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NORTH ESSEX Garden Communities

CONCEPT FEASIBILITY STUDY

VOLUME 3 - Garden Communities CONCEPT OPTIONS & EVALUATION

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NORTH ESSEX Garden Communities

CONCEPT FEASIBILITY STUDY

Garden Communities CHARTER, CONCEPT OPTIONS AND EVALUATION

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Volumes

Vol.1
Baseline Compendium

Vol.2
Opportunities and Constraints

Vol.3
Options & Evaluation

Vol.4
Garden Communities Charter

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01 Introduction

1.1 Introduction

1.1 Introduction

Colchester Borough Council, Braintree District Council and Tendring District Council are collaborating, alongside Essex County Council, to identify an agreed strategic approach to the allocation and distribution of large scale housing led mixed use development, including employment opportunities and infrastructure provision, in the form of potential "Garden Communities".

There has been a resurgence in the interest and attention being paid to the potential of Garden Communities and how they fit into the 21st Century Context. With the TCPA as strong advocates at the forefront of this movement, many places have sought to appreciate how a modern interpretation of the original Garden City Principles might address the urgent need to increase the level of housing development in the UK. The intention of the Garden Communities programme is to provide high quality homes, new transport improvements, good schools, jobs and community amenities to be delivered in a strategic and sustainable way. The four councils are in agreement that the Town and Country Planning Association's (TCPA) Garden City Principles provide a valuable initial framework for achieving new settlements that are inclusive and provide genuinely affordable, well designed homes, local jobs and schools, integrated transport systems, high standards of green infrastructure and promotion of health within and beyond the emerging local plan period for each authority of 2032/2033. In response the councils are exploring the potential to establish new settlements in the form of North Essex Garden Communities, for which four broad search areas have been identified by the councils for further consideration. This is in the context of the duty placed under the Localism Act 2011 on neighbouring authorities to cooperate on key strategic cross boundary issues in the preparation of their local plans.

As part of their investigation and analysis of the Garden Communities opportunity and its application and suitability to North Essex, the Councils commissioned AECOM to undertake a 'Garden Communities Concept Feasibility Study'. The outcome of this study is presented in four volumes:

1. Baseline Compendium
2. Opportunities and Constraints
3. Options and Evaluation
4. Garden Communities Charter

This report presents Volume 3 – Options and Evaluation. Informed by the evidence baseline (Volume 1) and opportunities and constraints (Volume 2), this report identifies a number of site options for each of the four broad search areas. A high-level indicative development capacity is provided based on a series of common assumptions, with the options subsequently evaluated using a Site Appraisal and the Garden Cities & Large Sites Financial Model (originated by ATLAS). The outcomes of each evaluation is presented but no conclusions drawn.

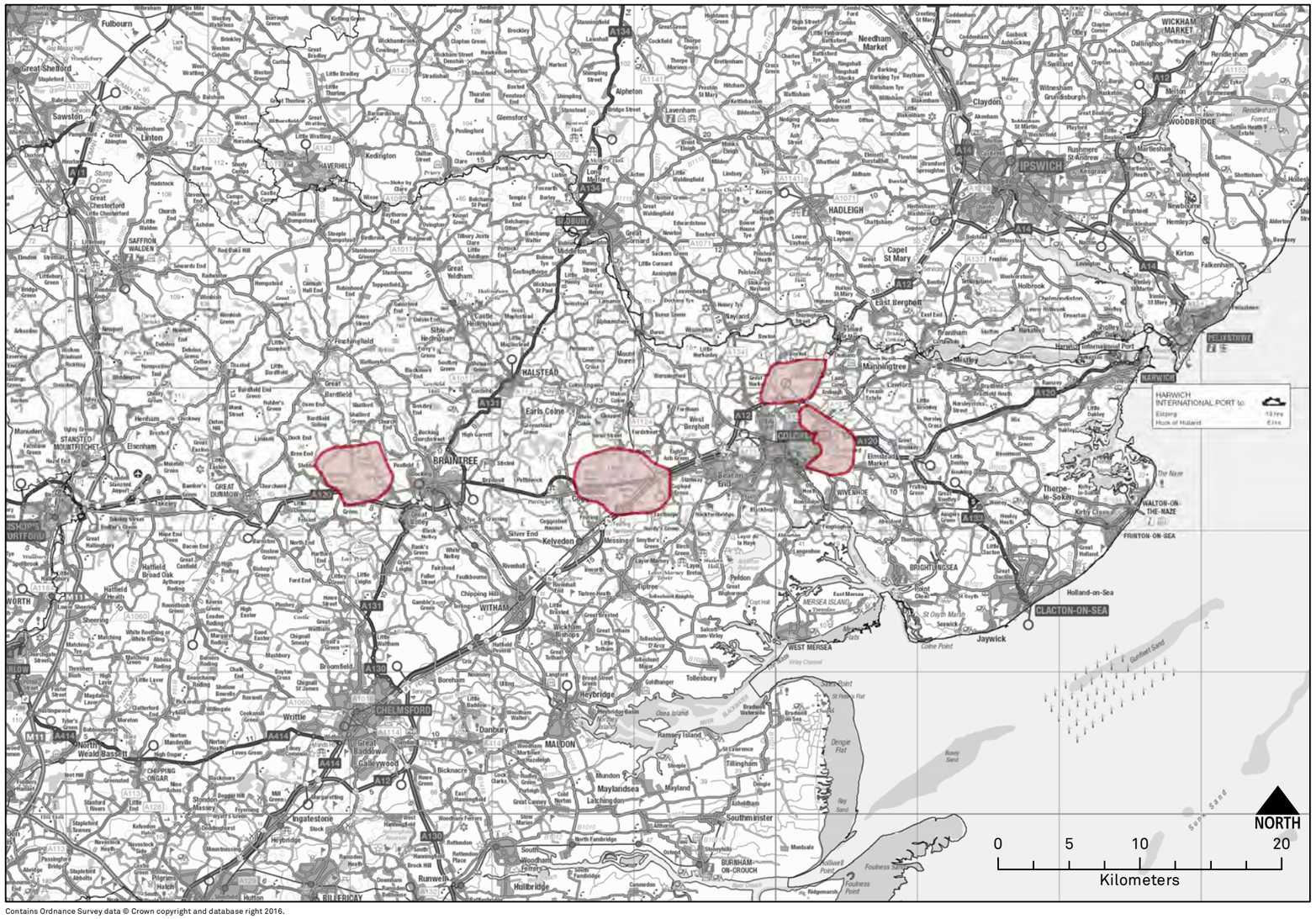

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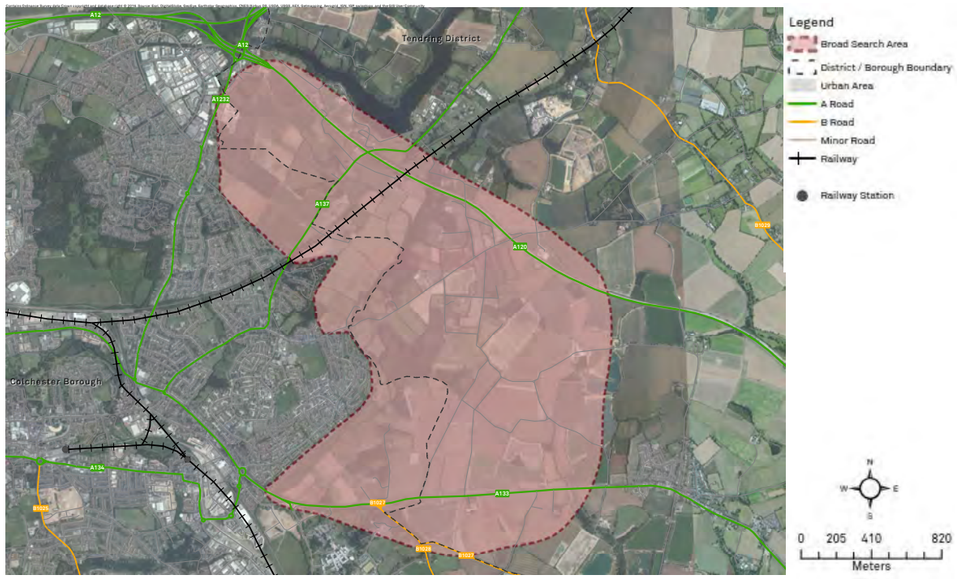
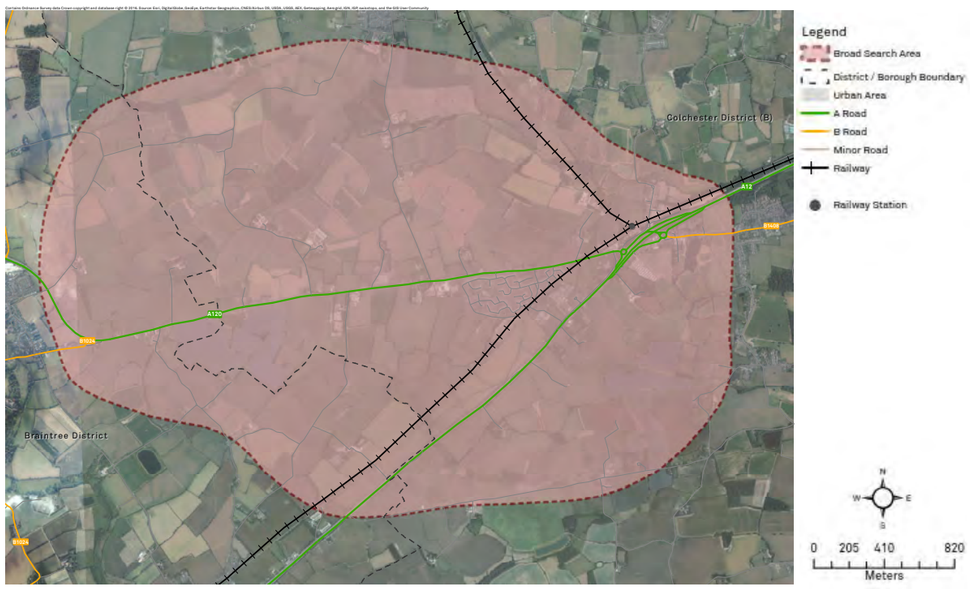
Figure 1: Study Area Context.

Figure 1 provides the location of each of the four broad search areas within the A120 corridor and relative to each other. A larger scale diagram of each Broad Search area is provided on the opposite page (Figure 2).

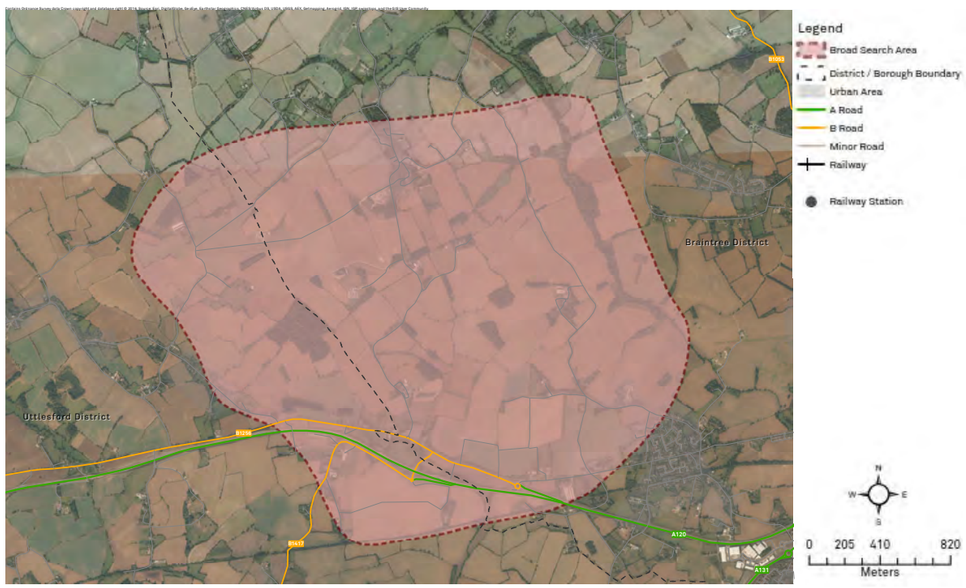


East of Colchester / West of Tendring

North of Colchester



West of Colchester / Marks Tey



West of Braintree

Figure 2: Broad Search Areas

This Section sets our key assumptions and strategies that have informed development capacity and infrastructure requirements.

02 Sites and Options: Key Assumptions

2.1 Calculating Developable Area and Development Capacities

2.2 Overarching Transport Strategy

2.1 Calculating Developable Area and Development Capacities

To identify the highlighted indicative development capacities for each of the 11 Site Options presented through the following sections of this report, a series of common development assumptions have been applied consistently. A breakdown of development capacities for each site option is provided at Appendix 1.

Developable Area

Developable Area represents the proportion of the overall site that in principle is available for physical development, including open space, built form and infrastructure. The total developable area has been derived from the identification of broad land parcels.

The exercise of defining or dividing the site option into broad land parcels is based on the outcome of the key opportunity and constraints analysis and principally a consequence of identifying areas not suitable for development such as ancient woodland, rivers, water courses, utility corridors and access routes etc. Within the 'Developable Area Diagrams', illustrated within sections 3 to 6 of this report, these features are presented as white space; the blue shading representing the indicative developable areas.

Although it is acknowledged that some constraints such as medium pressure gas pipes or minor infrastructure corridors may not neccessarily divide the site in reality, it has been appropriate for this exercise (not having undertaken intrusive site surveys) to assume such areas are deducted from the developable area. Similarly, areas of woodland etc that have been excluded could, through an exercise of Masterplanning, be incorporated into a site wide green infrastructure strategy and contribute to the overall quantum of greenspace within the garden community.

Land Use Development Quantum

The developable area of each scenario has been split between the following land uses, with a number of related assumptions as specified. The assumptions are judgements based on experience of the consultant team, and have not been derived from undertaking a site specific masterplanning related detailed study or an iterative process of viability testing.

Open Space:

- Publicly accessible open space/allotments/children's' play/ SUDs/Ecological space)
- 20% of land parcel area applied as a standard (above normal developer led approach and consistent with Garden City Principles)
- Rising to 30% or above where a greater proportion of land parcel is considered more likely to be open space/green infrastructure – e.g. where rural edge/buffer is important or the location of a country park is known as a result of existing planning policy.

Roads and Pavements:

- 15% of land parcel area applied as a standard (below normal developer led approach and consistent with increased green infrastructure and using a more efficient block structure ; greater levels of permeability with cycling and walking enhanced.

Mixed Uses:

- Assumed to be all uses (retail/leisure/community/culture/education/primary health) that would be associated with creating local and neighbourhood centres, and the attainment of vibrant communities.
- Generally 1% or 2% of parcel land area applied, consistent with dispersal of uses throughout settlement to promote vibrant and walkable communities.

Residential Density

- Average residential density 30 dwellings per hectare (DpH) - allows for walkable environments and can support public transport.
- For the purpose of calculating GIA (Gross Internal Area)[1], an average unit size of 90sqm has been applied (3 Bed for 4 people) - based on Technical Housing Standards - Nationally described space standards March 2015, Department for Communities and Local Government, pg 5)
- Assuming that the majority of units will be houses, an efficiency ratio of 5% is added to the GIA to get GEA (Gross External Area)[2].

Employment Floorspace

1. 0-3% of parcel land area allocated to employment related to:
   a. A level of employment representation throughout the settlement area; dispersal and integration of uses.
   b. Areas of more focused employment concentration where comparative advantages for employment are considered to exist.

Achieving an overall employment GEA that is considered appropriate for each site/ options informed by:

- Experience and judgement of consultant team (Cushman & Wakefield and AECOM);
- Reference to employment/employment land evidence base , including councils employment land supply forecast;
- Local site context.

For simplicity a Floor Area Ratio (FAR)[3] of 1 has been used because it facilitates diversity of density type and scale across the site.

Total Employment GEA has been proportioned between B1 and B2/B8 for the sites and consistently applied to each option. The detail of this is set out in Table 1.

Table 1: B1 and B2/B8 uses proportioned across each of the sites

	West of Braintree	West of Colchester / Marks Tey	North Colchester	East Colchester / West Tendring
B1	50%	50%	70%	70%
B2/B8	50% (more even split)	50% (more even split)	30% (more B2 less B8)	30% (more B2 less B8)

1 GIA (Gross Internal Area) is the area of a building measured to the internal face of the perimeter walls at each floor level.

2 GEA (Gross External Area) is the total floor area contained within the building measured to the external face of the external walls.

3 FAR (Floor Area Ratio) is the ratio of a building's total floor area (Gross Floor Area) to the size of the piece of land upon which it is built. For the purposes of this commission, the FAR is principally being used as a guide to building floor area, in order to generate a gross external area of employment floor space, rather than being a guide to how much of the site or land parcel will be covered by a building.

2.2 Overarching Transport Strategy

The transport infrastructure requirements/projects identified for each Option in the following sections have been informed by the following high-level overarching transport strategy. This common strategy is focussed on the need for the North Essex Garden Communities to achieve Sustainable Integrated Transport and a reduction in the use and dominance of the private car.

Analysis has highlighted a high proportion of internalisation of journey to work trips within the North Essex sub-region, but high car dependency. This suggests the opportunity exists for real change to existing transport patterns and behaviour, subject to an effective combination of infrastructure investment and policy implementation

The North Essex Garden Communities should seek to promote walking, cycling and low carbon public transport as the key modes for both short and longer journeys, especially for commuter (employment) related trips. To function appropriately, non-car mode choice needs to be enshrined at the design stage through appropriate provision of transport infrastructure both site-wide as well as the wider sub-region rather than, for example, relying solely on behavioural change through traditional travel planning measures (mode shift targets). Nevertheless, and in tandem, ambitious mode share targets for both internal trips and workplace commuting should be set.

Through the principle of bringing together mixed uses and varying levels of density, connected by complementary modes of transport for local and sub-regional mobility, the Garden Communities can help ensure the attractiveness of active modes and public transport.

Walking and cycling infrastructure should take the form of dedicated 'green way' corridors, utilising the favourable topography of the region by linking various parts of sites together whilst also creating links with external destinations through connections with the National Cycle Network and local trails. Greenways would also reduce severances created by both major road and rail axis by overpassing infrastructure at key locations using bridges / land bridges or similar, depending on location and spans. To ensure ease of use for cycling, cycle facilities (secure cycle hubs) could be located along routes with greenways integrated within the site wide public transport network in order to promote a clear sustainable transport corridor.

Site based public transport infrastructure should link to both local scale and sub-regional routes. Regional links could be facilitated by the expansion and re-purposing of the sub-regional inter-urban rail and bus networks to provide both short and longer distance connectivity, helping to achieve the targeted mode shares. Routes should be complemented by high-frequency services, well-planned public transport routes connecting key locations and taking advantage of current and future technological advancement and smart data accessibility. All parts of the sites should be accessible to a density dependant level of public transport - located within 800m, equivalent to a 10 minutes' walk of an interchange / stop. Additionally, the potential exists in each site to provide 'Transport Hubs' utilising the location of interchange between different public transport modes and corridors to provide a higher density built form, and a greater mix of employment, services and residential land uses and knowledge sharing, which together generate critical mass and user demand for transport interventions.

Whilst it is acknowledged that the desire to use the private car or a similar future equivalent will always exist to a degree, to minimise its impact, the desire must be planned for in the context of making walking, cycling and public transport the most attractive forms of local transport. Policy should primarily focus on site car parking and street design along with its capacity to serve development that is consistent with a modal choice away from the private car especially for local journeys whilst recognising the importance of connectivity to the wider strategic road network, but not at a cost to its function. In this context the current and potential future strategic road network capacity should be preserved through emphasis on investment in sustainable transport modes and the local road infrastructure should be viewed as one of a means of access to a site rather than the sole transport option available. Car parking policy must be radical in its intent to reduce car reliance. A clear grading of parking ratios based on public transport accessibility and housing/development density will be used as well as the promotion of car clubs or car sharing schemes, including peer to peer car sharing, as means of reducing private car ownership and providing a convenient option for longer distance car travel. This will seek to build on the concept of the sharing economy, and the environmental and community benefits that result. Additional parking capacity will be located at hubs to discourage site visitors to use parking via CPZ's. Robust and clear future proofing of provision for the anticipated take up of electric cars as part of a low carbon future within the NEGC will be provided. The required infrastructure such as charging points will be readily accessible within streets, car parks and the home.

In summary, the development of transport planning policy for the Garden Communities should consider the following:

Sustainable Mode Share

- Promote walking and cycling along with low carbon public transport
- Non-car mode choice needs to be enshrined in development

Target driven

(The proposed percentage mode shares are targets and will be solely reliant on well-planned infrastructure to succeed).

- 40% active modes for journeys typically < 2.5km
- 30% by public transport for journeys > 2.5km
- 30% private car > 2.5km (from current situation)

Focus on Sustainable Transport Orientated Development

- Bringing together mixed uses
- Varying levels of density
- Connected by complementary modes of transport for local and sub-regional mobility
- NEGC's will therefore require vital investment in key infrastructure

Walking and Cycling

- Promotion of active transport modes
- 'Green Spine' infrastructure corridors utilising the favourable topography of the region by creating safe cycling environments
- Link internal green spines with external destinations - National Cycle Network and trails
- Reduce severance by road and rail routes by ioverpassing infrastructure at key locations using bridge structures such as bridges / land bridges or similar, depending on location and spans

Public Transport

- Integrate public transport corridors with green spine alignment
- A clear hierarchical transport network based on density of development
- All development will have access to public transport within a 10 minute walk (800m)
- Ensure public transport use and appeal – design public transport routes within development / urban realm, connected within themselves, to neighbouring centres and regionally by a frequent public transport network
- Link NEGCs regionally via expansion and re-purposing of the inter-urban (sub-regional) rail and bus network to provide both short and long distance connectivity
- Creation of 'Journey Hubs' whereas locations with higher densities within the NEGC's and interchanges for multi-transport modes
- Making use of current and future technological advancement and smart data accessibility to provide real time and on-demand public transport timetabling

Car Borne Movements

- The desire to use the car will always exist and must be planned for. However this should be planned in the context of making walking, cycling and public transport the most attractive forms of local transport.
- Road and street design along with its capacity to serve development that is consistent with a modal choice away from the private car especially for local journeys
- The current and potential future strategic road network capacity should be preserved through emphasis on investment in sustainable transport modes
- Road infrastructure should be viewed as one of the means to accessing a site, rather than the sole transport option available to a site to accommodate an ever increasing volume of development traffic
- Car parking policy will be radical in its intent to reduce car reliance
- Use of car clubs / car hire (private car sharing) as well as advancements in technology and changes in social habits
- Parking located at hubs to discourage site wide visitor parking via CPZ's
- Robust and clear future proofing of provision for the anticipated take up of electric cars as part of a low carbon future within the NEGC. The required infrastructure such as charging points should be readily accessible within streets, car parks and the home.

Limiting car use and therefore parking provision is entirely dependent on the local provision of employment and services accessible within walking or cycling distance or easily accessible within minutes of high quality public transport.

Trip Generation Analysis

The trip generation tables set out under the analysis for each of the sites and their respective development scenario options, illustrate a high-level estimate of the anticipated Am peak hour two-way person trip generation associated with the residential and employment land uses, and are based on the following assumptions:

- Mixed-uses are considered ancillary / complimentary to the development i.e. small retail units rather than retail destinations in their own right and therefore are anticipated to generate solely internalised / linked trips within the development, rather than trip attractors.
- Trip rates for residential and employment (business park) land uses have been extracted from the TRICS database from similar sites located in the UK.
- The sites used however are far smaller in scale than the proposed NEGCs. The proposed mode share targets have been used to provide an indication of the impact on peak hour person trips by targeting active modes and public transport rather than private car use.

The tables provide a theoretical maximum carrying capacities for the various proposed public transport solutions both within the sites and sub-regionally, the solutions depicted are dependent on the location of the site. Theoretical carrying capacity of the public transport infrastructure is based on estimated maximum capacities. Due to the level of detail under this assessment, it is assumed that the proposed public transport only accommodate site development trips. In reality the surrounding local settlements would also utilise these networks, thus reducing the carrying capacity. The person trip demand assumes that, given the sheer scale of the sites (in some cases 3km wide) movement of people within a site is just as important as movements out i.e. at this stage of the work, it is not considered to be a valid methodology to remove residential and employment person trips from the assessment due to internalisation within the site and solely depict the impact on the external highway and public transport network. The assessment also does not take into consideration the impact of person trips on the existing bus and rail network in relation to their current capacity; this level of assessment along with future highways modelling will require a further level of analysis as part of future assessment work.

The assessment seeks to demonstrate the level of public transport infrastructure and therefore investment in the region that might be required in relation to the volume and scale of development proposed, to accommodate the anticipated passenger demand and the movements of people both within the site and externally at a first principle level of assessment. With regard to active transport, the sheer scale of person movements will require large scale pedestrian and cycle route infrastructure and the location of employment and destinations within sustainable commuting distance of the new homes.

Sub-regional Public Transport Connectivity

The final section of this report provides further details on the public transport options that might be available at the sub-regional level. They are provided in response to the need to provide some form of enhanced North Essex Sub-Regional public transport connectivity to maximise uptake of public transport use and a reduction in private car use. For the purposes of the Viability Appraisal (Section 8) it has been assumed that each site and options would make a financial contribution to a BRT system and network - i.e. a developer based contribution.

This Section provides concept options and associated infrastructure requirement for the East of Colchester / West of Tendring Broad Search Area.

03 East of Colchester / West of Tendring

3.1 Broad Search Area
3.2 Options Overview
3.3 Option 1: Southern Land Focus
3.4 Option 2: A133 to Colchester-Ipswich Rail Line
3.5 Option 3: North to South Wrap

3.1 Broad Search Area

Strategic Overview

The East of Colchester/West of Tendring Broad Search Area is located on the eastern boundary of Colchester's urban area and is broadly defined by the strategic road corridors of the A120 in the north and the A133 to the south, with the village of Elmstead Market to the east. The search area effectively wraps around the north eastern quadrant of Colchester, consisting predominantly of productive agricultural farmland and associated field hedgerows and areas of mature tree stands. The area is traversed by a number of narrow country lanes, and more substantially by the A137 Harwich Road in the north west of the search area and adjacent Great Eastern Mainline railway (GEML), these are used to provide access to several small farms and isolated residential properties located throughout the area.

The local authority boundary of Colchester Borough Council and Tendring District Council cuts through the site in a deviating north-south direction, with the majority of the land area located within Tendring district.

The A120 connects Colchester with Harwich and the international port of Harwich to the east, together, via its intersection with the A12, road connectivity to Ipswich and from there the international port of Felixstowe. To the west, via the A12, the A120 connects with Stansted Airport.

The A133 connects Colchester with Clacton-on-Sea to the south east, with the University of Essex located on the south side of the A133, just south of the broad search area.

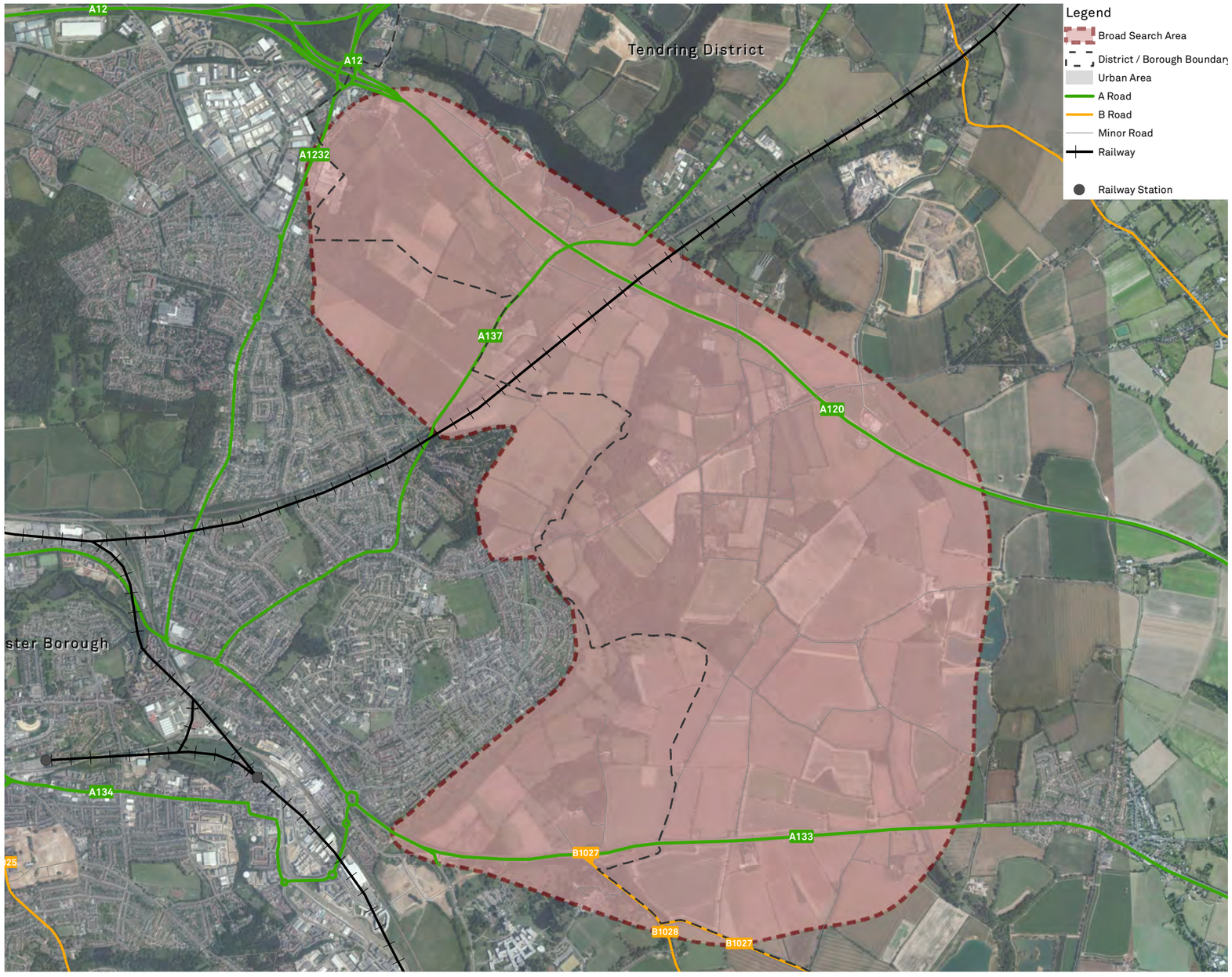


Figure 3: Broad Search Area Diagram

3.2 Options Overview

Option 1: Southern Land Focus

- Total Site Area: **472ha**
- Approximate Total Developable Area: **358ha**

Option 2: A133 to Colchester-Ipswich Rail Line

- Total Site Area: **639ha**
- Approximate Total Developable Area: **475ha**

Option 3: North to South Wrap

- Total Site Area: **816ha**
- Approximate Total Developable Area: **617ha**

3.3 Option 1: Southern Land Focus

Key Drivers

Overview

This option focuses development within the southern section of the wider search area, and to the south of Bromley Road. The full extent of this option is currently under a Development Option Agreement to a single housebuilder.

Landuse

- Landuse within the site boundary is principally agricultural, varying from Grade 1 to Grade 3 Class agricultural land.
- The higher quality agricultural land is situated towards the eastern side of the site, away from Colchester.
- Existing ecological assets, such as Churn Wood and Salary Brook, offer the opportunity for green corridors branching out from Colchester.
- Several farmsteads and isolated residential properties are scattered across the site.
- Some small-scale employment uses are situated along Bromley Road running east to west and along the northern boundary.

Adjacencies

- The residential neighbourhood of Greenstead borders the western edge of the site, but physical separation of is provided by Salary Brook and its related valley and topographic changes. Nevertheless the opportunity to provide some form of pedestrian/cycle connectivity between Greenstead and the Garden Community, utilising/expanding the existing Salary Brook Trail for example, may assist with integration of existing and new development with mutual benefits.
- The University of Essex located on south side of the A133 is a centre of academic excellence with international appeal. It is a sub-regional research and economic development catalyst, together with being a main local employer, with a focused student population. Connectivity between this institution and the Garden Community could be mutually beneficial – e.g. new housing for academic staff, development profile and the attainment of mixed use and vibrant community.
- Knowledge Gateway is science and business park associated with the University of Essex, it is already successful in attracting investment and new business location and start-ups. Developing associations between this facility and the Garden Community could provide mutual benefits.
- Elmstead Market is protected by a green buffer beyond the eastern site boundary.

Connectivity

- The site is strategically well connected, especially from the A120 which defines the north eastern boundary of the site. This provides connectivity into the wider Tendring district, including the international port of Harwich and the A12, connecting London, Ipswich and the Port of Felixstowe; providing potential economic advantages.
- The A133 on the southern boundary of the site connects to Clacton-on-Sea, a potential advantage for the dispersal of housing and economic benefit to the wider Tendring district, but west from the site the A133 becomes an urban road through the centre of Colchester and can be subject to congestion and delay.
- Bromley Road connects the site with Colchester Town Centre, providing an alternative to the A133, although it is very residential in character. Currently Bromley road provides no access onto the A120, and a new access onto this road from the Garden Community would need to be provided.

Transport Strategy

A combined pedestrian-cycle 'Greenway' running through the site, located alongside a potential segregated busway ensuring connectivity across the development could be provided. The Greenway could link via a network of future dedicated walking and cycling paths to the existing Salary Brook Trail bordering the west of the site. Southwards, externally to the site, a pedestrian/cycling bridge spanning the A133 could be provided creating links between the Greenway and the well-established town centre walking and cycling network, providing access to the University of Essex campus and existing and future public transport interchanges.

A public transport spine located alongside the Greenway could provide internal public transport connectivity to the site. Segregation in the form of central bus lanes separated from vehicular traffic along a well-planned tree lined street, rather than an inflexible and over engineered solution, might be an option.

A flexible solution for bus based site-wide connectivity, would allow multiple bus routes, both inter-urban and local to utilise the infrastructure. Two categories of stops could be used: transport hub stop located at high-density development with smaller scale bus stops located at lower density development throughout the site. The public transport spine offers the opportunity to link the site with the proposed future town centre BRT scheme, whilst also providing an important opportunity to link with the possible new University rail station / bus interchange in the future.

The public transport spine is anticipated to connect externally to the site via segregated on/off slips to and from the A133 at two junction locations: one formed with an upgrade to the signalised junction with the University link road and a new junction formed on the A133 providing access to a new A120 / A133 link road. Segregated on/off slips provide the ability for buses to join free flow traffic on the A133 without negotiating traffic at the junctions.

Major highway works would include upgrades to existing junctions and a number of new junctions to facilitate the level of development:

Based on the assumptions set out in Section 2.2, Table 2 and Table 3 outline an estimate of the AM Peak hour trips generated by the residential and employment uses within the context of theoretical maximum carrying capacity of various public transport modes.

Table 2: Estimate AM peak hour trips generated by the proposed residential and employment uses

Mode	Estimated AM Peak Hour Person Trip Generation (Two-Way)
Active modes (walking / cycling)	3,047
Private Car	2,285
Total Public Transport Trips	2,285

Table 3: Theoretical maximum carrying capacity of public transport modes

Public Transport Mode	No. Routes Assumed	Two-Way Frequency/ hr	Theoretical Capacity/ Hr	Estimated Maximum Theoretical Peak Hr Carrying Capacity
Inter-Urban Bus (BRT)	2	12	200	2,400
Local Bus	1	8	45	360
Tram-Train	1	12	240	2,880
Total				**5,640**

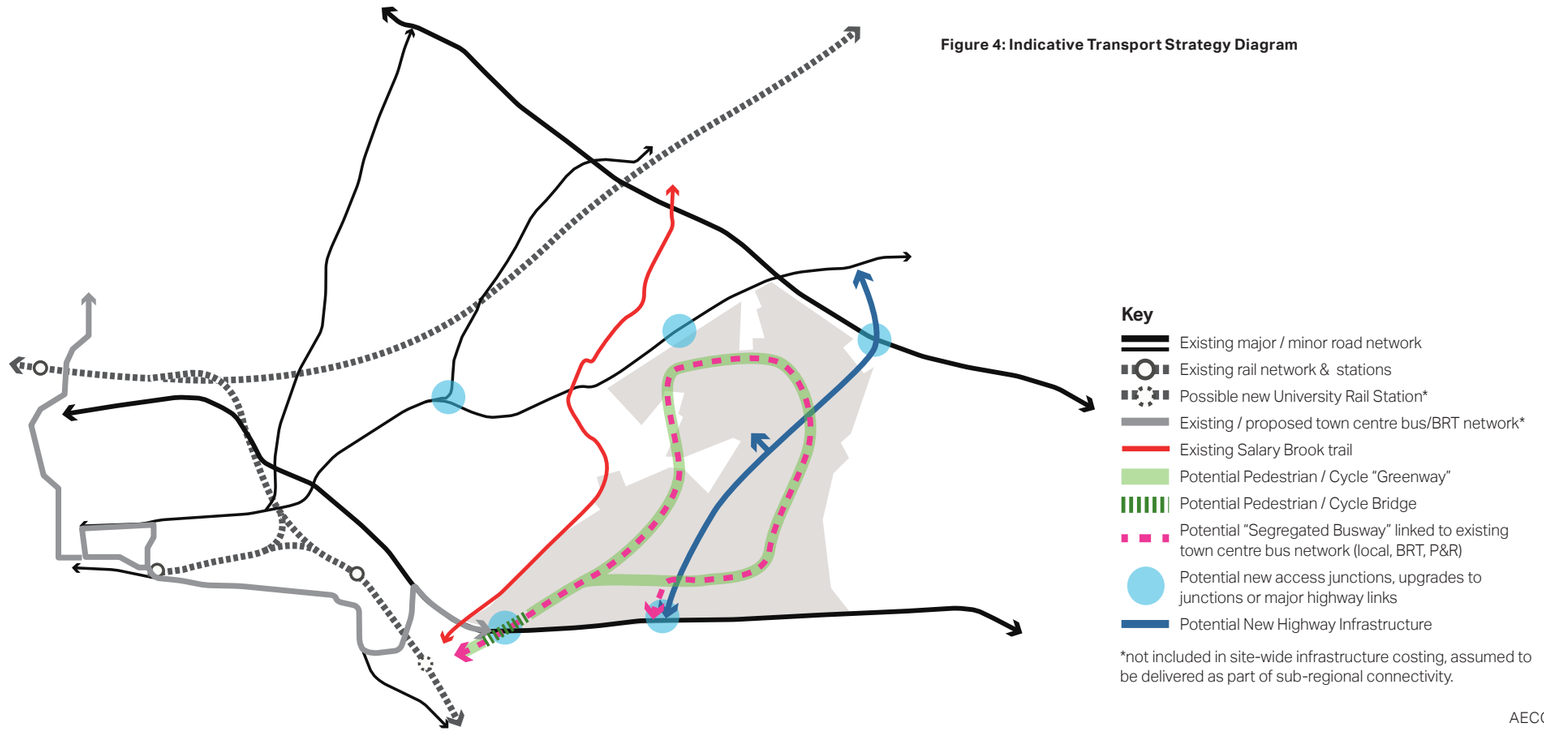
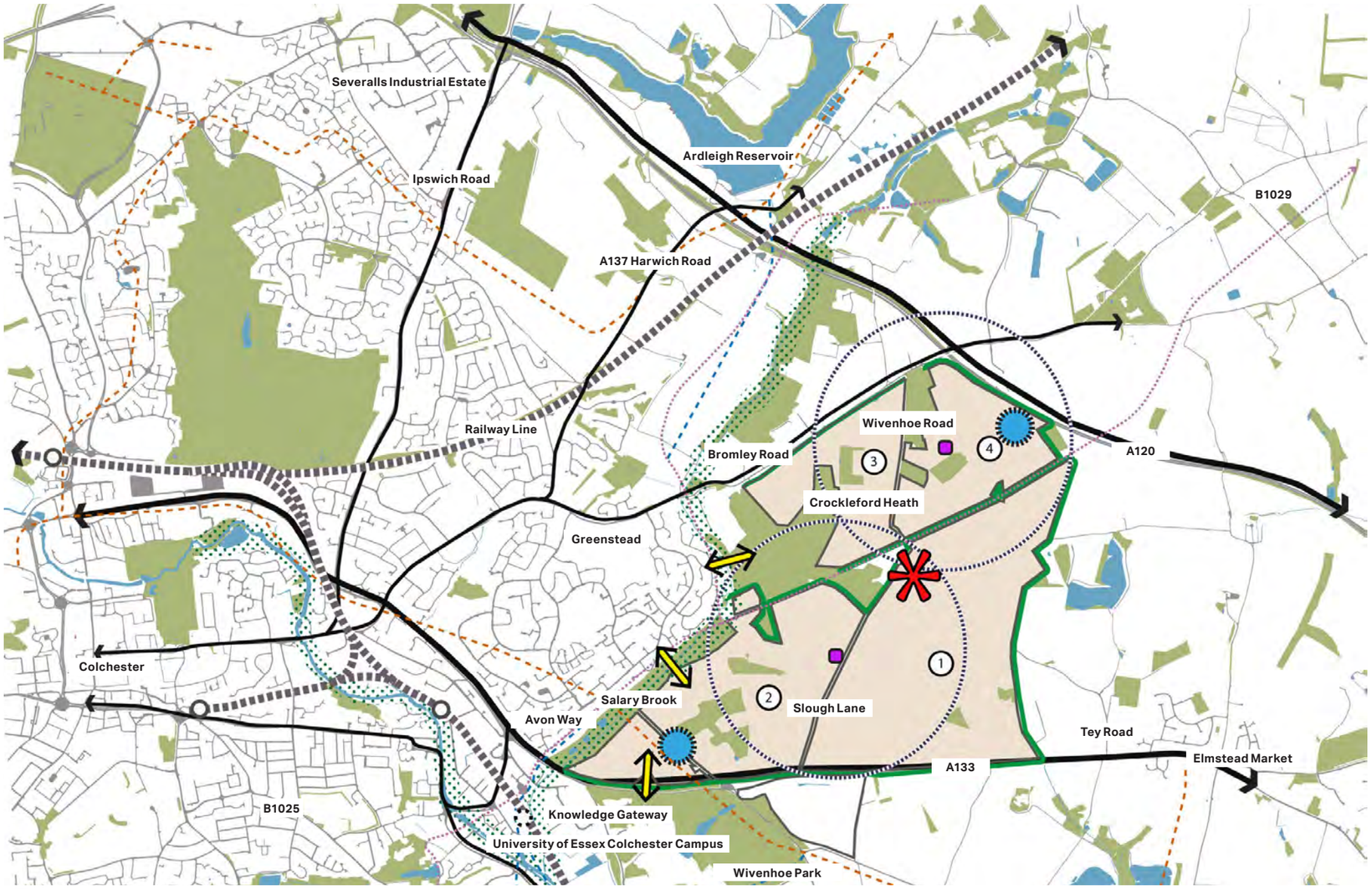


Figure 4: Indicative Transport Strategy Diagram

Indicative Spatial Representation Diagram & Development Capacities



KEY

- Environemntal Assets (to be Protected/Integrated)
- Water bodies
- Roads
- Railway
- Railway Station
- Watercourse Corridor
- High Pressure Gas Pipe
- Pipeline Section
- 33,000 V Tower Line
- Developable Land
- Potential Green Buffer
- Key Severance to Mitigate/stitch
- Potential Employment Concentration
- Potential Neighbourhood Centre Development
- Potential Gateway Markers
- Potential Local Centres
- 800m Walking Distance

A breakdown of the high-level indicative landuses and related development capacities for each development parcel illustrated by the indicative developable area diagram is provided at Appendix 1.

472 ha
Total Site Area

30 dph
6,611 homes

358 ha
Total Developable Area

220 ha
Residential Developable Area

7 ha
Mixed-Use

72 ha
Open Space

5 ha
Employment Land

54 ha
Roads, Footpaths and Parking

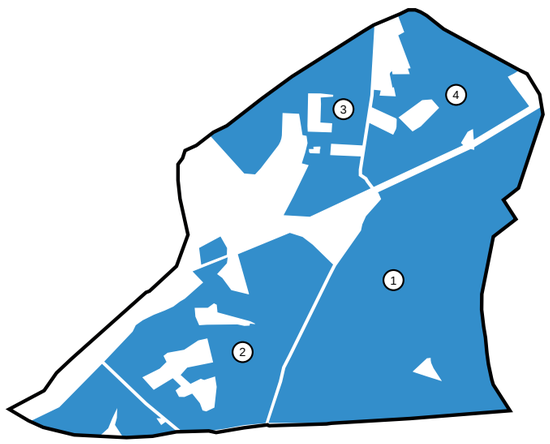


Figure 5: Indicative Developable Area Diagram

0 100m 300m 500m 1000m N

East of Colchester / West of Tendring Option 1: Southern Land Focus

Project List

The following table identifies the key project requirements to support East of Colchester Option 1 as it relates to Social Infrastructure, Utilities and Transport. These projects are based on a high level assessment of the infrastructure requirements for the development option and the growth (housing and employment) envisaged. It is assumption based only and related either to the transport strategy outlined above, the social infrastructure standards described at Appendix 2 and applied to the projected population, and utility infrastructure requirements informed where possible through preliminary discussions with the relevant service providers (e.g. UK Power Networks and Anglian Water). They are indicative only and are not based on a masterplanning exercise.

Infrastructure	Demand Arising from Development Option	Cost per Unit (£)	Total Cost (£)	Phasing	Justification
Education					
Primary Schools Form Entry	5.5 FE	£7,500	£49,582,500	Phasing of education infrastructure to occur within development period and post according to the housing growth triggers	Minimum requirement, assuming off-site mitigation and no account of existing surplus/deficit in existing surrounding facilities. Education costs and calculations based upon *The Essex County Council Developers' Guide to Infrastructure Contributions - Revised Edition 2016*
Secondary Schools Form Entry	5.1 FE				
Early Year Facilities	6.2				
Healthcare & Community					
General Practitioners	7GPs	£2,250	£14,874,750	Phasing of healthcare infrastructure to occur within development period and post development, according to the housing growth triggers for each facility	Minimum requirement, assuming off-site mitigation and no account of existing surplus/deficit in existing surrounding facilities. All AECOM Social Infrastructure Modelling (SIF) standards as set out in Appendix 2.
Dentists	7Dentists				
Acute Hospital Beds	25beds				
Library Space	380sq.m				
4 Court Sports Centre	0.91				
4 Lane Swimming Pool	0.61				
Open Space					
Outdoor Sport	19.39ha	£2,750	£18,180,250	Phasing of open space infrastructure to occur within development period and post development, according to the housing growth triggers for each type	Minimum requirement based on standards as set out in Appendix 2.
Children's Play Space	4.44ha				
Semi Natural Open Space	25.35ha				
Parks and Gardens	16.73ha				
Amenity Green Space	11.19ha				
Allotments	2.88ha				
Country Park Landscaping	-	-	£10,000,000	Phasing of country park to occur within development period and post development, according to the housing growth trigger	
Utilities - Scheme-wide Enabling Works					
Energy		Scheme Wide Enabling Works Cost/unit: £16,250 Environment/ Sustainability/ Waste Cost/ unit: £500	Scheme Wide Enabling Works Total Cost: £107,428,750 Environment/ Sustainability/ Waste Total Cost: £3,305,500		
45No. 11kV to 400v distribution substations	31MW			Phasing of energy infrastructure to occur within development and post development period, according to the housing growth triggers	Distribute to end-user loads
9No. 11kV ring circuits from primary to connect up to distribution substations	-				
Potable Water					
New network of distribution pipework	2,139 M3/day			Phasing of potable water infrastructure to occur within development and post development period, according to the housing growth triggers	New connection network from Ardleigh Reservoir
Waste Water					
1 No.2,000m3/day pumping station	1,925M3/day			Phasing of waste water infrastructure to occur within development and post development period, according to the housing growth triggers	Raw sewage to existing treatment plants in early phases but pumped to Colchester WRC before end of plan period (or a new RWC provided)
Plot connections for all properties - waste water	-				
Gas					
Plot connections for all properties	-			Phasing of gas infrastructure to occur within development and post development period, according to the housing growth triggers	Connecting to end users

Infrastructure	Demand Arising from Development Option	Cost per Unit (£)	Total Cost (£)	Phasing	Justification
Utilities - Off-Site Requirements					
Energy					
Primary Substation 132/11kV with 2 x 30MVA Primary Sub Station	31MW	-	£9,000,000	2033/2034	Provide electrical power capacity for development
Potable Water					
5km trunk mains on primary routes and distribution mains from Ardleigh Reservoir for water supply	2,139 M3/day	-	£4,000,000	Initial Phase	Distribution of potable water to end users
Waste Water					
Upgrades for water course discharges	1,925 M3/day	-	£1,000,000	Initial Phase	Environmental enhancement / EA regulations
2.5km connection to existing waste water treatment works - primary and secondary collection networks		-	£2,000,000	Initial Phase	Sewage network connection and flow to treatment plants, pumped to Colchester or a new WRC provided.
Gas					
Upgrade to low pressure distribution network	-	-	£2,000,000	Initial Phase	Gas supply to end users
Telecommunications					
Development of access chambers for BT Telecoms network and development of access chambers for private telecoms network throughout development	-	-	£2,000,000	Initial Phase	ICT and data networks to end users
Transport - On-Site / Off-Site Requirements					
New segregated busway through site to connect with wider bus/BRT network			£3,000,000	Up to Plan Period	To ensure non-car mode transit is embedded from the outset and to connect with the sub-regional transport connectivity solutions.
Transport Hub (BRT) At Grade			£10,000,000	2031/2032	
New combined segregated pedestrian / cycle "Greenway" through site			£1,300,000	Initial Phase	To ensure non-car mode transit is embedded from the outset linking the local region
New pedestrian / cycle bridge over A133 (Clingoe Hill / Clacton Road) located close to University vehicular access - 1 Nº			£2,000,000	Initial Phase	
Upgraded pedestrian & cycle networks (e.g connection with Salary Brook Trail)			£3,000,000	Up to Plan Period	
New major road link between A120 and A133 which includes an At-Grade roundabout on the A133 and a Grade-Separated junction with the A120			£17,000,000	Initial Phase	To facilitate vehicular connection to the site and minimise impact on strategic road network
New at-grade site access junctions formed with A133 / Boundary Road (University) & Bromley Road – 2 Nº			£10,000,000	Initial Phase	To facilitate vehicular connection to the site
Upgrade existing junction (Bromley Road A137 roundabout) - 1 Nº			£5,000,000	Initial Phase	
Travel plan measures (smarter choices, car clubs, charging points, etc) - Straight Line Cost Over Time			£5,619,350	Plan Period	To ensure non-car mode transit is embedded from the outset and ensure modal shift
Bus service subsidies & other public transport improvements - Straight Line Cost Over Time			£2,644,400	Development Period	
Contribution to Strategic ("Sub-regional") Public Transport solution e.g. BRT		£1,500	£9,916,500		To ensure non-car mode transit is embedded from the outset and to connect with the sub-regional transport connectivity solutions.
****Total Cost**					**£292,852,000** (Total Cost at May 2016 Prices but excluding Professional Fees and Design Development and Construction Contingency)

Table 4: Key Infrastructure Requirements for East of Colchester / West Tendring Option 1

3.4 Option 2: A133 to Colchester-Ipswich Rail Line

Key Drivers

The commentary provided against Option 1 is equally applicable to Option 2, but with the following additional points:

Overview

The A133 to Colchester-Ipswich Rail Line Option extends to incorporate land north of Option 1 in as far as the GEML rail line which defines the north-western boundary. This major transport corridor provides severance from the land further north-west, and in this respect forms a strong edge to the settlement under this Option. The expansion area associated with Option 2 has additional and fragmented land ownership. There is potential to increase scale of the Garden Community by approximately 2000 further dwellings.

Landuse

- The additional land area includes a combination of productive farmland, woodland and an additional number of residencies and farm buildings, some of which have alternative small scale employment uses.
- A large central area of the additional land is occupied by woodland associated with Salary Brook. This reduces developable land within this area of the site, but could be used positively within the development as part of the green infrastructure network and to provide intrinsic character to any new development.

Adjacencies

- Potential for easier integration of the Garden Community with Colchester's eastern residential development area, especially the Bromley Road and Harwich Road areas of Greenstead.

Connections

- This option provides immediate land adjacency to the GEML, which is the main rail line between London, Colchester and Ipswich. In theory this could provide an opportunity to create a railway station to serve the new Garden Community. However, it is understood that because of capacity issues and high costs, a station in this location is very unlikely.
- This option enables the inclusion within the Garden Community of an additional length on Salary Brook, which creates a continuous green link through the entire site from Clingoe Hill (A133) in the south to the A120 in the north, and potentially beyond this to Ardleigh Reservoir via Spring Valley Lane. This could be a valuable resource for ecology, recreation and amenity, and developed as a defining landscape feature and place making characteristic of the Garden Community in this location.

Transport Strategy

The solutions proposed for Option 1 are pertinent to this larger development scenario with the addition of new highway links in the form of upgrades to the A137 Harwich Road to provide an access route through to northern end of site. The larger site offers the opportunity to increase the length of the Greenway and segregated bus route to widen the site coverage. Bromley Road is likely to form part of a central spine route through the development providing access to various parcels of development.

Based on assumptions set out in Section 2.2, Table 5 and Table 6 outline an estimate of the AM Peak hour trips generated by the residential and employment uses within the context of theoretical maximum carrying capacity of various public transport modes.

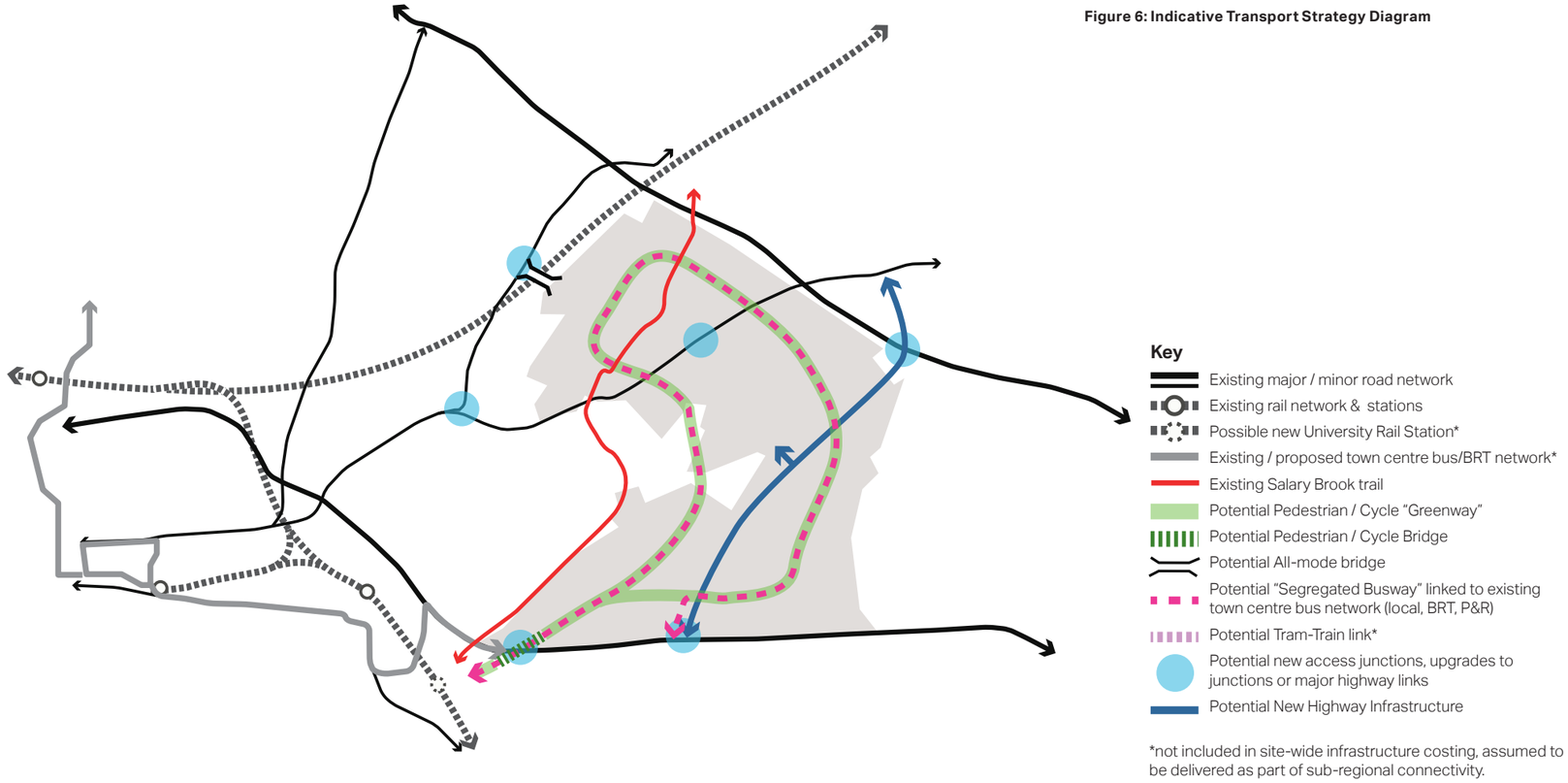
Table 5: Estimate AM peak hour trips generated by the proposed residential and employment uses

Mode	Estimated AM Peak Hour Person Trip Generation (Two-Way)
Active modes (walking / cycling)	3,961
Private Car	2,971
Total Public Transport Trips	2,971

Table 6: Estimate AM peak hour trips generated by the proposed residential and employment uses

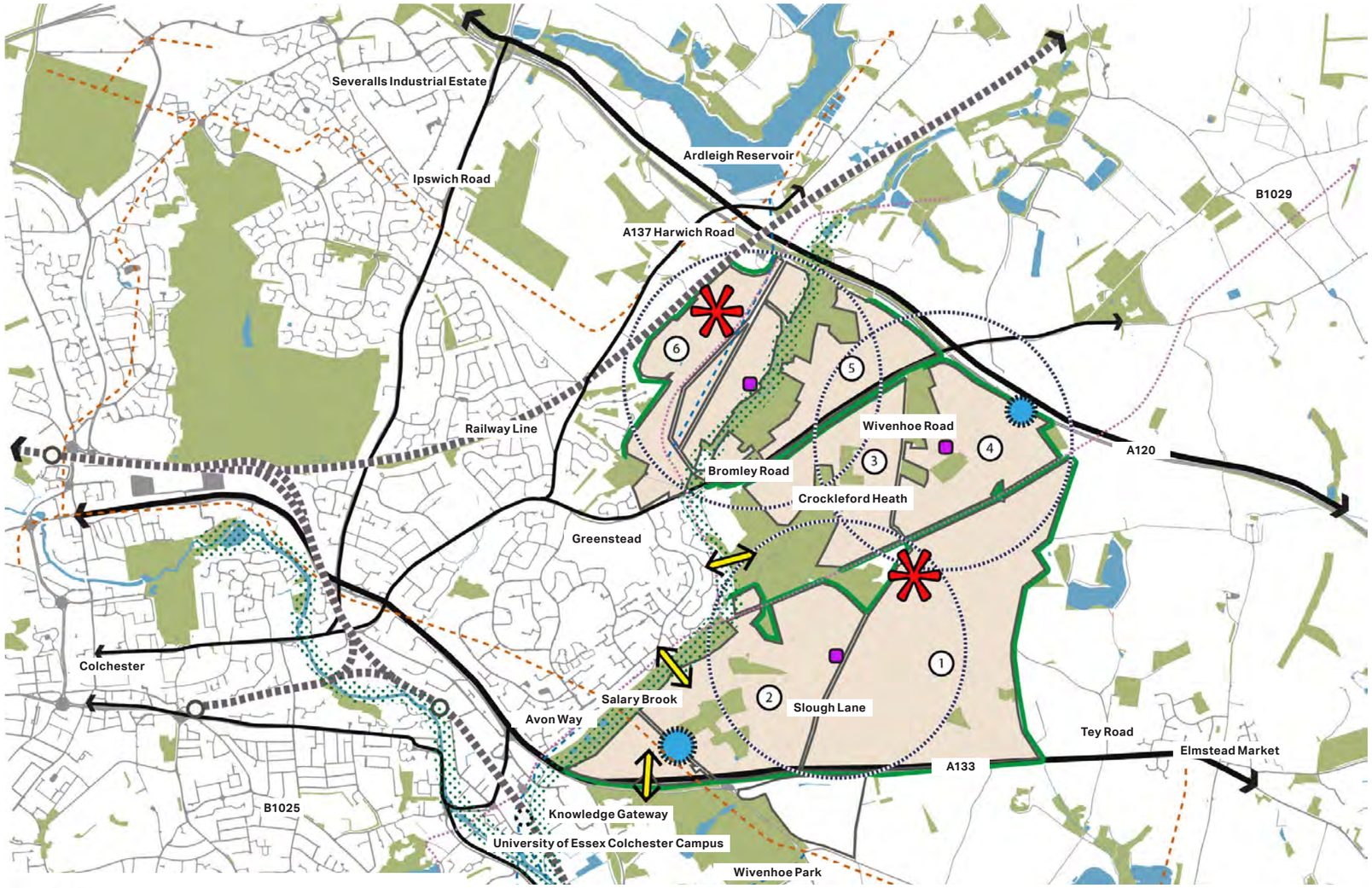
Public Transport Mode	No. Routes Assumed	Two-Way Frequency/ hr	Theoretical Capacity/ Hr	Estimated Maximum Theoretical Peak Hr Carrying Capacity
Inter-Urban Bus (BRT)	2	12	200	2,400
Local Bus	1	8	45	360
Tram-Train	1	12	240	2,880
Total				**5,640**

Figure 6: Indicative Transport Strategy Diagram



*not included in site-wide infrastructure costing, assumed to be delivered as part of sub-regional connectivity.

Indicative Spatial Representation Diagram & Development Capacities



KEY

- Environemntal Assets (to be Protected/Integrated)
- Water bodies
- Roads
- Railway
- Railway Station
- Watercourse Corridor
- High Pressure Gas Pipe
- Pipeline Section
- 33,000 V Tower Line
- Developable Land
- Potential Green Buffer
- Key Severance to Mitigate/stitch
- Potential Employment Concentration
- Potential Neighbourhood Centre Development
- Potential Gateway Markers
- Potential Local Centres
- 800m Walking Distance

A breakdown of the high-level landuses and related development capacities for each development parcel illustrated by the indicative developable area diagram is provided at Appendix 1.

639 ha
Total Site Area

30 dph
8,834 homes

475 ha
Total Developable Area

294 ha
Residential Developable Area

10 ha
Mixed-Use

95 ha
Open Space

5 ha
Employment Land

71 ha
Roads, Footpaths and Parking

Figure 7: Developable Area Diagram

0 100m 300m 500m 1000m

N

East of Colchester / West of Tendring Option 2: A133 to Colchester-Ipswich Rail Line

Project List

The following table identifies the key project requirements to support East of Colchester Option 2 as it relates to Social Infrastructure, Utilities and Transport. These projects are based on a high level assessment of the infrastructure requirements for the development option and the growth (housing and employment) envisaged. It is assumption based only and related either to the transport strategy outlined above, the social infrastructure standards described at Appendix 2 and applied to the projected population, and utility infrastructure requirements informed where possible through preliminary discussions with the relevant service providers (e.g. UK Power Networks and Anglian Water). They are indicative only and are not based on a masterplanning exercise.

Infrastructure	Demand Arising from Development Option	Cost per Unit (£)	Total Cost (£)	Phasing	Justification
Education					
Primary Schools Form Entry	7.4 FE	£7,500	£66,255,000	Phasing of education infrastructure to occur within development period and post according to the housing growth triggers	Minimum requirement, assuming off-site mitigation and no account of existing surplus/deficit in existing surrounding facilities. Education costs and calculations based upon *The Essex County Council Developers' Guide to Infrastructure Contributions - Revised Edition 2016*
Secondary Schools Form Entry	6.9 FE				
Early Year Facilities	8.3				
Healthcare & Community					
General Practitioners	9GPs	£2,250	£19,876,500	Phasing of healthcare infrastructure to occur within development period and post development, according to the housing growth triggers for each facility	Minimum requirement, assuming off-site mitigation and no account of existing surplus/deficit in existing surrounding facilities. All AECOM Social Infrastructure Modelling (SIF) standards as set out in Appendix 2.
Dentists	10Dentists				
Acute Hospital Beds	33beds				
Library Space	508sq.m				
4 Court Sports Centre	1.22				
4 Lane Swimming Pool	0.82				
Open Space					
Outdoor Sport	25.9ha	£2,750	£24,293,500	Phasing of open space infrastructure to occur within development period and post development, according to the housing growth triggers for each type	Minimum requirement based on standards as set out in Appendix 2.
Children's Play Space	5.93ha				
Semi Natural Open Space	33.87ha				
Parks and Gardens	22.35ha				
Amenity Green Space	14.96ha				
Allotments	3.84ha				
Country Park Landscaping	-	-	£10,000,000	Phasing of country park to occur within development period and post development, according to the housing growth trigger	
Utilities - Scheme-wide Enabling Works					
Energy		Scheme Wide Enabling Works Cost/unit: £16,250 Environment/ Sustainability/ Waste Cost/unit: £500	Scheme Wide Enabling Works Total Cost: £143,552,500 Environment/ Sustainability/ Waste Total Cost: £4,417,000		
45No. 11kV to 400v distribution substations	39MVA			Phasing of energy infrastructure to occur within development and post development period, according to the housing growth triggers	Distribute end-user loads
9No. 11kV ring circuits from primary to connect up to distribution substations	-				
Potable Water					
New network of distribution pipework	2,797 M3/day			Phasing of potable water infrastructure to occur within development and post development period, according to the housing growth triggers	Potable water storage
Waste Water					
1 No.2,000m3/day pumping station	2,518 M3/day			Phasing of waste water infrastructure to occur within development and post development period, according to the housing growth triggers	Raw sewage to existing treatment plants
Plot connections for all properties - waste water	-				
Gas					
Plot connections for all properties - gas	-			Phasing of gas infrastructure to occur within development and post development period, according to the housing growth triggers	Connecting to end users

Infrastructure	Demand Arising from Development Option	Cost per Unit (£)	Total Cost (£)	Phasing	Justification
Utilities - Off-Site Requirements					
Energy					
Primary Substation 132/11kV with 2 x 45MVA Primary Sub Station	39MVA	-	£11,000,000	2033/2034	Provide electrical power capacity for development
Potable Water					
5km trunk mains on primary routes and distribution mains to Ardleigh Reservoir for water supply	2,518 M3/day	-	£4,000,000	Initial Phase	Distribution of potable water to end users
Waste Water					
Upgrades for water course discharges	2,518 M3/day	-	£1,000,000	Initial Phase	Environmental enhancement / EA regulations
2.5km connection to existing waste water treatment works - primary and secondary collection networks	2,518 M3/day	-	£2,000,000	Initial Phase	Sewage network connection and flow to treatment plants, pumped to Colchester or a new WRC provided.
Gas					
Upgrade to low pressure distribution network	-	-	£2,000,000	Initial Phase	Gas supply to end users
Telecommunications					
Development of access chambers for BT Telecoms network and development of access chambers for private telecoms network throughout development	-	-	£2,000,000	Initial Phase	ICT and data networks to end users
Transport - On-Site / Off-Site Requirements					
New segregated busway through site to connect with wider bus/BRT network (increased length when compared to Option 1)			£4,250,000	Up to Plan Period	To ensure non-car mode transit is embedded from the outset and to connect with the sub-regional transport connectivity solutions.
Transport Hub (BRT) At Grade			£10,000,000	2031/2032	
New combined segregated pedestrian / cycle "Greenway" through site (increased length when compared to Option 1)			£1,800,000	Initial Phase	To ensure non-car mode transit is embedded from the outset linking the local region
New pedestrian / cycle bridge over A133 (Clingoe Hill / Clacton Road) located close to University vehicular access - 1 Nº			£2,000,000	Initial Phase	
All-modes road bridge (over GEML via A137 Harwich Road) - 1 Nº			£5,000,000		
Upgraded pedestrian & cycle networks (e.g connection with Salary Brook Trail)			£3,000,000	Up to Plan Period	To facilitate vehicular connection to the site and minimise impact on strategic road network
New major road link between A120 and A133 which includes an At Grade roundabout on the A133 and a Grade- Separated junction with the A120			£17,000,000	Initial Phase	To facilitate vehicular connection to the site
New at-grade site access junction formed with A133 / Boundary Road (University), Bromley Road & A137 Harwich Road – 3 Nº			£15,000,000	Initial Phase	
Upgrade existing junction (Bromley Road A137 roundabout) - 1 Nº			£5,000,000	Initial Phase	
Travel plan measures (smarter choices, car clubs, charging points, etc) - Straight Line Cost Over Time			£7,508,900	Plan Period	To ensure non-car mode transit is embedded from the outset and ensure modal shift
Bus service subsidies & other public transport improvements - Straight Line Cost Over Time			£3,533,600	Development Period	
Contribution to Strategic ("Sub-regional") Public Transport solution e.g. BRT		£1,500	£13,251,000		To ensure non-car mode transit is embedded from the outset and to connect with the sub-regional transport connectivity solutions.
			**Total Cost	**£377,738,000** (Total Cost at May 2016 Prices but excluding Professional Fees and Design Development and Construction Contingency)	

Table 7: Key Infrastructure Requirements for East of Colchester / West Tendring Option 2

3.5 Option 3: North to South Wrap

Key Drivers

The commentary provided against Option 1 and 2 is equally applicable to Option 3, but with the following additional points:

Overview
The North-south Wrap option incorporates the maximum amount of land identified through the Local Plan Call-for-Sites process and creates a development arc around the north east quadrant of Colchester from the University of Essex in the south to Severalls Business Park in the north west. The additional land included under this option extends the potential Garden Community north west from the GEML rail corridor to Ipswich road and potential to increase scale of the Garden Community by over a 2000 further dwellings.

Landuse
- The additional land area includes a combination of established woodland, productive farmland and surrounds the small village of Fox Street, which is a liner settlement located on either side of the A137 (Harwich Road), adjacent to and south of the A120, but without direct access to the A120.
- A large area of the additional land is occupied by woodland designated as an SSSI. This reduces developable land within this area of the site, but could be used positively within the development as part of the green infrastructure network and to provide intrinsic character to any new development.

Adjacencies
- The Highwoods residential neighbourhood is located on the south western boundary of the additional land area under Option 3, with St John's Road, Bullace Close and Green Lane forming a clear boundary.
- Highwoods includes pockets of commercial enterprise and mixed use facilities, including a large Tesco superstore, this area adjoins Severalls Industrial Park and beyond this the Colchester Northern Gateway regeneration zone. The existing and planned employment and leisure facilities of north Colchester are therefore in relative close proximity to the northern area of the potential Garden Community under this option.

Connections
- Opportunity might exist to link the site from St John's Road, at least for pedestrian and cycling connectivity. This would provide active mode (and potentially public transport) connectivity of the Garden Community with the existing and planned employment and leisure destination of north Colchester.
- Direct access from the Garden Community onto Ipswich Road is highly constrained by existing development along this frontage, meaning transport connectivity would likely be focused on the A137 and A120 to serve this area of the Garden Community.
- To provide a fully integrated settlement the existing severance caused by the GEML would need bridging.

Transport Strategy

The solutions proposed for Options 1 and 2 are pertinent to this option with the addition of various features to accommodate the increased development.

The increased level of development creates the need for additional points of access in the form of a new grade separated junction with the A120 to provide all movement junction and access the northern section of the site constrained by the existing development alongside the A1232 Ipswich Road.

The larger site offers the opportunity to increase the length of the Greenway and segregated bus route to widen the site coverage. In addition 2no. new vehicular bridge connections (all users) over the GEML will be required, accommodating the Greenway and public transport spine to reduce the severance created by the rail line.

The Increased boundaries and level of development will require significant investment in public transport to accommodate demand. The site offers the opportunity to bring forward an additional public transport solution in the form of integrating a possible sub-regional tram-train link between the possible University of Essex station located on the Sunshine coast line and a new interchange within the site.

Table 8 and Table 9 outline an estimate of the Am Peak hour trips generated by the residential and employment uses within the context of theoretical maximum carrying capacity of various public transport modes.

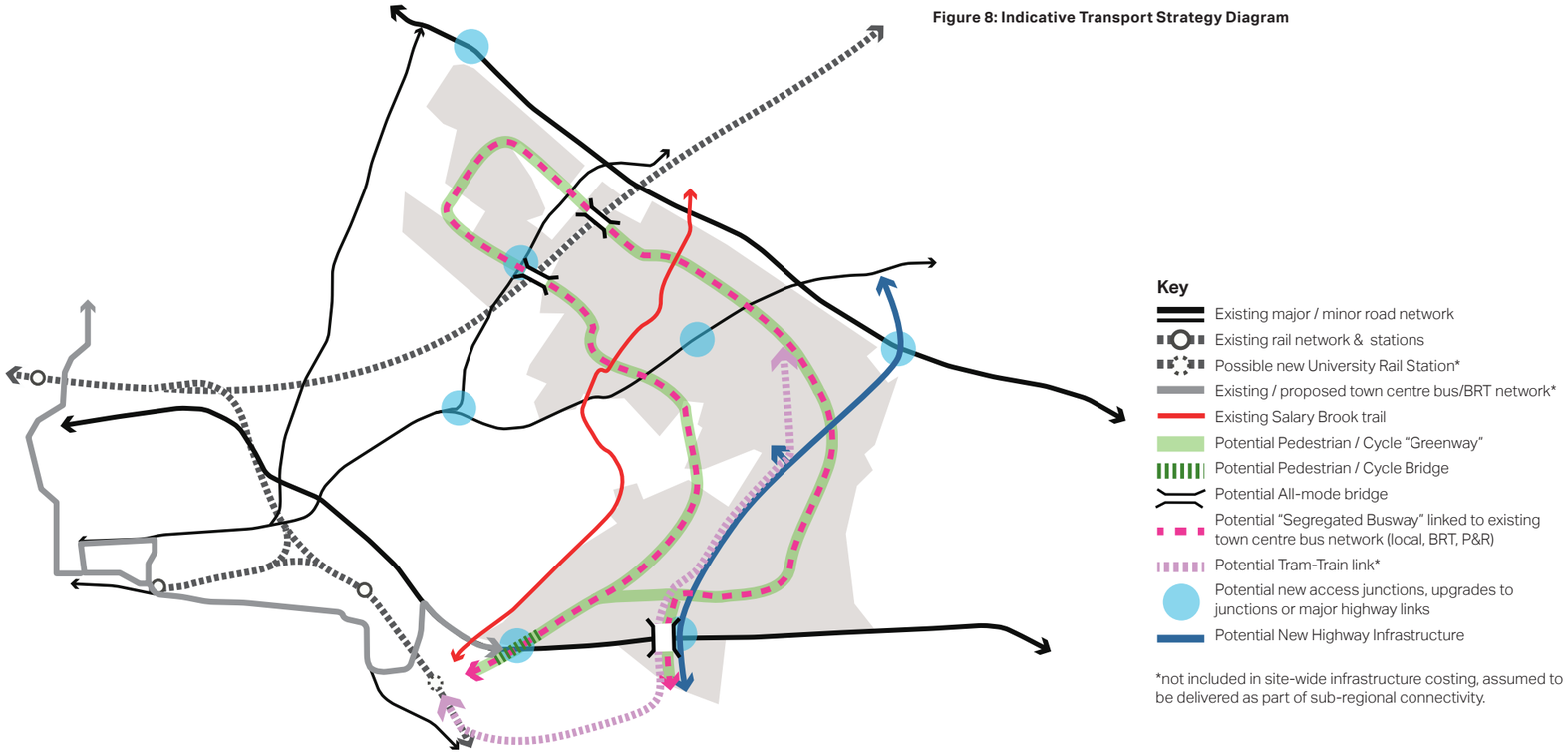
Table 8: Estimate AM peak hour trips generated by the proposed residential and employment uses

Mode	Estimated AM Peak Hour Person Trip Generation (Two-Way)
Active modes (walking / cycling)	3,961
Private Car	2,971
Total Public Transport Trips	2,971

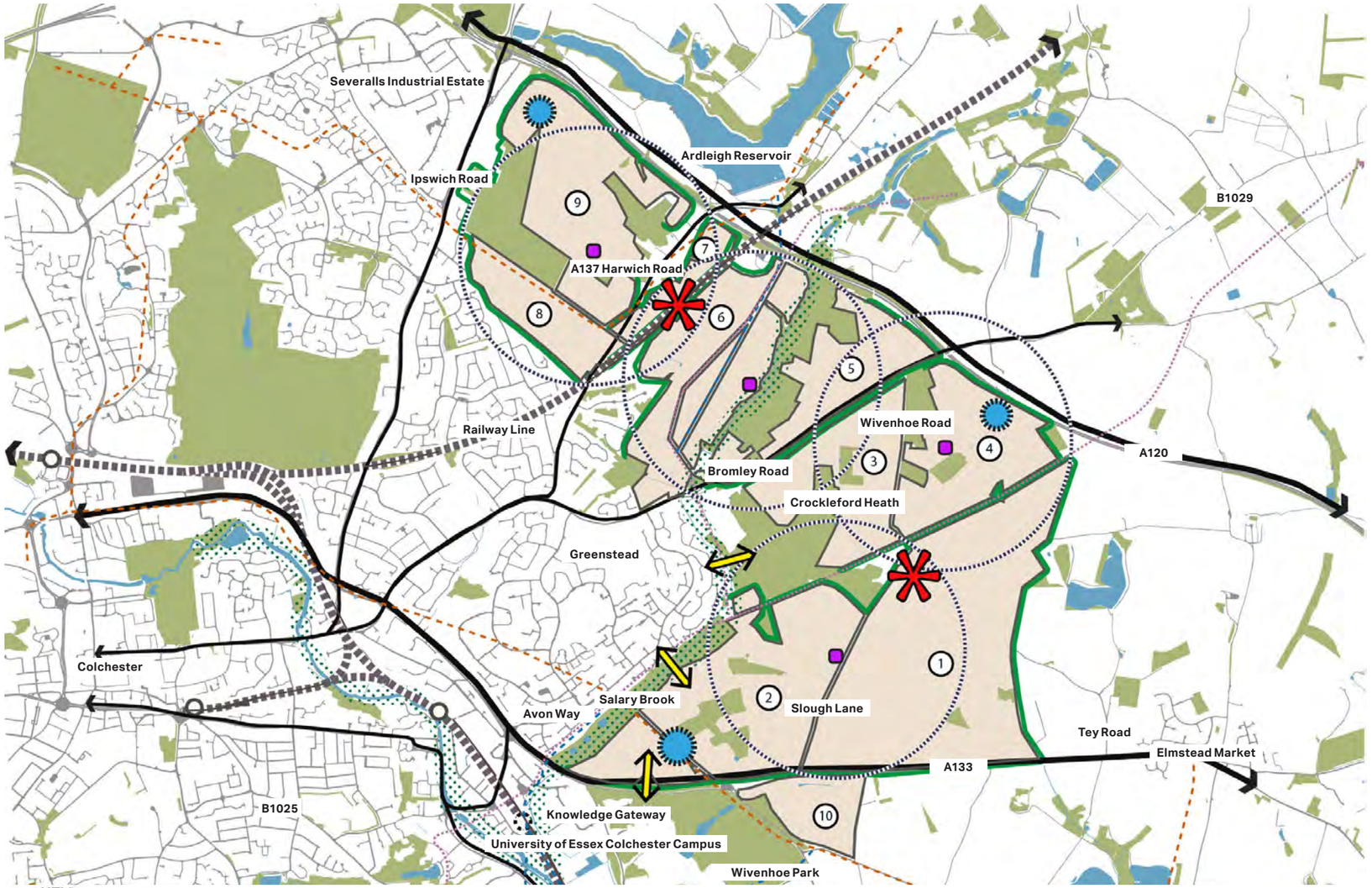
Table 9: Theoretical maximum carrying capacity of public transport modes

Public Transport Mode	No. Routes Assumed	Two-Way Frequency/ hr	Theoretical Capacity/ Hr	Estimated Maximum Theoretical Peak Hr Carrying Capacity
Inter-Urban Bus (BRT)	2	12	200	2,400
Local Bus	1	8	45	360
Tram-Train	1	12	240	2,880
Total				**5,640**

Figure 8: Indicative Transport Strategy Diagram



Indicative Spatial Representation Diagram & Development Capacities



KEY

- Environemntal Assets (to be Protected/Integrated)
- Water bodies
- Roads
- Railway
- Railway Station
- Watercourse Corridor
- High Pressure Gas Pipe
- Pipeline Section
- 33,000 V Tower Line
- Developable Land
- Potential Green Buffer
- Key Severance to Mitigate/stitch
- Potential Employment Concentration
- Potential Neighbourhood Centre Development
- Potential Gateway Markers
- Potential Local Centres
- 800m Walking Distance

A breakdown of the high-level landuses and related development capacities for each development parcel illustrated by the indicative developable area diagram is provided at Appendix 1.

816 ha
Total Site Area

30 dph
11,409 homes

617 ha
Total Developable Area

380 ha
Residential Developable Area

13 ha
Mixed-Use

123 ha
Open Space

7 ha
Employment Land

92 ha
Roads, Footpaths and Parking

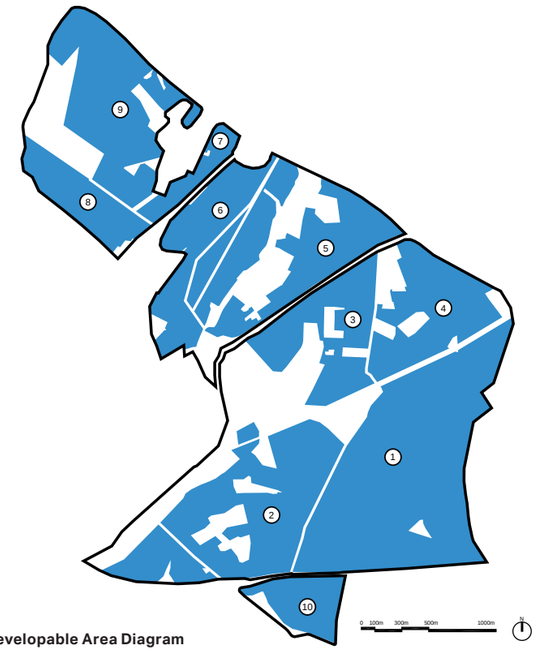


Figure 9: Developable Area Diagram

Option 3: North to South Wrap

Project List

The following table identifies the key project requirements to support East of Colchester Option 3 as it relates to Social Infrastructure, Utilities and Transport. These projects are based on a high level assessment of the infrastructure requirements for the development option and the growth (housing and employment) envisaged. It is assumption based only and related either to the transport strategy outlined above, the social infrastructure standards described at Appendix 2 and applied to the projected population, and utility infrastructure requirements informed where possible through preliminary discussions with the relevant service providers (e.g. UK Power Networks and Anglian Water). They are indicative only and are not based on a masterplanning exercise.

Infrastructure	Demand Arising from Development Option	Cost per Unit (£)	Total Cost (£)	Phasing	Justification
Education					
Primary Schools Form Entry	9.5 FE	£7,500	£85,567,500	Phasing of education infrastructure to occur within development period and post according to the housing growth triggers	Minimum requirement, assuming off-site mitigation and no account of existing surplus/deficit in existing surrounding facilities. Education costs and calculations based upon *The Essex County Council Developers' Guide to Infrastructure Contributions - Revised Edition 2016*
Secondary Schools Form Entry	8.9 FE				
Early Year Facilities	10.7				
Healthcare & Community					
General Practitioners	12GPs	£2,250	£25,670,250	Phasing of healthcare infrastructure to occur within development period and post development, according to the housing growth triggers for each facility	Minimum requirement, assuming off-site mitigation and no account of existing surplus/deficit in existing surrounding facilities. All AECOM Social Infrastructure Modelling (SIF) standards as set out in Appendix 2.
Dentists	12Dentists				
Acute Hospital Beds	43beds				
Library Space	656sq.m				
4 Court Sports Centre	1.57				
4 Lane Swimming Pool	1.06				
Open Space					
Outdoor Sport	33.46a	£2,750	£31,374,750	Phasing of open space infrastructure to occur within development period and post development, according to the housing growth triggers for each type	Minimum requirement based on standards as set out in Appendix 2.
Children's Play Space	7.65ha				
Semi Natural Open Space	43.74ha				
Parks and Gardens	28.87ha				
Amenity Green Space	19.32ha				
Allotments	4.96ha				
Country Park Landscaping	-	-	£10,000,000	Phasing of country park to occur within development period and post development, according to the housing growth trigger	
Utilities - Scheme-wide Enabling Works					
Energy		Scheme Wide Enabling Works Cost/unit: £16,250 Environment/ Sustainability/ Waste Cost/unit: £500	Scheme Wide Enabling Works Total Cost: £185,396,250 Environment/ Sustainability/ Waste Total Cost: £5,704,500		
80No. 11kV to 400v distribution substations	53MW			Phasing of energy infrastructure to occur within development and post development period, according to the housing growth triggers	Distribute end-user loads
18No. 11kV ring circuits from primary to connect up to distribution substations	-				
Potable Water					
New network of distribution pipework	3,649 M3/day			Phasing of potable water infrastructure to occur within development and post development period, according to the housing growth triggers	Potable water storage
Waste Water					
1 No.3,248m3/day pumping station	3,248 M3/day			Phasing of waste water infrastructure to occur within development and post development period, according to the housing growth triggers	Raw sewage to existing treatment plants
Plot connections for all properties - waste water	-				
Gas					
Plot connections for all properties - gas	-			Phasing of gas infrastructure to occur within development and post development period, according to the housing growth triggers	Connecting to end users
Utilities - Off-Site Requirements					
Energy					
Primary Substation 132/11kV with 2 x 66 MVA Primary Sub Station	53MW	-	£17,000,000	2033/2034	Provide electrical power capacity for development
Potable Water					
5km trunk mains on primary routes and distribution mains to Ardleigh Reservoir for water supply	3,649 M3/day	-	£4,000,000	Initial Phase	Distribution of potable water to end users

Infrastructure	Demand Arising from Development Option	Cost per Unit (£)	Total Cost (£)	Phasing	Justification
Waste Water					
Upgrades for water course discharges	3,248 M3/day	-	£1,000,000	Initial Phase	Environmental enhancement / EA regulations
2.5km connection to existing waste water treatment works - primary and secondary collection networks	3,248 M3/day	-	£2,000,000	Initial Phase	Sewage network connection and flow to treatment plants, pumped to Colchester or a new WRC provided.
Gas					
Upgrade to low pressure distribution network		-	£2,000,000	Initial Phase	Gas supply to end users
Telecommunications					
Development of access chambers for BT Telecoms network and development of access chambers for private telecoms network throughout development		-	£2,000,000	Initial Phase	ICT and data networks to end users
Transport - On-Site / Off-Site Requirements					
New segregated busway through site to connect with wider bus/BRT network (increased length when compared to Option 1&2)			£5,500,000	Up to Plan Period	To ensure non-car mode transit is embedded from the outset and to connect with the sub-regional transport connectivity solutions.
Transport Hub (BRT/LRT) At Grade			£10,000,000	2031/2032	
New combined segregated pedestrian / cycle "Greenway" through site (increased length when compared to Option 1&2)			£2,300,000	Initial Phase	To ensure non-car mode transit is embedded from the outset linking the local region
New pedestrian / cycle bridge over A133 (Clingoe Hill / Clacton Road) located close to University vehicular access - 1 Nº			£2,000,000	Initial Phase	
All-modes bridge (1 No with new link junction over A133 and 2 No over GEML via A137 Harwich Road) - 3 Nº total			£15,000,000	2031/2032	
Upgraded pedestrian & cycle networks (e.g connection with Salary Brook Trail)			£3,000,000	Up to Plan Period	To facilitate vehicular connection to the site and minimise impact on strategic road network
New major road link between A120 and A133 which includes an At Grade roundabout on the A133 and a Grade-Separated junction with the A120			£17,000,000	Initial Phase	To facilitate vehicular connection to the site
Potential new grade-separated on/off slips with A120 to provide all movement and access to northern section of site which is constrained by existing development alongside A1232 Ipswich Road - 1 No (worse case assumed, maybe possible to provide access via Ipswich Road)			£25,000,000	Initial Phase	
New at-grade site access junction formed with A133 / Boundary Road (University), Bromley Road & A137 Harwich Road – 3 Nº			£15,000,000	Plan Period	To ensure non-car mode transit is embedded from the outset and ensure modal shift
Upgrade existing junction (Bromley Road A137 roundabout) - 1 Nº			£5,000,000	Plan Period	
Travel plan measures (smarter choices, car clubs, charging points, etc) - Straight Line Cost Over Time			£9,697,650	Plan Period	
Bus service subsidies & other public transport improvements - Straight Line Cost Over Time			£4,563,600	Plan Period	
Contribution to Strategic ("Sub-regional") Public Transport solution e.g. BRT		£1,500	£17,113,500		To ensure non-car mode transit is embedded from the outset and to connect with the sub-regional transport connectivity solutions.

****Total Cost** **£502,888,000** (Total Cost at May 2016 Prices but excluding Professional Fees and Design Development and Construction Contingency)

Table 10: Key Infrastructure Requirements for East of Colchester / West Tendring Option 3

This Section provides concept options and associated infrastructure requirement for the North of Colchester Broad Search Area.

04 North of Colchester

4.1 Broad Search Area
4.2 Options Overview
4.3 Option 1: East of Langham Lane Focus
4.4 Option 2: Maximum Land Take

4.1 Broad Search Area

Strategic Overview

The North Colchester Broad Search Area is located to the north of Colchester's northern settlement boundary, which is currently contained by the A12, which connects London, Colchester and Ipswich, and from there the international port of Felixstowe. The search area is broadly defined by Salary Brook/the A12 to its south and the A12 to the east, the villages of Langham and Langham Moor to the north and Straight Road to the west. A large part of the search area consists of the former Boxted Airfield, developed in 1941 and used in the Second World War. Whilst the footprint of the airfield can still be identified from aerial photography the land is now in productive agricultural farmland. Consistent with its former use as an airfield, the land is predominantly flat and open, with the majority of residential property located on the periphery of the search area. Langham Lane traverses the search area north to south with some detached properties located throughout is length.

Save for a very small part of the search area close to the A12 in the far south east corner of the search area, which falls in Tendring district, the entire area is located in the administrative boundary of Colchester Borough Council.

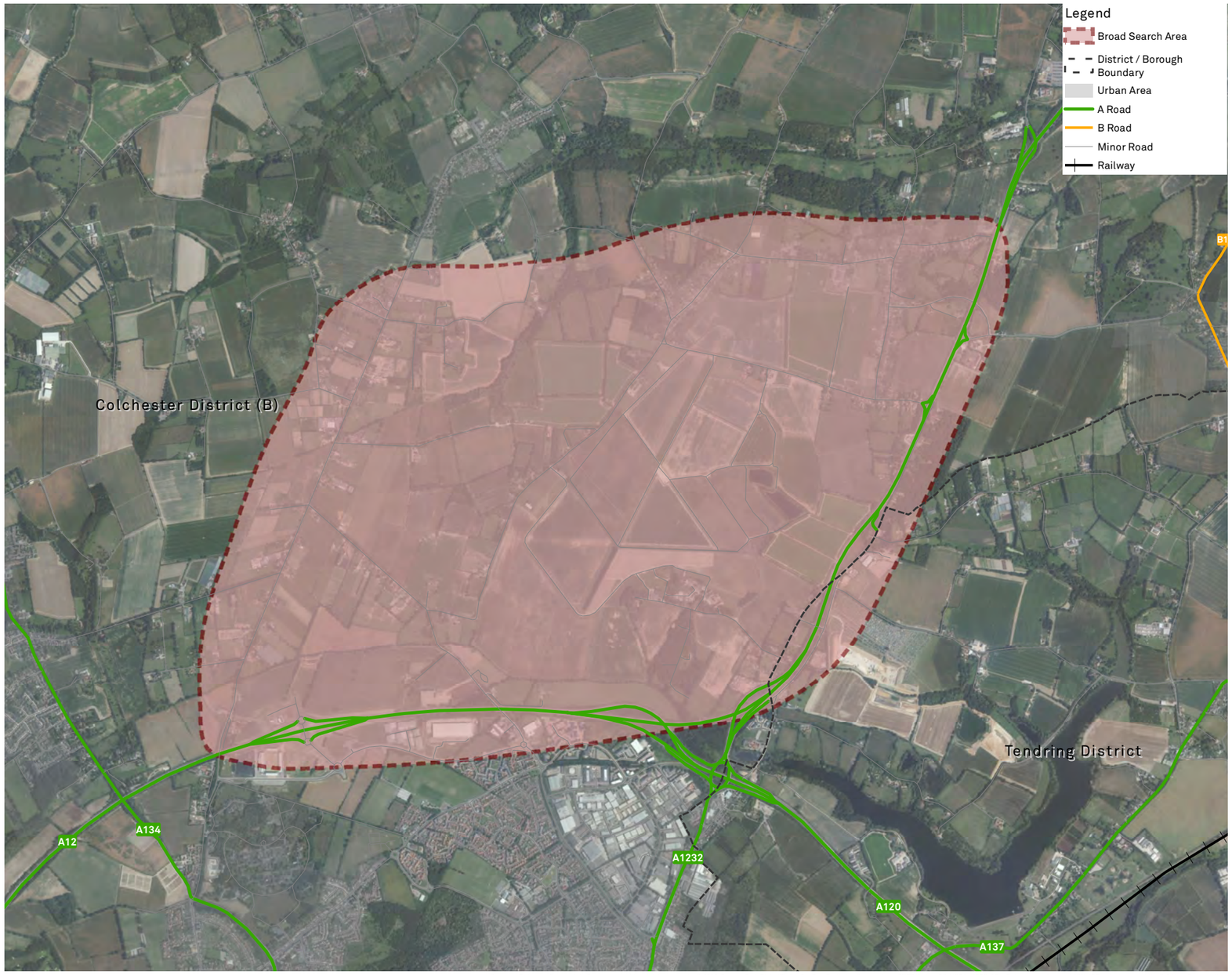


Figure 10: Broad Search Area Diagram

4.2 Options Overview

Option 1: East of Langham Lane Focus

- Total Site Area: **457ha**
- Approximate Total Developable Area: **389ha**

Option 2: Maximum Land Take

- Total Site Area: **681ha**
- Approximate Total Developable Area: **582ha**

4.3 Option 1: East of Langham Lane Focus

Key Drivers

Overview

Option 1 contains the potential Garden Community on the east side of Langham Lane and Moor Road, and is defined by School Road and Perry Lane in the north, the A12 to the east and Salary Brook to the south. This reflects the full land area promoted for development through the Local Plan Call-For-Sites process. Almost all of the land under this option is understood to be the subject of Development Option Agreement by a single developer.

The Option has potential to either integrate the villages of Langham and Langham Moor into the Garden Community or provide separation development (capacity identified on basis of limited integration) – i.e. built development would be included in land parcels north of Park Lane.

Seeks to maximise settlement scale to achieve largest population possible east of Langham Lane commensurate with creating conditions more conducive to creating mixed use vibrant communities and sustainable transport opportunity and use.

Landuse

- The majority of land is the site of the former World War II Boxted Airfield and is in productive agricultural use and undeveloped.
- Largely free of ecological development constraints
- A solar farm is located centrally within the site, covering an area of approximately 26ha with a current operating lease of 20 years. The solar farm, once removed, has the potential to be developed as part of the Garden Community, but equally could be retained as a source of zero carbon energy to serve the new settlement.
- A small employment centre/rural scale business park is located off Lodge Lane in the southern quadrant of the site. The opportunity might exist to extend this facility as part of larger employment zone or as part of a mixed use centre for the Garden Community.

Adjacencies

- By retaining development east of Langham Lane, the option potentially could place less importance on creating strong connections with Colchester's Northern Gateway development zone. However, because of the proximity of this to the Garden Community and the opportunities it may afford locally for employment and leisure, it would likely remain an attraction for residents and potential business of the Garden Community, and the need for good physical connections between the two sites might be an inevitable requirement.

Connectivity

- Located at the junction of the A12 and A120 the site is located adjacent to the strategic road network that provides north, south, east and west connectivity, including Ipswich to the north, the centre of Colchester to the south, London to the south west, and the district of Tendring to the south east, including the port of Harwich.
- Existing road connections link into and through the site from the A12, and subject to upgrading are understood to be capable of accommodating development, but the quantum of development and extent of upgrade will require detailed modelling and analysis.

Transport Strategy

A combined pedestrian-cycle 'Greenway' running through the site, located alongside a potential segregated busway ensuring connectivity across the development. The Greenway could link via a network of future dedicated walking and cycling paths the existing NCN route bordering the west of the site. Southwards, externally to the site, an upgrade to the existing pedestrian and cycle infrastructure on Severalls Lane to accommodate segregated cycle lanes north of the A12, including upgrades to the bridge over the A12 could be beneficial. An additional new pedestrian/cycle bridge over the A12 is proposed at junction 28. Both bridges will create the link between the greenway and the well-established Colchester walking and cycling network linking the site, the P&R, Stadium and importantly the employment and leisure area on the south side of the A12.

A public transport spine located alongside the Greenway would provide internal public transport connectivity to the site, segregation will be in the form of central bus lanes segregated from vehicular traffic along a well-planned tree lined street, rather than an inflexible and over engineered solution. The route will provide a flexible option for bus based site-wide connectivity, allowing multiple bus routes, both inter-urban and local to utilise the infrastructure, including BRT. Two categories of stops acould be used on this route: transport hub stop located at high-density development with smaller scale bus stops located at lower density development throughout the site. The public transport spine offers the opportunity to link the site with the proposed future town centre BRT scheme and the current P&R link.

Major highways works will include upgrades to existing junctions, as illustrated in Figure 11 and Table 13.

Based on assumptions set out in Section 2.2, Table 11 and Table 12 outline an estimate of the Am Peak hour trips generated by the residential and employment uses within the context of theoretical maximum carrying capacity of various public transport modes.

Table 11: Estimate AM peak hour trips generated by the proposed residential and employment uses

Mode	Estimated AM Peak Hour Person Trip Generation (Two-Way)
Active modes (walking / cycling)	3,148
Private Car	2,361
Total Public Transport Trips	2,361

Table 12: Theoretical maximum carrying capacity of public transport modes

Public Transport Mode	No. Routes Assumed	Two-Way Frequency/ hr	Theoretical Capacity/ Hr	Estimated Maximum Theoretical Peak Hr Carrying Capacity
Inter-Urban Bus (BRT)	2	16	200	2,400
Local Bus	1	8	45	360
Total				**3,560**

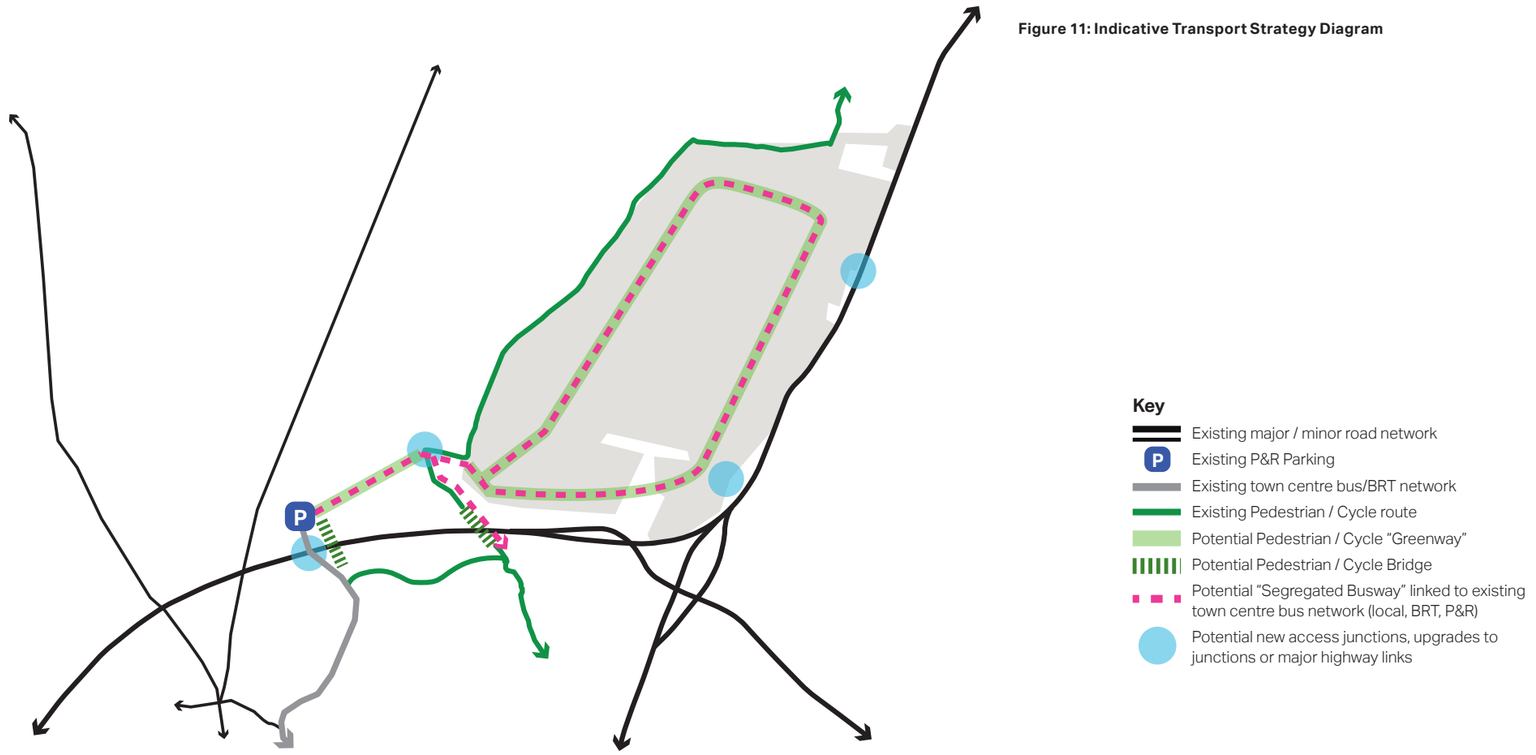
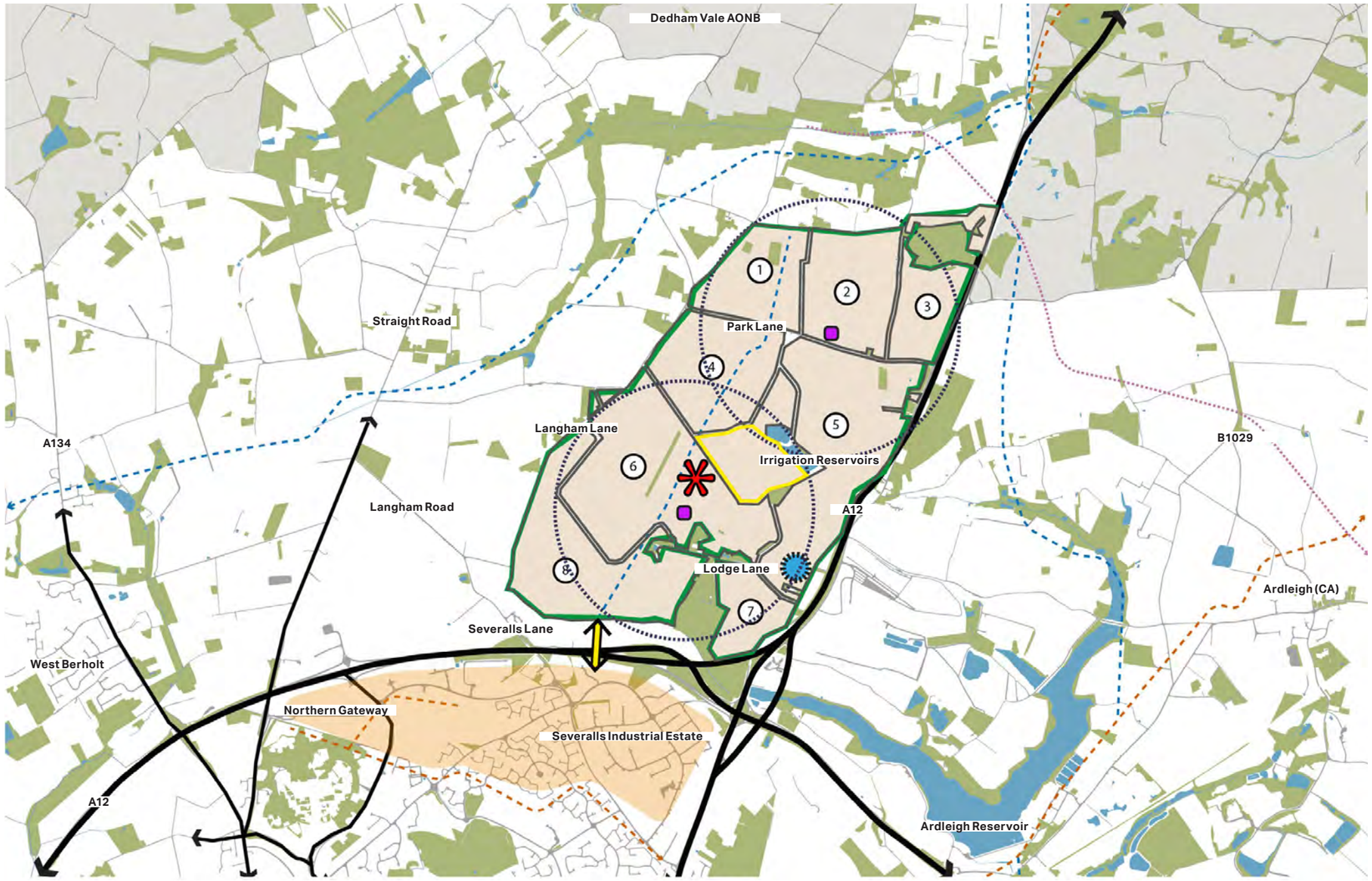


Figure 11: Indicative Transport Strategy Diagram

Indicative Spatial Representation Diagram & Development Capacities



KEY

- Environemntal Assets (to be Protected/Integratec
- Water bodies
- Roads
- Railway
- Medium Pressure Gas Pipe
- Whole Pipeline
- 33,000 V Tower Line
- Developable Land
- Potential Employment Concentration
- Potential Neighbourhood Centre Development
- Potential Local Centres
- 800m Walking Distance
- AONB
- Solar Farm
- Northern Gateway
- Key Severance to Mitigate/stitch

457 ha
Total Site Area

30 dph
6,606 homes

389 ha
Total Developable Area

220 ha
Residential Developable Area

7 ha
Mixed-Use

100 ha
Open Space

7 ha
Employment Land

56 ha
Roads, Footpaths and Parking

A breakdown of the high-level landuses and related development capacities for each development parcel illustrated by the indicative developable area diagram is provided at Appendix 1.

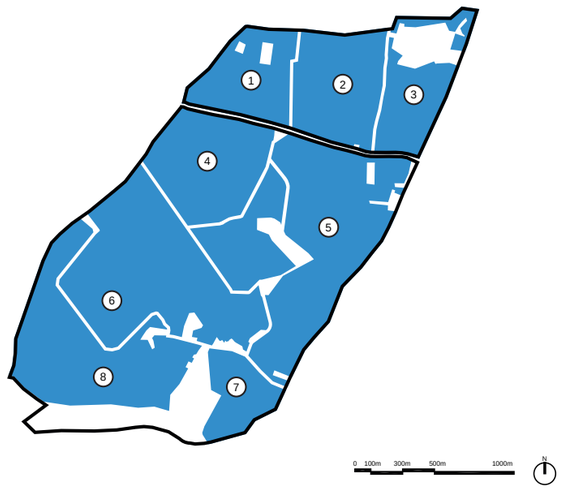


Figure 12: Developable Area Diagram

North of Colchester Option 1: East of Langham Lane Focus

Project List

The following table identifies the key project requirements to support North of Colchester Option 1 as it relates to Social Infrastructure, Utilities and Transport. These projects are based on a high level assessment of the infrastructure requirements for the development option and the growth (housing and employment) envisaged. It is assumption based only and related either to the transport strategy outlined above, the social infrastructure standards described at Appendix 2 and applied to the projected population, and utility infrastructure requirements informed where possible through preliminary discussions with the relevant service providers (e.g. UK Power Networks and Anglian Water). They are indicative only and are not based on a masterplanning exercise.

Infrastructure	Demand Arising from Development Option	Cost per Unit (£)	Total Cost (£)	Phasing	Justification
Education					
Primary Schools Form Entry	8.4 FE	£7,500	£49,545,000	Phasing of education infrastructure to occur within development period and post according to the housing growth triggers	Minimum requirement, assuming off-site mitigation and no account of existing surplus/deficit in existing surrounding facilities. Education costs and calculations based upon *The Essex County Council Developers' Guide to Infrastructure Contributions - Revised Edition 2016*
Secondary Schools Form Entry	7.9 FE				
Early Year Facilities	9.5				
Healthcare & Community					
General Practioners	7GPs	£2,250	£14,863,500	Phasing of healthcare infrastructure to occur within development period and post development, according to the housing growth triggers for each facility	Minimum requirement, assuming off-site mitigation and no account of existing surplus/deficit in existing surrounding facilities. All AECOM Social Infrastructure Modelling (SIF) standards as set out in Appendix 2.
Dentists	7Dentists				
Acute Hospital Beds	25beds				
Library Space	380sq.m				
4 Court Sports Centre	0.91				
4 Lane Swimming Pool	0.61				
Open Space					
Outdoor Sport	19.36ha	£2,750	£18,166,500	Phasing of open space infrastructure to occur within development period and post development, according to the housing growth triggers for each type	Minimum requirement based on standards as set out in Appendix 2.
Children's Play Space	4.43ha				
Semi Natural Open Space	25.314ha				
Parks and Gardens	16.7ha				
Amenity Green Space	11.18ha				
Allotments	2.87ha				
Country Park Landscaping	-	-	£10,000,000	Phasing of country park to occur within development period and post development, according to the housing growth trigger	
Utilities - Scheme-wide Enabling Works					
Energy		Scheme Wide Enabling Works Cost/unit: £16,250 Environment/ Sustainability/ Waste Cost/unit: £500	Scheme Wide Enabling Works Total Cost: £107,347,500 Environment/ Sustainability/ Waste Total Cost: £3,303,000		
75No. 11kV to 400v distribution substations	49MW			Phasing of energy infrastructure to occur within development and post development period, according to the housing growth triggers	Distribute end-user loads
15No. 11kV ring circuits from primary to connect up to distribution substations	-				
Potable Water					
New network distribution pipework from Ardleigh Reservoir	3,373 M3/day			Phasing of potable water infrastructure to occur within development and post development period, according to the housing growth triggers	New supply pipework from Ardleigh Reservoir
Waste Water					
1 No.3,000m3/day pumping station	3,035 M3/day			Phasing of waste water infrastructure to occur within development and post development period, according to the housing growth triggers	Raw sewage to existing treatment plants
Plot connections for all properties - waste water	3,035 M3/day				
Gas					
Provision for a Road crossing of the A12	-				Connecting to end users
Plot connections for all properties - gas	-			Phasing of gas infrastructure to occur within development and post development period, according to the housing growth triggers	

Infrastructure	Demand Arising from Development Option	Cost per Unit (£)	Total Cost (£)	Phasing	Justification
Utilities - Off-Site Requirements					
Energy					
Primary Substation 132/11kV with 2 x 66 MVA Primary Sub Station	49MW	-	£9,000,000	2033/2034	Provide electrical power capacity for development
Potable Water					
5km trunk mains on primary routes and distribution mains to properties for water supply	3,373 M3/day	-	£4,000,000	Initial Phase	Distribution of potable water to end users
Waste Water					
Upgrades for water course discharges	3,035 M3/day	-	£1,000,000	Initial Phase	Environmental enhancement / EA regulations
4km connection to existing waste water treatment works - primary and secondary collection networks	3,035 M3/day	-	£3,200,000	Initial Phase	Sewage network connection and flow to small existing treatment plants in early phases, then pumped to Colchester WRC, or a new WRC provided
Gas					
Upgrade to low pressure distribution network	-	-	£2,000,000	Initial Phase	Gas supply to end users
Telecommunications					
Development of access chambers for BT Telecoms network and development of access chambers for private telecoms network throughout development	-	-	£2,000,000	Initial Phase	ICT and data networks to end users
Transport - On-Site / Off-Site Requirements					
New segregated busway through site to connect with wider bus/BRT/P&R network			£4,500,000	Up to Plan Period	To ensure non-car mode transit is embedded from the outset and to connect with the sub-regional transport connectivity solutions.
Transport Hub (BRT) At Grade			£10,000,000	2031/2032	
New combined segregated pedestrian / cycle "Greenway" through site (increased length when compared to Option 1)			£1,600,000	Up to Plan Period	To ensure non-car mode transit is embedded from the outset linking the local region
New pedestrian / cycle bridge over A12 located close to J28 - 1 Nº			£2,000,000	Initial Phase	
Upgraded pedestrian & cycle networks (e.g Severalls Lane)			£3,000,000		
Upgrade to the existing Severalls Lane bridge over A12 (widening) to provide improved cycle lanes segregated from traffic.			£2,000,000	Up to Plan Period	
New at-grade junction formed from northern arm of junction J28 and possible upgrades to grade-separated slips on J28 - 1 Nº			£5,000,000	2031/2032	To facilitate vehicular connection to the site
New at-grade site accesses formed from upgrades to junctions on Severalls Lane, Langham Lane and Old Ipswich Road via the A12/A120 Slips - 3 Nº			£15,000,000	2031/2032	
Travel plan measures (smarter choices, car clubs, charging points, etc) - Straight Line Cost Over Time			£5,615,100	Up to Plan Period	To ensure non-car mode transit is embedded from the outset and ensure modal shift
Bus service subsidies & other public transport improvements - Straight Line Cost Over Time			£2,642,400	Plan Period	
Contribution to Strategic ("Sub-regional") Public Transport solution e.g. BRT		£1,500	£9,909,000	Plan Period	To ensure non-car mode transit is embedded from the outset and to connect with the sub-regional transport connectivity solutions.

****Total Cost** **£285,692,000** (Total Cost at May 2016 Prices but excluding Professional Fees and Design Development and Construction Contingency)

Table 13: Key Infrastructure Requirements for North of Colchester Option 1

4.4 Option 2: Maximum Land Take

Key Drivers

The commentary provided against Option 1 is equally applicable to Option 2, but with the following additional points:

Overview

Option 2 extends the Garden Community west of Langham Lane as far as Straight Road. Chapel Road creates the northern boundary, and in the south the settlement would abut Colchester Council's planned expansion of the Northern Gateway development for leisure purposes north of the A12.

The overarching objective of this option is to maximise the integration of the Garden Community with the Northern Gateway regeneration proposals and secure mutual benefits. For example the objectives of the Northern Gateway to develop as a high quality leisure destination are consistent with the desire to create a Garden Community which is vibrant, secures mixed uses and is healthy.

There is potential to increase the scale of the Garden Community by approximately 3,500 further new homes, potentially benefiting the viability and options for public transport.

Landuse

- The additional land area is predominantly in productive agricultural use and similar in character to the land to east of Langham Lane (Option 1)
- The Black Brook water course and associated linear tree line is located in the north of the additional land under this option. This slightly reduces developable land within this area of the site, but could be used positively within the development as part of the green infrastructure network and to provide intrinsic character to any new development.
- It is anticipated that the residential properties located throughout Straight Road would be retained, with sufficient buffer zone included to protect their amenity. The principal purpose of Straight Road being to provide additional access options into the Garden Community, rather than providing a road frontage.

Adjacencies

- The opportunity, as discussed, to maximise the potential development, economic, social and sustainable transport synergies with the development of Colchester Northern Gateway.
- The retention of a green buffer between the potential Garden Community and the village of Horkesley Heath.

Connectivity

- The connection of the Park & Ride within the Garden Community would present significant benefits for a potential BRT system.

Transport Strategy

The solutions proposed for Option 1 are pertinent to this larger development scenario with the addition of additional highway links in the form of upgrade of 2no. junctions on Straight Road with Langham Road and Old House Lane. The larger site offers the opportunity to increase the length of the Greenway and segregated bus route to widen the site coverage. It is also considered likely to warrant more substantial bridge crossings of the A12 to facilitate integration with, and movement between the Garden Communities and Colchester Northern Gateway, for example a land bridge structure.

Based on assumptions set out in Section 2.2, Table 14 and Table 15 outline an estimate of the Am Peak hour trips generated by the residential and employment uses within the context of theoretical maximum carrying capacity of various public transport modes.

Table 14: Estimate AM peak hour trips generated by the proposed residential and employment uses

Mode	Estimated AM Peak Hour Person Trip Generation (Two-Way)
Active modes (walking / cycling)	4,848
Private Car	3,636
Total Public Transport Trips	3,636

Table 15: Theoretical maximum carrying capacity of public transport modes

Public Transport Mode	No. Routes Assumed	Two-Way Frequency/ hr	Theoretical Capacity/ Hr	Estimated Maximum Theoretical Peak Hr Carrying Capacity
Inter-Urban Bus (BRT)	2	16	200	3,200
Local Bus	1	8	45	360
Total				**3,560**

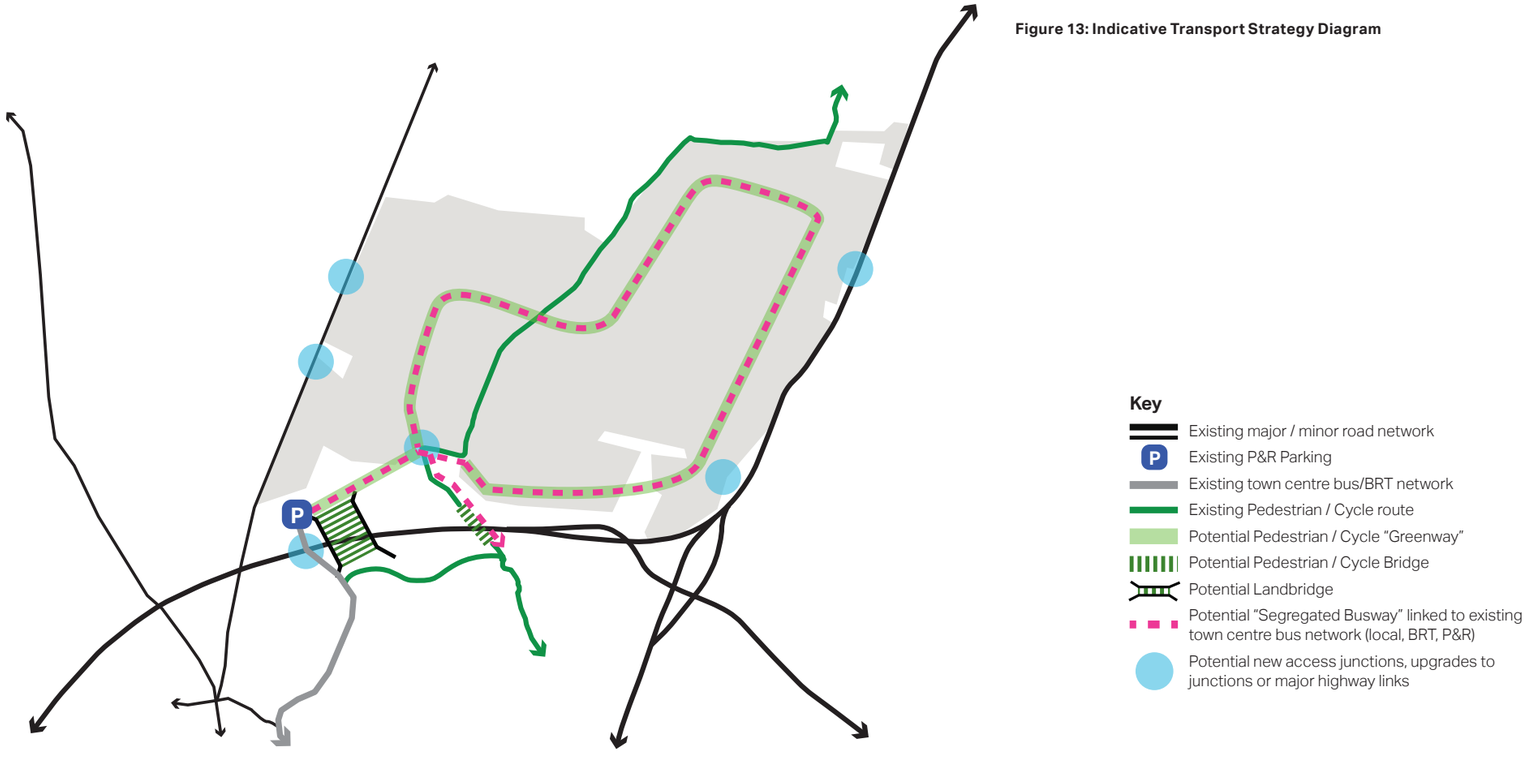
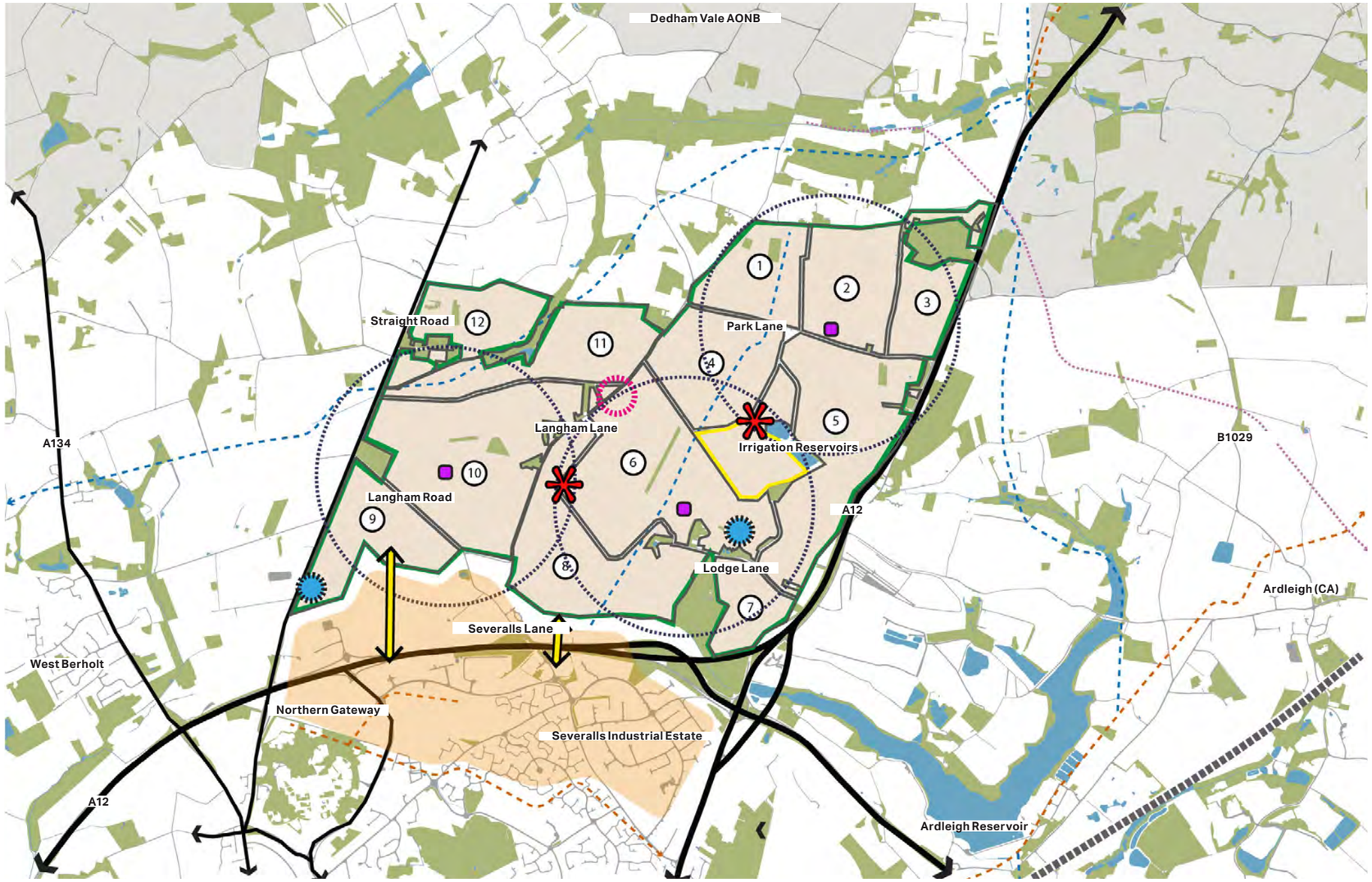


Figure 13: Indicative Transport Strategy Diagram

Indicative Spatial Representation Diagram & Development Capacities



681 ha
Total Site Area

30 dph
10,132 homes

582 ha
Total Developable Area

338 ha
Residential Developable Area

10 ha
Mixed-Use

139 ha
Open Space

10 ha
Employment Land

85 ha
Roads, Footpaths and Parking

KEY

- Environemntal Assets (to be Protected/Integrated)
- Water bodies
- Roads
- Railway
- Medium Pressure Gas Pipe
- Whole Pipeline
- 33,000 V Tower Line
- Developable Land
- Potential Employment Concentration
- Potential Neighbourhood Centre Development
- Potential Local Centres
- 800m Walking Distance
- AONB
- Solar Farm
- Northern Gateway
- Key Severance to Mitigate/stitch

A breakdown of the high-level landuses and related development capacities for each development parcel illustrated by the indicative developable area diagram is provided at Appendix 1.

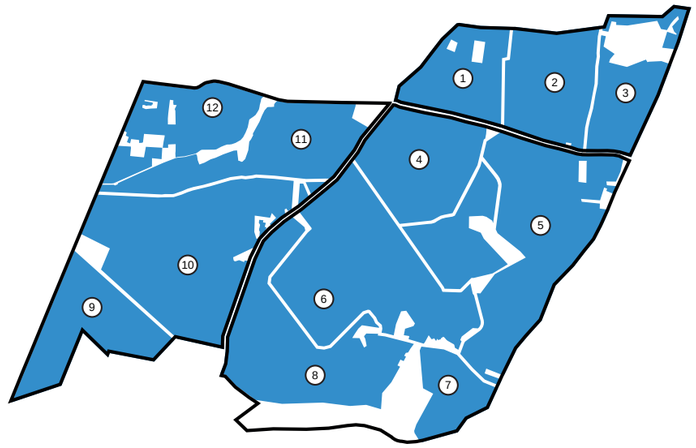


Figure 14: Developable Area Diagram

North of Colchester Option 2: Maximum Land Take

Project List

The following table identifies the key project requirements to support North of Colchester Option 2 as it relates to Social Infrastructure, Utilities and Transport. These projects are based on a high level assessment of the infrastructure requirements for the development option and the growth (housing and employment) envisaged. It is assumption based only and related either to the transport strategy outlined above, the social infrastructure standards described at Appendix 2 and applied to the projected population, and utility infrastructure requirements informed where possible through preliminary discussions with the relevant service providers (e.g. UK Power Networks and Anglian Water). They are indicative only and are not based on a masterplanning exercise.

Infrastructure	Demand Arising from Development Option	Cost per Unit (£)	Total Cost (£)	Phasing	Justification
Education					
Primary Schools Form Entry	5.5 FE	£7,500	£75,990,000	Phasing of education infrastructure to occur within development period and post according to the housing growth triggers	Minimum requirement, assuming off-site mitigation and no account of existing surplus/deficit in existing surrounding facilities. Education costs and calculations based upon *The Essex County Council Developers' Guide to Infrastructure Contributions - Revised Edition 2016*
Secondary Schools Form Entry	5.1 FE				
Early Year Facilities	6.2				
Healthcare & Community					
General Practioners	11GPs	£2,250	£22,797,000	Phasing of healthcare infrastructure to occur within development period and post development, according to the housing growth triggers for each facility	Minimum requirement, assuming off-site mitigation and no account of existing surplus/deficit in existing surrounding facilities. All AECOM Social Infrastructure Modelling (SIF) standards as set out in Appendix 2.
Dentists	11Dentists				
Acute Hospital Beds	38beds				
Library Space	583sq.m				
4 Court Sports Centre	1.4				
4 Lane Swimming Pool	0.94				
Open Space					
Outdoor Sport	29.72ha	£2,750	£27,863,000	Phasing of open space infrastructure to occur within development period and post development, according to the housing growth triggers for each type	Minimum requirement based on standards as set out in Appendix 2.
Children's Play Space	6.8ha				
Semi Natural Open Space	38.84ha				
Parks and Gardens	25.6ha				
Amenity Green Space	17.16ha				
Allotments	4.41ha				
Country Park Landscaping	-	-	£10,000,000	Phasing of country park to occur within development period and post development, according to the housing growth trigger	
Utilities - Scheme-wide Enabling Works					
Energy		Scheme Wide Enabling Works Cost/unit: £16,250 Environment/ Sustainability/ Waste Cost/unit: £500	Scheme Wide Enabling Works Total Cost: £164,645,000 Environment/ Sustainability/ Waste Total Cost: £5,066,000		
45No. 11kV to 400v distribution substations	32MW			Phasing of energy infrastructure to occur within development and post development period, according to the housing growth triggers	Distribute end-user loads
9No. 11kV ring circuits from primary to connect up to distribution substations	-				
Potable Water					
New network distribution pipework from Ardleigh Reservoir	2,190 M3/day			Phasing of potable water infrastructure to occur within development and post development period, according to the housing growth triggers	New supply pipework from Ardleigh Reservoir
Waste Water					
1 No.2,000m3/day pumping station	1,971 M3/day			Phasing of waste water infrastructure to occur within development and post development period, according to the housing growth triggers	Raw sewage to existing treatment plants
Plot connections for all properties - waste water	-				
Gas					
Provision for a Road crossing of the A12	-				Connecting to end users
Plot connections for all properties - gas	-			Phasing of gas infrastructure to occur within development and post development period, according to the housing growth triggers	

Infrastructure	Demand Arising from Development Option	Cost per Unit (£)	Total Cost (£)	Phasing	Justification
Utilities - Off-Site Requirements					
Energy					
Primary Substation 132/11kV with 2 x 30 MVA Primary Sub Station	32MW	-	£11,000,000	2033/2034	Provide electrical power capacity for development
Potable Water					
5km trunk mains on primary routes and distribution mains to properties for water supply	2,190 M3/day	-	£4,000,000	Initial Phase	Distribution of potable water to end users
Waste Water					
Upgrades for water course discharges	1,971 M3/day	-	£1,000,000	Initial Phase	Environmental enhancement / EA regulations
4km connection to existing waste water treatment works - primary and secondary collection networks	1,971 M3/day	-	£3,200,000	Initial Phase	Sewage network connection and flow to small existing treatment plants in early phases, then pumped to Colchester WRC, or a new WRC provided
Gas					
Upgrade to low pressure distribution network	-	-	£2,000,000	Initial Phase	Gas supply to end users
Telecommunications					
Development of access chambers for BT Telecoms network and development of access chambers for private telecoms network throughout development	-	-	£2,000,000	Initial Phase	ICT and data networks to end users
Transport - On-Site / Off-Site Requirements					
New segregated busway through site to connect with wider bus/BRT/P&R network (increased length when compared to Option 1)			£5,000,000	Up to Plan Period	To ensure non-car mode transit is embedded from the outset and to connect with the sub-regional transport connectivity solutions.
Transport Hub (BRT) At Grade			£10,000,000	2031/2032	
New combined segregated pedestrian / cycle "Greenway" through site (increased length when compared to Option 1)			£1,800,000	Up to Plan Period	To ensure non-car mode transit is embedded from the outset linking the local region
New pedestrian / cycle "land bridge" over A12 located close to J28 - 1 Nº			£2,000,000	Initial Phase	
Upgrade to the existing Severalls Lane bridge over A12 (widening) to provide improved cycle lanes segregated from traffic.			£2,000,000	Up to Plan Period	
Upgraded pedestrian & cycle networks (e.g Severalls Lane)			£3,000,000		
New at-grade junction formed from northern arm of junction J28 and possible upgrades to grade-separated slips on J28 - 1 Nº			£5,000,000	Up to Plan Period	To facilitate vehicular connection to the site
New at-grade site accesses formed from upgrades to junctions on Severalls Lane , Langham Lane, Old Ipswich Road via the A12/ A120 Slips and two junctions on Boxted Road / Straight Road - 5 Nº			£25,000,000	2031/2032	
Travel plan measures (smarter choices, car clubs, charging points, etc) - Straight Line Cost Over Time			£8,612,200	Up to Plan Period	To ensure non-car mode transit is embedded from the outset and ensure modal shift
Bus service subsidies & other public transport improvements - Straight Line Cost Over Time			£4,052,800	Plan Period	
Contribution to Strategic ("Sub-regional") Public Transport solution e.g. BRT		£1,500	£15,198,000	Plan Period	To ensure non-car mode transit is embedded from the outset and to connect with the sub-regional transport connectivity solutions.

****Total Cost** **£411,224,000** (Total Cost at May 2016 Prices but excluding Professional Fees and Design Development and Construction Contingency)

Table 16: Key Infrastructure Requirements for North of Colchester Option 2

This Section provides concept options and associated infrastructure requirement for the West of Colchester / Marks Tey Broad Search Area.

05 West of Colchester / Marks Tey

5.1 Broad Search Area
5.2 Options Overview
5.3 Option 1: North and South of A12 / Rail Corridor Focus
5.4 Option 2: South of A120 and North of Marks Tey Existing Settlement Focus
5.5 Option 3: South of A120 Focus
5.6 Option 4: Maximum Land Take

5.1 Broad Search Area

Strategic Overview

The West of Colchester/Marks Tey Broad Search Area is located approximately 5km west of the centre of Colchester, on the A120, connecting Colchester (and the A12) with Braintree and Stansted Airport to the west. The search area is broadly defined by Marks Tey railway station and the village of Copford in the east, Roman River in the north, the historic village of Coggeshall to the west, and the small hamlet of Easthorpe to the south east. The Great Eastern Mainline (GEML) railway and the adjacent A12 creates a key transport corridor, dividing the search area in two on a south west/northeast alignment, and providing both rail and road connectivity of the search area with London, Colchester and the international ports of Felixstowe and Harwich.

The majority of the land is in productive agricultural use, with field boundaries defined by field hedgerows, associated drainage ditches and stands of mature trees, which act to provide a degree of enclosure within the landscape. The village of Marks Tey is located within the east of the search area, principally located in and around the interchange of the A120 and A12 and heavily characterised and influenced by the strategic road and rail infrastructure in this location. As such the settlement generally lacks a clear identify and sense of cohesion. Further west along the A120 is the smaller village/hamlet of Little Tey. Beyond these settlements, and especially within the farmland to north of the A120 are a number of detached farm buildings and residential properties, access to which is provided by a network of country lanes that pass through the search area, connecting to settlements beyond.

The majority of the land within this search area is located within Colchester Borough, with land in the west, falling within Braintree District.

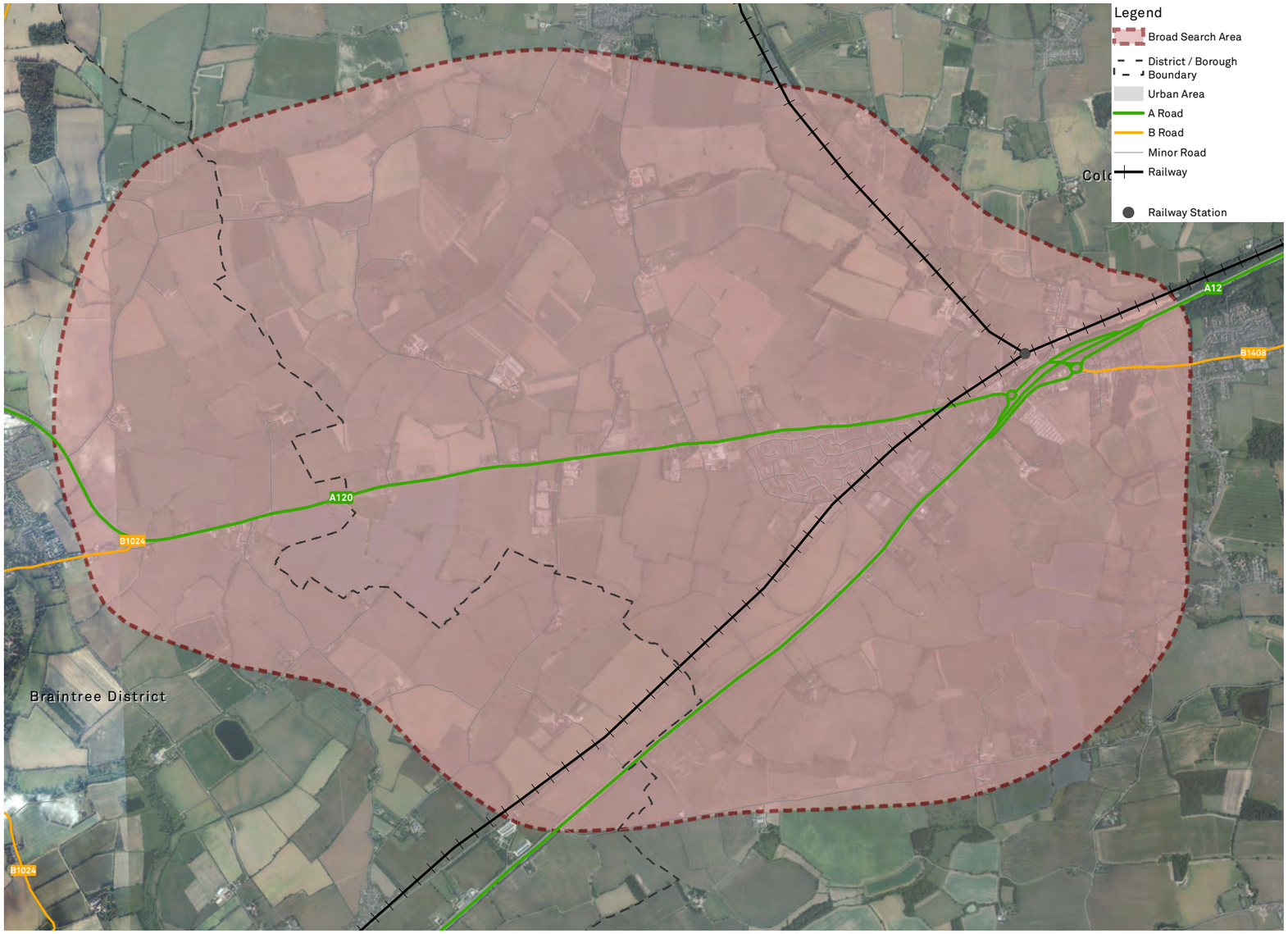


Figure 15: Broad Search Area Diagram

5.2 Options Overview

Option 1: North and South of A12 / Rail Corridor Focus

- Total Site Area: **1,015ha**
- Approximate Total Developable Area: **918ha**

Option 2: South of A120 and North of Marks Tey Existing Settlement Focus

- Total Site Area: **1,022ha**
- Approximate Total Developable Area: **942ha**

Option 3: South of A120 Focus

- Total Site Area: **756ha**
- Approximate Total Developable Area: **717ha**

Option 4: Maximum Land Take

- Total Site Area: **1,703ha**
- Approximate Total Developable Area: **1,579ha**

5.3 Option 1: North and South of A12 / Rail Corridor Focus

Key Drivers

Overview

Option 1 seeks to focus the location of the Garden Community in and around the existing village of Mark Tey, and incorporating Little Tey too. This provides settlement consolidation and expansion of Marks Tey. The site is broadly defined by the Roman River to the north and north west, Bracks Lane and a series of field boundaries to the west, Domsey Brook to the south and the villages of Easthorpe, Copford Green and Copford to the south east and east. The majority of the land under this option was included in the Braintree and Colchester Call-For-Sites process, and is promoted by two potential developers. The land to the north of the A120 and west of Great Tey Road was not included within either Call-For-sites process.

Landuse

- The majority of the land is in productive agricultural use and undeveloped.
- The main areas of built development are the villages of Marks Tey and the hamlet of Little Tey, it is envisaged that both would be absorbed into the Garden Community.
- A number of isolated/detached residential and farm related properties exist throughout the site area, especially to the north of the A120. The setting of these would inevitably change as a result of the Garden Community.
- Roman River and Domsey Brook, together with their associated scrub and linear woodland, are, together with Brick Pitt SSSI, the areas of most ecological value. Elsewhere the site is mostly free of ecological and physical constraints.
- The A12 and GEML transport corridor running south west/north east, and its junction with the A120, is a major feature of the site providing severance and permeability constraints.

Adjacencies

- This option seeks to retain a substantial green buffer (agricultural land) between the edge of the Garden Community and the surrounding villages of Copford, Copford Green, Feering and Coggeshall, whilst still providing a substantial new settlement of potentially over 16,000 new homes.
- This option is considered to be located a sufficient distance from the centres of Braintree and Colchester to develop as a potential complimentary new urban settlement, especially because of the existing road and rail transport connectivity and importantly the potential that this provides for the creation of an integrated sustainable transport system, subject to major infrastructure investment.
- The Colchester Borough Key Settlement of Stanway is located approximately 2km east of the site, recent planning policy has supported the growth of this settlement, including for retail, leisure and housing development. The desire exists locally to retain separation between Marks Tey (and any Garden Community in this location) and Stanway. The development strategy for both the Garden Community and Stanway would need to support this condition.

Connectivity

- Being located on the A120, the site is well located for direct access to Stansted Airport and Braintree to the west, and Colchester and Harwich International Port to the east. The efficiency and speed of this connectivity is being reviewed by Essex County Council. A feasibility study is currently being undertaken regarding long term improvements to the A120 between Braintree and the A12. This study will determine a shortlist of routes options to take to public consultation in 2017. Following this consultation ECC will make a recommendation to the Department of Transport and Highways England for a preferred option.
- As part of developing a potential Garden Community in this location, it may be beneficial to consider the opportunity of re-aligning the A120 such that through traffic is removed from the centre of what could be a settlement..
- The resulting de-classification of the existing alignment of the A120 would allow the existing road to create a central primary spine through the Garden Community with resulting place making benefits.
- The A12 provides direct road access from the site south to London and north to Colchester and beyond to Ipswich and the Port of Felixstowe.
- The existing Marks Tey Railway Station is located on the GEML providing direct connections to London in the south and north to Colchester and beyond to Ipswich. The station also connects north west to Sudbury.
- Overall these transport connections provide potential economic advantage; they are likely to be an attraction to a range of businesses in terms of location, and with appropriate investment and an integrated approach to transport and land use planning could provide the basis on which to develop a sustainable transport system for the Garden Community.

Transport Strategy

A combined pedestrian-cycle 'greenway' could be developed running through the site, located alongside a segregated busway, ensuring connectivity across the development. The existing dedicated pedestrian bridge over the A12 and the A120 could require upgrading to provide a dedicated pedestrian / cycle route and improved access to Marks Tey rail station. The route will also help to alleviate existing severance formed by the interchange of strategic roads in this area. Internal to the site, a land bridge may be a requirement to cross the A12 and GEML, accommodating both the greenway and public transport spine allowing a seamless connection between the eastern and the western parts of the site. Cycling facilities such as cycle parking hubs should be implemented at locations of higher development density and where public transport routes interchange.

A public transport spine located alongside the greenway would provide internal public transport connectivity with bus lanes segregated from vehicular traffic along a well-planned tree lined street, rather than an inflexible and over engineered solution.

This would provide a flexible solution for bus based site-wide connectivity, allowing multiple bus routes, both inter-urban and local to utilise the infrastructure, including BRT. Two categories of stops could be used on this route: transport hub stop located at high-density development with smaller scale bus stops located at lower density development throughout the site. Complementary to the bus based connections, there is an opportunity to re-purpose the existing Sudbury Branch Line, extending its route through the site, as part of the wider sub-regional tram-train connectivity option. The route could utilise part of the current A120 alignment to provide a spine through the development.

The main multimodal interchange between bus, possibly tram and national rail services, as well as cycle facilities would remain at the current Marks Tey railway station location.

Major highway works would include upgrades to existing junctions and a number of new junctions, as illustrated in Figure 16 and Table 20.

Table 17 and Table 18 outline an estimate of the Am Peak hour trips generated by the residential and employment uses within the context of theoretical maximum carrying capacity of various public transport modes.

Table 17: Estimate AM peak hour trips generated by the proposed residential and employment uses

Mode	Estimated AM Peak Hour Person Trip Generation (Two-Way)
Active modes (walking / cycling)	7,568
Private Car	5,676
Total Public Transport Trips	5,676

Table 18: Theoretical maximum carrying capacity of public transport modes

Public Transport Mode	No. Routes Assumed	Two-Way Frequency/ hr	Theoretical Capacity/ Hr	Estimated Maximum Theoretical Peak Hr Carrying Capacity
Inter-Urban Bus (BRT)	2	12	200	2,400
Local Bus	1	8	45	360
Tram-Train	1	12	240	2,880
Total				**5,640**

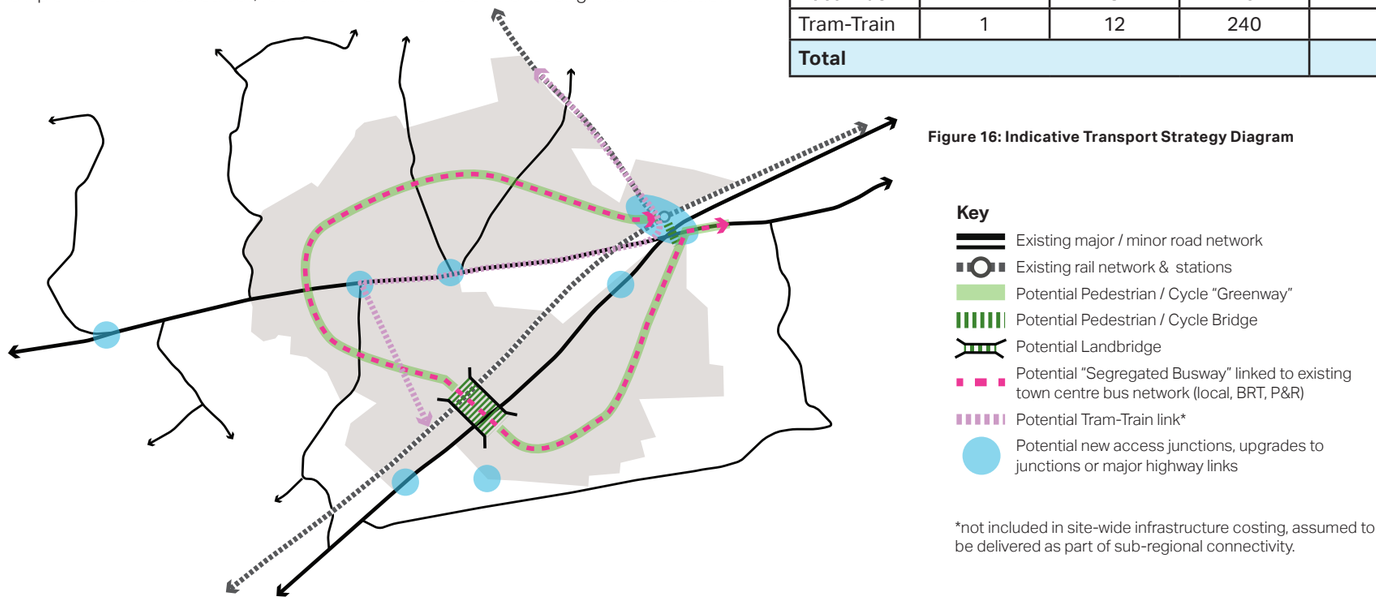
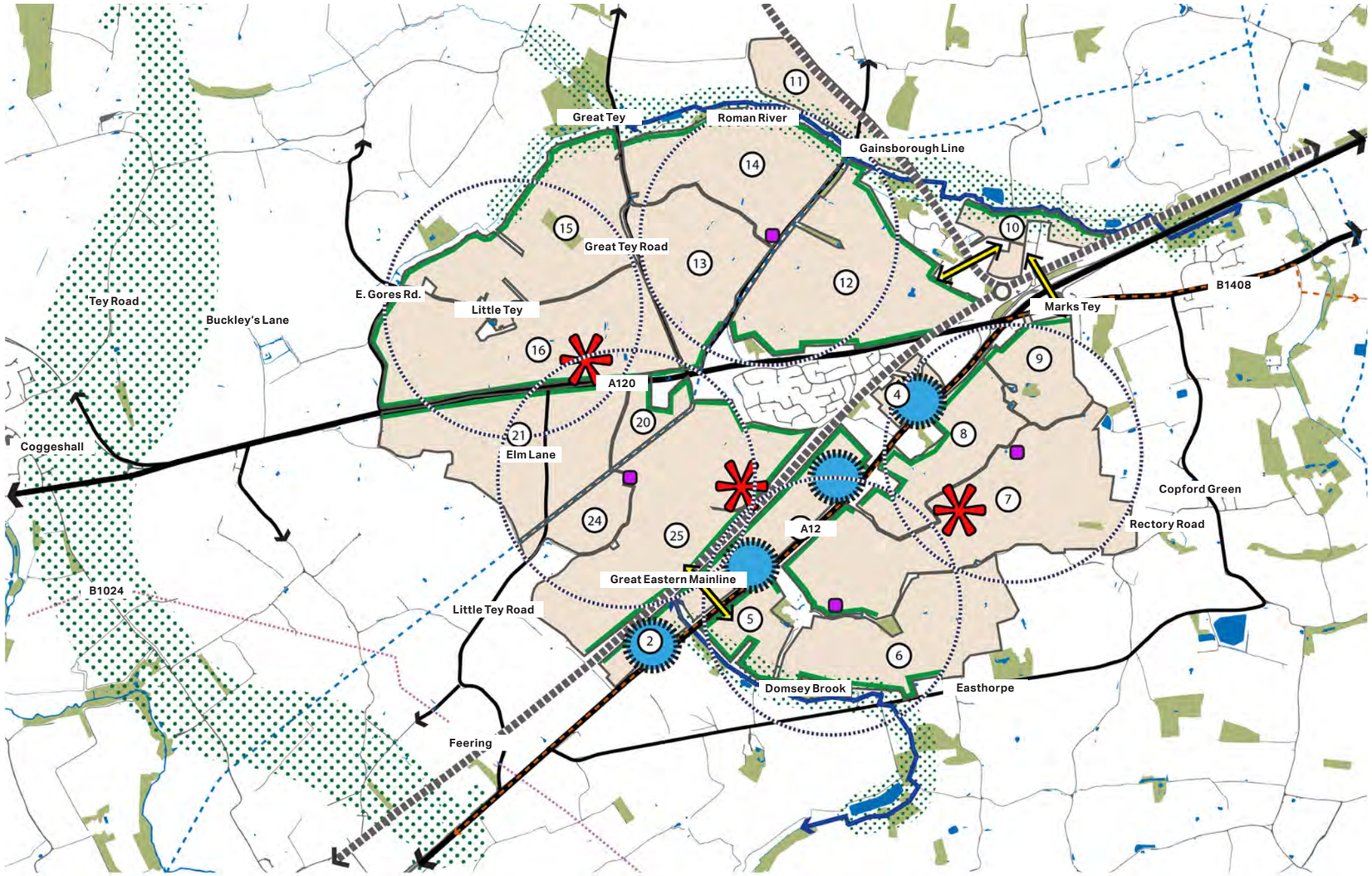


Figure 16: Indicative Transport Strategy Diagram

Indicative Spatial Representation Diagram & Development Capacities



KEY

- Environmental Assets (to be Protected/Integrated)
- Water bodies
- Roads
- Railway
- Railway Station
- Watercourse Corridor
- Medium Pressure Gas Pipe
- Pipeline Section
- 33,000 V Tower Line
- Developable Land
- Potential Green Buffer
- Potential Connector / Stitch
- Potential Employment Concentration
- Potential Neighbourhood Centre Development
- Potential Local Centres
- 800m Walking Distance

A breakdown of the high-level landuses and related development capacities for each development parcel illustrated by the indicative developable area diagram is provided at Appendix 1.

1,015 ha
Total Site Area

30 dph
16,861 homes

918 ha
Total Developable Area

562 ha
Residential Developable Area

9 ha
Mixed-Use

200 ha
Open Space

10 ha
Employment Land

138 ha
Roads, Footpaths and Parking

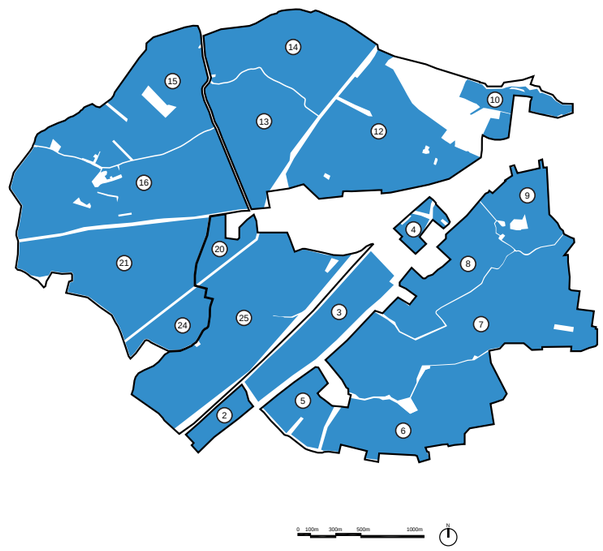


Figure 17: Developable Area Diagram

West of Colchester / Marks Tey Option 1: North and South of A12 / Rail Corridor Focus

Project List

The following table identifies the key project requirements to support Marks Tey Option 1as it relates to Social Infrastructure, Utilities and Transport. These projects are based on a high level assessment of the infrastructure requirements for the development option and the growth (housing and employment) envisaged. It is assumption based only and related either to the transport strategy outlined above, the social infrastructure standards described at Appendix 2 and applied to the projected population, and utility infrastructure requirements informed where possible through preliminary discussions with the relevant service providers (e.g. UK Power Networks and Anglian Water). They are indicative only and are not based on a masterplanning exercise.

Infrastructure	Demand Arising from Development Option	Cost per Unit (£)	Total Cost (£)	Phasing	Justification
Education					
Primary Schools Form Entry	14 FE	£7,500	£126,457,500	Phasing of education infrastructure to occur within development period and post according to the housing growth triggers	Minimum requirement, assuming off-site mitigation and no account of existing surplus/deficit in existing surrounding facilities. Education costs and calculations based upon *The Essex County Council Developers' Guide to Infrastructure Contributions - Revised Edition 2016*
Secondary Schools Form Entry	13.1 FE				
Early Year Facilities	15.8				
Healthcare & Community					
General Practioners	18GPs	£2,250	£37,937,250	Phasing of healthcare infrastructure to occur within development period and post development, according to the housing growth triggers for each facility	Minimum requirement, assuming off-site mitigation and no account of existing surplus/deficit in existing surrounding facilities. All AECOM Social Infrastructure Modelling (SIF) standards as set out in Appendix 2.
Dentists	18Dentists				
Acute Hospital Beds	63beds				
Library Space	970sq.m				
4 Court Sports Centre	2.33				
4 Lane Swimming Pool	1.56				
Open Space					
Outdoor Sport	49.45ha	£2,750	£46,367,750	Phasing of open space infrastructure to occur within development period and post development, according to the housing growth triggers for each type	Minimum requirement based on standards as set out in Appendix 2.
Children's Play Space	11.31ha				
Semi Natural Open Space	64.64ha				
Parks and Gardens	42.66ha				
Amenity Green Space	28.55ha				
Allotments	7.34ha				
Country Park Landscaping	-	-	£10,000,000	Phasing of country park to occur within development period and post development, according to the housing growth trigger	
Utilities - Scheme-wide Enabling Works					
Energy		Scheme Wide Enabling Works Cost/unit: £16,250 Environment/ Sustainability/ Waste Cost/unit: £500	Scheme Wide Enabling Works Total Cost: £273,991,250 Environment/ Sustainability/ Waste Total Cost: £8,430,500		
80No. 11kV to 400v distribution substations	60MW			Phasing of energy infrastructure to occur within development and post development period, according to the housing growth triggers	Distribute end-user loads
18No. 11kV ring circuits from primary to connect up to distribution substations	-				
Potable Water					
New distribution network from existing reservoir	5,288 M3/day			Phasing of potable water infrastructure to occur within development and post development period, according to the housing growth triggers	New connections to existing storage reservoirs
Waste Water					
3 No.2,000m3/day pumping station	4,795 M3/day			Phasing of waste water infrastructure to occur within development and post development period, according to the housing growth triggers	Raw sewage to existing treatment plants
Plot connections for all properties - waste water	-				
Gas					
Plot connections for all properties - gas	-			Phasing of gas infrastructure to occur within development and post development period, according to the housing growth triggers	Connecting to end users

Infrastructure	Demand Arising from Development Option	Cost per Unit (£)	Total Cost (£)	Phasing	Justification
Utilities - Off-Site Requirements					
Energy					
Primary Substation 132/11kV with 2 x 66 MVA Primary Sub Station	60MW	-	£17,000,000	2033/2034	Provide electrical power capacity for development
Potable Water					
5km trunk mains on primary routes and distribution mains to properties for water supply	5,288 M3/day	-	£4,000,000	Initial Phase	Distribution of potable water to end users
Waste Water					
Upgrades for water course discharges	4,759 M3/day	-	£1,500,000	Initial Phase	Environmental enhancement / EA regulations
10km connection to existing waste water treatment works - primary and secondary collection networks	4,759 M3/day	-	£8,000,000	Initial Phase	Sewage network connection and flow to small existing treatment plants, then establish new WRC towards end of the plan period with discharge to River Colne
Gas					
Upgrade to low pressure distribution network	-	-	£3,000,000	Initial Phase	Gas supply to end users
Telecommunications					
Development of access chambers for BT Telecoms network and development of access chambers for private telecoms network throughout development	-	-	£3,000,000	Initial Phase	ICT and data networks to end users
Transport - On-Site / Off-Site Requirements					
New segregated busway through site to connect with wider bus/BRT network			£4,500,000	Up to Plan Period	To ensure non-car mode transit is embedded from the outset and to connect with the sub-regional transport connectivity solutions.
Transport Hub (BRT/LRT) At Grade			£10,000,000	2031/2032	
New combined segregated pedestrian / cycle "Greenway" through site			£1,800,000	Initial Phase	To ensure non-car mode transit is embedded from the outset linking the local region
New pedestrian / cycle bridge crossing A12 and A120 at Marks Tey interchange to connect with rail station - 1 Nº			£2,000,000	Initial Phase	
New all-modes "land bridge" across A12 and GEML			£10,000,000	Up to Plan Period	
Upgraded pedestrian & cycle networks			£3,000,000	Initial Phase	To facilitate vehicular connection to the site
Junction upgrades to at-grade Marks-Tey roundabout - 1 Nº			£5,000,000	2031/2032	
New at-grade junctions / accesses formed off Prince of Wales Roundabout, North Lane, two at-grade junctions on current A120 alignment, one at-grade accessed formed with a potential A120 by-pass and at-grade roundabout with London Road and A12 Westbound on-slip - 6 Nº			£30,000,000	Initial Phase	
Travel plan measures (smarter choices, car clubs, charging points, etc) - Straight Line Cost Over Time			£14,331,850	Initial Phase	To ensure non-car mode transit is embedded from the outset and ensure modal shift
Bus service subsidies & other public transport improvements - Straight Line Cost Over Time			£6,744,400	Plan Period	
Contribution to Strategic ("Sub-regional") Public Transport solution e.g. BRT		£1,500	£25,291,500		To ensure non-car mode transit is embedded from the outset and to connect with the sub-regional transport connectivity solutions.
			**Total Cost	**£652,352,000** (Total Cost at May 2016 Prices but excluding Professional Fees and Design Development and Construction Contingency)	

Table 19: Key Infrastructure Requirements for West Colchester / Marks Tey Option 1

5.4 Option 2: South of A120 and North of Marks Tey Existing Settlement Focus

Key Drivers

The commentary provided against Option 1 is for the most part applicable to Option 2, but for the following:

Overview

Option 2 contains the majority of the development on the south side of the A120, extending this further south west to include a greater proportion of land within Braintree district, the edge of which is largely defined by a combination of filed boundaries and the alignment of Old Road. consistent with Option 1 an area north of the A120 and east of Great Tey Road is included, which retains the potential to improve the connectivity and integration of the existing Marks Tey Railway Station with the wider Garden Community. All of the land in this option was included in the Local Plan Call-For-Sites process. This option reduces the impact of the new settlement on Little Tey.

Overall this option provides a similar level of housing units to Option 1, and potentially very slightly higher.

Landuse

- Landuse is consistent with Option 1, but does not directly impact on the residential properties of Little Tey, or the limited number of detached residential/commercial properties located within the agricultural landscape beyond Little Tey.
- The additional land included in this option to the south west is again in productive agricultural use and undeveloped.

Adjacencies

- The inclusion of additional land within Braintree district places the boundary of the Garden Community closer to Coggeshall but still retains good separation from the village's conservation area boundary.
- The north/west to south east alignment of the western boundary maintains separation from Coggeshall Hamlet, the village of Feering and the River Blackwater valley.

Connectivity

- The additional land included to the south west under this option provides land adjacency to Old Road, which may benefit site access and connectivity, even if restricted to cycling/walking connectivity with the wider area.

Transport Strategy

The solutions proposed for Option 1 are pertinent to this development scenario, however the alignment and resultant coverage of the combined greenway and transit spine alters. Any by-pass developed to the west of Marks Tey may also need to consider junction requirement to serve the development.

Based on assumptions set out in Section 2.2, Table 20 and Table 21 outline an estimate of the Am Peak hour trips generated by the residential and employment uses within the context of theoretical maximum carrying capacity of various public transport modes.

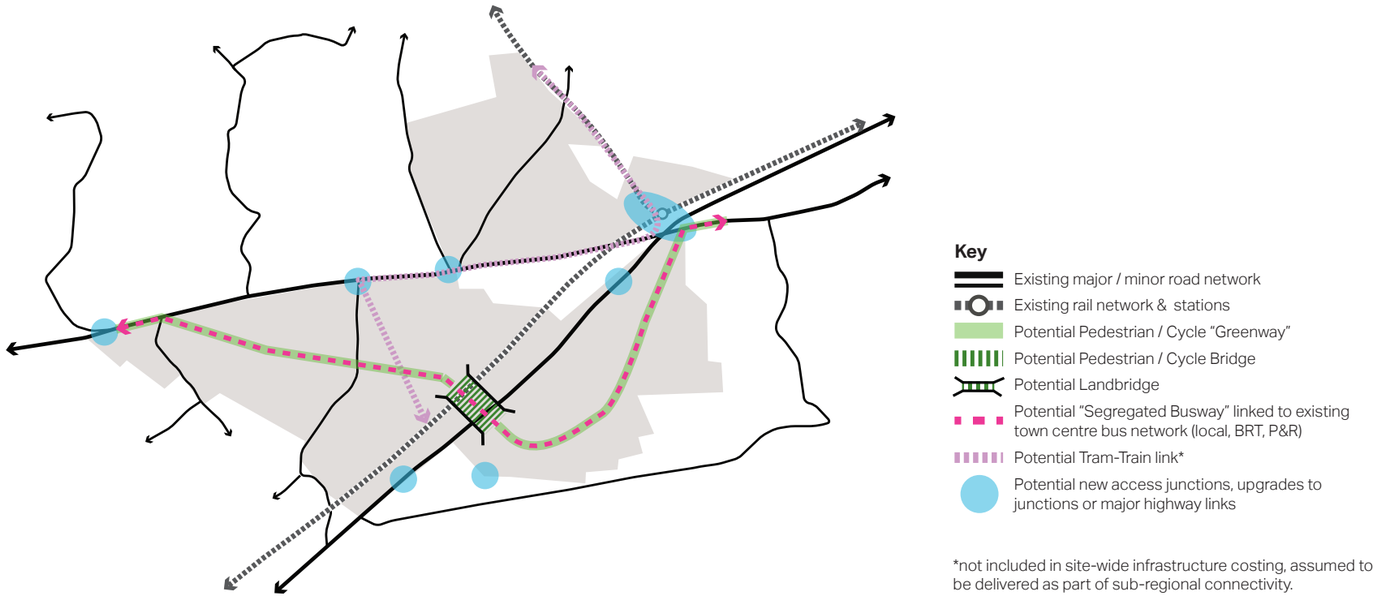
Table 20: Estimate AM peak hour trips generated by the proposed residential and employment uses

Mode	Estimated AM Peak Hour Person Trip Generation (Two-Way)
Active modes (walking / cycling)	7,750
Private Car	5,813
Total Public Transport Trips	5,813

Table 21: Theoretical maximum carrying capacity of public transport modes

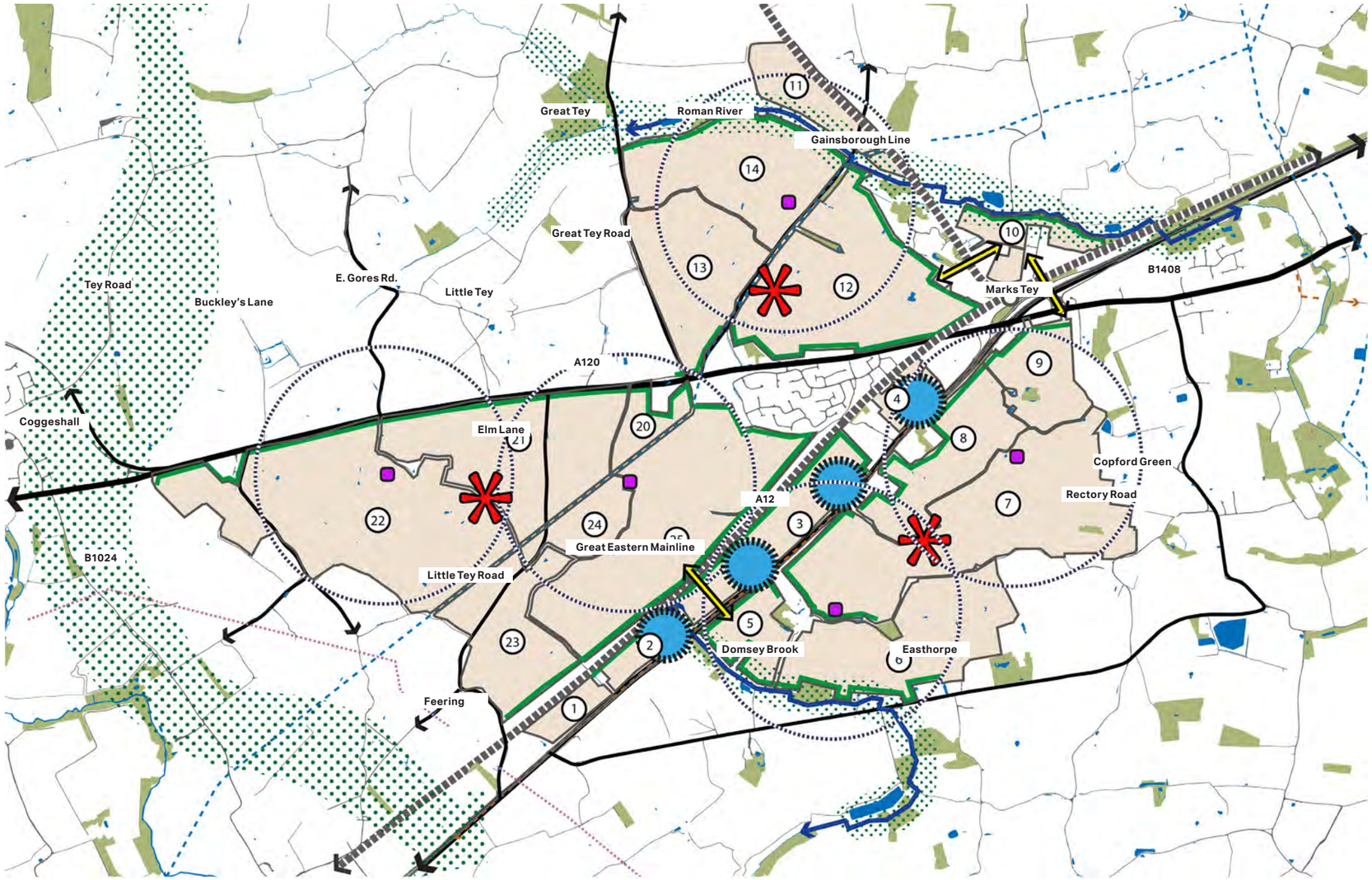
Public Transport Mode	No. Routes Assumed	Two-Way Frequency/ hr	Theoretical Capacity/ Hr	Estimated Maximum Theoretical Peak Hr Carrying Capacity
Inter-Urban Bus (BRT)	2	12	200	2,400
Local Bus	1	8	45	360
Tram-Train	1	12	240	2,880
Total				**5,640**

Figure 18: Indicative Transport Strategy Diagram



*not included in site-wide infrastructure costing, assumed to be delivered as part of sub-regional connectivity.

Indicative Spatial Representation Diagram & Development Capacities



KEY

- Environmental Assets (to be Protected/Integrated)
- Water bodies
- Roads
- Railway
- Railway Station
- Watercourse Corridor
- Medium Pressure Gas Pipe
- Pipeline Section
- 33,000 V Tower Line
- Developable Land
- Potential Green Buffer
- Potential Connector / Stitch
- Potential Employment Concentration
- Potential Neighbourhood Centre Development
- Potential Local Centres
- 800m Walking Distance

1,022 ha
Total Site Area

30 dph
17,182 homes

942 ha
Total Developable Area

573 ha
Residential Developable Area

9 ha
Mixed-Use

208 ha
Open Space

10 ha
Employment Land

141 ha
Roads, Footpaths and Parking

A breakdown of the high-level landuses and related development capacities for each development parcel illustrated by the indicative developable area diagram is provided at Appendix 1.

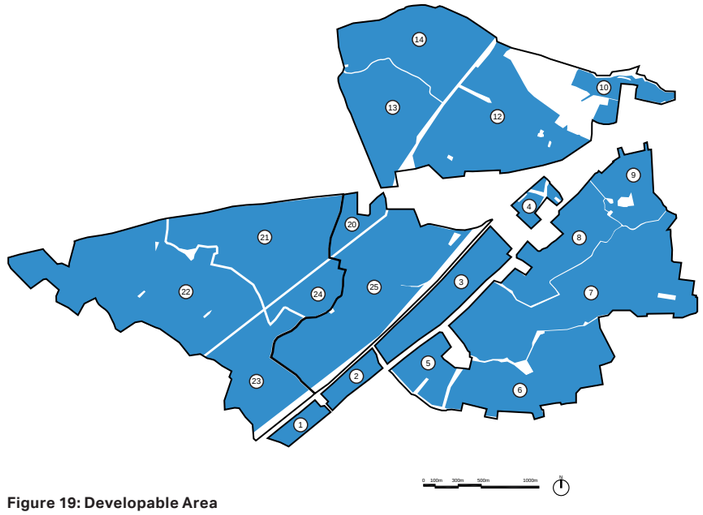


Figure 19: Developable Area

West of Colchester / Marks Tey Option 2: South of A120 and North of Marks Tey Existing Settlement Focus

Project List

The following table identifies the key project requirements to support Marks Tey Option 2 as it relates to Social Infrastructure, Utilities and Transport. These projects are based on a high level assessment of the infrastructure requirements for the development option and the growth (housing and employment) envisaged. It is assumption based only and related either to the transport strategy outlined above, the social infrastructure standards described at Appendix 2 and applied to the projected population, and utility infrastructure requirements informed where possible through preliminary discussions with the relevant service providers (e.g. UK Power Networks and Anglian Water). They are indicative only and are not based on a masterplanning exercise.

Infrastructure	Demand Arising from Development Option	Cost per Unit (£)	Total Cost (£)	Phasing	Justification
Education					
Primary Schools Form Entry	14.3 FE	£7,500	£128,865,000	Phasing of education infrastructure to occur within development period and post according to the housing growth triggers	Minimum requirement, assuming off-site mitigation and no account of existing surplus/deficit in existing surrounding facilities. Education costs and calculations based upon *The Essex County Council Developers' Guide to Infrastructure Contributions - Revised Edition 2016*
Secondary Schools Form Entry	13.4 FE				
Early Year Facilities	16.1				
Healthcare & Community					
General Practioners	18GPs	£2,250	£38,659,500	Phasing of healthcare infrastructure to occur within development period and post development, according to the housing growth triggers for each facility	Minimum requirement, assuming off-site mitigation and no account of existing surplus/deficit in existing surrounding facilities. All AECOM Social Infrastructure Modelling (SIF) standards as set out in Appendix 2.
Dentists	19Dentists				
Acute Hospital Beds	65beds				
Library Space	988sq.m				
4 Court Sports Centre	2.37				
4 Lane Swimming Pool	1.59				
Open Space					
Outdoor Sport	50.39ha	£2,750	£47,250,500	Phasing of open space infrastructure to occur within development period and post development, according to the housing growth triggers for each type	Minimum requirement based on standards as set out in Appendix 2.
Children's Play Space	11.53ha				
Semi Natural Open Space	65.87ha				
Parks and Gardens	43.48ha				
Amenity Green Space	29.09ha				
Allotments	7.48ha				
Country Park Landscaping	-	-	£10,000,000	Phasing of country park to occur within development period and post development, according to the housing growth trigger	
Utilities - Scheme-wide Enabling Works					
Energy		Scheme Wide Enabling Works Cost/unit: £16,250 Environment/ Sustainability/ Waste Cost/unit: £500	Scheme Wide Enabling Works Total Cost: £279,207,500 Environment/ Sustainability/ Waste Total Cost: £8,591,000		
80No. 11kV to 400v distribution substations	62MW			Phasing of energy infrastructure to occur within development and post development period, according to the housing growth triggers	Distribute end-user loads
18No. 11kV ring circuits from primary to connect up to distribution substations	-				
Potable Water					
New distribution network from existing reservoir	5,410 M3/day			Phasing of potable water infrastructure to occur within development and post development period, according to the housing growth triggers	New connections to existing storage reservoirs
Waste Water					
3 No.2,000m3/day pumping station	4,869 M3/day			Phasing of waste water infrastructure to occur within development and post development period, according to the housing growth triggers	Raw sewage to existing treatment plants
Plot connections for all properties - waste water	-				
Gas					
Plot connections for all properties	-			Phasing of gas infrastructure to occur within development and post development period, according to the housing growth triggers	Connecting to end users

Infrastructure	Demand Arising from Development Option	Cost per Unit (£)	Total Cost (£)	Phasing	Justification
Utilities - Off-Site Requirements					
Energy					
Primary Substation 132/11kV with 2 x 66 MVA Primary Sub Station	62MW	-	£17,000,000	2033/2034	Provide electrical power capacity for development
Potable Water					
5km trunk mains on primary routes and distribution mains to properties for water supply	4,869 M3/day	-	£4,000,000	Initial Phase	Distribution of potable water to end users
Waste Water					
Upgrades for water course discharges	7,828 M3/day	-	£1,500,000	Initial Phase	Environmental enhancement / EA regulations
10km connection to existing waste water treatment works - primary and secondary collection networks	7,828 M3/day	-	£8,000,000	Initial Phase	Sewage network connection and flow to small existing treatment plants, then establish new WRC towards end of the plan period with discharge to River Colne
Gas					
Upgrade to low pressure distribution network	-	-	£3,000,000	Initial Phase	Gas supply to end users
Telecommunications					
Development of access chambers for BT Telecoms network and development of access chambers for private telecoms network throughout development	-	-	£3,000,000	Initial Phase	ICT and data networks to end users
Transport - On-Site / Off-Site Requirements					
New segregated busway through site to connect with wider bus/BRT network (decreased length when compared to Option 1)			£3,250,000	Up to Plan Period	To ensure non-car mode transit is embedded from the outset and to connect with the sub-regional transport connectivity solutions.
Transport Hub (BRT/LRT) At Grade			£10,000,000	2031/2032	
New combined segregated pedestrian / cycle "Greenway" through site (decreased length when compared to Option 1)			£1,300,000	Initial Phase	To ensure non-car mode transit is embedded from the outset linking the local region
New pedestrian / cycle bridge crossing A12 and A120 at Marks-Tey interchange to connect with rail station - 1 Nº			£2,000,000	Initial Phase	
New all-modes "land bridge" across A12 and GEML			£10,000,000	Up to Plan Period	
Upgraded pedestrian & cycle networks			£3,000,000	Up to Plan Period	To facilitate vehicular connection to the site
Junction upgrades to at-grade Marks-Tey roundabout - 1 Nº			£5,000,000	Initial Phase	
New at-grade junctions / accesses formed off Prince of Wales Roundabout, North Lane, two at-grade junctions on current A120 alignment, one at-grade accessed formed with a potential A120 by-pass and at-grade roundabout with London Road and A12 Westbound on-slip - 6 Nº			£30,000,000	Initial Phase	
Travel plan measures (smarter choices, car clubs, charging points, etc) - Straight Line Cost Over Time			£14,604,700	Plan Period	To ensure non-car mode transit is embedded from the outset and ensure modal shift
Bus service subsidies & other public transport improvements - Straight Line Cost Over Time			£6,872,800	Plan Period	
Contribution to Strategic ("Sub-regional") Public Transport solution e.g. BRT		£1,500	£25,773,000		To ensure non-car mode transit is embedded from the outset and to connect with the sub-regional transport connectivity solutions.
			****Total Cost**	**£660,874,000**	(Total Cost at May 2016 Prices but excluding Professional Fees and Design Development and Construction Contingency)

Table 22: Key Infrastructure Requirements for West Colchester / Marks Tey Option 2

5.5 Option 3: South of A120 Focus

Key Drivers

The commentary provided against Option 2 is equally applicable to Option 3, but with the following additional points:

Overview

Option 3 is restricted to land south of the A120, which defines a strong northern boundary. To the south-west, south and east the boundary is consistent with Option 2. All land associated with this option has been submitted through the Call-for-Sites process and is being actively promoted by two developer consortiums, one with holdings to the south-east of the A12, and the other promoting the land between the A12 and the A120.

Landuse

- As with Options 1 and 2 the land area of this site is predominantly in productive agricultural use.
- Generally, and compared to land north of the A120, there are fewer detached residential/commercial properties located within the land area south of the A120 and south east of the A12, that would be affected by the new settlement.

Adjacencies

The commentary provided against Option 2 remains applicable to Option 3, with the following additional point:

- The option would limit impact on Little Tey and maintains the rural character of countryside north of the A120.

Connections

The commentary provided against Options 1 and 2 remain applicable to Option 3, with the following additional point:

- Under this option the existing Marks Tey rail station would be retained in its current location, but because the Garden Community would not extend north of the A120, the Station would continue spatially to have a similar (i.e. slightly detached) relationship to the wider Garden Community, as it does now with Marks Tey. Access to the station would remain focused only on the major junction interchange between the A120, A12 and B1408.

Transport Strategy

The solutions proposed for Option 2 are entirely pertinent to this scenario, however, given the spatial context of the proposed site, access from North lane is unlikely to be required in this scenario. Any by-pass developed to the west of Marks Tey may also need to consider junction requirement to serve the development.

Based on assumptions set out in Section 2.2, Table 23 and Table 24 outline an estimate of the Am Peak hour trips generated by the residential and employment uses within the context of theoretical maximum carrying capacity of various public transport modes.

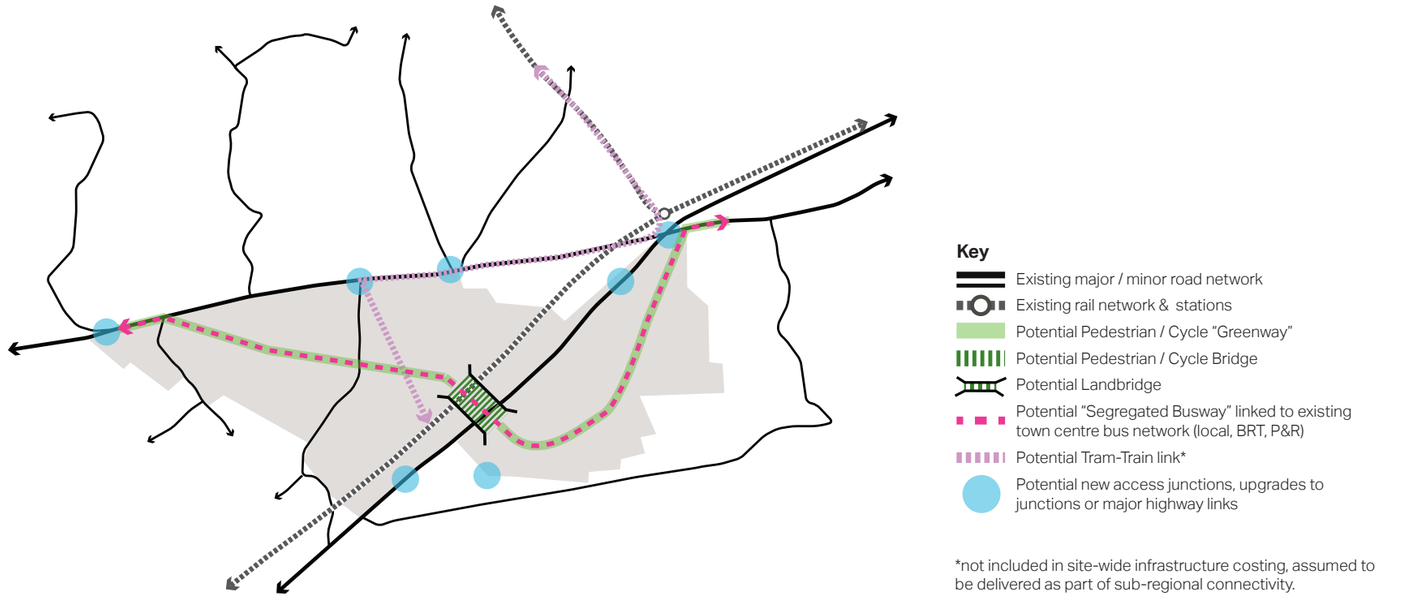
Table 23: Estimate AM peak hour trips generated by the proposed residential and employment uses

Mode	Estimated AM Peak Hour Person Trip Generation (Two-Way)
Active modes (walking / cycling)	5,960
Private Car	4,470
Total Public Transport Trips	4,470

Table 24: Theoretical maximum carrying capacity of public transport modes

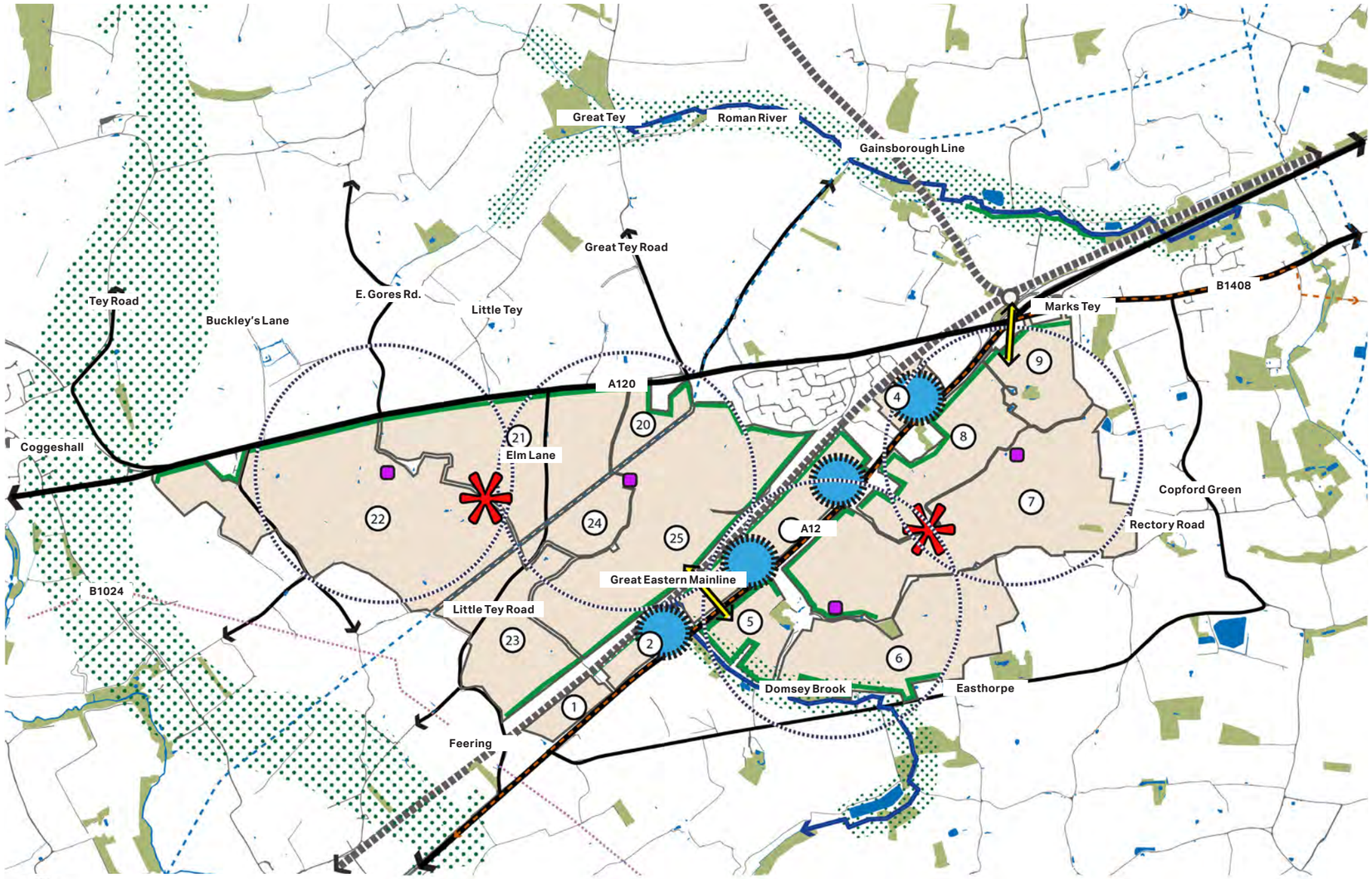
Public Transport Mode	No. Routes Assumed	Two-Way Frequency/ hr	Theoretical Capacity/ Hr	Estimated Maximum Theoretical Peak Hr Carrying Capacity
Inter-Urban Bus (BRT)	2	12	200	2,400
Local Bus	1	8	45	360
Tram-Train	1	12	240	2,880
Total				**5,640**

Figure 20: Indicative Transport Strategy Diagram



*not included in site-wide infrastructure costing, assumed to be delivered as part of sub-regional connectivity.

Indicative Spatial Representation Diagram & Development Capacities



KEY

- Environmental Assets (to be Protected/Integrated)
- Water bodies
- Roads
- Railway
- Railway Station
- Watercourse Corridor
- Medium Pressure Gas Pipe
- Pipeline Section
- 33,000 V Tower Line
- Developable Land
- Potential Green Buffer
- Potential Connector / Stitch
- Potential Employment Concentration
- Potential Neighbourhood Centre Development
- Potential Local Centres
- 800m Walking Distance

756 ha
Total Site Area

30 dph
13,105 homes

717 ha
Total Developable Area

437 ha
Residential Developable Area

7 ha
Mixed-Use

156 ha
Open Space

9 ha
Employment Land

107 ha
Roads, Footpaths and Parking

A breakdown of the high-level landuses and related development capacities for each development parcel illustrated by the indicative developable area diagram is provided at Appendix 1.

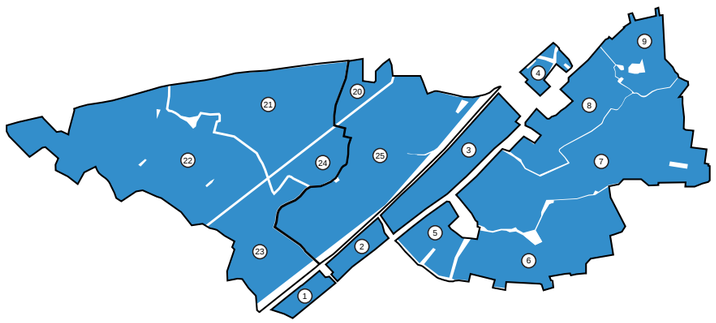


Figure 21: Developable Area Diagram

West of Colchester / Marks Tey Option 3: South of A120 Focus

Project List

The following table identifies the key project requirements to support Marks Tey Option 3 as it relates to Social Infrastructure, Utilities and Transport. These projects are based on a high level assessment of the infrastructure requirements for the development option and the growth (housing and employment) envisaged. It is assumption based only and related either to the transport strategy outlined above, the social infrastructure standards described at Appendix 2 and applied to the projected population, and utility infrastructure requirements informed where possible through preliminary discussions with the relevant service providers (e.g. UK Power Networks and Anglian Water). They are indicative only and are not based on a masterplanning exercise.

Infrastructure	Demand Arising from Development Option	Cost per Unit (£)	Total Cost (£)	Phasing	Justification
Education					
Primary Schools Form Entry	10.9 FE	£7,500	£98,287,500	Phasing of education infrastructure to occur within development period and post according to the housing growth triggers	Minimum requirement, assuming off-site mitigation and no account of existing surplus/deficit in existing surrounding facilities. Education costs and calculations based upon *The Essex County Council Developers' Guide to Infrastructure Contributions - Revised Edition 2016*
Secondary Schools Form Entry	10.2 FE				
Early Year Facilities	12.3				
Healthcare & Community					
General Practioners	14GPs	£2,250	£29,486,250	Phasing of healthcare infrastructure to occur within development period and post development, according to the housing growth triggers for each facility	Minimum requirement, assuming off-site mitigation and no account of existing surplus/deficit in existing surrounding facilities. All AECOM Social Infrastructure Modelling (SIF) standards as set out in Appendix 2.
Dentists	14Dentists				
Acute Hospital Beds	49beds				
Library Space	754sq.m				
4 Court Sports Centre	1.81				
4 Lane Swimming Pool	1.22				
Open Space					
Outdoor Sport	38.44ha	£2,750	£36,038,750	Phasing of open space infrastructure to occur within development period and post development, according to the housing growth triggers for each type	Minimum requirement based on standards as set out in Appendix 2.
Children's Play Space	8.79ha				
Semi Natural Open Space	50.24ha				
Parks and Gardens	33.16ha				
Amenity Green Space	22.19ha				
Allotments	5.7ha				
Country Park Landscaping	-	-	£10,000,000	Phasing of country park to occur within development period and post development, according to the housing growth trigger	
Utilities - Scheme-wide Enabling Works					
Energy		Scheme Wide Enabling Works Cost/unit: £16,250 Environment/ Sustainability/ Waste Cost/unit: £500	Scheme Wide Enabling Works Total Cost: £212,956,250 Environment/ Sustainability/ Waste Total Cost: £6,552,500		
80No. 11kV to 400v distribution substations	48MW			Phasing of energy infrastructure to occur within development and post development period, according to the housing growth triggers	Distribute end-user loads
18No. 11kV ring circuits from primary to connect up to distribution substations	-				
Potable Water					
New distribution network from existing reservoir	4,153 m3/day			Phasing of potable water infrastructure to occur within development and post development period, according to the housing growth triggers	New connections to existing storage reservoirs
Waste Water					
3 No.2,000m3/day pumping station	3,738 M3/day			Phasing of waste water infrastructure to occur within development and post development period, according to the housing growth triggers	Raw sewage to existing treatment plants
Plot connections for all properties - waste water	-				
Gas					
Plot connections for all properties	-			Phasing of gas infrastructure to occur within development and post development period, according to the housing growth triggers	Connecting to end users

Infrastructure	Demand Arising from Development Option	Cost per Unit (£)	Total Cost (£)	Phasing	Justification
Utilities - Off-Site Requirements					
Energy					
Primary Substation 132/11kV with 2 x 66 MVA Primary Sub Station	48MW	-	£17,000,000	2033/2034	Provide electrical power capacity for development
Potable Water					
5km trunk mains on primary routes and distribution mains to properties for water supply	4,153 M3/day	-	£4,000,000	Initial Phase	Distribution of potable water to end users
Waste Water					
Upgrades for water course discharges	3,738 M3/day	-	£1,500,000	Initial Phase	Environmental enhancement / EA regulations
10km connection to existing waste water treatment works - primary and secondary collection networks	3,738 M3/day	-	£8,000,000	Initial Phase	Sewage network connection and flow to small existing treatment plants, then establish new WRC towards end of the plan period with discharge to River Colne
Gas					
Upgrade to low pressure distribution network	-	-	£3,000,000	Initial Phase	Gas supply to end users
Telecommunications					
Development of access chambers for BT Telecoms network and development of access chambers for private telecoms network throughout development	-	-	£3,000,000	Initial Phase	ICT and data networks to end users
Transport - On-Site / Off-Site Requirements					
New segregated busway through site to connect with wider bus/BRT network (decreased length when compared to Option 1)			£3,250,000	Up to Plan Period	To ensure non-car mode transit is embedded from the outset and to connect with the sub-regional transport connectivity solutions.
Transport Hub (BRT/LRT) At Grade			£10,000,000	2031/2032	
New combined segregated pedestrian / cycle "Greenway" through site (decreased length when compared to Option 1)			£1,300,000	Initial Phase	To ensure non-car mode transit is embedded from the outset linking the local region
New dedicated pedestrian / cycle bridge crossing A12 and A120 at Marks-Tey interchange to connect with rail station - 1 Nº			£2,000,000	Initial Phase	
New all-modes "land bridge" across A12 and GEML			£10,000,000	Up to Plan Period	
Upgraded pedestrian & cycle networks			£3,000,000	Up to Plan Period	To facilitate vehicular connection to the site
Junction upgrades to at-grade Marks-Tey roundabout - 1 Nº			£5,000,000	Initial Phase	
New at-grade junctions / accesses formed off Prince of Wales Roundabout, two at-grade junctions on current A120 alignment, one at-grade accessed formed with a potential A120 by-pass and at-grade roundabout with London Road and A12 Westbound on-slip - 5 Nº			£25,000,000	Initial Phase	
Travel plan measures (smarter choices, car clubs, charging points, etc) - Straight Line Cost Over Time			£11,139,250	Plan Period	To ensure non-car mode transit is embedded from the outset and ensure modal shift
Bus service subsidies & other public transport improvements - Straight Line Cost Over Time			£5,242,000	Plan Period	
Contribution to Strategic ("Sub-regional") Public Transport solution e.g. BRT		£1,500	£19,657,500		To ensure non-car mode transit is embedded from the outset and to connect with the sub-regional transport connectivity solutions.
****Total Cost**					**£525,410,000** (Total Cost at May 2016 Prices but excluding Professional Fees and Design Development and Construction Contingency)

Table 25: Key Infrastructure Requirements for West Colchester / Marks Tey Option 3

5.6 Option 4: Maximum Land Take

Key Drivers

The commentary provided against Option 1 is equally applicable to Option 4, but with the following additional points:

Overview

Option 4 seeks to maximise the potential development scale available within the West of Colchester/Marks Tey Broad Search Area, and in doing so also increases the proportion of the settlement located within Braintree District. The additional scale of this option has been achieved by including more land north of the A120, up to the Roman River and following its alignment west from Great Tey Road as far as the Tey Road. Consequently, it has a theoretical capacity to provide close to 28,000 new houses as part of a mixed community.

Landuse

- The additional land under this option is principally in productive agricultural use and undeveloped. Similar to the rural landscape further east included within Option 1, a number of detached residential/commercial properties are located within this.
- Topographic level change associated with the additional land under this option introduces a different landscape character in comparison to land further east.

Adjacencies

- Whilst placing a very large new settlement in closer proximity to the historic village of Coggeshall compared to the other Options, separation would be maintained by the A120, agricultural land, hedgerows and some topographic level changes.

Connectivity

- This option provides additional land adjacency to the A120 from which access could potentially be taken.
- The expansion north west under this option, together with the presence of the A120 potentially facilitates the development of a larger neighbourhood or town centre destination to be created more centrally or west of centre within the Garden Community. This could assist in shifting the settlement focus away from the intersection of the A12, A120 and B1408, which is a recognised pinch point in the strategic transport network.
- The scale of this option in comparison to options 1-3 is considered sufficient to necessitate and potentially justify the relocation of the existing Marks Tey rail way station approximately 2km south west of its current location. This reflects the known physical constraints of the existing sites and the likely need for a larger station commensurate with the population size to be expected from a new settlement of this size.
- A relocated and new rail station could become the focus of a key mixed use centre, transport interchange and area of higher density development.

Transport Strategy

The solutions proposed for Option 1 are pertinent to this larger development scenario with the addition of the following key infrastructure in order to accommodate the considerable increase in development and site coverage:

- The larger site offers the opportunity to increase the length of the Greenway and segregated bus route to widen the site coverage.
- Whilst many of the highway access options outlined in Option 1 remain pertinent, a new at-grade junction on the current A120 alignment would likely to be required. In addition, any by-pass developed to the west of Marks Tey may also need to consider junction requirement to serve the development.
- This scenario may require or benefit from the relocation of Marks Tey station on the GEML to a more central location to the site, both creating a major multimodal interchange between bus, tram, cycle and mainline rail services at the new station location, but also potentially facilitating a new Rail Link 'Arc' between Stansted Airport.
- The existing Marks Tey station could be re-purposed to either accommodate only the branch line operation and/or rail stabling for Tram-Trains

Based on assumptions set out in Table 26 and Table 27 outline an estimate of the Am Peak hour trips generated by the residential and employment uses within the context of theoretical maximum carrying capacity of various public transport modes.

Table 26: Estimate AM peak hour trips generated by the proposed residential and employment uses

Mode	Estimated AM Peak Hour Person Trip Generation (Two-Way)
Active modes (walking / cycling)	12,282
Private Car	9,212
Total Public Transport Trips	9,212

Table 27: Theoretical maximum carrying capacity of public transport modes

Public Transport Mode	No. Routes Assumed	Two-Way Frequency/ hr	Theoretical Capacity/ Hr	Estimated Maximum Theoretical Peak Hr Carrying Capacity
Inter-Urban Bus (BRT)	3	18	200	3,600
Local Bus	2	16	45	720
Tram-Train	1	12	240	2,880
Rail Link 'Arc'	1	6	300	1,800
Total				**9,000**

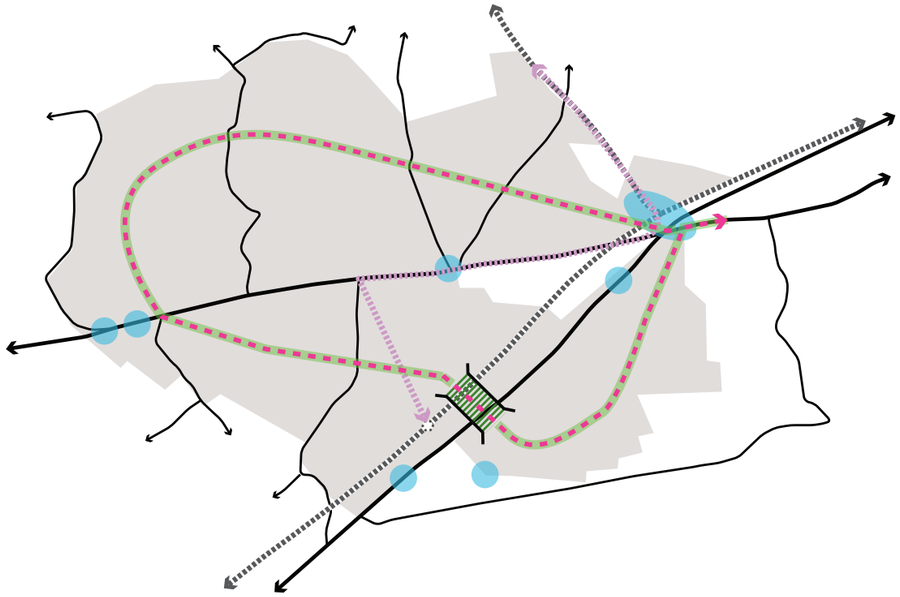
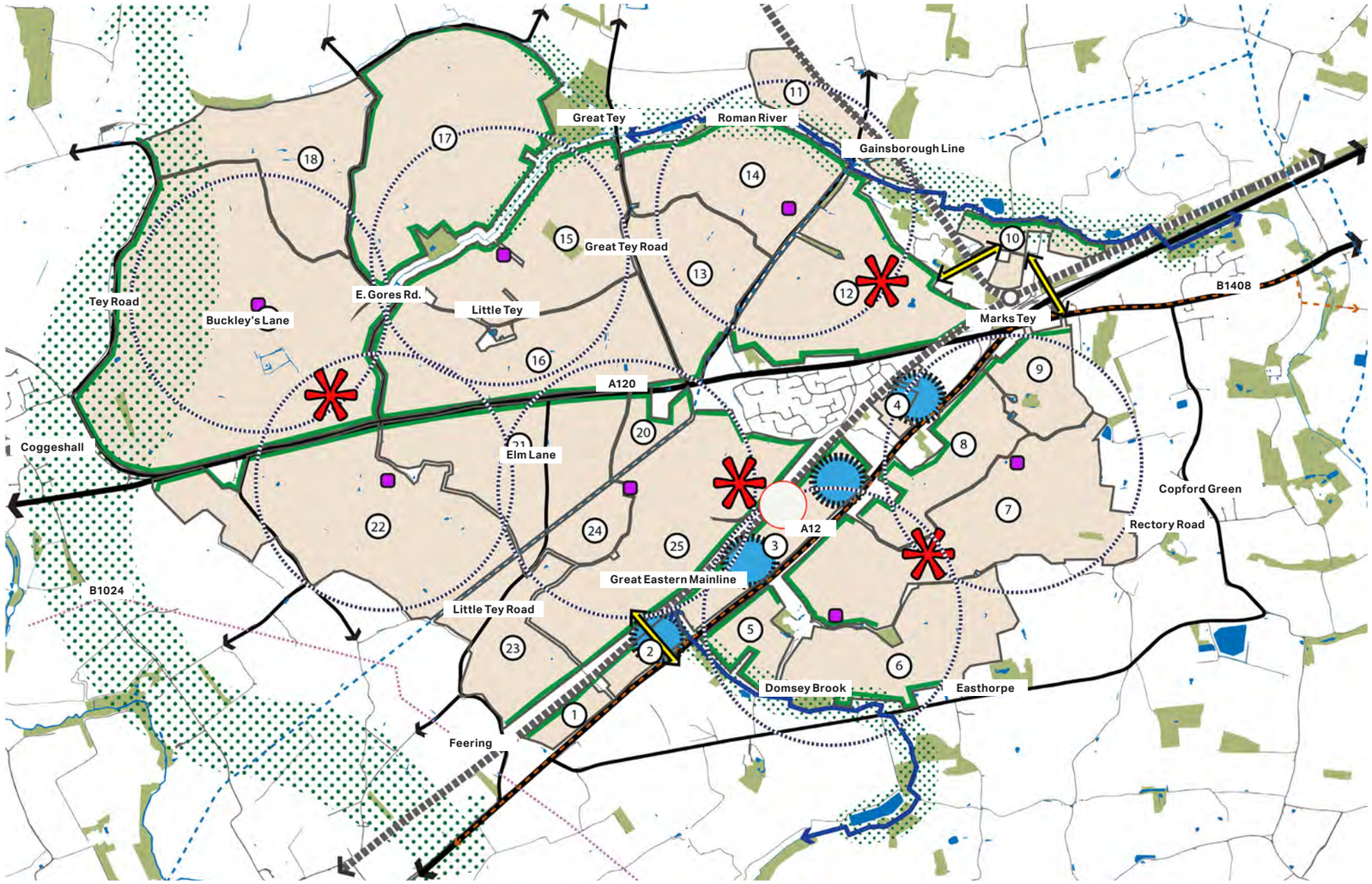


Figure 22: Indicative Transport Strategy Diagram

*not included in site-wide infrastructure costing, assumed to be delivered as part of sub-regional connectivity.

Indicative Spatial Representation Diagram & Development Capacities



KEY

- Environmental Assets (to be Protected/Integrated)
- Water bodies
- Roads
- Railway
- Railway Station
- Watercourse Corridor
- Medium Pressure Gas Pipe
- Pipeline Section
- 33,000 V Tower Line
- Developable Land
- Potential Green Buffer
- Potential Connector / Stitch
- Potential Employment Concentration
- Potential Neighbourhood Centre Development
- Potential Local Centres
- 800m Walking Distance
- Potential relocated station

1,703 ha
Total Site Area

30 dph
27,841 homes

1,579 ha
Total Developable Area

928 ha
Residential Developable Area

16 ha
Mixed-Use

387 ha
Open Space

15 ha
Employment Land

233 ha
Roads, Footpaths and Parking

A breakdown of the high-level landuses and related development capacities for each development parcel illustrated by the indicative developable area diagram is provided at Appendix 1.

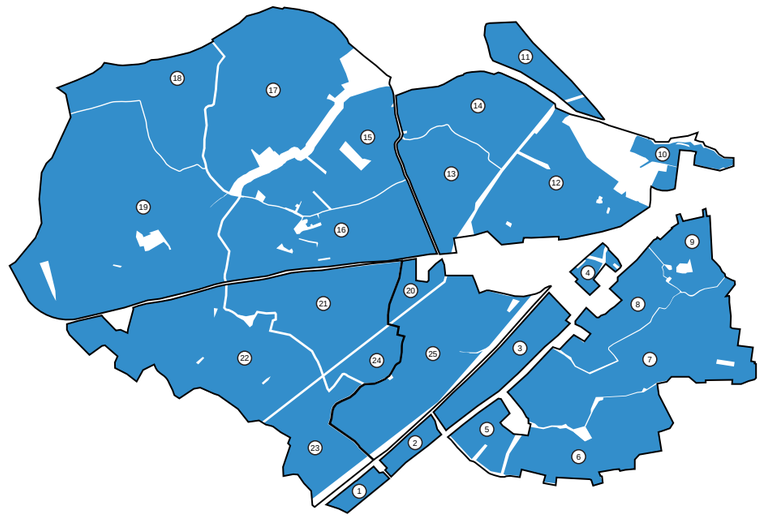


Figure 23: Developable Area Diagram

West of Colchester / Marks Tey Option 4: Maximum Land Take

Project List

The folllowing table identifies the key project requirements to support Marks Tey Option 4 as it relates to Social Infrastructure, Utilities and Transport. These projects are based on a high level assessment of the infrastructure requirements for the development option and the growth (housing and employment) envisaged. It is assumption based only and related either to the transport strategy outlined above, the social infrastructure standards described at Appendix 2 and applied to the projected population, and utility infrastructure requirements informed where possible through preliminary discussions with the relevant service providers (e.g. UK Power Networks and Anglian Water). They are indicative only and are not based on a masterplanning exercise.

Infrastructure	Demand Arising from Development Option	Cost per Unit (£)	Total Cost (£)	Phasing	Justification
Education					
Primary Schools Form Entry	23.2 FE	£7,500	£208,807,500	Phasing of education infrastructure to occur within development period and post according to the housing growth triggers	Minimum requirement, assuming off-site mitigation and no account of existing surplus/deficit in existing surrounding facilities. Education costs and calculations based upon *The Essex County Council Developers' Guide to Infrastructure Contributions - Revised Edition 2016*
Secondary Schools Form Entry	21.6 FE				
Early Year Facilities	26.1				
Healthcare & Community					
General Practioners	30GPs	£2,250	£62,642,250	Phasing of healthcare infrastructure to occur within development period and post development, according to the housing growth triggers for each facility	Minimum requirement, assuming off-site mitigation and no account of existing surplus/deficit in existing surrounding facilities. All AECOM Social Infrastructure Modelling (SIF) standards as set out in Appendix 2.
Dentists	30Dentists				
Acute Hospital Beds	105beds				
Library Space	1,601sq.m				
4 Court Sports Centre	3.84				
4 Lane Swimming Pool	2.58				
Open Space					
Outdoor Sport	81.65ha	£2,750	£76,562,750	Phasing of open space infrastructure to occur within development period and post development, according to the housing growth triggers for each type	Minimum requirement based on standards as set out in Appendix 2.
Children's Play Space	18.68ha				
Semi Natural Open Space	106.74ha				
Parks and Gardens	70.45ha				
Amenity Green Space	47.14ha				
Allotments	12.11ha				
Country Park Landscaping	-	-	£10,000,000	Phasing of country park to occur within development period and post development, according to the housing growth trigger	
Utilities - Scheme-wide Enabling Works					
Energy		Scheme Wide Enabling Works Cost/unit: £16,250 Environment/ Sustainability/ Waste Cost/unit: £500	Scheme Wide Enabling Works Total Cost: £452,416,250 Environment/ Sustainability/ Waste Total Cost: £13,920,500		
140No. 11kV to 400v distribution substations	98MW			Phasing of energy infrastructure to occur within development and post development period, according to the housing growth triggers	Distribute end-user loads
30No. 11kV ring circuits from primary to connect up to distribution substations	98MW				
Potable Water					
New distribution network from existing reservoir	8,698 M3/day			Phasing of potable water infrastructure to occur within development and post development period, according to the housing growth triggers	New connections to existing storage reservoirs
Waste Water					
5 No.2,000m3/day pumping station	7,828 M3/day			Phasing of waste water infrastructure to occur within development and post development period, according to the housing growth triggers	Raw sewage to existing treatment plants
Plot connections for all properties - waste water	7,828 M3/day				
Gas					
Plot connections for all properties	-			Phasing of gas infrastructure to occur within development and post development period, according to the housing growth triggers	Connecting to end users
Utilities - Off-Site Requirements					
Energy					
Primary Substation 132/11kV with 2 x 125 MVA Primary Sub Station	98MW	-	£21,000,000	2033/2034	Provide electrical power capacity for development

Infrastructure	Demand Arising from Development Option	Cost per Unit (£)	Total Cost (£)	Phasing	Justification
Potable Water					
5km trunk mains on primary routes and distribution mains to properties for water supply	8,698 M3/day	-	£4,000,000	Initial Phase	Distribution of potable water to end users
Waste Water					
Upgrades for water course discharges	7,828 M3/day	-	£2,000,000	Initial Phase	Environmental enhancement / EA regulations
10km connection to existing waste water treatment works - primary and secondary collection networks	7,828 M3/day	-	£8,000,000	Initial Phase	Sewage network connection and flow to treatment plants Sewage network connection and flow to small existing treatment plants, then establish new WRC towards end of the plan period with discharge to River Colne
Gas					
Upgrade to low pressure distribution network	-	-	£5,000,000	Initial Phase	Gas supply to end users
Telecommunications					
Development of access chambers for BT Telecoms network and development of access chambers for private telecoms network throughout development	-	-	£5,000,000	Initial Phase	ICT and data networks to end users
Transport - On-Site / Off-Site Requirements					
New segregated busway through site to connect with wider bus/BRT network (Increased length when compared to Option 1)			£6,000,000	Up to Plan Period	To ensure non-car mode transit is embedded from the outset and to connect with the sub-regional transport connectivity solutions.
Transport Hub (BRT/LRT) At Grade			£10,000,000	2031/2032	
Relocation of GEML station (new station located centrally within site)			£25,000,000	2031/2032	To ensure non-car mode transit is embedded from the outset linking the local region
New combined segregated pedestrian / cycle "Greenway" through site (Increased length when compared to Option 1)			£2,400,000	Initial Phase	
New dedicated pedestrian / cycle bridge crossing A12 and A120 at Marks-Tey interchange to connect with rail station - 1 Nº			£2,000,000	Initial Phase	
New all-modes "land bridge" across A12 and GEML			£10,000,000	Up to Plan Period	To facilitate vehicular connection to the site
Upgraded pedestrian & cycle networks			£3,000,000	Up to Plan Period	
Junction upgrades to at-grade Marks-Tey roundabout - 1 Nº			£5,000,000	Initial Phase	
New at-grade junctions / accesses formed off Prince of Wales Roundabout, North Lane, three at-grade junctions on current A120 alignment, one at-grade access formed with a potential A120 by-pass, at-grade roundabout with London Road and A12 Westbound on-slip - 7 Nº			£35,000,000	Initial Phase	To facilitate vehicular connection to the site
New grade-separated junction from on new A120 alignment - 1 Nº			£25,000,000	Initial Phase	
Travel plan measures (smarter choices, car clubs, charging points, etc) - Straight Line Cost Over Time			£23,664,850		To ensure non-car mode transit is embedded from the outset and ensure modal shift
Bus service subsidies & other public transport improvements - Straight Line Cost Over Time			£11,136,400	Plan Period	
Contribution to Strategic ("Sub-regional") Public Transport solution e.g. BRT		£1,500	£41,761,500		To ensure non-car mode transit is embedded from the outset and to connect with the sub-regional transport connectivity solutions.

****Total Cost** **£1,069,312,000** (Total Cost at May 2016 Prices but excluding Professional Fees and Design Development and Construction Contingency)

Table 28: Key Infrastructure Requirements for West Colchester / Marks Tey Option 4

This Section provides concept options and associated infrastructure requirement for the West of Braintree Broad Search Area.

06 West of Braintree

6.1 Broad Search Area
6.2 Options Overview
6.3 Option 1: Land in Braintree DC
6.4 Option 2: Land in Braintree DC and Uttlesford DC

6.1 Broad Search Area

Strategic Overview

The west of Braintree Broad Search Area is located adjacent to the A120 dual trunk road within the A120 Corridor; approximately 5km west of the centre of Braintree and 10km east of Stansted Airport and the M11 corridor, Stansted Airport can be accessed directly to the west along the A120. The search area is broadly defined by the village of Rayne and Pods Brook to the east, the village of Great Saling to the north, the villages of Stebbing and Stebbing Green to the west and to the south a combination of the B1256, A120, Fitchway and the village of Rayne. Principal access into the search area is provided by the A120 via the B1256, with the A120 providing connectivity east to Colchester and beyond to the international sea ports of Harwich and Felixstowe.

The vast majority of the land is in productive agricultural use with a small number of detached residential/commercial properties, often associated with farming, located within the rural landscape. These are connected by a limited network of country lanes that pass through the search area centrally and to its periphery, connecting to settlements beyond. The landscape is typically flat and open in character with medium to large fields divided by hedgerows and some areas of woodland copse, the most notable being Boxted Wood in the south east of the search area, which together with Pods Brook and Pods Lane, are the areas of highest ecological value.

Andrews airfield is located in the north west corner of the search area. This is an operational private airstrip for small light aircraft, but originally was part of a much larger airfield operation during World War II.

The majority of the land within this search area is located within Braintree District, with land in the west of falling within Uttlesford District.

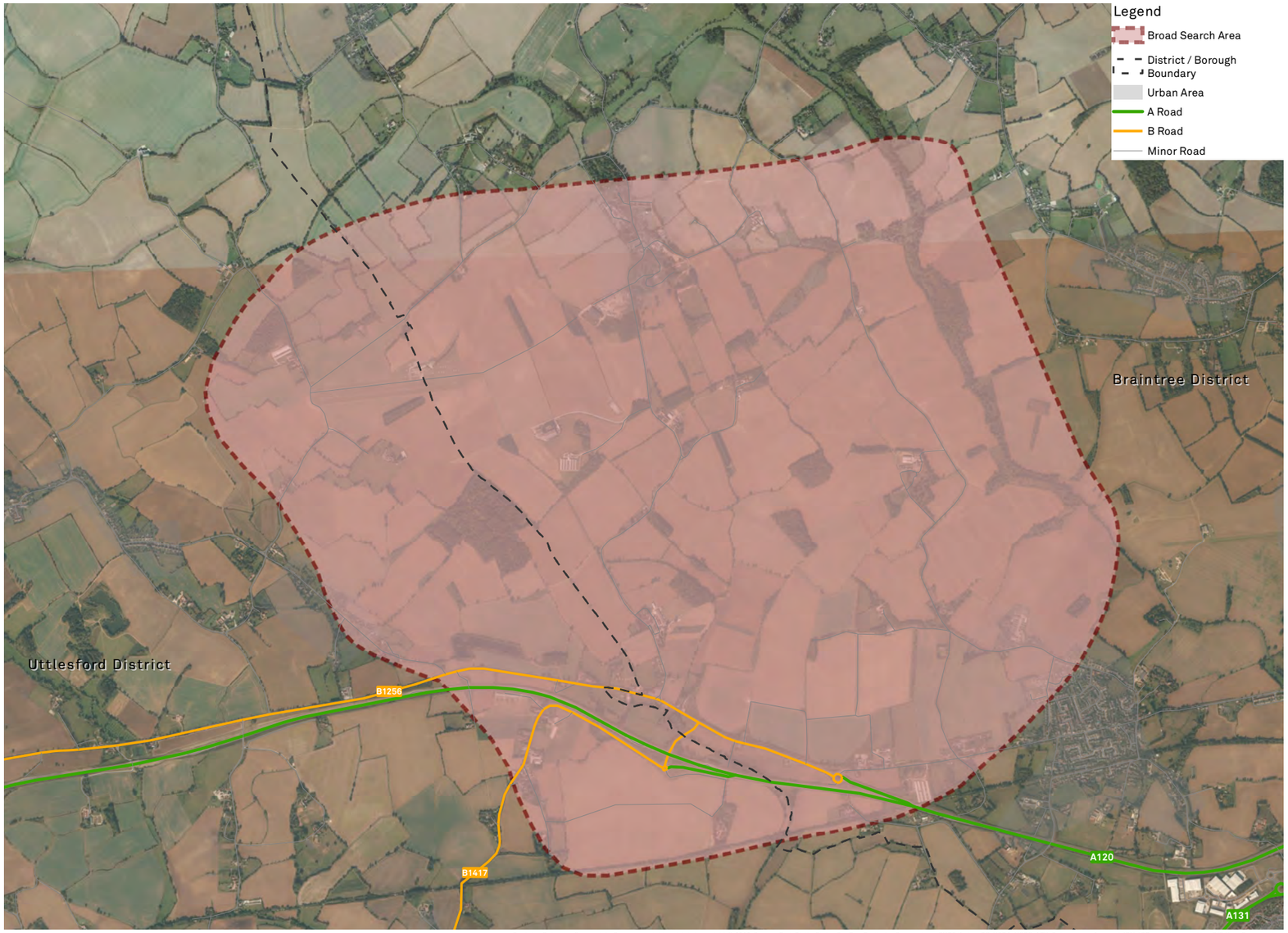


Figure 24: Broad Search Area Diagram

6.2 Options Overview

Option 1: Land in Braintree DC

- Total Site Area: **774ha**
- Approximate Total Developable Area: **660ha**

Option 2: Land in Braintree DC and Uttlesford DC

- Total Site Area: **996ha**
- Approximate Total Developable Area: **838ha**

6.3 Option 1: Land in Braintree DC

Key Drivers

Overview
Option 1 retains all land that would be developed for the Garden Community within Braintree District, principally following the administrative boundary line between neighbouring districts of Braintree and Uttlesford and related field boundaries as the western boundary of the settlement. This option is further defined to the north by field boundaries, to the east by Pods Brook and Pods Lane and to the south by the B1256. All land in this option was included in the Local Plan Call-For-Sites process, and is within four ownerships with coordinated single promotion.

Landuse
- The majority of the land is in productive agricultural use and undeveloped.
- 90ha of land in the southern part of the site with frontage to the B1256 has been designated within the Essex Minerals Local Plan – July 2014 as mineral extraction quarry, with estimated duration of 14 years, with restoration to a range of habitats. As part of the Garden Community development this could function as a country park.
- Pods Brook and Pods Lane provide areas of greatest ecological value, and could be expanded within the Garden Community to form key assets of a green infrastructure strategy and network.

Adjacencies
- This option maintains separation from the village of Rayne, which would be further strengthened by any future mineral site restoration scheme that created a country park/natural habitats in the south of the site.
- Separation is provided to the village of Great Saling, which would likely be strengthened through the incorporation of green edge/lower density towards the very north of the site. This will be especially important as the potential boundary of the Garden Community sits adjacent to the Grade II listed Park and Garden of Saling Grove; the setting, character and appearance of which will need to be preserved. The wider village of Great Saling is also designated a Conservation Area, with important groupings of listed buildings.
- A reasonable area of agricultural land is retained between the settlement edge and the villages of Stebbing Green and Stebbing.
- This option is considered to be located a sufficient distance from the centre of Braintree and Braintree Freeport to develop as a potential complimentary new urban settlement.

Connectivity
- All site access and egress would most likely be achieved by opening up all movements junction on A120 to enable access from the B1256.
- During operation of the mineral extraction quarry primary access to the Garden Community would likely be via junction improvements and the creation of a new access road in the vicinity of Blake End.
- Being located in the western end of the A120 Corridor, with direct access to the A120, this option has the potential to benefit from economic activity and ambition of the London-Stansted-Cambridge Growth Corridor.
- The A120 provides road vehicle access to a number of local employment destinations as well as the international gateways of Stansted Airport and the international sea ports of Harwich and Felixstowe.
- Potential to connect to the existing Flitch Way; a former railway line that passing through 15 miles of rural Essex between Bishop's Stortford and Braintree providing a flat, relatively straight route separated from vehicular traffic for walking, cycling and horse-riding.

Transport Strategy

A combined pedestrian-cycle 'Greenway' could be developed running through the site, located alongside a segregated busway ensuring connectivity across the development. The Greenway would continue south externally to the site, over the B1256 Dunmow Road and the A120, utilising an upgraded form of the existing western bridge connection, linking Flitch Way and ultimately towards Skyline 120 (employment), Great Notley CountryPark and existing residential development. Flitch Way would likely need to be upgraded to form a key route to Braintree Town centre and the rail station, through improved lighting and route delineation. Further west a new pedestrian/cycle bridge over the B1256 Dunmow Road, would provide a connection to a new cycle/pedestrian route alongside the B1417, over the grade separated A120 junction and alongside the westbound A120 lane, connecting with the existing footway bridge to the east. Pods Lane – a Protected Lane would likely be integrated and preserved within the site, offering a potential leisure trail between development and Flitch Way.

A public transport spine located alongside the site-wide Greenway would provide internal public transport connectivity to the site, this could take the form of central bus lanes segregated from vehicular traffic along a well-planned tree lined street, rather than an inflexible and over engineered option.

The bus route could connect externally to the site via segregated on/off slips to and from the A120 at two junction locations, allowing the ability for buses to join free flow traffic on the A120 without negotiating traffic at the junctions. The route would provide a flexible solution to bus based site-wide connectivity, allowing multiple bus routes, both inter-urban and local to utilise the infrastructure, including BRT. Two categories of stops could be used on this route: transport hub stop located at high density development close to the A120 with smaller scale bus stops located at lower density development throughout the site.

Major highway works would include upgrades to existing junctions and a number of new junctions to facilitate the level of development and in lieu of major highway network of note to the north, as illustrated in Figure 25.

Based on assumptions set out in Section 2.2, Table 29 and Table 30 outline an estimate of the Am Peak hour trips generated by the residential and employment uses within the context of theoretical maximum carrying capacity of various public transport modes.

Table 29: Estimate AM peak hour trips generated by the proposed residential and employment uses

Mode	Estimated AM Peak Hour Person Trip Generation (Two-Way)
Active modes (walking / cycling)	4,648
Private Car	3,486
Total Public Transport Trips	3,486

Table 30: Theoretical maximum carrying capacity of public transport modes

Public Transport Mode	No. Routes Assumed	Two-Way Frequency/ hr	Theoretical Capacity/ Hr	Estimated Maximum Theoretical Peak Hr Carrying Capacity
Inter-Urban Bus (BRT)	2	12	200	2,400
Local Bus	1	8	45	360
Rail Link 'Arc'	1	6	300	1,800
Total				**4,560**

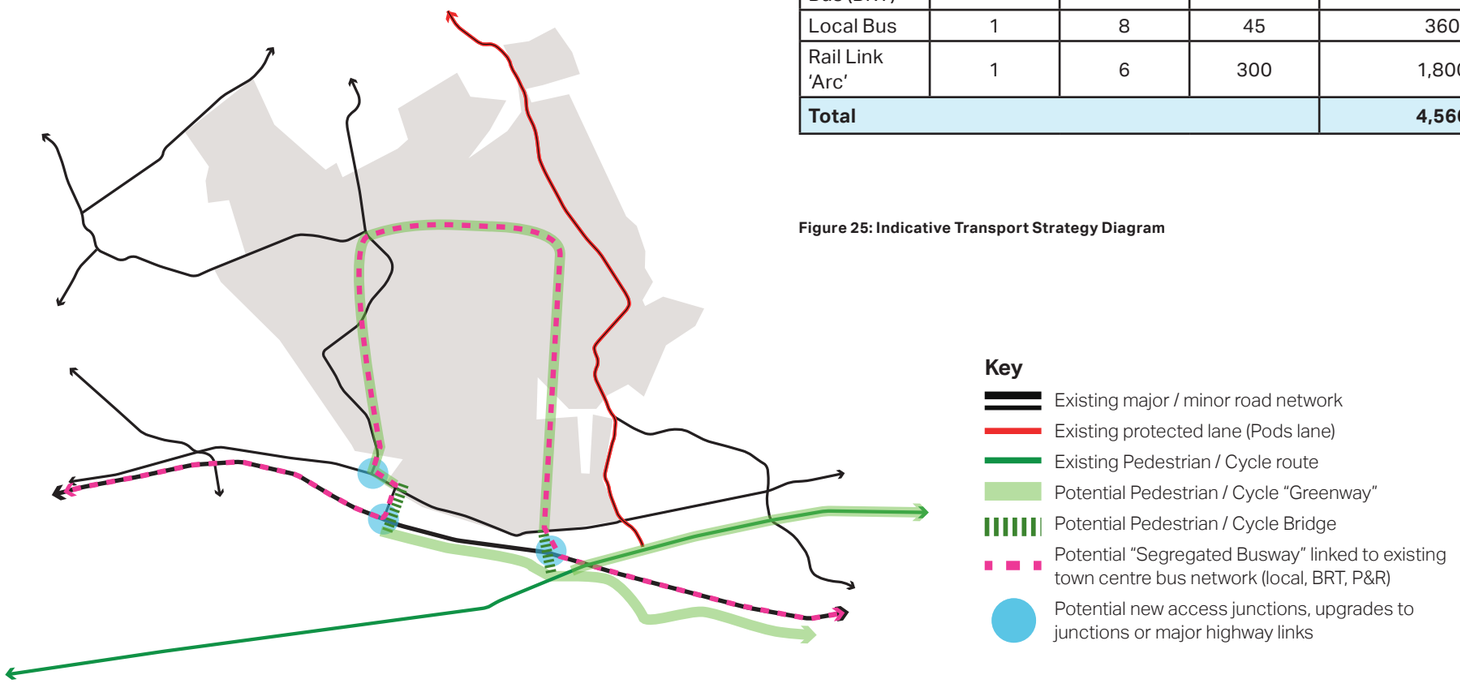


Figure 25: Indicative Transport Strategy Diagram

Indicative Spatial Representation Diagram & Development Capacities

KEY

- Environmental Assets (to Protected/Integrated)
- Water bodies
- Roads
- Exisiting Cycle/ Pedestrain route
- Medium Pressure Gas Pipe
- Developable Land
- Potential Green Buffer
- Key Severance to Mitigate/stitch
- Potential Employment Concentration
- Potential Neighbourhood Centre Development
- Potential Local Centres
- 800m Walking Distance
- Zoned for Mineral Extraction
- Post Mineral Working (Site Restoration: habitat Creation/ Country Park)

774 ha
Total Site Area

30 dph
9,665 homes

660 ha
Total Developable Area

322 ha
Residential Developable Area

12 ha
Mixed-Use

232 ha
Open Space

10 ha
Employment Land

83 ha
Roads, Footpaths and Parking

A breakdown of the high-level landuses and related development capacities for each development parcel illustrated by the indicative developable area diagram is provided at Appendix 1.

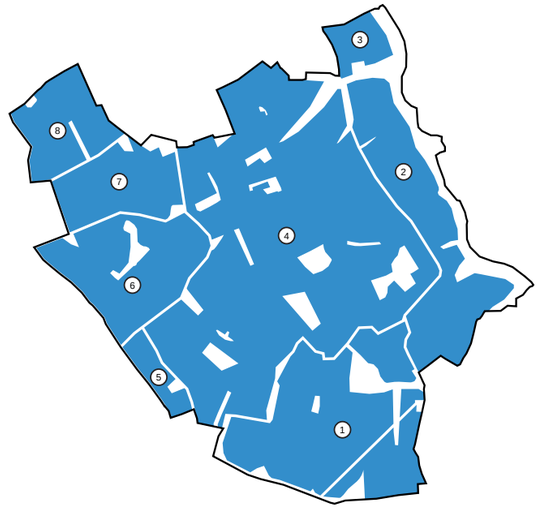


Figure 26: Developable Area Diagram

West of Braintree Option 1: Land in Braintree DC

Project List

The following table identifies the key project requirements to support Braintree Option 1 as it relates to Social Infrastructure, Utilities and Transport. These projects are based on a high level assessment of the infrastructure requirements for the development option and the growth (housing and employment) envisaged. It is assumption based only and related either to the transport strategy outlined above, the social infrastructure standards described at Appendix 2 and applied to the projected population, and utility infrastructure requirements informed where possible through preliminary discussions with the relevant service providers (e.g. UK Power Networks and Anglian Water). They are indicative only and are not based on a masterplanning exercise.

Infrastructure	Demand Arising from Development Option	Cost per Unit (£)	Total Cost (£)	Phasing	Justification
Education					
Primary Schools Form Entry	8 FE	£7,500	£72,487,500	Phasing of education infrastructure to occur within development period and post according to the housing growth triggers	Minimum requirement, assuming off-site mitigation and no account of existing surplus/deficit in existing surrounding facilities. Education costs and calculations based upon *The Essex County Council Developers' Guide to Infrastructure Contributions - Revised Edition 2016*
Secondary Schools Form Entry	7.5 FE				
Early Year Facilities	9.1				
Healthcare & Community					
General Practioners	10GPs	£2,250	£21,746,250	Phasing of healthcare infrastructure to occur within development period and post development, according to the housing growth triggers for each facility	Minimum requirement, assuming off-site mitigation and no account of existing surplus/deficit in existing surrounding facilities. All AECOM Social Infrastructure Modelling (SIF) standards as set out in Appendix 2.
Dentists	11Dentists				
Acute Hospital Beds	36beds				
Library Space	556sq.m				
4 Court Sports Centre	1.33				
4 Lane Swimming Pool	0.9				
Open Space					
Outdoor Sport	28.35ha	£2,750	£26,578,750	Phasing of open space infrastructure to occur within development period and post development, according to the housing growth triggers for each type	Minimum requirement based on standards as set out in Appendix 2.
Children's Play Space	6.48ha				
Semi Natural Open Space	37.05ha				
Parks and Gardens	24.46ha				
Amenity Green Space	16.37ha				
Allotments	4.24ha				
Country Park Landscaping	-	-	£10,000,000	Phasing of country park to occur within development period and post development, according to the housing growth trigger	
Utilities - Scheme-wide Enabling Works					
Energy		Scheme Wide Enabling Works Cost/unit: £16,250 Environment/ Sustainability/ Waste Cost/unit: £500	Scheme Wide Enabling Works Total Cost: £157,056,250 Environment/ Sustainability/ Waste Total Cost: £4,832,500		
36No. 11kV to 400v distribution substations	51MW			Phasing of energy infrastructure to occur within development and post development period, according to the housing growth triggers	Distribute end-user loads
9No. 11kV ring circuits from primary to connect up to distribution substations	-				
Portable Water					
New connection network from existing reservoirs	3,243 M3/day			Phasing of potable water infrastructure to occur within development and post development period, according to the housing growth triggers	New connection to existing storage reservoirs
Waste Water					
Existing plant upgrades to treat additional capacity	2,919 M3/day			Phasing of waste water infrastructure to occur within development and post development period, according to the housing growth triggers	Raw sewage to existing treatment plants
Plot connections for all properties - waste water	-				
Gas					
Plot connections for all properties	-			Phasing of gas infrastructure to occur within development and post development period, according to the housing growth triggers	Connecting to end users

Infrastructure	Demand Arising from Development Option	Cost per Unit (£)	Total Cost (£)	Phasing	Justification
Utilities - Off-Site Requirements					
Energy					
Primary Substation 132/11kV with 2 x 30 MVA Primary Sub Station	51MW	-	£9,000,000	2033/2034	Provide electrical power capacity for development
Potable Water					
5km trunk mains on primary routes and distribution mains to properties for water supply	3,243 M3/day	-	£4,000,000	Initial Phase	Distribution of potable water to end users
Waste Water					
Upgrades for water course discharges	2,919 M3/day	-	£1,000,000	Initial Phase	Environmental enhancement / EA regulations
6km connection to existing waste water treatment works - primary and secondary collection networks	2,919 M3/day	-	£4,000,000	Initial Phase	Braintree WRC is at capacity and can't take flows. Bocking WRC can accept flows in early phases but this is approximately 6km away and so a significant pumping distance. May be preferable to provided new WRC in early phases but this would have to be developer funded (this has not been costed within this piece of work).
Gas					
Upgrade to low pressure distribution network	-	-	£2,000,000	Initial Phase	Gas supply to end users
Telecommunications					
Development of access chambers for BT Telecoms network and development of access chambers for private telecoms network throughout development	-	-	£2,000,000	Initial Phase	ICT and data networks to end users
Transport - On-Site / Off-Site Requirements					
New segregated busway through site to connect with wider bus/BRT network			£3,000,000	Initial Phase	To ensure non-car mode transit is embedded from the outset and ensure modal shift
Transport Hub (BRT) At Grade			£10,000,000	Up to Plan Period	To ensure non-car mode transit is embedded from the outset and to connect with the sub-regional transport connectivity solutions.
New combined segregated pedestrian / cycle "Greenway" through site			£1,900,000	Initial Phase	To ensure non-car mode transit is embedded from the outset linking the local region
Upgrade to existing pedestrian bridge over A120 to provide pedestrian / cycle connection between site and Flitch Way - 1 Nº			£2,000,000	Initial Phase	
New pedestrian / cycle bridge over A120 providing a connection between the site and Flitch Way, including new route south of A120- 1 Nº			£6,200,000	Initial Phase	
Upgraded pedestrian & cycle networks (e.g to Flitch Way to provide continuous pedestrian/ cycle corridor between Braintree town centre, Skyline 120 and the site. Upgrades to include, Improved lighting, route delineation, new section of route to connect with Skyline 120			£3,000,000	Up to Plan Period	To ensure non-car mode transit is embedded from the outset and to connect with the sub-regional transport connectivity solutions.
New at-grade junction formed on B1256 whilst mineral extraction site is operational - 1 Nº			£5,000,000	Initial Phase	To ensure non-car mode transit is embedded from the outset linking the local region
Junction upgrades to A120 (new slip roads / grade separation) - 2 Nº			£50,000,000	Initial Phase	
Travel plan measures (smarter choices, car clubs, charging points, etc) - Straight Line Cost Over Time			£8,215,250	Plan Period	To facilitate vehicular connection to the site
Bus service subsidies & other public transport improvements - Straight Line Cost Over Time			£3,866,000	Plan Period	
Contribution to Strategic ("Sub-regional") Public Transport solution e.g. BRT		£1,500	£14,497,500	Plan Period	To ensure non-car mode transit is embedded from the outset and to connect with the sub-regional transport connectivity solutions.
			**Total Cost	**£422,380,000** (Total Cost at May 2016 Prices but excluding Professional Fees and Design Development and Construction Contingency)	

Table 31: Key Infrastructure Requirements for West of Braintree Option 1

6.4 Option 2: Land in Braintree DC and Uttlesford DC

Key Drivers

Overview

Option 2 seeks to expand the Garden Community into the neighbouring Uttlesford District. Landownership remains consistent with Option 1 and the vast majority of the additional land in this option was included in the Local Plan Call-For-Sites process. Under this option an additional 3000 new homes could be developed as part of the Garden Community, potentially increasing the overall housing number close to 13,000 units.

This option extends the new settlement west as far as Stebbing Green, and would incorporate Boxted Wood and Andrew's Airfield in the north east. The eastern boundary would follow a series of field boundaries, maintaining over 1km of separation to the village of Stebbing.

Landuse

- Consistent with Option 1 the majority of additional land under this option is in productive agricultural use, with the notable exception of Andrew's Airfield and Boxted Wood. It is anticipated that the former would not be retained as part of the Garden Community.
- Land frontage to the River Ter (a small water course) and its related ponds is provided in the south.

Adjacencies

- Option 2 would locate the edge of the Garden Community close to Stebbing Green, requiring a judgement as to the extent and desirability of integration of or separation from this settlement. In other respects the commentary provided against Option 1 is applicable.

Connectivity

- This option provides additional land frontage to the B1256 and parallel A120, which may provide greater site access and egress opportunities and flexibility within the overall transport network of the Garden Community. This could be a particular advantage during the operation of the planned mineral extraction quarry further to the east along the B1256 (Broadfield Farm). In other respects the commentary provided against Option 1 is applicable.

Transport Strategy

The solutions proposed for Option 1 are pertinent to this larger development scenario with the addition of upgrades to the existing vehicular bridge over the A120 to the west of the site to provide an additional north-south pedestrian / cycle connection with Flitch Way. The larger site offers the opportunity to increase the length of the Greenway and segregated bus route to widen the site coverage. The boundary and level of development implies the provision of a new grade separated junction with the B1256 and the A120 south west of the site and an at-grade junction on the B1256 Dunmow Road across the mineral extraction site in time.

Based on assumptions set out in Section 2.2, Table 32 and Table 33 outline an estimate of the Am Peak hour trips generated by the residential and employment uses within the context of theoretical maximum carrying capacity of various public transport modes.

Table 32: Estimate AM peak hour trips generated by the proposed residential and employment uses

Mode	Estimated AM Peak Hour Person Trip Generation (Two-Way)
Active modes (walking / cycling)	6,177
Private Car	4,633
Total Public Transport Trips	4,633

Table 33: Theoretical maximum carrying capacity of public transport modes

Public Transport Mode	No. Routes Assumed	Two-Way Frequency/ hr	Theoretical Capacity/ Hr	Estimated Maximum Theoretical Peak Hr Carrying Capacity
Inter-Urban Bus (BRT)	2	12	200	2,400
Local Bus	1	8	45	360
Rail Link 'Arc'	1	6	300	1,800
Total				**4,960**

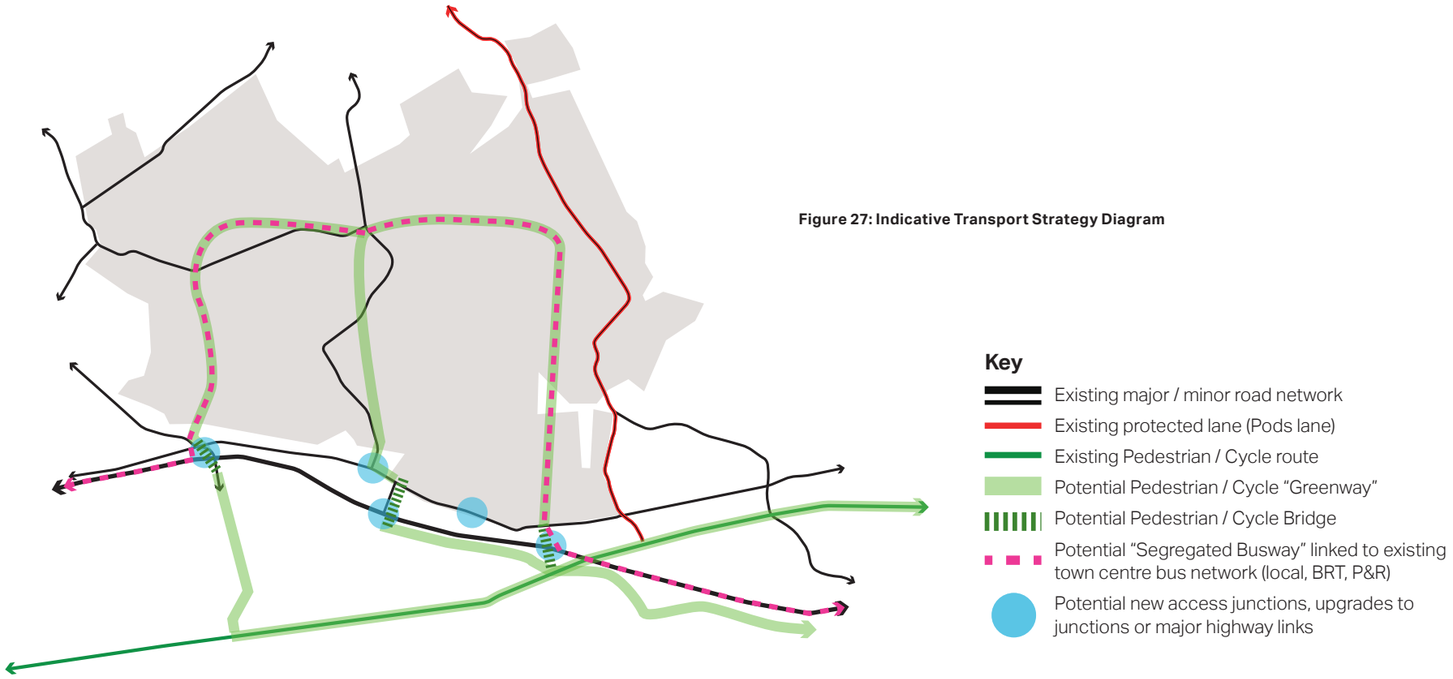


Figure 27: Indicative Transport Strategy Diagram

Indicative Spatial Representation Diagram & Development Capacities

KEY

- Environmental Assets (to Protected/Integrated)
- Water bodies
- Roads
- Exisiting Cycle/ Pedestrain route
- Medium Pressure Gas Pipe
- Developable Land
- Potential Green Buffer
- Key Severance to Mitigate/stitch
- Potential Employment Concentration
- Potential Neighbourhood Centre Development
- Potential Local Centres
- 800m Walking Distance
- Zoned for Mineral Extraction
- Post Mineral Working (Site Restoration: habitat Creation/ Country Park)

996 ha
Total Site Area

30 dph
12,949 homes

838 ha
Total Developable Area

432 ha
Residential Developable Area

16 ha
Mixed-Use

268 ha
Open Space

13 ha
Employment Land

109 ha
Roads, Footpaths and Parking

A breakdown of the high-level landuses and related development capacities for each development parcel illustrated by the indicative developable area diagram is provided at Appendix 1.

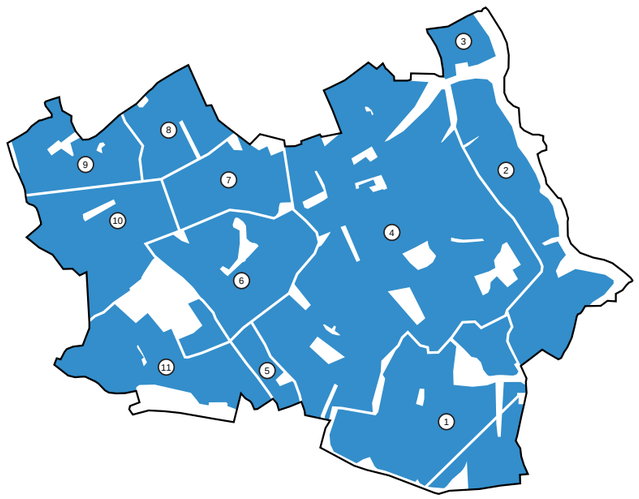


Figure 28: Developable Area Diagram

West of Braintree Option 2: Land in Braintree DC and Uttlesford DC

Project List

The following table identifies the key project requirements to support Braintree Option 1 as it relates to Social Infrastructure, Utilities and Transport. These projects are based on a high level assessment of the infrastructure requirements for the development option and the growth (housing and employment) envisaged. It is assumption based only and related either to the transport strategy outlined above, the social infrastructure standards described at Appendix 2 and applied to the projected population, and utility infrastructure requirements informed where possible through preliminary discussions with the relevant service providers (e.g. UK Power Networks and Anglian Water). They are indicative only and are not based on a masterplanning exercise..

Infrastructure	Demand Arising from Development Option	Cost per Unit (£)	Total Cost (£)	Phasing	Justification
Education					
Primary Schools Form Entry	10.8 FE	£7,500	£97,117,500	Phasing of education infrastructure to occur within development period and post according to the housing growth triggers	Minimum requirement, assuming off-site mitigation and no account of existing surplus/deficit in existing surrounding facilities. Education costs and calculations based upon *The Essex County Council Developers' Guide to Infrastructure Contributions - Revised Edition 2016*
Secondary Schools Form Entry	10.1 FE				
Early Year Facilities	12.1				
Healthcare & Community					
General Practioners	14GPs	£2,250	£29,135,250	Phasing of healthcare infrastructure to occur within development period and post development, according to the housing growth triggers for each facility	Minimum requirement, assuming off-site mitigation and no account of existing surplus/deficit in existing surrounding facilities. All AECOM Social Infrastructure Modelling (SIF) standards as set out in Appendix 2.
Dentists	14Dentists				
Acute Hospital Beds	49beds				
Library Space	745sq.m				
4 Court Sports Centre	1.79				
4 Lane Swimming Pool	0.9				
Open Space					
Outdoor Sport	37.98ha	£2,750	£35,609,750	Phasing of open space infrastructure to occur within development period and post development, according to the housing growth triggers for each type	Minimum requirement based on standards as set out in Appendix 2.
Children's Play Space	8.69ha				
Semi Natural Open Space	49.64ha				
Parks and Gardens	32.77ha				
Amenity Green Space	21.93ha				
Allotments	5.63ha				
Country Park Landscaping	-	-	£10,000,000	Phasing of country park to occur within development period and post development, according to the housing growth trigger	
Utilities - Scheme-wide Enabling Works					
Energy		Scheme Wide Enabling Works Cost/unit: £16,250 Environment/ Sustainability/ Waste Cost/unit: £500	Scheme Wide Enabling Works Total Cost: £210,421,250 Environment/ Sustainability/ Waste Total Cost: £6,474,500		
36No. 11kV to 400v distribution substations	67MW			Phasing of energy infrastructure to occur within development and post development period, according to the housing growth triggers	Distribute end-user loads
9No. 11kV ring circuits from primary to connect up to distribution substations	-				
Portable Water					
New connection network from existing reservoirs	4,314 M3/day			Phasing of potable water infrastructure to occur within development and post development period, according to the housing growth triggers	New connection to existing storage reservoirs
Waste Water					
Existing plant upgrades to treat additional capacity	3,813 M3/day			Phasing of waste water infrastructure to occur within development and post development period, according to the housing growth triggers	Raw sewage to existing treatment plants
Plot connections for all properties - waste water	-				
Gas					
Plot connections for all properties	-			Phasing of gas infrastructure to occur within development and post development period, according to the housing growth triggers	Connecting to end users

Infrastructure	Demand Arising from Development Option	Cost per Unit (£)	Total Cost (£)	Phasing	Justification
Utilities - Off-Site Requirements					
Energy					
Primary Substation 132/11kV with 2 x 66 MVA Primary Sub Station	67MW	-	£17,000,000	2033/2034	Provide electrical power capacity for development
Potable Water					
5km trunk mains on primary routes and distribution mains to properties for water supply	4,314 M3/day	-	£4,000,000	Initial Phase	Distribution of potable water to end users
Waste Water					
Upgrades for water course discharges	3,813 M3/day	-	£1,500,000	Initial Phase	Environmental enhancement / EA regulations
6km connection to existing waste water treatment works - primary and secondary collection networks	3,813 M3/day	-	£4,000,000	Initial Phase	Braintree WRC is at capacity and can't take flows. Bocking WRC can accept flows in early phases but this is approximately 6km away and so a significant pumping distance. May be preferable to provided new WRC in early phases but this would have to be developer funded (this has not been costed within this piece of work).
Gas					
Upgrade to low pressure distribution network	-	-	£3,000,000	Initial Phase	Gas supply to end users
Telecommunications					
Development of access chambers for BT Telecoms network and development of access chambers for private telecoms network throughout development	-	-	£3,000,000	Initial Phase	ICT and data networks to end users
Transport - On-Site / Off-Site Requirements					
New segregated busway through site to connect with wider bus/BRT network (increased length when compared to Option 1)			£4,500,000	Up to Plan Period	To ensure non-car mode transit is embedded from the outset and ensure modal shift
Transport Hub (BRT) At Grade			£10,000,000	Up to Plan Period	To ensure non-car mode transit is embedded from the outset and to connect with the sub-regional transport connectivity solutions.
New combined segregated pedestrian / cycle "Greenway" through site (increased length when compared to Option 1)			£2,800,000	Initial Phase	To ensure non-car mode transit is embedded from the outset linking the local region
Upgrade to existing pedestrian bridge over A120 in two locations (east & west) to provide pedestrian / cycle connection between site and Flitch Way -2 Nº			£4,000,000	Plan Period	
New pedestrian / cycle bridge over A120 providing a connection between the site and Flitch Way, including new route south of A120- 1 No			£6,200,000	Plan Period	
Upgraded pedestrian & cycle networks (e.g to Flitch Way to provide continuous pedestrian/cycle corridor between Braintree town centre, Skyline 120 and the site. Upgrades to include, Improved lighting, route delineation, new section of route to connect with Skyline 120			£3,000,000	Up to Plan Period	To ensure non-car mode transit is embedded from the outset and to connect with the sub-regional transport connectivity solutions.
New at-grade junction with B1256 - 2 Nº			£10,000,000	Initial Phase	To ensure non-car mode transit is embedded from the outset linking the local region
Junction upgrades to A120 (new slip roads / grade separation) - 2 Nº			£50,000,000	Initial Phase	
New junction / upgrade to A120 (grade separated) - 1 Nº			£25,000,000	Plan Period	To facilitate vehicular connection to the site
Travel plan measures (smarter choices, car clubs, charging points, etc) - Straight Line Cost Over Time			£11,006,650	Plan Period	
Bus service subsidies & other public transport improvements - Straight Line Cost Over Time			£5,179,600	Plan Period	To ensure non-car mode transit is embedded from the outset and to connect with the sub-regional transport connectivity solutions.
Contribution to Strategic ("Sub-regional") Public Transport solution e.g. BRT		£1,500	£19,423,500		
****Total Cost**			**£572,368,000**	(Total Cost at May 2016 Prices but excluding Professional Fees and Design Development and Construction Contingency)	

Table 34: Key Infrastructure Requirements for West of Braintree Option 2

This Section sets out the Site Option and Performance Review against each option.

07 Site Options and Performance Review

7.1 Criteria
7.2 Summary Review
7.3 East Colchester
7.4 North Colchester
7.5 West of Colchester / Marks Tey
7.6 West of Braintree

7.1 Criteria

Introduction

A qualitative assessment of the Sites and Options has been undertaken using selection criteria based upon Sustainability Objectives for Colchester, Tendring and Braintree alongside TCPA Garden City Principles. This has not been informed by any specific masterplanning exercise and instead the assessments are professional judgements only made in the context of a high level understanding of the sites and the concept of a Garden Community.

This assessment, alongside the viability assessment and supporting technical documentation, is considered to provide sufficient evaluation to inform further testing including feeding into the Councils' own Sustainability / SEA Appraisal Framework.

Summary of the assessment is set out in the matrix at Section 7.2 with detailed commentary provided in the following Sections 7.3 to 7.6.

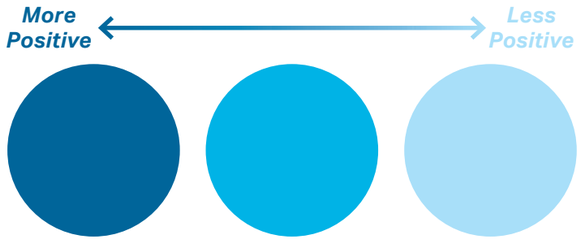
1. Physical Limitations	
●	There are physical limitations which may be difficult to mitigate or will likely require significant time and investment to be overcome.
●	There are some physical limitations which require mitigation in order to maximise development potential
●	There are no or very limited physical limitations to development.

2. Impacts	
●	Development may have a detrimental and negative impact upon areas of value and importance.
●	Development would require mitigation in order to ensure its impact on surrounding areas of value and importance is not at the detriment to their current status.
●	Impacts on surrounding areas of value and importance would be limited and acceptable.

3. Environment / Amenity	
●	Development may cause an unacceptable impact upon the occupiers of existing properties and neighbouring areas / towns.
●	Development would require mitigation to ensure an acceptable impact upon the occupiers of existing properties and neighbouring areas / towns.
●	Development would likely have an acceptable relationship on occupiers of existing properties and neighbouring areas / towns, and the impact may be positive.

4. Transport	
●	There is very limited potential to achieve integrated and accessible sustainable transport systems.
●	There is potential to achieve integrated and accessible sustainable transport systems, but this is likely to require significant on and off site investment.
●	There is existing access to sustainable transport systems or relative ease to establish an integrated and accessible transport system.

Scale of Performance



5. Resilience

- Development may have a detrimental impact on surrounding town centres, regeneration / development priority areas or established institutions.
- Development may impact on surrounding town centres, regeneration / development priority areas or established institutions, although this impact could be mitigated.
- Development would likely make a positive contribution to surrounding town centres, regeneration / development priority areas or established institutions.

6. Housing

- There is limited potential to secure a provision of a mix of tenures and housing types
- The ability to secure a mixed tenure and housing type development would likely require significant grant funding / developer support
- There is likely to be strong potential to provide a mix of housing types and tenure within the development.

7. Employment Opportunities

- Development may not be able to support enough, or is not located close enough to existing centres, to secure a wide range of local jobs on site or in easy commuting distance of new houses.
- It is likely to be possible to provide a wide range of jobs within the development, but providing sustainable transport access to local jobs in the wider area may be difficult.
- It is likely to be possible to provide a wide range of jobs within the development, with good sustainable transport potential to local jobs in the wider area.

8. Mixed -Use Opportunities

- There is limited opportunity to ensure the inclusion of cultural, recreational and shopping facilities in walkable, vibrant, sociable neighbourhoods.
- There is potential to ensure the inclusion of cultural, recreational and shopping facilities in walkable, vibrant, sociable neighbourhoods.
- There are existing cultural, recreational and shopping facilities within the site or in very close proximity which may have a positive effect on the development of community, with potential for new services that will ensure high levels of sustainability.

9. Environment Quality and Sustainability

- There are identified constraints that may limit the potential to incorporate areas of publicly accessible open space, allotments/food productions areas, biodiversity gains, SUDs and / or implement zero carbon/energy positive technology.
- There are some constraints that may limit the potential to incorporate areas of publicly accessible open space, allotments/food productions areas, biodiversity gains, SUDs and / or implement zero carbon/energy positive technology.
- There are no constraints that limit the potential to incorporate areas of publicly accessible open space, allotments/food productions areas, biodiversity gains, SUDs and / or implement zero carbon/energy positive technology. And existing landscape features exist which may assist provision.

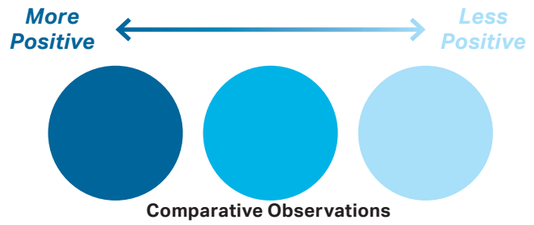
10. Developability & Deliverability

- All or the majority of the potential development area is not currently available, nor will it become available within the emerging local plan period (to 2032). And/or some of the land ownership is currently unknown or fragmented, with no current knowledge of the prospect of an appropriate delivery mechanism being agreed that will enable a proportion of the land value created to be used to fund delivery of infrastructure, community assets and long term stewardship needed for a garden community.
- All or the majority of the potential development area is currently available or can become available in time for meaningful development to commence within the emerging local plan period (to 2032); initial analysis suggests development should be capable of being commercially viable, but infrastructure requirements and investments are likely to be comparatively high. There is considered to be a good prospect of an appropriate delivery mechanism being agreed that will enable a proportion of the land value created to be used to fund delivery of infrastructure, community assets and long term stewardship needed for a garden community.
- All or the majority of the potential development area is currently available or can become available in time for meaningful development to commence within the emerging local plan period (to 2032); initial analysis suggests development should be capable of being commercially viable, and infrastructure requirements and investments are likely to be comparatively lower. There is considered to be a good prospect of an appropriate delivery mechanism being agreed that will enable a proportion of the land value created to be used to fund delivery of infrastructure, community assets and long term stewardship needed for a garden community.

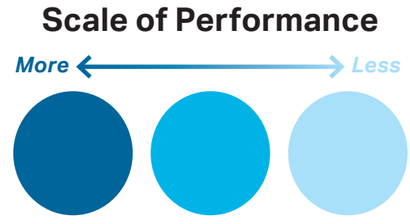
7.2 Summary Review

	East Colchester / West Tendring			North Colchester		West of Colchester / Marks Tey				West of Braintree		Comparative Observations
	Option 1 - Southern Land Focus	Option 2 - A133 to Colchester-Ipswich Rail Line	Option 3 - North to South wrap	Option 1 - East of Langham Lane Focus	Option 2 - Maximum Land Take	Option 1 - North and South of A12 / Rail Corridor Focus	Option 2 - South of A120 and North of Marks Tey Existing Settlement	Option 3 - South of A120 Focus	Option 4 - Maximum Land Take	Option 1 - Braintree DC Only	Option 2 - Braintree DC and Uttlesford DC Land	
1. Physical Limitations	●	●	●	●	●	●	●	●	◐	●	●	• All sites and options are considered to have some form of physical limitation that would require mitigation. • The most significant limitations relate to: road access/junction capacity, surface water management, localised severance from transport infrastructure and existing hedgerows. • It is considered that all limitations are capable of mitigation, though extent and cost will vary. • Marks Tey Option 4 – The scale of the development in this option may require not only major new highways infrastructure, but also the potential need to consider the relocation of Marks Tey Railway Station to a more central location within the development to achieve more effective place making.
2. Impacts	◐	●	●	●	◐	●	●	●	◐	●	●	• In the case of each site and option the majority of the development will result in the loss of Grade 2 Farmland, which Natural England defines as 'Very-Good', and 'Best and Most Versatile. • North Colchester Option 2 - As a proportion of the total additional land included in Option 2, a significant area located to the north of Langham Road, east of Straight Road and south of Chapel Road is classified as Grade 1 (Excellent) which is the best and most versatile land. Similaraly, a large proportion of East Colchester/West Tendring is Grade I agricultural land. • The scale of development proposed means that the Garden Community will create significant change in each case, but the sensitivity to change is possibly less in Marks Tey Option 3. • Impact on heritage assets relates in most cases to isolated listed buildings; generally Grade 2, often with a past agricultural connection. • Statutory nature conservation designations across all sites and options are limited, or where they exist mitigation should be possible. Main impacts on landscape features across all sites/options is likely to be on networks of field hedgerow/water courses/drainage. • Marks Tey- Option 4: The change in topography as the site progresses north and west, and relating landscape character, is considered more sensitive to development. • Overall mitigation of impacts likely to be possible – e.g. green infrastructure network.
3. Environment / Amenity	●	●	●	●	●	●	●	●	●	●	●	• All sites/options will impact to a degree on a number of isolated properties (detached farms, residencies, and other uses), small villages/hamlets and their rural setting and the amenity of occupiers; mitigation possible, with balance to be struck between separation and assimilation. Either because of landscape form or because fewer existing properties would be affected Options 1 and 2 of East Colchester/West Tendring and Option 3 of Marks Tey may have lesser impact. • Issues of potential settlement coalescence are likely to be manageable across those sites/options where this might be considered a risk, for example through the use of green buffers/open space to provide effective separation. Because of a combination of scale and proximity, the relationship of Marks Tey Option 4 to the neighbouring village of Coggeshall might necessitate greater mitigation measures.
4. Transport	●	●	●	●	●	●	●	●	●	●	●	• All options have the potential to create a scale that can provide population critical mass required to enable mixed use communities, support walking and cycling and assist public transport viability. • The flat topography across many of the sites/options is beneficial to promoting walking and cycling. • The sites and options of East Colchester/West Tendring and West Colchester/Marks Tey benefit from the local presence of existing sustainable transport networks such as rail, walking and cycling, which may more easily be linked with, and more effectively and efficiently create connectivity to key local centres/destinations. • The severance effects of the A12 may pose a particular challenge to be overcome by the North of Colchester site and options.
5. Resilience	●	●	●	●	●	●	●	●	●	●	●	• West of Braintree – potential to impact on Braintree Town Centre and Braintree Freeport; need for Garden Community to avoid developing as a competitor destination. • Land West of Colchester/Marks Tey – generally positive and growth beneficial to existing Marks Tey commercial centre, but scale of Option 4 would require careful and considered planning with respect to the existing settlements of Coggeshall and Stanway. • Land North of Colchester and East of Colchester/West Tendring – opportunity to develop complimentary urban extensions to Colchester, including Essex University/Knowledge Gateway and Colchester Northern Gateway. Supporting, developing and growing existing areas of focused investment and regeneration.
6. Housing	●	●	●	●	●	●	●	●	●	●	●	• All sites and options are considered capable of providing a range of housing types, tenures and affordability relating to local housing need.

	East Colchester / West Tendring			North Colchester		West of Colchester / Marks Tey				West of Braintree		
	Option 1 - Southern Land Focus	Option 2 - A133 to Colchester-Ipswich Rail Line	Option 3 - North to South wrap	Option 1 - East of Langham Lane Focus	Option 2 - Maximum Land Take	Option 1 - North and South of A12 / Rail Corridor Focus	Option 2 - South of A120 and North of Marks Tey Existing Settlement	Option 3 - South of A120 Focus	Option 4 - Maximum Land Take	Option 1 - Braintree DC Only	Option 2 - Braintree DC and Uttlesford DC Land	Comparative Observations
7. Employment Opportunities	●	●	●	●	●	●	●	●	●	●	●	• All sites and options are considered to have the potential to provide access to local employment, including new employment within the settlement, with each site having its own particular advantages in this respect. • Key for all sites and options will be the provision of transport infrastructure capable of enabling sustainable commuting. However, for the North Colchester site, because of the need to cross the A12 and reduce the impact of severance between the site and north Colchester, sustainable transport provision maybe a greater challenge. Similarly, whilst the West of Braintree site has good employment potential, including in the local area, its more remote location and adjacency to the A120 will inevitably facilitate car use if an attractive, frequent and reliable public transit system is not provided early.
8. Mixed-Use Opportunities	●	●	●	●	●	●	●	●	●	●	●	• All sites and options have the potential scale to create the conditions required for mixed use opportunities to develop, with a greater focus on serving day to day needs. • Other than West of Braintree, the sites and options contain pockets of existing community/settlement, or are located close to existing centres of population which might enable quicker attainment of mixed use and synergistic opportunities. • North of Colchester needs to be planned with careful consideration of its relationship with the mixed use offer of the Northern Gateway.
9. Environment Quality and Sustainability	●	●	●	●	●	●	●	●	●	●	●	• All sites and options are of sufficient scale to incorporate good levels of open space provision • All sites and options have landscape features which would form the initial structuring elements of a green infrastructure strategy/green grid. • Because all sites and options are predominantly located on intensively farmed agricultural land, biodiversity gains are possible. • The underlying geology of each site and option will require attenuation SUDs, which will create opportunities for incorporation of surface water features within the Garden Community landscape. • Land West of Colchester/Marks Tey, Option 3 – concentration of development on south side of A120 potentially gives greater significance to the severance effect of the A12/GEML corridor on achieving a comprehensive green infrastructure strategy/grid. • North of Colchester site/options – the physical presence, function and severance effects of the A12, especially once widened to 6 lanes, may act to compromise the overall environmental quality and sustainability of the Garden Community in this – urban edge/urban extension – location.
10. Developability	●	●	●	●	●	●	●	●	●	●	●	• For all sites and options either all, or the majority, of land has been identified as being available for development • Some options would require additional confirmation of land ownership and commencement of negotiations (Land West of Colchester/Marks Tey, Option 4, Land North of Colchester, Option 2, Land East of Colchester/West Tendring, Options 2 and 3) • All sites and options will require some form of major highway infrastructure works. • It is understood that an appropriate delivery mechanism is likely to be achievable across all sites. • West of Braintree Option 2 - the additional land included under Option 2 potentially allows more flexibility and options for providing access from the A120/B1256 into the Garden Community, and commencing development away from the Mineral Site • Land West of Colchester/Marks Tey – the development of all options would be heavily constrained (no more than 500-900 new homes) without significant investment in the strategic road network (A120/A12). Additionally, to achieve the full scale of Option 4, it may also be necessary to consider the relocation of the existing Marks Tey rail station to location more central to the new settlement and capable of accommodating a larger station.



7.3 East of Colchester / West Tendring



Physical Limitations

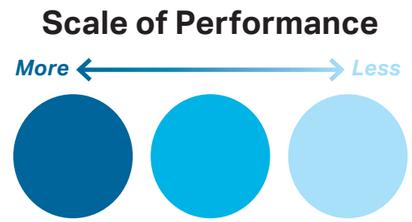
Option 1: Southern Land Focus	Access - site access will be dependent on the A120 and A133 and require an access strategy that manages interface between local and strategic traffic and restricts use of through routes across the site to move between the A120 and A133. The proposed link road to the west of the eastern boundary would be a critical aspect of this strategy that needs to be confirmed. It would also be difficult to achieve any direct vehicular access into Greenstead form the site. Bromley road would also only provide limited access options given the town centre congestion south and no junction with the A120. The A133 creates localised severance for pedestrians between the site and the university campus. It is therefore important that connections over the A133 to the University and beyond to Colchester Town Centre are provided to facilitate active modes (walking/cycling) use. A similar case for public transport connectivity, potentially by integrating the site with the University and town centre by Bus Rapid Transit (BRT), would also be important. A new rail station at the University (which is a current consideration) would make these connections even more relevant. Topography - The site slopes with a valley following the Salary Brook. This presents approximately 150m of undevelopable land for residential running south east - south-west along the brook. However, it is acknowledged that this could be utilised as a site wide asset for green infrastructure and open space, including expanding and improving the existing Salary Brook Trail (walking and cycling). Surface Water - Surface water networks are at capacity and new developments will need to deal with their surface run-off in a way that does not impose any additional load on the system. In practice, this means that surface water cannot be discharged to the existing disposal network. Waste Water - There are a number of small Water Recycling Centres (WRC) with some capacity in this area, including at Great Bromley and Fingringhoe. These could serve early development but before the end of the plan period (2032) waste water would need to be pumped to Colchester WRC at Hythe (including a river crossing), or a new treatment plant built to serve the development. Water Supply - It should be possible to take water supply from Ardleigh Reservoir, just to the north of the site, but new and upgraded existing infrastructure would be needed. Gas - The low pressure network will require reinforcement. Electricity - Some network reinforcement will be needed to ensure that the regulated reliability criteria are maintained under winter loading conditions. Development east of the river could be supported by upgrading Colchester Primary substation, but distribution may be more costly owing to the need to install new circuits under the river but other supply options could be made available to the area, subject to further study. Specifically, the substation at Lawford could be upgraded which would avoid the river crossing.
Option 2: A133 to Colchester - Ipswich Railway Line	Impacts would be consistent with Option 1 but with the possibility to create an additional site access into site from Bromley Road.
Option 3 - North to South Wrap	Impacts would be consistent with Option 1 and 2 but because the Great Eastern Mainline (GEML) bisects the site this creates severance for movements to the north-west and south-east, and although three vehicular bridge crossings exist, these will likely require upgrading to accommodate the requisite movements. In addition a new junction off the A120 to serve the north of the site is likely to be required.

East of Colchester / West Tendring

Impacts

Option 1: Southern Land Focus	Agricultural Land - Much of the eastern part of the site is Grade 1 (Excellent) agricultural land and therefore landuse in this area will need to be carefully justified. Most of the Grade 1 land is within Tendring DC and will need to demonstrate the overriding housing need and other place-making advantages, together with confirming no alternative land is available, including brownfield, which has less agricultural value. . The remainder of the site is characterised as Grade 2 (Very Good) and Grade 3 (Good to Moderate). Ecological Features - The existing natural landscape and ecological features within the site such as Salary Brook, Welsh Wood, ancient woodland, other woodland and a network of intact hedgerows and associated veteran trees, and land drains and ditches, if protected, conserved and enhanced, have the potential to be used to form key landscape structuring components of the Garden Community and related green infrastructure network. Connective green linkages between these features within and beyond the site will provide opportunity to deliver net biodiversity gains. The potential to improve the quality of Salary Brook which is currently moderate but should be a good quality asset, should coincide with managing flood risk along Salary Brook. Listed Buildings - There are a number of Listed buildings across the site in the form of existing agricultural buildings whose setting should be conserved. Landscape character - Development of this scale will present a significant change to the landscape character and present a significant extension to the urban area of Colchester. However, a combination of topography and mature landscaping (trees / hedgerows), if retained as much as possible, will help assimilate the development.
Option 2: A133 to Colchester - Ipswich Railway Line	Impacts identified are consistent with those documented for Option 1, but with more of Salary Brook and associated woodland included which could be incorporated into the site-wide green infrastructure strategy and provide amenity and placemaking benefits. This Option also entails development on less valuable agricultural land.
Option 3 - North to South Wrap	Impacts identified are consistent with those documented for Option 1 and 2. A greater proportion of lesser value agricultural land is included, but the new settlement would surround the existing linear village of Fox Street on Harwich Road, requiring an appropriate urban design response, and either its incorporation into the Garden Community or some degree of landscape separation included. Consideration and appropriate mitigation will also be needed with respect to Bullock Wood SSSI, which is a significant landscape feature of the additional land under this Option.

East of Colchester / West Tendring



Environment / Amenity

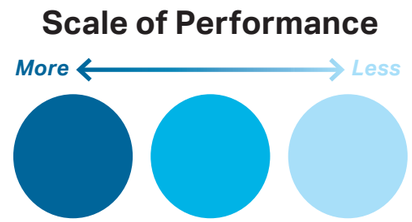
Option 1: Southern Land Focus	Long distance views - The topography of the area constrains views into and across the site which should reduce the visual impact of the development although being on the edge of Colchester there are likely to be an increased number of sensitive receptors affected. Relationship to Elmstead Market - Separation from the existing settlement of Elmstead Market would be maintained under this Option, but at less than 1km a sensitive landscape treatment to the far south-eastern portion of the site and its boundary may be necessary. Greenstead - The residential area of Greenstead defines the western boundary and is Colchester's eastern boundary. Although this provides a fixed boundary there is significant opportunity to enhance permeability into the existing communities to establish a more sustainable urban extension. This will need to address the challenges of topography relating to Salary Brook, but this could provide greenspace and amenity for both new and existing communities. If development and facilities are provided cognisant of and complimentary to those existing in Colchester and the neighbouring community of Greenstead, there is potential to ensure that development provides mutual benefit for new and existing communities. In the north of this site exists a number of residential properties adjacent to Chapel Lane, Green Lane and Wivenhoe Road. The majority of these have a mature landscape setting which would help to protect thier setting and the amenity of occupiers.
Option 2: A133 to Colchester - Ipswich Railway Line	Impacts identified are consistent with those documented for Option 1.
Option 3 - North to South Wrap	Impacts identified are consistent with those documented for Option 1 but additionally the small linear settlement of Fox Street, which sits either side of the A137 - Harwich Road, falls within the Garden Community boundary under this Option. This represents the largest grouping of residential property in the site boundary, and the impact of the new settlement on residential amenity would need to be considered. However, much of the settlement benefits from mature landscape setting which can be used to mitigate impact. Permeability across this spinal route should be considered while maintaining a clear separation of development either side of the A137 and existing character of Fox Street. Improving the vegetation around the A137 Harwich Road could provide visual screening and help reduce air and noise pollution.

East of Colchester / West Tendring

Transport

Option 1: Southern Land Focus	Active Modes Because of the relative proximity of the site to Colchester Town Centre and the University of Essex, which has an established and active Green Travel Plan, opportunities to connect the site with an existing cycling and pedestrian network exists, albeit new and upgraded infrastructure will be required. Notable existing infrastructure includes segregated pedestrian and cycle path from the University towards Colchester Town Centre, including Salary Brook Trail. Rail Hythe and Colchester Town Rail stations are located outside of appropriate walk distances (1km), but potentially accessible via cycling or public transport. These stations provide access to the Sunshine Coast rail line which currently offers limited service frequencies (1tph in either direction between Chelmsford/London or Clacton) and only anticipated to rise to 2tph by 2043. A new station stop located on the Sunshine Branch line at the University of Essex would bring about accessibility improvements to site – benefits to the wider site beyond the southern section would need to be addressed by interconnecting public transport. Bus / Public Transport The potential scale of population is sufficient to create the critical mass necessary to support public transport, which in this location is further enhanced by the proximity of the University and Town Centre. Existing strategic and local bus networks currently set down and pick-up in close proximity to the site. A bus interchange is located at the University Campus, however access to this is a key consideration given the current severances. Within the Colchester Local Plan provision is made for a dedicated bus corridor to support development in North Colchester. This is anticipated to be delivered on the back of the consented 1,500 new dwellings at Severalls Hospital. Jacobs have been instructed by ECC to develop options for a rapid transit system linking the site, University and the town centre. The most recent study entitled 'East Colchester Rapid Transit Option appraisal Garden settlement meeting, 6 January 2016' concludes that a bus Rapid Transit (BRT) would be the most cost effective approach and flexible in delivery, rather than a light rail / tram system. The routes between the town centre via the Hythe link, explored to date include: Option 1: via East Hill and Greenstead Road Option 2: via Colchester Town rail corridor Option 3: via Military Road, Recreation Road and new link to Colne Causeway Option 4: via East Hill and Greenstead Road Road The A120 and A133 provide east west connectivity, along with junction 29 of the A12, which provides an opportunity for efficient local connection with the strategic north-south trunk road network. Bromley Road forms the northern boundary of this Option and links the residential area of Greenstead and beyond to Colchester Town Centre. There is potential to use this connection to establish a clear spine to the development that enhances permeability and access, but capacity issues of the existing infrastructure will need to be fully tested. There is good opportunity for vehicular access via existing and well defined local road network – A1232 Ipswich Road, A137 Colchester Road, A133 Clingoe Hill. Existing congestion on and around the site including key hotspots at the junctions of the A1232/A120, A137/A120, Greenstead Roundabout, A120/A133 and Junction 29 of the A12 are a key consideration. The mix of local development traffic with strategic through-traffic is an issue, whilst there is likely to be a requirement for extensive infrastructure improvements to enable development on site. A new A133 / A120 link road would help to alleviate access as well as local congestion in the area.
Option 2: A133 to Colchester - Ipswich Railway Line	Impacts identified are consistent with those documented for Option 1. Additionally, the opportunity would exist to extend the existing Salary Brook Trail (pedestrian and cycling) into the extended development site, effectively linking the north of the development with the University using a fully segregated route. The BRT system identified under Option 1 would need to be extended, requiring the likely crossing of Salary Brook.
Option 3 - North to South Wrap	Impacts identified are consistent with those documented for Option 1 and 2. However, a new access would likely be required directly onto the A120 under this Option but this may also provide public transit connectivity into Colchester Northern Gateway regeneration zone. The additional scale of development under this Option may also warrant consideration of a Tram-Train infrastructure. This would connect through the site to the University and Colchester utilising the Sunshine Coast Branch Line.

East of Colchester / West Tendring



Resilience

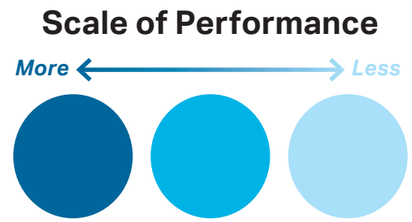
Option 1: Southern Land Focus	Proximity to existing centres - The relationship of the Garden Community with Colchester Town Centre to the west will be an important synergy defining the role and function of any new community. As an urban extension to Colchester there is potential to accommodate higher building densities and maximise opportunities for efficient infrastructure provision and public transport accessibility and sustainability. University of Essex and Knowledge Gateway - There is good potential to achieve physical, economic and social connectivity with the University of Essex and the Knowledge Gateway, and support economic clustering necessary for entrepreneurial start-ups and the science and technology sector. The provision within the Garden Community of high quality new homes may appeal to University and Knowledge Gateway staff, with positive benefits for attracting and retaining staff.
Option 2: A133 to Colchester - Ipswich Railway Line	Impacts identified are consistent with those documented for Option 1.
Option 3 - North to South Wrap	Impacts identified are consistent with those documented for Option 1, but it may be possible to derive additional benefits from improved connectivity with North Colchester and the Northern Gateway regeneration zone.

East of Colchester / West Tendring

Housing

Option 1: Southern Land Focus	The residential market - As a local comparison, average residential values are typically lower in Colchester than in Braintree at present. Values in Colchester had minimal growth in 2007–2012 (Colchester underperformed relative to wider Essex during this period), however within the last 2 – 3 years several data sources show a relatively sharp increase in values. Evidence shows that the market is responding to residential development opportunities in the wider Colchester area as evidenced by the significant pipeline. Proximity to Hythe railway station will place residential development in East Colchester at an advantage as transport links is an attribute which will likely help drive sales. Similarly the proximity to the University of Essex, and its ability to attract investment and people related to its academic and research success; regionally, nationally and internationally, is also likely to be favourable in the residential market and the opportunity to create value as part of the Garden Community's development and its unique identity. Overall, nothing within the location or character of this Option in itself would likely compromise the ability to achieve a mix of housing type, tenure and affordability which can be delivered to meet local needs now and in the future,
Option 2: A133 to Colchester - Ipswich Railway Line	Key findings are consistent with Option 1 although the larger area means that multiple outlets could be advanced at once, therefore enhancing the potential for greater variation in house type, tenure and delivery rates.
Option 3 - North to South Wrap	Key findings are consistent with Option 1 although the larger area means that multiple outlets could be advanced at once, therefore enhancing the potential for greater variation in house type, tenure and delivery rates.

East of Colchester / West Tendring



Employment Opportunities

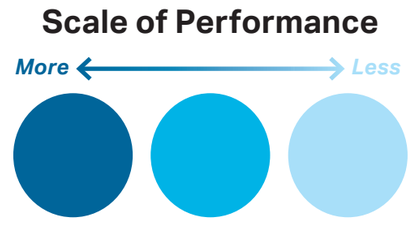
Option 1: Southern Land Focus	University of Essex - The University of Essex (Colchester Campus) which is a major local employer lies adjacent to the southern boundary of the site, accessed via the A133 Clingoe Hill. Proximity to the University may also benefit the creation of new jobs within the Garden Community itself. Knowledge Gateway - There will be possibilities to draw a relationship / synergies with the Knowledge Gateway and potentially create an 'Innovation District' for Colchester and Tendring. Colchester Town Centre - the proximity of the site to Colchester Town Centre means that the Garden Community would most likely create local centres complimentary to Colchester Town Centre.
Option 2: A133 to Colchester - Ipswich Railway Line	Impacts are consistent with those identified for Option 1 although perhaps greater opportunity to build upon the opportunities of the A120 corridor.
Option 3 - North to South Wrap	Impacts are consistent with those identified for Option 1 although with the added benefit of Severalls Industrial Park being adjacent to the north-western boundary. This comprises a number of light industrial and business units accessed via Newcomen Way off the A120. Employment uses could be focussed along this edge, though achieving a frontage or direct access from Ipswich Road is unlikely to be achievable.

East of Colchester / West Tendring

Mixed use Opportunities

Option 1: Southern Land Focus	The provision of cultural opportunities could be developed in synergy with the university campus, while recreational and shopping facilities should service the day to day needs of the new population and not directly compete with those services provided within Colchester Town Centre. Convenience retail is expected to be provided in local centres with the assumption that comparison retail is provided within Colchester Town Centre.
Option 2: A133 to Colchester - Ipswich Railway Line	Key findings and impacts are consistent with those identified for Option 1.
Option 3 - North to South Wrap	Key findings and impacts are consistent with those identified for Option 1.

East of Colchester / West Tendring



Environment Quality and Sustainability

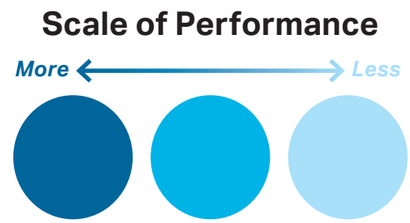
Option 1: Southern Land Focus	The river valley and sloping topography can be used positively within the layout of the development to maximise the benefit of natural assets. The Salary Brook flood plain is predominantly contained tightly to the edges of the water course apart form the lower reaches as the land form and flood plain open out. Enhancement of the Salary Brook and associated leisure trail on the western periphery of the site could provide a valuable green corridor that extends into Colchester. The lower stretch of Salary Brook and surrounding habitat is a Local Nature Reserve and site of importance for nature conservation. This could provide natural flood protection, and be enhanced to improve failing water quality, support biodiversity and provide an attractive central recreation spine for the future community, for example a country park. Given the relatively close proximity to the internationally important habitats of the Colne Estuary, under 5km, it is likely that significant development on this site would be considered to have a potential impact on the RAMSAR/SPA that would trigger the need of Habitat Regulations Assessment. If deemed to have an adverse impact the delivery of Suitable Alternative Natural Greenspace (SANG) may be required as a mitigation measure. There are also a number of other areas of habitat, including significant areas of woodland, some ancient including the Welsh Wood Local Nature Reserve and the large Churn Wood. The opportunity should exist to incorporate these into a comprehensive green infrastructure strategy with positive effects on placemaking character and identity. There is an secondary aquifer beneath the site and the site sits within both surface and groundwater nitrate vulnerability zones The topography of the site coupled with reduction in impervious surfacing associated with development along with impeded drainage potential of clay soils and underlying geology will result in high run-off rates that will need to be managed. This favours attenuation SuDS that could be used to create attractive swales and ponds on site, and have landscape amenity value, act as an ecological resource and can be used to store as clean surface water for reuse within the site. This would limit the need for new surface water sewer infrastructure and reduce pressure on the existing waste water networks. Alternative non-potable water supplies are likely to be increasingly important in this water scarce area.
Option 2: A133 to Colchester - Ipswich Railway Line	Key findings and impacts are consistent with those identified for Option 1.
Option 3 - North to South Wrap	Key findings and impacts are consistent with those identified for Option 1, although the nationally important Bullock Wood SSSI sits to the north-west of the site and will require consideration. It is of favourable condition and if not appropriately managed by the development and the impact of the development, its value may be adversely affected.

East of Colchester / West Tendring

Developability

Option 1: Southern Land Focus	All land in this option was put forward for development through he call-for-sites process. The majority of land in this option is actively being promoted by a single promoter who has an option to develop the land. It should be possible to commence development in the emerging plan period to 2032, with on and off-site infrastructure solutions identifiable and likely deliverable. Adequate lead-in time is considered to exist for the required planning, funding and delivery of major infrastructure works needed to accommodate the continued development and growth of the Garden Community beyond 2032. Landowner / Developer Negotiations - It is understood that it should be possible to achieve an appropriate delivery mechanism for this site that will enable a proportion of the land value created to be used to fund delivery of infrastructure, community assets and long term stewardship needed for a Garden Community.
Option 2: A133 to Colchester - Ipswich Railway Line	As documented for Option 1 although greater uncertainty with fragmented land ownership across additional land. It is also not known whether the additional landowners under this option would be willing to enter into dicussions with the Councils regarding the requirement for an appropriate delivery mechanism to be agreed that would enable a proportion of land value created to be used to fund delivery of infrastructure, community assets and long term stewardship needed for a Garden Community.
Option 3 - North to South Wrap	As documented for Option 1 and 2 although greater uncertainty with further fragmentation of land ownership across additional land in the north-western portion of the site. It is also not known whether the additional landowners under this option would be willing to enter into dicussions with the Councils regarding the requirement for an appropriate delivery mechanism to be agreed that would enable a proportion of land value created to be used to fund delivery of infrastructure, community assets and long term stewardship needed for a Garden Community.

7.4 North Colchester



Physical Limitations

Option 1: East of Langham Lane Focus	Access - Site access will be reliant on the A12 which borders the southern and eastern boundaries of the development. Significant consideration will need to be given to how the Garden Community relates to the A12, particularly developing strategies which form an appropriate interface between the A12 and local roads, restricting unnecessary traffic flows which would increase congestion along this strategically important route. The functionality of the development will be dependent upon bridging and facilitating sustainable linkages across the A12 connecting with Colchester to the south for walking and cycling. The A12 is currently 4 lanes wide but this is set to increase to 6 lanes under a widening scheme to be delivered by Highways England. This will increase both the physical and perceived separation and severance between the site and North Colchester, potentially creating further challenges to achieving effective connectivity between these two locations. A strong active mode (walking and cycling) and public transport connection south, integrating the P&R, leisure facilities and employment opportunities of Colchester Northern Gateway will be important ensuring non-car modes are promoted. Without a rail station to serve this site it will be reliant on a bus based network only and links to existing and future rail connections via this mode, therefore bus frequencies and the level of resultant service will be paramount. Existing Land Uses - The existing Solar Farm, which is understood to have a 20 year temporary planning permission, could present an obstacle which would need to be managed to avoid the delivery of an uncohesive and fragmented development; at least in the short/medium term before it is removed. Alternatively, the option might exist to retain the facility and for it to provide clean energy to the new settlement. Surface Water - The site area does not fall within a flood zone, however the Environment Agency identifies a high risk of surface water flooding along Salary Brook and adjacent to the irrigation reservoirs feeding into Ardleigh reservoir. Mitigation measures would be required to restrict impact upon proposed residential uses. Power - An existing EHV cable runs directly through the centre of the site which establishes a development-restrictive easement course. A high cost would be associated with the rerouting of this cable and so the constraint would need to be carefully considered and managed to ensure it does not segregate two sides of the Garden Community. In terms of providing electricity supply to the new settlement, there are a number of existing primary substations or reserved sites for new substations which could be utilised, subject to investment and development. Wastewater - Limited inflows of wastewater could be accommodated by existing Water Recycling Centres (WRC) at Langham and Dedham to support early development but before the end of the plan period 2032, waste water would need to be pumped to Colchester WRC at Hythe or a new WRC for the development built. Water Supply - Water supply would be possible from Ardleigh Reservoir subject to upgrade of existing infrastructure.
Option 2: Maximum Land Take	The commentary provided against Option 1 is equally applicable to Option 2, with the additional following points: Highway Access - Opportunity will exist to access the Garden Community from additional links with Straight Road (the western boundary of the site), which may provide greater flexibility in relation to the overall highway and related transport network for the new settlement, as well as greater distribution of traffic movement. This option is likely to rely on these further connections, because the links associated with Option 1 are only likely to accommodate a finite volume of traffic, given current constraints in the area. The additional scale of this development may also warrant consideration of a landbridge crossing of the A12 to achieve an appropriate level of physical and functional connectivity.

North Colchester

Impacts

Option 1: East of Langham Lane Focus	Agricultural Land - Development will result in the loss of Grade 2 Agricultural Land, which Natural England classify as 'Very Good' and is considered to be the best and most versatile farmland in England. A band of Grade 3 Classed land is located in the southern section of the site, adjacent to the A12. Development of this site will need to demonstrate the overriding housing need and other place-making advantages, together with confirming no alternative land is available, including brownfield, which has less agricultural value. Ecological Features - There are pockets of ecological assets located across the site, such as Kiln Wood. These could be utilised by the Garden Community as amenity assets and green linkages, creating liveable neighbourhoods with attractive landscape features. Heritage - There are concentrations of Grade II listed buildings within the villages of Langham Moore and Langham Wick to the north of the site. Development would need to be sensitive the heritage character, particularly around Langham, and develop measures which mitigates against the development's impact. Landscape Character - Overall the site is fairly flat and open, the alignment of the former airfield is apparent from several linear routes through the site. These have the potential to be used by the Garden Community to inform the layout of the settlement, helping to create an identity influenced by the past and historic use of the site. Beyond the site to the north of Black Brook and east of the A12 is the Dedham Vale Area of Outstanding Natural Beauty (AONB). The closest part of the site to the AONB is Birchwood Road and Perry Lane, but in both cases the AONB itself is situated on the east side of the A12, with the A12 itself densely screened with mature trees and hedges. Nevertheless, the development of this site will bring the urban edge of Colchester much closer to the AONB than currently, which will need careful consideration in the preparation of any masterplan and related landscape treatment.
Option 2: Maximum Land Take	The commentary provided against Option 1 is equally applicable to Option 2, with the following additional point: Agricultural Land - As a proportion of the total additional land to the west of Langham Lane included in Option 2, a significant area located to the north of Langham Road, east of Straight Road and south of Chapel Road is designated as Grade 1 Class (Excellent) agricultural land, defined as the best and most versatile land, and its development would need to be carefully justified. The overriding housing need and other placemaking advantages will need to be demonstrated, together with confirming no alternative land is available, including brownfield, which has less agricultural value.

North Colchester

Environment / Amenity

Scale of Performance

Option 1: East of Langham Lane Focus	Settlement Separation and Residential Amenity - The Garden Community will need to consider how the development will relate to the villages of Langham Wick and Langham Moor in the northern section of the site whilst respecting local character and context. These small villages could be integrated into the wider new settlement , with new areas of housing/employment extending north of Park Lane (necessary to achieve a settlement of approximately 6,500 new homes), or could be retained broadly as existing with the Garden Community not extending north of Park Lane (reducing housing numbers to around 5,400 units). The relationship of this northern part of the site with the Dedham Vale AONB will also need to be considered. The western boundary ensures a green buffer between the site and Horkesley Heath to mitigate the developments impact on the character and amenity enjoyed by the village and its residents. It is possible some of the small-scale employment uses located on the site in the south east corner would benefit from infrastructure improvements associated with delivery. Impact of A12 - The A12 provides a strong physical barrier to north Colchester, which although bridged for vehicular movements in two locations, nevertheless reinforces the sense of separation between North Colchester and the development site, which could be strengthened as a result of the planned widening of the A12 to 6 lanes in this location. However, because of the employment/leisure focus of the Colchester Northern Gateway development zone, and therefore the job and amenity opportunities that are likely to exist within this for future residents of the Garden Community, settlement separation in this context may not be the most appropriate landuse strategy. Certainly connections to nearby employment areas, particularly Colchester Town Centre, will need to be carefully managed in order to mitigate pressures on the local road network, including the bridge crossings of the A12. The site should seek to strengthen linkages with Northern Gateway, located to the south west outside of the site boundary. The aspirations of this growth area to develop as a high quality leisure destination would be mutually beneficial and tie in with the objectives of a 21st Century Garden Community.
Option 2: Maximum Land Take	The commentary provided against Option 1 is equally applicable to Option 2, with the following additional points: Relationship with Northern Gateway - Colchester Council, subject to local plan allocation and subsequent permissions, intend to extend the leisure offer of the Northern Gateway onto land immediately north of the A12 to be accessed from junction 28. The aspirations of this growth area to develop as a high quality leisure destination would be mutually beneficial and tie in with the objectives of a 21st Century Garden Community. These new leisure facilities would be within walking, cycling and public transport distance of the Garden Community, and could potentially be developed to function as centre for the new settlement, especially on the land located to west of Langham Lane and east of Straight Road.

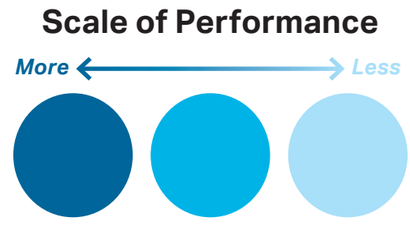
North Colchester

Transport

Option 1: East of Langham Lane Focus	Active Modes - The predominantly flat topography of the site lends itself to walking and cycling routes which could be aligned to the segregated bus transit spine. The layout of the former WWII airfield has the potential to be utilised as footpaths and cycleway to create an internal network of linear routes. Options should be developed for sustainable modal routes which cross the A12 to integrate the Garden Community and enhance connections with the existing Colchester urban area. Bridging the A12 is essential to help facilitate pedestrian and cycle route connections with the current established town centre cycle network. A cycle link and footpath between the site and High Woods Country Park could provide a green corridor and radial connection from Colchester Town Centre. It is considered likely that the existing bridge infrastructure could be improved for walking and cycling, but the adequacy of the existing bridges and their suitability for improvements will need to be considered in the context of the planned widening of the A12 to 6 lanes. The increased impact of severance from the widening will add to the importance of achieving adequate bridge crossings. Public Transport - J28 of the A12 provides opportunity for important access points across the site from the south and to the east which should be utilised for public transport. The development would, however, need to consider how to manage increased pressures along this strategically important route. Because of its proximity, and assuming capacity exists or can be achieved from the existing A12 bridge crossings, It should also be possible to integrate the development with planned sustainable transport initiatives and eventual network associated with Colchester Northern Gateway. And as an urban extension to Colchester there is potential to accommodate higher building densities and maximise opportunities for efficient infrastructure provision and public transport accessibility and sustainability. The existing Park and Ride in the south west corner provides significant potential for the origin of a bus system serving the site and onward travel further afield. A proposal for a segregated bus system in this location is particularly appropriate due to the connections it could establish between the Garden Community, Northern Gateway, Severalls Industrial Estate and Colchester Town Centre. Given that the site is not served by a rail station, a bus based rapid transit system will be essential. Existing Road Network - There is a fairly well established network of roads and lanes linked internally through the site which could, together with the former airfield, in part provide a blueprint for the layout of a new Garden Community, albeit with necessary improvements.
Option 2: Maximum Land Take	The commentary provided against Option 1 is equally applicable to Option 2, with the following additional points: Links to Northern Gateway - Garden Community could embrace the aspirations of this regeneration area to deliver a high-quality leisure destination and supplement and extend the sustainable linkages to and from the area. However, the additonal scale of growth combined with the planned widening of the A12 will add to pressure on the existing bridge infrastructure meaning additional crossings for all transport modes would likely be required, including the potential need to consider a landbridge option. It will be essential to protect the strategic function of the A12 and limit as far as possible the extent to which this is used for local movement.

North Colchester

Resilience



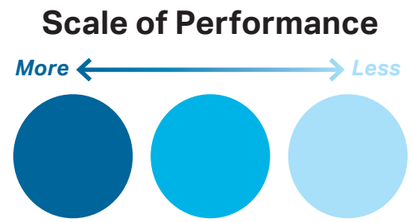
Option 1: East of Langham Lane Focus	Impact on Northern Gateway - Subject to confirmation of adequate A12 bridge crossing and junction capacity (including A12/A120), the scale of Garden Community development proposed under this option, whilst in itself being capable of supporting a number of neighbourhood/local mixed use centres, would likely be complimentary to the regeneration objectives of Colchester Northern Gateway, the high-quality leisure destination focus of which would have a strong cohesion with Garden Community Principles. Additionally, because of the proximity of the Northern Gateway and the established Severalls Business Park, the Garden Community may also benefit as a location that enables employment clustering, which is complimentary and contributes to the overall mix of employment space and business type locally.
Option 2: Maximum Land Take	The commentary provided against Option 1 is equally applicable to Option 2.

North Colchester

Housing

Option 1: East of Langham Lane Focus	The Residential Market - Values in Colchester had minimal growth in 2007–2012 (Colchester underperformed relative to wider Essex during this period), however within the last 2 – 3 years several data sources show a relatively sharp increase in values. Evidence shows that the market is responding to residential development opportunities in the wider Colchester area as evidenced by the significant pipeline. Overall, nothing within the location or character of this Option in itself would likely compromise the ability to achieve a mix of housing type, tenure and affordability which can be delivered to meet local needs now and in the future,
Option 2: Maximum Land Take	The commentary provided against Option 1 is equally applicable to Option 2.

North Colchester



Employment Opportunities

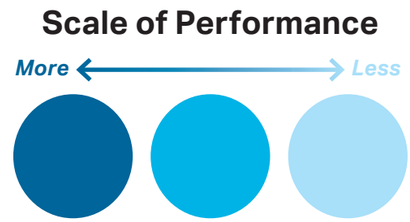
Option 1: East of Langham Lane Focus	Existing on-site Employment - two small areas of employment enterprise already exist on the site (i. Lodge Lane; and ii. off School Road). These, especially Lodge Lane, may provide an opportunity to expand the employment offer in this specific location as part of the Garden Community. In addition the proximity of the site and the existing, and more importantly potential, sustainable transport connectivity to Northern Gateway, Severalls Industrial Estate, Colchester Town Centre, and even Knowledge Gateway situated in south east Colchester, could potentially provide for a wide range of local jobs within easy commuting distance. However, this is very much dependent on achieving effective bridge crossings of the A12 for all transport modes and potentially upgraded / new junctions. Ultimately, it will be necessary to create a regular crossing environment of the A12, especially for walking and cycling, to create a safe and pleasant environment. Further development of the Park and Ride as the origin of a potential BRT network serving the Garden Community and surrounding areas and an extensive network of footpaths and cycleways would help to create sustainable linkages and commuting to these vital employment areas.
Option 2: Maximum Land Take	The commentary provided against Option 1 is equally applicable to Option 2.

North Colchester

Mixed use Opportunities

Option 1: East of Langham Lane Focus	With potential housing numbers of between approximately 5,500-6,500 depending on the extent of Langham integration, the Garden Community under this option should be capable of providing mixed use opportunities focused on small-scale convenience services and amenity uses which would contribute towards vibrant and social neighbourhoods. However, on the basis of proximity, both Colchester Northern Gateway and Colchester Town Centre would also act as local cultural, recreational and shopping destinations for residents of the Garden Community, providing mutual benefit. But this will require the implementation of sustainable transport connections, including active modes and effective crossings of the A12.
Option 2: Maximum Land Take	The commentary provided against Option 1 is equally applicable to Option 2, but with the additional points: The additional housing and population scale potential of this option may enable greater opportunities for a mix of uses throughout the Garden Community, but by virtue of proximity, the northern Gateway and its leisure destination focus, would likely play a role in the overall cultural and recreation function of the new settlement. Again emphasising the importance of achieving high levels of sustainable transport connectivity between the north and south sides of the A12.

North Colchester



Environment Quality and Sustainability

Option 1: East of Langham Lane Focus	Green Infrastructure - space exists within the site area to secure an effective multi-functional green infrastructure network. This could link to pockets of existing landscape features, and because the land is predominantly in arable agricultural production it could result in an overall biodiversity gain, which would also benefit from the creation of an attenuation SUDs system to manage surface water drainage consistent with the underlying London Clay geology throughout the site. However, in the context of delivering a Garden Community in which green infrastructure and walking and cycling are key to creating connected and healthy communities, the physical presence, function and severance effects of the A12, especially once widened, may act to compromise the overall environmental quality and sustainability of the Garden Community in this urban edge / urban extension location. Zero Carbon/Energy Positive - The opportunity might exist to retain the recently installed Boxted Airfield Solar Farm beyond the expiry of its temporary planning permission and use the energy produced to provide clean energy for the homes and businesses of the Garden Community, but this would reduce the amount of available land for housing. It is understood that under current plans the promoter of the site for development would remove the solar farm upon expiry of its consent, with the land then developed for housing. Measures to reduce energy demand through the layout and orientation of development and the possible inclusion of on-plot micro generation should all be possible too.
Option 2: Maximum Land Take	The commentary provided against Option 1 is equally applicable to Option 2.

North Colchester

Developability

Option 1: East of Langham Lane Focus	All land in this Option was put forward for development through the Call-for-Sites process, with the majority actively being promoted by a single developer with an option agreement with the landowners to develop. With both road access and utility infrastructure solutions in principle available, it should be possible to commence development within the next 6-10 years. However, the extent of development, especially beyond the plan period, will be dependent on the provision of significant new infrastructure, not least ensuring adequate bridge crossings of the A12. Landowner / Developer Negotiations - It is understood that it should be possible to achieve an appropriate delivery mechanism for this site that will enable a proportion of the land value created to be used to fund delivery of infrastructure, community assets and long term stewardship needed for a Garden Community.
Option 2: Maximum Land Take	The additional land put forward under this option was not included in the local plan call-for-sites process, but it is understood that the majority is potentially capable of being brought forward and developed by the same promoter as the land under Option 1 but this has not been confirmed. It would also not be all the land under Option 2, and additional land searches etc. would be required to bring forward Option 2 in its entirety. Landowner / Developer Negotiations - Whilst it might be possible that some of the land might be brought forward under Option 1, and therefore it might be possible to achieve an appropriate delivery mechanism for this site that will enable a proportion of the land value created to be used to fund delivery of infrastructure, community assets and long term stewardship needed for a Garden Community, it is not all of the land.

7.5 West of Colchester / Marks Tey

Physical Limitations

Scale of Performance

Option 1 - North and South of A12 / Rail Corridor Focus	Road Infrastructure - Road and junction access and capacity issues represent the main barrier to development in this location. Although the presence of A120 and A12 in one respect is beneficial to development; providing local and regional connectivity, both these road and related junctions in the vicinity of Mark Tey experience significant congestion. As such it is understood that without major new highway infrastructure, including the planned 3-lane widening of the A12 and the dualling of the A120 from Braintree to the A12, incorporating a potential bypass of Marks Tey, only between 500-900 new dwellings could be built within utilising the existing highway infrastructure and some localised junction upgrades. This would not be sufficient for the creation of a Garden Community. East/West severance - the alignment of the A12 and adjacent Great Eastern Main Line rail route (GEML) creates a physical barrier and severance to localised connectivity between land on the east and west of this major transport infrastructure spine. At present this severance is only bridged of note at the grade separated junction of the A12/A120/B1048 (the narrowest crossing point within this corridor which in other respects is approximately 200m wide), from which Marks Tey railway station is also directly accessed. Farm access roads also cross the GEML further south, however these links are not of significance to enable bridging the development. As such the north eastern section of this option currently represents a transport and urban planning pinch-point. The Garden Community will therefore require a significant transport infrastructure programme to overcome these issues, which fundamentally allows through traffic to join the A12 east of the Garden Community, and as a minimum provides a clear land bridge crossing of the A12/GEMR in the south western quadrant to assist with connectivity and overall site-wide distribution of movement. Crucially, the scale of available land both to the east and west of the A12/GEMR corridor is sufficient by itself to generate a critical mass of population to make viable neighbourhood and district centres, possibly reducing the absolute need to frequently bridge the corridor. As a major and heavily used road cutting through the development, including its function as a key part of the trunk network and therefore a HGV route, the A12 may present air quality and noise issues that the Garden Community will need to be planned cognisant of in terms of the type and distribution of land uses in the vicinity of this corridor. The current location of the rail station does not represent the most effective location for the new settlement to utilise, and improving its accessibility from the wider development will be a key issue to be addressed. Waste Water - Because Copford Water Recycling Centre could not accept waste water from the Garden Community for development in the plan period (up to 2032), sewerage could be treated at a number of existing smaller WRC's in the local area, including; Great Tey, Eight Ash Green, Coggeshall, Tiptree and Birch. However, beyond the plan period a new WRC would be required with probable discharge to the River Colne. Water Supply - Available from existing reservoirs but upgrade and new infrastructure required. Power - An existing primary substation located centrally within the site could provide power for early development phases. Later phases would require a further primary substation. Other Limitations - In other respects and relative to the overall scale of the development opportunity, the constraints are limited and related to the presence of underground and overhead pipeline and cable routes, which would likely require retention and the creation of development exclusion zones. It is considered that isolated areas of greater flood risk (medium) associated with Roman River and Domsey Brook could be readily incorporated into a green infrastructure strategy without compromising the ability of this option to create a Garden Community of at least 15,000 new homes.
Option 2 - South of A120 and North of Marks Tey Existing Settlement	The commentary provided against Option 1 is equally applicable to Option 2.
Option 3 - South of A120 Focus	Road and Utility Infrastructure - The commentary provided against Option 1 is equally applicable to Option 3. Other Limitations - In other respects the constraints are related to the presence of underground and overhead pipeline and cable routes, most significantly a gas pipeline east of the GEML, which would likely require retention and the creation of development exclusion zones. Areas of greater flood risk (medium) associated with Domsey Brook could be readily incorporated into a green infrastructure strategy without compromising the ability of this option to create a Garden Community of approximately 13,000 new homes.
Option 4 - Maximum Land Take	The commentary provided against Option 1 is equally applicable to Option 4, but with the following additional points. This option has a notional capacity of approximately 27,000 new homes which at an average occupancy rate of 2.4 persons would equate to a potential population of 64,800 (larger than Braintree Town Centre's population of c.41,000 persons (2011 Census). It is considered that rail, road and public transport infrastructure requirements will likely be substantial, including the likely need to relocate the Marks Tey railway station to a location more central and accessible to more of the overall settlement. In part this could also be true to the other options with regard to the GC principles, however to a lesser extent in comparison to this option.

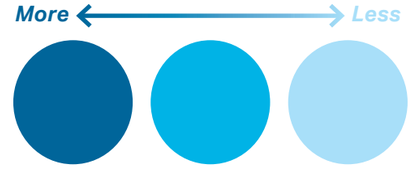
West of Colchester / Marks Tey

Impacts

Option 1 - North and South of A12 / Rail Corridor Focus	Agricultural Land Impact - Development will result in the loss of Grade 2 Agricultural Land, which Natural England classify as 'Very Good' and is considered to be the best and most versatile farmland in England. Land in the far south eastern fringe is slightly poorer quality (Grade 3), but by the majority is Grade 2. Development of this site will need to demonstrate the overriding housing need and other place-making advantages, together with confirming no alternative land is available, including brownfield, which has less agricultural value. Landscape/Townscape Impact - The existing settlement of Marks Tey is characterised by transport infrastructure, the post 1960s suburb development of Godmans Lane and Ashbury Drive and various individual commercial and industrial uses located throughout. In themselves these features aren't considered particular sensitive to the change that would result from the Garden Community. Outside of these areas (away from the A120 spine (Little Tey/Great Tey/Potts Green)) the land is characterised as raised farmland plateau with medium to large field patterns and mature hedgerows creating a degree of landscape enclosure which limits the occurrence of extensive/distant views. Within this there a number of listed buildings, including the Church of St James, Little Tey and St Andrew's, Marks Tey, both Grade 1. Other buildings are typically Grade 2 with an agricultural history (barn/farmhouse). In each case it is likely to be possible to respect the immediate setting of these buildings or otherwise successfully integrate them into the Garden Community. Therefore, whilst the landscape change will be significant the impact is likely to be acceptable overall, especially if the network of existing hedgerows and associated veteran trees can be retained wherever possible. Nature Conservation Interest - The most significant areas of nature conservation interest are identified as Marks Tey Brick Pit (designated as a SSSI for geological reasons) and Stonefield Strip, both designated as Local Wildlife Sites. It should be possible to incorporate these into an overarching Green Infrastructure Strategy. But caution may need to be exercised in relation to the impact of the SSSI on increasing development in and around Marks Tey railway station, including the ability to effectively link the station with the wider Garden Community to its north west.
Option 2 - South of A120 and North of Marks Tey Existing Settlement	Agricultural Land Impact - Although this option reduces the amount of agricultural land taken for development on the north side of the A120, it extends further south west in comparison to Option 1. And because it too is Grade 2 farmland, the overall impact of this option on agricultural land is considered similar to Option 1. Landscape/Townscape Impact - The existing settlement of Marks Tey is characterised by transport infrastructure, the post 1960s suburb development of Godmans Lane and Ashbury Drive and various individual commercial and industrial uses located throughout. In themselves these features aren't considered particularly sensitive to the change that would result from the Garden Community. By retaining development on the south side of the A120 from west of Great Tey Road, the impact on Little Tey is reduced in comparison to Option 1, with rural outlook to north west preserved, and the properties fronting the A120 potentially benefiting from the removal of through-traffic assuming a by-pass alignment for the A120 to the A12 east of Little Tey. Option 2 impacts on the setting of fewer listed buildings, including the Grade 1 listed St James's Church at Little Tey, but is within 250m of the village of Coggeshall, which is designated as a conservation area. However, topography change in particular is likely to limit the impact of the Garden Community on this. Nature Conservation Interest - assuming the preparation and implementation of a comprehensive green infrastructure strategy which respects the network of field hedgerows and drainage ditches and the local wildlife sites of Marks Tey Brick Pitt and Stonefield Strip, impacts on nature conservation should be capable of mitigation, management and potential enhancement.
Option 3 - South of A120 Focus	Agricultural Land Impact - Because Option 3 is smaller and retains the Garden Community on the south side of the A120, though still potentially providing more than 10,000 residential units, together with employment land, it's impact on grade 2 high-quality agricultural land is less, with a greater proportion of the overall development being on Grade 3 farmland. Landscape/Townscape Impact - Located south of the A120 this option focuses the Garden Community on land that has a greater physical and visual relationship with the GEML/A12 strategic transport corridor, together with the urban/suburban edge of Marks Tey; this is considered to have some advantages with respect to the landscape's sensitivity to change. Furthermore, by retaining development south of the A120 the Garden Community will not impact on the setting of the Grade 1 listed churches of St James The Less, Little Tey and St Andrews, Marks Tey, with fewer Grade 2 buildings overall also impacted. As with Option 2 the eastern edge of the village of Coggeshall is approximately 250m from sites western boundary, however, the topography change in particular is likely to limit impact of the Garden Community on the villages conservation area designation. Nature Conservation Interest - assuming the preparation and implementation of a comprehensive green infrastructure strategy which respects the network of field hedgerows, drainage ditches, and Domsey Brook, including its flood zone, impacts on nature conservation should be capable of mitigation, management and potential enhancement.
Option 4 - Maximum Land Take	The commentary provided against Option 1 is equally applicable to Option 4, but with the following additional points. Landscape and Townscape Quality - By extending north and west beyond the western boundary of Option 1, the topography of the landscape begins to rise, increasingly becoming visually and physically different in character to land to the east in and around Little Tey and Marks Tey on the north side of the A120. Development in the more northern and western areas of Option 4 is therefore likely to have a far greater impact on the character and quality of the rural landscape than elsewhere in this option. This includes impacting on the setting of an additional 10 or more grade 2 and grade 2* listed buildings. Additionally, because of the increasing topography and the adjacency of the development boundary to the A120 Coggeshall by-pass, the character of the Coggeshall conservation area, in particular the setting of the village in the rural landscape, might be impacted. However, it may be possible to mitigate such impacts to an acceptable level with an appropriate green infrastructure strategy, incorporating open space and suitable landscape treatments.

West of Colchester / Marks Tey

Scale of Performance



Environment / Amenity

Option 1 - North and South of A12 / Rail Corridor Focus	Settlement Coalescence - This option provides more than 1km of separation between the western limit of the Garden Community and the historic village of Coggeshall, and closer to 2km separation from the village of Feering. As such the setting of these villages, their rural character and identity will be protected. Similarly a separation of approximately 500m or more is maintained to the villages of Copford and Copford Green to the east, which should be adequate to prevent coalescence between the Garden Community and Copford, as well as retaining the sense that the villages sit within an agricultural landscape with their amenity, including sense of surrounding space , derived from this. Residential Amenity - With respect to the existing occupiers of property within Marks Tey and Little Tey, the impact on the occupiers of these properties will be the most directly affected. Although a generous and well planned green infrastructure strategy will be an overarching principle of the development, the predominantly agricultural landscape in which they sit and potentially value will change fundamentally. The extent to which individual properties are assimilated into the Garden Community or maintain some form of buffer separation will need to be developed through masterplanning and local community engagement, including with individual occupiers.
Option 2 - South of A120 and North of Marks Tey Existing Settlement	Settlement Coalescence - This option takes the western boundary of the development within approximately 250 metres of the eastern edge of the village of Coggeshall. This edge of the village and the housing fronting the B1024 is at a similar topographic level to the site in this location and will therefore have a strong visual relationship, with the potential to create settlement coalescence. The inclusion of a significant green buffer/potential country park in the western extent of the Garden Community might provide a potential mitigation measure. Residential Amenity - Elsewhere the settlement of Marks Tey will effectively be absorbed into the Garden Community. A suitable masterplan response to create effective integration will be required, with significant community engagement.
Option 3 - South of A120 Focus	The commentary provided against Option 2 is equally applicable to Option 3, with the following additional points: Residential Amenity - By remaining south of the A120 this option will have the least impact on the residents and amenity of Little Tey, the approach to Great Tey and those properties of Marks Tey that benefit from a northerly outlook beyond the A120.
Option 4 - Maximum Land Take	Settlement Coalescence - With such a potentially large settlement within 250m of Coggeshall the function and character of the village and the amenity value of it residents may be impacted. The inclusion of a significant green buffer/ potential country park in the western extent of the Garden Community might provide a potential mitigation measure. Residential Amenity - With respect to the existing occupiers of property within Marks Tey and Little Tey, the impact on the occupiers of these properties will be the most directly affected. Although a generous and well planned green infrastructure strategy will be an overarching principle of the development, the predominantly agricultural landscape in which they sit and potentially value will change fundamentally. The extent to which individual properties are assimilated into the Garden Community or maintain some form of buffer separation will need to be developed through masterplanning and local community engagement, including with individual occupiers.

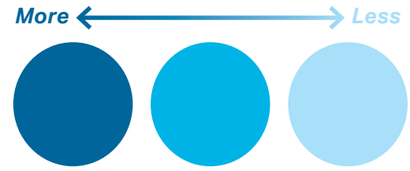
West of Colchester / Marks Tey

Transport

Option 1 - North and South of A12 / Rail Corridor Focus	Active Modes - Site topography is flat or gently sloping and lends itself well to promoting cycling and walking, and the development of an effective network throughout the site. However, the attractiveness of the development for active mode use and provision of a comprehensive and integrated network, especially for cycling, could potentially be undermined without first removing through traffic from the development, second enhancing the connectivity and integration of the railway station, and third, reducing severance caused by the A12/GEML rail corridor. Public Transport - As an existing settlement, Marks Tey / Little Tey is already connected by public transport - both bus and rail (Marks Tey rail station) to Colchester, Braintree and other centres, including London. This is a clear advantage for developing a sustainable transport system for the Garden Community. It also provides the opportunity to connect the site with and support some form of inter-urban North Essex public transport system, such as Bus Rapid Transit (BRT) or similar. This would be high frequency, connecting key nodes, including the railway station, and creating the conditions to achieve greater modal shift away from the car for local and longer distance trips. Investment in new infrastructure would be required but a good starting point nevertheless exists. Road - The current A120 alignment and capacity constrains development at Marks Tey, a possible new future A120 connection with the A12 would improve strategic traffic connectivity and congestion and also free-up the existing A120 alignment for re-purposing into a access road to development.
Option 2 - South of A120 and North of Marks Tey Existing Settlement	The commentary provided against Option 1 is equally applicable to Option 2.
Option 3 - South of A120 Focus	The commentary provided against Option 1 is equally applicable to Option 3.
Option 4 - Maximum Land Take	The commentary provided against Option 1 is equally applicable to Option 4, but with the following additional points: The potential attractiveness and ease of network provision for cycling, and to a lesser extent walking, might be marginally impacted by the rising topography in the north and west of the site. Given the scale of this option and the constrained location of the existing Marks Tey rail station, which limits any meaningful expansion of this facility, it is considered that to provide a fully integrated and accessible sustainable transport system it will be necessary to relocate the railway station to a more central location within the Garden Community. This would also be connected to segregated bus routes, including a potential North Essex BRT, with the opportunity also present to consider a Tram-Train option too, utilising the rail line and re-purposed Sudbury Branch Line.

West of Colchester / Marks Tey

Scale of Performance



Resilience

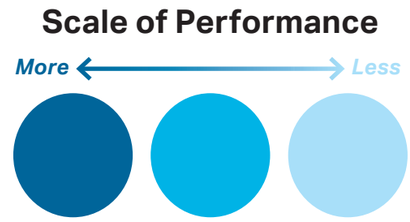
Option 1 - North and South of A12 / Rail Corridor Focus	Potential exists to enhance the existing commercial centre of Marks Tey, consolidating this and providing improved levels of settlement cohesiveness with the development of the Garden Community. The relative distance of Marks Tey from the centres of Braintree and Colchester provides greater opportunity for the development to create its own residential and employment market, maximising viability and long term sustainability. It is considered possible that this can be achieved without compromising the identified regeneration and development priority areas of Colchester, including its Northern Gateway and Town Centre, however, because the settlement of Stanway is closer, and has been a recent focus of retail and employment growth, its role in the context planning and bringing forward the Garden Community may need further definition.
Option 2 - South of A120 and North of Marks Tey Existing Settlement	The commentary provided against Option 1 is equally applicable to Option 2, with the following additional points: Because of its proximity to the village of Coggeshall, which is identified within Braintree district as Key Service Village, it is possible that residents in the western part of the Garden Community may use and therefore support the local services provided by Coggeshall.
Option 3 - South of A120 Focus	The commentary provided against Option 2 is equally applicable to Option 3.
Option 4 - Maximum Land Take	Impact of Scale and Proximity - Because of the potential scale of this option and the related need to create a larger and more diverse single centre in addition to more local mixed use provision throughout the Garden Community, it is conceivable that such a centre could develop as a destination for a wider geographic area than the settlement itself. The implications of this could be positive with respect to reducing some of the expenditure that is currently spent in centres outside of Colchester and Braintree, for example Chelmsford. However, it is also possible that the centre could attract trade away from neighbouring centres to their detriment, in particular Coggeshall and Stanway.

West of Colchester / Marks Tey

Housing

Option 1 - North and South of A12 / Rail Corridor Focus	Nothing within the location or character of this option in itself would likely compromise the ability to achieve a mix of housing type, tenure and affordability.
Option 2 - South of A120 and North of Marks Tey Existing Settlement	Nothing within the location or character of this option in itself would likely compromise the ability to achieve a mix of housing type, tenure and affordability.
Option 3 - South of A120 Focus	Nothing within the location or character of this option in itself would likely compromise the ability to achieve a mix of housing type, tenure and affordability.
Option 4 - Maximum Land Take	Nothing within the location or character of this option in itself would likely compromise the ability to achieve a mix of housing type, tenure and affordability.

West of Colchester / Marks Tey



Employment Opportunities

Option 1 - North and South of A12 / Rail Corridor Focus	**Local Jobs** - Because of the distance of Marks Tey from the centres of Colchester (c.10km) and Braintree (c.17km) , together with the availability of strategic road and rail transport infrastructure, this option is considered to have good potential to attract and develop new employment opportunities within the Garden Community itself. Additionally, the site is within easy commuting distance of established and expanding employment opportunities associated with the Centre of Colchester, Northern Gateway and Stanway, including Stane Park. Therefore, whilst these locations may present competitor employment locations, which may influence the extent and type of new employment land that can be viably developed within the Garden Community, it should be possible to connect these locations with the Garden Community by sustainable travel modes.
Option 2 - South of A120 and North of Marks Tey Existing Settlement	The commentary provided against Option 1 is equally applicable to Option 2
Option 3 - South of A120 Focus	The commentary provided against Option 1 is equally applicable to Option 3.
Option 4 - Maximum Land Take	The commentary provided against Option 1 is equally applicable to Option 4

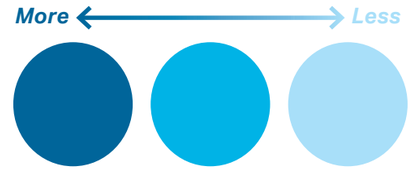
West of Colchester / Marks Tey

Mixed Use Opportunities

Option 1 - North and South of A12 / Rail Corridor Focus	Scale and Community - The scale of the population potential of this option is sufficient in theory to create the conditions needed to generate the demand for and make viable a mix of uses throughout the development. Additionally because this option seeks to integrate the existing settlements of Marks Tey and Little Tey into the Garden Community, the need to develop a new community from scratch, which can be one of the main challenges to creating sociable and vibrant mixed use neighbourhoods, especially through the early phases of a development, does not exist here. Instead, by adding to the existing development and resident population it should be simpler and quicker to achieve a neighbourhood-level critical population mass necessary for mixed use opportunities to develop. Higher Density Opportunity - In addition because of the existing and potential transport infrastructure, together with the landscape character in an around the existing Marks Tey settlement, it may be possible to introduce higher density development into this option, which would be beneficial to the creation of mixed-use communities.
Option 2 - South of A120 and North of Marks Tey Existing Settlement	The commentary provided against Option 1 is equally applicable to Option 2.
Option 3 - South of A120 Focus	The commentary provided against Option 1 is equally applicable to Option 3.
Option 4 - Maximum Land Take	The commentary provided against Option 1 is equally applicable to Option 3, but with the following additional points: The scale of this option will require more than local neighbourhood centres. Whilst these would exist throughout the Garden Community a more substantial higher-order single town centre would also be needed, providing a wider range of services and facilities necessary to support a population of this size.

West of Colchester / Marks Tey

Scale of Performance



Environment Quality and Sustainability

Option 1 - North and South of A12 / Rail Corridor Focus	Green Infrastructure - The site contains or is bordered by a range of existing landscape features including field hedgerows and related drainage ditches; water courses such as Roman River and Domsey Brook. These would provide the initial structuring elements on which to build a green infrastructure framework, with the creation of new areas of multi-functional open space/green corridor(s) providing the opportunity to link landscape features and reduce existing levels of habitat fragmentation within the site. Overall space exists to incorporate generous areas of publicly accessible open space, including allotments and food production areas, whilst also having the potential to provide a community of approximately 16,000 new homes. Biodiversity Gains - With the majority of the land in productive agricultural use; intensively farmed for arable crops and field size typically medium to large, existing biodiversity levels are unlikely to be high, with most ecological value to be found within and adjacent to Roman River, Domsey Brook and the network of field hedgerows and margins. Therefore, with an emphasis on connective green infrastructure, and a generous provision of public and private open space, the Garden Community may have the potential to increase overall biodiversity, both in terms of habitat and species. SUDs - Because of the underlying London Clay an attenuation rather than infiltration drainage system will be necessary. The existing network of drainage ditches may provide a framework for a sustainable drainage system. This could be expanded to include swales and ponds to collect, attenuate and clean surface water run-off prior to its eventual discharge to existing water courses. This could help improve the overall ecological quality of these, and create landscape and ecological interest and value throughout the development. These options would need to be explored through an Integrated Water Management Study and Plan for the site, which should also take account of managing overall water demand within an area predicted to be in water deficit condition by 2030. Zero Carbon/Energy Positive Technology - Because of the impact on landscape character of the existing transport infrastructure (A120, A12, GEML and Marks Tey Rail Station), which contributes to a greater sense of urban edge in this location, and the potential opportunity it also affords to promote development focused on public transport interchange, it maybe possible to achieve a higher density of development throughout this Garden Community option. This might provide an opportunity for a decentralised energy strategy and network, together with creating more favourable conditions for the operation and viability of bus rapid transit (BRT) or an equivalent.
Option 2 - South of A120 and North of Marks Tey Existing Settlement	The commentary provided against Option 1 is equally applicable to Option 2.
Option 3 - South of A120 Focus	Green Infrastructure - The site contains or is bordered by a range of existing landscape features including field hedgerows and related drainage ditches and water courses such as Domsey Brook. These would provide the initial structuring elements on which to build a green infrastructure framework, with the creation of new areas of multi-functional open space/green corridor(s) providing the opportunity to link landscape features and reduce existing levels of habitat fragmentation within the site. However, the ability to develop a fully integrated green grid throughout the Garden Community might be impacted by severance effects of the GEML/A12 corridor which, although a condition that exists in all Options, its impact might be more acutely experienced in Option 3 because development is forced to the south of the A120. The commentary provided against Option 1 with respect to Biodiversity Gains, SUDs and Zero Carbon/Energy Positive Technology is equally applicable to Option 3 with respect to providing a Garden Community of potentially up to 13,000 new homes.
Option 4 - Maximum Land Take	The commentary provided against Option 1 is equally applicable to Option 4 and in the context of providing up to approximately 27,000 new homes.

West of Colchester / Marks Tey

Developability

Option 1 - North and South of A12 / Rail Corridor Focus	With the exception of the triangular shaped land located to the north of the A120 and west of Great Tey Road, all other land under this option was included within the local plan call-for-sites process and is actively being promoted for development by two main parties. One of these parties is also understood to be able to bring forward the triangular land north of the A120 and west of Great Tey Road if this was identified for the Garden Community. It is believed that development could be commenced within the next 6-10 years, and make use of existing infrastructure to allow development to commence. Key Constraint - However, the extent of development will be heavily constrained (no more than 500-900 homes) without significant investment in the strategic road network (A120/A12). The Developability of this site is therefore directly linked to investment decisions and the development programme of Highways England. Landowner / Developer Negotiations -It is understood that it should be possible to achieve an appropriate delivery mechanism for this site that will enable a proportion of the land value created to be used to fund delivery of infrastructure, community assets and long term stewardship needed for a Garden Community.
Option 2 - South of A120 and North of Marks Tey Existing Settlement	All land under this option was included within the local plan call-for-sites process and is actively being promoted for development by two main parties. It is believed that development could be commenced within the next 6-10 years, and make use of existing infrastructure to allow development to commence. However, the extent of development will be heavily constrained (no more than 500-900 units) without significant investment in the strategic road network (A120/A12). The Developability of this site is therefore directly linked to investment decisions and the development programme of Highways England. Land Value Capture - It is understood that it should be possible to achieve an appropriate delivery mechanism for this site that will enable a proportion of the land value created to be used to fund delivery of infrastructure, community assets and long term stewardship needed for a Garden Community.
Option 3 - South of A120 Focus	The commentary provided against Option 2 is equally applicable to Option 3.
Option 4 - Maximum Land Take	With the exception of the land located to the north of the A120 and west of Great Tey Road, all other land under this option was included within the local plan call-for-sites process and is actively being promoted for development by two main parties. One of these parties is also understood to be able to bring forward some of the land north of the A120 and west of Great Tey Road, but it is not known if this is the full extent of the land area shown in this option. It is believed that development could be commenced within the next 6-10 years, and make use of existing infrastructure to allow development to commence. Key Constraints - However, the extent of development will be heavily constrained (no more than 500-900 homes) without significant investment in the strategic road network (A120/A12). Additionally, to achieve the full scale of this option may also require major upgrade and investment in heavy rail infrastructure to relocate Marks Tey railway station more centrally within the site. The Developability of this site is therefore directly linked to investment decisions and the development programme of Highways England and potentially Network Rail. Landowner / Developer Negotiations - Whilst it might be possible that some of the land might be brought forward by known promoters, and therefore it might be possible to achieve an appropriate delivery mechanism for some of this site option that will enable a proportion of the land value created to be used to fund delivery of infrastructure, community assets and long term stewardship needed for a Garden Community, it is not all of the land. Additional land searches and discussions would be required.

7.6 West of Braintree

Scale of Performance

Physical Limitations

Option 1: Braintree DC Only	Road Network - Away from the A120 Trunk Road the site is served by small rural lanes only. These provide limited connectivity to the site from the north, east and west and principally connect small villages or hamlets. Additionally one such lane, Pods Lane, is designated within the Braintree Local Plan as a 'Protected Lane' and would likely need to be integrated, in its existing form, into any new settlement as a leisure trail connection through the site linking ultimately with Flitch Lane. Site access will therefore be dependent on the A120 and B1256 from the south. Overall development of this site will require an access strategy that manages the interface between local and strategic traffic and restricts use of the rural lane network. Without sub-regional public transport connectivity, this site offers limited ability to develop as a non car based development with high active and public transport mode share. In turn if public transport connections are not formed then the impact of development traffic on the strategic nature of the A120 will be likely be great and its role to an extent compromised. It is therefore essential that high quality and high frequency public transport links both with Braintree town centre and wider afield are actively considered. Linking the site, Flitch Way and employment at Skyline 120 is essential, however it is acknowledged that these connections will be across land outside of the site ownership in many places. Proposed Mineral Extraction Quarry, west of Rayne - (Essex CC Mineral & Waste Local Plan, Site Ref: A9 Broadfield Farm) - The proposed quarry has a long frontage to the B1256, this restricts the available options to create access from this road into the Garden Community during the period in which the quarry site is in operation. However, by upgrading the junction of the B1256 and Blake End, a new access spur that avoids the quarry is, in principle, considered possible. As such this option should be able to deliver houses in parallel to quarry operations, and assuming appropriate environmental/amenity mitigation. Power - An existing power network West of Braintree are 11kv overhead rural supplies, with limited capacity and suitability for major new development. A new primary substation and 33kv supply infrastructure will be required in the early phase of the development. Water Supply - Supply should be possible from existing reservoirs but will require new and upgrade of existing infrastructure. Waste Water - The Water Recycling Centre (WRC) at Bocking would be able to accept waste water for the development in the period to 2032. However, this treatment plant is approximately 6km from the site and infrastructure and pumping costs would be high. Post 2032 a new Water Recycling Centre will be required. An alternative would be to develop a new WRC for the development early in the development of the Garden Community (or as advance infrastructure), but because of the very limited local water courses the treated sewage effluent would still need to be pumped to Bocking WRC for discharge to a suitable water course. However, the infrastructure and pumping costs would be much higher. In other respects the site is mostly free of physical limitations, assuming that the majority of existing hedgerows, field ditches and woodland copse are incorporated into a site wide green infrastructure network. Because Andrew's Airfield was actively used during World War II, historic discarded ordnance may remain a risk to development in this area of the site. The landowner has suggested that the risk is limited, but nevertheless some further evaluation may be required.
Option 2 - Braintree DC and Uttlesford DC Land	As per Option 1, but with following additional points: Road network - the need to manage the interfaces the strategic and rural road networks described in Option 1 may require additional solutions due to additional scale of development. Proposed Mineral Extraction Quarry, west of Rayne - (Essex CC Mineral & Waste Local Plan, Site Ref: A9 Broadfield Farm) - the additional road frontage (B1256) to the west of Blake End provided by the inclusion of additional land, may make overall site access easier, especially during operation of the quarry. Providing an option to access the site further to the West form then A120.

West of Braintree

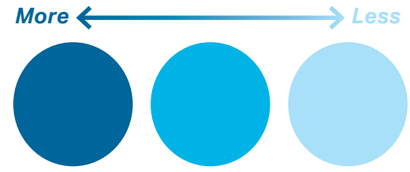
Impacts

Option 1: Braintree DC Only	Agricultural Land - Development will result in the loss of Grade 2 Agricultural Land, which Natural England classify as 'Very Good' and is considered to be the best and most versatile farmland in England. Land in the area of Andrew's Airfield is slightly poorer quality, but development in this location by itself would be inappropriate for a number of reasons, including transport. Development of this site will need to demonstrate the overriding housing need and other place-making advantages, together with confirming no alternative land is available, including brownfield, which has less agricultural value. Landscape and Heritage - Development of this scale and in this location will also constitute a significant change in the landscape, which because of its openness, will be visible in the wider area, including villages/hamlets on the periphery of the site. A combination of existing natural landscape features and available land, however, would provide an opportunity to manage impacts. The development will also need to be masterplanned to preserve the alignment, character and visual landscape qualities of Pods Lane (Protected Lane). Nature Conservation - Subject to the provision of significant and comprehensive green infrastructure strategy, it should be possible that existing areas of nature conservation interest can be retained and improved overall.
Option 2 - Braintree DC and Uttlesford DC Land	As per Option 1. But greater impact on Boxted Wood and any remaining heritage associated with Andrew's Airfield.

West of Braintree

Environment / Amenity

Scale of Performance



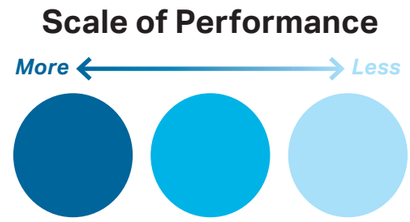
Option 1: Braintree DC Only	Amenity - Within the site the number of existing residential properties is limited, and those that exist are understood to be in favourable ownership with respect to the sites development. Because of the important access role that the B1256 will need to perform, impact on the amenity of residents in and around Blake End will be more significant, and difficult to mitigate. It is considered that it is most likely that Blake End would be integrated into the new settlement. The village of Great Sailing and its residents, though outside of the settlement boundary to the north, would experience impact to their amenity and change to their landscape setting. However, space exists to maintain a substantial green buffer separation between the village and any development, which would help to limit impact on rural character. Similarly it should be possible to achieve sufficient separation between the development and Rayne.
Option 2 - Braintree DC and Uttlesford DC Land	Amenity - As per Option 1, but additionally, the ancient woodland of Boxted Wood and its specific ecological value and sensitivity to development, potentially impacts far more on Option 2 than Option 1. This impact will need to be fully understood, including any ecological/habitat relationship between Boxted Wood and the River Ter, including the ponds adjacent to the B1256. This will help inform how close development should be located relative to Boxted Wood, which to the south and south west of the woodland, will also need to consider the extent of landscape buffer zone required to the village of Stebbing Green to maintain its rural character - if so desired.

West of Braintree

Transport

Option 1: Braintree DC Only	Active Modes - Site topography is flat or gently sloping which lends itself well to promoting cycling and walking, and the development of an effective network throughout the site. Connecting the site with Fitchway would provide direct links with Braintree and Braintree Railway Station. The establishment of links south of Fitchway would connect Skyline 120 for employment and Great Notley Country Park for leisure activity. The protected Pods Lane offers an opportunity to integrate the protected lane within the development and provide an leisure trail route between development and Flitch Way. Public Transport - Adjacency and direct access of the site to A120 is advantageous in terms of connecting the site with North Essex inter-urban bus routes, providing connectivity with Stansted Airport and employment centres and existing settlement. The opportunity to achieve a development of significant scale with population critical mass may rely on a system with greater connectivity and speed such as a form of BRT, tram or rail, without this inter-urban/ inter-regional public transport system, the risk exists that the majority of journeys external and internal to the site would likely be car based in this area. Road - Without well planned public transport and active mode infrastructure, the opportunity of direct access via the A120, together with a reliance on southern connections due to a lack of road infrastructure to the north of the site will likely result in local traffic combining with strategic traffic, creating further problems of junction hopping and localised congestion. The Option might exist to build a new link road in the north of the site between it and the A131 for example, which may spread traffic and create more dispersed movement, but it may be regarded as placing an over-emphasis on road based infrastructure to the detriment of public transport funding, innovation and integration.
Option 2 - Braintree DC and Uttlesford DC Land	The commentary provided against Option 1 is equally applicable to Option 2. However, this option provides greater opportunity to achieve access from the A120 (via B1256), but still require major highway infrastructure investment.

West of Braintree



Resilience

Option 1: Braintree DC Only	Resilient Town Centres - The site is located approximately 4km west of Braintree Town Centre and 6km west of Braintree Freeport. A development on the scale of the Garden Community could have the potential, if not appropriately planned and managed, to develop as a competitor location, especially with respect to Braintree Town Centre, further impacting on its resilience. It will be important for the Garden Community to therefore develop an economic strategy that compliments Braintree Town Centre and Braintree Freeport, but which avoids the Garden Community itself becoming a dormitory residential suburb. This will be a challenge; key requirements will likely be: provision of mixed retail, with a particular focus on convenience and associated A2/A3 uses incremental to housing growth, limited comparison retail, sustainable transport connectivity with Braintree Town Centre and Braintree Freeport, no large single town centre, a focus on B1 and SME employment space, and the identification of other niche uses that help create vibrancy and a sense of community.
Option 2 - Braintree DC and Uttlesford DC Land	The commentary provided against Option 1 is equally applicable to Option 2.

West of Braintree

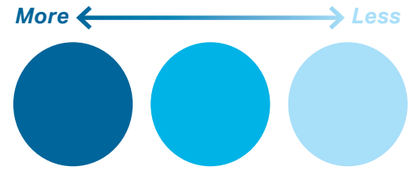
Housing

Option 1: Braintree DC Only	Nothing within the location or character of this option in itself would likely compromise the ability to achieve a mix of housing type, tenure and affordability.
Option 2 - Braintree DC and Uttlesford DC Land	The commentary provided against Option 1 is equally applicable to Option 2.

West of Braintree

Employment Opportunities

Scale of Performance



Option 1: Braintree DC Only	Access to Local Employment - This location is considered to have good potential access to local jobs, for example Braintree, Braintree Freeport, Witham, Chelmsford and Stansted Airport. These locations would be within easy commuting distance of the new Garden Community, but the challenge will be to ensure that they be reached using modes of travel other than the car. Additionally the site is located directly within or adjacent to areas considered to have the ability to attract new businesses and provide new jobs - e.g. the A120 Haven Gateway, Stansted Airport and the wider London Stansted Cambridge Corridor. With direct access onto the A120 dualled trunk road the Garden Community should be able to attract businesses to locate within it, but competitor locations do exist, including established employment centres with space to expand and those with direct rail access. The Harlow Enterprise Zone will also offer economic advantages to potential new occupiers which would not be available to the Garden Community development.
Option 2 - Braintree DC and Uttlesford DC Land	The commentary provided against Option 1 is equally applicable to Option 2, but with the following additions: In addition the provision of a further new access configuration using the A120/B1256 into the site for this option has the potential to create an additional area of employment land.

West of Braintree

Mixed Use Opportunities

Option 1: Braintree DC Only	Achieving Mixed Uses - The scale of the population potential of this option is sufficient in theory to create the conditions needed to generate the demand for and make viable a mix of uses throughout the development. However, there are no existing uses or pockets of population/community within the site that could be used as the basis on which to initially centre and develop an early phase mixed use opportunity, which may help to achieve initial critical mass within the overall development. As such securing genuine mixed use communities, and the benefits that are derived from this, is unlikely to be an early achievement of this option, unless annual housing completion rates are far higher than standard developer models would ordinarily deliver. And without provision of a BRT form of infrastructure, the opportunity and ease with which residents of the settlement would visit local centres such as Braintree Freeport by car will be high. Employment Land Type - The identified employment land/space requirement of the area is predominantly B1 (office), together with flexible space for the start-up and development of SMEs. This land use can more readily be located alongside and interwoven with other uses, including residential, retail, culture and recreation to create, over time, a genuine mix of uses within walkable, vibrant and sociable neighbourhoods.
Option 2 - Braintree DC and Uttlesford DC Land	The commentary provided against Option 1 is equally applicable to Option 2.

West of Braintree

Scale of Performance

Environment Quality and Sustainability

Option 1: Braintree DC Only	Green Infrastructure - The site contains a range of existing landscape features including field hedgerows and related drainage ditches; water courses such as Pods Brook and the River Ter; and woodland copse including Blackbush Wood and Golden Gove. These would provide the initial structuring elements on which to build a green infrastructure framework, with the creation of new areas of multi-functional open space/green corridor(s) providing the opportunity to link landscape features and reduce existing levels of habitat fragmentation within the site. Overall space exists to incorporate generous areas of publicly accessible open space, including allotments and food production areas, whilst also having the potential to provide a community approaching 10,000 new homes. The potential also exist following completion of planned quarrying in the south east of the site to return this land to a wetland focused country park. Biodiversity Gains - With the majority of the land in productive agricultural use; intensively farmed for arable crops, field size typically medium to large, and the majority of the water courses classified by the Environment Agency as ecologically poor, overall the site is unlikely to have high levels of existing biodiversity. As such with an appropriate green infrastructure strategy and site specific biodiversity action plan, the Garden Community may have the potential to provide a net overall biodiversity gain. SUDs - Because of the underlying London Clay an attenuation rather than infiltration drainage system will be necessary. The existing network of drainage ditches may provide a framework for a sustainable drainage system. This could be expanded to include swales and ponds to collect, attenuate and clean surface water run-off prior to its eventual discharge in to water courses such as Pods Brook and River Ter. This could help improve the overall ecological quality of these water courses, and create landscape and ecological interest and value throughout the development. These options would need to be explored through an Integrated Water Management Study and Plan for the site, which should also take account of managing overall water demand within an area predicted to be in water deficit condition by 2030. Zero Carbon/Energy Positive Technology - Because the density of development is likely to be relatively low (c.30dph average) a feature of the Garden Community in this location, the opportunities for decentralised energy provision such as CHP and the burning of bio-fuels are considered to be more limited, as such the National Grid is likely to be the main source of energy for the Garden Community. Opportunities to reduce and manage energy demand from the National Grid will therefore be an important consideration for the Garden Community. This might involve: rooftop mounted photovoltaic panels, energy storage solutions, and building block/ plot layout and orientation to maximise solar gain, together with other features of the Passive House approach to design.
Option 2 - Braintree DC and Uttlesford DC Land	The commentary provided against Option 1 is equally applicable to Option 2.

West of Braintree

Developability

Note: This will be reviewed / amended on completion of Cushman and Wakefields latest iteration of the viability model

Option 1: Braintree DC Only	Mineral Quarry Impact - The ease of establishing access into the Garden Community under this option will be impacted from the development of a mineral extraction quarry to the west of Rayne and north of the B1256. However, if developed consistent with the preferred site boundary included in the Essex Minerals Local Plan July 2014, it should still be possible to achieve access to the Garden Community and develop the new settlement whilst quarrying is undertaken. This assumes that, as a new settlement, having a direct frontage onto the B1256 is not critical. Land - As greenfield agricultural land with direct access from the A120 via the B1256 its development could be commenced relatively quickly and within 6-10 years, following receipt of planning permission. Developability of this site is also assisted by being in no more than three ownerships and is being promoted in its totality for development by the landowners jointly. However, the extent of first phase development could be constrained by the need to invest heavily in utility infrastructure; which consistent with the site's rural location is currently very limited in terms of physical networks and capacity. Landowner / Developer Negotiations - It is understood that it should be possible to achieve an appropriate delivery mechanism for this site that will enable a proportion of the land value created to be used to fund delivery of infrastructure, community assets and long term stewardship needed for a Garden Community.
Option 2 - Braintree DC and Uttlesford DC Land	The commentary provided against Option 1 is equally applicable to Option 2, but with the following additions: The additional land included under Option 2 potentially allows more flexibility and options for providing access from the A120/B1256 into the Garden Community, and commencing development of the new settlement relative to the operation and impact of the proposed quarry.

This Section sets out the cost and value assumptions as well as viability results aligned to development Options.

08 Viability Appraisal

8.1 Approach
8.2 Costs
8.3 Values
8.4 Delivery Assumptions and Commentary
8.5 Observations

8.1 Approach

The financial viability assessment has been undertaken by consultants Cushman and Wakefield (C&W) using the 'Garden Cities & Large Sites Financial Model (originated by ATLAS) and is based on undertaking a cashflow assessment of each of the respective scenarios for the four Garden Community sites. The development costs include all anticipated physical costs required in order to be able to sell serviced plots to individual developers but also an allowance for developer profit and a receipt for the land owner and promoter.

The Garden Cities & Large Sites Financial Model (originated by ATLAS) is based on a 'master developer' undertaking the infrastructure work, obtaining planning permission and then selling serviced plots to 'plot developers' (typically, individual house builders brining forward plots of 100-300 units and commercial development phases). In order to determine what the plot developer will be able to pay the master developer for the serviced plots, the Garden Cities & Large Sites Financial Model undertakes an underlying assessment of the development appraisal from a plot developer perspective.

The financial appraisal provides an indicative assessment of the costs and sales values associated with the schemes. Given the high level of information available, the use of the Model at this stage is for indicative purposes only, and to identify key input values and assumptions that future, more detailed modelling should take account of. As such, no conclusions are drawn or intended within this work regarding the viability of the sites and options.

The information presented within this report is indicative only and does not represent formal valuations in accordance with the RICS Appraisal and Valuation Standards. The model utilised has been provided by ATLAS (part of the Homes & Communities Agency) and C&W has not audited the mechanics or formulation of the model.

8.2 Costs

Land Acquisition

An indicative land acquisition cost of £100,000 per acre has been used based on C&W's experience of large strategic sites. These values are inclusive of the costs of securing vacant possession of the full site area.

In reality, it is understood that there are ongoing discussions for all of the respective sites on the basis that a minimum land acquisition cost is agreed with the respective land owners/ promoters and this is likely to vary. The pace of delivery of land will be heavily influenced by the minimum land acquisition cost as the higher the level, the higher the barrier to the release of land for development, i.e. all other things being equal, a scheme with a minimum land price of £100,000 per acre is going to be significantly more deliverable than a scheme with a minimum land price of £150,000 per acre.

A standard base land acquisition cost is being used for analysis purposes. In reality, land values are negotiated on a case by case basis reflecting various matters including local property market contexts as well as infrastructure and policy requirements.

The land acquisition is assumed to be on a phased drawdown basis two years prior to the delivery of residential units (i.e. to allow for infrastructure and construction work). No Stamp Duty Land Tax (SDLT) or fees have been allowed for.

Construction

Construction cost assumptions are based on location-adjusted figures from the Build Cost Information Service (BCIS) for Quarter 2 2016, supplemented with our agency consideration of prevailing build cost rates required to achieve the sales values indicated in this report.

Use Type	Cost per sq m
Residential	**£1,061**
B1	**£1,527**
B2/8	**£804**
Retail	**£759**

Table 35: BCIS Costs Applied

Infrastructure

For each site and option the assessment has used the indicative infrastructure items and costs provided by AECOM, as presented in section 3 to 6 of this report. In summary this has provide the following infrastructure cost per unit excluding professional fees and contingency.

- East of Colchester/West Tedring Option 1; 6,611 units; £44,298 / unit
- East of Colchester /West Tedring Option 2; 8,834 units; £42,760 / unit
- East of Colchester/West Tedring Option 3; 11,409 units; £44,078 / unit

- North Colchester Option 1; 6606 units; £43,247 / unit
- North Colchester Option 2; 10,132 units; £40,587 / unit

- West of Colchester/Marks Tey Option 1; 16,861 units; £38,690 / unit
- West of Colchester/Marks Tey Option 2; 17,182 units; £38,643 / unit
- West of Colchester/Marks Tey Option 3; 13,105 units; £40,092 / unit
- West of Colchester/Marks Tey Option 4; 27,841 units; £38,048 / unit

- West of Braintree Option 1; 9,665 units; £43,702 / unit
- West of Braintree Option 2; 12,949 units; £44,202 / unit

Key Assumptions on Infrastructure Works - These are noted as follows:
Site Topography and Ground Conditions – It is assumed that all of the sites are level and as they are "greenfield" have very limited issues associated with decontamination. It is also assumed generally that ground conditions are good and would not for instance required piling for new structures and the like.

Utilities and Drainage – off site reinforcement of the networks generally have been allowed for, but upgrades to the reservoirs for the water supply and the sewerage treatment works for foul water discharge are assumed to be covered by Anglian Water.

Renewable Energy – any costs associated with this are excluded.

Energy Centre Serving a District Heating System – these are excluded.

Major Utilities Diversions / Undergrounding of Overhead Lines – it is assumed that these are not required as the schemes will be designed around these as a constraint.

In addition the following key assumptions apply:
1. Management and Long Term Governance; included on a pro rata basis, using the cost previously included by the client group (for Braintree) of £25,000,000 for a 7,525 unit scheme. Therefore, for instance Braintree Scenario 1 relates to £25,000,000 x 9,665/ 7,525.
2. Professional Fees and Other Costs; Professional Fees allowance adjusted from 5% to 10% as this is considered appropriate.
3. Contingencies; all contingencies (except the plot infrastructure contingency at 5%) at 10% as this is considered to be more realistic given the very limited information available on the sites
4. Exclusions; it is noted that all of the costs exclude VAT and inflation from today's prices.

Professional Fees

Taking into account architect fees, engineering fees and other specialist consultancy input, the rolled up cost of professional advice equates to an approximately 8% sum of build costs; it should be noted that these professional fees relate to the plot development element of the scheme and a separate professional fee allowance relates to the master developer's infrastructure elements (as noted earlier). This rate reflects several site characteristics which are:

- The site areas are mostly rural, greenbelt land which does not possess the same degree of complications associated with brownfield delivery.
- The scale of the project affords economies of scale for professional consultants who will typically do it at below average rate to reflect the sheer volume of business.
- Professional fees typically incur a premium charge if the sites and end product are overly complex, but it is envisaged that although there will be a variety of style of homes, there should be relatively few complications.

We have also included a Strategic Planning Cost of £500 per unit in our modelling in addition to professional fees.

Discount Rate

A rate of 2.5% has been utilised which is broadly in line with the Public Works Loan Board (PWLB) rate and reflects long term public sector investment return requirements. Utilising this discount rate, the financial model calculates the NPV on the respective schemes based on a scenario with no finance cost allowance. A positive NPV illustrates that the development is viable if funded at the discount rate.

Purchaser's Costs

These are now calculated on the revised changes made to SDLT, following the 2016 Budget update which has dispensed with a single slab rate structure in favour of marginal rates. Freehold sales and transfers of commercial and mixed use property are charged at the rates in Table 2. These rates are applied to the sale of the serviced land plots by the master developer to the plot developers.

Property or lease premium or transfer value	SDLT rate
Up to £150,000	**Zero**
The next £100,000 (the portion from £150,001 to £250,000)	**2%**
The remaining amount (the portion above £250,000)	**5%**

Table 36: SDLT Rates

Given the scale of land transactions within each scenario (which will incur SDLT charges) SDLT will be significantly larger than the £250k upper band, C&W has - for the purpose of analysis - assumed a flat rate of 5% SDLT is applied. In addition to SDLT, the following standard fee rate assumptions have been used:

- Agents fees (1%)
- Legal fee (0.5%)
- VAT payable (0.3%)

The effective rate for SDLT including additional costs therefore equates to 6.8% overall.

Marketing Fees

A rate of 1% on Gross Development Value (GDV) has been assumed for the plot developers based upon the need to promote the new communities and settlements, particularly in relation to the early stages of the commercial development.

Disposal Fees

This relates to fees on the development of the individual plots.

Residential

- Sales agency fee for open market units at 1% of private residential GDV.
- Sales legal fee at 0.5% on private and affordable residential units.

Commercial

- Agency fee - 1% of the sale price.
- Legal fee - 0.5% of the sale price.
- No SDLT allowance.

Lettings Fee

- Agency fee - 10% of per annum (pa) commercial rent.
- Legal fee - 5% of pa commercial rent.

Finance Rate

C&W assumes that in all scheme options (from the master developer perspective), costs are 100% debt funded at a flat finance rate of 6.50%. This guidance is based on C&W's experience in reviewing significant residential led schemes of similar size and nature. The finance rate has been adjusted accordingly to reflect the scale of the scheme, the untested locations (i.e. in the countryside or otherwise in relatively unestablished market locations within the urban area) and the long term delivery timeframe of multiple phases.

In relation to the plot developer, finance has been assumed to apply to 50% of the funding requirement. This is a relatively low level of finance requirement, based on the assumption that the development would be funded by a variety of equity sources initially. However, developers/ investors/ public sector often apply a finance rate on equity input in any case – in this case it is assumed that this is captured within the profit margin to the plot developer.

Profit Allowance

Master Developer

The master developer is undertaking the infrastructure work to create the serviced plots to sell to plot developers (who take the 'market risk' on residential sales and commercial development). We consider that a rate of 15% profit on cost is a market level for this undertaking.

Plot Developer

C&W's experience of working on major developments indicates that developers will seek both a percentage return on their equity investment (C&W view is that a rate of 6.5% as per the finance rate is realistic) and a 'profit' return to reflect the risk. This return can be calculated by way of an IRR, profit as a percentage of costs or profit as a percentage of GDV as highlighted above.

For the purposes of this model and the level of analysis being undertaken, C&W consider that a 20% profit on GDV allowance on standard market, private residential units is reasonable given the risks involved. However, a significantly reduced profit level for the affordable elements of the scheme (at circa 6% on cost, although within the analysis we have used 6% on affordable GDV as a proxy) would be expected. This reflects the reduced level of risk associated with developing affordable housing because a registered provider will typically purchase units upfront at an early stage within the development, which de-risks the scheme.

For the commercial development land, it is considered that a profit rate of 17.5% on sales values is reasonable.

Contingency

AECOM's assumption for the contingency requirement for infrastructure works is 10%. This fits with C&W's experience, where typically, a contingency rate on construction costs of circa 10% for large scale developments would be assumed in order to provide sufficient cover for unforeseen costs. This rate reflects the scale of infrastructure works needed to make this an 'oven ready' site and the greater degree of risk inherent in building out multiple phases over such a long timeframe. This would normally provide a healthy margin to cover unforeseen costs that might arise concerning planning, procurement and construction cost overruns. Typically it is expected that this contingency rate would reduce as the scheme progresses to a more detailed stage. Within the assessment undertaken a assessment scenario has been included with this contingency reduced to 5%.

The rate applied for the plot development contingency is 5% (AECOM figure) which reflects a reduced rate compared to the master development contingency, reflecting a significantly reduced construction risk.

S106, Affordable Housing & CIL

Section 106 costs are accounted for within the assumed infrastructure costs and no Community Infrastructure Levy (CIL) allowance has been made. The no CIL assumption is based on the strategic nature of the proposed schemes and the inclusion of all the direct costs associated with creating the infrastructure they require being within this financial assessment.

In relation to affordable housing allowances, the policy level varies between the respective Local Authority areas:

- Braintree – the 2008-2014 Policy is 30% although, this may be increased to 40% pending a viability study.
- Colchester – policy is 20% as per the Focused Review to the Core Strategy.
- Tendring - as of the Core Strategy, an allowance of 30% affordable housing has been made.

These policy levels of affordable housing are subject to tests of viability on individual sites (as per National Planning Policy Framework guidance) if achieving the target level is shown to impact on the potential to bring forward the schemes. In practice, schemes with the infrastructure burden which exists here are unlikely to achieve target levels of affordable housing provision, particularly in the early phases. This would need to be tested as schemes come forward and detailed planning permission is sought but for analysis purposes only, it is considered that a flat rate of 25% affordable housing across all schemes is an appropriate level at this stage to test initial feasibility.

Growth

The assessment model has been run with scenarios that assume no cost or revenue inflation, and a scenario where modest cost and revenue inflation has been allowed for.

8.3 Values

Use Class	Values	West of Braintree	Marks Tey	North Colchester	East Colchester/ West Tendring	Notes
Residential Private	**Price (psf)**	£310	£300	£ 270	£ 270	
	Commentary	West of Braintree achieves the highest values out of the garden settlements sites. The area is characterised by market towns with good amenity value and schools, typically attracting a relatively wealthier buyer demographic. This is reflected in the product coming to the market which are predominantly family homes, with generous size and high specification finishes.	This locality has seen little newbuild activity and thus it is hard to determine current pricing levels. The Hampton Park scheme by Persimmon is the closest comparable (by distance) on the market, with asking prices equating to £377. This is noticeably expensive for the area and reflects the high asking prices relative to the size of units (800 sq ft for 3 bed, 1,345 sq ft for 4 bed). However homes being launched at the Oliver's Grove scheme are achieving 3 bed values of £300 psf which is more in line with the market.	This area has a lower tone of values compared to Braintree and Marks Tey and is characterised by high density, small homes on large estate developments. This area lacks the amenity offering (restaurants, shops etc) to be found in other locations which is reflected in the lower psf values.	Very similar pricing to North Colchester.	Data sourced from rightmove, zoopla and local agents.
Residential (Affordable)	**Price (psf)**	£171	£165	£149	£149	55% of private residential values.
	Rent (psf)	£13.50	£14.00	£16.25	£15.00	Rent for Marks Tey in Options 2 and 4 increases to £18.50 psf.

Use Class	Values	West of Braintree	Marks Tey	North Colchester	East Colchester/ West Tendring	Notes
B1	**Commentary**	Recent lettings/market demand indicators place Braintree rental values at a slight discount to Colchester ones.	Good quality of stock but softer demand compared to the Colchester northern business parks hence slight discount. Some units on local business parks currently struggling to let at £16 psf according to agents.	Strong demand from occupiers for these units on the Colchester northern business parks, achieving rents of £16 psf. Recent development activity at Axial Way suggests confidence in the occupier market.	Less established with small take up levels on a large site allocation. Future demand is predicated on business need for links with university. This untested market in conjunction with its poorer connectivity compared to other competing office hubs translates to a lower tone of value.	YIELDS Chelmsford is considered the prime regional office market , with deals achieving a benchmark capital value of 6.5% (Bidwells). Recent deals give guidance to expected sale values but pricing can be effected by the individual qualities of the asset in question. -The Octagon, Colchester 8.5%-largest office building in Colchester which has sold as a asset management opportunity given its current vacancy of 21%. This is reflected in the yield. -Jupiter House-8.25%-Brentwood (closer and better connected to London but it is a standalone development lacking the critical mass of occupiers associated with business parks schemes that characterise the local market) However a number of investors are buying into Colchester's occupational market which has good representation from corporates and reasonable take up levels. We would expect yields for new stock to be in the low-mid 7% range. However Braintree is not as established a commercial centre as Colchester, with a much more localised demand profile therefore to reflect its higher risk, we have re-rated upwards to 8%. Source - ELNA, PMA, Agents
	Yield (%)	7.50	7.50	7.00	7.00	Note - the yield for Marks Tey in Options 2 and 4 tightens to 7% as per Colchester.
	Rent (psf)	£7.50	£6.00	£6.75	£6.75	
B2/8	**Commentary**	Industrial demand strongest here due to the Stansted effect. Skyline achieves highest rents locally and recent speculative development has achieved up to £8 psf on letting (subject to size).	Assumed a lower end Colchester average for Marks Tey due to limited transactional evidence in the immediate area.	Recent letting of a high quality light industrial unit for £6.50 psf. Local agents have indicated that the best space at Severalls Park is going for £7 psf.	Similar market conditions to North Colchester as its northern boundary also benefits from close proximity to the large industrial cluster focused around Severalls Way. Space at this industrial location is in demand because it has excellent access to the A12.	YIELDS In Colchester prime yields for big sheds stand at 5.25%, albeit this is a limited market. It is unlikely requirements of such size and covenant will be demanded in our market. Standard units currently price at 5.5% (PMA). Typical investment transactions in Thurrock are trading at 6% and this is a better market giving its superior location, access to London and higher rental values (£8.75psf). That said, secondary stock in Witham and Colchester have reached yields of 6.5-7%, which leaves headroom for further yield compression on new purpose built industrial space. Therefore we consider that a yield of 6.5% would be more applicable to our Colchester garden sites and Braintree would benefit from a 0.25-0.5% yield movement inwards to reflect its stronger market fundamentals compared to Colchester. This correction is supported by a recent forward funding deal of a speculative industrial scheme at a yield of 6.25% (CW business space) Source - PMA
	Yield (%)	6.25	6.75	6.5	6.5	

Use Class	Values	West of Braintree	Marks Tey	North Colchester	East Colchester/ West Tendring	Notes
Retail	**Rent (psf)**	15.00	15.00	15.00	15.00	Retail rental rates quoted in the commentary reflect the best local rates for retail space in primary retail locations, where as retail on our possible sites will be correlated to the residential demand from the Garden Community rather than an occupier demand for space at a new retail destination. Given the envisioned difference in offering there will be a disconnect between what rents are being achieved in the best performing retail assets in the local market and what are site can realistically support. Therefore, an overall rate for all sites has been utilised which is a high level blend for a variety of mixed use and retail uses.
	Commentary	The Freeport Park agents have indicated that the tone of rents stand at £27.50-£28.50 psf.	The rental spread is based on recent lettings and rent reviews at the Tollgate centre.	99p Stores took 4,000 sq ft unit at Colchester retail park in April 2014 at just under £25 psf, while Intersport Sporting Pro had earlier taken a larger 12,000 sq ft store in September 2013 at £17 psf.	Less established retail centre, and so commands lower rental values at around £16-18 psf mark as evidence by recent rent reviews and Aldi's taking space at £16 psf.	RENTS Greater volatility in rental levels typically reflects the more diversified nature of retail stock and product which requires different trading formats. Retail investment well placed to access to a more varied risk profile which is mirrored in the yield. YIELDS PMA research places prime yields in Colchester generally at 6.25% which represents an inward movement of 0.25% as of 6months ago. The Lion Walk shopping centre recently sold at 6%, which equates to a cap value of £368 psf. However shopping centres attract a premium over other stock types and this is a fully let asset in what is considered a prime, in-town retail pitch. This would not be a like-for-like comparison but shows there is good investor appetite in the market. Factoring in typology of stock and recent investment sales, the following provide an indication to realistic cap rates: Hybrid retail parks could achieve 6.25%, a more traditional park would attract a yield of 6.75% (retail park in Maidstone reached 6.5%) Solus units with A1 consent and strong convenience could reach 5.5% Solus bulky comparison units with strong convenience could reach 6% (B&Q & Halfords) at Havering achieved 6.10%) Large food stores let to a grocer multiple could achieve 5.5% (Aldi in Witham achieved 5.75%) Braintree already has a performing out of town retail centre, with premium brands operating from Freeport outlet and good multiple representation at the adjacent park. It commands the highest rents out of the options. We believe it might attract a yield premium of 6% for a hybrid park. Colchester-out of town retail, unlikely to transact below town shopping centre prices so 6.25% has been reached to reflect the underlying fundamentals of this market. Marks Tey has a strong offering at Stanway and so is priced similar to North Colchester. Slight upward adjustment for East Colchester given the lack of critical mass in terms of offering in this locality.
	Yield	**6.5**	**6.5**	**6.5**	**6.5**	

8.4 Delivery Assumptions and Commentary

Residential Build and Sale Rate Assumptions

Given the heterogeneous nature of each site with unique variables in terms of housing volume, mix and delivery timeframe, it is only possible to refer generally to issues of typical build out rates in the analysis below, which won't necessarily reflect the reality of granular detail required to make a more accurate determination of completion rates on an individual basis.

However for the purposes of modelling it is assumed that an indicative development of 10,000 market units over a 20 year period equates to a prerequisite build out rate of 500 units pa, if the garden city is to be delivered within the desired timeframe.

In this semi-rural, urban fringe location, an individual house builder can typically achieve an average sales rate of circa 1 unit a week which is approximately 50-60 units pa. C&W's recent experience of working on strategic developments is that accelerated completion rates ranging from 120-160 units pa are being achieved on certain projects. For example in Ashford over 2,000 homes were delivered over the decade pre 2012 (sustaining sales of 100-130 dwellings pa or 8-10 per month) and C&W is aware of major schemes around Maidstone which are envisaging similar build out rates. C&W are also currently advising on strategic developments (of 1,000 – 2,000 units) in a number of locations within easy commuting distance of London where rates of circa 160 private units pa are being assumed (e.g. West Stevenage and Bishop Stortford). The common denominator shared across projects hitting an enhanced sales rates is significant public sector intervention at the outset that de-risks sites and enables the private housebuilders to accelerate their housebuilding program.

On strategic projects of scale there is often capacity to model multiple house builders working simultaneously on site. If done carefully, this will not necessarily jeopardise best pricing because each housebuilder will target a different buyer demographic resulting in a diversified product mix coming to the market, which minimises the risk of oversupply. The number of housebuilders accommodated can range up to 4-5 subject to considerations of scale and demand. Within each sales plot, C&W would typically model phasing/ sales as a shallow bell curve, with 1 or 2 brands on site to start with delivering fewer units and working up to more brands and more units before tailing off again. The inclusion of different tenure types (i.e. PRS, Starter Homes and Extra Care housing) may allow for a quicker build out rate without impacting on the sales rate of traditional housing and thus increase overall delivery rates.

It should be noted that all of this commentary relates to private residential housing only and excludes affordable housing. Affordable housing can typically (and this is the C&W assumption for this analysis) come forward much quicker than private housing as the driver of price is the rules and regulations around what is affordable as opposed to the demand and supply dynamics that drive private housing for sale. It can also speed up the phasing of private sales by improving developer's cashflow through early receipts from sale of the entire affordable housing to a registered provider. Therefore, any assessment of what is delivered from a private housing standpoint will have the proportionate quantum of affordable housing in addition (subject to a viability test in relation to if policy levels of affordable housing can be provided).

Whilst the proposed Garden Communities are separate to housing land already identified by the respective Local Authorities, they will sit within the wider context of the housing market in each Local Authority area. Therefore, the relationship to both the historic build rate within the local areas and the forecast need should be reflected upon:

- **Braintree:** the Monitoring Report 2015 for Braintree Council shows that the net supply of units delivered was 409 pa. This is an increase on the 2011/ 2012 figures produced by Braintree District Council Site Allocations and Development Management Policies Plan which set a managed delivery target for April 2012 of 247 additional dwelling pa. This was exceeded with net additional dwellings at 301 pa. In 2012/2013 the net additional dwelling target was 169, which was exceeded with 178 being provided. The Braintree 2015 Core Strategy projects a need (2016-2026) of 824 dwellings pa
- **Colchester:** the Colchester District Council Housing Strategy Evidence base demonstrates that from 2008 to 2013 an average rate of 770 was achieved in the Borough - this is below the local plan annual net additional dwelling target of 830. In 2014/2015 there was some improvement with 943 units delivered but this is still down from 2011 and 2012 levels. It is projected that the need from 2016 to 2026 will be 920 pa.
- **Tendring:** The Tendring Housing Supply and Requirement report (April 2016) sets out a need of 500-600 units pa and agrees on the use of the mid-point (550 units pa) as the Council's provisional housing target for the Local Plan. The Local Plan recommendation is to make provision for an increase of between 9,974 and 10924 new homes over the 17-year period 1st April 2015 to 31st March 2032 to meet objectively assessed housing needs

Residential Modelled Build Period and Absorption Assumptions

For the purposes of this analysis, it has been assumed that there would be a maximum of 3 sales outlets at any given time across each site based on 1 'significant' infrastructure access point; if a totally independent access point was available then it may constitute a 'separate' (at least for the formative years of the development of the Garden Community) development. This would be an 'aggressive' build out rate given the location of the sites outside of the strongest commuter locations in the Home Counties and it is not consider that adding additional sales outlets would be reasonable.

It is considered reasonable to differentiate Braintree and Marks Tey from the two sites close to Colchester because these Garden Communities are much more standalone in nature with more limited competition in an existing 'market'. These sites have the potential (if the required infrastructure and commercial mix is in place) for a build out rate which is relatively higher than the sites close to Colchester; the Colchester sites are likely to have more competition and would be being built in a location which already has a defined existing market with significant land supply in the pipeline. To illustrate this differential, it has been assumed that 3 sales outlets at any one time for Braintree and Marks Tey would be possible compared to 2 sales outlets at any one time for North Colchester and East Colchester/ West Tendring. For West of Braintree considerate is considered that although the visual impact of the quarry can be mitigated to some extent (and it is assumed that it would be), it is nevertheless considered important to reflect the limitations caused by it in the first 10-15 years of the development; to that extent, a small reduction in the rate per outlet (reduced from 60 to 50 pa) has been assumed. Therefore:

- For West of Colchester/Marks Tey options, an assumption of 60 private units per outlet equating to 180 homes pa. Adding a 25% affordable housing scenario contribution on top which gives a total for 240 homes pa.
- For West of Braintree options, an assumption of 50 private units per outlet equating to 150 homes pa. Adding a 25% affordable housing scenario contribution on top which gives a total for 200 homes pa.
- For the North Colchester and East Colchester/ West Tendring sites and options, an assumption of 60 private units per outlet, but modelled on 2 sales outlets which equates to a total of 120 units pa. Adding a 25% affordable housing scenario contribution on top which gives a total for 160 homes pa.

These assessments of potential trajectory are based on the typical house builder model and do not relate specifically to the Garden Settlement aims of the proposed developments nor the proposed delivery mechanism (i.e. including the influence of the Local Delivery Vehicles (LDVs) in partnership with the current landowners). Calculating the specific impact of this delivery mechanism and a relatively high level of public sector input is not an exact science, but C&W has utilised a scenario which accelerates the delivery rate by 50% based on:

- Public sector funding accelerates the delivery of infrastructure and significantly de-risks the overall development for plot developers and the master developer (with whom it is in partnership).
- Through marketing and promotion of the Garden Communities by the public sector, demand levels are 'deepened' allowing a faster delivery of units without compromising the minimum land price.
- The promotion and inclusion of alternative residential tenures/ sectors within the scheme to widen demand; e.g. self and custom build housing, sheltered housing, private rental stock and Starter Homes. In order to deliver these tenures (particularly at an early stage of the developments) may require additional support from the public sector to ensure it is viable.
- This would bring the projected build out rates to:
  - For Marks Tey - 360 units pa
  - For West of Braintree - 300 units pa
  - For North Colchester and East Colchester/ West Tendring – 240 units pa
- In all scenarios it is assumed that the first 2 years are at ¼ and ½ the rate respectively, in order to reflect a build-up of market demand.
- The above rates are for the first 13/14 years of the development.

Creating Critical Mass and Key Infrastructure Upgrades post 2032/33

After the initial 13/ 14 year period, following infrastructure upgrades and the creation of a degree of critical mass, there may be the potential to increase the build out rate further. There is a variety of infrastructure required to deliver each of the scenarios, for which the cost, timing and phasing have been estimated and reflected in the modelling. The following infrastructure improvement measures are present in all of the scenarios and specifically relate to transport improvements:

- Travel plan measures
- Introduction of a guided busway
- New transport Hub BRT / LRT
- New Junctions / road links
- Bus service / public transport improvements

Once fully implemented it is assumed that these improvements are likely to have a direct and upward impact on residential trajectories. For consistency it has been assumed that a single additional building outlet is added in each scenario from the year 2034/35 onwards, the point at which the entire above infrastructure is fully implemented. It is not considered appropriate to add the 50% uplift scenario in build out rates (to reflect that this is a Garden Settlement) as the 'sense of place' is assumed to have been established by this point. Rates would therefore increase as follows:

- West of Braintree: 300 to 380 pa
- Marks Tey: 360 to 440* pa

  Within Scenario 4 (and assuming a relocated Station), it is assumed that a quicker build out rate of 50 units pa for a five year period to reflect the release of higher density units near to the station would be possible.
- East Colchester: 240 to 320 pa
- North Colchester: 240 to 320 pa

Commercial Trajectories

Table 4 illustrates the existing stock and take up data for commercial space in the two primary occupier property markets in and around the proposed Garden Settlement locations (i.e. Braintree and Colchester). The data within Tables 4 and 5 comes from a variety of sources with the relevant acronym quoted in the tables following the below format

- BT RS - Braintree Retail Study
- Bidwells - The 2015 Business Space Data Book
- CRS - Colchester Retail Study
- CR - Completely Retail
- ELNA - Employment Land Need Assessment (2015)
- IPMR - Interim Property Market Report
- PMA - Property Market Analysis/PROMIS
- ONS - Office of National Statistics
- T ELR - Tendring Employment Land Review
- T RS - Tendring Retail Study

North Essex 'Property Markets'

	Braintree			Colchester		
Use Class	**A Class**	**B1**	**B2/B8**	**A Class**	**B1**	**B2/B8**
Total Stock (sq m)	**48,821** *town centre & freeport (BT RS) **73,000** *covers Braintree District	**204,000** (IPMR)	**746,000** (ONS)	**95,700** (PMA)	**208,000** (ELNA/PMA)	**660,000** (PMA)
Key Commercial centres (sq m)	Freeport: **27,000** Braintree Retail Park-**6,100** (source-PMA/CR)	Skyline Business Park: **46,500** Lakeside Innovative centre: **3,900** (source-PMA)	Springwood Industrial Estate: **40,000** (estimate) Broomhill Industrial Estate: **10,000** Lakes Industrial Park: **20,000** (estimate)	Tollgate Centre: **12,000** Turner Rise Retail Park: **11,600** Colchester Leisure Centre: **8,100** (source-CR)	Colchester Business Park-**23,200** Tollgate Business Park-**3,250** Knowledge gateway-potential **25,000**	Severalls Industrial Park: **25,000** Peartree Road Industrial Estate: **5,500**
PA Take up (sq m)	**3,900** (2015,EGI)	**5,900** (2015,EGI)	**9,800** (2014, Bidwells)	***3,500** (2014, PMA)	**4,180** avg **5,760** (2015, Bidwells) **1,670** (2014, PMA) **5,110** (2013, PMA)	**14,000** avg 2015-**12,080** (PMA for all dates) 2014-**22,670** 2013-**8,450** 2012-**15,980** 2011-**10,780**
Notes				*Take up figures aren't inclusive of independent retail lettings	Office take up in 2014 fell 67% compared with 2013. To put the 2014 take up level in Colchester in a historic context, the annual average since the 2008 crash has been 3,250 sqm , while the 1999-2008 average was 3,250 sqm. (PMA) Past development rates (ELNA) Office-3,340 sqm per annum (2006-2011)	Large units - of over 10,000 sq m - are of limited importance in Colchester, with more activity seen within smaller production/warehouse units. Over the last five years the 10,000 to 25,000 sq ft sizeband has seen the largest share of take up at 33%. In comparison, over the last year to Q2 2015, the 50,000 to 100,000 sq ft sizeband has seen the largest share of take up at 43%.

Table 37: Commercial Property Market Volumes in and around proposed Garden Settlement locations

Whilst Table 4 gives a past trend perspective of A and B class uses within the Braintree and Colchester areas, all three Councils also produce data in terms of their forecast for the future floorspace requirements within their areas. Table 5 sets out this information for Braintree, Colchester and Tendring. It should be noted that these estimates do not take into account the potential for a significant Garden Settlement and the figures used in our assessment are based on demand exclusive of the existing forecasts for the three Local Authority areas.

Future Floorspace Requirements

	Braintree			Colchester			Tendring		
Use Class	**A1**	**B1**	**B2/8**	**A Class (2012-2026)**	**B1 (2014-2032)**	**B2/8 (2014-2032)**	**A Class (2015-2033)**	**B1**	**B2/8**
Total Floorspace (sq m)	**27,000** (Braintree town centre & Freeport combined) Source: BT RS	**55,500** (BT ELNA)	**7,000** * (BT ELNA)	**46,000** (CRS)	*4 different models projected different floorspace requirements Model 4 predicts floorspace by future labour supply **Model 1-Baseline Job** 94,500 **Model 2-Past completion rates** 60,445 (based on 2006-11 completions rate) **Model 3-higher past completion rates** 60,445 **Model 4-Labour supply** 76,000	**Model 1** 9,700 **Model 2** 189,900 NOTE: this figure heavily distorted by Flakt Woods whose consolidation process equated to over 100,000 sq m loss of industrial space in 2006,08 & 09. **Model 3-PDR excl Flakt Woods activity** 117,300 Model 4-Labour supply 28,400	**17,545** (T RS) convenience floorspace: 1330 sq m comparison floorspace:16,215 sq m	2009-15 average take up per annum was **1,000** (T ELR)	2009-15 average take per annum was **3,900** (T ELR)
Blended avg per annum (rounded)	**1,500**	**3,100**	**390**	**3,000**	**4,200 (model 4 result)**	**1,600 (model 4 result)**	**1,000**	**TBC**	**TBC**
Notes		Office demand will grow at an average rate of 1.3% per annum, slightly higher than across the rest of the PMA, equating to a 27% increase overall	*This figure masks dual spatial trends for subsectors: warehousing (B8) net increase of 32,700 manufacturing net loss of 39,000						

Table 38: Local Authority Commercial Floorspace Projections

In terms of understanding future demand for employment and commercial space (to support the respective build out trajectories), the high level plans of three of the major economic drivers within the North Essex sub-region, namely the Stansted Airport/ M11 corridor, the University of Essex and the Haven Gateway, have been reviewed. The most relevant and quantifiable impacts appear likely to come from the Stansted Airport/ M11 corridor (20,000 net additional jobs forecast as the airport grows to its capped level of 35 million air movements pa) and the University of Essex (2,000 jobs as it seeks to development circa 37,000 sq m of office space).

Across the sites employment floor space has been applied for B1 and B2/ B8 use classes, with the relative split being 50:50 for West of Braintree and Marks Tey and 70:30 for North Colchester and East Colchester/ West Tendring. The higher proportion of B1 for North Colchester and East Colchester/ West Tendring broadly matches the proportion within the forecast pa mix for Colchester in Table 5 whilst the lower level for the two other sites reflects the relative strength of the industrial market in Braintree and the strong logistics position presented by Marks Tey.

In terms of the individual take up rates for each settlement, is has been assumed that rather than absorbing a portion of existing market churn, a settlement would emerge synergistically alongside the existing market and add to the demand profile within the area. The rate at which this will occur can be highly variable but based on the scale of the envisaged settlements, an assumed build out/ take up rates of 20-25% of the respective pa take up levels (combining B1 and B2/ B8) identified in Table 4 for West Braintree, North Colchester and East Colchester/ West Tendring, has been used. This is not a scientific exercise, but from C&W's agency experience on significant new/ emerging developments, these build out rates are not unreasonable. The B1 element forms a relatively higher proportion of the take up assumption for North Colchester and East Colchester/ West Tendring compared to West of Braintree in line with the earlier commentary. For West Colchester/Marks Tey an enhanced take up rate based on its strategic position on road and rail networks, the relative 'standalone' nature of its setting and the large scale of development compared to the other locations, has been applied. Whilst some of the strategic advantages of Marks Tey could be seen to apply to the two other sites sitting partly within Colchester Borough, the same enhancement on those sites has not been used given the relatively mature existing market and pipeline which it is considered may restrict take up to some extent.

This gives a build out rate of:

West of Braintree:

- B1 2,500 sq m pa
- B2/ B8 1,500 sq m pa

Marks Tey:

- B1 3,750 sq m pa
- B2/ B8 3,000 sq m pa

North Colchester:

- B1 2,500 sq m pa
- B2/ B8 1,500 sq m pa

East Colchester:

- B1 2,500 sq m pa
- B2/ B8 1,500 sq m pa

It has been assumed that the first 2 years of B1 take up would be at double the above rates for each scenario, to reflect the need for the commercial element of the scheme to reach a certain critical mass; it is also considered prudent for this first element of B1 space to lag the initial residential development by 2 years to give occupiers more confidence in the wider environment. The B2/ B8 space is delivered without a time lag given the more limited amenity requirements of occupiers compared to B1 occupiers. This leads to build out of the schemes (even in the biggest development) pre 2040 and prior to completion of the residential developments. It has also been assumed that should Marks Tey Station be moved (Option 4) to a more central location there will be an opportunity for a higher scale of commercial development which will double the build out rate for four years.

In relation to the trajectory of the delivery of retail space, Given the location of the settlements on the verges of existing retail centres such as Freeport (Braintree) and Tollgate (Colchester) for example, It is assumed that new retail will take the form of neighbourhood centres serving the new residential communities and will predominantly be tied to the residential floorspace trajectories (although in reality delivery will be 'lumpy' to a degree). The modelling has therefore tied retail build out trajectories to residential trajectories as this is considered the most appropriate approach at this level of analysis on the basis of limited comparison retail and no change in the local retail hierarchy.

8.5 Observations

Whilst all options appear from preliminary analysis to be in principle capable of positive scheme viability, the Model and outputs are extremely sensitive to variations in input values and assumptions.

East Colchester/ West Tendring

- Capable of positive viability.
- Relatively low residential values but strong potential for growth, influenced by University of Essex.
- The nearby settlement of Wivenhoe is close to the University too, and has some of the highest residential property values; potentially comparable to the ambition of the Garden Community.
- Low industrial take-up (limited future demand identified)
- B1 positive given university link but minimal viability impact
- Potential for increasing scale to reduce viability
- Highest infrastructure cost per unit
- Perception and attractiveness of area for investment, including office space location, would benefit from addressing congestion issues locally and including the town centre.

North Colchester

- Capable of positive viability.
- Relatively low residential values
- Low industrial take-up (limited future demand identified)
- Strongest B1 potential, especially given proximity to A12, but may have limited scale and therefore viability impact .
- Infrastructure cost per unit diluted in Scenario 2 however does not improve viability.
- Significant new local retail provision may limit what can be delivered by this option.
- Infrastructure costs per unit diluted in Option 2, but this does not improve overall viability.

West of Colchester/Marks Tey

- Capable of positive viability.
- Residential values slightly below West of Braintree, but historically higher than wider Colchester area.
- Potential to create a significant development which controls its own environment and drives residential values and viability.
- Local evidence exist of good levels of employment space demand.
- B1 & B2/ B8 relatively high take up but potential short term suppressed rents given unestablished market
- Provision of new flexible office space could be suitable at Marks Tey, including gateway potential from transport perspective.
- Potential for reduced viability if significant transport infrastructure requirements are considered necessary for largest development option (Option 4)

West of Braintree

- Capable of positive viability.
- Highest residential values
- Potential to create a significant development which controls its own environment and drives residential values and viability.
- Relatively high employment/industrial rents
- Highest potential serviced land value
- Good access to A120
- Evidence shows sufficient employment market demand and depth to absorb growth.
- Potential to benefit from Stansted/ M11 corridor effect
- Potential for marginal negative viability effect from increased scale (Option 2)

09 Sub-Regional Connectivity

9.1 Sub-Regional Connectivity

9.2 Precedents/Case Studies

9.1 Sub-Regional Connectivity

Sub-Regional Transport Strategy

Without sub-regional public transport intervention, it is highly unlikely that the sites will benefit from the levels of uptake in sustainable transport use required, and car borne travel will prevail. Sub-regional public transport solutions would also ensure that the Garden Communities are not only connected with key destinations within the sub-region, but would also be served by internal movement within the sites (very important given the size of the areas considered), thus reducing private car use.

Given the existing traffic congestion on the current A120 and A12 routes, their strategic and local nature and the proposed growth in population, public transport connectivity will help to support wider sub-regional growth. Without connections the capacity of the strategic roads will be further eroded. As such these Garden Communities should forward plan and implement upfront infrastructure to ensure uptake in active and public transport modes, this is particularly important in the lead up to 2032 and beyond.

Three options have been looked at to provide sub-regional connectivity in North Essex as well as site wide access and connectivity. It is evident that certain solutions may suit different Garden Community site options in different ways, based entirely on re-purposing the existing public transport network available. It is also important to consider journey times via these pieces of infrastructure, journey times must be comparable to the private car otherwise it will be difficult to promote public transport as the key solution. Evidently parts of all three options could also be explored in future to allow for flexible and fast solution to site wide and regional movement.

The sub-regional transport options identified are based on a high level analysis of the gaps in the transport network in the region and in light capacity constraints on the London – Norwich rail corridor. Likely demand for movement resulting from the NEGC's. would therefore require further study to be defined in the future.

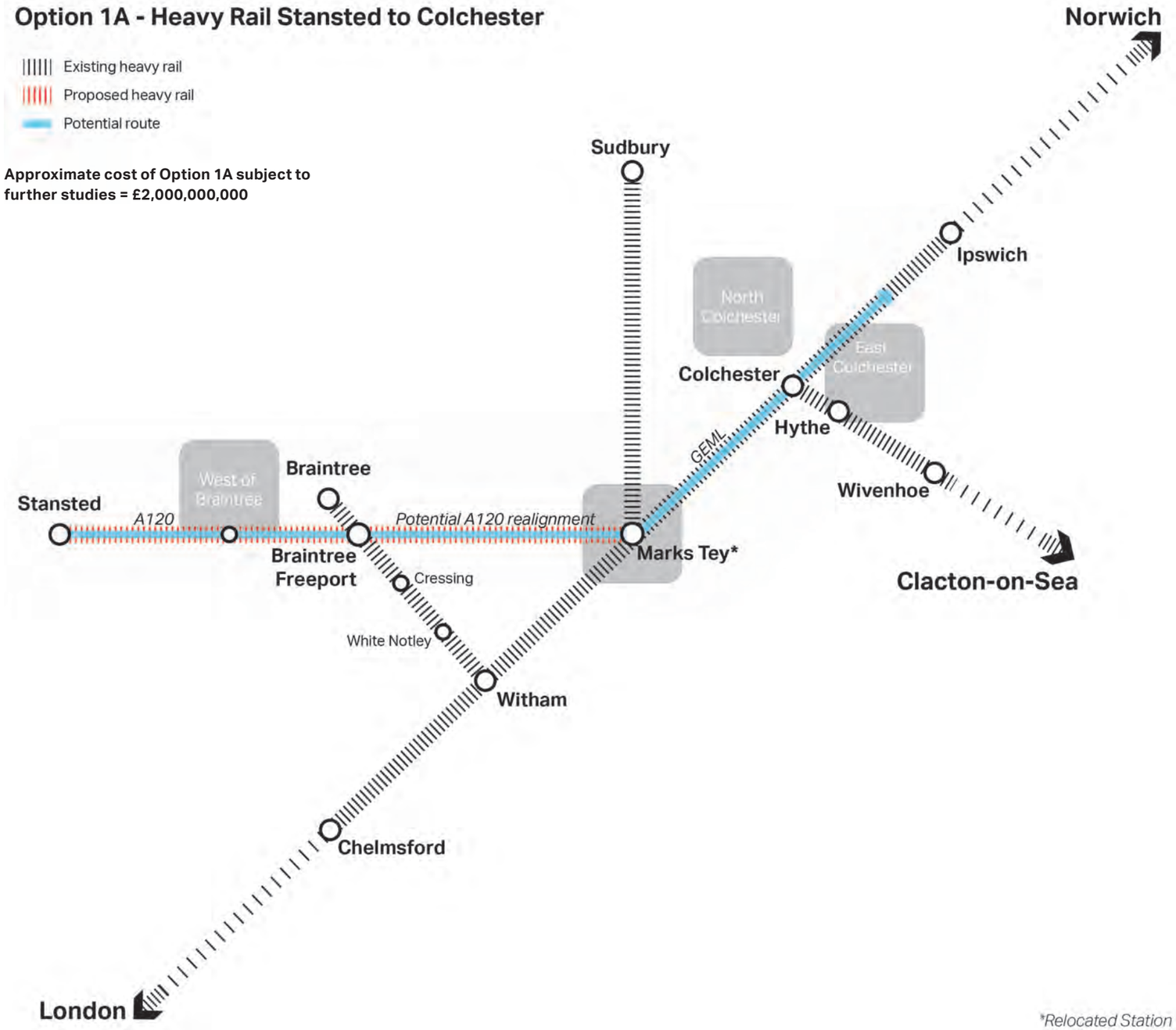
Option 1A

This options constitutes the most ambitious sub-regional transport solution, providing a new East-West heavy rail link between Marks Tey and Stansted Airport, following the alignment of the possible future A120 road between Marks Tey and Braintree, and the alignment of the current dualled section of the A120 between Braintree and Stansted. Strategically the route offers the opportunity to link the Great Eastern Mainline (GEML) to West Anglia Mainline (WAML), providing not only a passenger service between Suffolk, North Essex and potentially future services from London via Crossrail 2, but also an opportunity to develop a freight line cross country avoiding the congested network at Stansted and in turn freeing up commuter train capacity. Along the route stations located at the west of Braintree site, Braintree Freeport, Marks Tey site and continuing via the GEML to Colchester and beyond to Ipswich and Norwich act as the necessary piece of infrastructure to link the Garden Communities with local and regional centres.

Option 1A - Heavy Rail Stansted to Colchester

Existing heavy rail
Proposed heavy rail
Potential route

Approximate cost of Option 1A subject to further studies = £2,000,000,000



Option 1B

Offering an alternative solution to Option 1A, Option 1B promotes a sub-regional tram-train network. This would utilise and re-purpose the existing branch line rail network on the GEML and overall would require limited infrastructure upgrades. This network would consist of four main sections:

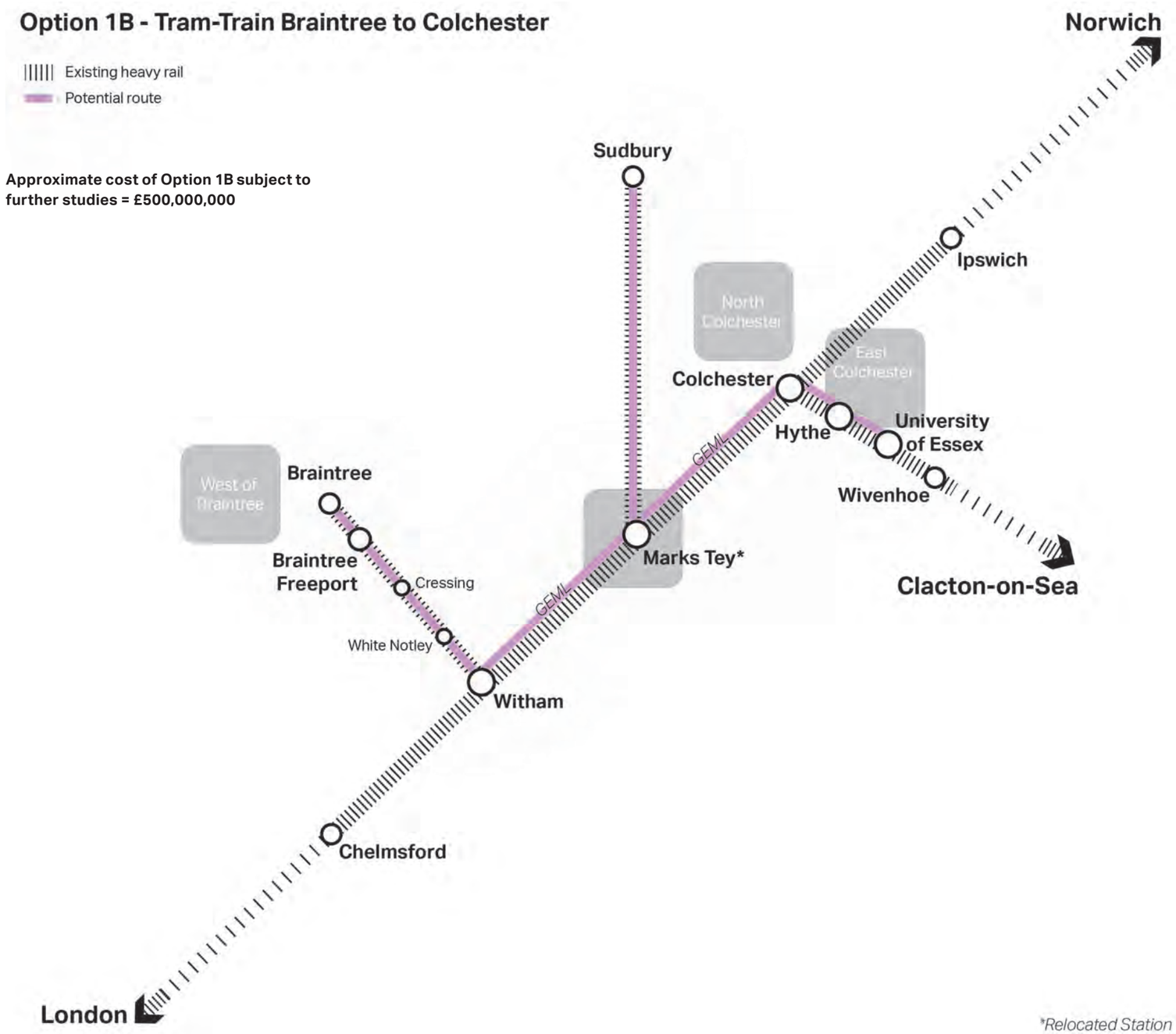
- The Braintree branch line (Flitch Line): whilst continuing to allow the one through service to London to continue, tram-trains on this rail line could operate on a 10 minute frequency, dramatically increasing the number of trains between Braintree and Witham or other further destinations
- The GEML: question of capacity on this section needs to be addressed with Network Rail, however Tram-trains in theory could run from Witham to Colchester station via existing track and or more likely a third line, improving North Essex inter urban connectivity and linking Marks Tey and Colchester sites.
- The Sudbury Branch line: in a similar fashion to the Braintree branch line, trams-trains could connect Sudbury with Marks Tey and in doing so highly link the internal areas of the Marks Tey site, providing both solution to internal movement as well as links with the wider network.
- The Sunshine Coast line: from Colchester Mainline station the tram-train network could continue on the sunshine coast line, via Hythe to a potential new station at the University of Essex serving both the University and the East Colchester site.

Option 1B - Tram-Train Braintree to Colchester

Existing heavy rail

Potential route

Approximate cost of Option 1B subject to further studies = £500,000,000



*Relocated Station

Option 1C

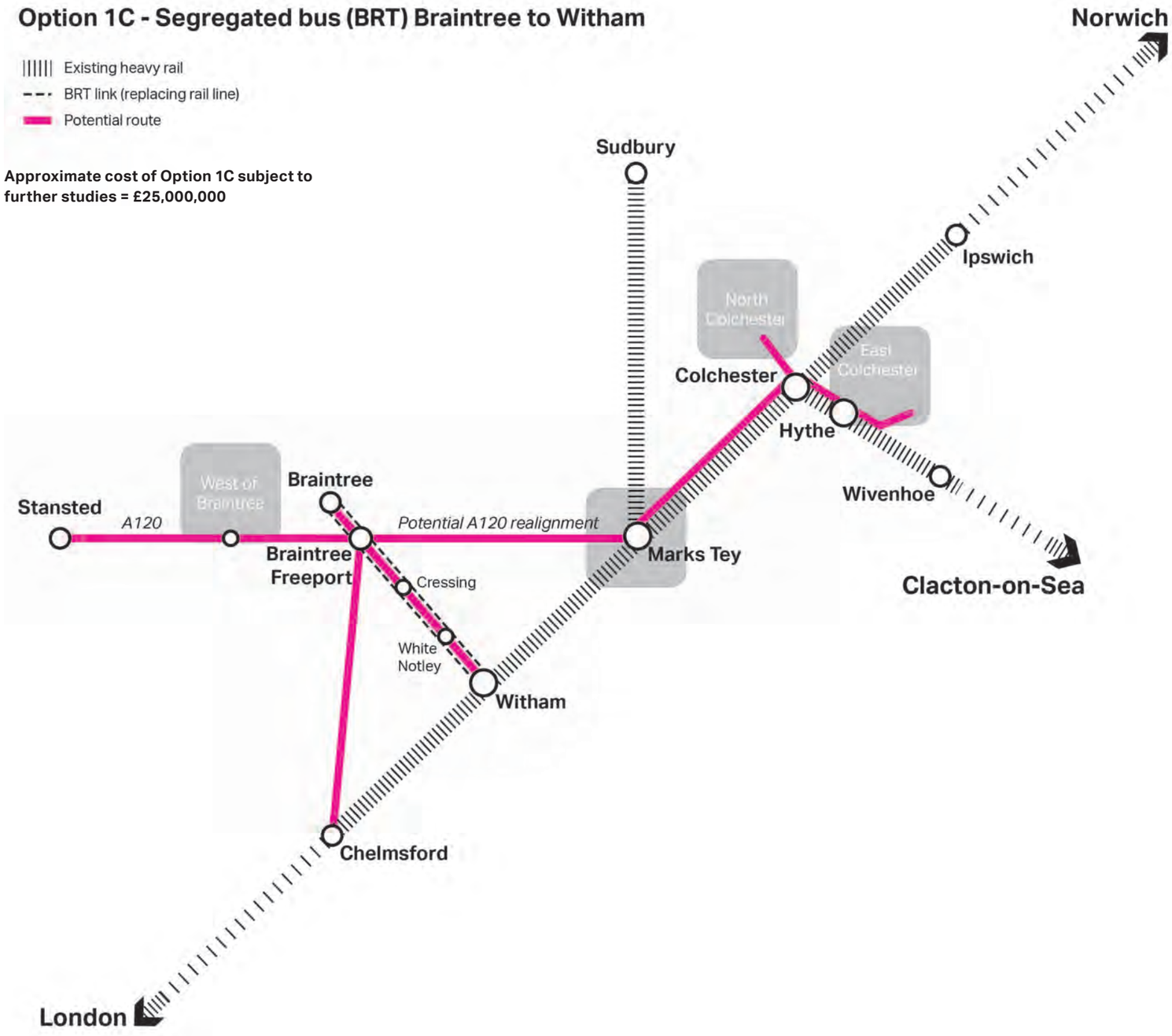
This option offers a road based solution to North Essex connectivity by promoting a combined Bus Rapid Transit (BRT), part in-traffic and part-segregated bus network between the main North Essex towns and Garden Communities. The network would allow a flexible approach to bus movement in the region and provide a highly connected system of routes, utilising existing strategic road network as well as future highway infrastructure, streets within sites and re-purposed sections of rail lines. This network could constitute the following main sections of infrastructure and bus routes:

- Between Stansted Airport running in-traffic on the A120, serving the West of Braintree site via segregated bus lanes and connecting with Braintree Freeport station and commercial centre.
- From Braintree Freeport to Chelmsford, part in-traffic via the A131 serving Skyline 120 employment site, and part segregated on the planned North East Chelmsford A130 Bypass.
- From Braintree Town Centre Station to Witham Station, via a fully guided BRT utilising the current Flitch Line alignment (replacement of rail tracks with guided bus infrastructure) providing for a much improved frequency of service to the GEML and potentially a direct service from the West of Braintree site.
- From Braintree Freeport to Marks Tey, running on the potential future A120 realignment (one of several options being considered by ECC to alleviate congestion along this strategically important route) and serving Marks Tey Garden Community.
- From Marks Tey to Colchester running in-traffic on the A12. Locally integrating the existing part-segregated P&R service from Colchester town centre to North Colchester site and the proposed BRT from Colchester town centre to the University of Essex campus in Colchester and the East Colchester Garden Community.

Option 1C - Segregated bus (BRT) Braintree to Witham

Existing heavy rail
BRT link (replacing rail line)
Potential route

Approximate cost of Option 1C subject to further studies = £25,000,000



9.2 Precedents / Case Studies

Europe: Kassel Regio Tram-Train (Germany)

- Operational since 2007.
- 184km long tram-train connecting Kassel in central Germany to surrounding cities. Only 6km of newly constructed route, the remaining sections utilise existing rail lines.
- Original cost - EUR180m
- 4 lines connecting Kassel
- 30 minute frequency on average
- Utilises tram lines and regional rail lines
- 3 car trains reaching speeds of 100kph
- Hybrid diesel / electric vehicles – flexibility in utilising existing rail infrastructure. i.e. electrification of line in city centres, diesel on rural links

UK : Sheffield SuperTram

- 2008 DfT first announced plans to operate a trial tram-train on the Penistone Line in South Yorkshire.
- 2012 DfT approval for trial, with a commitment of £58m towards the construction of a 400m link between the Network Rail and Supertram networks, electrification of 8 miles of the route to Rotherham and the purchase of seven new tram-train vehicles.
- Length 60km – 3lines
- Connecting Sheffield to Halfway (33min), Malin Bridge (21min), Meadowhall (17min), Middlewood (18min) and Herdrings park (17min)
- 2017 to Rotterham
- 10 minute frequency on average
- Reaches speeds of 80kph
- Annual ridership: 11.5m (2014/2015)
- Capacity - Seat 104 / standing (4 pass/m^2) 140 = circa 250 passengers per train

UK: Luton-Dunstable Guided Busway

- Operational since 2013.
- Length : 13,4km – utilises stretch of old rail line
- Cost circa: £91m
- Connecting Luton Airport to Dunstable in 20 minutes and Houghton Regis in 30 minutes
- 15 minute frequency on average
- Reaches speeds of 80kph

UK: Cambridgeshire Guided Busway

- Operational since 2011.
- Length : 25km
- Original cost circa; £181m
- Connecting Cambridge to Huntingdon (60min) and Trumpington (15min)
- 7 minute frequency on average
- Reaches speeds of 90kph

UK: Fastrack busway

- Operational since 2008.
- Connecting Dartford to Bluewater (25min), Ebbsfleet International station (40min) and Gravesend (50min)
- 10 minute frequency on average

Kassel Regio Tram-Train (Germany)
Source: Google Images

Sheffield SuperTram
Source: Google Images

Cambridge Guided Busway
Source: Google Images

APPENDIX 1

Indicative Development Capacity Schedules

East of Colchester / West of Tendring

The following tables provide the high level breakdown of land use by parcel for each option consistent with the assumptions described in Section 2 of this Report. They have not been developed through an exercise of concept masterplanning. They are intended only to contribute to an initial understanding of viability to help inform judgements relating to option potential as part of the Councils' wider considerations of planning for strategic growth in the development of the emerging local plans.

East of Colchester/West Tendring: Scenario 01

Total Site Area m2	Total Site Area Ha
4,722,073	**472**

Zone No	Area (m2)	Developable Area (Ha)	Open Space %	Mixed Use %	Employment %	Roads, Footpaths and Parking %	Residential %	100% check	Open Space m2	Mixed Use m2	Employment m2	Roads, Footpaths and Parking m2	Residential m2	Residential Developable Area (Ha)	Density / Capacity: DpHa	Density / Capacity: Dwellings	GIA: 2b 4ppl (79 sq. m GIA)	Efficiency: 5%	GEA: sq. m.	Percentage split: B1 %	Percentage split: B2/B8 %	GEA: B1	GEA: B2/B8
1	1,597,167	160	20%	2%	1%	15%	62%	100%	319,433	31,943	15,972	239,575	990,243	99	30	2,971	234,687.7	11734.4	246,422.1	70%	30%	11180.17	4791.50
2	981,024	98	20%	2%	2%	15%	61%	100%	196,205	19,620	19,620	147,154	598,425	60	30	1,795	141,826.7	7091.3	148,918.0	70%	30%	13734.34	5886.14
3	485,085	49	20%	2%	1%	15%	62%	100%	97,017	9,702	4,851	72,763	300,753	30	30	902	71,278.4	3563.9	74,842.4	70%	30%	3395.60	1455.26
4	515,084	52	20%	2%	2%	15%	61%	100%	103,017	10,302	10,302	77,263	314,201	31	30	943	74,465.6	3723.3	78,188.9	70%	30%	7211.17	3090.50
Total	3,578,360	**358**							715,672	71,567	50,745	536,754	2,203,622	**220**		**6,611**	**522,258.4**		**548,371.3**			**35521.3**	**15223.4**
									72ha	**7ha**	**5ha**	**54ha**	**220ha**				**52ha**		**55ha**			**3.5ha**	**1.5ha**

East of Colchester/West Tendring: Scenario 02

Total Site Area m2	Total Site Area Ha
6,391,704	**639**

Zone No	Area (m2)	Developable Area (Ha)	Open Space %	Mixed Use %	Employment %	Roads, Footpaths and Parking %	Residential %	100% check	Open Space m2	Mixed Use m2	Employment m2	Roads, Footpaths and Parking m2	Residential m2	Residential Developable Area (Ha)	Density / Capacity: DpHa	Density / Capacity: Dwellings	GIA: 2b 4ppl (79 sq. m GIA)	Efficiency: 5%	GEA: sq. m.	Percentage split: B1 %	Percentage split: B2/B8 %	GEA: B1	GEA: B2/B8
1	1,597,167	160	20%	2%	1%	15%	62%	100%	319,433	31,943	15,972	239,575	990,243	99	30	2,971	234,687.7	11734.4	246,422.1	70%	30%	11180.17	4791.50
2	981,024	98	20%	2%	2%	15%	61%	100%	196,205	19,620	19,620	147,154	598,425	60	30	1,795	141,826.7	7091.3	148,918.0	70%	30%	13734.34	5886.14
3	485,085	49	20%	2%	1%	15%	62%	100%	97,017	9,702	4,851	72,763	300,753	30	30	902	71,278.4	3563.9	74,842.4	70%	30%	3395.60	1455.26
4	515,084	52	20%	2%	2%	15%	61%	100%	103,017	10,302	10,302	77,263	314,201	31	30	943	74,465.6	3723.3	78,188.9	70%	30%	7211.17	3090.50
5	450,296	45	20%	2%	0%	15%	63%	100%	90,059	9,006	0	67,544	283,687	28	30	851	67,233.7	3361.7	70,595.4	70%	30%	0.00	0.00
6	725,729	73	20%	2%	0%	15%	63%	100%	145,146	14,515	0	108,859	457,209	46	30	1,372	108,358.5	5417.9	113,776.5	70%	30%	0.00	0.00
Total	4,754,385	**475**							950,877	95,088	50,745	713,158	2,944,518	**294**		**8,834**	**697,850.7**		**732,743.2**			**35521.27**	**15223.40**
									95ha	**10ha**	**5ha**	**71ha**	**294ha**				**70ha**		**73ha**			**3.5ha**	**1.5ha**

East of Colchester/West Tendring: Scenario 03

Total Site Area m2	Total Site Area Ha
8,160,933	**816**

Zone No	Area (m2)	Developable Area (Ha)	Open Space %	Mixed Use %	Employment %	Roads, Footpaths and Parking %	Residential %	100% check	Open Space m2	Mixed Use m2	Employment m2	Roads, Footpaths and Parking m2	Residential m2	Residential Developable Area (Ha)	Density / Capacity: DpHa	Density / Capacity: Dwellings	GIA: 2b 4ppl (79 sq. m GIA)	Efficiency: 5%	GEA: sq. m.	Percentage split: B1 %	Percentage split: B2/B8 %	GEA: B1	GEA: B2/B8
1	1,597,167	160	20%	2%	1%	15%	62%	100%	319,433	31,943	15,972	239,575	990,243	99	30	2,971	234,687.7	11734.4	246,422.1	70%	30%	11180.17	4791.50
2	981,024	98	20%	2%	2%	15%	61%	100%	196,205	19,620	19,620	147,154	598,425	60	30	1,795	141,826.7	7091.3	148,918.0	70%	30%	13734.34	5886.14
3	485,085	49	20%	2%	1%	15%	62%	100%	97,017	9,702	4,851	72,763	300,753	30	30	902	71,278.4	3563.9	74,842.4	70%	30%	3395.60	1455.26
4	515,084	52	20%	2%	2%	15%	61%	100%	103,017	10,302	10,302	77,263	314,201	31	30	943	74,465.6	3723.3	78,188.9	70%	30%	7211.17	3090.50
5	450,296	45	20%	2%	0%	15%	63%	100%	90,059	9,006	0	67,544	283,687	28	30	851	67,233.7	3361.7	70,595.4	70%	30%	0.00	0.00
6	725,729	73	20%	2%	0%	15%	63%	100%	145,146	14,515	0	108,859	457,209	46	30	1,372	108,358.5	5417.9	113,776.5	70%	30%	0.00	0.00
7	139,100	14	20%	2%	3%	15%	60%	100%	27,820	2,782	4,173	20,865	83,460	8	30	250	19,780.0	989.0	20,769.0	70%	30%	2921.10	1251.90
8	296,757	30	20%	2%	0%	15%	63%	100%	59,351	5,935	0	44,514	186,957	19	30	561	44,308.8	2215.4	46,524.3	70%	30%	0.00	0.00
9	752,376	75	20%	2%	2%	15%	61%	100%	150,475	15,048	15,048	112,856	458,950	46	30	1,377	108,771.1	5438.6	114,209.6	70%	30%	10533.27	4514.26
10	222,570	22	20%	5%	2%	15%	58%	100%	44,514	11,128	4,451	33,385	129,090	13	30	387	30,594.4	1529.7	32,124.1	70%	30%	3115.97	1335.42
Total	6,165,188	**617**							1,233,038	129,981	74,417	924,778	3,802,975	**380**		**11,409**	**901,305.0**		**946,370.2**			**52091.62**	**22324.98**
									123ha	**13ha**	**7ha**	**92ha**	**380ha**				**90ha**		**95ha**			**5ha**	**2ha**

North of Colchester

The following tables provide the high level breakdown of land use by parcel for each option consistent with the assumptions described in Section 2 of this Report. They have not been developed through an exercise of concept masterplanning. They are intended only to contribute to an initial understanding of viability to help inform judgements relating to option potential as part of the Councils' wider considerations of planning for strategic growth in the development of the emerging local plans.

North of Colchester: Scenario 01

Total Site Area m2	Total Site Area Ha
4,573,458	**457**

Zone No	Area (m2)	Developable Area (Ha)	Open Space %	Mixed Use %	Employment %	Roads, Footpaths and Parking %	Residential %	100% check	Open Space m2	Mixed Use m2	Employment m2	Roads, Footpaths and Parking m2	Residential m2	Residential Developable Area (Ha)	Density / Capacity: DpHa	Density / Capacity: Dwellings	GIA: 2b 4ppl (79 sq. m GIA)	Efficiency: 5%	GEA: sq. m.	Percentage split: B1 %	Percentage split: B2/B8 %	GEA: B1	GEA: B2/B8
1	294,778	29	30%	0%	0%	15%	55%	100%	88,433	0	0	44,217	162,128	16	30	486	38,424.3	1921.2	40,345.5	70%	30%	0.00	0.00
2	380,410	38	20%	2%	2%	15%	61%	100%	76,082	7,608	7,608	57,061	232,050	23	30	696	54,995.8	2749.8	57,745.6	70%	30%	5325.73	2282.46
3	278,795	28	90%	0%	0%	5%	5%	100%	250,916	0	0	13,940	13,940	1	30	42	3,303.7	165.2	3,468.9	70%	30%	0.00	0.00
4	416,991	42	20%	2%	2%	15%	61%	100%	83,398	8,340	8,340	62,549	254,364	25	30	763	60,284.4	3014.2	63,298.6	70%	30%	5837.87	2501.95
5	961,073	96	20%	2%	2%	15%	61%	100%	192,215	19,221	19,221	144,161	586,255	59	30	1,759	138,942.4	6947.1	145,889.5	70%	30%	13455.03	5766.44
6	763,839	76	20%	2%	2%	15%	61%	100%	152,768	15,277	15,277	114,576	465,942	47	30	1,398	110,428.3	5521.4	115,949.7	70%	30%	10693.75	4583.04
7	184,166	18	20%	2%	2%	15%	61%	100%	36,833	3,683	3,683	27,625	112,341	11	30	337	26,624.8	1331.2	27,956.1	70%	30%	2578.32	1104.99
8	614,575	61	20%	2%	2%	15%	61%	100%	122,915	12,292	12,292	92,186	374,891	37	30	1,125	88,849.1	4442.5	93,291.6	70%	30%	8604.05	3687.45
Total	3,894,627	**389**							1,003,560	66,421	66,421	556,315	2,201,910	**220**		**6,606**	**521,852.8**		**547,945.4**			**46494.76**	**19926.32**
									100ha	**7ha**	**7ha**	**56ha**	**220ha**				**52ha**		**55ha**			**5ha**	**2ha**

North of Colchester: Scenario 02

Total Site Area m2	Total Site Area Ha
6,809,694	**681**

Zone No	Area (m2)	Developable Area (Ha)	Open Space %	Mixed Use %	Employment %	Roads, Footpaths and Parking %	Residential %	100% check	Open Space m2	Mixed Use m2	Employment m2	Roads, Footpaths and Parking m2	Residential m2	Residential Developable Area (Ha)	Density / Capacity: DpHa	Density / Capacity: Dwellings	GIA: 2b 4ppl (79 sq. m GIA)	Efficiency: 5%	GEA: sq. m.	Percentage split: B1 %	Percentage split: B2/B8 %	GEA: B1	GEA: B2/B8
1	294,778	29	30%	0%	0%	15%	55%	100%	88,433	0	0	44,217	162,128	16	30	486	38,424.3	1921.2	40,345.5	70%	30%	0.00	0.00
2	380,410	38	20%	2%	2%	15%	61%	100%	76,082	7,608	7,608	57,061	232,050	23	30	696	54,995.8	2749.8	57,745.6	70%	30%	5325.73	2282.46
3	278,795	28	90%	0%	0%	5%	5%	100%	250,916	0	0	13,940	13,940	1	30	42	3,303.7	165.2	3,468.9	70%	30%	0.00	0.00
4	416,991	42	20%	2%	2%	15%	61%	100%	83,398	8,340	8,340	62,549	254,364	25	30	763	60,284.4	3014.2	63,298.6	70%	30%	5837.87	2501.95
5	961,073	96	20%	2%	2%	15%	61%	100%	192,215	19,221	19,221	144,161	586,255	59	30	1,759	138,942.4	6947.1	145,889.5	70%	30%	13455.03	5766.44
6	763,839	76	20%	2%	2%	15%	61%	100%	152,768	15,277	15,277	114,576	465,942	47	30	1,398	110,428.3	5521.4	115,949.7	70%	30%	10693.75	4583.04
7	184,166	18	20%	2%	2%	15%	61%	100%	36,833	3,683	3,683	27,625	112,341	11	30	337	26,624.8	1331.2	27,956.1	70%	30%	2578.32	1104.99
8	614,575	61	20%	2%	2%	15%	61%	100%	122,915	12,292	12,292	92,186	374,891	37	30	1,125	88,849.1	4442.5	93,291.6	70%	30%	8604.05	3687.45
9	376,515	38	20%	2%	2%	15%	61%	100%	75,303	7,530	7,530	56,477	229,674	23	30	689	54,432.8	2721.6	57,154.4	70%	30%	5271.21	2259.09
10	809,760	81	20%	2%	2%	15%	61%	100%	161,952	16,195	16,195	121,464	493,954	49	30	1,482	117,067.0	5853.3	122,920.3	70%	30%	11336.64	4858.56
11	424,803	42	20%	2%	2%	15%	61%	100%	84,961	8,496	8,496	63,720	259,130	26	30	777	61,413.7	3070.7	64,484.4	70%	30%	5947.24	2548.82
12	315,862	32	20%	2%	2%	15%	61%	100%	63,172	6,317	6,317	47,379	192,676	19	30	578	45,664.2	2283.2	47,947.4	70%	30%	4422.07	1895.17
Total	5,821,567	**582**							1,388,948	104,960	104,960	845,355	3,377,344	**338**		**10,132**	**800,430.5**		**840,452.0**			**73471.9**	**31488.0**
									139ha	**10ha**	**10ha**	**85ha**	**338ha**				**80ha**		**84ha**			**7ha**	**3ha**

Reason for additional open space above 20%

- Zone 1 - Greater proportion of open space to reduce impact on Langham and Langham Moor
- Zone 3 - Greater proportion of open space to reduce impact on Langham and Langham Moor

West of Colchester / Marks Tey

The following tables provide the high level breakdown of land use by parcel for each option consistent with the assumptions described in Section 2 of this Report. They have not been developed through an exercise of concept masterplanning. They are intended only to contribute to an initial understanding of viability to help inform judgements relating to option potential as part of the Councils' wider considerations of planning for strategic growth in the development of the emerging local plans.

West of Colchester/Marks Tey: Scenario 01

Total Site Area m2	Total Site Area Ha
10,150,786	**1015**

Zone No	Area (m2)	Developable Area (Ha)	Open Space %	Mixed Use %	Employment %	Roads, Footpaths and Parking %	Residential %	100% check	Open Space m2	Mixed Use m2	Employment m2	Roads, Footpaths and Parking m2	Residential m2	Residential Developable Area (Ha)	Density / Capacity: DpHa	Density / Capacity: Dwellings	GIA: 2b 4ppl (79 sq. m GIA)	Efficiency: 5%	GEA: sq. m.	Percentage split: B1 %	Percentage split: B2/B8 %	GEA: B1	GEA: B2/B8
2	102,401	10	20%	1%	2%	15%	62%	100%	20,480	1,024	2,048	15,360	63,489	6	30	190	15,046.9	752.3	15,799.2	50%	50%	1024.01	1024.01
3	380,977	38	20%	1%	1%	15%	63%	100%	76,195	3,810	3,810	57,146	240,015	24	30	720	56,883.6	2844.2	59,727.8	50%	50%	1904.88	1904.88
4	71,161	7	20%	1%	1%	15%	63%	100%	14,232	712	712	10,674	44,831	4	30	134	10,625.0	531.3	11,156.3	50%	50%	355.80	355.80
5	191,420	19	20%	1%	1%	15%	63%	100%	38,284	1,914	1,914	28,713	120,595	12	30	362	28,581.0	1429.0	30,010.0	50%	50%	957.10	957.10
6	660,378	66	20%	1%	1%	15%	63%	100%	132,076	6,604	6,604	99,057	416,038	42	30	1,248	98,601.0	4930.1	103,531.1	50%	50%	3301.89	3301.89
7	1,130,068	113	20%	1%	1%	15%	63%	100%	226,014	11,301	11,301	169,510	711,943	71	30	2,136	168,730.5	8436.5	177,167.0	50%	50%	5650.34	5650.34
8	419,218	42	20%	1%	1%	15%	63%	100%	83,844	4,192	4,192	62,883	264,108	26	30	792	62,593.5	3129.7	65,723.2	50%	50%	2096.09	2096.09
9	263,404	26	20%	1%	1%	15%	63%	100%	52,681	2,634	2,634	39,511	165,944	17	30	498	39,328.8	1966.4	41,295.2	50%	50%	1317.02	1317.02
10	155,951	16	20%	1%	2%	15%	62%	100%	31,190	1,560	3,119	23,393	96,690	10	30	290	22,915.4	1145.8	24,061.2	50%	50%	1559.51	1559.51
12	911,549	91	20%	1%	1%	15%	63%	100%	182,310	9,115	9,115	136,732	574,276	57	30	1,723	136,103.4	6805.2	142,908.6	50%	50%	4557.75	4557.75
13	538,828	54	20%	1%	1%	15%	63%	100%	107,766	5,388	5,388	80,824	339,462	34	30	1,018	80,452.4	4022.6	84,475.0	50%	50%	2694.14	2694.14
14	645,350	65	30%	1%	0%	15%	54%	100%	193,605	6,453	0	96,802	348,489	35	30	1,045	82,591.9	4129.6	86,721.5	50%	50%	0.00	0.00
15	772,004	77	20%	1%	1%	15%	63%	100%	154,401	7,720	7,720	115,801	486,363	49	30	1,459	115,268.0	5763.4	121,031.4	50%	50%	3860.02	3860.02
16	949,638	95	30%	1%	1%	15%	53%	100%	284,892	9,496	9,496	142,446	503,308	50	30	1,510	119,284.1	5964.2	125,248.3	50%	50%	4748.19	4748.19
21	793,715	79	20%	1%	1%	15%	63%	100%	158,743	7,937	7,937	119,057	500,041	50	30	1,500	118,509.6	5925.5	124,435.1	50%	50%	3968.58	3968.58
24	173,216	17	20%	1%	1%	15%	63%	100%	34,643	1,732	1,732	25,982	109,126	11	30	327	25,862.9	1293.1	27,156.0	50%	50%	866.08	866.08
25	1,025,138	103	20%	1%	2%	15%	62%	100%	205,028	10,251	20,503	153,771	635,586	64	30	1,907	150,633.8	7531.7	158,165.5	50%	50%	10251.38	10251.38
Total	9,184,418	**918**							1,996,382	91,844	98,226	1,377,663	5,620,303	**562**		**16,861**	**1,332,011.8**		**1,398,612.4**			**49112.8**	**49112.8**
									200ha	**9ha**	**10ha**	**138ha**	**562ha**				**133ha**		**140ha**			**5ha**	**5ha**

West of Colchester/Marks Tey: Scenario 02

Total Site Area m2	Total Site Area Ha
10,224,644	**1022**

Zone No	Area (m2)	Developable Area (Ha)	Open Space %	Mixed Use %	Employment %	Roads, Footpaths and Parking %	Residential %	100% check	Open Space m2	Mixed Use m2	Employment m2	Roads, Footpaths and Parking m2	Residential m2	Residential Developable Area (Ha)	Density / Capacity: DpHa	Density / Capacity: Dwellings	GIA: 2b 4ppl (79 sq. m GIA)	Efficiency: 5%	GEA: sq. m.	Percentage split: B1 %	Percentage split: B2/B8 %	GEA: B1	GEA: B2/B8
1	83,303	8	20%	1%	2%	15%	62%	100%	16,661	833	1,666	12,495	51,648	5	30	155	12,240.5	612.0	12,852.5	50%	50%	833.03	833.03
2	102,401	10	20%	1%	2%	15%	62%	100%	20,480	1,024	2,048	15,360	63,489	6	30	190	15,046.9	752.3	15,799.2	50%	50%	1024.01	1024.01
3	380,977	38	20%	1%	1%	15%	63%	100%	76,195	3,810	3,810	57,146	240,015	24	30	720	56,883.6	2844.2	59,727.8	50%	50%	1904.88	1904.88
4	71,161	7	20%	1%	1%	15%	63%	100%	14,232	712	712	10,674	44,831	4	30	134	10,625.0	531.3	11,156.3	50%	50%	355.80	355.80
5	191,420	19	20%	1%	1%	15%	63%	100%	38,284	1,914	1,914	28,713	120,595	12	30	362	28,581.0	1429.0	30,010.0	50%	50%	957.10	957.10
6	660,378	66	20%	1%	1%	15%	63%	100%	132,076	6,604	6,604	99,057	416,038	42	30	1,248	98,601.0	4930.1	103,531.1	50%	50%	3301.89	3301.89
7	1,130,068	113	20%	1%	1%	15%	63%	100%	226,014	11,301	11,301	169,510	711,943	71	30	2,136	168,730.5	8436.5	177,167.0	50%	50%	5650.34	5650.34
8	419,218	42	20%	1%	1%	15%	63%	100%	83,844	4,192	4,192	62,883	264,108	26	30	792	62,593.5	3129.7	65,723.2	50%	50%	2096.09	2096.09
9	263,404	26	20%	1%	1%	15%	63%	100%	52,681	2,634	2,634	39,511	165,944	17	30	498	39,328.8	1966.4	41,295.2	50%	50%	1317.02	1317.02
10	155,951	16	20%	1%	2%	15%	62%	100%	31,190	1,560	3,119	23,393	96,690	10	30	290	22,915.4	1145.8	24,061.2	50%	50%	1559.51	1559.51
12	911,549	91	20%	1%	1%	15%	63%	100%	182,310	9,115	9,115	136,732	574,276	57	30	1,723	136,103.4	6805.2	142,908.6	50%	50%	4557.75	4557.75
13	538,828	54	20%	1%	1%	15%	63%	100%	107,766	5,388	5,388	80,824	339,462	34	30	1,018	80,452.4	4022.6	84,475.0	50%	50%	2694.14	2694.14
14	645,350	65	30%	1%	0%	15%	54%	100%	193,605	6,453	0	96,802	348,489	35	30	1,045	82,591.9	4129.6	86,721.5	50%	50%	0.00	0.00
20	122,987	12	20%	1%	1%	15%	63%	100%	24,597	1,230	1,230	18,448	77,482	8	30	232	18,363.2	918.2	19,281.4	50%	50%	614.94	614.94
21	793,715	79	20%	1%	1%	15%	63%	100%	158,743	7,937	7,937	119,057	500,041	50	30	1,500	118,509.6	5925.5	124,435.1	50%	50%	3968.58	3968.58
22	1,291,036	129	30%	1%	1%	15%	53%	100%	387,311	12,910	12,910	193,655	684,249	68	30	2,053	162,167.1	8108.4	170,275.4	50%	50%	6455.18	6455.18
23	456,859	46	20%	1%	2%	15%	62%	100%	91,372	4,569	9,137	68,529	283,252	28	30	850	67,130.8	3356.5	70,487.3	50%	50%	4568.59	4568.59
24	173,216	17	20%	1%	1%	15%	63%	100%	34,643	1,732	1,732	25,982	109,126	11	30	327	25,862.9	1293.1	27,156.0	50%	50%	866.08	866.08
25	1,025,138	103	20%	1%	2%	15%	62%	100%	205,028	10,251	20,503	153,771	635,586	64	30	1,907	150,633.8	7531.7	158,165.5	50%	50%	10251.38	10251.38
Total	9,416,960	**942**							2,077,031	94,170	105,953	1,412,544	5,727,263	**573**		**17,182**	**1,357,361.3**		**1,425,229.4**			**52976.31**	**52976.31**
									208ha	**9ha**	**10ha**	**141ha**	**573ha**				**136ha**		**143ha**			**5ha**	**5ha**

West of Colchester/Marks Tey: Scenario 03

Total Site Area m2	Total Site Area Ha
7,559,421	**756**

Zone No	Area (m2)	Developable Area (Ha)	Open Space %	Mixed Use %	Employment %	Roads, Footpaths and Parking %	Residential %	100% check	Open Space m2	Mixed Use m2	Employment m2	Roads, Footpaths and Parking m2	Residential m2	Residential Developable Area (Ha)	Density / Capacity DpHa	Density / Capacity Dwellings	GIA 2b 4ppl (79 sq. m GIA)	Efficiency 5%	GEA sq. m.	Percentage split B1 %	Percentage split B2/B8 %	GEA B1	GEA B2/B8
1	83,303	8	20%	1%	2%	15%	62%	100%	16,661	833	1,666	12,495	51,648	5	30	155	12,240.5	612.0	12,852.5	50%	50%	833.03	833.03
2	102,401	10	20%	1%	2%	15%	62%	100%	20,480	1,024	2,048	15,360	63,489	6	30	190	15,046.9	752.3	15,799.2	50%	50%	1024.01	1024.01
3	380,977	38	20%	1%	1%	15%	63%	100%	76,195	3,810	3,810	57,146	240,015	24	30	720	56,883.6	2844.2	59,727.8	50%	50%	1904.88	1904.88
4	71,161	7	20%	1%	1%	15%	63%	100%	14,232	712	712	10,674	44,831	4	30	134	10,625.0	531.3	11,156.3	50%	50%	355.80	355.80
5	191,420	19	20%	1%	1%	15%	63%	100%	38,284	1,914	1,914	28,713	120,595	12	30	362	28,581.0	1429.0	30,010.0	50%	50%	957.10	957.10
6	660,378	66	20%	1%	1%	15%	63%	100%	132,076	6,604	6,604	99,057	416,038	42	30	1,248	98,601.0	4930.1	103,531.1	50%	50%	3301.89	3301.89
7	1,130,068	113	20%	1%	1%	15%	63%	100%	226,014	11,301	11,301	169,510	711,943	71	30	2,136	168,730.5	8436.5	177,167.0	50%	50%	5650.34	5650.34
8	419,218	42	20%	1%	1%	15%	63%	100%	83,844	4,192	4,192	62,883	264,108	26	30	792	62,593.5	3129.7	65,723.2	50%	50%	2096.09	2096.09
9	263,404	26	20%	1%	1%	15%	63%	100%	52,681	2,634	2,634	39,511	165,944	17	30	498	39,328.8	1966.4	41,295.2	50%	50%	1317.02	1317.02
20	122,987	12	20%	1%	1%	15%	63%	100%	24,597	1,230	1,230	18,448	77,482	8	30	232	18,363.2	918.2	19,281.4	50%	50%	614.94	614.94
21	793,715	79	20%	1%	1%	15%	63%	100%	158,743	7,937	7,937	119,057	500,041	50	30	1,500	118,509.6	5925.5	124,435.1	50%	50%	3968.58	3968.58
22	1,291,036	129	30%	1%	1%	15%	53%	100%	387,311	12,910	12,910	193,655	684,249	68	30	2,053	162,167.1	8108.4	170,275.4	50%	50%	6455.18	6455.18
23	456,859	46	20%	1%	2%	15%	62%	100%	91,372	4,569	9,137	68,529	283,252	28	30	850	67,130.8	3356.5	70,487.3	50%	50%	4568.59	4568.59
24	173,216	17	20%	1%	1%	15%	63%	100%	34,643	1,732	1,732	25,982	109,126	11	30	327	25,862.9	1293.1	27,156.0	50%	50%	866.08	866.08
25	1,025,138	103	20%	1%	2%	15%	62%	100%	205,028	10,251	20,503	153,771	635,586	64	30	1,907	150,633.8	7531.7	158,165.5	50%	50%	10251.38	10251.38
Total	7,165,281	**717**							1,562,160	71,653	88,330	1,074,792	4,368,347	**437**		**13,105**	**1,035,298.2**		**1,087,063.1**			**44164.91**	**44164.91**
									156ha	**7ha**	**9ha**	**107ha**	**437ha**				**104ha**		**109ha**			**4.5ha**	**4.5ha**

West of Colchester/Marks Tey: Scenario 04

Total Site Area m2	Total Site Area Ha
17,033,991	**1703**

Zone No	Area (m2)	Developable Area (Ha)	Open Space %	Mixed Use %	Employment %	Roads, Footpaths and Parking %	Residential %	100% check	Open Space m2	Mixed Use m2	Employment m2	Roads, Footpaths and Parking m2	Residential m2	Residential Developable Area (Ha)	Density / Capacity DpHa	Density / Capacity Dwellings	GIA 2b 4ppl (79 sq. m GIA)	Efficiency 5%	GEA sq. m.	Percentage split B1 %	Percentage split B2/B8 %	GEA B1	GEA B2/B8
1	83,303	8	20%	1%	2%	15%	62%	100%	16,661	833	1,666	12,495	51,648	5	30	155	12,240.5	612.0	12,852.5	50%	50%	833.03	833.03
2	102,401	10	20%	1%	2%	15%	62%	100%	20,480	1,024	2,048	15,360	63,489	6	30	190	15,046.9	752.3	15,799.2	50%	50%	1024.01	1024.01
3	380,977	38	20%	1%	1%	15%	63%	100%	76,195	3,810	3,810	57,146	240,015	24	30	720	56,883.6	2844.2	59,727.8	50%	50%	1904.88	1904.88
4	71,161	7	20%	1%	1%	15%	63%	100%	14,232	712	712	10,674	44,831	4	30	134	10,625.0	531.3	11,156.3	50%	50%	355.80	355.80
5	191,420	19	20%	1%	1%	15%	63%	100%	38,284	1,914	1,914	28,713	120,595	12	30	362	28,581.0	1429.0	30,010.0	50%	50%	957.10	957.10
6	660,378	66	20%	1%	1%	15%	63%	100%	132,076	6,604	6,604	99,057	416,038	42	30	1,248	98,601.0	4930.1	103,531.1	50%	50%	3301.89	3301.89
7	1,130,068	113	20%	1%	1%	15%	63%	100%	226,014	11,301	11,301	169,510	711,943	71	30	2,136	168,730.5	8436.5	177,167.0	50%	50%	5650.34	5650.34
8	419,218	42	20%	1%	1%	15%	63%	100%	83,844	4,192	4,192	62,883	264,108	26	30	792	62,593.5	3129.7	65,723.2	50%	50%	2096.09	2096.09
9	263,404	26	20%	1%	1%	15%	63%	100%	52,681	2,634	2,634	39,511	165,944	17	30	498	39,328.8	1966.4	41,295.2	50%	50%	1317.02	1317.02
10	155,951	16	20%	1%	2%	15%	62%	100%	31,190	1,560	3,119	23,393	96,690	10	30	290	22,915.4	1145.8	24,061.2	50%	50%	1559.51	1559.51
11	264,939	26	100%	0%	0%	0%	0%	100%	264,939	0	0	0	0	0	30	0	0.0	0.0	0.0	50%	50%	0.00	0.00
12	911,549	91	20%	1%	1%	15%	63%	100%	182,310	9,115	9,115	136,732	574,276	57	30	1,723	136,103.4	6805.2	142,908.6	50%	50%	4557.75	4557.75
13	538,828	54	20%	1%	1%	15%	63%	100%	107,766	5,388	5,388	80,824	339,462	34	30	1,018	80,452.4	4022.6	84,475.0	50%	50%	2694.14	2694.14
14	645,350	65	30%	1%	0%	15%	54%	100%	193,605	6,453	0	96,802	348,489	35	30	1,045	82,591.9	4129.6	86,721.5	50%	50%	0.00	0.00
15	772,004	77	20%	1%	0%	15%	64%	100%	154,401	7,720	0	115,801	494,083	49	30	1,482	117,097.6	5854.9	122,952.5	50%	50%	0.00	0.00
16	949,638	95	20%	1%	1%	15%	63%	100%	189,928	9,496	9,496	142,446	598,272	60	30	1,795	141,790.5	7089.5	148,880.0	50%	50%	4748.19	4748.19
17	1,317,821	132	30%	1%	1%	15%	53%	100%	395,346	13,178	13,178	197,673	698,445	70	30	2,095	165,531.5	8276.6	173,808.1	50%	50%	6589.11	6589.11
18	728,837	73	30%	1%	0%	15%	54%	100%	218,651	7,288	0	109,325	393,572	39	30	1,181	93,276.5	4663.8	97,940.3	50%	50%	0.00	0.00
19	2,339,068	234	30%	1%	1%	15%	53%	100%	701,720	23,391	23,391	350,860	1,239,706	124	30	3,719	293,810.3	14690.5	308,500.8	50%	50%	11695.34	11695.34
20	122,987	12	20%	1%	1%	15%	63%	100%	24,597	1,230	1,230	18,448	77,482	8	30	232	18,363.2	918.2	19,281.4	50%	50%	614.94	614.94
21	793,715	79	20%	1%	1%	15%	63%	100%	158,743	7,937	7,937	119,057	500,041	50	30	1,500	118,509.6	5925.5	124,435.1	50%	50%	3968.58	3968.58
22	1,291,036	129	20%	1%	1%	15%	63%	100%	258,207	12,910	12,910	193,655	813,353	81	30	2,440	192,764.6	9638.2	202,402.9	50%	50%	6455.18	6455.18
23	456,859	46	20%	1%	2%	15%	62%	100%	91,372	4,569	9,137	68,529	283,252	28	30	850	67,130.8	3356.5	70,487.3	50%	50%	4568.59	4568.59
24	173,216	17	20%	1%	1%	15%	63%	100%	34,643	1,732	1,732	25,982	109,126	11	30	327	25,862.9	1293.1	27,156.0	50%	50%	866.08	866.08
25	1,025,138	103	20%	1%	2%	15%	62%	100%	205,028	10,251	20,503	153,771	635,586	64	30	1,907	150,633.8	7531.7	158,165.5	50%	50%	10251.38	10251.38
Total	15,789,267	**1,579**							3,872,912	155,243	152,018	2,328,649	9,280,445	**928**		**27,841**	**2,199,465.4**		**2,309,438.6**			**76008.95**	**76008.95**
									387ha	**16ha**	**15ha**	**233ha**	**928ha**				**220ha**		**231ha**			**7.5ha**	**7.5ha**

Reason for additional open space above 20%

- Zone 14 - Greater proportion of open space in parcel because of Roman River and ssumed incorporation of linear openspace zone
- Zone 16 - Incorporation of greater proportion of green edge/open space/ softer transition from urban to rural cognisant of setting of Grade II* Houchins Farm to west.
- Zone 17 - Greater proportion of open space in parcel because of Roman River and ssumed incorporation of linear openspace zone
- Zone 18 - Greater proportion of open space in parcel because of Roman River and ssumed incorporation of linear openspace zone
- Zone 19 - Greater proportion of open space to reduce impact on Coggeshall
- Zone 22 - Greater proportion of open space to reduce impact on Coggeshall

West of Braintree

The following tables provide the high level breakdown of land use by parcel for each option consistent with the assumptions described in Section 2 of this Report. They have not been developed through an exercise of concept masterplanning. They are intended only to contribute to an initial understanding of viability to help inform judgements relating to option potential as part of the Councils' wider considerations of planning for strategic growth in the development of the emerging local plans.

West of Braintree: Scenario 01

Total Site Area m2	Total Site Area Ha
7,742,148	**774**

Zone No	Area (m2)	Developable Area (Ha)	Open Space %	Mixed Use %	Employment %	Roads, Footpaths and Parking %	Residential %	100% check	Open Space m2	Mixed Use m2	Employment m2	Roads, Footpaths and Parking m2	Residential m2	Residential Developable Area (Ha)	Density / Capacity: DpHa	Density / Capacity: Dwellings	GIA: 2b 4ppl (79 sq. m GIA)	Efficiency: 5%	GEA: sq. m.	Percentage split: B1 %	Percentage split: B2/B8 %	GEA: B1	GEA: B2/B8
1	1,154,719	115	95%	2%	0%	1%	2%	100%	1,096,983	23,094	0	11,547	23,094	2	30	69	5,473.4	273.7	5,747.0	50%	50%	0.00	0.00
2	811,052	81	30%	1%	0%	15%	54%	100%	243,316	8,111	0	121,658	437,968	44	30	1,314	103,798.5	5189.9	108,988.4	50%	50%	0.00	0.00
3	139,845	14	60%	0%	0%	15%	25%	100%	83,907	0	0	20,977	34,961	3	30	105	8,285.8	414.3	8,700.1	50%	50%	0.00	0.00
4	2,939,351	294	20%	2%	3%	15%	60%	100%	587,870	58,787	88,181	440,903	1,763,611	176	30	5,291	417,975.8	20898.8	438,874.6	50%	50%	44090.27	44090.27
5	111,481	11	20%	2%	1%	15%	62%	100%	22,296	2,230	1,115	16,722	69,118	7	30	207	16,381.0	819.1	17,200.1	50%	50%	557.40	557.40
6	648,245	65	20%	2%	1%	15%	62%	100%	129,649	12,965	6,482	97,237	401,912	40	30	1,206	95,253.1	4762.7	100,015.8	50%	50%	3241.22	3241.22
7	413,880	41	20%	2%	1%	15%	62%	100%	82,776	8,278	4,139	62,082	256,605	26	30	770	60,815.5	3040.8	63,856.3	50%	50%	2069.40	2069.40
8	378,117	38	20%	2%	1%	15%	62%	100%	75,623	7,562	3,781	56,718	234,433	23	30	703	55,560.5	2778.0	58,338.6	50%	50%	1890.59	1890.59
Total	6,596,690	**660**							2,322,420	121,026	103,698	827,843	3,221,703	**322**		**9,665**	**763,543.6**		**801,720.8**			**51848.89**	**51848.89**
									232ha	**12ha**	**10ha**	**83ha**	**322ha**				**76ha**		**80ha**			**5ha**	**5ha**

West of Braintree: Scenario 02

Total Site Area m2	Total Site Area Ha
9,963,966	**996**

Zone No	Area (m2)	Developable Area (Ha)	Open Space %	Mixed Use %	Employment %	Roads, Footpaths and Parking %	Residential %	100% check	Open Space m2	Mixed Use m2	Employment m2	Roads, Footpaths and Parking m2	Residential m2	Residential Developable Area (Ha)	Density / Capacity: DpHa	Density / Capacity: Dwellings	GIA: 2b 4ppl (79 sq. m GIA)	Efficiency: 5%	GEA: sq. m.	Percentage split: B1 %	Percentage split: B2/B8 %	GEA: B1	GEA: B2/B8
1	1,154,719	115	95%	2%	0%	1%	2%	100%	1,096,983	23,094	0	11,547	23,094	2	30	69	5,473.4	273.7	5,747.0	50%	50%	0.00	0.00
2	811,052	81	30%	1%	0%	15%	54%	100%	243,316	8,111	0	121,658	437,968	44	30	1,314	103,798.5	5189.9	108,988.4	50%	50%	0.00	0.00
3	139,845	14	60%	0%	0%	15%	25%	100%	83,907	0	0	20,977	34,961	3	30	105	8,285.8	414.3	8,700.1	50%	50%	0.00	0.00
4	2,939,351	294	20%	2%	3%	15%	60%	100%	587,870	58,787	88,181	440,903	1,763,611	176	30	5,291	417,975.8	20898.8	438,874.6	50%	50%	44090.27	44090.27
5	111,481	11	20%	2%	1%	15%	62%	100%	22,296	2,230	1,115	16,722	69,118	7	30	207	16,381.0	819.1	17,200.1	50%	50%	557.40	557.40
6	648,245	65	20%	2%	1%	15%	62%	100%	129,649	12,965	6,482	97,237	401,912	40	30	1,206	95,253.1	4762.7	100,015.8	50%	50%	3241.22	3241.22
7	413,880	41	20%	2%	1%	15%	62%	100%	82,776	8,278	4,139	62,082	256,605	26	30	770	60,815.5	3040.8	63,856.3	50%	50%	2069.40	2069.40
8	378,117	38	20%	2%	1%	15%	62%	100%	75,623	7,562	3,781	56,718	234,433	23	30	703	55,560.5	2778.0	58,338.6	50%	50%	1890.59	1890.59
9	420,583	42	20%	2%	0%	15%	63%	100%	84,117	8,412	0	63,087	264,967	26	30	795	62,797.3	3139.9	65,937.2	50%	50%	0.00	0.00
10	662,734	66	20%	2%	1%	15%	62%	100%	132,547	13,255	6,627	99,410	410,895	41	30	1,233	97,382.1	4869.1	102,251.2	50%	50%	3313.67	3313.67
11	697,692	70	20%	2%	3%	15%	60%	100%	139,538	13,954	20,931	104,654	418,615	42	30	1,256	99,211.8	4960.6	104,172.4	50%	50%	10465.38	10465.38
Total	8,377,699	**838**							2,678,622	156,647	131,256	1,094,994	4,316,180	**432**		**12,949**	**1,022,934.8**		**1,074,081.5**			**65627.93**	**65627.93**
									268ha	**16ha**	**13ha**	**109ha**	**432ha**				**102ha**		**107ha**			**7ha**	**7ha**

Reason for additional open space above 20%

- Zone 1 - Likely restoration of majority of parcel into a country park following the working of site for minerals
- Zone 2 - Greater proportion of open space in parcel because of Pods Brook and ssumed incorporation of linear openspace zone
- Zone 3 - Greater proportion of open space in parcel because of Pods Brook and ssumed incorporation of linear openspace zone

APPENDIX 2

Development Assumptions and Standards

Social Infrastructure Requirements

Social infrastructure will form an integral part of any future Garden Community. The provision of recreation, culture, health, education and community facilities ensures that residents' well-being is enhanced and walkable, vibrant and accessible communities created. As such, an indicative understanding of the likely social infrastructure requirements of the Garden Community is important to determine with respect to generating a cost estimation for use in the viability assessment. For this exercise AECOM's Social Infrastructure Model (SIF) was used (with the exception of education calculations), with the following assumptions and standards applied.

The following household and tenure assumptions have been applied to assess the population impacts of the proposed housing growth across each site and option.

Housing Tenure Mix

Housing tenure mix was determined based on a review of the housing mix assumptions from policy or evidence base of each local authority.

Market Owned	**65%**
Affordable	**35%**
Social Rented Affordable	**70%**
Private Rented	**30%**

Housing Size Mix

Assumption that 80% of future dwellings would be houses and 20% flats - reflecting current ratio in Essex County.

To determine the housing size mix, a review of the SHMA for Colchester and Braintree allowed for the identification of a target tenure. The average between both local authorities was utilised to determine final housing mix.

	Flats (no. of bedrooms)				Houses (no. of bedrooms)			
	1	**2**	**3**	**4+**	**1**	**2**	**3**	**4+**
Market Owned	**7%**	**6%**	**5%**	**2%**	**28%**	**24%**	**20%**	**8%**
Social Rented Affordable	**7%**	**6%**	**6%**	**1%**	**29%**	**23%**	**24%**	**4%**
Private Rented	**7%**	**8%**	**4%**	**2%**	**28%**	**32%**	**14%**	**6%**
All Units	**7%**	**6%**	**5%**	**2%**	**28%**	**24%**	**20%**	**8%**

Average Household Size by Unit Type

The average household size was determined by utilising the 2011 Census data by collating all three local authorities , to ensure appropriate proportions of households and population are accounted for.

Market Housing	
Flat - 1 bed	1.27
Flat - 2 bed	1.59
Flat - 3 bed	2.03
Flat - 4 bed	2.83
House - 1 bed	1.49
House - 2 bed	1.75
House - 3 bed	2.39
House - 4 bed	2.97

Social Rented Housing	
Flat - 1 bed	1.27
Flat - 2 bed	1.59
Flat - 3 bed	2.03
Flat - 4 bed	2.83
House - 1 bed	1.49
House - 2 bed	1.75
House - 3 bed	2.39
House - 4 bed	2.97

Intermediate Housing	
Flat - 1 bed	1.18
Flat - 2 bed	2.18
Flat - 3 bed	2.78
Flat - 4 bed	2.39
House - 1 bed	1.32
House - 2 bed	2.04
House - 3 bed	3.14
House - 4 bed	4.24

Social Infrastructure Standards

The Household tenure, size and mix assumptions have been used to inform the population profiles of each site and development option. These have been assessed against the following bespoke list of planning standards from a list of national and local resources.

Topic		Standard	Ref.
Early Years	early year demand per 2 bed+ Flat	0.045	Essex County Council - Developers' Guide to Infrastructure Contributions 2016
	early year demand per 2 bed+ House	0.090	
	places per nursery	56	
	Sq.m per 56 place nursery	337	
Primary Schools **	Pupil Demand per 2 bed+ Flat	0.150	Essex County Council - Developers' Guide to Infrastructure Contributions 2016
	Pupil Demand per 2 bed+ House	0.300	
	Primary School Pupils in 1 Form Entry	210	
Secondary Schools **	Pupil Demand per 2 bed+ Flat	0.100	Essex County Council - Developers' Guide to Infrastructure Contributions 2016
	Pupil Demand per 2 bed+ House	0.200	
	Secondary School Pupils in 1 Form Entry	150	
Sixth Form	Proportion of 16-17 year olds in Sixth Form	32%	AECOM Calculation of Sixth form roll 2016 against 16-17 population
Primary Health Centre	People per GP	1,800	NHS
Dental Practice	People per Dentist	1,760	Existing ratio of Dentists to Population across England 2015
Acute Hospital	People per Bed	510	Existing ratio of Hospital Beds to population across England 2015
Library Space; based on branch	sq.m per 1,000 person	30	Arts Council
Police Station	Population per Station	25	Previous AECOM Experience
Fire Station	Population per Station	1,180	Previous AECOM Experience
Ambulance Station	Population per Station	65	Previous AECOM Experience
Indoor Sports Facility (4 court hall)	facility per 1,000 person	0.072	Colchester SPG Provision of Open Space, Sport and Recreational Facilities 2006 (0.072 facilities per 1,000 persons)
Swimming Pool (4 lanes)	facility per 1,000 person	0.048	
Natural Green Space	ha per 1,000 person	2.000	Recommend adoption of Braintree and Tendring standard - Colchester was 5ha
Outdoor Sports	ha per 1,000 person	1.530	Average of Braintree, Colchester and Tendring LPA
Parks and Gardens	ha per 1,000 person	1.320	
Amenity Green Space	ha. per 1,000 people	0.883	
Allotments	ha. per 1,000 people	0.227	
Children's Playspace (Informal)	ha. per 1,000 people	0.208	
Children's Playspace (formal)	ha. per 1,000 people	0.142	
Green Corridor	ha per 1,000 person	0.750	Tendring Open Space Strategy (2009)

** Bespoke Essex County Council Standards Applied

People Movement

- The level of assessment within all transport sections of the reports are a high level study and will therefore require further levels of assessment to be defined in future

Identified Site Based Transport Infrastructure

- Identified infrastructure is based on a logical spatial assessment of the sites and their constraints, their location in the wider region, a review of assessments produced under the call for sites exercise and assumptions drawn from the AECOM baseline review.

APPENDIX 3

Glossary of Terms

Glossary of Terms

Glossary of Terms	
AONB	Area of Outstanding Natural Beauty
B1	Business Employment Type Use Class
B2	General Industrial Employment Type Use Class
B8	Storage & Distribution Employment Type Use Class
BRT	Bus Rapid Transit
CIL	Community Infrastructure Levy
CPZs	Controlled Parking Zones
C&W	Cushman and Wakefield
DpH	Dwellings Per Hectare
EA	Environment Agency
FAR	Floor Area Ratio
FE	Full-Time Equivalent
GDV	Gross Development Value
GEA	Gross External Area
GIA	Gross Internal Area
GEML	Great Eastern Main Line Rail
ha	Hectares
KM	Kilometres
KPH	Kilometres per Hour
MW	Mega Watt
NEGC	North Essex Garden Communities
NPV	Net Present Value
pa	Per Annum
PWLB	Public Works Loan Board
PSF	Price Per Square Foot
RICS	Royal Institute of Chartered Surveyors
SDLT	Stamp Duty Land Tax
SSSI	Site of Special Scientific Interest
TRICS	The national standard for trip generation analysis
WAML	West Anglia Mainline Rail