

# 10 TRANSPORTATION

## 10.1 INTRODUCTION

### Company

Peter Brett Associates (PBA), Now Part of Stantec is a leading consultancy of engineers, planners, environmental consultants, and economists working on major development and infrastructure projects.

Our environmental consultants and engineers work alongside our planners and economists ensuring key environmental issues are identified at the earliest inception stage of a project. We help shape high-quality schemes that optimise environmental performance and commercial outcomes whilst delivering lasting benefits for local communities.

### Author

Jason Lewis is a Director of Transport Planning for Peter Brett Associates, now Part of Stantec. He has a total of 29 years' experience in the highways and transport field, of which 19 has been spent in consultancy. He is an experienced expert witness and has attended numerous public inquiries and appeals.

Jason, in a previous role, was part of a team that successfully gained IEMA accreditation and certification for a planning and transport consultancy firm. He is experienced in the field of assessing the transport aspects of Environmental Assessment, on a range of schemes of the size and scale similar to the proposals.

In accordance with Regulation 18(5) of the Town and Country Planning (Environmental Impact Assessment) Regulations 2017, as amended, a statement outlining the relevant expertise and qualifications of competent experts, in the context of the EIA Regulations and for contributions to the Environmental Statement, is provided in Appendix A.5, of the Transport Assessment, Appendix 10.1, Vol III.

### Chapter Purpose

This Chapter, prepared by PBA, presents an assessment of the likely significant effects of the proposed development on the existing transport conditions within the area local to the application site and the wider surrounding area.

The Chapter provides a description of the methods used in the transport assessment, a description of the relevant baseline conditions of the application site and surrounding area, and an assessment of the likely significant environmental effects relating to transport during the demolition and construction works and once the proposed development is completed and operational.

Mitigation measures are identified, where appropriate, to avoid, reduce or offset any adverse effects of the proposed development during the demolition and construction works and once the proposed development is completed and operational. The Chapter concludes by examining the nature and significance of likely residual effects taking account of the mitigation measures.

A Transport Assessment (TA) has been submitted in support of the Planning Application for the proposed development. This Chapter has been prepared on the basis of the detailed assessment within the TA at Appendix 10.1, Vol III and refers to the TA and its supporting appendices where further information is required.

### Appendices

- Appendix 10.1: Transport Assessment including the Framework Travel Plan at Appendix N within that document.

## 10.2 METHODOLOGY

### Guidance

This Chapter has been prepared in accordance with the requirements set out in the EIA Regulations 2017 and has taken account of the guidance presented within the following:

- Guidelines for Environmental Impact Assessment (Institute of Environmental Management and Assessment (IEMA), 2004) [1];
- Guidelines for the Environmental Assessment of Road Traffic (Institute of Environmental Assessment (now IEMA), 1993) (the 'IEMA Guidelines') [2]; and
- Volume 11 of the Design Manual for Roads and Bridges (DMRB) – Environmental Assessment (Highways Agency et al., 2007 / 2008 / 2009 / 2011) [3].

The above listed 'Guidelines for the Environmental Assessment of Road Traffic' refer to the 'Manual of Environment Appraisal' (MEA) published by the (then) Department of Transport in 1983, which has been superseded. Reference has therefore been made to the relevant sections of the DMRB - specifically Volume 11 entitled 'Environmental Assessment'.

### Legislation and Policy

The following section describes the relevant national, regional and local policy context as well as relevant legislation, guidance and standards related to transport.

#### National Policy

Ministry of Housing, Communities and Local Government - National Planning Policy Framework (February 2019) [4]

In February 2019, the Ministry of Housing, Communities and Local Government published a revised National Planning Policy Framework (NPPF), which replaces the first NPPF published in March 2012. It sets out the government's planning policies for England and how these are expected to be applied.

Chapter 9: 'promoting sustainable transport' outlines the following policies most relevant to this ES:

- Paragraph 102: Transport issues should be considered from the earliest stages of plan-making and development proposals, so that (d) the environmental impacts of traffic and transport infrastructure can be identified, assessed and taken into account – including appropriate opportunities for avoiding and mitigating any adverse effects, and for net environmental gains.
- Paragraph 103: The planning system should actively manage patterns of growth in support of these objectives. Significant development should be focused on locations which are or can be made sustainable, through limiting the need to travel and offering a genuine choice of transport modes. This can help to reduce congestion and emissions, and improve air quality and public health. However, opportunities to maximise sustainable transport solutions will vary between urban and rural areas, and this should be taken into account in both plan-making and decision-making.
- Paragraph 109: Development should only be prevented or refused on highways grounds if there would be an unacceptable impact on highway safety, or the residual cumulative impacts on the road network would be severe.
- Paragraph 110: applications for development should:
  - give priority first to pedestrian and cycle movements, both within the scheme and with neighbouring areas; and second – so far as possible – to facilitating 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 minimise 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.

Department for Communities and Local Government - Planning Practice Guidance (July 2019) [5]

The Planning Practice Guidance (PPG), published in March 2014, supports the NPPF and offers guidance on effective delivery of objectives through the planning process.

Travel plans, transport assessments and statements in decision-taking section provides advice on when transport assessments and transport statements are required, and what they should contain.

This supports both Paragraph 32 and Paragraph 36 of the PPG:

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- Paragraph 32 sets out that all developments that generate significant amounts of transport movement should be supported by a Transport Statement or Transport Assessment.
- Paragraph 36 sets out that all developments which generate significant amounts of transport movement should be required to provide a Travel Plan.

## Regional Planning Policy

### Kent County Council Local Transport Plan 3: 2011-2016, 2011

The Local Transport Plan (LTP) [6] for Kent, covering a period from 2011 to 2016, is Kent County Council's (KCC) third LTP and was adopted on 6 April 2011. It sets out a five year plan for the area, which is based on the previous Government's five National Transport Goals, but made appropriate to the Kent area:

- growth without gridlock;
- a safer and healthier county;
- supporting independence;
- tackling a changing climate; and
- enjoying life in Kent.

### Kent Downs AONB Management Plan 2014 – 2019, 2014

The application site is situated within the Kent Downs Area of Outstanding Natural Beauty (AONB); although the main access to the application site from the A224 lies outside the AONB boundary.

The Kent Downs AONB Management Plan [7] sets out a vision and clear aims and policies. The policies provided in the plan recognise and reflect the pressure from growth and development in the Kent Downs AONB. This includes securing mitigation measures to take advantage of the opportunities generated by this growth and to prevent a harmful impact on the AONB.

Specific policies from the AONB Management Plan that relate to transport are:

- SD 12: "Transport and infrastructure schemes are expected to avoid the Kent Downs AONB as far as practicable. Essential developments will be expected to fit unobtrusively into the landscape, respect landscape character, be mitigated by sympathetic landscape and design measures and provide environmental compensation by benefits to natural beauty elsewhere in the AONB"
- AEU2: "Diversion and stopping up of PRoWs (Public Rights of Way) will be resisted unless it can be demonstrated that they will not have a detrimental impact on opportunities for access and quiet enjoyment of the AONB landscape and historic character"
- AEU3: "Investment to secure sustainable, high quality, low impact and easy access, multiuser routes from towns and growth areas to the AONB will be pursued"

- AEU4: "The sustainable and enhanced management and promotion of open access sites will be pursued"
- AEU5: "Mechanisms will be supported to resolve conflicts between rightful users of Public Rights of Way. Where there are irreconcilable conflicts from legal but damaging activities, quiet recreation will be supported above other activities"
- AEU7: "Improvements to the Rights of Way Network to provide and improve countryside access, health and well-being opportunities, including way-marking, signposting and maintenance, new routes and establishment of higher rights which conforms with AONB policies and design guidance, will be supported".
- AEU11: "A reduction in the need to travel by car will be supported through new and improved measures to provide integrated, attractive and affordable public transport in the Kent Downs. New business, community and other initiatives in support of the vision, aims and policies of the Management Plan will seek to relate to existing public transport links"
- AEU12: "Sustainable solutions to problems of rural traffic will be supported, particularly in rural settlements or where there is a conflict with landscape quality or walkers, cyclists and horse riders"
- AEU13: "A strategic approach to the use of road signage, furniture, design and maintenance that conserves and enhances the local character and distinctiveness and encourages nonmotorized access will be pursued through the adoption and implementation of the AONB Rural Streets and Lanes Design Handbook."

## Local Planning Policy

### Sevenoaks District Council, Core Strategy Development Plan Document, 2011

The relevant policy for transport in Sevenoaks District Council (SDC's) adopted Core Strategy [8] is included within SP 2: Transport, which stipulates:

"The Council will support and promote measures to reduce reliance on travel by car both in providing for new development and in supporting measures promoted through the Transport Strategy. Specifically, it will:

- support improvements to enhance the safety and convenience of public and community transport;
- seek improved facilities for cyclists and pedestrians; and
- require the inclusion of Travel Plans and other appropriate measures in new developments that generate significant traffic volumes."

### Sevenoaks District Council, Allocations and Development Management Plan, 2015

The relevant policies contained in SDC's adopted Allocations and Development Management Plan [9] are as follows:

- Policy EMP3: Redevelopment of Fort Halstead which in relation to transport states that:
  - "Redevelopment proposals (...) would be expected to:
    - be sustainable in respect of the location, uses and quantum of development and be accompanied by a Travel Plan incorporating binding measures to reduce dependency of future occupants on car use;
    - provide accessibility to jobs, shops and services by public transport, cycling or walking, including proposals for onsite provision proportionate to the proposed development; (...)
    - confirm, by way of a Transport Assessment, that the development would not have an unacceptable adverse impact on the local and strategic road networks; (...)
    - improve the provision and connectivity of green infrastructure, including the protection, enhancement and management of biodiversity and the provision of improvements to the Public Right of Way network."
- Policy T1: Mitigating Travel Impact stipulates that:
  - "New developments will be required to mitigate any adverse travel impacts, including their impact on congestion and safety, environmental impact, such as noise and tranquillity, pollution and impact on amenity and health. This may mean ensuring adequate provision is made for integrated and improved transport infrastructure or other appropriate mitigation measures, through direct improvements and/or developer contributions."
- Policy T2: Vehicle Parking states that:
  - "Vehicle parking provision, including cycle parking, in new residential developments should be made in accordance with the current KCC vehicle parking standards in Interim Guidance Note 3 to the Kent Design Guide (or any subsequent replacement). (...) Vehicle parking provision, including cycle parking, in new non-residential developments should be made in accordance with advice by Kent County Council as Local Highway Authority or until such time as non-residential standards are adopted."

However, SDC reserves the right to depart from the standards under special circumstances.
- Policy T3: Provision of Electrical Vehicle Charging Points seeks:
  - "For all major non-residential development proposals the applicant should set out within their Transport Assessment a scheme for the inclusion of electric vehicle charging infrastructure.
  - In considering whether a publicly accessible charging point is appropriate the Council will have regard to:
    - a. the accessibility of the location;

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- b. *the suitability of the site as a long stay destination during charging;*
- c. *the number of existing and proposed publicly accessible charging points in the surrounding area;*
- d. *the potential impact of providing electric vehicle charging points on development viability.*
  - *Within new residential developments all new houses with a garage or vehicular accesses should include an electrical socket with suitable voltage and wiring for the safe charging of electric vehicles.*
  - *Schemes for new apartments and houses with separate parking areas should include a scheme for at least one communal charging point.*
  - *In non-residential developments where it is not appropriate to provide electric vehicle charging points, new development should be designed to include the electrical infrastructure in order to minimise the cost and disturbance of retrofitting at a later date."*

### Consultees

Kent County Council – Highways, Transportation and Waste

- Louise Rowlands (18/10/2018 & 22/1/2019)
- Dave Barton (22/1/2019)

Sevenoaks District Council - Planning

- Alison Salter (18/10/2018)
- Claire Shearing (22/1/2019)

### Scoping

A Transport Scoping Report was submitted for the proposed development to KCC in September 2018. Following this submission, further information was submitted to KCC during the pre-application stage.

A number of meetings were undertaken with KCC through late 2018 and ongoing up to the planning application stage, on matters including but not limited to: means of access, bus access, walking and cycling provisions, and, on and off-site vehicle access design and safety. Various correspondence with the LPA and KCC has supported these discussions. The Transport Scoping report and pre-application discussion for the TA can be found in Appendix A of the TA which can be found in Appendix 10.1, ES Volume III.

In regard to the EIA Scoping Report, no consultation response was provided by KCC (the Highway authority); however, Highways England (HE) provided a response, which was included within the Scoping Opinion. The response stated that HE had no comment on whether or not an EIA is required but that they would be concerned with proposals that have potential to impact on the SRN, which in this area is the M25 and M26. Potential effects on the

M25 have been assessed in this chapter. Effects on the M26 have not been assessed as there is no direct route for vehicles to enter the M26 from the site without entering the M25, travelling to Junction 6 at Godstone before travelling in the opposite direction to the M26.

### Consideration of Climate Change

It is not considered that Climate Change will have an effect on the development in terms of Transport. However, policies on electric vehicle (EV) charging have been considered in the Transport Assessment and will be provided on the development at a level required by the Council and government at the reserved matters stage. It is anticipated that an increase in electric vehicles and public transport, walking and cycling improvements would assist in tackling climate change. Wider consideration of climate change in relation to the proposed development is provided at Appendix 2.4, Vol III of this ES.

### Consideration of Human Health

Human Health would be affected by the change of traffic flows due to the development; however, this would be as a result of changes in Noise and Air Quality. Therefore, consideration of Human Health in this regard is addressed in Chapter 11 Air Quality and Chapter 12 Noise & Vibration, of this ES. Wider consideration of human health in regard to the proposed development is provided at Appendix 2.5, Vol III of this ES.

### Consideration of Risk of Major Accidents and/or Disasters

Five years' worth of accident data has been considered within the TA and within this Transport chapter. Consideration has been made as to how the development may impact on accident rates for cluster areas (excluding the M25). Details of the accidents considered can be found in section 2.9 of the TA in Appendix 13.1. Wider consideration of the risks of major accidents and disasters in regard to the proposed development is provided at Appendix 2.6, Vol III of this ES.

### Alternatives

No alternatives are relevant to the assessment of transportation.

### Assessment of Baseline Conditions & Receptor Sensitivity

The assessment of transport and access related impacts has been carried out in accordance with the 'Guidelines for the Environmental Assessment of Road Traffic' and the 'Design Manual for Roads and Bridges'.

The baseline conditions year that has been considered is 2018, in line with the assessments carried out within the Transport Assessment.

Within The TA, the focus of the assessment is on the impacts of the development upon the highway. For the purpose of this assessment individual assessments have not been completed for public transport, cycling and pedestrian networks as these were not seen as a concern by KCC and SDC. These have therefore been scoped out the assessment.

Baseline conditions of the existing cycle, walking and bus routes are provided within section 2 of the TA.

The Transport Assessment sets out trips which could occur under the Certificate of Lawfulness of Existing Use or Development (CLEUD), as agreed with SDC, based on the pre-and post-development floor areas within the certificate. Trip offsets against the proposed development are then set out, confirming the residual vehicle trip generations. However, in order to provide the most robust approach this trip offset was not taken forward through the TA impacts assessments, and likewise the ES Chapter follows the same robust approach.

The IEMA Guidelines suggest two broad rules to identify the appropriate extent of the highways assessment area, as follows:

- Road links with all vehicle or Heavy Vehicles traffic flow increases in any assessment year of +30%; and
- Road links with medium or high sensitivity receptors with flow increases greater than 10%.

Based on these rules, the highway assessment area includes all links of the application site's surrounding local and strategic road network that are subject to daily traffic flow changes as a result of the proposed development's construction or operation.

The area that has been assessed to determine the likely significant impacts of the proposed development includes links (roads) and junctions of significant importance to the local and strategic road networks in the vicinity of the application site, i.e. links and junctions which connect the site to the main local destinations and to the wider strategic road network (A21 towards Bromley, M25 at junctions 4 and 5, and A25), where changes in traffic would be likely to occur because of the proposed development.

A combination of Manual Classified Counts (MCC) junction counts and Automatic Traffic Counts (ATC) data has been collected to establish a 2018 baseline. This data has been extracted from previous planning applications for the site. To supplement recent traffic surveys that were conducted in 2017 and 2018, counts have been taken from the 2015 Outline Planning Permission (2015 OPP) and uplifted using Tempro to form a baseline. Full details of which junctions and links were assessed and when can be found within Appendix 10.1 Transport Assessment, at Section 6.

The receptors that have been identified for the proposed development, along with their main features and sensitivity, have been determined based on professional judgement taking into account their relative importance for all road users, and are summarised in Section 10.3 of this Chapter.. The majority of the identified receptors are links, but a number of junctions have been identified in relation to the potential for driver delay.

A number of the links have varying characteristics along their length. For example, Otford Lane is mainly a rural lane with little frontage or pedestrian activity, although when it enters the village of Halstead, it is subject to a much higher level of frontage activity and has a more important role for pedestrian movement. In such cases the link has been categorised

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in relation to the most sensitive part. Table 0.1 sets out the scale of sensitivity that has been applied to receptors identified and considered within this assessment.

**Table 0.1**  
Scale of sensitivity used in the assessment

SENSITIVITY	DESCRIPTION
Very High	High frontage activity and pedestrian activity: access to many residential properties and local facilities, including a school.
High	Medium frontage and pedestrian activity: access to properties and facilities
Medium	Some frontage and medium pedestrian activity.
Low	Little frontage and low pedestrian activity.
Negligible	No frontage and no pedestrian activity.

## Assessment of Magnitude

The assessment was undertaken based on the description of development contained in Chapter 3 Application Site & Proposed Development of this volume of the ES. Table 0.2 indicates the scale of impact magnitude that has been used in undertaking the assessment.

The IEMA Guidelines identify that the main transport effects that could arise from the construction and operation of new developments relate to the following:

- Severance;
- driver delay;
- pedestrian delay and amenity;
- fear and intimidation;
- accidents and road safety;
- dust and dirt; and
- hazardous loads.

The 'dust and dirt' criterion has not been considered within this assessment, as this topic is covered within Chapter 11 Air Quality.

The 'Hazardous Loads' criterion has also not been considered in this assessment, as at this stage it is deemed unlikely that the construction or operation of the proposed development will require the transportation of hazardous loads.

Further details of the approach to the assessment in respect of each of the above criteria is provided below.

### Severance

The IEMA Guidelines states that: "severance is the perceived division that can occur within a community when it becomes separated by a major traffic artery." Further, "Changes in traffic flow of 30%, 60% and 90% are regarded as producing 'slight', 'moderate' and 'substantial' changes in

severance respectively". However, the guidance acknowledges that the measurement and prediction of severance is extremely difficult. The assessment of severance pays full regard to specific local conditions, in particular the location of pedestrian routes to key local facilities and whether or not crossing facilities are provided.

Volume 11, Section 3, Part 8, Chapter 6 of the DMRB entitled 'Pedestrians and Others and Community Effects' provides further guidance on the aspect of New Severance within a community in terms of the 2-way Annual Average Daily Traffic flow (AADT) on a link. It states that new severance should be described in terms of "Slight", "Moderate" or "Severe" and that these categories: "... should be coupled with an estimate of the numbers of people affected, their location and the community facilities from which they are severed."

The potential effects as set out later in this Chapter are based on an assessment, which takes into account IEMA's thresholds and guidance set out in the DMRB. Table 0.2 summarises these thresholds.

**Table 0.2**  
Scale of magnitude for severance impacts used in the assessment

MAGNITUDE	DESCRIPTION
Very large	Over 90% change in AADT flows as a result of the proposed development
Large	Between 60 – 90% change in AADT flows as a result of the proposed development
Medium	Between 30 – 60% change in AADT flows as a result of the proposed development
Small	Less than 30% change in AADT flows as a result of the proposed development

### Driver Delay

Delay to drivers can be predicted through capacity assessments at key points on the local and strategic highway network. The addition of new development generated traffic could result in an increase in the number of vehicles using key routes and junctions. This may lead to additional delays depending on the existing operation, levels of background traffic and development generated traffic.

Assessment of junction capacity and delay is undertaken through the use of standard practice analytical tools and junction analysis programs. Driver delay is only likely to be an issue requiring consideration of mitigations where junctions are operating beyond capacity.

Table 0.3 below shows the magnitude-scale applied to the category 'driver delay' for the purpose of this assessment.

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**Table 0.3**  
Scale of magnitude for Driver Delay used in the assessment

MAGNITUDE	DESCRIPTION
Very large	Average vehicle delay changes of more than 1 minute as a result of the proposed development during the peak hour periods
Large	Average vehicle delay changes are between 30 and 60 seconds as a result of the proposed development during the peak hour periods
Medium	Average vehicle delay changes are between 20 and 30 seconds as a result of the proposed development during the peak hour periods
Small	Average vehicle delay changes are less than 20 seconds as a result of the proposed development during the peak hour periods

### Pedestrian Delay and Amenity

Pedestrian delays for a particular walking journey can be increased by changes to traffic flows, and can affect the ability of pedestrians to cross roads. This, therefore, will affect an individual’s desire to make a particular walking journey. Changes in the volume, speed or composition of traffic are most likely to affect pedestrian delay, with the level of severity dependent on the general level of pedestrian activity and the physical condition of crossing points.

The determination of what constitutes a material impact on pedestrian delay is generally left to the judgement of the assessor and knowledge of local factors and conditions. However, the IEMA Guidelines suggest: “a lower threshold of 10 seconds delay and an upper threshold of 40 seconds delay, for a link with no crossing facilities”. It further advises that the lower threshold equates to a two-way flow of approximately 1,400 vehicles per hour.

Table 0.4 below shows the magnitude-scale applied to links with insufficient or no pedestrian facilities at desired lines and links subject to significant volumes of pedestrian footfall.

**Table 0.4**  
Scale of magnitude for Pedestrian Delay used in the assessment

MAGNITUDE	DESCRIPTION
Very large	Link subject to a two-way traffic flow of more than 5,600 vehicles per hour
Large	Link subject to a two-way flow of 3,500-5,600 vehicles per hour
Medium	Link subject to a two-way flow of 1,400-3,500 vehicles per hour
Small	Link subject to a two-way flow of less than 1,400 vehicles per hour

Pedestrian amenity is broadly defined as the relative pleasantness of a journey, which is affected by traffic flow, traffic composition and pavement width / separation from traffic. This potentially significant effect is

considered to be a broad assessment category which also encompasses fear, intimidation and exposure to noise and air pollution.

A tentative threshold for judging the significance of changes in pedestrian amenity is described by the IEMA guidance as instances “where traffic flow (or its lorry component) is halved or doubled”.

### Fear and Intimidation

A further effect of traffic flows on pedestrian movements is the issue of fear and intimidation individual travellers will experience with respect to vehicular movements. The impact of this factor is dependent on the volume of traffic, the HGV (Heavy Goods Vehicle) content, the width of footpath and closeness of the footpath to the carriageway edge. As is the case with pedestrian delay, there are no commonly agreed thresholds for the measurement of this impact, with appraisal based on the judgement of the assessor.

Table 0.5 below shows the magnitude-scale applied to the category ‘fear and intimidation’ for the purpose of this assessment.

**Table 0.5**  
Scale of magnitude for fear and intimidation impacts used in the assessment

MAGNITUDE	DESCRIPTION
Very large	Average traffic flow over 18 hours of 1800 + vehicles/hr; An average 18-hour HGV flow of 3000 +; or Average speed over 18 hours of 20 + mph.
Large	Average traffic flow over 18 hours of 1200-1800 vehicles/hr; An average 18-hour HGV flow of 2000-3000; or Average speed over 18 hours of 15-20 mph.
Medium	Average traffic flow over 18 hours of 600-1200 vehicles/hr; An average 18-hour HGV flow of 1000-2000; or Average speed over 18 hours of 10-15mph.
Small	Average traffic flow over 18 hours of less than 600 vehicles/hr; An average 18-hour HGV flow of less than 1000; or Average speed over 18 hours of less than 10mph.

### Accidents and Road Safety

The assessment of accident risk and highway safety is based upon existing accident rates and specific local circumstances to identify accident clusters. For example, should a particular link or junction be found to have a high existing accident rate, the addition of substantial traffic volumes generally would be expected to have an adverse effect on highway safety due to further increased opportunities for conflict. Mitigation measures may therefore be required.

A further assessment of highway safety may also include the comparison of accident rates at those locations identified for highway improvements related to capacity issues. An assessment of expected accident rates for a new junction design compared to the existing layout would identify future accident risk related to development-generated traffic.

The IEMA Guidelines state that “professional judgement will be needed to assess the implications of local circumstances, or factors, which may elevate or lessen risks of accidents, e.g. junction conflicts”.

As noted above, a review of accidents occurring over the most recent three-year period within the area surrounding the application site has been undertaken in order to identify existing accident clusters, where 10 or more accidents occurred over the three-year period.

Table 0.6 shows the magnitude of impact categories applied to accidents and road safety.

**Table 0.6**  
Scale of magnitude for accidents and road safety impacts used in the assessment

MAGNITUDE	DESCRIPTION
Very large	Expected change in accident risk of 15+ % at the location of existing accident cluster
Large	Expected change in accident risk of 10%-14% at the location of existing accident cluster
Medium	Expected change in accident risk of 5%-9% at the location of existing accident cluster
Small	Expected change in accident risk of less than 5% at the location of existing accident cluster

### Assessment of Significance

The assessment of significance within this chapter is based on the matrix presented in

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Table 0.7.

**Table 0.7**

Significance Matrix

MAGNITUDE OF IMPACT	SENSITIVITY OF RECEPTOR				
	Very High	High	Medium	Low	Negligible
<b>Very Large</b>	Major Significance	Major Significance	[3]	Moderate Significance	[1]
<b>Large</b>	Major Significance	[3]	Moderate Significance	Minor Significance	[2]
<b>Medium</b>	[3]	Moderate Significant	Minor Significance	[2]	Negligible Significance
<b>Small</b>	Moderate Significance	Minor Significance	[2]	Negligible Significance	Negligible Significance
<b>Negligible</b>	[1]	[2]	Negligible Significance	Negligible Significance	Negligible Significance

[1] The choice between 'Moderate Significance', 'Minor Significance' and 'Negligible Significance' will depend on the specifics of the impact and will be down to professional judgement and reasoning.

[2] The choice between 'Minor Significance' and 'Negligible Significance' will depend on the specifics of the impact and will be down to professional judgement and reasoning.

[3] The choice between 'Major Significance' and 'Moderate Significance' will depend on the specifics of the impact and will be down to professional judgement and reasoning.

n.b. 'Negligible Significance' includes 'Neutral' and 'No Impact' assessments.

### Relevant Future Baseline and Cumulative Schemes

The following developments have been assessed within this ES chapter and added to the future baseline scenarios.

#### Future Baseline

Fort Halstead Outline Planning Permission (OPP) – The previous permission (15/00628/OUT) which includes for 450 houses, 27,000sqm GEA of business area and a hotel of up to 80 beds. This has been considered as a committed development for this scheme as this development has been granted planning permission and could be built at any time. This has been included within the future baseline, but not within the with development scenarios as it would not be built in addition to the proposed development.

As part of the 2015 OPP, various mitigation measures were agreed to manage the transport related impacts of the development and to minimise any adverse environmental effects on the local community. These measures have been taken forward for the current application or improved upon, where relevant and necessary. The list of mitigation measures includes:

- Star Hill Road Access - This includes improvements to visibility splays, junction geometries, and, warning signs and anti-skid surfacing placed in appropriate locations;
- Offord Lane/A224 Junction - The roundabout improvement scheme that was approved as part of the 2015 OPP;
- Star Hill Traffic Calming - It is proposed that the previously agreed 40mph speed restriction along Star Hill is maintained. As stated above, there will be junction warning signage provided on Star Hill Road and there will be an improvement to visibility splays related to the Star Hill access junction.
- Internal Highway Traffic Calming – Traffic calming measures were proposed to reduce vehicle speeds through the site.
- Star Hill Road/Rushmore Hill - Periodic monitoring of traffic flows along this link is proposed to inform if the developer should be required to design additional traffic calming measures.
- Pedestrian and Cycle Mitigation - The development would provide enhanced connections to the existing rights of way and will have new access routes though the site for the benefit of the wider community. This includes connections to the existing footways which provide access to Knockholt Village. The development would also upgrade the existing bridleway between Polhill and Twitton. In terms of cycle access, on-street cycle lanes on London Road would be provided to link Offord Lane with the existing advisory cycle lanes on Old London Road which provide access towards the Knockholt Station.
- Public Transport Improvements – The main public transport improvements include the diversion of the existing 431 bus service into the site and provision of a new community bus service into the site.
- A detailed site-wide Travel Plan will be submitted and agreed with the Planning Authority prior to the occupation of any part of the new development. This will aim to encourage sustainable forms of transport and minimise reliance on single occupancy car journeys.

The assessment within this chapter takes all these measures into consideration with the exception of the community bus and therefore provides a worst case scenario in vehicle traffic generation terms.

#### Cumulative Scheme

The West Kent Cold Store (WKCS) planning permission (09\_02635/FUL) includes for up to 500 houses, commercial units and a medical centre.

The scheme is being marketed as Ryewood by Berkeley Homes and the sales website notes that Coppice Drive is the final collection of 2, 3 and 4 bedroom homes, all of which are listed as sold. As such, it is considered that the development is largely complete and therefore, its inclusion as a cumulative scheme in addition to any of its existing car movements that may have been captured by the baseline traffic surveys represents a conservative assessment.

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### Relevant Associated Development

- Star Hill Road Access - This includes improvements to visibility splays, junction geometries, and, warning signs and anti-skid surfacing placed in appropriate locations;
- Otford Lane/A224 Junction - The roundabout improvement scheme that was approved as part of the 2015 OPP;
- Star Hill Traffic Calming - It is proposed that the previously agreed 40mph speed restriction along Star Hill is maintained. As stated above, there will be junction warning signage provided on Star Hill Road and there will be an improvement to visibility splays related to the Star Hill access junction.
- Internal Highway Traffic Calming – Traffic calming measures were proposed to reduce vehicle speeds through the site.
- Star Hill Road/Rushmore Hill - Periodic monitoring of traffic flows along this link is proposed to inform if the developer should be required to design additional traffic calming measures.
- Pedestrian and Cycle Mitigation - The development would provide enhanced connections to the existing rights of way and will have new access routes though the site for the benefit of the wider community. This includes connections to the existing footways which provide access to Knockholt Village. The development would also upgrade the existing bridleway between Polhill and Twitton. In terms of cycle access, on-street cycle lanes on London Road would be provided to link Otford Lane with the existing advisory cycle lanes on Old London Road which provide access towards the Knockholt Station.
- Public Transport Improvements – The main public transport improvements include the diversion of the existing 431 bus service into the site and provision of a new community bus service into the site.

### Assumptions/Limitations

The assessment is limited to the accuracy of the forecast tools used for calculation of future background traffic flows and the estimation of trips that would be generated by the proposed development, including the mode of travel and their distribution onto the transport networks that provide access to the application site. Notwithstanding these limits, these tools are widely accepted industry standards and the methodology has been agreed with KCC.

The use of trip rates derived from TRICS (Trip Rate Information Computer System) relies on information from similar sites but may overlook certain local conditions, which has been corrected to the best possible extent.

TEMPRO (Trip End Model Presentation Program) growth factors are widely used but are increasingly regarded as being liable to overestimate traffic growth, since the growth factor always predicts increases in car traffic and thus, potentially underestimates other travel modes such as cycling take-up or modern travel/working patterns supported by travel plans and new technologies (flexible working hours, home deliveries, etc.). However, this

limitation only makes the assessment more robust in the sense that it presents a worst case in terms of traffic generation.

The modal split, trip distribution and traffic assignment have been estimated using a spreadsheet-based first principles distribution model which has drawn on journey to work data from the 2011 Census but also takes account of the location of local and more strategic services in assessing the distribution of other non-work, home based residential trips. The use of such a first principles model is a widely accepted means for forecasting development trip impacts.

Most calculations have been based on peak hour traffic flows and then converted to daily flows. The focus on peak hour flows is intended to assess the worst case traffic predictions. It has further been ensured that the conversion factors are robust and reflect likely worst cases.

Details of the limitations and assumptions for each of the calculations can be found in the appropriate sections of the TA in Appendix 10.1.

Owing to the predominantly outline nature of the planning application, for the assessment of transport-related impacts during demolition and construction, construction traffic generation estimates have been based on the indicative demolition and construction programme, and, the estimated waste (demolition and remediation) arisings, using previous project experience and professional judgement.

The proposed working hours during demolition and construction are 08:00 to 18:00 on weekdays and 08:00 to 13:00 on Saturdays, with no works on Sundays or bank holidays.

A construction route from the M25 (Junction 4) along the A224 London Road and into the application site through the A224 Polhill Road and onto Crow Drive has been assumed. No construction traffic would access / egress the Site from Star Hill Road, unless otherwise agreed with SDC.

Based on the indicative phasing and construction programme, the busiest construction year in terms of predicted traffic generation of construction vehicles has been identified to be 2023, as there will be highways, utilities and onsite works in this year. For that period, the likely traffic flows and HGV composition have been estimated, under a number of assumptions that are fully detailed within Section 7.4 of the TA in Appendix 10.1. When considering both construction traffic and occupation flows together, 2029 is seen to be the busiest year; however, the anticipated flows during this year are below those anticipated for the operational phase during the 2035 scenario and therefore have not been considered necessary to assess.

2035 has been assessed for the future baseline and operational phase impact assessment scenarios to align the development to the end of the Local Plan as requested at the scoping stage. As all the proposed buildings will be occupied and operational by this time, this use of this year for this assessment is considered a worse case for the operational phase impacts.

Details of the assumptions made in relation to the construction traffic have been detailed within Section 7 of the TA which can be found in Appendix 10.1.

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## 10.3 BASELINE CONDITIONS

KEY RECEPTORS	DESCRIPTION	SENSITIVITY	FURTHER INFORMATION
Old London Road - Link	Local distributor with some frontage activity on one side of road and limited pedestrian activity	Low	Section 2 of the TA in Appendix 10.1
Knockholt Main Road - Link	Rural lane with moderate frontage activity: access to many properties and some local facilities, including a primary school.	Medium	Section 2 of the TA in Appendix 10.1
Shoreham Lane / Knockholt Road - Link	Rural lane with moderate frontage activity within the village of Halstead: access to some residential properties and local facilities.	Medium	Section 2 of the TA in Appendix 10.1
Offord Lane - Link	Rural lane with frontage activity within the village of Halstead: access to some residential properties and local facilities.	Medium	Section 2 of the TA in Appendix 10.1
Star Hill Road (South) - Link	Rural lane with little frontage or pedestrian activity: access to very few residential properties on one side of road.	Low	Section 2 of the TA in Appendix 10.1
Crow Drive - Link	Rural lane with little direct frontage activity.	Medium	Section 2 of the TA in Appendix 10.1
A224 London Road - Link	Local distributor with little frontage activity: access to few local facilities.	Low	Section 2 of the TA in Appendix 10.1
M25 (south of A21) - Link	Strategic motorway with no frontage activity	Low	Section 2 of the TA in Appendix 10.1
Rushmore Hill - Link	Rural lane with moderate frontage activity: access to many properties and some local facilities.	Medium	Section 2 of the TA in Appendix 10.1
A224 Orpington By-Pass - Link	Local distributor with little frontage activity: access to a few residential properties.	Low	Section 2 of the TA in Appendix 10.1
A21 Sevenoaks Road - Link	Strategic distributor with little frontage activity.	Low	Section 2 of the TA in Appendix 10.1
A224 Polhill - Link	Local distributor with no frontage activity.	Low	Section 2 of the TA in Appendix 10.1
Offord High Street - Link	Rural lane with moderate to high frontage activity: access to many residential properties high and local facilities, including a school.	High	Section 2 of the TA in Appendix 10.1
A224 London Road (Aisher Way to A25 Riverhead) - Link	Local distributor with medium frontage and pedestrian activity: access to properties and facilities.	High	Section 2 of the TA in Appendix 10.1
A224 London Road (Morants Court Road roundabout to Aisher Way) - Link	Local distributor with medium frontage and pedestrian activity: access to properties and facilities.	High	Section 2 of the TA in Appendix 10.1
Star Hill Road (north) - Link	Rural lane with some frontage's activity within the village of Knockholt Pound	Medium	Section 2 of the TA in Appendix 10.1
Hewitt's roundabout - Junction	Strategic junction	High	Section 2 of the TA in Appendix 10.1
Shacklands roundabout - Junction	Distributor junction	Medium	Section 2 of the TA in Appendix 10.1

Details of the local transport network within the vicinity of the site can be found within the Transport Assessment. These details include information about walking, cycling and public transport infrastructure and services. This has aided the classification of the Key Receptors within the table above.

## 10.4 POTENTIAL SIGNIFICANT IMPACTS

PHASE	DESCRIPTION	ADVERSE/BENEFICIAL
Construction	The potential impacts of traffic generated by the construction works on severance, driver delay, pedestrian delay and amenity, fear and intimidation, accidents and road safety, pedestrian network, cycle network and public transport network.	Adverse
Operation	The potential impacts of traffic generated by the operational scheme on severance, driver delay, pedestrian delay and amenity, fear and intimidation, accidents and road safety, pedestrian network, cycle network and public transport network.	Adverse



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## 10.5 DESIGN INTERVENTIONS

DESIGN INTERVENTION	DESCRIPTION	REASON FOR INTERVENTION	FURTHER INFORMATION
Vehicular Accesses	The proposed development includes for the use of two available vehicle accesses: Crow Drive/A224 Polhill (Roundabout) and Crow Drive/Star Hill Road (Priority Junction).	KCC have stated that the application site must have two vehicular accesses in accordance with the Kent Design Guide requirement for residential developments of more than 300 units to have two access points.	Section 4 of the TA in Appendix 10.1
Traffic Calming Measures	This includes reduction of speed limit within vicinity of the site access, speed warning signs. This includes traffic calming measures along Crow Drive.	Intervention previously requested in the 2015 OPP, carried over for proposed development	Section 4 of the TA in Appendix 10.1
Pedestrian and Cycle Measures	Highway measures proposed will improve connectivity for pedestrians and cyclists between the existing highway network and the site. On street cycle lanes on London Road to connect site to Knockholt Station.	Ensure good connectivity between the site and the surrounding areas.	Section 4 of the TA in Appendix 10.1
Cycle Parking	Cycle parking will be supplied to the minimum standards set out for the use by the Local Highway Authority	Requirement within policy	Section 8 of the TA in Appendix 10.1
EV Charging	Charging for EVs to meet Government or Council policy requirements at the Reserved matters stage	Requirement within policy	Section 3 of the TA in Appendix 10.1

## 10.6 ASSESSMENT PRE-MITIGATION (INCLUDING DESIGN INTERVENTION)

The following assessments have been undertaken in line with the IEMA guidance criteria outlined at the beginning of this ES chapter. This includes; Severance, Driver Delay, Pedestrian Delay and Amenity, Fear and Intimidation, and Accidents and Safety. The assessments have been undertaken for both the construction phase and once the scheme is fully operational in 2035. The future year of 2035 has been assessed in line with the TA, to align with the end of the emerging Local Plan. It is expected that all uses would be occupied and operational by 2035 and, as such, the use of this year for the operational phase assessment is considered robust. For the construction year, the peak year of construction has been used which is 2023 as this is the peak year of construction considering cumulatively and concurrently occurring site building activities, utilities works and roadworks. The peak year for cumulative construction and proposed development occurs in 2029, just before the development construction is finished, however the construction traffic element in this scenario is lower than in 2023 when the construction only peak occurs. The 2035 proposed development scenario produced a greater traffic flow than the aforementioned 2029 scenario, and is a worse case, therefore the 2029 scenario has not been tested within the construction effect section.

The peak construction year has also been assessed including the development traffic associated with the level of occupation expected by this year. Only four links have been assessed within the construction as these are the links that construction vehicles would use as defined within the Construction Management Plan (CMP) for the scheme, which can be seen in section 7 of the TA in Appendix 10.1 .

The during occupation scenarios compare the 2035 Baseline (Do Minimum), which includes the 2035 background traffic, the existing residential elements of the site, committed developments including the West Kent Cold Store and the OPP scheme with the 2035 Baseline with proposed Development (Do Something) to understand the impact of the proposed development on the key links identified.

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## Severance

PHASE	LINK REF	KEY RECEPTOR	% DIFFERENCE BETWEEN: 2023 BASE AND 2023 WITH CONSTRUCTION; OR 2035 FUTURE BASELINE (INCLUDING 2015 OPP SCHEME) AND 2035 BASELINE WITH PROPOSED DEVELOPMENT	DESCRIPTION	MAGNITUDE PRE-MITIGATION	SIGNIFICANCE PRE-MITIGATION	MITIGATION PROPOSED?	FURTHER INFORMATION
Constructn	8	Crow Drive	126.7%	Increase in two way vehicle flows along the link of 230 vehicles, however, this link is an internal road and has low baseline flows. All increases along this link will be contained within the site and are as a result of the operation of the site.	Very large	Major	Yes	Section 7 of the TA
	9	A224 London Road	6.4%	Increase in two way vehicle flows along the link of 230 vehicles	Small	Negligible Adverse	Yes	Section 7 of the TA
	10	M25 (South of A21)	0.8%	Increase in two way vehicle flows along the link of 230 vehicles	Small	Negligible Adverse	Yes	Section 7 of the TA
Operation	12	A224 Orpington By-Pass (2017)	7.8%	Increase in two way vehicle flows along the link of 230 vehicles	Small	Negligible Adverse	Yes	Section 7 of the TA
	1	Old London Road	4.6%	Increase in two way vehicle flows along the link of 232 vehicles	Small	Negligible Adverse	Yes	Section 6 of the TA
	2 & 3	Main Road / Halstead Lane	3.5%	Increase in two way vehicle flows along the link of 110 vehicles	Small	Negligible Adverse	Yes	Section 6 of the TA
	4 & 5	Shoreham Lane / Knockholt Road	0.0%	No change in two way vehicle flows along the link	Small	Negligible Neutral	Yes	Section 6 of the TA
	6	Oxford Lane	33.3%	Increase in two way vehicle flows along the link of 269 vehicles	Medium	Minor Adverse	Yes	Section 6 of the TA
	7	Star Hill Road (S) (2017)	54.5%	Increase in two way vehicle flows along the link of 2,203 vehicles, however existing situation has a very low baseline flow.	Medium	Minor Adverse	Yes	Section 6 of the TA
	8	Crow Drive	23.3%	Increase in two way vehicle flows along the link of 1,233 vehicles.	Small	Negligible Adverse	Yes	Section 6 of the TA
	9	A224 London Road	8.6%	Increase in two way vehicle flows along the link of 1,567 vehicles.	Small	Negligible Adverse	Yes	Section 6 of the TA
	10	M25 (South of A21)	-0.4%	Reduction in two way vehicle flows along the link of 483 vehicles.	Small	Negligible Beneficial	Yes	Section 6 of the TA
	11	Rushmore Hill	-1.0%	Reduction in two way vehicle flows along the link of 46 vehicles.	Small	Negligible Beneficial	Yes	Section 6 of the TA
12	A224 Orpington By-Pass (2017)	8.2%	Increase in two way vehicle flows along the link of 1,240 vehicles.	Small	Negligible Adverse	Yes	Section 6 of the TA	

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1 3	A21 Sevenoaks Road	0.9%	Increase in two way vehicle flows along the link of 232 vehicles.	Small	Negligible Adverse	Yes	Section 6 of the TA
1 4	Polhill - 008	-2.0%	Reduction in two way vehicle flows along the link of 334 vehicles.	Small	Negligible Beneficial	Yes	Section 6 of the TA
1 5	Offord High Street	3.4%	Increase in two way vehicle flows along the link of 383 vehicles.	Small	Negligible Adverse	Yes	Section 6 of the TA
1 6	A 224 London Road (Bullfinch Lane)	1.5%	Increase in two way vehicle flows along the link of 352 vehicles.	Small	Negligible Adverse	Yes	Section 6 of the TA
1 7	A 224 London Road (Station Road)	2.2%	Increase in two way vehicle flows along the link of 352 vehicles.	Small	Negligible Adverse	Yes	Section 6 of the TA
1 8	Star Hill - 011	7.2%	Increase in two way vehicle flows along the link of 269 vehicles.	Small	Negligible Adverse	Yes	Section 6 of the TA

### Construction

As can be seen within the table above, with the exception of Crow Drive, all links affected by construction traffic experience a maximum of 7.8% increase of traffic due to the construction. Crow Drive experiences a 126.7% increase of traffic. There are no construction flows for the OPP site for 2023 and therefore cannot be compared directly. As there are no OPP flows the baseline flows for the construction year are lower and therefore Crow Drive (an internal road with little activity) has a very low baseline. Although the flow increase is large, this is a short-term impact of the peak construction period. On this basis, the construction traffic is seen to have a Major Adverse effect, however, this will be managed throughout the implementation of mitigation measures during the construction period and would therefore not have a significant residual effect (see Section 10.8).

### Operation

As can be seen the majority of links experience an increase in severance in the proposed development scenario when compared against the future baseline scenario, however, are below 30% increase and therefore have a negligible effect. The only links to receive a reduction are M25 (South of the A21), Rushmore Hill and Polhill. There are 2 links that experience an increase in vehicles over 30%, these are Offord Lane and Star Hill Road (S). Due to the nature of these roads and the receptor sensitivity level given, these links experience an adverse – minor effect due to the development, albeit baseline flows are seen to be low. On the whole, the development is anticipated to have an adverse – negligible effect.

Negative percentage impacts denote links where the 2035 With Development flows are lower compared to the 2035 Future Base flows. This is because the 2035 Future Base scenario contains flows from the 2015 OPP consent for the site based on a single access from Polhill whereas the current proposed development includes Star Hill as a secondary access. As such, a single access point results in higher flows across various links and junctions as the flows are not distributed depending on origin and destination and all development flows would have to route via the north of the site. Having a secondary access point from Star Hill results in lower flows across the links shown despite the 2015 consent for the site having a lower quantum of residential development.

### Driver Delay

Construction traffic has not been assessed for driver delay as the majority of movements to and from the site throughout the construction period would be outside of the AM and PM peaks and therefore would not be travelling within the busiest period of the day and will be less likely to affect driver delay.

The following junctions have been assessed for delay; Site Access/Star Hill, Hewitts Roundabout, Shacklands Roundabout, Offord Lane/A224, A224 Polhill junction/ Pilgrims Way West Link Road junction, Morant Court Road Roundabout. These junctions have been assessed for driver delay in the Transport Assessment. The driver delay section includes delay experienced by bus users as they would be on the links that have been assessed and therefore would be affected in the same manner as car drivers.

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PHASE	JUNCTION	MOVEMENT	DELAY (S) AM	CHANGE IN DELAY AM	DELAY (S) PM	CHANGE IN DELAY PM	MAGNITUDE PRE-MITIGATION	SIGNIFICANCE PRE-MITIGATION	MITIGATION PROPOSED?	FURTHER INFORMATION	
Operation	Site/ Star Hill	2018 Observed									
		Site – Star Hill Road (south)	6.13		5.82						
		Site– Star Hill Road (north)	7.81		0						
	2035 With Development	Star Hill Road (south) – Site		7.44		7.59					
			Site – Star Hill Road (south)	6.48	0.35	6.77	0.95	Small	Negligible Adverse	Yes	Section 6 of the TA
			Site– Star Hill Road (north)	9.24	1.43	9.16	9.16	Small	Negligible Adverse	Yes	Section 6 of the TA
		Star Hill Road (south) – Site	7.32	-0.12	7.12	-0.47	Small	Negligible Beneficial	Yes	Section 6 of the TA	
		Hewitts Rbt	2018 Observed								
			A – Orpington By-Pass	6.18		4.27					
B – Wheatshaf Hill	46.03			11.85							
2035 Baseline	Hewitts Road	C – A21 Sevenoaks Road	2.42		2.78						
		D – A224 Court Road	4.69		8.54						
		E – Hewitts Road	8.32		18.02						
		F – M25	4.28		2.29						
		A – Orpington By-Pass	17.89		11.52						
		B – Wheatshaf Hill	1667.58		18.76						
	2035 with Development	Hewitts Road	C – A21 Sevenoaks Road	2.89		3.44					
			D – A224 Court Road	6.92		145.43					
			E – Hewitts Road	12.72		585.37					
		Shacklands Rbt	F – M25	14.31		3.08					
			A – Orpington By-Pass	19.75	1.86	10.12	-1.4	Small	Negligible Beneficial	Yes	Section 6 of the TA
			B – Wheatshaf Hill	1675.74	8.16	17.27	-1.49	Small	Negligible Beneficial	Yes	Section 6 of the TA
			C – A21 Sevenoaks Road	2.91	0.02	3.35	-0.09	Small	Negligible Beneficial	Yes	Section 6 of the TA
			D – A224 Court Road	7.01	0.09	128.73	-16.7	Small	Negligible Beneficial	Yes	Section 6 of the TA
			E – Hewitts Road	12.89	0.17	430.55	-154.82	Small	Negligible Beneficial	Yes	Section 6 of the TA
Operation	Shacklands Rbt	2018 Observed									
		A – A224 Polhill	3.82		4.85						
		B – Shoreham Lane	5.95		6.48						
		C – Old London Road	3.61		3.61						
		D – Orpington By-Pass	3.55		2.93						

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		E – Shacklands Road	3.17		2.7					
		2035 Baseline								
		A – A224 Polhill	4.98		5.32					
		B – Shoreham Lane	7.07		6.87					
		C – Old London Road	4.68		3.88					
		D – Orpington By-Pass	8.11		3.61					
		E – Shacklands Road	4.68		3.12					
		2035 With Development								
		A – A224 Polhill	5.14	0.16	4.98	-0.34	Small	Negligible Beneficial	Yes	Section 6 of the TA
		B – Shoreham Lane	7.2	0.13	6.66	-0.21	Small	Negligible Beneficial	Yes	Section 6 of the TA
		C – Old London Road	4.72	0.04	3.81	-0.07	Small	Negligible Beneficial	Yes	Section 6 of the TA
		D – Orpington By-Pass	7.31	-0.8	3.66	0.05	Small	Negligible Adverse	Yes	Section 6 of the TA
		E – Shacklands Road	4.53	-0.15	3.15	0.03	Small	Negligible Adverse	Yes	Section 6 of the TA
Operation	Otford Lane/A224 Junction	2018 Observed								
		Otford Lane – London Road	7.14		7.53					
		Otford Lane – Polhill	12.32		12.39					
		London Road – Otford Lane	7.7		6.44					
		2035 Baseline								
		A - A224 Polhill	7.48		6.45					
		B - Crow Drive	8.55		19.49					
		C - Otford Ln	7.69		10.7					
		D - A224 London Rd	26.05		9.95					
		2035 With Development								
		A - A224 Polhill	6.05	-1.43	6.39	-0.06	Small	Negligible Beneficial	Yes	Section 6 of the TA
		B - Crow Drive	8.24	-0.31	11.3	-8.19	Small	Negligible Beneficial	Yes	Section 6 of the TA
		C - Otford Ln	7.53	-0.16	8.87	-1.83	Small	Negligible Beneficial	Yes	Section 6 of the TA
		D - A224 London Rd	17.7	-8.35	8.97	-0.98	Small	Negligible Beneficial	Yes	Section 6 of the TA
Operation	A224 Polhill junction/ Pilgrims Way West Link Road junction	2018 Observed								
		Pilgrims Way – Polhill (south)	17.31		11.7					
		Pilgrims Way – Polhill (north)	32.64		25.11					
		Polhill (south) – Pilgrims Way	8.31		8.41					
		2035 Baseline								
		Pilgrims Way – Polhill (south)	237.12		142.87					

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		Pilgrims Way – Polhill (north)	220.47		112.73					
		Polhill (south) – Pilgrims Way	9.72		10.2					
		2035 With Development								
		Pilgrims Way – Polhill (south)	164.18	-72.94	95.26	-47.61	Small	Negligible Beneficial	Yes	Section 6 of the TA
		Pilgrims Way – Polhill (north)	156.89	-63.58	92.5	-20.23	Small	Negligible Beneficial	Yes	Section 6 of the TA
		Polhill (south) – Pilgrims Way	9.7	-0.02	9.99	-0.21	Small	Negligible Beneficial	Yes	Section 6 of the TA
Operation	Morants Court Road Rbt	2018 Observed								
		A - Star Hill Rd	6		4.57					
		B - A224 Polhill	6		4.4					
		C - A224 Morants Court Rd	4.27		3.98					
		D - Sundridge Rd	3.95		4.17					
		2035 Baseline								
		A - Star Hill Rd	4.78		5					
		B - A224 Polhill	9.82		6.72					
		C - A224 Morants Court Rd	7.22		4.87					
		D - Sundridge Rd	5.4		5.11					
		2035 With Development								
		A - Star Hill Rd	5.21	0.43	5.96	0.96	Small	Negligible Adverse	Yes	Section 6 of the TA
		B - A224 Polhill	10.97	1.15	6.55	-0.17	Small	Negligible Beneficial	Yes	Section 6 of the TA
		C - A224 Morants Court Rd	7.94	0.72	5.15	0.28	Small	Negligible Adverse	Yes	Section 6 of the TA
		D - Sundridge Rd	6.06	0.66	5.72	0.61	Small	Negligible Adverse	Yes	Section 6 of the TA

## Construction

Driver delay has not been assessed for the construction period, as the flows are only proposed to use a few links within the network and are expected to have a lower impact on the junctions that the fully occupied scheme. On this basis, the worst case scenario assessed is within the 2035 full occupation scheme.

## Operation

As can be seen from the table above, there is no junction that experiences more than an 8.16 second delay in the AM as a result of the development and 9.16 second in the PM peak as a result of the development. The majority of junction arms experience a slight reduction in delay as a result of the development. On this basis, it is seen that the development will have a negligible effect on driver delay for both cars and bus users.

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## Pedestrian Delay and Amenity

PHASE	LINK REF	KEY RECEPTOR	AVERAGE HOURLY FLOW				HGV FLOWS				DESCRIPTION	MAGNITUDE PRE-MITIGATION	SIGNIFICANCE PRE-MITIGATION	MITIGATION PROPOSED?	FURTHER INFORMATION
			BASE	WITH DEV	HALVED?	DOUBLED?	BASE	WITH DEV	HALVED?	DOUBLED?					
Construction	8	Crow Drive	703	1,593	NO	YES	66	191	NO	YES	There is a doubling of hourly flows and HGV flows. This link is within the site and therefore has low baseline flows. The increase in both vehicles and HGVs would be a short term impact of the development.	Medium	Negligible Adverse	No	Section 7 of the TA
Construction	9	A224 London Road	13,981	14,871	NO	NO	898	1,023	NO	NO	No halving or doubling of hourly flows or HGV flows	Small	Negligible Adverse	No	Section 7 of the TA
Construction	10	M25 (South of A21)	111,214	112,104	NO	NO	9,287	9,412	NO	NO	No halving or doubling of hourly flows or HGV flows	Small	Negligible Adverse	No	Section 7 of the TA
Construction	12	A224 Orpington Bypass (2017)	11,480	12,370	NO	NO	1,093	1,217	NO	NO	No halving or doubling of hourly flows or HGV flows	Small	Negligible Adverse	No	Section 7 of the TA
Operation	1	Old London Road	5,076	5,308	NO	NO	82	88	NO	NO	No halving or doubling of hourly flows or HGV flows	Small	Negligible Adverse	No	Section 5 of the TA
Operation	2 & 3	Main Road / Halstead Lane	3,162	3,272	NO	NO	215	218	NO	NO	No halving or doubling of hourly flows or HGV flows	Small	Negligible Adverse	No	Section 5 of the TA
Operation	4 & 5	Shoreham Lane / Knockholt Road	1,146	1,146	NO	NO	26	26	NO	NO	No halving or doubling of hourly flows or HGV flows	Small	Negligible Adverse	No	Section 5 of the TA
Operation	6	Offord Lane	806	1,075	NO	NO	1	8	NO	YES	Doubling of HGVs due to small number within the base	Small	Negligible Adverse	No	Section 5 of the TA
Operation	7	Star Hill Road (S) (2017)	4,040	6,243	NO	NO	315	368	NO	NO	No halving or doubling of hourly flows or HGV flows	Small	Negligible Adverse	No	Section 5 of the TA

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Operation	8	Crow Drive	5,296	6,529	NO	NO	181	212	NO	NO	No halving or doubling of hourly flows or HGV flows	Small	Negligible Adverse	No	Section 5 of the TA
Operation	9	A224 London Road	18,207	19,774	NO	NO	1,051	1,086	NO	NO	No halving or doubling of hourly flows or HGV flows	Small	Negligible Adverse	No	Section 5 of the TA
Operation	10	M25 (South of A21)	123,390	122,907	NO	NO	10,244	10,231	NO	NO	No halving or doubling of hourly flows or HGV flows	Small	Negligible Beneficial	No	Section 5 of the TA
Operation	11	Rushmore Hill	4,490	4,443	NO	NO	332	330	NO	NO	No halving or doubling of hourly flows or HGV flows	Small	Negligible Beneficial	No	Section 5 of the TA
Operation	12	A224 Orpington By-Pass (2017)	15,138	16,377	NO	NO	1,254	1,279	NO	NO	No halving or doubling of hourly flows or HGV flows	Small	Negligible Adverse	No	Section 5 of the TA
Operation	13	A21 Sevenoaks Road	27,196	27,428	NO	NO	3,573	3,577	NO	NO	No halving or doubling of hourly flows or HGV flows	Small	Negligible Adverse	No	Section 5 of the TA
Operation	14	Polhill - 008	16,567	16,233	NO	NO	913	904	NO	NO	No halving or doubling of hourly flows or HGV flows	Small	Negligible Beneficial	No	Section 5 of the TA
Operation	15	Oxford High Street	11,428	11,812	NO	NO	568	577	NO	NO	No halving or doubling of hourly flows or HGV flows	Small	Negligible Adverse	No	Section 5 of the TA
Operation	16	A 224 London Road (Bullfinch Lane)	22,907	23,259	NO	NO	1,203	1,212	NO	NO	No halving or doubling of hourly flows or HGV flows	Small	Negligible Adverse	No	Section 5 of the TA
Operation	17	A 224 London Road (Station Road)	15,784	16,136	NO	NO	857	865	NO	NO	No halving or doubling of hourly flows or HGV flows	Small	Negligible Adverse	No	Section 5 of the TA
Operation	18	Star Hill - 011	3,742	4,011	NO	NO	222	229	NO	NO	No halving or doubling of hourly flows or HGV flows	Small	Negligible Adverse	No	Section 5 of the TA

## Construction

As can be seen from the table above, during the construction period only one of the four links experience a doubling of traffic and HGVs when compared to the baseline. However, as previously stated, Crow Drive is an internal route which has a low traffic usage in the 2023 construction year. This increase in movements would be a short-term effect of the construction period. As it is a short term impact, it is anticipated that this would have a negligible effect on pedestrian delay and amenity, and would be heavily managed on site. It should also be noted that construction traffic flows would be spread out throughout the day and construction workers would be instructed to arrive and depart outside of the peak hours.



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## Operation

As can be seen from the table above, during the operation of the proposed development, there is no link that is anticipated to experience either a doubling or halving of vehicles when comparing the future baseline and the future baseline with proposed development scenarios. As can be seen, many of the links experience a reduction in hourly two-way flows. The only link that sees a double of HGVs are on Otford Lane. This is not severe as the link goes from 1 HGV to 8 HGVs. In addition to this, the pedestrian and cycle improvements works proposed within the TA would assist pedestrian and cycle delay. On this basis, the development is expected to have a beneficial or negligible effect on the links assessed.

## Fear and Intimidation

PHASE	LINK REF	KEY RECEPTOR	AVERAGE HOURLY FLOW		18 HOUR HGV FLOWS		DESCRIPTION	MAGNITUDE PRE-MITIGATION	SIGNIFICANCE PRE-MITIGATION	MITIGATION PROPOSED?	FURTHER INFORMATION				
			BASE	MAGNITUDE	WITH DEV	MAGNITUDE						BASE	MAGNITUDE	WITH DEV	MAGNITUDE
Construction	8	Crow Drive	39	Small	88	Small	66	Small	191	Small	No Change in Magnitude	Small	Negligible Adverse	No	Section 7 of the TA
	9	A224 London Road	777	Medium	826	Medium	898	Small	1,023	Medium	Change from Negligible to Minor for HGV flows	Small	Negligible Adverse	No	Section 7 of the TA
	10	M25 (South of A21)	6,179	Very Large	6,228	Very Large	9,287	Very Large	9,412	Very Large	No Change in Magnitude	Small	Negligible Adverse	No	Section 7 of the TA
	12	A224 Orpington By-Pass (2017)	638	Medium	687	Medium	1,093	Medium	1,217	Medium	No Change in Magnitude	Small	Negligible Adverse	No	Section 7 of the TA
Operation	1	Old London Road	282	Small	295	Small	82	Small	88	Small	No Change in Magnitude	Small	Negligible Adverse	No	Section 5 of the TA
	2 & 3	Main Road / Halstead Lane	176	Small	176	Small	215	Small	218	Small	No Change in Magnitude	Small	Negligible Adverse	No	Section 5 of the TA
	4 & 5	Shoreham Lane / Knockholt Road	64	Small	64	Small	26	Small	26	Small	No Change in Magnitude	Small	Negligible Adverse	No	Section 5 of the TA
	6	Otford Lane	45	Small	60	Small	1	Small	8	Small	No Change in Magnitude	Small	Negligible Adverse	No	Section 5 of the TA
	7	Star Hill Road (S) (2017)	224	Small	347	Small	315	Small	368	Small	No Change in Magnitude	Small	Negligible Adverse	No	Section 5 of the TA
	8	Crow Drive	294	Small	363	Small	181	Small	212	Small	No Change in Magnitude	Small	Negligible Adverse	No	Section 5 of the TA
	9	A224 London Road	1,012	Medium	1,099	Medium	1,051	Medium	1,086	Medium	No Change in Magnitude	Small	Negligible Adverse	No	Section 5 of the TA
	10	M25 (South of A21)	6,855	Very Large	6,828	Very Large	10,244	Very Large	10,231	Very Large	No Change in Magnitude	Small	Negligible Beneficial	No	Section 5 of the TA

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11	Rushmore Hill	249	Small	247	Small	332	Small	330	Small	No Change in Magnitude	Small	Negligible Beneficial	No	Section 5 of the TA
12	A224 Orpington By-Pass (2017)	841	Medium	910	Medium	1,254	Medium	1,279	Medium	No Change in Magnitude	Small	Negligible Adverse	No	Section 5 of the TA
13	A21 Sevenoaks Road	1,511	Large	1,524	Large	3,573	Large	3,577	Large	No Change in Magnitude	Small	Negligible Adverse	No	Section 5 of the TA
14	Polhill - 008	920	Medium	902	Medium	913	Small	904	Small	No Change in Magnitude	Small	Negligible Beneficial	No	Section 5 of the TA
15	Oxford High Street	635	Medium	656	Medium	568	Small	577	Small	No Change in Magnitude	Small	Negligible Adverse	No	Section 5 of the TA
16	A 224 London Road (Bullfinch Lane)	1,273	Large	1,292	Large	1,203	Medium	1,212	Medium	No Change in Magnitude	Small	Negligible Adverse	No	Section 5 of the TA
17	A 224 London Road (Station Road)	877	Medium	896	Medium	857	Small	865	Small	No Change in Magnitude	Small	Negligible Adverse	No	Section 5 of the TA
18	Star Hill - 011	208	Small	223	Small	222	Small	229	Small	No Change in Magnitude	Small	Negligible Adverse	No	Section 5 of the TA

## Construction

As can be seen from the table above, the only link to see a change in magnitude is A224 London Road, which sees a change due to the increase of HGVs. This is expected due to the large number of HGVs expected for the development of the scheme. However, this is the peak year of construction and only just goes over the threshold to fall into a medium magnitude. As this is expected for a short term period, it is considered that this would cause an adverse- negligible effect on fear and intimidation. It should also be noted that construction traffic flows would be spread out throughout the day and construction workers would be instructed to arrive and depart outside of the peak hours and therefore would not arrive all at once, so would not be expected to change the characteristics of any links assessed.

## Operation

As can be seen from the table above, no link assessed has seen a change in magnitude as a result of the development and therefore the characteristics of the links will not change. On this basis, the development is to have a negligible effect on all links assessed.

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## Accidents and Safety

As the operation of the development in 2035 is seen to have higher flows than the construction period, the effect of construction vehicles on accidents and safety has not been considered as the 2035 with development scenario is worse case.

PHASE	CLUSTER LOCATION	NUMBER OF ACCIDENTS			DESCRIPTION	MAGNITUDE PRE-MITIGATION	SIGNIFICANCE PRE-MITIGATION	MITIGATION PROPOSED?	FURTHER INFORMATION
		DO MINIMUM	DO SOMETHING	INCREASE IN ACCIDENT RISK					
Operation	Hewitts Roundabout	13	13	-0.55%	The junction is not likely to result in additional accidents as a result of the development.	Small	Negligible Beneficial	Yes	Section 2 of the TA
Operation	Starhill Road/Morants Court Road Roundabout	5	5	7.5%	The site may result in additional accidents as a result of the development due to the increased number of vehicles anticipated to use Starhill Road (South).	Small	Negligible Adverse	Yes	Section 2 of the TA
Operation	Starhill Road	5	5	7.2%	The site may result in additional accidents as a result of the development due to the increased number of vehicles anticipated to use Starhill Road (South).	Small	Negligible Adverse	Yes	Section 2 of the TA

For the purpose of this assessment, accidents along the M25 have not been considered, as the development is seen to have a beneficial effect on the M25 as there is a reduction of 0.4% daily two way trips along the M25 in comparison to the 2035 Base as seen within the Severance table.

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## 10.7 MITIGATION & ENHANCEMENT MEASURES

PHASE	POSSIBLE EFFECT BEING MITIGATED	MITIGATION MEASURE	HOW SECURED / TRIGGER	MAGNITUDE POST-MITIGATION	ADVERSE/BENEFICIAL	FURTHER INFORMATION
Construction	Potential for HGV movements to be uncontrolled.	Implementation of a Construction Logistics Plan and a Construction Environmental Management Plan to reduce the effects of HGVs and worker vehicles throughout construction.	Planning condition	Small	Negligible Beneficial	Section 4 of the TA
Operation	Number of vehicles generated by the development	Implementation of a Travel Plan to reduce car vehicle trip generation and promote sustainable modes share.	Planning condition	Small	Negligible Beneficial	Section 4 of the TA
Operation	Traffic Flows	Periodic monitoring of traffic flows along Star Hill Road/Rushmore Hill is proposed to inform if the developer should be required to design additional traffic calming measures.	Planning condition	Small	Negligible Beneficial	Section 4 of the TA
Operation	Number of people driving to and from site	The main public transport improvements include the diversion of the existing 431 bus service into the site and provision of a new community bus service into the site.	Planning condition	Small	Negligible Beneficial	Section 4 of the TA

## 10.8 ASSESSMENT POST-MITIGATION

PHASE	RECEPTOR	RESIDUAL IMPACT	RESIDUAL EFFECT					
			SIGNIFICANCE	ADV/BEN	ST/MT/LT	D/IND	P/T	R/IRR
Construction	Severance	Implementation of the CEMP will agree routes for construction vehicles	Negligible	BEN	ST	IND	T	IRR
	Driver Delay	Implementation of the CEMP will ensure that HGVs operate within specific hours which will help to ensure construction vehicles are on the Local Highway Network outside of Peak hours to reduce the impact of the construction on the operation of junctions within both the AM and PM peak.	Negligible	BEN	ST	IND	T	IRR
	Pedestrian and Cycle Delay	Implementation of the CEMP will ensure that HGVs operate within specific hours which will help to reduce the likely interaction between people and HGVs.	Negligible	BEN	ST	IND	T	IRR
	Fear and Intimidation	Implementation of the CEMP will ensure that HGVs operate within specific hours which will help to reduce the likely interaction between people and HGVs.	Negligible	BEN	ST	IND	T	IRR
	Accident and Safety	Limited Impact	Negligible	BEN	ST	IND	T	IRR
Operation	Severance	Bus, monitoring and Travel Plan expected to reduce car trips which would reduce severance	Negligible	BEN	LT	IND	P	IRR
	Driver Delay	Bus, monitoring and Travel Plan and mitigation at junctions is anticipated to relieve driver delays at the assessed junctions.	Negligible	BEN	LT	IND	P	IRR
	Pedestrian and Cycle Delay	Bus, monitoring and Travel Plan expected to reduce car trips which would reduce effect on pedestrian and cycle delay.	Negligible	BEN	LT	IND	P	IRR
	Fear and Intimidation	Bus, monitoring and Travel Plan expected to reduce car trips which would reduce effect on fear and intimidation.	Negligible	BEN	LT	IND	P	IRR
	Accident and Safety	Bus, monitoring and Travel Plan expected to reduce car trips which would reduce effect on accidents and safety.	Negligible	BEN	LT	IND	P	IRR

Key: ADV/BEN = Adverse/Beneficial; ST/MT/LT = Short-term/Medium-term/Long-term; D/IND = Direct/Indirect; P/T = Permanent/Temporary; R/IRR = Reversible/Irreversible

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## 10.9 TRANSPORT: INTER-CUMULATIVE SCHEME IMPACTS

CUMULATIVE SCHEME	SCHEME DESCRIPTION	POTENTIAL FOR CUMULATIVE IMPACTS?	CONSIDERED WITHIN ASSESSMENT?
West Kent Cold Store	500 residential units, commercial units and a medical centre	The West Kent Cold Store scheme would have the potential to produce cumulative effects alongside the current proposals on local health, education, jobs and housing provision as a result of bringing 500 additional new residents to the area.	Yes – already inherently considered within assessment set out within this Chapter.

## 10.10 GLOSSARY & ABBREVIATIONS

TERM/ABBREVIATION	DESCRIPTION
IEMA	Institute of Environmental Management and Assessment
MCC	Manual Classified Counts
ATC	Automatic Traffic Counter
CEMP	Construction Environmental Management Plan
CLP	Construction Logistics Plan

## 10.11 NON-TECHNICAL SUMMARY

This ES Chapter assesses the impact of traffic in terms of Severance, Fear and Intimidation, Pedestrian Amenity, Pedestrian Delay, Accidents and Safety and Driver Delay as outlined within the IEMA guidelines. These have been assessed in the construction (2023) and during the future operation scenario (2035).

The assessment of all the IEMA criteria found that during the construction period, the construction vehicles anticipated for the development are to have a negligible effect on the local network links assessed. The same assessment has been undertaken for the operational traffic flows. The 2035 with development scenario has been compared against the 2035 Baseline. The assessment showed that there is anticipated to be a negligible impact of the development on any of the criteria set out within the IEMA guidance. Some links even experience a beneficial effect due to the development.

A CEMP has been proposed to support the construction period to ensure that there is minimal disturbance due to the construction. A Travel Plan has been proposed to reduce the number of vehicles generated by the site which will have a beneficial affect when compared to the 2035 full occupation.

On the basis of the assessments in this ES, it is considered that the development will have a negligible effect on all links considered.

## 10.12 WORKS CITED

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