

From: [REDACTED]
To: [Manston Airport](#)
Subject: Re: TR020002 - Manston Airport:
Date: 14 February 2019 21:03:20
Attachments: [Aircraft Noise and Sleep Disturbance A Review.pdf](#)
[KCC Corridor-Studies-Existing-Conditions-2018.pdf](#)

I wish to state my opposition to the application by RSP for DCO on the Manston site.

Given the thriving marina and beach resort this application is of no National interest and will cause economic disaster in this area and across north east Kent.

I choose to live here for health reasons. Reference the World Health Organisation documented health risk for both noise and pollution from airports. I work in and around Thanet and travel up and down the A299, M2 and A2. It is already heavily congested with constant snarl ups that there is a Facebook page so that we can at least prepare for siting in tragic for hours in excess of journeys and let our customers know.

Sir Roger Gail state erroneously and without proof that the majority of residents of Thanet want a cargo hub but then cites the health risks to residents near Heathrow as an argument against the government backed third runway because his grandson lives there. He has failed to speak out to protect the residents of Ramsgate or Herne Bay where an airport will negatively affect the populations.

The amount of freight traffic will impact the already badly congested routes out of Thanet as far as the Dartford crossing. **See attached report from Kent County Council**

40 | Kent County Council | Growth and infrastructure Framework

4.1 Transport

Current Situation Kent and Medway is currently facing increased congestion, on both road and rail. Major routes such as the M20, A2/M2 and A21 form important local and strategic links that when congested result in delay on the wider local network. With increasing congestion in the major town centres such as Ashford, Canterbury, Maidstone and Tunbridge Wells, growth across the County will be constrained without investment in increasing capacity. Recent investment such as the High-Speed rail service has improved access along its corridor to London, but further investment is required on the wider network

The local economy will change as businesses are already threatening to withdraw and some to return to London.

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It will drive away visitors to the Marina and beaches that have prospered since the failure of the last airline. This has improved and continues to improve the employment prospects of residents as evidenced by Craig Mackinlay in 2017, stating that unemployed numbers had decreased to 33% lower than in 2010

There is a well-known history of consistent failure of airlines run from the Manston site. Mr Anthony Freudmun should declare this to the inspectorate as he has been involved through those previous attempts to run this site as a commercial airport.

We need housing which the current owner is awaiting planning permission for. This includes additional leisure, industrial units and a historical museum. All of which will increase the economy in this area.

See attached letter from RT HON JAMES BROKENSHIRE highlighting the failure of the local council:

'.....putting on public record my concerns about the low level of housing supply and delivery in Thanet'.

Thanet is desperate for housing now, not further years of delay for use of a site whilst yet another company involving Mr Freudmun attempts to run a commercial airport. There are thousand on the waiting lists that are wither homeless or in substandard accommodation that does not meet the resident's needs. I have family and friends that are struggling to find appropriate housing, even having the money ready for rent in advance. We need housing and have done so for years.

The current plans submitted to Thanet District Council by SHP will reduce the need for many to commute out of area as the planned business units will provide opportunities for them locally. The planned housing on Manston site can be increased eventually to meet more of the government's identified quota for housing in this area.

The plans submitted by RSP point to the planned extra train station at Manston green when it is developed. They have been short sighted or forgotten that the station is planned around a new housing complex which would be immediately blighted as it surely would be seated in a personal safety zone close to the proposed runway. Where is the in-depth risk impact assessment on personal safety given the magnitude of the long-term plans of this site as an airport? No adequate personal safety zone?

The current owners have plans which would meet national interests whilst acknowledging and promoting the good health of the residents, as well as business and leisure facilities. SHP have developed a thriving business community in Sandwich – discovery park which has given thousands of Thanet residents training, study to degree level and permanent technical and highly skilled employment

RSP misled us at their consultation meeting saying there would be no need for night flights. Their application to the inspectorate states differently.

I have experience the same animosity in online forums from pro-airport supporters, who I accept have truly believe the hype that RSP and Sir Roger Gale who meet with them for barbeques to give them updates, resort to name calling such as Antis, NIMBYS, Scaremongers, a bunch of whingers, haters, accuse us of being highly tutored by The non-night flight group: Not true as no one is standing over my shoulder as I write this. I write this of my free will and my experience and knowledge of what's out there.

My family who live under the 'potential' flight path have been told in no uncertain term to 'MOVE' (yes, capital letters were used in anger) if they don't like it. The airport was there before they moved there. Not true. It had been closed and there were no plans on the surveys to indicate it would open as an airport. The others that have lived under the flight path in the past would love the airport back 'as it was'. It was noisy and you had to stop a conversation until the craft had passed. However, it was

tolerable as you got some sleep and there were only a handful of occasion per day that craft flew in or out. a 24hr freight Hub would destroy sleep patterns of those living in Ramsgate and Herne Bay, not just underneath the flight path.

See attached report: Environmental Research and Consultancy Department ERCD REPORT 0905 Aircraft Noise and Sleep Disturbance: A Review K Jones, 2.9 (d)

The disturbance attributed by respondents to aircraft noise increased more substantially as Leq values increased i.e. the increase was greater than the corresponding increase in total reported disturbance. When asked about awakening, about half the respondents at the noisiest sites (65 dBA Leq) gave ERCD Report 0905 Aircraft Noise and Sleep Disturbance April 2009 4 aircraft noise as a main cause compared with a tenth at the sites with least aircraft noise (40 Leq).

There was never enough need for the freight or passenger flight business here. My brother in law was employed by the airport to unload and load. It was ad-hoc low skilled work on zero hours. Not enough wages to cover rent. They sent planes off empty of with very little such was the lack of need for freight in this area.

As to the claims by both the local MPs claiming to have a mandate from the local constituents, this is spurious to say the least and is an unprovable claim. Craig Mackinlay was fighting an election against the popularity of the Ukip leader and MEP, Nigel Farage in which there was an massive Conservative overspend on election funding in the area.

Those that support the opening do not seem to have actually read the details of the DCO application submitted and in particular the meaning of between 17,000 and 83,00 ATMs. They seem to believe that they will have an air show and 'red arrow displays every weekend' according to posts on social media. This could not happen at a major freight hub airport.

In light of the Seaborne fiasco at Ramsgate Harbour, where the contract was given to a company who had no adequate finances to put in place which a business required, how is this similar application allowed to proceed further?

Given the lack of business case or solid finances in British banks (or in Belize for that matter) to back this venture, it begs the question how this application came to be accepted for examination? Particularly as RSP have failed thus far to produce details for scrutiny which have clearly been requested by the inspectorate?

I object to this application for a DCO



A28 & A256 Corridors – Existing Conditions Study Thanet Local Plan Evidence Base

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Document Control Sheet

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Contents

1	Introduction	2
1.1	Overview	2
1.2	A256/A254 Study Corridor	2
1.3	A28 Study Corridor	3
2	Policy Context	5
2.1	Introduction	5
2.2	National Policy	5
2.3	Local Policy	6
3	A256 Haine Road - Current Traffic Conditions	9
3.1	Overview	9
3.2	Junction Operation	9
3.3	Link Capacity	47
3.4	Average Journey Times	49
3.5	Highway Safety Record	50
3.6	Summary	55
4	A28 Canterbury Road – Current Traffic Conditions	57
4.1	Overview	57
4.2	Junction Operation	57
4.3	Link Capacity	77
4.4	Average Journey Times	80
4.5	Highway Safety Record	80
4.6	Summary	85

1 Introduction

1.1 Overview

- 1.1.1 Amey have been commissioned by Kent County Council (KCC) to investigate the existing transport conditions along the A256/A254 corridor, from the A299 Hengist Way/A256 Richborough Way junction to the Victoria traffic lights in Margate, and the A28 corridor, from Birchington to A28 Marine Terrace/Marine Drive junction.
- 1.1.2 The purpose of the study is to provide a robust evidence base of 'typical' traffic conditions along the A28 and A256/A254 corridors. It is intended to form part of the evidence base supporting the emerging Thanet Local Plan.
- 1.1.3 The existing issues within the corridor have been identified through the analysis of various datasets as follows:
- Junction Turning Counts (JTCs);
 - Queue Length Surveys;
 - Average journey time data; and
 - Personal injury crash records.

1.2 A256/A254 Study Corridor

- 1.2.1 The A256 is a key route in East Kent linking Thanet to Dover in the south. The road begins on the outskirts of Broadstairs, at a roundabout with the A255 and heads west past the Westwood retail park and becoming Haine Road at Westwood Cross roundabout.
- 1.2.2 The A256 Haine Road then continues south west on the western fringe of Newington housing estate towards the 'Lord of the Manor' (A256 Haine Road/ A299 Hengist Way/ A299 Canterbury Road East) junction. This junction provides access to Ramsgate to the east via the A255. At this point the A256 merges with the A299 Hengist Way, on the recently constructed East Kent Access dual carriageway, for less than two kilometres, before the A299 heads north and the A256 becomes Richborough Way and heads south towards Sandwich and on to Dover.
- 1.2.3 The A299 continues west meeting the A28 around 8km away, giving access to Canterbury in the south west and continuing on to become the Thanet Way, providing access to Herne Bay, Whitstable and Faversham before becoming the M2 towards West Kent and London.

- 1.2.4 This study will focus on the A256 and A254 between the junctions of A299 Hengist Way/A256 Richborough Way roundabout to Westwood Roundabout where the A256 meets the A254 which continues north to the 'Victoria Traffic Lights' (A254 Ramsgate Road/B2052 College Road) junction in Margate.
- 1.2.5 Due to the physical geography of Thanet, the A256 provides the primary access to and from southern Thanet from other East Kent towns to the south and the wider county west of Thanet.
- 1.2.6 Figure 1-1 shows the A256/A254 study area.

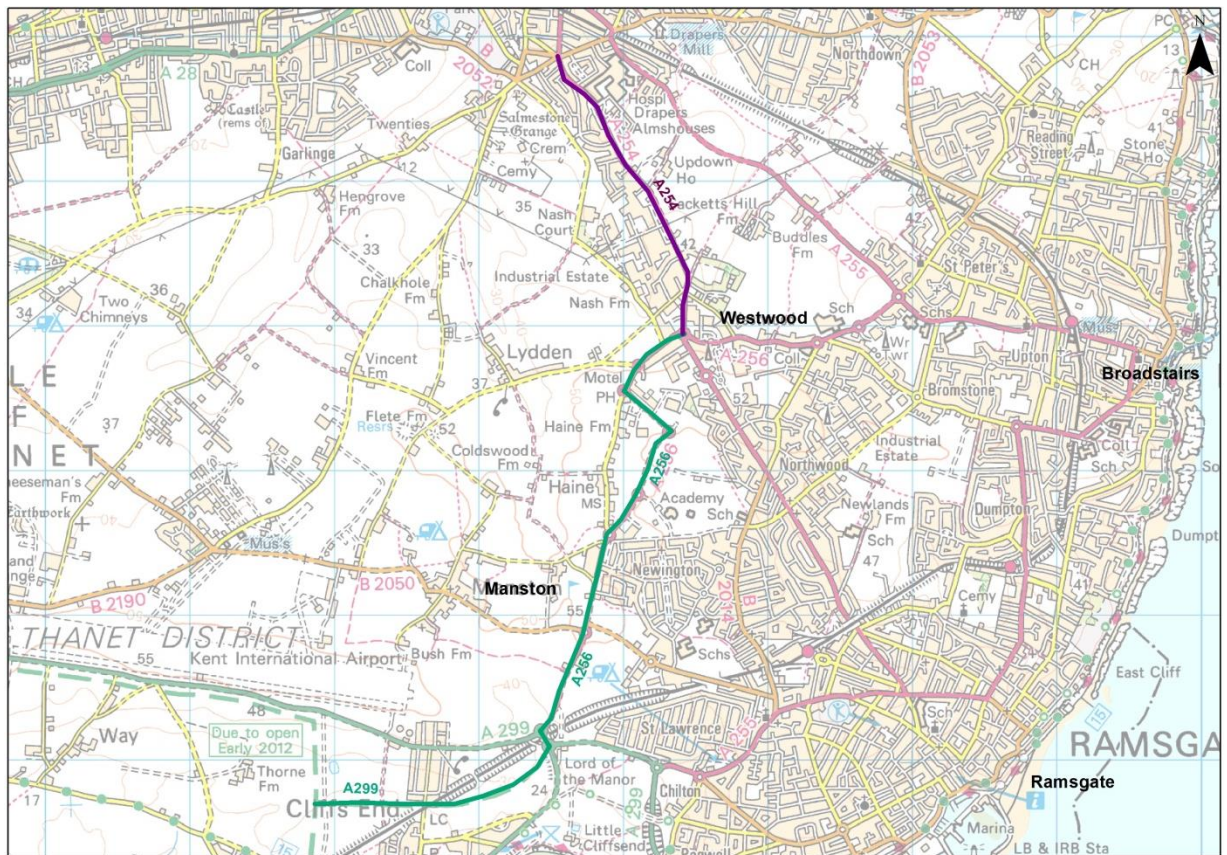


Figure 1-1: A256/A254 Corridor Study Area

1.3 A28 Study Corridor

- 1.3.1 The A28 links the seafront of Margate westwards to the A299 Thanet Way travelling through the villages of Birchington and Westgate-on-Sea. The road continues south west through Sarre and on to Sturry and Canterbury. It forms part of Canterbury's ring road before continuing further south west and eventually arriving in Ashford with a link to the M20 Motorway. The A28 then leaves Ashford on its south western side and heads towards the A21 just north of Hastings via Tenterden, Northiam in East Sussex and Brede.

- 1.3.2 This study will focus on the corridor between A299 Thanet Way/A28 Canterbury Road roundabout to the A28 Marine Terrace/Marine Drive junction on the seafront at Margate.
- 1.3.3 The A28 provides the primary access to and from northern Thanet from other Kent towns to the west.
- 1.3.4 Figure 1-2 shows the A28 study area.



Figure 1-2: A28 Corridor Study Area

2 Policy Context

2.1 Introduction

2.1.1 As part of this commission, Amey has undertaken a review of national and local planning and transport policy to identify the overarching aims and objectives of the study. This section reviews national and local policy documents relevant to transport in the context of route studies of the A28 and A256 in Thanet.

2.2 National Policy

The National Planning Policy Framework March 2012

2.2.2 The National Planning Policy Framework (NPPF) was published in March 2012 and is designed to set out how planning authorities are expected to enable sustainable development. In order to achieve this it sets out an overarching presumption in favour of sustainable development, taking account of the three dimensions of:

- An economic role relating to building a strong responsive and competitive economy. In relation to the planning system this is fundamentally about ensuring that sufficient land is available to enable job creation, together with the infrastructure to support this;
- A social role in supporting strong, vibrant and healthy communities, with an emphasis on the provision of housing in the context of high-quality built environment and access to local services; and
- An environmental role in terms of protecting and enhancing the local environment and helping mitigate and adapt to climate change.

2.2.3 Transport and connectivity play a key role in all three dimensions and the NPPF contains a section which outlines this and sets out a number of key requirements in terms of planning and decision making by local planning authorities. Much of this is about limiting the impacts of developments and improving their long term sustainability.

"Transport policies have an important role to play in facilitating sustainable development but also in contributing to wider sustainability and health objectives... The transport system needs to be balanced in favour of sustainable transport modes, giving people a real choice about how they travel."(Paragraph 29)

- 2.2.4 The A28 and A256 corridors experience delays and congestion during peak periods.

"Encouragement should be given to solutions which support reductions in greenhouse gas emissions and reduce congestion." (Paragraph 30)

- 2.2.5 The A28 and A256 corridors experience congestion and are key routes into and out of the Thanet district. The corridors provide access to Margate and Broadstairs and the surrounding areas to the east of the district.

"Local planning authorities should identify and protect where there is robust evidence, sites and routes which could be critical in developing infrastructure to widen transport choice." (Paragraph 41)

2.3 Local Policy

Local Transport Plan 4: Delivering Growth without Gridlock 2016–2031

Kent's fourth Local Transport Plan (LTP4) sets out Kent County Council's Strategy and Implementation Plans for local transport investment for the period 2016-31. It is based on the evidence from 'Kent and Medway Growth and Infrastructure Framework 2 (GIF)'.

"LTP4 sets out our policies to deliver strategic outcomes for transport and is accompanied by implementation plans and a methodology for prioritising funding."

- 2.3.1 Kent County Council aims to achieve their transportation ambition through five overarching policies that are targeted at delivering specific outcomes (Table 2-1). All of these policies align with the vision in Increasing Opportunities, Improving Outcomes: KCC's Strategic Statement 2015 – 20203.

Policy	Outcome
Deliver resilient transport infrastructure and schemes that reduce congestion and improve journey time reliability to enable economic growth and appropriate development, meeting demand from a growing population.	Economic growth and minimised congestion
Promote affordable, accessible and connected transport to enable access for all to jobs, education, health and other services.	Affordable and accessible door-to-door journeys

Policy	Outcome
Provide a safer road, footway and cycleway network to reduce the likelihood of casualties, and encourage other transport providers to improve safety on their networks.	Safer travel
Deliver schemes to reduce the environmental footprint of transport and enhance the historic and natural environment.	Enhanced environment
Provide and promote active travel choices for all members of the community to encourage good health and wellbeing, and implement measures to improve local air quality.	Better health and wellbeing

Table 2-1: Kent Local Transport Plan 4 Policies

- 2.3.2 The LTP4 highlights that transport infrastructure has and will change the perceived isolation of Thanet, and remoteness from London, which has been a disincentive for investors and businesses. It states that the investment in road network, addressing the junctions, greater use of public transport and faster rail times to London can help Thanet unlock its development sites and maximise its potential. Some of the proposed transport priorities for Thanet are shown in Figure 2-1.
- 2.3.3 The Plan states the Westwood area is continuing to attract investment but recognises the area does suffer from traffic congestion and accessibility around the centre, particularly on foot, is not convenient. It identifies the scale of development will impact on the A256 and A254 intersection (Westwood roundabout).
- 2.3.4 The Plan identifies that the planned development around the A28 and A256 will be required to identify improvements to the surrounding road network in the Transport Assessment and be expected to provide an appropriate contribution to offsite highway improvements.

Transport Priorities for Thanet

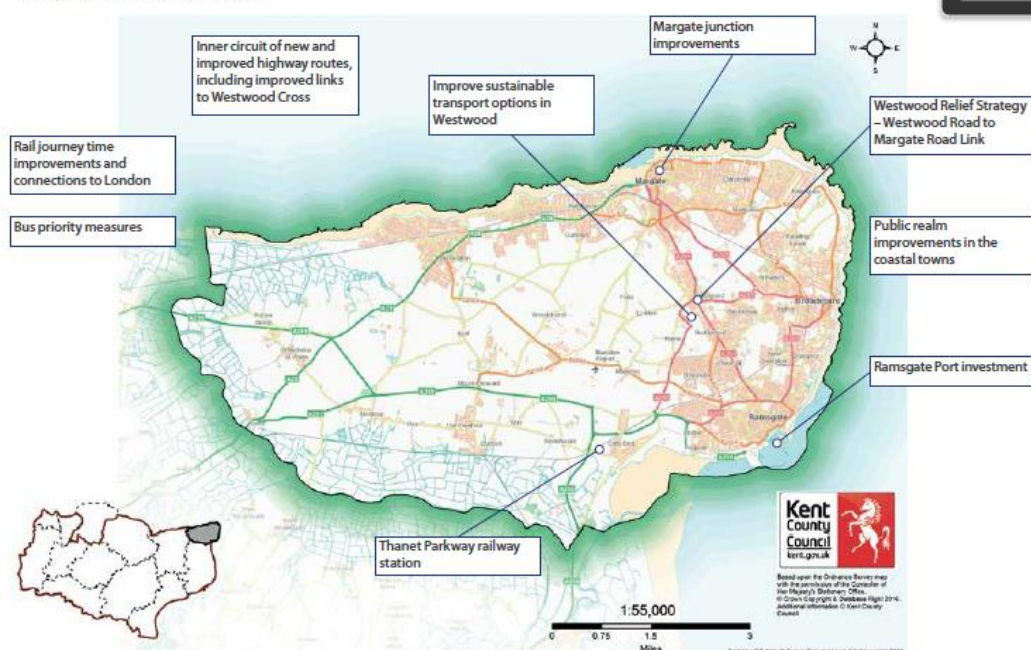


Figure 2-1: Transport Priorities for Thanet.

Air Quality - Thanet Annual Status Report, 2016

- 2.3.5 The requirements of the Local Air Quality Management (LAQM) process, as set out in Part IV of the Environment Act (1995), requires a regular review and assessment of air quality in Thanet by the Local Authority and to determine whether or not the Air Quality Strategy (AQS) objectives are likely to be achieved. Where an exceedance is considered likely the local authority must declare an Air Quality Management Area (AQMA) and prepare an Air Quality Plan (AQP) setting out the measures it intends to put in place to work towards the objectives.
- 2.3.6 The document notes that the main source of air pollution in Thanet is road traffic emissions from major roads, A28, A299, A254, A255 and A256.
- 2.3.7 An AQMA was declared in March 2006 for The Square, Birchington, where exceedances of the annual mean objective for nitrogen dioxide (NO₂) were predicted. A second AQMA was declared at High Street, St Lawrence in April 2010. These two AQMAs were incorporated into a single Thanet Urban AQMA in 2011. The area encompasses the main urban extent of Thanet and is monitoring the NO₂ annual mean.

3 A256 Haine Road - Current Traffic Conditions

3.1 Overview

- 3.1.1 Existing traffic conditions along the A256 corridor have been captured through traffic data collection and analysis. The following surveys have been undertaken at key junctions within the study area:
- Junction Turning Counts (JTC); and
 - Queue Length Surveys.
- 3.1.2 In addition, average journey times have been established through the corridor using Highways Analyst software. Furthermore, personal injury crash records have been analysed to determine historic highway safety considerations within the corridor.
- 3.1.3 The data has been analysed in order to better understand traffic movements and identify where issues exist. The following section presents the analysis for each survey.

3.2 Junction Operation

- 3.2.1 JTC surveys were provided by third parties and the queue length surveys were collected as part of this study to further contribute to the understanding of the operation of the major junctions along the study corridor. Queue length surveys were undertaken only at junctions observed to experience delays during site visits in the weekday AM and PM peak periods. Junctions where queue length surveys were not undertaken are identified in the list below.

- 3.2.2 The following junctions have been assessed as part of this study:

Junction 1 – A299 Hengist Way/A256 Richborough Way;
Junction 2 – A299 Hengist Way/Canterbury Rd East/A256 Haine Rd;
Junction 3 – A256 Haine Rd/B2050 Manston Rd;
Junction 4 – A256 Haine Rd/St John's Ave (no queue length survey);
Junction 5 – A256 New Haine Rd/Old Haine Rd (south);
Junction 6 – A256 New Haine Rd/New Cross Rd;
Junction 7 – A256 New Haine Rd/Old Haine Rd (north);
Junction 8 – A256 Haine Rd/Star Lane Link/Westwood Cross;
Junction 9 – A256 Haine Rd/A254 Margate Rd (Westwood roundabout);
Junction 10 – A254 Margate Rd/Star Lane/Poorhole Lane; and
Junction 11 – A254 Ramsgate Rd/B2052 College Rd (Victoria Traffic Lights).

3.2.3 An additional 2 junctions were surveyed in May 2017 these junctions were:

Junction 12 – A254 Ramsgate Rd / Enterprise Rd;

Junction 13 - A254 Ramsgate Road / Queen Elizabeth Queen Mother Hospital.

3.2.4 The locations of the junction turning count surveys are shown in Figure 3-1.

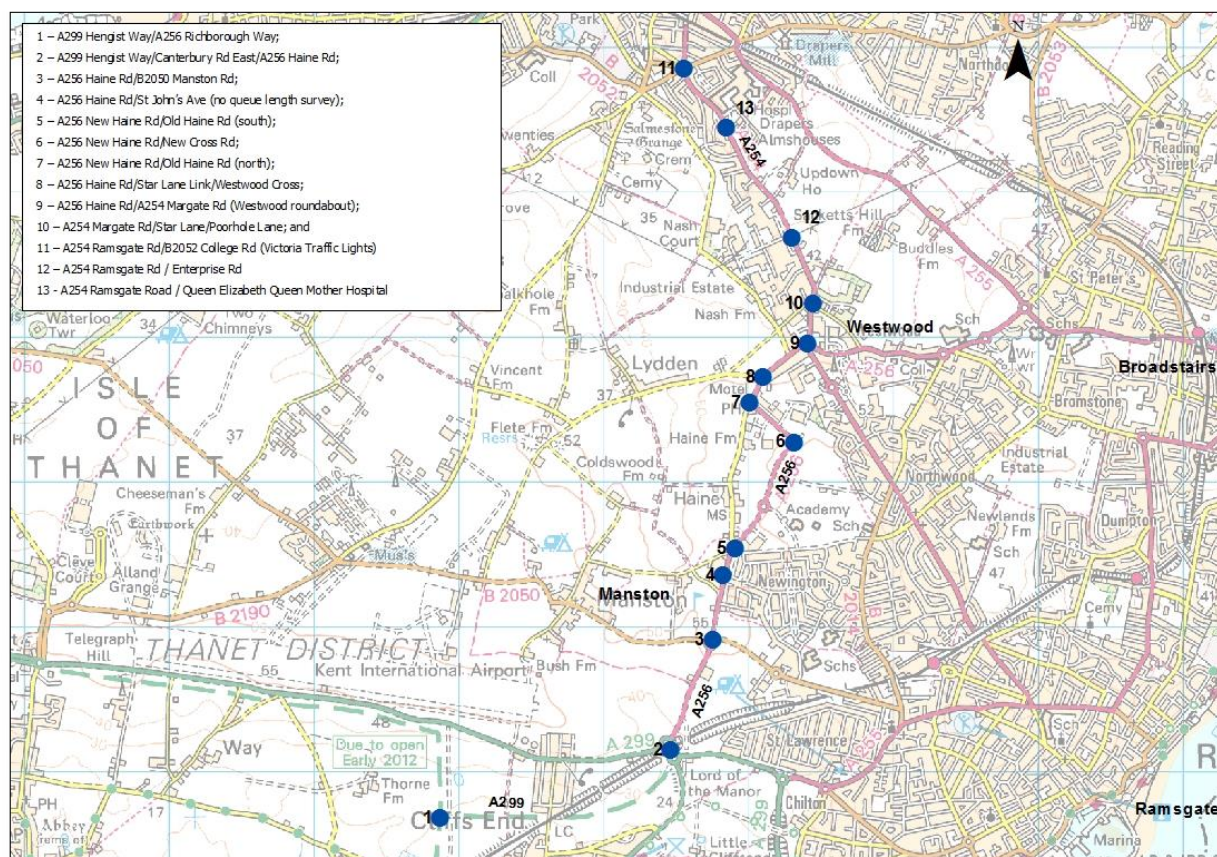


Figure 3-1: A256/A254 Corridor - Junction Turning Count Survey Locations

3.2.5 The JTC surveys were carried out on Tuesday 12th January 2017 between the hours of 07:30 and 09:30, and 16:30 and 18:30. Queue length surveys were carried out at each junction identified above, on Wednesday 1st March 2017.

3.2.6 The additional junction surveys were carried out on Wednesday 24th May 2017 between the hours of 07:00 and 10:00, and 16:00 and 19:00. Queue length surveys were carried out simultaneously with the junction turning counts.

3.2.7 The data is intended to provide a snapshot of existing traffic conditions along the A256/A254 corridor. The specific weekday AM and PM peak hours have been determined for each individual junction and reported in Table 3-1.

Location		Weekday AM Peak	Weekday PM Peak
1	A299 Hengist Way/ A256 Richborough Way	07:30-08:30	16:45-17:45
2	A299 Hengist Way/ Canterbury Rd East/ A256 Haine Rd	07:30-08:30	16:45-17:45
3	A256 Haine Rd/ B2050 Manston Rd	07:45-08:45	16:45-17:45
4	A256 Haine Rd/ St John's Ave	07:45-08:45	16:45-17:45
5	A256 New Haine Rd/ Old Haine Rd (south)	08:00-09:00	17:00-18:00
6	A256 New Haine Rd/ New Cross Rd	08:00-09:00	17:00-18:00
7	A256 New Haine Rd/ Old Haine Rd (north)	07:45-08:45	17:00-18:00
8	A256 Haine Rd/ Star Lane Link/ Westwood Cross	08:00-09:00	16:30-17:30
9	A256 Haine Rd/ A254 Margate Rd	08:15-09:15	16:30-17:30
10	A254 Margate Rd/ Star Lane/ Poorhole Lane	08:00-09:00	16:30-17:30
11	A254 Ramsgate Rd/ B2052 College Rd (Victoria Traffic Lights)	07:45-08:45	16:30-17:30
12	A254 Ramsgate Rd /Enterprise Rd	08:30-09:30	16:00-17:00
13	A254 Ramsgate Road / Queen Elizabeth Queen Mother Hospital	08:45-09:45	16:15-17:15

Table 3-1: A256/A254 Corridor - Peak Hour by Junction

- 3.2.8 The queue length results tables have been colour coded with a RAG rating in order to easily identify lengths of queues across the surveyed hour. Table 3-2 provides the key to the queue length tables in the following sections.

Queue Length	Approximate Distance (m)
0 – 9 vehicles	0 - 52
10-19 vehicles	58 - 110
20-29 vehicles	115 - 167
30 + vehicles	173+

Table 3-2: Queue Length RAG Ratings

Junction 1 – A299 Hengist Way/A256 Richborough Way

3.2.9 The A299 Hengist Way/ A256 Richborough Way junction is located at the south western extent of the study corridor. The northern arm connects the A299 westwards to the Thanet Way and the A28 towards Canterbury with the A256 which continues south to Sandwich and Dover. A299 Hengist Way east continues to Ramsgate and re-joins the A256 which heads north towards Westwood Cross.

Observed Traffic Movements

3.2.10 The peak hour turning movements are shown in Figure 3-2.

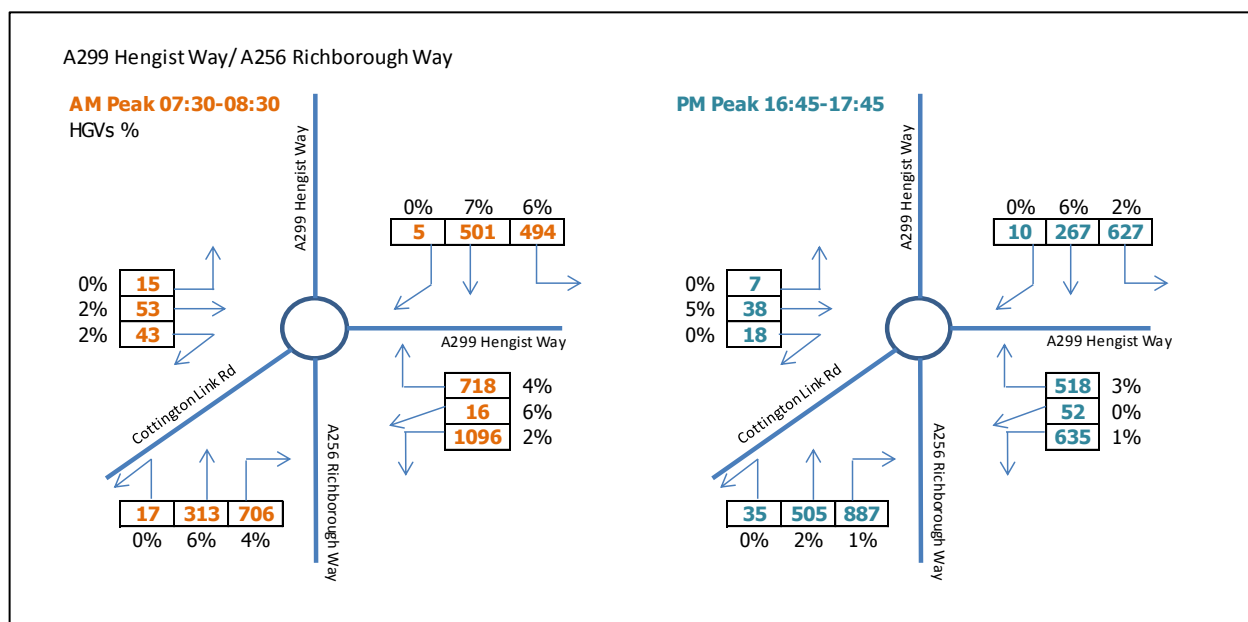


Figure 3-2: A299 Hengist Way/A256 Richborough Way – Turning Movements (Vehicles)

3.2.11 Figure 3-2 shows that the AM peak is the busiest peak at this junction; however, the flows in the PM peak are not significantly less. In the AM peak the A299 Hengist Way

(east) has the highest total flow with over 1,000 vehicles turning left onto A256 Richborough Way and over 700 turning right onto A299 Hengist Way (north).

- 3.2.12 From the A256 Richborough Way the dominant turning movement in both the AM and PM peaks is the right turn to A299 Hengist Way east. The turning movements from A299 Hengist Way (north) are fairly balanced in the AM peak heading east and south. In the PM peak these movements are much less balanced with around 70% turning left to A299 Hengist Way and nearly 30% heading straight. In both peak periods there is a very small flow entering and exiting the Cottingham Link Road arm.

Observed Queue Lengths

- 3.2.13 Table 3-3 displays the queue lengths (in vehicles) at this junction across the AM and PM peak hours. It highlights that queueing of over 20 vehicles occurs on four occasions across the AM hour peak on the A299 Hengist Way east arm of this junction. Across most of the AM peak there is queueing of between 10-19 vehicles in both Lanes of this arm.
- 3.2.14 Lane 2 of the A256 Richborough Way arm also experiences queueing of between 10-19 vehicles throughout the AM peak hour. In the PM peak, the queueing on this arm in Lane 2 is consistently above 20 vehicles or just below. For about half of this surveyed period, queueing is between 10-19 vehicles in Lane 1 of this arm. Queueing on other arms of this junction in the PM peak is always far below 10 vehicles.

	A299 Hengist Way N		A299 Hengist Way E		A256 Richborough Way		Cottingham Link Rd
Time	Lane 1	Lane 2	Lane 1	Lane 2	Lane 1	Lane 2	Lane 1
07:30-07:35	4	1	13	11	3	5	3
07:35-07:40	4	2	18	9	5	13	2
07:40-07:45	2	2	21	8	5	14	5
07:45-07:50	4	2	23	13	3	12	2
07:50-07:55	3	1	13	12	4	18	3
07:55-08:00	6	2	12	10	7	18	5
08:00-08:05	2	2	22	11	2	11	2
08:05-08:10	5	5	20	7	3	18	1
08:10-08:15	4	1	19	12	10	18	8
08:15-08:20	5	4	14	10	4	19	9
08:20-08:25	3	2	8	8	2	21	2
08:25-08:30	2	3	4	6	3	17	2
Total	44	27	187	117	51	184	44
16:45-16:50	2	1	4	4	10	29	2

	A299 Hengist Way N		A299 Hengist Way E		A256 Richborough Way		Cottingham Link Rd
16:50-16:55	3	3	3	4	4	25	1
16:55-17:00	5	3	3	5	2	12	3
17:00-17:05	2	3	3	5	2	6	2
17:05-17:10	5	2	4	6	19	22	1
17:10-17:15	5	1	6	5	18	19	2
17:15-17:20	3	2	8	4	11	21	2
17:20-17:25	2	1	3	4	10	25	2
17:25-17:30	3	1	7	3	5	24	3
17:30-17:35	3	1	7	4	16	21	4
17:35-17:40	3	4	6	4	10	22	4
17:40-17:45	4	3	7	3	7	19	5
Total	40	25	61	51	114	245	31

Table 3-3: A299 Hengist Way/A256 Richborough Way – Queue Lengths (Vehicles)

Junction 2 – A299 Hengist Way/ Canterbury Rd East/ A256 Haine Rd

- 3.2.15 The A299 Hengist Way/Canterbury Road east/A256 Haine Road junction (known locally as The Lord of the Manor) consists of a 4-arm signalised roundabout junction on the southern side leading to a smaller 3-arm configuration to the north. Following the completion of East Kent Access, further traffic calming was introduced at the smaller northern roundabout to encourage greater transfer of trips from A256 Haine Road to the new sections of A299 and A256. This prevents vehicles travelling west through Cliffsend from the A256 Haine Road and forces them south to the large roundabout and onto the A299 Hengist Way.

Observed Traffic Movements

- 3.2.16 The peak hour turning movements are shown in Figure 3-3.

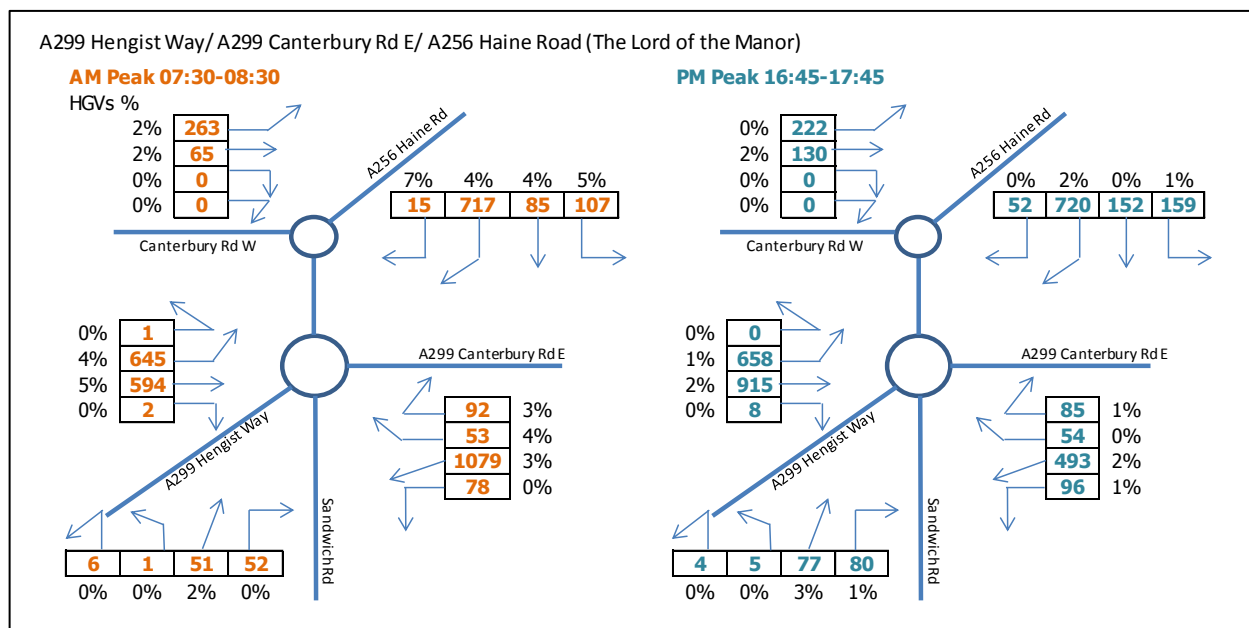


Figure 3-3: The Lord of the Manor – Turning Movements (Vehicles)

- 3.2.17 In the AM peak, 645 vehicles were observed travelling from A299 Hengist Way to A256 Haine Road and there are 717 vehicles making the reverse of this movement. In the PM peak, a very similar number of vehicles (658) travel from A299 Hengist Road to A256 Haine Road whilst a similar number is also making the reverse of this movement (720 vehicles).
- 3.2.18 The peak hour traffic flows demonstrate that in the AM there are over 1,000 vehicles travelling from A299 Canterbury Road East westwards to the A299 Hengist Way. In the PM peak, just over 900 vehicles are making the return trip eastwards from A299 to Canterbury Road East. In both peak periods, approximately half of each flow is making the reverse of these movements. Therefore more vehicles are exiting Thanet via this route than entering in the AM peak and vice versa in the PM peak.
- 3.2.19 Over 200 vehicles in both the AM and PM peak hours travel west from Canterbury Road West to the A256 Haine Road. The returning flow in both peak hours from A256 Haine Road is around 30 vehicles. This could potentially be due to vehicles trying to avoid perceived queueing on the A299 Hengist Way through the signal controlled southern roundabout and continuing to use Cliffsend as a through route.

Observed Queue Lengths

- 3.2.20 Table 3-4 displays the queue lengths (in vehicles) at this junction across the AM peak hour. It identifies that on the A256 Canterbury Road west and A299 Canterbury Road east there are occasional periods of longer queues of just over 10 vehicles in both

lanes of both arms, however, in general the level of queueing is not considered to be severe.

A256 Canterbury Rd W			A299 Canterbury Rd E			Sandwich Rd		A299 Hengist Way			
Signal Change	Lane 1	Lane 2	Signal Change	Lane 1	Lane 2	Time	Lane 1	Signal Change	Lane 1	Lane 2	Lane 3
07:30:14	4	6	07:30:45	8	6	07:30-07:35	3	07:30:25	3	0	0
07:31:09	6	6	07:31:56	10	5	07:35-07:40	3	07:30:49	2	0	0
07:32:11	8	5	07:33:06	8	5	07:40-07:45	3	07:31:24	0	1	0
07:33:34	4	5	07:34:20	9	3	07:45-07:50	1	07:31:52	0	3	0
07:34:49	5	7	07:35:38	9	6	07:50-07:55	9	07:32:23	3	1	0
07:36:00	9	9	07:36:32	7	3	07:55-08:00	7	07:32:51	3	1	0
07:37:04	3	4	07:37:37	10	7	08:00-08:05	3	07:33:36	3	1	0
07:37:57	9	3	07:39:04	8	8	08:05-08:10	4	07:34:07	1	0	0
07:39:27	8	10	07:40:16	7	2	08:10-08:15	5	07:34:47	2	1	0
07:40:39	6	7	07:41:26	15	2	08:15-08:20	6	07:35:34	2	0	0
07:41:43	7	14	07:42:38	10	7	08:20-08:25	4	07:36:09	6	2	1
07:42:59	9	8	07:44:12	7	6	08:25-08:30	6	07:36:52	3	1	0
07:44:35	9	6	07:45:04	11	12			07:37:27	1	0	0
07:45:29	4	3	07:46:18	10	8			07:39:55	2	1	0
07:46:35	12	12	07:47:10	10	8			07:40:28	1	0	0
07:47:40	2	3	07:48:19	9	6			07:40:57	1	2	0
07:48:36	6	12	07:49:26	5	3			07:41:40	4	3	0
07:49:51	8	8	07:52:15	14	13			07:42:19	0	2	0
07:51:43	11	15	07:54:13	12	12			07:43:09	2	1	0
07:52:22	13	12	07:56:28	11	10			07:43:53	0	3	0
07:54:15	15	13	07:58:22	13	5			07:44:20	2	2	0
07:56:14	10	10	08:00:11	14	6			07:44:48	4	0	0
07:56:52	8	10	08:01:42	12	4			07:45:20	2	2	0
07:58:28	12	13	08:03:34	10	7			07:45:55	3	2	0
08:00:19	11	13	08:05:05	9	6			07:47:03	2	1	0
08:02:05	14	13	08:06:10	13	2			07:47:37	6	0	0
08:03:38	11	13	08:08:50	18	16			07:48:19	1	0	0
08:05:14	8	10	08:10:31	16	10			07:48:53	1	2	0
08:06:38	4	4	08:11:56	6	2			07:49:28	1	1	0
08:08:15	14	12	08:13:16	6	4			07:50:08	2	3	0
08:09:00	9	15	08:14:10	9	10			07:50:47	7	1	0
08:10:44	15	12	08:15:18	7	11			07:51:27	7	4	0
08:12:24	8	8	08:16:31	12	4			07:52:00	1	1	0
08:13:41	9	5	08:18:25	17	4			07:52:39	3	2	0
08:14:41	6	5	08:20:01	9	9			07:53:21	9	4	0
08:15:44	4	9	08:21:31	9	9			07:53:57	5	4	0
08:16:51	15	8	08:23:01	10	7			07:54:10	0	2	0
08:18:30	14	11	08:24:30	14	7			07:54:58	1	5	1
08:20:14	15	6	08:26:00	12	4			07:55:47	1	2	1

A256 Canterbury Rd W			A299 Canterbury Rd E			Sandwich Rd		A299 Hengist Way			
08:21:44	8	7	08:27:30	8	7			07:56:21	1	0	0
08:23:14	10	4	08:29:01	7	3			07:57:36	4	3	1
08:24:45	11	10						07:58:11	1	3	0
08:26:14	13	5						07:58:42	2	3	0
08:27:44	11	11						07:59:32	2	3	2
08:29:14	10	9						08:00:01	1	0	1
								08:00:46	0	2	0
								08:01:21	3	1	0
								08:01:46	3	1	1
								08:02:18	1	1	1
								08:03:15	1	0	0
								08:03:42	2	0	0
								08:04:15	4	2	0
								08:05:06	3	5	0
								08:05:33	0	4	0
								08:06:14	0	7	0
								08:06:59	0	2	0
								08:07:32	4	2	2
								08:08:25	0	1	0
								08:08:49	4	2	0
								08:09:52	1	2	0
								08:10:28	7	2	1
								08:11:16	8	1	0
								08:12:02	4	0	1
								08:12:40	0	1	0
								08:13:15	0	1	0
								08:13:48	0	2	0
								08:14:37	4	1	0
								08:15:07	2	2	0
								08:15:43	0	2	0
								08:16:17	2	2	3
								08:16:58	2	2	1
								08:17:45	4	6	2
								08:18:30	0	5	0
								08:18:54	2	7	0
								08:19:28	6	2	0
								08:20:34	2	4	4
								08:21:14	3	3	0
								08:22:11	3	5	0
								08:22:42	2	7	0
								08:23:01	0	7	0
								08:23:35	2	11	0
								08:24:23	3	5	0
								08:25:04	3	4	2

A256 Canterbury Rd W			A299 Canterbury Rd E			Sandwich Rd		A299 Hengist Way			
								08:26:05	1	8	0
								08:26:56	3	1	0
								08:27:32	1	2	1
								08:28:15	3	5	1
								08:29:25	5	2	0

Table 3-4: The Lord of the Manor – AM Peak Queue Lengths (Vehicles)

3.2.21 Table 3-5 displays the queue lengths at this junction across the PM peak hour. Similar queues occur on the A256 Canterbury Road west and A299 Canterbury Road east arms of this junction as was observed in the AM peak, of just over 10 vehicles.

3.2.22 The most significant queuing was recorded for a short period on the A299 Hengist Way with lane 2 observing a maximum queue length of 24 vehicles.

A256 Canterbury Rd W			A299 Canterbury Rd E			Sandwich Rd		A299 Hengist Way			
Signal Change	Lane 1	Lane 2	Signal Change	Lane 1	Lane 2	Time	Lane 1	Signal Change	Lane 1	Lane 2	Lane 3
16:45:38	8	5	16:45:36	9	1	16:45-16:50	3	16:45:06	1	3	2
16:47:08	2	8	16:47:09	9	3	16:50-16:55	2	16:45:37	0	3	0
16:48:38	10	10	16:48:39	9	6	16:55-17:00	3	16:46:30	4	4	1
16:50:08	6	6	16:50:09	11	7	17:00-17:05	6	16:47:14	4	2	3
16:51:38	3	9	16:51:41	13	7	17:05-17:10	4	16:48:01	2	1	1
16:53:07	11	4	16:53:10	7	1	17:10-17:15	6	16:49:05	0	6	0
16:54:39	10	6	16:54:40	9	2	17:15-17:20	8	16:50:06	3	7	1
16:56:09	10	5	16:56:10	8	2	17:20-17:25	7	16:51:00	0	3	2
16:57:38	5	10	16:57:39	6	2	17:25-17:30	6	16:51:46	2	3	1
16:59:10	11	4	16:59:09	9	4	17:30-17:35	13	16:52:17	1	1	0
17:00:39	6	6	17:00:40	7	2	17:35-17:40	10	16:52:48	1	2	0
17:02:09	7	6	17:02:40	7	1	17:40-17:45	10	16:53:26	1	0	1
17:03:38	2	5	17:03:39	7	3			16:54:15	0	1	0
17:05:08	13	6	17:05:09	10	5			16:54:49	1	4	1
17:06:36	11	6	17:06:39	9	1			16:55:14	4	3	2
17:08:09	4	14	17:08:10	11	7			16:56:06	0	8	4
17:09:36	8	7	17:09:40	7	3			16:56:34	0	9	5
17:11:06	8	5	17:11:08	14	7			16:57:13	2	0	0
17:12:37	7	7	17:12:39	8	5			16:57:48	1	7	6
17:14:07	7	6	17:14:09	11	7			16:58:34	4	2	1
17:15:36	7	7	17:15:39	13	6			16:59:21	2	8	1
17:17:06	9	8	17:17:08	6	0			16:59:51	1	6	1
17:18:36	7	11	17:18:38	15	2			17:00:32	0	2	2
17:20:07	10	13	17:20:08	14	5			17:01:10	0	2	0
17:21:38	9	11	17:21:38	10	3			17:01:31	0	1	0
17:23:06	14	8	17:23:08	11	10			17:01:50	2	1	0

A256 Canterbury Rd W			A299 Canterbury Rd E			Sandwich Rd		A299 Hengist Way			
17:24:36	12	8	17:24:38	7	6			17:02:15	2	2	0
17:26:06	9	7	17:26:08	8	6			17:02:54	0	3	2
17:27:37	8	10	17:27:37	9	4			17:03:28	1	3	0
17:29:06	11	11	17:29:07	13	5			17:04:06	6	5	3
17:30:36	6	9	17:30:37	3	3			17:04:54	2	10	0
17:32:06	8	5	17:32:07	8	5			17:05:08	0	14	0
17:33:35	10	10	17:33:36	7	1			17:06:00	1	2	1
17:35:06	7	10	17:35:06	10	5			17:06:36	0	4	0
17:36:35	12	5	17:36:37	6	2			17:07:02	4	5	4
17:38:05	8	14	17:38:06	14	9			17:07:44	1	3	0
17:39:35	7	6	17:39:37	3	2			17:08:07	0	8	3
17:41:05	11	9	17:41:06	6	4			17:08:31	3	9	3
17:42:34	3	7	17:42:37	4	5			17:09:41	2	11	5
17:44:05	9	7	17:44:06	8	2			17:10:30	6	4	0
								17:11:06	0	3	0
								17:11:43	5	2	0
								17:12:12	3	3	2
								17:12:36	0	1	0
								17:12:56	2	4	3
								17:13:29	2	2	1
								17:14:03	3	1	1
								17:14:46	0	2	1
								17:15:06	0	2	0
								17:15:46	2	7	0
								17:16:34	5	5	0
								17:17:13	1	5	0
								17:17:43	2	9	1
								17:18:25	4	3	0
								17:19:00	2	13	3
								17:19:38	4	7	0
								17:20:05	8	10	2
								17:21:14	3	1	1
								17:21:36	0	9	2
								17:22:23	0	3	1
								17:23:07	0	10	0
								17:23:25	4	10	5
								17:24:22	1	4	2
								17:25:12	1	4	1
								17:26:16	1	13	2
								17:27:29	6	6	1
								17:28:06	3	5	0
								17:28:44	0	2	0
								17:29:08	0	5	1
								17:29:41	5	4	2

A256 Canterbury Rd W			A299 Canterbury Rd E			Sandwich Rd		A299 Hengist Way			
								17:30:44	5	14	3
								17:31:42	0	4	0
								17:32:36	2	6	0
								17:33:32	2	13	6
								17:34:32	3	6	0
								17:35:09	1	13	6
								17:36:22	5	9	0
								17:36:52	0	14	5
								17:37:30	4	13	3
								17:38:20	5	14	11
								17:39:22	3	12	10
								17:40:03	0	15	13
								17:41:04	3	22	12
								17:42:26	15	24	14
								17:43:13	13	16	15
								17:44:05	13	15	13

Table 3-5: The Lord of the Manor – PM Peak Queue Lengths (Vehicles)

Junction 3 – A256 Haine Rd/B2050 Manston Rd

- 3.2.23 The A256 Haine Road/Manston Road junction consists of a roundabout and neighbouring priority junction. It connects the A256 Haine Road corridor to Manston to the west (via the roundabout) and Ramsgate to the east (via the priority junction).

Observed Traffic Movements

- 3.2.24 The peak hour turning movements are shown in Figure 3-4.

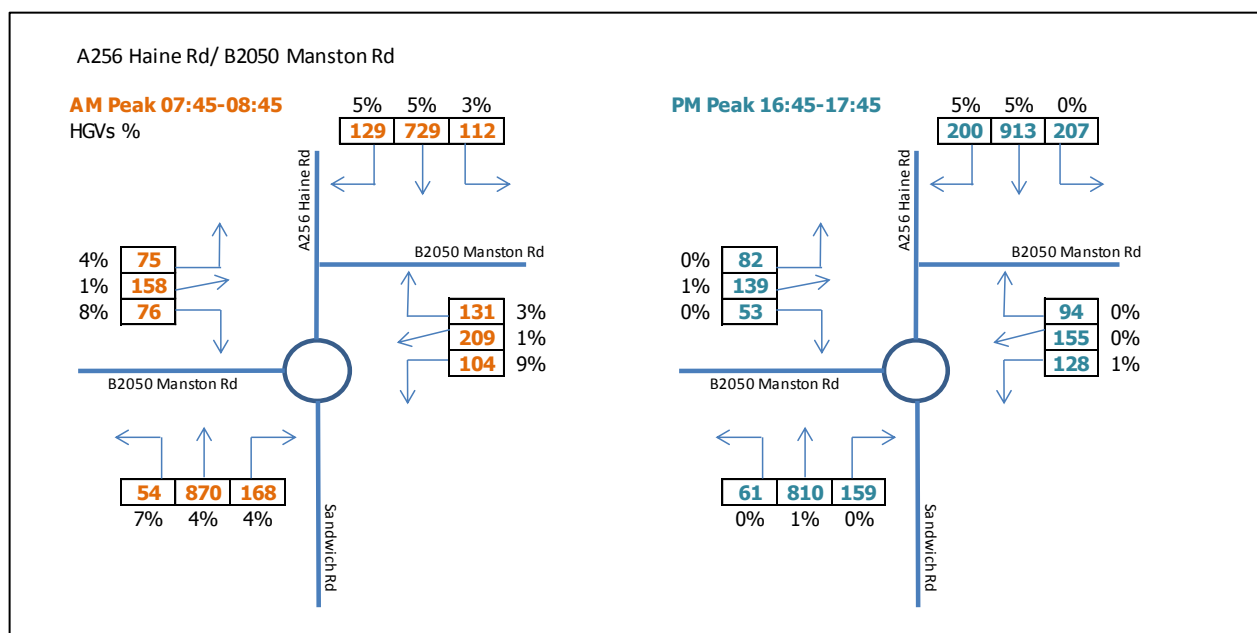


Figure 3-4: A256 Haine Rd/B2050 Manston Rd – Turning Movements (Vehicles)

- 3.2.25 The peak hour flows at this junction demonstrate that the dominant flow is on the A256 Haine Road with between 729 and 913 vehicles travelling in each direction during the peak periods.
- 3.2.26 It should also be noted that there are also a relatively high number of conflicting movements in and out of the minor arms. For example, in the AM peak there are over 300 vehicles turning out of B2050 Manston Road (from the west) and over 400 turning out of the B2050 Manston Road (from the east). This is a similar pattern to that in the PM peak hour.

Observed Queue Lengths

- 3.2.27 Table 3-6 displays the queue length survey results for the A256 Haine Road/ B2050 Manston Road roundabout and priority junction for both peak periods. The table demonstrates that some significant queueing of over 20 vehicles occurs in the AM peak hour in Lane 1 of the A256 Haine Road south arm of this junction.
- 3.2.28 In the PM peak hour significant queues of over 20 vehicles was recorded on 3 of the 4 arms of the junction. In particular, Lane 2 of the A256 Haine Road north and Lane 1 of the B2050 Manston Road west observed more sustained levels of high queues. The queueing and associated delay observed at this junction is likely due to dominant flow on the A256 combined with relatively high conflicting movement flows as described above.

	A256 Haine Road N		B2050 Manston Rd E		A256 Haine Rd S		B2050 Manston Rd W	
Signal Change	Lane 1	Lane 2	Lane 1	Lane 2	Lane 1	Lane 2	Lane 1	Lane 2
07:45-07:50	0	5	2	8	16	2	5	0
07:50-07:55	1	0	3	10	20	3	8	0
07:55-08:00	1	0	2	7	20	3	10	0
08:00-08:05	0	0	4	7	16	1	7	0
08:05-08:10	1	0	3	3	18	2	8	0
08:10-08:15	0	0	2	6	14	4	7	1
08:15-08:20	0	0	2	12	12	2	12	0
08:20-08:25	0	0	4	10	24	1	18	0
08:25-08:30	0	0	1	9	24	2	19	0
08:30-08:35	0	0	3	10	17	1	10	0
08:35-08:40	1	0	2	5	10	1	6	0
08:40-08:45	1	0	1	3	13	1	9	1
Total	5	5	29	90	204	23	119	2

	A256 Haine Road N		B2050 Manston Rd E		A256 Haine Rd S		B2050 Manston Rd W	
16:45-16:50	0	11	2	8	10	1	5	0
16:50-16:55	1	26	5	9	19	2	4	0
16:55-17:00	1	4	3	9	13	2	2	0
17:00-17:05	4	27	3	8	7	3	10	1
17:05-17:10	1	26	5	9	12	2	7	0
17:10-17:15	2	15	6	12	8	2	22	1
17:15-17:20	1	25	3	8	19	1	11	0
17:20-17:25	1	26	2	7	16	2	4	1
17:25-17:30	1	11	3	7	8	1	9	1
17:30-17:35	2	0	3	4	10	3	28	1
17:35-17:40	0	6	3	9	24	8	25	1
17:40-17:45	2	0	3	6	18	3	22	0
Total	16	177	41	96	164	30	149	6

Table 3-6: A256 Haine Rd/B2050 Manston Rd – Queue Lengths (Vehicles)

Junction 4 – A256 Haine Rd/St John's Ave

- 3.2.29 The A256 Haine Road/St John's Avenue junction is a 3-arm priority arrangement. St John's Avenue provides access to the east of Haine Road through the Newington residential area to the A254 Margate Road.
- 3.2.30 There is a Traffic Regulation Order (TRO) prohibiting vehicles turning right from Haine Road south into St John's Avenue. In order to make this movement vehicles have to make a U-turn at the nearby Old Haine Road/New Haine Road roundabout further to the north of this junction and then turn left into St John's Avenue.

Observed Traffic Movements

- 3.2.31 The peak hour turning movements are shown in Figure 3-5.

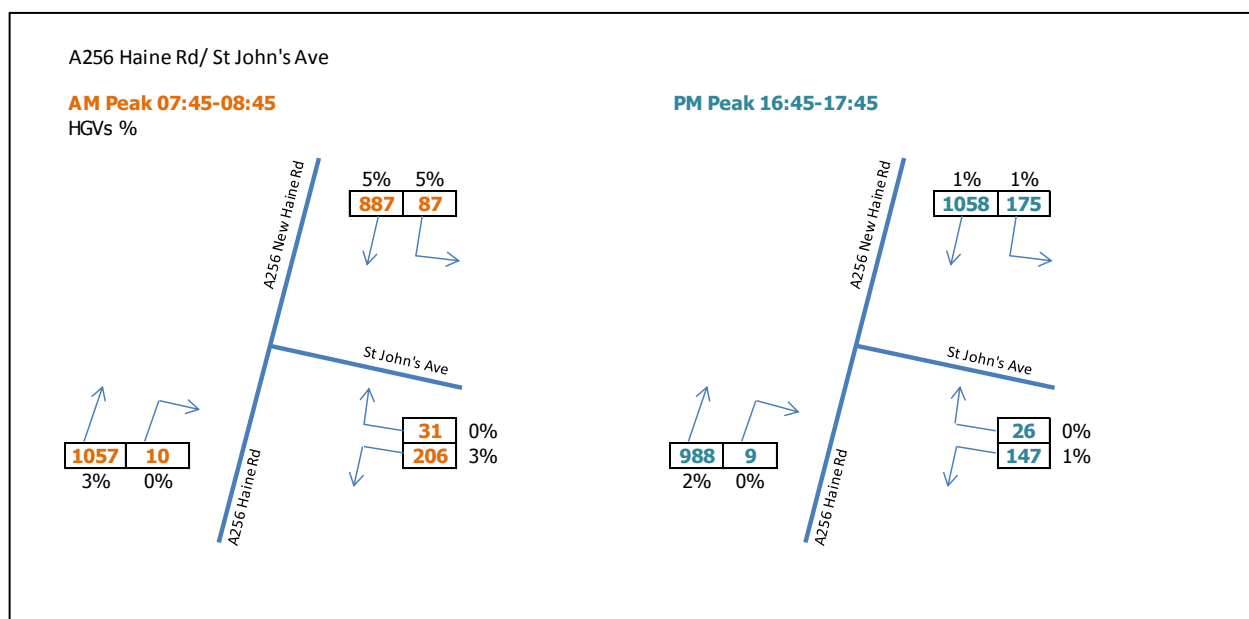


Figure 3-5: A256 Haine Rd/St John's Ave –Turning Movements (Vehicles)

- 3.2.32 The peak hour flows indicate a dominant flow on the A256 in both directions of circa 1000 vehicles. The St. John's Avenue arm is very much the minor arm with relatively low flows in and out in each peak.
- 3.2.33 Outbound movements from St John's Avenue are heavily biased to left out movements to the A256 Haine Rd (S) in both peaks, which may be due to the heavy straight ahead flow on the A256 resulting in few gaps for right turning traffic.

Junction 5 – A256 New Haine Rd/Haine Rd (South)

- 3.2.34 The A256 New Haine Road/Haine Road southern junction is the southern extent of New Haine Road which was built in 2008/09. From the roundabout Haine Road provides access from the south to Haine Village where the A256 was previously aligned.

Observed Traffic Movements

- 3.2.35 The peak hour turning movements are shown in Figure 3.6.
- 3.2.36 The dominant flow at this junction is on the A256 Haine Road/A256 New Haine Road. The Haine Road arm has relatively low flows in and out during each peak, particularly from the north. The high number of U-turning vehicles on the southern arm of this junction is likely due to the prohibition of right turning traffic at the previous junction.

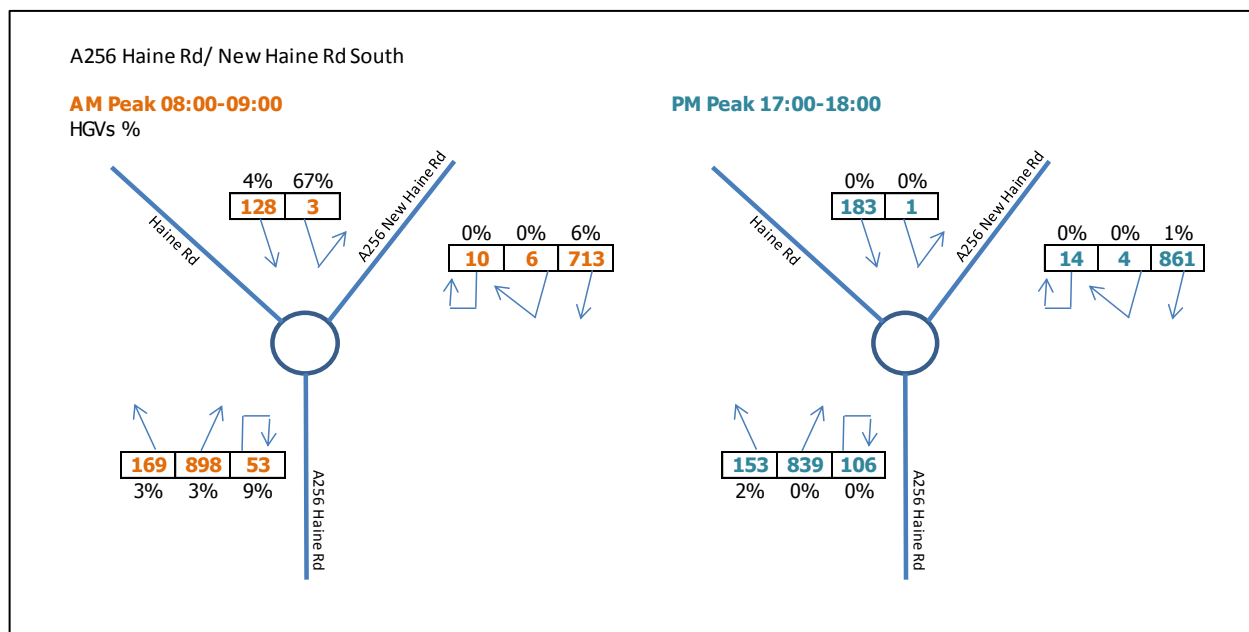


Figure 3-6: A256 New Haine Rd/Haine Rd (S) - Turning Movements (Vehs)

Observed Queue Lengths

- 3.2.37 Table 3-7 displays the queue length survey results for the A256 New Haine Road/Haine Road roundabout junction.
- 3.2.38 The table shows there are very short queues at this junction in the AM peak hour. The significantly longer queues in Lane 1 of the A256 New Haine Road arm of this junction in the PM peak hour are in contrast to the queue lengths observed throughout the AM peak hour and are significantly higher than those observed at the start and end of the remaining PM peak survey period (between 16:00 and 19:00).
- 3.2.39 Throughout most of the PM peak hour queue lengths were longer than 30 vehicles and no specific incidents were recorded by the enumerators during the survey period. The data suggests some form of exit blocking occurs during the PM peak which causes the significant queueing on the southbound A256 approach to the junction.

	Haine Road	A256 New Haine Rd		A256 Haine Rd S	
Signal Change	Lane 1	Lane 1	Lane 2	Lane 1	Lane 2
08:00-08:05	0	5	0	0	0
08:05-08:10	2	2	0	0	0
08:10-08:15	3	3	0	4	0
08:15-08:20	3	1	0	4	0
08:20-08:25	2	2	0	0	0
08:25-08:30	1	2	0	0	0
08:30-08:35	2	5	1	3	0
08:35-08:40	2	3	0	9	0
08:40-08:45	1	2	0	3	0
08:45-08:50	2	2	0	0	0
08:50-08:55	1	0	0	0	0
08:55-09:00	3	2	0	0	0
Total	22	29	1	23	0
17:00-17:05	8	37	1	3	2
17:05-17:10	14	35	1	6	1
17:10-17:15	16	36	1	3	1
17:15-17:20	14	38	1	3	1
17:20-17:25	7	37	1	1	1
17:25-17:30	3	22	1	1	0
17:30-17:35	5	28	1	0	0
17:35-17:40	2	42	1	1	0
17:40-17:45	3	37	1	1	1
17:45-17:50	4	38	1	0	0
17:50-17:55	2	42	1	0	0
17:55-18:00	5	35	1	1	0
Total	83	427	12	20	7

Table 3-7: A256 Haine Rd/New Haine Rd – Queue Lengths (Vehicles)

Junction 6 – A256 New Haine Rd/New Cross Rd

- 3.2.40 The A256 New Haine Road/New Cross Road junction is a 3-arm roundabout with New Cross Road providing a link to the A254 Margate Road to the north east.

Observed Traffic Movements

- 3.2.41 The peak hour turning movements are shown in Figure 3-7.
- 3.2.42 In the AM peak, over 250 vehicles turn into New Cross Road from A256 New Haine Road with a similar flow exiting New Cross Road. In the PM peak, nearly 450 vehicles turn into New Cross Road from A256 New Haine Road whilst 310 vehicles exit.

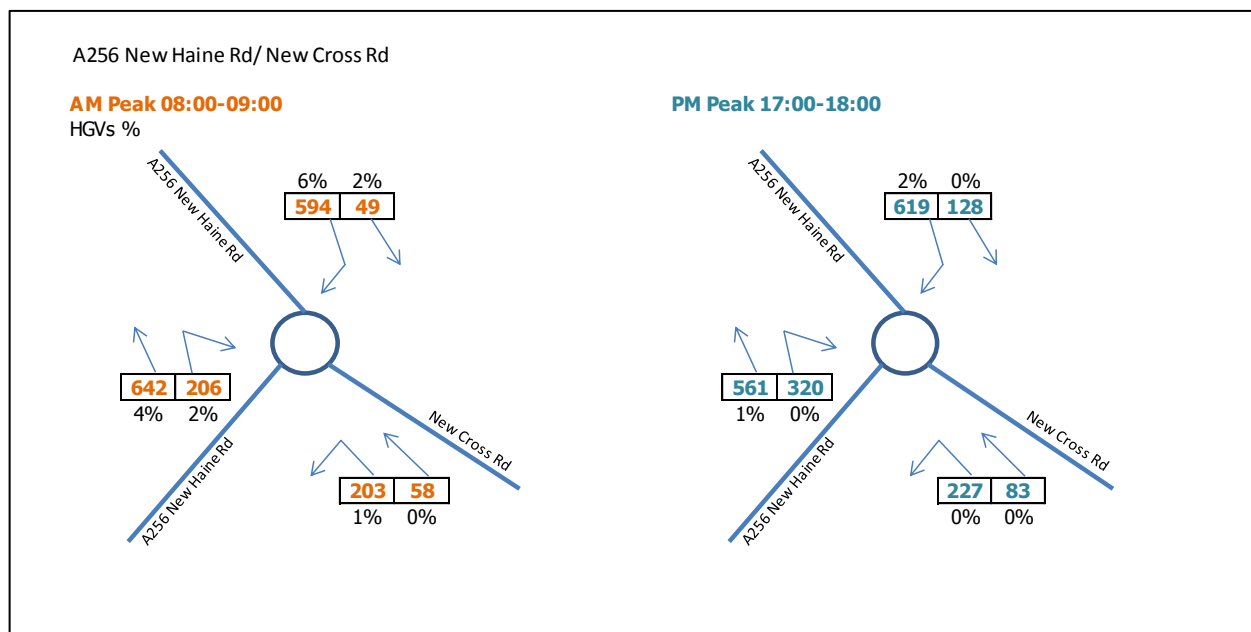


Figure 3-7: A256 Haine Rd/New Cross Rd – Turning Movements (Vehicles)

Observed Queue Lengths

- 3.2.43 Table 3-8 displays the queue length survey results for the A256 Haine Road/New Cross Road junction. As can be seen there are fairly consistent but short queues on the New Cross Road arm of this junction in both the AM and PM peak hours. The maximum queues observed were 7 vehicles in the AM peak. Very short queues were observed on both A256 Haine Road arms of this junction in the AM peak hour.
- 3.2.44 In the PM peak hour, queues of up to 20 vehicles were observed for over half of the peak hour. The remainder of the hour and the other arms of this junction experienced short queues during the PM peak hour.

	A256 New Haine Rd N	New Cross Rd	A256 New Haine Rd S
Signal Change	Lane 1	Lane 1	Lane 1
08:00-08:05	6	1	0
08:05-08:10	4	3	2
08:10-08:15	3	3	3
08:15-08:20	6	2	2
08:20-08:25	6	7	2
08:25-08:30	4	5	0
08:30-08:35	5	3	1
08:35-08:40	0	1	3
08:40-08:45	1	3	0
08:45-08:50	4	3	2
08:50-08:55	2	3	2
08:55-09:00	1	3	1
Total	42	37	18
17:00-17:05	8	3	4
17:05-17:10	17	6	1
17:10-17:15	20	4	4
17:15-17:20	19	5	4
17:20-17:25	20	3	3
17:25-17:30	15	2	5
17:30-17:35	18	6	3
17:35-17:40	20	3	0
17:40-17:45	5	4	2
17:45-17:50	5	1	1
17:50-17:55	5	2	1
17:55-18:00	3	1	2
Total	155	40	30

Table 3-8: A256 Haine Rd/New Cross Rd – Queue Lengths (Vehicles)

Junction 7 – A256 New Haine Rd/Old Haine Rd (North)

- 3.2.45 The A256 New Haine Road/Haine Road northern roundabout is the northern most point of the New Haine Road. From the roundabout, Haine Road provides access from the north to Haine Village. The A256 Haine Road continues north towards the Westwood roundabout.

Observed Traffic Movements

- 3.2.46 The peak hour turning movements are shown in Figure 3-8.

- 3.2.47 The dominant flow of traffic during both peaks is between the A256 Haine Road and the A256 New Haine Road. The minor Haine Rd arm observed 190 vehicles turning out in the AM peak compared with 166 in the PM peak. The lower flow on the northbound A256 Haine Road arm compared with the outgoing flows from the previous junction (A256 Haine Road/New Cross Road) are explained by the entrance to employment sites and the rear access into Westwood Cross retail/leisure complex.

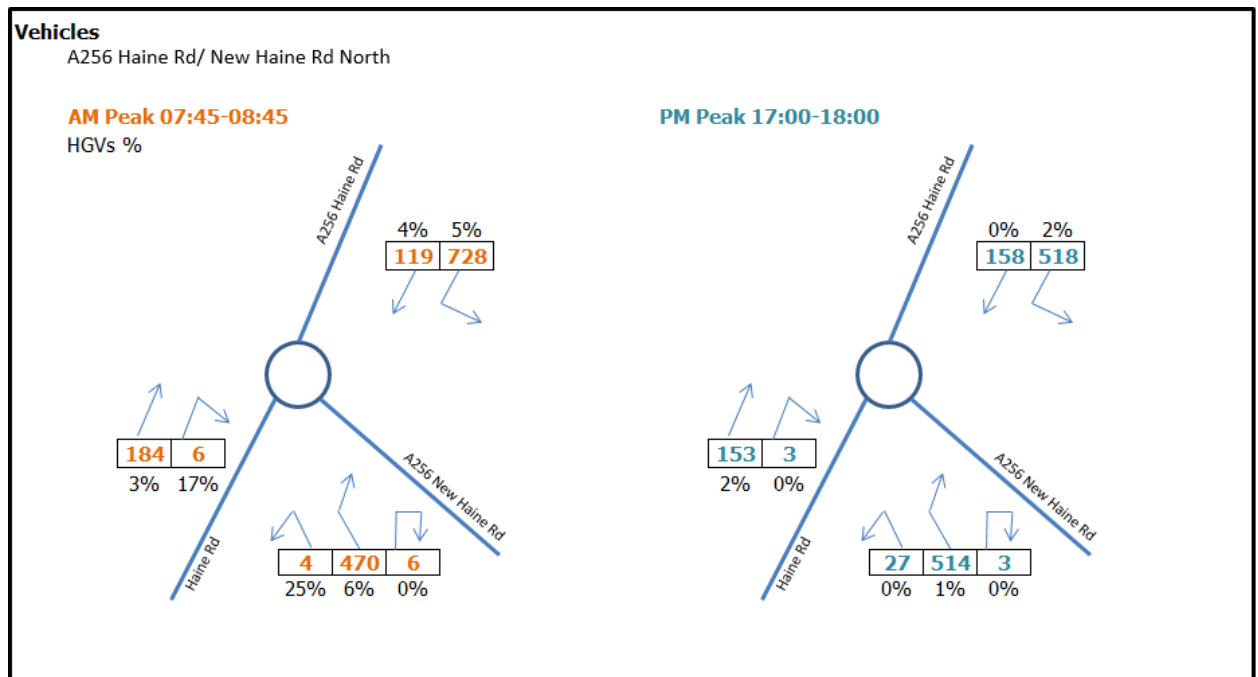


Figure 3-8: A256 New Haine Rd/Haine Rd (N) – Turning Movements (Vehs)

Observed Queue Lengths

- 3.2.48 Table 3-9 displays the queue length survey results for the A256 New Haine Road/Haine Road northern junction. The table highlights that there is very little queueing in both the AM and PM peak hours. A maximum queue of 11 vehicles formed on the A256 New Haine Road arm of this junction in the AM peak.
- 3.2.49 Queues were also longest on this arm in the PM peak hour, with a maximum of 19 vehicles observed. Queues of over 10 vehicles were observed consistently for 25 minutes of the peak hour.

	A256 Haine Road		A256 New Haine Rd		Haine Rd
Signal Change	Lane 1	Lane 2	Lane 1	Lane 2	Lane 1
07:45-07:50	0	0	0	9	2
07:50-07:55	0	0	0	8	2
07:55-08:00	0	0	0	4	1
08:00-08:05	2	0	0	10	2
08:05-08:10	0	0	0	2	2
08:10-08:15	0	0	0	1	1
08:15-08:20	0	0	2	1	1
08:20-08:25	0	0	1	9	3
08:25-08:30	1	0	0	5	0
08:30-08:35	0	0	0	2	2
08:35-08:40	0	0	2	11	1
08:40-08:45	0	0	0	5	5
Total	3	0	5	67	22
17:00-17:05	0	2	1	13	2
17:05-17:10	0	0	2	19	1
17:10-17:15	0	0	6	16	4
17:15-17:20	0	0	3	10	2
17:20-17:25	0	0	8	11	3
17:25-17:30	0	0	0	6	5
17:30-17:35	0	0	1	6	2
17:35-17:40	1	0	1	5	2
17:40-17:45	0	0	0	6	0
17:45-17:50	0	0	1	8	3
17:50-17:55	0	0	0	5	2
17:55-18:00	0	0	0	0	3
Total	1	2	23	105	29

Table 3-9: A256 New Haine Rd/Haine Rd (N) – Queue Lengths (Vehicles)

Junction 8 – A256 Haine Rd/Star Lane Link/Westwood Cross

3.2.50 The A256 Haine Road/Star Lane Link/Westwood Cross junction is a 4 arm roundabout providing an access to the Westwood Cross shopping/leisure complex. The Star Lane Link provides an alternative route to the A254 Margate Road to avoid the Westwood roundabout. It crosses Nash Road to the north west and meets the A254 at the Poorhole Lane roundabout junction.

Observed Traffic Movements

3.2.51 The peak hour turning movements are shown in Figure 3-9.

- 3.2.52 In both the AM and PM peak hours there are a similar number of vehicles turning into and out of Star Lane Link from the A256 Haine Road south. There are 466 vehicles travelling from A256 Haine Road south to north in the AM peak and 409 vehicles in the PM peak. There are around 100 vehicles fewer travelling from the A256 Haine Road north to south in the PM peak, however there are around 100 vehicles more turning into Westwood Cross from this arm in the PM peak. There are also more vehicles exiting Westwood Cross in the PM peak.

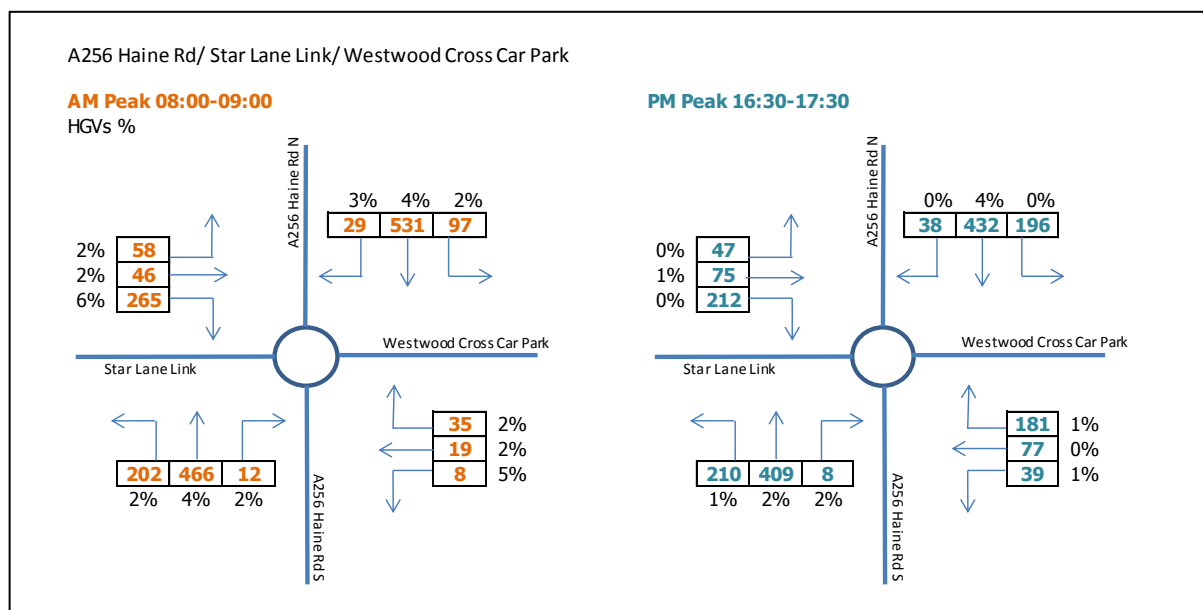


Figure 3-9: A256 Haine Rd/Star Lane Link/Westwood Cross – Turning Movements (Vehicles)

Observed Queue Lengths

- 3.2.53 Table 3-10 displays the queue length surveys for the A256 Haine Road/Westwood Cross access Star Lane link roundabout junction. In the AM peak no queues reach more than eight vehicles and this length queue is observed only in Lane 1 of the A256 Haine Road south in two five-minute intervals. In the PM peak, slightly longer queues are observed at this junction. The A256 Haine Road north queueing reaches a maximum of 11 vehicles and queueing throughout the rest of the peak hour is less than 7 vehicles.

	A256 Haine Road N		Westwood Cross		A256 Haine Rd S		Star Lane Link	
Signal Change	Lane 1	Lane 2	Lane 1	Lane 2	Lane 1	Lane 2	Lane 1	Lane 2
08:00-08:05	0	0	1	3	3	0	0	0
08:05-08:10	2	0	1	2	5	0	1	0
08:10-08:15	5	0	1	4	5	0	0	1
08:15-08:20	3	0	1	3	2	0	2	3
08:20-08:25	1	0	0	2	4	0	1	0
08:25-08:30	2	0	1	3	8	1	0	0
08:30-08:35	3	0	2	2	8	1	0	1
08:35-08:40	2	0	0	4	5	1	1	0
08:40-08:45	6	0	1	0	2	0	2	1
08:45-08:50	4	0	1	4	2	0	1	1
08:50-08:55	2	0	2	4	4	0	1	1
08:55-09:00	1	0	2	2	4	1	1	0
Total	31	0	13	33	52	4	10	8
16:30-16:35	4	0	1	6	5	0	2	1
16:35-16:40	11	1	1	5	4	0	1	1
16:40-16:45	7	1	2	8	8	1	1	4
16:45-16:50	11	0	1	3	3	1	1	3
16:50-16:55	4	1	2	1	3	1	2	2
16:55-17:00	7	1	2	4	8	0	1	3
17:00-17:05	6	1	1	3	6	0	1	3
17:05-17:10	5	0	2	7	7	1	2	4
17:10-17:15	7	1	2	2	8	1	1	4
17:15-17:20	5	0	1	5	8	2	1	3
17:20-17:25	4	2	2	2	6	1	1	3
17:25-17:30	3	0	1	2	6	0	1	2
Total	74	8	18	48	72	8	15	33

Table 3-10: A256 Haine Rd/Star Lane Link/Westwood Cross – Queue Lengths (Vehicles)

Junction 9 – A256 Haine Rd/A254 Margate Rd (Westwood roundabout)

3.2.54 The Westwood roundabout is a 4-arm junction where the A256 Haine Road meets the A254 Margate Road. The A256 continues east as Westwood Road to St Peters. The A254 Margate Road runs south east of this junction through Northwood towards Ramsgate and north of the junction to Margate.

Observed Traffic Movements

3.2.55 The peak hour turning movements are shown in Figure 3-10.

- 3.2.56 In both the AM and PM peak hours, the A256 Haine Road arm of this junction carries the largest number of vehicles by nearly 100 vehicles. In the AM peak there are around 250 vehicles travelling both north (on A254 Margate Road) and straight over (on A256 Westwood Road) from this arm. Just less than 200 vehicles turn right onto A54 Margate Road south. In the PM peak the dominant flow is straight over (to A254 Westwood Road) with 428 vehicles making this movement, whilst less than 200 vehicles are turning left (Margate Road north) and south (Margate Road south).
- 3.2.57 On the remaining three arms of this junction, and in both the AM and PM peak hours, the largest flows are the straight ahead movements. Even so, from the A254 Margate Road north and south, there is a large flow of around 200 vehicles, turning right and left respectively, into A256 Haine Road in both the AM and PM peak hours.

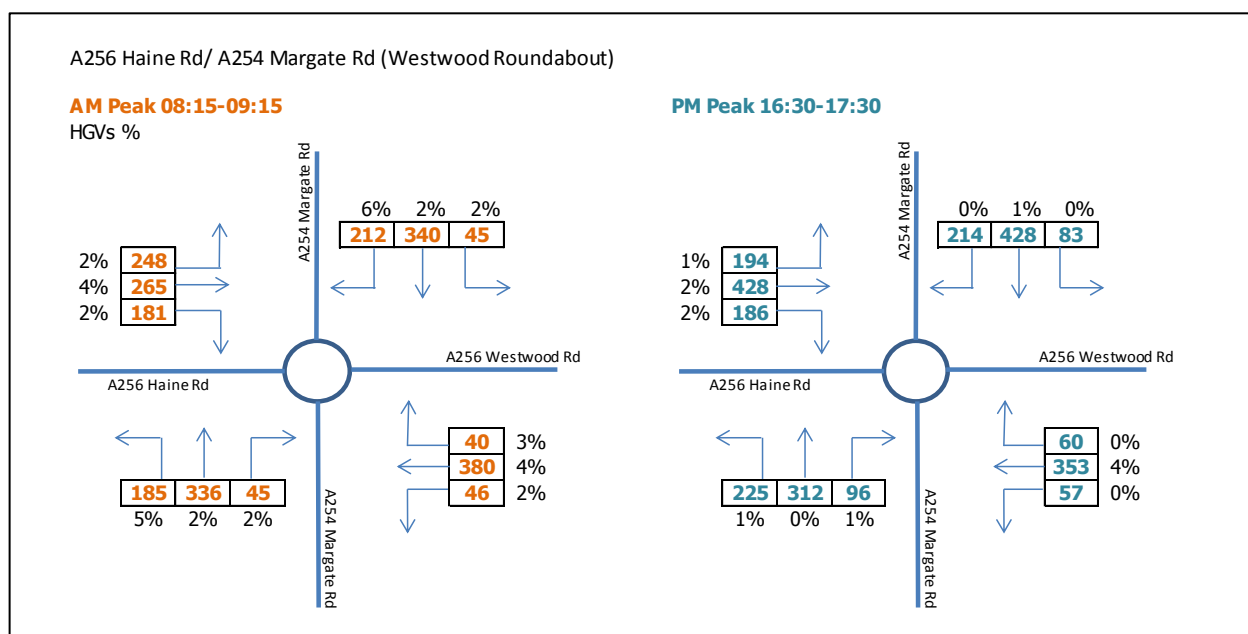


Figure 3-10: A256 Haine Rd/A254 Margate Rd (Westwood roundabout) – Turning Movements (Vehicles)

Observed Queue Lengths

- 3.2.58 Table 3-11 displays the queue length survey results for the A256 Haine Road/A254 Margate Road/Westwood Road (Westwood) roundabout. In the AM peak hour, the longest queues are observed on the A256 Westwood Road where queuing was observed to be over or nearing 20 vehicles for the majority of the hour. During one 5-minute interval the queue spiked to 40 vehicles.
- 3.2.59 Occasional queue lengths of over 10 vehicles were observed in Lanes 1 and 2 of the A254 Margate Road north arm of this junction.

3.2.60 In the PM peak hour, there was more consistent and prolonged queueing on both the A254 Margate Road north arm and the A256 Westwood Road arms of this junction. In Lane 1 of both of these arms, the queueing never falls below 14 vehicles and reaches a maximum of 42 vehicles on the A254 and 38 vehicles on the A256.

	A254 Margate Rd N		A256 Westwood Rd		A256 Margate Rd S		A256 Haine Rd	
Signal Change	Lane 1	Lane 2	Lane 1	Lane 2	Lane 1	Lane 2	Lane 1	Lane 2
08:15-08:20	4	3	19	0	3	6	1	1
08:20-08:25	18	11	40	1	3	6	5	2
08:25-08:30	15	9	25	0	1	7	3	5
08:30-08:35	9	3	21	2	2	3	3	2
08:35-08:40	8	1	24	3	1	4	4	1
08:40-08:45	3	3	9	1	1	3	3	3
08:45-08:50	7	3	7	0	2	8	5	2
08:50-08:55	8	10	24	1	5	6	5	3
08:55-09:00	7	6	13	1	2	5	2	1
09:00-09:05	9	2	17	1	2	6	5	2
09:05-09:10	6	6	20	2	1	6	4	3
09:10-09:15	7	2	19	4	4	4	2	2
Total	101	59	238	16	27	64	42	27
16:30-16:35	28	9	22	2	3	5	6	4
16:35-16:40	42	25	37	7	9	9	5	2
16:40-16:45	23	10	23	1	2	8	5	2
16:45-16:50	21	15	15	1	2	7	5	1
16:50-16:55	20	5	16	1	3	8	5	2
16:55-17:00	15	4	16	3	4	7	7	1
17:00-17:05	15	8	30	3	5	7	5	2
17:05-17:10	35	12	24	3	2	8	9	2
17:10-17:15	28	22	28	6	3	8	5	2
17:15-17:20	39	22	38	7	4	7	3	1
17:20-17:25	18	10	28	9	4	8	7	5
17:25-17:30	14	4	23	10	2	6	3	1
Total	298	146	300	53	43	88	65	25

Table 3-11: A256 Haine Rd/A254 Margate Rd (Westwood roundabout) – Queue Lengths (Vehicles)

Junction 10 – A254 Margate Rd/Star Lane/Poorhole Lane

- 3.2.61 The A254 Margate Road/Star Lane/Poorhole Lane junction is a newly built 4-arm roundabout and along with upgrades to Poorhole Lane itself was opened August 2015. This junction was built with them aim of relieving some of the congestion at the A254/ A256 Westwood roundabout junction to the south. Star Lane heads south west, crossing Nash Road to the west and meets the A256 Haine Road at the Westwood Cross roundabout. Poorhole Lane heads south east and meets the A256 Westwood Road at another newly constructed roundabout junction, east of the Westwood roundabout the retail park and supermarket roundabout junctions.

Observed Traffic Movements

- 3.2.62 The peak hour turning movements are shown in Figure 3-11.
- 3.2.63 Poorhole Lane and Star Lane remove around 150 vehicles each from the southbound A254 Margate Road flow during both the AM and PM peak hours. The flow on this arm of the junction is the largest of all arms in both peak hours and the removal of over 300 vehicles lowers the straight on turning traffic from 868 vehicles to 566 vehicles in the AM peak, and from 1005 vehicles to 674 vehicles in the PM peak.

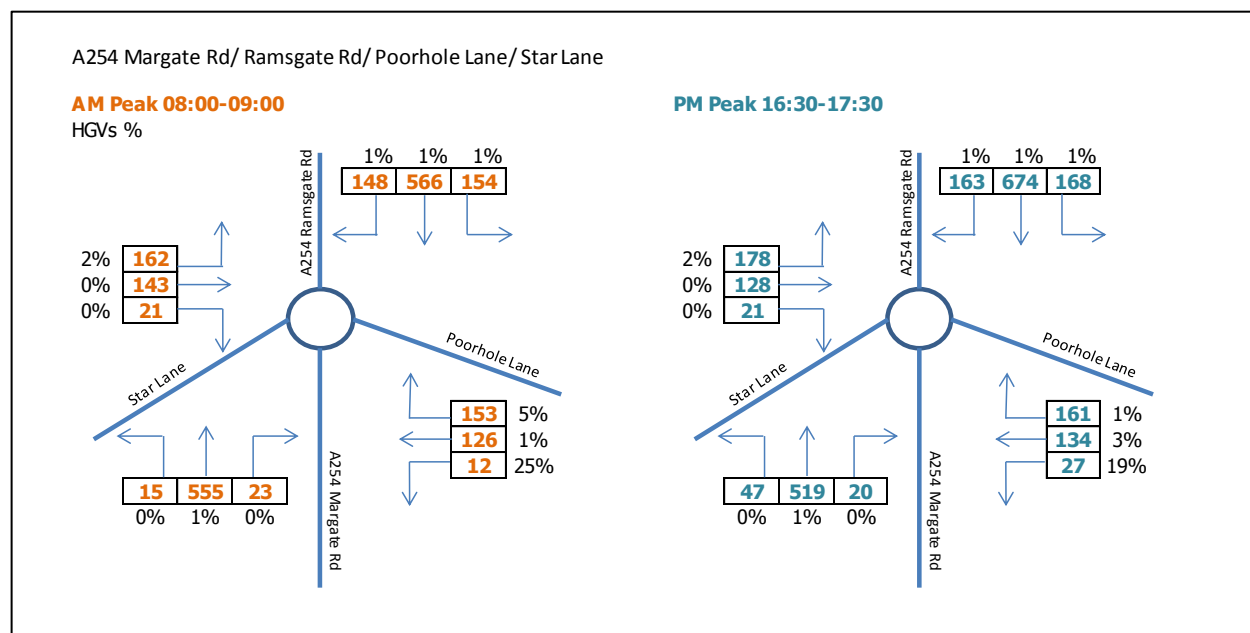


Figure 3-11: A254 Margate Rd/Star Lane/Poorhole Lane – Turning Movements (Vehicles)

- 3.2.64 A large proportion of the left turning traffic out of Poorhole Lane, heading towards the Westwood roundabout, is HGV traffic. This suggests they have come from the servicing yards on Poorhole Lane.

Observed Queue Lengths

3.2.65 Table 3-12 displays the queue length survey results for the A254 Margate Road/A254 Ramsgate Road/ Poorhole Lane roundabout junction. Overall queueing is low on all arms of this junction and is similar in both the AM and PM peak periods; however, there are more spikes in the queue lengths during the PM peak hour on the Poorhole Lane and A254 Margate Road arms of this junction. Recent highway improvements on Star Lane and Poorhole Lane have provided relief to the junction and reduced peak hour queueing and delay.

	A254 Ramsgate Rd		Poorhole Lane		A254 Margate Rd	Star Lane
Signal Change	Lane 1	Lane 2	Lane 1	Lane 2	Lane 1	Lane 1
08:00-08:05	2	3	5	6	4	4
08:05-08:10	0	6	7	11	11	5
08:10-08:15	1	6	10	4	9	4
08:15-08:20	2	3	2	2	5	4
08:20-08:25	5	4	2	3	4	5
08:25-08:30	1	6	6	5	3	7
08:30-08:35	1	5	5	2	2	4
08:35-08:40	1	4	5	8	4	4
08:40-08:45	0	2	4	5	6	7
08:45-08:50	1	1	8	6	8	5
08:50-08:55	4	2	1	2	5	8
08:55-09:00	1	6	5	4	11	8
Total	19	48	60	58	72	65
16:30-16:35	2	5	10	6	15	4
16:35-16:40	0	5	15	12	6	4
16:40-16:45	0	4	5	8	3	4
16:45-16:50	1	4	6	6	0	3
16:50-16:55	1	4	8	11	10	5
16:55-17:00	1	4	5	6	8	4
17:00-17:05	2	5	15	3	6	5
17:05-17:10	1	6	17	11	10	5
17:10-17:15	6	5	8	15	3	6
17:15-17:20	2	2	12	6	7	8
17:20-17:25	2	5	4	6	14	5
17:25-17:30	2	4	14	11	7	7
Total	20	53	119	101	89	60

Table 3-12: A254 Margate Rd/Star Lane/Poorhole Lane – Queue Lengths (Vehicles)

Junction 11 – A254 Ramsgate Rd/ B2052 College Rd (Victoria Traffic Lights)

- 3.2.66 The A254 Ramsgate Road from the Westwood area of Thanet meets the B2052 College Road at this 5-arm signalised junction. The B2052 head north east through Northdown to Kingsgate and south west for approximately 350m where it meets Shottendane Road which runs east and parallel to the A28 heading out of Thanet. A254 Ramsgate Road to the north of this junction heads into the centre of Margate town.
- 3.2.67 The B2052 Beatrice Road is one way inbound and the B2052 College Road west is one way outbound. There is a no right turn from B2052 College Road east to A254 Ramsgate Road north.

Observed Traffic Movements

- 3.2.68 The peak hour turning movements are shown in Figure 3-12.

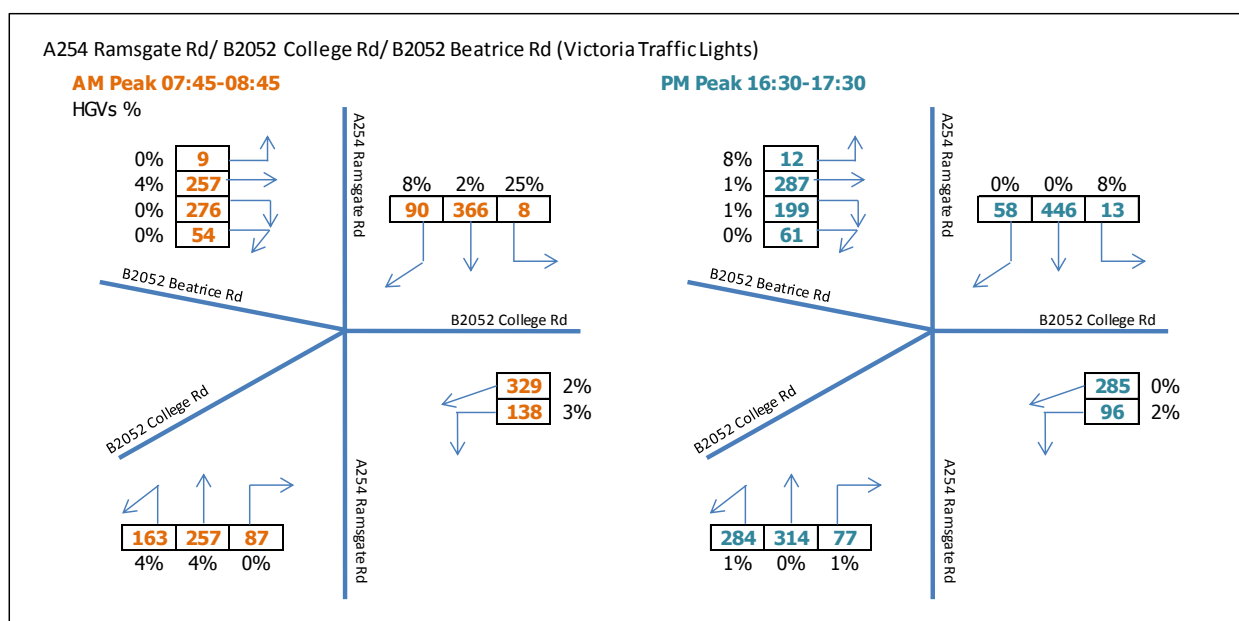


Figure 3-12: A254 Ramsgate Rd/B2052 College Rd (Victoria Traffic Lights) – Turning Movements (Vehicles)

- 3.2.69 In the AM peak, the total vehicular flows on each of the arms of this junction are fairly balanced at around 500 vehicles; however the B2052 Beatrice Road flows are slightly larger at nearly 600 vehicles. In the PM peak hour, the flows through the junction are of the same order as the AM peak; however, notably the northbound and southbound flows on the A254 Ramsgate Road are greater.

Observed Queue Lengths

- 3.2.70 Table 3-13 displays the AM peak hour queue length survey results for the Victoria traffic lights junction in Margate. The table highlights that there are fairly consistent queues of between 10 and 20 vehicles in at least one lane of each arm at this junction. The B2052 College Road experiences the longest sustained queues of over 15 vehicles for the majority of the AM peak hour.
- 3.2.71 Table 3-14 displays the PM peak hour queue length survey results for the junction. This junction experiences longer queues in the PM peak hour than in the AM peak hour. The queues experienced on the B2052 College Road are over 20 vehicles for longer intervals and near 30 vehicles at some points. Lane 1 of the A254 Ramsgate Road south also has longer queues in the PM peak with over 20 vehicles at a number of consecutive signal changes.

A254 Ramsgate Rd N			B2052 College Rd E		A254 Ramsgate Rd S			B2052 Beatrice Rd					
Signal Change	Lane 1	Lane 2		Lane 1		Lane 1	Lane 2		Lane 1		Lane 2		Lane 3 (Right Turn)
07:47:27	9	4	07:45:47	17	07:45:34	13	2	07:45:47	14	07:46:49	9	07:45-07:50	0
07:49:49	11	0	07:48:07	16	07:48:06	16	5	07:48:07	8	07:49:13	12	07:50-07:55	0
07:52:16	14	4	07:50:42	15	07:50:26	18	5	07:50:42	15	07:51:38	11	07:55-08:00	0
07:54:47	17	4	07:53:05	14	07:52:55	19	6	07:53:05	12	07:54:09	15	08:00-08:05	1
07:57:15	16	2	07:56:05	16	07:55:25	17	5	07:56:05	13	07:56:41	7	08:05-08:10	1
07:59:12	16	1	07:57:49	14	07:56:08	0	4	07:57:49	6	07:58:33	8	08:10-08:15	0
08:01:44	8	2	08:00:31	20	07:57:53	5	1	08:00:31	8	08:01:03	8	08:15-08:20	0
08:03:50	13	5	08:02:31	19	07:59:49	18	2	08:02:31	3	08:03:14	4	08:20-08:25	0
08:06:10	8	4	08:04:44	19	08:02:23	12	4	08:04:44	6	08:05:32	8	08:25-08:30	0
08:08:41	10	5	08:07:15	18	08:04:28	12	2	08:07:15	6	08:08:11	10	08:30-08:35	0
08:10:44	10	5	08:09:27	20	08:06:49	13	2	08:09:27	1	08:10:08	9	08:35-08:40	0
08:13:28	19	1	08:11:43	24	08:09:18	13	0	08:11:43	6	08:12:47	15	08:40-08:45	0
08:15:55	23	1	08:14:26	25	08:11:22	17	0	08:14:26	3	08:15:25	19		
08:18:55	12	2	08:17:11	18	08:14:05	19	2	08:17:11	17	08:18:20	14		
08:21:08	14	2	08:19:42	20	08:16:33	18	5	08:19:42	14	08:20:27	16		
08:24:21	20	2	08:22:39	22	08:17:33	4	3	08:22:39	21	08:23:40	18		
08:27:02	8	5	08:25:51	20	08:19:33	17	1	08:25:51	11	08:26:28	14		
08:29:53	15	3	08:28:22	19	08:21:46	16	3	08:28:22	18	08:29:15	16		
08:32:04	13	4	08:30:43	18	08:24:58	19	1	08:30:43	7	08:31:24	22		
08:34:03	10	5	08:32:49	16	08:27:39	20	3	08:32:49	14	08:33:29	11		
08:36:49	9	1	08:35:31	20	08:30:30	12	2	08:35:31	5	08:36:11	17		
08:39:25	21	3	08:37:42	19	08:32:42	19	2	08:37:42	9	08:38:43	17		
08:42:10	14	3	08:40:55	22	08:34:40	14	5	08:40:55	22	08:41:35	16		
08:44:08	10	4	08:42:57	20	08:37:28	15	0	08:42:57	20	08:43:33	11		
			08:44:45	22	08:40:02	20	1	08:44:45	5				
					08:42:46	9	4						
					08:44:46	18	2						

Table 3-13: A254 Ramsgate Rd/B2052 College Rd (Victoria Traffic Lights) - AM Peak Queue Lengths (Vehicles)

A254 Ramsgate Rd N			B2052 College Rd E		A254 Ramsgate Rd S			B2052 Beatrice Rd					
Signal Change	Lane 1	Lane 2		Lane 1		Lane 1	Lane 2		Lane 1		Lane 2		Lane 3 (Right Turn)
16:32:09	20	3	16:30:31	25	16:30:25	18	2	16:30:31	2	16:31:38	7	16:30-16:35	0
16:34:47	11	3	16:33:39	22	16:32:46	21	1	16:33:39	8	16:34:06	11	16:35-16:40	0
16:36:41	5	2	16:35:44	25	16:35:25	15	1	16:35:44	23	16:38:29	10	16:40-16:45	1
16:39:00	17	0	16:37:33	24	16:37:19	15	4	16:37:33	14	16:40:35	7	16:45-16:50	0
16:41:06	16	3	16:39:41	23	16:39:39	18	3	16:39:41	5	16:43:15	9	16:50-16:55	0
16:43:52	10	2	16:42:16	17	16:41:43	17	3	16:42:16	8	16:45:46	4	16:55-17:00	0
16:46:27	14	1	16:45:12	18	16:44:31	19	5	16:45:12	12	16:47:53	4	17:00-17:05	0
16:48:26	12	4	16:47:33	18	16:47:05	18	2	16:47:33	8	16:50:03	8	17:05-17:10	0
16:50:41	11	5	16:49:25	20	16:49:02	22	0	16:49:25	9	16:52:47	4	17:10-17:15	0
16:53:19	16	5	16:52:10	25	16:51:18	20	3	16:52:10	16	16:55:31	9	17:15-17:20	0
16:56:10	19	6	16:54:44	23	16:53:55	14	0	16:54:44	10	16:57:48	10	17:20-17:25	0
16:58:24	17	5	16:57:12	27	16:56:46	21	3	16:57:12	6	17:00:35	8	17:25-17:30	0
17:01:05	16	6	16:59:48	28	16:59:02	20	2	16:59:48	11	17:03:28	9		
17:04:02	14	5	17:02:24	22	17:01:46	22	6	17:02:24	12	17:06:05	18		
17:06:36	20	4	17:05:01	19	17:04:38	19	1	17:05:01	4	17:08:56	17		
17:09:28	21	2	17:07:52	18	17:07:14	21	2	17:07:52	9	17:11:10	7		
17:11:43	18	1	17:10:36	26	17:10:06	22	8	17:10:36	19	17:13:36	22		
17:14:14	17	2	17:12:58	24	17:12:21	19	6	17:12:58	11	17:16:18	19		
17:16:52	12	2	17:15:34	22	17:14:52	20	1	17:15:34	17	17:18:05	13		
17:18:42	13	5	17:17:33	24	17:17:31	13	1	17:17:33	8	17:20:21	5		
17:20:51	4	4	17:19:41	21	17:19:20	19	1	17:19:41	12	17:23:06	21		
17:23:36	7	4	17:22:01	23	17:21:30	21	1	17:22:01	6	17:25:44	6		
17:26:17	10	1	17:24:40	27	17:24:15	22	1	17:24:40	21	17:27:36	8		
17:28:12	5	1	17:27:13	17	17:26:54	20	3	17:27:13	9				
			17:29:41	16	17:28:51	18	3	17:29:41	13				

Table 3-14: A254 Ramsgate Rd/B2052 College Rd (Victoria Traffic Lights) - PM Peak Queue Lengths (Vehicles)

Junction 12 – A254 Ramsgate Rd / Enterprise Rd

- 3.2.72 Enterprise Road to the north of the route is the sole access to the Westwood industrial estate which contains a mix of commercial and industrial units with parking provided. The junction is a signalised T-junction with a right turn lane for traffic from the north.

Observed Traffic Movements

- 3.2.73 The peak hour turning movements are shown in Figure 3-13.
- 3.2.74 In the AM peak period approximately 18% of traffic on the A254 Ramsgate Road was shown to turn into the industrial estate. There are seen to be approximately twice the number of vehicles turning into Enterprise Road from the south as from the north.
- 3.2.75 In the PM peak period approximately 10% of the traffic on the A254 Ramsgate Road was seen to turn into the industrial estate.

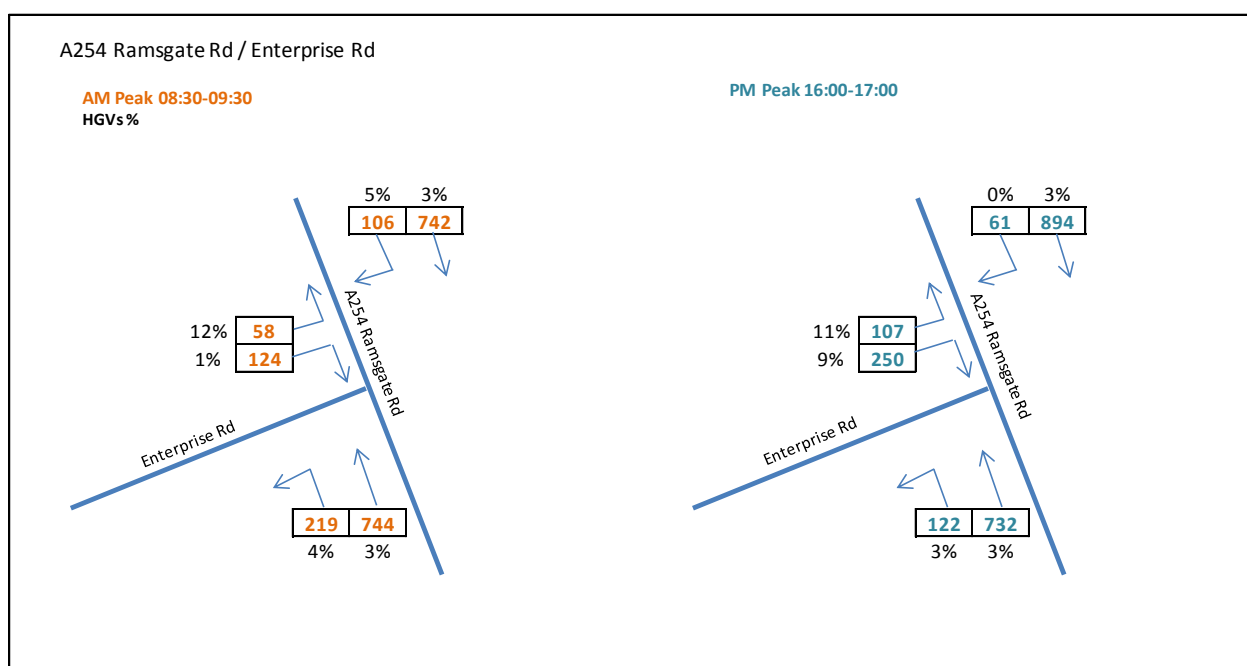


Figure 3-13: A254 Ramsgate Rd / Enterprise Rd – Turning Movements (Vehicles)

- 3.2.76 Table 3-15 shows the queuing traffic during the AM peak period. Traffic from the north shows occasional queues of traffic including a short period of time when queuing traffic reaches 20+ vehicles and remains beyond the signal change. Traffic turning into the industrial estate is provisioned with a queueing capacity of 87 metres (approximately 15 car lengths) and is therefore unlikely to be a component part of the queues.

3.2.77 In the AM peak traffic from the south builds into queues which in the main appear to clear on change of signal.

3.2.78 Enterprise Road has no significant queues within the AM peak period.

A - A254 Ramsgate Rd N			B - A254 Ramsgate Rd S		C - Enterprise Road		
Signal Change	Lane 1	Lane 2		Lane 1		Lane 1	Lane 2
8:30:37	1	0	8:30:02	7	8:30:00	1	2
8:31:41	15	0	8:31:06	11	8:31:05	2	1
8:33:08	2	0	8:32:10	1	8:32:30	0	1
8:34:10	7	1	8:33:37	8	8:33:35	3	1
8:35:37	6	0	8:34:39	6	8:35:01	0	2
8:36:55	4	0	8:36:06	11	8:36:19	1	1
8:37:58	8	0	8:37:27	14	8:37:24	1	2
8:39:02	12	0	8:38:27	3	8:38:27	8	0
8:40:05	0	0	8:39:31	15	8:39:30	1	1
8:41:09	1	0	8:40:34	10	8:40:33	1	2
8:42:25	3	2	8:41:38	2	8:41:47	2	1
8:43:28	2	0	8:42:54	5	8:42:51	4	3
8:44:51	1	1	8:43:57	8	8:44:14	0	2
8:46:11	4	0	8:45:20	8	8:45:34	1	2
8:47:14	1	1	8:46:40	7	8:46:37	2	1
8:48:18	7	0	8:47:43	6	8:49:17	0	3
8:49:55	14	1	8:48:47	6	8:50:23	1	0
8:50:59	13	1	8:50:24	7	8:51:27	3	0
8:52:02	21	0	8:51:28	4	8:52:39	1	1
8:53:17	20	0	8:52:31	10	8:54:00	0	1
8:54:36	18	2	8:53:46	11	8:55:04	5	0
8:55:40	9	5	8:55:05	8	8:56:06	2	5
8:56:44	7	2	8:56:09	8	8:57:11	2	1
8:57:46	10	2	8:57:13	12	8:58:13	1	3
8:58:49	4	0	8:58:15	9	8:59:36	1	1
9:00:12	5	1	8:59:18	13	9:00:58	0	1
9:01:34	2	2	9:00:41	9	9:02:19	0	1
9:02:57	1	1	9:02:03	6	9:03:24	1	3
9:04:00	1	6	9:03:26	8	9:04:27	0	1
9:05:03	5	6	9:04:29	11	9:05:43	2	1
9:06:19	6	5	9:05:32	4	9:06:46	0	1
9:07:22	10	2	9:06:48	7	9:07:49	0	3
9:08:26	3	0	9:07:51	5	9:08:59	3	2
9:09:35	0	1	9:08:55	6	9:10:11	2	1

A - A254 Ramsgate Rd N			B - A254 Ramsgate Rd S		C - Enterprise Road		
9:10:47	19	2	9:10:04	6	9:11:20	1	1
9:11:55	20	0	9:11:16	2	9:12:44	0	4
9:13:20	2	0	9:12:24	4	9:14:52	1	0
9:14:23	10	1	9:13:49	8	9:15:57	1	0
9:15:27	0	0	9:14:52	8	9:17:39	2	2
9:16:33	4	6	9:15:56	6	9:18:42	1	2
9:18:15	5	0	9:17:02	5	9:19:47	1	0
9:19:18	5	2	9:18:44	10	9:20:48	2	4
9:20:21	3	3	9:19:47	14	9:21:51	0	2
9:21:25	7	3	9:20:50	12	9:22:57	1	4
9:22:28	1	0	9:21:54	6	9:23:58	2	2
9:23:32	9	4	9:22:57	11	9:25:01	2	2
9:24:34	4	5	9:24:01	4	9:26:40	0	1
9:25:37	0	2	9:25:03	13	9:27:57	1	5
9:27:18	7	0	9:26:06	13	9:29:00	0	1
9:28:35	5	0	9:27:47	8			
9:29:38	6	0	9:29:04	6			

Table 3-15: A254 Ramsgate Rd /Enterprise Rd - AM Peak Queue Lengths (Vehicles)

3.2.79 Table 3-16 shows the PM peak traffic queues. Traffic is shown to queue consistently through the PM peak on the A254 from the north, these queues are seen to frequently extend to 20+ vehicles and are sustained beyond the signal change. Traffic from the south also shows consistent queueing these queues appear to ebb and flow with the light sequence. Traffic turning into Enterprise Road from the north does not appear to queue once access has been gained to the dedicated right turn lane.

3.2.80 There was seen to be a period of just over 5 minutes when queues built up on Enterprise Road extending to a maximum of 37. No issues or anomalies were reported by the survey collection team.

A - A254 Ramsgate Rd N			B - A254 Ramsgate Rd S		C - Enterprise Road		
Signal Change	Lane 1	Lane 2		Lane 1		Lane 1	Lane 2
16:01:13	19	0	16:01:42	10	16:00:20	1	0
16:02:55	10	2	16:03:24	5	16:02:03	3	6
16:04:37	18	0	16:05:06	6	16:03:47	3	19
16:06:21	11	0	16:06:50	7	16:05:29	4	23
16:08:04	19	2	16:08:33	13	16:07:12	2	37
16:09:47	20	1	16:10:16	12	16:08:57	0	19

16:11:30	20	1	16:11:59	15	16:10:40	4	3
16:13:14	8	0	16:13:43	13	16:12:23	3	3
16:15:02	9	0	16:15:31	15	16:14:11	1	7
16:17:06	7	2	16:17:35	5	16:16:15	1	3
16:19:53	6	1	16:20:22	11	16:19:01	0	12
16:21:37	12	1	16:22:06	18	16:20:44	0	4
16:23:39	16	0	16:24:08	6	16:22:46	2	4
16:25:25	25	2	16:25:54	13	16:24:30	2	0
16:27:15	18	0	16:27:44	18	16:26:25	1	5
16:28:59	27	0	16:29:28	18	16:28:07	4	0
16:30:44	16	0	16:31:13	18	16:29:52	1	6
16:32:25	23	1	16:32:54	11	16:31:36	0	13
16:34:10	18	1	16:34:39	14	16:33:16	6	5
16:35:51	20	0	16:36:20	10	16:35:00	5	7
16:37:42	20	0	16:38:11	12	16:36:51	0	6
16:39:33	18	1	16:40:02	13	16:38:41	1	3
16:41:16	19	0	16:41:45	8	16:40:25	0	2
16:43:00	18	2	16:43:29	15	16:42:08	2	4
16:44:43	17	0	16:45:12	12	16:43:52	1	1
16:46:40	22	0	16:47:09	16	16:45:47	2	7
16:48:36	13	2	16:49:05	10	16:47:44	1	5
16:50:21	21	3	16:50:50	5	16:49:29	3	3
16:52:15	19	0	16:52:44	9	16:51:24	3	4
16:53:58	20	2	16:54:27	15	16:53:08	3	5
16:55:41	17	0	16:56:10	22	16:54:49	4	4
16:57:26	23	3	16:57:55	29	16:56:35	1	2
16:59:10	11	1	16:59:39	24	16:58:16	4	3

Table 3-16: A254 Ramsgate Rd /Enterprise Rd - PM Peak Queue Lengths (Vehicles)

Junction 13 – A254 Ramsgate Rd / QEQM Hospital

3.2.81 The QEQM hospital has two entrances one of which is on the A255 the other on the A254 to the northern end of the route. The QEQM junction with the A254 is a signalised T-junction with a left turn lane for traffic from the north and a right turn lane for traffic from the south.

Observed Traffic Movements

3.2.82 The peak hour turning movements are shown in Figure 3-14. Buses serving the hospital pick up and set down within the hospital site which is reflected in the relatively high HGV percentages shown turning into and out of the site.

3.2.83 In the AM peak period approximately 15% of traffic on the A254 Ramsgate Road was

recorded as turning into the hospital at this junction compared with approximately 8% in the PM peak period.

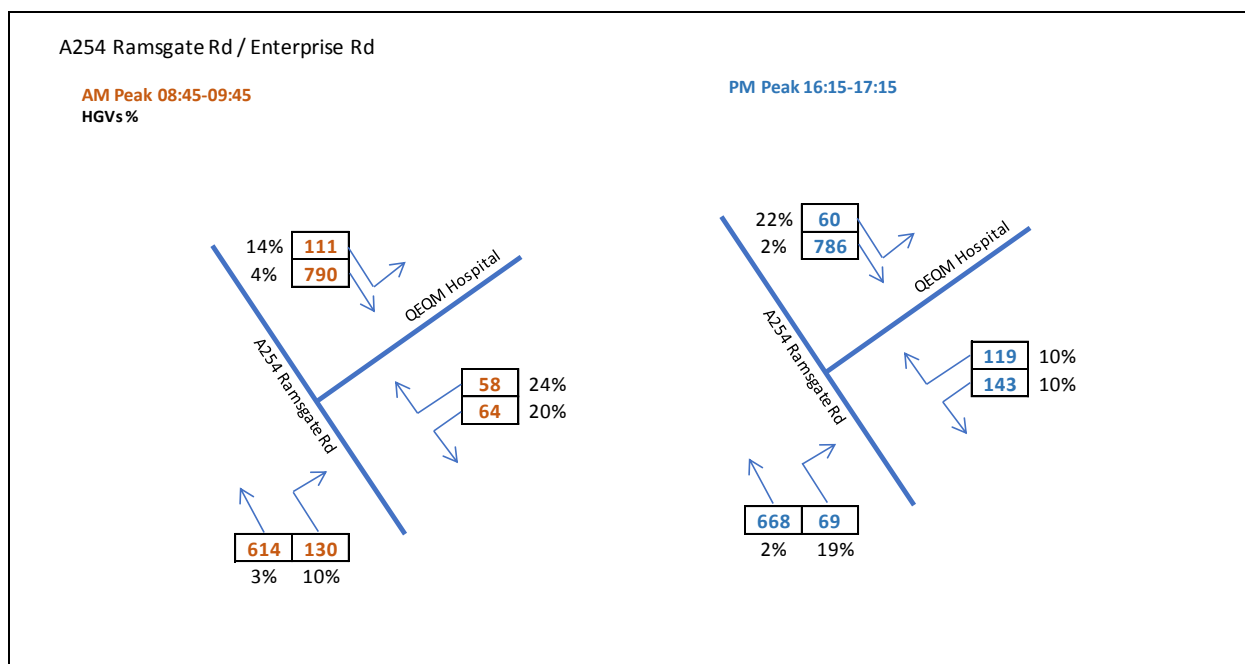


Figure 3-14: A254 Ramsgate Rd / Enterprise Rd – Turning Movements (Vehicles)

3.2.84 Table 3-17 shows the AM peak hour queues at the QE/QM Hospital junction. As can be seen some queue development occurs in lane 2 on the A254 from the north, this is the straight ahead movement. Queues appear to ebb and flow and do not appear to continue beyond the signal change.

A - A254 Ramsgate Rd N				B - Queen Elizabeth Queen Mother			C - A254 Ramsgate Rd S			
Signal Change	Lane 1		Lane 2		Lane 1	Lane 2		Lane 1		Lane 2
8:46:04	0	8:46:25	20	8:45:49	3	0	8:45:46	5	8:46:58	3
8:47:49	0	8:48:04	21	8:47:25	1	4	8:47:25	2	8:48:31	2
8:49:30	0	8:49:40	13	8:49:00	1	1	8:49:01	5	8:50:57	7
8:52:00	0	8:50:30	9	8:49:52	2	0	8:49:51	4	8:52:40	7
8:53:42	1	8:52:12	19	8:51:33	1	2	8:51:33	8	8:54:20	7
8:55:26	1	8:53:52	7	8:53:15	2	0	8:53:13	4	8:56:16	6
8:57:22	1	8:55:49	20	8:55:12	4	0	8:55:10	13	8:58:11	7
8:59:14	1	8:57:43	5	8:57:06	2	2	8:57:04	5	8:59:50	3
9:00:46	1	8:59:23	9	8:58:47	1	1	8:58:44	2	9:01:13	1
9:02:05	0	9:00:46	6	9:01:39	5	0	9:00:07	0	9:02:46	5
9:03:46	0	9:02:19	2	9:03:22	5	0	9:01:40	2	9:04:30	3
9:05:48	1	9:04:03	20	9:05:22	2	1	9:03:24	10	9:06:25	6

A - A254 Ramsgate Rd N				B - Queen Elizabeth Queen Mother			C - A254 Ramsgate Rd S			
9:07:24	0	9:05:58	7	9:06:57	1	0	9:05:19	3	9:08:01	5
9:09:01	0	9:07:34	3	9:08:34	5	0	9:06:55	9	9:09:52	2
9:10:49	1	9:09:20	4	9:10:21	2	1	9:08:41	4	9:11:26	5
9:12:28	1	9:10:59	6	9:12:01	2	1	9:10:20	1	9:13:28	4
9:14:28	0	9:13:02	7	9:14:13	1	1	9:12:23	5	9:15:16	6
9:16:16	0	9:14:49	14	9:15:47	0	4	9:14:10	3	9:16:55	8
9:18:05	0	9:16:29	8	9:17:38	3	1	9:15:50	3	9:18:43	2
9:19:47	3	9:18:16	6	9:19:16	0	1	9:17:37	1	9:20:29	4
9:21:33	0	9:19:59	10	9:21:16	3	2	9:19:20	2	9:22:22	2
9:23:20	0	9:21:55	19	9:22:54	1	0	9:21:16	9	9:23:59	4
9:24:57	2	9:23:30	7	9:24:30	5	0	9:22:51	5	9:25:42	3
9:26:40	1	9:25:17	20	9:26:12	3	1	9:24:38	5	9:27:16	1
9:28:09	1	9:26:49	7	9:27:40	5	0	9:26:10	7	9:28:55	3
9:29:58	3	9:28:27	2	9:29:42	2	4	9:27:48	7	9:30:48	2
9:31:46	1	9:30:22	8	9:31:16	4	3	9:29:43	6	9:32:28	4
9:33:26	0	9:32:01	16	9:33:00	3	2	9:31:22	2	9:34:05	1
9:35:08	0	9:33:38	9	9:34:51	1	1	9:32:59	2	9:35:58	2
9:36:54	0	9:35:29	21	9:36:37	0	3	9:34:50	14	9:37:43	2
9:38:41	2	9:37:16	5	9:38:12	1	1	9:36:37	6	9:39:17	4
9:40:16	0	9:38:51	7	9:39:48	2	1	9:38:12	1	9:41:01	1
9:41:58	0	9:40:34	21	9:41:31	2	4	9:39:55	3	9:44:01	2
		9:42:11	3	9:43:05	0	2	9:41:32	6		
		9:43:44	7	9:44:36	3	1	9:43:05	3		
							9:44:45	0		

Table 3-17: A254 Ramsgate Rd /QEQM Hospital - AM Peak Queue Lengths (Vehicles)

3.2.85 Table 3-18 shows the PM peak hour queues at the QEQM Hospital junction. As can be seen in the PM peak there is some development of queues for southbound traffic but mostly these do not extend beyond the signal change. Queues for northbound traffic often exceed 19 vehicle with queues of 30 plus vehicles being common place. Queues of this length will persist beyond the signal change. There are also gaps within the peak hour period when queues are minimal and likely to dissipate following the signal change.

A - A254 Ramsgate Rd N				B - Queen Elizabeth Queen Mother			C - A254 Ramsgate Rd S			
Signal Change	Lane 1		Lane 2		Lane 1	Lane 2		Lane 1		Lane 2
16:17:07	0	16:15:45	7	16:15:00	1	5	16:15:06	36	16:16:10	2
16:18:47	0	16:17:25	16	16:16:39	6	0	16:16:46	36	16:17:52	2
16:20:32	0	16:19:05	8	16:18:18	5	1	16:18:26	38	16:19:33	3
16:22:24	0	16:21:03	20	16:20:17	4	4	16:20:24	36	16:21:29	1
16:24:05	0	16:22:42	21	16:21:54	5	0	16:22:03	38	16:23:09	2
16:25:49	0	16:24:24	17	16:23:38	3	4	16:23:45	38	16:24:51	2
16:27:42	0	16:26:19	21	16:25:32	6	0	16:25:40	37	16:26:46	2
16:29:29	0	16:28:01	14	16:27:15	7	1	16:27:22	20	16:28:28	1
16:31:24	1	16:30:00	7	16:29:14	6	1	16:29:21	23	16:30:27	4
16:32:59	0	16:31:34	5	16:30:59	2	2	16:30:55	8	16:32:01	5
16:34:43	1	16:33:16	19	16:32:32	6	2	16:32:37	7	16:33:44	4
16:36:23	0	16:35:00	19	16:34:15	3	4	16:34:21	17	16:35:28	4
16:38:11	1	16:36:41	17	16:35:57	6	2	16:36:02	14	16:37:09	10
16:39:48	1	16:38:25	4	16:37:44	1	1	16:37:46	16	16:38:51	3
16:42:51	0	16:40:06	21	16:39:19	7	3	16:39:27	18	16:41:50	2
16:44:44	0	16:41:22	1	16:40:35	6	3	16:40:43	14	16:43:49	1
16:47:55	1	16:43:22	20	16:42:33	5	0	16:42:43	37	16:46:57	3
16:49:31	0	16:45:01	18	16:44:14	6	3	16:44:22	22	16:48:39	0
16:51:13	0	16:46:30	8	16:45:46	5	1	16:45:51	28	16:50:20	1
16:54:15	0	16:48:12	11	16:47:25	5	2	16:47:33	35	16:53:19	3
16:55:48	0	16:49:45	4	16:49:04	4	2	16:49:06	39	16:54:51	4
16:57:18	0	16:51:31	4	16:50:44	7	1	16:50:52	38	16:56:26	0
16:59:00	0	16:52:52	3	16:52:14	0	1	16:52:13	37	16:58:03	3
17:00:49	0	16:54:24	3	16:53:47	2	2	16:53:45	9	16:59:46	3
17:02:41	0	16:55:58	6	16:55:20	6	2	16:55:19	9	17:01:45	1
17:04:38	1	16:57:37	6	16:56:52	6	0	16:56:58	10	17:03:37	2
17:06:20	0	16:59:19	21	16:58:36	7	0	16:58:40	8	17:05:25	2
17:08:02	0	17:01:18	9	17:00:30	4	2	17:00:39	35	17:07:08	3
17:09:41	0	17:03:11	19	17:02:25	5	1	17:02:32	26	17:08:49	0
17:14:21	0	17:04:56	14	17:04:09	5	0	17:04:17	28	17:13:26	2
		17:06:39	9	17:05:52	4	3	17:06:00	8		
		17:08:22	6	17:07:35	6	2	17:07:43	36		
		17:10:00	8	17:09:13	5	4	17:09:21	38		
		17:11:29	8	17:10:45	5	5	17:10:50	37		
		17:12:59	1	17:12:11	1	5	17:12:20	20		
		17:14:40	15	17:13:54	6	2	17:14:01	37		

**Table 3-18: A254 Ramsgate Rd /QEQM Hospital - PM Peak Queue Lengths
(Vehicles)**

3.3 Link Capacity

- 3.3.1 An indication of the current conditions in terms of link capacity at certain points within the study corridor can be identified using the Design Manual for Roads and Bridges (DMRB) and existing one-way traffic flows.
- 3.3.2 The roads through the A256/A254 corridor can be categorised using the DMRB volume 5 TA 79/99. This classification and the road width then determine a theoretical capacity to compare against flows. An extract of the relevant section of the DMRB providing a description of the different road classifications is shown in Figure 3-15. These guidelines are seen as a relevant indicative tool for assessing capacity.

	UM	UAP1	UAP2	UAP3	UAP4
General Description	Through route with grade separated junctions, hardshoulders or hardstrips, and motorway restrictions.	High standard single/dual carriageway road carrying predominantly through traffic with limited access.	Good standard single/dual carriageway road with frontage access and more than two side roads per km.	Variable standard road carrying mixed traffic with frontage access, side roads, bus stops and at-grade pedestrian crossings.	Busy high street carrying predominantly local traffic with frontage activity including loading and unloading.
Speed Limit	60mph or less	40 to 60 mph for dual, & generally 40mph for single carriageway	Generally 40 mph	30 mph to 40 mph	30mph

Figure 3-15: DMRB TA 79/99 road classifications

- 3.3.3 Three locations within the corridor have been identified as follows:
1. A254 between Victoria Lights and Salmestone Rd junctions;
 2. A254 to the north of the junction with Star Lane and Poorhole Lane; and
 3. A256 between the Haine Rd and St Johns Avenue junctions.



Figure 3-16: A256/A254 Link Capacity - Site 1 (©2017 Google)

- 3.3.4 Site 1 is considered to fall within the UAP4 category with a road width of 6.75 metres. The section of the route has the function of a high street with a 30mph speed limit, shop frontages and busy interactions with side roads. The characteristics of this section of the corridor are shown in Figure 3-16.
- 3.3.5 Sites 2 and 3 are considered to fall within the UAP3 category with road width of 6.75 metres. Both sites have frequent side roads and frontage accesses. Site 2 has a speed limit of 30 mph and Site 3 has a speed limit of 40mph. The characteristics of these sections of the corridor are shown in Figure 3-16 and Figure 3-17.



Figure 3-16: A256/A254 Link Capacity - Site 2 (©2017 Google)



Figure 3-17: A256/A254 Link Capacity - Site 3 (©2017 Google)

- 3.3.6 The theoretical link capacity at each of the 3 sites has been compared with the worst case one-way peak hour flow to provide an indication of the current operation of the links. These comparisons are shown in Table 3-19.

	Road Type	Carriageway Width (m)	Theoretical capacity (one-way)	Max Hourly flow (one-way)	Ratio of flow/capacity
Site 1	UAP4	6.75	900	780 (AM/SB)	0.87
Site 2	UAP3	6.75	1110	1005 (PM/SB)	0.91
Site 3	UAP3	6.75	1110	1120 (AM/NB)	1.00
	UAP2	6.75	1260	1120 (AM/NB)	0.88

Table 3-19: A254/A256 Corridor – Indicative Link Flow/Capacity

- 3.3.7 The above table indicates that the sites along the study corridor are operating very close to their theoretical capacity. In particular, the A256 to the south of the junction with Haine Road (site 3) has met its capacity, when judged as UAP3, as per the above assessment. As the A256 Haine Road/New Haine Road is quite varied along its route it has seemed useful to provide the range using UAP3 and UAP2.

3.4 Average Journey Times

- 3.4.1 Average journey times through the corridor have been established using the Basemap software 'Highways Analyst'. Average link times were calculated for the route through

the corridor in both directions for the AM peak (0800 – 0900) and PM peak (1700 – 1800) peaks; and for an overnight period¹ assumed to reflect free-flow conditions.

3.4.2 By comparing journey times during free flow and peak times scenarios the average level of delay observed during peak periods has been established.

3.4.3 The journey time corridor used for this calculation is that shown in Figure 1-11-1, from the A299 Hengist Way/A256 Richborough Way roundabout junction near Cliffsend to the 'Victoria traffic lights' junction in Margate.

3.4.4 Table 3-20 displays the average journey times for the A256/A254 corridor.

Direction	Distance (kms)	AM (mm:ss)	PM (mm:ss)	Free Flow* (mm:ss)	Delay	
					AM	PM
SB	7.4	09:52	11.01	08:21	01:32	02:41
NB	7.3	11:21	11:47	08:28	02:52	03:18
Total					04:24	05:59

Table 3-20: A256/A254 Corridor – Average Journey Times and Delay

3.4.5 The table shows that the corridor experiences delay in both directions when compared with free-flow conditions. The PM peak hour experiences more delay in total than the AM peak hour, by over one and a half minutes. There is also a notably larger delay in the northbound direction with approximately three minutes delay experienced in both the AM and PM peak hour. This is a level of delay which becomes notable, adding an additional third of the journey time of this route from an important suburb to the town centre.

3.4.6 Given that the link capacity of the Haine Corridor portion of the A256 is close to being reached, it is expected that anything other than a slight increase in traffic flows could have a significant impact on journey times, and journey time reliability, within the corridor without material improvements to the link as a whole being delivered.

3.5 Highway Safety Record

3.5.1 Personal Injury Crash records (PICs) have been analysed for a period of 3 years and 9 months from 1st June 2012 to 31st March 2016. This period of analysis excludes data recorded prior to the opening of the East Kent Access link road.

3.5.2 A desktop analysis has been carried out of reported PICs along the 7.6 km (4.7 mile) A254/A256 study area between Victoria lights and Sevenscore roundabout to assist in

¹ Typically 1am to 5am but extended where data was unavailable between these times.

the identification of existing issues and problems on A254/A256 corridor.

3.5.3 An initial review of the data for the study area identified that there were a total of 144 PICs during the 3 year 9 month time period. Of these: 1 (1%) were Fatal and 13 (9%) were classified as Serious incidents. The remaining 130 (90%) of PICs were deemed to be Slight in severity.

3.5.4 Table 3-21 shows the number of crashes by severity for each year and Figure 3- shows the locations of these PICs.

	2012 to 2013²	2013 to 2014	2014 to 2015	2015 to 2016
Slight	24	36	36	34
Serious		2	4	7
Fatal				1

Table 3-21: A256/A254 Corridor - Crashes by Year and Severity³

² March, April and May 2012 not included in this data set EKA road not complete until May 2012.

³ Yearly periods run from the March to February of the following year.

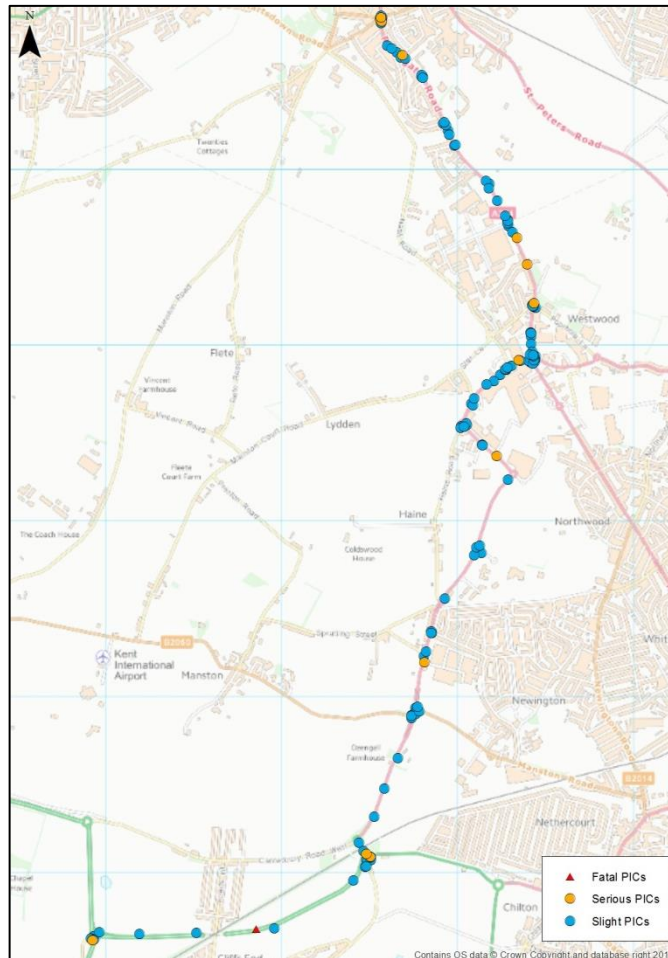


Figure 3-19: A256/A254 Corridor - PIC Locations by Severity

3.5.5 Figure 3-19 indicates that crashes have occurred throughout the route; however, clusters of crashes have been observed at most major junctions. Table 3-22 reports the total number of PICs for all junctions where 4 or more incidents occurred within the study period.

Junction	PICs		
	Slight	Serious	Total
Westwood Cross	20	1	21
Victoria Lights	8	3	11
Poorhole Lane	10	1	11
Manston Road	9	-	9
Lord of the Manor (s)	7	1	8
Haine Road (n)	6	-	6
Enterprise Road	5	-	5

Junction	PICs		
QEQM	5	-	5
Perkins Avenue	3	1	4

Table 3-22: A256/A254 - PICs at Junctions

- 3.5.6 As can be seen Westwood Cross has the highest recorded number of crashes with 21 incidents within the study period. Victoria lights and Poorhole Lane both have 11 incidents recorded for the time period with 3 of these being serious incidents at Victoria lights.

Vulnerable Road Users

- 3.5.7 Table 3-23 shows the total number of injuries sustained by vulnerable road users regardless of other vehicles involved.
- 3.5.8 45 (31%) of the total number of PICs involved a pedestrian, cyclist, mobility scooter user or a motorcyclist and at least one other motor vehicle. A further 12 incidents were reported which involved a pedestrian, cyclist or a motorcyclist but did not involve any other motorised vehicles. In these 57 crashes, 59 individuals from this more vulnerable group sustained injury.

	Severity	2012-2013	2013-2014	2014-2015	2015-2016	Total
Pedestrians	Slight		2	3		5
	Serious				2	2
Cyclists	Slight	7	4	5	6	22
	Serious			2	1	3
Motorcyclists	Slight	4	1	6	6	17
	Serious		2	2	3	7
Mobility Scooters	Fatal				1	1
Total		11	9	18	19	57

Table 3-23: A256/A254 Corridor - Vulnerable Road User PICs by Year

Summary

- 3.5.9 In terms of vulnerable road users the crash record suggests that there are no particular hotspots in terms of highway safety hazards for pedestrians, cyclists and motorcyclists.
- 3.5.10 Victoria Lights has been recorded as having the highest number of pedestrian incidents with 4 of the 7 incidents seen corridor wide occurring in this location. In general the volume of pedestrian incidents on the corridor is considered to be relatively low.
- 3.5.11 There are a high proportion of motorcycle related incidents (17%). Westwood Cross and the southernmost Lord of The Manor roundabout are both recorded as having 4 of these incidents with Sevenscore roundabout being recorded as having 3 motorcycle related incidents.
- 3.5.12 Westwood Cross, Victoria Lights, Poorhole Lane and Manston Road are shown to have the poorest accident record with regard to motorised vehicles in general.

Comparison with National Values

- 3.5.13 An annual crash rate has been calculated based on the observed crashes and using Annual Average Daily Flow (AADF) values as taken from the DfT website. The crash rate is based upon a weighted average AADF and route length. Table 3-24 shows the average total route length, the average AADF and calculated crash rate.

Start Junction	End Junction	Distance (m)	KM	AADT Count	No Crashes	Crashes per year	Annual no Cars	Annual Distance Travelled (km)	Million kms of Travel	Crash Rate
Sevenscore Roundabout	Victoria Lights	7300	7.300	17474	144	28.8	6378000	46559400	46.6	0.62

Table 3-24: A256/A254 Corridor - Crash Rate

- 3.5.14 The calculated crash rate is 0.62 PIC accidents per million vehicle kilometres travelled, however, it should be noted that this is an average across a 7.3 km route which is made up of a variety of road types and speed limits including the very modern section of A254 Hengist Way and Westwood Cross alongside older sections of route.

3.5.15 The corridor crash rate has been compared to appropriate national crash rate values reported in WebTAG COBALT data tables as shown in Table 3-25. A range of national crash rates have been selected to reflect the various characteristics of the study corridor. The corridor crash rate of 0.62 is considered to be broadly comparable with national values.

Accident Rates and Change Factors					
Road Type	Speed Limit (mph)	Accident Rate	Road Description	Areas of comparison	Approximate % route
4	30/40	0.532	Modern S2 Roads	New Haine Road / Westwood Cross	18%
8	30/40	0.863	Older S2 A Roads	North of Manston Road	47%
8	>40	0.244	Older S2 A Roads	South of Manston Road / North of Poorhole Lane to Victoria lights	11%
10	>40	0.107	Modern D2 Roads	Hengist Way	25%

Table 3-25: Highway Crash Rates⁴

3.6 Summary

3.6.1 In summary, the collated data indicates that the A256/A254 corridor generally operates with moderate levels of queueing and delay. The study has identified that the Haine Road Corridor is approaching its design link capacity; as such a modest increase in traffic flow has the potential to generate a disproportionate increase in journey time delay during times of peak traffic demand.

3.6.2 A number of junctions observe notable levels of peak hour queueing and delay. In particular the A299 Hengist Way/A256 Richborough Way, Westwood roundabout, the Victoria Traffic Lights A254 Ramsgate Rd /Enterprise Rd and A254 Ramsgate Road / QEQM Hospital junctions all observe more significant queueing during one or more of the weekday peak periods. At least one approach at all of these junctions observes queues in excess of 20 vehicles which suggest some capacity issues are present.

3.6.3 The most severe congestion currently observed occurs at the Westwood roundabout and Victoria Lights junctions where more sustained and significant queueing was recorded.

⁴ Cobalt 3 - Update of Highway Accident Rates for Use in Scheme Appraisal - TRL 2012 (Table 7-2 for Overall Accident Rates (2008-2010); pg.26 and Table 4/1 for Accident Rate Reduction Factor (β) (personal injury accidents pmvk - 2009 Base); pg.42)

- 3.6.4 In terms of highway safety there are clusters of crashes at some of the key junctions, in particular at the Westwood roundabout, however, in general the route is considered to have a lower than average annual crash rate.

4 A28 Canterbury Road – Current Traffic Conditions

4.1 Overview

4.1.1 Existing traffic conditions along the A28 corridor have been captured through the analysis of a range of data sources. The following data collection and analysis has been undertaken at key junctions within the study area:

- Junction Turning Counts (JTC); and
- Queue Length Surveys.

4.1.2 In addition, average journey times have been established through the corridor using Highways Analyst software. Furthermore, personal injury crash records have been analysed to determine historic highway safety considerations within the corridor.

4.1.3 The data has been analysed in order to better understand traffic movements and identify where issues exist. The following section presents the analysis for each survey.

4.2 Junction Operation

4.2.1 The current traffic conditions at the key junctions on the study corridor have been captured through junction turning count (JTC) surveys and queue length surveys. The JTC surveys were provided by third parties and the queue length surveys were collected at the majority of these junctions as part of this study to further contribute to the understanding of the operation of the major junctions along the study corridor.

4.2.2 Queue length surveys were undertaken only at junctions considered to experience delays in the AM and PM peak periods. Junctions where queue length surveys were not undertaken are identified in the list overleaf.

4.2.3 The A28 Canterbury Road/Station Road (The Square, Birchington) junction was not captured as part of the third party data collection exercise. This junction is known to experience severe queueing during the peak periods therefore the JTC was collected as part of this study.

4.2.4 The following junctions have been used assessed as part of this corridor study:

Junction 1 – A299 Thanet Way/A28 Canterbury Rd (St Nicholas roundabout) (no queue length survey);

Junction 2 – A28 Canterbury Rd/Seamark Rd (no queue length survey);

Junction 3 – A28 Canterbury Rd/Park Lane;

Junction 4 – A28 Canterbury Rd/Station Rd (Birchington Square);

Junction 5 – A28 Canterbury Rd/St Mildreds Rd/ Minster Rd;

Junction 6 – A28 Canterbury Rd/Garlinge High St;

Junction 7 – A28 Canterbury Rd/George V Ave/ Maynard Ave;

Junction 8 – A28 Canterbury Rd/A28 Marine Terrace/Station Approach (no queue length survey); and

Junction 9 – A28 Marine Terrace/A254 Marine Gardens/Marine Drive.

4.2.5 The locations of the junction turning count surveys are shown in Figure 4-1

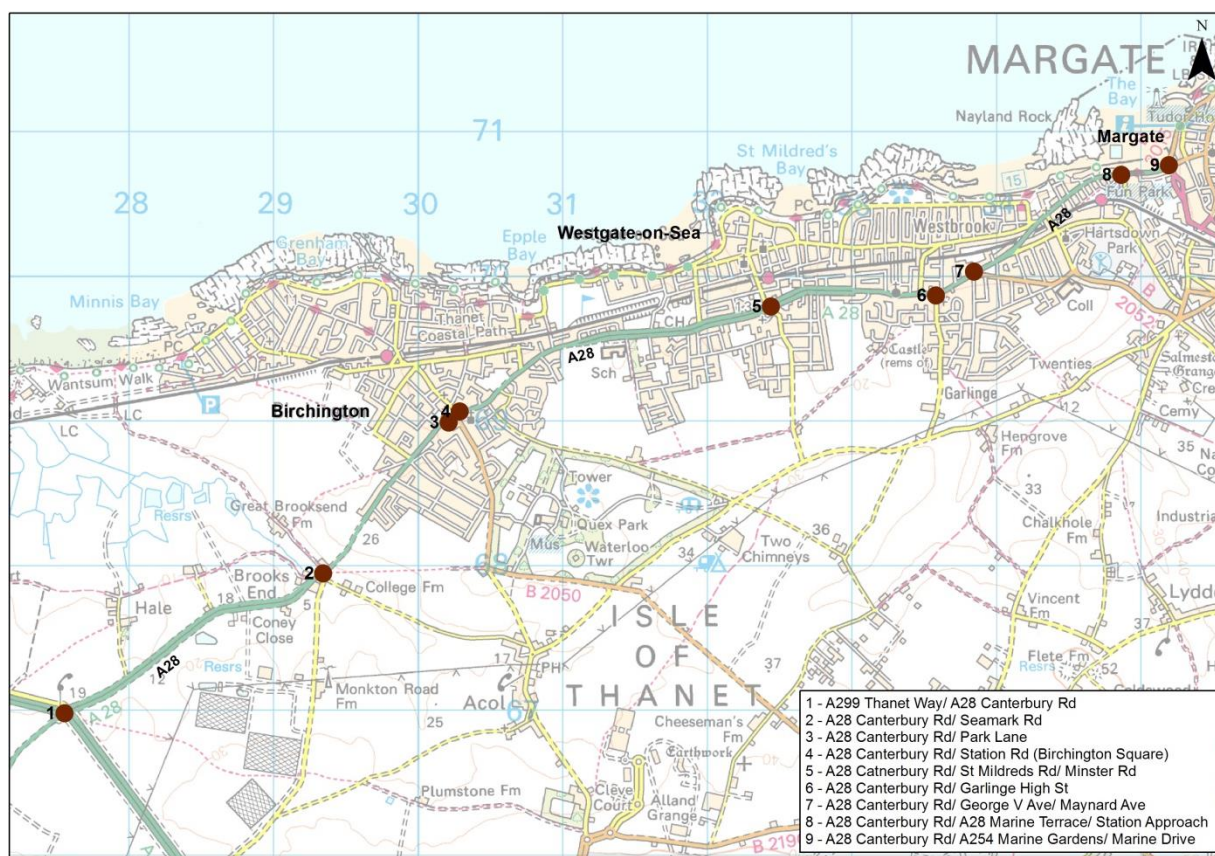


Figure 4-1: A28 Corridor - Junction Turning Count Survey Locations

4.2.6 The JTC surveys were carried out on Tuesday 12th January 2017 between the hours of 07:30 and 09:30, and 16:30 and 18:30. The Square, Birchington JTC and the queue length surveys were carried out on Wednesday 1st March 2017.

- 4.2.7 The data is intended to provide a snapshot of existing traffic conditions along the A28 corridor. The exact AM and PM peak hours have been determined for each individual junction and reported in Table 4-1.

	Location	Weekday AM Peak	Weekday PM Peak
1	A299 Thanet Way/ A28 Canterbury Rd (St Nicholas roundabout)	07:30-08:30	16:45-17:45
2	A28 Canterbury Rd/ Seamark Rd	07:45-08:45	16:45-17:45
3	A28 Canterbury Rd/ Park Lane	07:45-08:45	16:45-17:45
4	A28 Canterbury Rd/ Station Rd (Birchington Square)	08:00-09:00	17:00-18:00
5	A28 Canterbury Rd/ St Mildreds Rd/ Minster Rd	08:00-09:00	17:00-18:00
6	A28 Canterbury Rd/ Garlinge High St	08:00-09:00	17:00-18:00
7	A28 Canterbury Rd/ George V Ave/ Maynard Ave	08:00-09:00	17:00-18:00
8	A28 Canterbury Rd/ A28 Marine Terrace/ Station Approach	08:15-09:15	16:45-17:45
9	A28 Marine Terrace/ A254 Marine Gardens/ Marine Drive	08:15-09:15	16:45-17:45

Table 4-1: A28 Corridor - Peak Hour by Junction

- 4.2.8 The queue length results tables have been colour coded with a RAG rating in order to easily identify lengths of queues across the surveyed hour. Table 4-2 provides the key to the queue length tables in the following sections.

Queue Length	Approximate Distance (m)
0 – 9 vehicles	0 - 52
10-19 vehicles	58 - 110
20-29 vehicles	115 - 167
30 + vehicles	173+

Table 4-2: Queue Length RAG Ratings

Junction 1 – A299 Thanet Way/A28 Canterbury Rd

- 4.2.9 The A299 Thanet Way/A28 Canterbury Road (St Nicholas) roundabout is a 5-arm junction located approximately 3.5km west of Birchington Village Square via the A28 Canterbury Road. The A28 Canterbury Road also continues west from this junction towards Canterbury. The A299 Thanet Way heads west towards Herne Bay, the M2 and London whilst eastwards is Ramsgate and Westwood Cross. Potten Street Road is a small country road leading to farms and a few residential buildings.

Observed Turning Movements

- 4.2.10 The peak hour turning movements are shown in Figure 4-2.

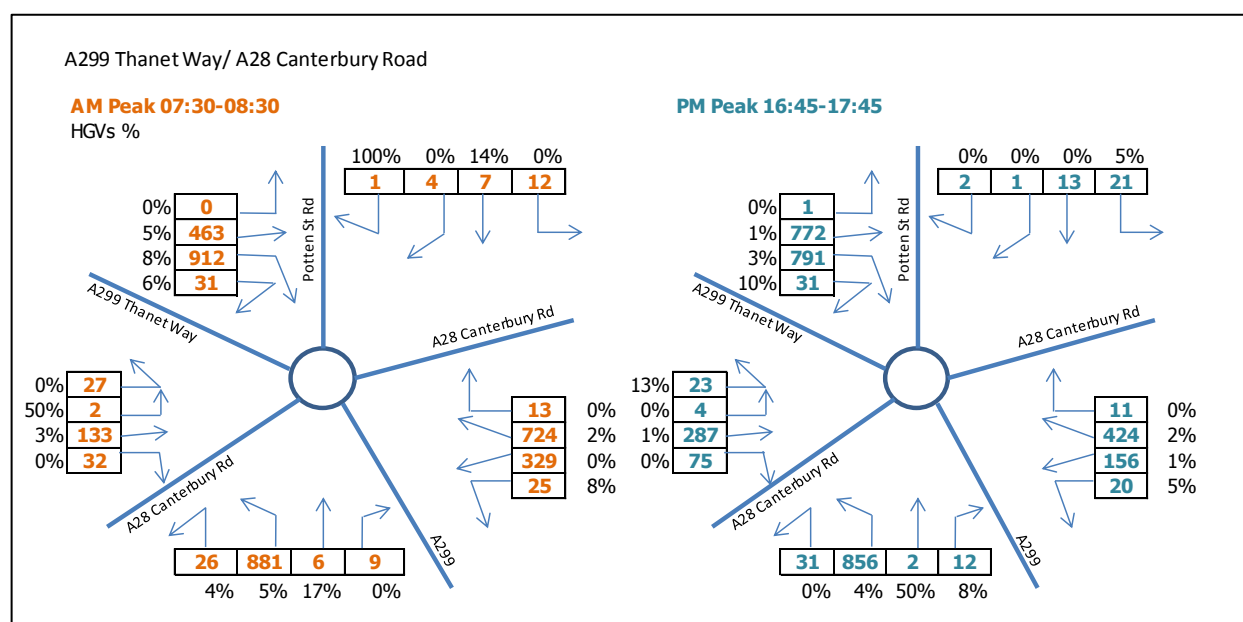


Figure 4-2: A299 Thanet Way/A28 Canterbury Rd – Turning Movements (Vehicles)

- 4.2.11 In the AM peak hour, over 900 vehicles turn from the Thanet Way to the A299 towards Ramsgate. In addition from this direction, nearly 500 vehicles turn towards Birchington on the A28 Canterbury Road. From the A299 east the overwhelmingly dominant turn is to the Thanet Way with 881 vehicles turning this way. From the direction of Birchington on the A28, most movements are towards the Thanet Way and Canterbury with 724 vehicles and 329 vehicles respectively. There is a significantly lower flow coming from Canterbury with a total of 194 vehicles making turns at this junction.
- 4.2.12 In the PM peak, the flows from the A299 Thanet Way to the A299 east and A28 Birchington becomes far more balanced than in the AM peak with 791 vehicles continuing on the A299 and 772 vehicles going towards Birchington. The flow from Birchington on the A28 is nearly half that observed in the AM peak on this arm.

Junction 2 – A28 Canterbury Rd/Seamark Rd

- 4.2.13 The A28 Canterbury Road/Seamark Road junction is located on the western outskirts of Birchington village, at the end of the dual carriageway leading from St Nicholas roundabout. The speed limit in the vicinity of this junction is 50 mph on the dual carriageway which lowers to 40 mph heading east towards the village.
- 4.2.14 This priority junction is located at the foot of Brooksend Hill and there is access to a private road (Great Brooksend Farm) opposite Seamark Road. Small slip roads are present for exiting and joining the westward moving traffic (travelling away from Birchington) and a turning bay for right turning traffic into Seamark Road.

Observed Turning Movements

- 4.2.15 The peak hour turning movements are shown in Figure 4-3.

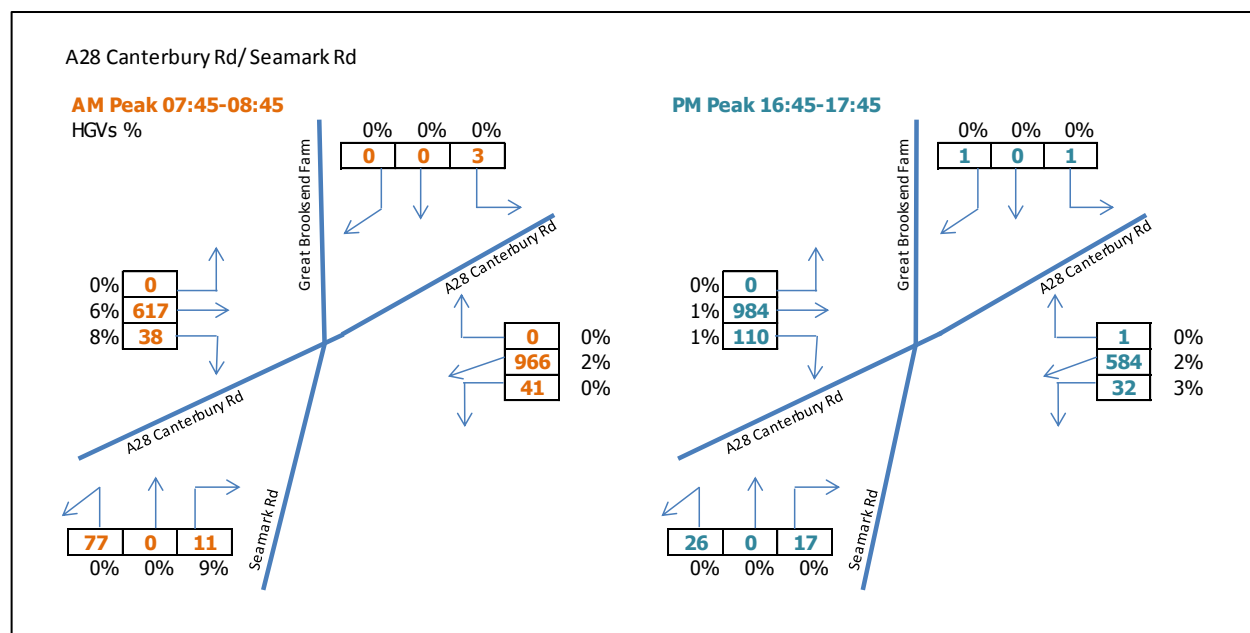


Figure 4-3: A28 Canterbury Rd/Seamark Rd – Turning Movements (Vehs)

- 4.2.16 The significantly dominant flow at this junction is on the A28 Canterbury Road heading into and out of Birchington village. There are over 650 vehicles travelling towards Birchington in the AM peak and 1007 vehicles travelling away from the Birchington. Around 40 vehicles turn into Seamark Road from both the east and westbound A28, whilst 77 vehicles turn west from Seamark Road and 11 turn east towards Birchington.
- 4.2.17 In the PM peak, 1094 vehicles travel east towards Birchington with 616 vehicles travelling away from Birchington. From the eastbound A28 110 vehicles turn right into Seamark Road whilst only 32 turn left from the westbound A28. From Seamark Road, 26 turn west and 17 turn east towards Birchington.

Junction 3 – A28 Canterbury Rd/Park Lane

- 4.2.18 The A28 Canterbury Road/Park Lane priority junction is located immediately south of the Birchington Square roundabout junction. Due to this proximity, at peak times it can be extremely difficult to get into and out of this junction and movements can also be hindered due to the width restriction on Park Lane approximately 10 metres from the entrance to the junction.
- 4.2.19 In addition, a pedestrian crossing is located to the west of Park Lane and is highly utilised, particularly around school start and finish times, and further inhibits movements at this junction.

Observed Turning Movements

- 4.2.20 The peak hour turning movements are shown in Figure 4-4.

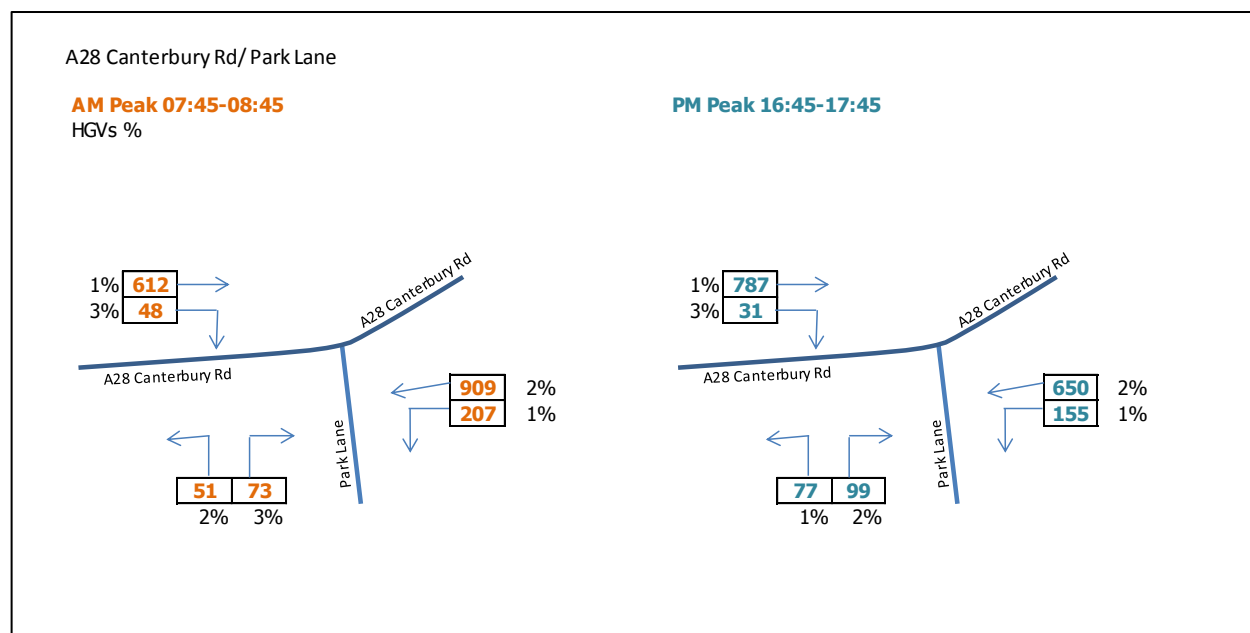


Figure 4-4: A28 Canterbury Rd/Park Lane – Turning Movements (Vehicles)

- 4.2.21 In the AM peak, 124 vehicles turn out of Park Lane with approximately 60% turning right towards Birchington Square. From the direction of Birchington Square, over 200 vehicles turn left into Park Lane whilst 909 vehicles head straight-on westwards on the A28. From the west there are 612 vehicles that continue straight towards Birchington Square and 48 vehicles turn right into Park Lane.
- 4.2.22 In the PM peak, 176 vehicles turn out of Park Lane, whilst 155 vehicles turn left into Park Lane from the direction of Birchington Square. From the west there are 31 vehicles which turn right into Park Lane. From the east 650 vehicles continue on the A28 whilst 787 continue on the A28 from the west towards Birchington Square.

Observed Queue Lengths

4.2.23 Table 4-3 displays the queue length surveys results for the junction.

	A28 Canterbury Rd E	Park Lane	A28 Canterbury Rd W
	Lane 1	Lane 2	Lane 1
07:45-07:50	4	3	12
07:50-07:55	4	1	5
07:55-08:00	4	3	7
08:00-08:05	4	2	12
08:05-08:10	4	3	10
08:10-08:15	3	3	8
08:15-08:20	4	5	8
08:20-08:25	4	4	14
08:25-08:30	4	3	20
08:30-08:35	4	3	9
08:35-08:40	4	2	9
08:40-08:45	4	3	15
Total	47	35	129
16:45-16:50	4	3	10
16:50-16:55	0	3	7
16:55-17:00	4	6	5
17:00-17:05	4	3	22
17:05-17:10	4	3	21
17:10-17:15	4	4	25
17:15-17:20	4	3	23
17:20-17:25	4	3	23
17:25-17:30	4	2	24
17:30-17:35	4	3	26
17:35-17:40	0	3	23
17:40-17:45	3	3	24
Total	39	39	233

Table 4-3: A28 Canterbury Rd/Park Lane – Queue Lengths (Vehicles)

4.2.24 In both the AM and PM peak hour the longest queues are observed on the A28 Canterbury Road west. It should be noted that queue lengths are consistently four vehicles on the A28 Canterbury Road east and this would be the length in vehicles to the next junction (Birchington Square mini roundabout) therefore there it is possible that queueing extends further than this next junction however it can't be reflected in the following results.

- 4.2.25 In addition, the queueing on Park Lane is limited due to the narrow one lane section just beyond the give way line; therefore the consistent queueing of around three vehicles indicates further queueing beyond the view of the surveyors.
- 4.2.26 In the AM peak hour, the queueing on A28 Canterbury Road west reaches over 10 vehicles for nearly half of the peak hour. The queues on this arm are much longer in the PM peak hour with much of the hour experiencing queueing of over 20 vehicles. Some of the queueing on this arm could be explained by right turning vehicles into Park Lane. The queueing on this arm is conserved to be due, in part, to the proximity to the pedestrian crossing and the Birchington Square (A28 Canterbury Road/Station Road) junction.

Junction 4 – A28 Canterbury Rd/Station Rd (Birchington Square)

- 4.2.27 The Square, Birchington is a 3-arm mini roundabout junction located on the A28 Canterbury Road at the south eastern extent of Station Road in Birchington village. The junction is known to suffer from congestion during peak periods and was an AQMA in itself before the AQMA was extended to include Thanet urban area. Station Road is the main village thoroughfare through Birchington village, and from The Square junction heads north-west to Birchington train station.

Observed Turning Movements

- 4.2.28 The peak hour turning movements are shown in Figure 4-5.

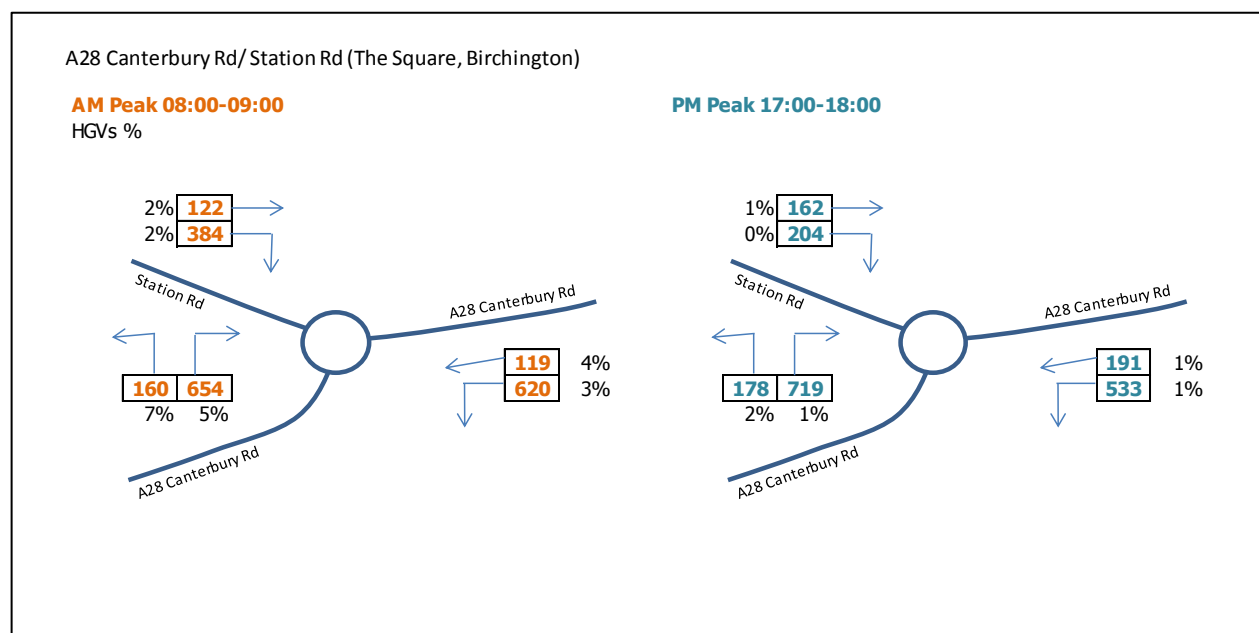


Figure 4-5: The Square, Birchington – Turning Movements (vehicles)

- 4.2.29 In the AM peak, there are over 800 vehicles travelling east on the A28 Canterbury Road west and of these over 650 vehicles make the right turn onto A28 Canterbury Road east. In addition, 122 vehicles travel from Station Road eastwards onto A28 Canterbury Road east. From Station Road, nearly 400 vehicles make the right turn onto A28 Canterbury Road west and another 620 travel from A28 Canterbury east to west.
- 4.2.30 In the PM peak hour, similar volumes of traffic and movements are seen to travel through this junction. Eastward flows on the A28 Canterbury Road are slightly higher than the AM peak at nearly 900 vehicles and there are 724 vehicles travelling westwards on the A28 Canterbury Road which is nearly the same as the AM peak however a higher proportion of this flow turns into Station Road. There is also a lower flow out of Station Road with 366 vehicles exiting.

Observed Queue Lengths

- 4.2.31 Table 4-4 displays the queue length survey results for the junction. In both peak hours, Lane 2 of the A28 Canterbury Road west arm of this junction consistently experiences of around 4/5 vehicles. This is approximately how far back the Park Lane priority junction is. This provides some support to the explanation above for the long queues on the A28 Canterbury Road west of the Park Lane junction probably as a result of the Birchington Square junction not solely the impact of right turners into Park Lane. This also means the queueing at this junction is not directly reflected in the results in Table 4-4.

	A28 Canterbury Rd E		A28 Canterbury Rd W		Station Road	
	Lane 1	Lane 2	Lane 1	Lane 2	Lane 1	Lane 2
08:00-08:05	9	2	0	4	1	18
08:05-08:10	14	2	0	5	1	20
08:10-08:15	15	3	0	4	1	10
08:15-08:20	24	0	2	4	0	5
08:20-08:25	28	2	1	5	2	8
08:25-08:30	21	1	0	4	1	4
08:30-08:35	7	2	1	4	3	8
08:35-08:40	5	2	0	4	4	9
08:40-08:45	14	1	0	4	1	16
08:45-08:50	13	3	1	3	1	15
08:50-08:55	6	2	1	5	2	10
08:55-09:00	3	2	2	4	3	4
Total	159	22	8	50	20	127

	A28 Canterbury Rd E		A28 Canterbury Rd W		Station Road	
17:00-17:05	14	3	1	4	2	15
17:05-17:10	6	2	0	4	3	4
17:10-17:15	7	1	1	5	1	3
17:15-17:20	7	2	2	5	1	5
17:20-17:25	10	1	1	4	2	6
17:25-17:30	4	2	0	4	1	2
17:30-17:35	4	1	1	4	4	3
17:35-17:40	2	4	0	4	2	4
17:40-17:45	2	4	1	4	2	4
17:45-17:50	5	4	1	4	2	3
17:50-17:55	4	2	0	5	2	3
17:55-18:00	6	1	1	5	2	4
Total	71	27	9	52	24	56

Table 4-4: The Square, Birchington – Queue Lengths (Vehicles)

- 4.2.32 The A28 Canterbury Road east arm of this junction experiences queues of over 10 vehicles in two distinct blocks within the peak period. Queues build gradually peaking at a high of 28 vehicles between 8:05 AM and 8:30 AM. At around 8:40 AM queues of up to 14 vehicles are seen for approximately 10 minutes. Queueing during the PM peak hour shows occasional spikes of moderate queueing.
- 4.2.33 Given the junction's proximity with the adjacent A28 Canterbury Rd/Park Lane junction it is important to consider the datasets together. The queues observed on the A28 eastbound approach to the junctions is considered to be due to the operation of the Birchington Square junction in addition to right turning traffic into Park Lane.

Junction 5 – A28 Canterbury Rd/St Mildreds Rd/Minster Rd

- 4.2.34 The A28 Canterbury Road/St Mildreds Road/Minster Road is a 4-arm signalised junction located in Westgate. The A28 at this junction is a 40 mph dual carriageway; whilst the speed limit on St Mildreds Road and Minster Road is 30 mph. Minster Road is a predominantly residential road with open fields to its southern extent and connects by priority junction to Shottendane Road. St Mildreds Road provides access to the shopping parade of Westgate just to the north of the junction.
- 4.2.35 Formal pedestrian crossing points are located across both arms of the A28 Canterbury Road at this junction, in the form of staggered crossings. On both St Mildreds Road and Minster Road dropped curbing and tactile paving is present however no formal

crossing point.

Observed Turning Movements

4.2.36 The peak hour turning movements are shown in Figure 4-6.

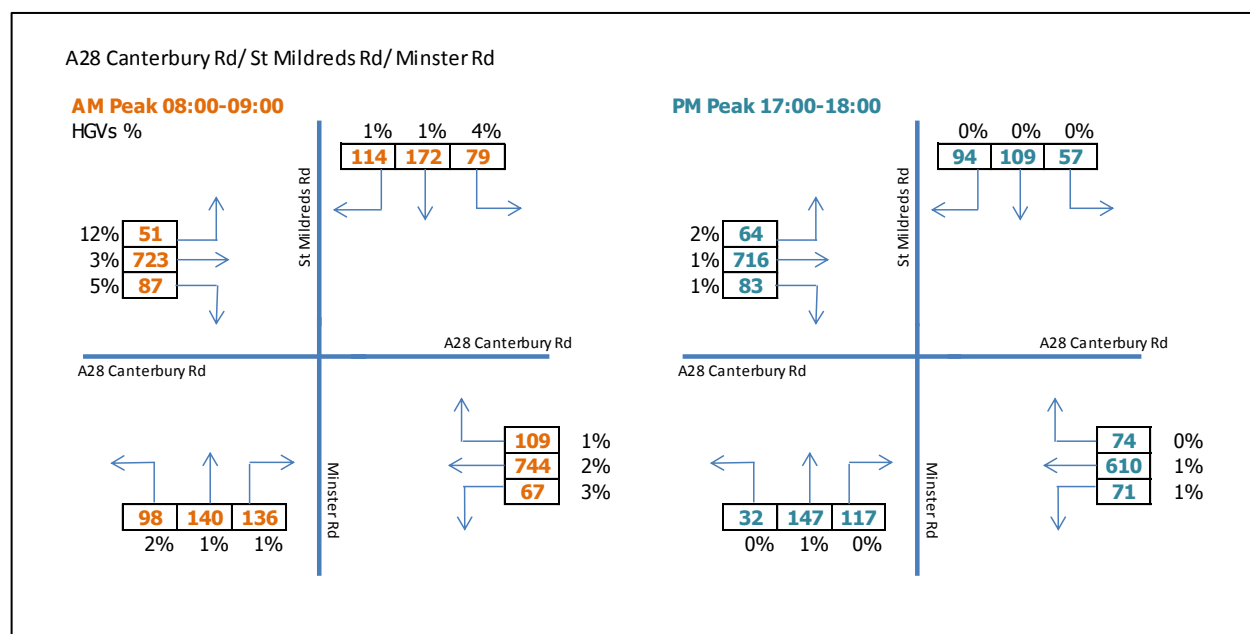


Figure 4-6: A28 Canterbury Rd/St Mildreds Rd/Minster Rd – Turning Movements (Vehicles)

- 4.2.37 In the AM peak hour, over 700 vehicles travel straight across this junction in both eastbound and westbound directions on the A28. There are around 370 vehicles turning out of both St Mildreds Road and Minster Road.
- 4.2.38 In the PM peak hour there are less than 300 vehicles turning out of both St Mildreds Road and Minster Road. There are 610 vehicles travelling westbound on the A28 and 716 vehicles travelling eastbound.

Observed Queue Lengths

- 4.2.39 Table 4-5 displays the queue length survey results for the AM peak hour at the junction. Queueing on both of the A28 Canterbury Road arms is frequently over 10 vehicles in both Lanes and queueing of over 30 vehicles is frequent in Lane 2. Queues on St Mildreds Road and Minster Road are shorter and occasionally over 10 vehicles. In Lane 1 of the Minster Road arm the queues near 20 vehicles in 6 five minute periods but they are sporadic and not sustained.

St Mildreds Road			A28 Canterbury Rd E			Minster Rd			A28 Canterbury Rd W		
	Lane 1	Lane 2		Lane 1	Lane 2		Lane 1	Lane 2		Lane 1	Lane 2
08:01:25	10	4	08:00:35	13	12	08:00:50	17	0	08:02:01	7	17
08:03:44	2	10	08:02:51	6	17	08:03:08	13	2	08:04:16	9	8
08:06:03	7	7	08:05:05	8	28	08:05:27	3	4	08:06:35	10	16
08:08:24	5	2	08:07:24	15	21	08:07:47	4	3	08:08:39	4	9
08:10:25	6	2	08:09:28	11	27	08:09:50	12	0	08:10:47	11	15
08:12:29	5	5	08:11:36	11	25	08:11:53	5	4	08:13:07	8	11
08:14:54	7	4	08:13:56	13	29	08:14:18	9	2	08:15:13	11	13
08:16:59	7	5	08:16:01	6	21	08:16:23	11	3	08:17:31	6	9
08:19:18	8	2	08:18:19	6	22	08:18:42	7	4	08:19:43	4	11
08:21:21	7	0	08:20:32	11	26	08:20:45	6	4	08:21:38	3	12
08:23:23	7	1	08:22:25	10	24	08:22:47	8	1	08:23:39	5	5
08:25:23	4	2	08:24:27	8	19	08:24:47	9	4	08:25:45	8	12
08:27:32	6	2	08:26:36	12	22	08:26:57	18	2	08:28:08	14	13
08:29:56	6	3	08:28:57	18	31	08:29:20	19	3	08:30:30	11	23
08:32:18	2	5	08:31:21	16	33	08:31:42	18	3	08:32:52	14	26
08:34:43	12	6	08:33:44	21	32	08:34:08	11	6	08:35:16	15	25
08:37:06	5	8	08:36:07	20	30	08:36:30	14	5	08:37:40	14	26
08:39:33	16	8	08:38:32	28	19	08:39:01	18	3	08:40:10	23	35
08:41:57	6	14	08:40:58	19	25	08:41:21	11	3	08:42:32	27	36
08:44:21	8	10	08:43:23	21	20	08:43:45	7	3	08:44:50	23	29
08:46:39	7	13	08:45:42	14	20	08:46:05	3	6	08:47:09	24	35
08:48:58	8	13	08:48:01	19	19	08:48:23	9	3	08:49:28	17	23
08:51:05	6	14	08:50:20	10	13	08:50:29	10	3	08:51:35	8	16
08:53:01	11	6	08:52:23	5	8	08:52:25	7	3	08:53:33	11	21
08:55:18	3	3	08:54:20	14	14	08:54:43	2	4	08:55:36	10	12
08:57:22	4	1	08:56:24	9	13	08:56:46	19	0	08:57:56	8	15
08:59:43	2	2	08:58:45	13	16	08:59:06	12	4			

Table 4-5: A28 Canterbury Rd/St Mildreds Rd/Minster Rd AM Peak – Queue Lengths (Vehicles)

4.2.40 Table 4-6 displays the queue length survey results for the PM peak hour at the junction. The table highlights shorter queues in the PM peak hour compared to the AM. The longest queues are again observed on the A28 Canterbury Road east and west arms of this junction. Queues of between 10 and 15 vehicles are frequent and sustained in Lane 2 of Canterbury Road east. Queues on St Mildreds Road and Minster Road are low and only once reaches over 10 vehicles in Lane 1 of St Mildreds Road.

St Mildreds Road			A28 Canterbury Rd E			Minster Rd			A28 Canterbury Rd W		
	Lane 1	Lane 2		Lane 1	Lane 2		Lane 1	Lane 2		Lane 1	Lane 2
17:00:42	1	7	17:02:02	0	3	17:00:06	9	4	17:01:12	11	14
17:02:49	9	4	17:04:00	6	12	17:02:13	7	4	17:03:12	2	11
17:04:54	4	1	17:06:00	12	11	17:04:18	3	4	17:05:11	10	15
17:07:03	3	8	17:08:22	13	14	17:06:26	7	5	17:07:30	18	20
17:09:19	13	1	17:10:38	5	12	17:08:44	5	5	17:09:47	13	17
17:11:24	9	0	17:12:29	7	13	17:10:47	8	2	17:11:39	10	13
17:13:22	5	0	17:14:38	13	14	17:12:46	3	4	17:13:49	8	12
17:15:35	4	3	17:16:36	8	11	17:15:00	2	4	17:15:45	5	10
17:17:32	5	2	17:18:35	3	5	17:16:56	5	1	17:17:46	7	8
17:19:15	5	2	17:20:21	6	11	17:18:40	4	4	17:19:32	3	5
17:21:08	6	1	17:22:15	11	14	17:20:32	7	3	17:21:26	3	3
17:23:09	0	3	17:24:20	8	11	17:22:33	8	3	17:23:28	9	12
17:25:16	6	6	17:26:28	11	13	17:24:40	0	4	17:25:38	10	20
17:27:25	3	2	17:28:25	6	13	17:26:47	6	1	17:27:34	7	13
17:29:16	4	0	17:30:11	13	15	17:28:41	4	3	17:29:21	3	8
17:31:08	5	0	17:32:13	7	11	17:30:32	6	3	17:31:24	6	11
17:32:59	8	3	17:34:17	10	15	17:32:23	9	1	17:33:28	11	12
17:35:13	3	5	17:36:17	7	12	17:34:14	4	4	17:35:28	10	16
17:37:05	5	1	17:38:13	9	14	17:36:27	7	4	17:37:21	6	8
17:39:14	2	1	17:40:23	7	11	17:38:39	7	3	17:39:35	7	10
17:41:09	7	2	17:42:24	6	8	17:40:32	4	2	17:41:32	8	10
17:43:00	0	1	17:43:59	10	13	17:42:24	3	1	17:43:08	9	8
17:44:57	3	3	17:46:11	9	11	17:44:22	1	0	17:45:22	8	9
17:47:07	4	7	17:48:23	10	13	17:46:30	3	2	17:47:33	11	11
17:49:21	5	6	17:50:30	9	12	17:48:44	2	2	17:49:41	8	12
17:51:24	4	3	17:52:26	9	11	17:50:49	2	1	17:51:36	8	8
17:53:13	5	1	17:54:26	10	13	17:52:37	9	1	17:53:37	9	11
17:55:23	6	1	17:56:26	3	9	17:54:47	5	3	17:55:36	3	11
17:57:16	2	5	17:58:21	5	10	17:56:41	4	2	17:57:31	4	5
17:59:00	2	0	17:59:56	13	12	17:58:24	4	3	17:59:06	4	9

Table 4-6: A28 Canterbury Rd/St Mildreds Rd/Minster Rd PM Peak – Queue Lengths (Vehicles)

Junction 6 – A28 Canterbury Rd/Garlinge High St

- 4.2.41 The A28 Canterbury Road/Garlinge High Street provides access to Garlinge from the A28 corridor and is located further east along this study corridor. The southern end of Garlinge High Street meets Shottendane Road, like Minster Road as detailed in the previous junction, and these roads run roughly parallel to each other.

Observed Turning Movements

4.2.42 The peak hour turning movements are shown in Figure 4-7.

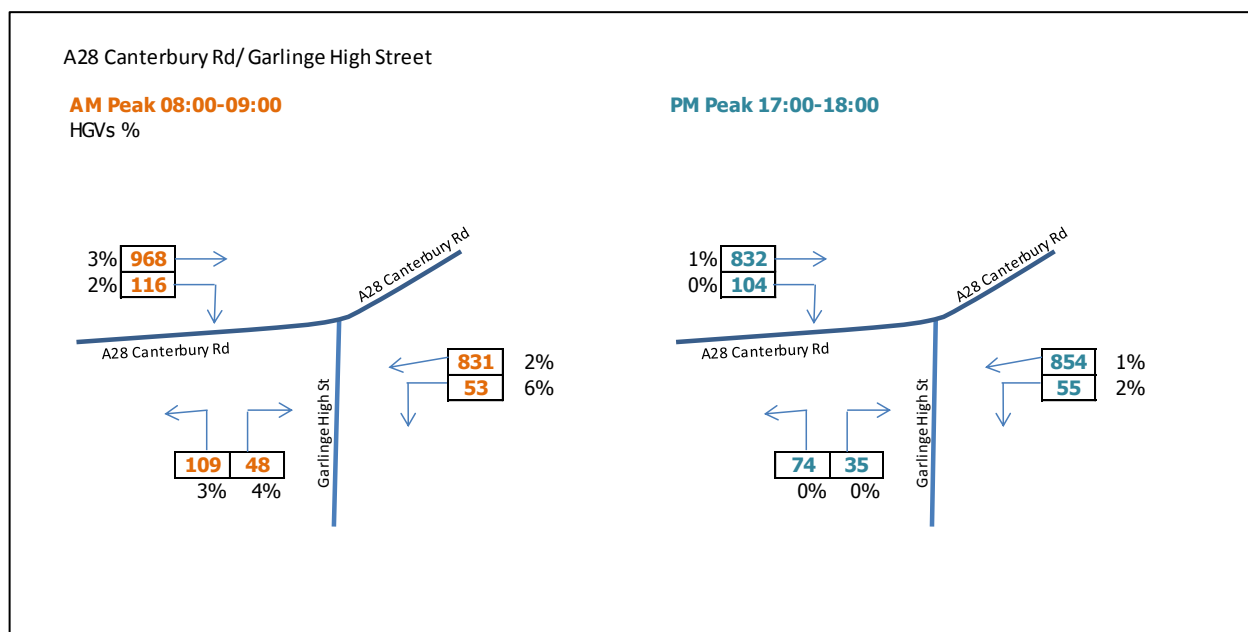


Figure 4-7: A28 Canterbury Rd/Garlinge High St – Turning Movements (Vehicles)

- 4.2.43 In the AM peak hour, the A28 traffic flow is over 1,000 vehicles in the eastbound direction heading towards Margate and closer to 900 vehicles travelling westbound. There are 116 vehicles that turn right into Garlinge High Street from the eastbound A28 and 48 vehicles which turn right out of Garlinge High Street towards Margate. There are around 50 vehicles that turn into Garlinge High Street from the westbound A28 and 109 vehicles turn left, westbound, onto the A28.
- 4.2.44 In the PM peak, the A28 eastbound flow is around 100 vehicles lower than in the AM, with over 900 vehicles travelling towards Margate. The westbound flow is around 900 vehicles. There are similar flows turning from the A28 into Garlinge High Street but the flow turning out onto the A28 is lower than observed in the AM peak.

Observed Queue Lengths

- 4.2.45 Table 4-7 displays the queue length survey results for the A28 Canterbury Road/ Garlinge High Street priority junction. The queues in Lane 2 of the A28 Canterbury Road east and Lane 1 of Canterbury Road west occur at the pedestrian crossing. The table suggests there are very short queues on all arms of this junction in both the AM and PM peak hours.

	A28 Canterbury Rd E		Garlinge High St		A28 Canterbury Rd W	
	Lane 1	Lane 2	Lane 1	Lane 2	Lane 1	Lane 2
08:00-08:05	1	5	2	2	7	1
08:05-08:10	0	4	1	1	9	1
08:10-08:15	0	3	1	1	1	5
08:15-08:20	0	4	1	1	5	3
08:20-08:25	0	6	2	0	2	0
08:25-08:30	0	5	2	1	4	3
08:30-08:35	1	2	1	1	3	4
08:35-08:40	1	1	3	3	4	2
08:40-08:45	1	3	3	1	5	3
08:45-08:50	2	4	4	2	5	2
08:50-08:55	0	0	3	1	0	2
08:55-09:00	1	4	1	1	6	1
Total	7	41	24	15	51	27
17:00-17:05	0	3	1	1	0	1
17:05-17:10	1	5	2	2	2	3
17:10-17:15	1	5	3	2	2	4
17:15-17:20	0	2	2	1	2	3
17:20-17:25	0	5	4	2	0	2
17:25-17:30	0	7	1	1	2	2
17:30-17:35	0	1	1	1	2	1
17:35-17:40	0	0	3	2	0	1
17:40-17:45	0	1	2	0	1	1
17:45-17:50	0	0	2	2	0	1
17:50-17:55	1	0	2	3	0	2
17:55-18:00	1	0	1	1	2	2
Total	4	29	24	18	13	23

Table 4-7: A28 Canterbury Rd/Garlinge High St – Queue Lengths (Vehicles)

Junction 7 – A28 Canterbury Rd/George V Ave/Maynard Ave

- 4.2.46 The A28 Canterbury Road/ George V Avenue/ Maynard Avenue priority junction is located in Westbrook. George V Avenue provides access towards Hartsdown and on to Victoria traffic lights. This route provides access to other parts of Thanet whilst avoiding the centre of Margate. Maynard Avenue is a residential road and provides access to Garlinge.

Observed Turning Movements

- 4.2.47 The peak hour turning movements are shown in Figure 4-8.

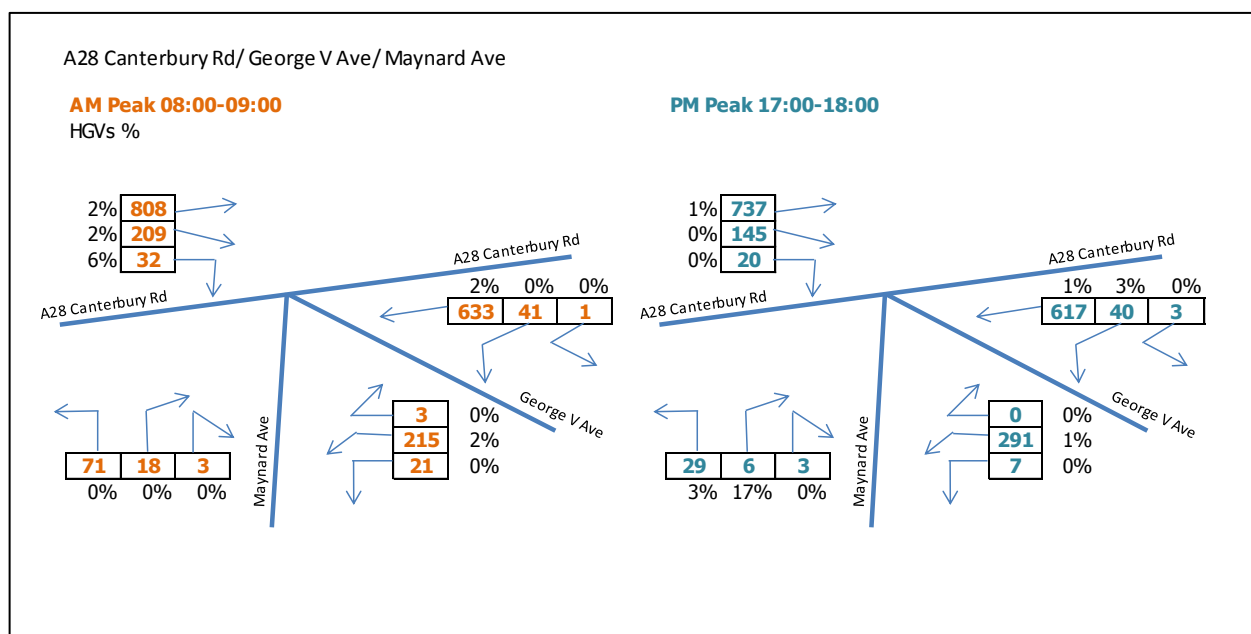


Figure 4-8: A28 Canterbury Rd/George V Ave/Maynard Ave – Turning Movements (Vehicles)

- 4.2.48 In the vicinity of this junction, the A28 Canterbury Road eastbound flow is over 1,000 vehicles in the AM peak hour, and of these over 200 vehicles turned right into George V Avenue. There were also just over 200 vehicles turning left out of George V Avenue onto the westbound A28. Very few vehicles turned right out of George V Avenue eastbound on the A28 and again very few turned left from the westbound flow of traffic on the A28. This can be explained by George V Avenue running diagonally from the A28 and earlier opportunities for westbound traffic to turn off of the A28 through adjoining roads between the A28 and George V Avenue.
- 4.2.49 Eastbound flows on the A28 are about 100 vehicles lower in the PM peak however the pattern of movements at this junction during this peak hour is very similar to the AM peak hour.

Observed Queue Lengths

- 4.2.50 Table 4-8 displays the queue length survey results for the A28 Canterbury Road/B2052 George V Ave priority junction.

	A28 Canterbury Rd E	B2052 George V Ave	Maynard Ave	A28 Canterbury Rd W (Right Turn)
	Lane 1	Lane 1	Lane 1	Lane 1
08:00-08:05	0	17	2	14
08:05-08:10	0	16	2	9
08:10-08:15	0	12	2	11
08:15-08:20	0	12	2	10
08:20-08:25	0	15	2	5
08:25-08:30	0	17	5	5
08:30-08:35	0	6	2	7
08:35-08:40	0	13	3	7
08:40-08:45	0	10	2	3
08:45-08:50	0	0	0	0
08:50-08:55	0	4	4	1
08:55-09:00	0	16	3	6
Total	0	138	29	78
17:00-17:05	0	23	3	10
17:05-17:10	0	21	2	20
17:10-17:15	3	25	2	5
17:15-17:20	0	22	4	8
17:20-17:25	0	19	2	5
17:25-17:30	0	20	0	10
17:30-17:35	1	20	2	9
17:35-17:40	0	7	2	6
17:40-17:45	0	22	1	8
17:45-17:50	0	8	2	6
17:50-17:55	0	24	0	4
17:55-18:00	0	15	0	7
Total	4	226	20	98

Table 4-8: A28 Canterbury Rd/George V Ave/Maynard Ave – Queue Lengths (Vehicles)

- 4.2.51 The table highlights that there are long queues on the B2052 George V Ave in both the AM and PM peak hours, with longer queues in the PM peak. In the AM peak queues are consistently between 10 to 19 vehicles and in the PM peak queues are consistently between 20-29 vehicles. Queueing occurs on the A28 Canterbury Road west arm of this junction due to the right turning vehicles into B2052 George V Avenue or Maynard Avenue. During one five minute interval in the PM peak hour queueing reached 20 vehicles.

Junction 8 – A28 Canterbury Rd/A28 Marine Terrace/Station Approach

4.2.52 The A28 Canterbury Road/A28 Marine Terrace/Station Approach junction is an oversized 4-arm roundabout junction with a merge required from vehicles wishing to enter the A28 mainline eastbound flow at the northern extent of the junction. The junction provides access to Margate railway station and car park. The A28 Marine Terrace heads east into Margate town centre along the seafront. All Saints' Avenue heads south away from Margate meeting Tivoli Park Avenue and on to the B2052 and the one way system near the Victoria traffic lights at the southern extent of Margate.

Observed Turning Movements

4.2.53 The peak hour turning movements are shown in Figure 4-9.

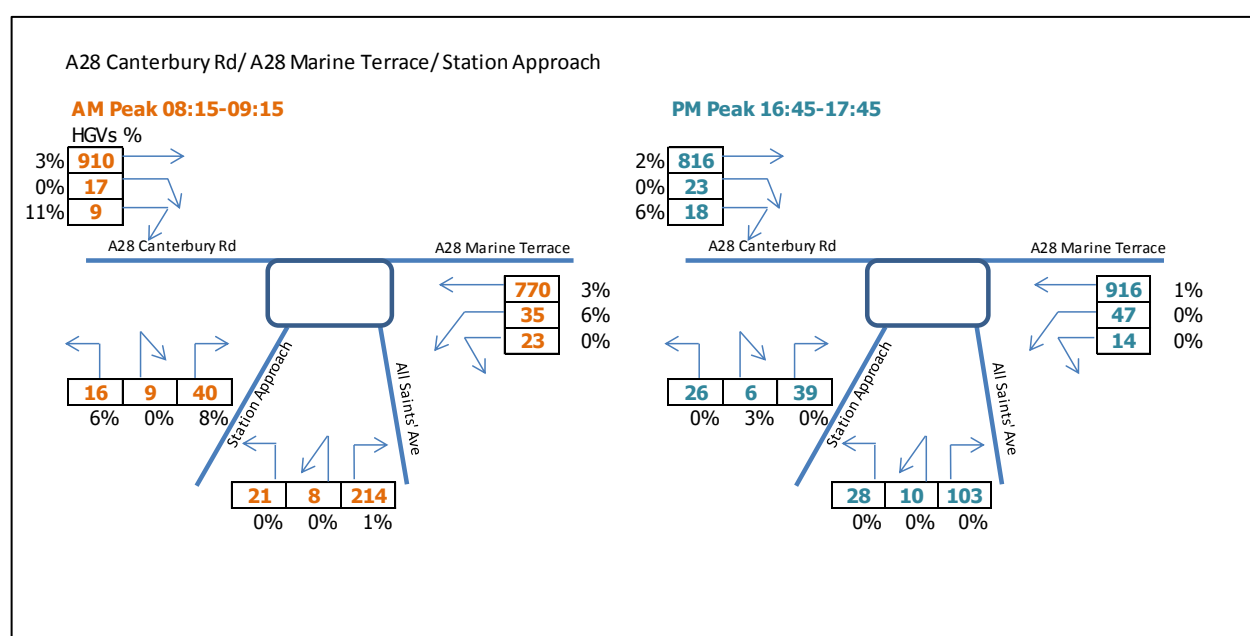


Figure 4-9: A28 Canterbury Rd/A28 Marine Terrace/Station Approach – Turning Movements (Vehicles)

- 4.2.54 The predominant flow at this junction is on the A28 Canterbury Road/Marine Terrace. In the AM peak there are nearly 1,200 vehicles heading eastbound onto Marine Terrace. Westbound there are nearer 800 vehicles entering Canterbury Road. There are over 200 vehicles turning from All Saints' Avenue towards Marine Terrace.
- 4.2.55 In the PM peak hour, the flow on the A28 is much more balanced with 958 vehicles heading eastbound towards Marine Terrace and 970 vehicles heading westbound to Canterbury Road. There is approximately half the flow making the movement from All Saints' Avenue to Marine Terrace in the PM peak. All other flows at this junction are very low and remain very similar in both the AM and PM peak hours.

Junction 9 – A28 Marine Terrace/A254 Marine Terrace/Marine Drive

- 4.2.56 The A28 Marine Terrace meets the A254 at this junction, located on Margate seafront. Less than 50 metres east of this junction, the A254 heads south away from Margate town centre and towards Victoria traffic lights and beyond to Westwood. Marine Drive follows the seafront north east providing access to the Old Town of Margate and on towards Cliftonville.

Observed Turning Movements

- 4.2.57 The peak hour turning movements are shown in Figure 4-10.

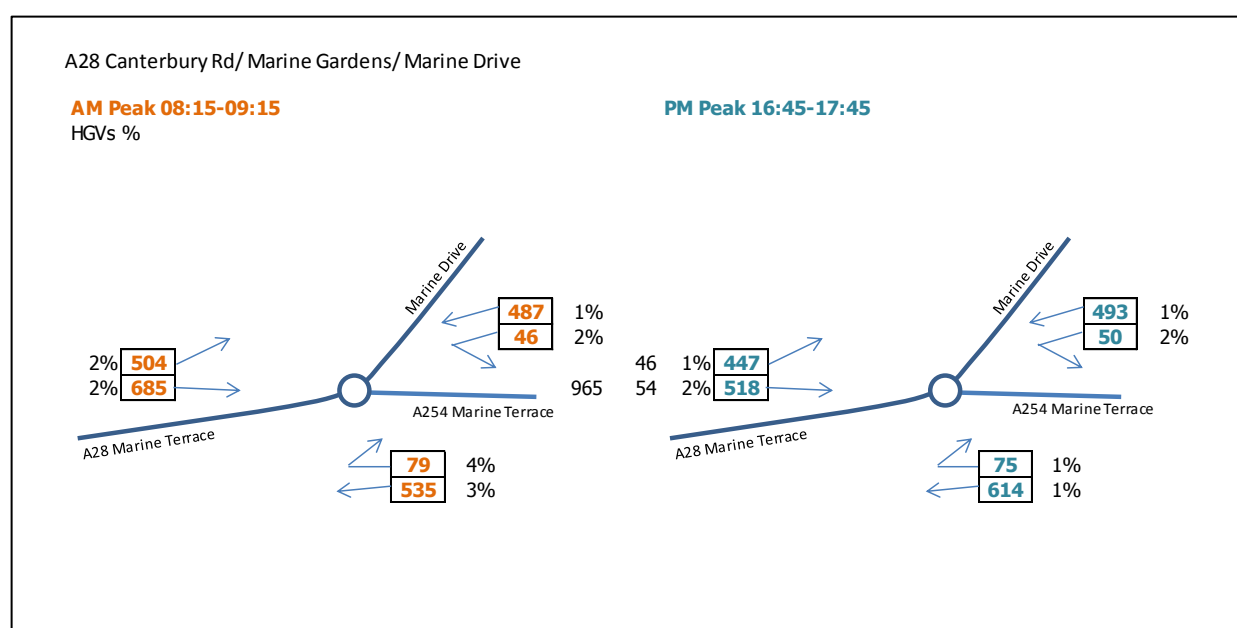


Figure 4-10: A28 Marine Terrace/A254 Marine Terrace/Marine Drive – Turning Movements (Vehicles)

- 4.2.58 In both the AM and PM peak the eastbound A28 Marine Terrace flow splits at this junction with just over half of the flow turning right to A254 Marine Terrace and just under half turning left to Marine Drive. This is also reflected in the westbound flow towards Marine Terrace; over half of the flow comes from A254 Marine Terrace and under half comes from Marine Drive.

Observed Queue Lengths

- 4.2.59 Table 4-9 displays the queue length survey results for the junction. The most significant queueing was observed in Lane 2 of Marine Drive in both the AM and PM peak hours. For more than half of the peak hour queues were over 15 vehicles reaching a maximum of 34 vehicles. Some queueing occurred in Lane 1 of the A254 Marine Terrace with just over 10 vehicles in four consecutive five-minute intervals.

4.2.60 In the PM peak, queueing in Lane 2 of Marine Drive was over 20 vehicles for half of the peak hour, and reached over 30 vehicles for two consecutive five-minute intervals. Longer queues were observed in Lane 1 of the A254 Marine Terrace arm in the PM peak than in the AM peak. Occasional spikes of over 10 vehicles occurred and four consecutive five-minute intervals observed queues longer than 20 vehicles, between 17:10 and 17:30.

	Marine Drive	A254 Marine Terrace		A28 Marine Terrace	
	Lane 1	Lane 1	Lane 2	Lane 1	Lane 2
08:15-08:20	9	4	1	1	0
08:20-08:25	15	7	2	1	2
08:25-08:30	27	10	2	1	4
08:30-08:35	18	11	3	0	0
08:35-08:40	27	12	1	3	2
08:40-08:45	28	11	1	2	4
08:45-08:50	34	7	2	5	2
08:50-08:55	32	8	1	7	2
08:55-09:00	17	5	2	4	4
09:00-09:05	4	5	2	2	5
09:05-09:10	8	2	2	2	0
09:10-09:15	12	2	0	1	5
Total	231	84	19	29	30
16:45-16:50	18	10	2	1	1
16:50-16:55	26	8	1	5	1
16:55-17:00	21	6	2	1	1
17:00-17:05	22	5	2	2	2
17:05-17:10	31	10	3	2	1
17:10-17:15	32	20	1	6	6
17:15-17:20	29	26	2	2	2
17:20-17:25	28	28	1	0	1
17:25-17:30	8	20	1	1	1
17:30-17:35	9	6	2	2	3
17:35-17:40	17	18	2	5	1
17:40-17:45	8	7	1	1	2
Total	249	164	20	28	22

Table 4-9: A28 Marine Terrace/Marine Gardens/Marine Drive – Queue Lengths (Vehicles)

4.3 Link Capacity

- 4.3.1 As before, an indication of the current conditions in terms of link capacity at certain points within the study corridor can be identified using the Design Manual for Roads and Bridges (DMRB) and existing one-way traffic flows.
- 4.3.2 The roads through the A28 corridor can be categorised using the DMRB volume 5 TA 79/99. This classification and the road width then determine a theoretical capacity to compare against flows. An extract of the relevant section of the DMRB providing a description of the different road classifications is shown in Figure 4-11. These guidelines are seen as a relevant indicative tool for assessing capacity.

	UM	UAP1	UAP2	UAP3	UAP4
General Description	Through route with grade separated junctions, hardshoulders or hardstrips, and motorway restrictions.	High standard single/dual carriageway road carrying predominantly through traffic with limited access.	Good standard single/dual carriageway road with frontage access and more than two side roads per km.	Variable standard road carrying mixed traffic with frontage access, side roads, bus stops and at-grade pedestrian crossings.	Busy high street carrying predominantly local traffic with frontage activity including loading and unloading.
Speed Limit	60mph or less	40 to 60 mph for dual, & generally 40mph for single carriageway	Generally 40 mph	30 mph to 40 mph	30mph

Figure 4-11: DMRB TA 79/99 road classifications

- 4.3.3 Three locations within the corridor have been identified as follows:
1. A28 to SW of junction with Park Lane, Birchington;
 2. A28 to West of junction with High Street, Garlinge; and
 3. A28 to West of junction with marine Drive, Margate.



Figure 4-12: A28 Link Capacity - Site 1 (©2017 Google)

- 4.3.4 Site 1 has been difficult to classify and has been considered in both UAP3 and UAP4 categories with a road width of 6.75 metres. The road has a speed limit of 30mph. The characteristics of this section of the corridor are shown in Figure 4-12.
- 4.3.5 Sites 2 and 3 are considered to fall within the UAP3 category with road width of 7.3 metres. Both sites have frequent side roads and frontage accesses and a speed limit of 30mph. The characteristics of these sections of the corridor are shown in Figure 4-13 and Figure 4-14.



Figure 4-13: A28 Link Capacity - Site 2 (©2017 Google)



Figure 4-14: A28 Link Capacity - Site 3 (©2017 Google)

4.3.6 The theoretical link capacity at each of the 3 sites has been compared with the worst case one-way peak hour flow to provide an indication of the current operation of the links. These comparisons are shown in Table 4-10.

	Road Type	Carriageway Width (m)	Theoretical capacity (one-way)	Max Hourly flow (one-way)	Ratio of flow/capacity
Site 1	UAP3	6.75	1110	960 (AM/WB)	0.86
	UAP4	6.75	900	960	1.06
Site 2	UAP3	7.3	1300	1084 (AM/EB)	0.83
Site 3	UAP3	7.3	1300	1189 (AM/EB)	0.91

Table 4-10: A28 Corridor – Indicative Link Flow/Capacity

4.3.7 The above table indicates that the sites along the A28 corridor are approaching the theoretical capacity of the links; particularly on the 'busy' (bus/pedestrian/vehicle interaction) link around Site 1 approaching Birchington Square.

4.4 Average Journey Times

- 4.4.1 Average journey times through the corridor have been established using the Basemap software 'Highways Analyst'. Average link times were calculated for the route through the corridor in both directions for the AM peak (0800 – 0900) and PM peak (1700 – 1800) peaks; and for an overnight period⁵ assumed to reflect free-flow conditions.
- 4.4.2 By comparing journey times during free flow and peak times scenarios the average level of delay observed during peak periods has been established.
- 4.4.3 The journey time corridor used for this calculation is that shown in Figure 1-2, from the A299 Thanet Way/A2 Canterbury Road roundabout junction near St Nicholas-at-Wade to the A28 Marine Terrace/Marine Drive junction on Margate seafront.
- 4.4.4 Table 4-11 displays the journey times across the length of the study area, for both eastbound and westbound directions.

Direction	Distance (kms)	AM (mm:ss)	PM (mm:ss)	Free Flow* (mm:ss)	Delay	
					AM	PM
EB	9	13:58	13:33	09:47	04:10	03:46
WB	9	13:40	12:49	09:49	03:51	03:00
Total					08:01	06:46

Table 4-11: A28 Corridor – Average Journey Times and Delay

- 4.4.5 The table shows that more delay is observed during the AM peak hour observes more delay in both directions of travel. Compared to the free flows times across this network, the AM peak approximately adds four minutes to a journey of approximately ten minutes through the corridor. This is a level of delay which becomes notable, as it adds almost an additional half of the journey time of this route from the edge of the district through the Westwood shopping area and into the conurbation.
- 4.4.6 Given that the link capacity of the A28 near Birchington Square is close to being reached, it is expected that anything other than a slight increase in traffic flows could have a significant impact on journey times, and journey time reliability.

4.5 Highway Safety Record

- 4.5.1 Personal Injury Crash records (PICs) have been analysed for a 5 year time period between 1st April 2011 and 31st March 2016. The analysis of reported PICs has been undertaken for the 9 km (5.7 mile) A28 study area between the junction with A299

⁵ Typically 1am to 5am but extended where data was unavailable between these times.

Thanet Way and the A254 Marine to assist in the identification of existing issues and problems on A28.

- 4.5.2 An initial review of the data for the study area identified that there were a total of 164 PICs during the 5 year time period. Of these, 2 (1%) were Fatal and 27 (16%) were classified as Serious incidents. The remaining 135 (82%) of PIAs were deemed to be Slight in severity.
- 4.5.3 Table 4-12 below shows the number of crashes by severity for each yearly period running from April to March and Figure 4-15 shows the locations of these PICs.

	2011 to 2012	2012 to 2013	2013 to 2014	2014 to 2015	2015 to 2016
Slight	22	19	33	35	26
Serious	3	8	4	5	7
Fatal	1	0	1	0	0

Table 4-12: A28 Corridor - PIC Crashes by Year and Severity⁶



Figure 4-15: A28 Corridor – All PICs by Severity

⁶ Yearly periods run from the April to March of the following year.

- 4.5.4 The two fatal crashes occurred to the east of St Nicholas roundabout, before Brooksend Hill, on the dual carriageway section of the A28. They involved vehicles crossing the central grass verge.

Vulnerable Road Users

- 4.5.5 Table 4-13 shows the total number of injuries sustained by vulnerable road users and Figure 4-16 shows the locations of these PICs.

	Severity	2011 to 2012	2012 to 2013	2013 to 2014	2014 to 2015	2015 to 2016	Total
Pedestrians	Slight	3	2	5	5	4	19
	Serious	1	4	1	2	2	10
Cyclists	Slight	0	2	1	5	3	11
	Serious	0	1	1	0	1	3
Motorcyclists	Slight	2	3	3	5	3	16
	Serious	1	4	1	1	3	10
Mobility Scooters	Slight	0	0	1	0	0	1
Total		7	16	13	18	16	70

Table 4-13: A28 Corridor – Vulnerable Road User PICs



Figure 4-16: A28 Corridor - Vulnerable Road User PIC Locations

- 4.5.6 64 of the total number of PICs within the study corridor involved a pedestrian, cyclist, mobility scooter user or a motorcyclist and at least one other motor vehicle. A further 6 incidents were reported which involved a pedestrian, cyclist, mobility scooter user or a motorcyclist but did not involve any other motorised vehicles.
- 4.5.7 It should be noted that a small section of the route has a large majority of the incidents involving vulnerable road users. The 0.7 mile stretch between Rancorn Road and Marine Gardens has observed the following:
- 13 (45%) of the 29 pedestrian related incidents occurred in this stretch, of these 6 were serious incidents and 7 were slight;
 - 8 (57%) of the 14 cycle related incidents, of which 2 were serious and 6 were slight; and
 - 13 (50%) of the 26 motorcycle related incidents of which 5 were serious and 8 were slight.

Summary

- 4.5.8 The highest concentration (46%) of PICs relating to vulnerable road users are found to have occurred on the 0.7 mile stretch of the route between Rancorn Road and Marine

Gardens with both these junctions showing relatively high accident numbers.

- 4.5.9 In terms of incidents involving motorised vehicles the 0.7 mile stretch of the route between Rancorn Road and Marine Gardens also has a high proportion (29%) of the total number of PICs involving non vulnerable road users.
- 4.5.10 St Nicholas's Roundabout accounts for 13% of all PICs recorded in the study period.

Comparison with National Values

- 4.5.11 An annual crash rate has been calculated based on the observed crashes and using Annual Average Daily Flow (AADF) values as taken from the DfT website. The crash rate is based upon a weighted average AADF and route length. Table 4-14 shows the average total route length, the average AADF and calculated crash rate.

	Start Junction	End Junction	Distance (m)	KM	AADT Count	No Accidents	Accidents per year	Annual no Cars	Annual Distance Travelled (km)	Million kms of Travel	Accident Rate
1-3	A299	B2055	9000	9.000	19216	164	32.8	7013905	63125144	63.1	0.52

Table 4-14: A28 Corridor – Annual Average Crash Rate

- 4.5.12 An average annual crash rate of 0.52 has been calculated for this route. This rate has been compared to the value reported in WebTAG COBALT data tables for type 8 roads (Older S2 A Roads, 30/40mph) which gives a crash rate of 0.863 PICs per million vehicle kilometres travelled.
- 4.5.13 This suggests that the A28 has a lower than average crash rate. However it should be noted that this is an average across a 9 km route and there will be areas where this value is higher. In particular it should be noted that the section of the route from Rancorn Road and Marine Gardens has a particularly high accident rate when compared to the rest of the route.

4.6 Summary

- 4.6.1 In summary, the collated data indicates that the A28 corridor generally operates with moderate levels of queueing and delay. There are locations where design link capacity is close to saturation; as such increases in traffic demand on this corridor could potentially disproportionately impact on journey times and delay.
- 4.6.2 A number of junctions observe some level of peak hour queueing and delay. In particular the A28 Canterbury Rd/St Mildreds Rd/Minster Rd, the combined Birchington Square/Park Lane junctions, A28 Canterbury Rd/George V Ave/Maynard Ave, and A28 Marine Terrace/Marine Gardens/Marine Drive all observe more significant queueing during one or more of the weekday peak periods. At least one approach at all of these junctions observes queues in excess of 20 vehicles which suggest existing capacity issues are present.
- 4.6.3 In terms of highway safety there are clusters of crashes at some of the key junctions, in particular the section of the route through Margate has observed a high number of PICs. In addition, two fatal accidents have occurred on the more rural eastern end of the route. However, in general the route is considered to have a lower than average annual crash rate.

From: [Laurie Hudson](#)
To: [Manston Airport](#)
Subject: id 20012767
Date: 14 February 2019 21:35:41
Attachments: [Solutions+to+Operation+Stack+Factsheet.pdf](#)
[noise-aircraft-noise-effects-on-health 2015.pdf](#)

"I object to the application by RSP for a DCO on the disused Manston site

The freight traffic would add to the weekly incidents on the A299, M2 and A2. As well as cause more congestion. The route to west Kent is a nightmare most working days of the week with congested roads leading to and from Thanet. Its soul destroying sitting in traffic due to congestion but there are often accidents along the two major routes the M2 and M20. this is often made worse by operation stack for which there is still no agreed resolution.

Highways England - Solutions to Operation Stack (see attached)

While extra parking has been provided at the Kent ports, capacity is often exceeded when severe weather, industrial action or operational problems occur. When this happens, port-bound lorries start to form a queue on Kent's roads. This causes disruption for other road users traveling on the M20 / A20, M2 / A2 corridors and surrounding local roads.

Noise pollution from night flights is proven to cause health problems such as stroke and sleep deprivation. this was a major problem previously when the were 'shoulder landings and take offs'. Nobody begrudged the humanitarian flight but I do not recall any emergencies. I do recall the horrendous noise when there occasional infringements of the night time bans. I can assure you it was nothing like a slight breeze. It was thunderous rumble with associated engine noise. then there was the constant engine revving and tick over whilst idle on the runway awaiting take off. it woke the children who were then scared of the noise.

Aircraft Noise and Sleep Disturbance: A Review

Over the past 10 years, evidence that aircraft noise exposure leads to increased risk for poorer cardiovascular health has increased considerably. A recent review, suggested that risk for cardiovascular outcomes such as high blood pressure (hypertension), heart attack, and stroke, increases by 7 to 17% for a 10dB increase in aircraft or road traffic noise exposure (Basner et al., 2014). A review of the evidence for children concluded that there were associations between aircraft noise and high blood pressure (Paunovic et al., 2011), which may have implications for adult health (Stansfeld & Clark, 2015).

Please do not allow the night flight element of this application. There is no strict upper limit on the amount of flights in this application at night which is contrary to what RSP have told us at consultation.

Ban night flights as they are not needed. Looking at the capacity at other airports, it is doubtful that opening Manston as an airport is needed at all in the national interest. It is certainly not evidenced in the submission other it is RSPs opinion. This was my experience.

There will be sufficient capacity for freight at Heathrow with their third runway, ample personal safety zone and a much more detailed noise mitigation plan. Manston is not required, nor wanted.

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Queen Mary
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Aircraft noise effects on health

Prepared for the Airports Commission

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May 2015

Table of Contents

1. Introduction	2
2. Aircraft noise effects on health: a review of recent evidence.....	2
2.1. Cardiovascular health	2
2.2. Sleep disturbance.....	5
2.3. Annoyance	8
2.4. Psychological health.....	9
2.5. Implications of the evidence for aircraft noise effects on health for the shortlisted options for a new runway.....	10
2.5.1. Populations exposed for each shortlisted option.....	10
2.5.1.1. Gatwick 2-R	11
2.5.1.2. Heathrow-NWR.....	13
2.5.1.3. Heathrow-ENR	15
2.5.2. Mitigation.....	17
2.5.3. Implications of the noise effects on health evidence for the proposed schemes	18
3. Aircraft noise effects on children’s cognition and learning.....	19
3.1. Reading and memory	19
3.2. School intervention studies	20
3.3. Implications of the evidence for aircraft noise effects on children’s cognition and learning for the proposed schemes.....	21
3.3.1. Gatwick 2-R	21
3.3.2. Heathrow-NWR.....	22
3.3.3. Heathrow-ENR	23
3.4. Discussion.....	24
4. Guidelines for Environmental Noise Exposure	25
4.1. The WHO Community Noise Guidelines	25
4.2. WHO Night Noise Guidelines	27
4.3. Building Bulletin 93: Acoustic Design of Schools in the UK	27
5. Conclusion.....	27
6. References	28

1. Introduction

Recent years have seen an increase in the strength of the evidence linking environmental noise exposure (road, rail, airport and industrial noise) to health. The World Health Organization (WHO, 2011) recently estimated that between 1 and 1.6 million healthy life years (Disability-Adjusted Life Years) are lost annually because of environmental noise exposure¹, such as road traffic noise and aircraft noise, in high income western European Countries. The WHO estimated that each year 903,000 DALYS are lost due to sleep disturbance; 654,000 DALYS due to noise annoyance; 61,000 DALYS due to heart disease; and 45,000 DALYS due to cognitive impairment in children.

Aircraft noise negatively influences health if the exposure is long-term and exceeds certain levels (Basner et al., 2014). This review briefly summarizes the strength of the evidence for aircraft noise effects on cardiovascular health, sleep disturbance, annoyance, psychological well-being, and effects on children's cognition and learning, as well as briefly discussing guidelines for environment noise exposure. This evidence is related to the three shortlisted schemes for the new runway.

This is a selective review focusing on reviews assessing the strength of the evidence, as well as high quality, robust, large-scale epidemiological field studies of aircraft noise exposure, highlighting studies that have been conducted within the United Kingdom, where possible. It represents key studies within the field but should not be considered an exhaustive review. Studies of road traffic noise, as opposed to aircraft noise, have only been included where evidence for aircraft noise exposure is unavailable.

2. Aircraft noise effects on health: a review of recent evidence

2.1. Cardiovascular health

Over the past 10 years, evidence that aircraft noise exposure leads to increased risk for poorer cardiovascular health has increased considerably. A recent review, suggested that risk for cardiovascular outcomes such as high blood pressure (hypertension), heart attack, and stroke, increases by 7 to 17% for a 10dB increase in aircraft or road traffic noise exposure (Basner et al., 2014). A review of the evidence for children concluded that there were associations between aircraft noise and high blood pressure (Paunović et al., 2011), which may have implications for adult health (Stansfeld & Clark, 2015).

The HYENA study (HYpertension and Exposure to Noise near Airports) examined noise effects on the blood pressure (hypertension) of 4,861 people, aged 45-70 years, who had lived for over 5 years near 7 major European airports including London Heathrow; Amsterdam Schiphol; Stockholm Arlanda & Bromma; Berlin Tegel, Milan Malpensa; and Athens Eleftherios Venizelos (Jarup et al., 2008). High blood pressure was

¹ The range 1 to 1.6 million is given as it is not known if the effects for the different health outcomes are additive or if they might interact/co-occur.

assessed via measurements and medication use. The HYENA study found that a 10dB increase in aircraft noise at night (L_{night}) was associated with a 14% increase in odds for high blood pressure but day-time aircraft noise ($L_{\text{Aeq 16 hour}}$) did not increase the odds for high blood pressure (Jarup et al., 2008). The HYENA study did not find an association between day-time aircraft noise and high blood pressure which might be because many residents work away from home during the day-time, leading to potential mis-classification of their day-time aircraft noise exposure. The HYENA study also found that a 10dB increase in night-time aircraft noise was associated with a 34% increase in the use of medication for high blood pressure in the UK (Floud et al., 2011). The HYENA study is a high quality large-scale study of aircraft noise exposure effects on blood pressure, which includes a population sample around London Heathrow airport. One short-coming of the study is that it assesses noise and health at the same point in time, meaning that we cannot be sure whether noise exposure occurred before the poorer health outcomes, or whether the poorer health outcomes may have preceded the noise exposure.

A recent study around London Heathrow airport examined risks for hospital admission and mortality for stroke, coronary heart disease and cardiovascular disease for around 3.6 million people living near London Heathrow airport (Hansell et al., 2013). Both day-time ($L_{\text{Aeq 16 hour}}$) and night-time (L_{night}) aircraft noise exposure were related to increased risk for a cardiovascular hospital admission. Compared to those exposed to aircraft noise levels below 51dB in the day-time, those exposed to aircraft noise levels over 63dB in the day-time had a 24% higher chance of a hospital admission for stroke; a 21% higher chance of a hospital admission for coronary heart disease; and a 14% higher chance of a hospital admission for cardiovascular disease. These estimates took into account age, sex, ethnicity, deprivation and lung cancer mortality as a proxy for smoking. These results were also not accounted for by air pollution, which was adjusted for in the analyses. Similar effects were also found between aircraft noise exposure and mortality for stroke, coronary heart disease, and cardiovascular disease. The study concluded that high levels of aircraft noise were associated with increased risks of stroke, coronary heart disease, and cardiovascular disease for both hospital admissions and mortality in areas near Heathrow airport.

Further longitudinal evidence for an association between aircraft noise exposure and mortality from heart attacks comes from a large-scale Swiss study of 4.6 million residents over 30 years of age (Huss et al., 2010). This study found that mortality from heart attacks increased with increasing level and duration of aircraft noise exposure (over 15 years), but there were no associations between aircraft noise exposure and other cardiovascular outcomes including stroke or circulatory disease. The lack of association between aircraft noise and stroke differs from the findings of the similar study conducted around Heathrow airport, which did find an association of aircraft noise on stroke mortality (Hansell et al., 2013).

It is not uncommon for studies in this field to demonstrate some inconsistencies in the specific cardiovascular outcomes for which significant effects of aircraft noise associations are found. There are several explanations for this. Firstly, demonstrating environmental noise effects on cardiovascular disease requires very large samples.

Even in large samples effects may not be statistically significant, as the confidence intervals for the estimate of the effect can be wide, if the cardiovascular outcome does not have a high prevalence, e.g. incidence of stroke. Thus, studies vary in their sample size and in their ability to examine a range of cardiovascular outcomes. Secondly, with epidemiological studies, there is always the potential for residual confounding: the analyses may still not be taking into account all factors, which might be influencing the association between aircraft noise and cardiovascular disease. Thirdly, there is always the possibility of exposure mis-classification: the estimated aircraft noise exposure may be incorrect for some of the sample, which could influence the findings. For example, there is a limitation to using day-time aircraft noise exposure at home for adult samples, when they may work away from their home environment. Fourthly, there is variation in the level and range of aircraft noise exposures examined, which could explain differences between the studies. Despite these differences between the aircraft noise studies, the most recent meta-analysis of the field (Babisch, 2014) concluded that aircraft noise exposure was associated with increased risk for cardiovascular outcomes such as high blood pressure, heart attack and stroke.

It is biologically plausible that long-term exposure to environmental noise might influence cardiovascular health (Babisch, 2014). Figure 2.1. shows a model of proposed pathways between environmental noise exposure and cardiovascular diseases (Babisch, 2014). In brief, increased stress associated with noise exposure might cause physiological stress reactions in an individual, which in turn can lead to increases in established cardiovascular disease risk factors such as blood pressure, blood glucose concentrations, and blood lipids (blood fats). These risk factors lead to increased risk of high blood pressure (hypertension) and arteriosclerosis (e.g. narrowing of arteries due to fat deposits) and are related to serious events such as heart attacks and strokes (Babisch, 2014; Basner et al., 2014). The stress that triggers this pathway can operate directly via sleep disturbance or indirectly via interference with activities and annoyance.

To date, few studies have examined whether aircraft noise exposure influences metabolic risk factors for cardiovascular health, such as Type II diabetes, body mass index, and waist circumference. Such factors would lie on the proposed pathway between aircraft noise exposure and cardiovascular diseases. A recent study of long-term exposure to aircraft noise in Sweden found that exposure was associated with a larger waist circumference but less clearly with Type II diabetes and body mass index (Eriksson et al., 2014). This is an area of research where further evidence should be forthcoming in the next few years.

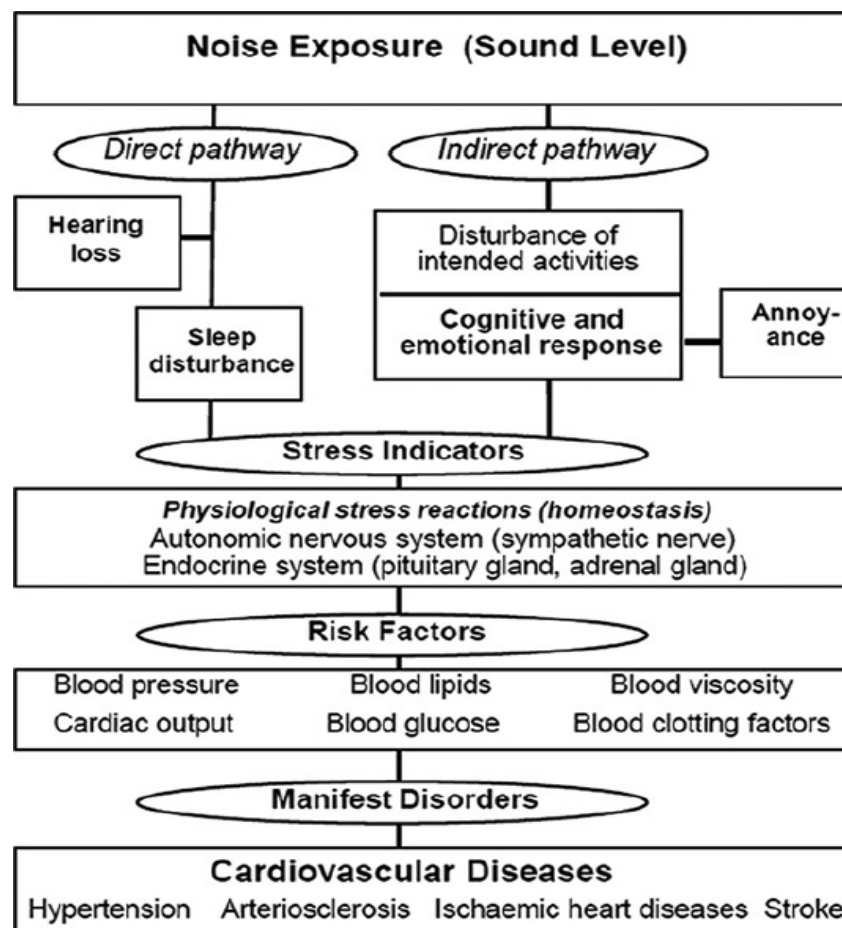


Figure 2.1. Pathways from environmental noise exposure to cardiovascular disease (Babisch, 2014).

2.2. Sleep disturbance

The WHO estimated sleep disturbance to be the most adverse non-auditory effect of environmental noise exposure (Basner et al., 2014; WHO, 2011). Undisturbed sleep of a sufficient number of hours is needed for alertness and performance during the day, for quality of life, and for health (Basner et al., 2014). Humans exposed to sound whilst asleep still have physiological reactions to the noise which do not adapt over time including changes in breathing, body movements, heart rate, as well as awakenings (Basner et al., 2014). The elderly, shift-workers, children and those with poor health are thought to be at risk for sleep disturbance by noise (Muzet, 2007).

The effect of night-time aircraft noise exposure has been explored for a range of sleep outcomes ranging from subjective self-reported sleep disturbance and perceived sleep quality, to more objective measures of interference with ability to fall asleep, shortened sleep duration, awakenings, and increased bodily movements as assessed

by polysomnography² (Michaud et al., 2007). Most evidence comes from studies of self-reported sleep disturbance. However, self-reported sleep disturbance outcomes are vulnerable to bias, as such measures are likely to be influenced by noise annoyance and other demographic factors (Clark & Stansfeld, 2011).

Reviews have concluded that there is evidence for an effect of night-time aircraft noise exposure on sleep disturbance from community based studies (Hume et al., 2012; Miedema & Vos, 2007). However, some reviews have concluded that the evidence is contradictory and inconclusive (Jones, 2009; Michaud et al., 2007), which might be explained by methodological differences between studies of noise effects on sleep disturbance. A meta-analysis of 24 studies, including nearly 23,000 individuals exposed to night-time noise levels ranging from 45-65dBA, found that aircraft noise was associated with greater self-reported sleep disturbance than road traffic noise (Miedema & Vos, 2007). However, another study, whilst confirming that aircraft noise was associated with greater self-reported sleep disturbance than road traffic noise, found that when polysomnography measures of sleep disturbance were analysed that road traffic noise was associated with greater disturbance than aircraft noise (Basner et al., 2011).

Polysomnography enables the assessment of noise effects on different stages of the sleep cycle. The average sleep cycle last between 90 to 110 minutes, and an individual experiences between four to six sleep cycles per night (Michaud et al., 2007). Figure 2.2. describes the duration and characteristics of each stage of the sleep cycle (Clark & Stansfeld, 2011) from wake, through non-rapid eye movement (NREM) stages 1 to 4, and rapid eye movement (REM) sleep. It is usual for people to move between NREM sleep stages several times before undergoing REM sleep. Slow-wave sleep (NREM stage 3 and 4) occurs more frequently in the first half of the night, and REM sleep propensity is greater in the second half of the night. Sleep disturbance is indicated by less stage 3, stage 4 and REM sleep, and by more wake and stage 1 sleep, as well as more frequent changes in sleep stage (Basner & Siebert, 2010).

There is evidence that aircraft noise influences the time spent in different sleep stages, with aircraft noise reducing slow-wave sleep (NREM Stage 4) and REM sleep and increasing NREM Stages 1, 2 & 3 (Basner et al., 2008; Swift, 2010). This evidence, taken with the increase in REM sleep in the later stages of the night might have implications for early morning (04.00-06.30 hours) flight operations at airports.

A laboratory study compared the potential effects of changes in the night-time curfew at Frankfurt airport on sleep disruption (Basner & Siebert, 2010), using polysomnography on 128 subjects over 13 nights. Three different operational scenarios were compared: scenario 1 was based on 2005 air traffic at Frankfurt airport which included night flights; scenario 2 was as scenario 1 but cancelled flights between 23.00-05.00 hours; scenario 3 was as scenario 1 but with flights between 23.00-05.00

² Polysomnography records biophysiological changes that occur during sleep, including brain waves using electroencephalography (EEG), eye movements using electroculography (EOG), muscle activity using electromyography (EMG), and heart rhythm using electrocardiography (ECG).

hours rescheduled to the day-time and evening periods. The study found that compared to the night without a curfew on night flights (scenario 1), small improvements were observed in sleep structure for the nights with curfew, even when the flights were rescheduled to periods before and after the curfew period. However, the change in the amount of time spent in the different sleep stages for the different scenarios was small, which might be explained by the small number of night-flights (on average 4 take-offs per hour) in the Frankfurt airport scenarios examined: larger effects may be observed for airports with a greater number of night-flights. The authors concluded that the benefits for sleep seen in the scenario involving rescheduling of flights rather than cancellation may be offset by the expected increase in air traffic during the late evening and early morning hours for those who go to bed before 22.30 or after 01.00 hours.

Wake	
Non-rapid eye movement (NREM)	
Stage 1	Light stage of sleep Lasts 5-10 minutes Bridge between wakefulness and sleep
Stage 2	Light stage of sleep Lasts around 20 minutes Brain waves of increased frequency Increased heart rate variability
Stage 3	Transition to deeper stages of sleep Increased amount of delta waves of lower frequency
Stage 4	Deepest stage of sleep Characterised by a greater number of delta waves
Rapid Eye Movement (REM) sleep	Typically starts 70-90 minutes after falling asleep Characterised by rapid eye movements Increases in brain activity Greater variability in respiration rate, blood pressure and heart rate

Figure 2.2. Stages of sleep, adapted from (Clark & Stansfeld, 2011).

The WHO Europe Night Noise Guidelines (WHO, 2009) were based on expert-consensus that there was sufficient evidence that nocturnal environmental noise exposure was related to self-reported sleep disturbance and medication use, and that there was some evidence for effects of nocturnal noise exposure on high blood pressure (hypertension) and heart attacks. The WHO Europe Night Noise Guidelines state that the target for nocturnal noise exposure should be 40 dB $L_{\text{night, outside}}$, which should protect the public as well as vulnerable groups such as the elderly, children, and the chronically ill from the effects of nocturnal noise exposure on health. The Night Noise Guidelines also recommend the level of 55 dB $L_{\text{night, outside}}$, as an interim target for countries wishing to adopt a step-wise approach to the guidelines. It is worth noting that the 40dB $L_{\text{night outside}}$ guideline represents a very low level of noise exposure, e.g. a refrigerator humming.

There have been fewer studies on aircraft noise exposure and sleep in children (Stansfeld & Clark, 2015), even though children are a group thought to be vulnerable to the effects of sleep disturbance (Pirrera et al., 2010). Drawing on studies of road traffic noise exposure in children, studies have suggested associations with sleeping problems (Tiesler et al., 2013), sleep quality (Ohrstrom et al., 2006) and sleepiness during the day (Ohrstrom et al., 2006) but not with difficulties falling asleep (Ohrstrom et al., 2006). However, these studies are limited by small samples and self-reports of sleep. Children sleep outside the typical hours used to denote night-time noise exposure around airports (e.g. L_{night} is typically 23.00 hours to 07.00 hours), so exposures during the hours of the evening and morning, which would fall within day-time exposure metrics may also be relevant when considering sleep disturbance effects for children.

2.3. Annoyance

Annoyance is the most prevalent community response in a population exposed to environmental noise. The term annoyance is used to describe negative reactions to noise such as disturbance, irritation, dissatisfaction and nuisance (Guski, 1999). Annoyance can also be accompanied by stress-related symptoms, leading to changes in heart rate and blood pressure, as described above. Acoustic factors, such as the noise source and sound level, account for only a small to moderate amount of annoyance responses: other factors such as the fear associated with the noise source, interference with activities, ability to cope, noise sensitivity, expectations, anger, attitudes to the source – both positive or negative, and beliefs about whether noise could be reduced by those responsible influence annoyance responses (WHO, 2000).

Annoyance scales are commonly used within European policy to measure the quality of life impact of environmental noise exposure on communities around airports. An International Standard is in place governing the measurement of annoyance in community surveys (Fields et al., 2001; ISO/TS, 2003), with questions typically taking the format “Thinking about the last year when you are at home, how much does the noise from aircraft bother, disturb or annoy you?” with responses ideally given on a 10 point scale with 0 being ‘not at all annoyed’ and 10 being “extremely annoyed”. This question is often reported as the % of the population “highly annoyed” or “annoyed”, where “highly annoyed” is 72% or more on the scale and “annoyed” is 50% or more on the scale.

Exposure to aircraft noise at 60dB L_{den} is estimated to be associated with 38% of the population reporting being “annoyed” and 17% being “highly annoyed” (EC, 2002). Exposure to aircraft noise at 65dB L_{den} is estimated to be associated with 48% of the population reporting being “annoyed” and 26% being “highly annoyed” (EC, 2002). However, in recent years, several studies have suggested that aircraft noise annoyance around major airports in Europe has increased (Babisch et al., 2009; Janssen et al., 2011; Schreckenberg et al., 2010), so the percentage of the population reporting being “annoyed” or “highly annoyed” at each noise exposure level may have

increased since these figures were put forward by the European Commission in 2002 (EC, 2002).

Annoyance responses can also increase in relation to a change in airport operations. A study around Zurich airport found that residents who experienced a significant increase in aircraft noise exposure due to an increase in early morning and late evening flight operations had a pronounced over-reaction of annoyance i.e. the annoyance reaction was greater than that which would be predicted by the level of noise exposure (Brink et al., 2008).

Children also report annoyance responses, although it is not known at what age children begin to exhibit annoyance responses. The RANCH (Road traffic and Aircraft Noise exposure and children's Cognition and Health) study found that children aged 9-11 years of age living near London Heathrow, Amsterdam Schiphol, and Madrid Barajas airports, reported annoyance for aircraft noise exposure at school and at home (van Kempen et al., 2009). For school exposure the percentage of "highly annoyed" children increased from about 5.1% at 50dB $L_{Aeq\ 16\ hour}$, to 12.1% at 60dB $L_{Aeq\ 16\ hour}$.

2.4. Psychological health

Following on from annoyance, it has been suggested that long-term noise exposure might influence psychological health. However, overall the evidence for aircraft noise exposure being linked to poorer well-being, lower quality of life, and psychological ill-health is not as strong or consistent as for other health outcomes, such as cardiovascular disease. A recent study of 2300 residents near Frankfurt airport found that annoyance but not aircraft noise levels per se ($L_{Aeq\ 16\ hour}$, L_{night} , L_{den}) was associated with self-reported lower quality of life (Schreckenberget al., 2010).

Several studies of children around London Heathrow airport have shown no effect of aircraft noise at school on children's psychological health or cortisol levels (Haines et al., 2001a; Haines et al., 2001b; Stansfeld et al., 2009): we would expect cortisol levels to be raised in children with depression. However, there may be a small effect of aircraft noise on hyperactivity symptoms. The West London Schools Study of 451 children around Heathrow airport, aged 8-11 years found higher rates of hyperactivity symptoms for children attending schools exposed to aircraft noise exposure $>63\text{dB } L_{Aeq\ 16\ hour}$ compared with $<57\text{dB } L_{Aeq\ 16\ hour}$ (Haines et al., 2001a). A similar effect was observed in the RANCH study where 10dB $L_{Aeq\ 16\ hour}$ increase in aircraft noise exposure at school was associated with 0.13 increase in hyperactivity symptoms (Stansfeld et al., 2009). However, these increases in hyperactivity symptoms, whilst statistically significant, are extremely small and most likely not of clinical relevance. Aircraft noise exposure does not appear to be causing children to develop hyperactivity problems.

There have been fewer studies of aircraft noise effects on adult psychological health. The HYENA study, found that a 10dB increase in day-time ($L_{Aeq\ 16\ hour}$) was associated

with a 28% increase in anxiety medication use: similarly, a 10dB increase in night-time (L_{night}) aircraft noise was associated with a 27% increase in anxiety medication use. However, day-time and night-time aircraft noise exposure were not associated with sleep medication or anti-depressant medication use (Floud et al., 2011). Anxiety medication is prescribed for individuals experiencing levels of anxiety and worry that interfere with their ability to function effectively: they can also be prescribed for sleeping problems. A sub-study of the HYENA study found that salivary cortisol (a stress hormone which is higher in people with depression) was 34% higher for women exposed to aircraft noise $> 60\text{dB } L_{\text{Aeq } 24 \text{ hour}}$, compared to women exposed to less than $50\text{dB } L_{\text{Aeq } 24 \text{ hour}}$ (Selander et al., 2009). However, no association between aircraft noise and salivary cortisol was found for men.

2.5. Implications of the evidence for aircraft noise effects on health for the shortlisted options for a new runway

2.5.1. Populations exposed for each shortlisted option

This section considers the implications of the current evidence for aircraft noise effects on cardiovascular health, sleep disturbance, annoyance, and psychological health for the three shortlisted options for a new runway:

- Gatwick 2-R promoted by Gatwick Airport Limited (GAL).
- Heathrow-NWR promoted by Heathrow Airport Limited (HAL).
- Heathrow-ENR promoted by Heathrow Hub (HH).

Information relating to each of these options is taken from the “Noise: Baseline”, the “Noise: Local Assessment” and the “Noise: Local Assessment Addendum” reports prepared by Jacobs for the Airport Commission (all available on <https://www.gov.uk/government/organisations/airports-commission>).

The Commission has evaluated these shortlisted options in terms of populations exposed to several noise metrics including $L_{\text{Aeq } 16 \text{ hour}}$, $L_{\text{Aeq } 8 \text{ hour}}$, L_{den} , $N70$ & $N60$. Most of the evidence for aircraft noise effects on health has made use of average noise metrics such as $L_{\text{Aeq } 16 \text{ hour}}$ and $L_{\text{Aeq } 8 \text{ hour}}$. This section relates key messages from the evidence to the estimated populations exposed to $L_{\text{Aeq } 16 \text{ hour}}$ and $L_{\text{Aeq } 8 \text{ hour}}$ for each of the shortlisted options using the predefined exposure categories used by the Commission of >54 , >57 , >60 , >63 , >66 , >69 , and $>72\text{dB}$ for $L_{\text{Aeq } 16 \text{ hour}}$ and >48 , >51 , >54 , >57 , >60 , >63 , >66 , >69 , and $>72\text{dB}$ for $L_{\text{Aeq } 8 \text{ hour}}$.

The magnitude of the populations exposed to aircraft noise varies between the shortlisted options for each scheme and is nearly always greater in terms of the net population exposed in the Do-Something scenario compared with the Do-Minimum scenario.

2.5.1.1. Gatwick 2-R

For Gatwick-2-R, the estimated population exposed to day-time noise levels greater than 54dB $L_{Aeq\ 16\ hour}$ is 17,600 in 2030, 19,400 in 2040, and 24,600 in 2050. The estimated population exposed to night-time noise levels greater than 48dB $L_{Aeq\ 8\ hour}$ is 22,300 in 2030, 17,400 in 2040 and 18,600 in 2050.

Table 2.1. Estimated population exposed to levels greater than 54dB $L_{Aeq\ 16\ hour}$ and $L_{Aeq\ 8\ hour}$ in 2030, 2040, & 2050 for Gatwick 2-R.

	Gatwick 2-R		
	2030	2040	2050
Day-time			
54dB $L_{Aeq\ 16\ hour}$	17,600	19,400	24,600
57dB $L_{Aeq\ 16\ hour}$	4,900	5,300	7,200
60dB $L_{Aeq\ 16\ hour}$	1,700	1,900	2,800
63dB $L_{Aeq\ 16\ hour}$	400	500	800
66dB $L_{Aeq\ 16\ hour}$	<50	<50	200
69dB $L_{Aeq\ 16\ hour}$	<50	<50	<50
72dB $L_{Aeq\ 16\ hour}$	<50	<50	<50
Night-time			
48dB $L_{Aeq\ 8\ hour}$	22,300	17,400	18,600
51dB $L_{Aeq\ 8\ hour}$	6,500	5,200	5,400
54 dB $L_{Aeq\ 8\ hour}$	2,900	2,300	2,400
57dB $L_{Aeq\ 8\ hour}$	800	500	700
60dB $L_{Aeq\ 8\ hour}$	200	100	100
63dB $L_{Aeq\ 8\ hour}$	<50	<50	<50
66dB $L_{Aeq\ 8\ hour}$	<50	<50	<50
69dB $L_{Aeq\ 8\ hour}$	<50	<50	<50
72dB $L_{Aeq\ 8\ hour}$	<50	<50	<50

These estimates for the population exposed in the Do-Something scenario for Gatwick 2-R are higher than the estimates for the Do-Minimum scenario in 2030, 2040 and 2050. The differences in the 2030, 2040, and 2050 Do-Something scenario compared with the 2030, 2040, and 2050 Do-Minimum scenario are summarized below for day-time and night-time exposure:

2030 $L_{Aeq\ 16\ hour}$

- >54 dB: An increase of 9,600 (from 8,000 to 17,600)
- >57 dB: An increase of 2,700 (from 2,200 to 4,900)
- >60 dB: An increase of 600 (from 1,100 to 1,700)
- >63 dB: No discernible difference from (from 400 to 400)
- >66 dB: A reduction from 300 to <50
- >69 dB: A reduction from 200 to <50
- >72 dB: No discernible difference (from <50 to <50)

2040 L_{Aeq} 16 hour

- >54 dB: An increase of 12,000 (from 7,400 to 19,400)
- >57 dB: An increase of 3,100 (from 2,200 to 5,300)
- >60 dB: An increase of 1,000 (from 900 to 1,900)
- >63 dB: No discernible difference (from 500 to 500)
- >66 dB: A reduction from 300 to <50
- >69 dB: A reduction from 200 to <50
- >72 dB: No discernible difference (<50 to <50)

2050 L_{Aeq} 16 hour

- >54 dB: An increase of 17,000 (from 7,600 to 24,600)
- >57 dB: An increase of 4,400 (from 2,800 to 7,200)
- >60 dB: An increase of 1,600 (from 1,200 to 2,800)
- >63 dB: An increase of 300 (from 500 to 800)
- >66 dB: A reduction of 100 (from 300 to 200)
- >69 dB: A reduction from 200 to <50
- >72 dB: No discernible difference (from <50 to <50)

2030 L_{Aeq} 8 hour

- >48 dB: An increase of 10,600 (from 11,700 to 22,300)
- >51 dB: An increase of 900 (from 5,600 to 6,500)
- >54 dB: An increase of 1,200 (from 1,700 to 2,900)
- >57 dB: An increase of 200 (from 600 to 800)
- >60 dB: A reduction of 200 (from 400 to 200)
- >63 dB: A reduction from 300 to <50
- >66 dB: No discernible difference (from <50 to <50)
- >69 dB: No discernible difference (from <50 to <50)
- >72 dB: No discernible difference (from <50 to <50)

2040 L_{Aeq} 8 hour

- >48 dB: An increase of 6,300 (from 11,100 to 17,400)
- >51 dB: A reduction of 300 (from 5,500 to 5,200)
- >54 dB: An increase of 600 (from 1,700 to 2,300)
- >57 dB: A reduction of 100 (from 600 to 500)
- >60 dB: A reduction of 300 (from 400 to 100)
- >63 dB: A reduction from 300 to <50
- >66 dB: No discernible difference (from <50 to <50)
- >69 dB: No discernible difference (from <50 to <50)
- >72 dB: No discernible difference (from <50 to <50)

2050 L_{Aeq} 8 hour

- >48 dB: An increase of 7,400 (from 11,200 to 18,600)
- >51 dB: A reduction of 200 (from 5,600 to 5,400)
- >54 dB: An increase of 700 (from 1,700 to 2,400)
- >57 dB: An increase of 100 (from 600 to 700)
- >60 dB: A reduction of 300 (from 400 to 100)

- >63 dB: A reduction from 300 to <50
- >66 dB: No discernible difference (from <50 to <50)
- >69 dB: No discernible difference (from <50 to <50)
- >72 dB: No discernible difference (from <50 to <50)

2.5.1.2. Heathrow-NWR

For Heathrow-NWR-T, the estimated population exposed to day-time noise levels greater than 54dB $L_{Aeq\ 16\ hour}$ is 456,200 in 2030, 488,600 in 2040, and 491,900 in 2050. The estimated population exposed to night-time noise levels greater than 48dB $L_{Aeq\ 8\ hour}$ is 266,800 in 2030, 308,500 in 2040 and 295,800 in 2050.

Table 2.2. Estimated population exposed to levels greater than 54dB $L_{Aeq\ 16\ hour}$ and $L_{Aeq\ 8\ hour}$ in 2030, 2040, & 2050 for Heathrow-NWR-T.

	Heathrow-NWR-T		
	2030	2040	2050
Day-time			
54dB $L_{Aeq\ 16\ hour}$	456,200	488,600	491,900
57dB $L_{Aeq\ 16\ hour}$	237,100	249,900	249,300
60dB $L_{Aeq\ 16\ hour}$	128,200	137,000	140,600
63dB $L_{Aeq\ 16\ hour}$	38,300	41,300	42,900
66dB $L_{Aeq\ 16\ hour}$	1,200	11,800	10,900
69dB $L_{Aeq\ 16\ hour}$	900	900	800
72dB $L_{Aeq\ 16\ hour}$	<50	<50	<50
Night-time			
48dB $L_{Aeq\ 8\ hour}$	266,800	308,500	295,800
51dB $L_{Aeq\ 8\ hour}$	167,200	188,800	185,600
54 dB $L_{Aeq\ 8\ hour}$	72,200	95,700	88,600
57dB $L_{Aeq\ 8\ hour}$	11,600	18,100	12,100
60dB $L_{Aeq\ 8\ hour}$	900	2,400	900
63dB $L_{Aeq\ 8\ hour}$	200	200	200
66dB $L_{Aeq\ 8\ hour}$	<50	<50	<50
69dB $L_{Aeq\ 8\ hour}$	<50	<50	<50
72dB $L_{Aeq\ 8\ hour}$	<50	<50	<50

The differences in the 2030, 2040, and 2050 Do-Something scenarios compared with the 2030, 2040, and 2050 Do-Minimum scenarios are summarized below for day-time and night-time exposure. Generally, the estimates for the population exposed in the Do-Something scenarios for Heathrow-NWR-T in the day-time are higher than the estimates for the Do-Minimum scenarios in 2030, 2040 and 2050: there is an increase in the population exposed at the lower contour levels for $L_{Aeq\ 16\ hour}$ along with a slight reduction in the population exposed at the higher contour levels. For night-noise the population exposed to >48dB $L_{Aeq\ 8\ hour}$ is reduced for the Do-Something scenarios compared with the Do-Minimum scenarios at 2030, 2040 and 2050. In 2030 and 2040,

there is an increase in the population exposed to >51dB and >54dB L_{Aeq} 8 hour but reductions are estimated for all the other L_{Aeq} 8 hour exposure contours. For the 2050 scenario the number of the population exposed at night-time is reduced across all the contours.

2030 L_{Aeq} 16 hour

- >54 dB a decrease of 37,400 (from 493,600 to 456,200)
- >57 dB an increase of 15,900 (from 221,200 to 237,100)
- >60 dB an increase of 19,200 (from 109,000 to 128,200)
- >63 dB an increase of 3,100 (from 35,200 to 38,300)
- >66 dB an increase of 4,100 (from 7,900 to 12,000)
- >69dB a reduction of 1,200 (from 2,100 to 900)
- >72 dB no discernible difference (from <50 to <50)

2040 L_{Aeq} 16 hour

- >54 dB an increase of 28,000 (from 460,600 to 488,600)
- >57 dB an increase of 30,500 (from 219,400 to 249,900)
- >60 dB an increase of 33,200 (from 103,800 to 137,000)
- >63 dB an increase of 7,400 (from 33,900 to 41,300)
- >66 dB an increase of 4,700 (from 7,100 to 11,800)
- >69 dB a reduction of 1,200 (from 2,100 to 900)
- >72 dB no discernible difference (from <50 to <50)

2050 L_{Aeq} 16 hour

- >54 dB an increase of 56,100 (from 435,800 to 491,900)
- >57 dB an increase of 29,700 (from 219,600 to 249,300)
- >60 dB an increase of 36,800 (from 103,800 to 140,600)
- >63 dB an increase of 8,000 (from 34,900 to 42,900)
- >66 dB an increase of 3,200 (from 77,00 to 10,900)
- >69 dB a reduction of 1,300 (from 2,100 to 800)
- >72 dB no discernible difference (from <50 to <50)

2030 L_{Aeq} 8 hour

- >48 dB a reduction of 4,400 (from 271,200 to 266,800)
- >51 dB an increase of 15,900 (from 151,300 to 167,200)
- >54 dB an increase of 11,100 (from 61,100 to 72,200)
- >57 dB a reduction of 10,300 (from 21,900 to 11,600)
- >60 dB a reduction 3,000 (from 3,900 to 900)
- >63 dB a reduction of 1,100 (from 1,300 to 200)
- >66 – 72 dB no discernible differences (all remain at <50 in both scenarios)

2040 L_{Aeq} 8 hour

- >48 dB a reduction of 28,500 (from 337,000 to 308,500)
- >51 dB an increase of 4,200 (from 184,600 to 188,800)
- >54 dB an increase of 14,400 (from 813,00 to 95,700)
- >57 dB a reduction of 13,300 (from 31,400 to 18,100)
- >60 dB a reduction of 4,000 (from 6,400 to 2,400)

- >63 dB a reduction of 2,200 (from 2,400 to 200)
- >66 – 72 dB no discernible differences (all remain at <50 in both scenarios)

2050 L_{Aeq} 8 hour

- >48 dB a reduction of 7,730 (from 373,100 to 295,800)
- >51 dB a reduction of 11,800 (from 197,400 to 185,600)
- >54 dB a reduction of 600 (from 89,200 to 88,600)
- >57 dB a reduction of 21,800 (from 33,900 to 12,100)
- >60 dB a reduction of 6,200 (from 7,100 to 900)
- >63 dB a reduction of 2,400 (from 2,600 to 200)
- >66 – 72 dB no discernible differences (all remain at <50 in both scenarios)

2.5.1.3. Heathrow-ENR

For Heathrow-ENR-O (using the offset flight path results), the estimated population exposed to day-time noise levels greater than 54dB L_{Aeq} 16 hour is 480,300 in 2030, 488,900 in 2040 and 462,900 in 2050. The estimated population exposed to night-time noise levels greater than 48dB L_{Aeq} 8 hour is 263,800 in 2030, 298,900 in 2040 and 306,700 in 2050.

Table 2.3. Estimated population exposed to levels greater than 54dB L_{Aeq} 16 hour and L_{Aeq} 8 hour in 2030, 2040, & 2050 for Heathrow-ENR-O.

	Heathrow-ENR-O		
	2030	2040	2050
Day-time			
54dB L _{Aeq} 16 hour	480,300	488,900	462,900
57dB L _{Aeq} 16 hour	257,900	264,700	261,200
60dB L _{Aeq} 16 hour	157,500	164,400	165,500
63dB L _{Aeq} 16 hour	63,700	67,500	67,100
66dB L _{Aeq} 16 hour	17,100	17,700	17,800
69dB L _{Aeq} 16 hour	3,900	4,000	3,900
72dB L _{Aeq} 16 hour	600	700	600
Night-time			
48dB L _{Aeq} 8 hour	263,800	298,900	306,700
51dB L _{Aeq} 8 hour	177,400	193,800	197,200
54 dB L _{Aeq} 8 hour	87,800	107,300	110,300
57dB L _{Aeq} 8 hour	31,000	36,900	36,400
60dB L _{Aeq} 8 hour	4,900	6,800	6,200
63dB L _{Aeq} 8 hour	800	1,600	1,600
66dB L _{Aeq} 8 hour	200	300	200
69dB L _{Aeq} 8 hour	<50	100	<50
72dB L _{Aeq} 8 hour	<50	<50	<50

The number of people within the day-time $L_{Aeq\ 16\ hour}$ noise contours are greater in the Heathrow-ENR-O Do-Something scenarios, when compared to the Do-Minimum scenarios, for all of the assessment years considered. For night-noise the population exposed to $>48\text{dB } L_{Aeq\ 8\ hour}$ and $>63\ L_{Aeq\ 8\ hour}$ is reduced for the Do-Something scenario compared with the Do-Minimum scenario at 2030, 2040 and 2050, however, within the other exposure contours there are increases in the population exposed to night-noise.

2030 $L_{Aeq\ 16\ hour}$

- $>54\text{ dB}$: A reduction of 13,300 (from 493,600 to 480,300)
- $>57\text{ dB}$: An increase of 36,700 (from 221,200 to 257,900)
- $>60\text{ dB}$: An increase of 48,500 (from 109,000 to 157,500)
- $>63\text{ dB}$: An increase of 28,500 (from 35,200 to 63,700)
- $>66\text{ dB}$: An increase of 9,200 (from 7,900 to 17,100)
- $>69\text{ dB}$: An increase of 1,800 (from 2,100 to 3,900)
- $>72\text{ dB}$: An increase from <50 to 600

2040 $L_{Aeq\ 16\ hour}$

- $>54\text{ dB}$: An increase of 28,300 (from 460,600 to 488,900)
- $>57\text{ dB}$: An increase of 45,300 (from 219,400 to 264,700)
- $>60\text{ dB}$: An increase of 60,600 (from 103,800 to 164,400)
- $>63\text{ dB}$: An increase of 33,600 (from 33,900 to 67,500)
- $>66\text{ dB}$: An increase of 10,600 (from 7,100 to 17,700)
- $>69\text{ dB}$: An increase of 1,900 (from 2,100 to 4,000)
- $>72\text{ dB}$: A change from <50 to 700

2050 $L_{Aeq\ 16\ hour}$

- $>54\text{ dB}$: An increase of 27,100 (from 435,800 to 462,900)
- $>57\text{ dB}$: An increase of 41,600 (from 219,600 to 261,200)
- $>60\text{ dB}$: An increase of 61,700 (from 103,800 to 165,500)
- $>63\text{ dB}$: An increase of 32,200 (from 34,900 to 67,100)
- $>66\text{ dB}$: An increase of 10,100 (from 7,700 to 17,800)
- $>69\text{ dB}$: An increase of 1,800 (from 2,100 to 3,900)
- $>72\text{ dB}$: A change from <50 to 600

2030 $L_{Aeq\ 8\ hour}$

- $>48\text{ dB}$: A reduction of 7,400 (from 271,200 to 263,800)
- $>51\text{ dB}$: An increase of 26,100 (from 151,300 to 177,400)
- $>54\text{ dB}$: An increase of 26,700 (from 61,100 to 87,800)
- $>57\text{ dB}$: An increase of 9,100 (from 21,900 to 31,000)
- $>60\text{ dB}$: An increase of 1,000 (from 3,900 to 4,900)
- $>63\text{ dB}$: A reduction of 500 (from 1,300 to 800)
- $>66\text{ dB}$: An increase from <50 to 200
- $>69\text{ dB}$: No discernible change (from <50 to <50)
- $>72\text{ dB}$: No discernible change (from <50 to <50)

2040 $L_{Aeq\ 8\ hour}$

- >48 dB: A reduction of 38,100 (from 337,000 to 298,900)
- >51 dB: An increase of 9,200 (from 184,600 to 193,800)
- >54 dB: An increase of 26,000 (from 81,300 to 107,300)
- >57 dB: An increase of 5,500 (from 31,400 to 36,900)
- >60 dB: An increase of 400 (from 6,400 to 6,800)
- >63 dB: A reduction of 800 (from 2,400 to 1,600)
- >66 dB: An increase from <50 to 300
- >69 dB: An increase from <50 to 100
- >72 dB: No discernible change (from <50 to <50)

2050 L_{Aeq} 8 hour

- >48 dB: A reduction of 66,400 (from 373,100 to 306,700)
- >51 dB: A reduction of 200 (from 197,400 to 197,200)
- >54 dB: An increase of 21,100 (from 89,200 to 110,300)
- >57 dB: An increase of 2,500 (from 33,900 to 36,400)
- >60 dB: A reduction of 900 (from 7,100 to 6,200)
- >63 dB: A reduction of 1,000 (from 2,600 to 1,600)
- >66 dB: An increase from <50 to 200
- >69 dB: An increase from <50 to <50
- >72 dB: No discernible change (from <50 to <50)

2.5.2. Mitigation

All the schemes suggest mitigation activities for their schemes. Aspects to note are as follows:

- Gatwick 2-R: houses within the 60 L_{Aeq} 16 hour contour will be offered £3,000 towards double glazing and loft insulation for newly affected homes. Residents with a home within the 57dB L_{Aeq} 16 hour contour will be offered £1000 per annum – to qualify residents must have been living in the house before 1st January 2015.
- Heathrow-NWR: runway operations allow respite for local populations. Residents in the 60dB L_{Aeq} 16 hour contour will be offered full-costs for insulation; residents exposed to 55dB L_{den} will be offered a £3,000 contribution towards insulation.
- Heathrow ENR: the promoter is not advocating night-time operation of the extended runway and is also planning to reduce day-time exposure by use of noise preferential routing. This scheme will also offer full-costs for home insulation for residents in the 60dB L_{Aeq} 16 hour contour, with residents in the 55dB L_{den} contour offered a £3,000 contribution towards insulation.

In terms of mitigation, very little is understood in terms of how monetary payments or respite from exposure might influence the associations between aircraft noise and health. The health-benefits associated with many of these activities should not be assumed and need to be empirically tested. The impact of any mitigation scheme would ideally be evaluated to assess efficacy and cost-effectiveness.

2.5.3. Implications of the noise effects on health evidence for the proposed schemes

A brief consideration of the evidence for noise effects on health in relation to the three schemes is provided below:

- Aircraft noise exposure is associated with small increases in risk for poor cardiovascular health outcomes such as high blood pressure, heart attacks, and stroke, as well as with cardiovascular hospital admission and cardiovascular mortality, with effects observed for day-time (L_{Aeq} 16 hour) and night-time (L_{Aeq} 8 hour) exposure.
- Whilst the increase in risk observed between aircraft noise exposure and cardiovascular health is considered moderate, such increases in risk become important if a large population is exposed to aircraft noise.
- Night-noise is associated with self-reported sleep disturbance and with changes in sleep structure. Night-noise might also be particularly important for cardiovascular effects. Populations exposed to night-time noise could benefit from insulation of their home. It may also be beneficial to consider the use of curfews for night-noise flights: respite may also be effective but needs empirically evaluating.
- Aircraft noise exposure during the evening and early morning (outside the typical 23.00 to 07.00 8 hour night exposure metric) also has relevance for the health and sleep quality of the local population, and may be particularly relevant for children, the physically ill, and shift-workers. Therefore the impact of aircraft noise on the sleep of the local population may not be restricted only to the night-time period and insulation to the homes of populations exposed to day-time noise levels might also be beneficial.
- Consideration should be given to health monitoring of cardiovascular risk factors in the exposed population: for example, high blood pressure and cholesterol can be treated with medication to avoid more serious cardiovascular disease progression. This can probably be achieved through existing NHS Health Checks offered to individuals aged 40-74 by their GPs, which checks vascular and circulatory health.
- Aircraft noise annoyance responses are to be expected for children and adults and it should be borne in mind that annoyance responses in relation to exposure may be higher than predicted by the traditional annoyance curves. In particular, annoyance can increase in relation to operational changes; where populations become newly exposed to noise; where populations experience a step-change in exposure; and in response to early morning and evening flights. Monitoring of annoyance responses over the long-term using survey methods in the exposed population would be advisable. In particular, annoyance responses at different times of the day should be examined. Surveys assessing baseline annoyance, in terms of annoyance responses prior to the development of the new runway would

be useful for comparative purposes. Such monitoring would help the airport to identify any increases in annoyance related to operational decisions.

- Based on current evidence aircraft noise might be associated with decreased quality of life but is unlikely to be causing psychological ill-health. The increases in hyperactivity symptoms observed for children are small and unlikely to be of clinical significance in the population exposed. The evidence relating to aircraft noise effects on psychological health should be re-reviewed throughout the planning process, as further evidence becomes available.

3. Aircraft noise effects on children's cognition and learning

3.1. Reading and memory

Many studies have found effects of aircraft noise exposure at school or at home on children's reading comprehension or memory skills (Evans & Hygge, 2007). The RANCH study (Road traffic and Aircraft Noise and children's Cognition & Health) of 2844 9-10 year old children from 89 schools around London Heathrow, Amsterdam Schiphol, and Madrid Barajas airports found that aircraft noise was associated with poorer reading comprehension and poorer recognition memory, after taking social position and road traffic noise, into account (Stansfeld et al., 2005).

Figure 3.1 shows the exposure-effect relationship between aircraft noise at school and reading comprehension from the RANCH study (Clark et al., 2006), indicating that as aircraft noise exposure increased, performance on the reading test decreased. Reading began to fall below average at around 55dB $L_{Aeq\ 16\ hour}$ at school but as the association is linear, (thus there is no specific threshold above which noise effects begin) any reduction in aircraft noise exposure at schools should lead to an improvement in reading comprehension, supporting a policy to not only insulate schools exposed to the highest levels of aircraft noise. The development of cognitive skills such as reading and memory is important not only in terms of educational achievement but also for subsequent life chances and adult health (Kuh & Ben-Shlomo, 2004). In the UK, reading age was delayed by up to 2 months for a 5dB increase in aircraft noise exposure (Clark et al., 2006). The UK primary schools in the RANCH study ranged in aircraft noise exposure from 34dB $L_{Aeq\ 16\ hour}$ to 68 dB $L_{Aeq\ 16\ hour}$. If we take a 20dB difference in aircraft noise exposure between schools, the study would estimate an 8-month difference in reading age.

For primary school children, aircraft noise exposure at school and at home are very highly correlated: in the RANCH UK sample, this correlation was $r=0.91$ (Clark et al., 2006). Such a high correlation can make estimating the impact of aircraft noise exposure in both environments difficult. The RANCH study found that night-time aircraft noise at the child's home was also associated with impaired reading comprehension and recognition memory, but night-noise was not having an additional effect to that of day-time noise exposure on reading comprehension or recognition memory (Clark et al., 2006; Stansfeld et al., 2010). These findings suggest that indices

of aircraft noise exposure in the day-time in the school environment should be sufficient to capture effects. Further analyses of the UK RANCH sample found that these associations for aircraft noise exposure remained after taking co-occurring air pollution levels into account (Clark et al., 2012).

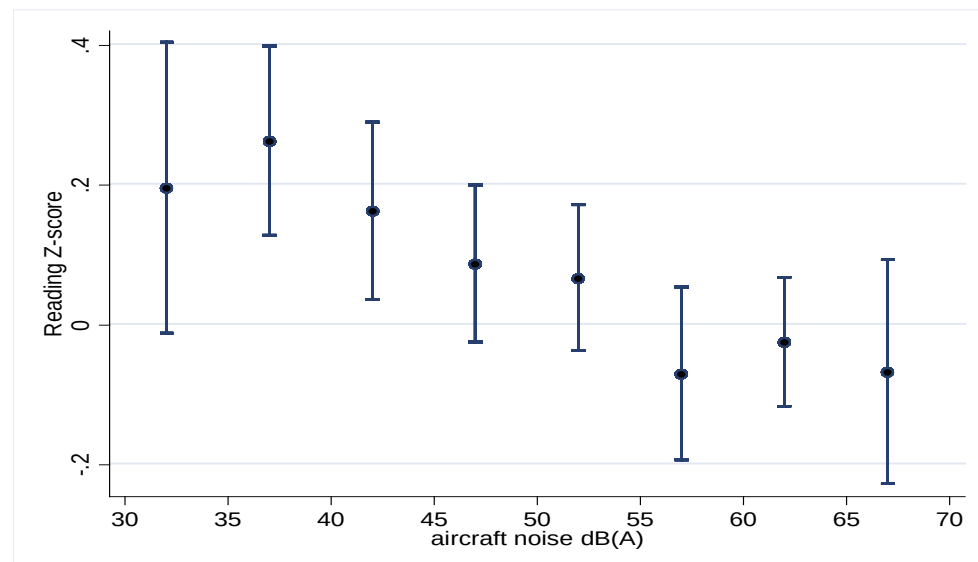


Figure 3.1. Exposure-effect relationship between aircraft noise exposure at school and reading comprehension in the RANCH study (Clark et al., 2006).

There are several ways in which aircraft noise could influence children’s cognition: lost teaching time - as a teacher may have to stop teaching whilst noise events occur; teacher and pupil frustration; annoyance and stress responses; reduced morale; impaired attention; children might tune out the aircraft noise and over-generalise this response to other sounds in their environment missing out on information; and sleep disturbance from home exposure which might cause performance effects the next day (Stansfeld & Clark, 2015).

Children spend a considerable amount of time at school in the playground. Play is thought to be important for children’s social, cognitive, emotional and physical development, as well as enabling relaxation between more formal teaching activities. Unfortunately, at this time, there is no empirical evidence upon which to draw conclusions about how aircraft noise exposure might impact upon children’s use of playground settings.

3.2. School intervention studies

Two studies of interventions to reduce or remove aircraft noise exposure at school are worth noting. The longitudinal Munich Airport study (Hygge et al., 2002) found that prior to the relocation of the airport in Munich, high noise exposure was associated with poorer long-term memory and reading comprehension in children aged 10 years. Two years after the airport closed these cognitive impairments were no longer

present, suggesting that the effects of aircraft noise on cognitive performance may be reversible if the noise stops. In the cohort of children living near the newly opened Munich airport impairments in memory and reading developed over the following two years.

A recent study of 6,000 schools exposed between the years 2000-2009 at the top 46 United States airports, (exposed to Day-Night-Average Sound Level of 55dB or higher) found significant associations between aircraft noise and standardised tests of mathematics and reading, after taking demographic and school factors into account (Sharp et al., 2014). In a sub-sample of 119 schools, they found that the effect of aircraft noise on children's learning disappeared once the school had sound insulation installed. This study supports a policy for insulating schools that may be exposed to high levels of aircraft noise associated with a new runway.

3.3. Implications of the evidence for aircraft noise effects on children's cognition and learning for the proposed schemes

It is clear from the research studies that aircraft noise exposure at school is associated with children's having poorer reading and memory skills. Further, evidence is emerging that confirms the use of insulation to mitigate against these effects, and which ever scheme is undertaken, there should be a commitment to insulate schools exposed to high levels of aircraft noise in the day-time.

Schools located near airports often also experience high levels of road traffic noise but it is important to appreciate that aircraft noise exposure still influences children's learning, even if road traffic noise exposure is high. The results presented for the RANCH study are the association for aircraft noise exposure, after taking road traffic noise into account (Clark et al., 2006).

For each of the shortlisted options an estimate of the change in the number of sensitive buildings, including schools, within each contour between the Do-Minimum and the Do-Something scenarios has been made. Below a summary is given of the difference in the number of schools in the Do-Minimum scenario and the Do-Something scenario for each scheme, focusing on day-time noise exposure which best represents exposure during the school day. It should be noted that these figures do not represent the total number of schools impacted by the schemes: the figures are restricted to schools whose exposure is changed by the scheme.

3.3.1. Gatwick 2-R

Gatwick Airport Limited (GAL) states that it hopes that no new noise sensitive buildings would be given planning consent in the areas with the highest noise contours. It is estimated that in 2030, compared with the Do-Minimum scenario, that there will be 5 additional schools exposed to >54dB $L_{Aeq\ 16\ hour}$; in 2040 there will be 7 additional schools exposed to >54dB $L_{Aeq\ 16\ hour}$; and in 2050 14 additional schools exposed to >54dB $L_{Aeq\ 16\ hour}$. There will also be a small reduction in the number of

schools exposed to >60dB and 63dB $L_{Aeq\ 16\ hour}$ in 2030, 2040, and 2050: in 2030 there will also be a small reduction in the number of schools exposed to 57dB $L_{Aeq\ 16\ hour}$.

The N70 metrics for the schools are at the lower end for all years, with schools mostly exposed to $N70>20$. These school exposed to aircraft noise associated with Gatwick 2-R would be at the lower-end of the N70 contours, but should be insulated to protect against effects on children's learning. There is a small reduction in the number of schools exposed to $N70>200$ in 2030, 2040, and 2050: small reductions are also seen for the number of schools exposed to $N70>100$ in 2030 and 2040, and for $N70>50$ in 2030.

Table 3.1. Number of schools in the Do-Something Scenarios for Gatwick 2-R compared with the Do-Minimum scenarios.

	Gatwick 2-R		
	2030	2040	2050
Day-time			
54dB $L_{Aeq\ 16\ hour}$	5	7	14
57dB $L_{Aeq\ 16\ hour}$	(1)	(1)	2
60dB $L_{Aeq\ 16\ hour}$	(1)	(1)	(1)
63dB $L_{Aeq\ 16\ hour}$	(2)	(2)	(1)
66dB $L_{Aeq\ 16\ hour}$	0	0	0
69dB $L_{Aeq\ 16\ hour}$	0	0	0
72dB $L_{Aeq\ 16\ hour}$	0	0	0
N70			
$N70>20$	7	6	8
$N70>50$	(1)	2	2
$N70>100$	(1)	(1)	0
$N70>200$	(1)	(1)	(1)
$N70>500$	0	0	0

Numbers in parentheses indicate a reduction in the number of schools within that noise contour.

3.3.2. Heathrow-NWR

It is estimated that in 2030, compared with the Do-Minimum scenario, that there will be 49 fewer schools exposed to 54dB $L_{Aeq\ 16\ hour}$. In 2040 it is estimated that there will be 12 additional schools exposed to >54dB $L_{Aeq\ 16\ hour}$ and in 2050 24 additional schools exposed to >54dB $L_{Aeq\ 16\ hour}$.

In 2030 there is a reduction of 2 in the number of schools exposed to $N70>20$. However, there are increases in the number of schools exposed to $N70>20$ in 2040 and 2050, and for $N70>50$, $N70>100$ and $N70>200$ in 2030, 2040 and 2050. There is also a small increase ($n=2$) in the number of schools exposed to $N70>500$ in 2040 and 2050. Schools experiencing a high number of events over 70dB would benefit from being included in insulation schemes.

Table 3.2. Number of schools in the Do-Something Scenarios for Heathrow-NWR-T compared with the Do-Minimum scenarios.

	Heathrow-NWR-T		
	2030	2040	2050
Day-time			
54dB L _{Aeq} 16 hour	(49)	12	24
57dB L _{Aeq} 16 hour	15	22	15
60dB L _{Aeq} 16 hour	17	22	23
63dB L _{Aeq} 16 hour	1	1	1
66dB L _{Aeq} 16 hour	2	3	4
69dB L _{Aeq} 16 hour	1	1	1
72dB L _{Aeq} 16 hour	0	0	0
N70			
N70>20	(2)	11	12
N70>50	6	11	9
N70>100	8	16	13
N70>200	4	10	14
N70>500	0	2	2

Numbers in parentheses indicate a reduction in the number of schools within that noise contour.

3.3.3. Heathrow-ENR

Using the offset flight path results, it is estimated that in 2030, compared with the Do-Minimum scenario, that there would be a reduction of 22 schools exposed to >54dB L_{Aeq} 16 hour in 2030. In 2040 it is estimated that there will be 25 additional schools exposed to >54dB L_{Aeq} 16 hour and in 2050 13 additional schools exposed to >54dB L_{Aeq} 16 hour.

Compared with the Do-Minimum scenario, there would be increase in the number of schools exposed to N70>20, with 16 additional schools exposed in 2030, 29 additional schools in 2040, and 19 additional schools in 2050. For the Heathrow-ENR-O scheme there is also an increase in the number of additional schools exposed to N70>50, N70>100, and N70>200 in 2030, 2040 and 2050. Schools experiencing a high number of events over 70dB would benefit from being included in insulation schemes.

Table 3.3. Number of schools in the Do-Something Scenarios for Heathrow-ENR-O compared with the Do-Minimum scenarios.

	Heathrow-ENR-O		
	2030	2040	2050
Day-time			
54dB L _{Aeq} 16 hour	(22)	25	13
57dB L _{Aeq} 16 hour	22	34	32

60dB L _{Aeq 16 hour}	36	40	39
63dB L _{Aeq 16 hour}	11	12	12
66dB L _{Aeq 16 hour}	3	2	3
69dB L _{Aeq 16 hour}	2	2	2
72dB L _{Aeq 16 hour}	0	0	0
N70			
N70>20	16	29	19
N70>50	19	25	24
N70>100	12	17	19
N70>200	23	27	27
N70>500	0	0	0

Numbers in parentheses indicate a reduction in the number of schools within that noise contour.

3.4. Discussion

The Gatwick 2-R scheme results in a small number of additional schools being exposed to >54dB L_{Aeq 16 hour} in each year. Both of the Heathrow schemes are initially associated with a reduction in the number of schools exposed to 54dB L_{Aeq 16 hour} (49 fewer schools for Heathrow-NWR and 22 fewer schools for Heathrow-ENR), but in subsequent years (2040 & 2050) both schemes would result in additional schools being exposed to 54dB L_{Aeq 16 hour}. The number of schools additionally exposed to 54dB L_{Aeq 16 hour} in 2040 is 12 for Heathrow-NWR and 29 for Heathrow-ENR. The number of schools additionally exposed to 54dB L_{Aeq 16 hour} in 2050 is 24 for Heathrow-NWR and 13 for Heathrow-ENR. Over-time both of the Heathrow schemes would result in a considerable increase in the number of schools in the surrounding area being exposed to aircraft noise. Both schemes also result in a small number of additional schools being exposed at the higher ends of the contours.

Whilst Gatwick impacts on fewer additional schools, funding for the insulation of schools additionally exposed to aircraft noise over the process of extending the airport operation (whether it be Gatwick 2R, Heathrow-NWR, or Heathrow-ENR) would need to be found. For example, at present the Heathrow-NWR scheme has £19 million included to insulate schools. Schools exposed would be insulated as they fell into the noise contours. Currently, schools around Heathrow airport are insulated if they are exposed to 63dB L_{Aeq 16 hour}. Consideration should be given, particularly for schools experiencing an increase in their average noise exposure and therefore subject to a step-change in exposure, to insulating schools exposed to a high level of aircraft noise. Consideration should also be given to including schools experiencing a high number of events over 70dB in the insulation programme. It is important that any insulation programme for schools is fully-funded and managed over the decades, as the number of schools affected by aircraft noise increases with the operation of some of the schemes, despite initially decreasing the number of schools exposed. Such a large-scale insulation plan of schools should also be evaluated empirically to ensure its effectiveness.

It is important to note that the figures in relation to the number of schools exposed to aircraft noise discussed in this section, do not include schools that may already be exposed to levels above 54dB $L_{Aeq\ 16\ hour}$ or $N70>20$ prior to the additional runway being commissioned, and/or which may already have been insulated via existing mitigation schemes. It is advisable that all schools within the contours identified as eligible for mitigation, whether newly exposed or already exposed to aircraft noise be offered access to the same insulation programme.

4. Guidelines for Environmental Noise Exposure

4.1. The WHO Community Noise Guidelines

There are recommended guidelines for environmental noise exposure levels. The most influential set of guidelines are those proposed by the World Health Organisation Europe back in 2000 (WHO, 2000), which were determined by expert panels evaluating the strength of the evidence and suggesting guideline values for thresholds for exposure in specific dwellings and for specific health effects. Below is a summary of the guideline levels suggested for dwellings, schools & pre-schools, hospitals, and parkland:

DWELLINGS

Day-time

- Indoors the dwelling during the day/evening – 35 dB $L_{Aeq\ 16\ hour}$
- Outdoor living areas - 55 dB $L_{Aeq\ 16\ hour}$ to protect the majority of people from being ‘seriously annoyed’ during the day-time.
- Outdoor living areas – 50 dB $L_{Aeq\ 16\ hour}$ to protect the majority of people from being ‘moderately annoyed’ during the day-time

Night-time

- Outside façades of the living spaces should not exceed 45 dB $L_{Aeq\ 8\ hour}$ and 60 dB L_{Amax} to protect from sleep disturbance.
- Inside bedrooms - 30 dB $L_{Aeq\ 8\ hour}$ and 45 dB L_{Amax} for single sound events to protect from sleep disturbance.

SCHOOLS & PRE-SCHOOL

- School playgrounds outdoors should not exceed 55 dB L_{Aeq} during play to protect from annoyance.
- School classrooms should not exceed 35 dB L_{Aeq} during class to protect from speech intelligibility and, disturbance of information extraction.
- The reverberation time in the classroom should be about 0.6 s.
- Pre-school bedrooms – 30 dB during sleeping time & 45 dB L_{Amax} for single sound events to protect from sleep disturbance.

HOSPITALS

Day-time

- Hospital ward rooms indoor values during the day-time/evening - 30 dB L_{Aeq} 16 hour to protect from sleep disturbance and interference with rest and recovery.

Night-time

- Hospital ward rooms indoor values at night - 30 dB L_{Aeq} 8 hour, together with 40 dB L_{Amax} to protect from sleep disturbance and interference with rest and recovery.

PARKLAND AND CONSERVATION AREAS

- Existing large quiet outdoor areas should be preserved and the signal-to-noise ratio kept low.

Below these noise levels, it is thought there are no detrimental effects on health.

The WHO Community Guidelines represent a 'precautionary principle' approach to environmental noise effects on health and the WHO Community Guidelines are often thought by policy makers and acousticians to be very difficult to achieve in practice. It is also worth noting that when these guidelines were established in the late 1990s the evidence-base for noise effects on cardiovascular health and children's cognition was much weaker and that these effects per se, did not inform the guidelines. The WHO plans to publish a revision of these guidelines in 2015, so it is worth stipulating that the revised guidelines should be considered in relation to school, home, hospital and any other settings affected by the new runway.

The number of hospitals identified as being impacted by aircraft noise is low for Gatwick-2R, Heathrow-NWR, and Heathrow-ENR, falling at the lower ends of the noise exposure contours. However, efforts to insulate these hospitals should be included in the planning consent for the successful scheme.

4.2. WHO Night Noise Guidelines

The WHO Europe Night Noise Guidelines (WHO, 2009) state that the target for nocturnal noise exposure should be 40 dB $L_{\text{night, outside}}$, which should protect the public as well as vulnerable groups such as the elderly, children, and the chronically ill from the effects of nocturnal noise exposure on health. The Night Noise Guidelines also recommend the level of 55 dB $L_{\text{night, outside}}$, as an interim target for countries wishing to adopt a step-wise approach to the guidelines.

4.3. Building Bulletin 93: Acoustic Design of Schools in the UK

For schools, it is also worth noting the requirements of recently updated Building Bulletin 93: Acoustic Design of Schools in the UK (DfE, 2015), which recommends external noise levels for new school buildings or refurbished school buildings should not exceed <60 dB $LA_{30 \text{ minutes}}$.

5. Conclusion

The health effects of environmental noise are diverse, serious, and because of widespread exposure, very prevalent (Basner et al, 2014). For populations around airports, aircraft noise exposure can be chronic. Evidence is increasing to support preventive measures such as insulation, policy, guidelines, & limit values. Efforts to reduce exposure should primarily reduce annoyance, improve learning environments for children, and lower the prevalence of cardiovascular risk factors and cardiovascular disease (Basner et al, 2014).

6. References

- Babisch, W. (2014). Updated exposure-response relationship between road traffic noise and coronary heart diseases: A meta-analysis. *Noise and Health*, 16, 1-9.
- Babisch, W., Houthuijs, D., Pershagen, G., Cadum, E., Katsouyanni, K., Velonakis, M., et al. (2009). Annoyance due to aircraft noise has increased over the years--results of the HYENA study. *Environment International*, 35, 1169-1176.
- Basner, M., Babisch, W., Davis, A., Brink, M., Clark, C., Janssen, S., et al. (2014). Auditory and non-auditory effects of noise on health. *Lancet*, 383, 1325-1332.
- Basner, M., Glatz, C., Griefahn, B., Penzel, T., & Samel, A. (2008). Aircraft noise: Effects on macro- and microstructure of sleep. *Sleep Medicine*, 9, 382-387.
- Basner, M., Müller, U., & Elmenhorst, E.M. (2011). Single and combined effects of air, road, and rail traffic noise on sleep and recuperation. *Sleep*, 34, 11-23.
- Basner, M., & Siebert, U. (2010). Markov processes for the prediction of aircraft noise effects on sleep. *Medical Decision Making*, 30, 275-289.
- Brink, M., Wirth, K.E., Schierz, C., Thomann, G., & Bauer, G. (2008). Annoyance responses to stable and changing aircraft noise exposure. *Journal of the Acoustical Society of America*, 124, 2930-2941.
- Clark, C., Crombie, R., Head, J., van Kamp, I., van Kempen, E., & Stansfeld, S.A. (2012). Does traffic-related air pollution explain associations of aircraft and road traffic noise exposure on children's health and cognition? A secondary analysis of the United Kingdom sample from the RANCH project. *American Journal of Epidemiology*, 176, 327-337.
- Clark, C., Martin, R., van Kempen, E., Alfred, T., Head, J., Davies, H.W., et al. (2006). Exposure-effect relations between aircraft and road traffic noise exposure at school and reading comprehension - The RANCH project. *American Journal of Epidemiology*, 163, 27-37.
- Clark, C., & Stansfeld, S. (2011). The Effect of Nocturnal Aircraft Noise on Health: a Review of Recent Evidence. London: Queen Mary University of London.
- DfE. (2015). Acoustic design of schools: performance standards. Building Bulletin 93.: Department for Education, UK.
- EC. (2002). Position paper on dose response relationships between transportation noise and annoyance. Luxembourg: Office for Official Publications of the European Communities.
- Eriksson, C., Hilding, A., Pyko, A., Bluhm, G., Pershagen, G., & Östenson, C.G. (2014). Long-term aircraft noise exposure and body mass index, waist circumference, and

type 2 diabetes: a prospective study. *Environmental Health Perspectives*, 122, 687-694.

Evans, G.W., & Hygge, S. (2007). Noise and performance in children and adults. In Noise and its effects. In L. Luxon, & D. Prasher (Eds.), *Noise and its effects*. London: Whurr Publishers.

Fields, D.M., De Jong, R.G., Gjestland, T., Flindell, I.H., Job, R.F.S., Kurra, S., et al. (2001). Standardized general-purpose noise reaction questions for community noise surveys: Research and a recommendation. *Journal of Sound and Vibration*, 242, 641-679.

Floud, S., Vigna-Taglianti, F., Hansell, A., Blangiardo, M., Houthuijs, D., Breugelmans, O., et al. (2011). Medication use in relation to noise from aircraft and road traffic in six European countries: results of the HYENA study. *Occupational and Environmental Medicine*, 68, 518-524.

Guski, R. (1999). Personal and social variables as co-determinants of noise annoyance. *Noise and Health*, 1, 45-56.

Haines, M.M., Stansfeld, S.A., Brentnall, S., Head, J., Berry, B., Jiggins, M., et al. (2001a). The West London Schools Study: the effects of chronic aircraft noise exposure on child health. *Psychological Medicine*, 31, 1385-1396.

Haines, M.M., Stansfeld, S.A., Job, R.F., Berglund, B., & Head, J. (2001b). Chronic aircraft noise exposure, stress responses, mental health and cognitive performance in school children *Psychological Medicine*, 31, 265-277.

Hansell, A.L., Blangiardo, M., Fortunato, L., Floud, S., de Hoogh, K., Fecht, D., et al. (2013). Aircraft noise and cardiovascular disease near Heathrow airport in London: small area study. *British Medical Journal*, 347, f5432.

Hume, K.I., Brink, M., & Basner, M. (2012). Effects of environmental noise on sleep. *Noise and Health*, 14, 297-302.

Huss, A., Spoerri, A., Egger, M., & Röösli, M. (2010). Aircraft noise, air pollution, and mortality from myocardial infarction. *Epidemiology*, 21, 829-836.

Hygge, S., Evans, G.W., & Bullinger, M. (2002). A prospective study of some effects of aircraft noise on cognitive performance in schoolchildren. *Psychological science*, 13, 469-474.

ISO/TS. (2003). Acoustics - Assessment of noise annoyance by means of social and socio-acoustic surveys. Geneva: Reference No. ISO/TC 43/SC 1 N 1313 2003.: International Organization for Standardization.

Janssen, S.A., Vos, H., van Kempen, E.E., Breugelmans, O.R., & Miedema, H.M. (2011). Trends in aircraft noise annoyance: the role of study and sample characteristics. *Journal of the Acoustical Society of America*, 129, 1953-1962.

- Jarup, L., Babisch, W., Houthuijs, D., Pershagen, G., Katsouyanni, K., Cadum, E., et al. (2008). Hypertension and exposure to noise near airports: the HYENA study. *Environmental Health Perspectives*, 116, 329-333.
- Jones, K. (2009). Aircraft noise and sleep disturbance: a review. ERCD Report 0905.
- Kuh, D., & Ben-Shlomo, Y. (2004). *A lifecourse approach to chronic disease epidemiology*. Oxford: Oxford University Press.
- Michaud, D.S., Fidell, S., Pearsons, K., Campbell, K.C., & Keith, S.E. (2007). Review of field studies of aircraft noise - induced sleep disturbance. . *Journal of the Acoustical Society of America*, 121, 32-41.
- Miedema, H.M.E., & Vos, H. (2007). Associations between self - reported sleep disturbance and environmental aircraft noise - induced sleep disturbance. *Journal of the Acoustical Society of America*, 121, 32-41.
- Muzet, A. (2007). Environmental noise, sleep, and health. *Sleep Medicine Reviews*, 11, 135-142.
- Ohrstrom, E., Hadzibajramovic, E., Holmes, E., & Svensson, H. (2006). Effects of road traffic noise on sleep: studies on children and adults. *Journal of Environmental Psychology*, 26, 116-126.
- Paunović, K., Stansfeld, S., Clark, C., & Belojević, G. (2011). Epidemiological studies on noise and blood pressure in children: Observations and suggestions. *Environment International*, 37, 1030-1041.
- Pirrera, S., De Valck, E., & Cluydts, R. (2010). Nocturnal road traffic noise: a review on its assessment and consequences on sleep and health. *Environment International*, 36, 492-498.
- Schreckenberger, D., Meis, M., Kahl, C., Peschel, C., & Eikmann, T. (2010). Aircraft noise and quality of life around Frankfurt Airport. *International journal of environmental research and public health*, 7, 3382-3405.
- Selander, J., Bluhm, G., Theorell, T., Pershagen, G., Babisch, W., Seiffert, I., et al. (2009). Saliva cortisol and exposure to aircraft noise in six European countries. *Environmental Health Perspectives*, 117, 1713-1717.
- Sharp, B., Connor, T.L., McLaughlin, D., Clark, C., Stansfeld, S.A., & Hervey, J. (2014). Assessing aircraft noise conditions affecting student learning. In A.C.R. Program (Ed.): Transportation Research Board of the National Academies.
- Stansfeld, S., & Clark, C. (2015). Health effects of noise exposure in children. *Current Environmental Health Reports*.

Stansfeld, S.A., Berglund, B., Clark, C., Lopez-Barrio, I., Fischer, P., Ohrstrom, E., et al. (2005). Aircraft and road traffic noise and children's cognition and health: a cross-national study. *Lancet*, 365, 1942-1949.

Stansfeld, S.A., Clark, C., Cameron, R.M., Alfred, T., Head, J., Haines, M.M., et al. (2009). Aircraft and road traffic noise exposure and children's mental health *Journal of Environmental Psychology*, 29, 203-207.

Stansfeld, S.A., Hygge, S., Clark, C., & Alfred, T. (2010). Night time aircraft noise exposure and children's cognitive performance. *Noise and Health*, 12, 255-262.

Swift, H. (2010). Partner Project 19: A review of the literature related to potential health effects of aircraft noise. Report No. COE - 2010 - 003. Cambridge, MA.: Partnership for AiR Transportation Noise and Emissions Reduction, Massachusetts Institute of Technology.

Tiesler, C.M.T., Birk, M., Thiering, E., Kohlböck, G., Koletzko, S., Bauer, C.-P., et al. (2013). Exposure to road traffic noise and children's behavioural problems and sleep disturbance: Results from the GINIplus and LISAplus studies. *Environmental research*, 123, 1-8.

van Kempen, E.E., van Kamp, I., Stellato, R.K., Lopez-Barrio, I., Haines, M.M., Nilsson, M.E., et al. (2009). Children's annoyance reactions to aircraft and road traffic noise. *Journal of the Acoustical Society of America*, 125, 895-904.

WHO. (2000). Guidelines for Community Noise. Geneva: World Health Organization Europe.

WHO. (2009). Night Noise Guidelines for Europe. World Health Organization Europe.

WHO. (2011). Burden of Disease from Environmental Noise. World Health Organization, Europe.

Fact sheet

Solutions to Operation Stack



Background

The M20 / A20 and M2 / A2 routes that run between the London area and the Kent ports are some of the south-east's most important roads.

Thousands of vehicles use these roads on the shortest, quickest and cheapest route to mainland Europe.

Maintaining free-flowing traffic on these routes is essential for local people, businesses and freight hauliers.

While extra parking has been provided at the Kent ports, capacity is often exceeded when severe weather, industrial action or operational problems occur.

When this happens, port-bound lorries start to form a queue on Kent's roads. This causes disruption for other road users traveling on the M20 / A20, M2 / A2 corridors and surrounding local roads.

Operation Stack

When extraordinary levels of disruption occur, Operation Stack is activated by Kent Police, on behalf of the Kent Resilience Forum, to manage the congestion on Kent's motorways and major roads. Under this arrangement, port-bound lorries form a queue on the M20.

This causes issues for non-freight traffic as Operation Stack closes parts of the M20 and adversely impacts surrounding roads, local communities and businesses in Kent.

Between January and August 2015, Operation Stack was in place for 32 days. During this time, carriageways were closed to general traffic and used to hold over 5,000 lorries.

Without further intervention, existing and future issues will continue to put pressure on Kent's roads. The forecast increase in general and lorry related traffic on the M20 / A20 and M2 / A2 routes means that doing nothing is not an option.

Our proposed solution

The government has asked Highways England to bring forward solutions to reduce traffic congestion caused by periods of extraordinary cross-Channel disruption.

By keeping the M20 open to traffic in both directions, we expect any proposed solution will reduce the effect of traffic congestion on Kent's motorways and major roads, and so avoid Operation Stack in all but the most exceptional circumstances.

On-road and off-road solutions

Our proposed solutions could include on-road and / or and off-road locations.

The development of an on-road solution would make use of our existing roads, as they currently exist or in a modified form.

By contrast, any off-road solution could include proposals that would require the acquisition of land to build a separate area for lorries.

What we did

Highways England held a 6-week public information exercise between 11 June and 22 July 2018 on its proposed approach to develop a lorry holding area solution.

Information about the project was made available via the Highways England website, newspaper adverts, radio and television interviews. Copies of the project brochure and questionnaire were available at over 30 libraries. Information about the project was also available at 7 public exhibitions across Kent and at mobile exhibitions held at motorway service areas.

The exercise invited feedback on:

- the principle of developing a lorry holding area solution
- possible locations for one or more lorry holding areas
- The provision of additional everyday 24-hour lorry parking in Kent

Ecological surveys

As part of the scheme's development, we are carrying out simple walk-over surveys across Kent to ensure we have a better understanding of the regional landscape.

Surveys are a regular process throughout a scheme's development and are not indicative of any land needed for the construction of the scheme.

The current round of traffic and ecological surveys is simply a means to fill the gaps in our knowledge.

We may have to carry out additional surveys in the future either on the same land, adjacent land or on completely different land.

However, no sites have yet been selected or identified for use as potential lorry holding areas.

Temporary measures

We are also developing temporary traffic management measures for use on the M20 while we prepare the permanent solution which must follow a formal planning process.

The temporary measures will only be used if necessary and will involve a contraflow on the London-bound carriageway of the M20 between junction 8 at Maidstone and junction 9 at Ashford.

The measures will be available by March 2019 and will ensure the M20 remains open to traffic in both directions during periods of cross-Channel disruption.

Next steps

The public information exercise is the first step of a wider consultation process that will take place to identify a permanent solution.

We are currently in the process of analysing over 1,200 responses received as part of the public information exercise and will publish a report which summarises the feedback later in the year.

Subject to the feedback received and government decisions, we intend to consult on more detailed options in winter 2018-2019.

If advanced, the scheme will be progressed through a comprehensive and transparent planning process that will include extensive public consultation and a full environmental impact assessment.

Further information

You can visit our website and sign up for email alerts whenever the webpage is updated at:

www.highwaysengland.co.uk/kentlorryarea

Further information about the temporary measures can be found by visiting the above website or:

Email:

M20temporarysolution@highwaysengland.co.uk

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Phone:

0300 123 5000

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