

Conwy Deposit Local Development Plan 2007 – 2022 (Revised edition 2011)



BACKGROUND PAPER 38

Abergele Traffic Study

March 2011

This document is available to view and download on the Council's web-site at: www.conwy.gov.uk/ldp . Copies are also available to view at main libraries and Council offices and can be obtained from the Planning Policy Service, 26 Castle Street, Conwy LL32 8AY or by telephoning (01492) 575447. If you would like to talk to a planning officer working on the Local Development Plan about any aspect of this document please contact the Planning Policy Service on (01492) 575180 / 575181 / 575124.

If you would like an extract or summary of this document on cassette, in large type, in Braille or any other format, please call the Planning Policy Service on (01492) 575180.

Abergele Traffic Study

Traffic Appraisal of Local Development Plan Allocation Proposals at Abergele

Abergele Traffic Study

Traffic Appraisal of Local Development Plan Allocation Proposals at Abergele

Notice

This report was produced by Atkins (St. Asaph) for Conwy County Borough Council for the specific purpose of reviewing LDP proposals at Abergele.

This report may not be used by any person other than Conwy County Borough Council without their express permission. In any event, Atkins accepts no liability for any costs, liabilities or losses arising as a result of the use of or reliance upon the contents of this report by any person other than Conwy County Borough Council.

Document History

JOB NUMBER: 5095640			DOCUMENT REF:			
4	Final Issue	PGS	HJ		HJ	04.01.11
3	Final Issue	PGS	HJ		HJ	14.12.10
2	Final to Client approval	PGS	HJ		HJ	02.12.10
1	Final Draft for Client approval	PGS	HJ		HJ	30.09.10
0	Draft for Client approval	NT/PGS	HJ	PK	HJ	17.09.10
Revision	Purpose Description	Originated	Checked	Reviewed	Authorised	Date

CONTENTS

Page

1.0	Introduction / Commission requirements:-.....	7
2.0	Existing Traffic Flows	8
3.0	Abergele Bypass and Pensarn Link Reassignment	24
4.0	Residential Development Trip Generation	36
5.0	Residential Development Trip Distribution	38
6.0	Traffic Flows on the A55	44
7.0	Road Safety	51
8.0	Car Parking	54
9.0	Rat-Running via Local Roads	56
10.0	Suggested Mitigation Measures	58
11.0	Summary of Conclusions	63

Tables:-

Table 2.1	Overview of ANPR inbound matches
Table 2.2	Existing Origin / Destination Summary for vehicles entering Abergele
Table 2.3	ATC Data Summary
Table 2.4	ARCADY Results – Junction 24 AM Peak Hour 2010
Table 2.5	AM Peak Hour Traffic Flows along the A547 east
Table 2.6	ARCADY Results – Junction 24 PM Peak Hour 2010
Table 3.1	Matched Movements to/from the East
Table 3.2	Abergele Bypass – Forecast Base Reassignment
Table 3.3	Abergele Bypass – Reassignment Summary
Table 3.4	Pensarn Link – Forecast Base Reassignment
Table 3.5	Pensarn Link – Reassignment Summary
Table 3.6	Abergele Bypass + Pensarn Link – Combined Forecast Reassignment
Table 3.7	Abergele Bypass – Reassignment Summary
Table 3.8	Bypass / Pensarn Link 12 Hour Traffic Flows
Table 3.9	Forecast Change in Flows through Abergele (12hr without Development)
Table 4.1	Housing Development Trip Generation
Table 5.1	Generated Trips Composition
Table 6.1	Existing Traffic Flows on the A55 West
Table 6.2	ARCADY Results J24 AM 2015 (with bypass but no development)
Table 6.3	ARCADY results J24 AM 2025 (with bypass but no development)
Table 6.4	ARCADY Results J24 AM 2025 (with bypass and development)
Table 6.5	ARCADY results J24 PM 2025 (with bypass and development)

Report Figures:-

- Figure 1 Survey Location Key Plan
 Figure 2 Surveyed AM Peak Hour Traffic Movements 2010

- Figure 3 Surveyed PM Peak Hour Traffic Movements 2010
- Figure 4 Surveyed Traffic Movements J24 AM 2010
- Figure 5 Surveyed Traffic Movements J24 PM 2010
- Figure 6 Modelled Traffic Flows J24 AM Design Year 2025
- Figure 7 Modelled Traffic Flows J24 PM Design Year 2025
- Figure 8 Proposed Connection of Bypass to J24

Appendices:-

- Appendix A Distribution Diagrams (A1 – A3 & A32 – A44 inc.)

1.0 Introduction / Commission requirements:-

- 1.1 This report comprises a review of traffic patterns and volumes at Abergele for Conwy County Borough Council (CCBC) in order to inform an assessment of possible changes that could result from proposals for the Local Development Plan (LDP).
- 1.2 The intended LDP proposals comprise of 800 residential units located on land to the east side of the town which would be served via a new road that would connect between the Junction 24 (J24) of the A55 trunk road and the A548 'Llanfair Road'. The completed route would thereby provide a bypass around the east side of the town.
- 1.3 As a separate consideration, the brief also required that an assessment of traffic movements being made between Pensarn and the A55 east via Junction 24 was made in order to ascertain to what degree the existing trunk road access arrangements are contributing to traffic flows at Abergele.
- 1.4 The commission brief contained the following specific requirements:-
 - i. **Survey existing traffic patterns through the town along routes that might be altered by the proposed eastern bypass,**
 - ii. **Predict the volume of existing traffic that could transfer to the bypass,**
 - iii. **Assess what volume of traffic might transfer to a (separate) link between the A55 and Pensarn,**
 - iv. **Calculate trips for the LDP residential proposals and predict assignment thereof,**
 - v. **Assess the capacity of the A55 mainline and J24 for various scenarios,**
 - vi. **Prepare a preliminary design for connecting the bypass to J24,**
 - vii. **Assess and report on the capacity of the A547 through the town,**
 - viii. **Review injury accident data for the area,**
 - ix. **Review potential for rat-running following bypass and development,**

x. Consider if mitigation measures to relieve town centre congestion are possible.

- 1.5 The above items are reviewed in the relevant Sections of this report and at the end of each Section a brief overview summary is provided to highlight main points.

2.0 Existing Traffic Flows

- 2.1 In order to ascertain what volume of trips would possibly transfer to the proposed eastern bypass or potential 'Pensarn Link' it is necessary to review the existing traffic situation.
- 2.2 The main vehicular routes at Abergele are the A547 that passes east/west through the town centre and the A548 that runs in a north/south direction. The dual-carriageway A55 trunk road skirts around the north and east sides of the town and access to and from it is provided at Junction numbers 23A to the north of the town and 24 to the east.
- 2.3 The A547 and A548 are single carriageway roads and the latter intersects the A547 at two tee junctions at the town centre. The tee junctions are 94m apart, however, traffic movements through them is controlled by signals and hence the arrangement basically operates as a staggered crossroads layout.
- 2.4 The traffic signals are linked in order to improve efficiency and to control the volume of traffic that is allowed into the central zone at any given time. This is necessary in order to prevent blocking back through the junction which (if present) would affect traffic movements to and from the side roads (A548). It is understood that the operation sequence of the signals has been subjected to a number of reviews and the current arrangements are considered to optimise capacity (vehicle throughput) with the minimum of delay for road users.
- 2.5 As the traffic signals lie at the town centre at the junction of the two main vehicle routes the delays they impose upon traffic are evident in the town. The signal layout includes pedestrian crossings on most arms and when any of these are

operated traffic flows are halted by an 'all-red' signal phase. This arrangement provides safe crossing opportunities for pedestrians but by necessity will increase delays for drivers. The operation of the signals is reviewed in more detail later in this Section of the report.

- 2.6 Junction 24 of the A55 lies on the A547 to the east and provides access to and from the trunk road in all directions; however, J23A on the A548 to the north of the town only provides access to and from the A55 west and, as a consequence, drivers travelling between Pensarn (A548 east) and the A55 east have to use J24 which requires them to use the roads through Abergele.

Traffic Surveys / Data Collection

- 2.7 Accurately predicting the influence a bypass would have upon existing traffic movements will usually require the establishment of a comprehensive traffic model which would be based upon extensive data collection and would include such things as driver interviews to assess aspects such as reason for journey, frequency etc.
- 2.8 The commission excluded the establishment of a simulation traffic model and instead required that a preliminary assessment of what volume of existing traffic could possibly transfer to the proposed bypass and/or possible Pensarn Link was to be undertaken. In order to provide the basis for this exercise a series of Automatic Number-Plate Recognition (ANPR) cameras were installed on the main routes in and out of Abergele for 12 hours (07:00-19:00) during a weekday in July 2010. The ANPR surveys were carried out during school term time in order to capture a normal situation. The ANPR sites are shown on Figure 1.
- 2.9 The ANPR cameras captured part of the registration number of vehicles as they entered and left the town via the routes surveyed. Note that the information collected complies with data protection requirements and is not linked to DVLA or other sources and so, for example, it could not be used to identify any details concerning the vehicle, the owners or their addresses.

- 2.10 Two of the ANPR cameras were located on the A548 a short distance south of the traffic signals at the town centre, in order to collect data from vehicles that had originated from or were heading to the existing residential areas and which would not thereby be picked up (at Site 4) on the southern extremity of the town. Similarly, two cameras were located on Faenol Avenue (site 5) to check movements via that road, as it was suspected that journeys to/from Pensarn and the A55 east would possibly be made via that route and also by way of checking the pattern of possible school based trips.
- 2.11 The captured data was passed through computer software that ‘matches’ the partial registration numbers that were logged at more than one camera site entry or exit point and thereby the output provides confirmation concerning the route taken by the vehicle in question. The time of entry or exit is also logged by the camera and so the output provides confirmation of the time it took each vehicle to complete the journey in question. This is important as it enables an assessment to be made of which journeys were made as a single movement and which must have included a stop-off at some point along the way.
- 2.12 Not all registration plate numbers will be matched as clearly some vehicles might leave the cordon via a route not included in the survey or they might enter the area but not leave (or vice versa), for example a return journey home during the time period of the ANPR survey.
- 2.13 In some cases of course, the ANPR data will record vehicles entering and leaving the cordon via the same site as would apply when someone had called at destination within the town but then left via a reversal of their original route (for example, a school drop-off or shopping trip).
- 2.14 The ANPR sites chosen thereby gave an indication of the volume of traffic making the following traffic movements (note in each case the reverse movement was also recorded):-
- 1) **A548 south of the town to A55 east** (site 4 to 6 via 3)
 - 2) **A547 through the town** (site 1 to 6)
 - 3) **A548 north to A55 east** (site 2 to 6 including via 5)

- 4) **A548 north to south through the town** (site 2 to 4 via 3)
- 5) **A548 south to the A547 west of the town** (site 4 to 1 via 3)
- 6) **As 5) but via the residential side roads** (site 4 to 1 not via 3)

- 2.15 Movement 1) would comprise the main pattern that would be transferred to the proposed Abergele eastern bypass, whilst movements 3) and 4) would apply to the possible Pensarn Link. Data relating to movements 2), 5) and 6) would not likely be altered by the bypass proposals but would give some indication concerning traffic volumes that pass directly through the town along with an indication as to whether or not a significant number of drivers heading between the south and west use the side roads in preference to the main A548/A547 road corridor.
- 2.16 In addition to the ANPR surveys, 12-hour turning counts were carried out at the A548/A547 staggered junction (traffic signals), at the St.George Road tee-junction and of all movements at J24 of the A55 (Figure 1).
- 2.17 Automatic traffic counters (ATC's) were installed for one full week on the A547 between the town centre and the A55 and on the A548 to the south of the town in order to record 24-hour traffic flows and speeds. This data was to supplement that from existing permanent ATC's which are located on the A547 to the west of the town and A548 to the north.
- 2.18 In addition to the surveys undertaken, CCBC Highways provided the results from a number of relevant traffic surveys that have been previously carried out at Abergele, along with recorded personal injury accident data for past five years for the main routes in question.

Results of the Traffic Surveys:-

- 2.19 Table 2.1 summarises the number of vehicles that were recorded by the 'entry' direction ANPR cameras over the 12-hour period recorded. The results were processed into two categories, namely: journeys completed in less than 15 minutes and those that took more than 15 minutes, on the basis that journeys which took more than 15 minutes to complete will have included a stop-off within the town at some point. Only trips made in less than 15 minutes have been used

in calculating a possible transfer of movements to the bypass (or Pensarn Link). Table 2.1 confirms that the sub 15 minute trips comprise the higher proportion of all those made in any case.

2.20 The rightmost columns of Table 2.1 show the total volume of vehicles that entered the cordon area (i.e. the sum of matched and unmatched vehicles) at those sites located at the perimeter of the survey zone and thereby illustrates what proportion of all vehicles were subsequently detected at other ANPR sites. This shows that the ANPR survey matched the vast majority of vehicles passing through and hence it can be concluded that in the absence of a more comprehensive simulation model, the resulting data concerning the route vehicles had taken provides a reasonable basis for estimating the possible traffic relief that the bypass (and Pensarn Link) proposals would be likely to deliver.

ANPR site / Direction	Matched < 15 mins	Matched > 15 mins	Total Matched	Total Veh's	%age Matched By ANPR
1 eastbound	1,512	1,777	3,289	3,300	100%
2 southbound	2,637	1,696	4,333	4,400	98%
3 northbound	350	208	558	n/a	-
4 northbound	1,531	591	2,122	2,789	76%
5 southbound	156	58	214	n/a	-
6 westbound	3,618	1,704	5,322	5,488	97%
Total	9,804	6,034	15,838	-	-

**Table 2.1 – Overview of ANPR matched vehicles
Relative to inbound direction traffic flows**

2.21 Table 2.2 below provides an outline of the existing distribution of vehicles entering the survey cordon. Note that the 'origin' of each site in this Table is simply the ANPR camera location (i.e. the origin simply reflects the number of vehicles captured at each site which were then matched to other ANPR sites). Using Site 6 as an example, the vehicles noted as originating at that Site will clearly comprise of all traffic entering the survey cordon from the east and therefore includes traffic movements from the A55 trunk road, the A547 from

areas to the east (Rhuddlan etc) and any vehicles that have used the minor lane past the Kinmel Manor Hotel.

Origin Site	Matched Plates (within 15 mins)	Destination / Direction (Matches within 15 minutes)			
		Northbound	Eastbound	Southbound	Westbound
1: A547 Eastbound (entering Abergele from the west)	1,512	24%	35%	33%	8%
		There was no intermediate ANPR site between Sites 1 and 2 and so it is not possible to stipulate the exact route taken.	30% of all matched eastbound trips reached Site 6 at J24 of the A55 via the A547, however, 3% were matched via site 5 (Faenol Ave). 2% of matched trips eastbound trips terminated at Site 5.	6% of matched trips terminated beyond Site 3 suggesting a journey to the residential area. 26% of matched arrived at Site 4, however, only 11% had passed via Site 3 indicating most drivers (15%) had travelled via the south-west residential area.	8% of eastbound flows made a return journey within 15 minutes. 52% of matches in excess of 15 minutes involved a return journey through Site 1. (Possible shopping trips)
2: A548 Dundonald Avenue Southbound (from Pensarn)	2,637	5%	64%	17%	14%
		5% of matched southbound flows through Site 2 made a return journey within 15 minutes. 50% of matches in excess of 15 minutes involved a return journey through Site 2.	61% of matched trips travelled to Site 6 (A55) comprising 45% via Site 5 (Faenol Ave) and 15% who did not route via site 5. This indicates that 3 out of 4 journeys to the A55 or A547 east from Pensarn route via Faenol Avenue.	Only 3% of matched trips passed through Site 3 before terminating. 14% of matched trips travel reached Site 4 (via 3) indicating these were through-trips.	14% of matched southbound trips through ANPR Site 2 passed through Site 1. As there are no intermediate ANPR sites it is not possible to determine the exact routing of these trips.

Origin Site	Matched Plates (within 15 mins)	Destination / Direction (Matches within 15 minutes)			
		Northbound	Eastbound	Southbound	Westbound
3: A548 Chapel St Northbound (south of A547 signals to town Ctr) NB: - Excl veh's that passed thr'u Site 4.	350	22%	51%	3%	24%
		22% of trips from Site 3 passed through Site 2 (Dundonald Ave).	The majority of matched trips (42%) reach Site 6 (A55 J24) via the A547, but 3% routed via Site 5 (Faenol Avenue). 5% of eastbound trips terminate at Site 5	3% of northbound matched trips made a return journey within 15 minutes. <i>30% of matches in excess of 15 minutes involved a return journey through Site 3.</i>	It is assumed that all of the matched trips between Sites 3 and 1 used Chapel Street / Market Street
4: A548 Llanfair Road Northbound (entering the cordon from areas to the south heading to the town centre)	1,531	21%	46%	2%	32%
		21% of matched journeys passed through Site 2, towards Pensarn. These trips were routed via Site 3 (A547 signal controlled junction).	The majority of matched trips (43%) reached Site 6 (A55 J24) via the A547, with 1% shown to have routed via Site 5 (Faenol Avenue). 2% of eastbound trips terminate at Site 5.	2% of matched northbound trips through Site 4 made a return journey within 15 minutes. <i>8% of matches in excess of 15 minutes were return journeys through Site 4.</i>	Of trips made to Site 1 (west of the town), half went via Site 3 on Chapel Street but half used an alternative route (probably via the residential routes of Lon Dirion or Lon Ffawydd).
5: Starting at Faenol Avenue and heading South	156	0%	53%	18%	30%
		No trips that began southbound on Faenol Road were subsequently recorded heading north at Site 2 (to Pensarn).	The majority of trips originating at Faenol Avenue and heading south were shown to be to the J24 at the A55 (A55/A547 east movements)	18% of southbound trips originating at Site 5 were matched to Site 3 to the south of the town centre. The majority of these (15%) also passed through Site 4 further to the south. The rest did not reach Site 4. These could comprise school based trips between Faenol Avenue and the residential areas south of the town.	27% of matched trip were to Site 1 on the A547 to the west of the town. 3% were matched as return trips passing back through Site 5. (Note: Of the matches which took in excess of 15 minutes, 48% also passed back through Site 5.

Origin Site	Matched Plates (within 15 mins)	Destination / Direction (Matches within 15 minutes)			
		Northbound	Eastbound	Southbound	Westbound
6: Westbound from the A55 roundabout junction 24	1,187	47%	11%	29%	14%
		43% of matched trips travelled to Site 2 (Pensarn). The majority of these (33%) travelled via Site 5 (Faenol Ave) with the remaining 10% using another route (likely the A547 / A548 Water Street.) 4% of trips ended at Site 5.	9% of sub 15 minute trips were made to Site 5 then back (possibly school or PFS related trips. 1/5 th of all such trips occurred between 08:00 and 09:00. (NB for trips over 15 minutes, 60% passed back through Site 6.	23% of matched trips passed through Sites 3 and 4 (to the A548 south of the town), a further 5% passed only through Site 3. (NB) 1% of trips from Site 6 passed through Site 5 en-route to Site 3.	14% of matched trips through Site 6 passed through Site 1 (west) comprising 2% which travelled via Site 5 (Faenol Avenue) and 12% direct on the A547.

Table 2.2 – ANPR O/D Summary for vehicles entering Abergele

2.22 Points of note from the ANPR results include:-

- Over half of all traffic travelling in either direction between the A547 west of the town (ANPR site 1) and areas served along Llanfair Road to the south of Abergele, (beyond site 4), **did not** pass through the town centre via site 3 and therefore must have used alternative routes that exist through the residential area in-between Sites 1 and 4.
- Similarly, over three quarters of the traffic that was recorded as travelling in either direction between sites 2 (Pensarn) and 6 (A55 J24) routed via Faenol Avenue and thereby also avoided using the A548/A547 corridor.

The above findings indicate that drivers with local knowledge use side road based routes for south/west and north/east journeys in preference to using the main A547 / A548 corridor through the town and thereby avoid passing through the traffic signal controlled junction at the town centre. This could be simply as the chosen route is shorter; however it is equally likely to be based upon a desire to avoid delay by not passing through the traffic signals / busiest part of the town.

- In contrast, the vast majority of all traffic movements matched in either direction between Site 4 (areas along the A548 Llanfair Road to the south of the town) and either site 6 (A55 J24) to the east, or site 2 (Pensarn) to the north were shown to have passed through Site 3; indicating that the lack of suitable alternative routes for these journeys retains this traffic on the A547/A548 through the town centre and therefore through the signal controlled junction.

2.23 As noted, in addition to the ANPR survey, ATC and turning count surveys were also carried out in order to confirm directional traffic flow volumes. The ATC's were in place for a full week, including a weekend. The turning counts were carried out over the same 12-hour time period as the ANPR survey and thereby provide additional information concerning distribution patterns and in the case of J24, the baseline data required for testing the capacity of the A55 interchange with and without the proposed development.

2.24 Diagrams A1-A3 show the 12-hour movements recorded by the junction counts whilst Table 2.3 provides a summary of the average results recorded by the ATC surveys carried out on the A547 Bridge Street and A548 Llanfair Road.

Time Period	Llanfair Road		Bridge Street	
	Mean Weekday	Saturday	Average Weekday	Saturday
07:00 – 08:00	239	113	399	184
08:00 – 09:00	504	171	756	358
09:00 – 10:00	381	302	615	504
10:00 – 11:00	347	335	603	595
11:00 – 12:00	355	373	617	681
12:00 – 13:00	376	330	652	691
13:00 – 14:00	377	389	660	713
14:00 – 15:00	409	406	673	704
15:00 – 16:00	432	399	700	687
16:00 – 17:00	474	389	780	695
17:00 – 18:00	483	347	791	633
18:00 – 19:00	374	327	633	548

Time Period	Llanfair Road		Bridge Street	
	Mean Weekday	Saturday	Average Weekday	Saturday
12 hour (07:00 – 19:00)	4,751	3,881	7,880	6,993
24 Hour	5,624	4,792	9,578	8,642

Table 2.3 – ATC Two Way Count Data (2010)

- 2.25 The above Table shows two-way traffic flows combined. Figures 2 and 3 show the directional movements recorded by the surveys during the AM and PM peak hours and in tandem with the other information a comparison against design flows as outlined within the 'Design Manual for Roads and Bridges' (DMRB) concerning what volume of traffic a typical road can accommodate, (depending upon the applicable carriageway cross-section) has been made.
- 2.26 DMRB TA 46/97 provides guidance on traffic flow ranges for new rural roads (i.e. of similar standard to the A548 entering Abergele from the south). Two flow ranges are outlined with the first being the acceptable maximum daily traffic flows at the year of opening of the road (allowing for future increases in traffic demand) and the second being the threshold at which congestion would likely be experienced. The respective typical values are given 13,000 and 23,000 vehicles per day (both travel directions combined). Table 2.3 confirms that the 24-hour traffic flows recorded on the A548 Llanfair Road to the south of Abergele are well within these values.
- 2.27 For urban roads the desirable maximum flow thresholds outlined within DMRB is expressed as the maximum that can be accommodated in the busiest direction (lane) during a peak hour. The single carriageway values are given as 1,320 vehicles for a 6.75m wide single carriageway and 1,590 vehicles for a 7.3m wide single carriageway. Some sections of the existing roads at Abergele have carriageway widths in excess of 7.3m, however, measurement at the narrowest parts on the A547 and A548 approaches to the town centre traffic signals are in the region of 6.7m wide, with Chapel Street being slightly less over a short distance south of the junction.
- 2.28 Notwithstanding this, Figures 2 and 3 confirm that the directional traffic volumes along the A548 and A547 through the town are well within the DMRB theoretical

maximum capacity limits for a 6.75m wide single carriageway urban road. The highest directional flows recorded near the town centre during the survey was 411 vehicles travelling eastbound along the A547 Bridge Street between 08:00 and 09:00 hours and 425 in the opposite direction during the PM peak hour. These volumes equate to around 32% of the theoretical maximum capacity for a 6.75m wide road, as outlined in DMRB.

- 2.29 The highest traffic flows by area were recorded at J24 of the A55, when movements to and from Faenol Avenue are added to the A547 traffic volumes heading to and from the town centre. The directional flows recorded just to the west of the junction were 752 eastbound (to J24) and 605 westbound during the morning peak hour and 560 / 641 respectively for the afternoon peak hour. Therefore, even at this location traffic demand is still under what a single carriageway road could be expected to accommodate. (A flow of 752 vehicles equates to 57% ($752 \div 1,320$) of theoretical capacity for the road standard).
- 2.30 In simplistic terms therefore, the traffic flows on the A547/A548 corridors are not in excess of what the roads should be able to accommodate and hence the governing factor as to whether or not the local roads can accommodate the existing (or future) traffic demands without resulting in significant delays or congestion is likely to be down to the performance (capacity) of the connecting junctions.
- 2.31 In this regard, the greatest influence upon the free-flow of traffic through the town is likely to be the performance (capacity or otherwise) of the traffic signal controlled junction at the town centre. The commission brief excluded a requirement to undertake capacity tests of the traffic signals, as CCBC confirmed that optimisation of the signal timings and staging sequencing has been recently reviewed and operationally it is believed that they are therefore working as best as can be achieved. It is understood, however, that whilst the performance of the traffic signals has been optimised, they are possibly operating at close to capacity during the AM and PM peak hour periods and as a consequence vehicle queuing on the approaches is commonplace.

2.32 The layout arrangements and performance of the junction has therefore been visually assessed for this report during peak and off-peak demand periods in order to ascertain if there are any aspects that might be affecting performance and/or safety and which could therefore be potentially exacerbated by the addition of development related traffic.

2.33 The following aspects which were noted and are provided for information (note the list is not in any order of priority).

- a) Significant waiting time can be imposed upon pedestrians after they've pushed the signals button to call in the crossing phase (timing indicates that it takes up to 1½ minutes before the 'green man' to indicate pedestrians can cross is shown). As a consequence, it was observed that pedestrians tended to cross if the interim traffic conditions allowed (for example during the vehicle control inter-green phasing stages). It appears that it is therefore commonplace for there to be no waiting pedestrians when the 'all red' phase is implemented. Clearly an un-required all red period delays traffic unnecessarily. This situation appeared much more commonplace during the AM peak hour when the pedestrian phase was frequently initiated by school children. In contrast during the off-peak observations it was noted that elderly pedestrians or adults with young children tended to wait until the 'green man' was lit.
- b) During the AM peak hour, vehicles were observed to frequently park in the hatched area beyond the A547 (Market Street) eastbound entry. These vehicles didn't seem to cause undue problems; however, their presence can make forward progress for larger vehicles more difficult and especially when a vehicle is waiting to turn right into Chapel Street. This situation therefore increases the potential for blocking back.
- c) Delivery and other vehicles (notably disabled badge holders) were frequently observed parking in the bus lay-by on the westbound exit to Market Street.

- d) Due to the limited amount of visibility available from the side road, drivers of right-turning vehicles from Chapel Street were occasionally observed having to brake sharply due to a lead vehicle or others unexpectedly stopping or manoeuvring to enter/leave the parking bays in the central zone (eastbound drivers sometimes reversed back having noticed an empty bay). Observation suggests that this situation can be worsened when drivers from Chapel Street see the amber signal as some clearly increased their speed at the last moment in order to exit the side road before the lights turned red.
- e) The positioning of the secondary signal head on Market Street that faces the westbound traffic from the central zone between the two A548 limbs appears to cause confusion. This signal shows red when those for Chapel Street are on green (go) and on several occasions it was noted that drivers leaving Chapel Street that turned left (west) saw this red signal and so stopped. When this happened, waiting pedestrians took the opportunity to cross Market Street, adding to the confusion as the waiting drivers then clearly believed that the red signal related to the pedestrian crossing. This situation caused blocking back of vehicles into Chapel Street and led to the sounding of vehicle horns by following drivers.
- f) Whilst there is a box hatching road marking on Bridge Street at the mouth of the junction to Glanrafon and 'Keep Clear' markings at St. George Road to the east of the signals, there is nothing to protect access to the church car park that lies between these. During the morning peak hour observation three separate drivers turned right into the church car park from the direction of the town centre. On two occasions the effect was slight; however in one incident the car waiting to turn right caused blocking back of following traffic through the traffic signals following which gridlock resulted. The drivers in the queue across the church access had to manoeuvre by closing up the gaps between themselves and adjacent vehicles in order to create enough room for the car to turn into the church yard and thereby remove the obstruction.

- g) The centreline road markings on the A547 encourage right turning drivers to Water Street to move over such that they do not block following traffic, however, the layout requires eastbound vehicles to make a jinking movement around the vehicle that is waiting to turn right into Water Street.

This appears to work satisfactorily for cars but can block the route of eastbound HGV's, their drivers therefore have to stop in order to allow the opposing right-turn. This causes only momentary delays and is not a major issue.

Observation suggests however that the layout might not be swiftly assimilated by all road users as one elderly driver leaving the town was observed swerving at the last moment after passing the waiting right-turning car and as a consequence narrowly avoided mounting the footway on the north side of Bridge Street. The kerbs in the area do not show tyre marking or damage that would indicate that this is a frequent issue and so the observed incident may be a unique occurrence. The north footway is however quite narrow and was very busy with school children at the time of this incident and obviously had the driver mounted the footway a serious accident would have resulted.

It was further noted that when there is no right-turning vehicle from Bridge Street present, eastbound drivers leaving the town tend to 'straight-line' the junction and consequently they cross the centreline theoretically partly entering the opposing traffic lane.

- 2.34 As noted, the commission brief did not require capacity assessments of the traffic signals to be undertaken, however, it is noteworthy that the ongoing development of the Science Park to the west side of the town is predicted to significantly increase peak hour traffic volumes along the A547 through the town and therefore the observed situation may change in the future.

- 2.35 The brief did however stipulate that the performance of J24 was to be tested, as that junction will require modification as part of the bypass proposals and will experience the greatest change in demand patterns as a consequence of the bypass and LDP housing development proposals. The roundabout was tested against surveyed traffic flows using the ARCADY 7(2) computer program - the geometric parameters of the junction were measured from the Ordnance Survey data provided by CCBC.
- 2.36 The existing AM peak hour traffic volumes that were recorded passing through the junction are shown on Figure 4 and the ARCADY results of the analysis of that period is provided in the following Table 2.4.

Arm	Entry Flow (Veh/min)	Circulating Flow (Veh/min)	RFC	End Queue (Veh)
A547 from Rhuddlan	14.96	9.86	0.898	6.82
McDonalds Site	(Exit-only)	(Exit-only)	(Exit-only)	(Exit-only)
A55 eastbound on	(Exit-only)	(Exit-only)	(Exit-only)	(Exit-only)
A55 westbound off	4.29	15.80	0.204	0.26
Kinmel Manor	0.22	19.98	0.028	0.03
A547 from Abergele	13.73	9.21	0.382	0.62
A55 westbound on	(Exit-only)	(Exit-only)	(Exit-only)	(Exit-only)
A55 eastbound off	7.25	12.98	0.242	0.32

Table 2.4 – ARCADY results for J24 AM Peak Hour Year 2010

- 2.37 The AM peak hour ARCADY results for J24 indicate that the roundabout is operating within capacity, but that the A547 entry from the east (Rhuddlan) is getting close to capacity, as it is shown to be operating slightly in excess of the preferred maximum RFC of 0.85.
- 2.38 There are long-term road-works on the A55 at J27 (St. Asaph interchange), however, at the time of the survey traffic flows along the mainline were not being affected and hence there was no reason to believe that drivers heading for the A55 west would have diverted along alternative roads to join the A55 via the A547 at J24 in order to avoid the road-works.
- 2.39 To check this; data has been obtained from CCBC's ATC on the A547 at the County boundary near 'Borth', to the east of J24; on the basis that traffic that was avoiding the A55 from areas to the east would be detected at that location.

The data indicates that the average AM peak hour traffic volumes passing over the counter during July 2010 is similar to the previous three years and so does not therefore suggest that there has been a sharp rise in peak hour traffic flows along the A547 to coincide with the A55 road works. Table 2.5 shows the July AM peak hour flows recorded by the A547 'Borth' counter.

Year	AM Peak
2007	1,180
2008	1,124
2009	1,195
2010	1,117

Table 2.5 AM Peak hour flow A547 east of A55 J24

- 2.40 The AM peak hour analyses therefore suggest that if the volume of traffic entering the junction from the A547 east, or similarly the amount passing that entry, increase significantly above existing volumes then a shortfall in capacity at the A547 east entry is likely.
- 2.41 The junction was then tested against the movements recorded during PM peak hour 17:00-18:00 (as shown on Figure 5) with the following results:-

Arm	Entry Flow (Veh/min)	Circulating Flow (Veh/min)	RFC	End Queue (Veh)
A547 from Rhuddlan	11.15	4.47	0.544	1.17
McDonalds Site	(Exit-only)	(Exit-only)	(Exit-only)	(Exit-only)
A55 eastbound on	(Exit-only)	(Exit-only)	(Exit-only)	(Exit-only)
A55 westbound off	6.16	10.85	0.249	0.33
Kinmel Manor	0.10	16.94	0.011	0.01
A547 from Abergele	9.48	6.08	0.245	0.32
A55 westbound on	(Exit-only)	(Exit-only)	(Exit-only)	(Exit-only)
A55 eastbound off	7.16	9.16	0.205	0.26

Table 2.6 – ARCADY results for J24 PM Peak Hour Year 2010

- 2.42 Table 2.6 shows that in the afternoon peak hour the junction is shown to be operating well within capacity, including the A547 entry from the east which is shown to have an RFC of 0.544 with only a nominal queue (1 vehicle).

Section 2 Summary:-

- In the absence of a detailed traffic model, an ANPR survey of existing traffic movements has been carried out in order to inform a preliminary assessment of changes that could result from constructing the Abergele bypass (and possible 'Pensarn Link'),
- Base traffic flows (to which the possible LDP generated trips can be added) have been recorded and show that existing volumes are within normally acceptable limits for single carriageway roads and therefore...,
- The capacity of existing road junctions is likely to be the main determinant in relation to delays and congestion,
- CCBC has indicated that the A547/A548 traffic signals are operating close to maximum capacity at peak demand periods,
- ARCADY analyses of A55 J24 indicates that it is currently operating within capacity, however the A547 entry from Rhuddlan Road is close to capacity during the AM peak hour period.

3.0 Abergele Bypass and Pensarn Link Reassignment

- 3.1 A preliminary bypass reassignment has been established based upon the traffic patterns indicated by the ANPR surveys and application of a 'diversion curve' methodology in estimating what volume of existing movements would potentially divert to using the bypass. As the 'Pensarn Link' may never be progressed, the effects of adding that are assessed separately and are discussed later in this Section of the report.
- 3.2 Once completed the bypass would run from the southern extent of the settlement boundary on the A548 south of Abergele to the A55 Junction 24 on the A547. The route has an approximate distance of 1.7km and for the purpose of this assessment it has been assumed that the average speed of vehicles using the bypass will be 55km/hr (approximately 34 miles/hr.) The same assumptions have been made for the additional tests involving the Pensarn Link Road.
- 3.3 The Diversion Curve Assignment used to reassign traffic from existing routes to the proposed bypass is based upon the Department for Transport WeITAG Unit

3.5.6 (March 2010 – Draft) to determine a value of time and distance to form the diversion curve.

- 3.4 The Diversion Curve Assignment has been used where number plate matches have been recorded and potential for reassignment has been identified. Clearly, the main movements that would be altered by the bypass relate to those between the A548 south of the town and the A55 J24 (ANPR sites 4 to 6 via site 3 + reverse). A proportion of drivers from the residential areas southwest of the town might also choose to travel south along the A548 and then use the bypass to access the A55 corridor or other local destinations to the east such as the schools or petrol filling station off Faenol Avenue.
- 3.5 Furthermore, the ANPR surveys indicate that some trips to and from site 6 and destinations to the west were made via site 5 as summarised in the following Table 3.1:-

Movement	Total ANPR Matched Trips for Movement (Within 15 Minutes)	Movements Not Via Site 5			Movements Via Site 5		
		ANPR Sites	Trips	% of Total between Sites	ANPR Sites	Trips	% of Total between Sites
Trips to the East							
West to East	496	1 to 6	450	91%	1 to 5 to 6	46	9%
North to East	1,600	2 to 6	405	25%	2 to 5 to 6	1,195	75%
Town to East	160	3 to 6	148	93%	3 to 5 to 6	12	7%
South to East	677	4 to 6	660	97%	4 to 5 to 6	17	3%
Trips from the East							
East to West	483	6 to 1	422	87%	6 to 5 to 1	61	13%
East to North	1,531	6 to 2	344	22%	6 to 5 to 2	1,187	72%
East to Town	198	6 to 3	178	90%	6 to 5 to 3	20	10%
East to South	845	6 to 4	835	99%	6 to 5 to 4	10	1%
East to East	409	6 to 6	72	18%	6 to 5 to 6	337	82%

Table 3.1 - Route of Matched Movements to and From the East

- 3.6 Taking the ANPR matches in the sub-fifteen minute category, the diversion curve assignment was used to calculate the proportion of reassignment for each matched movement, based on the travel time and distance of using the existing or bypass route. Reassignment proportions have been calculated for AM (07:00-10:00), Off-Peak (10:00-16:00) and PM (16:00-19:00) periods in accordance with the existing travel speeds calculated from the journey time surveys.
- 3.7 Over the 12-hour ANPR survey period 3,003 trips were identified as currently making movements where there is potential for reassignment, and of those the diversion curve analysis forecast that 1,906 (63%) would be reassigned to the Abergele bypass. As outlined, the main movement forecast to reassign are those between the south and east (Sites 4 and 6) which are at either end of the proposed bypass route.
- 3.8 The following Table 3.2 provides a summary of the reassignment between the ANPR site locations.

Time Period	Trips surveyed between sites (<15 mins)	Existing Time Through Town (min:sec)	Existing Distance Through Town (km)	Estimated Time Using Bypass (min:sec)	Estimated Distance Via Bypass	Reassigned trips via bypass	
						%	Number of trips
Site 4 to 6							
07:00 – 10:00	206	07:04	1.80	01:53	1.73	100%	205
10:00 – 16:00	244	07:30		01:53		98%	238
16:00 – 19:00	210	05:46		01:53		100%	209
07:00 – 19:00	660						653
Site 6 to 4							
07:00 – 10:00	218	05:36	1.80	01:53	1.73	98%	214
10:00 – 16:00	320	05:21		01:53		98%	312
16:00 – 19:00	297	07:15		01:53		100%	296
07:00 – 19:00	835						822
Site 4 to 6 (via 5)							
07:00 – 10:00	0	03:12	2.14	02:18	2.01	71%	0
10:00 – 16:00	11	03:08		02:18		70%	8
16:00 – 19:00	6	03:09		02:18		70%	4
07:00 – 19:00	17						12
Site 6 to 4 (via 5)							
07:00 – 10:00	0	03:11	2.14	02:18	2.01	70%	0
10:00 – 16:00	7	03:03		02:18		68%	5
16:00 – 19:00	3	03:11		02:18		71%	2
07:00 – 19:00	10						7

Time Period	Trips surveyed between sites (<15 mins)	Existing Time Through Town (min:sec)	Existing Distance Through Town (km)	Estimated Time Using Bypass (min:sec)	Estimated Distance Via Bypass	Reassigned trips via bypass	
						%	Number of trips
Site 4 to 5							
07:00 – 10:00	10	02:59	2.00	02:06	1.87	71%	7
10:00 – 16:00	8	02:56		02:05		71%	6
16:00 – 19:00	6	02:56		02:06		71%	4
07:00 – 19:00	24						17
Site 5 to 4							
07:00 – 10:00	8	02:58	2.00	02:06	1.87	71%	6
10:00 – 16:00	14	02:51		02:05		69%	10
16:00 – 19:00	2	02:58		02:06		71%	1
07:00 – 19:00	24						17
Site 3 to 6							
07:00 – 10:00	55	05:52	1.00	03:04	2.53	80%	44
10:00 – 16:00	57	06:18		03:00		86%	49
16:00 – 19:00	36	04:36		03:05		56%	20
07:00 – 19:00	148						113
Site 6 to 3							
07:00 – 10:00	30	04:25	1.00	03:05	2.53	52%	16
10:00 – 16:00	59	04:14		03:05		48%	28
16:00 – 19:00	89	06:03		03:03		82%	73
07:00 – 19:00	178						117
Site 3 to 6 (via 5)							
07:00 – 10:00	2	02:00	1.34	03:29	2.81	7%	0
10:00 – 16:00	10	01:56		03:25		7%	1
16:00 – 19:00	0	01:59		03:30		7%	0
07:00 – 19:00	12						1
Site 6 to 3 (via 5)							
07:00 – 10:00	4	02:00	1.34	03:30	2.81	7%	0
10:00 – 16:00	11	01:56		03:30		7%	1
16:00 – 19:00	5	01:59		03:28		7%	0
07:00 – 19:00	20						1
Site 3 to 5							
07:00 – 10:00	11	01:47	1.20	03:17	2.67	6%	1
10:00 – 16:00	7	01:44		03:12		7%	1
16:00 – 19:00	1	01:46		03:18		6%	0
07:00 – 19:00	19						1
Site 5 to 3							
07:00 – 10:00	3	01:47	1.20	03:18	2.67	6%	0
10:00 – 16:00	1	01:44		03:17		6%	0
16:00 – 19:00	0	01:46		03:16		6%	0
07:00 – 19:00	4						0

Time Period	Trips surveyed between sites (<15 mins)	Existing Time Through Town (min:sec)	Existing Distance Through Town (km)	Estimated Time Using Bypass (min:sec)	Estimated Distance Via Bypass	Reassigned trips via bypass	
						%	Number of trips
Site 1 to 5							
07:00 – 10:00	14	03:08	2.10	04:56	3.77	7%	1
10:00 – 16:00	14	03:02		04:50		7%	1
16:00 – 19:00	3	03:06		04:54		7%	0
07:00 – 19:00	31						2
Site 5 to 1							
07:00 – 10:00	14	03:08	2.10	04:56	3.77	7%	1
10:00 – 16:00	22	03:02		04:50		7%	2
16:00 – 19:00	6	03:06		04:54		7%	0
07:00 – 19:00	42						3
Site 1 to 6							
07:00 – 10:00	55	03:58	1.80	04:43	3.63	15%	8
10:00 – 16:00	255	03:54		04:38		15%	39
16:00 – 19:00	140	03:54		04:42		14%	20
07:00 – 19:00	450						67
Site 6 to 1							
07:00 – 10:00	132	03:58	1.80	04:43	3.63	15%	20
10:00 – 16:00	225	03:54		04:38		15%	34
16:00 – 19:00	65	03:54		04:42		15%	10
07:00 – 19:00	422						63
Site 1 to 6 (via 5)							
07:00 – 10:00	5	03:20	2.24	05:08	3.91	8%	0
10:00 – 16:00	25	03:14		05:02		8%	2
16:00 – 19:00	16	03:19		05:07		8%	1
07:00 – 19:00	46						4
Site 6 to 1 (via 5)							
07:00 – 10:00	9	03:20	2.24	05:08	3.91	8%	1
10:00 – 16:00	33	03:14		05:02		8%	3
16:00 – 19:00	19	03:19		05:07		8%	1
07:00 – 19:00	61						5

Table 3.2 – Proposed Abergele Bypass: Forecast Base Trip Reassignment by Movement

Total Reassigned Movements (Bypass)							
	Northbound			Southbound			Two Way
	Existing Trips	% Reassignment	Reassigned Trips	Existing Trips	% Reassignment	Reassigned Trips	Reassigned Trips
07:00 – 10:00	358	76%	267	418	54%	257	524
10:00 – 16:00	631	57%	343	692	56%	394	737
16:00 – 19:00	418	63%	260	486	70%	385	645
07:00 – 19:00	1,407	62%	870	1,596	65%	1,036	1,906

Table 3.3 – Proposed Abergele Bypass: Forecast Base Trip Reassignment Summary

3.9 As noted, a cost benefit or similar analysis for the bypass is beyond the scope of this brief, however, it is feasible that with daily two-way traffic flows of less than

2,000 vehicles a robust financial case for providing the bypass purely on the basis of network benefits might be difficult to justify (or defend at a public inquiry if necessary). It is therefore possible that provision of the road would have to be based upon a development led (as opposed to highways) case. This aspect will need to be carefully considered when establishing funding and delivery mechanisms for the bypass.

- 3.10 Diagram A32 (at Appendix A), shows the bypass reassignment predicted in the AM peak hours. It can be seen that an estimated 121 right-turning movements are removed from the A548 south and 91 from the left-turn to the same road. These flows represent a significant reduction on the existing situation as the surveyed corresponding turning movements were 193 and 117 vehicles.
- 3.11 Similarly, the removal of 124 eastbound and 101 westbound movements along the A547 to the east of the town represents an approximate 30% fall in traffic demand along that road during the peak hour.
- 3.12 Diagram A33 shows the PM peak hour bypass reassignment predicted and in this scenario the reduction in the aforementioned turning movements is 60 removed from the A548 south right-turn and 137 from the left turn to the A548 south. Again the reduction represents a significant proportion of existing traffic making these manoeuvres as the surveyed corresponding movements were 114 and 142 vehicles respectively. The percentage reduction along the A547 east of the town is approximately 17% eastbound and 33% westbound and therefore represents a quantum which should be discernable in comparison to the existing situation.
- 3.13 A point of note however is that it is feasible that the reduction in traffic flows that could be delivered to the A547 corridor by the bypass may be replaced by local development proposals and in particular by the on-going development of the Science Park to the west of the town. The initial traffic report for that site predicted that 55% of trips could be made via the A547 through Abergele and this could equate to 228 inbound / 31 outbound trips in the AM peak and 31 inbound / 166 outbound in the afternoon peak hour. The Park is already partially built-out and so a proportion of those trips will already be being made and will

therefore be counted within the measured flows, however, further increases are presumably likely as the remainder of the Science Park is developed.

- 3.14 The predicted reassignment of A548 south (Llanfair Road) traffic to the proposed bypass should therefore benefit the performance of the town centre traffic signal controlled crossroads by virtue of the reduction in demand; however, as with the daily total the volume of traffic that is transferred along the bypass in the AM and PM peak hour periods (around 220 vehicles for both directions combined) is possibly not of a magnitude that would justify funding as a stand-alone County road scheme (i.e. purely to act as a bypass of the town centre for traffic movements between the A548 south and A547 east.
- 3.15 As noted previously, traffic assessments to determine the need or otherwise for a bypass would normally include extensive surveys (probably including driver interviews) and analyses and it should therefore be borne in mind that the reassignment outlined in this report for the Abergele proposals is based upon data collected on a single weekday.
- 3.16 Whilst there is no reason to suggest that the ANPR results would represent anything other than a typical situation it would be usual practice to validate all results in some way.

With 'Pensarn Link'

- 3.17 As requested by CCBC, an additional assessment has also been carried out to estimate what influence a possible link from J24 to Pensarn would have upon traffic movements and this is now described.
- 3.18 A road link between J24 of the A55 and the A548 at Pensarn would facilitate access between Pensarn and the A55 east and could also serve to reassign some Pensarn / Abergele based trips, for example those associated with the schools. It would also enable development generated trips from the LDP sites to access the A548 to east of Pensarn without using the A547 / A548 corridor (Bridge Street/Water Street) or perhaps Faenol Avenue.

- 3.19 In the same manner as for the main bypass, the Pensarn Link reassignment was based upon application of a diversion curve to the trips that the ANPR survey highlighted were following routes that could be replaced by the Pensarn Link. The ANPR indicated that 3,226 existing movements had the potential for reassignment and the diversion curve assignment forecast that 2,590 (80%) of these trips would be reassigned to the Pensarn Link. A summary is provided at Tables 3.4 and 3.5.
- 3.20 The addition of the Pensarn Link would obviously serve to attract additional movements via the Abergele bypass as movements between Pensarn (and areas to the east of it) and the A548 Llanfair Road to the south of Abergele could be made via the combined routes.
- 3.21 Following the above data, Table 3.6 shows movements which may be reassigned by using **both** the bypass and Pensarn Link to complete their journey. The ANPR survey recorded a total of 851 existing such movements, over the 12 hour period 07:00-19:00. Application of the diversion curve assignment process forecasts that 255 (30%) of these trips would reassign to using the combined route offered via the Abergele bypass and the Pensarn Link. Table 3.7 shows the totals using both links in the various time periods by direction.

Time Period	Trips surveyed between sites (<15 mins)	Existing Time Through Town (min:sec)	Existing Distance Through Town (km)	Estimated Time Using Bypass (min:sec)	Estimated Distance Via Bypass	Reassigned trips via bypass	
						%	Number of trips
Site 6 to 12							
07:00 – 10:00	84	04:35	2.10	02:02	1.7	94%	79
10:00 – 16:00	208	04:36		02:02		95%	197
16:00 – 19:00	52	04:43		02:02		95%	49
07:00 – 19:00	344						325
Site 12 to 6							
07:00 – 10:00	46	04:35	2.10	02:02	1.7	94%	43
10:00 – 16:00	244	04:36		02:02		95%	231
16:00 – 19:00	115	04:43		02:02		95%	109
07:00 – 19:00	405						384

Time Period	Trips surveyed between sites (<15 mins)	Existing Time Through Town (min:sec)	Existing Distance Through Town (km)	Estimated Time Using Bypass (min:sec)	Estimated Distance Via Bypass	Reassigned trips via bypass	
						%	Number of trips
Site 6 to 12 (Via 5)							
07:00 – 10:00	256	03:02	2.04	02:02	1.7	77%	197
10:00 – 16:00	477	02:59		02:02		76%	362
16:00 – 19:00	454	03:01		02:02		77%	348
07:00 – 19:00	1187						908
Site 12 to 6 (Via 5)							
07:00 – 10:00	266	03:02	2.04	02:02	1.7	77%	205
10:00 – 16:00	591	02:59		02:02		76%	449
16:00 – 19:00	338	03:01		02:02		77%	259
07:00 – 19:00	1195						913
Site 5 to 12							
07:00 – 10:00	0	02:50	1.90	02:15	1.84	64%	0
10:00 – 16:00	0	02:47		02:14		63%	0
16:00 – 19:00	0	02:49		02:14		64%	0
07:00 – 19:00	0						0
Site 12 to 5							
07:00 – 10:00	32	02:50	1.90	02:15	1.84	64%	21
10:00 – 16:00	45	02:47		02:14		63%	28
16:00 – 19:00	18	02:49		02:14		64%	12
07:00 – 19:00	95						61

Table 3.4 – ‘Pensarn Link’: Forecast Base Trip Reassignment by Movement.

Total Reassigned Movements (Pensarn Link)							
	Northbound			Southbound			Two Way
	Existing Trips	% Reassignment	Reassigned Trips	Existing Trips	% Reassignment	Reassigned Trips	Reassigned Trips
07:00 – 10:00	340	81%	276	344	78%	269	545
10:00 – 16:00	685	81%	559	880	78%	708	1267
16:00 – 19:00	506	79%	398	471	81%	380	778
07:00 – 19:00	1531	81%	1233	1695	80%	1357	2590

Table 3.5 – Possible Pensarn Link: Forecast Base Trip Reassignment Summary

Time Period	Trips surveyed between sites (<15 mins)	Existing Time Through Town (min:sec)	Existing Distance Through Town (km)	Estimated Time Using Bypass (min:sec)	Estimated Distance Via Bypass	Reassigned trips via bypass	
						%	Number of trips
Site 3 to 12							
07:00 – 10:00	25	02:41	1.80	05:07	4.23	2%	1
10:00 – 16:00	42	02:38		05:07		2%	1
16:00 – 19:00	11	02:40		05:05		2%	0
07:00 –19:00	78						2

Time Period	Trips surveyed between sites (<15 mins)	Existing Time Through Town (min:sec)	Existing Distance Through Town (km)	Estimated Time Using Bypass (min:sec)	Estimated Distance Via Bypass	Reassigned trips via bypass	
						%	Number of trips
Site 12 to 3							
07:00 – 10:00	16	02:41	1.80	05:07	4.23	2%	0
10:00 – 16:00	30	02:38		05:07		2%	1
16:00 – 19:00	31	02:40		05:05		3%	1
07:00 – 9:00	77						2
Site 4 to 12 (Via 3)							
07:00 – 10:00	71	03:52	2.60	03:55	3.43	37%	27
10:00 – 16:00	149	03:45		03:55		37%	54
16:00 – 19:00	97	03:52		03:55		37%	35
07:00 – 9:00	317						116
Site 12 to 4 (Via 3)							
07:00 – 10:00	55	03:52	2.60	03:55	3.43	37%	20
10:00 – 16:00	233	03:45		03:55		35%	81
16:00 – 19:00	91	03:52		03:55		37%	34
07:00 – 9:00	379						135

Table 3.6 – Bypass + Pensarn Link: Forecast Base Trip Reassignment by Movement

Total Reassigned Movements (Both Bypass and Pensarn Link)							
	Northbound			Southbound			Two Way
	Existing Trips	% Reassignment	Reassigned Trips	Existing Trips	% Reassignment	Reassigned Trips	Reassigned Trips
07:00 – 10:00	96	26%	27	71	20%	21	48
10:00 – 16:00	191	27%	55	263	29%	82	137
16:00 – 19:00	108	33%	36	122	28%	35	70
07:00 – 19:00	395	30%	118	456	30%	137	255

Table 3.7 – Bypass + Pensarn Link: Forecast Base Trip Reassignment Summary

3.22 Table 3.8 summarises the total forecast 12-hour reassignment of existing trips on the network as a result of providing both the bypass and Pensarn Link.

Section	Northbound	Southbound	Two Way
Abergele Bypass	988	1,173	2,161
Pensarn Link	1,351	1,494	2,845

Table 3.8 – Reassigned Flows on the Bypass and Pensarn Link by Direction (12 Hours)

3.23 Finally, the changes in traffic flows through the town have been estimated and are presented in the following Table 3.9.

Section	A548 Chapel Street			A547 Bridge Street		
	N'bnd	S'bnd	Two Way	E'bnd	W'bnd	Two Way
Existing (Figure A3)	2,827	2,407	5,234	4,506	3,903	8,409
Bypass – No Development						
Forecast Change (Figure A15)	-796	-964	-1760	-833	-1003	-1836
Net Flows % of original flows	2,031	1,443	3,474	3,673	2,900	6,573
	72%	60%	66%	82%	74%	78%
Bypass and Pensarn Link – No Development						
Forecast Change (Figure A15)	-914	-1101	-2015	-1217	-1328	-2545
Net Flows % of original flows	1,913	1,306	3,219	3,289	2,575	5,864
	68%	54%	62%	73%	66%	70%

* Flows represent those on the A547 (east) arm to and from the junction and A548 (south) arm to and from the junction

Table 3.9 – Forecast Change in Flows through Abergele (12 Hours)

- 3.24 With regard to peak hour reductions with the 'Pensarn Link' the reassignment predicts that two-way traffic flows along Faenol Avenue could fall by around 169 vehicles in the AM peak hour and 226 in the PM peak hour (Figures A34 and A35). Additional reductions in traffic flows are also predicted along the A547 and A548 corridors due to the reassignment of trips between areas north and south of the town.
- 3.25 Traffic flows through the town centre traffic signals are therefore further reduced (by around 40 vehicles in total AM peak and 70 vehicles PM peak hour) and logically this would again assist the performance of them with the probability that queuing and delays should be less than is currently experienced.
- 3.26 The ANPR survey data and reassignment calculations has therefore provided a set of background scenarios to which possible development generated trips can be added. The next Section of the report describes the assumed development scenarios and derivation of trip predictions relating to them.

Section 3 Summary:-

- The ANPR survey has provided the basis to calculate a preliminary reassignment of existing traffic movements to the proposed Abergele bypass and the calculation carried out would suggest that (with Abergele bypass only) daily traffic flows along the A547 to the east of the town centre could reduce by approximately one quarter and perhaps by slightly more during the AM and PM peak hour periods.
- Whilst any reassignment of traffic away from the town centre would be beneficial, and in particular the performance of the traffic signal controlled junction, the preliminary predications suggested by the calculations done for this report would suggest that the actual volume of traffic predicted to use the bypass is not overall of a significant magnitude.
- The 'Pensarn Link' would likely deliver a significant reduction (circa 30% peak hour based on measured flows) in traffic use of Faenol Avenue (and other roads to the north) by predominantly removing existing trips that are currently being between Pensarn area and the A55 east.
- Provision of the Pensarn Link in addition to the bypass would serve to further reduce daily and peak hour two way traffic flows between the town centre and A55 (it is estimated that this could reduce existing traffic flows by approximately one third of measured volumes at all times).
- Notwithstanding the above, as with the bypass, the volume of predicted peak period and daily traffic flows along the 'Pensarn Link' is quite modest.
- It is considered that as a consequence of the modest traffic flows, there is a strong probability that financial justification for either of the new road links in purely highways benefit terms may be difficult to prove. As a consequence it is feasible that funding for the construction of the bypass (and possibly Pensarn Link) would have to be supported by developments, such as the LDP housing allocation. Delivery mechanisms may therefore require careful consideration.

4.0 Residential Development Trip Generation

- 4.1 CCBC has confirmed that a development of 800 houses is to be assumed on the land to the east side of the town as served by the proposed bypass. They also confirmed that CCBC planning policy for new housing is that 50% of units should be to 'affordable' standard. The composition of the housing units has a bearing upon trip generation rates and hence with the agreement of CCBC comparison sets of figures has been produced whereby the 'affordable' housing component is assumed to be 25%.
- 4.2 The trip generation rates for the proposed 800 houses were determined by reference to the latest version of the TRICS database. This holds data concerning traffic surveys that have been carried out at existing established sites and is therefore a reliable means of predicting traffic flows for proposed developments. In order to try to represent the scale and location of the proposed development relative to Abergele, the search parameters were limited to only include '*Edge of Town Centre, Suburban Area and Edge of Town*' sites and in addition, sites where populations of over 125,000 lived within 5 miles were also omitted. Finally, all UK regions were chosen but excluding the Republic of Ireland, Northern Ireland, Scotland, Greater London and the South East.
- 4.3 With regard to the composition categories, surveys of 'Houses Privately Owned' were used to represent the open market component of houses. This category is defined in TRICS as being:-"Housing developments where at least 75% of units are privately owned. Of the total number of units, 75% must also be houses (sum of non-split terraced, detached, semi-detached, bungalows, etc), with no more than 25% of the total units being flats. Properties that are privately owned and then privately rented have been included. Trip rates are calculated by Site Area, Dwellings, Housing Density, or Total Bedrooms."
- 4.4 For the 'affordable component the 'Houses – Mixed Non Private' sites were used and that category is defined as being comprised of "Housing developments where at least 75% of units are non-privately owned. Of the total number of units, less than 75% must be houses (sum of non-split terraced, detached, semi-detached, bungalows, etc), and less than 75% must be flats (sum of flats in

blocks and split houses). Non-privately owned may be council rented or housing association rented/part-owned.”

- 4.5 12-hour (daily) traffic rates were established along with peak period rates which are predicted to be 08:00-09:00 for departure movements and 17:00-18:00 for arrivals. The following Table 4.1 summarises forecast trip rates for 800 houses with 25% and 50% affordable dwelling category provisions. The trips for the peak hours (shaded) include 85th percentile rates for the ‘Houses – Privately Owned’ component; however, as there was insufficient survey data to calculate 85th percentile rates the affordable proportion and so average rates have been applied. Average rates for both housing types have been calculated for the hourly intervals outside of the peak hours.

Time Period	75% Open Market: 25 % Affordable			50% Open Market: 50 % Affordable		
	Arrival Trips	Departure Trips	Two Way Trips	Arrival Trips	Departure Trips	Two Way Trips
07:00 - 08:00	53	179	232	48	134	183
08:00 - 09:00	156	349	505	132	285	417
09:00 - 10:00	128	156	284	127	138	265
10:00 - 11:00	122	130	252	126	126	252
11:00 - 12:00	144	136	280	152	134	286
12:00 - 13:00	147	139	285	138	137	275
13:00 - 14:00	143	130	273	137	127	264
14:00 - 15:00	160	157	318	166	166	332
15:00 - 16:00	200	162	362	182	164	347
16:00 - 17:00	228	154	382	190	138	329
17:00 - 18:00	354	249	602	307	214	521
18:00 - 19:00	200	156	356	180	138	318
Total	2033	2097	4131	1887	1902	3788

Table 4.1 – Housing Trip Generation

Section 4 Summary:-

- The likely volume of traffic that could be generated by 800 houses has been predicted by reference to the latest TRICS database taking account of possible house type mixes,
- The search parameters were set to extract data from sites of similar context to the proposals at Abergele,
- Two development mixes have been assessed for information purposes.

5.0 Residential Development Trip Distribution

5.1 In accord with a previous Atkins report on development proposals at Abergele (2008) it has been assumed that access to St. George Road from the bypass / proposed housing sites will be restricted in some way, either by stopping up, introducing one-way arrangements or perhaps taking either road over or under the other. The assignment of development trips carried out for the purpose of this assessment therefore assumes that there will be **no** access to or from the development site or bypass via St George Road.

5.2 Three main development scenarios have been considered for the trip distribution assessments, as follows:-

- **Scenario A** -Assumes the provision of 500 dwellings on land to the southwest of the A55 with access gained via the modified Junction 24. Trip generation for 25% and 50% proportions of affordable housing respectively have been calculated but only the higher generating mix (25%) has being used in the assessments and is therefore presented on the diagrams. Note that in this scenario the bypass does not link to Llanfair Road and therefore it does not provide any relief on network traffic movements.
- **Scenario B** - Assumes that a total of 800 dwellings are provided at the LDP land. (Again 25% and 50% proportions of affordable housing respectively were checked). For this scenario it is assumed that the bypass is completed and therefore it provides a network as well as development function.
- **Scenario C** – This scenario is the same as Scenario B; however, it assumed the addition of the Pensarn Link to the north of J24. Scenario C has limited influence upon the assignment of development traffic (A548 north only); however, it does alter network traffic patterns further when compared with Scenario B.

Definition of Trip Categories

5.3 The trips (journeys) that people make each day vary in purpose and that has a bearing upon the route chosen. For this assessment it is assumed that residential trips will comprise three categories; namely, Home Based Work Trips (HBW), Home Based

Education Trips (HBED) and Home Based Other Trips (HBO) – e.g. shopping, leisure etc.

- 5.4 The assignment of these trips over a 12 hour period is summarised in Table 5.1. Note that the HBO proportion shown in the Table reflect the fact that TRICS data for food superstores indicates that journeys associated with stores tend to be made between 09:00 and 19:00 on an average weekday.

Time Period	Outbound Trips			Inbound Trips		
	HBW	HBED	HBO	HBW	HBED	HBO
07:00 – 10:00	75%	25%	0%	0%	0%	100%
10:00 – 15:00	0%	0%	100%	0%	0%	100%
15:00 – 16:00	0%	0%	100%	0%	25%	75%
16:00 – 19:00	0%	0%	100%	75%	0%	25%

Table 5.1 – Generated Trips Composition

Derivation of Trips Distribution

- 5.5 An assignment for the above trips categories has been established in the following ways:-

Home Based Work: The pattern outlined by interrogation of the 2001 Census ‘Journey to Work’ data for the ‘Abergele Pensarn’ ward was used as the basis to distribute trips from the proposed development site to the existing road network and proposed new bypass. (This distribution therefore assumes that jobs will be created for inhabitants of the new development in accordance with existing patterns of employment). This analysis results in HBW trips being distributed from the site as follows; 2% north, 3% east, 20% north-east, 19% north-west, 8% south, 39% south-east, 10% town (west).

Home Based Education: It is feasible that the close proximity of the development zone to existing schools will result in a high proportion of school journeys being made by non-car based modes; however, all development generated car based education related trips have been routed to Faenol Avenue and via Junction 24.

Home Based Other: For these trips a gravity model was constructed using the following local population centres as possible destinations;

*Abergele (location of Tesco store used as primary shopping destination),
Llandudno, Bangor, St Asaph, Prestatyn, Rhyl and Rhuddlan.*

- 5.6 The gravity model assigns trips on the basis that the probability of making a journey to one of the above locations is proportional to the population of the destination and inversely proportional to the intervening travel time.
- 5.7 The distribution of HBO trips thus derived is 5% to/from the east, 5% north-east, 2% south-east, and 88% to / from Abergele town centre to the west of the site. It can be seen that on this basis Abergele attracts a high proportion of such trips. This is perhaps not unreasonable due to the shopping offer that exists and would be in close proximity to the LDP site. This has not been adjusted as the assignment thus derived for HBO trips will thereby ensure that the potential for additional traffic passing through Abergele town centre is robust.

Changes in Traffic Flows on the Local Roads

- 5.8 The worst-case situation in relation to increased demand on local roads would relate to the assumed 'Scenario A', whereby 500 houses are constructed but the bypass is not completed as in this scenario the new trips associated with the 500 houses are entirely in addition to existing traffic movements. As noted, for assessment purposes the model that has the 25% affordable component has been applied as the trips generation is slightly higher than with 50% affordable.
- 5.9 Diagram A36 at Appendix A shows that during the AM peak hour 38 vehicles from the assumed 500 dwellings at the LDP housing area are predicted to travel westbound along the A547 to the town centre traffic signals and that 85 vehicles are making the reverse movement from the A547 west (Tesco side). These trips represent an approximate 11% increase over existing in westbound movements (to the town) and 29% in eastbound movements through the traffic signals. During the PM peak hour (Diagram A37) the corresponding increases in trips are predicted to be 138 westbound and 64 eastbound or +32% and +18% over existing.
- 5.10 Daily variations in traffic flows of around 10% are commonplace and therefore the 11% increase in AM peak hour westbound trips might not ordinarily be of a magnitude that would warrant mitigation; however, the eastbound increase is clearly in excess of 10% and as a consequence it is feasible that the amount of

additional demand from the west may have the potential to adversely affect the capacity (vehicular throughput) of the signals.

- 5.11 Similarly during the PM peak hour increases that are of a magnitude that would normally warrant an assessment of the possible impacts via capacity modelling of the traffic signals are predicted, however, as noted, this is beyond the remit of this study.
- 5.12 Discussion with CCBC Highways has indicated that there is limited (if any) surplus capacity at the town centre traffic signals and so any additional traffic may have the effect of adding to existing queuing and delays. Scenario A is provided to show what level of additional trips could be added to the network by 500 houses in the absence of completing the bypass. The number of houses permitted would need to be given careful consideration including allowance for other anticipated increases over the measured traffic volumes along the A547, such as those that could be generated as Abergele Science Park is further developed.
- 5.13 Give the lack of capacity at the town centre traffic signals, it seems reasonable to conclude traffic relief that is predicted could be delivered by completion of the Abergele bypass may be of fundamental importance in offsetting the increase in demand arising from the housing proposals. As outlined above, the Scenario B assessment therefore adds the traffic associated with 800 houses to the background situation that includes the reassignment of network traffic that is predicted as described post completion of the bypass.
- 5.14 Figures A38 and A39 (Appendix A) show the distribution of trips that could be generated by 800 houses during the AM and PM peak hour time periods (again assuming 25% affordable as this is the worst-case trip generation). Only the traffic movements generated by the housing are shown on these plans but the road situation does assume that the full bypass is in place. This explains why the volume of development traffic using the A547 to the west of the town centre is slightly below that estimated in 'Scenario A' (500 houses/no bypass) – as a consequence of the alternative routeing that is offered via the completed bypass.

- 5.15 Clearly, this is only part of the picture as the true situation can only be understood by establishing the net change that will occur along each road by adding the development trips to the revised network flows brought about by the bypass reassignment (as shown on Figures A32 and A33). Figure A41 shows the resulting net change in the AM peak hour traffic volumes with the bypass carrying network as well as development flows (800 units). It can be seen that in comparison with the present-day situation, an overall reduction in traffic volumes heading to the town via the A547 from the east and A548 from the south is predicted with the only increase being to eastbound flows on the A547 west of the signals (predominantly comprising of return HBO trips).
- 5.16 Whilst the individual entry flows may have increased, the assignment models suggest that post completion of the bypass and 800 houses, 53 fewer vehicles in total would be predicted to pass through the signal controlled junction in the AM peak hour when compared with the existing situation. Simplistically, this may suggest that in this instance the bypass reassignment is serving to offset the increase in traffic predicted from the LDP development such that an approximate equilibrium in relation to traffic movements through the town centre and therefore performance of the signals would exist.
- 5.17 Figure A42 shows the Scenario B predictions during the PM peak hour 17:00-18:00. In this situation the development generated trips have increased the straight-through movements along the A547 in each direction and has also increased the left turn from the A548 south with the consequence that in the afternoon peak hour traffic flows through the signals are predicted to be approximately 124 higher than in the present day (surveyed) situation.
- 5.18 Note that in the development trip assignment model, destinations to the west of the town centre have been assumed to use the A547 and A548 road corridors and therefore the 109 left-turning movements shown at the traffic signals from the A548 south in the PM peak hour gives an indication of the volume of traffic that could choose to follow alternative routes via the housing areas to the west of the A548 (for example via Lon Dirion / Ffordd Tan'r Allt and Gopa Road).

- 5.19 The transfer of those movements to alternative side road routes would serve to reduce traffic demand at the traffic signals such that post development PM peak hour situation would be close to existing overall volumes, albeit distributed in a different pattern. Whilst this would reduce the potential for capacity issues at the traffic signals it would clearly add traffic flows via the residential side roads and could thereby be considered as rat-running.
- 5.20 As reported earlier in the report, the ANPR survey suggests that around ½ of traffic movements between the A547 west and A548 south do not pass through the traffic signals and must therefore already be made via side road routes. Whilst this aspect may be undesirable to residents it is not necessarily unacceptable in purely highway terms providing the routes being used are of an appropriate standard and safety is not being compromised. (See Section 8 for further details).
- 5.21 Finally, consideration has been given to how the addition of the Pensarn Link could influence traffic volumes and patterns (Scenario C). Figures A43 and A43 show the AM and PM peak hour changes in background flows resulting from the additional reassignment brought about by providing the Pensarn Link – but still including development generated trips from 800 houses.
- 5.22 The diagrams show that, as would be anticipated, the biggest influence of the Pensarn Link is to significantly reduce traffic flows along Faenol Avenue and consequently via connecting routes between it and the A548 north.
- 5.23 Whilst a reduction in demand is also predicted along the A548 through the town centre (around 15 vehicles each way in the peak hours), the changes in volume are such that in reality the Pensarn Link is not predicted to be removing sufficient traffic from the town centre such that a clear benefit to the operation of the traffic signals could be anticipated.

Section 5 Summary:-

- The distribution of development generated trips considers a variety of journey purposes (work, leisure etc) and then uses established ward

census data and possible attraction to other local centres to predict an assignment to and from the site,

- The resulting distribution pattern has predicted possible increases in traffic demand on local roads including the routes through the town centre,
- CCBC has confirmed that the town centre traffic signals are currently operating at (or with a limited amount of residual) capacity, and increases in traffic demand through them due to other local developments is expected,
- The LDP housing development proposals would also add to the traffic demand at the signals, however, this increase could be offset to a large degree by the reassignment of A548 south /A547 east network traffic to the bypass,
- Even with the bypass relief, it is possible that the housing development would lead to traffic flows passing through the signals during the PM peak hour being in excess of existing volumes. This could lead to an increased potential for rat-running between the A548 south and A547 west,
- The possible 'Pensarn Link' would have limited influence upon the distribution of LDP development generated trips and is not predicted to relieve traffic demand at the town centre traffic signals by a significant amount.

6.0 Traffic Flows on the A55

6.1 As part of the brief, the Trunk Road Authority has requested that a review of traffic changes on the A55 west of Abergele should be carried out to compare the existing and post development situations.

6.2 Data has been obtained from Traffic Wales from the permanent traffic counter site on the A55 to the west of J24 and that dating from October 2009 (the last full neutral month that was available) has been reviewed. The highest recorded weekday peak hour vehicle flows are presented in Table 6.1 (Note – the busiest day of the week generally appears to be Friday) along with the mean 5 day and 24 hour by direction volumes for the month.

Time	Eastbound	Westbound
08:00-09:00	2,029	2,163
17:00-18:00	1,895	2,345
07:00-19:00	17,321	18,185
24 Hour	20,321	21,926

Table 6.1 – Existing Traffic Flows on the A55 west of Abergele

6.3 The above data suggests that on weekdays the A55 to the west of J24 could be carrying in the region of 42,300 vehicles in 24-hours. This volume has been checked against Average Annual Daily Traffic flows (AADF) as provided by Traffic Wales to the year 2008 which are:-

- 2006 = 39,993
- 2007 = 40,717
- 2008 = 39,381

6.4 Traffic patterns differ from area to area, however traffic growth (increases) in North Wales has generally been modest in recent years and so it would be reasonable to assume that the current AADF is likely to be of a similar magnitude to the above (i.e. possibly no more than 41,000-42,000 veh's). This would indicate that the A55 is not currently over-capacity as DMRB TA46/97 indicates a typical Congestion Reference Flow (CRF) of 68,000 vehicles per day for a dual two-lane all purpose trunk road such as the A55.

6.5 The trip generation and assignment model for the LDP proposal of 800 houses at Abergele is predicted to add around 250 daily trips via the A55 west and therefore would not take flows on the trunk road over acceptable thresholds. In terms of percentage change the development would increase daily trips along the A55 west by less than 1% and in reality such a change would not be discernable against background movements.

6.6 The periods of greatest change are therefore likely to be during the AM and PM peak hour periods as that is when most of the additional A55 west trips would be made. The assignment model indicates that an extra 49 westbound trips and 1 eastbound are expected via the A55 west during the AM peak hour 08:00-09:00; during the PM peak hour the corresponding movements are predicted as 1 and 50 vehicles respectively.

- 6.7 Reference to Table 6.1 indicates that once again the magnitude of change in comparison to the existing background trips due to the development would be in the region of 2.5% in the busiest direction. Historically, traffic impact guidelines suggested that changes in traffic flows on trunk roads of less than 5% would not be considered as detrimental and would not warrant impact assessments to be carried out.
- 6.8 The main influence of the LDP proposals upon the performance of the A55 is therefore whether or not the capacity performance of Junction 24 will be adversely affected, both as a consequence of being modified to accommodate the bypass link and then by virtue of the increased traffic demands that would be experienced due to the housing development.
- 6.9 It is accepted practice to test the performance of a modified junction at two time periods, namely the year of opening and a later 'design year' by when it is assumed that further growth in traffic demand will have been realised. For the purposes of this report the opening year for the modified J24 layout to accommodate the bypass connection (Figure 8 shows the bypass tie-in layout tested in the future scenarios) is assumed to be 2015 and the design year is assumed to be 2025.
- 6.10 In line with accepted practice, the background traffic (network) flows have been increased by the application of NRTF'08 'Central by Road Type' estimates for Wales to these future years. From 2010 to 2015 this equates to an increase of 10.7%, with a similar increase then applied from 2015 to 2025.
- 6.11 Figures 4, 5, 6 and 7 show the traffic flows used in the AM and PM assessments for each of these years and the following Tables provide an extract of the ARCADY results at the peak demand profile period of each hour. To begin with, the junction has been tested against the reassigned network trips only to assess the influence of the bypass proposals.

Arm	Entry Flow (Veh/min)	Circulating Flow (Veh/min)	Capacity (Veh/min)	RFC	End Queue (Veh)
A547 from Rhuddlan	15.83	11.07	16.47	1.026	19.53
McDonalds Site	(Exit-only)	(Exit-only)	(Exit-only)	(Exit-only)	(Exit-only)
A55 eastbound on	(Exit-only)	(Exit-only)	(Exit-only)	(Exit-only)	(Exit-only)
A55 westbound off	4.75	17.09	20.36	0.234	0.30
Abergele Bypass	2.81	20.33	14.20	0.198	0.25
A547 from Abergele	12.75	12.43	33.74	0.378	0.61
A55 westbound on	(Exit-only)	(Exit-only)	(Exit-only)	(Exit-only)	(Exit-only)
A55 eastbound off	8.02	14.41	29.14	0.275	0.38

Table 6.2 – J24 with Bypass AM 2015 (Network Flows Only)

- 6.12 In the bypass opening year scenario, all of the junction entry arms are predicted to be operating well within capacity however, as would be expected given the 2010 results, the addition of growth to the existing network traffic flows is sufficient to take the A547 east arm over capacity with the result that the potential for delays and vehicle queuing would be increase during the AM peak hour period.
- 6.13 At present the A547 entry from Rhuddlan comprises a single traffic lane and this will be affecting the rate at which vehicles can enter the junction and will thereby reduce capacity. To check this, the ARCADY model for above demand situation was re-run but with the A547 east entry geometry altered to be two-lanes wide (7m) at the roundabout and flared from a single lane over just 12m. With this geometry the ARCADY analysis predicted that the arm would be operating well within capacity and the peak RFC was calculated as being 0.72 (i.e. better than the existing situation). This indicates that some modest alterations to the layout of the A547 east arm would increase capacity, however, the presence of buildings on the south side of the entry lane would likely dictate that the widening works would have to be done on the north side, which in turn would require alterations to also be made to the exit lane from the roundabout. The ownership of the surrounding land is not known and it is not known if there is sufficient Highway land to facilitate such works. Note that if ever proposals for the Pensarn Link were progressed it would be necessary to significantly amend the east side of the junction to accommodate that route in any case and by necessity this would also require alteration to the A547 east entry.

- 6.14 For completeness, the junction was then tested to the 'design year' 2025 and in this scenario the background traffic flows have been increased from 2015 values by the further application of NRFT'08 factors (2015-2025 = 1.11).
- 6.15 The application of growth will allow for extra traffic that might be generated by other local developments, however, it is noted that the information provided to Atkins for the Science Park scheme suggest a potential for increases due to that development that would be in excess of what growth factors would predict. The TS for that scheme does not indicate a distribution beyond the Science Park access but (as noted in Section 3) does indicate that 228 inbound / 31 outbound trips in the AM peak and 31 inbound / 166 outbound in the afternoon peak hour are expected from/to the Abergele direction respectively.
- 6.16 Clearly the volume indicted would include trips from all directions that converge to the east, including destinations access via the A548 north and south as well as those originating at Abergele itself and so the actual volume of trips that could pass through J24 is therefore not known. It is therefore suggested that if the developer of the Science Park has not already done so, they should be asked to provide confirmation regarding the impact of that scheme on the performance of Junction 24 and in particular the A547 east entry.
- 6.17 The ARCADY results at the peak demand period as modelled are shown in Table 6.3 below.

Arm	Entry Flow (Veh/min)	Circulating Flow (Veh/min)	Capacity (Veh/min)	RFC	End Queue (Veh)
A547 from Rhuddlan	15.76	11.57	16.22	1.072	26.94
McDonalds Site	(Exit-only)	(Exit-only)	(Exit-only)	(Exit-only)	(Exit-only)
A55 eastbound on	(Exit-only)	(Exit-only)	(Exit-only)	(Exit-only)	(Exit-only)
A55 westbound off	4.89	17.24	20.26	0.242	0.32
Abergele Bypass	2.89	20.56	14.07	0.206	0.26
A547 from Abergele	13.11	12.49	33.70	0.390	0.64
A55 westbound on	(Exit-only)	(Exit-only)	(Exit-only)	(Exit-only)	(Exit-only)
A55 eastbound off	8.89	14.83	28.87	0.308	0.44

Table 6.3 –J24 AM 2025 (Network Flows Only)

- 6.18 As would be expected, the additional growth exacerbates the shortfall in capacity on the A547 approach from the east, which is now shown to have an

RFC of 1.072 and an end queue of 27 vehicles. It is important to note that this situation is predicted to occur regardless of whether the housing development takes place and similarly the bypass does not affect matters as it would not alter demand from the A547 east. (Note: when this model was tested again with modified geometry for the A547 east arm, as described above, the junction was then predicted to be operating within capacity and the RFC for the A547 east is 0.75).

- 6.19 As a final test, the Scenario B development traffic (800 houses with 25% affordable type) was added to the design year 2025 AM peak hour model (with existing geometry for the A547 east arm) in order to evaluate how much difference the extra development trips would make to the performance of the junction. The peak demand stage results are tabulated below.

Arm	Entry Flow (Veh/min)	Circulating Flow (Veh/min)	Capacity (Veh/min)	RFC	End Queue (Veh)
A547 from Rhuddlan	14.66	14.44	14.88	1.169	44.06
McDonalds Site	(Exit-only)	(Exit-only)	(Exit-only)	(Exit-only)	(Exit-only)
A55 eastbound on	(Exit-only)	(Exit-only)	(Exit-only)	(Exit-only)	(Exit-only)
A55 westbound off	4.89	17.50	20.14	0.243	0.32
Abergele Bypass	8.21	19.53	14.66	0.563	1.26
A547 from Abergele	14.40	15.21	31.88	0.452	0.82
A55 westbound on	(Exit-only)	(Exit-only)	(Exit-only)	(Exit-only)	(Exit-only)
A55 eastbound off	8.89	18.52	26.50	0.336	0.50

Table 6.4 –J24 AM 2025 (Network + Development Flows)

- 6.20 The ARCADY results, outlined in Table 6.4, confirm that the bypass arm would not be unduly affected by the addition of development generated traffic as that is shown to be operating well within capacity and with minimal queuing. A similar picture applies to all other arms, with the exception of the A547 from the east as the shortfall in capacity already predicted for that limb is worsened due to the additional movements to the A55 east resulting from the housing development. These extra circulating movements would serve to reduce gap availability for traffic entering from the A547 east and thereby increases delays for traffic wanting to enter the roundabout from that side.

- 6.21 For completeness, the above model was re-run with the A547 entry widened as previously described. As in the 'without development' situations the entry was

then predicted to be operating within capacity as the RFC was 0.80 with an end queue of 4 vehicles. This suggests that the housing development would only have a marginal impact upon the capacity performance of J24 if all of the existing entry arms were operating within capacity to begin with.

6.22 The PM peak hour results for the existing situation indicated that all of the approach arms at J24 are operating well within acceptable capacity values and therefore in order to reduce superfluous data the ARCADY test of the PM peak has been limited to checking the 'design year' with 800 houses development situation. Again growth factors were applied to the surveyed network movements and as with the AM models this will allow for additional trips to other developments (NB; same comments re additional trips associated with Science Park further developments applies).

Arm	Entry Flow (Veh/min)	Circulating Flow (Veh/min)	Capacity (Veh/min)	RFC	End Queue (Veh)
A547 from Rhuddlan	14.70	6.32	19.66	0.748	2.89
McDonalds Site	(Exit-only)	(Exit-only)	(Exit-only)	(Exit-only)	(Exit-only)
A55 eastbound on	(Exit-only)	(Exit-only)	(Exit-only)	(Exit-only)	(Exit-only)
A55 westbound off	9.25	15.16	22.26	0.416	0.71
Abergele Bypass	4.00	17.71	9.00	0.445	0.79
A547 from Abergele	10.28	9.24	36.60	0.281	0.39
A55 westbound on	(Exit-only)	(Exit-only)	(Exit-only)	(Exit-only)	(Exit-only)
A55 eastbound off	9.57	11.50	33.37	0.287	0.40

Table 6.5 –J24 PM 2025 (Network + Development Flows)

Section 6 Summary:-

- A review of traffic use of the A55 to the east of Abergele J24 has been undertaken as requested by WAG,
- This has shown that the trunk road is not currently carrying daily traffic volumes in excess of its design capacity,
- The peak hour changes to and from the west of J24 as a consequence of the development are predicted to be modest and would not therefore be likely to alter that situation (i.e. they are less than the 5% of existing traffic flows generally considered as representing a material change),
- The performance of Junction 24 has been assessed. The ARCADY analyses indicate that the A547 east entry is currently close to

capacity in the AM peak hour and therefore further increases in circulatory of A547 east traffic would take that entry over capacity,

- The capacity shortfall is predicted by 2015 if traffic volumes increase in line with DMRB NRTF 'central' values, regardless of the proposed housing development,
- During the AM peak hour, the housing development would however add additional turning movements to the A55 east (i.e. past the A547 east entry arm) and so would exacerbate the capacity shortfall at that limb.
- The bypass connection and reassignment of network traffic flows would not exacerbate the capacity shortfall highlighted at the A547 east entry. Rerunning of the models with some revised geometry suggest that modest changes to the entry in question would address the issue.

7.0 Road Safety

7.1 CCBC has provided details of recorded personal injury accidents for the five year period 2005-2009 inclusive. A review of the data by road section has been carried out and is now summarised.

A55 Junction 24 / Junction of Faenol Avenue

7.2 18 'slight' category accidents were recorded in the above area over the five years, of which 15 occurred at J24, 2 near to the junction of Faenol Avenue with the A547 and 1 on the A547 about 200m east of J24.

7.3 All but one of the accidents at J24 comprised of rear end collisions, whereby a following driver failed to stop in time when approaching waiting vehicles at the junction. The accident 200m east of J24 on the A547 east occurred at 08:25 hours and was of the same type but the distance from the roundabout gives an indication of the length of vehicle queue that can be encountered during the AM peak hour on that approach.

7.4 The majority of the J24 accidents were at the A55 eastbound off-slip entry (5 No) and A547 east entry (6 No). The nature of the incidents at the off-slip road

would point to driver error as opposed to an obvious contributory factor in the road design, however, it is noted that forward visibility to the entry from the A547 east is limited and also requires negotiation of a bend with a radius of circa 50m. It is therefore feasible that the latter geometric elements could perhaps be contributory factors to the number of accidents that occur on the A547 entry. For example, one of the accidents on this side of the junction happened when a driver lost control on the bend at the approach to the roundabout.

- 7.5 Both accidents near to the Faenol Avenue junction were also of the rear-end shunt type with one being between vehicles approaching J24 and the other being when a car waiting to turn right into Faenol Avenue was struck by another that had left the roundabout.

A547 from J24 to St. George Road

- 7.6 5 'slight' and 1 'serious' injury accidents have been recorded on the above stretch of road in five years. Four of them involved either a cyclist or pedestrian.
- 7.7 Two such accidents involved cars colliding with crossing pedestrians (in one case the pedestrian was hit at the Pelican crossing) and the third occurred when a child ran into the road. The serious accident occurred when a pedal cyclist that had been riding along the footway pulled into the path of a car that was travelling towards the town. There is insufficient detail provided to ascertain the exact circumstances, however, it is noted that vehicles are regularly parked along each side of the A547 in the area concerned and it is possible that inter-visibility between pedestrians and motorists is therefore compromised.
- 7.8 The final two incidents were car collisions, 1 when a driver pulled out of a side road into the path of another vehicle and one rear end collision with a parked car. These incidents are therefore driver error related.

A547 Town Centre

- 7.9 Along Market Street to as far as Gele Bridge to the east there were 16 recorded accidents over the five-year period with 11 of them being 'Slight' injury and 5 'serious'. Looking at the accidents in more detail, all of the 'serious injury' category involved pedestrians and generally occurred when people stepped out,

or on one occasion ran, into the path of passing vehicles. One of the 'slight injury' accidents also involved a pedestrian who slipped into a car that had stopped to allow the person to cross the road and another when two pedestrian ran into the path of a bus.

- 7.10 One 'slight injury' accident involved a pedal cyclist who was travelling along the north side footway and was struck by a car that was exiting the garage forecourt to the west of the town.
- 7.11 All of the other slight injury accidents were between motor vehicles with 5 being rear-end shunt types, 2 when one vehicle pulled into the path of others and 1 when a car was reversed into another. One of the rear-end shunt accidents involved 3 cars and was as a result of the vehicles failing to stop in time upon encountering another car manoeuvring into a parking bay on Market Street.
- 7.12 There appears to be a common factor in the accidents involving pedestrians insofar as it is mentioned that they have stepped out from between vehicles. The reports do not confirm if the vehicles are parked or are simply queuing at the traffic lights, however, the plan of the accident locations would suggest the latter.
- 7.13 Three of the serious injury accidents happened near to Church Street junction, from where there is a pedestrian route past the church and on to Water Street; it is therefore possible that the people involved were crossing to or from that route. There is no formal crossing of Market Street near Church Street as facilities are provided at the traffic signals; however, they are some 45m to the east. It is possible that the desire line for crossing is closer to Church Road and that as a consequence people are crossing away from the provided facilities. During the site visits it was noted that delivery and other vehicles frequently parked on the hatched area on the south side of Market Street opposite Church Street (outside of the Harp public house) and in such instances visibility for crossing pedestrians could be hampered by queuing or parked vehicles.
- 7.14 It would perhaps be reasonable to assume that had the pedestrians in question used the signal controlled facilities then these accidents may not have occurred, however, the fact that they didn't may indicate that either the facilities are not

appropriately located or perhaps that pedestrians can become frustrated at the delay incurred in using the signal facilities and cross independently instead.

A547 west of town centre

- 7.15 2 'slight' category accidents were recorded west of the town centre, one being a rear-end shunt type and the other when a driver pulled out of a side street into the path of another. These are simple driver error incidents.

Section 7 Summary:-

- A review of injury accident data for the past five complete years has been carried out.
- The accidents at junction 24 tend to be typical driver error types; however, it is possible that the geometric and visibility constraints at the A547 entry to J24 from the east could be a contributory factor.
- Rear end shunt type accidents have occurred on Market Street when vehicles were manoeuvring into parking spaces.
- A high proportion of accidents in/near to the town centre involved pedestrians. It is possible that the delays incurred in using the signal controlled crossings lead to people crossing at other times and that vehicles parked along the main street may be reducing safety by restricting inter-visibility between drivers and crossing pedestrians.

8.0 Car Parking

- 8.1 CCBC has provided details of the public car parks at Abergele. This indicates that there are two public car parks, a pay and display car park off Water Street (56 spaces) and one at the Library (24 spaces + 6 for staff and 2 for registry office). There are small flag type signs at the Water Street / Bridge Street junction indicating that the car park is for 'Shoppers'.
- 8.2 The largest car park is at the Tesco superstore and whilst this is obviously predominantly for customers, there is a 3 hour waiting limit which clearly provides time to combine a visit to the superstore and town centre.

- 8.3 The other parking area is at the leisure centre off Faenol Avenue to the east although this is not signed as a public car park and it is not clear if the general public would make much use of it during the day. Use of the leisure centre for parking would require local knowledge and even then the distance between it and the town centre would deter use by many.
- 8.4 Much of the car parking at Abergele is therefore on-street and in particular along the A547 at and to the east of the town centre. The on-street areas closer to the town centre have a waiting time limit, however, the restrictions are unusual in that on Market Street at the heart of the town 45 minutes is allowed, however, further out along Bridge Street the time limit is 30 minutes. Perhaps the opposite situation would be more usual.
- 8.5 Extensive parking takes place along the A547 near to A55 J24 - where no time limits apply, this parking is however a long way from the town centre and so is unlikely to be used by many shoppers, however, it is feasible that workers at the town may choose the location due to 'all day' parking being permissible. Another reason could be that it is a meeting place for lift-sharing commuters that travel along the A55, or simply the vehicles belong to local residents who do not have off-road parking. Whatever the reason, it is commonplace for both sides of the A547 east of the town to be fully occupied by parked vehicles on most days.
- 8.6 Parking along the A548 is generally prohibited and so whilst the main road is clear, the side streets off the A548 tend to also have much on-street parking. There appears to be limited off-street public parking available and the perception is gained that parking at the town is in short supply. This is confirmed by CCBC's parking officer who reported that they regularly receive requested from local residents who want some form of designated parking provision.
- 8.7 It is also understood that parking problems for visitors to some recently completed residential flats has been reported as only a small amount of parking was included as part of the development.
- 8.8 Observation would therefore imply that car parking at Abergele town centre is in very short supply and what is provided has only limited signage. For example,

whilst the Water Street car park is noted as being for ‘Shoppers’ there would appear to be no clear provision for longer stay parking for visitors to the town.

8.9 Theoretically the LDP housing site is within an acceptable walking (or cycling) distance of the town centre, however, not all residents would be capable of making shopping journeys in such a way and it has to be acknowledged that for most people the use of a car for shopping trips is commonplace. It would therefore be unreasonable to assume that the development would not add to parking demand.

8.10 A more detailed review of parking at the town in light of the LDP proposals would therefore seem to be appropriate.

Section 8 Summary:-

- Parking at Abergele is already in short supply with much of the provision being on-street and for restricted time periods,
- CCBC has received requests for resident parking to be designated, pointing to a lack of confirmed availability in side streets,
- The LDP proposals will add to demand and therefore a review of the potential impacts is recommended.

9.0 Rat-Running via Local Roads

9.1 Rat-running is a frequently used term to describe drivers who choose to detour via side streets in order to avoid busier areas where they might encounter delays.

9.2 The ANPR surveys and other data provided by CCBC indicate that rat-running is commonplace in and around Abergele. The predominant alternative routes for traffic movements between the A547/A548 road corridors are the residential areas to the southwest of the town and ‘Faenol Avenue’ and other streets such as Peel Street to the north on the east side of the town. The survey data collected would suggest that the latter is by far the busier of the routes and that

whilst rat-running via the residential areas to the west does take place, the overall volume of traffic involved is modest.

- 9.3 The LDP housing development would have the potential to add traffic to both of these routes with Faenol Avenue being an obvious route for school trips and for accessing the A548 northeast (Pensarn / Towyn).
- 9.4 The likely trips distribution for the housing development can only be estimated however as outlined earlier in the report it is predicted that during the AM peak hour, for the 800 houses with Abergele bypass completed scenario, 87 extra movements would be made to Faenol Avenue with many of those being school based trips.
- 9.5 During the same hour, 13 development generated trips are predicted to turn left out of the A548 Chapel Street to the A547 west and clearly the potential exists for those drivers to chose alternative routes and perhaps via 'Lon Dirion' and 'Ffordd Tan'r Allt'; however, even if all 13 trips diverted via alternative routes the volume involved would not make a noticeable difference to the existing situation as the roads in question serve around 1,100 houses and clearly the residents will already generate a significant number of traffic movements along those roads in any case. The accident records do not suggest that use of roads to the southwest is reducing safety as only 3 slight injury incidents were recorded in 5 years.
- 9.6 During the PM peak hour the corresponding movements are 10 to Faenol Avenue and 109 left out of Chapel Street. The increase in shopping based trips from the development (which it has been assumed will be to Tesco Abergele) is noticeable in this hour and clearly if all of the A548 trips assigned via side roads it would add to existing rat-running.

Section 9 Summary:-

- The collected and available traffic data indicates that some drivers are currently using side roads in preference to the A547/A548 corridors through the town.

- With regard to roads to the east of the town, this issue is exacerbated by virtue of access / egress to the A55 east having to be made via J24.
- In most cases however, the alternative routes being used are shorter than a route via the main (A547/A548) roads and hence it is possible they would be used in any case regardless of whether or not the drivers would encounter delays at the town centre traffic signals.
- The LDP housing proposals have the potential to add to the existing situation.

10.0 Suggested Mitigation Measures

- 10.1 A number of existing issues at Abergele serve to restrict traffic flow or impede road crossing movements for pedestrians. In particular, the traffic signals at the town centre can cause significant delays at peak demand times and in tandem with extensive on-street parking might lead to a local perception that the *roads* in the area cannot cope with any extra traffic. In fact, the volume of traffic using the roads is well below acceptable capacity thresholds and hence the limitations being imposed are likely dictated by how well the traffic signal controlled junction caters for the demands.
- 10.2 The assessments made for this report suggest that the bypass proposals would only remove a modest proportion of traffic from the town centre and, whilst any relief would be beneficial, it is possible that further measures could be explored to ascertain if other ways to assist the free-flow of traffic through the town are possible and thereby help to further reduce any potential impact of the LDP housing proposals.
- 10.3 The following Tables outline suggestions for mitigation works that it is considered may be worthwhile exploring further. The first table provides suggestions that may apply regardless of whether or not the housing proposals come forward, whilst the second Table relates to LDP development specific issues. Note the suggested measures listed are not in any order of priority.

Problem	Suggested Mitigation	Advantages	Disadvantages
1) Pedestrians cross before signals change to red.	Provide infrared detectors at pedestrian crossings.	Would reduce delays to traffic by ignoring unnecessary pedestrian crossing phases.	Possible upgrade of whole junction required if existing equipment not suitable.
2) Pedestrians cross road away from designated crossing locations.	Review pedestrian demand and crossing location provisions. E.g. would a single (possibly uncontrolled) crossing within the central area be better?	Would reduce the possibility that pedestrians would cross elsewhere so increasing safety. If suitable a single crossing could reduce delays to traffic.	Some parking and alterations to existing signals / controllers could be required. Possible knock-on effects to vehicle queue arrangements.
3) Multiple pedestrian crossing locations controlled by single all red phase.	Review if altered phasing would be possible, for example, permitting right-turns on one arm when crossing on other arm is in use.	Could improve junction throughput by not delaying traffic on all arms.	Lack of room to provide right-turn lanes might mean the idea has limited benefit.
4) Vehicles manoeuvring within central zone when parking.	Remove parking (except for deliveries and disabled) from between A548 limbs on safety grounds (in tandem with 2) above?)	Improves visibility along street so safer for pedestrians, removes conflicts between traffic movements.	Loss of parking would be resisted by shoppers and shop owners. Parking already in short supply.
5) Location of secondary signals on Market Street (both ends) can confuse drivers.	Relocate secondary signal heads or, if suitable, install hoods so that they cannot be seen by drivers from the side roads.	Would address the issue of drivers stopping when they don't need to and removes pedestrian confusion that follows this situation.	Suitable alternative locations may not exist?
6) Illegal parking on hatched areas around / near traffic signals inc bus stop lay-by.	Review viability of kerbing off hatched areas. Increase enforcement of regulations.	Reduces chance that parked vehicles will impede flow of traffic or visibility for pedestrians.	Enforcement costs?
7) Lack of pedestrian crossing near Church Road.	Review need for crossing, perhaps in lieu of existing at west side of traffic signals (see 2 above).	If required it provides a crossing on the desire line increasing pedestrian safety.	Could complicate operation of traffic signals / vehicle flows.
8) Access to premises blocked by traffic queues on signal approaches.	Consider provision of 'Keep Clear' markings to Church car park.	Keeps access clear and thereby prevents blocking back by waiting vehicles.	Increases queue length.

Problem	Suggested Mitigation	Advantages	Disadvantages
9) Congestion at traffic signals due to existing constraints and lack of capacity.	Consider options to remove signals – for example provision of a free-flow gyratory road layout at the Town centre.	Removal of traffic signals would greatly improve passage of traffic through the town. Easier layout for pedestrians to assimilate. Increased potential for on-street parking.	Would likely require compulsory acquisition of private property and /or loss of some community parkland.
10) Rat-running via residential areas to the southwest of the town	Review need for traffic-calming measures to deter errant use of side roads.	Would reduce possibility that drivers would choose side roads over the main A547/A548 corridor.	Increases traffic demand at the traffic signals. Traffic-calming features not popular (e.g. emergency veh's / PSV's).
11) Duration of parking allowed at town centre is greater than outside of centre.	Review time allowed for parking, perhaps reversing allowance between town centre and outer zones.	Parking is in short supply near the town centre. Reducing time for quicker turn around might be beneficial.	Loss of parking time may not be popular with shoppers and businesses. Increased turn over = more vehicle manoeuvring.
12) Parking of vehicles near side road junctions.	Remove parking that impedes side road inter-visibility.	Improves visibility along street so safer for all road users.	Loss of parking would be resisted (already short supply).
13) Lack of parking at town centre.	Review if a new car park (or parks) can be provided close to town centre.	Could provide the means to remove existing undesirable parking thereby improving pedestrian environment and safety / aids flow of traffic.	Possible difficulty in finding suitable locations. Cost of acquiring land / building car park.
14) Cyclist use footways through town centre probably due to lack of road width and being intimidated by traffic environment.	Investigate options to provide cycle route(s) through the town and perhaps especially between LDP housing site and shopping areas.	Would increase safety for cyclists, especially vulnerable groups such as young / elderly. Supports sustainable travel objectives.	

Suggested Mitigation – Bypass / Housing Development specific issues

Problem	Suggested Mitigation	Advantages	Disadvantages
1) Additional traffic passing along A547 through the town for shopping trips associated with LDP site.	Consider provision of shopping facilities as part of the development allocation or on suitable site to east side of town. A second supermarket may benefit the town as well as the proposed LDP housing.	Reduces the need to make off-site shopping journeys and could also reduce cross-town trips by existing residents from areas to the east of the town.	Sequential testing may not support need. Could be unpopular with existing local businesses.
2) Additional school based trips to Faenol Avenue.	Consider provision of a school shuttle bus as part of the development (or new school?).	Reduces the need to make off-site car journeys.	Funding of shuttle bus. May not be sufficient demand for a new school.
3) Rat-running via St. George Road.	Consider not having a connection between bypass and St. George Road.	Precludes use of unsuitable roads by development traffic.	Does not provide access to bypass for residents of St. George Road.
4) Increase in traffic demand prior to bypass being completed.	Limit the number of houses that can be built prior to completing the bypass link to the A548.	Bypass would provide traffic relief at town centre signals that helps to offset increase arising from housing development.	Complicates funding of bypass if revenue from housing is restricted.
5) Bypass design as currently proposed may not suit progressive construction from east to west.	Review the bypass proposals.	Could assist in building the bypass in discreet phases and may also reduce environmental impacts such as visual impact.	None.
6) Bypass connections to side roads and site not yet determined but will influence rat-running.	Investigate how the bypass should be connected to the local road network (note this aspect could affect the bypass vertical alignment)	Treatment of the side roads affects the scheme design and could serve to offset negative impacts that could otherwise result.	None.

NB: Points raised in first two tables above would also apply to the housing development as extra traffic generated would exacerbate those issues.

- 10.4 The bypass takes some network traffic out of the town but it will not assist in accommodating any increases in across town traffic movements. As highlighted, the view could be taken that the bypass would serve to offset the increases that the LDP housing will generate, however, that view does not take account of the extra trips that could also be generated by the Science Park development once that site is fully occupied, or other schemes which might come forward at the town.
- 10.5 It is therefore feasible that due to the various development proposals congestion at the town centre would remain post completion of the bypass and that some form of alleviation scheme that would address the town centre bottleneck might still be required. For example, a gyratory system or similar could be a worthwhile consideration and in fact may even offer an alternative to completing the bypass. Other aspects may also be worthy of comparison - such as would funding for a town centre scheme be cheaper and thereby easier to secure? (For example; via developer contributions to implement the scheme very early on in the development of the LDP site and/or perhaps linked to consents for other sites such as further expansion of the Science Park).

11.0 Summary of Conclusions

- 11.1 This report has reviewed existing traffic patterns and volumes at Abergele in order to make a preliminary assessment of the changes that would result from the eastern bypass proposals and also to indicate what volume of traffic could be generated by a development of 800 houses on land to the east of the town.
- 11.2 By way of a summary the brief headings are reproduced and the report findings outlined:-
- i) **Survey existing traffic patterns through the town along routes that might be altered by the proposed eastern bypass,**
 - ii) **Predict the volume of existing traffic that could transfer to the bypass,**
 - iii) **Assess what volume of traffic might transfer to a (separate) link between the A55 and Pensarn,**
- 11.3 Work to address the above items has not included the establishment of a detailed traffic model for the town, however, data on existing travel patterns was collected and a reassignment to the bypass has been predicted which suggests that the bypass would offer modest relief of existing traffic demand at the town centre by the removal of the existing trips being made between A548 south/A547 east. In the AM / PM peak hour periods, approximately 200 trips (both directions combined) are predicted to be reassigned with around 1,850 movements in total on a weekday.
- 11.4 In light of the above, it has been noted that the volume of network traffic that might reassign may not be of a magnitude that would warrant funding of a bypass as a County road improvement purely on traffic relief grounds.
- 11.5 The reassignment to the Pensarn Link is predicted to be slightly higher with around 300 peak hour movements and 2,500 weekday movements using that route.
- iv) **Calculate trips for the LDP residential proposals and predict assignment,**

- 11.6 The volume of traffic that could be generated by the LDP housing has been estimated and assigned to the network based upon travel to work census data and the location of local shopping attractions. Depending on the mix of housing it has been shown that around 500 trips could be generated in the AM peak hour and 600 in the PM peak hour.

v) Assess the capacity of the A55 west and J24 with / without the development.

- 11.7 The analysis of the A55 Junction 24 has indicated that the A547 entry (from Rhuddlan) may already be getting close to capacity during the AM peak hour and, clearly, that further increases in traffic volumes on or passing that entry could take the limb over-capacity. This situation is predicted to occur even without the 800 LDP site houses; however, it has been highlighted that the additional turning movements to the A55 westbound slip road associated with the housing development in the AM peak would serve to worsen matters. It appears that some modest alteration to the entry layout could address matters but it is not known if the land required is controlled by the Highway Authorities.
- 11.8 The A55 is not carrying flows in excess of its theoretical capacity and based upon the provision assignment model established, the LDP proposals would not be predicted to alter that situation.

vi) Prepare a design to connect the bypass with J24.

- 11.9 This is shown at Figure 8. Capacity modelling of the proposed layout to the assumed design year 2025 (with the bypass and LDP development) indicates the arrangement would be predicted to be operating within capacity.

vii) Assess and report on the capacity of the A547 through the town

- 11.10 The review of the existing situation shows that the A547 traffic volumes are not in excess of what a single carriageway can accommodate, but that delays are imposed by the traffic signal controlled junction at the town centre.

- 11.11 The proportion of LDP development trips heading to and from the town centre is similar in volume to the reassignment of network trips to the bypass and hence completion of the bypass would serve to offset the increase in demand along the A547 to the east of the town centre traffic signals.
- 11.12 However, the location of existing shopping facilities in relation to the proposed housing site would lead to an increase in cross-town movements and in this sense the LDP housing proposals would clearly add to the straight-through movements at the town centre signal controlled junction, which it is understood is already operating at close to capacity.
- 11.13 In the absence of an alternative relief scheme, the delivery of the bypass is therefore potentially fundamental to mitigating the impact of the additional housing on the A547 through the town.
- 11.14 It has been noted that this situation may pose funding issues that it is recommended will need careful consideration: - as it is possible that the new road would have to be progressively constructed by the housing developer(s) and under such a scenario a developer would want to build and sell off a significant amount of housing to fund the road. In the interim period additional housing trips would be generated but the bypass would be incomplete and hence no traffic relief would be realised.
- 11.15 It has been highlighted that the design of the bypass as currently proposed may not suit progressive construction from east to west and, ideally, should be reviewed as part of establishing a delivery mechanism.

viii) Review injury accident data

- 11.16 Areas of possible concern have been identified including the layout of the A547 entry to J24 from the east. At the town centre concerns regarding the proportionally high number of serious injury accidents involving pedestrians (in comparison to all those recorded) has been highlighted - which it is suggested may, in part, be potentially linked to the extensive on-street parking, which can

compromise visibility between drivers and pedestrians and also perhaps due to delays that can be imposed at the pedestrian crossing facilities.

- 11.17 The housing development proposals would add to traffic flows through the town centre and would also increase parking demand and therefore has the potential to exacerbate matters. Although less in number, similar accidents were also recorded along the A547 to the east of the town centre where again extensive on-street parking takes place.
- 11.18 In light of these issues it is recommended that further investigation into how parking and pedestrian crossing facilities at the town can be improved should be carried out. It is possible that an increase in off-street parking provisions at the town would serve to improve safety for all road users and could deliver added benefits such as also improving the visual quality of the area. The presence of high numbers of vehicles parked along the local roads may also be adding to the local perception that traffic activity in the town is at a much higher level than the measured flows would actually indicate.

ix) Review Rat-Running

- 11.19 Journeys between the north and east of the town or west and south can be made via existing side roads which offer a shorter and quicker route than travelling via the town centre traffic signals and thereby also avoid the delays that can be encountered at the signals. Most of the routes used are of a reasonable highway standard and the extra traffic that they may be carrying does not seem to be detrimental to their functionality. For example, only a very small number of accidents have been recorded on the roads passing through the residential areas to the southwest of the town.
- 11.20 It is likely that a proportion of the trips generated by the proposed housing development would similarly be made via those routes. In particular it is expected that use of Faenol Avenue and roads to the north would be increased by LDP site residents when making trips to destinations reached via the A548 north and east. The other possibility is that when making trips to the west of the town (perhaps shopping trips in particular) LDP site traffic might choose

alternative routes to the A548/A547 by using the bypass and then the residential roads to the southwest of the town.

- 11.21 As noted, the alternative routes are of a suitable standard to cater for the potential increase however, it is likely that local residents would consider it to be rat-running and may seek assurance that measures to minimise use of these local roads would be implemented. Traffic-calming features could be introduced to deter use of the side roads but such an approach could be unpopular (e.g. by the emergency services). Also it would need to be borne in mind that action to deter use of alternative routes would then serve to increase demand at the town centre traffic signals which, as noted, are reportedly at capacity now.
- 11.22 As a complimentary approach to making local improvements wherever possible, it is suggested that CCBC should consider including other allocations as part the LDP development to reduce off site trips.
- 11.23 For example; it would be reasonable to assume that a food store located either on the LDP site or at another suitable location to the east of the town centre would help to reduce the number of car trips made across the town by both existing and future residents that live in east Abergele.

x) Suggest mitigation measures

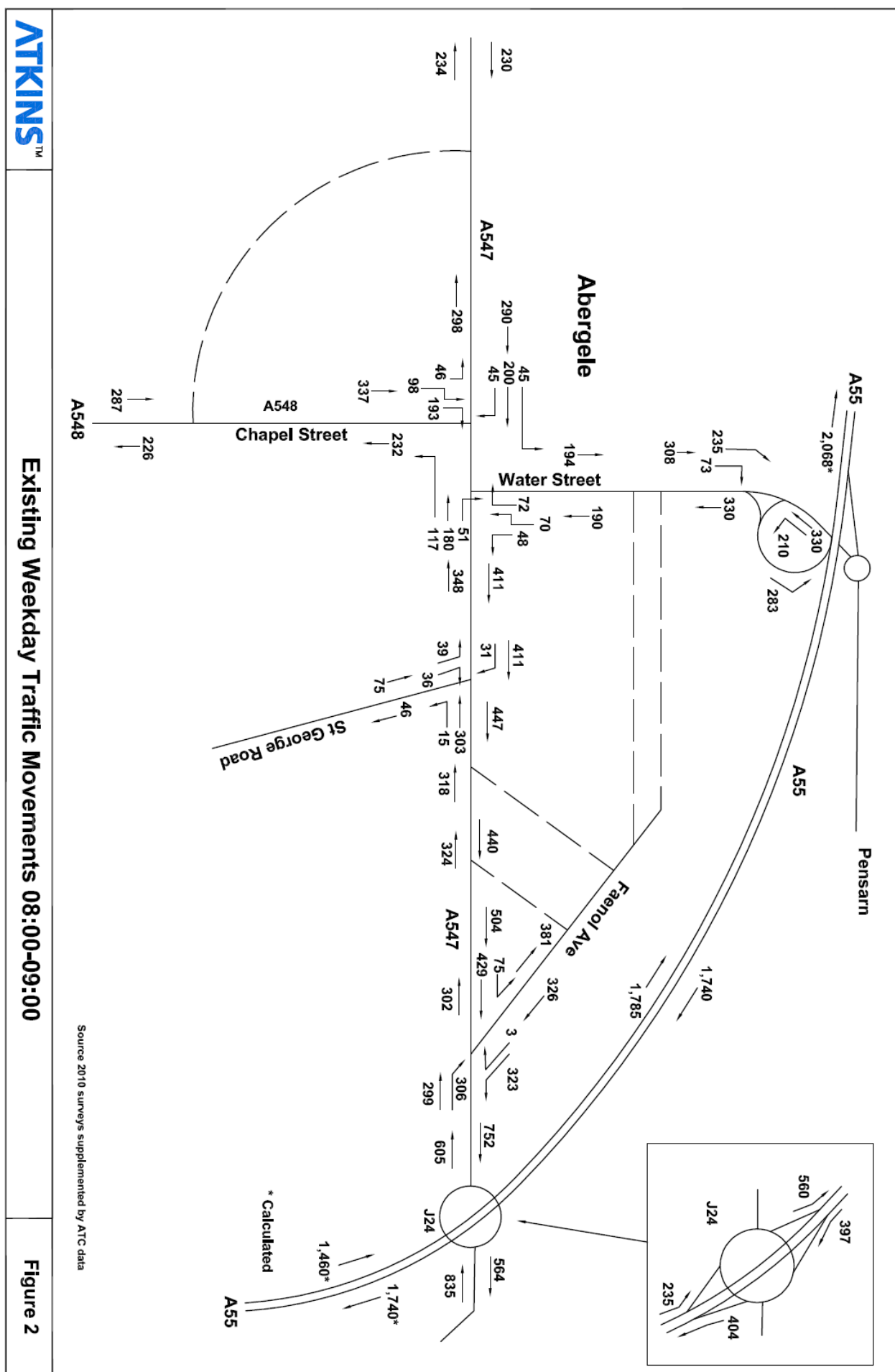
- 11.24 CCBC's proposals for an easterly Abergele bypass will serve to remove a proportion of network traffic movements from the A548/A547 and town centre and it has been shown that the volume removed in peak hour periods could be of a similar magnitude to that which could be generated by the LDP housing proposals. The bypass scheme could therefore largely offset the influence of additional development traffic on the town such that post development the traffic situation could be similar to the present-day.
- 11.25 This report includes a number of other mitigation measures that are put forward for further consideration. These include investigation of possible ways to improve the performance of the town centre traffic signals, reviewing and

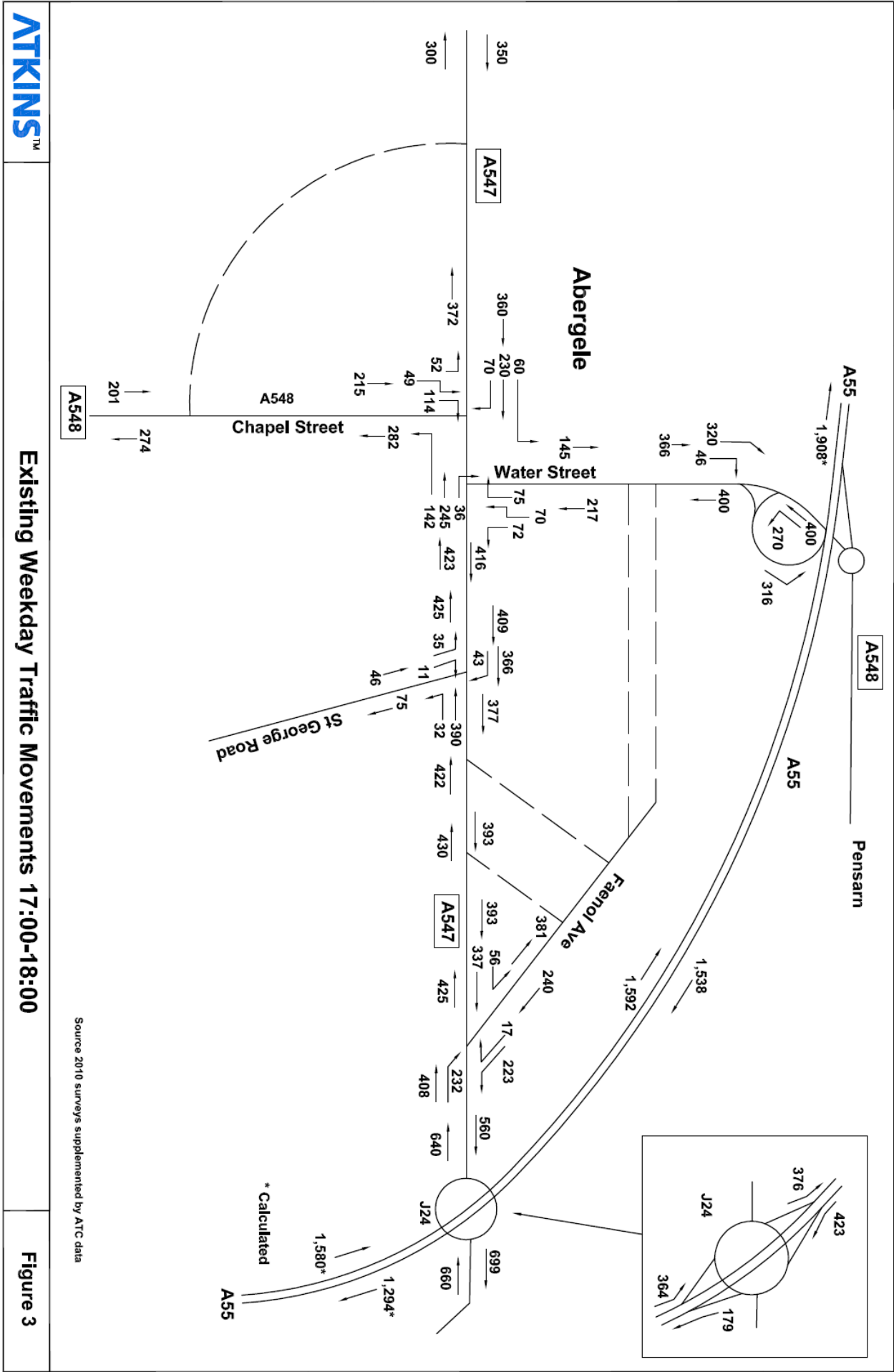
perhaps amending existing pedestrian crossing facilities and consideration to providing more off-street car parking in the town.

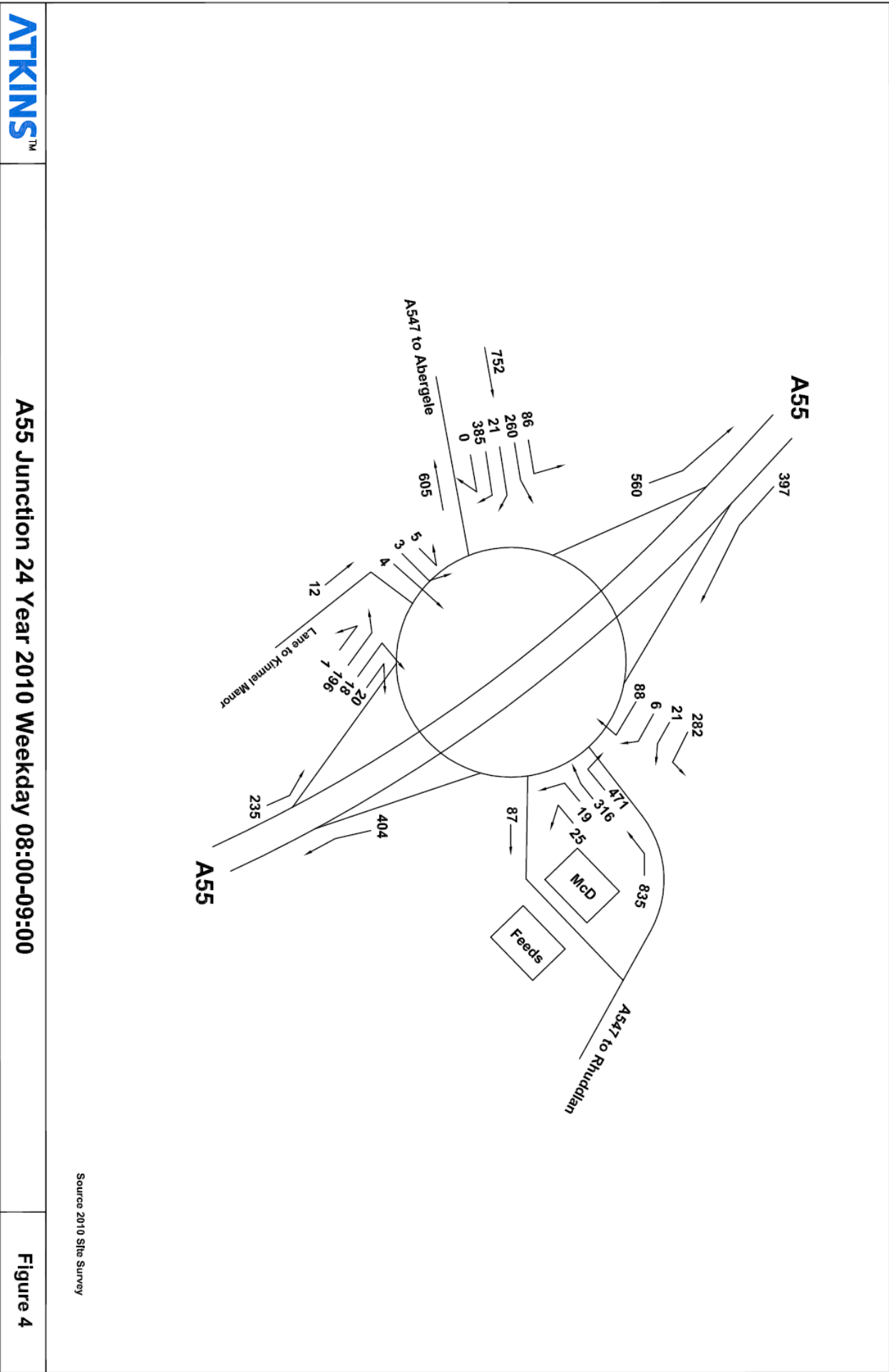
- 11.26 The bypass would not however relieve A547 east / west (across-town) traffic movements and therefore if a holistic view is taken this raises a concern that (even with the bypass in place), the potential for traffic delays and congestion to occur at the town centre remains. Therefore, it is feasible that future local developments could serve to exacerbate existing problems.
- 11.27 With this in mind, it is suggested that further consideration should be given to investigating possible solutions to address the town centre traffic problems which would ideally include the removal of the traffic signals.



Figure 1



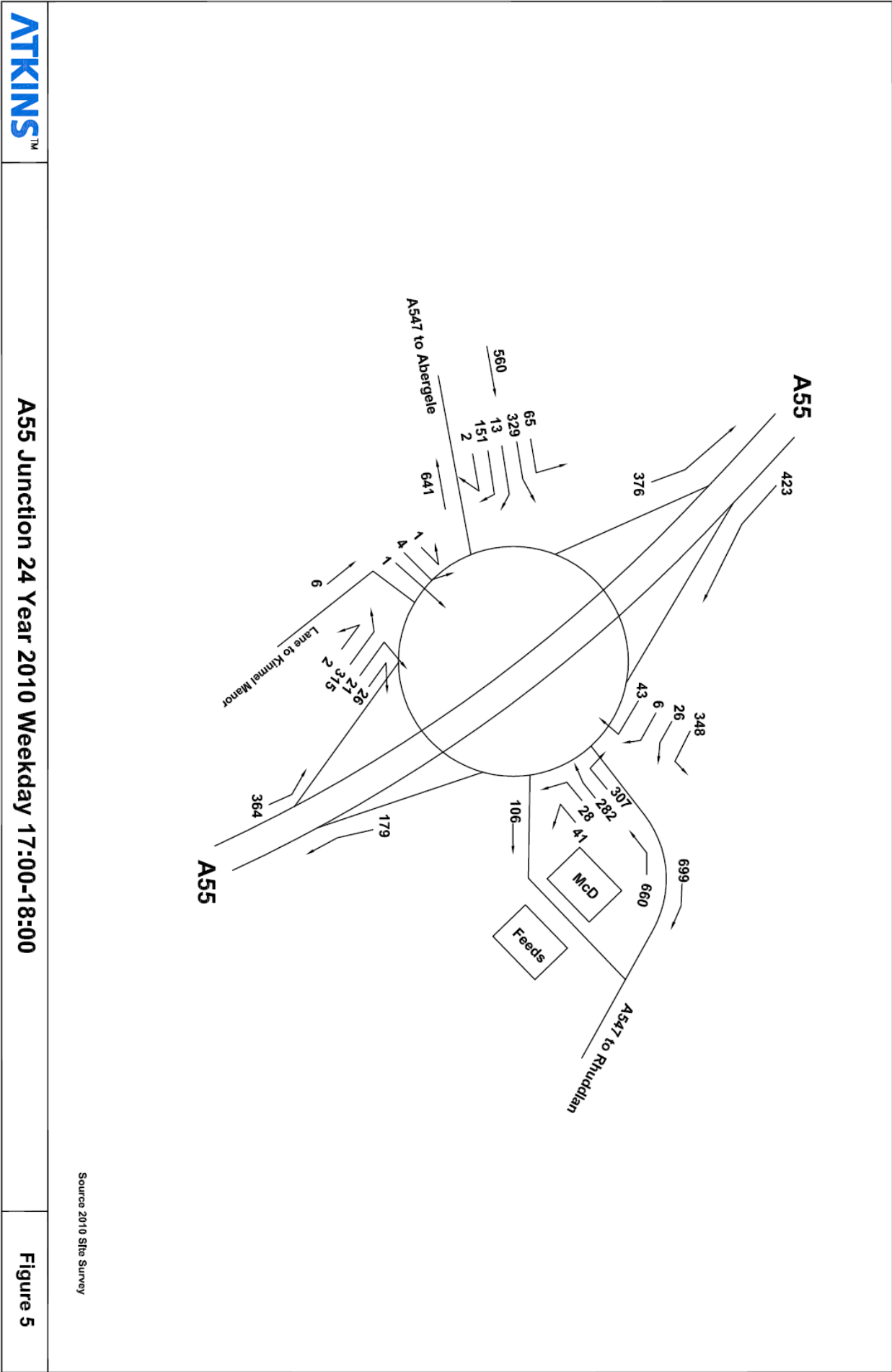


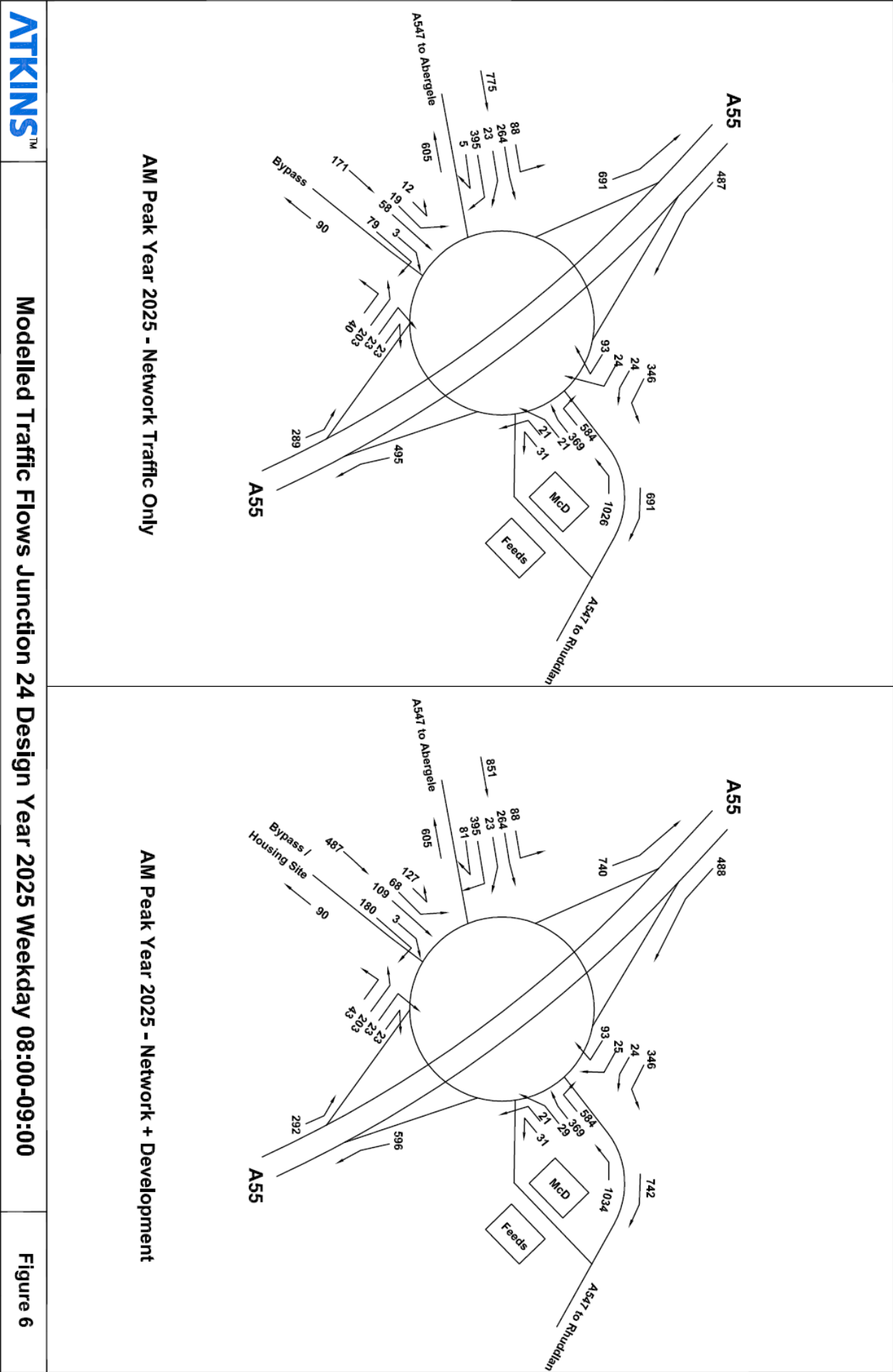


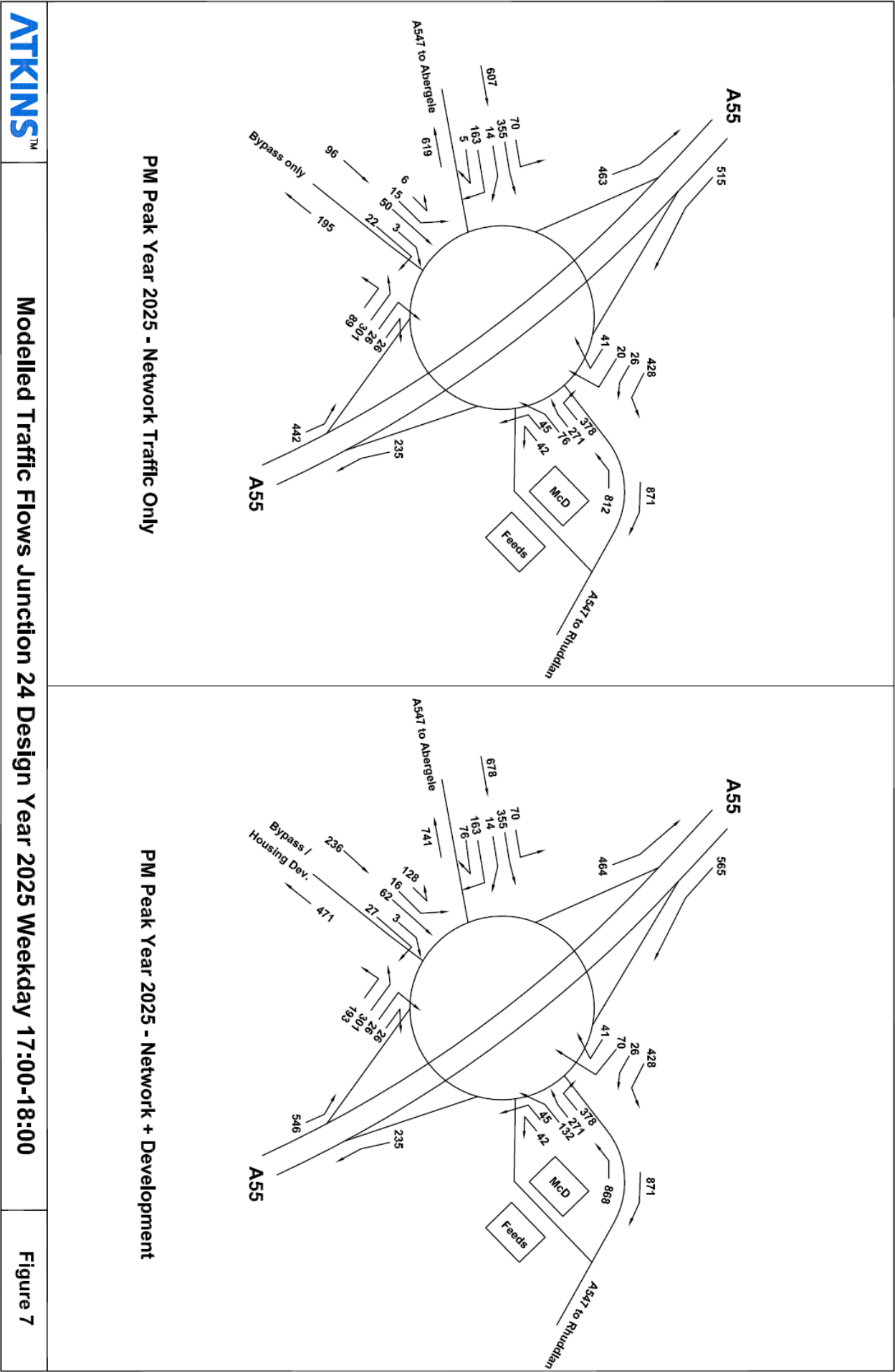
ATKINS™

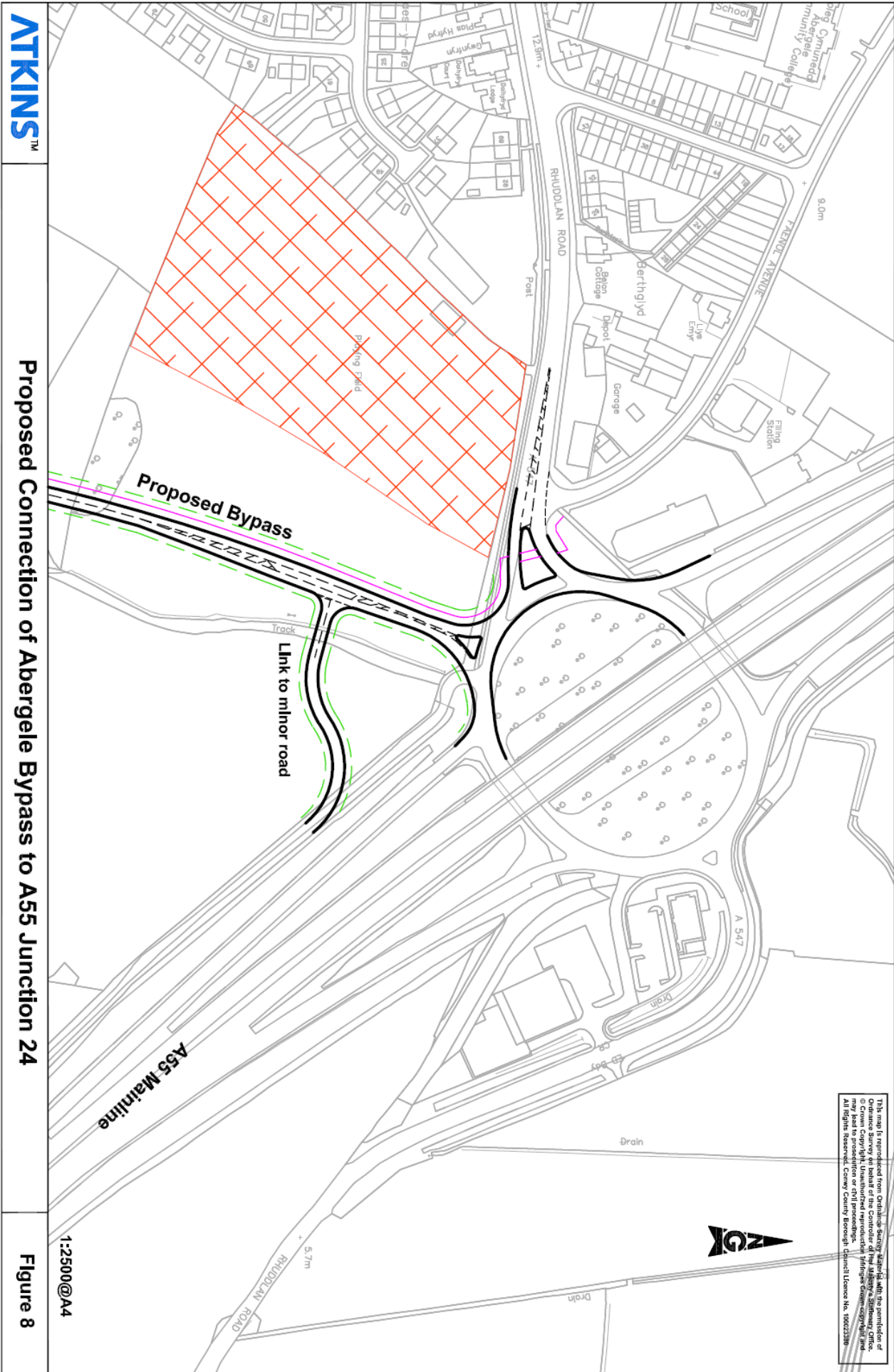
A55 Junction 24 Year 2010 Weekday 08:00-09:00

Figure 4



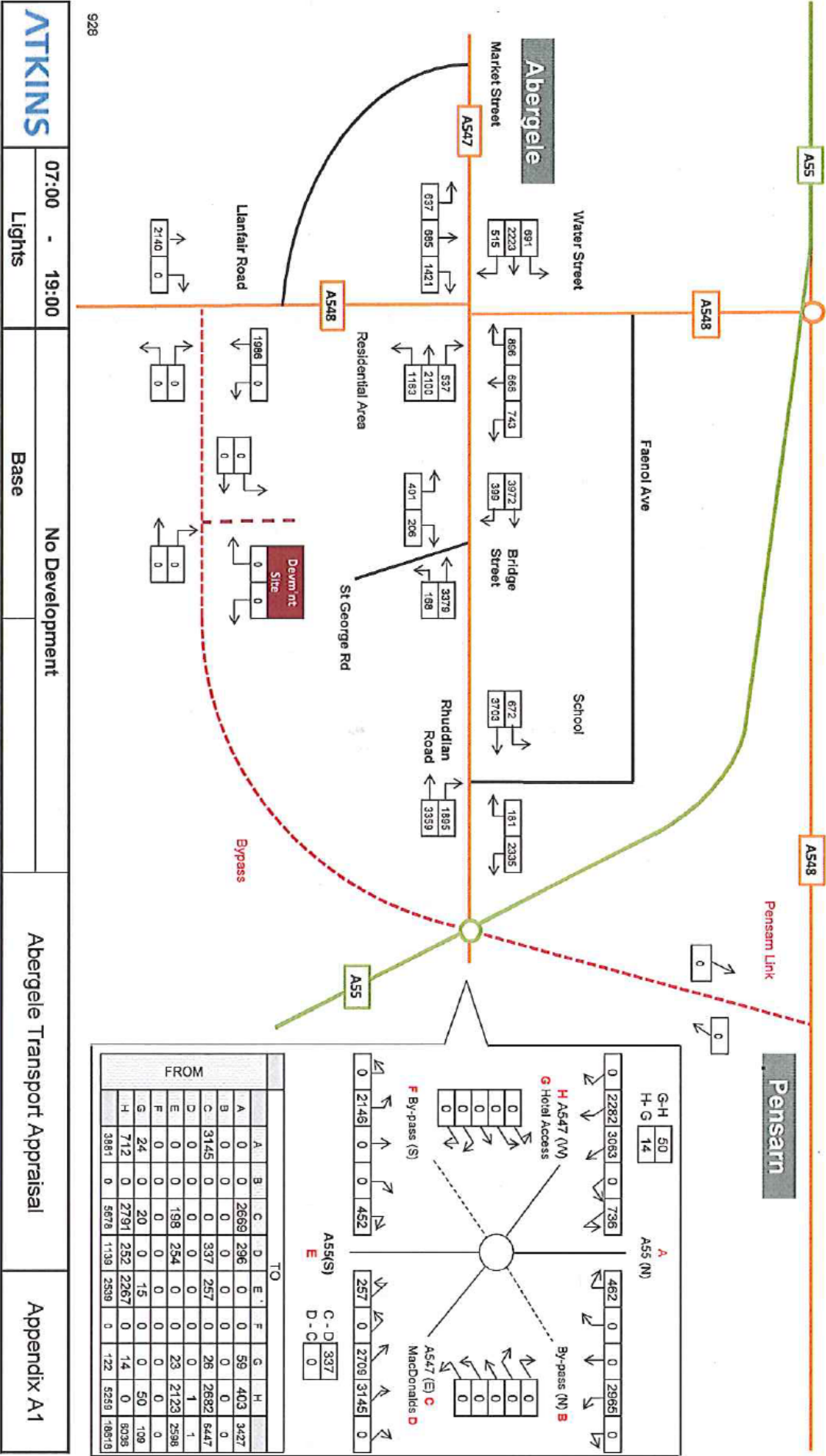


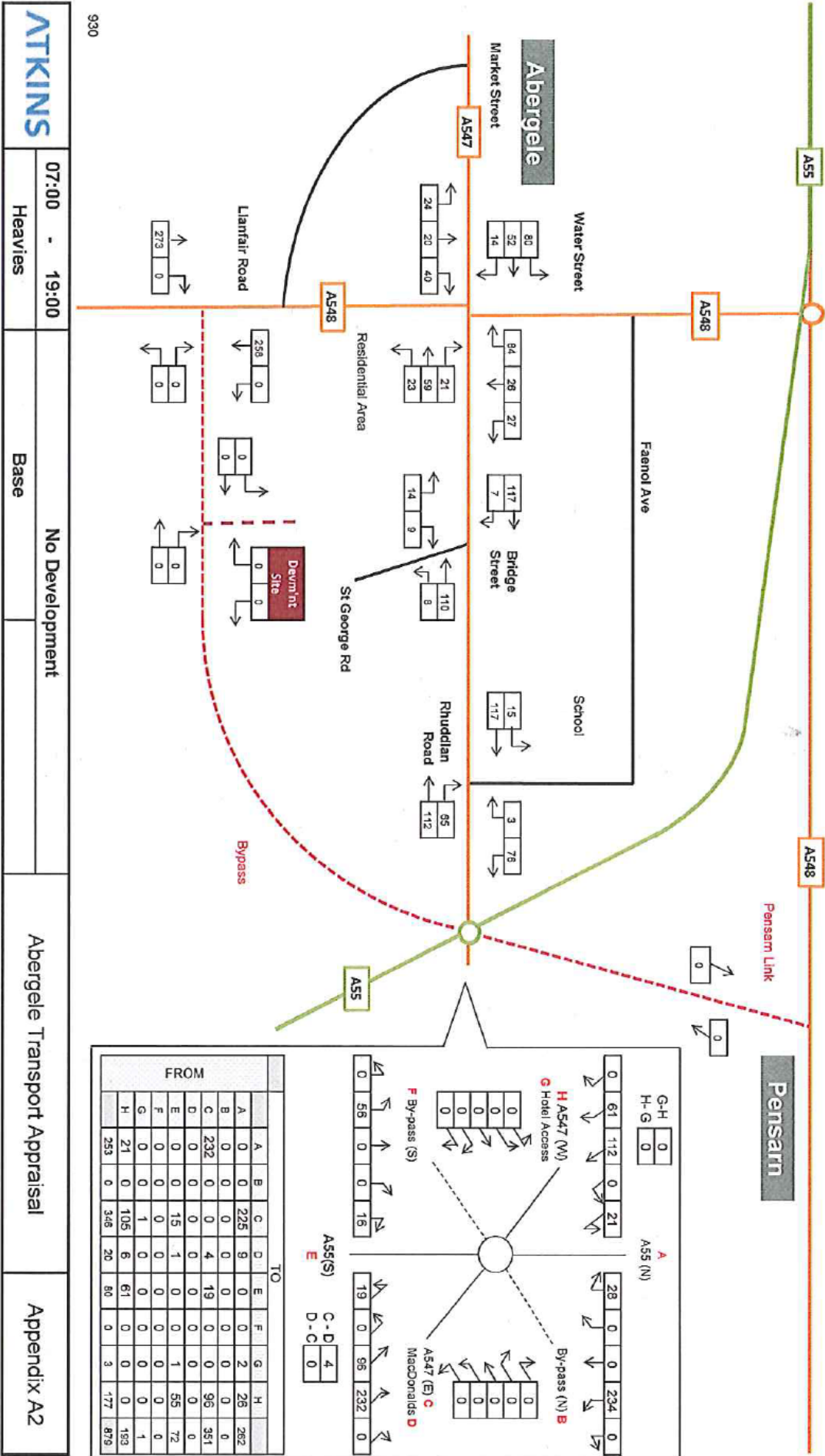


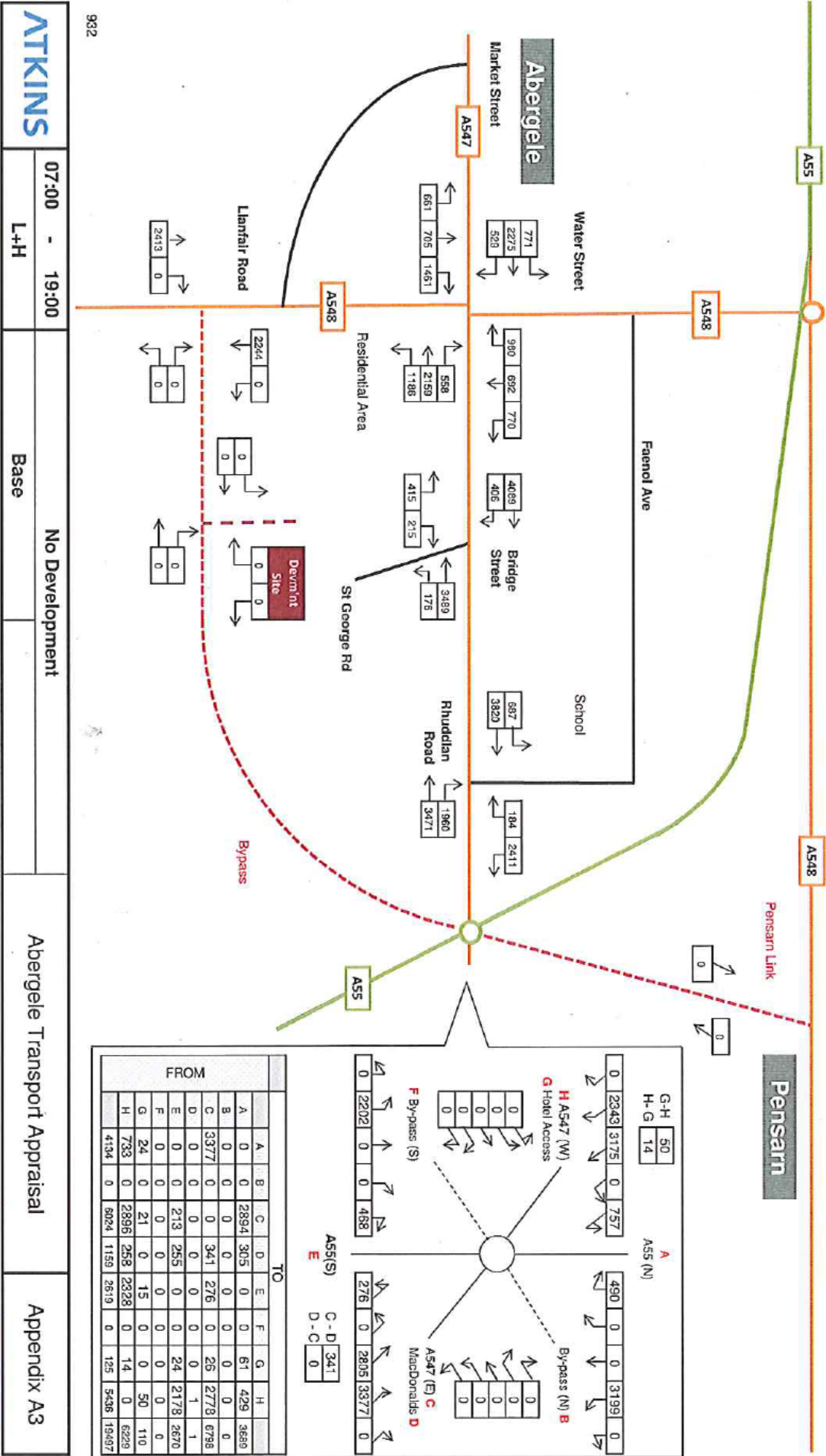


APPENDIX A

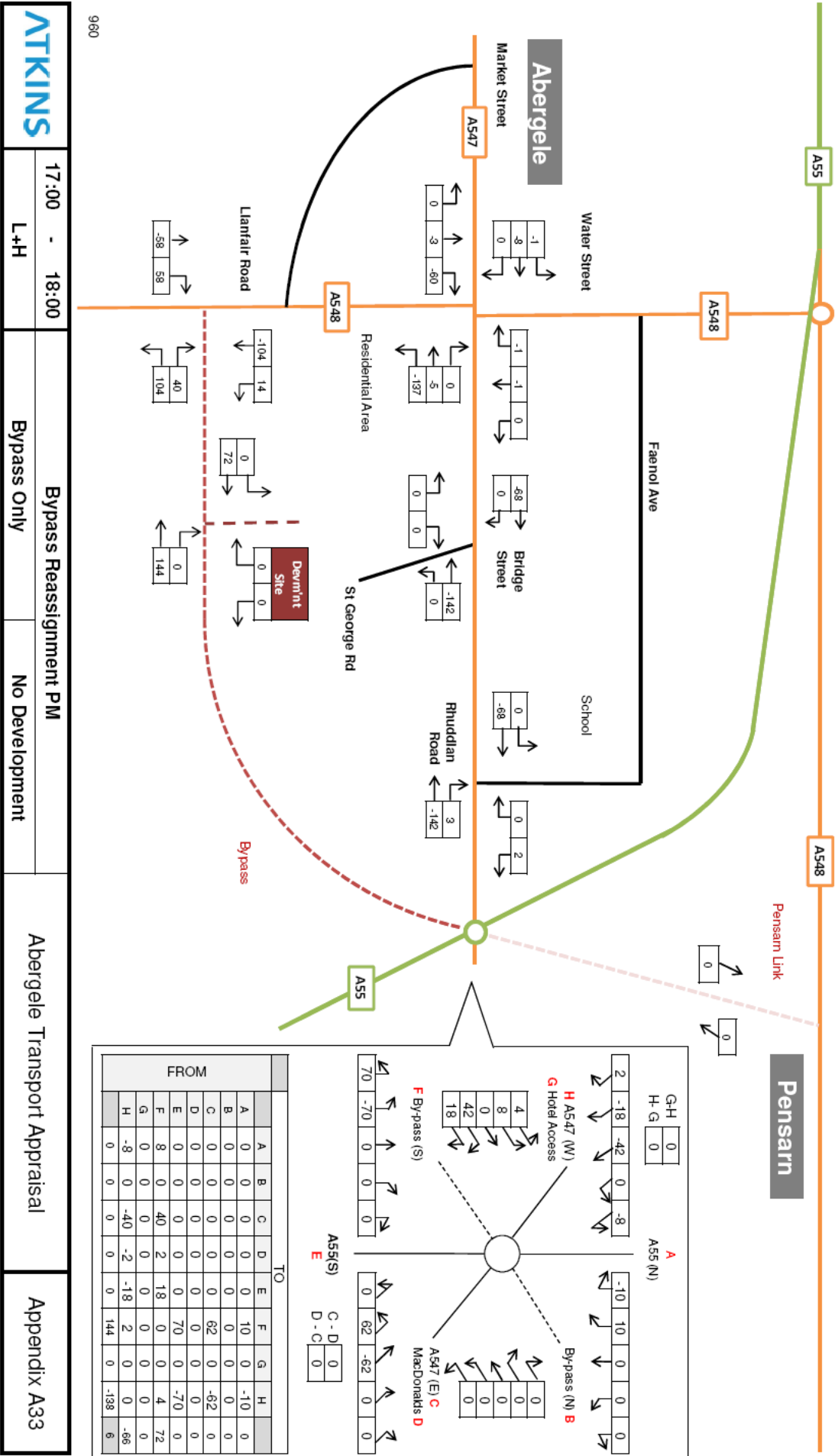
TRAFFIC ASSIGNMENT DIAGRAMS

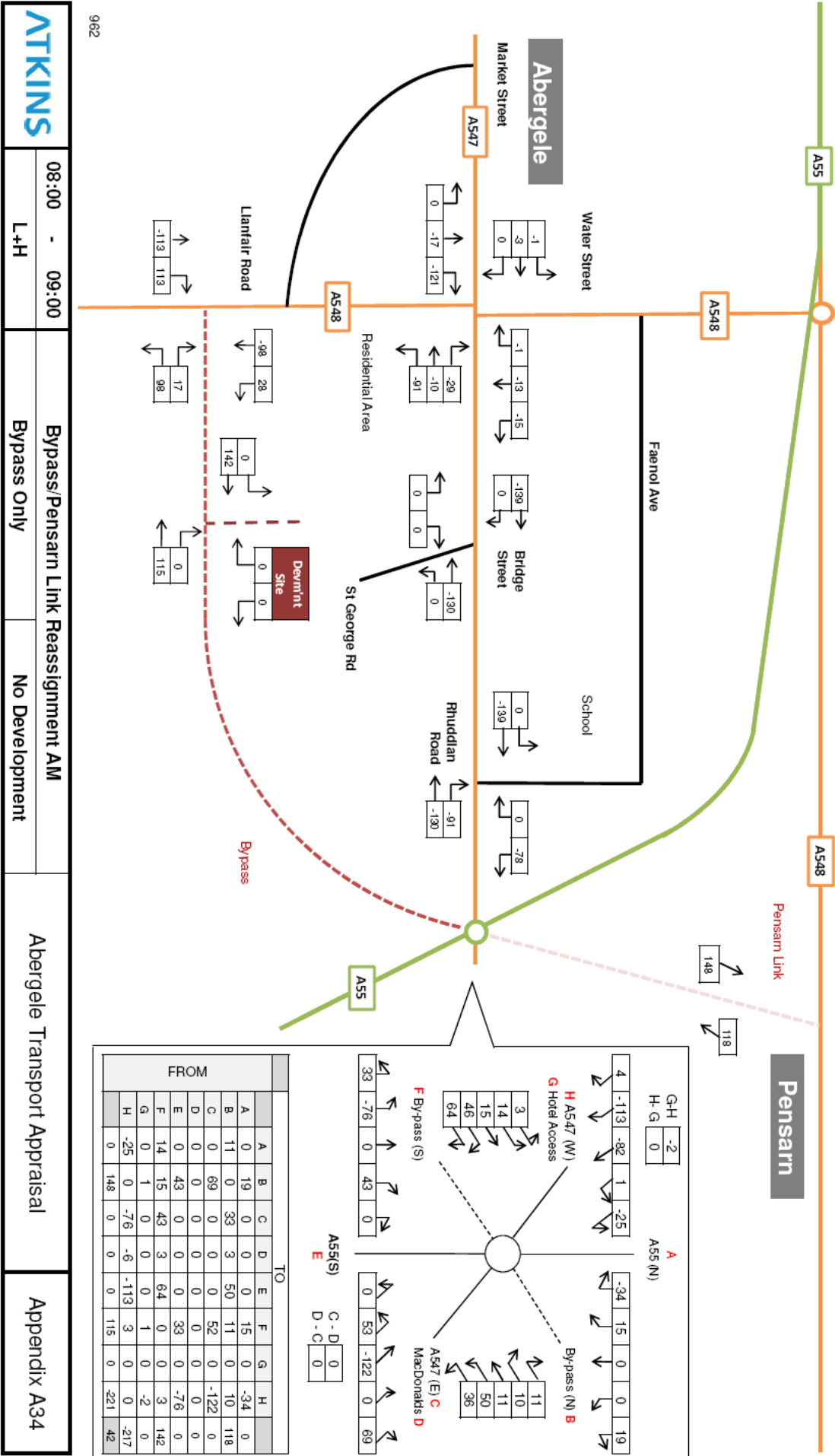


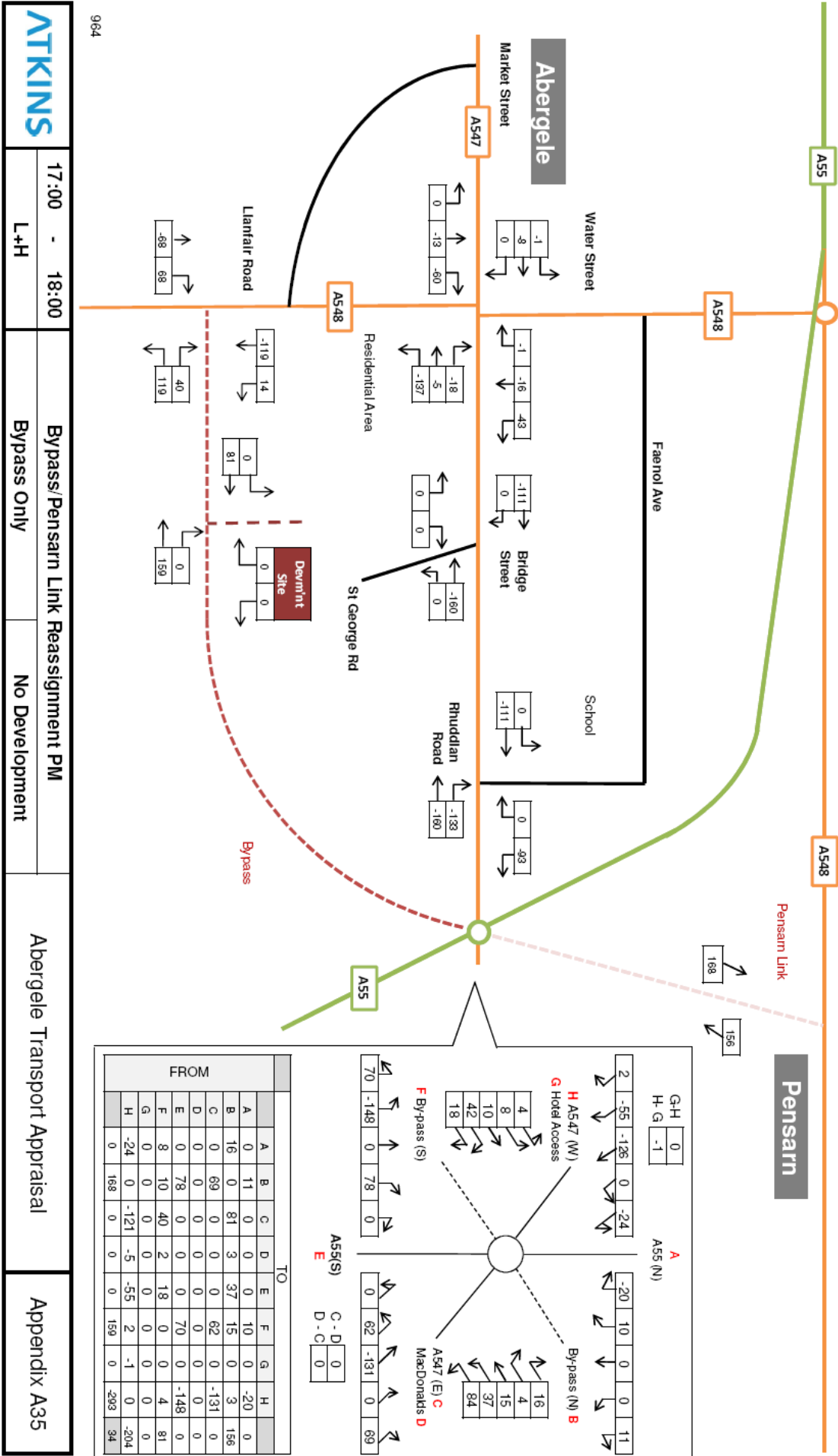


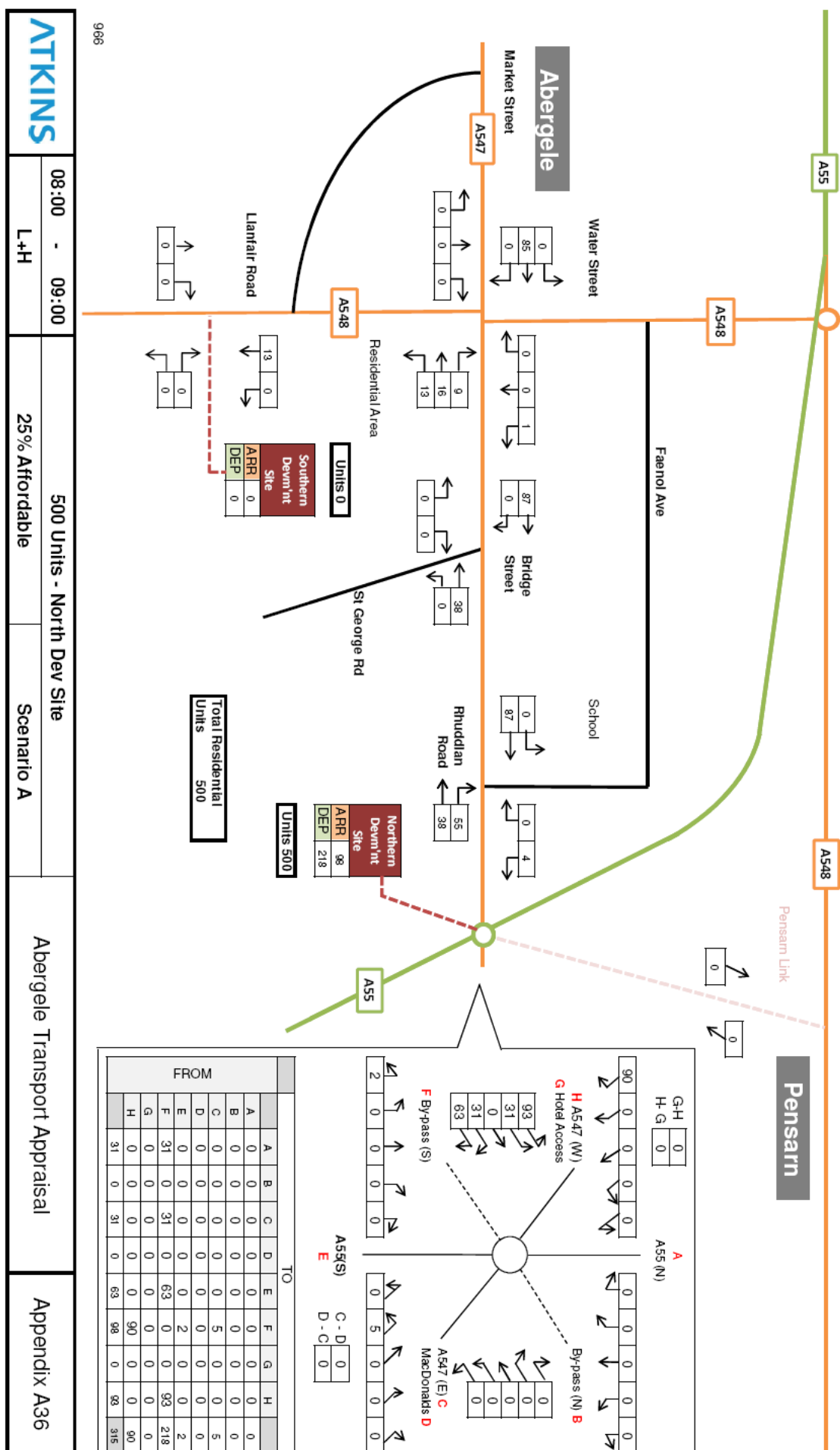


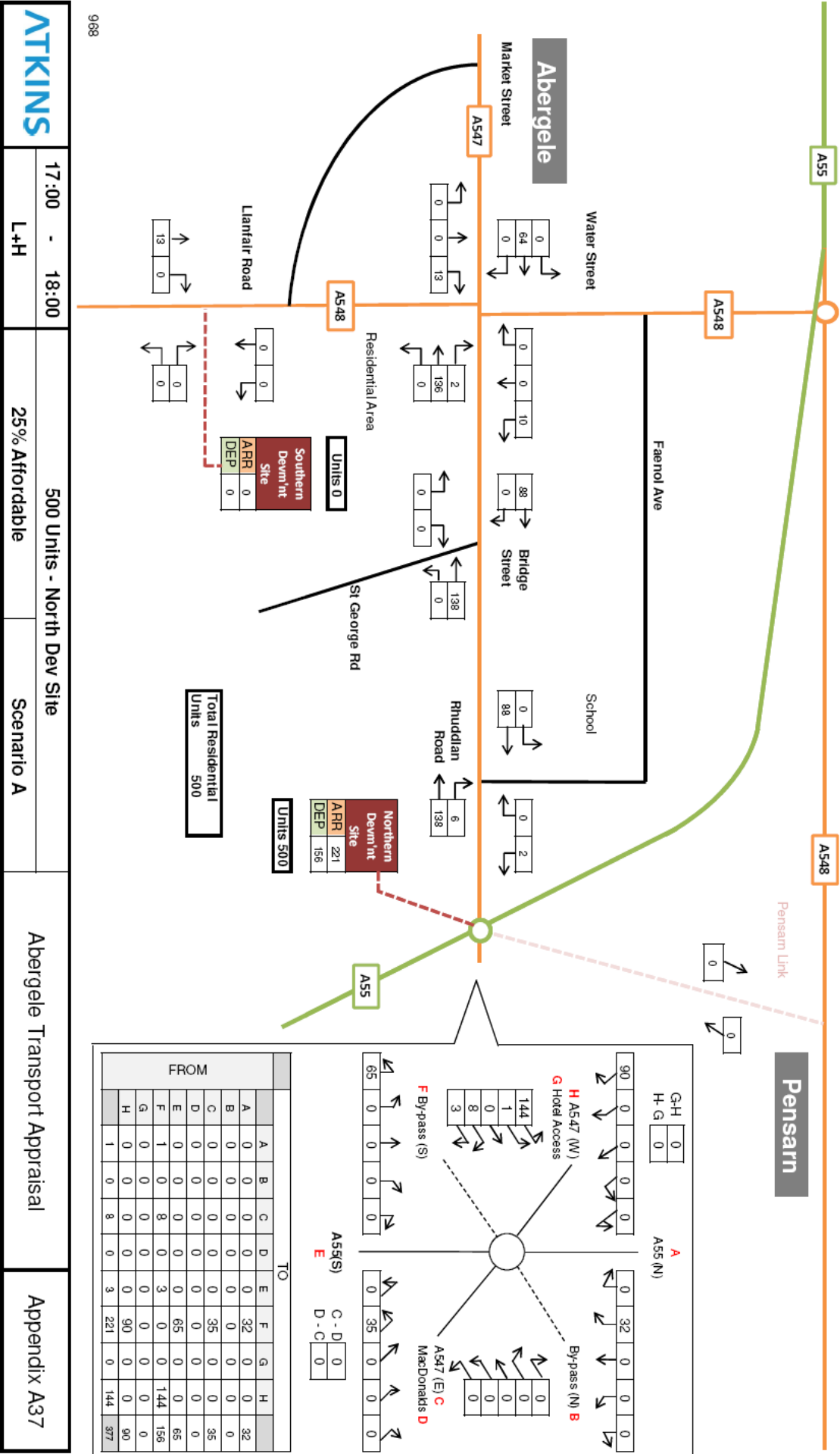
ATKINS	07:00 - 19:00		No Development		Abergele Transport Appraisal	Appendix A3
	L+H	Base				

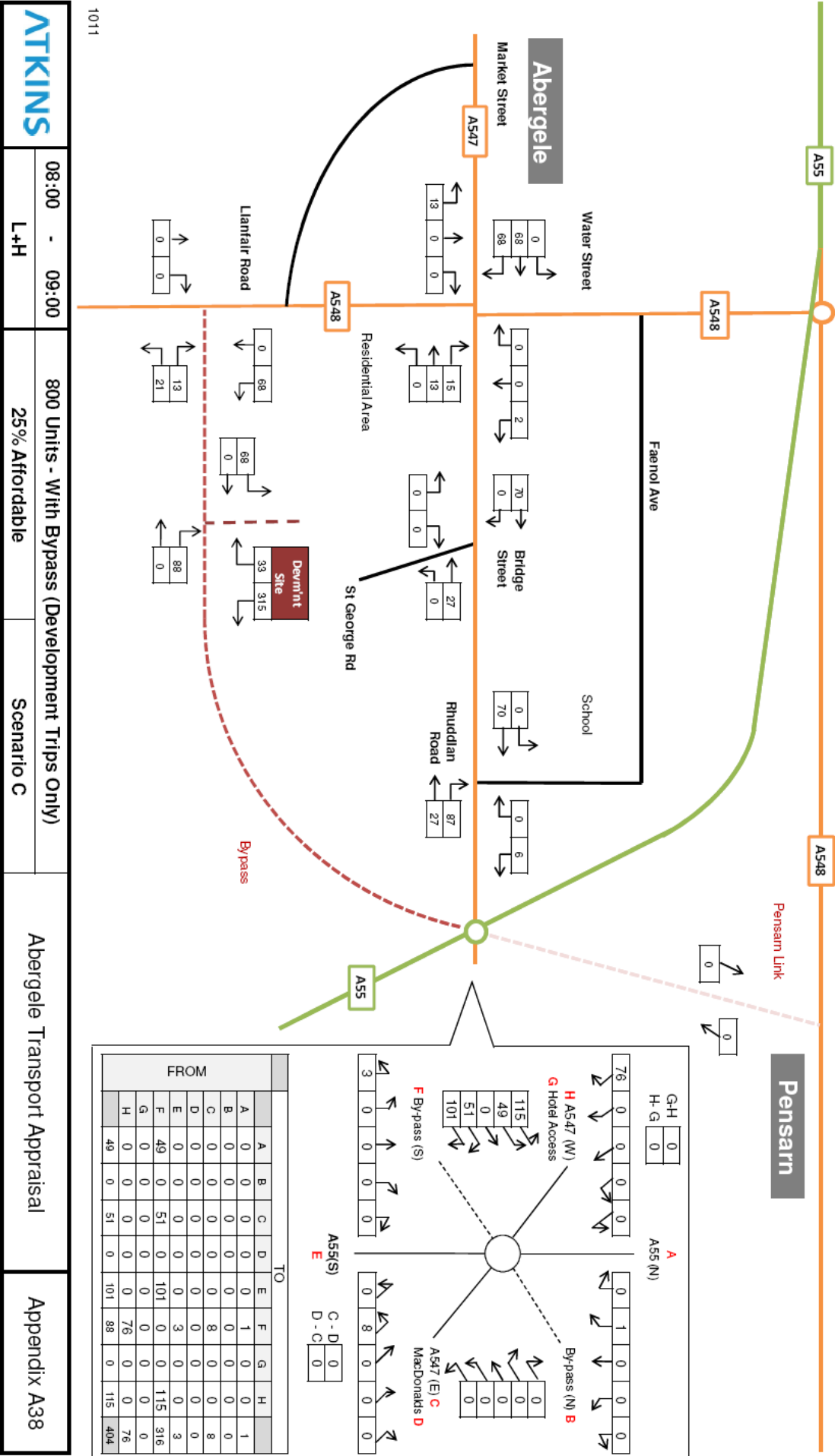






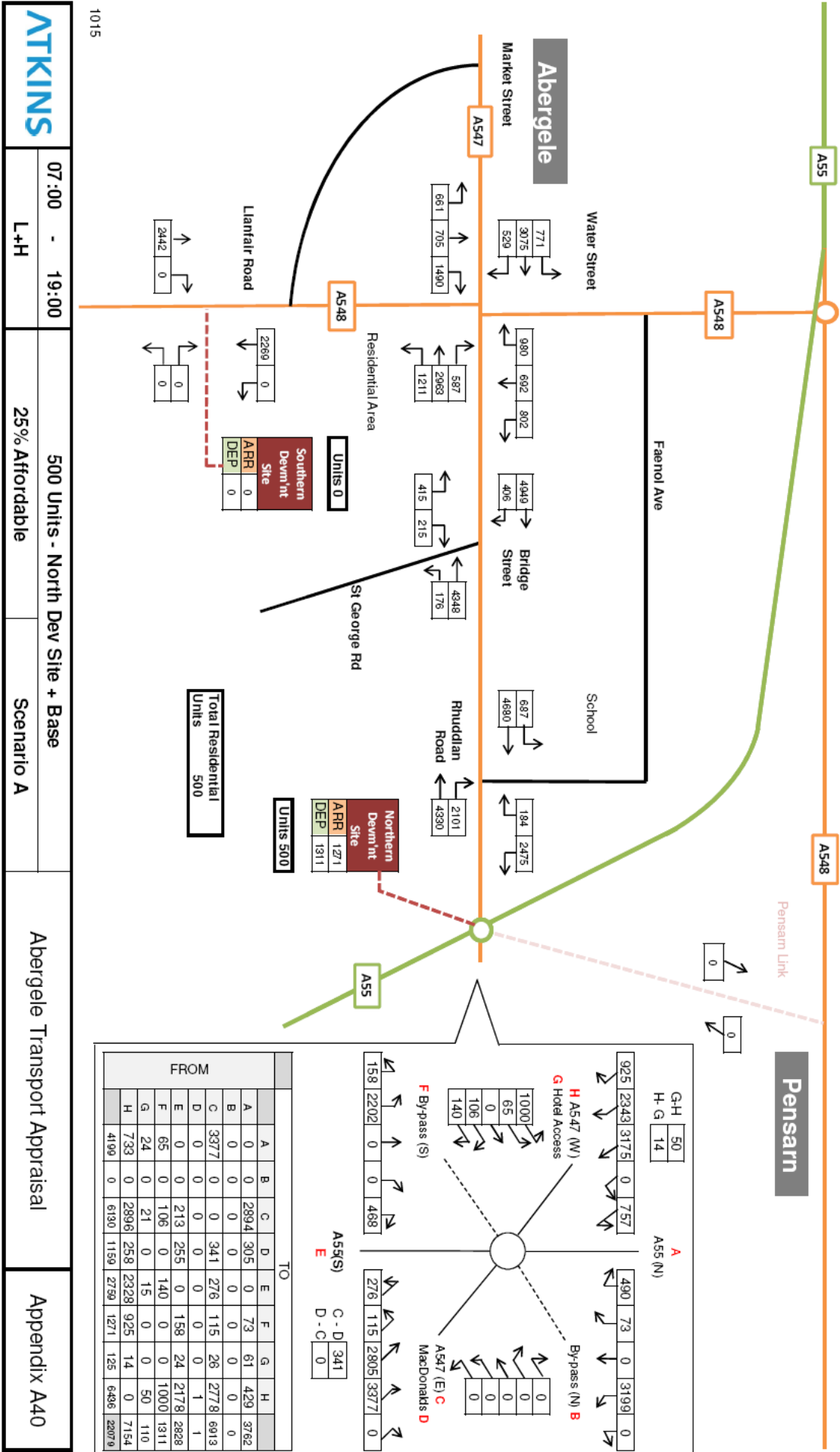


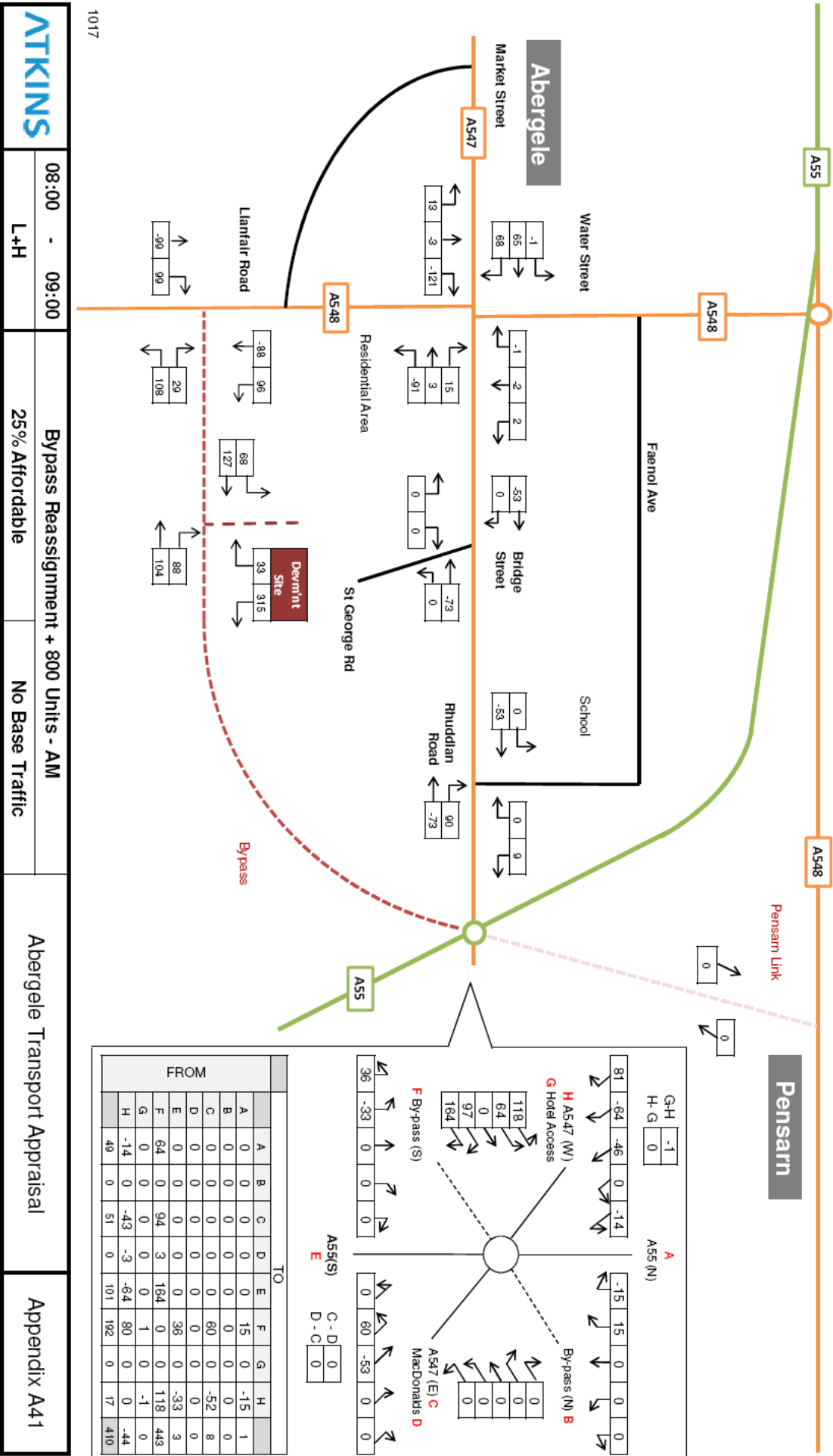






ATKINS	17:00 - 18:00	800 Units - With Bypass (Development Trips Only)		Abergele Transport Appraisal	Appendix A39
	L+H	25% Affordable	Scenario C		





ATKINS	08:00 - 09:00	Bypass Reassignment + 800 Units - AM	Abergele Transport Appraisal
	L+H	25% Affordable	No Base Traffic

