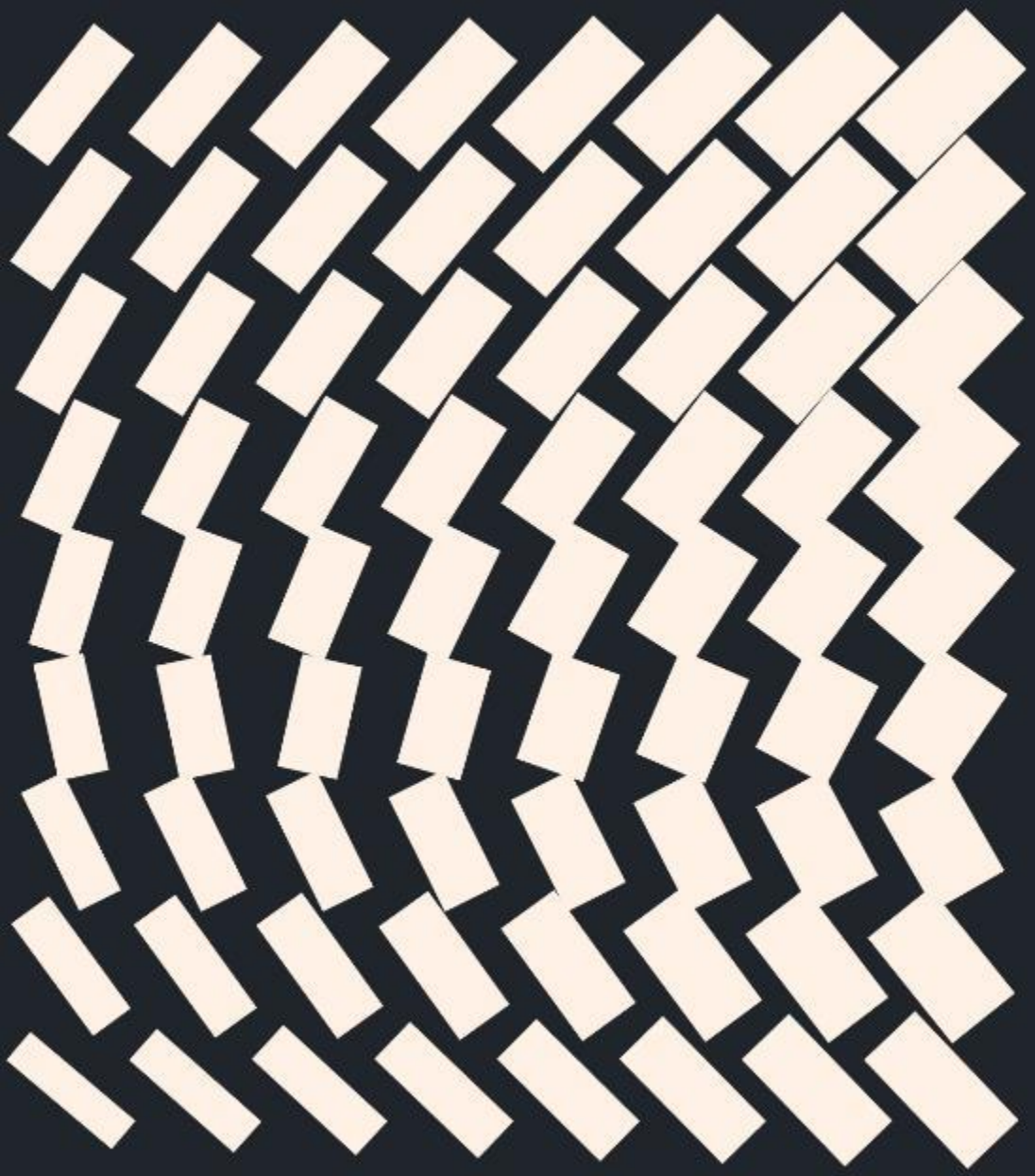


Stanfield Garden Village: The Hethel Project

Mobility Vision

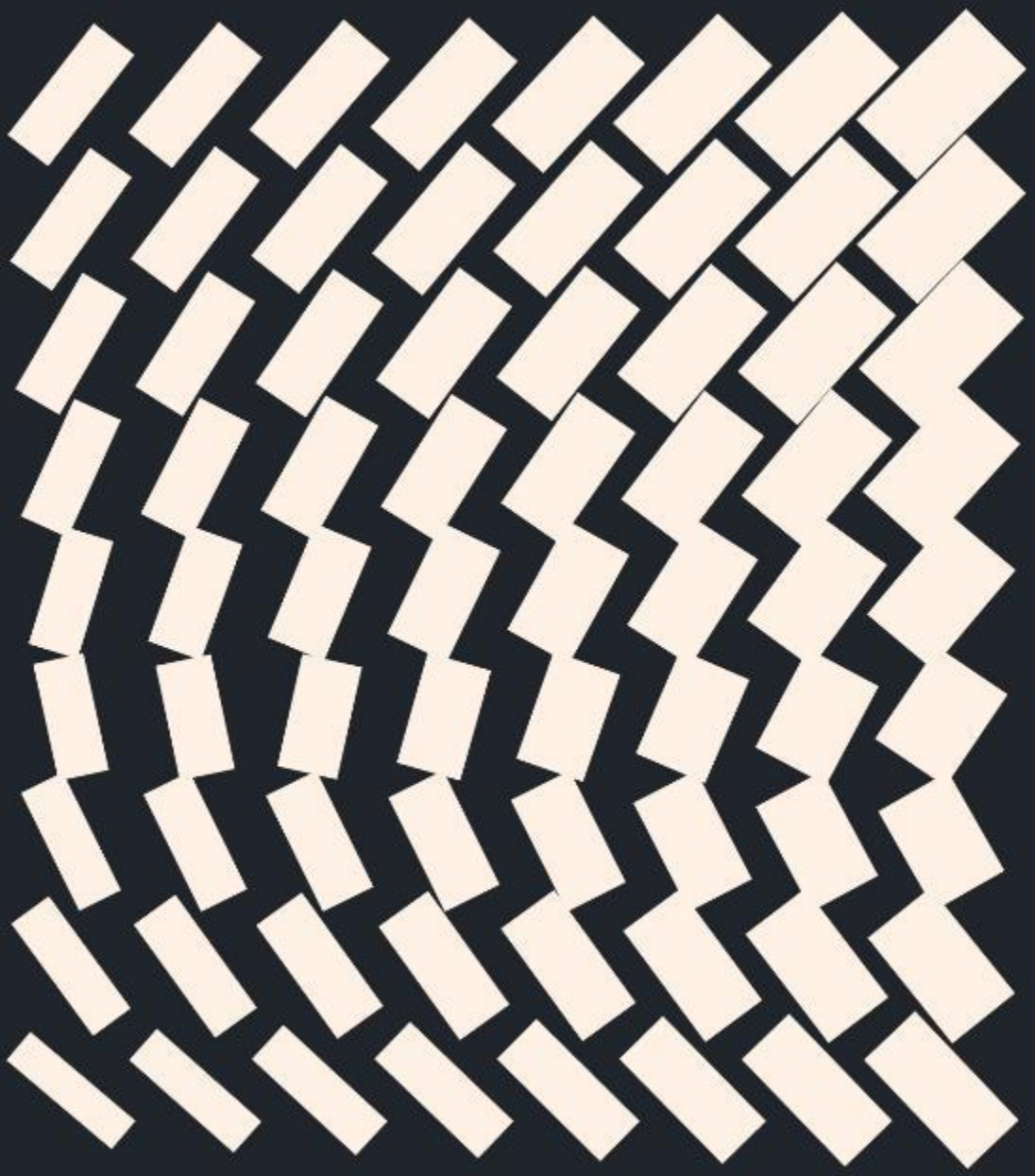
Human + Nature

70074638

September 2020

Future Mobility

wsp



The Paris Agreement focuses on keeping the global temperature rise in this century to 1.5˚C to avoid “severe, widespread and irreversible” climate change effects. If current trends continue, the world is likely to pass the 1.5˚C mark between 2030 and 2052 unless it finds a way to reach net zero emissions. Our ‘domino effect’ graphic represents this tension.

Stanfield Garden Village: The Hethel Project

Human + Nature

70074638

September 2020

WSP UK Limited
70 Chancery Lane
London
WC2A 1AF

Tel: +44 20 7314 5000
Fax: +44 20 7314 5111

wsp.com

Future Mobility

Contents

Foreword

Let's change the way we think. *Let's create change.*

Report Context

This report sets out a draft Mobility Vision for The Hethel Project (also referred to as Stanfield Garden Villages).

Further to the Stanfield Garden Villages Vision & Delivery report, this document provides the supplementary Mobility narrative to support that vision.

A new way of thinking is needed, one that recognises the organic growth of the community, creates a unique sense of place and supports the mobility needs of the community in a convenient, sustainable and safe manner.

At the national level, the DfT's Decarbonising Transport Plan calls for **'place-based solutions'** and recognises different solutions will be needed for different places and locations.

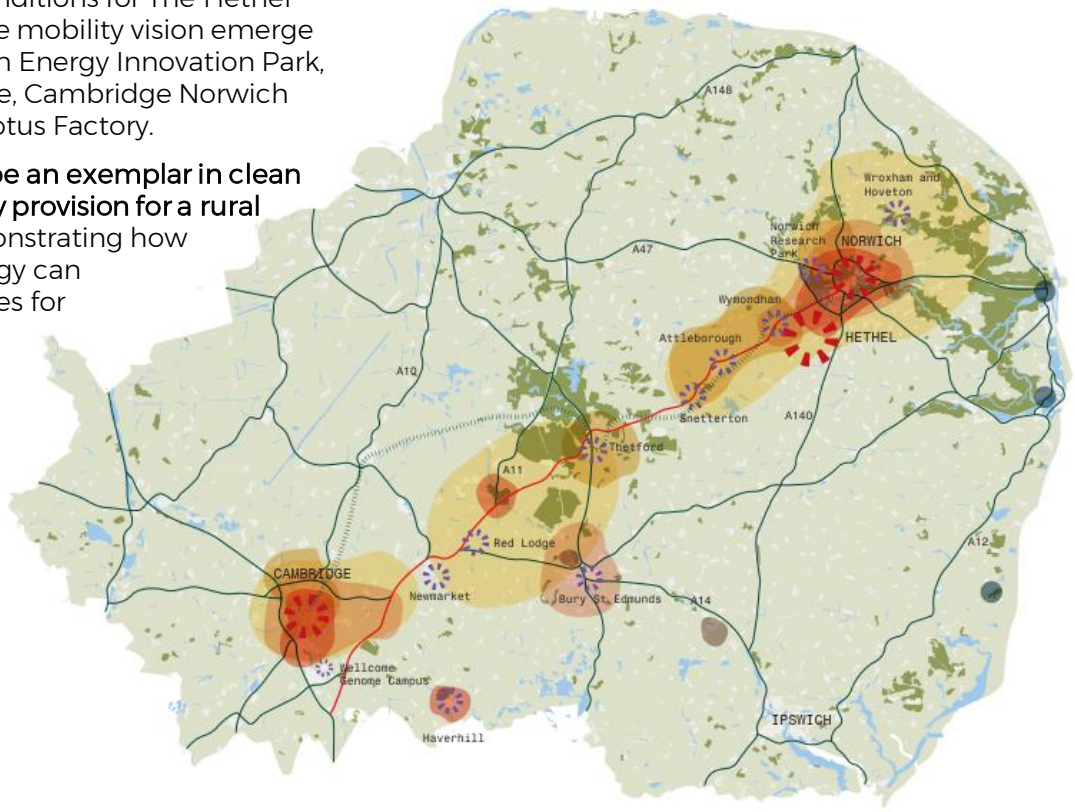
The New Anglia LEP and the Greater Norwich Local Plan are considering what this means for how they enable Clean Growth.

The site near the historic market town of Wymondham, and approximately 10 miles south of Norwich has strategic rail and road connectivity to Cambridge and London via the A11.

Improved rail services have recently seen rail journey times to London decrease with new rolling stock. International connectivity is available via Norwich Airport which hubs into Amsterdam Schiphol.

The unique enabling conditions for The Hethel Project and a progressive mobility vision emerge from the nearby Norwich Energy Innovation Park, Hethel Innovation Centre, Cambridge Norwich Tech Corridor and the Lotus Factory.

The Hethel Project will be an exemplar in clean and sustainable mobility provision for a rural community whilst demonstrating how a flexible mobility strategy can support net zero lifestyles for residents and business.



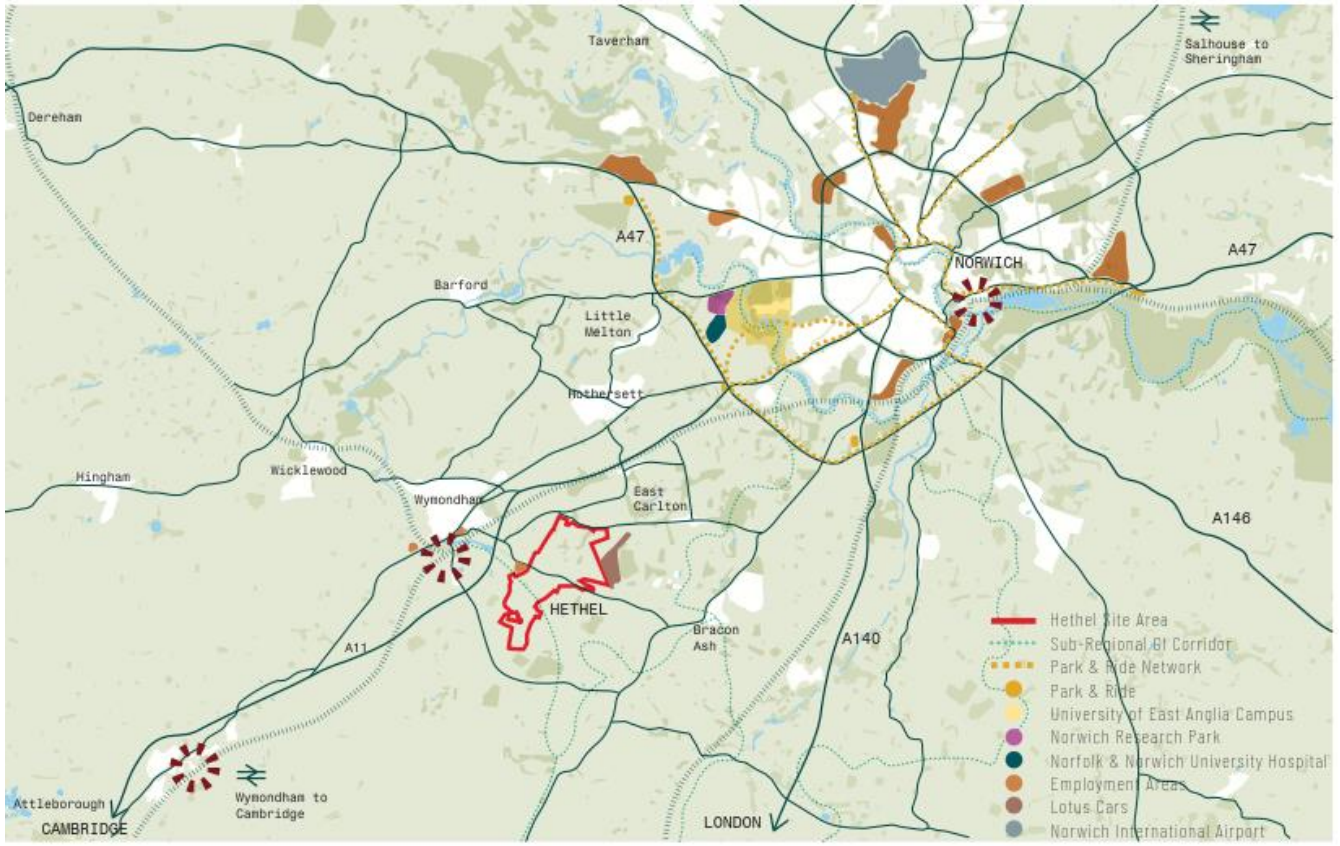
Let's change the way we think. *Let's create change.*

Report Purpose

This report comprises :

- A mobility / transport blueprint for Hethel
- Transport planning 'scenario' modelling
- The relevance of human and place centric design
- Principles that ensure decarbonisation is at the heart of the scheme
- Measures for how the scheme can capitalise on sustainable emerging mobility solutions

Appended to the rear of this report are traditional transport reports on Transport Connectivity (**Appendix A**) and Highway Capacity Modelling (**Appendix B**) which underpin the mobility proposals.



Regional context

Policy Context

Policy Context

Place-based solutions to decarbonising transport.

The ambitious vision for sustainable living outlined by the Hethel Project sits against a policy context with an ever-increasing focus on decarbonisation.

National Context

The Department for Transport's **Decarbonising Transport: Setting the Challenge** (March 2020) recognises that measures to reduce overall travel demand and increase the use of sustainable transport modes must accompany technological change, such as vehicle electrification, in order to meet the UK's carbon emissions reduction commitments. The DfT has defined **'place-based solutions'** as one of the strategic priorities for its forthcoming Transport Decarbonisation Plan.

The Future of Mobility is one of four Grand Challenges identified by Department for Business, Energy & Industrial Strategy at placing the UK at the forefront of industries of the future. The mission is to ***"Put the UK at the forefront of the design and manufacturing of zero emission vehicles, with all new cars and vans effectively zero emission by 2040"*** which is of obvious importance to the Hethel site with Lotus and the Hethel Engineering Centre being adjacent to the site.

In 2019, the Government published the **Future of Mobility: Urban Strategy**, and highlighted that the wave of change in transport technologies and business models is creating an opportunity to support the UK's ambitions for decarbonisation and net zero. New types of travel and new business models, enabled by data and connectivity, automation and electrification are starting to transform how people and goods move. Whilst 'urban' in its focus, similar principles apply to rural i.e. new forms of mobility are user-centric in their design and service offering, aiming to meet the needs of customers and increasing the range of available travel solutions. Below are some examples in rural settings.

Koloni is a micro-mobility service provider. In the rural town of Pocahontas, Iowa (population 1,800), the company has deployed a public dockless bike share scheme, with plans to extend this to e-bikes.

A self-driving Navya shuttle has been tested on a 1.4-kilometer long track in the village of Koppl, Austria (population 3,200). The focus of this trial was to evaluate the driving capabilities compared to a human operator, and to understand user responses to the technology.

240 test drives were carried out, transporting 874 passengers and covering 341 test kilometres. The trials showed that self-driving shuttlebuses can increase the attractiveness of public transport services by improving first/last mile connectivity.

Policy Context

Place-based solutions to decarbonising transport.

Regional Context

The Hethel Project fits the narrative at the regional level; "Clean Growth" underpins the New Anglia LEP's **Local Industrial Strategy** and **Economic Strategy**. This is likely to be reinforced as part of the revised post-coronavirus strategy. A recognition of the unique regional geography of rural and coastal areas places an emphasis on reducing isolated deprivation. The regional strategy points to opportunities for modal shift and active travel, broader network efficiency and flexibility, as well as reducing the need to travel through initiatives such as improved digital connectivity.

The New Anglia LEP have also launched the **Covid-19 Economic Recovery Restart Plan** which outlines the strong local appetite, energy and measures for getting the regional economy going again and helping those who have been hit hardest.

Transport East also identifies key priorities of:

- Global Gateways
- Multi Centred Connectivity
- Energised Coastal Communities

The **Norfolk 3rd Local Transport Plan (2011)** outlines the vision for transport in Norfolk as:

A transport system that allows residents and visitors a range of low carbon options to meet their transport needs and attracts and retains business investment in the county.

This vision is to be achieved by making the best use of existing infrastructure to facilitate reliable journeys; reducing the need to travel; influencing others and ensuring transport is integrated into development plans; working with communities and our partners to seek new solutions and new ways of delivering; and lobbying for and pursuing improvements to Norfolk's strategic transport network

A public consultation was undertaken early 2020 for the 4th Local Transport Plan covering the period 2020-2036.

Local Context

Within Greater Norwich, the **Greater Norwich Local Plan** draft recently closed for consultation in March 2020. The draft identifies what the GNLP aims to achieve for Greater Norwich up to 2038. This places particular importance on promoting sustainable growth and securing the required transport infrastructure to support it. Alongside the GNLP consultation process, a survey was put together for the update of the **Norwich Area Transport Strategy** adopted in 2004.

Transport priorities which influence the GNLP are set out in Norfolk Local Transport Plan; the Norwich Area Transportation Strategy; the emerging Transport for Norwich strategy and Transforming Cities. Improvements at Wymondham Rail Station were put forward as part of Norwich's Transforming Cities proposals (although Norwich were not successful), however improvements would be key in enabling sustainable growth at the Hethel Project. As mentioned later in this report, a study is ongoing in the potential for new services to connect the mid-Norfolk railway to Norwich through Wymondham.

Best-practice guidance in garden village mobility.

The Hethel project will take the best of best-practice guidance and international precedent for low-impact sustainable mobility design.

The Hethel project seeks to demonstrate best practice and advance the standard for mobility and transport provision in a Garden Village setting. A useful critique of garden villages is **Transport for New Homes "Garden Villages and Garden Towns: Visions and Reality"** which assesses how today's Garden Village schemes stand up against the aspirational scene for vibrant, mixed-use communities as set out in the Government's Garden Communities prospectus 2018.

The document outlines from a transport perspective, developments should be integrated, forward-looking and accessible. This should include promotion of public transport, walking, and cycling so that settlements are easy to navigate, and facilitate simple and sustainable access to jobs, education, and services. A common theme picked up in the review of where Garden Villages have failed to deliver on sustainable transport visions results from adopting a predict and provide approach to transport provision.

In this context, we believe there is an opportunity for The Hethel Project to set the UK standard and be considered as best practice in garden village design.

International Best Practice

Amersfoort a small historic city in The Netherlands, with its three new suburbs: Kattenbroek, Nieuwland and Vathorst. Amersfoort hosts safe walking and cycle routes through the site reduce car dependency

Hammarby Sjöstad is an urban development project located south of Stockholm. Hammarby has become a prototype for integrating diverse systems including energy, water and waste for a carbon efficient system, and supports sustainable mobility through attractive pedestrian and bicycle network, a large carpooling system, a popular ferry and an extensive time-line system which is the main commuter mode.

Further international place-based inspiration.

Whilst Vauban is a fairly established development in Freiburg, which is often referenced for it's human-scale, it is still worth mentioning here since it has successfully deployed a number of interventions to enable car-free development.

A more recent example is the proposals at Culdesac Tempe in the US. Despite its semi-urban context not being directly comparable with the Hethel Project, the level of ambition is similar. Delivering car-free development in the US, and especially Arizona will be challenging. The developer is hoping to validate the latest consumer preferences for convenience and community living over car-dependent lifestlyes and will be an example of working through the multi-layered provision of mobility and lifestyle services.

Child friendly "play-streets in Vauban (Source: Cycling Christchurch)

The Vauban district in Freiburg, Germany, is a world renown car-free development with an ethos rooted in supporting an environmentally-conscious living at 'human-scale'. The development is centred around a highly accessible tramline, and configured to encourage active travel over private car usage. Vehicle parking is only provided in consolidated parking, freeing streets of cars and enabling initiatives like 'play streets' where cars are guests.

Culdesac Tempe – a car-free development under construction in Tempe, Arizona

Culdesac Tempe is a car-free rental apartment community in Tempe, AZ, which provides a convenient, sustainable, flexible way of living. For example, residents can extend their home on-demand by booking additional space temporarily. Additionally, the 5-minute city concept adopted makes active travel the only suitable way of moving around the development. In support of this, there are scooters, ridesharing, delivery services and ample bike parking available, further substantiated by on-site light rail and car share for trips further afield.

Transitioning from Predict and Provide to Vision and Validate.

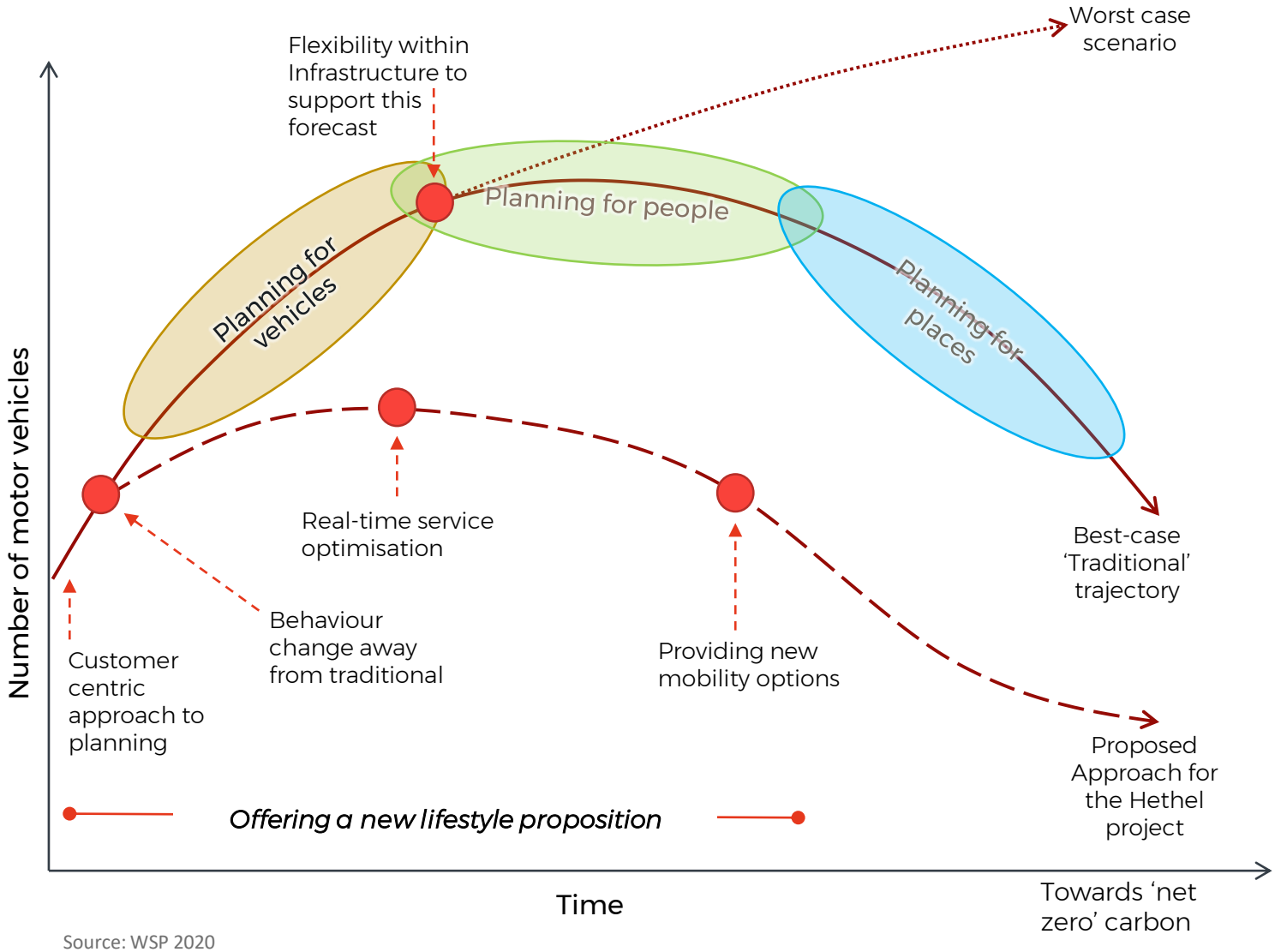
The Vision and Validate Opportunity

The historical approach to transport planning is rooted in **planning for vehicles** and only then typically supplemented by sustainable transport interventions. Owing to historic vehicle-heavy trip rates, this can lead to the early and potential over-provision of significant transport infrastructure that supports a future of private car ownership.

A user-centric approach considers the mobility needs of future residents and visitors to the Hethel Project and allows a move towards **planning for people.** The robust planning of highway infrastructure could still be provisioned for and only triggered by carefully set thresholds for trip generation agreed with the planning and highways officers (as part of **a Monitor and Manage approach**). The tailored provision of new mobility options can then more effectively reduce the reliance on the private car.

The validation of lower private car trip rates and sustainable travel choices importantly could be measured early on as a means of justifiably pushing out the trigger point for which highway infrastructure is delivered.

This progressive **Vision and Validate** strategy ultimately enables **planning for places** by putting the vision and design of the Hethel Project ahead of the negative impacts commonly associated with accommodating dominant private car infrastructure.



Source: WSP 2020

Planning For The Future

The Government recently announced changes to the current planning system through the "Planning for the future" White Paper (August 6th 2020).

The White Paper suggests draft changes to planning policy through 3 pillars;

Pillar 1: **planning for development**

Pillar 2: **planning for beautiful and sustainable places**

Pillar 3: **planning for infrastructure and connected places**

These changes seek to enable simpler decision-making, that is faster and more certain, with firm deadlines, and making greater use of digital technology.

The White Paper states Local Plans should be subject to a single statutory "sustainable development" test, replacing the existing tests of soundness.

"The homes we need in the places we want to live in at prices we can afford, so that all of us are free to live where we can connect our talents with opportunity."

Amongst many proposals within the White Paper, the following are of particular relevance to the Hethel Project;

- "be more ambitious for the places we create, expecting new development to be beautiful and to create a 'net gain' not just 'no net harm'"
- "support home ownership, helping people and families own their own beautiful, affordable, green and safe homes, with ready access to better infrastructure and green spaces"
- "create a virtuous circle of prosperity in our villages, towns and cities, supporting their ongoing renewal and regeneration without losing their human scale, inheritance and sense of place"

Planning for resilience and shock events

The undesirable arrival of a **shock event** such as the recent Covid-19 Pandemic has required a fundamental shift in how society and business functions to advance through a difficult period of uncertainty. Under the resulting lockdown, some mobility trends have accelerated (e.g. working from home, active travel, increased freight and more local deliveries) others have been paused or moved in the other direction. Whilst some of these trends will be short lived, such a fundamental pause in everyday life will undoubtedly lead to some longstanding lifestyle changes in consumer behaviour.

As a response to the Covid-19 pandemic, and particularly the noticeable shift towards private mobility, the Department for Transport announced an **Emergency Active Travel Fund in May 2020**. This grant funding intended to support local transport authorities with producing walking and cycling facilities for the installation of both temporary projects during the Pandemic and longer-term projects. Funding was also made available to protect and create transport services, and level-up infrastructure.

Part of the Covid-19 social distancing and active travel response in Norfolk County Council
Source: Denise Bradley

Thinking through the provision of infrastructure and mobility interventions applicable to the Hethel Project, such as mobility hubs, these could have wider benefits in terms of community and network resilience in providing locations for critical assets.

Thinking about place

Mobility and place-led thinking to deliver healthy, inclusive and connected living

Report Context

The vision for the Hethel Project is to "create a healthy, socially inclusive and well-connected place, where residents, workers and visitors can easily move around the site and access surrounding areas by non-car modes". This will be realised through the delivery of 5,000 affordable homes in multiple, varied, carbon positive and enterprise-rich, sustainable village clusters over 10 years and 1,000 additional one off-homes or 'specials' over 15 years in total.

The high level mobility aspirations of the scheme will provide;

- **Quality life experiences –** the Hethel Project will place an emphasis on quality life experiences which extends to the design of transport and mobility. Transport is often referenced as a derived demand which can lead to a lack of ambition in how it can positively enable quality life experiences.
- **Human centred design** is a mindset that starts with end-user's needs to ensure that solutions are actually relevant and beneficial, in the long run, for the people they are intended to serve.
- **'Car-free' development** is necessary to enable wide open spaces as well as permeable, mixed-use development. The removal of cars from the built environment can create an equitable and rewarding active travel and micromobility network.

Ringkobing K by Effekt (from Stanfield Garden Village Vision Document)

- **Striking a balance to reach Net zero -** we need to achieve a balance between the carbon emissions going into the atmosphere and being taken out. Becoming net zero will challenge the Hethel community and site users to acknowledge their carbon footprint and balance their emissions by offsetting, isolating and reducing carbon.

Future residents attracted to this lifestyle offering will be very self-aware of their ecological, CO2 and GHG emission footprint, and therefore attracted to the mobility interventions that enable low impact living.

	Ecological footprint		Carbon dioxide emissions		Greenhouse gas emissions (in CO_2 equivalents)	
	Gha/cap	Per cent	Tonnes/cap	Per cent	Tonnes/cap	Per cent
Housing	0.46	8%	0.97	8%	1.04	8%
Home energy	1.01	18%	2.78	23%	2.94	22%
Transport	0.83	15%	2.73	23%	2.86	21%
Food	1.23	23%	0.99	8%	1.64	12%
Consumer goods	0.75	14%	1.48	13%	1.70	13%
Private services	0.48	9%	1.18	10%	1.34	10%
Government	0.37	7%	0.93	8%	1.07	8%
Capital assets	0.31	6%	0.80	7%	0.84	6%
Total	5.45	100%	11.87	100%	13.43	100%

Average ecological footprint, CO2 and GHG emissions of a UK resident. BioRegional Development Group and the Commission for Architecture and the Built Environment (CABE).

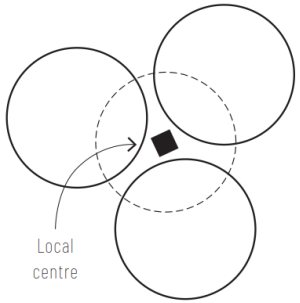
The role of mobility in enabling a sense of place.

Leveraging the site's, location, aspiration, mixed land use proposal and the core aim of prioritising active travel, **Hethel could be a rural exemplar '15 minute neighbourhoods' concept** with strong internal connectivity and permeability across the entire masterplan.

Active and sustainable travel will facilitate greater community engagement, creating self-sufficient clusters of development with a strong sense of community with an overall cohesive sense of distinct place.

The polycentric nature of Hethel, with its community of interlinked communities, provides the opportunity to bake in existing and emerging sustainable transport solutions, targeted at people and freight/logistics, building upon emerging best practice from the UK and beyond. **With a hierarchy of walking, wheeling, scooting and cycling first** (as has been demonstrated so successfully in places such as Groningen and Delft in the Netherlands, Freiburg in Germany and more recently with street closures across the UK as a result of the pandemic), **the transport network will be human-scale** rather than vehicle-scale.

Visioning a network of hubs serving clusters, which themselves could be a focus for community activities, essential services, energy generation. Sustainable and on-demand transport solutions would provide internal connectivity and linkages beyond local industry (Geeley, Hethel Innovation Centre and other developments which come on stream) to Wyndonham (for rail connections) and Norwich.



Similar inbound and outbound freight and logistics (including for utilities such as waste collection) would be similarly catered for with an on-site consolidation facilitating onward distribution and pick-up by e-cargo bike or automated droids.

Taking proven concepts from other exemplar locations and applying them to the conditions enabled at Hethel through considerate design and tying services to the needs of residents and business could reap significant dividends in providing an intuitive ecosystem of mobility.

Traditionally transportation has generally impacted the places it serves, sometimes in significant ways. Placing a net-zero, human centric vision at the heart of design not only will provide attractive solutions as electric vehicles (utility, public and private transport) as the norm but use vehicular assets more effectively using on-demand techniques and integrated means of access and payment.

With world beating walking and cycling facilities, which are designed to accommodate all forms of sustainable wheeled mobility (from e-cargo bikes, to trikes to delivery droids), cars/vans and other traditional vehicles will be segregated from sustainable movements. **The network of local hubs (with parking, EV charging, demand responsive and shared modes) will be the interface between the human-scale environment and vehicular.** Through careful, future facing design, Hethel will capitalise upon the opportunities that automated and autonomous solutions will bring, providing greater connectivity for reduced ongoing costs.

For the first time anywhere, mobility will play an active role in enabling a string sense of place, with all modes of transport working in harmony to serve residents and visitors of all ages and needs.

The role of mobility in enabling a sense of place.

15-minute neighbourhood

The Hethel Project has an aspiration to design for a 15-minute neighbourhood. The concept, whether for a 10, 15 or 20-minute neighbourhood underpins a 'living locally' lifestyle.
The walking and cycling connectivity between the different land uses and residential locations will be key for inclusive design.
All movement within villages will be by foot and micromobility except for controlled servicing traffic.
The provision, mode hierarchy and spatial layout of the development will dictate the sense of place that is created.
Walkable neighbourhoods will be orientated around community hubs as the nodes of activity.

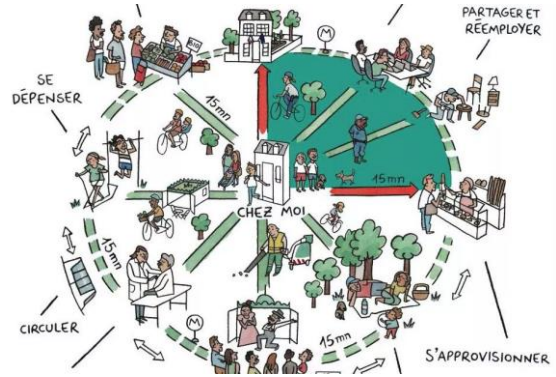
While fixed land uses require multiple sustainable transport options to meet all users needs. Mobile (vehicle-based) assets such as mobile food trucks, mobile libraries, mobile hairdressers could further meet community needs through temporary deployment.
Finally the mobility assets themselves must be shared and accessible in a way that promotes their use over the private car.
While there will be a place for car use, at edge of town car barns, it must be seen as a last resort for all of those functions within the 15 minute neighbourhood.

douce mobile hairdressers in Eddington

Local food market at Urban Villages Project by Effekt

The challenge for the Hethel Project is translating the 15-minute neighbourhood into something that is inherently rural in nature.

Plan Melbourne 2017–2050



15-minute city. Paris en Commun

Considering the unintended consequences of design.

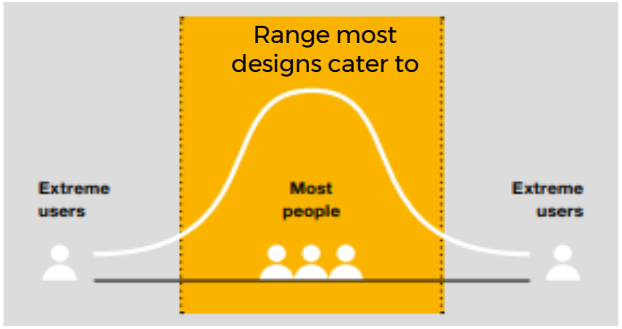
The human-centric design approach will ensure adequate interventions are implemented for the future residents, workers and visitors of the Stanfield Garden Villages.

To mitigate the unintended consequences of design, an agile Monitoring & Evaluation Framework will be put in place, allowing for changes to levels of provision, service quality and other changes to be made. This process includes the following milestones:

1. Preparation of Scheme design and development of the M&E Framework
2. Monitoring post-occupation
3. Real-time service optimisation

As such, the M&E Framework will be a 'live' document with an iterative 'monitor and manage' approach that tries to outline a more accurate representation of who might use the site and how might they wish to travel; also demonstrating the practical mechanisms required to adjust with changing needs, technology advancements and other factors which will ultimately ensure meeting end user requirements in the future.

Traditionally, transport planning has catered to the 'majority user', typically based on the commuter during peak hour travel. Recognising the limitations of this, it is imperative to widen the lens with which transport is planned, delivered and assessed. That is, **considering diverse identities of gender, physical ability, race and more, enables a more inclusive understanding of how people navigate transport systems.** It is important to consider how the varying intersections of these identities can shape one's experience of mobility options. This can be understood to be ***intersectionality:*** the layered intersection of 'disadvantaged' identities – particularly those diverging from the 'white-male' norm – and where the layers overlap, a unique type of discrimination is experienced.



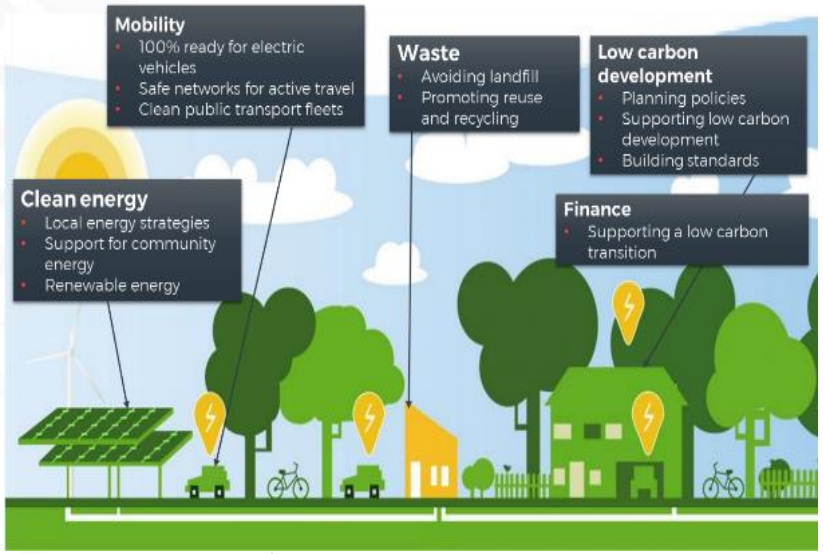
In alignment with the principles outlined in the Network Rail's ThinkStation Report, the extreme users should set the parameters of design to ensure spaces and services are inclusive.

People with additional needs	Night time users
Carers	Night time walks for charities
Elderly	Late night and early morning clubbers
Mentally disabled users	Shift workers
Person with colour blindness	Revellers
Person with a hearing impairment	
Person with visual impairments	
Person with a mental health condition	
Person with anxiety	
Person with temporarily reduced mobility	
Person with mobility aids	
People with access/mobility needs	
Person on a mobility scooter	
Person with permanent reduced mobility	
Person with visual impairment	
Pregnant women	
Temporarily impaired	
Single parent with young kids	
Wheelchair users	

In a series of workshops held by Network Rail and Design Council, within the **ThinkStation Programme**, stakeholders were invited to share ideas and insights on stations and the processes through which new stations are designed, planned and delivered. Adopting a Design Thinking approach, the workshop provided an opportunity to explore the 'problem statement' at great depth, yielding a deeper understand of who stations are designed for. The extract above provides an indication of the user groups identified, showcasing the divergence towards 'extreme users'.

Villages with integrated energy, digital and mobility.

With the growing electrification of transport systems and the environmental pressures to tackle climate change, the of interconnectedness of energy, digital and mobility are apparent. The integration between places, energy needs, digital landscape and mobility provide technology optimising, carbon cutting opportunities, with wider environmental and social benefits. The figure below illustrates the possible interdependencies in a local system, where carbon trade-offs can be made between activities/ services. Efficiencies arise from the generation, storage and use within the home, consumers and between asset owners.



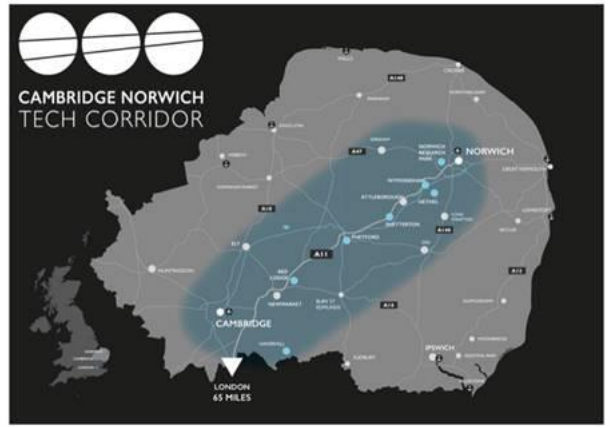
WSP Energy 360 Approach

At the strategic level, there will also be benefits in the generation, storage and use of energy, the digital connectivity and physical connectivity through clean mobility.
The Hethel Project could benefit from the ecosystem effect of a number of existing and forthcoming complementary developments and investments;

1. **Geeley Factory –** the former Lotus factory now owned by Geeley is a significant employer in the region.
2. **The Goff Project** - Norwich Energy Innovation Park with anaerobic digester which could create up to 300 local jobs. This could also generate CNG.
3. **Hethel Innovation Centre** - The Hethel Technology Park planned on Geeley (Lotus) Land. Could bring an expansion to significant employment in this area
4. **Cambridge Norwich Tech Corridor**

It is also worth noting that Norwich is the fifth most popular city in the UK for cycling. It is also home to Liftshare, one of the UK's leading ridesharing platforms who support an extensive ridesharing network across the region and for key employers.

The Goff Project



Cambridge Norwich Tech Corridor

A preliminary assessment of highway impact from different development scales.

1,000 dwellings | 2,000 dwellings | 3,000 dwellings | 4,000 dwellings | 5,000 dwellings | 6,000 dwellings

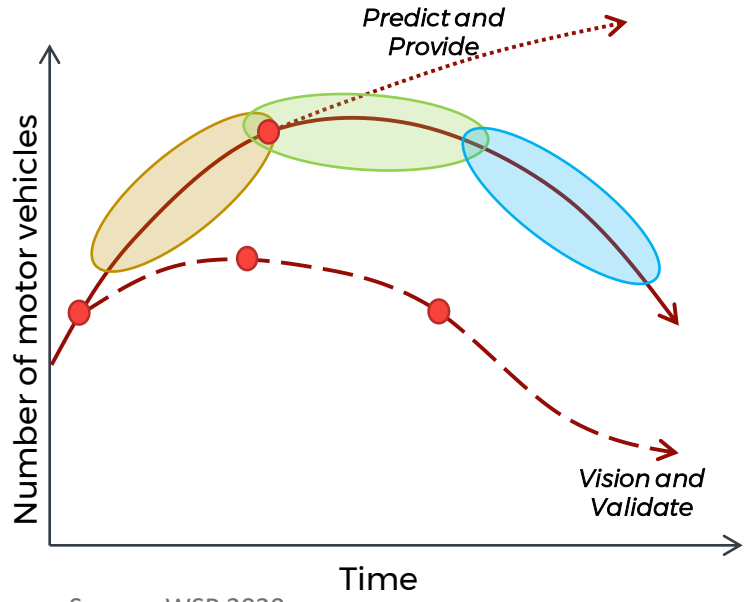
Recognising the development will need to demonstrate an acceptable impact on the local highway network, a 'traditional' movement analysis has been undertaken for the A11 Wymondham Bypass / Browick Road junction, with the extensive analysis included within **Appendix B**.

This measures in capacity terms what level of development can be accommodated without either highway mitigation or associated measures to reduce car mode share for the development. In order to ensure the proposed development does not result in a significant adverse impact on the operation and performance of the A11 Wymondham Bypass / Browick Road junction, under its existing layout and design, a number of scenarios have been modelled for varying quanta of development as illustrated above (1,000 to 6,000 dwellings).

These analyses are typically aligned to a **'predict and provide'** approach to providing for and reviewing the success of the proposed interventions relating to the scheme, which is rooted in planning for vehicles.

However, when combined with a user-centric approach considering the mobility needs of future residents and visitors to the Hethel Project and allows a move towards planning for people. The robust planning of highway infrastructure could still be provisioned for and only triggered by carefully set thresholds for trip generation agreed with the planning and highways officers. Agreed trip rates at certain agreed trigger points will be dependent upon increased internalisation as the development progresses.

The tailored provision of new mobility options can then more effectively reduce the reliance on the private car, as envisioned for the scheme. The validation of lower private car trip rates and sustainable travel choices importantly could be measured early on as a means of justifiably **pushing out the trigger point** for which new highway infrastructure is delivered.



Source: WSP 2020

This progressive **'vision and validate'** strategy ultimately enables planning for places by putting the vision and design of Stanfield Garden Villages ahead of the negative impacts commonly associated with accommodating dominant private car infrastructure.

Adopting a poly-centric place-led design ethos could present significant opportunities for the future mobility offer. How should these be tailored to the needs of those living, learning, working and enjoying Hethel?

Human-centric design

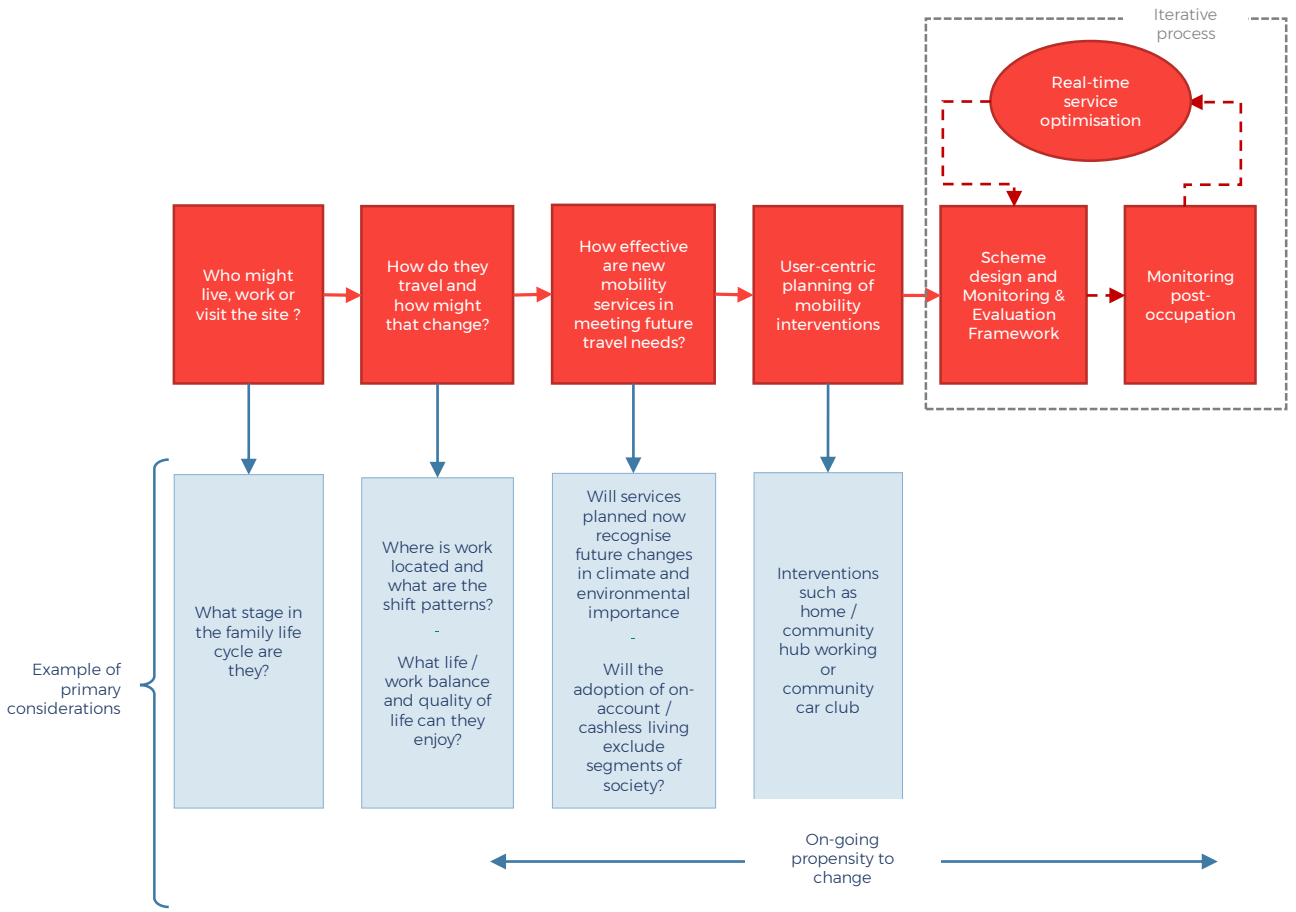
Human-centric design

Putting the human at the centre of the design process to embed positive experiences

Human-centred design (HCD) is an approach to problem-solving that puts the people we are designing for at the heart of the process. The goal of employing HCD is to **develop solutions that meet the needs of all potential users**, particularly those who will live, work and visit The Hethel Project. This will be an iterative process, allowing for continuous adjustments to levels of provision, service quality and other changes which are required to be made.

The **iterative refinement** of service provision will be key to meeting the needs of different users (all residents and visitors), considering the subtleties of **intersectionality**, and how needs will change through individuals' life cycles or as a family unit.

The diagram presents the user-centric approach alongside the primary considerations of users and how these might change.



WSP – User-centric approach

The target audience for those living and working at the Hethel Project

The use of user personas in design is associated with enabling a greater understanding of user needs. It allows us to better view the users, their behaviours and to open our eyes to new opportunities. For the Hethel Project, it will help us to generate meaningful solutions that are human-centred rather than technology focused. It is particularly relevant given the context of the DfT's DTP in the promotion of 'place-based solutions' which acknowledge that different areas will need different combinations of solutions to reduce emissions (and meet human needs). The plan highlights that methodologies informed by behavioural science to encourage people to make more environmentally friendly choices is key.

It is expected that the predominant personas making up the Hethel Project given its unique affordable offer could comprise:

- Younger families
- Empty nesters

These groups are associated with lower car ownership. Importantly the radical affordability will also ensure there will be a diverse and inclusive community across socio-demographic segments with different propensities. Developing a deep understanding of these needs is critical to inform interventions.

Hethel Innovation Centre (Source: TechCorridor)

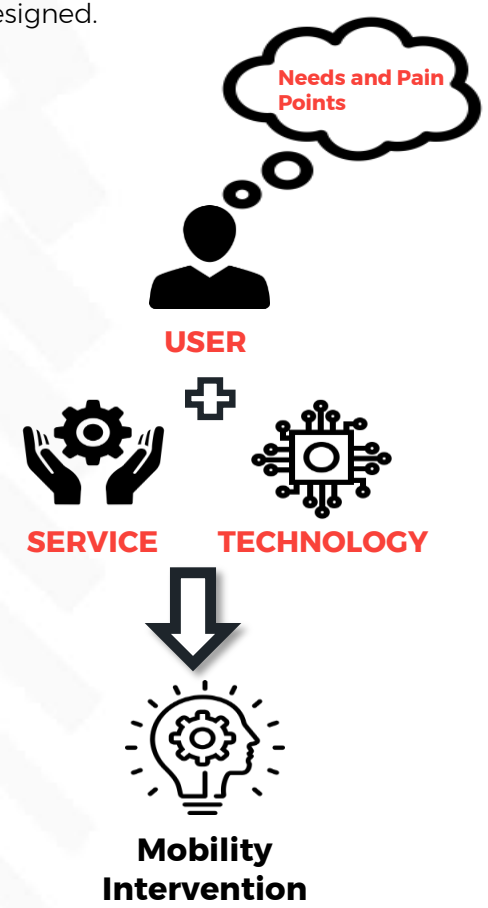
SNRG car-free housing for a UK Garden Town

Geeley Factory (Source: Autocar)

Pashley, hand-built British bicycles, Stratford-upon-Avon

Supporting the mobility needs of residents, workers and visitors to the Hethel Project

The diagram below identifies that mobility interventions must be grounded in user needs and pain points and only then can the appropriate mobility service or technology be designed.



Focusing the mobility design on expected and future needs of different user segments requires various methods of engagement to gather insights; from surveys, focus groups to interviews. These engagements should be undertaken with local users (within the Greater Norwich area) as well as across a wider reaching catchment that represents where future users might be moving from (i.e. Cambridge and London).

Validation of the sustainable lifestyle and associated mobility strategy will be key for the Hethel Project. An example output from a similar user-centric survey exercise (encompassing over 2,500 respondents) to support garden village proposals in Southeast England is provided below.

50%

of survey respondents would be open to having their vehicle parked in a **nearby central, secure and covered location** instead of at their doorstep, if it saved them money

The mobility provision and movement strategy will be tailored respond to different user's needs. A persona-led example is provided below;

Mr and Mrs Oakham are moving to Hethel as a young family with two small girls (aged below 10 years).

They are moving from being a two-car household to a single-car household as they feel the Hethel mobility options can support their current lifestyle. They have expressed values that reflect the following needs, with an articulation of appropriate solutions might be developed.

These could be met through:

Flexibility: a mobility credit package that can be used across different transport modes, including a demand responsive bus service to provide access to key centres including Wymondham station

Safety: an active travel network that prioritises walking and cycling

Choice: access to car sharing, bicycles, e-bikes, e-scooters, parcel lockers

Value for money: improved mobility provision at a lower cost than at their previous home

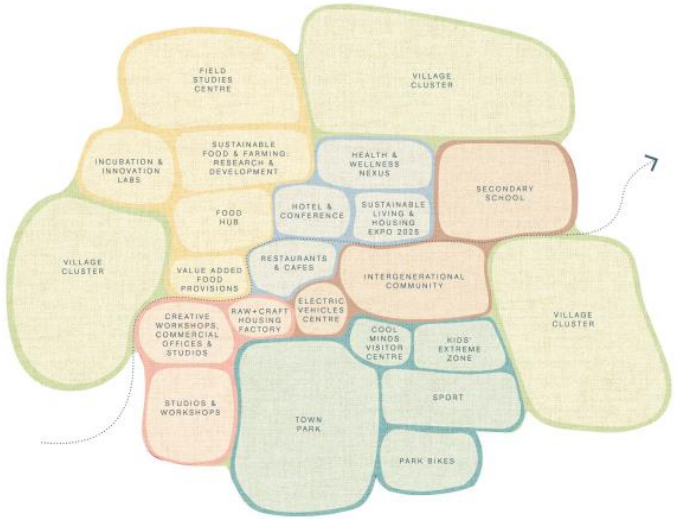
The mobility strategy also needs to be attractive in a sustained multi-generational way with long term, highly connected communities that reduce the level of turnover across site-users.

How does putting the human (those that live, work and visit Hethel) at the centre of planning help focus planning for movement ?

Using sustainable mobility to anchor places (and their activities)

Recognising the important role transport has in enabling access to places and their related activities, it is key to scope the mobility requirements to support different land uses at the Hethel Project.

The indicative plan of the town centre for the Hethel Project is shown below. Each of these land uses and industries will have specific mobility requirements.



Indicative town centre plan at the Hethel Project

As an example, the proposed bi-annual Sustainable Living, Clean Growth, and Housing EXPO (provisionally commencing from 2026) would require an Events Strategy, detailing event-day crowd management, operational requirements and Freight & Servicing plan, all relating to mobility. Additionally, user-facing interventions to meet event-day demand could include a temporary increased frequency of the demand-responsive shuttle bus, crowdsourced coach routes (from key centres in Cambridge and East Anglia) and carsharing opportunities (e.g. Liftshare, Faxi) all integrated with the ticket purchase.

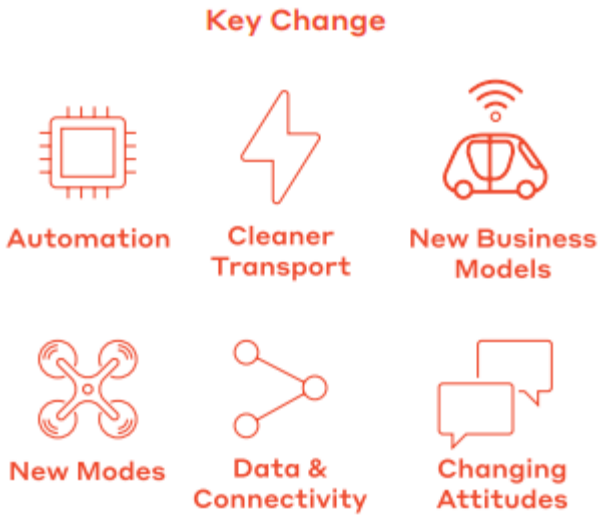
Meeting the vision of zero local air pollution must be considered across all journey purposes including freight and logistics. The poly-centric growth of the Hethel project will equally need a freight and servicing strategy that grows at the same pace. The initial villages will support micro-consolidation centres that reduce overall LGV and HGV movements within the masterplan. Over time, a strategic consolidation centre will support the network of micro-consolidation centres further reducing the need for large vehicles to enter the heart of the villages.

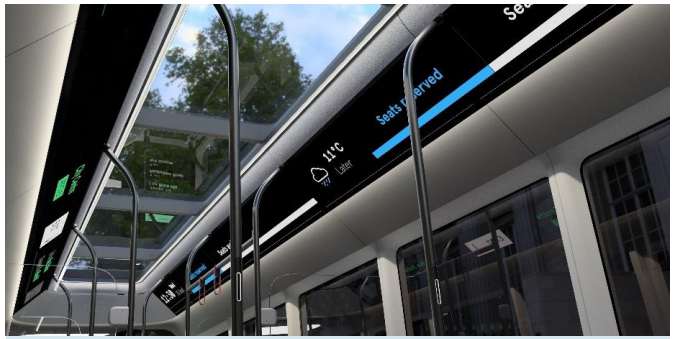
Considering future mobility alongside the delivery programme

A summary of the key milestones across the SGV delivery timeline are provided below:

- **2022** – construction commencing for the first three villages including the bike lane network, town-edge car park and bike scheme
- **2025** - first 1500 homes completed sold and rented
- **Summer 2026**, Sustainable Living and Housing EXPO
- **December 2028**, a further 1500 homes completed across 10 villages
- **December 2032**, 6000 homes finished and occupied. Target of 8,000 jobs achieved

Future Mobility will have implications on scheme design given the delivery timeline for Hethel. The six key changes identified within DfT's Future of Mobility: Urban Strategy are deemed equally applicable to the rural context. The 'six key changes' are highlighted below and their potential relevance for SGVs scheme design is provided on the following pages.





The new electric ARRIVAL bus which has adopted human-centred design to deliver an accessible, premium public transport experience includes;

- Contactless interaction to activate the bus bell
- In-journey information
- A vehicle that is easier to clean

In the words of Arrival's CXO, Kwame Nyanning: "Every single touchpoint with these vehicles is an opportunity to improve someone's moment."

A similar approach could be adopted for the mobility interventions deployed at the Hethel Project, not in vehicle design but in how mobility services are provisioned, and in how infrastructure and networks are designed.

Applying the Six Key Future Mobility Changes to Hethel

Cleaner Transport

The net zero vision for Stanfield Garden Village will encompass initiatives that decarbonise transport; giving consideration to avoiding the need to travel, zero emissions at the tailpipe and net zero from a whole lifecycle perspective. **The centralised provision of electric vehicle charging infrastructure across mobility hubs and the edge of town car parking is more pragmatic than excessive provision of charging infrastructure by individual plot that could result in promoting single-car occupancy use. Electric, hydrogen and human means of propulsion will also contribute to zero emissions within the masterplan.**

New Modes

New modes and forms of propulsion give rise to new forms of accessibility to services, products and opportunities in Stanfield Garden Village. **First and last mile connectivity could be strongly supported by emerging modes such as e-scooters, e-bikes and demand-responsive transport. Automated or e-cargo bikes could play a key role for facilitating last mile freight deliveries across the masterplan.**

Data & Connectivity

The increasing availability of data and improved connectivity are allowing travellers to plan journeys in advance and in real-time. Increasing vehicle and infrastructure connectivity, combined with advances in artificial intelligence can bring improved information, optimised service planning and improved safety.

New Business Models

The emergence of new digitally enabled models of transport provision. The increasing maturity of residential-led mobility business models could further enable convenient and customised mobility services (that provide an alternative to private car usage).

Changing Attitudes

Rising customer expectations are driving passenger transport and delivery services that are increasingly affordable, convenient and personalised. **Understanding the demographics of Stanfield Garden Village will determine the types of mobility services required as described in the earlier sections of this report.**

Automation

Automation - Improved sensing technology, computing power and software engineering are leading to increasing levels of automation in transport. The automation of jobs also has a significant impact on travel patterns. Commercial deployments in public service vehicles and private car ownership of automated vehicles are expected before the full completion of the development. **Vehicle automation changes where transport facilities will be located and how they are planned. The edge of town car park location is resilient for an increasingly automated future.**

FUTURE MOBILITY FOR RURAL COMMUNITIES,
The Royal Automobile Club / RCA challenge 2019/20

The megatrends impacting how we travel

The access and mobility needs of our society are increasingly influenced by mega trends that are impacting how, when, and where people will need to travel, particularly in the wake of Covid-19. The mega-trends have the potential to influence how future residents, workers and visitors of Hethel navigate and experience the villages.

These mega-trends can be broadly categorised as follows Demographic challenges, Social change, Environmental focus, Economic shift and Political landscape, and are shifting at varied rates. As such, considering wider journey types is central to a human-centric design, allowing a more holistic approach to understanding where people travel to. Some key movements may include :

- Education and learning
- Healthcare
- Retail (travelling to a location)
- Leisure (travelling to a location)
- Logistics and deliveries (serving most of the above)
- Utilities and maintenance

The Covid-19 Pandemic has changed the way we live, work and enjoy our leisure time, with anticipated lasting effects. For instance, working from home is expected to become more commonplace, with some companies such as Twitter already announcing that staff will work from home permanently.

Additionally, people have steered away from public transport and are undertaking more active travel trips locally due to concerns of hygiene and safety.

As an example, in keeping in line with the national requirement to maintain 2m social distancing, Transport for London will only be able to carry around 13-15 per cent of normal passenger numbers on bus and tube even when 100 per cent of services are operating again.

While this is hopefully a short-term operational restriction it does impact the long-term attractiveness of public transport services.

Changes in consumer behaviour have highlighted how modern society is underpinned by freight. For example, the UK has grown to be one of the world's largest e-commerce markets. According to the University of Westminster this has generated 1.26bn UK deliveries annually across grocery, non-food retail, takeaway and home delivery. This change has contributed to van fleet numbers growing by 71% in the last 20 years to 3.2m with an increased focus on serving urban residential and commercial premises.

Whilst it is impossible to know what the new normal will be, it is unlikely we will go back to operating how we operated before. This will require new developments to adjust accordingly; enabling contactless deliveries through mobility hubs and reducing vehicle km travelled through consolidation centres..

Whilst trends are indeed changing, the transport network south of Norwich is largely static and change is comparatively slow . Understanding the local context is key in determining which interventions might be applicable.

The key movement functions at Hethel

The site will be developed in a way that promotes active travel and the use of public transport, whilst maximizing the opportunities for emerging new mobility services to be implemented. In doing so, the Hethel Project will develop a **place that reduces the need to travel by private car, and where people prefer to travel by non-car modes.**

A review of the existing site connectivity and a sustainable transport strategy is provided within the Transport Connectivity report contained within **Appendix A.**

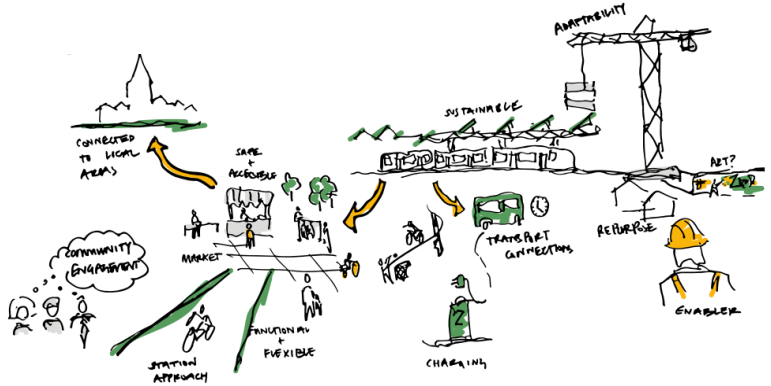
The surrounding walking and cycling infrastructure is deemed to be adequate quality; the pedestrian network allows for travel into the local Public Rights of Way Network, but it is not possible to access existing bus and rail services within a suitable 25-minute walking time. Cycling would enable future residents to interchange in Wymondham (particular with the potential of e-bikes) and would require good cycle parking facilities to encourage increased use in the future. As such, **improved networks will be needed to achieve direct access to local pedestrian and cycling infrastructure**, making the site more attractive to residents who work in these key employment areas. Detail of potential improvements are included within the Transport Connectivity report.

The proposed development is well located to facilitate sustainable travel into the surrounding area. Wymondham Railway Station, located approximately a 40-minute walk or 15-minute cycle from the site, is the closest Rail Station and Bus Stop to the site and provides access to frequent bus services, direct trains to Norwich and Cambridge / Stansted Airport. The potential for extending the proposed Wymondham to Norwich BRT route to serve the Hethel Project would hugely benefit the site connectivity.

The station offers a small number of cycle parking stands, which would need to be increased and upgraded if increased use is encouraged to residents, as current levels are not suitable to accommodate increase demand. **Wider station upgrades incorporating mobility hub principles** could be considered (as depicted by Network Rail's ThinkStation report).

A rail study into re-establishing through services from the Mid-Norfolk Railway (which is currently a preserved railway, but has a national rail connection at Wymondham and is currently being used to store redundant tarins) and through services to Norwich which could improve train frequencies through Wymondham.

The site is also close to the A11, which forms part of the UK's Strategic Road Network (SRN), connecting Norwich and the A47 (to the north-east) to Cambridge and the M11 (to the south-west).
The Geeley factory to the south will potentially bring products and services associated with a move to electric propulsion. With the nearby Hethel Centre, other developments in south Norwich and future activities at the Hethel Project, there is **an ecosystem benefit** that could see the site as an **early test-bed location** for new transport technology.



Design Council / Network Rail : ThinkStation Report – Sustainable Station Concept

Overview of the highway capacity analysis

A technical note on the A11 Wymondham Bypass / Browick Road Junction Capacity Assessment is provided within **Appendix B**. The note sets out the trip generation methodology, assessment scenarios and junction performance results.

A summary is provided in the table below of the junction performance for all scenarios, indicating the maximum RFC across all arms for both roundabouts to indicate whether the junction:

- operates with reserve capacity (green; all RFC's below 0.85);
- operates above theoretical capacity, but below practical capacity (orange; maximum RFC is below 1); or
- operates above capacity (red; minimum of one arm with an RFC above 1).

The scenarios show that **under a 'predict and provide analysis' no detrimental impact on the junction performance would be expected for a development scale of between 2,000 and 3,000 dwellings.**

Relating back to the **vision and validate** approach, the opportunity within the development planning process is to identify the **trigger points** from a development impact perspective. This **would build in flexibility for how the development could potentially validate lower external trip rates** and more sustainable mode share to deliver more units than this with no detrimental impact.

The **Monitoring and Evaluation Framework** would be key in ensuring there is not an overprovision of expensive transport infrastructure whilst enabling the organic growth of the Hethel project.

Scenario	2021 Base		2025 Base		2025 Base + Dev		2040 Base		2040 Base + Dev	
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
1,000 Dwellings	0.13	0.15	0.14	0.16	0.46	0.38	0.16	0.18	0.47	0.40
2,000 Dwellings					0.77	0.38			0.79	0.40
3,000 Dwellings					1.08	0.49			1.10	0.51
4,000 Dwellings					1.40	0.63			1.41	0.64
5,000 Dwellings					1.71	0.76			1.73	0.76
6,000 Dwellings					2.02	0.91			2.04	0.93

Junction Performance for all scenarios A11 Wymondham Bypass / Browick Road

What are the next steps for progressing the Hethel Mobility Vision?

Progressing the Hethel Project Mobility Vision

This report sets out a blueprint for mobility at the Hethel Project. The next stage for the project is to **develop proposals such that the site can be allocated in the Local Plan**. Key to this will be the **development of a Monitor and Manage strategy** in order to map the progress and development of the scheme.

The following actions are also needed to progress the vision and develop the masterplan proposals:

- Scoping discussions to present the Hethel Project mobility vision to local authorities and other key stakeholders
- Public Consultation
- Scoping of the digital, energy, mobility opportunity (both strategically and locally) to identify commercial appetite and establish responsibilities across key partners and stakeholders
- Vision and Validate: User-centric travel survey to inform progressive trip rate and mode share targets
- Strategy for Active and Healthy Travel, Public Transport and Reducing the Overall Need to Travel
- Masterplan design advice and transport network development
- Predict and Provide: a robust forecast of trip rates and mode shares associated with traditional trip generation methodology
- Road Connectivity and Access Strategy (including Planned Transport Network Improvements, Parking Provision)

The Hethel Project proposition is a unique one that relies upon the aggregated benefit of sustainable living and new mobility services. The key roles of asset owner, operators and users have not yet been defined. We would also recommend some early validation of the likely business models that would support some of the progressive concepts ;

- Integrated energy, digital and mobility services
- Operation of shared mobility services
- Operation and feasibility of freight and servicing services

Let's change the way we think. *Let's create change.*

Future Mobility

Appendix A

Stanfield Garden Villages – Technical Note 1

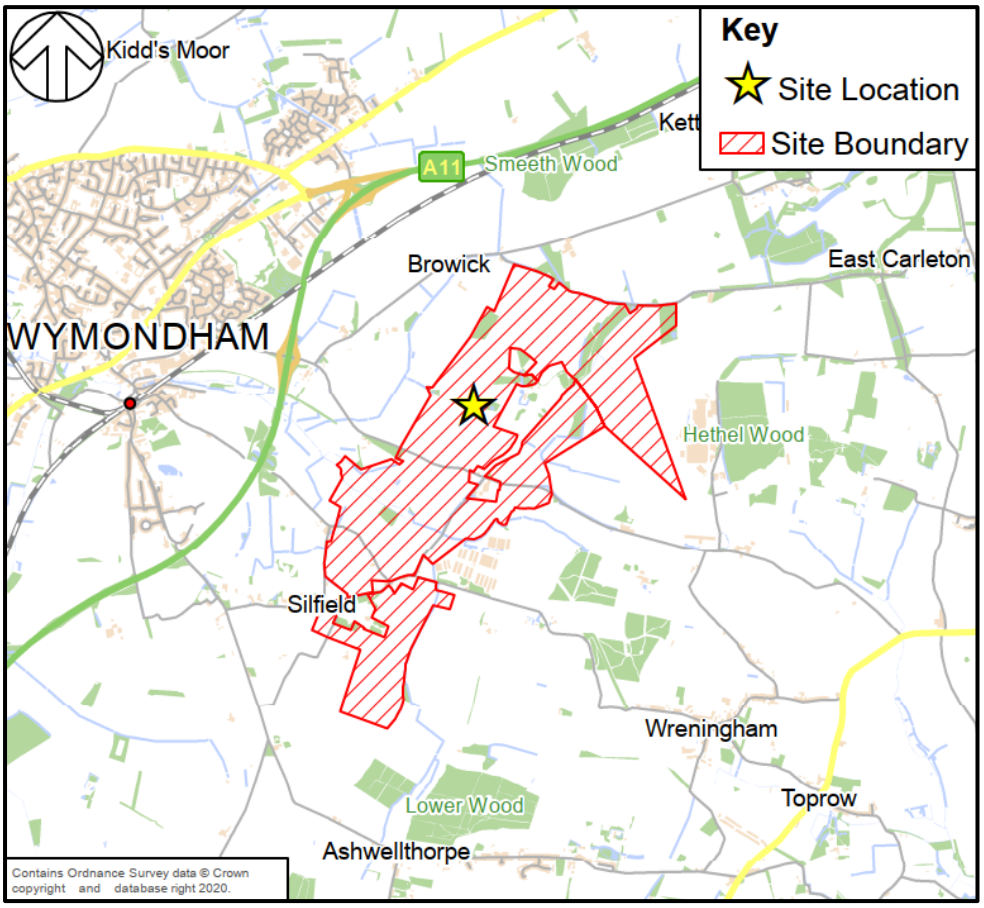
DATE:	20 August 2020	**CONFIDENTIALITY:**	Public
SUBJECT:	Sustainable Transport Appraisal		
PROJECT:	70074638	**AUTHOR:**	UKHEG001
CHECKED:	UKACP002	**APPROVED:**	UKNMD002

INTRODUCTION

WSP has been appointed by Human + Nature to provide transport advice for the promotion of the Hethel Project also known as “Stanfield Garden Villages”. The site has been identified for development due to its proximity to Wymondham, which provides access to frequent bus services, direct trains to Norwich and Cambridge / Stansted Airport and strong provision for walking and cycling. The site is also close to the A11, which forms part of the UK’s Strategic Road Network (SRN), connecting Norwich and the A47 (to the north-east) to Cambridge and the M11 (to the south-west).

The extent of the site being investigated is approximately 342ha in size and lies approximately 3.3km east of Wymondham town centre. It is bounded by agricultural land to the north, south and west and Hethel Innovation Centre to the east. The Location of the site is indicated in **Figure 1**.

Figure 1: Site Location Plan



Broadland District Council, South Norfolk District Council and Norwich City Council are working together with Norfolk County Council to produce the Greater Norwich Local Plan to provide a sustainable vision for the future of the area. At this stage in the development of the Plan, they want to know about potential development

DATE:	20 August 2020	**CONFIDENTIALITY:**	Public
SUBJECT:	Sustainable Transport Appraisal		
PROJECT:	70074638	**AUTHOR:**	UKHEG001
CHECKED:	UKACP002	**APPROVED:**	UKNMD002

sites or broad locations for development across Greater Norwich, as such they have carried out a 'Sites Plan consultation', to inform policies on the new Local Plan for housing, employment and other uses.

The Stanfield Garden Villages project aims to become a preferred choice for a land allocation within the Local Plan which will support the project to develop housing, employment, education and retail uses of benefit to the wider area.

Future Development Vision

As noted in the Vision and Delivery Document, the transport vision for Stanfield Garden Villages is to:

> *"create a healthy, socially inclusive and well-connected place, where residents, workers and visitors can easily move around the site and access surrounding areas by non-car modes"*

The following objectives will assist in achieving this vision:

- develop a place that reduces the need to travel by private car, and where people prefer to travel by non-car modes;
- maximise the opportunities that are emerging for new types of mobility;
- promote walking and cycling for local trips within the Garden Village and with surrounding areas over the use of private car; and
- maximise public transport use.

Stanfield Garden Villages will include a number of key amenities and services to meet many of the day-to-day needs of future residents, which will reduce the need to travel off-site, thus reducing development-induced trips onto the local highway network. Distances to key amenities and services within the site will be relatively short so that they are available to residents of all levels of mobility, thereby encouraging the notion of "walkable neighbourhoods".

The site will include a new and comprehensive walking and cycling network to link facilities together and encourage a healthy and active lifestyle. The site will also be integrated with existing employment areas in Hethel – including Lotus, Hethel Innovation Centre and the proposed Hethel Technology Park – which will provide employment opportunities for future residents. Improvements will also be made to existing infrastructure (Stanfield Road / Browick Road, Burnthouse Lane bridleway, the A11 footbridge) to enhance the Wymondham Circular route. Modifications may also be made to the A11 Wymondham Bypass / Browick Road grade-separated dumb-bell junction to improve provision for pedestrian and cycle movements.

The potential introduction of demand responsive transport or a Personal Rapid Transit (PRT) network within the site, linking to Wymondham town centre and railway station, will further improve accessibility to the wider area and reduce personal vehicle use. Opportunities for the PRT to expand to employment areas such as Norwich Research Park, the University of East Anglia and Norfolk & Norwich University Hospital, along with interchanges at travel hubs (for example, Thickthorn Park & Ride), can increase accessibility and facilitate longer journeys into Norwich and further afield.

POLICY CONTEXT

National Policy

National Planning Policy Framework (2019)

The *National Planning Policy Framework* (NPPF), published in February 2019 by the Ministry of Housing, Communities and Local Government (MHCLG), contains the Government's planning policies for England and how these are expected to be applied. When considering development proposals, the NPPF [paragraph 108] advises that any development should ensure:

- appropriate opportunities to promote sustainable transport modes can be – or have been – taken up, given the type of development and its location;
- safe and suitable access to the site has been achieved for all users; and
- any significant impacts from the development on the transport network (in terms of capacity and congestion), or on highway safety, can be cost effectively mitigated to an acceptable degree.

The NPPF [paragraph 110] goes further to add that developments should:

- give priority first to pedestrian and cycle movements, both within the scheme and with neighbouring areas; and second to facilitate access to high quality public transport, with layouts that maximise the catchment area for bus or other public transport services, and appropriate facilities that encourage public transport use;
- address the needs of people with disabilities and reduced mobility in relation to all modes of transport;
- create places that are safe, secure and attractive – which minimises the scope for conflicts between pedestrians, cyclists and vehicles, avoid unnecessary street clutter, and respond to local character and design standards;
- allow for the efficient delivery of goods, and access by service and emergency vehicles; and
- be designed to enable charging of plug-in and other ultra-low emission vehicles in safe, accessible and convenient locations.

Stanfield Garden Villages is in accordance with these objectives, as the development will encourage travel by active and sustainable transport modes, safe and suitable access will be achieved and any traffic impacts on the surrounding highway network (to be agreed with Norfolk County Council) will be mitigated.

The Strategic Road Network and the Delivery of Sustainable Development

The Department for Transport (DfT) produced guidance – *DfT Circular 02/2013* – on how the delivery of sustainable development must safeguard the primary function and purpose of the SRN. The guidance recognises that:

- development proposals are likely to be acceptable if they can be accommodated within the existing capacity of a section (link or junction), or they do not increase demand for use of a section that is already operating at over-capacity levels;
- development should only be prevented or refused on transport grounds where the residual cumulative impacts of development are severe;

- promoters of development should put forward initiatives that manage the traffic impact of proposals to support the promotion of sustainable transport; and
- Transport Assessments (TA) undertaken should be comprehensive enough to establish the environmental impacts, including air quality, light pollution and noise, and to identify the measures to mitigate these impacts.

As a part of the Stanfield Garden Villages project, junction capacity assessments will be undertaken, using traffic flows obtained from the wider Norwich Area Transport Strategy (NATS) model. This will demonstrate where mitigation is required (if any) to improve the wider transport network, following construction. An accompanying TA will consider all effects associated with the Stanfield Garden Villages development.

Local Policy

Connecting Norfolk, Norfolk's Local Transport Plan 2011-2026

NCC's third Local Transport Plan (LTP), *Connecting Norfolk*, sets the long-term strategy for transport delivery up to 2026. It provides the policy framework for improvements to transport as well as being a guide for future development or delivery. Norfolk's transport vision is to have:

> *"a transport system that allows residents and visitors a range of low carbon options to meet their transport needs and attracts and retains business investment in the county"*

This vision will be achieved by the following:

- making the best use of existing infrastructure to facilitate reliable journeys;
- reducing the need to travel;
- influencing others and ensuring transport is integrated into development plans; and
- working with communities and other partners to seek new solutions.

The LTP outlines a number of policies that set out the priorities going forward:

- ***Policy 2: Traffic Management*** – measures to increase journey time reliability, particularly for public transport;
- ***Policy 6: Transport Infrastructure to Support Growth*** – recognition should be given to require improvements on the highway network at bottlenecks. These should be matched with sustainable travel packages or measures to encourage regeneration;
- ***Policy 9: Travel Choice*** – emphasis should be in enhancing travel choice where options offer a viable alternative to single occupancy car travel and potential for modal shift;
- ***Policy 15: Access for All*** – Accessibility for all, especially disabled people, should be considered as part of all transport maintenance and improvement works and opportunities to ensure adequate facilities are provided.

Stanfield Garden Villages aims to create a development that encourages travel on foot, by bike and public transport, whilst providing facilities within the site (such as retail facilities and schools) to reduce the need to travel by private vehicle. The site will encourage modal shift, by designing the internal layout to support sustainable travel and create a network of safe and attractive walking and cycling routes.

Norwich Area Transportation Strategy (2004) and Implementation Plan Update (2013)

The *Norwich Area Transport Strategy* (NATS) has been designed to help deliver the growth that will happen within the Norwich area and address transport problems. The NATS aims to increase travel choice for all by improving facilities for walking and cycling and routes for public transport, including implementation of bus priority measures on the core bus network.

The *Implementation Plan Update* identifies a Bus Rapid Transit (BRT) network as a key feature, which will link major facilities, such as employment areas, with existing residential areas or planned growth areas. The plan outlines six potential routes, including one along Newmarket Road into Wymondham, which will include branded stops and vehicles and frequent services to provide a viable alternative to car travel.

The Emerging Norfolk County Council Transport Plan 2020-2036

Norfolk County Council is refreshing the Local Transport Plan to cover the period of 2020-2036. An initial draft was consulted on from 13th January – 28th February 2020, focusing on key transport priorities.

The LTP is being updated to include new priorities, such as the NWL, A140 Long Stratton Bypass, A10 West Winch Relief Road, Attleborough Link Road and full dualling of the A47 including Tilney to East Winch and Acle Straight.

The draft aims of the new LTP are:

- Well managed and maintained transport network;
- Delivering a sustainable Norfolk;
- Enhancing connectivity;
- Enhancing Norfolk's quality of life;
- Improving transport safety; and
- Increasing accessibility.

The Emerging Greater Norwich Local Plan 2018 – 2038

A Greater Norwich Local Plan (GNLP) is currently being produced by Broadland District Council, South Norfolk District Council, Norwich City Council and Norfolk County Council. The current JCS plans for the housing and job needs of the area to 2026 and the GNLP will ensure that these needs continue to be met to 2038. A Regulation 18 Draft Plan Consultation was held from 29th January to 16th March 2020, with adoption likely to occur by September 2022.

Within Paragraph 126, the Plan notes that to achieve the objectives for the future, there needs to be a radical shift away from the use of private cars, with many more people walking, cycling or using clean transport. Stanfield Garden Village proposes a neighbourhood that will make sustainable travel attractive and encourage modal shift, by creating pedestrian and cycle infrastructure that links houses with key services and public transport that is efficient and reliable.

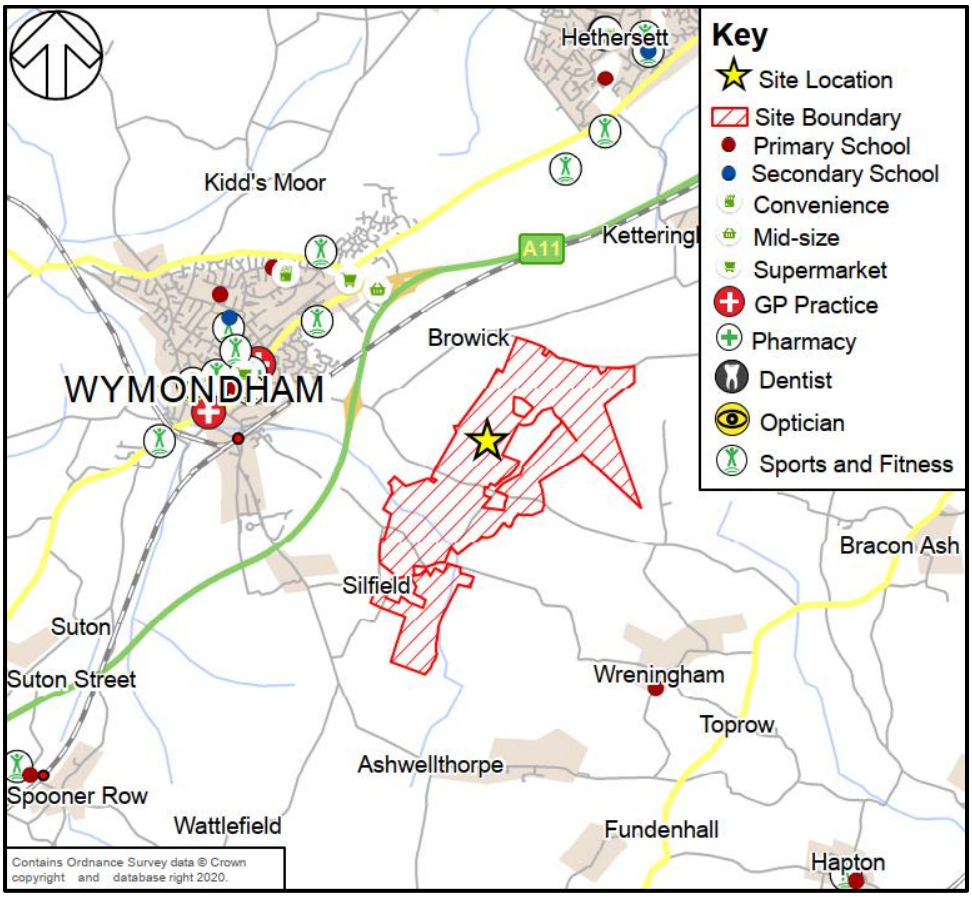
The Plan goes on to promote increased electric vehicle provision, where personal vehicle travel cannot be avoided; the Garden Village will have the necessary infrastructure to promote electric vehicles for future residents.

PLACE

Local Facilities

The site is located near to a number of amenities, including retail stores, medical centres and education facilities, mostly within Wymondham (**Figure 2**).

Figure 2: Local Facilities Plan



The objective of these Garden Villages is to create a place where people want to live and work and this scheme therefore proposes a development in a sustainable location, with strong transport connections and compact neighbourhoods to enable access to services, facilities and green space all within walking distance.

There are currently no facilities within the proposed development location, however if the site was to come forward, the Garden Villages would provision village and local centres that would contain retail provision, employment opportunities, a health centre, primary schools, a secondary school, library and public transport interchange. The scheme has an aspiration to design for a 15-minute rural neighbourhood.

Local Transport Infrastructure

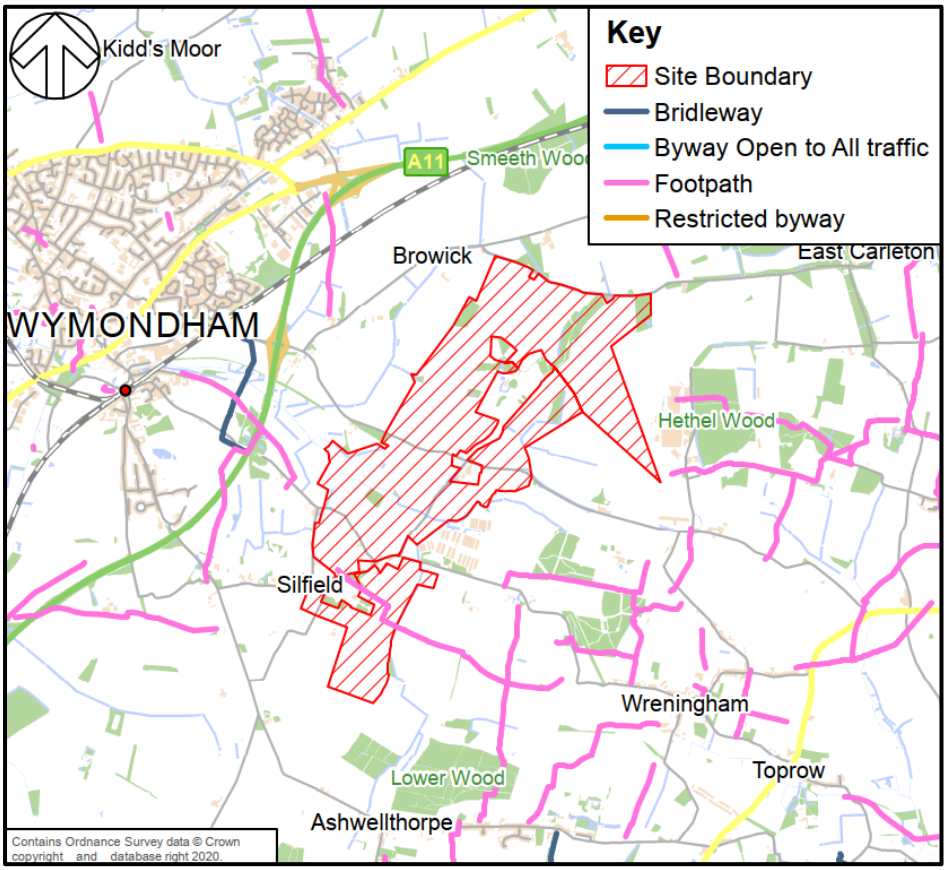
Walking and Cycling

Given that access to the local footway / cycleway network is currently poor from the proposed development site, improved networks will be needed to achieve direct access to local pedestrian and cycling infrastructure.

There is a strong Public Right of Way network around the site, with two Footpaths, Wymondham FP20 and Wreningham FP20 crossing the site boundary to the south.

Further footpaths can provide access into Wreningham and Wymondham improving the connectivity of the site to the wider area. Figure 3 shows the locations of the Public Rights of Way.

Figure 3: Public Right of Way Network

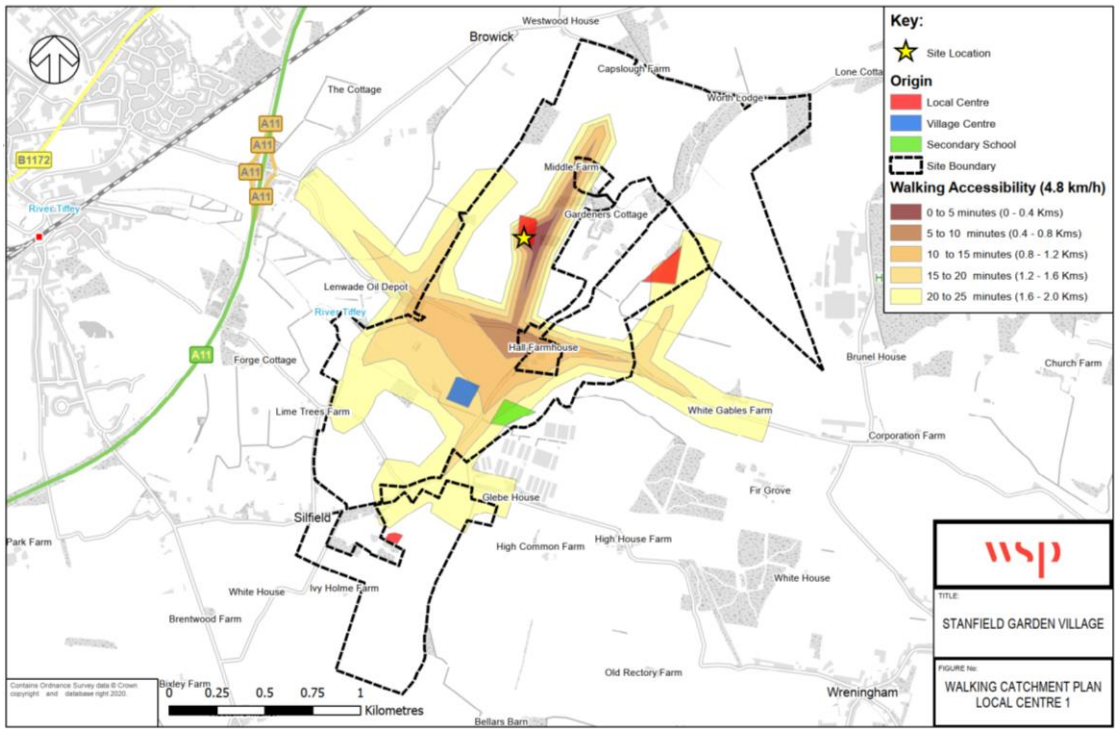


A walking accessibility plot showing the 25-minute walking catchment of the potential development site key locations (local centres, village centre and secondary school) are shown in **Figure 4**, **Figure 6**, **Figure 8**, **Figure 10** and **Figure 12**. Cycling isochrones show the potential accessibility of the site within a 25-minute cycling journey times, which are included in **Figure 5**, **Figure 7**, **Figure 9**, **Figure 11** and **Figure 13**.

Northern Local Centre

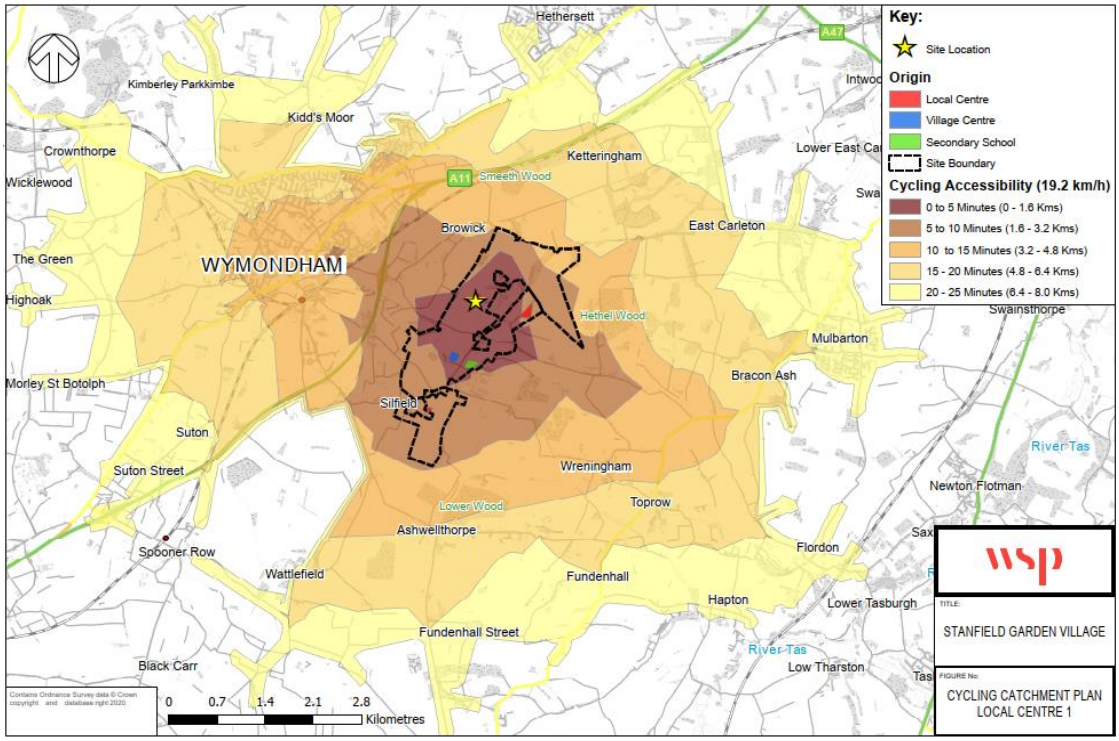
The northern local centre via the existing pedestrian network allows for travel to the Village Centre and Secondary School but does not reach beyond the A11 into Wymondham.

Figure 4: Northern Local Centre - Walking Isochrone



The cycling isochrones show that within a 25-minute ride, Wymondham, Mulbarton and Hapton can all be reached, making the site attractive to residents who work in these key employment areas.

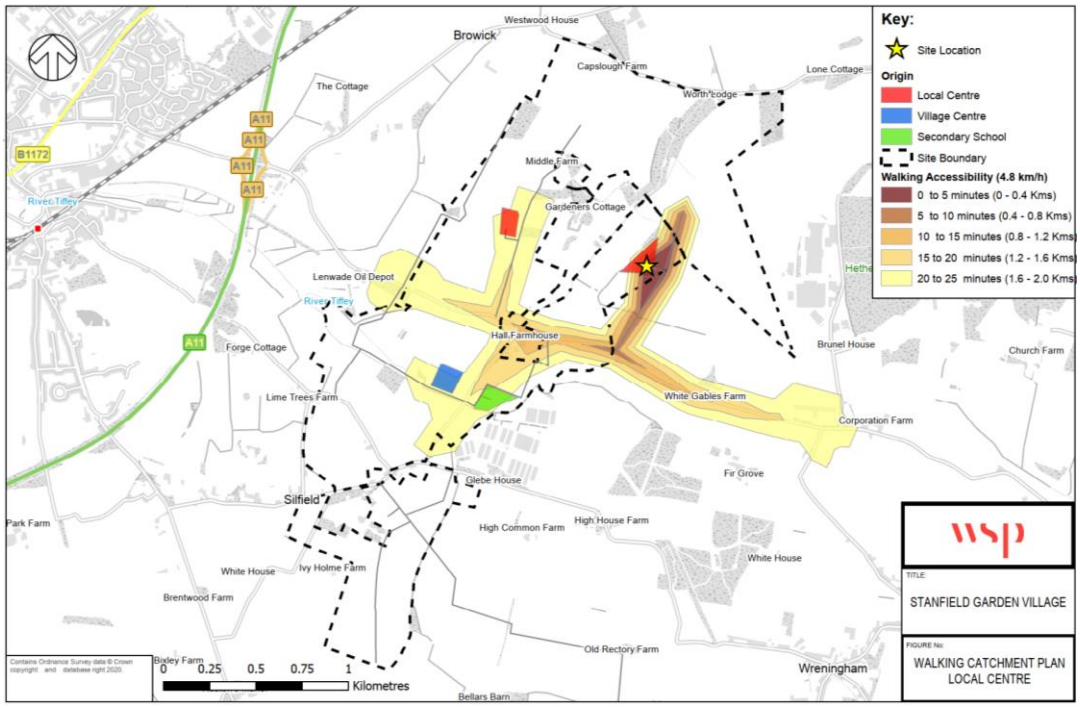
Figure 5: Northern Local Centre - Cycling Isochrone



Eastern Local Centre

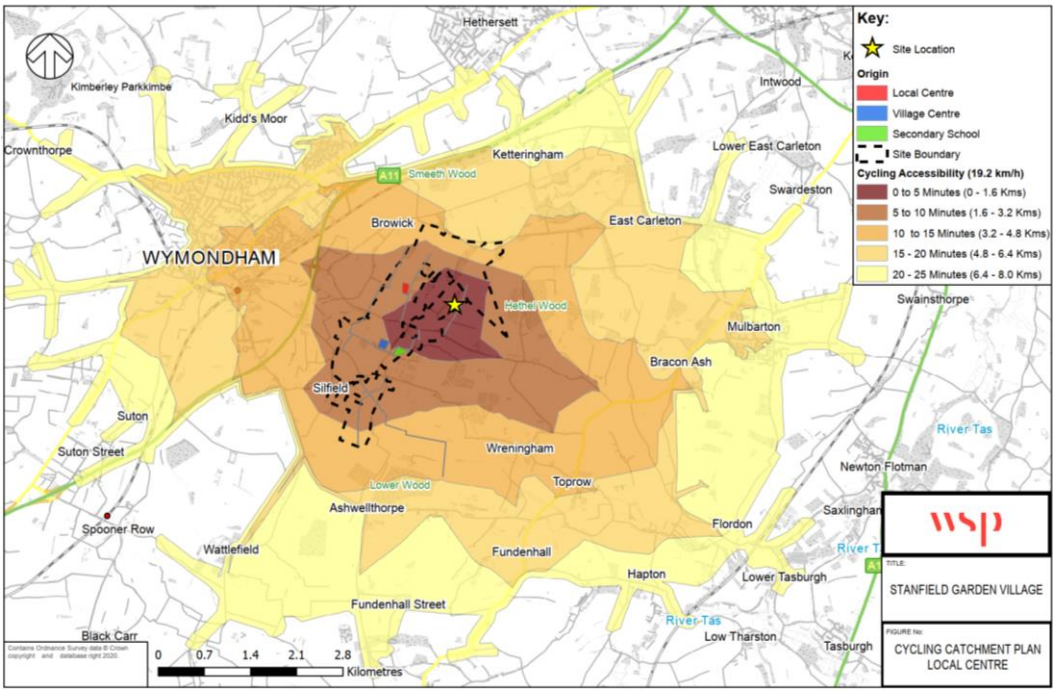
The eastern local centre connects the northern local centre, Village Centre and Secondary School along the existing pedestrian infrastructure. Wymondham is not reached within a 25-minute walk, which limits the ability to connect to bus and rail infrastructure for sustainable travel into Norwich and the wider area.

Figure 6: Eastern Local Centre - Walking Isochrone



Wymondham is accessible by bicycle, making it easier for residents to travel to Wymondham to interchange for rail services and bus services. Furthermore, from the eastern local centre, Tasburgh, Mulbarton and Lower East Carleton can be reach in 25 minutes.

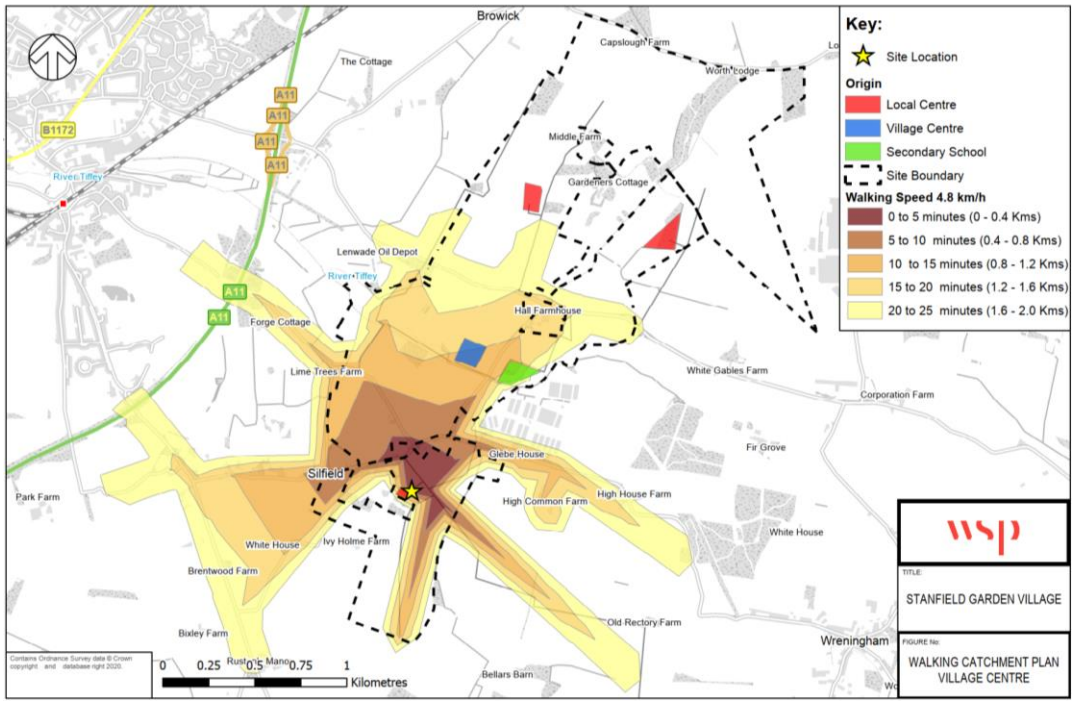
Figure 7: Eastern Local Centre - Cycling Isochrone



Southern Local Centre

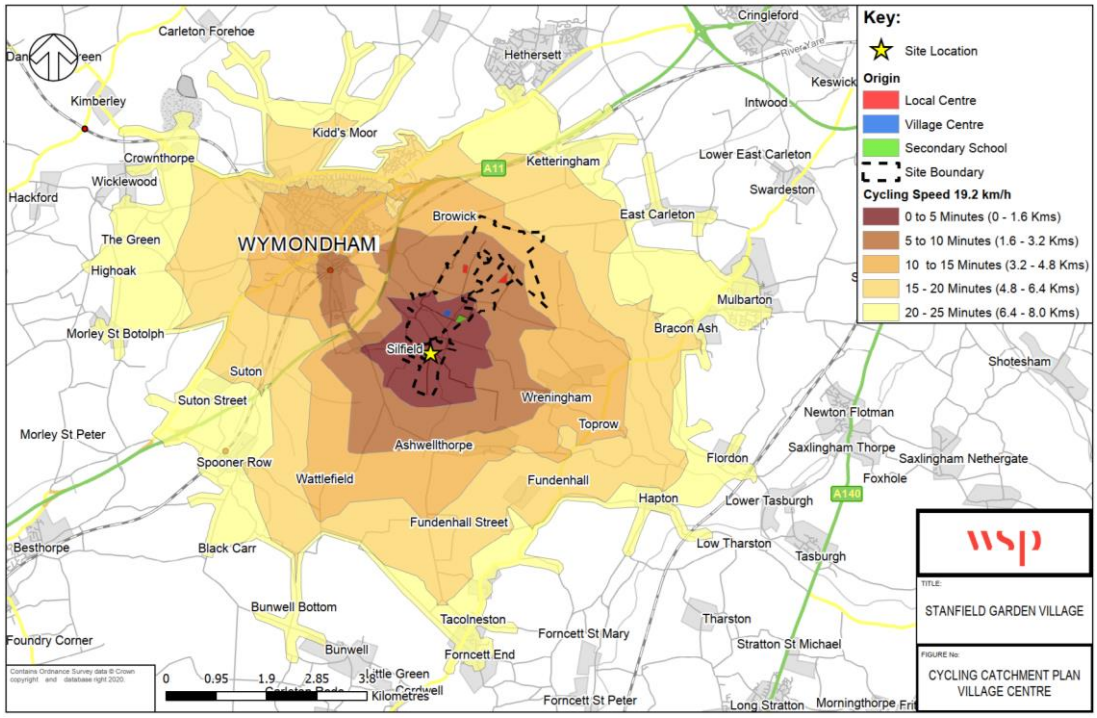
Walking from the southern local centre, only the Village Centre and Secondary School are accessible within 25 minutes.

Figure 8: Southern Local Centre - Walking Isochrone



However, by bicycle, the key settlements of Wymondham, Mulbarton and southern Hethersett can be reached within 25 minutes, making the proposed development well positioned to serve residents who currently travel to these areas for work.

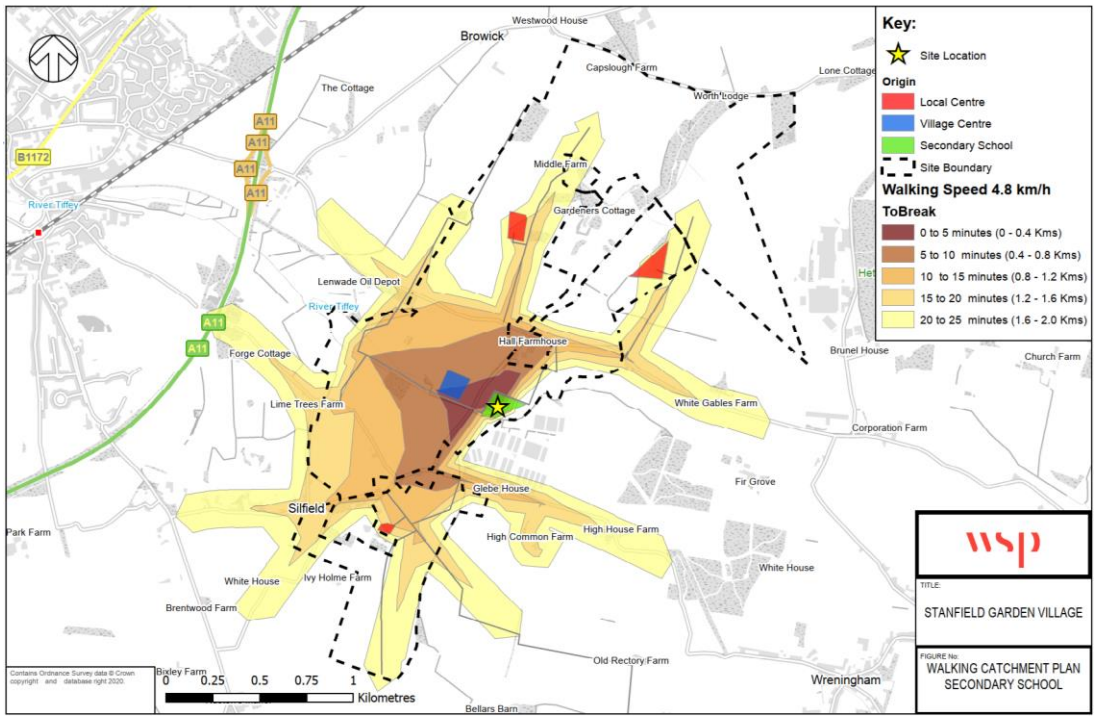
Figure 9: Southern Local Centre - Cycling Isochrone



Secondary School

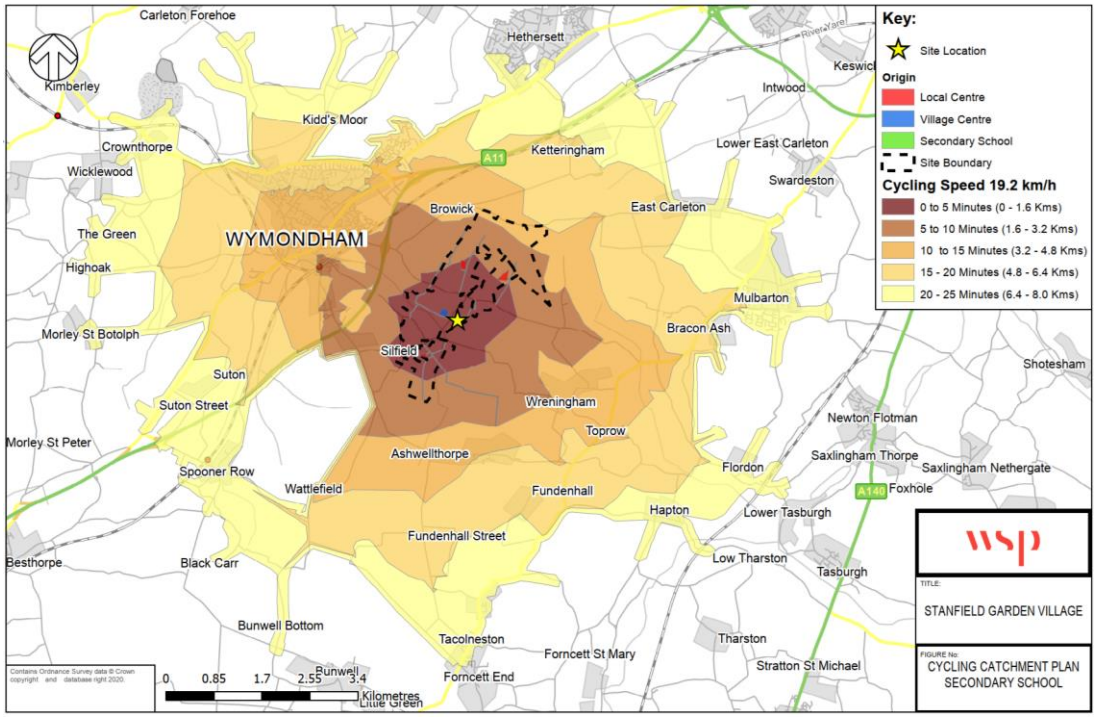
The Secondary School is well positioned at the centre of the Garden Villages, allowing access to all key centres within a 25-minute walk.

Figure 10: Secondary School - Walking Isochrone



Cycling allows for greater travel distances within 25-minutes, where Wymondham, Tacolneston, Mulbarton and southern Hethersett.

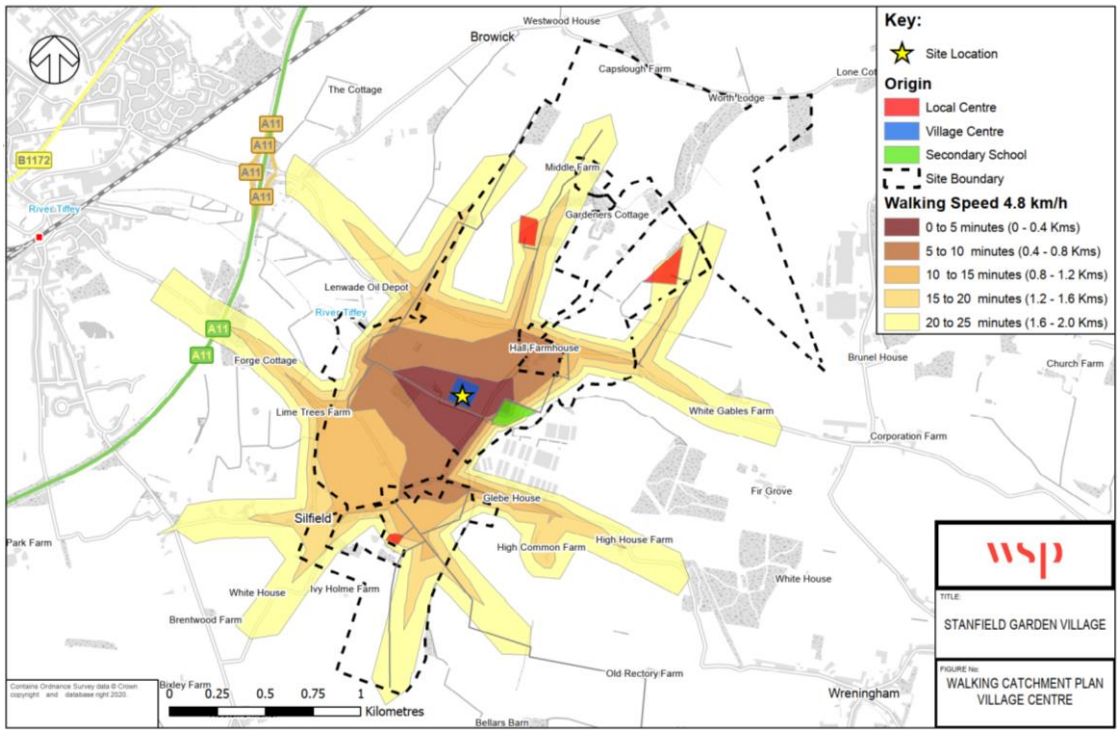
Figure 11: Secondary School - Cycling Isochrone



Village Centre

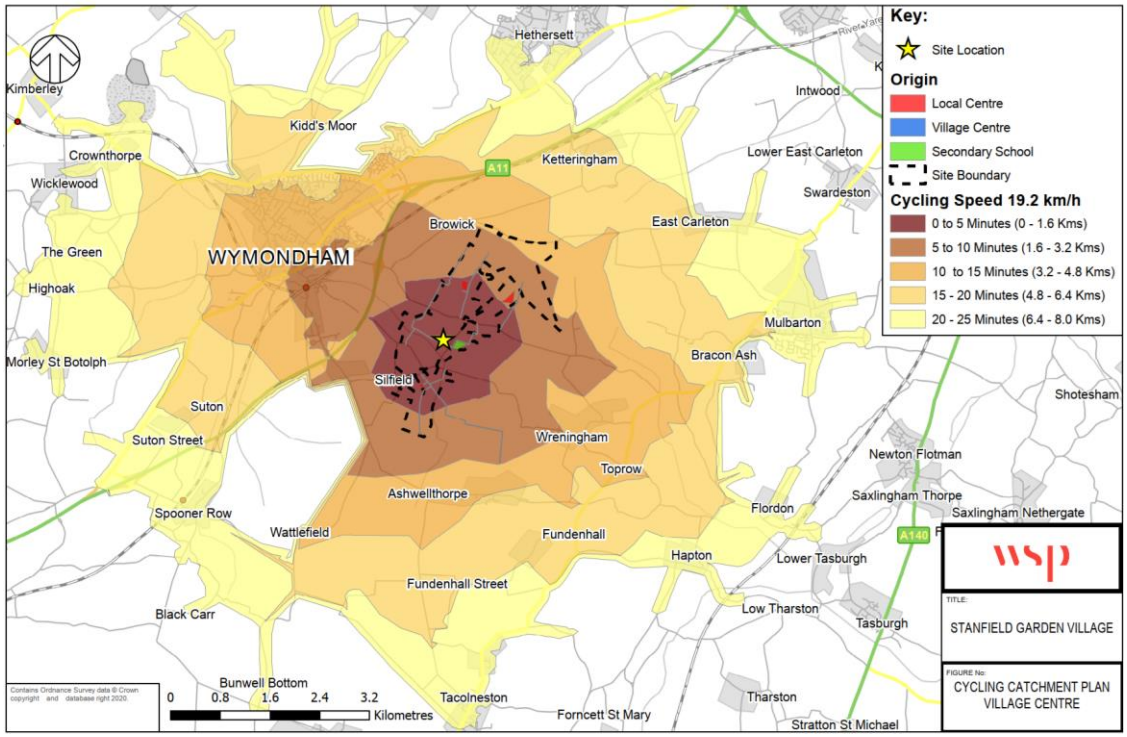
The Village Centre is well placed at the heart of the Garden Villages, connecting up all of the local centres and Secondary School that are within a 25-minute walk.

Figure 12: Village Centre - Walking Isochrone



The cycling isochrone shows that within a 25-minute cycle, Wymondham, Morley St Botolph, Tacolneston, Hethersett and Mulbarton can be reached.

Figure 13: Village Centre - Cycling Isochrone



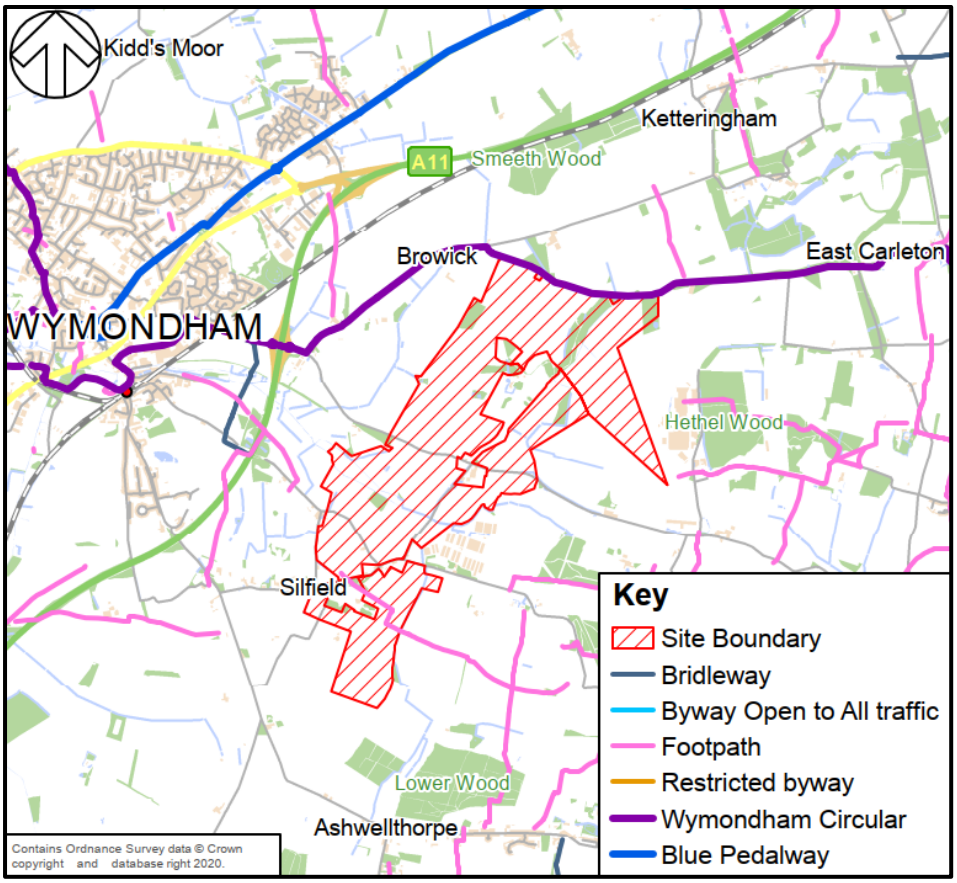
The above figures show that current walking infrastructure does not allow for great distances of travel, such as to access Wymondham for bus or rail services. Improved connections should be sought to improve travel into Wymondham and the wider Public Rights of Way Network.

The project is proposing improved pedestrian and cycle links into Wymondham, as part of Phase 1, which would support approximately 1,855 initial dwellings. A Greenway Spine Link is proposed through the site to connect the entire development together and promote healthy lifestyles and active travel by providing the necessary infrastructure to encourage use. The spine link would also link up possible bus stops and make bus travel accessible to the whole of the development, whilst providing the necessary footfall to support a bus link.

Wymondham Pedalway & Circular

The Wymondham Circular route passes along the northern boundary of the site along St Thomas' Lane, as part of the wider Norwich Pedalway Network. The Blue Pedalway can be accessed from within Wymondham and connects Hethersett, Cringleford, Norwich City Centre and Sprowston. **Figure 14** shows the routes of the Pedalway and Circular.

Figure 14: Cycleway Network



Public Transport – Bus Accessibility

There are no bus stops within Hethel, the closest are located within Wreningham, to the east, and Wymondham in the west, however, they are not possible to walk to within 25 minutes.

Three routes operate within Wymondham, The Green Line and Turquoise Line (Service No: 13/13A/13B/13C/X13 and 14/14A/15/15A/15B), run by First Bus and the No. 9 by H Semmence & Co.

A further service, No. 37A, run by Coach Services Ltd, travels through Wreningham.

Table 1 below illustrates the bus frequencies around the site (Monday to Friday); the 37A service includes times from the 'Wreningham, Bird in Hand' bus stop and the three other services show services from 'Wymondham Cross' bus stop.

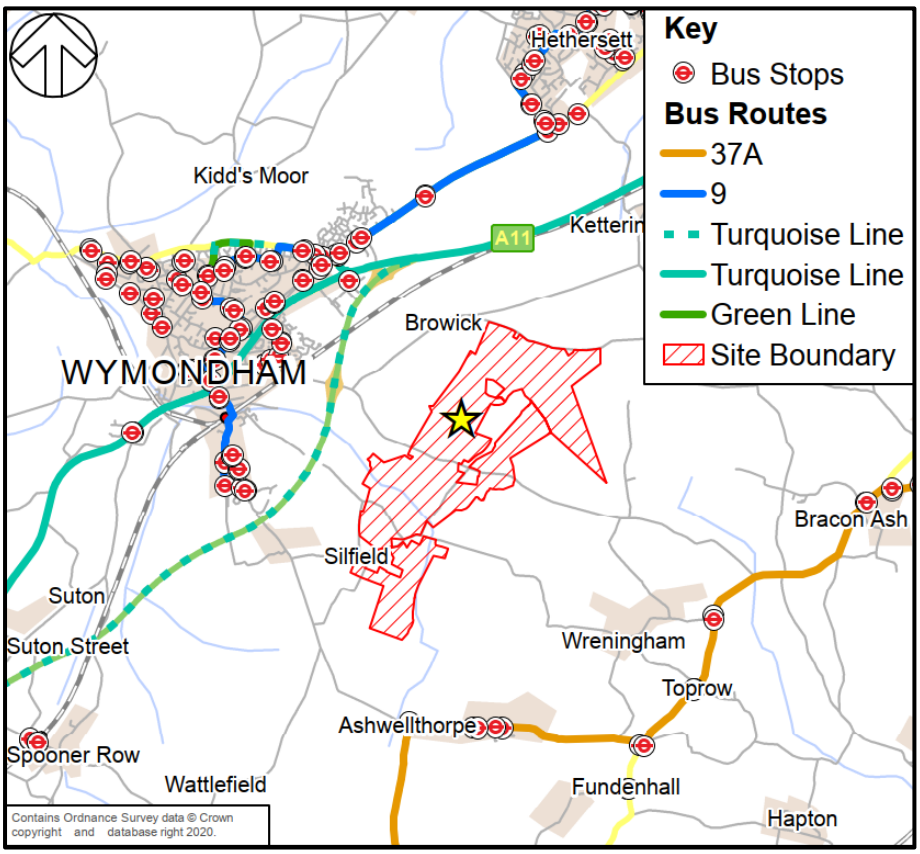
Table 1: Bus Services

Service	Route	Frequency	First Service	Last Service	Journey Time
37A	East Harling to Norwich	Twice per day	07:40	10:09	40 minutes
	Norwich to East Harling		13:15	17:45	
9	Wymondham to Norfolk & Norwich Hospital	Five per day	07:20	14:20	35 minutes
	Norfolk & Norwich Hospital to Wymondham		09:35	17:15	
Turquoise Line & Green Lin	Wymondham Cross to Norwich	Every 10-30 minutes	06:20	22:40	40 minutes
	Wymondham Cross to Norwich		06:45	23:20	

Source: Coach Services Ltd (2020), First Group (2020) and H Semmence & Co (2019)

Figure 15 displays the routes of the above bus services in relation to the proposed development.

Figure 15: Bus Network



The bus routes do not link to the proposed development, although the Green and Turquoise Line do operate at a frequency to encourage increased bus travel, therefore any improvements to bus infrastructure, such as new bus stops, diverted routes or a new dedicated service would enhance the public transport connectivity of the development.

Public Transport – Rail Accessibility

Wymondham Railway Station is closest to the proposed development, approximately a 40-minute walk or 15-minute cycle using existing pedestrian and cycle infrastructure. The station offers a small number of cycle parking stands, which would need to be increased and upgraded if increased use is encouraged to residents, as current levels are not suitable to accommodate increase demand.

The Station is on the Breckland Line that runs from Norwich to Cambridge / London Stansted, which is operated by Greater Anglia and received 200,000 passengers in 2018/19 (*Office for Rail and Road, 2020*).

The majority of services from Wymondham are to Cambridge and Norwich, with stops to Attleborough, Thetford, Brandon, Ely and Cambridge North, creating an average journey time of 1 hour 7 minutes. Greater Anglia have now included an hourly service to Stansted Airport from Norwich, following the Norwich to Cambridge route, as shown in **Table 2** below.

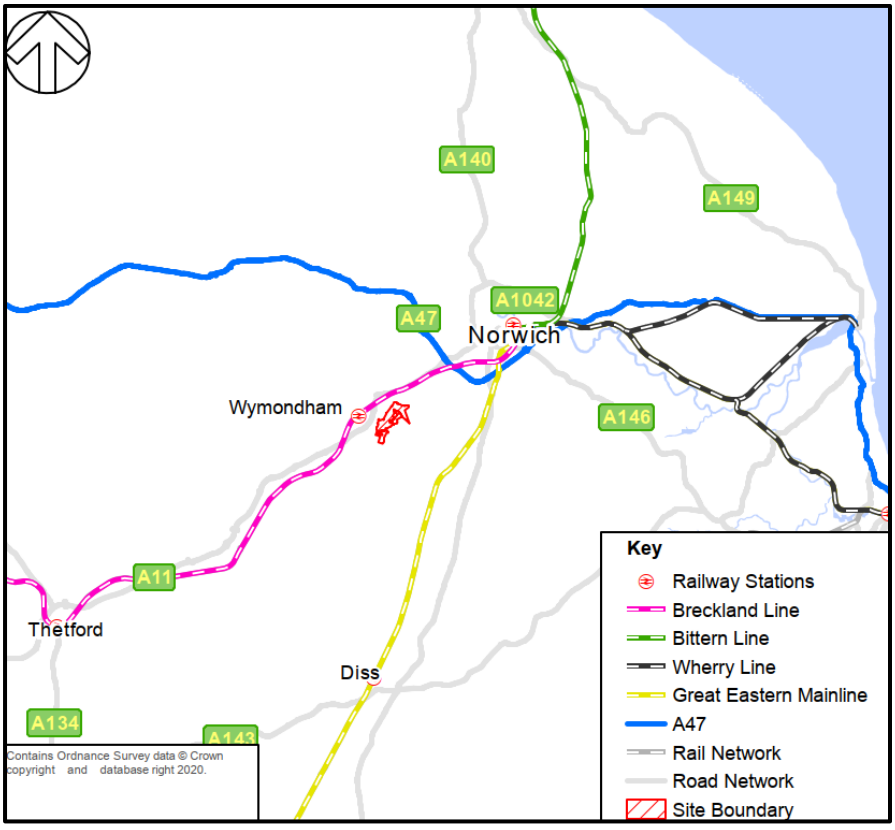
Table 2: Rail Services

Service	Calling Points	Frequency	First Service	Last Service	Journey Time
Cambridge	Attleborough, Thetford, Brandon, Ely and Cambridge North	Hourly	05:45	22:52	1 hour 7 minutes
Norwich	-	Hourly	07:11	00:01	15 minutes
Stansted Airport	Attleborough, Thetford, Brandon, Ely, Cambridge North, Cambridge, Whittlesford Parkway and Audley End	Hourly	08:45	19:39	1 hour 40 minutes

Source: Timetable 10 Cambridge to Ely, Peterborough and Norwich, Greater Anglia (2019)

Figure 16 displays the routes of the rail network and nearby railway stations in relation to the proposed development.

Figure 16: Rail Network



.

Potential Development Site Access

A new highway access will be provided from Stanfield Road to the existing employment areas to the east of the site, which will be able to accommodate any new job opportunities for future residents, thus limiting the number of trips onto the wider highway network

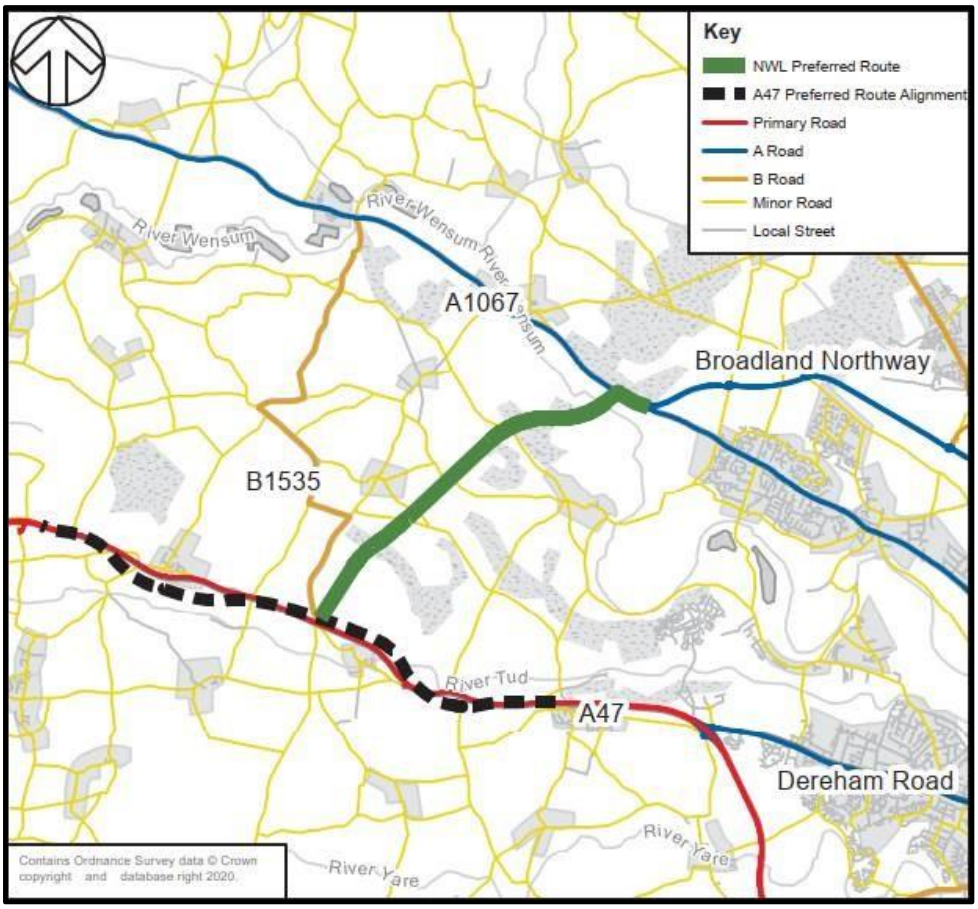
Future Transport Improvements – Publicly Funded

Norwich Western Link (NWL)

The NWL was identified as a key 'missing link' in the Major Road Network, which will connect the A47 and Broadland Northway to ease the existing and forecasted traffic in Norwich. As it will provide an alternative route option for vehicle travelling into Norwich and surrounding settlements.

The proposed route of the dual carriageway will connect an upgraded and dualled A47 trunk road (due March 2024) near Wood Lane, Honingham, to the A1067 Fakenham Road, approximately 400m west of the end of the A1270 Broadland Northway. The proposed NWL dual carriageway is shown indicatively in **Figure 17**.

Figure 17: Norwich Western Link



Thickthorn Interchange Improvements

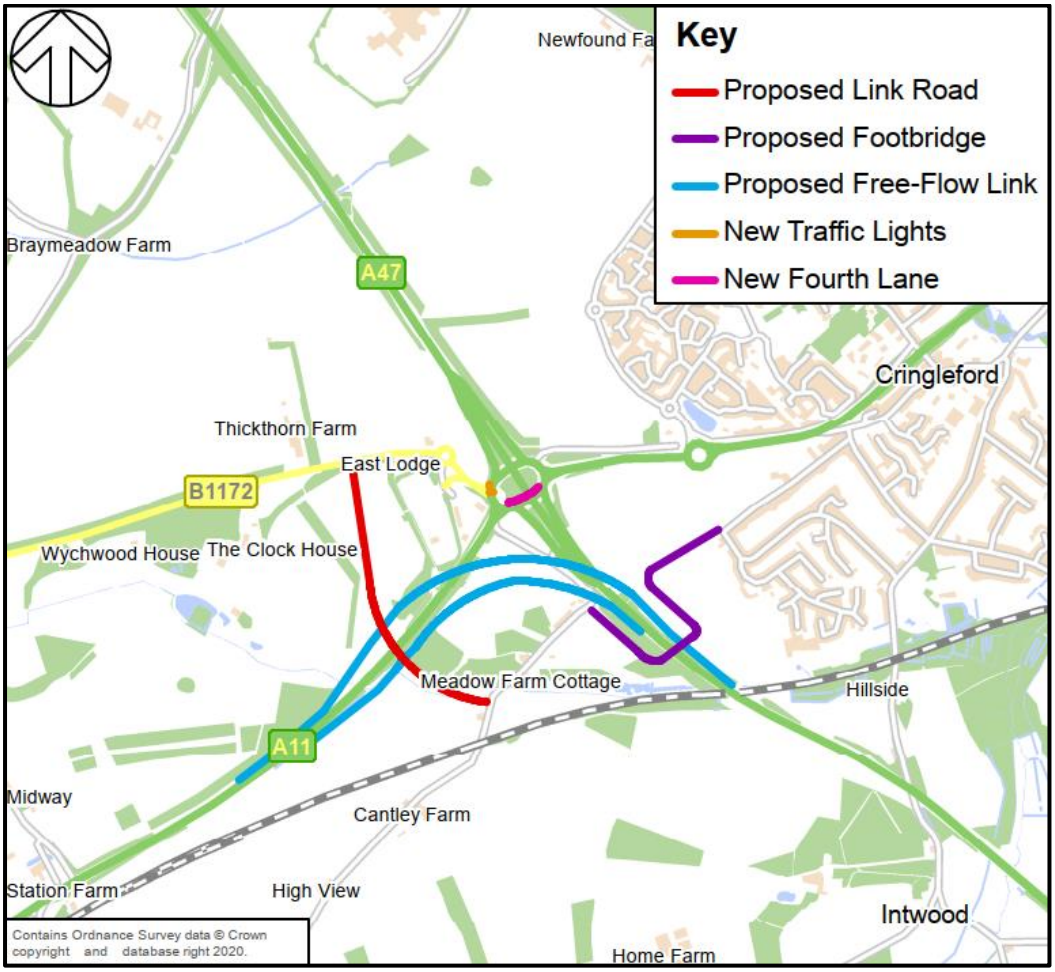
Following public consultation held in 2017, Highways England have presented the proposed design to improve the Thickthorn Interchange to the south of Norwich. The interchange connects two arterial roads into Norwich, the A47 and A11, with the current layout unsuitable to accommodate the existing and future trips predicted to route through the junction.

The scheme consists of two new single lane free-flowing link roads connecting the A11 northbound to the A47 eastbound via three underpasses and the A47 westbound to the A11 southbound. There will be a number of improvements to the junction itself including; new traffic lights on the approach to the junction from the B1172 and incorporating a 4th lane on the southern section of the roundabout. A new link road will connect Cantley Lane South with the B1172 to the north.

There will be provision for walking, cycling and horse riding with a new footbridge to be constructed over the A47 and provision along the Cantley Lane link road. The improvements are illustrated in

Figure 18.

Figure 18: Thickthorn Interchange Improvements



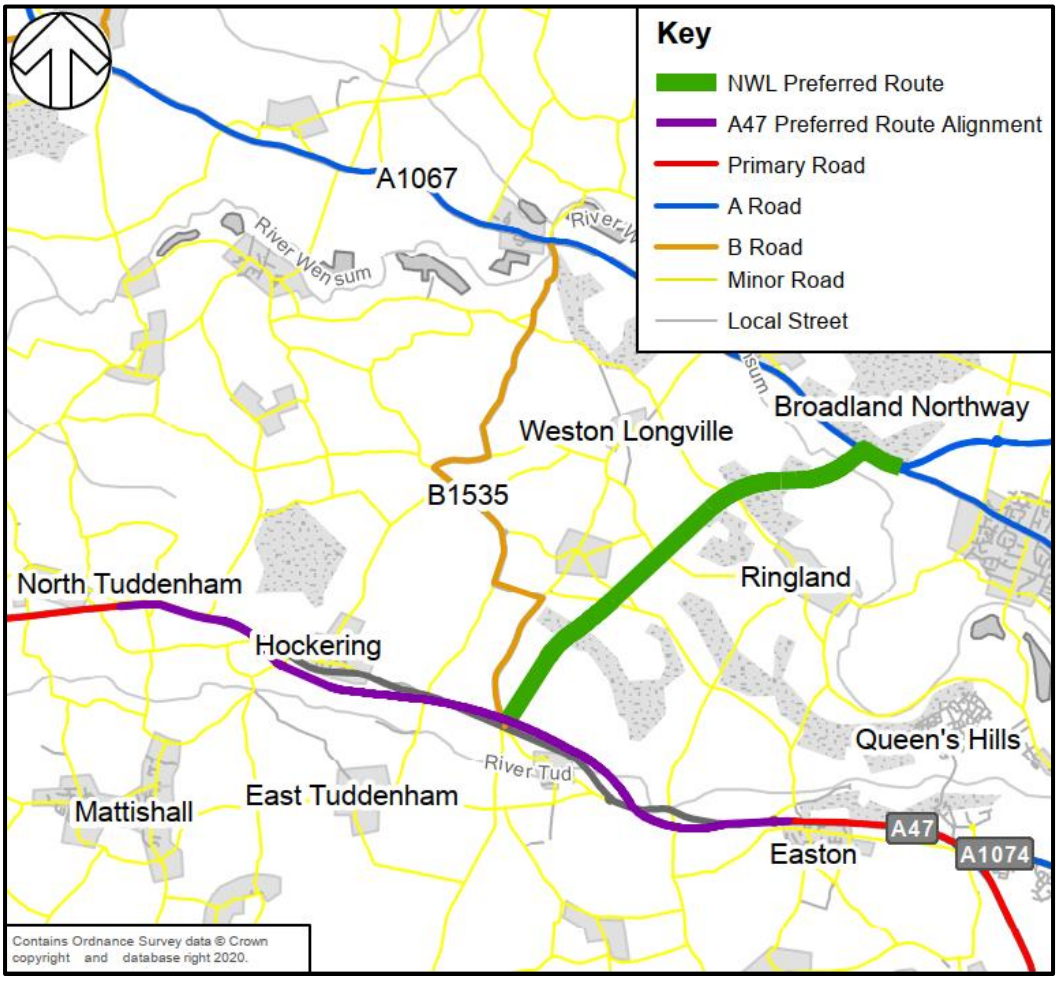
A47 North Tuddenham To Easton Dualling

The A47 is a part of the Strategic Road Network, and the section from North Tuddenham to Easton is one of the final sections of the route that is not of dual carriageway standard. Dualling the section of the A47 would reduce congestion, make journeys more reliable and provide capacity for future growth.

The proposed design includes 9km of new dual carriageway, running to the south of the existing A47 at Hockering and to the north of the existing A47 at Honingham. Two new junctions are proposed where the A47 passes over the local roads at the intersections of Berry's Lane with Wood Lane (Wood Lane junction) and Blind Lane with Taverham Road (Norwich Road junction).

Sections of the existing A47 will be retained as new routes for pedestrians, cyclists and horse riders where possible, improving connectivity with the wider Public Rights of Way network. The proposed alignment of the A47 dualling scheme is shown in **Figure 19**.

Figure 19: A47 North Tuddenham to Easton Dualling

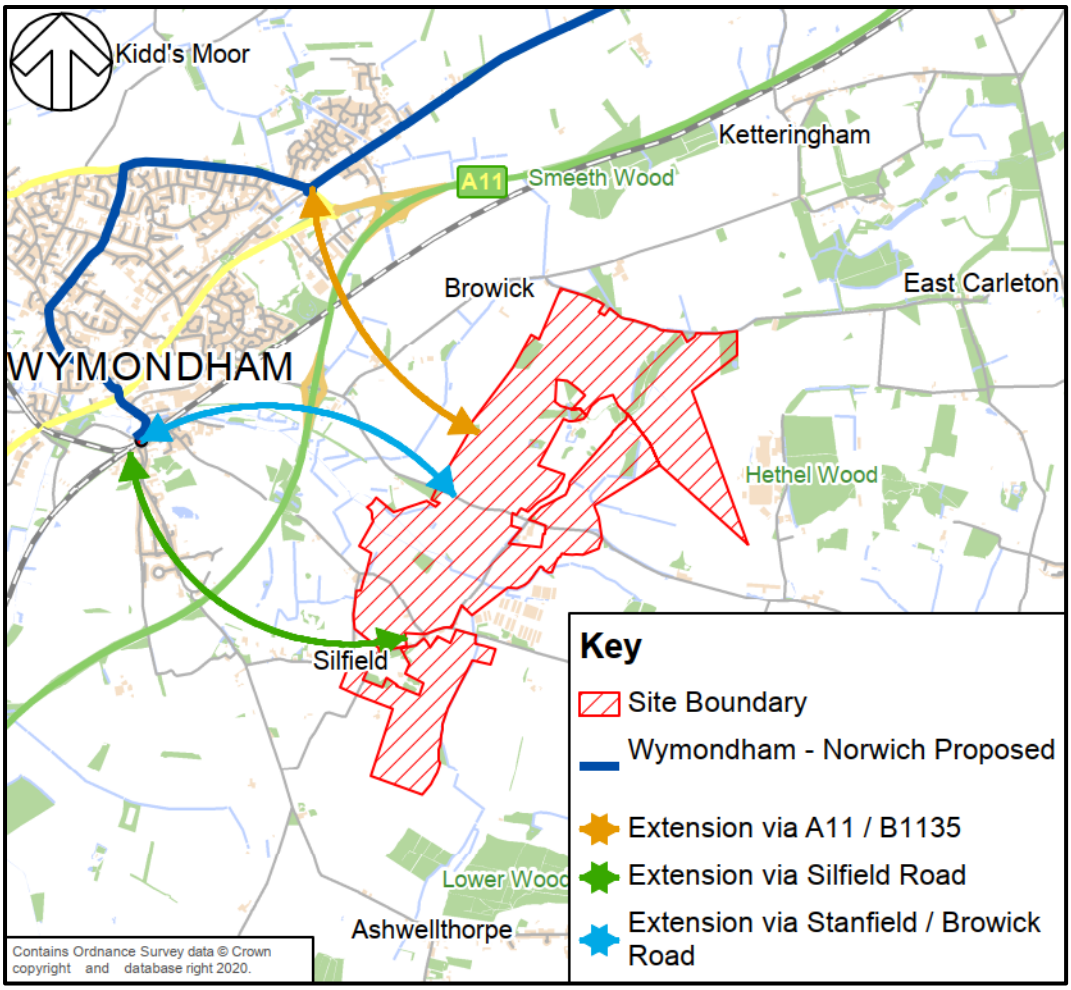


Bus Rapid Transit (BRT)

The BRT would maximise the opportunity that future residents have to travel sustainably by public transport and make it a more viable option than personal vehicle use. The proposed development would seek an extension to the BRT route between Wymondham and Norwich, set out with the Norwich Area Transport Strategy document (2004), to link to the Garden Village via three possible options, as shown in **Figure 20**.

One route would connect via Stanfield Road and Browick Road to the Town Centre. Other options consider a connection to the south via Silfield Road or from north via the A11 / B1135. Bus priority measures would need to be implemented at the A11 / Browick Road junction, the A11 / London Road junction and the B1135 to facilitate the extensions. The BRT system would provide an excellent opportunity to travel sustainability and support the Garden Village's aim to recue personal vehicle travel. An alternative to a BRT extension could be demand responsive bus services that are well integrated and provide seamless connection with the BRT Wymondham stop.

Figure 20: Bus Rapid Transit



Future Transport Improvements – Developer Funded

The vision is for the site is to include infrastructure for electric vehicles, shuttle transport services and a layout that facilitates walking and bike use. The Garden Village will be split into three village clusters, with a dense network of lanes and cycle routes to ensure that all destinations within the site can be reached within 15 minutes, ensuring that all most all trips can be made on foot and bike.

There will be an electric shuttle bus service to Wymondham Station at peak times and weekends and feasibility studies will be undertaken for the viability of a service directly to Norwich City Centre and key places of work.

The site will operate an electric vehicle car sharing and car hiring service with local operators to ensure that cars are available for journeys that cannot be made on foot or by bike.

Non-commercial visitors by car will be encouraged to park at the edge-of-town car park and can then travel on from there by bike.

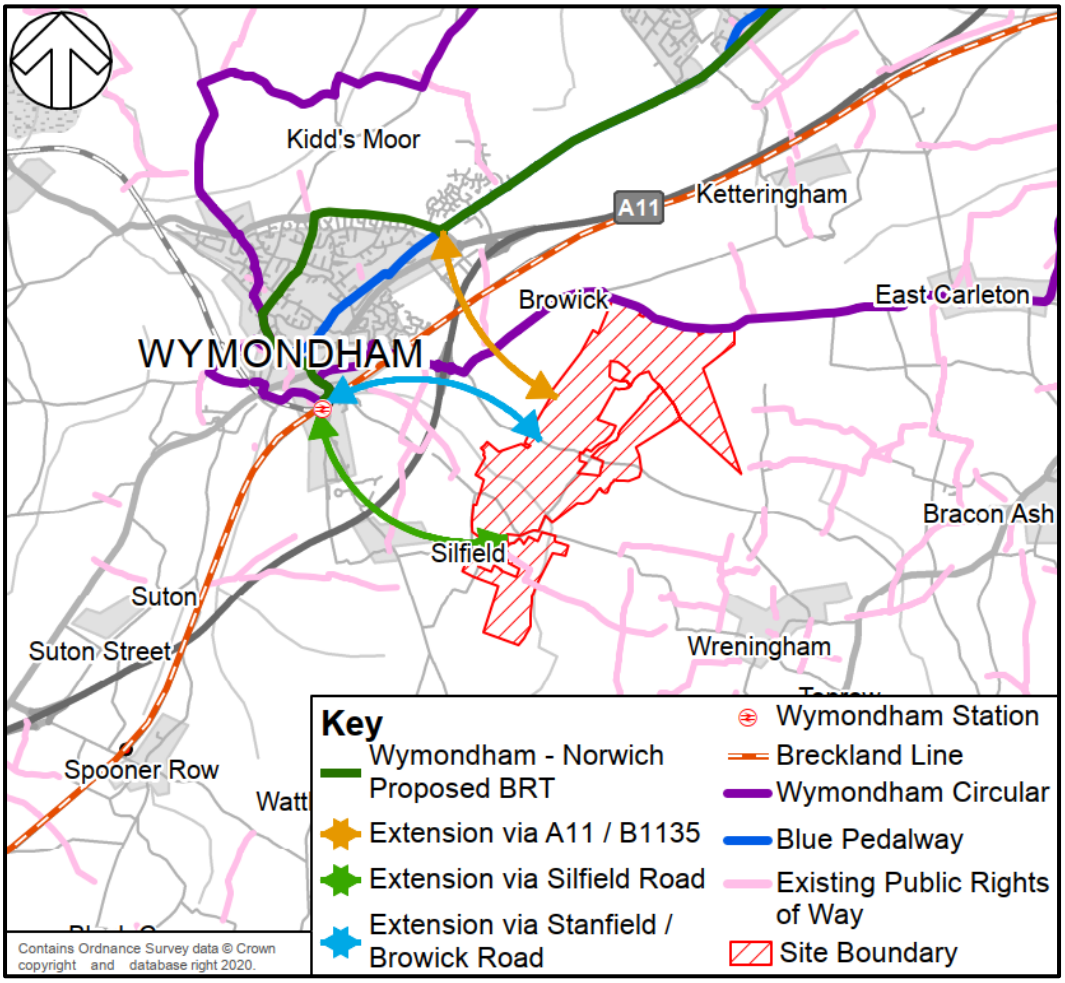
The developer would also seek to consider funding for the Bus Rapid Transit system into Wymondham, to allow the route to connect up to the site. This link would then provide a competitive option for travel into Wymondham and Norwich, whilst reducing private vehicle reliance.

Movement Strategy

The above analysis has found that there are number of existing walking, cycling and public transport interventions that can help to fulfil the aims of the Stanfield Garden Village project and ensure that sustainable travel is promoted above private vehicle use. The layout of the development will link up the three village centres will ensure that all areas are walkable and cyclable, also well as planning for the future of vehicle travel with electric vehicles, where personal vehicle travel cannot be avoided. Figure 21 shows the culmination of the existing sustainable transport infrastructure and planned interventions around the site.

Providing strong connections into Wymondham will ensure that journeys by rail and bus can be made into Norwich, Cambridge and the wider area.

Figure 21: Movement Strategy



Summary

The above evidence shows that the proposed development is well located to facilitate sustainable travel into the surrounding area. The walking and cycling infrastructure is of good quality; the pedestrian network allows for travel into the local Public Rights of Way Network, but cannot access bus and rail services currently within a suitable 25-minute walking time. Cycling would enable future residents to interchange in Wymondham and would require good cycle parking facilities to encourage increased use in the future.

The planned transport improvements would help to solve the above issues by connecting the development to a wider BRT system, reducing reliance on private car use and improving public transport uptake.

PEOPLE

Existing Travel Patterns

The comparative travel patterns of future residents at the potential development site can best be approximated based on the travel patterns of existing residents in the surrounding area. The 2011 Census Journey to Work data for the surrounding area contains journey to work information on these local residents and has been analysed using the Mid-Layer Super Output Area (MSOA) for South Norfolk 007 covering the study area.

Table 3 below summarises the journey to work mode split (main mode) for the MSOA South Norfolk 007. The resident population not in employment and those working from home have been excluded from the results as they do not make a journey to work on the surrounding highway network.

Table 3: 2011 Census Journey to Work by Mode - Resident Population

Method of Travel to Work	Total	Percentage
Underground, metro, light rail or tram	2	0%
Train	81	2%
Bus, minibus or coach	250	6%
Taxi	14	0%
Motorcycle, scooter or moped	57	1%
Driving a car or van	2,997	**72%**
Passenger in a car or van	195	5%
Bicycle	176	4%
On foot	352	8%
Other method of travel to work	22	1%

Source: Table QS701EW – Method of Travel to Work, NOMIS, 2011

Table 3 shows that the car / van driver is the main mode of travel to work for residents, with a mode share of 72%, and that 5% of residents travel to work as passengers in a car / van. Sustainable modes have a low combined mode share of 20%, 8% of residents walking, 4% of residents cycling and 8% of residents using public transport (which includes bus and train), so there is potential for an uptake in sustainable modes for future residents.

Table 4 summarises the distance travelled to work for residents within the MSOA South Norfolk 007, which covers the study area.

Table 4: Distance Travelled to Work - Resident Population

Distance Travelled to Work	Total	Percentage
Less than 2km	758	19%
2km to less than 5km	290	7%
5km to less than 10km	567	14%
10km to less than 20km	1,464	**37%**
20km to less than 30km	157	4%
30km to less than 40km	121	3%
40km to less than 60km	102	3%
60km and over	147	4%
Other	329	8%

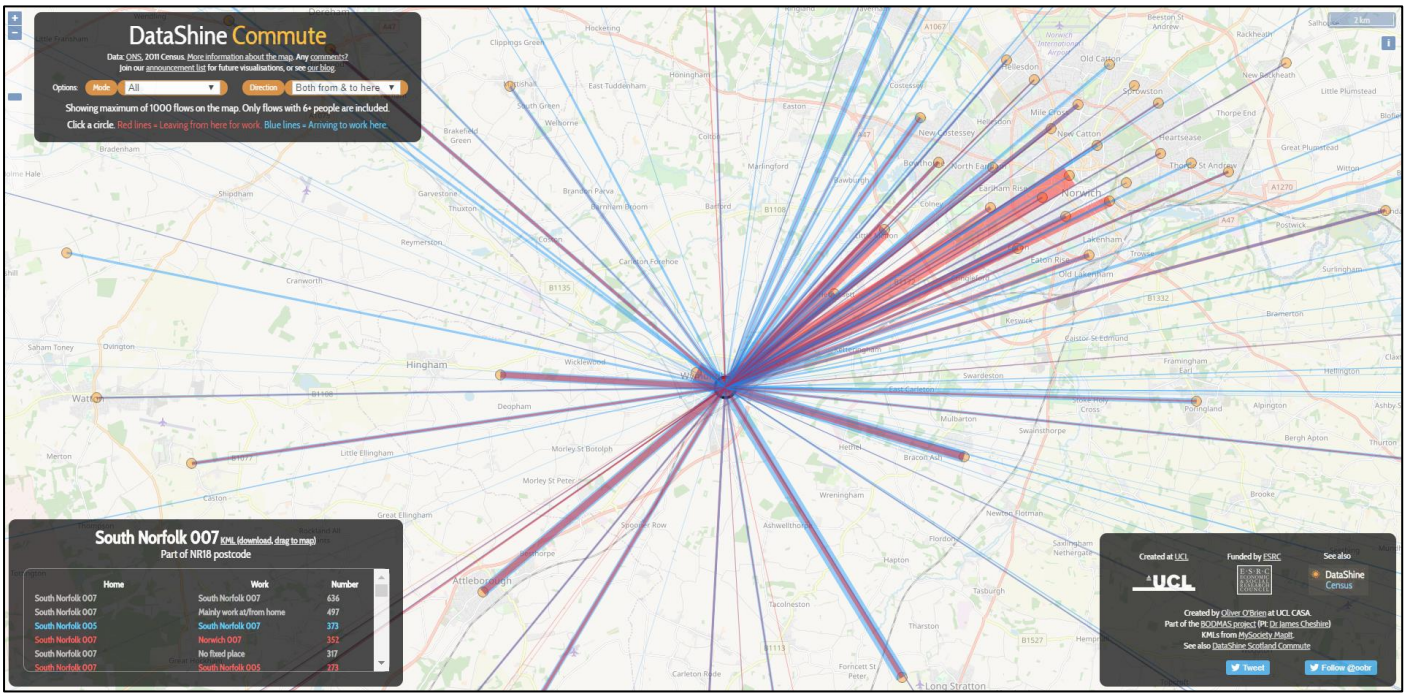
Source: Table QS702EW – Distance Travelled to Work, NOMIS, 2011

The results from the Census show that the majority of residents (37%) travel between 10km to less than 20km to work. Norwich is within a 20km distance, and so improved connections to bus services could make public transport more attractive to residents. 26% of resident travel less than 5km to work, which is a distance that can be easily travelled by bicycle, so modal shift could be encouraged to persuade residents to travel more sustainably.

Using the data collected during the 2011 Census, an online site – DataShine Commute (**Figure 22**) has visually displayed the locations that residents from within the South Norfolk 007 MSOA travel to. The map shows the areas that residents travel from Hethel to work (red lines) and the areas that people travel from in order to work in Hethel (blue lines). It can be seen that residents within South Norfolk 007 travel to Norwich, Wymondham, Long Stratton and Little Melton for work in the greatest volumes. Within these areas are the Norfolk and Norwich University Hospital, Norwich City Centre, Attleborough Town Centre and Wymondham Town Centre.

Furthermore, of those who work within South Norfolk 007, travel from Norwich, Long Stratton, Attleborough and Greater Norwich.

Figure 22: Locations of Workplace Destinations from Hethel



Source: DataShine Commute, 2020

Conclusion / Next Steps

In promoting the proposed cluster of villages to the east of Wymondham through the Local Plan process, we will seek to deliver a sustainable form of development which reduces the need to travel and minimises the impact of the development upon the local highway network.

It is likely that the majority of homes could be delivered and occupied by 2032, with early delivery of affordable homes by 2025.

Against this background, the development of up to 6,000 dwellings on the site is deliverable in transport terms (reference: paragraph 108 of the NPPF):

- The site provides ample opportunities to encourage sustainable transport, which will promote walking and cycling both within the development and into Wymondham for onward travel by bus and rail;
- Safe and suitable access will be provided for users of all levels of mobility;
- An additional technical note *70074638-WSP-TN002* shows that the development impact can be mitigated to ensure that there is not an adverse effect on the local road network.

Appendix B

Stanfield Garden Villages – Technical Note 2

DATE:	20 August 2020	**CONFIDENTIALITY:**	Public
SUBJECT:	A11 Wymondham Bypass / Browick Road Junction Capacity Assessments		
PROJECT:	70074638	**AUTHOR:**	UKACP002
CHECKED:	UKGSM002	**APPROVED:**	UKNMD002

INTRODUCTION

Background

WSP has been appointed by Human + Nature to provide transport advice for the promotion of the Hethel Project also known as “Stanfield Garden Villages”. The site has been identified for development due to its proximity to Wymondham, which provides access to frequent bus services, direct trains to Norwich and Cambridge / Stansted Airport and strong provision for walking and cycling. The site is also close to the A11, which forms part of the UK’s Strategic Road Network (SRN), connecting Norwich and the A47 (to the north-east) to Cambridge and the M11 (to the south-west).

Site Location

The extent of the site being investigated is approximately 342ha in size and lies approximately 3.3km east of Wymondham town centre. It is bounded by agricultural land to the north, south and west and Hethel Innovation Centre to the east. The location of the site is indicated in **Figure 1**.

A11 Wymondham Bypass / Browick Road Junction

Vehicular access to the proposed development is to be from Stanfield Road, which subsequently provides access to the surrounding SRN via the A11 Wymondham Bypass / Browick Road grade-separated junction. The A11 Wymondham Bypass / Browick Road junction, shown in **Figure 2**, is situated approximately 1.5km east of Wymondham town centre and is comprised of two four-arm roundabouts in a dumb-bell arrangement over the A11 Wymondham Bypass.

Figure 1: Site Location Plan

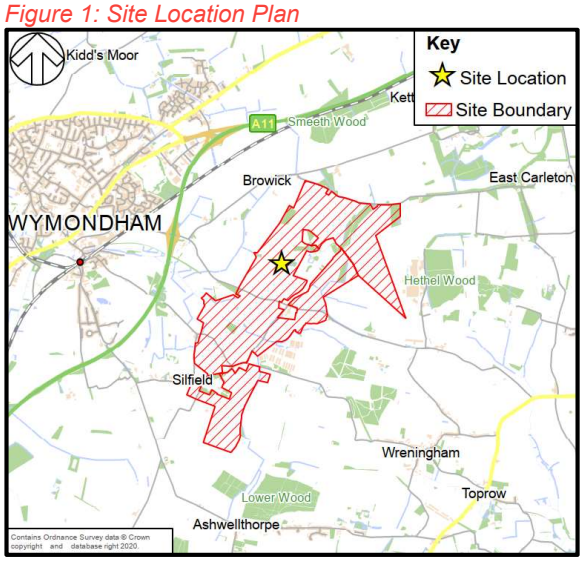
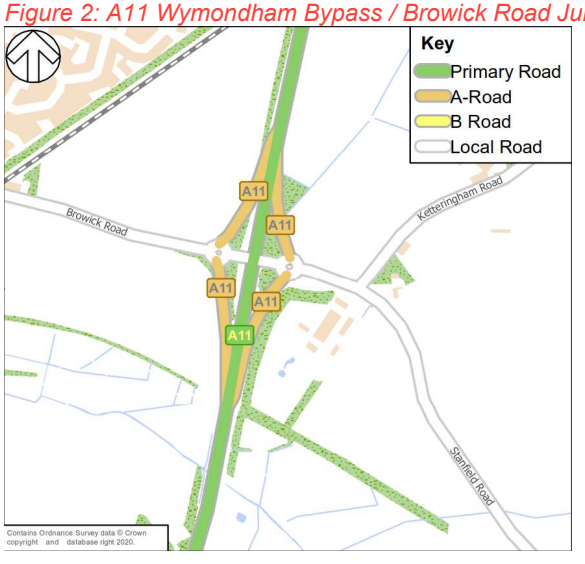


Figure 2: A11 Wymondham Bypass / Browick Road Junction



Purpose

This *Technical Note* (TN) presents results from a high-level assessment of the A11 Wymondham Bypass / Browick Road junction, in capacity terms, to ascertain what level of development can be accommodated without either highway mitigation or associated measures to reduce car mode share for the development. The assessment will be key for developing a "monitor and manage" approach that enables scheme delivery.

Initial discussions with Highway England (HE) – who operate, maintain and improve England's motorways and major A-Roads – have been positive, with HE indicating that their records show that there are no apparent capacity issues at the A11 Wymondham Bypass / Browick Road junction and that there are no apparent collision clusters. At this stage, HE have not raised any concerns related to the existing junction design or any maintenance issues associated with the Burnthouse Lane overbridge (the proposed route to Wymondham Railway Station from the development site for non-motorised users).

METHODOLOGY

This section summarises the scenarios and assessment years that have been modelled, before identifying the source of the forecast traffic flows (without development). The generation and distribution of trips at the A11 Wymondham Bypass / Browick Road junction associated with varying levels of development is then discussed.

Scenarios

In order to ensure the proposed development does not result in a significant adverse impact on the operation and performance of the A11 Wymondham Bypass / Browick Road junction, under its existing layout and design, a number of scenarios have been modelled for varying quanta of development:

Figure 3: Modelled scenarios based upon number of dwellings

Assessment Years

It is anticipated that the planning application for the site will be submitted in 2021; therefore, this has been assumed to be the "base year". Future forecast years of 2025 and 2040 have then been assessed, aligning with the future years within Norfolk County Council's (NCC) transport model.

Forecast Traffic Flows

Due to the COVID-19 pandemic, traffic surveys on the A11 Wymondham Bypass / Browick Road junction were unable to be commissioned, as they would not have provided outputs that were representative of typical traffic flows. Therefore, 2016 turning count data has been obtained from NCC's traffic model which has subsequently been uplifted to the 2021 baseline scenario using the Trip End Model Presentation Program (TEMPro) v7.2, using the National Trip End Model (NTEM) and National Traffic Model (NTM) AF15 datasets. Growth factors were also obtained for 2021-2025 and 2021-2040 in order to ascertain the forecast flows without development for the assessment years. Network flow diagrams for each of the baseline scenarios are provided in **Appendix A**.

The average of the TEMPro growth factors for rural roads across the South Norfolk 007 and South Norfolk 009 Middle-Layer Super Output Areas (MSOA) – across which the proposed development site lies – are summarised in **Table 1**.

Table 1: TEMPro growth factors

TEMPro Growth	AM Peak	PM Peak
2016-2021	1.0775	1.0758
2021-2025	1.0722	1.0737
2021-2040	1.2053	1.2119

Source: Trip End Model Presentation Program v7.2

Development Trips

TRIP GENERATION

The Trip Rate Information Computer System (TRICS) database has been used to predict the trip generation for privately-owned houses (providing the most robust trip rate). The person trip rates per dwelling for the typical weekday AM (08:00-09:00), PM (17:00-18:00) and daily periods (07:00-19:00) are shown in **Table 2**.

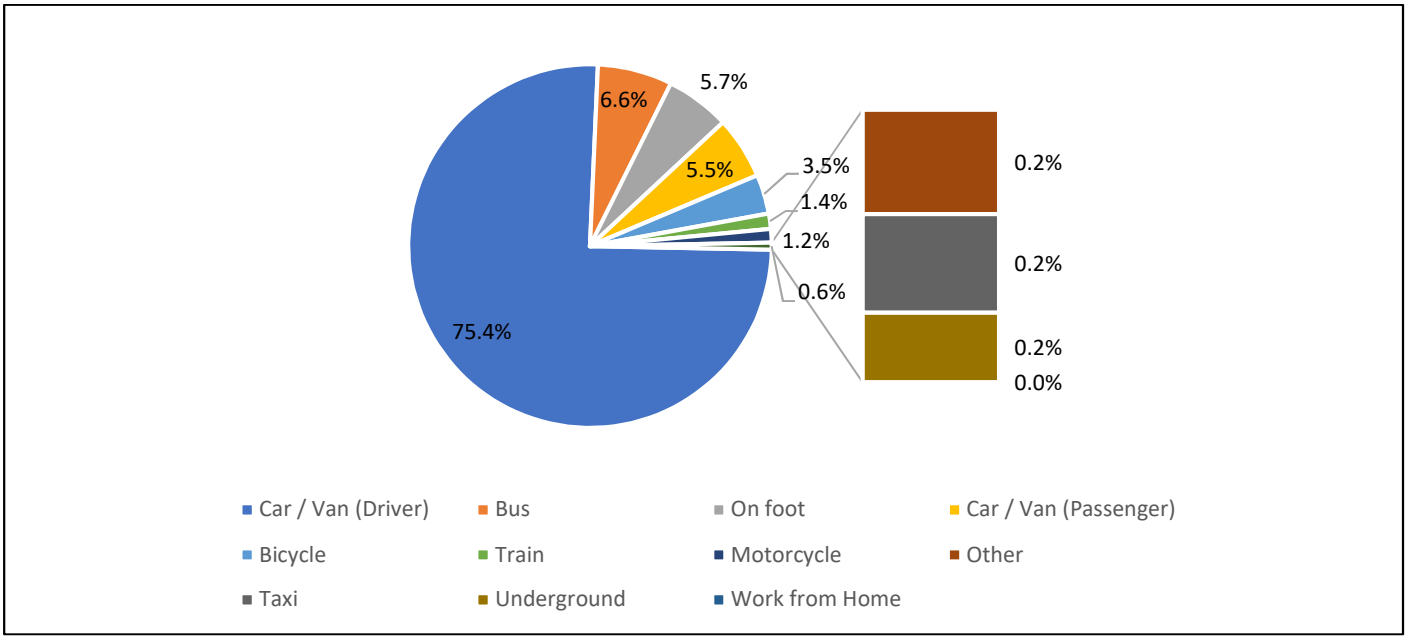
Table 2: Person trip rate for privately owned houses

Trip Rate	AM Peak Hour			PM Peak Hour			Daily Period		
	Arrive	Depart	Total	Arrive	Depart	Total	Arrive	Depart	Total
Person (per dwelling)	0.220	0.805	1.025	0.634	0.276	0.910	3.963	4.043	8.006

Source: Trip Rate Information Computer System v7.7.1

The person trip rates have been applied to the varying quanta of development for which the modelled scenarios are based upon (as outlined in **Figure 3** on page 2). The percentage mode share (for journeys to work) across the South Norfolk 007 and South Norfolk 009 MSOAs – shown in **Figure 4** – has been applied to the total people trips to ascertain an overall number of trips undertaken using private vehicles (cars).

Figure 4: Journey to work mode share for existing residents of South Norfolk 007 and South Norfolk 009 MSOAs



Source: WU03EW – Location of usual residence and place of work by method of travel to work (MOSA level) (Census, 2011)

Table 3 provides the associated trips for private vehicles (cars) for each of the scenarios being tested. The full TRICS output is attached as **Appendix B**.

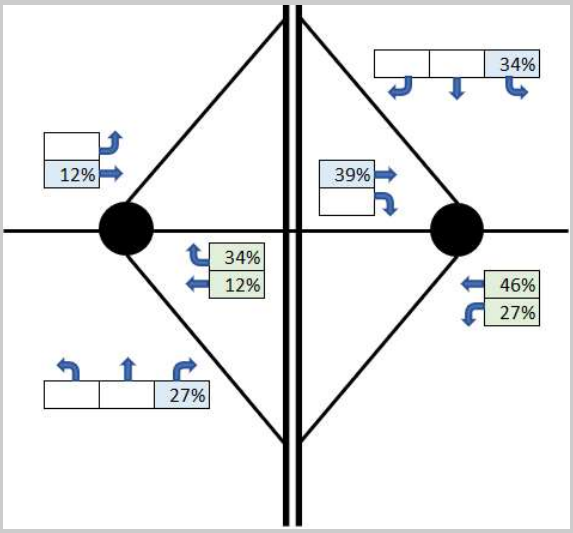
Table 3: Vehicular trips generated by varying levels of development

Trip Rate	AM Peak Hour			PM Peak Hour			Daily Period		
	Arrive	Depart	Total	Arrive	Depart	Total	Arrive	Depart	Total
1,000 dwellings	166	607	773	478	208	686	2,988	3,048	6,036
2,000 dwellings	332	1,214	1,546	956	416	1,372	5,976	6,097	12,073
3,000 dwellings	498	1,821	2,319	1,434	624	2,058	8,964	9,145	18,109
4,000 dwellings	664	2,428	3,091	1,912	832	2,745	11,952	12,193	24,146
5,000 dwellings	829	3,035	3,864	2,390	1,040	3,431	14,940	15,242	30,182
6,000 dwellings	995	3,642	4,637	2,868	1,249	4,117	17,928	18,290	36,218

TRIP DISTRIBUTION

The trips associated with the differing scenarios of proposed development have been assigned to the highway network using 2011 Census method of travel to work origin-destination data for existing residents of South Norfolk 007 and South Norfolk 009 MSOAs. The route choices are derived from web-based journey planners, and where more than one route option is available, the approach has been proportionally distributed. **Figure 5** demonstrates the overall directional assignment of vehicle trips and how these apply to the turning movements at the A11 Wymondham Bypass / Browick Road junction.

Figure 5: Distribution of proposed development trips at the A11 Wymondham Bypass / Browick Road junction



Route	Total
B1135[W] > A11[S]	27%
B1135[W] > A11[N]	34%
B1135[W] > Browick Road	12%
B1135[E]	27%

The trips associated with the varying levels of proposed development have been added to the 2025 and 2040 future baseline values to form the “future year with development” scenarios, for which network flow diagrams are shown in **Appendix B**.

JUNCTION CAPACITY ASSESSMENT

This section provides details on the modelling software used to assess the A11 Wymondham Bypass / Browick Road junction before detailing the modelling results for each scenario and assessment year tested.

Model Package

The Assessment of Roundabout Capacity and Delay (ARCADY) module of Junctions 9 has been used to assess the A11 Wymondham Bypass / Browick Road junction (two roundabouts in a dumb-bell arrangement). The junction has been modelled as two linked roundabouts; however, as per guidance provided in the Junctions 9 user guide, the junction has not been modelled as grade-separated.

As per the Department for Transport's (DfT) *Transport Analysis Guidance* (WebTAG), in normal circumstances, the 2021 base model would be compared to observed data to allow an assessment to be made of the models' ability to predict the junction operation. Naturally, in the current COVID-19 situation, this has not been possible.

The Ratio of Flow to Capacity (RFC) model output has been used to assess the performance of each arm. The *Design Manual for Roads and Bridges* (DMRB) industry-standard 0.85 RFC threshold has been used to determine whether a give-way arm is indicating any signs of stress in any given scenario. Delay, in seconds, and queue length outputs are also provided in the summary tables (presented in **Table 5** on page 6). Full ARCADY model outputs can be viewed upon request.

Model Outputs

Table 4 provides a summary of the junction performance for all scenarios, indicating the maximum RFC across all arms for both roundabouts to indicate whether the junction:

- operates with reserve capacity (green; all RFC's below 0.85);
- operates above theoretical capacity, but below practical capacity (orange; maximum RFC is below 1); or
- operates above capacity (red; minimum of one arm with an RFC above 1).

Table 4: Modelling overview

Scenario	2021 Base		2025 Base		2025 Base + Dev		2040 Base		2040 Base + Dev	
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
1,000 Dwellings	0.13	0.15	0.14	0.16	0.46	0.38	0.16	0.18	0.47	0.40
2,000 Dwellings					0.77	0.38			0.79	0.40
3,000 Dwellings					1.08	0.49			1.10	0.51
4,000 Dwellings					1.40	0.63			1.41	0.64
5,000 Dwellings					1.71	0.76			1.73	0.76
6,000 Dwellings					2.02	0.91			2.04	0.93

The modelling results indicate that in the 2021 base scenario, the A11 Wymondham Bypass / Browick Road junction operates with significant reserve capacity (all RFC values below the 0.85 threshold). Stanfield Road facilitates the largest number of vehicular movements; therefore, the maximum RFCs of 0.13 and 0.15 in the AM and PM peaks respectively are attributable to this arm. The associated queues and delays across all arms are relatively short.

Applying background traffic to the future forecast years of 2025 and 2040 does not significantly impact upon the performance of the junction. By 2025, the maximum RFC increases by 0.01 across both peak periods compared to the 2021 base scenario and by the future forecast year of 2040, the maximum RFC reaches 0.16 in the AM peak and 0.18 in the PM peak (an increase of 0.03 across both peak hours compared to the 2021 base scenario).

With the introduction of traffic associated with 1,000 dwellings, the A11 Wymondham Bypass / Browick Road junction would operate with reserve capacity, with the maximum RFC reaching 0.47 in the AM peak and 0.40 in the PM peak by 2040. The modelling also demonstrates that trips associated with 2,000 dwellings would ensure that the A11 Wymondham Bypass / Browick Road junction would still operate within capacity, with the maximum RFC reaching 0.79 in the AM peak and 0.40 in the PM peak by 2040. However, adding trips to the network associated with 3,000 dwelling pushes the junction over-capacity in the AM peak period, as the proposed development would significantly increase the number of movements at the Stanfield Road arm. Therefore, it can be seen that the optimum number of dwellings that can be accommodated at the A11 Wymondham Bypass / Browick Road junction without the need for mitigation or taking into account measures to reduce car mode share for the development, lies between 2,000 and 3,000 dwellings.

With the introduction of traffic associated with 6,000 dwellings, the A11 Wymondham Bypass / Browick Road junction would operate significantly over-capacity, as the proposed development would significantly increase the number of movements at the Stanfield Road arm in the AM peak hour (resulting in an RFC of 2.04 in the 2040 forecast year with significant queuing and delays) and on the A11 northbound off-slip and Browick Road in the PM peak hour, subsequently increasing conflicting movements and resulting in RFC values of 0.93 and 0.91 respectively.

Table 5: Modelling summary tables

2021 Base	AM			PM		
	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)	RFC
1 - Rbt [W] - B - Browick Road (E)	0.1	2.74	0.10	0.1	2.79	0.12
1 - Rbt [W] - C - A11 off-slip	0.0	1.76	0.03	0.0	1.81	0.03
1 - Rbt [W] - D - Browick Road (W)	0.1	2.68	0.05	0.0	2.68	0.03
2 - Rbt [E] - A - A11 off-slip	0.0	1.75	0.04	0.0	1.73	0.03
2 - Rbt [E] - B - Stanfield Road	0.2	2.73	0.13	0.2	2.77	0.15
2 - Rbt [E] - D - Browick Road	0.1	2.67	0.09	0.1	2.66	0.08

2025 Base	AM			PM		
	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)	RFC
1 - Rbt [W] - B - Browick Road (E)	0.1	2.76	0.11	0.2	2.82	0.13
1 - Rbt [W] - C - A11 off-slip	0.0	1.77	0.03	0.0	1.83	0.04
1 - Rbt [W] - D - Browick Road (W)	0.1	2.7	0.05	0.0	2.71	0.04
2 - Rbt [E] - A - A11 off-slip	0.0	1.76	0.04	0.0	1.74	0.04
2 - Rbt [E] - B - Stanfield Road	0.2	2.76	0.14	0.2	2.80	0.16
2 - Rbt [E] - D - Browick Road	0.1	2.69	0.10	0.1	2.67	0.09

2040 Base	AM			PM		
	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)	RFC
1 - Rbt [W] - B - Browick Road (E)	0.1	2.81	0.12	0.2	2.87	0.15
1 - Rbt [W] - C - A11 off-slip	0.0	1.79	0.04	0.0	1.85	0.04
1 - Rbt [W] - D - Browick Road (W)	0.1	2.75	0.06	0.0	2.76	0.04
2 - Rbt [E] - A - A11 off-slip	0.1	1.79	0.05	0.0	1.76	0.04
2 - Rbt [E] - B - Stanfield Road	0.2	2.82	0.16	0.2	2.87	0.18
2 - Rbt [E] - D - Browick Road	0.1	2.72	0.11	0.1	2.71	0.10

2025 + Development (1,000)	AM			PM		
	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)	RFC
1 - Rbt [W] - B - Browick Road (E)	0.5	3.59	0.32	0.4	3.37	0.28
1 - Rbt [W] - C - A11 off-slip	0.1	2.04	0.06	0.2	2.27	0.18
1 - Rbt [W] - D - Browick Road (W)	0.1	3.15	0.08	0.2	3.84	0.16
2 - Rbt [E] - A - A11 off-slip	0.1	1.86	0.08	0.3	2.51	0.23
2 - Rbt [E] - B - Stanfield Road	0.8	4.30	0.46	0.6	3.75	0.38
2 - Rbt [E] - D - Browick Road	0.2	2.83	0.15	0.6	3.74	0.36

2025 + Development (2,000)	AM			PM		
	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)	RFC
1 - Rbt [W] - B - Browick Road (E)	1.1	5.15	0.53	0.4	3.37	0.28
1 - Rbt [W] - C - A11 off-slip	0.1	2.40	0.10	0.2	2.27	0.18
1 - Rbt [W] - D - Browick Road (W)	0.1	3.78	0.11	0.2	3.84	0.16
2 - Rbt [E] - A - A11 off-slip	0.1	1.97	0.11	0.3	2.51	0.23
2 - Rbt [E] - B - Stanfield Road	3.3	10.11	0.77	0.6	3.75	0.38
2 - Rbt [E] - D - Browick Road	0.2	2.99	0.19	0.6	3.74	0.36

2025 + Development (3,000)	AM			PM		
	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)	RFC
1 - Rbt [W] - B - Browick Road (E)	2.0	7.52	0.68	0.5	3.74	0.35
1 - Rbt [W] - C - A11 off-slip	0.2	2.80	0.15	0.4	2.63	0.27
1 - Rbt [W] - D - Browick Road (W)	0.2	4.50	0.15	0.3	4.85	0.25
2 - Rbt [E] - A - A11 off-slip	0.2	2.10	0.14	0.6	3.27	0.36
2 - Rbt [E] - B - Stanfield Road	77.4	149.53	1.08	0.9	4.53	0.49
2 - Rbt [E] - D - Browick Road	0.3	3.17	0.24	1.0	4.74	0.49

2025 + Development (4,000)	AM			PM		
	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)	RFC
1 - Rbt [W] - B - Browick Road (E)	2.1	7.5	0.67	0.7	4.20	0.42
1 - Rbt [W] - C - A11 off-slip	0.2	2.9	0.18	0.6	3.12	0.36
1 - Rbt [W] - D - Browick Road (W)	0.2	4.82	0.18	0.6	6.60	0.36
2 - Rbt [E] - A - A11 off-slip	0.2	2.25	0.18	1.0	4.67	0.51
2 - Rbt [E] - B - Stanfield Road	430.0	983.55	1.40	1.4	5.72	0.59
2 - Rbt [E] - D - Browick Road	0.4	3.38	0.29	1.7	6.46	0.63

2025 + Development (5,000)	AM			PM		
	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)	RFC
1 - Rbt [W] - B - Browick Road (E)	2.0	7.46	0.67	1.0	4.79	0.49
1 - Rbt [W] - C - A11 off-slip	0.3	3.01	0.21	0.8	3.85	0.45
1 - Rbt [W] - D - Browick Road (W)	0.3	5.18	0.21	1.0	10.28	0.51
2 - Rbt [E] - A - A11 off-slip	0.3	2.42	0.21	2.2	8.16	0.69
2 - Rbt [E] - B - Stanfield Road	992.8	2235.49	1.71	2.3	7.76	0.70
2 - Rbt [E] - D - Browick Road	0.5	3.61	0.34	3.2	10.14	0.76

2025 + Development (6,000)	AM			PM		
	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)	RFC
1 - Rbt [W] - B - Browick Road (E)	2.0	7.44	0.67	1.3	5.56	0.56
1 - Rbt [W] - C - A11 off-slip	0.3	3.14	0.24	1.3	5.02	0.56
1 - Rbt [W] - D - Browick Road (W)	0.3	5.6	0.24	2.6	23.02	0.74
2 - Rbt [E] - A - A11 off-slip	0.3	2.62	0.25	8.5	28.48	0.91
2 - Rbt [E] - B - Stanfield Road	1596.5	3542.14	2.02	4.1	12.03	0.81
2 - Rbt [E] - D - Browick Road	0.6	3.89	0.38	7.9	22.34	0.90

2040 + Development (1,000)	AM			PM		
	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)	RFC
1 - Rbt [W] - B - Browick Road (E)	0.5	3.66	0.33	0.4	3.45	0.29
1 - Rbt [W] - C - A11 off-slip	0.1	2.06	0.07	0.2	2.31	0.19
1 - Rbt [W] - D - Browick Road (W)	0.1	3.22	0.09	0.2	3.94	0.17
2 - Rbt [E] - A - A11 off-slip	0.1	1.88	0.08	0.3	2.55	0.24
2 - Rbt [E] - B - Stanfield Road	0.9	4.45	0.47	0.7	3.88	0.40
2 - Rbt [E] - D - Browick Road	0.2	2.87	0.16	0.6	3.81	0.37

2040 + Development (2,000)	AM			PM		
	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)	RFC
1 - Rbt [W] - B - Browick Road (E)	1.2	5.3	0.54	0.4	3.45	0.29
1 - Rbt [W] - C - A11 off-slip	0.1	2.44	0.11	0.2	2.31	0.19
1 - Rbt [W] - D - Browick Road (W)	0.1	3.87	0.12	0.2	3.94	0.17
2 - Rbt [E] - A - A11 off-slip	0.1	2.00	0.11	0.3	2.55	0.24
2 - Rbt [E] - B - Stanfield Road	3.6	10.95	0.79	0.7	3.88	0.40
2 - Rbt [E] - D - Browick Road	0.3	3.03	0.21	0.6	3.81	0.37

2040 + Development (3,000)	AM			PM		
	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)	RFC
1 - Rbt [W] - B - Browick Road (E)	2.1	7.56	0.68	0.6	3.84	0.36
1 - Rbt [W] - C - A11 off-slip	0.2	2.82	0.15	0.4	2.68	0.27
1 - Rbt [W] - D - Browick Road (W)	0.2	4.58	0.16	0.3	5.01	0.26
2 - Rbt [E] - A - A11 off-slip	0.2	2.13	0.15	0.6	3.34	0.37
2 - Rbt [E] - B - Stanfield Road	90.5	173.80	1.10	1.0	4.72	0.51
2 - Rbt [E] - D - Browick Road	0.3	3.22	0.25	1.0	4.85	0.50

2040 + Development 4,000)	AM			PM		
	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)	RFC
1 - Rbt [W] - B - Browick Road (E)	2.1	7.53	0.68	0.8	4.33	0.44
1 - Rbt [W] - C - A11 off-slip	0.2	2.93	0.18	0.6	3.20	0.37
1 - Rbt [W] - D - Browick Road (W)	0.2	4.92	0.19	0.6	6.89	0.37
2 - Rbt [E] - A - A11 off-slip	0.2	2.29	0.18	1.1	4.81	0.52
2 - Rbt [E] - B - Stanfield Road	456.1	1049.94	1.41	1.6	6.03	0.61
2 - Rbt [E] - D - Browick Road	0.4	3.44	0.30	1.8	6.66	0.64

2040 + Development (5,000)	AM			PM		
	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)	RFC
1 - Rbt [W] - B - Browick Road (E)	2.1	7.49	0.67	1.0	4.79	0.49
1 - Rbt [W] - C - A11 off-slip	0.3	3.04	0.22	0.8	3.85	0.45
1 - Rbt [W] - D - Browick Road (W)	0.3	5.30	0.22	1.0	10.28	0.51
2 - Rbt [E] - A - A11 off-slip	0.3	2.46	0.22	2.2	8.16	0.69
2 - Rbt [E] - B - Stanfield Road	1026.8	2309.50	1.73	2.3	7.76	0.70
2 - Rbt [E] - D - Browick Road	0.5	3.68	0.35	3.2	10.14	0.76

2040 + Development (6,000)	AM			PM		
	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)	RFC
1 - Rbt [W] - B - Browick Road (E)	2.0	7.45	0.67	1.4	5.79	0.58
1 - Rbt [W] - C - A11 off-slip	0.3	3.16	0.25	1.3	5.23	0.57
1 - Rbt [W] - D - Browick Road (W)	0.3	5.73	0.26	3.1	26.89	0.77
2 - Rbt [E] - A - A11 off-slip	0.4	2.67	0.26	10.0	32.97	0.93
2 - Rbt [E] - B - Stanfield Road	1630.7	3616.72	2.04	4.6	13.47	0.83
2 - Rbt [E] - D - Browick Road	0.6	3.97	0.39	8.7	24.45	0.91

Modal Share / Internalisation

MODAL SHARE

The proposed development will seek to take a “future-ready” approach to development in order to be ready for tomorrow's world as well as today. The mode share for private vehicles across the South Norfolk 007 and South Norfolk 009 MSOAs currently stands at 75% (as shown in **Figure 4** on page 3); however, Stanfield Garden Villages will seek to take an aggressive, but positive, stance towards reducing the modal share of private vehicles from first occupation with sustainable and active modes supporting the majority of trips.

By means of example, reducing the modal share of private vehicles by 50% (down to approximately 37%) would significantly reduce the impact of the proposed development on the surrounding highway network whilst providing capacity to accommodate additional development. For example, using the existing mode share, the junction capacity assessment indicates that 2,000 dwellings can be accommodated at the A11 Wymondham Bypass / Browick Road junction; however, if the mode share was reduced by 50%, the number of dwellings that could be accommodated at the junction could double to 4,000.

The *Stanfield Garden Village: Vision and Delivery Document* indicates that the following measures can be implemented to assist in achieving a positive modal share, dominated by active and sustainable modes from the outset:

- improved pedestrian and cycle links into Wymondham, and the surrounding area by connecting to the existing extensive network of Public Rights of Way (PRoW) and the Wymondham Circular and the Norwich Pedalway cycle networks;
- a Greenway Spine Link through the middle of the cluster of new villages would be delivered, aligned with early provision of village facilities. The link would promote active travel as the most attractive mode to travel across the site whilst encouraging healthy lifestyles and providing accessibility to potential new public transport infrastructure (i.e. new bus stops / routes); and
- the proposed development would seek an extension to the Bus Rapid Transit (BRT) route between Wymondham and Norwich, as set out with the *Norwich Area Transport Strategy* (2004), to connect with Stanfield Garden Villages.

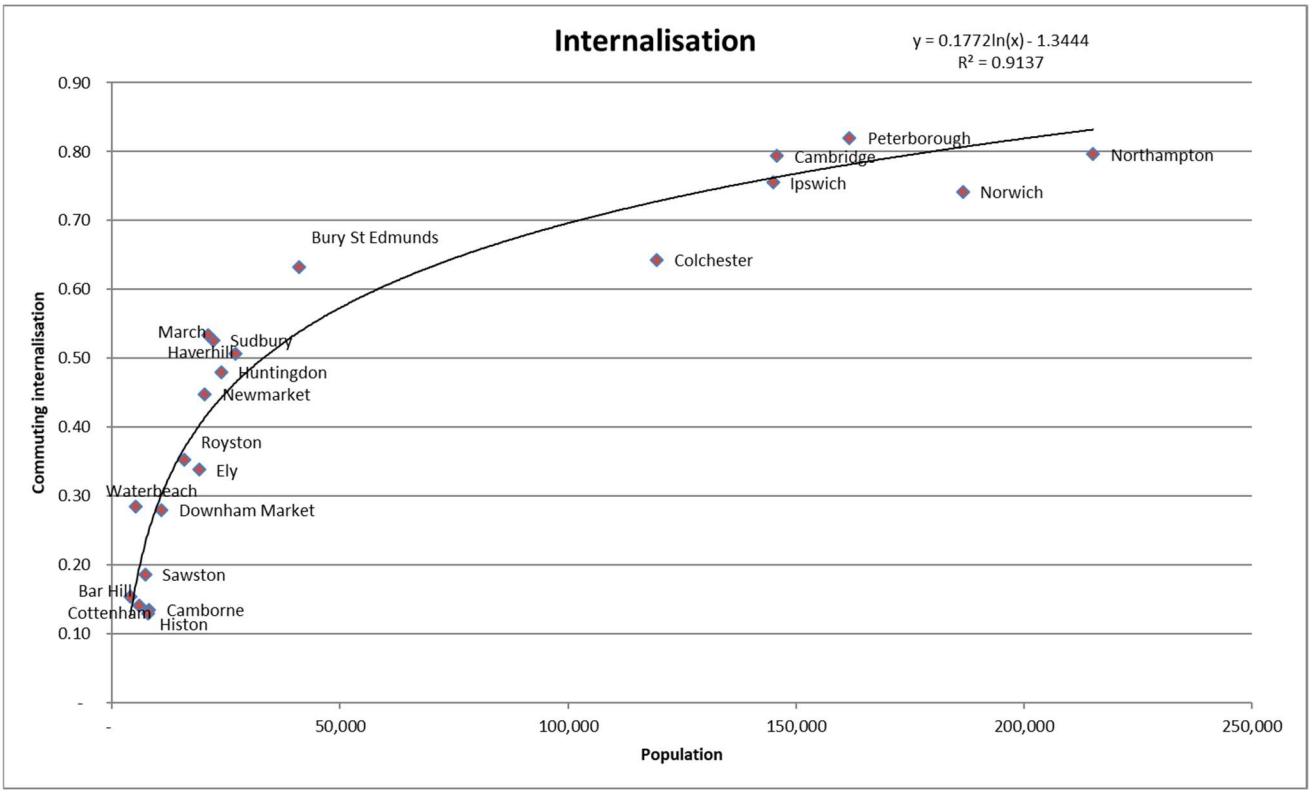
This "future-ready" approach to development will be beneficial to the economy and communities across Norfolk by providing employment opportunities, improving the local transport infrastructure and by providing environmental and health benefits.

INTERNALISATION

The vehicular trips associated with development (outlined in **Table 3** on page 4) in the foregoing assessment, are all assumed to be external trips. However, in reality, Stanfield Garden Villages will include a range of different land uses which would enable containment in accordance with sustainable development principles.

As a part of the Waterbeach New Town East project, a detailed review was carried out to understand the relationship between settlement scale (in terms of population) and containment of commuting trips. This was achieved by calculating the proportion of the total population living within a particular settlement who also work in the same settlement. The results are replicated in **Figure 6**.

Figure 6: Trip internalisation by settlement scale



Source: Transport Assessment for Waterbeach New Town East (WSP, 2019)

The research demonstrates that there is a very distinct relationship which is defined by a logarithmic function. As settlement size increases the level of containment also increases. This is likely to be a result of increasing demand for local facilities generated as settlement size grows and with increased population the viability of new shops, services and new businesses increases.

There are currently no existing facilities within the proposed development location; however, Stanfield Garden Villages would provide village and local centres that would contain retail provision, employment opportunities, a health centre, primary schools, a secondary school, library and public transport interchanges, thereby reducing the need to travel off-site.

VISION & VALIDATE APPROACH

This TN adopts the typical "predict and provide" approach which is rooted in planning for vehicles. Owing to historic vehicle-heavy trip rates, this can lead to the early and potential over-provision of significant transport infrastructure that supports a future of private car ownership.

A user-centric approach considers the mobility needs of future residents and visitors to Stanfield Garden Villages and allows a move towards planning for people. The robust planning of highway infrastructure could still be provisioned for and only triggered by carefully set thresholds for trip generation agreed with the planning and highways officers. The tailored provision of new mobility options can then more effectively reduce the reliance on the private car. The validation of lower private car trip rates and sustainable travel choices importantly could be measured early on as a means of justifiably pushing out the trigger point for which highway infrastructure is delivered.

This progressive "vision and validate" strategy ultimately enables planning for places by putting the vision and design of Stanfield Garden Villages ahead of the negative impacts commonly associated with accommodating dominant private car infrastructure.

SUMMARY

This TN presented results from a high-level capacity assessment of the A11 Wymondham Bypass / Browick Road junction in order to indicate the level of development that can be accommodated at this junction without highway mitigation or associated measures to reduce car mode share.

Due to the COVID-19 pandemic, traffic surveys on the A11 Wymondham Bypass / Browick Road junction were unable to be commissioned. Therefore, 2016 turning count data, obtained from NCC's traffic model, has subsequently been uplifted to the 2021 baseline scenario, 2025 future year and 2040 future year using TEMPro growth factors for the South Norfolk 007 and South Norfolk 009 MSOAs.

The Trip Rate Information Computer System (TRICS) database has been used to predict the trip generation for privately-owned houses (providing the most robust trip rate). The person trip rates have been applied to varying quantum of development (6,000 dwellings, 5,000 dwellings, 4,000 dwellings, 3,000 dwellings, 2,000 dwellings and 1,000 dwellings) and then the percentage mode share (for journeys to work) across the South Norfolk 007 and South Norfolk 009 MSOAs has been applied to the total people trips to ascertain an overall trips undertaken using private vehicles.

The trips associated with the differing scenarios of proposed development have been assigned to the highway network using 2011 Census method of travel to work origin-destination data for existing residents of South Norfolk 007 and South Norfolk 009 MSOAs. The route choices are derived from web-based journey planners, and where more than one route option is available, the approach has been proportionally distributed.

The ARCADY module of Junctions 9 has been used to assess the A11 Wymondham Bypass / Browick Road junction (two roundabouts in a dumb-bell arrangement). The modelling results indicate that in the 2021 base scenario, the junction operates with significant reserve capacity (all RFC values below the 0.85 threshold) and the impact of background traffic growth does not significantly impact upon the operation of the junction by the 2025 and 2040 forecast years. With the addition of trips of the highway network associated with 2,000 dwellings would ensure that the A11 Wymondham Bypass / Browick Road junction would still operate within capacity, with the maximum RFC reaching 0.79 in the AM peak and 0.40 in the PM peak by 2040. Adding trips to the network associated with 3,000 dwelling pushes the junction over-capacity; therefore, the optimum number of dwellings that can be accommodated at the A11 Wymondham Bypass / Browick Road junction without the need for mitigation or taking into account measures to reduce car mode share for the development, lies between 2,000 and 3,000 dwellings. It should be noted that without observed data, it has not been possible to calibrate the model; therefore, the outputs from the junction capacity assessments should be viewed with caution.

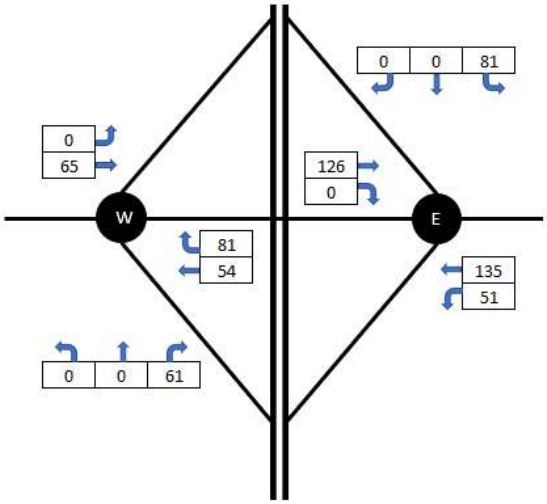
Stanfield Garden Villages will seek to take a “future-ready” approach to development in order to be ready for tomorrow's world as well as today by taking an aggressive, but positive, stance towards reducing the modal share of private vehicles from first occupation with sustainable and active modes supporting the majority of trips. In order to achieve such a significant mode share from first occupation, it is important that a comprehensive package of interventions are developed to ensure that sustainable and active travel measures are more attractive to future residents than journeys by private vehicle as well as maximising the opportunities to support emerging types of mobility. The *Stanfield Garden Village: Vision and Delivery Document* indicates a series of measures that are proposed to help achieve mode share ambitions.

It should also be noted that the trip generation methodology used within this TN presented the most robust trip generation for the development with all trips assumed to be external. In reality, Stanfield Garden Villages will include a range of different land uses which would enable containment. Previous research demonstrates that as settlement size increases, the level of containment also increases, due to increasing demand for local facilities. Stanfield Garden Villages would provide village and local centres from a very early stage that would contain retail provision, employment opportunities, a health centre, primary schools, a secondary school, library and public transport interchanges, thereby reducing the need to travel off-site.

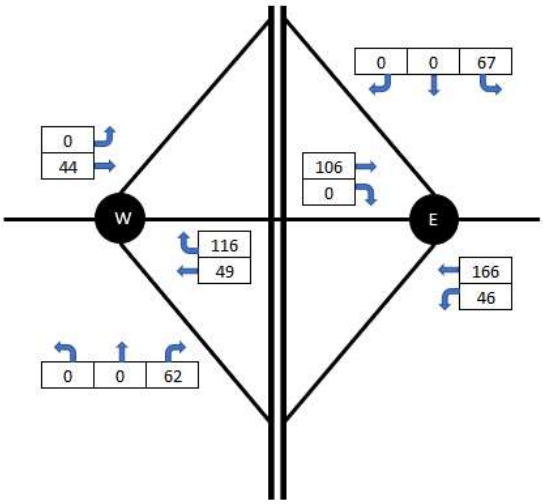
APPENDIX A

Network Flow Diagrams

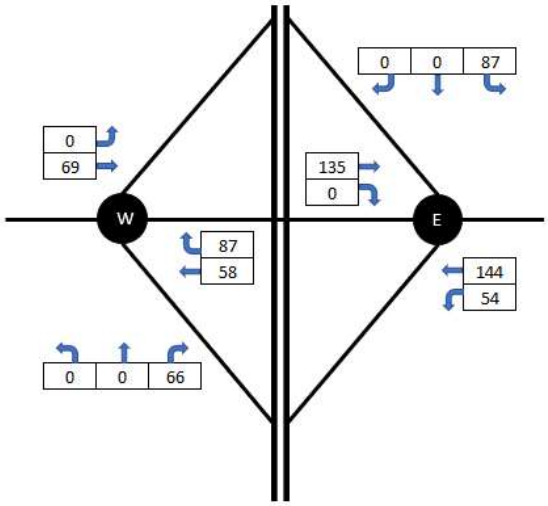
2021 Base (AM)



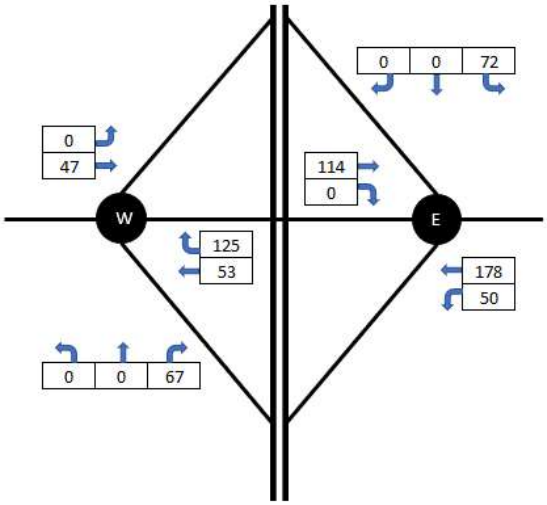
2021 Base (PM)



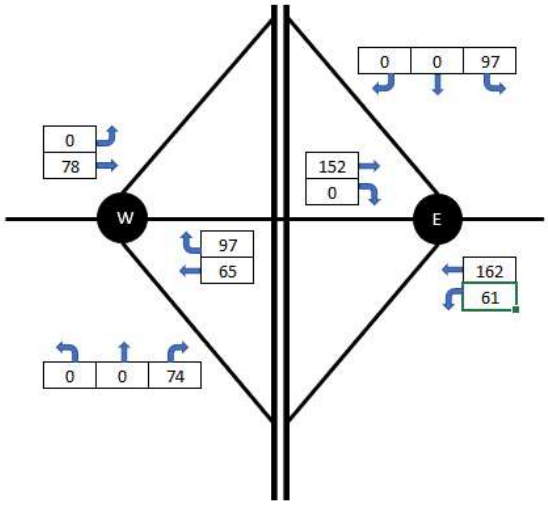
2025 Base (AM)



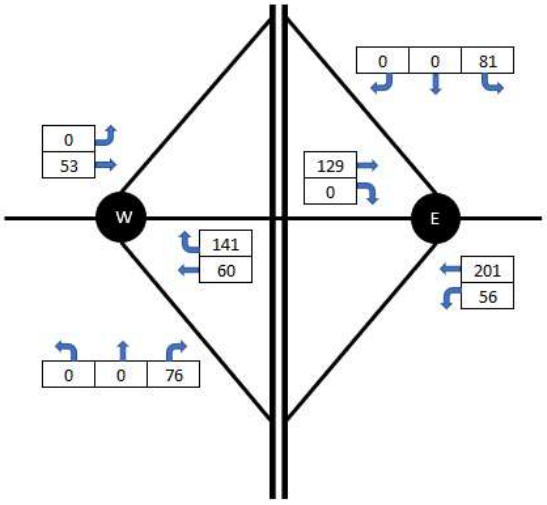
2025 Base (PM)



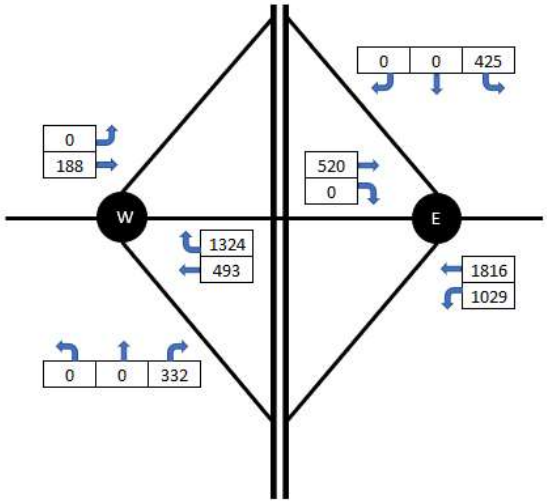
2040 Base (AM)



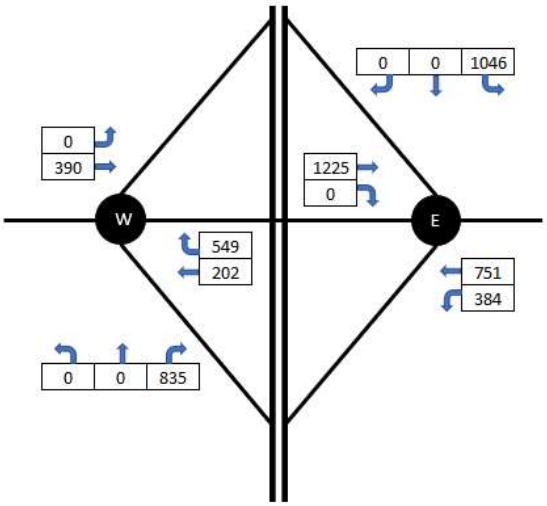
2040 Base (PM)



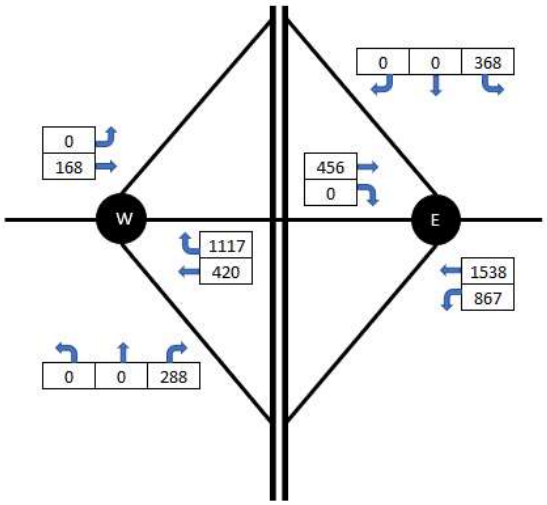
2025 Base + Development 6,000 (AM)



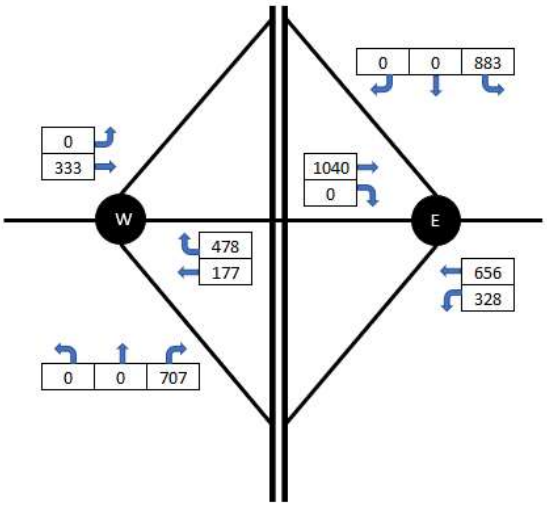
2025 Base + Development 6,000 (PM)



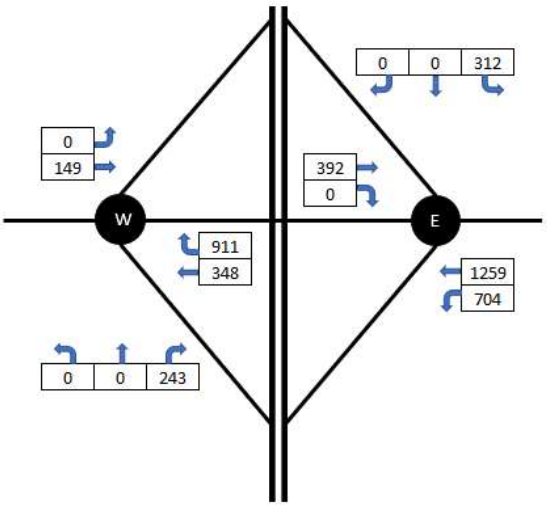
2025 Base + Development 5,000 (AM)



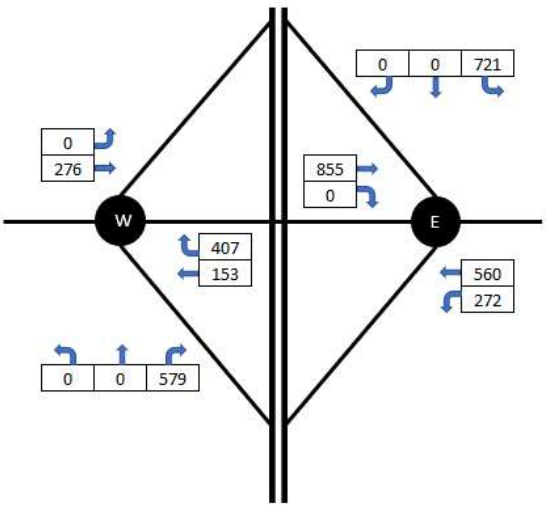
2025 Base + Development 5,000 (PM)



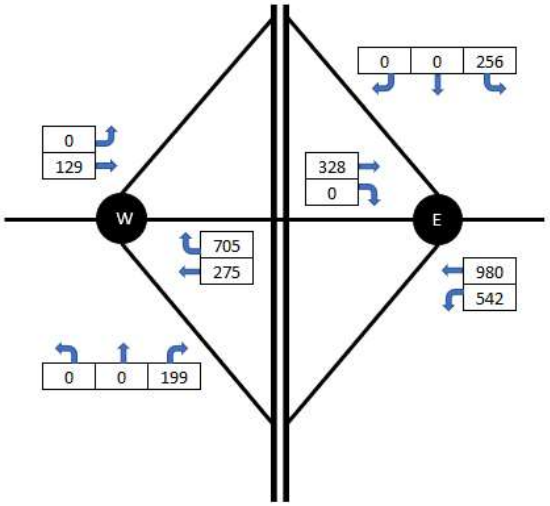
2025 Base + Development 4,000 (AM)



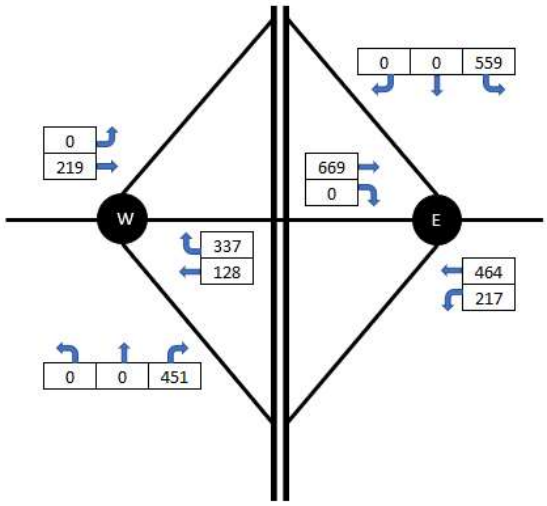
2025 Base + Development 4,000 (PM)



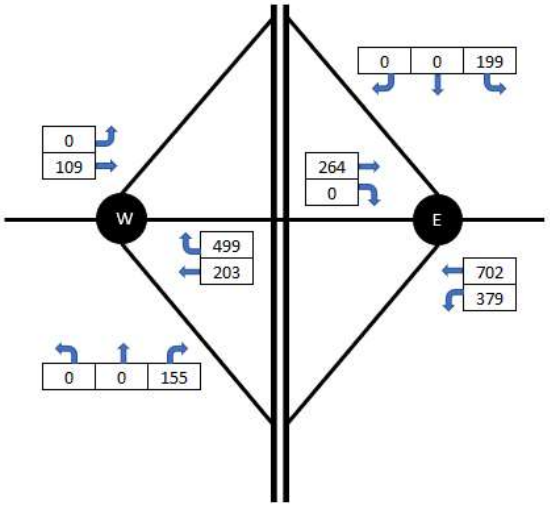
2025 Base + Development 3,000 (AM)



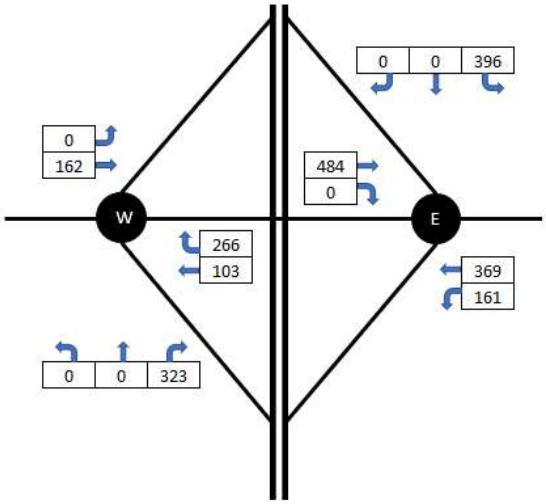
2025 Base + Development 3,000 (PM)



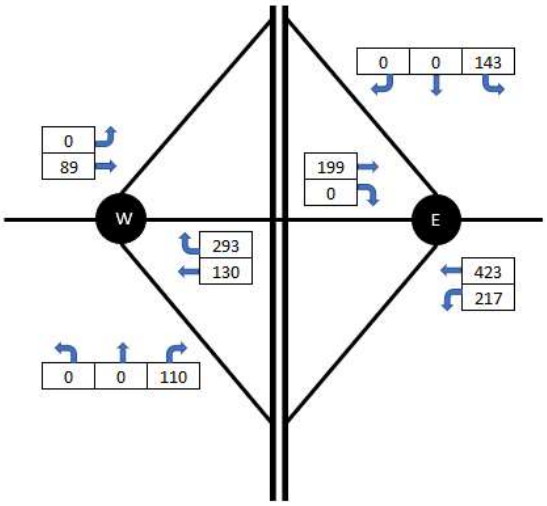
2025 Base + Development 2,000 (AM)



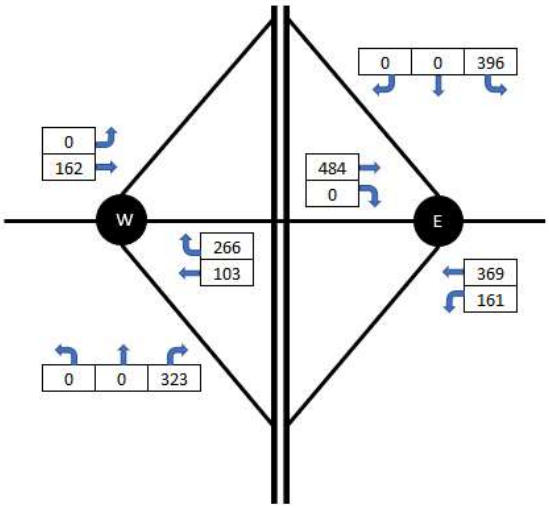
2025 Base + Development 2,000 (PM)



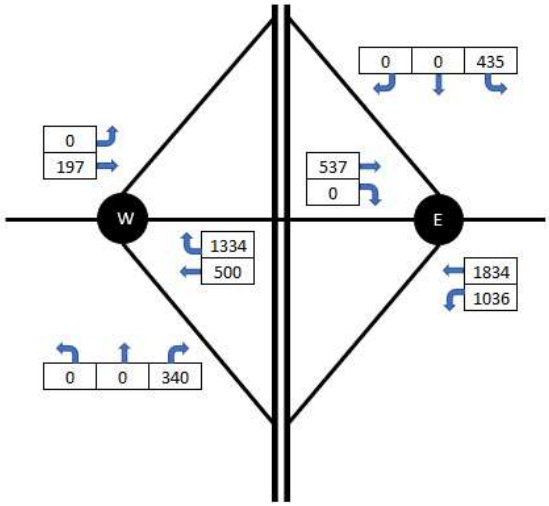
2025 Base + Development 1,000 (AM)



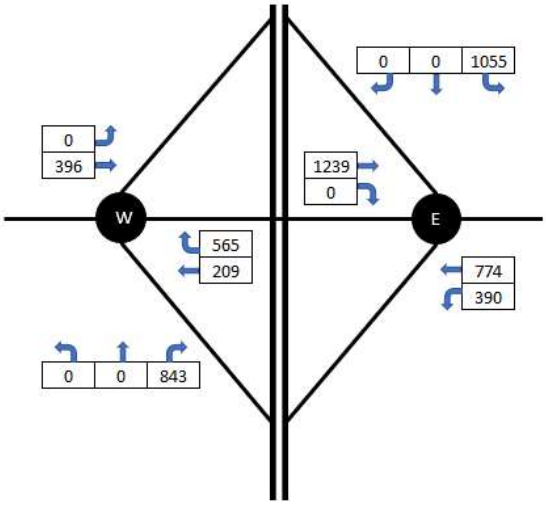
2025 Base + Development 1,000 (PM)



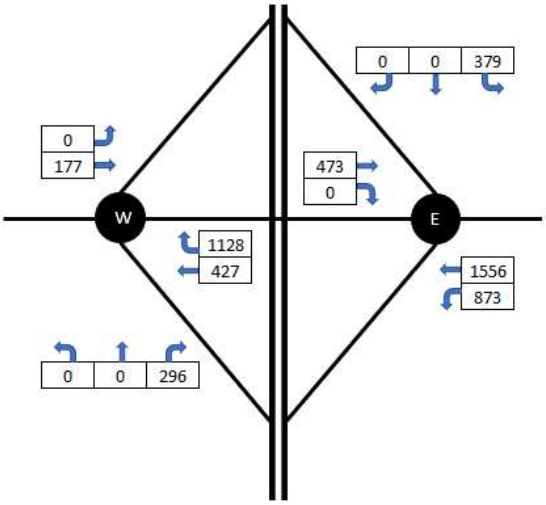
2040 Base + Development 6,000 (AM)



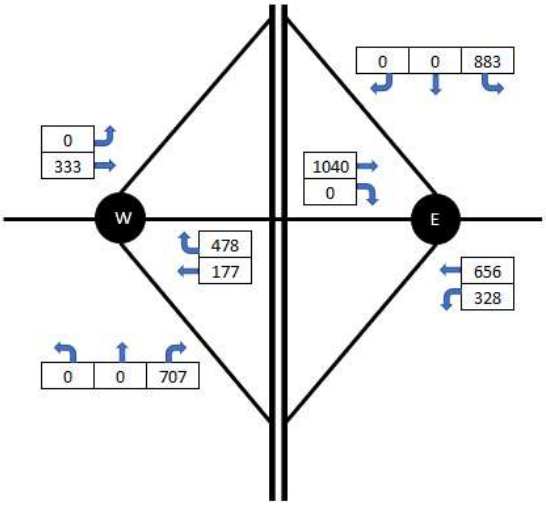
2040 Base + Development 6,000 (PM)



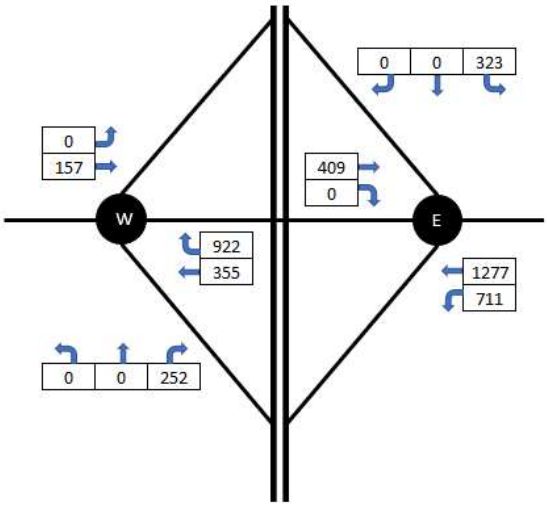
2040 Base + Development 5,000 (AM)



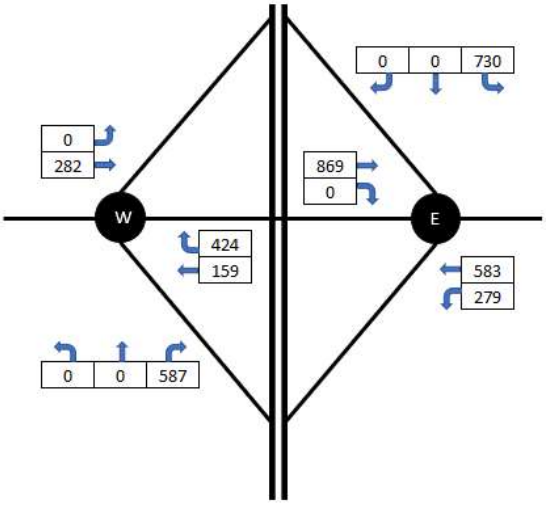
2040 Base + Development 5,000 (PM)



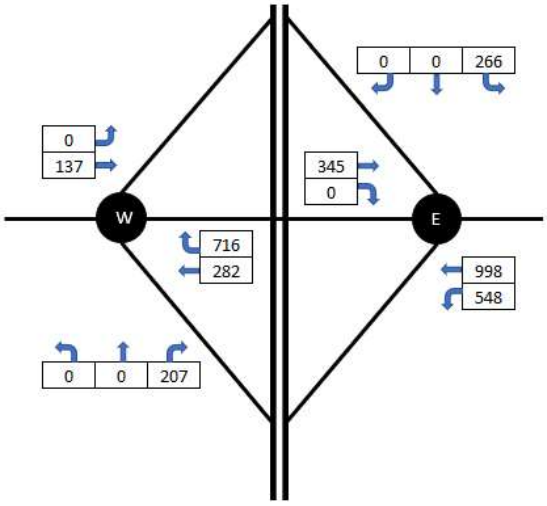
2040 Base + Development 4,000 (AM)



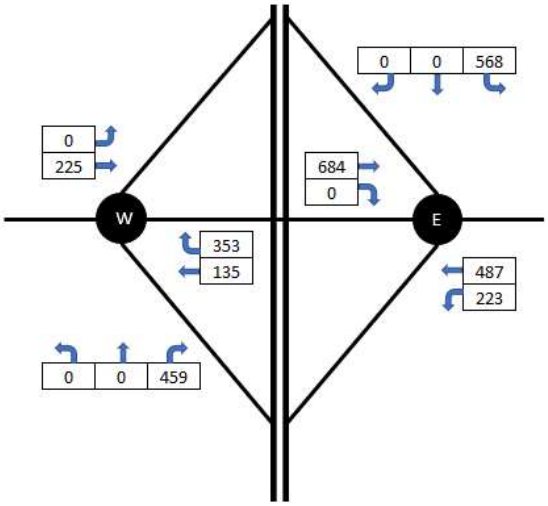
2040 Base + Development 4,000 (PM)



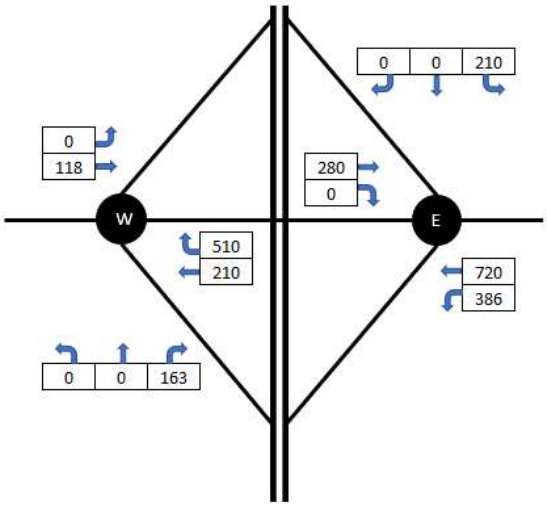
2040 Base + Development 3,000 (AM)



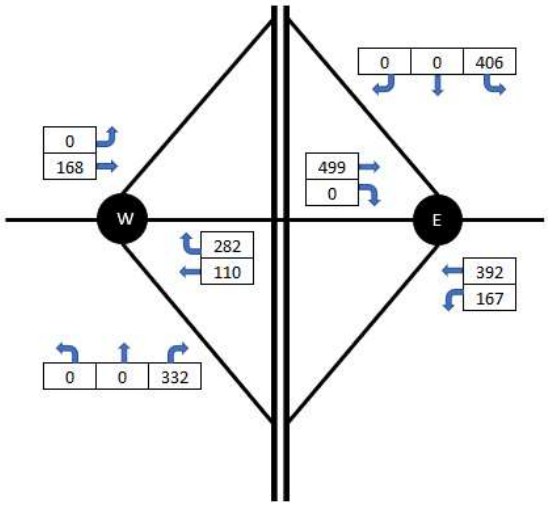
2040 Base + Development 3,000 (PM)



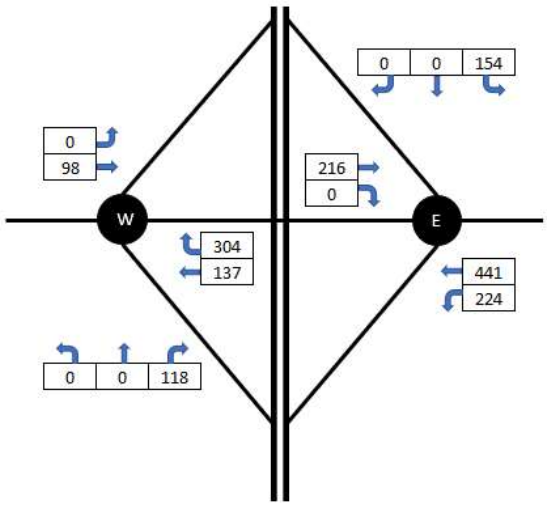
2040 Base + Development 2,000 (AM)



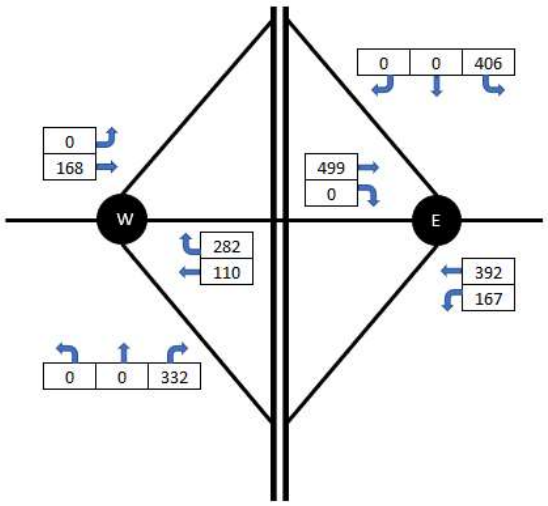
2040 Base + Development 2,000 (PM)



2040 Base + Development 1,000 (AM)



2040 Base + Development 1,000 (PM)



APPENDIX B

TRICS Output

Calculation Reference: AUDIT-100314-200716-0734

TRIP RATE CALCULATION SELECTION PARAMETERS:

Land Use : 03 - RESIDENTIAL
Category : A - HOUSES PRIVATELY OWNED
MULTI-MODAL VEHICLES

Selected regions and areas:

02	SOUTH EAST		
	ES	EAST SUSSEX	1 days
	HC	HAMPSHIRE	1 days
	HF	HERTFORDSHIRE	1 days
	KC	KENT	4 days
	WS	WEST SUSSEX	4 days
03	SOUTH WEST		
	DV	DEVON	2 days
	SM	SOMERSET	3 days
04	EAST ANGLIA		
	NF	NORFOLK	2 days
	SF	SUFFOLK	1 days
05	EAST MIDLANDS		
	LE	LEICESTERSHIRE	1 days
06	WEST MIDLANDS		
	SH	SHROPSHIRE	2 days
	ST	STAFFORDSHIRE	1 days
07	YORKSHIRE & NORTH LINCOLNSHIRE		
	NE	NORTH EAST LINCOLNSHIRE	1 days
	NY	NORTH YORKSHIRE	3 days
08	NORTH WEST		
	CH	CHESHIRE	3 days

This section displays the number of survey days per TRICS® sub-region in the selected set

Primary Filtering selection:

This data displays the chosen trip rate parameter and its selected range. Only sites that fall within the parameter range are included in the trip rate calculation.

Parameter: No of Dwellings
Actual Range: 16 to 918 (units:)
Range Selected by User: 6 to 1817 (units:)

Parking Spaces Range: All Surveys Included

Parking Spaces per Dwelling Range: All Surveys Included

Bedrooms per Dwelling Range: All Surveys Included

Percentage of dwellings privately owned: All Surveys Included

Public Transport Provision:
Selection by: Include all surveys

Date Range: 01/01/12 to 19/11/19

This data displays the range of survey dates selected. Only surveys that were conducted within this date range are included in the trip rate calculation.

Selected survey days:

Monday	4 days
Tuesday	8 days
Wednesday	6 days
Thursday	9 days
Friday	3 days

This data displays the number of selected surveys by day of the week.

Selected survey types:

Manual count	30 days
Directional ATC Count	0 days

This data displays the number of manual classified surveys and the number of unclassified ATC surveys, the total adding up to the overall number of surveys in the selected set. Manual surveys are undertaken using staff, whilst ATC surveys are undertaking using machines.

Selected Locations:

Edge of Town Centre	1
Suburban Area (PPS6 Out of Centre)	7
Edge of Town	16
Neighbourhood Centre (PPS6 Local Centre)	6

This data displays the number of surveys per main location category within the selected set. The main location categories consist of Free Standing, Edge of Town, Suburban Area, Neighbourhood Centre, Edge of Town Centre, Town Centre and Not Known.

Selected Location Sub Categories:

Residential Zone	23
Village	6
No Sub Category	1

This data displays the number of surveys per location sub-category within the selected set. The location sub-categories consist of Commercial Zone, Industrial Zone, Development Zone, Residential Zone, Retail Zone, Built-Up Zone, Village, Out of Town, High Street and No Sub Category.

Secondary Filtering selection:

Use Class:

C3	30 days

This data displays the number of surveys per Use Class classification within the selected set. The Use Classes Order 2005 has been used for this purpose, which can be found within the Library module of TRICS®.

Population within 1 mile:

1,000 or Less	2 days
1,001 to 5,000	8 days
5,001 to 10,000	8 days
10,001 to 15,000	8 days
15,001 to 20,000	2 days
20,001 to 25,000	2 days

This data displays the number of selected surveys within stated 1-mile radii of population.

Population within 5 miles:

5,001 to 25,000	7 days
25,001 to 50,000	6 days
50,001 to 75,000	6 days
75,001 to 100,000	11 days

This data displays the number of selected surveys within stated 5-mile radii of population.

Car ownership within 5 miles:

1.1 to 1.5	28 days
1.6 to 2.0	2 days

This data displays the number of selected surveys within stated ranges of average cars owned per residential dwelling, within a radius of 5-miles of selected survey sites.

Travel Plan:

Yes	9 days
No	21 days

This data displays the number of surveys within the selected set that were undertaken at sites with Travel Plans in place, and the number of surveys that were undertaken at sites without Travel Plans.

PTAL Rating:

No PTAL Present	30 days

This data displays the number of selected surveys with PTAL Ratings.

TRIP RATE for Land Use 03 - RESIDENTIAL/A - HOUSES PRIVATELY OWNED
MULTI-MODAL TOTAL PEOPLE
Calculation factor: 1 DWELLS
BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. DWELLS	Trip Rate	No. Days	Ave. DWELLS	Trip Rate	No. Days	Ave. DWELLS	Trip Rate
00:00 - 01:00									
01:00 - 02:00									
02:00 - 03:00									
03:00 - 04:00									
04:00 - 05:00									
05:00 - 06:00									
06:00 - 07:00									
07:00 - 08:00	30	123	0.106	30	123	0.504	30	123	0.610
08:00 - 09:00	30	123	0.220	30	123	0.805	30	123	1.025
09:00 - 10:00	30	123	0.230	30	123	0.279	30	123	0.509
10:00 - 11:00	30	123	0.197	30	123	0.270	30	123	0.467
11:00 - 12:00	30	123	0.204	30	123	0.247	30	123	0.451
12:00 - 13:00	30	123	0.244	30	123	0.228	30	123	0.472
13:00 - 14:00	30	123	0.258	30	123	0.235	30	123	0.493
14:00 - 15:00	30	123	0.266	30	123	0.284	30	123	0.550
15:00 - 16:00	30	123	0.567	30	123	0.295	30	123	0.862
16:00 - 17:00	30	123	0.524	30	123	0.295	30	123	0.819
17:00 - 18:00	30	123	0.634	30	123	0.276	30	123	0.910
18:00 - 19:00	30	123	0.513	30	123	0.325	30	123	0.838
19:00 - 20:00									
20:00 - 21:00									
21:00 - 22:00									
22:00 - 23:00									
23:00 - 24:00									
Total Rates:			3.963			4.043			8.006

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

*To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: COUNT/TRP*FACT. Trip rates are then rounded to 3 decimal places.*

Nigel Downes
Director, Planning & Advisory
nigel.downes@wsp.com

Giles Perkins
Technical Director, Head of Future Mobility
giles.perkins@wsp.com

Toby Thornton
Technical Director, Future Mobility
toby.thornton@wsp.com

Future Mobility