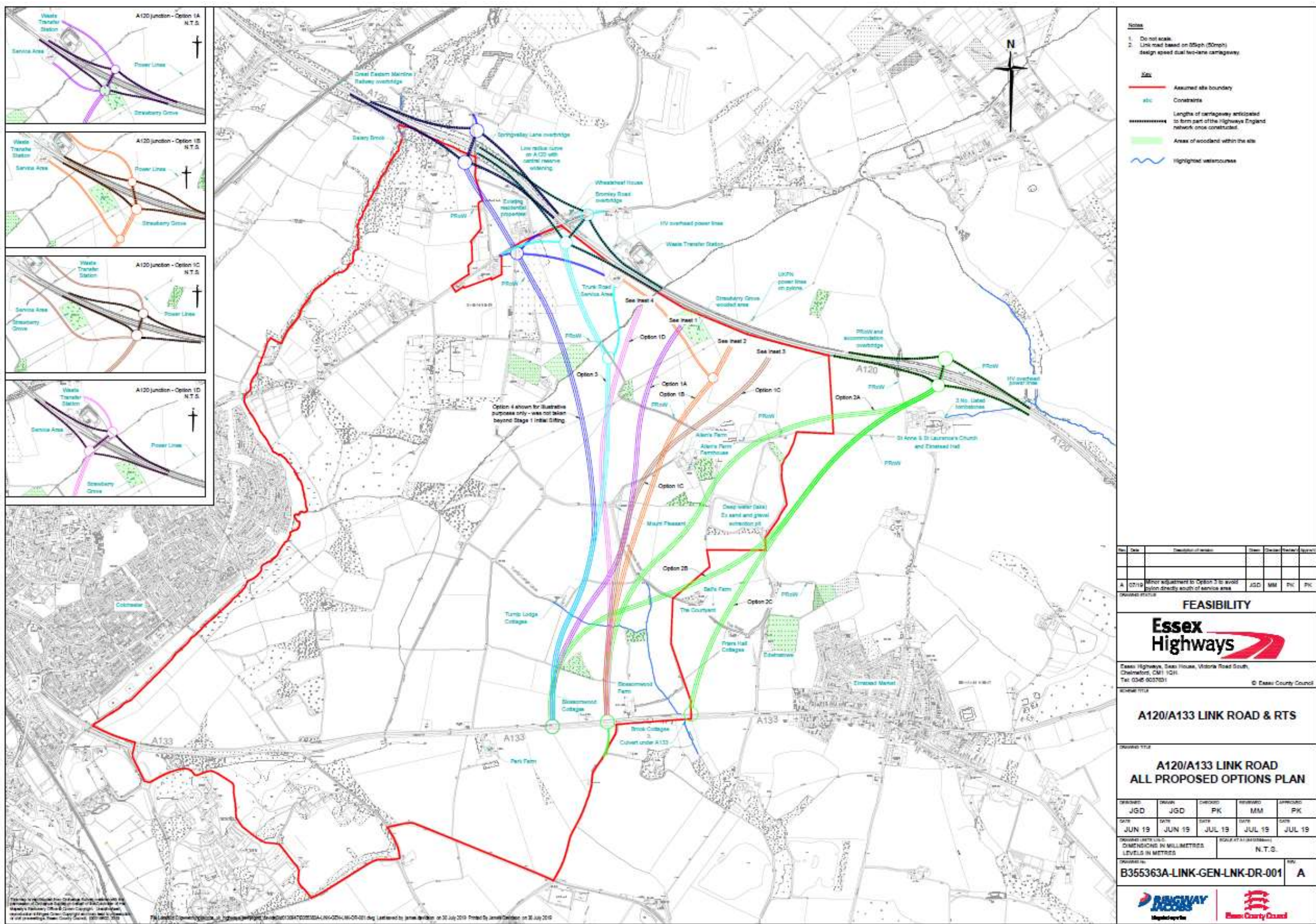


Figure 1 – All original options

4 Options Discounted at Stage 1 Initial Sifting

4.1 Option 4

Option 4 was discounted at initial sifting for a number of reasons. Primarily for the significant impact on a number of residential properties in the north west corner of the site between the A120 and Bromley Road off Springvalley Lane in an area that has been excluded from the NEGC boundary. The scheme would require compulsory purchase of some of the properties and there is unlikely to be sufficient justification, particularly as they are excluded from the extents of the published outline Garden Community proposals.

The Garden Community Concept Framework Park and Choose, Employment and Town Centre areas are to be located in the north east corner of the site near to the A120. With Option 4, another key route would need to be constructed from the Link Road providing access into the north east corner, (not off the A120) passing through the Garden Community residential areas, or require a redesign of the Concept Framework.

This option was also the longest. It would sever the site and cause noise and visual intrusion to the residential areas on both sides. It will also be a barrier to east/west passage for all highway user groups. Whilst a route through the middle of the site may give quicker access to all areas, the Link Road may then fail the key objectives as its use for internal Garden Community journeys would hinder its function as a key link between the A120 and A133 and as a result not relieve the pressure on these roads. Finally depending on more detailed design work with topographical survey there is a risk the position of the replaced Springvalley Lane overbridge would mean that the west-facing slip roads cannot be fitted in prior to the railway bridge.

4.2 Option 2

In the early part of Stage 2 it was concluded that the variants of Option 2 did not meet the objective of providing connectivity and serving the Garden Community because the variants are all generally beyond the eastern limits of the proposed site. The connections into the development would be long, create severance and sterilisation of land, and significantly increase land acquisitional requirements over the Garden Community area. This decision was made on the basis that one of Option 1 variants or Option 3 would allow a compliant design in relation to the new junction and closure of existing accesses onto the A120. It would also have the largest impact on Elmstead Hall and St Anne and St Lawrence's Church, Elmstead Market village and operations surrounding Allen's Farm.

4.3 Option 1B

Option 1B was put forward because at this position, power lines aside, there was potential to avoid major encroachment into Strawberry Grove and be a manageable distance from the petrol station and WTS to the west and the accommodation bridge to the east. Even though the proposed carriageway levels did not give adequate clearance to the 132kV overhead power lines, it was assumed that this matter would be resolved if the existing overhead power lines could be buried under the A120, either to facilitate just the road scheme or as part of the advance works for the Garden Community development. After initial discussions with UKPN and NEGC, the cost of the directional drilling and the timescale meant it was unfeasible to undertake this task in association with the road scheme. Therefore, this option is considered not viable as the minimum required clearance must be met to these overhead power lines. This option also isolates Strawberry Grove in between roads.

4.4 Existing Infrastructure – Alternative Option

There is an unused overbridge and parts of an eastbound merge, and westbound diverge (both now used as lay-bys) on the A120 approximately 3km southeast of the Bromley Road overbridge – see Figure 2 below. It is assumed that this was built at the time of construction of the A120 around 1980 as part of an Elmstead Market bypass, providing access between the A133/eastern and southern Colchester and the A120 east and west to Harwich via free-flow links, as the A120/A133 junction at Hare Green to the east was built as a restricted movements junction. This link has never been constructed, and traffic travelling to/from these destinations uses local roads.

Utilising this infrastructure was considered. However, this infrastructure is too remote from the Garden Community site to be able to serve the development. Also it gives no provision for travelling on the A120 west to/from the A12.

Road users would need to spend longer on the A120 coming from the west, passing the Garden Community, as the route would be well off the A12-development desire line, and the Link Road is a longer route and hence more expensive. Initial design suggests new west facing free flow links would give a very large footprint to the junction and generate areas of sterile severed land. A 'dumb-bell' type junction would be more compact and considered adequate, but it does not allow the existing overbridge to be used because of its skew and the plan for a 2+1 carriageway width across the structure. For these reasons, using this infrastructure is not considered viable for this option.



Figure 2 – Existing unused infrastructure

5 Options put forward for Consultation

5.1 Plan of options put forward

The four Link Road options shown in Figure 2 were put forward for non-statutory public consultation that took place in November and December 2019. In addition, two alternative positions for the A133 at-grade junction were consulted on. The four Link Road options were shown with a possible route to each A133 at-grade roundabout option.

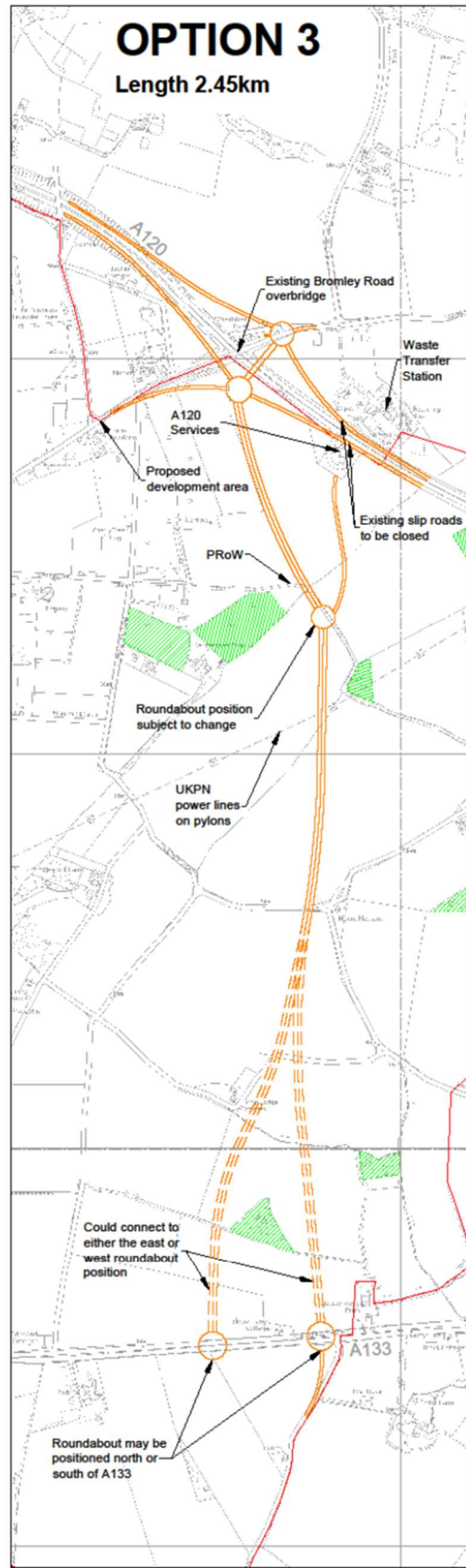
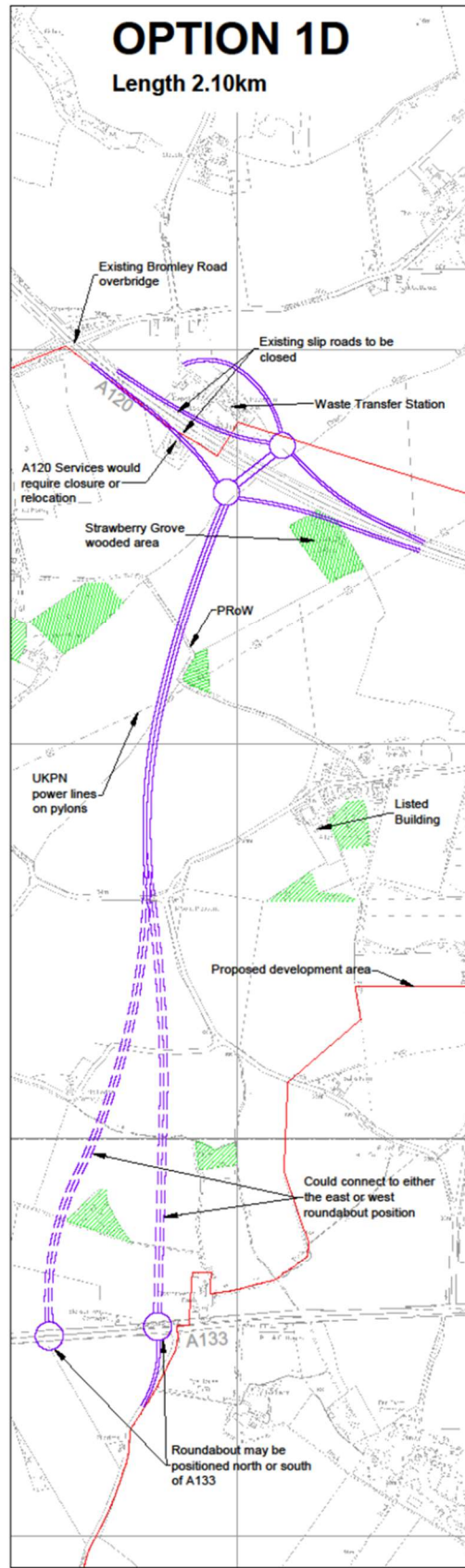
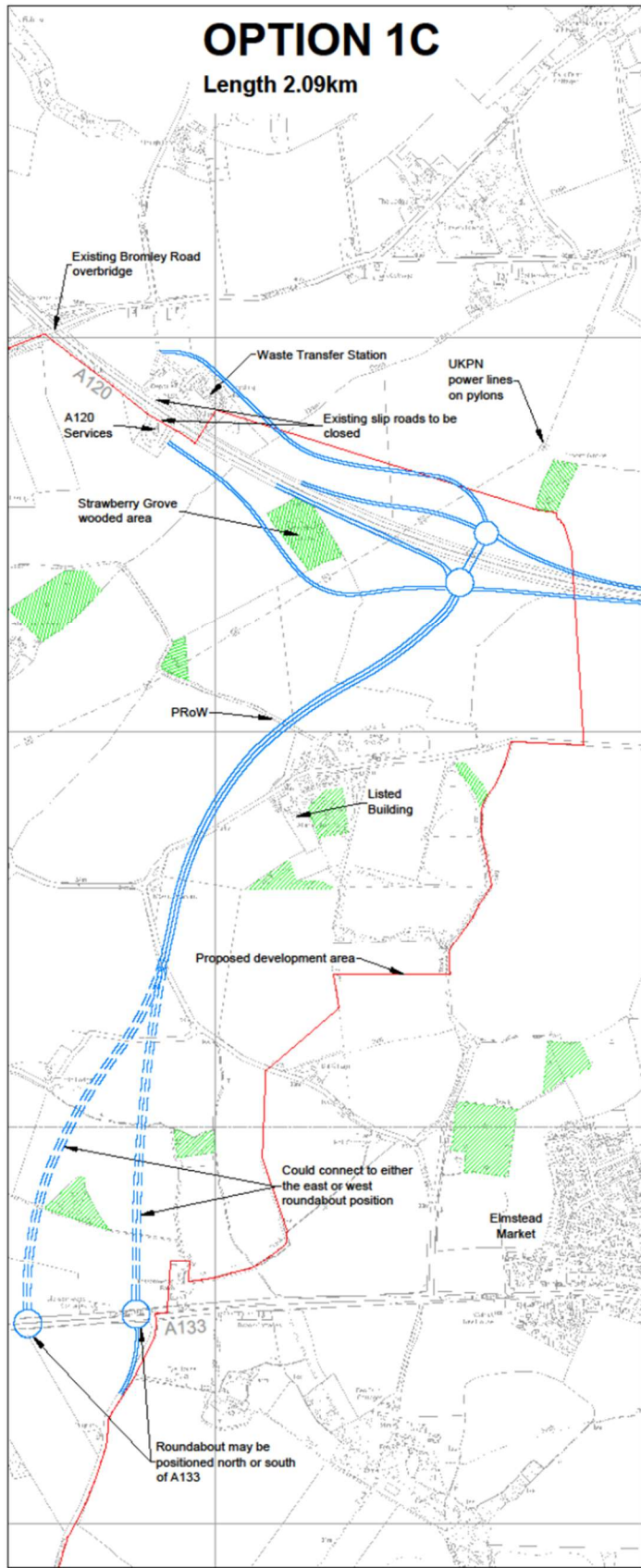
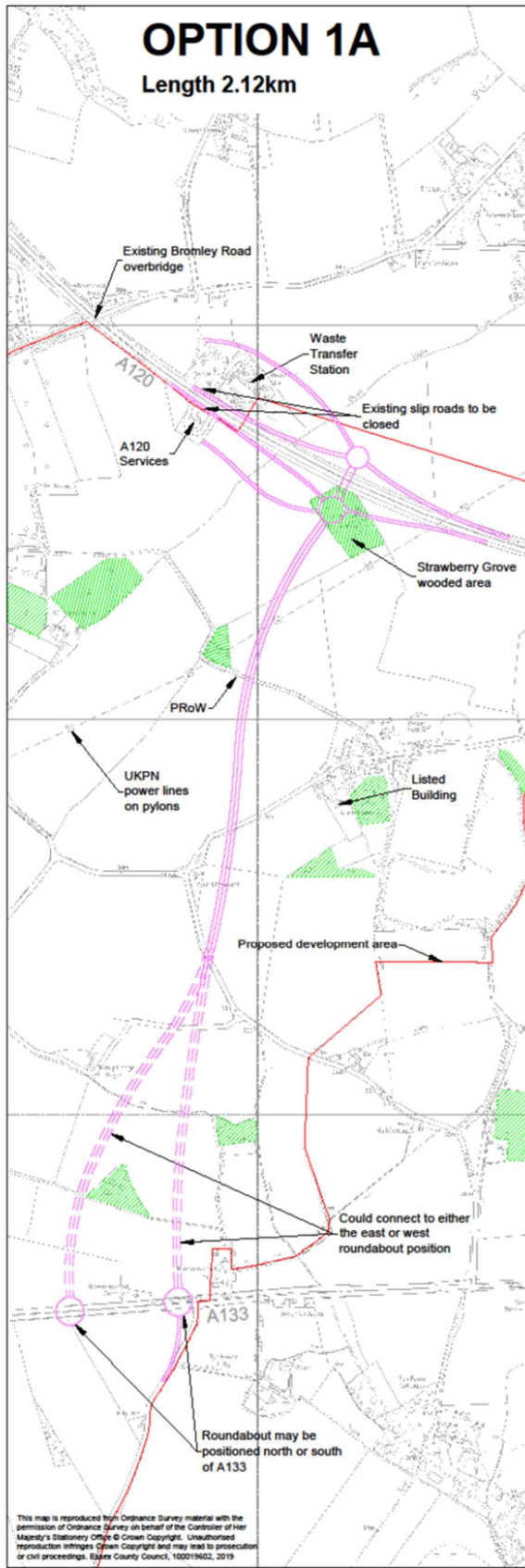


Figure 3 – The sifted options

6 Link Road cross section and junction types

6.1 A120 junction

An application has been submitted to Highways England via Para 39 of DfT Circular 02/2013 The Strategic Road Network and the Delivery of Sustainable Development, for approval for the new junction onto the A120. Highways England have verbally suggested they would have no objection to the Link Road options provided that they met the strategic growth test and that the modelled impacts on the surrounding strategic network are demonstrated. Given the nature of the A120 at this location, it is apparent the new junction needs to be grade-separated to DMRB chapter CD 122.

There would be some benefits, particularly relating to reducing the visual intrusion, in taking the dumb-bell connecting road under the A120, so it is not visible from surrounding areas. However, jacking a box under the A120 comes with a number of risks such as drainage and the water table, services, the size of the box and the stability of the A120 carriageway above. There is no halfway measure either because of the large vertical curves associated with the 120kph design speed A120 dual carriageway, and its rigid (concrete) construction. Therefore, the new junction is proposed above the A120. This arrangement will allow the disruption to the trunk road during construction to be minimised.

6.2 A133 junction

The A133 at this location is dual carriageway, but it does not have a compliant D2AP cross section to DMRB chapter CD 127. Its AADT is only just outside that of single carriageway and at the low end of D2AP to DMRB chapter TA46. There are scattered residential properties alongside it. It has no grade-separated junctions and hence a DMRB chapter CD 122 junction is not considered appropriate. The two junction alternatives are roundabout and traffic signals. A roundabout has been put forward but will be subject to Arcady testing. A large traffic signal junction may be a suitable alternative, but whilst a signalised alternative will allow the junction to work most efficiently during busy times it is likely to add delay outside of peak hours that a roundabout may not. A roundabout also makes U-turns possible, which is preferable to turns carried out through gaps in the central reserve.

7 Evaluation of Options

7.1 Option 1A

Engineering Standards

Pros

This option (see General Arrangement in Appendix B) holds no issues with geometry on the Link Road, and intermediate roundabouts are expected to be used, which will further aid changes in direction. Radii used on this option are 720m (3.5% superelevation) and 1440m (maintain crossfall).

A120 grade separated junction - The existing at grade petrol station and WTS direct accesses would be lost but this can be considered an advantage as it will remove these conflict points, which are sub-standard, from the dual carriageway.

The A120 appears compliant to DMRB CD 109 and CD 127 with a D2AP cross section, and it has a rigid (concrete) pavement.

Provisional assessment to CD 122 gives the following slip road types for the A120 junction:

- Parallel Merge westbound, would tie in prior to Bromley Road overbridge. However, if this option were taken forward, the slip road shown on the General Arrangement (GA) drawing would need to be moved slightly south to avoid earthworks encroaching onto the A120 mainline;
- Taper Merge eastbound, ties in prior to accommodation overbridge. Likewise, if this option were taken forward the slip road shown on the GA drawing would need to be moved slightly north because the earthworks encroach onto the mainline A120;
- Taper Diverge westbound, no issues.

Gradients and vertical curves have been used on the slip roads; the gradients range between 2.6% and 3.5%, and there are no apparent departures for vertical curvature or SSD.

Where the route passes over a tributary of Sixpenny Brook it is anticipated the road will be raised to the required level such that the watercourse can be culverted on existing bed level, and the crossing of the stream gives attenuated surface water drainage discharge opportunities. No other known watercourses are crossed.

Cons

Provisional assessment to CD 122 gives the following slip road types for the A120 junction:

- Two-lane Taper Diverge eastbound, small encroachment into non-operational area of WTS;
- The WTS access road uses a 510m radius curve, and the petrol station 720m and 255m, although the Design Speed has not been confirmed. This is brought about by the length and space available for the access roads between the dumb-bell roundabouts and suitable points of entry into the sites, and not extending the footprint of the scheme too far from the A120, the land acquisitional requirements and avoidance of sterilisation of plots.

The long section gradient is 4% for both the WTS and petrol station, and they can be achieved without any departures for vertical curvature. However, verge widening may be required on approach to the roundabout to provide compliant Stopping Sight Distance (SSD).

The entries and exits on the western side of the southern A120 dumb-bell roundabout are very close together, making the detailed design of the roundabout geometry more challenging.

It is anticipated the scheme may result in the loss of up to three existing lay-bys on the A120, which may need alternative provision. The petrol station site could be used as a rest area which would restore some of the required provision.

Programme

The Construction Programme in Appendix G for this option suggests an approximately 95 week construction phase. This falls within the 104 weeks/2 years maximum duration envisaged within the HIF bid.

Environmental

Environmental mitigation will be identified and developed through the preliminary design and Environmental Impact Assessment, and it is anticipated that tree and vegetation planting will be associated with the Link Road scheme and habitats created within the corridor.

A significant and detrimental impact of the option is the permanent loss of Strawberry Grove, which although not ancient woodland is still priority habitat. If land could be secured in advance of the clearance of the woodland, then a new area of wood could be planted but it would be in its infancy and the ecosystem present in the mature woodland would be permanently lost. When considering the full footprint of the road, including embankment and space required for construction, there would be very little of Strawberry Grove left unaffected.

The eastern half of Turnip Lodge Lane, which this option severs, is a Protected Lane as designated in the Tendring District Council Local Plan (refer to the Environmental Options Appraisal in Appendix D). Protected Lanes have been designated because of their diversity and integrity through an undamaged visual historic and vegetation condition. It is understood the severance may be accepted, with mitigation, and the aim would be to retain the remaining sections of this lane in their current condition and use them as WCH routes. However, it may be preferable to avoid the lane.

The route as drawn passes at approximately 240m from the listed Allen's Farm Farmhouse. Hence it has a potential effect on the setting of the Grade II listed Allen's Farmhouse.

Where the route passes through the petrol station and waste transfer areas there is a potential land contamination risk.

There will be a large number of future receptors to noise and air quality effects west of this route, and the cumulative effects will need to be considered with mitigation provided on the basis that the Garden Community is going to be built.

Affordability

The cost estimate is £78.7m (refer to Appendix E - Construction Cost Estimate, Appendix H - Property Cost Estimate and additional elements breakdown in the Affordability tab of the Scoring Matrix). The budget for the Link Road from the HIF bid was £65.7m, therefore the option as presented is over budget.

Stakeholder Feedback

At the consultation event there was some negative comment in relation to the destruction of Strawberry Grove. This was generally reflected in the questionnaire responses in the Consultation Report in Appendix F, with 15% answering Option 1A as their preferred A120 junction position. This option is the second least preferred position. There were a number of responses to open questions

which commented on the wish and need to retain the woodland habitat because of the importance of the natural environment and the need to reduce pollution.

Walking Cycling Horse Riding (WCH) including severance

A Restricted Byway is severed 400m southwest of Strawberry Grove - Elmstead PRow 21. A diversion and reconnection to the existing network has been put forward as part of the side and access road possible layout proposals.

There is plentiful opportunity for WCH provision and facilities will be provided with the Link Road, in the Public Right of Way (PRow) diversion, and there are expected to be several opportunities for connections through the future Garden Community Masterplan. The initial WCH report can be found in Appendix I. However, the route along the Link Road would end at the A120 which allows no connectivity to the north of the A120 at this location.

Tye Road and Turnip Lodge Lane would be severed 170m north and west respectively from the existing junction of these two roads. If the existing roads were severed with no connection to the Link Road, Balls Farm and The Courtyard would be the northernmost properties that could be accessed on Tye Road from the A133. Mount Pleasant and Turnip Lodge Cottages would only be accessible from roads west of the Link Road. Turnip Lodge Lane could be promoted as a WCH route in addition to a means of access to the properties. The existing access track to Allen's Farm would also be severed 170m northeast of its junction with Tye Road. This will be an issue during construction and a temporary/alternative access may be required.

Impact on Public Utilities

This option's junction position with the A120 is potentially far enough away from the overhead power lines on pylons that the new slip roads can pass underneath with no need to move the junction position or introduce a false sag curve to gain adequate clearance.

UKPN has confirmed a 5m no dig offset is required to each tower pylon leg to protect the integrity of the foundation. On the General Arrangement drawings roads are shown close to tower pylons because of the greater clearance available from a new road level to the overhead power lines near to the pylon compared to the mid span. Roads will be adjusted to avoid the 5m no dig limit around each tower pylon.

Potential diversions/conflicts

- Route passes over BT Openreach underground cables northeast of Turnip Lodge Cottages
- Route passes under BT Openreach and UKPN HV overhead lines east of Mount Pleasant
- Route passes under the UKPN 132kV overhead lines at the east facing slip roads but avoids tower pylon north of A120
- Route passes over 24inch diameter asbestos concrete water main immediately south (Link Road) and west (petrol station access) of the southern dumb-bell roundabout, and again, at the points of A120 widening for the slip roads at the location where the non-asbestos (steel) main passes under the A120
- Impacts upon BT Openreach feed to WTS weighbridge
- The west facing slip roads interact with water, BT Openreach and UKPN power to the northwest of the petrol station and WTS

Impacts on Landowners

The area of land required for this option based on the anticipated footprint of the entire works covers 8 land owners.

The edge of the carriageway of the Link Road is between 100-250m from both Turnip Lodge Cottages; 50-100m from the nearest façades of 1 and 2 Mount Pleasant; approximately 240m from the nearest façade of the listed Allen's Farm farmhouse, and between 100-250m from the nearest façades of Blossomwood Cottages.

	Distance to existing property		
	0-50m	50-100m	100-250m
Number of properties	0	3	4

Table 1 – Option 1A, tally of existing properties within distance bands from the nearest property façade to the proposed road edge

The edge of the proposed A120 westbound merge is approximately 9.5m from edge of petrol station canopy.

The edge of earthworks for the eastbound diverge is approximately 5m from the WTS weighbridge.

This option takes a route through generally arable farmland.

It runs on an alignment that would separate residential allocation from the employment area in the NE corner of the site in line with the Concept Framework.

Land required outside of the current proposed Garden Community area of interest is that to the north of the A120, for the grade separated junction and for the new access to the WTS.

It is anticipated that small unworkable fragments of land would be acquired alongside the main corridor, and they may be used for mitigation works. Two strips south of Turnip Lodge Lane are not included in this, nor a wedge west of Strawberry Grove.

Land and field access may be available from both sides of the Link Road but discussions will need to take place with all landowners in regard to both temporary and permanent land access arrangements and accommodation works.

Impact on Petrol Station

The loss of direct access onto the A120 for the petrol station is likely to affect patronage. The new access road for the petrol station would be in the region of 355m long from the A120 junction southern dumb-bell which is not considered significant and it may be visible from the roundabout as well as the A120, hence patronage could be increased on this option. Petrol station symbols can be used on the directional signs to guide road users to the facility. There would be a small encroachment into petrol station land boundary.

Impact on Waste Transfer Station

Vehicles accessing and exiting the WTS will be able to use the new junction to travel east and west along the A120, which they can't currently do because there is only access from the eastbound carriageway, so it will bring about a significant mileage saving. The new access road would be short.

The footprint of the earthworks suggests a small encroachment into the operational area of the site but this could be limited by a retaining wall. This option may also have an impact on the stats supply to the weighbridge.

Buildability

This option has the following challenges. The trees in Strawberry Grove will need to be completely removed along with the stumps and any organic material prior to the commencement of preparing the ground for the earthworks. If areas of poor or made ground are encountered during the GI or once on site they will require mitigation and it is known that the groundwater level is relatively high which will impact for example piles for bridge foundations. The main challenge as identified in the Construction Programme in Appendix G is the quantity of fill material required and its availability. Because of the large volume required either borrow pit(s) within the site or nearby extraction site(s) would be preferable to reduce the HGV movements. Also, favourable weather conditions/time of the year will be needed for the laying and compaction of all the material.

At each location where the route passes under the overhead power lines the Contractor will need to implement the appropriate special working procedures and comply with HSE Health and Safety Avoidance of Danger from Overhead Power Lines GS6. Also, much of the dumb-bell junction will need to be built before the WTS direct access can be cut off, otherwise the facility will have no access. A robust solution will be needed for the tie-in detail to the A120 rigid (concrete) pavement.

Another matter to resolve will be an available location for the site compound, within the site. For most site traffic it would be beneficial to have an access point off the A120 strategic route subject to HE agreement. It may be easier to leave the A120 on the northern side at the WTS but there is no means for crossing the A120. Site traffic would need to leave on the southern side of the A120 to access the main part of the site rather than causing disruption to local communities by using the A133 or local roads. If material is sourced to the north of Bromley Road, there would be a need to use the local road network to a point where they could enter the site onto haul routes.

7.2 Option 1C

Engineering Standards

Pros

This option (see General Arrangement in Appendix B) holds no issues with geometry on the Link Road and intermediate roundabouts are expected to be used which will further aid changes in direction. Radii used on layout shown are 2x 720m (3.5% superelevation), the rest exceed 1440m (maintain crossfall).

A120 junction - The existing at grade petrol station and WTS direct accesses would be lost but this can be considered an advantage as it will remove these conflict points on the dual carriageway. It would also remove what would be non-compliant weaving lengths to the proposed junction.

Provisional assessment to CD 122 gives the following slip road types for the A120 junction:

Parallel Merge westbound, ties in prior to Bromley Road overbridge.

Two-lane Taper Diverge eastbound, no issues.

Gradients and vertical curves have been used on the slip roads; the gradients range between 2.6% and 3.5%, and there are no apparent departures for vertical curvature or SSD.

Where the route passes over a tributary of Sixpenny Brook it is anticipated the road will be raised to whatever level is required such that the watercourse can be culverted on existing bed level, and the

crossing of the stream gives attenuated surface water drainage discharge opportunities. No other known watercourses are crossed.

Cons

Both east facing A120 Taper Merge/Diverge slip roads tie in beyond the accommodation and PRoW overbridge. It would be preferable to tie both in prior to the bridge as there is no space under it to fit them in and the structure would need to be replaced, so the vertical alignment of both should be reviewed and optimised if this option is taken forward.

The WTS access road uses a 510m radius curve, and the petrol station 720m and 255m, although the Design Speed has not been confirmed. This is brought about by the length and space available for the access roads between the dumb-bell roundabouts and suitable points of entry into the sites, and not extending the footprint of the scheme too far from the A120, the land acquisitional requirements and avoidance of sterilisation of plots. The gradient is 4% for both the WTS and petrol station accesses, and they can be achieved without any departures for vertical curvature. However verge widening may be required on approach to the roundabout to provide compliant SSD.

The entries and exits on the western side of the southern A120 dumb-bell roundabout are very close together, making the detailed design of the roundabout geometry more challenging.

Up to three existing lay-bys on the A120 would be lost, and may need alternative provision. The petrol station site could be used as a rest area which would restore some of the required provision.

Programme

The Construction Programme in Appendix G for this option suggests an approximately 102 week construction phase. This just falls within the 104 weeks/2 years duration envisaged in the HIF bid.

Environmental

Environmental mitigation will be identified and developed through the preliminary design and Environmental Impact Assessment, and it is anticipated that tree and vegetation planting will be associated with the Link Road scheme and habitats created within the corridor.

There is an anticipated loss of less than 10% of Strawberry Grove, although the alignment of the petrol station access road would isolate Strawberry Grove and give no way of allowing land-based wildlife a route in or out without crossing the highway.

The eastern half of Turnip Lodge Lane, which this option severs is a Protected Lane as designated in the Tendring District Council Local Plan, (refer to the Environmental Options Appraisal in Appendix D). Protected Lanes have been designated because of their diversity and integrity through an undamaged visual historic and vegetation condition. It is understood the severance may be accepted, with mitigation, and the aim would be to retain the remaining sections of this lane in their current condition and use them as WCH routes. However, it may be preferable to avoid the lane.

The route as drawn passes at approximately 132m from the listed Allen's Farm Farmhouse. Hence it has a potential effect on the setting of the Grade II listed Allen's Farmhouse.

Where the route passes through the petrol station and waste transfer areas there is a potential land contamination risk.

There will be a large number of future receptors to noise and air quality effects west of this route, and the cumulative effects will need to be considered with mitigation provided on the basis that the Garden Community is going to be built.

Affordability

The cost estimate is £79.1m, (refer to Appendix E - Construction Cost Estimate, Appendix H - Property Cost Estimate and additional elements breakdown in the Affordability tab of the Scoring Matrix). The budget for the Link Road from the HIF bid was £65,747,900, therefore the option as presented is over budget.

Stakeholder Feedback

There was no general detrimental comment against this option at the public consultation event and from the questionnaire responses in the Consultation Report in Appendix F, 31% answered 1C as their preferred A120 junction position. This was marginally the highest (just above Option 1D). Tendring District Council and Colchester Borough Council also suggested this may be the more preferable option. They also noted for this option the isolation of the woodland by the proposed petrol station access road and the closer proximity to listed building(s). There was also a general steer towards this and other Option 1 variants because they are further away from the community affected by Option 3.

Walking Cycling Horse Riding including severance

A Restricted Byway is severed just north of Allen's Farm - Elmstead PRoW 21. A diversion and reconnection to the existing network has been put forward as part of the side and access road possible layout proposals.

There is plentiful opportunity for WCH provision and facilities will be provided with the Link Road, in the PRoW diversions, and there are expected to be several opportunities for connections through the future Garden Community Masterplan. The initial WCH report can be found in Appendix I. However, the route along the Link Road would end at the A120 which allows no connectivity to the north of the A120 at this location.

Tye Road and Turnip Lodge Lane would be severed 150m north and 110m west respectively from the existing junction of these two roads. If the existing roads were severed with no connection to the Link Road, Balls Farm and The Courtyard would be the northernmost properties that could be accessed on Tye Road from the A133. Mount Pleasant and Turnip Lodge Cottages would only be accessible from roads west of the Link Road. Turnip Lodge Lane could be promoted as a WCH route in addition to a means of access to the properties. The existing access track to Allen's Farm would also be severed 220m NE of its junction with Tye Road. This will be an issue during construction and a temporary/alternative access may be required.

Impact on Public Utilities

This route passes under the UKPN 132kV overhead lines on tower pylons at: westbound merge slip road, petrol station access road, WTS access road and eastbound diverge slip road. The new highway will be up to 7m above existing A120 carriageway level which may not leave adequate clearance. Assessment work has been carried out, using information provided by UKPN to determine a position where adequate clearance is achieved at all locations. The eastbound diverge has been directed

north to avoid conflict with the tower pylon adjacent to the A120 eastbound carriageway. The minimum clearance required is 6.7m but it is proposed that 7.5m is chosen at this stage.

UKPN has confirmed a 5m no dig offset is required to each tower pylon leg to protect the integrity of the foundation. On the General Arrangement drawings roads are shown close to tower pylons because of the greater clearance available from a new road level to the overhead power lines near to the pylon compared to the mid span. Roads will be adjusted to avoid the 5m no dig around each tower pylon.

Potential diversions/conflicts

- Route passes over BT Openreach underground cables northeast of Turnip Lodge Cottages
- Route passes under BT Openreach and UKPN HV overhead lines east of Mount Pleasant
- Route passes under UKPN HV overhead lines and over/along UKPN underground cables to the bio-gas plant power station. If this route is selected it is intended that it be re-routed slightly west as necessary to avoid this power infrastructure
- Route passes over 24inch diameter asbestos water main northeast of Allen's Farm. Also, the petrol station access road runs along the route of it past Strawberry Grove, and there will be interaction where it runs alongside the A120 but the west facing merge and diverge have tied into the A120 prior to the point the main passes under the dual carriageway

Impacts on Landowners

The area of land required for this option falls under 10 land owners.

The edge of carriageway of the Link Road is between 100-250m from the nearest façade of both Turnip Lodge Cottages; between 50-100m from the nearest façades of No. 1 and 2 Mount Pleasant; approximately 132m from nearest façade of the listed Allen's Farm farmhouse, although there is a farm building in between Allen's Farm and the route at this point, so the nearest clear line of sight is 140m; between 50-100m from the nearest façade of Blossomwood Cottages and Blossomwood Farm; between 100-250m from the nearest façade of Tye House and Tye Farm and between 100-250m from the nearest façade of No. 1 and 2 Brook Cottages.

	Distance to existing property		
	0-50m	50-100m	100-250m
Number of Properties	0	5	7

Table 2 – Option 1C, tally of existing properties within distance bands from the nearest property façade to the proposed road edge

This option takes a route through generally arable farmland.

It runs on an alignment that would separate residential allocation from the employment area in the NE corner of the site in line with the Concept Framework.

Because the petrol station access road needs to pass to the south of Strawberry Grove this creates a large, road enclosed area, which is not required for the road scheme and therefore sterilised.

Land required outside of the current proposed Garden Community area of interest is that to the north of the A120, for the grade separated junction and for the new access to the WTS.

The option cuts through the FullCircle Energy Ltd consented second anaerobic digester site north of Allen's Farm. If this option were taken forward the road alignment would need to be shifted to the west to avoid the red line and the complications this would bring.

It is anticipated that small unworkable fragments would be acquired alongside the main corridor, and they may be used for mitigation works, although there are not many of this size along this route. A couple of larger fragments located north of Blossomwood Farm and another by Allen's Farm are not included at this stage, the latter so as to not inherit the power infrastructure connected to the bio-gas plant power station. There is no leftover strip between the route and Turnip Lodge Lane by Turnip Lodge Cottages.

Land and field access may be available from both sides of the Link Road but discussions will need to take place with all landowners in regard to both temporary and permanent land access arrangements and accommodation works.

Impact on Petrol Station

Loss of direct access onto the A120 for the petrol station is likely to affect patronage. The new access road for the petrol station on this option would be in the region of 860m long from the A120 junction southern dumb-bell roundabout. The petrol station is unlikely to be visible from the roundabout as Strawberry Grove will be in between but it would be accessible from all directions. Petrol station symbols can be used on the directional signs to guide road users to the facility. There is not anticipated to be any encroachment into the petrol station site.

Impact on Waste Transfer Station

Vehicles accessing and exiting the WTS will be able to use the new junction to travel east and west along the A120, which they can't currently do because there is only access from the eastbound carriageway, and it will bring about a significant mileage saving. Therefore the length of the access road is not considered an issue.

There is not expected to be any encroachment into the operational WTS site.

Buildability

This option has the following buildability challenges. If areas of poor or made ground are encountered during the GI or once on site they will require mitigation and it is known that the groundwater level is relatively high which will impact for example piles for bridge foundations. The main challenge as identified in the Construction Programme in Appendix G is the quantity of fill material required and its availability. Because of the large volume required either borrow pit(s) within the site or nearby extraction site(s) would be preferable to reduce the HGV movements. Also, favourable weather conditions/time of the year will be needed for the laying and compaction of all the material.

At each location where the route passes under the overhead power lines the Contractor will need to implement the appropriate special working procedures and comply with HSE Health and Safety Avoidance of Danger from Overhead Power Lines GS6. The existing direct access to the WTS can be kept open throughout construction and then the traffic transferred onto the new junction when its open which is a big benefit. A robust solution will be needed for the tie-in detail to the A120 rigid (concrete) pavement.

Another matter to resolve will be an available location for the site compound, within the site. For most site traffic it would be beneficial to have an access point off the A120 strategic route subject to HE agreement. It may be easier to leave the A120 on the northern side at the WTS but there is no means for crossing the A120 unless arrangement is made to utilise a haul route to and from the existing accommodation bridge. If this cannot be arranged, site traffic would need to leave on the

southern side of the A120 to access the main part of the site rather than causing disruption to local communities by using the A133 or local roads. If material is sourced to the north of Bromley Road, there would be a need to use the local road network to a point where they could enter the site onto haul routes.

7.3 Option 1D

Engineering Standards

Pros

This option (see General Arrangement in Appendix B) holds no issues with geometry on the Link Road and intermediate roundabouts are expected to be used which will further aid changes in direction. Radii used on layout shown are large; one is 1440m (maintain crossfall), the rest exceed this.

A120 junction - The existing at grade petrol station and WTS direct accesses would be lost but this can be considered an advantage as it will remove these conflict points on the dual carriageway.

Provisional assessment to CD 122 gives the following slip road types for the A120 junction:

Taper Merge eastbound ties in without conflicting any known constraints.

Vertical curves are used almost exclusively on the slip roads, but there is a gradient of 4% on the westbound merge, and as it is 'downhill' it is not considered an issue. There are no apparent departures for vertical curvature or SSD, aside from the issue with the eastbound diverge, and any are considered necessary to minimise the encroachment into Strawberry Grove.

The access road to the WTS is 320m which means a 3.8% gradient is required over 168m to bring the road back to ground level, however there are no apparent departures for vertical curvature.

Where the route passes over a tributary of Sixpenny Brook it is anticipated the road will be raised to whatever level is required such that the watercourse can be culverted on existing bed level, and the crossing of the stream gives attenuated surface water drainage discharge opportunities. No other known watercourses are crossed.

Cons

Parallel Merge westbound is 95m longer than will allow it to be tied in prior to the Bromley Road overbridge. At this location the structural piers are considered to be set at the minimum required set-back from the main carriageway meaning there is insufficient space to accommodate any widening of the A120 to construct the merge and diverge. The structure would need to be replaced/modified, or a departure from standard(s) solution would need to be found/agreed.

In line with the merge above, the two-lane Diverge Taper eastbound would need to commence prior to the Bromley Road overbridge where there is insufficient space to accommodate any widening (due to the position of bridge piers). Also, the slip road significantly encroaches into the WTS site. Verge widening may also be required to give adequate SSD.

Variants were tested with increased skew on the angle of the proposed A120 overbridge to reduce the encroachment into the WTS. The maximum allowable skew is 25-30degrees, because it would detrimentally impact the geometry of the dumb-bell roundabouts, positioning the A120 eastbound off-slip and overbridge arms too close and resulting in a layout where road users approaching the roundabout from the eastbound A120 having to look over their shoulders to see what was

approaching from the overbridge. The conclusion was that a solution which minimises encroachment into the WTS and has a suitable skew falls close to the position of Option 1A.

Taper Diverge westbound ties in but with encroachment into Strawberry Grove (>15% loss). The only identified solution is to take the slip road around the southern side of Strawberry Grove which may not be supported by HE, and there would be a conflict with a tower pylon.

It has been necessary to design the WTS access road with 180m and 255m radii. This is brought about by the length and space available for the access road between the dumb-bell roundabout and a suitable point of entry into the WTS site, and not extending the footprint of the scheme, the reduce land acquisitional requirements and sterilisation of plots. Verge widening may be required for adequate SSD.

Up to three lay-bys would be lost on the A120, which may need alternative provision. The petrol station site could be used as a rest area which would restore some of the required provision.

Programme

The Construction Programme in Appendix G for this option suggests an approximately 111 week construction phase. With a more detailed design or contractor involvement it may be possible to identify ways to reduce this to nearer two years but as it stands it is a little over the 104 weeks/2 years maximum duration envisaged in the HIF bid.

Environmental

Environmental mitigation will be identified and developed through the preliminary design and Environmental Impact Assessment, and it is anticipated that tree and vegetation planting will be associated with the Link Road scheme and habitats created within the corridor.

There is an anticipated loss of more than 15% of Strawberry Grove.

The eastern half of Turnip Lodge Lane, which this option severs is a Protected Lane as designated in the Tendring District Council Local Plan, (refer to the Environmental Options Appraisal in Appendix D). Protected Lanes have been designated because of their diversity and integrity through an undamaged visual historic and vegetation condition. It is understood the severance may be accepted, with mitigation, and the aim would be to retain the remaining sections of this lane in their current condition and use them as WCH routes. However, it may be preferable to avoid the lane.

The route as drawn passes at approximately 420m from the listed Allen's Farm Farmhouse. Hence it has the potential to effect the setting of the Grade II listed Allen's Farmhouse.

Where the route passes through the waste transfer station there is a potential land contamination risk but this is definitely the case for the petrol station which will need to be addressed before the road and its embankment is constructed over the site.

There will be a large number of future receptors to noise and air quality effects west of this route, and the cumulative effects will need to be considered with mitigation provided on the basis that the Garden Community is going to be built.

Affordability

The cost estimate is £79.3m, (refer to Appendix E - Construction Cost Estimate, Appendix H - Property Cost Estimate and additional elements breakdown in the Affordability tab of the Scoring Matrix). The budget for the Link Road from the HIF bid was £65,747,900, therefore the option as presented is over budget.

Stakeholder Feedback

There was no general detrimental comment against this option at the public consultation event aside from the specific impacts to the petrol station and waste transfer station from the owner/operators of the sites. From the questionnaire responses in the Consultation Report in Appendix F, 30% answered 1D as their preferred A120 junction position, just below that of the highest scoring option 1C. There was also a general steer towards this and other Option 1 variants because they are further away from the community affected by Option 3.

Walking Cycling Horse Riding and severance

A Restricted Byway is severed west of Whitehouse Farm - Elmstead PRow 21. A diversion and reconnection to the existing network has been put forward as part of the side and access road possible layout proposals.

There is plentiful opportunity for WCH provision and facilities will be provided with the Link Road, in the PRow diversion, and there are expected to be several opportunities for connections through the future Garden Community Masterplan. The initial WCH report can be found in Appendix I. However, the route along the Link Road would end at the A120 which allows no connectivity to the north of the A120 at this location.

Tye Road would be severed just west of the access to Allen's Farm, and Turnip Lodge Lane would be severed 140m west of its junction with Tye Road. This means Allen's Farm and Mount Pleasant would remain accessible along Tye Road from the A133. Turnip Lodge Lane could be promoted as a WCH route in addition to a means of access to the properties.

Impact on Public Utilities

This option's junction position with the A120 is potentially far enough away from the overhead power lines on pylons that the new slip roads can pass underneath with no need to move the junction position or introduce a false sag curve to gain adequate clearance.

UKPN has confirmed a 5m no dig offset is required to each tower pylon leg to protect the integrity of the foundation. On the General Arrangement drawings roads are shown close to tower pylons because of the greater clearance available from a new road level to the overhead power lines near to the pylon compared to the mid span. Roads will be adjusted to avoid the 5m no dig around each tower pylon.

The point at which the water main passes under the A120 is between the junction overbridge and where the slip roads tie in so there is potentially no road construction immediately on top of the infrastructure at each change in direction of the main.

Potential diversions/conflicts

- Route passes over BT Openreach underground cables northeast of Turnip Lodge Cottages
- Route passes under UKPN HV overhead lines west of Mount Pleasant
- Route passes over BT Openreach underground cables by the WTS and petrol station and on northern side of the A120 to west of the WTS
- Route passes under UKPN HV overhead lines to the northwest of the petrol station and WTS
- Westbound merge and its earthworks straddle the water main and BT Openreach underground cables running along the southern side of the A120 west of the petrol station

- Route passes under the UKPN 132kV overhead lines close to third tower pylon south of the A120; the route may need to be realigned slightly to ensure the road footprint passes this tower pylon with adequate clearance
- Both westbound and eastbound diverges would cross the 24inch diameter asbestos concrete water main, and the southern overbridge abutment may be positioned above it. The east facing merge and diverge layouts extend to a point under the overhead lines on tower pylons but the new construction will be at a similar level to the existing carriageway at this point

Impacts on Landowners

The area of land required for this option falls under 8 land owners.

The alignment traced over the Concept Framework results in a segment of the development being to the east of the Link Road.

The edge of the carriageway of the Link Road is between 100-250m from the nearest façade of both Turnip Lodge Cottages; 0-50m from the nearest façade of No.s 1 and 2 Mount Pleasant; approximately 411m from nearest façade of the listed Allen's Farm farmhouse; between 50-100m from the nearest façade of Blossomwood Cottages and Blossomwood Farm; between 100-250m from the nearest façade of Tye House and Tye Farm and between 100-250m from the nearest façade of No. 1 and 2 Brook Cottages.

	Distance to existing property		
	0-50m	50-100m	100-250m
Number of Properties	2	3	7

Table 3 – Option 1D, tally of existing properties within distance bands from the nearest property façade to the proposed road edge

When the west facing merge/diverge layouts are plotted they encroach into the WTS and petrol station sites to an unacceptable level.

This option takes a route through generally arable farmland.

The southern half runs on an alignment at the eastern edge of the residential allocation.

Land required outside of the current Garden Community area of interest is that to the north of the A120, for the grade separated junction and for the new access road to the WTS.

It is anticipated that small unworkable fragments would be acquired alongside the main corridor, and they may be used for mitigation works, although there are not many of this size along this route. Three larger fragments located between Blossomwood Farm and Mount Pleasant are not included at this stage.

Land and field access may be available from both sides of the Link Road but discussions will need to take place with all landowners in regard to both temporary and permanent land access arrangements and accommodation works.

Impact on Petrol Station

There would be large encroachment into the site from the westbound merge, and the footprint of the road and its earthworks spans much of the fuel station canopy area, ruling out providing the junction and keeping open the petrol station in its current location.

Impact on Waste Transfer Station

This option results in major encroachment into the operational area of the WTS. Layouts for the diverge and slip road have been tested but even for a layout which has less impact, verge widening would be required to achieve the necessary Stopping Sight Distance and so the encroachment remains the same. Retaining walls were considered but would exceed 6m in height and verge, road restraint system, width of retaining structure and construction area would all contribute to further encroachment. It is considered not very adverse to have this level of impact upon the WTS.

Buildability

This option has the following challenges. If areas of poor or made ground are encountered during the GI or once on site they will require mitigation and it is known that the groundwater level is relatively high which will impact for example piles for bridge foundations. The main challenge as identified in the Construction Programme in Appendix G is the quantity of fill material required and its availability. Because of the large volume required either borrow pit(s) within the site or nearby extraction site(s) would be preferable to reduce the HGV movements. Also favourable weather conditions/time of the year will be needed for the laying and compaction of all the material.

At each location where the route passes under the overhead power lines the Contractor will need to implement the appropriate special working procedures and comply with HSE Health and Safety Avoidance of Danger from Overhead Power Lines GS6. A robust solution will be needed for the tie-in detail to the A120 rigid (concrete) pavement.

It may provide difficult for the contractor to work in close proximity to the WTS with operations ongoing within the WTS and for the required working space. The removal or sealing of what was under the petrol station will be a significant operation for a subcontractor.

Another matter to resolve will be an available location for the site compound, within the site. For most site traffic it would be beneficial to have an access point off the A120 strategic route subject to HE agreement. It may be easier to leave the A120 on the northern side at the WTS but there is no means for crossing the A120. Site traffic would need to leave on the southern side of the A120 to access the main part of the site rather than causing disruption to local communities by using the A133 or local roads. If material is sourced to the north of Bromley Road, there would be a need to use the local road network to a point where they could enter the site onto haul routes.

7.4 Option 3

Engineering Standards

Pros

This option (see General Arrangement in Appendix B) has no issues with geometry on the Link Road, and intermediate roundabouts are expected to be used which will further aid changes in direction. The route is shown on a fairly straight alignment with an eastern bias to best fit with the Garden Community Concept Framework but this places the route close to four residential properties and

two woodland constraints. Radii used are all at least 1440m except 1x720m radius (3.5% superelevation) to take the route past the plot of woodland to the north of Blossomwood Cottages.

An extra intermediate roundabout is shown for service area access. Its location is not fixed, but has currently been positioned to allow more flexibility with horizontal alignment to the south passing the area of woodland and in case of a fourth arm being required to the east into the development. However placing it further north would shorten the distance to the service area.

A120 junction - The existing at grade petrol station and WTS direct accesses would be lost but this can be considered an advantage as it will remove these conflict points from the dual carriageway.

The new structure over the A120 could be built offline from the existing Bromley Road bridge to allow the existing to remain open during construction of the new then traffic diverted over prior to its demolition.

All merges and diverges - westbound Parallel Merge and taper merges and diverges can be provided to standard, although both east facing would need to be designed so as to have minimal impact on the WTS and petrol station.

Where the route passes over a tributary of Sixpenny Brook it is anticipated the road will be raised to whatever level is required such that the watercourse can be culverted on existing bed level, and the crossing of the stream gives attenuated surface water drainage discharge opportunities. No other known watercourses are crossed.

Cons

5-arm southern dumb-bell roundabout would accommodate Bromley Road. 5-arms is not preferred but necessary at this location. The ICD of 65m works although the Link Road and westbound diverge arms are close. The radius heading south on the Link Road could be reduced to allow the arm to be moved further from the westbound diverge and allow adequate entry and exit geometry for these two arms.

The realignment of the new Bromley Road back to the old is approximately to 70kph with a 2.5-3.5% superelevation. This would be checked for departures from standard but if SSD is met then it may be acceptable.

The 4-arm northern dumb-bell roundabout may need to be moved into the field to the southeast to accommodate the raised level and allow for the realignment of Bromley Road into the roundabout.

It is anticipated the scheme may result in the loss of up to three lay-bys on the A120, which may need alternative provision.

Programme

The Construction Programme in Appendix G for this option suggests an approximately 130 week construction phase. This is considerably over the 104 weeks/2 years maximum duration envisaged in the HIF bid, potentially even if a few efficiencies can be found.

Environmental

Environmental mitigation will be identified and developed through the preliminary design and Environmental Impact Assessment, and it is anticipated that tree and vegetation planting will be associated with the Link Road scheme and habitats created within the corridor.

The eastern half of Turnip Lodge Lane, which this option severs is a Protected Lane as designated in the Tendring District Council Local Plan, (refer to the Environmental Options Appraisal in Appendix

D). Protected Lanes have been designated because of their diversity and integrity through an undamaged visual historic and vegetation condition. It is understood the severance may be accepted, with mitigation, and the aim would be to retain the remaining sections of this lane in their current condition and use them as WCH routes. However it may be preferable to avoid the lane.

There will be a large number of future receptors to noise and air quality effects to both the east and west of the route, and the cumulative effects will need to be considered with mitigation provided on the basis that the Garden Community is going to be built.

The option will impact upon two Noise Important Areas along the A120 corridor in the NW corner of the site.

There is a potential land contamination risk from the proximity to potentially infilled land and an area of artificial ground near Bromley Road as well as the potential land contamination risk from the areas of the petrol station and waste transfer station that the option crosses.

Affordability

The cost estimate is £72.9, (refer to Appendix E - Construction Cost Estimate, Appendix H - Property Cost Estimate and additional elements breakdown in the Affordability tab of the Scoring Matrix). The budget for the Link Road from the HIF bid was £65,747,900, therefore the option as presented is over budget.

Stakeholder Feedback

At the consultation event this option received the greatest level of negative comment, mostly from the community of Crockleford Heath and along Bromley Road, concerned about the impact on their properties and traffic increases on Bromley Road. This is mirrored in the Consultation Report in Appendix F and only 11% answered Option 3 as their preferred A120 junction position, the lowest percentage of all options, although some did provide comment in the open questions to detail why they considered this the best option. However more comment was around quality of life, health and wellbeing and severance, and some of these points were strongly put across. Tendring District Council and Colchester Borough Council indicated less preference for Option 3 noting the above concerns of the impact to the existing community and its greater encroachment into the developable area of the proposed Garden Community the latter of which is raised by NEGC Ltd.

Walking Cycling Horse Riding

This option severs and briefly runs along the alignment of the Restricted Byway Elmstead PRoW 21. A diversion and reconnection to the existing network has been put forward as part of the side and access road possible layout proposals.

There is plentiful opportunity for WCH provision and facilities will be provided with the Link Road, in the PRoW diversions, and there are expected to be several opportunities for connections through the future Garden Community Masterplan. The initial WCH report can be found in Appendix I. Also by joining Bromley Road this opens up direct connectivity to routes and communities to the north of the A120.

Alteration to Bromley Road will introduce two new roundabouts and potentially create delay for users which they do not get currently.

Creating the junction onto the A120 at the location of Bromley Road will allow a new point of access from the A120 into Colchester town centre, which will introduce additional traffic onto a route which may not be able to accommodate the volume.

Tye Road would be severed just west of the access to Allen's Farm, and Turnip Lodge Lane would be severed 270m west of its junction with Tye Road. This means Allen's Farm and Mount Pleasant would remain accessible along Tye Road from the A133. Turnip Lodge Lane could be promoted as a WCH route in addition to a means of access to the properties.

Impact on Public Utilities

UKPN has confirmed a 5m no dig offset is required to each tower pylon leg to protect the integrity of the foundation. On the General Arrangement drawings roads are shown close to tower pylons because of the greater clearance available from a new road level to the overhead power lines near to the pylon compared to the mid span. Roads will be adjusted to avoid the 5m no dig around each tower pylon.

Potential diversions/conflicts

- Route passes over BT Openreach underground cables northeast of Turnip Lodge Cottages
- Route passes under UKPN HV overhead lines east of Mount Pleasant
- Route passes under UKPN 132kV overhead lines on tower pylons northwest of Allen's Farm
- Route passes under UKPN HV overhead lines southwest of the petrol station
- Westbound diverge and roundabout passes over 2x water mains, and BT Openreach underground cables, and under UKPN HV overhead lines
- Westbound merge passes over 2x BT Openreach underground cables, 4x water mains
- Eastbound diverge and roundabout passes over 5x water main and 1x BT Openreach underground cables, and under 1x UKPN HV overhead lines and 1x BT Openreach overhead lines
- Eastbound merge passes over 2x water main and 1x BT Openreach underground cables, and under 1 x UKPN HV overhead lines

Impacts on Landowners

The area of land required for this option falls under 10 land owners.

Wheatsheaf House would be surrounded by a triangle of roads of A120, eastbound diverge and Bromley Road, which would be highly detrimental and access to it would be problematic. In line with the Property Cost Estimate in Appendix H it is assumed that the residential property would have to be acquired.

The edge of the carriageway of the Link Road is greater than 250m from Balls Farm and The Courtyard; approximately 250m from Whitehouse Farm but greater than 250m from Rose Cottages, Hammonds and Cherry Tree Farms, Cherry Tree Cottage and Gilead.

The realignment to Bromley Road would move it away from properties such as Freshfields and Nursery House which are currently alongside it.

The northern Bromley Road dumbbell roundabout is greater than 250m from Slough Farm.

The edge of the carriageway of the Link Road is between 0-50m from the nearest façade of 31 Turnip Lodge Cottages, 50-100m from the nearest façade of No. 32 Turnip Lodge Cottages; between 50-100m from the nearest façade of Nos 1 and 2 Mount Pleasant and between 100-250m from the nearest façade of Blossomwood Cottage; approximately 369m from nearest façade of the listed Allen's Farm Farmhouse and between 100-250m from the nearest façade of White House.

The northern Bromley Road dumbbell roundabout is between 50-100m from the nearest façade of White House (2nd property named White House) and between 100-250m from the nearest façade of Carringtons

	Distance to existing property		
	0-50m	50-100m	100-250m
Number of Properties	10	7	6

Table 4 – Option 3, tally of existing properties within distance bands from the nearest property façade to the proposed road edge

The route passes almost through the middle of the main northern area of housing allocation based on the Concept Framework and with residential properties on both sides of the Link Road this may create severance issues for the communities either side, as it may form a road more akin to a Spine Road rather than a Link Road.

Access to the WTS would be via, or roughly parallel to, a currently private track to the rear of the facility to Bromley Road, and then to the proposed northern dumb-bell A120 junction roundabout. The negative impact caused by this is likely to be restricted to Wheatsheaf House, White House and Carringtons.

All of the mainline Link Road is within the proposed Garden Community boundary.

This option takes a route through generally arable farmland.

Land required outside of the current proposed Garden Community boundary is that to the north of the A120 for the grade separated junction, and to the south of the A120 for the westbound merge.

It is anticipated that small unworkable fragments would be acquired alongside the main corridor, and they may be used for mitigation works. The option shows a sliver required from the northern part of the property boundary of No. 31 Turnip Lodge Cottages at the point where the alignment of Turnip Lodge Lane deviates slightly to the east, but the corridor could be shifted east to avoid this.

Land and field access may be available from both sides of the Link Road but discussions will need to take place with all landowners in regard to both temporary and permanent land access arrangements and accommodation works.

Any specific severance will need to be discussed with individual landowners. Narrow slivers or other small unworkable areas of land are assumed to be acquired and used for mitigation measures for the Link Road.

Impact on Petrol Station

The new junction would result in the loss of the direct access onto the A120 for the petrol station is likely to affect patronage. However the alignment of the Link Road and connection to the petrol station may open the site up to new customers from the Garden Community or beyond. The distance from the A120 junction southern dumb-bell on this option is 960m excluding the circulatory of the additional roundabout, although this could be reduced, depending on the roundabout location. There is some encroachment into the petrol station site and a retaining wall would be required.

Impact on Waste Transfer Station

There is a level of encroachment into the site adjacent to the WTS. It is not apparent if the site could remain in operation at this stage without consultation with the owner and occupier. This option may also have an impact on the stats supply into the weighbridge.

The access into the site would be via Bromley Road a short distance from the northern dumb-bell roundabout. The proposed route would be via a barriered track which currently gives access to a sand and gravel extraction quarry off Sough Lane to and from the A120. This track is private and hence an agreement would have to be reached with the current owner.

Buildability

This option has the following challenges. If areas of poor or made ground are encountered during the GI or once on site they will require mitigation and it is known that the groundwater level is relatively high which will impact for example piles for bridge foundations. As identified in the Construction Cost Estimate and Construction Programme, the quantity of fill material required for this option is less than that required for the option 1 variants because the A120 has entered cutting at the proposed junction location but a large volume of fill material is required and either borrow pit(s) within the site or nearby extraction site(s) would be preferable to reduce the HGV movements. Also, favourable weather conditions/time of the year will be needed for the laying and compaction of all the material.

At each location where the route passes under the overhead power lines the Contractor will need to implement the appropriate special working procedures and comply with HSE Health and Safety Avoidance of Danger from Overhead Power Lines GS6. Also, the dumb-bell junction will need to be built before the WTS direct access can be cut off, otherwise the facility will have no access. A robust solution will be needed for the tie-in detail to the A120 rigid (concrete) pavement.

Another matter to resolve will be an available location for the site compound, within the site. For most site traffic it would be beneficial to have an access point off the A120 strategic route subject to HE agreement and it may be possible to use the Bromley Road overbridge to cross the A120. It may be that construction could commence on slip roads off the A120 up to Bromley Road for access to both sides of the site. However much of the dumb-bell junction will need to be built before the WTS direct access can be cut off, otherwise the facility will have no access.

Access to Bromley Road and Wheatsheaf House may be difficult during the construction of the northern dumb-bell, Bromley Road bridge can then only be demolished once new is available to traffic.

7.5 Additional notes

Based on the Stage 2 desk study, the ground conditions are fairly uniform across the site and hence no specific comparison of options has been generated, but the Geotechnical Desk Study can be found in Appendix J. Also, for each option the main point of attenuated discharge is Sixpenny Brook at the southern end of the site. The availability of infiltration will only be known once ground investigations are complete.

8 A133 roundabout position

8.1 Western roundabout position – west of Blossomwood Cottages

Engineering Standards and Buildability

Both carriageways of the A133 are approximately 7m wide and the central reserve is approximately 4.5m wide in this location. There are no gaps in the centre reserve at this location.

The roundabout ICD is expected to be large (55-70m). Initial design assessment suggests it works geometrically on-line centred about the A133 although this may not be preferred with regard to buildability, or off-line to north or south. In this position, there is no connection to Elmstead Road but 70m ICD has been drawn as all three arms are dual carriageway although this size is slightly larger than may be required at detailed design. This location suggests flexibility over the precise final position of the roundabout and Stopping Sight Distance lines are not anticipated to cross private residential property.

An existing lay-by on the A133 eastbound carriageway would be lost.

Stakeholder Feedback

There was no specific detrimental comment against this option at the public consultation event although it is noted that it may reduce the available developable area for the Garden Community. The Consultation Report in Appendix F states 18% of responders selected this roundabout position, but 18% answered the east roundabout so no judgement can be based on this. It was noted in some responses that the western roundabout is further from existing properties which is a positive.

Walking, Cycling and Horse Riding

There is a footway along the northern side of the A133, and at this point it forms part of the Essex Cycle Network. Although it will be severed by the Link Road, it can be reconnected via a crossing point, and connected into the new Link Road walking and cycling provision.

Public Utilities

Potential diversions/conflicts

- A133 roundabout positioned over 2x BT Openreach underground cables.
- Route passes under UKPN HV overhead lines northwest of Blossomwood Cottages.

Impacts on Landowners

The A133 roundabout is greater than 250m from Blossomwood Farm, Park Farm, Tye House and Solomons Glory and 6x Brook Cottages; and the Link Road is greater than 250m from Balls Farm and The Courtyard.

The A133 roundabout is between 100-250m from nearest façades of Blossomwood Cottages.

Impacts on Properties

There are no residential properties with private accesses on the immediate approach to this roundabout position, and parts of the old A133 would not be required for access. There would also be no change to existing right turns/U-turns through the central reserve from these properties. This roundabout position is further from existing properties than the eastern position.

The categories for Programme and Environmental are not broken down further for the roundabout positions, but form part of the wider options review in Section 7.

8.2 Eastern roundabout position – between Blossomwood Cottages and Blossomwood Farm

Engineering Standards and Buildability

Both carriageways of the A133 are approximately 7m wide and the central reserve is narrowed to approximately 4.0m wide on approach to a gap in the central reservation for right turns in and out of Elmstead Road.

A133 junction - The roundabout ICD is expected to be large (55-70m), probably nearer the higher number if four-arms are provided, three of which are dual carriageway. Initial assessment suggests it works geometrically on-line centred about A133 although this may not be preferred with regard to buildability, or off-line to the south.

It would be necessary to divert Elmstead Road into the roundabout to remove a major/minor junction from the close proximity of the roundabout and remove the safety and operational conflicts this would create. However, it is noted that the inclusion of Elmstead Road as an arm of the roundabout makes this road more inviting to road users even though in places it is not wide enough for two vehicles to pass and historically there have been collisions at its crossroads junction with the B1027, so further measures on this road would be required.

No existing lay-bys would be lost on the A133.

A133 roundabout - Because the entry and exit alignments, Stopping Sight Distance lines and the associated highway footprint would encroach into the gardens of the adjacent Blossomwood properties, an offline position to the north of the A133 is not feasible.

Stakeholder Feedback

The Consultation Report in Appendix F states 18% of responders selected this roundabout position, but 18% answered the west roundabout so no judgement can be based on this. Concern was raised over the Link Road causing an increase in traffic on Elmstead Road, with opinion being that it is unsuitable even for the current traffic usage and could not accommodate any increase. It was also noted that this roundabout position is closer to existing properties.

Walking, Cycling and Horse Riding

There is a footway along the northern side of the A133, and at this point it forms part of the Essex Cycle Network. Although it will be severed by the Link Road, it can be reconnected via a crossing point, and connected into the new Link Road walking and cycling provision.

Public Utilities

Potential diversions/conflicts

- A133 roundabout positioned over 2x BT Openreach underground cables, and under 1x overhead lines
- Another (12inch diameter) asbestos concrete water main runs along the central reserve of the A133 from the east and then turns south along Elmstead Road. If this roundabout position is selected along with the realignment of the A133 approaches and Elmstead Road, significant diversionary works may be required for this main

Impacts on Landowners

The A133 roundabout is greater than 250m from Solomons Glory, Park Farm and No's 3-6 Brook Cottages.

The A133 roundabout is between 50-100m from the nearest façade of Blossomwood Cottages and Blossomwood Farm; 100-250m from the nearest façade of Tye House and Tye Farm and 100-250m from the nearest façade of No. 1 and 2 Brook Cottages.

This option will create a barrier and severance for wildlife travelling between the two small wooded areas north of Blossomwood Cottages and Farm.

Impacts on Properties

Private residential access for Blossomwood Cottages would be on the approach to the new roundabout with the online roundabout position, however realignment of the A133 into an offline roundabout position to the south will mitigate this. This would then mean part of the old A133 would need to be retained for access to the properties but some turning opportunities previously available may no longer be available and beside the new A133 roundabout there are no others close by east or west for the right turn manoeuvre.

9 Evaluation of Options Summary

9.1 Matrix

A scoring matrix has been drawn up on the information contained within Sections 7 and 8 of this report to quantitatively assess the various options against each other, see Appendix A. The impact score range that has been used is from -1 (very adverse) to + 4 (Beneficial). The Matrix and Sections 7 and 8 are summarized below to outline which options are considered feasible or beneficial, and which are not.

9.2 Review of matrix and summary.

The northern part of Option 1A is not considered preferable from an environmental or sustainability viewpoint as the rereferred option, because of the established mature Strawberry Grove woodland that would be destroyed. This is contrary to the ethos of the Garden Communities. A score of -1 was given to the Environmental section of the matrix on the basis that the removal of Strawberry Grove would bring about the destruction of the established ecosystem that would take time to establish in the new mitigation planting.

This option is over the budget available for the project, even though it has the shortest duration on the Construction Programme in Appendix G. There is a possibility of interaction with the asbestos cement water main immediately south of the A120 and other public utilities northwest of the petrol station/WTS. It passes three times under the 132kV power lines but neither location is believed to cause a problem with required clearance.

The other notable consideration with this option relates to buildability and the WTS, even though construction can still potentially occur within the desired timescale (see Construction Programme in Appendix G). The full grade separated junction will need to be constructed, excluding the eastbound diverge, before the existing access can be closed for construction of the eastbound diverge. During this period there will be no direct access from the A120 in the eastbound direction and vehicles will have to travel to their current u-turning roundabout, return and exit westbound onto the new A120/Link Road junction, over its bridge and along the new WTS access road.

Whilst the northern part of Option 1A is ruled out by the score of -1 very adverse, the overall score of 17 is only three less than the highest scoring Option 1C suggesting elements of this route south of Strawberry Grove could be considered.

Option 1D has been deemed unfeasible if the Waste Transfer Station is to remain operating on the site. The earthworks associated with the eastbound diverge would encroach considerably into the operational site and bring about the closure of the facility because vehicles could not negotiate the site in an efficient or safe manner. The alternative could be to provide a retaining structure instead of earthworks but the size, lack of lateral space and sheer presence of the wall would be significant and possibly not constructible as even this would be within the operational area and over the weighbridges. Therefore, this option also scored -1. A small amount of verge widening for SSD may be required increasing the road footprint and encroachment into the site, so a slip road layout to minimise encroachment may not actually result in a smaller footprint. There is no variant available geographically between Options 1D and 1A which avoids the WTS, has an acceptable grade-separated junction skew and does not have a major impact on Strawberry Grove, considering the full footprint of the road not just the carriageway area. The overall matrix score was well below and only approximately half that of Options 1A and 1C.

The footprint of the road also crosses the canopy of the petrol station, meaning an alternative access and a reconfiguration of the site is unlikely to be possible so it would result in the closure of the facility. On the basis that it may be possible to come to an arrangement with the current owner this has been scored 0 rather than -1.

This option is over the budget available for the project and at 111 weeks over the available programme. There is interaction with the asbestos cement water main at the A120 junction position, with both the southern bridge abutment and a retaining wall beside the WTS on top of the main. It also interacts with other public utilities northwest of the petrol station/WTS.

In line with Option 1A a buildability issue will occur with the WTS, as the full grade separated junction will need to be constructed, excluding the eastbound diverge, before the existing access can be closed for construction of the eastbound diverge. During this period there will be no direct access from the A120 in the eastbound direction and vehicles will have to travel to their current u-turning roundabout, return and exit westbound onto the new A120/Link Road junction, over its bridge and along the new WTS access road. Any contaminated ground within both the petrol station and WTS will need to be removed/treated and all the petrol station infrastructure removed.

According to initial traffic modelling findings, Option 3 could bring a potentially unmitigable large traffic increase to Bromley Road and this along with new highway infrastructure close to existing residential property is a cause of concern to those who live in the immediate area. The Consultation Report in Appendix F demonstrated that a number of the negative comments were directed towards this option. However it is fair to give this a score of 0 rather than -1 as it is a small rather than large community and for a few properties Bromley Road will be realigned further away. Also the derived programme for this option does not suggest it can be constructed within the two year timescale available which gives another score of 0 in the matrix. Like Option 1D this option came out poorly on its overall matrix score.

There is heavy interaction with public utilities in the vicinity of the new junction position, including the southern bridge abutment and the northern dumb-bell roundabout. This option involves the highest number of landowners of the four options.

The option results in the loss of the existing access to the petrol station and encroaches into this site, very close to the canopy area. A retaining structure would be required. The detour for passing road users is notable and determined by the Link Road access roundabout position. For the WTS, similar to Option 1A and 1D, the eastbound merge would be constructed across the existing access so the grade-separated junction will need to be part constructed to allow some access onto/off the A120 via Bromley Road before this slip road is constructed, closing off the existing access.

Option 1C offers the most feasible junction position on the A120 as it is away from the main points of ground constraint which are the WTS, petrol station and Strawberry Grove woodland area. The components of the junction can pass under the 132kV cables with adequate clearance, although in terms of buildability it will mean the contractor has more rigorous and involved health and safety obligations in this area. The accommodation bridge to the east of the site if affected by the scheme would add approximately £2.3m to the raw structures element of the project, so it is recommended this is designed out. Its construction will allow the existing access to the WTS to remain open during construction simplifying construction of the new grade-separated junction.

The option is over budget so value engineering and other means of reducing the cost will be required although the Construction Programme in Appendix G suggests it can be constructed in just under the two-year period.

It was not able to score more than 0 on the matrix for Environment for a number of factors which have an adverse impact on the area including clipping the corner of Strawberry Grove and isolating it

with the petrol station access road. In common with the other options it severs Turnip Lodge Lane but also passes the closest to the listed Allen's Farmhouse.

This option scored the highest on the matrix but only three ahead of Option 1A suggesting that whilst Options 1Cs A120 junction position is preferred, there are elements of Option 1A which perform better than Option 1C, namely the location of the A133 junction. As a result, the location of the A133 junction was assessed using similar criteria as used for the main options assessment.

9.3 Review of A133 roundabout matrix and summary.

The western roundabout position gained the best score in the matrix in Appendix A and it is recommended this roundabout position is utilised because it is less constrained and offers the most flexibility. The eastern roundabout position has a greater number of constraints; a significant one is an asbestos cement water main running along the central reserve of the A133 to the east of the Elmstead Road junction which turns south into this side road. As C3 enquiries have not yet been undertaken it is not known if a diversion, replacement with steel or construction of a protection slab would be required or the order of cost of any of these measures. Parts of the old road would need to be retained for access into Blossomwood Farm and Cottages if an offline solution was developed which could attract undesirable use. Also access may become more difficult for example to give Blossomwood Farm compliant provision to turn right across the central reserve onto the westbound carriageway of the A133 especially with any large vehicles.

At the eastern roundabout position because of the need to tie Elmstead Road in rather than have the major/minor junction close by, it may lead to an apparent continuation of the Link Road onto Elmstead Road towards Wivenhoe. However Elmstead Road is in places not wide enough for two vehicles to pass. An argument could be made that the roundabout's position could create a new desire line and increase traffic flow on Elmstead Road which was mentioned on several occasions during the public consultation events. Significant improvement and widening works could be enforced involving the loss of trees and hedging, potential work involving public utilities and drainage and the cost associated with this, none of which is within the scope of the project. If an Elmstead Road connection is made to the roundabout, the other option would be to provide deterrents to stop it from widely being used as a through route. The signed route would be via the B1027 and A133.

The western roundabout would allow the existing access to Blossomwood Cottages and Blossomwood Farm to remain unchanged, there are no notable public utility diversions required and the main impacts would be the loss of a lay-by and a small number of roadside trees.

9.4 Emerging Option

Based on the information provided in Sections 7 and 8, an emerging option involves the northern part (A120 junction) from Option 1C, the southern part (western A133 roundabout) from Option 1A and a variation in the middle to avoid Turnip Lodge Lane. This route is to be named Option 1C Variant, as it is based on the Option 1C A120 junction position which was the main difference between each option. To understand if it is a better performing option, this option was assessed together with Options 1A, 1C, 1D and 3 using the same score matrix.

9.5 Points that Option 1C Variant will look to address.

Based on the information provided in Sections 7 and 8, whilst Option 1C scores as the most favourable of the options, there are some aspects that remain as constraints and/or have scored poorly on the matrix and it will be preferable that the emerging option addresses these prior to it being confirmed as the preferred route. They include:

- Affordability
- Access to petrol station
- Protected Lane - Turnip Lodge Lane
- FullCircle Energy Ltd site
- A133 Roundabout position
- Environment
- Impact on public utilities

10 Option 1C Variant

10.1 Option 1C

Engineering Standards

Pros

The drawn option (see plan in Appendix C) holds no issues with geometry on the Link Road and the intermediate roundabouts are aiding changes in direction. Radii used on Option 1C Variant are all desirable minimum or greater. There is the need to use a desirable minimum 510m radius with 5% superelevation between the A133 roundabout and the first intermediate roundabout near Tye Road to allow the road to pass the triangle of wood and the eastern end of Turnip Lodge Lane.

A120 junction - The existing at grade petrol station and WTS direct accesses would be lost but this can be considered an advantage as it will remove these conflict points on the dual carriageway. It would also remove what would be non-compliant weaving lengths to the proposed junction.

Provisional assessment to CD 122 gives the following slip road types for the A120 junction:

Parallel Merge westbound, ties in prior to Bromley Road overbridge.

Two-lane Taper Diverge eastbound, no issues.

Further assessment has concluded that both east facing A120 Taper Merge/Diverge slip roads can be tied into the dual carriageway just prior the existing accommodation and PRow overbridge. There is a risk that a Departures from Standard (DfS) may be required for the merge/diverge Stopping Sight Distance being interrupted by the existing bridge piers. The significant cost of works to the structure for a compliant design would be used in the case for the DfS if it were required.

Gradients and vertical curves have been used on the slip roads, and are most prominent on the east facing slip roads where shortened to fit in to the west of the accommodation bridge. The westbound diverge has a max gradient of 3% which is close to the desirable max for an uphill gradient. The eastbound merge uses a gradient of 4.5% but as it is downhill this is not considered an issue and should not hinder HGVs or create abnormal carriageway deformation.

Where the route passes over a tributary of Sixpenny Brook it is anticipated the road will be raised to whatever level is required such that the watercourse can be culverted on existing bed level, and the crossing of the stream gives attenuated surface water drainage discharge opportunities. It is not

known at this stage what size or type of culvert will be used. No other known watercourses are crossed, although the route passes close to the source of Sixpenny Brook beside Tye Road.

Cons

The separate access road for the petrol station has been removed and it has been combined with the westbound merge. It is currently shown running parallel with the A120 with an access into the petrol station and then then parallel merge tying in prior to the Bromley Road overbridge. This arrangement still needs to be agreed with Highways England. If acceptable it will reduce the size of the road footprint in this area and there would be no new carriageway to the southwest of Strawberry Grove.

The eastbound diverge and the WTS access road need to pass under the 132kV overhead power lines north of the A120. To do so the WTS access road needs to pass closely to the north of the pylon but a layout which achieves adequate geometry at the roundabout directs the WTS access road towards the overhead power line sag point which would not give adequate clearance. The other disbenefit of this geometrically preferable layout is it increases the footprint of the scheme. To avoid this it is recommended a T-junction arrangement is provided for the WTS access road and this can then be directed parallel to the eastbound diverge and round the perimeter of the WTS site, leaving maintenance space for the pylon, minimising land required.

The A133 roundabout has been moved about 150m west (further away from Blossomwood Cottages) to allow its approaches and Sight Stopping Distance to be designed to 120kph, which takes into consideration current recorded 85%ile speeds. This is in case a 50mph posted speed limit is not supported for this part of the A133, or road users fail to slow sufficiently upon entering the posted 50mph wherever it is placed.

Up to three existing lay-bys on the A120 would be lost, and may need alternative provision. A separate assessment for this is proposed.

Programme

The Construction Programme in Appendix G for this option suggests an approximately 89 week construction phase. This falls within the 104 weeks/2 years maximum duration envisaged in the HIF bid. Although the earthworks volume has been reduced on this variant compared with the original Option 1 variants, there remains a large quantity of material required and so the availability of the material is a risk to this construction programme.

Environmental

Environmental mitigation will be identified and developed through the preliminary design and Environmental Impact Assessment, and it is anticipated that tree and vegetation planting will be associated with the Link Road scheme and habitats created within the corridor.

The benefit of this variant over the original Option 1C is the removal of the proposal for an access road to the petrol station to the south of Strawberry Grove. This will allow wildlife to enter/leave Strawberry Grove to the south and west without having to cross highway, as well as contracting the land acquisitional requirements and sterilisation of the plot at this location. There may though be a slightly greater permanent loss of Strawberry Grove alongside the A120.



Figure 4 – Strawberry Grove alongside the westbound carriageway of the A120

All but the very eastern tip of Turnip Lodge Lane will be retained, and the preferred route proposal involves stopping up the lane at its eastern end so that aside from access from the west for Turnip Lodge Cottages it can be used solely for WCH. However there will still be a potential impact to the character and eastern tie in of Turnip Lodge Protected Lane, as detailed in the Environmental Options Appraisal Addendum in Appendix D.

The route passes approximately 184m from the listed Allen's Farm Farmhouse. Hence it has a potential effect on the setting of the Grade II listed Allen's Farmhouse, but this is further away than Option 1C.

Where the route passes through the petrol station and waste transfer areas there is a potential land contamination risk.

There will be a large number of future receptors to noise and air quality effects west of this route, and the cumulative effects will need to be considered with mitigation provided on the basis that the Garden Community is going to be built.

Affordability

The cost estimate is £69.7, (refer to Appendix E - Construction Cost Estimate, Appendix H - Property Cost Estimate and additional elements breakdown in the Affordability tab of the Scoring Matrix). The budget for the Link Road from the HIF bid was £65,747,900 so this is a little over, but it is recommended further value engineering opportunities are taken during preliminary design as well as risk workshop(s) to bring this figure down to the budget.

Stakeholder Feedback

This emerging route combines one of the two consultee preferred A120 junction positions, that from Option 1C, and the western A133 roundabout location which received the same number of selections as the eastern but if preferred under other criteria. Also, in line with feedback in the Consultation Report in Appendix F, the middle part of the route passes the eastern end of Turnip Lodge Lane, to minimise the impact on the protected lane.

Walking Cycling Horse Riding including severance

The Restricted Byway is severed just north of Allen's Farm - Elmstead PRoW 21. A diversion and reconnection to the existing network has been put forward as part of the side and access road possible layout proposals.

There is plentiful opportunity for WCH provision and facilities will be provided with the Link Road, in the PRoW diversions, and there are expected to be several opportunities for connections through the future Garden Community Masterplan. The initial WCH report can be found in Appendix I. However, the route along the Link Road would end at the A120 which allows no connectivity to the north of the A120 at this location.

Tye Road and Turnip Lodge Lane would be severed at the point of their existing junction. If the existing roads were severed with no connection to the Link Road, Balls Farm and The Courtyard would be the northernmost properties that could be accessed on Tye Road from the A133. Mount Pleasant and Turnip Lodge Cottages would only be accessible from roads west of the Link Road. Turnip Lodge Lane could be promoted as a WCH route in addition to a means of access to the properties. The existing access track to Allen's Farm (Allen's Lane) would be severed 235m NE of its junction with Tye Road. Temporary/alternative access may be required during construction.

Impact on Public Utilities

This route passes under the UKPN 132kV overhead lines on tower pylons at: westbound merge slip road, petrol station access road, WTS access road and eastbound diverge slip road. The new highway will be up to 7m above existing A120 carriageway level which may not leave adequate clearance. Assessment work has been carried out, using information provided by UKPN to determine a position where adequate clearance is achieved at all locations. UKPN has confirmed a 5m no dig offset is required to each tower pylon leg to protect the integrity of the foundation. The eastbound diverge can pass to the south of the tower pylon adjacent to the A120 eastbound carriageway but will need a retaining structure to prevent the need from moving the junction further east. The minimum clearance required is 6.7m but it is proposed that 7.5m is chosen as a target to aim for at this stage.

Potential diversions/conflicts

- A133 roundabout positioned over 2x BT Openreach underground cables.
- Route passes under UKPN HV overhead lines northwest of Blossomwood Cottages.
- Route passes over 1x BT Openreach underground, and under 1x BT Openreach overhead line.
- Route passes under UKPN HV overhead lines southwest of Allen's Farm.
- Route passes over 24inch diameter asbestos water main northeast of Allen's Farm. Also the petrol station access road passes over it southeast of the petrol station.
- The merge layout northwest of the petrol station passes over another water main and BT Openreach underground cables.

Impacts on Landowners

The area of land required for this option falls under 10 land owners, excluding Highways England.

The A133 roundabout is greater than 250m from Blossomwood Farm, Tye House, Brick and Tile Cottages and Solomons Glory and 6x Brook Cottages; and the Link Road is greater than 250m from Balls Farm and The Courtyard.

The A133 roundabout is between 100-250m from nearest façades of Blossomwood Cottages and Park Farm.

The edge of the carriageway of the Link Road is between 100-250m from the nearest façade of both Turnip Lodge Cottages; between 100-250m from the nearest façades of No. 1 and 2 Mount Pleasant, and approximately 184m from nearest façade of the listed Allen's Farm farmhouse.

	Distance to existing property		
	0-50m	50-100m	100-250m
Number of Properties	0	0	8

Table 5 – Option 1C Variant, tally of existing properties within distance bands from the nearest property façade to the proposed road edge

This route clips the corner of the FullCircle Energy site to the north of Allen's Farm. This alignment has been mapped against the Red Line for the consented expansion to the anaerobic digester site and it is outside that line and gives less encroachment into the FullCircle Energy site than Option 1C did.

This option takes a route through generally arable farmland.

Land required outside of the current proposed Garden Community area of interest is that to the north of the A120, for the grade separated junction and for the new access to the WTS.

It is anticipated that small unworkable fragments would be acquired alongside the main corridor, and they may be used for mitigation works, although there are not many of this size along this route.

Land and field access may be available from both sides of the Link Road, but discussions will need to take place with all landowners regarding both temporary and permanent land access arrangements and accommodation works.

A benefit over Option 1C is that the large bulbous area of land surrounding and including Strawberry Grove is not required, thus not isolating the wood or sterilising the area of land to the east of it.

Impact on Petrol Station

The loss of direct access from the A120 for the petrol station is likely to affect patronage. A further disadvantage of this option over the original Option 1C is that the access road does not allow for two-way traffic, so although now all traffic joining the A120 in the westbound direction would pass the facility, this would be the only traffic able to directly access it and they would only have one option of joining the A120 westbound afterwards. Traffic already on the A120 westbound coming from the Harwich/Clacton direction would need to use the new junction infrastructure, rather than directly access from the dual carriageway. The distance along the new access between the southern dumb-bell roundabout and the petrol station on this option would be in the region of 840m. The petrol station is unlikely to be visible from the roundabout as Strawberry Grove will be in between. Petrol station symbols can be used on the directional signs to guide road users to the facility. Depending upon what width of separation the new access road/merge can be agreed with Highways England there may not be any encroachment into the petrol station site. Whilst this arrangement for a combined petrol station access road/westbound on slip/merge has been put to Highways England, the detail still needs to be provided and it accepted. If the petrol station is not retained the parallel road will not be utilised and the westbound merge would join the A120 as per Option 1C.

Impact on Waste Transfer Station

Vehicles accessing and exiting the WTS will be able to use the new junction to travel east and west along the A120, which they can't currently do because there is only access from the eastbound carriageway, and it will bring about a significant mileage saving. Therefore the length of the access road is not considered an issue.

The new junction position means the existing access to the WTS cannot be retained, but by providing a better access outside the objectives of the scheme, the costs and land acquisitional requirements need to be kept to a reasonable minimum. Therefore instead of using geometric curves it is proposed to use 'T' junctions to change direction from the dumb-bell roundabout and into the site, with robust carriageway construction to resist the scrubbing effect of the HGV wheels, to minimise the land required, and allow the road to pass under the overhead power lines with adequate clearance.

There is not expected to be any encroachment into the operational WTS site.

Buildability

This option has the following buildability challenges. If areas of poor or made ground are encountered during the GI or once on site, they will require mitigation and it is known that the groundwater level is relatively high which will impact for example piles for bridge foundations. Because of the large volume of fill material required either borrow pit(s) within the site or nearby would be preferable to reduce the HGV movements. Also favourable weather conditions/time of the year will be needed for the laying and compaction of all the material.

At each location where the route passes under the overhead power lines the Contractor will need to implement the appropriate special working procedures and comply with HSE Health and Safety Avoidance of Danger from Overhead Power Lines GS6. The existing direct access to the WTS can be kept open throughout construction and then the traffic transferred onto the new junction when its open which is a big benefit. A robust solution will be needed for the tie-in detail to the A120 rigid (concrete) pavement.

Another matter to resolve will be an available location for the site compound, within the site. For most site traffic it would be beneficial to have an access point off the A120 strategic route subject to HE agreement. It may be easier to leave the A120 on the northern side at the WTS but there is no means for crossing the A120 unless arrangement is made to utilise a haul route to and from the existing accommodation bridge. If this cannot be arranged, site traffic would need to leave on the southern side of the A120 to access the main part of the site rather than causing disruption to local communities by using the A133 or local roads. If material is sourced to the north of Bromley Road, there would be a need to use the local road network to a point where they could enter the site onto haul routes.

11 Summary of Option 1C Variant and matrix

11.1 Review of matrix and summary

Option 1C Variant scores well with a total of 26 and exceeds the previous best performing option by 6 points. There are several categories scoring beneficial and just three score slight adverse with none lower than that.

At 89 weeks, the option appears constructible within two years, noting the earthworks risk. The construction cost estimate is the lowest of all options and less than £70m so with value engineering and realisation of risk through the design process this figure may come down nearer to the bid figure. It combines generally preferred options from the consultation and stakeholder consultation and in combination with the Garden Community offers plentiful opportunities for WCH and reconnection of existing routes. Whilst this option does not have the least landowners, it is the only option where the carriageway does not pass within 100m of existing property. Also, when considering the existing access arrangement for the WTS, the new arrangement in this option gives benefit in the final state, and minimal disruption through construction.

The scores of slight adverse cover Environmental, because while much of it can be mitigated there is a negative net environmental impact brought about by a road scheme because of the loss of the greenfield site affecting both the natural and human environment. Also scoring 1 is impact on public utilities because even though public utilities are fairly sparsely located across the site, there are a number of interactions including with the asbestos cement water main. Finally impact on the petrol station, because of the loss of the direct access and the significant detour to reach it. For these three categories, an environmental mitigation plan/strategy will be produced to minimise the impact of the road; C3 enquiries will be issued to the utility companies and discussions commenced to understand the full impact of each public utility interaction, and the impact on the petrol station will involve further discussions with the affected parties.

It is therefore recommended that Option 1C Variant is put forward as the Preferred Option.

12 Infrastructure impact – Transport benefits for existing users of the network

12.1 Transport Impacts and BCR

As a final consideration across all options, transport impacts related to user benefits, carbon emissions and indirect taxes (fuel duty) have been monetised using the Department for Transport (DfT) TUBA software (v1.9.12), which takes demand and cost (time and distance) data from transport modelling and standard economic parameters from DfT as inputs.

As outlined in TAG Unit A2.2, the estimation of user-benefits under fixed land use, land use should be the same in the do something and do minimum transport model scenarios. Thus user-benefits should be estimated excluding the impact of the dependent development on travel demand.

The estimation of conventional transport user-benefit assessment requires two transport model runs:

- Do-Nothing network (without the A120-A133 Link Road and RTS), and without the dependent travel demand (scenario P with 1,000 homes at TCBGC); and
- Do-Something network (with A120-A133 Link Road and RTS), and with the dependent travel demand (scenario S with 1,000 homes at TCBGC).

Since the EMME model is a strategic transport model, Options 1A, 1C, 1C-Variant and 1-D have no difference. For this reason, two different options of the link road have been tested:

- Option 1; and
- Option 3.

In other words, the transport benefits for existing users of the network associated with the Link road are the same for Options 1A, 1C, 1C-Variant and 1D.

In the HIF bid, the alignment of the Link Road that was modelled, was similar to Option 1.

Note that RTS has been included in all scenarios. The reason is that in 2051 the amount of homes at TCBGC will be around 7,800, which means that far better public transport services will be in place.

For reference the results of the HIF bid are presented in the following table, in £ millions, 2019 factored prices discounted to 2019.

HIF Bid	
Present Value of Benefits (PVB)	£262.7
Present Value of Costs (PVC)	£142.7
Net Present Value (NPV)	£120.0
Benefit to Cost Ratio (BCR)	1.8

The results of the different scenarios are presented in the following table in £ millions, 2019 factored prices discounted to 2019. It is also worth bearing in mind that since the HIF bid was submitted there have been some limited enhancements made to the strategic transport model and an alternative RTS alignment has been used. Nevertheless, the new runs show strong consistency with the previous assessment of the benefits of the Link Road.

(Prices in 2019 £ millions)	Option 1A	Option 1C	Option 1C-V	Option 1D	Option 3
Present Value of Benefits (PVB)	£248.5	£248.5	£248.5	£248.5	£244.9
Present Value of Costs (PVC)	£144.2	£142.2	£131.2	£140.8	£130.9
Net Present Value (NPV)	£104.3	£106.3	£117.3	£107.8	£114.1
Benefit to Cost Ratio (BCR)	1.7	1.7	1.9	1.8	1.9

The total present value impact of the infrastructure on user benefits is about £248.5m in the scenarios with Option 1 Link Road and RTS; and about £244.9m in the scenario with Option 3 link road and RTS. The magnitude of this impact is in line with expectations given that it does not include the transport benefits associated with dependent housing.

The table below presents the results of the different scenarios mentioned previously without taking into account the benefits and costs of RTS, even though RTS is included in all scenarios. As previously, the results are presented in £ millions, 2019 factored prices discounted to 2019.

(Prices in 2019 £ millions)	Option 1A	Option 1C	Option 1C-V	Option 1D	Option 3
Present Value of Benefits (PVB)	£139.2	£139.2	£139.2	£139.2	£144.8
Present Value of Costs (PVC)	£91.6	£89.6	£78.6	£88.1	£78.2
Net Present Value (NPV)	£47.6	£49.6	£60.6	£51.0	£66.6
Benefit to Cost Ratio (BCR)	1.5	1.6	1.8	1.6	1.9

All options have benefits which exceed their implementation and operating costs. Given that the Link Road provides benefits on the strategic road network, which is currently congested, it is expected that a significant amount of benefits is associated with the Link Road.