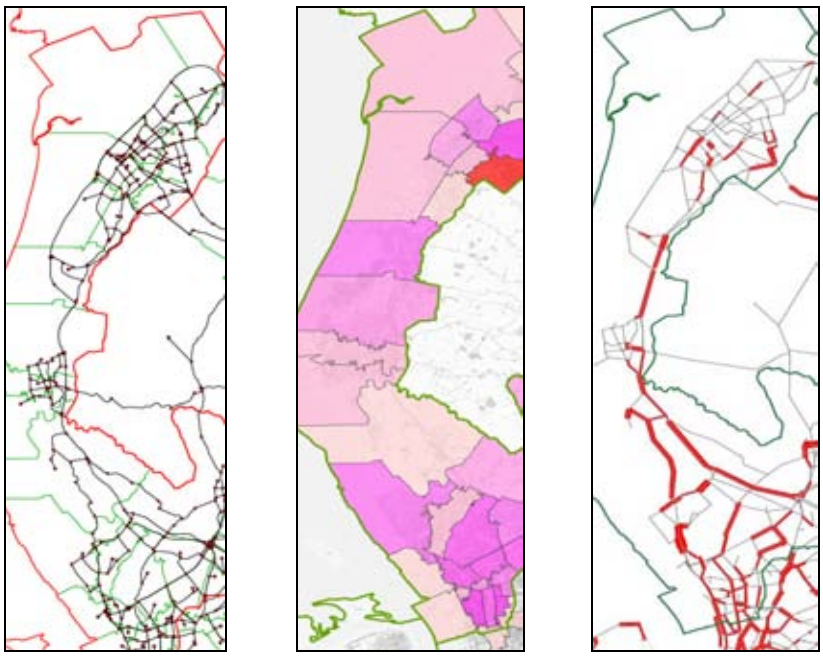


Sefton Local Plan

Transport Modelling Option Testing

April 2013
Sefton Council

Mott MacDonald

Sefton Local Plan

Transport Modelling Option Testing

April 2013

Sefton Council

Magdalen House
Trinity Road
Bootle
L20 3NJ

Mott MacDonald, 4th Floor, Royal Liver Building, Pier Head, Liverpool L3 1JH, United Kingdom
t +44 (0)151 236 4343 f +44 (0)151 236 1144, W www.mottmac.com

Issue and revision record

Revision	Date	Originator	Checker	Approver	Description
001	24/04/2013	MQ/SP	NG	NG	Draft

Mott MacDonald, 4th Floor, Royal Liver Building, Pier Head, Liverpool L3 1JH, United Kingdom
t +44 (0)151 236 4343 f +44 (0)151 236 1144, W www.mottmac.com

Content

Appendices 30

Tables

Figures

1. Introduction

1.1 Background

Sefton Council is currently producing a statutory 'Local Plan' for the borough, known as the 'Core Strategy'. This will set out a strategy for development and investment within Sefton over the next 15 years to meet the needs of local communities whilst protecting the environment.

A key element of the Core Strategy is to identify the scale of new development to be accommodated in Sefton. The housing and employment requirements are set out in the 'Core Strategy Options Paper'. These were informed by a number of reports including the Strategic Housing Land Availability Assessment (SHLAA), the 'Housing Requirement Study' (Review of the Housing Requirement for Sefton), a strategic housing market assessment and an Employment Land and Premises Study.

As a result three different options have been identified to achieve the aims of the core strategy:
- Option One: urban containment
- Option Two: meeting identified needs
- Option Three: a stable population

Option One assumes that the number of new homes or employment opportunities to be provided is limited to the capacity in the borough.

Option Two allocates enough land to meet Sefton's identified housing and employment needs, initially directed to urban areas and moving to the Green Belt when suitable sites are no longer available in the urban areas.

Option Three would seek to maintain Sefton's 2010 population and allow more development on the Green Belt than Option Two.

For the purpose of the appraisal Option One has been defined as the Do-Minimum.

1.2 Outline

Mott MacDonald has been commissioned by Sefton Council to assess the transport impacts of development proposals within the three options for the Core Strategy. In undertaking this work, Mott MacDonald has utilised the Liverpool City Region Transport Model (LCRTM), which has been set up to compare the three development scenarios.

LCRTM has been used to provide an indication of where congestion and delay on the highway network is likely to occur (referred to as hot spots) as a result of development in locations being progressed in the Local Plan: Core Strategy.

Following this introduction, the report is split into four further chapters:
- **Chapter 2** provides information on the structure of LCRTM, what it was designed to do and its component parts. The forecasting process is also described in terms of how future years' travel demand is estimated and the inputs that are required for this;
- **Chapter 3** summarises the forecast development scenarios and how these have been accounted for in the model set up;

- **Chapter 4** contains a summary and explanation of the model results; and
- **Chapter 5** presents the study's conclusions.

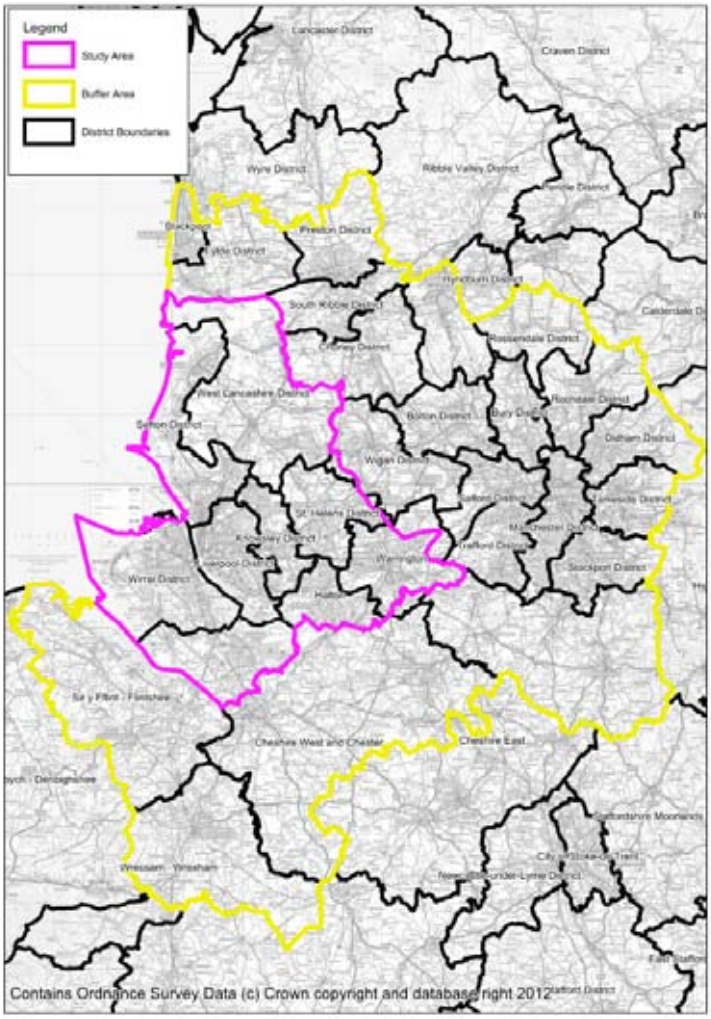
2. Modelling Components

2.1 Liverpool City Region Transport Model

The Liverpool City Region Transport Model (LCRTM) is a multi-modal transport model, comprising a link-based highway model, a public transport model and a variable demand model. It is the primary assessment tool for testing various transport intervention measures in the City Region.

The geographical scope for the model includes the Liverpool City Region as the main study area together with areas of West Cheshire, West Lancashire and Warrington, and a buffer area beyond extending further into Lancashire and areas of Greater Manchester and North Wales (see **Figure 2.1**).

Figure 2.1: Geographical scope of LCRTM



Source: LCRTM Highway Model Local Model Validation Report – December 2009

LCRTM has a base year of 2008 – that is it is representative of travel demand and conditions in 2008. The model has been used for appraising measures within Merseyside's Third Local Transport Plan (LTP3), which became active in April 2011.

The model was updated in August 2011 to incorporate new traffic data into the highway model, although the model retained its 2008 base year. Since then, prominent applications of the model have included supporting Merseyside's Local Sustainable Transport Fund (LSTF) bid and more recently associated bidding for the Better Bus Area Fund (BBAF), which secured funding of £20M and £4M respectively for the region from the Department for Transport (DfT).

2.1.1 Objectives

LCRTM has been designed to address the following objectives:

- to produce **a long term forecast of growth in demand for travel** in the region, which will reflect changes to land use, demographics, employment and the economy;
- to forecast the **impacts of growth** and changes in demand for travel on the existing highways and public transport networks;
- to forecast the **impacts of specific major regeneration projects and major land use developments** on the transport system in the Liverpool City Region;
- to forecast the **impacts of increased congestion** on the local economy and quality of life; and
- to examine an **array of measures and interventions** that could be deployed to **mitigate** traffic/travel growth impacts.

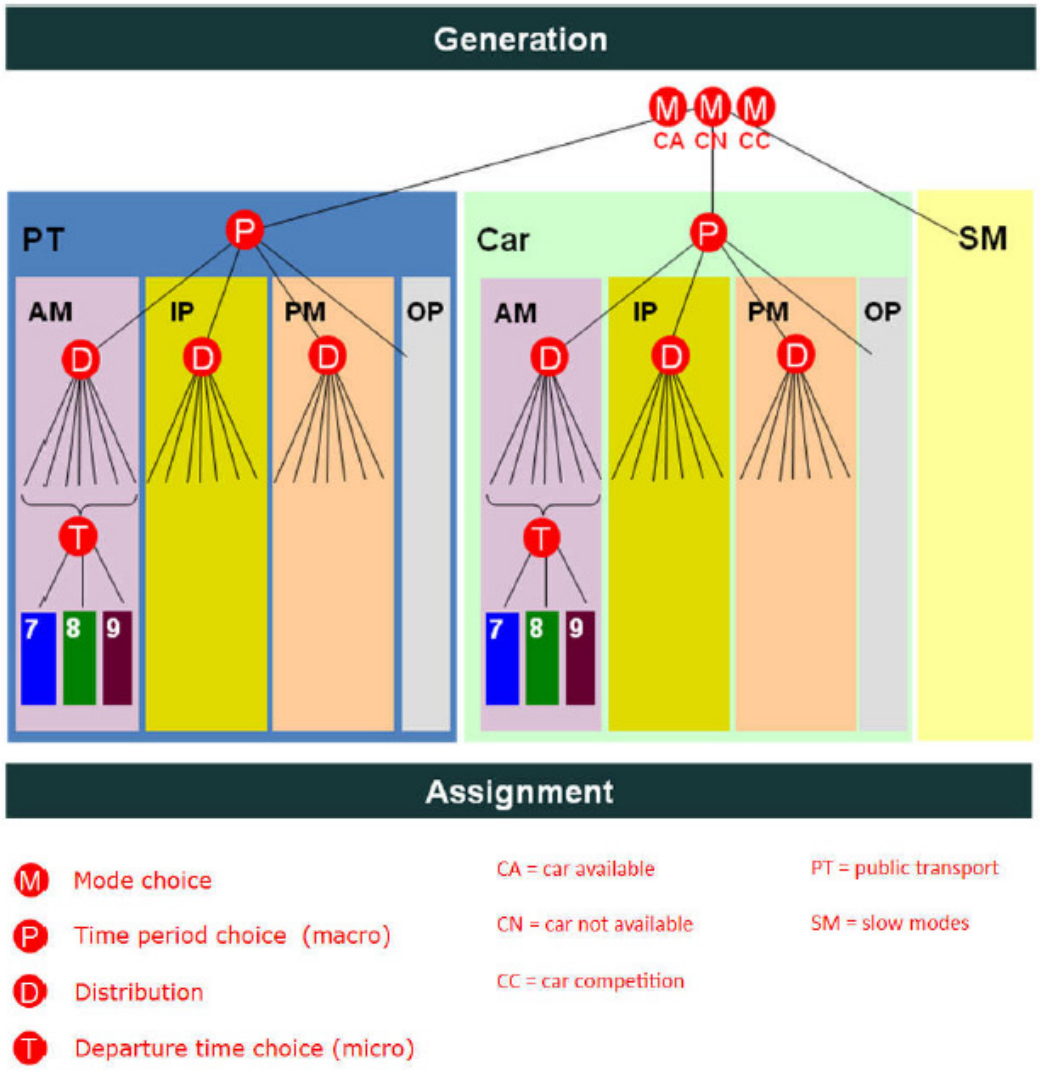
2.1.2 Structure

LCRTM follows the Department for Transport (DfT) guidance WebTAG in respect of its components and structure. The model system operates within CUBE Voyager[1] software, using applications and bespoke scripting of processes such as the assignment methodology and the variable demand model.

The general structure of LCRTM is explained in **Figure 2.2**, illustrating the hierarchy of travel choices that fall between trip generation and assignment. At each level in the hierarchy the travel choice is dependent upon the change in cost of travel from the base year to the forecast year. The highway and public transport models, which are the final stage in the model are concerned with the assignment (routing) of vehicles and passengers throughout the transport system, whilst the demand model deals with the traveller choices in terms of mode choice (*how to travel*), time period choice (*when to travel*) and distribution (*where to travel*).

[1] *CUBE Voyager is the name of a commercially available software package produced by Citilabs for use in transport modelling.*

Figure 2.2: Overall LCRTM 5-Stage Model Structure



Source: Source: LCRTM Demand Modelling Report – August 2010

2.1.3 Stage 1: Trip Generation

Trip Generation is a measure of the total demand for travel across all destinations, time periods and modes. It is split by journey purpose, for example journeys to work (commuting), journeys in the course of work (employers business) and other (such as shopping, education and leisure related trips). A further discussion on the mechanism used to forecast the total demand for travel is provided in **Section 2.2**.

2.1.4 Stage 2: Mode Choice

Subsequent to trip generation the total travel demand is then split across three travel modes: public transport (comprising of bus and rail), car, and slow modes (which are also known as active modes and comprise of walk and cycle).

2.1.5 Stage 3: Time Period Choice (Macro)

The model has four discrete time periods: the morning peak period (07:00-10:00); interpeak (10:00-16:00), evening peak period (16:00-19:00) and the off peak (19:00-07:00).

2.1.6 Stage 4: Distribution

Trips by purpose, mode and time period are then distributed to destinations within the model.

2.1.7 Stage 5: Departure Time Choice

Within the morning peak period, the model splits the number of trips in the three hour AM peak period into three one-hour periods, comprising of a pre-peak (07:00-08:00), peak (08:00-09:00), and post-peak hour (09:00-10:00).

2.1.8 Assignment

This concerns the routing of passengers on the public transport network, that is which bus and rail services they use to connect their trip origin and destination. For car users, it is the choice of roads that connect each end of their journey. In both cases, route choice is based on travellers using the cheapest cost route, based on factors such as fares, waiting times, travel times and fuel costs.

In terms of the highway model, three vehicle classes are assigned: cars, light goods vehicles (LGV) and other goods vehicles (OGV). The car vehicle class is further sub-divided into three journey purposes: commuting, employers business and other. Only the peak hours (08:00-09:00 and 17:00-18:00) and the average interpeak (between 10:00-16:00) are subject to assignment.

2.1.9 Base Year Travel Demand

As stated LCRTM currently has a base year of 2008. The total demand for travel in 2008, and the respective origin and destination of trips in the City Region has been developed using a number of sources including:

- historical roadside interview data collected across the region;
- information derived from the Merseyside Travel Survey (HTS) on household trip rates; and
- land-use indicators, such as statistics on total employment, retail employment and educational places.

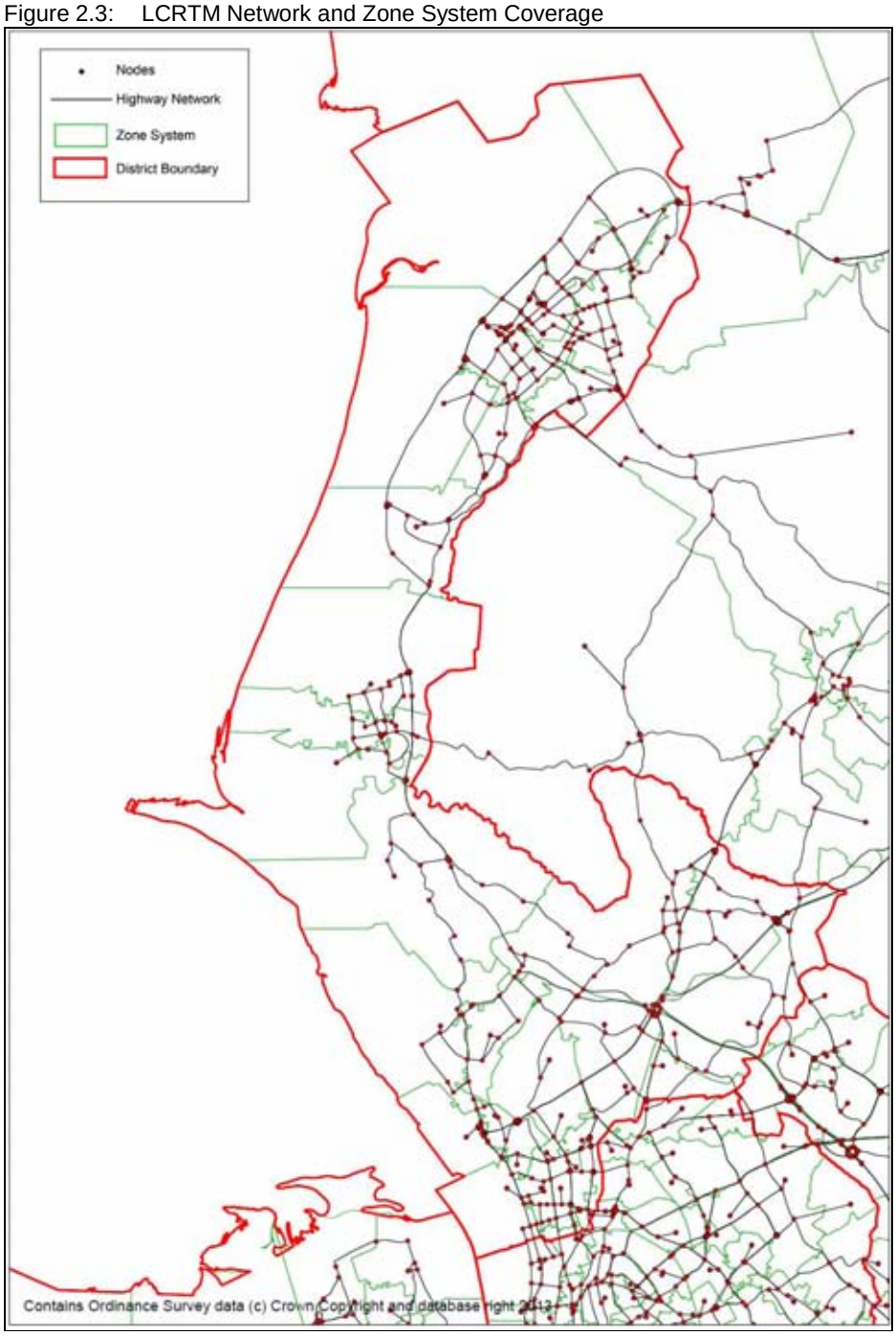
An update to the LCRTM highway model was undertaken in 2011 during which the roadside interview (RSI) data collected in 2009 in Wirral and Liverpool was incorporated into the model, thus improving the representation of trips to and from these areas of the model. The base year of the model was left unchanged. A further update to the highway model was undertaken in 2012 to incorporate additional traffic count data in the Maghull area to enhance the representation of modelled flows in this part of Sefton – this is the model that has been used for this appraisal.

2.1.10 LCRTM Highway Network and Zoning Sefton

LCRTM comprises of 459 model zones, 38 of which are located within Sefton's administrative boundary as shown in **Figure 2.3**. The zoning system has been developed based on Census Output Area boundaries, which have then been aggregated.

The coverage of the highway network in Sefton and adjacent areas is also shown in **Figure 2.3** (where the black lines show the road links included in the model). All motorways, A-roads, B-roads and significant C-roads are included, thus providing a good coverage of the major routes between trip origins and destinations in the district. The LCRTM highway network is link based and the representation of delay to highway vehicles is undertaken by the use of speed flow curves. There is no explicit junction modelling in the current version of LCRTM, hence the analysis of impacts on junctions cannot be assessed.

Figure 2.3: LCRTM Network and Zone System Coverage



2.2 Forecasting Travel Demand

Changes in travel demand arise from:
- population growth, through:
  - Housing development
  - Changes in the occupancies of households;
- location and volume of employment, including strategic development sites
  - Regeneration and economic activity; and
- changes in car ownership.

These features are all represented in LCRTM's approach to forecasting future travel demand.

2.2.1 Forecast years

The default forecast years for LCRTM are 2014 and 2024. For the purpose of the current study the latter forecast year has been used as a proxy for the end of the plan period (2028).

2.2.2 Trip Production Forecasts

Forecasts of trip productions are split into three broad categories:
- The number of **home based trips**: The quantum of home based trips are based on the changes in the number of households taking into account Government forecasts in terms of compositions of households and car ownership, which are then combined with the trip generation rates derived from the Merseyside Household Travel Survey (HTS).
- **Non-home based trips**: Non home based trips, for example a trip made from a place of work on business, are estimated based on information in the HTS on the propensity for making a non-home based trip, which is then applied to the non-home end of a home based trip.
- **Freight**: the growth in freight is based on the growth in total employment.

2.2.3 Trip Attraction Forecasts

Within LCRTM, attraction forecasts are based on future year estimates of:
- total employment;
- retail employment;
- pupils; and
- population.

These estimates are undertaken at zonal level and then used to distribute the trip productions prior to the demand model being run. For example, home based commuting trips are distributed according to the location and scale of total employment, whilst trips associated with education and shopping are distributed according to Government forecasts on pupil numbers and retail employment respectively.

2.2.4 Constraint to Trip Productions

It is important to note that forecasting within LCRTM is primarily a home-based forecast, recognising the fundamental building block of trip generation is the household unit. Whilst databases such as TRICS[2] are often used to develop estimates of the trips into and out of development sites, the default approach taken in LCRTM is to **estimate the total number of trips generated by the household unit, which is then distributed across the various trip attractions**. Hence, the number of journeys to work in the model, for example, is governed not by the number of employment places, but by the number of journey to work trips created by all the households. In general terms, the number of employment places is only used as a weight to distribute the commuting trips across the modelled zones.

2.2.5 Outputs

The forecasting of trips is undertaken in a separate LCRTM module, contained within an Access Database: the External Forecasting Model (EFM). The outputs from EFM are future year trip matrices that are based on travel costs remaining unchanged from those in the base year – these are termed *reference case matrices*.

When assigned to the transport network the reference case matrices result in changes to travel costs (through increased congestion from increased traffic levels) compared to the base year model. The response to these cost changes in terms of the mode, destination and time period choices, are determined within the demand model. The output from the demand model is a new set of assignment matrices for Car and Public Transport users that reflect the changes to travel costs resulting from future increases in travel demand. This can be used to estimate the impact of developments on the transport network.

[2] *TRICS is a commercially available database system which allows its users to establish potential levels of trip generation for a wide range of development and location scenarios. TRICS is widely used as part of the planning application process by both developers and local authorities.*

3. Model Inputs

3.1 Introduction

In this chapter the development scenarios that have been tested in the Liverpool City Region Transport Model (LCRTM) are described.

3.2 Scenarios

Three development scenarios have been modelled in LCRTM, namely:
- Option One: urban containment
- Option Two: meeting identified needs
- Option Three: a stable population

The three scenarios represent increasing levels of development; therefore each scenario contains all the developments present in the previous scenario *plus* additional developments.

3.3 Development Data

In view of the forecasting mechanism utilised in LCRTM, Sefton Council provided bespoke projections in terms of the predicted growth in housing and employment within Sefton. The information is summarised in **Tables 3.1** and **3.2**. Background employment growth in Sefton is taken from the LTP3 forecasts (see Section 3.4), and additional employment relevant to the Option testing is added to this forecast.

Figures 3.1 – 3.5 present the geographical location of the additional housing and employment.

Table 3.1: Sefton Housing Changes 2008 - 2024

Scenario	Household Units	Difference from 2008	Difference from Option 1
2008 Base Year	128,717	-	-
Option 1	135,817	7,100	-
Option 2	141,516	12,799	5,699
Option 3	142,999	14,282	7,182

Source: LCRTM External Forecasting Module

Table 3.2: Sefton Employment Changes 2008 – 2024

Scenario	Employment Number of Jobs	Difference from 2008	Difference from Option 1
2008 Base Year	99,967	-	-
Option 1	109,092	9,125	-
Option 2	111,809	11,842	2,717
Option 3	111,809	11,842	2,717

Source: LCRTM External Forecasting Module

Figure 3.1: Household Projections : Option 1 Additional Households 2008 - 2024

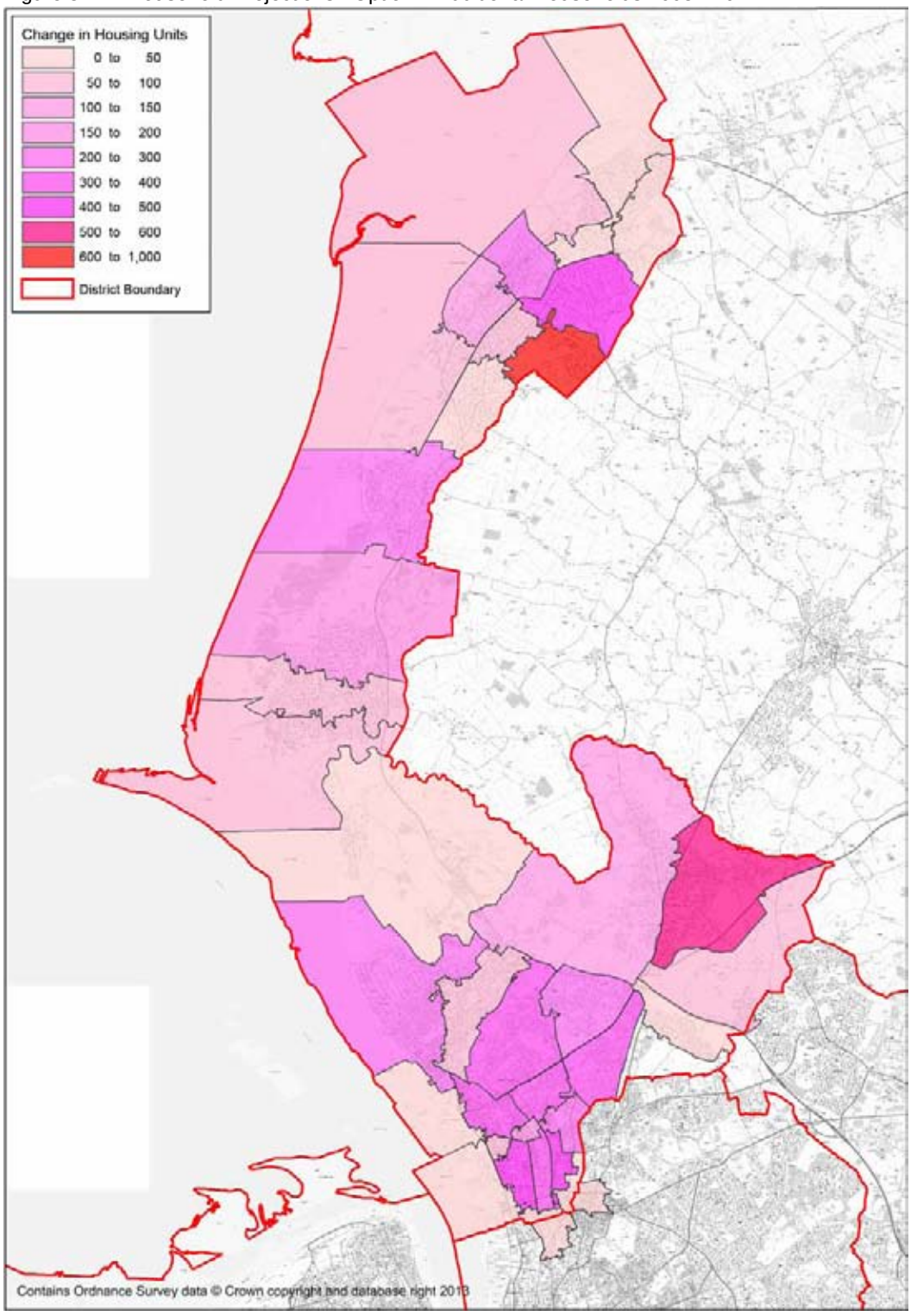


Figure 3.2: Household Projections : Option 1 To Option 2 Location and Scale of Additional Housing Units

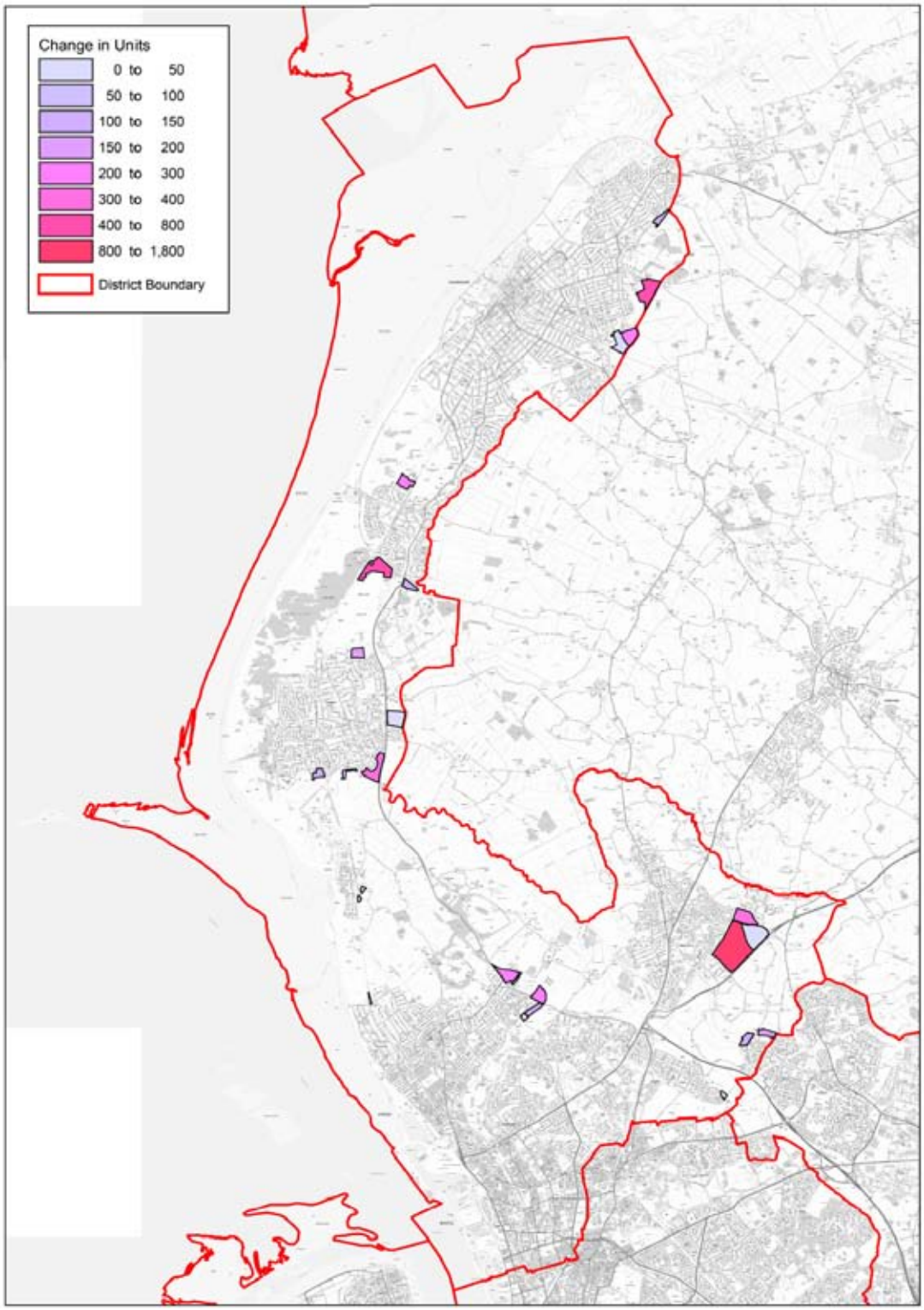


Figure 3.3: Household Projections : Option 1 To Option 3 Location and Scale of Additional Housing Units

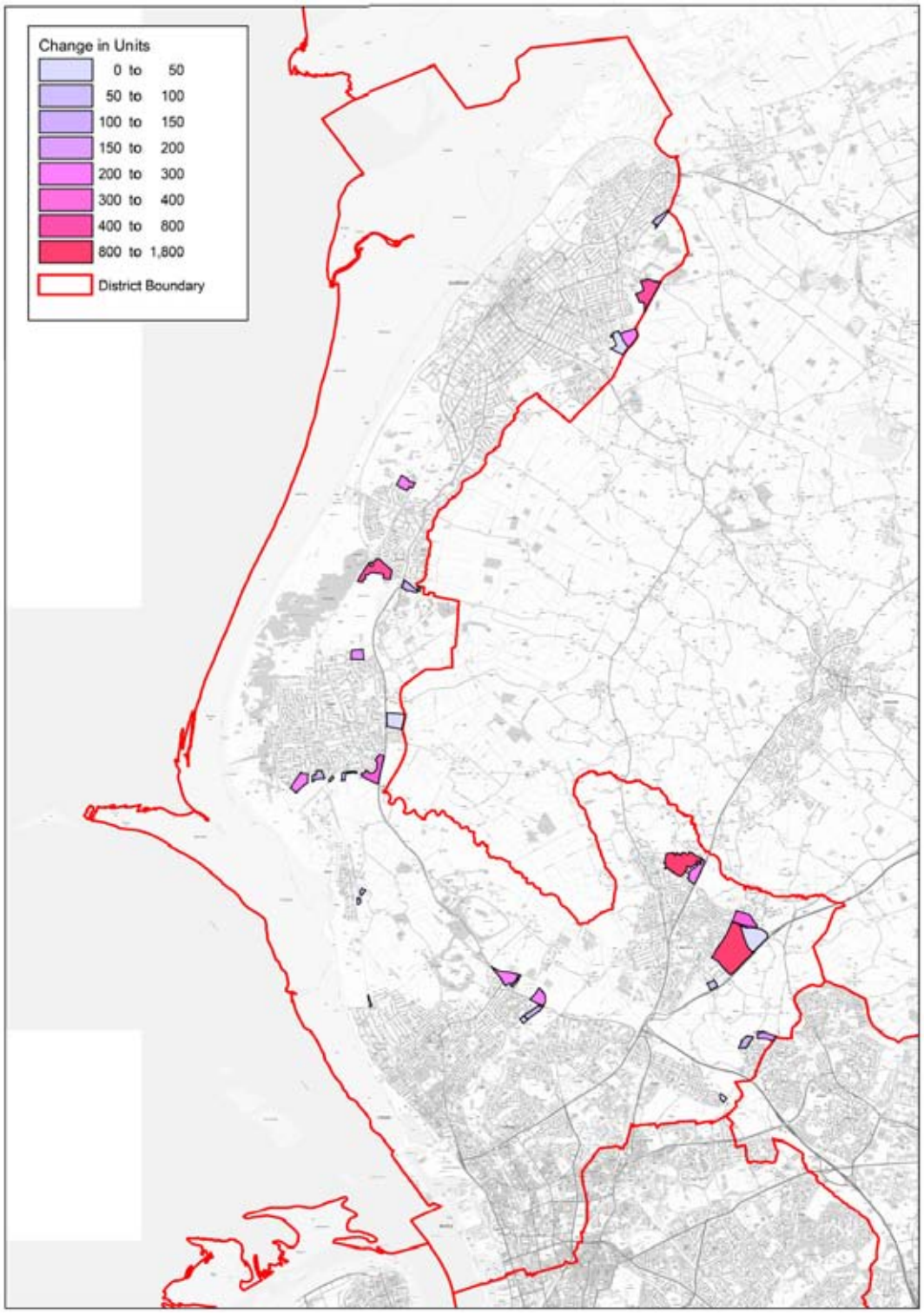


Figure 3.4: Employment Projections : Option 1 Additional Employment 2008-2024

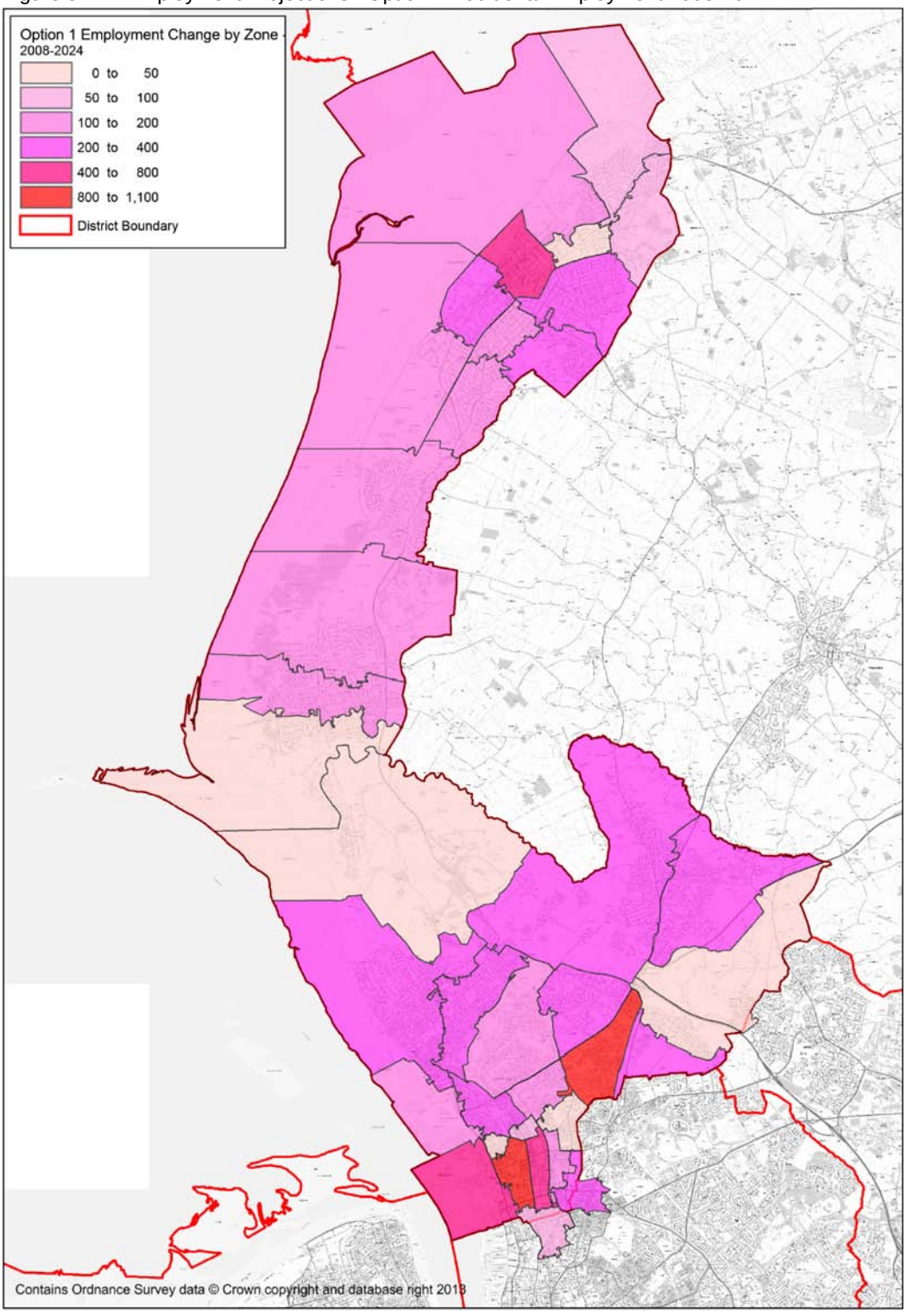
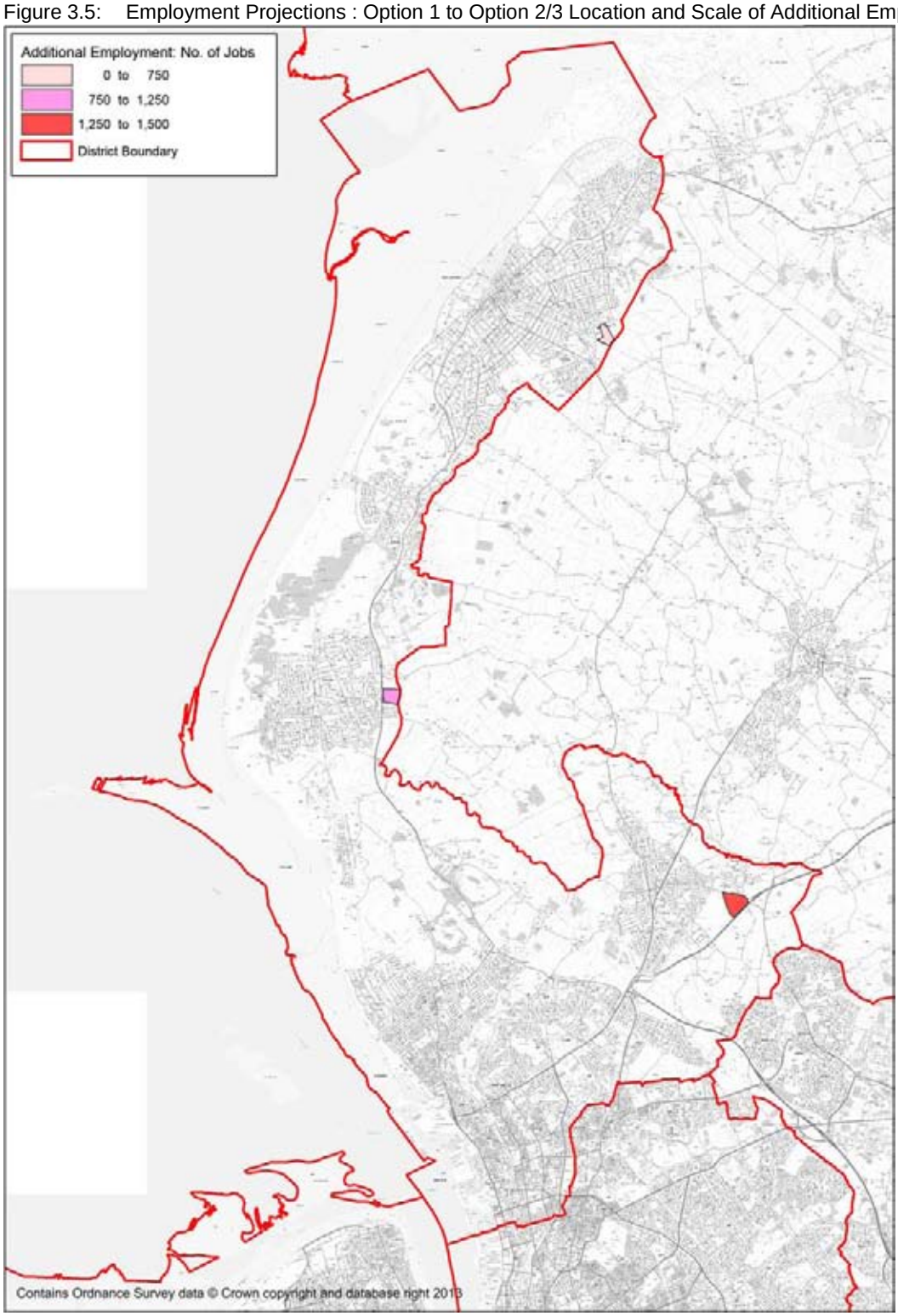


Figure 3.5: Employment Projections : Option 1 to Option 2/3 Location and Scale of Additional Employment



3.4 Non - Sefton Zones

The household and employment growth used in the City Region outside of Sefton is consistent to that adopted in the version of LCRTM used to appraise the third Local Transport Plan (LTP3). Hence, for employment, projections and major employment sites are consistent with the "Aspirational" forecast for the City Region made by Cambridge Econometrics/PION in 2009 (on behalf of the Merseyside Partnership)[3] and used in LTP3.

The LTP3 forecast included the addition of major employment sites such as Liverpool Waters (Liverpool), Parkside (St Helens) and Daresbury (Warrington). These have all been *included* within the Core Strategy Scenario.

The housing projections outside of Sefton are those agreed during consultations with each Merseyside district in 2011 and are thus representative of the best forecasts available at that time.

3.5 Forecast Networks

Highway and Public Transport networks have been developed to include all future year schemes that it is considered will be complete in 2024. Again, these are consistent with the networks used to appraise the Third Local Transport Plan. For this assessment, the highway network has been amended to include the more detailed information now available on the Thornton – Switch Island Link.

The following committed schemes have been added to the 2008 networks:

- Hall Lane Strategic Gateway;
- Tarbock Island (Junction 6 of M62);
- A5117 Deeside Park Junctions Improvement;
- A5300/A562 Speke Road Improvement;
- Mersey Gateway: Second Mersey crossing in Halton;
- Switch Island: Thornton Link Road; and
- North West Triangle rail electrification (Liverpool-Manchester and Liverpool-Wigan).

[3] *Economic Forecasts for the Liverpool City Region: Recession and Recovery. Technical Report. PION Economics and Cambridge Econometrics, December 2010*

4. Assessment

4.1 Introduction

In this chapter the results from running LCRTM for the three Options are presented.

In the first instance, the total growth in trips from Option 1: urban containment (which is considered a 'Do-Minimum' scenario) to Options 2: meeting needs and 3: stable population is presented. Further analysis reviews the impact of these scenarios on mode share, followed by statistics on the total vehicle kilometres and average trip distances.

The final stage of the LCRTM is the assignment of the travel demand on the highway (and public transport networks) after all the travel choices within the demand model have been taken into account. For the purpose of the study the analysis of the assignment impact has focused on the morning peak hour (08:00-09:00) and evening peak hour (17:00-18:00) at a forecast year of 2024.

Using the model outputs, the "*hot spots*" in terms of the location of significant increases in traffic volumes and volume over capacity (V/C) ratios as well as travel times can be identified. Since LCRTM is a link based model, it is not currently possible to capture the impact of the developments on the operation of junctions. However, by determining where the level of traffic growth is at its greatest, the areas where impacts on junctions are likely can be identified.

4.2 Total Growth in Trips

Table 4.1 shows the overall growth in trips for commuting (Commute), other and employer's business (EB). At the 24-hour level, it compares the model base year of 2008 to Options 1, 2 and 3. **Table 4.2** presents the comparison of Options 2 and 3 against Option 1.

The comparison against 2008 shows an increase in trips to Sefton of:
- 20,000 for Option 1
- 52,000 for Option 2
- 61,000 for Option 3

The increase in trips from Sefton is:
- 16,500 for Option 1
- 50,000 for Option 2
- 58,500 for Option 3

Comparison of the results of Option 1 and 2 show a 4% increase in trips to and from Sefton from/to the rest of the LCRTM study area. This represents around 33,000 additional trips, per weekday, in each direction.

The results in **Table 4.2** show that there is 6% increase in trips from Sefton to the rest of the LCRTM study area when Option 1 and 3 are compared. This is equivalent to around 42,000 additional trips, per weekday, in each direction.

Table 4.1: 24 Hour Trip Generation : Comparison to 2008 Base Year

Highway	Commute				Other				Employer's Business				Total			
	Trips From Sefton		Trips To Sefton		Trips From Sefton		Trips To Sefton		Trips From Sefton		Trips To Sefton		Trips From Sefton		Trips To Sefton	
	24 Hour Trips	Difference to 2008	24 Hour Trips	Difference to 2008	24 Hour Trips	Difference to 2008	24 Hour Trips	Difference to 2008	24 Hour Trips	Difference to 2008	24 Hour Trips	Difference to 2008	24 Hour Trips	Difference to 2008	24 Hour Trips	Difference to 2008
2008	106,497	-	105,895	-	337,016	-	334,487	-	42,086	-	44,881	-	485,600	-	485,263	-
Option 1	111,518	5,021	109,749	3,854	359,815	22,799	354,430	19,944	44,230	2,144	53,406	8,524	515,564	29,964	517,585	32,322
Option 2	117,156	10,659	115,383	9,488	376,413	39,397	370,683	36,197	46,006	3,920	54,951	10,070	539,576	53,976	541,018	55,754
Option 3	118,508	12,010	116,644	10,749	380,930	43,914	375,023	40,536	46,418	4,332	55,327	10,446	545,856	60,256	546,994	61,731

Public Transport	Commute				Other				Employer's Business				Total			
	Trips From Sefton		Trips To Sefton		Trips From Sefton		Trips To Sefton		Trips From Sefton		Trips To Sefton		Trips From Sefton		Trips To Sefton	
	24 Hour Trips	Difference to 2008	24 Hour Trips	Difference to 2008	24 Hour Trips	Difference to 2008	24 Hour Trips	Difference to 2008	24 Hour Trips	Difference to 2008	24 Hour Trips	Difference to 2008	24 Hour Trips	Difference to 2008	24 Hour Trips	Difference to 2008
2008	20,991	-	20,982	-	73,751	-	74,028	-	1,341	-	1,353	-	96,082	-	96,364	-
Option 1	18,186	-2,804	18,761	-2,221	68,626	-5,125	69,527	-4,501	1,160	-180	1,248	-105	87,973	-8,109	89,536	-6,828
Option 2	18,731	-2,259	19,333	-1,650	70,714	-3,037	71,612	-2,417	1,185	-155	1,274	-79	90,631	-5,451	92,218	-4,146
Option 3	18,841	-2,150	19,444	-1,539	71,179	-2,572	72,069	-1,959	1,189	-151	1,277	-75	91,209	-4,873	92,790	-3,573

Active Modes	Commute				Other				Employer's Business				Total			
	Trips From Sefton		Trips To Sefton		Trips From Sefton		Trips To Sefton		Trips From Sefton		Trips To Sefton		Trips From Sefton		Trips To Sefton	
	24 Hour Trips	Difference to 2008	24 Hour Trips	Difference to 2008	24 Hour Trips	Difference to 2008	24 Hour Trips	Difference to 2008	24 Hour Trips	Difference to 2008	24 Hour Trips	Difference to 2008	24 Hour Trips	Difference to 2008	24 Hour Trips	Difference to 2008
2008	12,231	-	12,230	-	131,168	-	131,152	-	1,268	-	1,268	-	144,666	-	144,651	-
Option 1	12,033	-198	12,064	-166	125,904	-5,264	125,911	-5,241	1,494	227	1,487	219	139,431	-5,235	139,463	-5,188
Option 2	12,641	410	12,672	442	131,807	639	131,803	650	1,572	304	1,562	294	146,020	1,354	146,037	1,386
Option 3	12,788	557	12,816	586	133,312	2,145	133,305	2,153	1,590	323	1,580	312	147,690	3,024	147,702	3,052

Total	Commute				Other				Employer's Business				Total			
	Trips From Sefton		Trips To Sefton		Trips From Sefton		Trips To Sefton		Trips From Sefton		Trips To Sefton		Trips From Sefton		Trips To Sefton	
	24 Hour Trips	Difference to 2008	24 Hour Trips	Difference to 2008	24 Hour Trips	Difference to 2008	24 Hour Trips	Difference to 2008	24 Hour Trips	Difference to 2008	24 Hour Trips	Difference to 2008	24 Hour Trips	Difference to 2008	24 Hour Trips	Difference to 2008
2008	139,719	-	139,108	-	541,935	-	539,667	-	44,694	-	47,503	-	726,348	-	726,278	-
Option 1	141,738	2,019	140,575	1,467	554,345	12,410	549,869	10,201	46,885	2,191	56,141	8,638	742,968	16,620	746,584	20,307
Option 2	148,529	8,810	147,388	8,280	578,935	37,000	574,098	34,430	48,763	4,069	57,787	10,285	776,227	49,879	779,273	52,995
Option 3	150,137	10,418	148,904	9,797	585,422	43,487	580,398	40,730	49,198	4,503	58,185	10,682	784,756	58,408	787,487	61,209

Table 4.2: 24 Hour Trip Generation : Comparison to Option 1

	Difference (Option 2 - Option 1)				% Difference			
Highway	Commute	Other	EB	Total	Commute	Other	EB	Total
Trips From Sefton	5,638	16,598	1,776	24,013	5%	5%	4%	5%
Trips To Sefton	5,634	16,253	1,545	23,432	5%	5%	3%	5%
	Difference (Option 3 - Option 1)				% Difference			
Highway	Commute	Other	EB	Total	Commute	Other	EB	Total
Trips From Sefton	6,989	21,115	2,188	30,293	6%	6%	5%	6%
Trips To Sefton	6,895	20,593	1,921	29,409	6%	6%	4%	6%

	Difference (Option 2 - Option 1)				% Difference			
Public Transport	Commute	Other	EB	Total	Commute	Other	EB	Total
Trips From Sefton	545	2,088	25	2,658	3%	3%	2%	3%
Trips To Sefton	572	2,085	26	2,682	3%	3%	2%	3%
	Difference (Option 3 - Option 1)				% Difference			
Public Transport	Commute	Other	EB	Total	Commute	Other	EB	Total
Trips From Sefton	655	2,553	29	3,236	4%	4%	3%	4%
Trips To Sefton	682	2,542	30	3,254	4%	4%	2%	4%

	Difference (Option 2 - Option 1)				% Difference			
Active Modes	Commute	Other	EB	Total	Commute	Other	EB	Total
Trips From Sefton	608	5,903	77	6,589	5%	5%	5%	5%
Trips To Sefton	607	5,892	75	6,574	5%	5%	5%	5%
	Difference (Option 3 - Option 1)				% Difference			
Active Modes	Commute	Other	EB	Total	Commute	Other	EB	Total
Trips From Sefton	755	7,408	96	8,259	6%	6%	6%	6%
Trips To Sefton	752	7,394	93	8,239	6%	6%	6%	6%

	Difference (Option 2 - Option 1)				% Difference			
Total	Commute	Other	EB	Total	Commute	Other	EB	Total
Trips From Sefton	6,792	24,589	1,878	33,260	5%	4%	4%	4%
Trips To Sefton	6,813	24,229	1,646	32,689	5%	4%	3%	4%
	Difference (Option 3 - Option 1)				% Difference			
Total	Commute	Other	EB	Total	Commute	Other	EB	Total
Trips From Sefton	8,399	31,076	2,313	41,788	6%	6%	5%	6%
Trips To Sefton	8,330	30,529	2,044	40,903	6%	6%	4%	5%

4.3 Mode Share

Tables 4.3 and **4.4** show the mode share for travel for all trips with *at least* one end of their journey in Sefton (that is a journey that starts, ends or is completely within Sefton). **Table 4.3** relates to the AM peak (08.00-09.00) and **Table 4.4** relates to the PM peak (17.00-18.00).

From **Tables 4.3 and 4.4** it can be seen that there is very little difference in the mode share between the three options. In the AM peak hour around 65% of trips are made by car, and 16.5% by Public Transport. In the PM peak hour around 68% of trips are made by car, and 14% by Public Transport.

Note active modes are only considered in the LCRTM model at 24 hour level, so this comparison considers only motorised forms of transport.

The decrease in Public Transport mode share occurs across Merseyside and reflects the forecast of increased car ownership in Merseyside in the future.

Table 4.3: AM Peak Hour Mode Share

AM	Car	Freight	Public Transport
2008 (Base)	66.5%	12.2%	21.3%
2024 Option 1	64.5%	18.9%	16.6%
2024 Option 2	65.2%	18.3%	16.5%
2024 Option 3	65.3%	18.2%	16.5%

Table 4.4: PM Peak Hour Mode Share

PM	Car	Freight	Public Transport
2008 (Base)	69.5%	12.6%	17.9%
2024 Option 1	67.6%	18.2%	14.2%
2024 Option 2	68.2%	17.7%	14.1%
2024 Option 3	68.4%	17.5%	14.1%

4.4 Growth in Trips

Tables 4.5 to **4.8** present the change in the number of trips in each hour of the AM peak period and the PM peak period between Option 1 and Options 2 and 3.

The percentage growth in trips compared to Option 1 is the same for each hour of the AM peak period, suggesting that the extra trips generated as a result of the different options will be spread evenly over the peak period.

Option 2 leads to a 5% growth in trips from Sefton and a 4% growth in trips to Sefton in the AM peak period compared to Option 1. The PM peak shows a similar scale of growth; a 4% increase in trips both to and from Sefton.

Option 3 leads to a 6% growth in trips from Sefton and a 5% growth in trips to Sefton in the AM peak period compared to Option 1. The PM peak shows a similar scale of growth; a 5% increase in trips both to and from Sefton.

Table 4.5: Growth in Trips (07.00-08.00)

Highway	Difference (Option 2 - Option 1)				% Difference			
	Commute	Other	EB	Total	Commute	Other	EB	Total
Trips From Sefton	912	226	78	1,216	5%	6%	5%	5%
Trips To Sefton	718	180	61	958	5%	4%	4%	5%
Highway	**Difference (Option 3 - Option 1)**				**% Difference**			
	Commute	Other	EB	Total	Commute	Other	EB	Total
Trips From Sefton	1,148	283	94	1,526	7%	7%	6%	7%
Trips To Sefton	805	213	69	1,087	5%	5%	4%	5%

Public Transport	Difference (Option 2 - Option 1)				% Difference			
	Commute	Other	EB	Total	Commute	Other	EB	Total
Trips From Sefton	83	54	1	138	3%	4%	2%	3%
Trips To Sefton	56	40	1	97	3%	3%	2%	3%
Public Transport	**Difference (Option 3 - Option 1)**				**% Difference**			
	Commute	Other	EB	Total	Commute	Other	EB	Total
Trips From Sefton	104	68	1	173	4%	5%	2%	4%
Trips To Sefton	62	48	1	112	3%	4%	2%	3%

Total	Difference (Option 2 - Option 1)				% Difference			
	Commute	Other	EB	Total	Commute	Other	EB	Total
Trips From Sefton	995	280	79	1,354	5%	5%	5%	5%
Trips To Sefton	774	219	62	1,056	5%	4%	4%	4%
Total	**Difference (Option 3 - Option 1)**				**% Difference**			
	Commute	Other	EB	Total	Commute	Other	EB	Total
Trips From Sefton	1,253	350	96	1,699	6%	7%	6%	6%
Trips To Sefton	868	261	70	1,199	5%	5%	4%	5%

Table 4.6: Growth in Trips (08.00-09.00)

Highway	Difference (Option 2 - Option 1)				% Difference			
	Commute	Other	EB	Total	Commute	Other	EB	Total
Trips From Sefton	917	1,634	142	2,692	5%	6%	3%	5%
Trips To Sefton	737	1,288	97	2,122	4%	4%	2%	4%
Highway	**Difference (Option 3 - Option 1)**				**% Difference**			
	Commute	Other	EB	Total	Commute	Other	EB	Total
Trips From Sefton	1,182	2,071	184	3,437	6%	7%	4%	6%
Trips To Sefton	839	1,564	125	2,528	5%	5%	3%	5%

Public Transport	Difference (Option 2 - Option 1)				% Difference			
	Commute	Other	EB	Total	Commute	Other	EB	Total
Trips From Sefton	133	247	1	381	3%	4%	2%	4%
Trips To Sefton	86	185	1	273	3%	3%	1%	3%
Public Transport	**Difference (Option 3 - Option 1)**				**% Difference**			
	Commute	Other	EB	Total	Commute	Other	EB	Total
Trips From Sefton	164	308	2	473	4%	5%	2%	4%
Trips To Sefton	95	223	1	319	3%	4%	1%	3%

Total	Difference (Option 2 - Option 1)				% Difference			
	Commute	Other	EB	Total	Commute	Other	EB	Total
Trips From Sefton	1,050	1,881	144	3,074	4%	5%	3%	5%
Trips To Sefton	823	1,473	99	2,394	4%	4%	2%	4%
Total	**Difference (Option 3 - Option 1)**				**% Difference**			
	Commute	Other	EB	Total	Commute	Other	EB	Total
Trips From Sefton	1,346	2,379	185	3,910	6%	7%	4%	6%
Trips To Sefton	934	1,787	126	2,847	5%	5%	3%	5%

Table 4.7: Growth in Trips (09.00-10.00)

Highway	Difference (Option 2 - Option 1)				% Difference			
	Commute	Other	EB	Total	Commute	Other	EB	Total
Trips From Sefton	331	1,055	118	1,504	6%	6%	6%	6%
Trips To Sefton	257	840	91	1,187	5%	4%	4%	5%
Highway	**Difference (Option 3 - Option 1)**				**% Difference**			
	Commute	Other	EB	Total	Commute	Other	EB	Total
Trips From Sefton	419	1,309	143	1,871	7%	7%	8%	7%
Trips To Sefton	289	989	103	1,380	6%	5%	5%	5%

Public Transport	Difference (Option 2 - Option 1)				% Difference			
	Commute	Other	EB	Total	Commute	Other	EB	Total
Trips From Sefton	43	167	1	211	3%	3%	2%	3%
Trips To Sefton	30	134	1	165	3%	3%	2%	3%
Public Transport	**Difference (Option 3 - Option 1)**				**% Difference**			
	Commute	Other	EB	Total	Commute	Other	EB	Total
Trips From Sefton	54	210	1	264	4%	4%	2%	4%
Trips To Sefton	34	162	1	196	3%	3%	2%	3%

Total	Difference (Option 2 - Option 1)				% Difference			
	Commute	Other	EB	Total	Commute	Other	EB	Total
Trips From Sefton	374	1,222	118	1,715	5%	5%	6%	5%
Trips To Sefton	287	974	91	1,353	5%	4%	4%	4%
Total	**Difference (Option 3 - Option 1)**				**% Difference**			
	Commute	Other	EB	Total	Commute	Other	EB	Total
Trips From Sefton	473	1,518	143	2,135	7%	6%	7%	6%
Trips To Sefton	322	1,151	104	1,577	5%	5%	5%	5%

Table 4.8: Growth in Trips (16.00-19.00)

Highway	Difference (Option 2 - Option 1)				% Difference			
	Commute	Other	EB	Total	Commute	Other	EB	Total
Trips From Sefton	1,410	3,022	425	4,857	5%	4%	4%	5%
Trips To Sefton	1,630	2,946	414	4,991	5%	4%	3%	4%
Highway	**Difference (Option 3 - Option 1)**				**% Difference**			
	Commute	Other	EB	Total	Commute	Other	EB	Total
Trips From Sefton	1,646	3,796	505	5,947	6%	6%	5%	6%
Trips To Sefton	2,014	3,656	497	6,167	7%	5%	3%	6%

Public Transport	Difference (Option 2 - Option 1)				% Difference			
	Commute	Other	EB	Total	Commute	Other	EB	Total
Trips From Sefton	137	275	6	417	2%	2%	2%	2%
Trips To Sefton	231	324	7	562	3%	2%	2%	3%
Public Transport	**Difference (Option 3 - Option 1)**				**% Difference**			
	Commute	Other	EB	Total	Commute	Other	EB	Total
Trips From Sefton	158	343	7	507	3%	3%	2%	3%
Trips To Sefton	292	412	8	712	4%	3%	2%	3%

Total	Difference (Option 2 - Option 1)				% Difference			
	Commute	Other	EB	Total	Commute	Other	EB	Total
Trips From Sefton	1,546	3,297	431	5,274	5%	4%	4%	4%
Trips To Sefton	1,861	3,270	421	5,552	5%	4%	3%	4%
Total	**Difference (Option 3 - Option 1)**				**% Difference**			
	Commute	Other	EB	Total	Commute	Other	EB	Total
Trips From Sefton	1,804	4,138	512	6,454	5%	5%	5%	5%
Trips To Sefton	2,307	4,067	505	6,879	6%	5%	3%	5%

4.5 Vehicle Kilometres

Tables 4.9 and **4.10** show the impact of Options 2 and 3 on total vehicle kilometres travelled for trips with at least one end of their journey in Sefton.

By comparing the results of Option 1 and 2 for 2024 AM peak it can be seen that there is a 2.8% increase in vehicle kilometres for all highway trip purposes. This increase is mainly due to the increase in Car Commute and Car Other trips, Goods Vehicles do not contribute to the total growth. The same trend is observed when comparing Option 1 and 3; an increase of 3.7% across all highway trip purposes.

The overall change in vehicle kilometres in the PM peak shows a similar pattern to the AM, although in this case Car Commute is the largest contributor followed by Car Other. This reflects the changes in the number of trips by user class.

Table 4.9: 2024 AM Vehicle Kilometres

AM	Car - Commute	Car- Other	Car - Employer's Business	Light Goods Vehicles	Other Goods Vehicles	Total
2008 Base	364,691,970	132,640,221	76,485,841	69,803,906	34,229,902	677,851,839
2024 Option 1	426,669,213	141,433,851	79,398,598	105,160,809	41,659,493	794,321,964
2024 Option 2	442,048,462	147,305,947	80,386,526	105,093,694	41,690,696	816,525,325
2024 Option 3	447,172,260	148,984,109	80,751,932	105,105,625	41,679,411	823,693,338
Absolute Difference Option 1 and 2	15,379,248	5,872,096	987,929	-67,115	31,203	22,203,361
Difference % Option 1 and 2	3.60%	4.15%	1.24%	-0.06%	0.07%	2.80%
Absolute Difference Option 1 and 3	20,503,047	7,550,259	1,353,334	-55,184	19,918	29,371,374
Difference % Option 1 and 3	4.81%	5.34%	1.70%	-0.05%	0.05%	3.70%

Table 4.10: 2024 PM Vehicle Kilometres

PM	Car - Commute	Car- Other	Car - Employer's Business	Light Goods Vehicles	Other Goods Vehicles	Total
2008 Base	339,870,050	189,873,988	80,961,035	65,188,996	22,922,504	698,816,573
2024 Option 1	385,062,622	232,241,342	92,288,426	98,219,690	27,562,443	835,374,525
2024 Option 2	399,471,330	239,851,569	93,942,150	98,286,457	27,538,030	859,089,536
2024 Option 3	404,616,639	242,319,097	94,559,009	98,297,834	27,544,749	867,337,328
Absolute Difference Option 1 and 2	14,408,708	7,610,226	1,653,723	66,767	-24,413	23,715,012
Difference % Option 1 and 2	3.74%	3.28%	1.79%	0.07%	-0.09%	2.84%
Absolute Difference Option 1 and 3	19,554,017	10,077,755	2,270,583	78,143	-17,694	31,962,803
Difference % Option 1 and 3	5.08%	4.34%	2.46%	0.08%	-0.06%	3.83%

4.6 Average Trip Length

Tables 4.11 and **4.12** show the average length of a trip in the AM and PM peak hours. It can be seen that development in Options 2 and 3 results in a slight reduction (< 1%) in the average trip length. This also suggests that although there is an increase in the demand for travel the locations do not lead to longer journeys.

Table 4.11: Average Trip Length : AM Peak Hour

AM	2008 Average Trip Distance (km)	2024 Average Trip Distance (km)
Option 1	6.8	12.7
Option 2	6.8	12.6
Option 3	6.8	12.6
% Change (Option 1-2)	N/A	-0.6%
% Change (Option 1-3)	N/A	-0.6%

Table 4.12: Average Trip Length : PM Peak Hour

PM	2008 Average Trip Distance (km)	2024 Average Trip Distance (km)
Option 1	16.2	13.9
Option 2	16.2	13.9
Option 3	16.2	13.9
% Change (Option 1-2)	N/A	-0.4%
% Change (Option 1-3)	N/A	-0.3%

4.7 Assignment Analysis

The assignment of Options 1, 2 and 3 have been compared to identify the likely hot-spots in terms of network performance in Sefton. In the first instance, an analysis has been undertaken of the performance of each of the Options.

Following this analysis, three different measures have been used to show where, as a result of increases in traffic over Option 1, there may be additional performance issues in terms of the delay experienced by road users.

The following analyses have been undertaken:

- Identifying where absolute **flow changes** could be considered to be materially significant. This has been based on identifying those links where the increase in flow compared to Option 1 is greater than 5% ***or*** more than 50 vehicles per hour.
- Identifying where the **volume over capacity ratio** in Options 2 and 3 exceeds 85% on a link that in Option 1 was less than 85%; that is where capacity is close to being exceeded and likely to cause congestion.
- Identifying where the **link travel time** in Options 2 and 3 is 5% greater than the travel time in Option 1.

A series of outputs from the model are presented in **Appendices A to E.** A plot is provided in **Appendix A** to illustrate key road names to aid in the interpretation of the figures.

4.8 Analysis of the Options

Appendix B shows that, under all Options, by 2024 many links in Sefton are expected to have a volume over capacity ratio (V/C) exceeding 85%. Whilst a V/C ratio of 100% indicates a road at capacity, anything above 85% is indicative of a road approaching capacity, where congestion and negative impacts on journey times can be expected.

In the Do-Minimum scenario (Option 1) it can be seen that many links in south Sefton have a V/C exceeding 85%, particularly along the A565 corridor with specific hot-spots around Crosby. Also of note are the approach roads to Maghull from Junction 1 of the M58. In Options 2 and 3, the same pattern is observed.

4.9 Flow plots

Appendix C shows the locations where the traffic flow in Options 2 and 3 exceeds Option 1 by 5% *or* by more than 50 vehicles. It can be seen by cross reference to **Figures 3.2** and **3.3** that these hot spots are consistent to the areas seeing the biggest change in the number of households.

4.10 Volume over Capacity Ratios

Appendix D shows the links where the volume over capacity (V/C) in Options 2 and 3 is greater than 85% where it was less than 85% in Option 1.

When compared to Option 1, there are relatively few additional locations where the volume over capacity ratio is greater than 85% (100% being operating at capacity). This indicates that the further development in Options 2 and 3 is unlikely to have wide-ranging impacts on the performance of the highway over and above what would be expected in Option 1.

4.11 Change in Link Travel Times

Appendix E shows the links where journey times are expected to increase by over 5% in Options 2 and 3 compared to Option 1. As expected, the locations where journey times are expected to increase are broadly consistent with where the increase in the number of journeys is at its greatest.

5. Conclusions

This study compares the three Options for Sefton's Local Plan. The impact of each Option is considered, and comparisons are presented of the additional impacts of Option 2: Meeting Needs and Option 3: Stable Population compared to Option 1: Urban Containment (the Do-Minimum in this appraisal). It uses the Liverpool City Region Transport Model (LCRTM) which contains modelling of traffic growth to 2024 which has been used as a proxy for the end of the plan period (2028) for the Local Plan: Core Strategy.

The testing of each Option indicates that, regardless of the Option chosen, many roads in Sefton will have a volume over capacity ratio in excess of 85% in the morning and evening peak hours. This means that there will be potential network issues whichever Option is taken forward.

The model predicts that, in 2024, there will be a small number of locations on the network that are likely to exhibit noticeable increases in traffic and reduction in available capacity compared with Option 1 ie the Do-Minimum.

At the locations where the increase in flows is greater than 5% in the AM and PM peak hours, the analysis shows that Options 2 and 3 in general have little additional impact on the capacity remaining on these roads. That is not to say, however, that junction delays will be insignificant. It should be recognised that the model works at a high level and provides a measure of where congestion is likely. The findings will require more detailed analysis at the local level for issues specific to Sefton's network.

The issues highlighted in this study should only be seen as an indication of potential network areas that will need to be considered in detail by developers of the sites. In summary a more detailed modelling approach would be required to examine the operation of junctions in these areas.

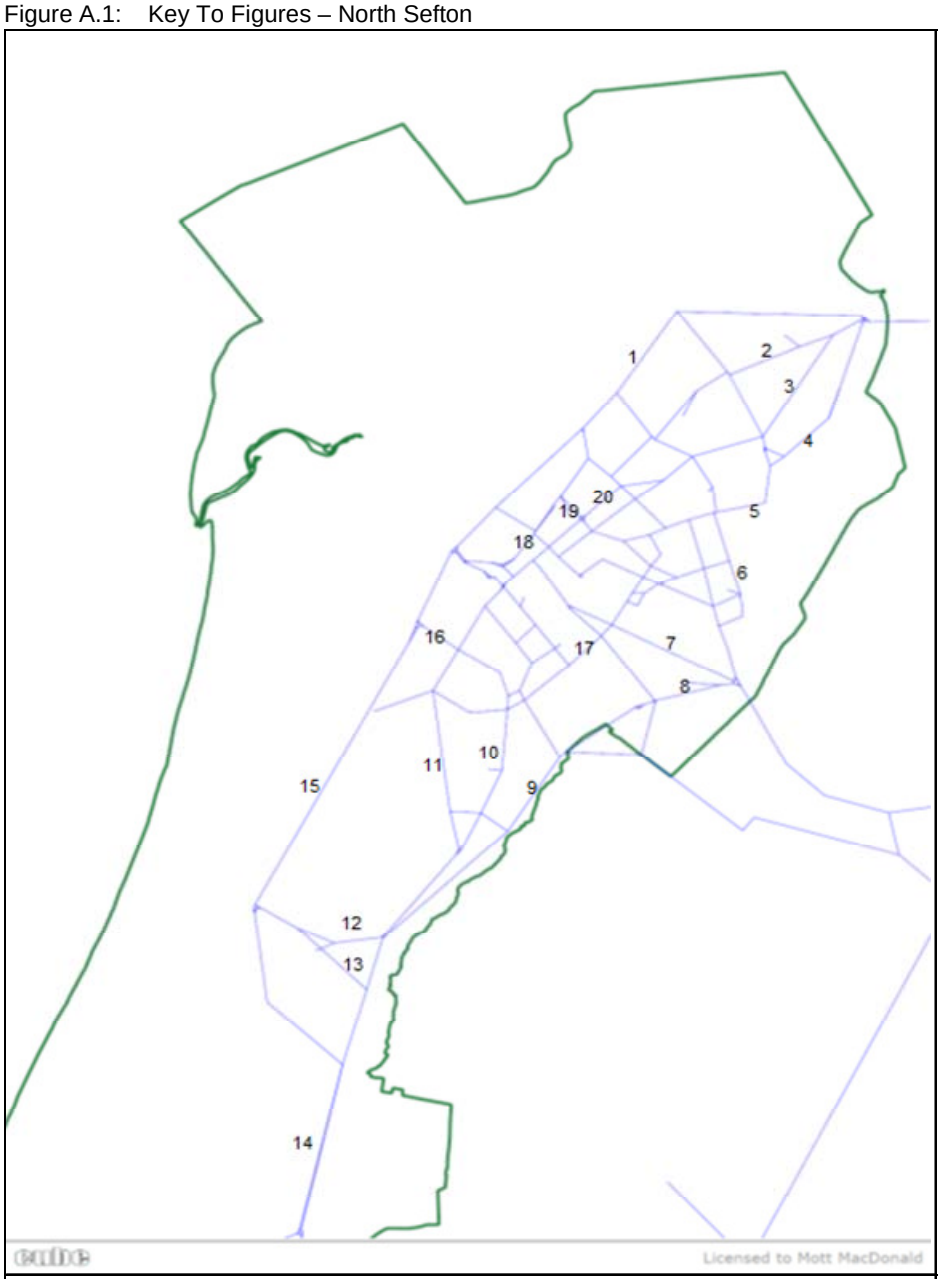
However, the model outputs suggest that the "*hot-spots*", in terms of the additional impact of Options 2 and 3 on the highway network performance, are likely to be limited to discreet areas of the Borough and unlikely to have notable impact on the wider road network. It is expected that targeted junction improvements combined with demand management measures such as enhancements to public transport services would provide mitigation against these impacts when compared to the Do-Minimum. It is also anticipated that the developers wishing to develop the area would fund the cost of the improvement measures required by their development. The findings of this report could be utilised to provide a framework of the likely areas to be considered at such time.

Appendices

Appendix A. Key to Figures

Figure A.1 shows a selection of key road names in Sefton in relation to LCRTM's representation of the road network. This image is provided to aid readers in the interpretation of subsequent illustrations.

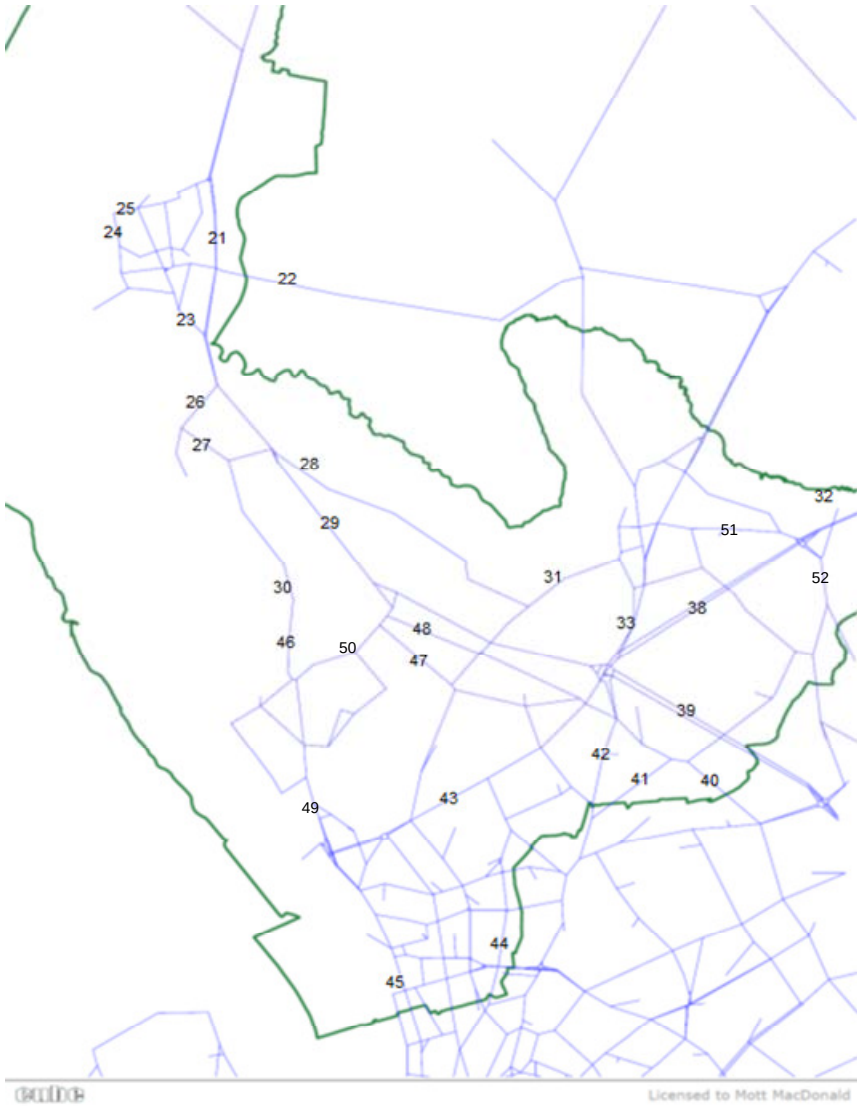
Figure A.1: Key To Figures – North Sefton



KEY	1 Marine Drive	11 A565 Waterloo Road
	2 Fylde Road	12 Station Road
	3 A565 Preston New Road	13 Kenilworth Road
	4 B5244 Bankfield Lane	14 A565 Formby Bypass
	5 A5267 Roe Lane	15 Coastal Road
	6 Wennington Road	16 Weld Road
	7 A570 Scarisbrick New Road	17 A5267 Ash Street
	8 Town Lane Kew	18 B245 Promenade
	9 Guildford Road	19 B5245 Leicester Street
	10 A5267 Liverpool Road	20 Albert Road

Source: LCRTM

Figure A.2: Key To Figures – South Sefton



KEY	21 A565 Formby Bypass	37 A5147 Liverpool Road
	22 B5195 Altcar Road	38 M58
	23 B5424 Liverpool Road	39 M57
	24 Freshfield Road	40 Aintree Lane
	25 Old Town Lane	41 Melling Road
	26 North End Lane	42 Ormskirk Road
	27 Moss Lane	43 Church Road
	28 Lady Green Lane	44 Southport Road
	29 A565 Moor Lane	45 Rimrose Road
	30 Delph Road	46 Little Crosby Road
	31 B5422 Bridges Lane	47 Edge lane
	32 B5197 Prescot Road	48 Lydiate Lane
	33 Northway	49 A565 Crosby Road North
	34 School Lane	50 A565 Moor Lane
	35 Hall Lane	51 School Lane
	36 Eastway	52 A506 Bank Lane

Source: LCRTM

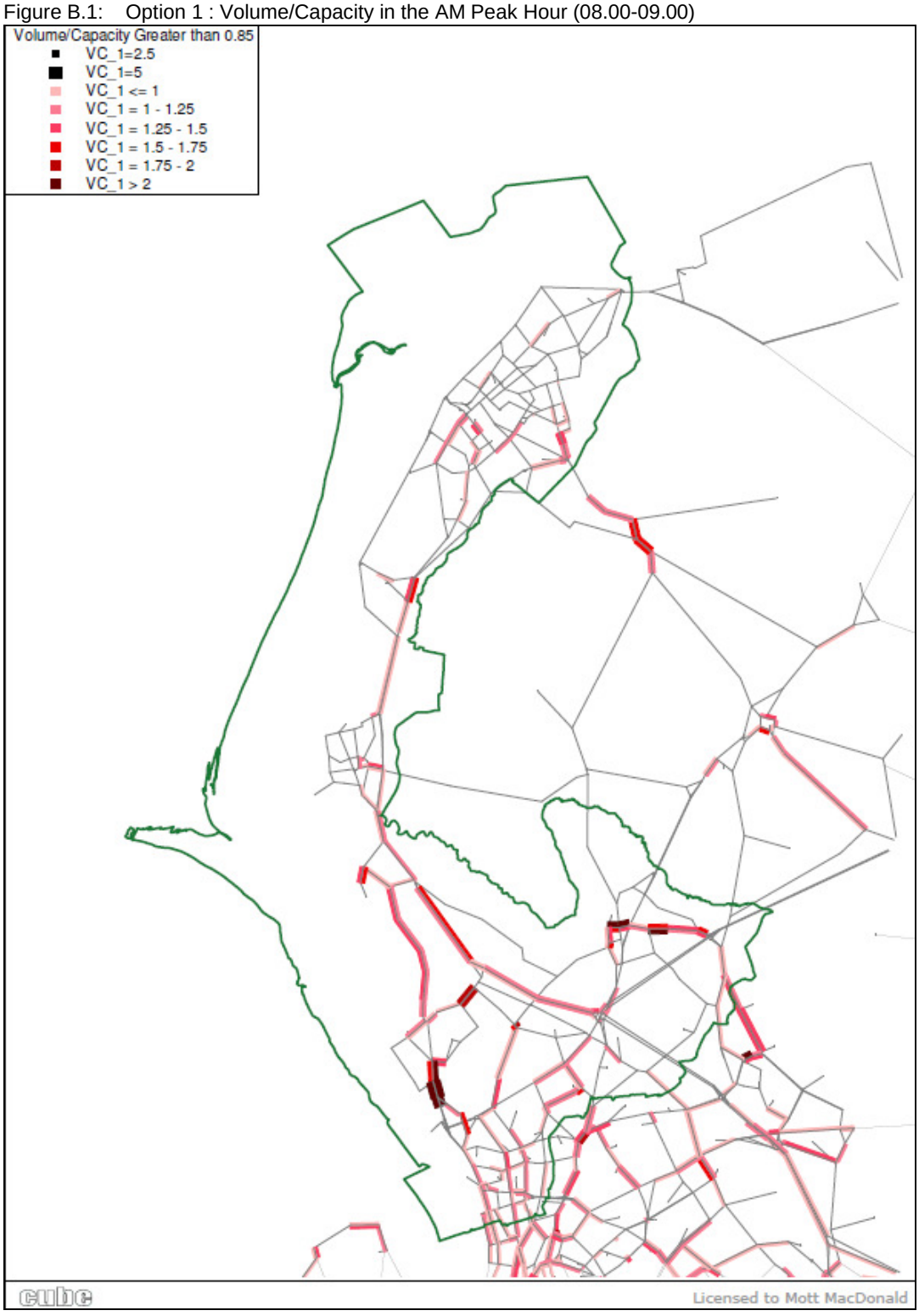
Appendix B. Volume/Capacity

The following plots show where the link volume over capacity (V/C) ratio exceeds **85%**.

Links meeting this criterion are highlighted.

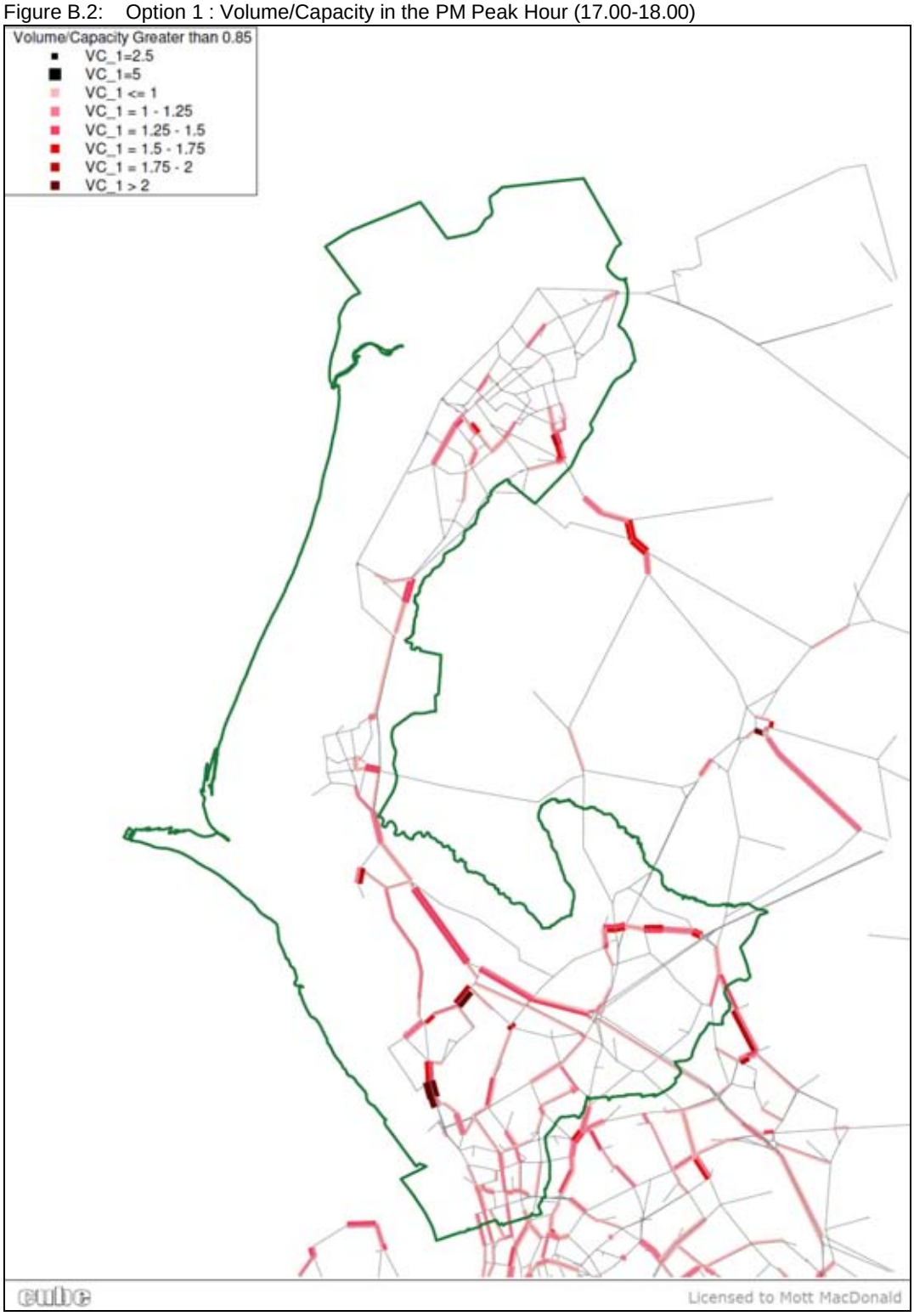
Plots are produced for each Option and illustrate the AM and PM peak hours.

Figure B.1: Option 1 : Volume/Capacity in the AM Peak Hour (08.00-09.00)



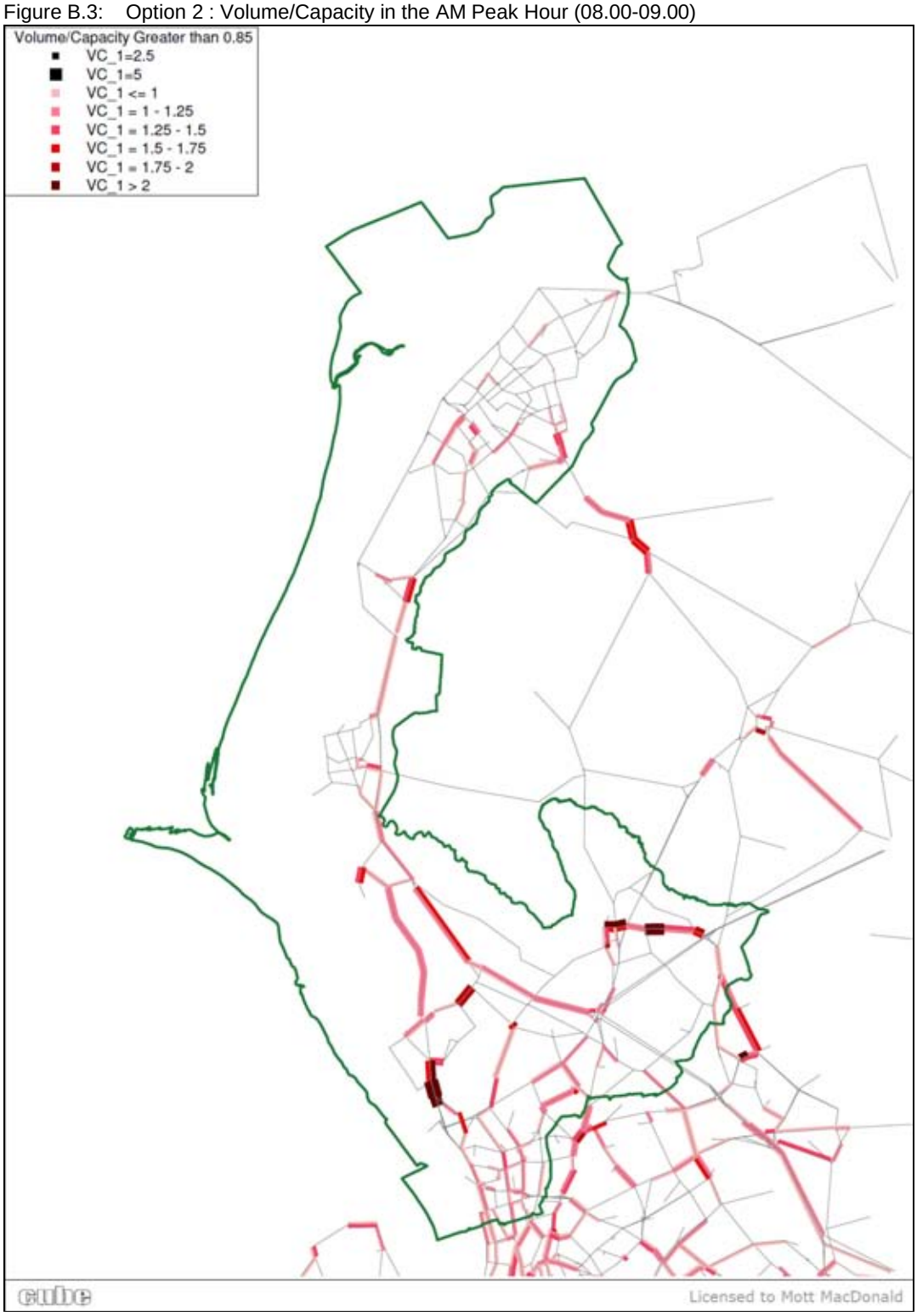
Source: LCRTM

Figure B.2: Option 1 : Volume/Capacity in the PM Peak Hour (17.00-18.00)



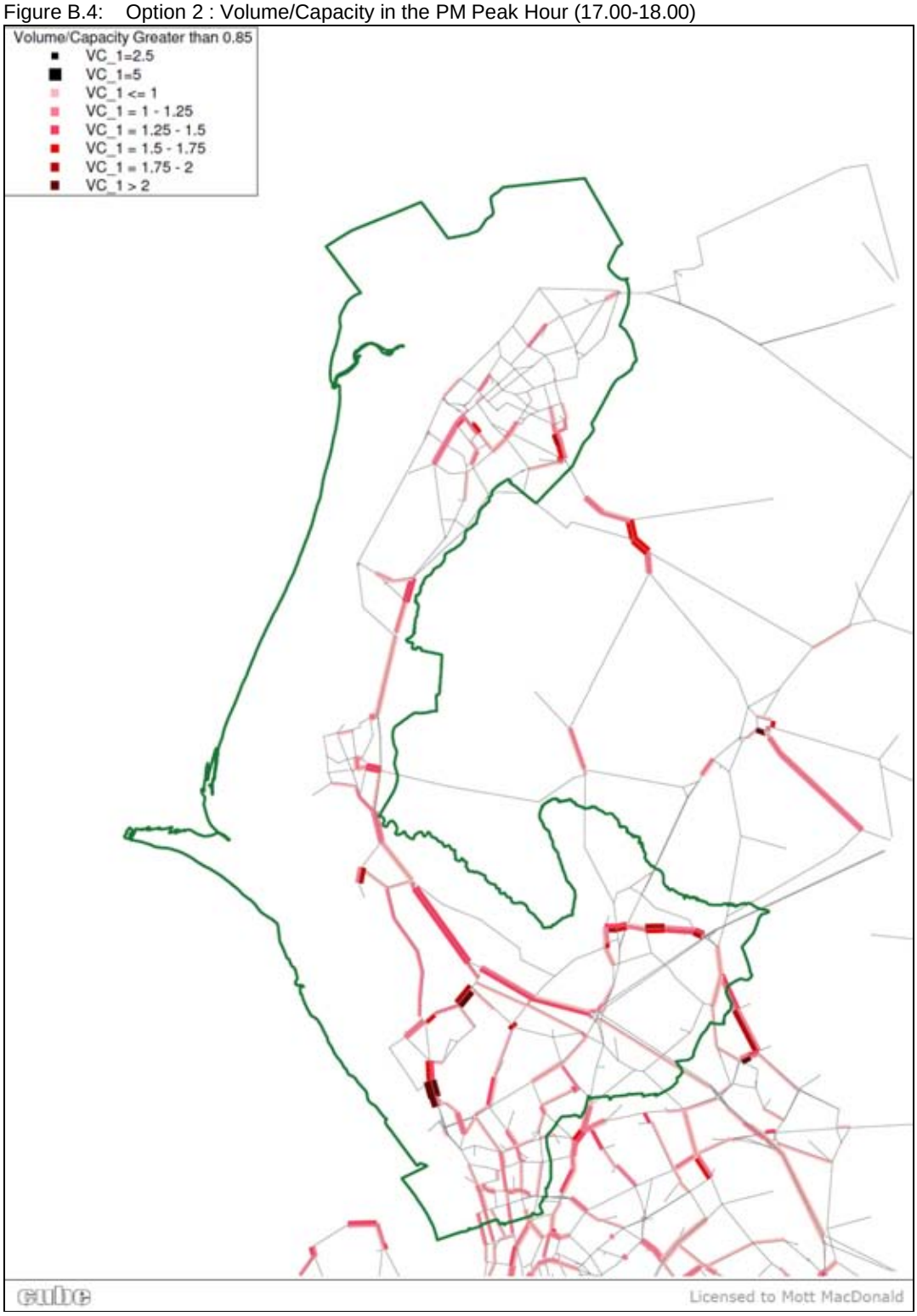
Source: LCRTM

Figure B.3: Option 2 : Volume/Capacity in the AM Peak Hour (08.00-09.00)



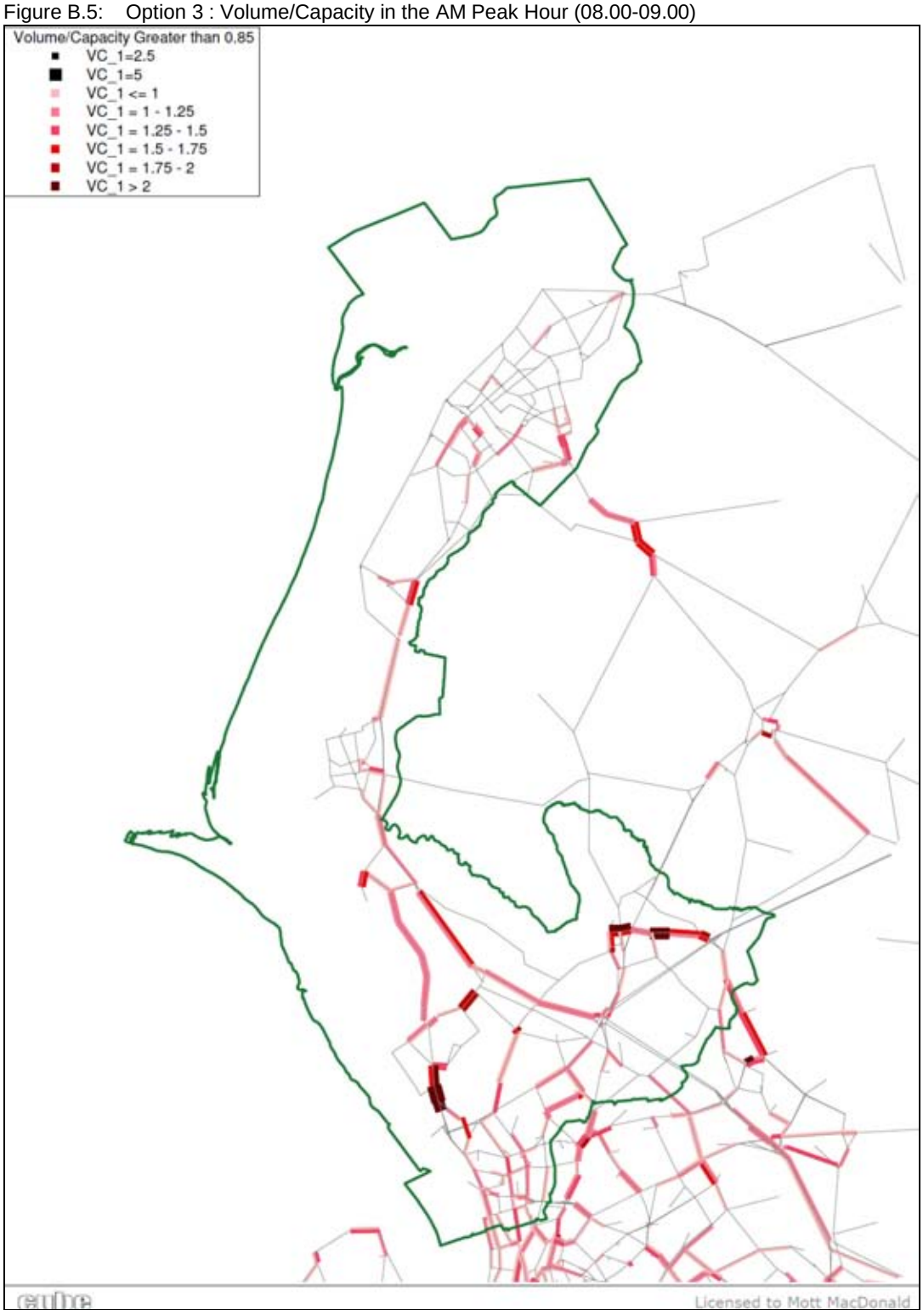
Source: LCRTM

Figure B.4: Option 2 : Volume/Capacity in the PM Peak Hour (17.00-18.00)



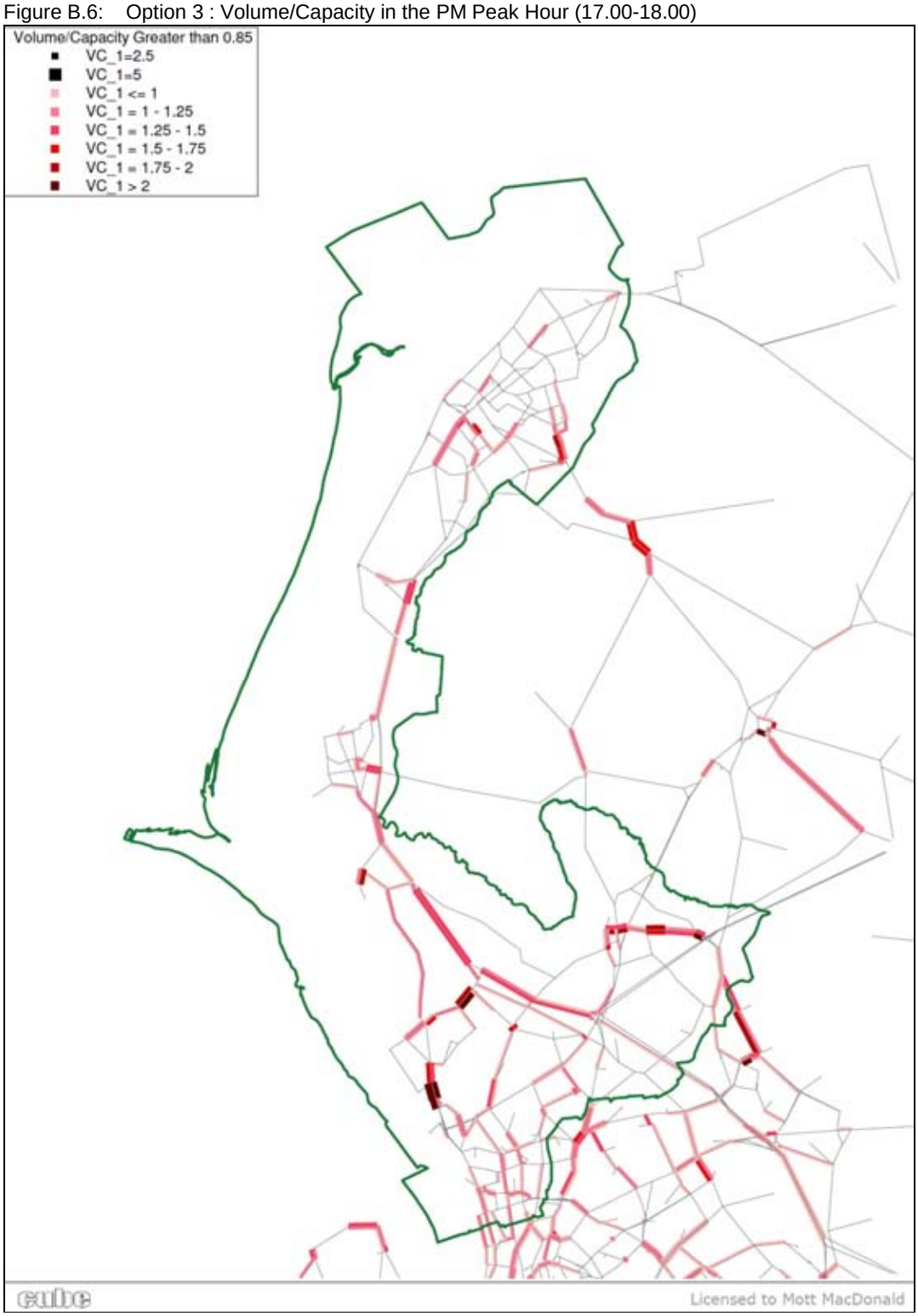
Source: LCRTM

Figure B.5: Option 3 : Volume/Capacity in the AM Peak Hour (08.00-09.00)



Source: LCRTM

Figure B.6: Option 3 : Volume/Capacity in the PM Peak Hour (17.00-18.00)



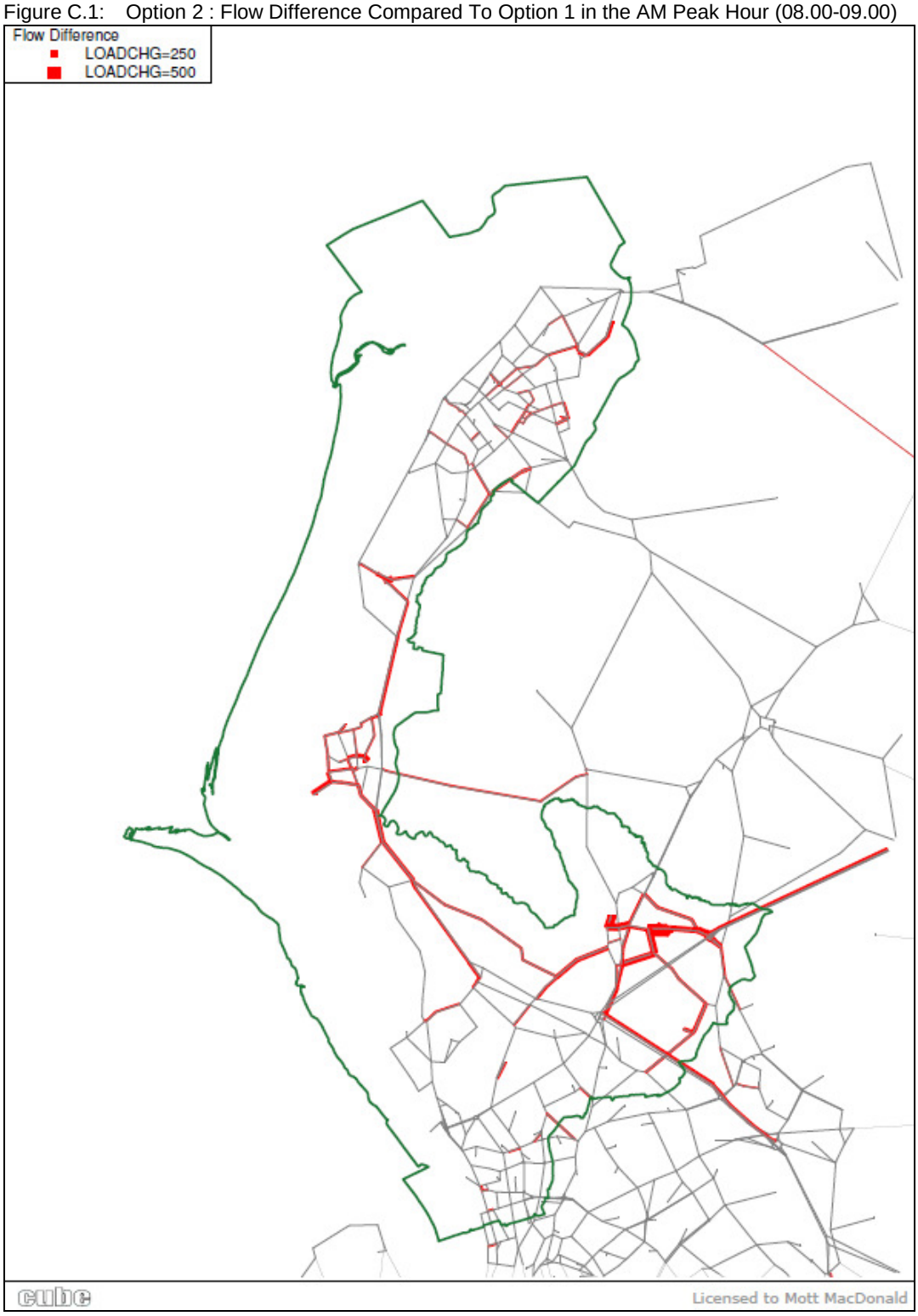
Source: LCRTM

Appendix C. Flow Difference

The following plots show where the absolute change in traffic flow as a result of the implementation of Option 2 or Option 3 could be considered materially significant compared to the implementation of Option 1. This has been based on identifying those links where the increase in traffic is greater than **5%** or there is a change in flow of more than **50** vehicles per hour (represented by the attribute LOADCHG in the plots).

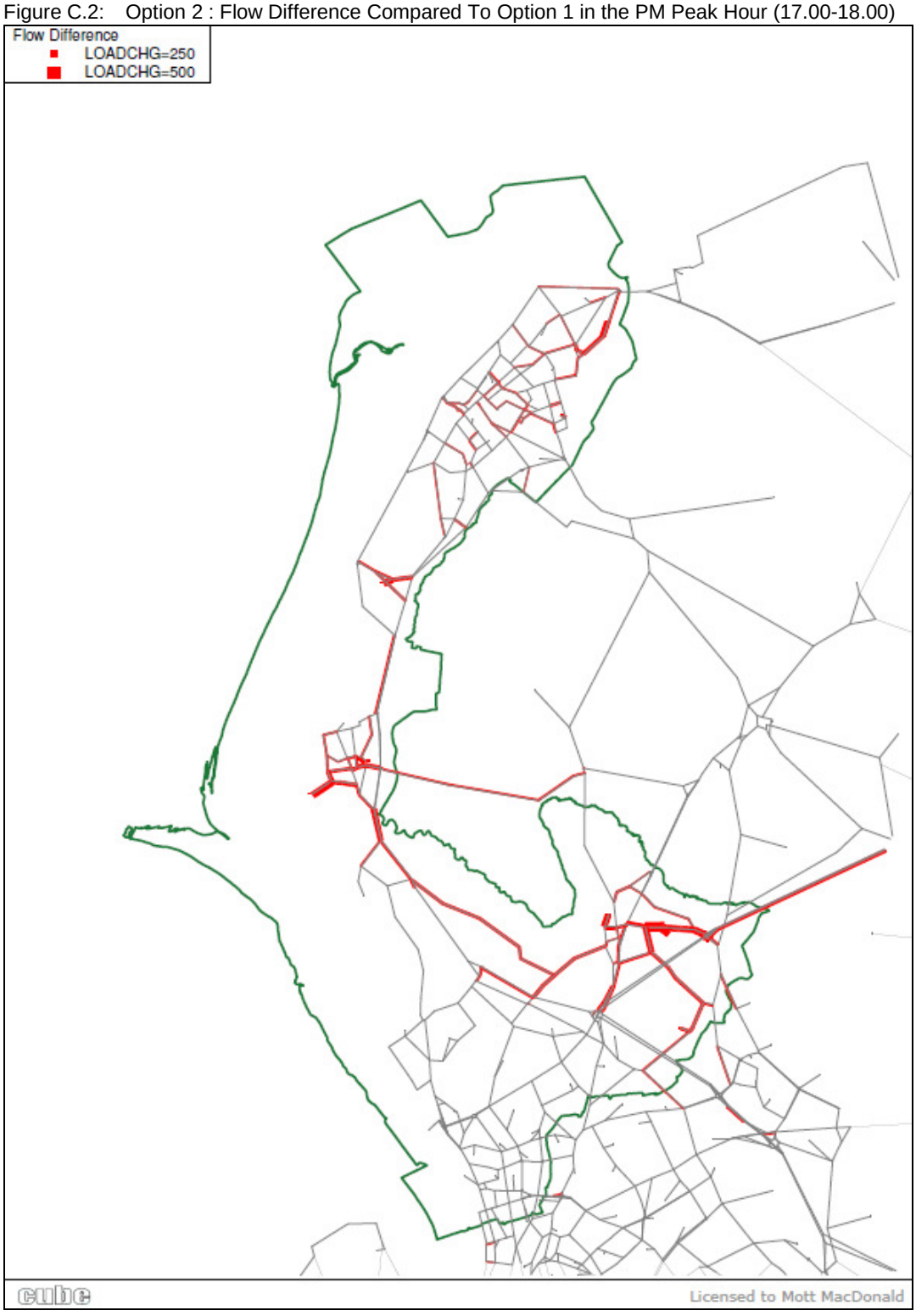
Links meeting this criterion are highlighted by thick red lines.

Figure C.1: Option 2 : Flow Difference Compared To Option 1 in the AM Peak Hour (08.00-09.00)



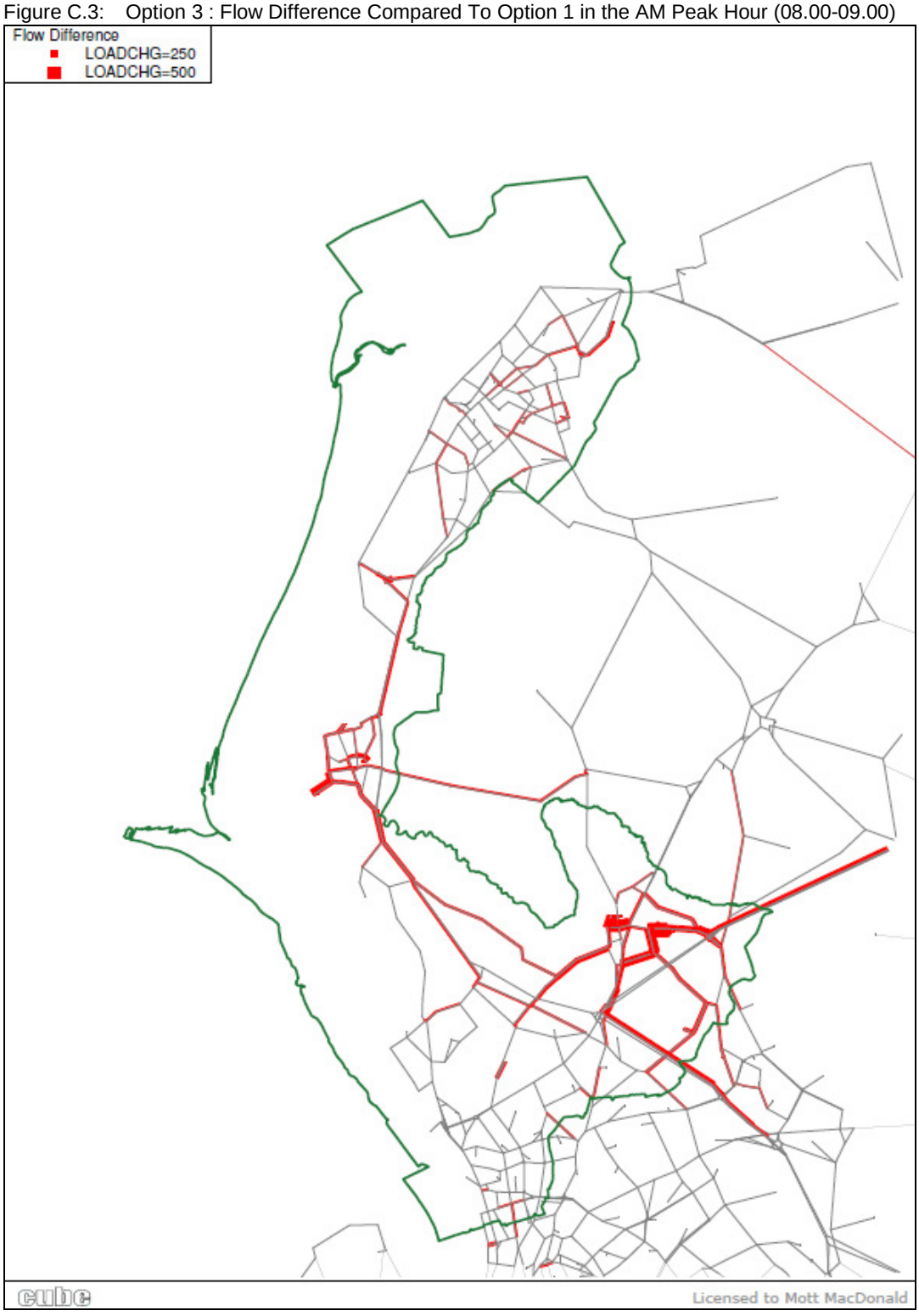
Source: LCRTM

Figure C.2: Option 2 : Flow Difference Compared To Option 1 in the PM Peak Hour (17.00-18.00)



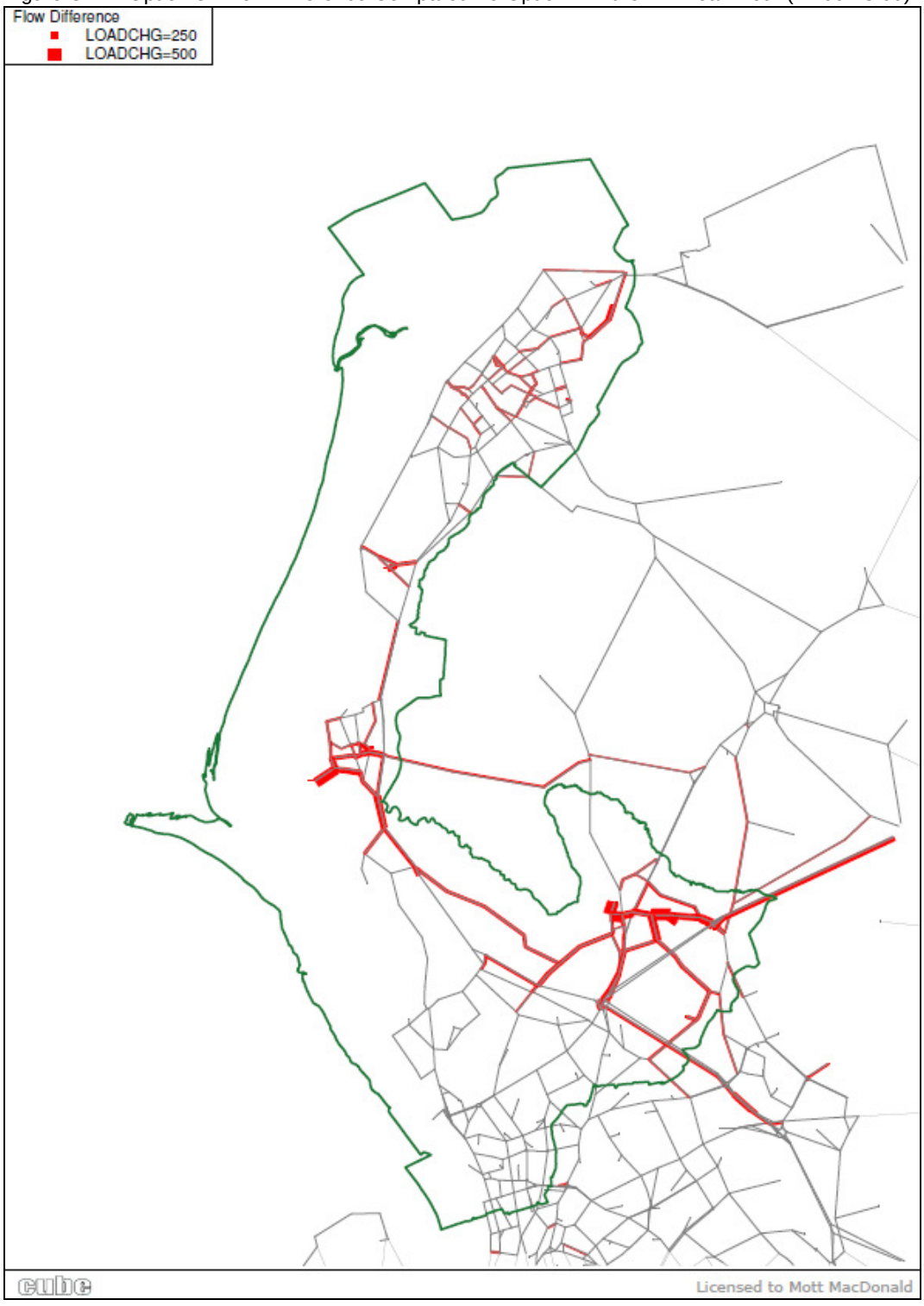
Source: LCRTM

Figure C.3: Option 3 : Flow Difference Compared To Option 1 in the AM Peak Hour (08.00-09.00)



Source: LCRTM

Figure C.4: Option 3 : Flow Difference Compared To Option 1 in the PM Peak Hour (17.00-18.00)



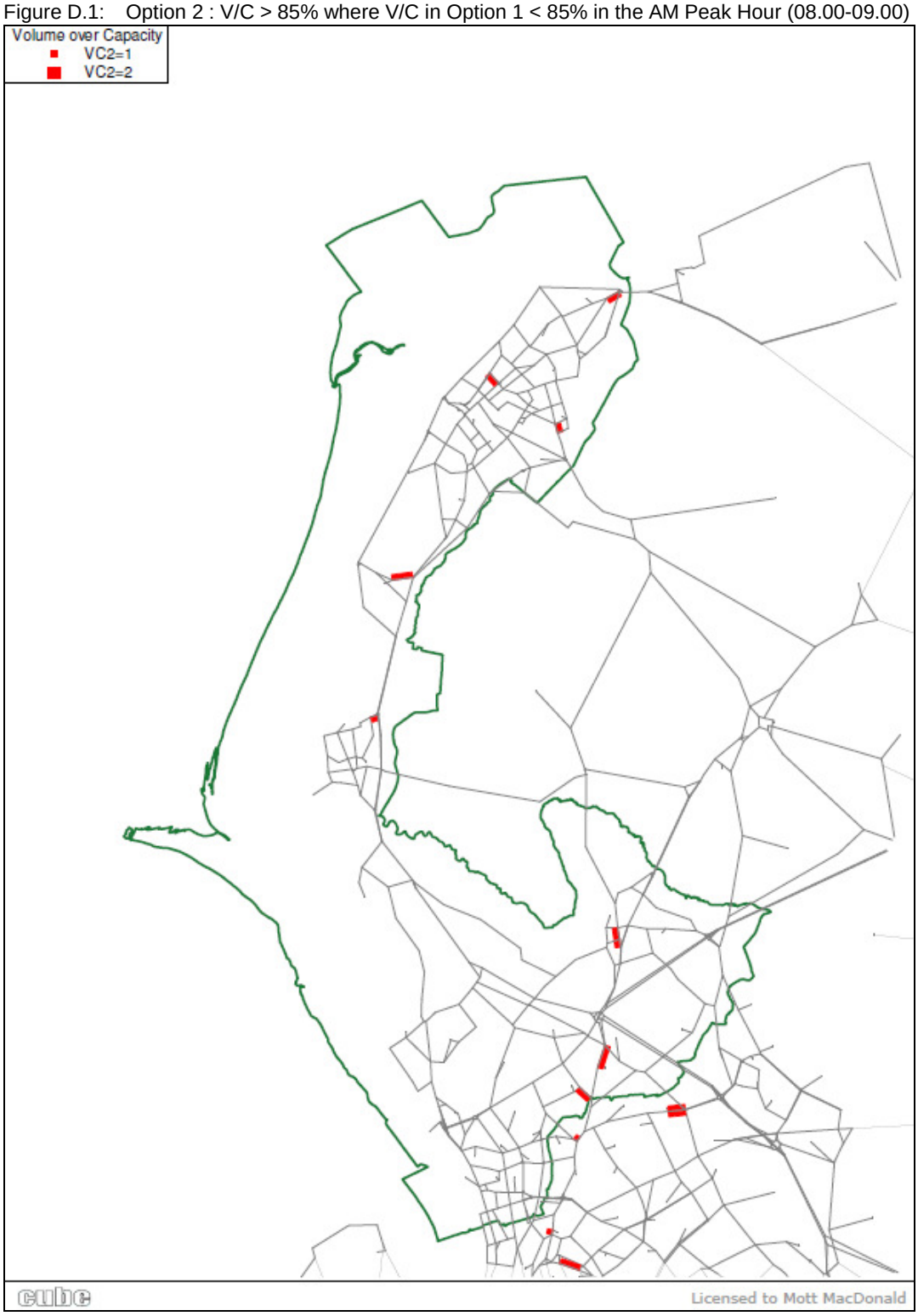
Source: LCRTM

Appendix D. Volume/Capacity Changes

The following plots show where the volume over capacity (V/C) in Options 2 and 3 is **greater than 85%** when in Option 1 it was **less than 85%.** That is to say the analysis identifies where the implementation of Option 2 or Option 3 is likely to cause a link to become close to capacity.

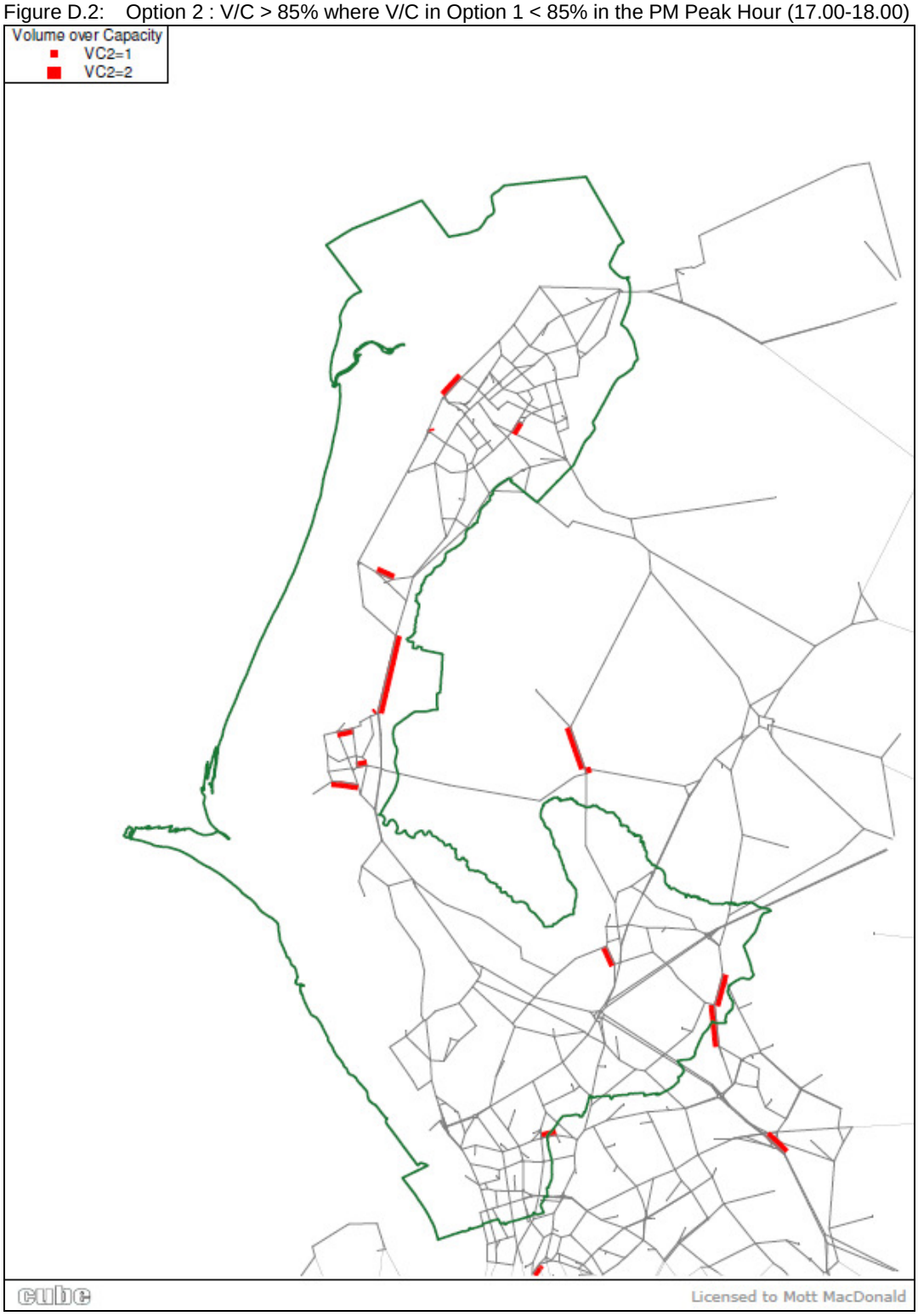
Links meeting this criterion are highlighted by thick red lines.

Figure D.1: Option 2 : V/C > 85% where V/C in Option 1 < 85% in the AM Peak Hour (08.00-09.00)



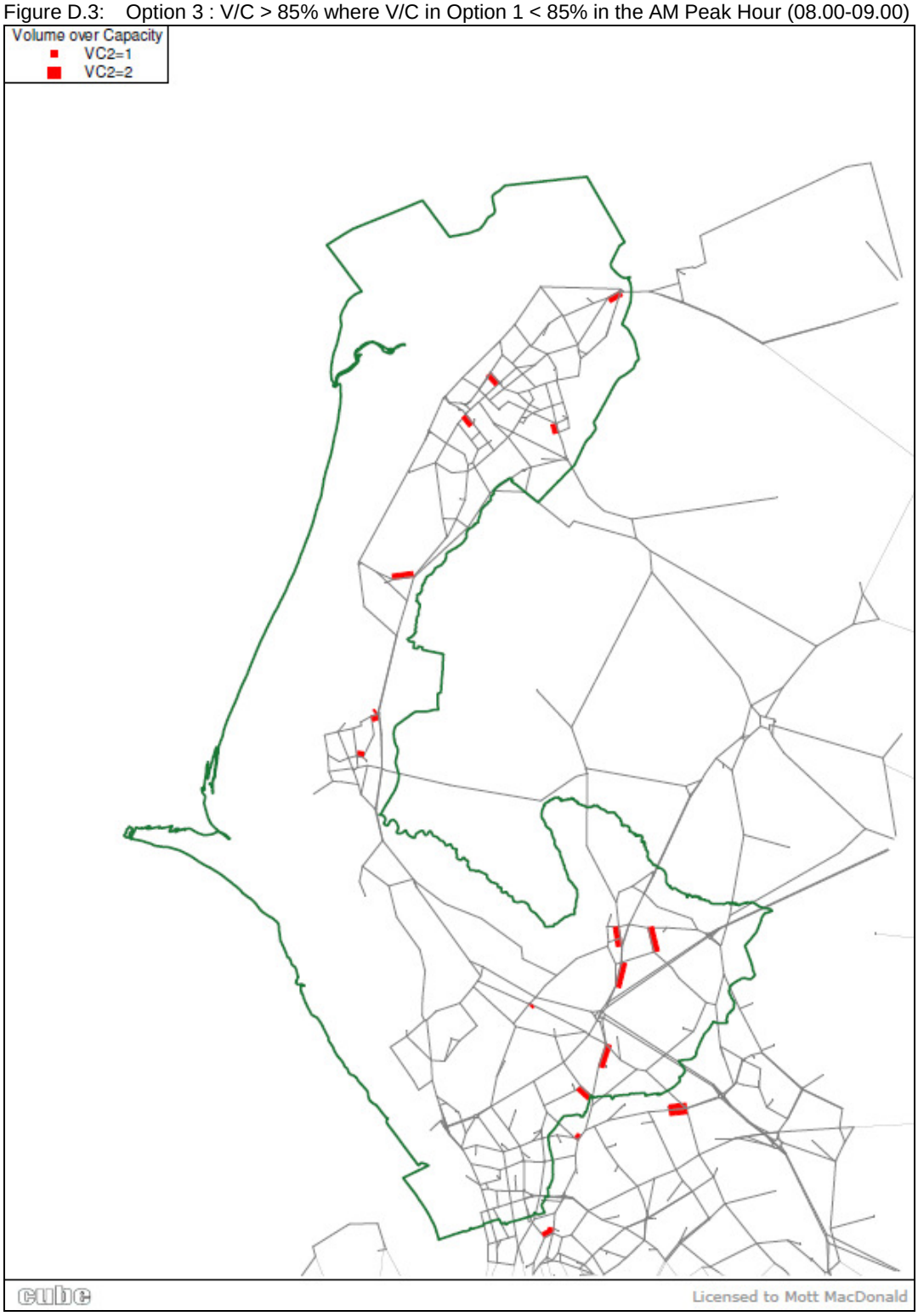
Source: LCRTM

Figure D.2: Option 2 : V/C > 85% where V/C in Option 1 < 85% in the PM Peak Hour (17.00-18.00)



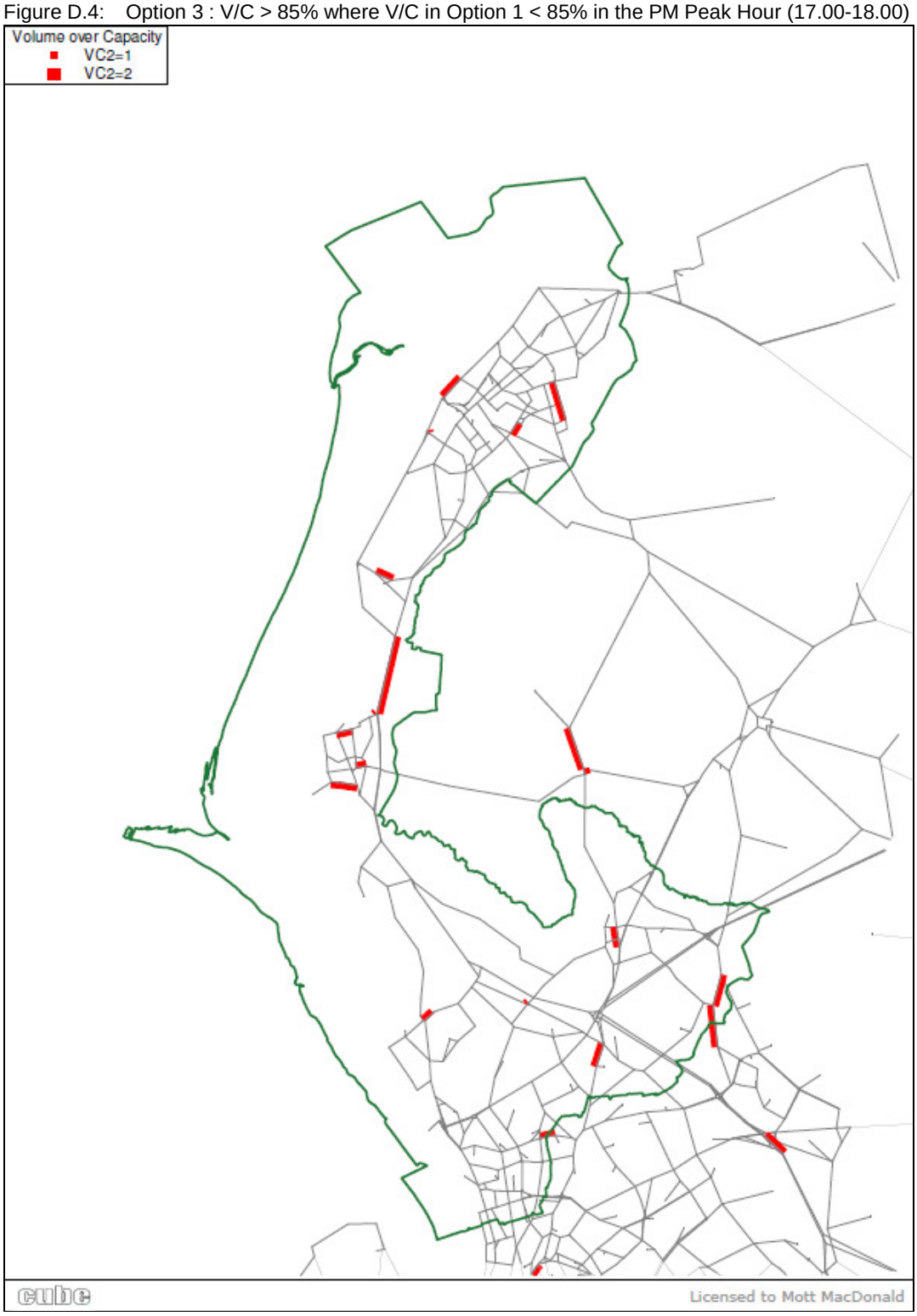
Source: LCRTM

Figure D.3: Option 3 : V/C > 85% where V/C in Option 1 < 85% in the AM Peak Hour (08.00-09.00)



Source: LCRTM

Figure D.4: Option 3 : V/C > 85% where V/C in Option 1 < 85% in the PM Peak Hour (17.00-18.00)



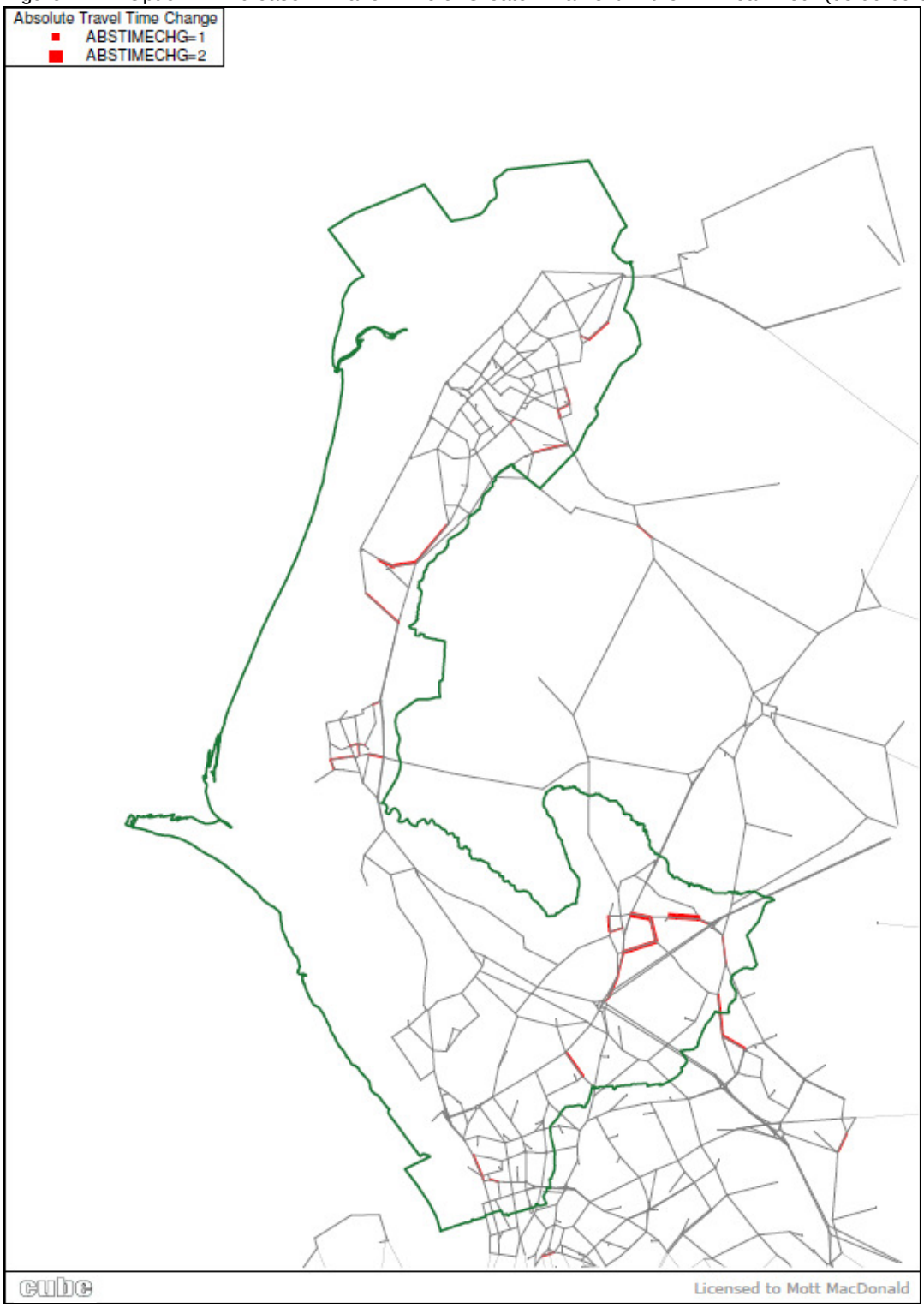
Source: LCRTM

Appendix E. Link Travel Time

The following plots show where the link travel time in Options 2 and 3 exceeds the Option 1 travel time by **5%** (represented by the attribute ABSTIMECHG in the plots).

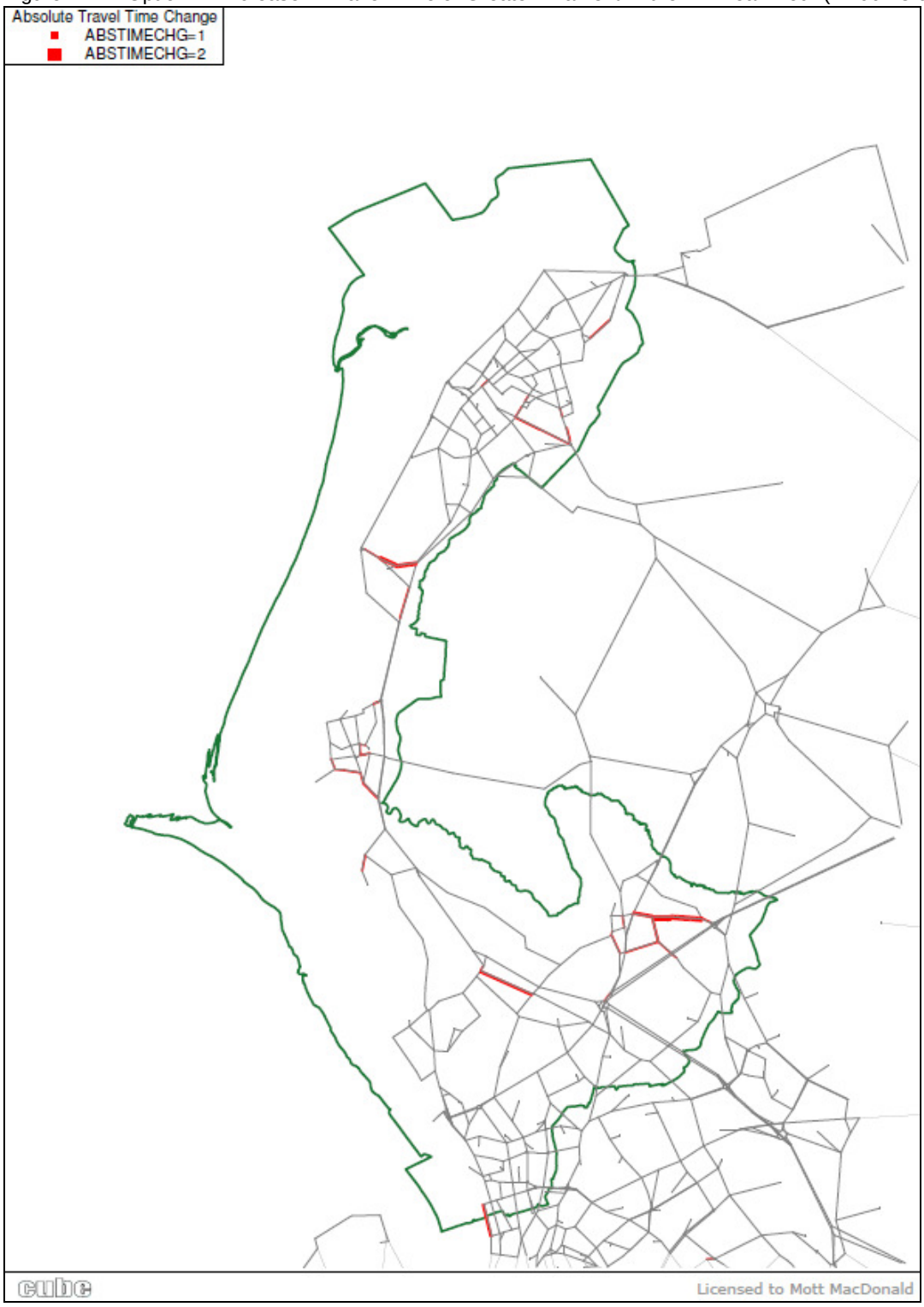
Links meeting this criterion are highlighted by thick red lines.

Figure E.1: Option 2 : Increase in Travel Time of Greater Than 5% in the AM Peak Hour (08.00-09.00)



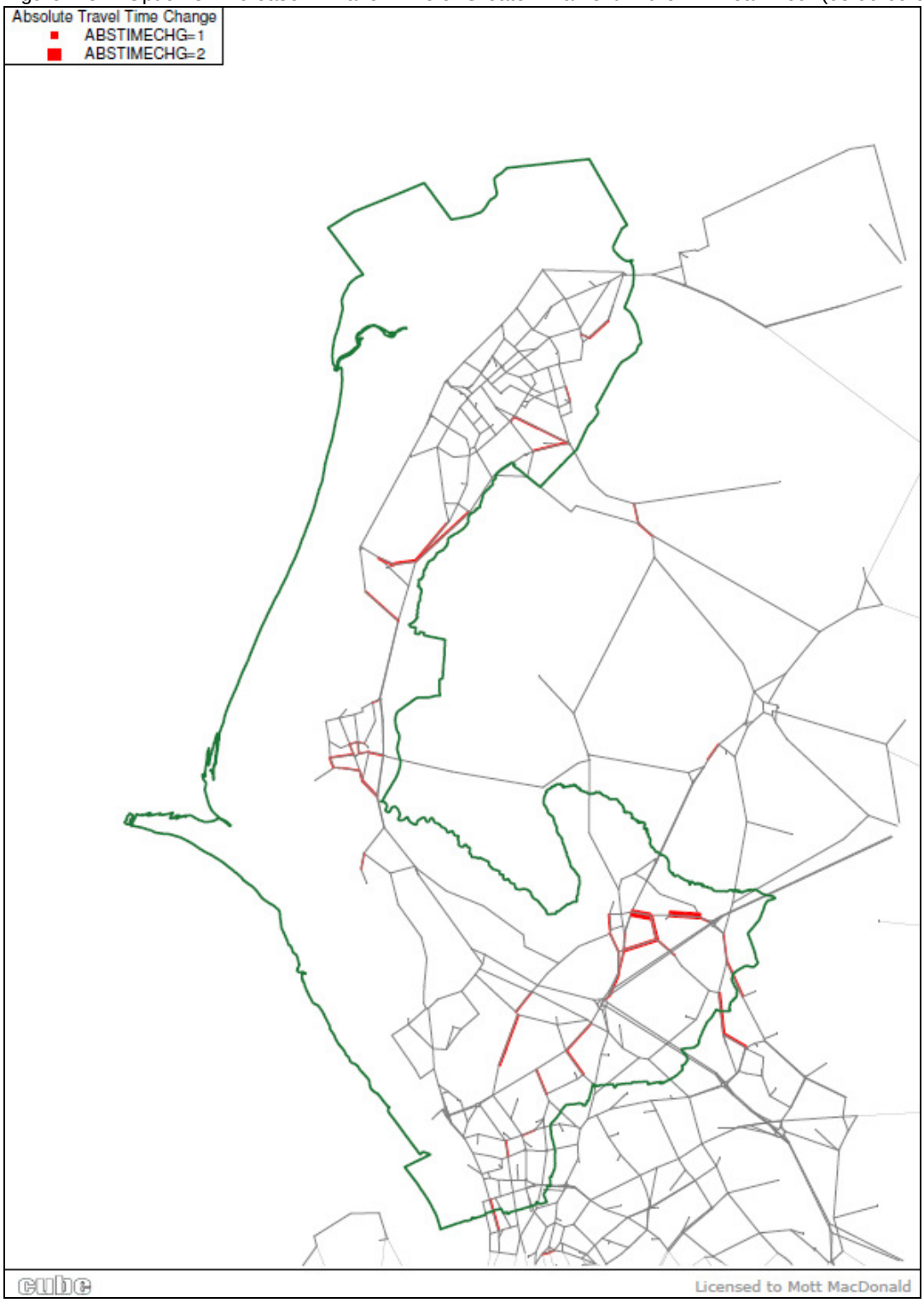
Source: LCRTM

Figure E.2: Option 2 : Increase in Travel Time of Greater Than 5% in the PM Peak Hour (17.00-18.00)



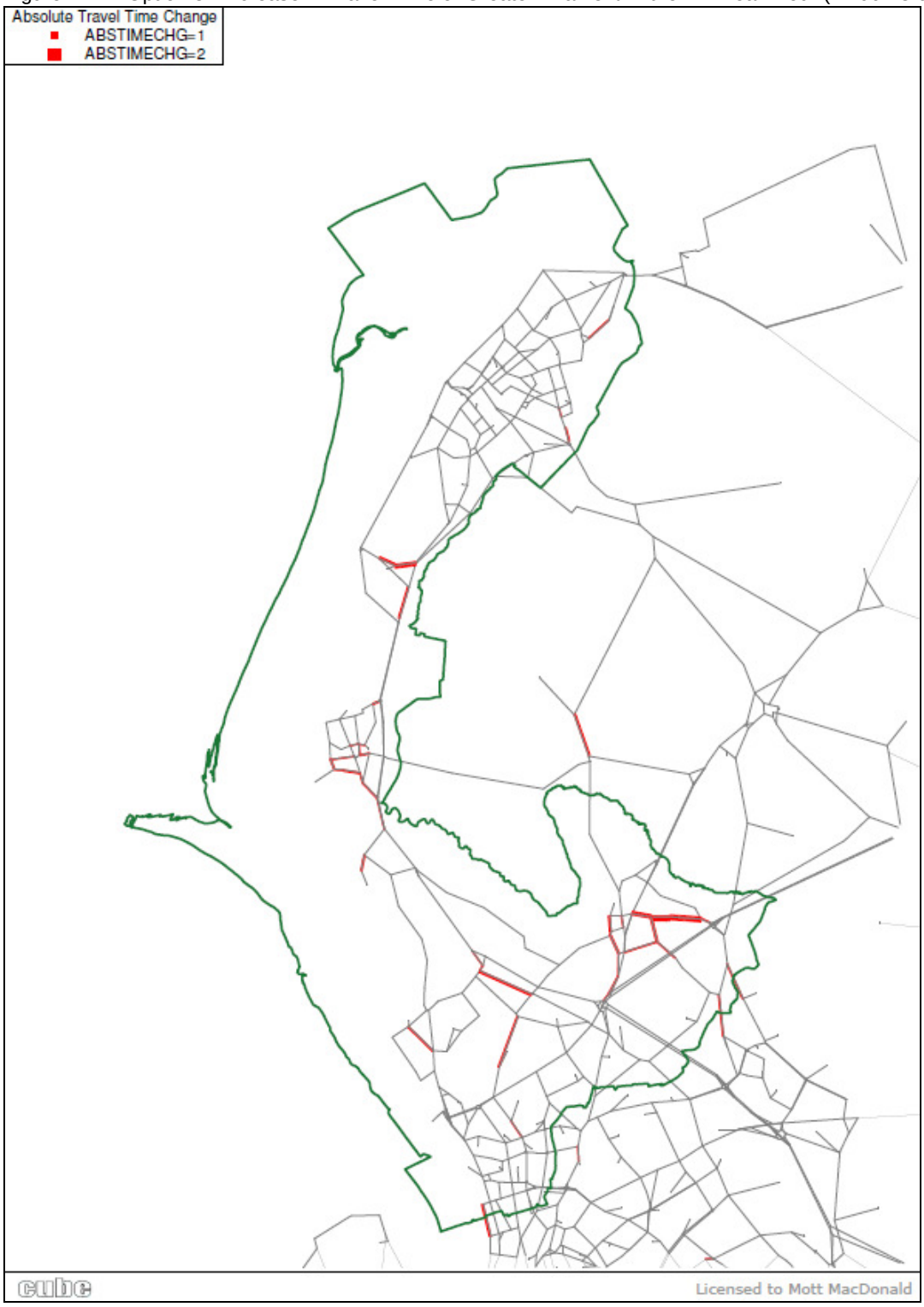
Source: LCRTM

Figure E.3: Option 3 : Increase in Travel Time of Greater Than 5% in the AM Peak Hour (08.00-09.00)



Source: LCRTM

Figure E.4: Option 3 : Increase in Travel Time of Greater Than 5% in the PM Peak Hour (17.00-18.00)



Source: LCRTM