Medway LP Regulation 19 – Proportionality Assessment

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1. Introduction

1.1 Foreword

As the custodian of the Kent Transport Model (KTM) on behalf of Kent County Council (KCC), Jacobs has been commissioned by Medway Council (MC) to develop an evidence base to support the Regulation 19 (Reg19) Local Plan (LP) assessment. Details of the Regulation 18 (Reg18) and Reg 19 analysis are presented in "250627_MedwayTransportModel_ForecastingReport_Reg19". The Reg19 evidence base utilised an interim Do Something (iDS) scenario to identify junctions within Medway requiring mitigations as a result of the traffic growth generated by LP. The junctions identified as potential "hot spots" on the network and thus requiring mitigation as part of the interim Reg19 assessment had mitigation designs developed. The mitigations were then input into the final Reg19 DS models (fDS).

This Technical Note summarises the methodology and results used to identifying the junctions requiring mitigations, alongside the proportionate financial contribution required from each Local Plan site.

1.2 Background Information

The development of the Medway Transport Model (MTM) is based on an existing cordon of the KTM, developed to support Gravesham's Local Plan transport evidence base (namely, the Gravesham Transport Model). The MTM follows a standard sufficient for this purpose, with due regard to Transport Analysis Guidance (TAG). Further details of the MTM model build can be found in the Local Model Validation Report (LMVR) "Medway Local Plan – Local Model Validation_Final" and the forecasting methodology and results of the Reg18 assessment can be found in the Forecasting Report "250627_MedwayTransportModel_ForecastingReport".

The MTM was used as the basis for developing a 2041 Reference Case (RC) (e.g. without the LP) in which committed developments and infrastructure were modelled, in addition to adjusted background growth and a 2041 'DS' model (e.g. with the LP option) was developed to assess the proposed LP allocations, which was consulted upon as part of Reg18.

After Reg18 consultation in Autumn 2023, refinements were made to the LP strategy, and the following scenarios were developed as part of the Reg19 LP allocations and used to assess the transport impact:

1. 2041 Reference Case (RC): includes completions and consented development and infrastructure planned for the 2019-2041 growth period within Medway; outside of the Area of Detailed Modelling, 'near certain' developments have been modelled in adjoining authorities (Gravesham, Tonbridge & Malling, Maidstone and Swale) and background growth for cars comes from TEMPro v8 (using alternative assumptions tool for adjoining authorities to ensure no double counting). The growth of good vehicles across the model is provided by Road Traffic Forecasts (RTF).
2. 2041 Refined Reference Case (rRC): The rRC was developed as a baseline to assess the Reg19 LP development. The only difference between the RC and rRC is the full build out at the MedwayOne development site, and the consideration of reduced trip rates at consented sites that may benefit from more sustainable transport methods (detailed further in "Medway LP2041 TEB Mode Share Strategy Stage 3_Draft").
3. 2041 Interim Do Something (iDS): built upon the rRC scenario, with the inclusion of proposed interim Reg19 LP allocations and associated infrastructure (where appropriate). The only difference between the rRC and the iDS is the proposed LP demand and infrastructure. The purpose of the iDS scenario is to determine "hot spots" on the Medway network for further Local Junction Modelling analysis to determine if potential junction mitigations are required.
4. 2041 Final Do Something (fDS): built upon the iDS with the addition of junction mitigations identified in the iDS and the final Reg19 LP site allocations. This scenario also considers the revised trip rates at consented and LP sites that may have provisions for more sustainable transport methods.

1.3 Technical Note Purpose

This technical note has been written to outline the methodology to assess the potential LP contributions at those junctions identified to require mitigation, providing the estimate proportional contributions required by the developers and has been calculated considering two different methodologies:

Method 1: "Pure proportionality": all developments can contribute to all scheme's apportionment (true apportionment): the proportionate impact for each development is calculated considering the percentage of trips travelling through each junction requiring mitigation.

Method 2: Certain developments will only contribute to certain mitigation schemes. The proportionate impact is split into two sections removing sites already contributing to certain junctions based on other locations/ criteria.

The assessment methodology is discussed further in Section 3, summarising the methodology for the LP proportional contributions and the process to calculate their impact on the junction.

2. Key Local Plan Sites

Within the Reg19 Medway Local Plan strategy, the fDS assesses the impact of 18,887 houses and 249,501sqm employment space at 88 sites across the Medway network. Just under half of the total LP allocations have been explicitly modelled (defined as >100 households or jobs, modelled in their own zone to isolate the impact of the development on the network) and as such considered in the proportionality assessment.

2.1 Key Local Plan Sites

As agreed with Medway Council (MC), key Local Plan sites (those with >100 households or jobs) have been explicitly modelled in the fDS scenario; this includes 36 residential allocations (17,773 of total households) and 6 employment allocations. The locations of the allocations assessed are presented in Figure 2-1 and the quantum associated with each site further detailed in Appendix A.

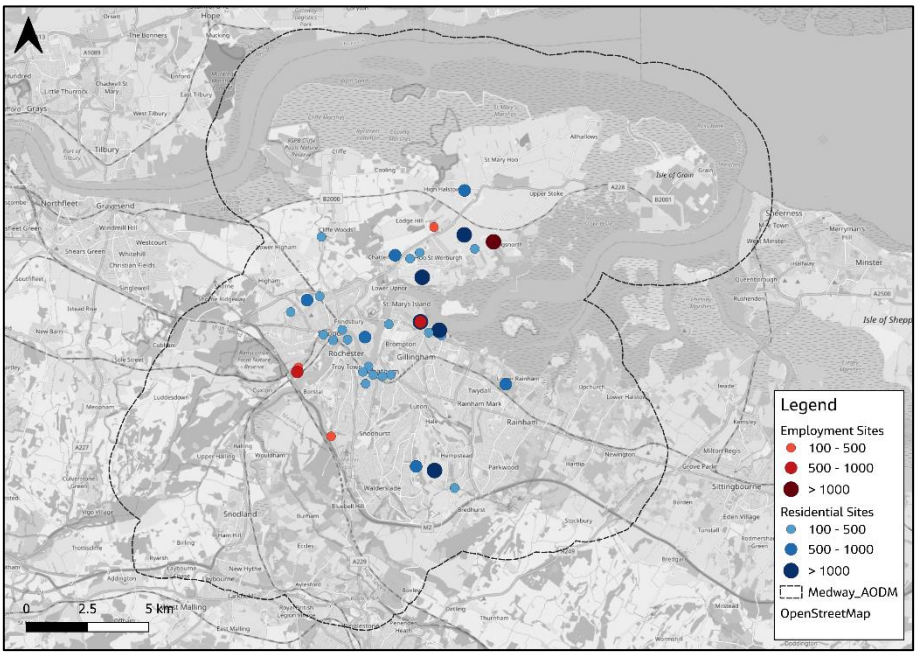

Figure 2-1- Local Plan Explicitly Modelled Sites

Using the trip rates taken from the Medway Local Plan evidence base (attached in Appendix A) the trip generation for the explicitly modelled local sites was calculated based on the development quantum. The total trips associated with the LP sites assessed in the proportionality assessment is presented in Table 2-1.

Table 2-1- Trip Generation

Trip Generation	AM Peak			PM Peak		
	Arrive	Departure	Total	Arrive	Depart	Total
Total Trip Generation	3,084	4,584	7,668	4,534	3,665	8,198

3. Methodology

To assess the proportional impact of the Local Plan development on those junctions requiring mitigation, a proportionality assessment was undertaken using the fDS. The methodology focused on identifying the relative contribution of growth at the junction in the LP scenario, averaged across the AM and PM peak.

3.1 Assessment Methodology

3.1.1 Models Used

The 2041 iDS was built upon the rRC scenario, with the inclusion of proposed LP allocations and associated infrastructure (where appropriate). This interim scenario was used to determine where potential junction mitigations were required on the network. Those junctions requiring further analysis using Local Junction Modelling (LJM) software were defined using a combination of model outputs, such as:

- Actual Flow Difference Plots; between the iDS and rRC to identify areas with significant change to flow behaviours.
- Demand vs Actual Flow Plots; used to identify areas on the network where actual flows were not reaching the route due to the congestion holding flows elsewhere on the network.
- Junction LoS
- Queue Plots; useful to identify links on the network with high levels of delay.
- Link and Turn Volume Capacity Ratio

This identified twelve junctions requiring potential mitigations (as illustrated in Figure 3-1):

1. Four Elms Roundabout
2. Cornwallis Avenue / Yokosuka Way
3. A228 Peninsula Way / Main Road Hoo
4. A228 Peninsula Way / Dux Court Road/ Bells Lane Roundabout
5. A228 Peninsula Way / Ropers Lane / Ratcliffe Highway Roundabout
6. Sans Pareil Roundabout
7. A2 / High Street / Station Road / Canal Road Signalised junction
8. Pier Road / Pegasus Way
9. Gillingham Gate Gyratory
10. Dock Road / Middle Street
11. M2 Junction 4
12. Union Street / Best Street

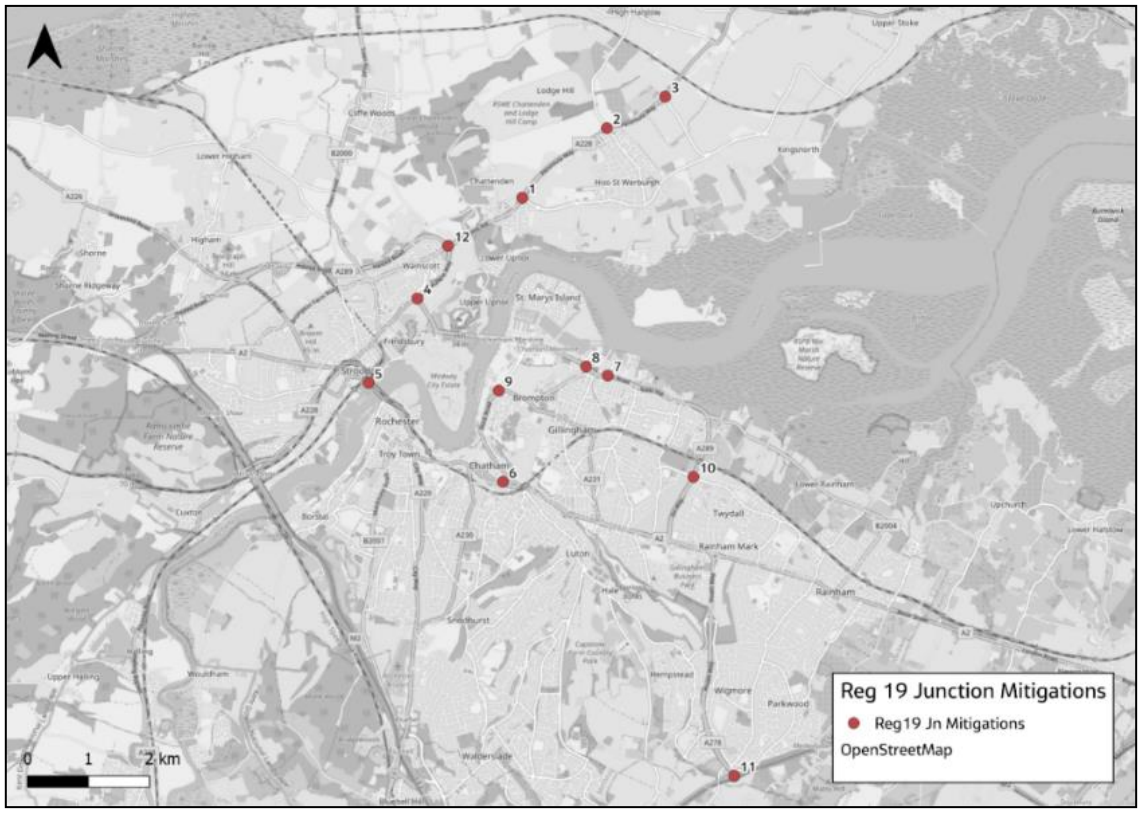

Figure 3-1- Junctions Requiring Further LJM Assessment

The local junction model assessment identified seven junctions that were over capacity and required mitigation, these were:

1. Four Elms Roundabout
3. A228 Peninsula Way/ Main Road Hoo
4. A228 Peninsula Way/ Dux Court Road/ Bells Lane Roundabout
5. A228 Peninsula Way/ Roper's Lane/ Ratcliffe Highway Roundabout
6. Sans Pareil Roundabout
7. A2/ High Street/ Station Road/ Canal Road Signalised junction
9. Gillingham Gate Gyratory

The above junctions then had a mitigation strategy developed and concept designs produced, which was discussed with Medway Council (MC). These concept designs were then input into the fDS models to assess junction efficiency and to identify if there were any remaining hot spots on the network resulting from the Reg19 LP. More detail of the mitigations developed are provided in the "Local Junction Modelling Mitigation Technical Note".

The 2041 fDS includes the infrastructure associated with the junction mitigations identified in the iDS, as well as the final Reg19 LP site allocations. The fDS was used to determine the proportion of LP trips travelling through each junction requiring mitigation.

3.1.2 Methodology

To determine the volumes of LP flow travelling through each junction that required mitigation, flow bundles were extracted on each approach arm (with the mitigation coded) using the 2041 fDS model. The resulting demand matrices were then used to proportion the trips travelling to/ from each of the key LP sites. Junctions requiring mitigation and the approach arms taken for this assessment are illustrated in Figure 3-2.

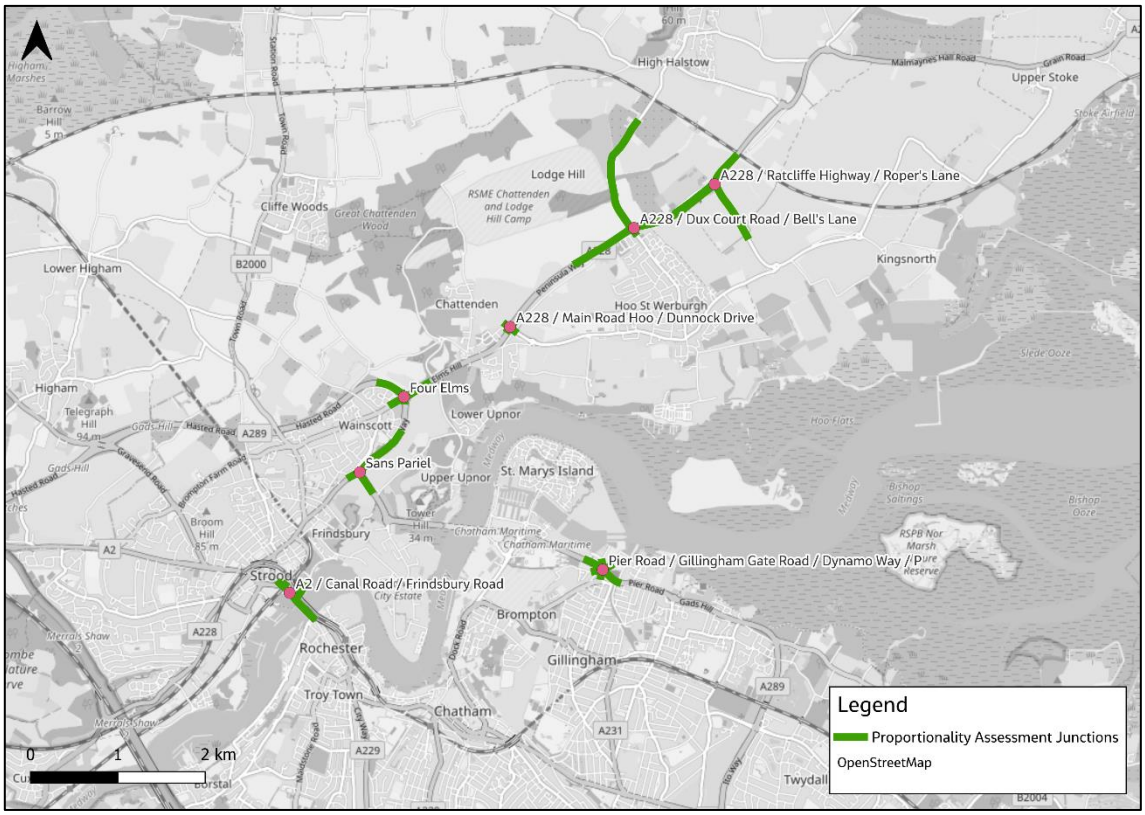

Figure 3-2- Selected Junctions for Mitigation used in Proportionality Assessment

Approach arms to those junctions requiring mitigation were consistently assessed to obtain the demand matrices; to avoid double counting the following methodology was taken:

1. Flow bundle was undertaken on approach arm to the junction requiring mitigation (as illustrated in Figure 3-3) using the model that includes the junction mitigations.
2. Explicitly modelled LP sites were analysed only;
    a. In the AM Peak, only origin trips taken for residential sites and only destination trips for employment sites.
    b. In the PM Peak the reverse was applied - only origin trips from employment sites and only destination trips to residential sites
3. The total trips from each individual development site were assigned a proportion of the total LP trips (i.e. total number of development trips from LP Site allocations i.e. SMI6 as a proportion of all explicitly modelled LP sites as a percentage).
4. The proportional contribution of each site to each junction was calculated for both AM and PM peak periods and an average across the two peaks was taken.
5. Steps 1-4 repeated for each junction requiring mitigation to ascertain the proportional impact of the LP site on that specific junction in isolation.

Figure 3-3- Example of a Flow Bundle on an approach to a junction

3.2 Results

3.2.1 Method 1

The Method 1 approach considers a "Pure proportionality" whereby all developments can contribute to all schemes' apportionment (true apportionment): the proportionate impact for each development is calculated considering the percentage of trips travelling through each junction requiring mitigation.

Table 3-1 presents the assigned percentage of traffic growth that each key LP site has on the junctions requiring mitigation when the Method 1 approach is taken.

It is important to note that junctions with less than 1% (for Four Elms, Main Road Hoo and Sans Pareil) or 2% (for Bells Lane, Ropers Lane, A2 High Street/Sation Road and Gillingham Gyratory) impact (criteria defined below) are not included in the data table and LP impact on each junction has been reproportioned to reflect the updated total impact at the junction. There is a rounding error in the presentation of the data within this table, although all work undertaken to 5.d.p in excel analysis.

Table 3-1- Method 1 Summary - Proportion of development trips from Key LP Sites

Criteria for each junction		>1%	>1%	>2%	>2%	>1%	>2%	>2%
LP Site	**Quantum**	Four Elms	Main Road Hoo	Bells Lane	Ropers Lane	Sans Pareil	A2 High Street / Station Rd	Gillingham Gyratory
HHH26	760	9%	10%	18%	18%	6%	7%	2%
HHH12	1801	23%	21%	-	-	21%	13%	10%
SNF41	216	-	-	-	-	-	8%	-
SMI6	33,200	3%	-	-	-	8%	6%	43%
HHH6	550	7%	8%	-	-	6%	4%	3%
HHH11	240	3%	3%	-	-	3%	-	-

HHH33	330	4%	4%	7%	7%	3%	3%	-
FP10	139	6%	7%	-	-	5%	3%	3%
SR4	130	-	-	-	-	-	3%	-
CCB49	150	-	-	-	-	-	5%	-
GN3	176	-	-	-	-	1%	-	5%
HHH35	156,999	-	-	-	-	1%	-	4%
RWB5	3693	-	-	-	-	1%	-	-
CHR16	25,300	1%	-	-	-	2%	5%	-
SNF3	800	2%	-	-	-	4%	-	8%
RN9	800	23%	26%	42%	43%	19%	16%	12%
CCB25	150	17%	19%	30%	32%	14%	11%	10%
RN31	80	-	-	-	-	-	3%	-
SR14	49	-	-	-	-	1%	6%	-
SR53	690	2%	-	-	-	3%	7%	-
HHH19	14,409	1%	2%	3%	-	1%	-	-
Total*		101%	100%	100%	100%	99%	100%	100%

*There is a rounding error in the presentation of data, all work was undertaken to 5.d.p. in excel analysis

3.2.2 Method 2

The Method 2 approach only considers certain developments to contribute to certain mitigation schemes; this will include the proportionate impact by removing sites already contributing to certain junctions based on other locations or criteria. Alongside this, the viability of each site and the monetary contribution anticipated will be considered. This is a methodology that will be further developed in the Summer of 2025 in collaboration with MC. The reporting will be further updated to reflect this approach.

4. Summary

The Proportionality Assessment has been developed to support the evidence base for Medway Council's Reg 19 Local Plan, evaluating the relative impact of the proposed key LP development sites on the junctions requiring mitigations. The fDS was used to quantify the proportional contributions (averaged across the AM and PM Peak) and define a percentage increase of LP flows at the junctions.

The results of this analysis provide a robust, evidence-based framework to support infrastructure planning and developer contributions.

A pure apportionment is presented in 3.2.1, considering all sites as contributing to the changes at the junctions in question. Further development on Method 2 approach is required in collaboration with MC in Summer 2025 to capture any additional considerations such as site viability, junction and site location or proximity.

Appendix A.

Table 4-1- LP Key Site Quantum and Development Trips

			AM Peak (08:00 -09:00)						PM Peak (17:00 -18:00)					
			Trip Rate			Trip Generation			Trip Rate			Trip Generation		
LP Site	Quantum	Site Allocation	Destination	Origins (De	Two-Way	Destination	Origins (De	Two-Way	Destination	Origins (De	Two-Way	Destination	Origins (De	Two-Way
HHH26	760	Resi-led	0.14	0.30	0.44	106	225	331	0.27	0.14	0.41	206	107	313
HHH12	1801	Resi-led	0.13	0.27	0.39	225	480	705	0.24	0.13	0.37	439	229	668
CCB15	60	Resi-led	0.04	0.10	0.14	2	6	8	0.14	0.16	0.30	8	10	18
SNF41	216	Resi-led	0.03	0.15	0.19	7	33	40	0.14	0.07	0.20	29	14	44
SNF35	171	Resi-led	0.00	0.09	0.09	0	15	15	0.18	0.00	0.18	30	0	30
LW4	670	Resi-led	0.12	0.39	0.51	78	264	342	0.37	0.19	0.56	249	125	374
HHH6	550	Resi-led	0.13	0.27	0.39	69	147	215	0.24	0.13	0.37	134	70	204
HHH11	240	Resi-led	0.13	0.27	0.39	30	64	94	0.24	0.13	0.37	59	30	89
HHH33	330	Resi-led	0.13	0.27	0.39	41	88	129	0.24	0.13	0.37	80	42	122
LW8	2000	Resi-led	0.12	0.39	0.51	234	788	1022	0.37	0.19	0.56	742	374	1116
FP11	123	Resi-led	0.04	0.10	0.14	5	12	17	0.14	0.16	0.30	17	20	37
RN30	90	Resi-led	0.12	0.39	0.51	11	35	46	0.37	0.19	0.56	33	17	50
RN31	80	Resi-led	0.12	0.39	0.51	9	32	41	0.37	0.19	0.56	30	15	45
HHH8	450	Resi-led	0.13	0.27	0.39	56	120	176	0.24	0.13	0.37	110	57	167
CCB37	200	Resi-led	0.04	0.10	0.14	8	20	28	0.14	0.16	0.30	28	32	60
FP10	139	Resi-led	0.09	0.32	0.41	13	44	57	0.30	0.15	0.45	41	21	62
GN6	400	Resi-led	0.04	0.15	0.19	16	58	74	0.12	0.07	0.19	48	27	75
SR4	130	Resi-led	0.13	0.27	0.39	16	35	51	0.24	0.13	0.37	32	16	48
SNF15	350	Resi-led	0.04	0.10	0.14	14	35	49	0.14	0.16	0.30	49	56	105
FP1	28	Resi-led	0.04	0.10	0.14	1	3	4	0.14	0.16	0.30	4	4	8
CCB49	150	Resi-led	0.04	0.10	0.14	6	15	21	0.14	0.16	0.30	21	24	45
FP6	102	Resi-led	0.09	0.32	0.41	10	32	42	0.30	0.15	0.45	30	15	46
FP25	121	Resi-led	0.04	0.10	0.14	5	12	17	0.14	0.16	0.30	17	19	36
GN15	1100	Resi-led	0.04	0.15	0.19	44	160	204	0.12	0.07	0.19	133	74	207
RWB25	132	Resi-led	0.00	0.09	0.09	0	12	12	0.18	0.00	0.18	23	0	23
GN3	176	Resi-led	0.09	0.32	0.41	16	55	72	0.30	0.15	0.45	52	26	79
CCB25	150	Resi-led	0.09	0.32	0.41	14	47	61	0.30	0.15	0.45	45	22	67
SNF1	360	Resi-led	0.14	0.29	0.43	50	105	154	0.28	0.17	0.45	102	61	163
SNF3	800	Resi-led	0.14	0.29	0.43	110	233	343	0.28	0.17	0.45	226	136	362
SR5	120	Resi-led	0.14	0.29	0.43	17	35	51	0.28	0.17	0.45	34	20	54
RN9	800	Resi-led	0.14	0.29	0.43	110	233	343	0.28	0.17	0.45	226	136	362
SR14	49	Resi-led	0.14	0.30	0.44	7	15	21	0.27	0.14	0.41	13	7	20
HHH22 & H	1700	Resi-led	0.14	0.29	0.43	235	495	729	0.28	0.17	0.45	481	289	770
HW3	335	Resi-led	0.14	0.29	0.43	46	97	144	0.28	0.17	0.45	95	57	152
SR53	690	Resi-led	0.04	0.17	0.21	27	117	144	0.15	0.07	0.23	106	51	156
	2,200 HH													
SMI6	31,000sqm	Mixed	0.79	0.13	0.92	322	229	551	0.23	0.79	1.02	336	548	884
HHH35	156,999sqm	Employment	1.33	0.29	1.62	698	149	848	0.31	1.06	1.36	161	553	714
RWB5	3,693sqm	Employment	0.71	0.21	0.92	26	8	34	0.12	0.81	0.93	4	30	34
CHR17	14,600sqm	Employment	0.85	0.03	0.88	124	5	129	0.10	0.71	0.81	15	104	119
CHR16	25,300sqm	Employment	0.85	0.03	0.88	215	9	223	0.10	0.71	0.81	26	180	206
HHH19	14,409sqm	Employment	0.41	0.13	0.54	59	18	78	0.12	0.31	0.43	18	44	62