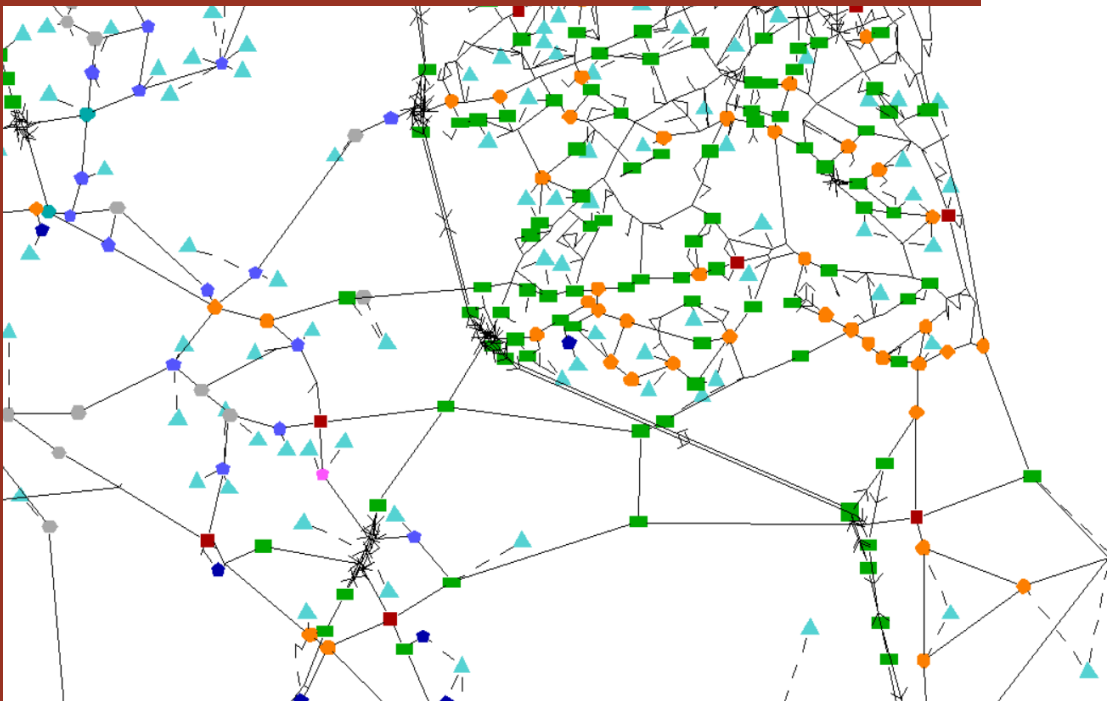
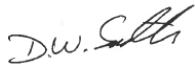




## Sunderland Local Plan

Assessment of Transport Impacts -  
Addendum Two  
25 May 2018



## Quality Management

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# 1. Introduction

## 1.1 Background

- 1.1.1 Capita were initially commissioned by Sunderland City Council (SCC) in 2017 to undertake a transport impact assessment of the proposed Local Plan development allocations, contained within the Core Strategy and Development Plan (CSDP). This has modelled the impacts of the proposed new developments on the local and trunk road network using the Sunderland Highway Model (SHiM), utilising the SATURN modelling suite.
- 1.1.2 The methodology employed for assessing the impacts of the new developments within the model, as well as results were first detailed in the '*Sunderland Local Plan: Initial Assessment of Transport Impacts Report*', produced by Capita dated April 2017.
- 1.1.3 A year on, Sunderland City Council have further revised the CSDP. Two changes have been tested, for which two supporting Addendum Reports have been produced, - this being the second – including:
- **Addendum One** – assessing the impact of a series of revised land allocations including consideration of potential housing sites contained within the Strategic Housing Land Availability Assessment (SHLAA) as well as the Employment Land Review (ELR); and
  - **Addendum Two** – assessing the impact of additional highway mitigation measures identified through a sifting process to support the wider highway network.
- 1.1.4 Both Addendum Reports test the impacts of the changes within the model and output results are presented in a similar format. In this most recent update to the CSDP, SCC have identified a total of six mitigation measures including:
- A19 junction improvements and City Way dualling.
  - Doxford Park / Ryhope Link Road and localised junction improvements.
  - Ryhope Street South / Bevan Avenue signalisation.
  - SSTC5 and localised junction improvements.
  - A19S off-slip / Parkside south traffic signal optimisation.
  - Parkside South / West Park traffic signal optimisation.
  - SSTC3 and localised junction improvements.
  - A182/B1286 Link Road.
- 1.1.5 Testing of the proposed highway mitigations has been phased in line with the previous approach to allow ease of comparison.
- 1.1.6 This Addendum Report therefore provides an update on the results of the modelling exercise first produced in April 2017. It sets out the mitigation measures proposed and presents the results of the modelling exercise in the form of junction capacities across Local Authority Area.

## 1.2 Structure of Report

1.2.1 This Addendum report includes the following sections:

- Section 1: Introduction;
- Section 2: Modelling Assumptions;
- Section 3: Mitigation Measures Assessed;
- Section 4: Modelling Outputs & Impacted Junctions; and
- Section 5: Summary & Conclusion

1.2.2 Supporting Appendices to this Addendum Report are presented at the rear of the document.

## 2. Modelling Assumptions

### 2.1 Introduction

2.1.1 This section of the report outlines the assumptions used in the assessment of the additional mitigation measures coded into the model. It also gives an overview of the development of 'with' and 'without' mitigation measures assessed and outlines how these have been coded.

### 2.2 Modelling Year Scenarios

2.2.1 The modelling of the future year scenarios that have been assessed as part of this second Addendum Report includes the following:

- Phase 0: is the reference year scenario which includes committed developments and traffic growth in the year zero (0) to year five (5) with highway mitigation measures;
- Phase 1: includes phase 0 with the committed developments and traffic growth in years six (6) to eleven (11) with highway mitigation measures;
- Phase 2: include phase 0 and phase 1 with the committed developments and traffic growth in years twelve (12) to year fifteen (15) with highway mitigation measures; and
- Phase 3: is the full plan period which includes phases 0 to 2 with the committed developments and traffic growth for the sixteen (16) seventeen (17) years with highway mitigation measures.

2.2.2 As a basis for comparison, the assessment of the "No Mitigation" forecast models presented in the first Addendum report are included within **Section 4** of this report.

### 2.3 Reference Case Scenario (No Mitigation)

2.3.1 The reference case scenario, developed as part of Addendum One, includes developments which have planning permission and live applications that are likely to be granted planning approval. Other developments that are likely to gain planning permission and be considered by 2033 have been included where information was available. This is not prejudicial to the planning process and is based on guidance on uncertainty as defined by guidance outlined in Table A2 in '*WebTAG Unit M4 Forecasting and Uncertainty*'.

2.3.2 The additional phases include traffic demand for a mix of development types, such as residential, employment, leisure, and retail, and consists of the following assumptions:

- Developments which have been completed between 2011 and 2016;
- Developments which have been granted planning permission (committed development); and
- All developments where a planning application has been submitted to the Local Authority as of May 2016, which have not yet been determined but are likely to be granted planning approval.

2.3.3 Further details of the developments included are outlined in the '*Sunderland Local Plan: Assessment of Transport Impacts – Addendum (One)*' produced issued on the 16th April 2018.

## 2.4 Sifting & Identification of Schemes Assessed

- 2.4.1 Capita have identified several required junction-based mitigations from previous assessment work in SATURN. This informed the development of a 'long-list' of areas for improvement.
- 2.4.2 However, Sunderland City Council, as part of the Local Plan and other pipeline works, has already identified several mitigations and larger schemes required to support further growth in Sunderland. Therefore, both scheme lists were cross-checked to ensure no duplication of scheme.
- 2.4.3 Six schemes were therefore identified and required further assessment using the SATURN model. These are presented in **Section 3** of this report.

## 2.5 With Mitigation Measures Scenario

- 2.5.1 The 'With Mitigation Measures' scenario includes the highway infrastructure as outlined in **Section 1.1.4** of this report. Further details of the individual schemes and their locations is illustrated in the following **Section 3** of this report.
- 2.5.2 Detailed simulation coding of the mitigation scheme has been undertaken using the existing coding conventions outlined in the Local Model Validation Report (LMVR) for the scheme. Therefore, link capacities, saturation flows and all other coding has been undertaken in line with the original approach.
- 2.5.3 Trip demands have not been adjusted from those as previously reported in Addendum One. User classes in the model therefore represent the following five demand classes:
- Car: Commuter users
  - Car: Business Users
  - Car: 'Other' User
  - LGV Business Users
  - HGV Business Users
- 2.5.4 The six network interventions have been coded as a several INCLUDE files within the overall SATURN data file.
- 2.5.5 SATURN networks are built around a main SATURN .dat file with corresponding INCLUDE files for each section of the dat file, in line with best practice and reflective of the layout of the SATURN manual (see Chapters 6 for dat file structure and Chapter 16 for examples). The coding conventions for the model are presented in **Table 1** overleaf.
- 2.5.6 Further disaggregation of the "11111" section therefore allows the different elements of the network to be easily updated or amended, and any forecast network mitigations to be included or excluded easily, or a combination of these. The proposed 7 network mitigations have been coded into the model as the following separate 'INCLUDE' files:
- Simulation Coding - 11111\_Additions.dat
  - Zone Connector revisions: 22222\_AdditionsZones.dat
  - XY Coordinates (Nodes): 55555\_AdditionsNodes.dat
  - XY Coordinates (Zones): 55555\_AdditionsZones.dat
  - Bus pre-loads): 66666\_Sunderland\_FutureBus\_XX.dat
- 2.5.7 As bus network pre-load routes were affected by the revisions to the network, these were reviewed and updated for each time period.
- 2.5.8 Furthermore, it was noticed that SSTC Phase 4 (New Bridge to A19) has not been previously coded as part of the model, therefore this was also coded as part of the commission, but not included within the assessment outputs, therefore allowing future assessment of this element of the scheme if required.



**Table 1 SCC SHIM Coding Structure**

Coding	SATURN Coding Section	Example	Convention	Applicable to:
Main .dat File	N/A	SHIM_AM_2015_BY_A	<ul style="list-style-type: none"> <li>• scheme identifier,</li> <li>• time period,</li> <li>• Year,</li> <li>• “Base Year”, or in the forecasts DM, DS etc...</li> <li>• model version identifier (user prescribed)</li> </ul>	N/A
INCLUDE Files	00000	00000_PARAMS.DAT	SATURN parameters	All time periods, variable by year
	11111	11111_PJNCTS.dat	Simulation coding of detailed junctions	All time periods, variable by year
		11111_SIGS_AM.dat	Simulation signal coding, interchangeable between time periods	Variable by time period/year
	22222	22222_SIMCONS	Simulation connectors	All time periods, variable by year
	33333	33333_BUF_AM	Buffer coding	Variable by time period/year
		33333_CAPINDEX	Speed flow curve relationships	All time periods, variable by year
	44444	44444_HGVRES	HGV restrictions	All time periods, variable by year
	55555	55555_COORDS	XY coordinates of node/zone locations	All time periods, variable by year
	66666	66666_BUSROUTES_AM	Optional coded bus preloads	Variable by time period/year
		66666_JTR_AM	Optional coded journey time routes	Variable by time period/year
	77777	77777_LINKCOUNTS_AM	Optional included link count information	Variable by time period/year
88888	88888_Costs	PPM and PPK values for all defined user classes	Variable by time period/year	

## 2.6 Summary

2.6.1 This section has outlined how the with and without mitigation measures scenarios have been developed

2.6.2 The following section of the report outlines the locations and coding of each of the mitigation measures.

## 3. Mitigation Measures Assessed

### 3.1 Introduction

3.1.1 This section of the report outlines the six mitigation measures identified from the sifting exercise and gives further details of their locations.

### 3.2 Identified Mitigation Measures

3.2.1 Schemes were agreed with Planning Officers at Sunderland City Council. **Table 2** lists the scheme location, the agreed potential highway mitigation and whether this is contained within an existing Sunderland City Proposed scheme.

**Table 2 List of proposed Mitigation schemes**

	Junction Name	Potential Major Highway Mitigation	Council Identified Schemes
1	Doxford Park Way / Silksworth Way	Doxford Park Way/City Way junction to Monarch Way, the carriageway has 1 lane and cannot accommodate additional traffic. Creating an additional lane from Doxford Park Way to Monarch Way would provide additional capacity.	A19/A690 junction improvements and City Way dualling.
2	Burdon Road / Burdon Lane	Increasing the number of lanes on Burdon Lane from 1 lane in each direction to 2 lanes in each direction, and the introduction of a signalised junction at this location to control higher traffic flows on this part of the network. Consideration could be given to bus/cycle provision along Burdon Lane.	Doxford Park / Ryhope Link Road and localised junction improvements.
3	Ryhope Street South / Bevan Avenue	Introduce traffic signal control.	Doxford Park / Ryhope Link Road and localised junction improvements.
4	St Alban's Street / Commercial Road	Increase the number of lanes or build a flare on Alban's Street approach.	SSTC5 and localised junction improvements.
5	A19S off-slip / Parkside south	Traffic signal optimisation.	A690 / A19 junction improvements.
6	Parkside South / West Park	Traffic signal optimisation.	A690 / A19 junction improvements.
7	Committed Highway Scheme		SSTC3
8	Committed Highway Scheme		A182/B1286 Link Road

- 3.2.2 Before coding could commence, a review of the locations where the interventions were proposed was undertaken to ensure that these were within the modelled simulation area.
- 3.2.3 **Figure 1** illustrates the location of the schemes within the SATURN model.

**Figure 1 Location of schemes included in mitigation testing**



**KEY:**

- BLUE - A19/A690 Junction Improvements and City Way Dualling.
- RED - Doxford Park/Ryhope Link Road and Junction Improvements.
- YELLOW - Ryhope Street South / Bevan Avenue
- PINK - SSTC5 and localised junction improvements.
- GREEN - A19S off-slip / Parkside south & Parkside South / West Park improvements (both schemes)
- BLACK - SSTC3 and localised junction improvements
- PURPLE - A182/1286 Link Road

- 3.2.4 Further details of the coding of the six schemes are provided in the following sub-sections.

### 3.3 A19/A690 Junction Improvements and City Way Dualling.

- 3.3.1 **Figure 2** illustrates the location of the A19/A690 and City Way Dualling scheme. This includes the upgrading of the carriageway along City way from single to dual carriageway.

**Figure 2 Location of A19/A690 & City Way Dualling Scheme**

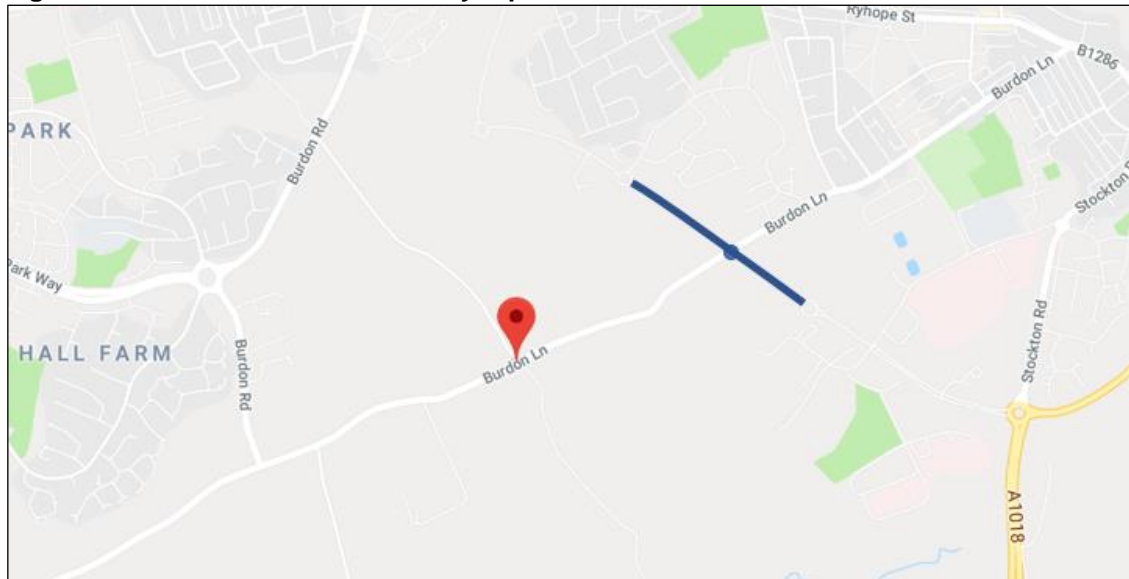


- 3.3.2 This was coded utilising the existing coding within the SATURN model. Nodes were extracted for the highlighted link sections above, and the following adjustments were made:
- Number of lanes increased on links; and
  - Junction lane allocations and turning movements updated.

### 3.4 Doxford Park/Ryhope Link Road and Junction Improvements.

- 3.4.1 **Figure 3** illustrates the location of the Doxford Park/Ryhope Link road scheme and associated junction on Burdon Lane. Note that within the model, this includes the full link road from the A1018 to Doxford Park Way.

**Figure 3 Location of Doxford Park/Ryhope Link Road Scheme**



- 3.4.2 This was coded utilising the existing coding within the SATURN model, however with the inclusion of several new links and nodes. The following information was applied in the coding:
- The new junction on Burdon Road was coded as a roundabout, with standard geometries for a junction of this type;
  - Coordinates were extracted from GIS and used in the model; and
  - Distances were extracted from GIS and compared to the “Crow flies” distance within the model for accuracy. Whilst the alignment of the road may not be straight, this still provides a good ‘logic check’ of the values applied.
- 3.4.3 For the existing nodes, the following coding was updated within the INCLUDE file:
- Link distances amended for the intersecting junction;
  - Zone centroid connectors amended to simulation nodes where required; and
  - Junction lane allocations and turning movements updated.

### 3.5 Ryhope Street South/Bevan Avenue Signalisation

3.5.1 **Figure 4** illustrates the location of the proposed Ryhope Street South/Bevan Avenue Signalisation (highlighted in **blue**).

**Figure 4 Location of Ryhope Street South/Bevan Avenue Signalisation scheme**



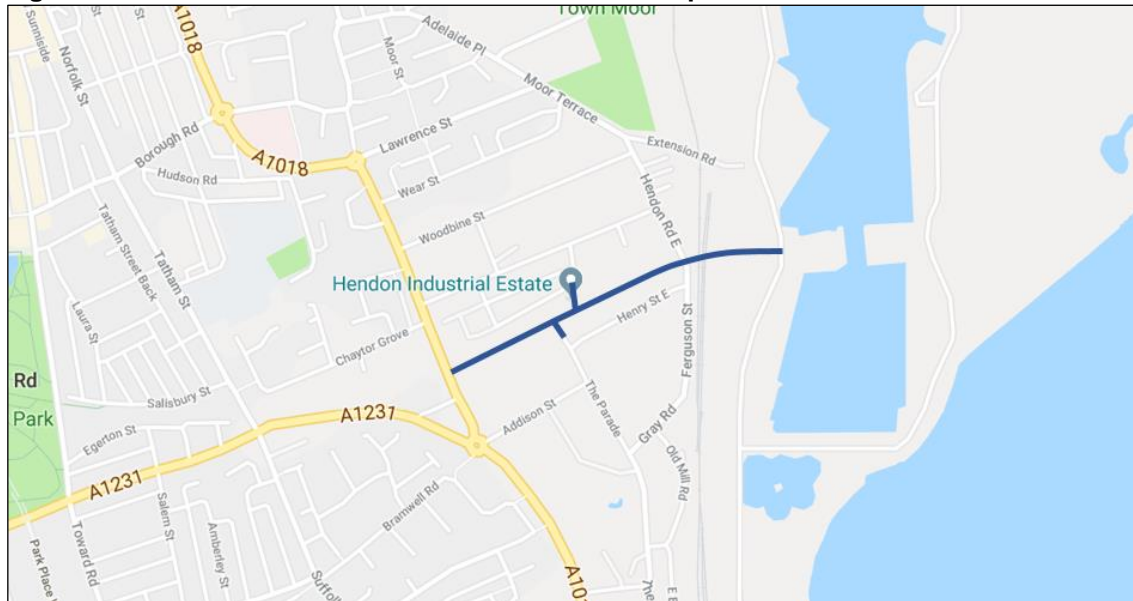
3.5.2 This junction was coded utilising the existing coding within the SATURN model. This was coded as a single node (priority junction), therefore the following adjustments were made:

- Change node type to 'signal';
- Revise junction coding accordingly for standard signal junction;
- Coded with a 120 second cycle time; and
- Typical 3 phase movement coded, with flow weighted signal times for each.

### 3.6 SSTC5 and localised junction improvements.

- 3.6.1 **Figure 5** illustrates the location of the proposed Sunderland Strategic Transport Corridor Phase 5, the final phase of the SSTC programme linking the port to the rest of the highway network within Sunderland.

**Figure 5 Location of SSTC5 and Localised Junction Improvements Scheme**

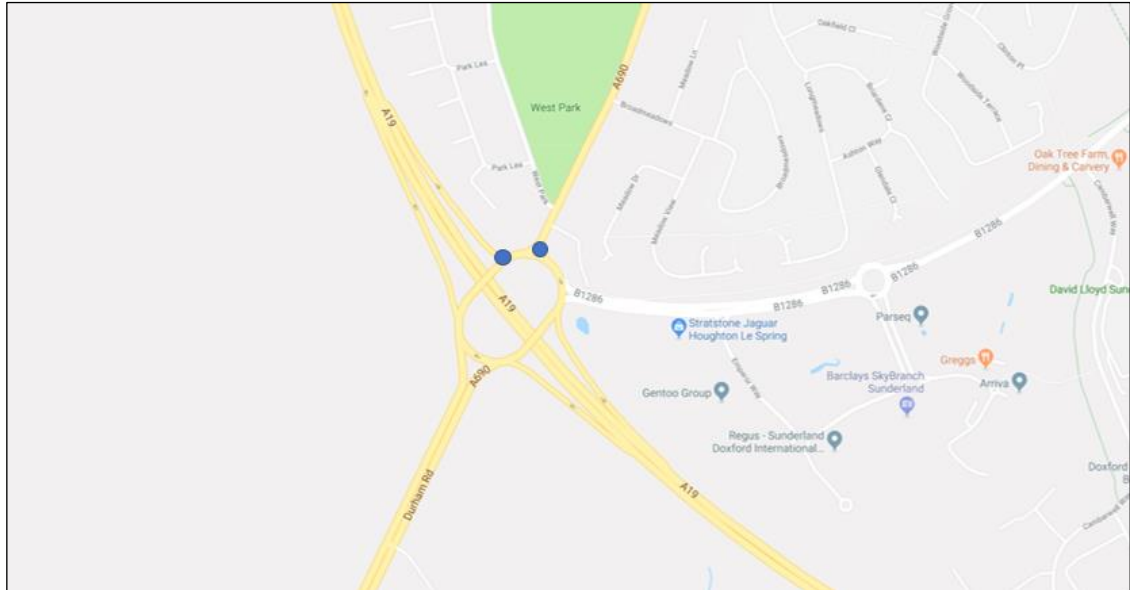


- 3.6.2 This was coded utilising the existing coding within the SATURN model, however with the inclusion of several new links and nodes. The following information was applied in the coding:
- Two new priority 'T' junctions on the new SSTC5 Link Road, tying into the existing roads adjacent to the scheme. Both were coded as single lane, standard arrangement geometries;
  - Splitting of the link representing the A1018, with a new node and junction arrangement coded;
  - Coordinates were extracted from GIS and used in the model; and
  - Distances were extracted from GIS and compared to the "Crow flies" distance within the model for accuracy. Whilst the alignment of the road may not be straight, this provides a good 'logic check' of the values applied.
- 3.6.3 For the existing nodes, the following coding was updated within the INCLUDE file:
- Link distances amended for the intersecting junction on the A1018;
  - Zone centroid connectors amended to simulation nodes where required; and
  - Junction lane allocations and turning movements updated.

### 3.7 A19/A690 Junction Signal Optimisation

3.7.1 **Figure 6** illustrates the location of the proposed A19/A690 roundabout signal improvements.

**Figure 6 Location of A19/A690 Junction Signal Optimisation Scheme**



3.7.2 This junction was coded utilising the existing coding within the SATURN model. Both nodes were already coded as signalised junctions, platooning the traffic from the A19 off slip around the roundabout which is coded as an exploded grade-separated junction, as is illustrated in **Figure 1**.

3.7.3 Selective signal optimisation was used within SATURN, utilising the SIGOPT and SELECT parameters in all models.

3.7.4 SIGOPT allows the optimisation of signal timings within the assignment processes of model, effectively optimising the signal times to the flow.

3.7.5 SELECT within SATURN is a sub-parameter of SIGOPT which allows only selected signalised nodes to be optimised within the model assignment.

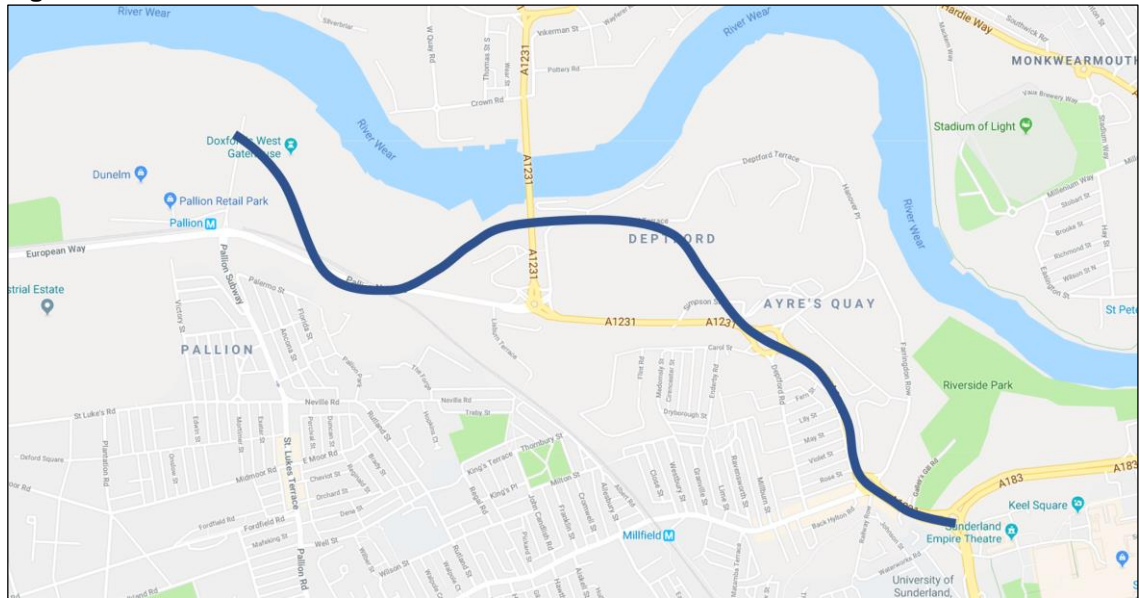
3.7.6 A further parameter, SATOFF related to signal phases was not used.

### 3.8 SSTC 3 and localised Junction Improvements

3.8.1 **Figure 7** illustrates the location of the Sunderland Strategic Transport Corridor Phase 3 scheme.



**Figure 7 Location of SSTC3 Scheme**



3.8.2 This was coded utilising the existing coding within the SATURN model, however with the inclusion of several new links and nodes. The following information was applied in the coding:

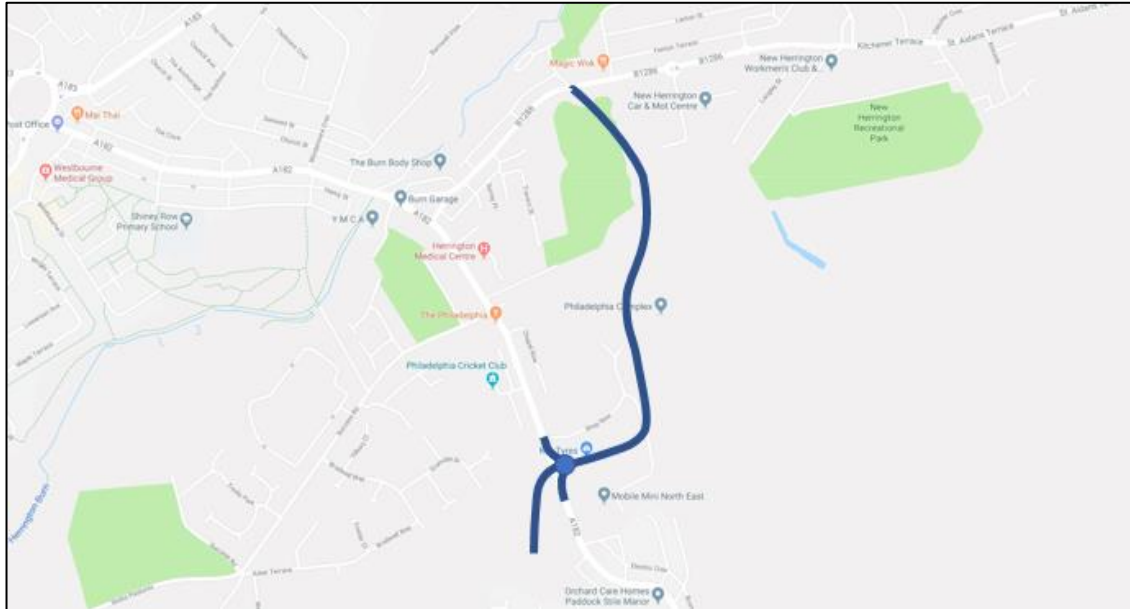
- Joining the new links into the existing junctions and updating of coding
- Coordinates were extracted from GIS and used in the model; and
- Distances were extracted from GIS and compared to the “Crow flies” distance within the model for accuracy. Whilst the alignment of the road may not be straight, this provides a good ‘logic check’ of the values applied.

3.8.3 For the existing nodes, the following coding was updated within the INCLUDE file:

- Link distances amended for the junctions affected;
- Zone centroid connectors amended to simulation nodes where required; and
- Junction lane allocations and turning movements updated.

### 3.9 A182/B1286 Link Road

3.9.1 **Figure 8** illustrates the location of the A182/B1286 Link Road, a committed developer funded scheme to enable the development of the surrounding land.

**Figure 8 Location of A182/B1286 Link Road Scheme**

3.9.2 This was coded utilising the existing coding within the SATURN model, however with the inclusion of several new links and nodes. The following information was applied in the coding:

- Updating of buffer network coding to simulation coding on the A182 and B1286 links
- Splitting of the links representing the A182 and B1286, with two new nodes and junction arrangement coded;
- Coordinates were extracted from GIS and used in the model; and
- Distances were extracted from GIS and compared to the “Crow flies” distance within the model for accuracy. Whilst the alignment of the road may not be straight, this provides a good ‘logic check’ of the values applied.

3.9.3 For the existing nodes, the following coding was updated within the INCLUDE file:

- Link distances amended for the intersecting junction on the A1018;
- Zone centroid connectors amended to simulation nodes where required (2 zones) with new spigot connectors; and
- Junction lane allocations and turning movements updated.

### 3.10 Summary

3.10.1 This section of the report has outlined the eight schemes coded and assessed within this Addendum Report.

3.10.2 The following section outlines the results of the assessment and provides a comparison to the reference case.

## 4. Modelling Outputs & Impacted Junctions

### 4.1 Introduction

4.1.1 This section of the report outlines the results of the assessment within SATURN and compares the with and without schemes for 223 junctions across the modelled area. Identification of junctions which continue to be over capacity are presented in the following section.

### 4.2 Ratio of Flow to Capacity

4.2.1 The Ratio of Flow to Capacity (RFC) of a highway link or a junction is one of the principal factors influencing queues and delays on the highway network. RFC is an indicator of the likely performance of a junction under a future year scenario incorporating future traffic demand.

4.2.2 An RFC of 85% (0.85) demonstrates that a junction will operate within capacity and with 15% spare capacity and an RFC of 86% (0.86) and above suggests a junction will operate within capacity but may experience capacity issues in the future. An RFC of 100%+ (1.00) indicates that a junction will operate beyond the design capacity and become oversaturated, highlighting that traffic delays and congestion will be more than likely at the junction.

4.2.3 RFC is therefore, a useful tool in helping to devise improvements that will enable a link or junction to operate without major queues and delays if it is predicted to become oversaturated.

### 4.3 Results

4.3.1 From the Sunderland Local Plan, a total of 13,604 residential units and 66 employment sites have been assessed over the four phases.

4.3.2 In the final Phase 3 of the Local Plan allocation, more than 10,000 trips and nearly 12,000 trips will be generated in the AM and PM peaks respectively. This additional volume of traffic will have a significant influence on traffic conditions within the city.

4.3.3 The following sections present the assessment for both with and without the mitigation measures in place, with a comparison for ease.

### 4.4 Phase 0 Results

4.4.1 With the addition of 2,000 – 3,000 assumed trips during the morning and evening peak hours the number of junctions predicted to operate beyond capacity rises to 10-11 during both peaks.

4.4.2 **Table 3** outlines the results for both the with and without mitigation scenarios. The comparison of both schemes indicates where junction RFCs have reduced (highlighted in **GREEN**) or increased (highlighted in **RED**). Absolute differences in RFC indicate the magnitude of the difference brought about.

**Table 3 Comparison of Results: 'Without Mitigation' vs 'With Mitigation': Phase 0**

Scenario:		Without Mitigation		With Mitigation		Absolute Difference	
Ref	Junction	AM	PM	AM	PM	AM	PM
1	A19 NB off-Slip/A1290 Downhill Ln	0.93	0.73	0.59	0.66	-0.33	-0.07
2	Sunderland Highway/A19	0.73	0.95	0.59	0.70	-0.14	-0.25
3	A19/A183 W	0.38	0.31	0.39	0.33	0.01	0.02
4	A19N on-slip/A183W	0.73	0.57	0.69	0.49	-0.04	-0.08
5	A19S off-slip/Parkside south	0.88	1.00	0.90	0.94	0.02	-0.05
6	A19N off-slip/Durham Rd	0.67	0.81	0.64	0.79	-0.02	-0.02
7	A19/Durham Road	0.48	0.47	0.48	0.48	-0.01	0.01

Scenario:		Without Mitigation		With Mitigation		Absolute Difference	
8	A19N on-slip/Durham Road	0.98	0.93	0.85	0.80	-0.13	-0.13
9	City Way/Emperor Way	0.35	0.60	0.37	0.45	0.01	-0.15
10	City Way/Monarch Way	1.01	0.76	0.37	0.32	-0.64	-0.44
11	City Way/Camberwell Way	0.49	1.00	0.34	0.32	-0.14	-0.68
12	City Way/Doxford Park Way	0.83	0.90	0.85	0.65	0.02	-0.25
13	Doxford Park Way/Silksworth Way	0.78	0.73	0.74	0.68	-0.04	-0.05
14	Doxford Park Way/Half Farm Road	0.04	0.04	0.04	0.04	0.00	0.00
15	Doxford Park Way/Burdon Road	0.16	0.21	0.21	0.29	0.05	0.08
16	Burdon Road/Bardon Lane	0.10	0.09	0.17	0.19	0.06	0.10
17	Burdon Road/Bevan Avenue	0.05	0.05	0.09	0.08	0.04	0.03
18	Burdon Lane/Ryhope Street South	0.20	0.25	0.10	0.12	-0.10	-0.13
19	Ryhope Street South/Black Road	0.22	0.20	0.08	0.10	-0.14	-0.10
20	Ryhope Street South/Bevan Avenue	0.23	0.34	0.21	0.39	-0.02	0.05
21	Stockton Road/The Village	0.26	0.26	0.09	0.10	-0.18	-0.16
22	The Village/ Robson Pl	0.15	0.18	0.15	0.14	0.00	-0.04
23	See View/A1018	0.52	0.61	0.51	0.59	0.00	-0.02
24	A1018/B1287	0.59	0.56	0.52	0.45	-0.06	-0.11
25	Ryhope Road/See View	0.32	0.38	0.37	0.34	0.05	-0.04
26	Ryhope St/Nelson St	0.20	0.20	0.07	0.06	-0.14	-0.13
27	Toll Bar Road/Fenside Road	0.32	0.33	0.27	0.33	-0.04	0.00
28	B1405/Salterfen Road	0.61	0.61	0.66	0.59	0.05	-0.02
29	A1018/Salterfen Road	0.63	0.51	0.59	0.42	-0.04	-0.09
30	Toll Bar Road/Carrmere Road	0.12	0.11	0.11	0.09	-0.01	-0.01
31	Toll Bar/Hollycarrside Road	0.21	0.15	0.19	0.15	-0.03	-0.01
32	Tunstall Village Green/Burdon Road	0.33	0.37	0.32	0.29	-0.01	-0.09
33	Tunstall Village Lane/Tunstall Village Rd	0.18	0.26	0.20	0.23	0.02	-0.03
34	Maple Avenue/Paddock Lane	0.17	0.30	0.17	0.20	0.00	-0.10
35	Tunstall Hope Road/Paddock Lane	0.30	0.52	0.30	0.44	0.00	-0.08
36	Toll Bar Road/Leechmere Road	0.39	0.44	0.33	0.38	-0.06	-0.06
37	Leechmere Way/Toll Bar Road	0.31	0.40	0.25	0.36	-0.06	-0.04
38	Leechmere/Toll Bar North	0.22	0.23	0.22	0.22	0.00	-0.01
39	Leechmere Road	0.23	0.20	0.23	0.21	0.00	0.01
40	Leechmere Road/Tunstall Road	1.01	0.98	0.91	0.81	-0.10	-0.17
41	Premier Road/Essex Way	0.99	1.00	0.75	0.86	-0.25	-0.13
42	Warwick Terrace/Silksworth Lane	0.61	0.72	0.58	0.71	-0.03	0.00
43	Silksworth Lane/North Moor Lane	0.43	0.47	0.41	0.49	-0.02	0.02
44	Silksworth Lane/Silksworth Road	0.63	0.82	0.52	0.76	-0.11	-0.06
45	Silksworth Way/Silksworth Road	0.64	0.83	0.59	0.87	-0.04	0.04
46	Essex Way/Langley Road	0.50	0.55	0.44	0.52	-0.06	-0.03
47	A690/West Park	0.73	0.43	0.46	0.48	-0.26	0.06
48	West Park/Herrington Road	0.62	0.52	0.57	0.46	-0.04	-0.06
49	A690/Herrington Road	0.97	1.01	0.79	0.88	-0.18	-0.13
50	A690/North Moor Lane	0.97	0.98	0.79	0.77	-0.18	-0.21
51	Durham Road/Premier Road	0.92	0.95	0.84	0.80	-0.08	-0.14
52	A690/Barnes Park Road	0.43	0.30	0.34	0.29	-0.08	-0.02
53	Queen Alexandra Road/Silksworth Lane	0.60	0.60	0.38	0.43	-0.22	-0.17
54	Durham Road/Richard Avenue	0.39	0.42	0.36	0.36	-0.02	-0.06
55	Durham Road/Ettrick Grove	0.83	0.87	0.45	0.44	-0.38	-0.42
56	Ryhope Road/Ocean Road South	0.68	0.61	0.57	0.63	-0.10	0.02
57	A1018/Ocean Road South	0.63	0.67	0.55	0.45	-0.08	-0.22
58	Queen Alexandra Rd/Ashbrooke Range	0.46	0.48	0.33	0.34	-0.13	-0.15
59	The Cedars/Ryhope Road	0.56	0.37	0.34	0.26	-0.21	-0.12
60	St Alban's Street/Commercial Road	0.75	0.75	0.67	0.60	-0.09	-0.15
61	Commercial Road/Robinson Terrace	0.74	0.71	0.65	0.58	-0.09	-0.12
62	Ryhope Road/Mowbray Road	0.45	0.29	0.37	0.29	-0.08	0.01
63	Commercial Road/White House Road	0.77	0.71	0.66	0.61	-0.10	-0.10
64	A690/Barnes Park Road	0.43	0.30	0.34	0.29	-0.08	-0.02
65	Park Road/A1231	0.16	0.19	0.19	0.21	0.03	0.02
66	Burn Park/Eden House Road	0.41	0.51	0.36	0.49	-0.05	-0.01
67	New Durham Road/Burn Park Road	0.23	0.28	0.18	0.17	-0.04	-0.11
68	Burn Park/Derby Street	0.21	0.19	0.18	0.19	-0.04	0.00
69	Chester Road/The Royalty	0.20	0.22	0.19	0.21	0.00	-0.01
70	Chester Road/St Michael Way	0.94	0.87	0.87	0.78	-0.08	-0.09
71	Grange Terrace/ Thornhill Cres	0.54	0.52	0.52	0.53	-0.02	0.01

Scenario:		Without Mitigation		With Mitigation		Absolute Difference	
72	A1231/A690	0.86	0.56	0.60	0.49	-0.27	-0.08
73	A690/St Michaels Way	0.65	0.63	0.53	0.39	-0.12	-0.24
74	SB St Michaels Way/ A690	0.54	0.70	0.49	0.58	-0.05	-0.12
75	Mary St/St Michael's Way	0.35	0.47	0.36	0.46	0.01	-0.01
76	A1231/Belvedere Road	0.75	0.55	0.74	0.70	-0.01	0.15
77	Lawrence St/Hendon Road	0.74	0.57	0.65	0.52	-0.09	-0.05
78	Borough Road/A1018	0.60	0.49	0.49	0.48	-0.11	-0.01
79	WB West Wear Street/Wearmouth Bridge	0.66	0.90	0.50	0.47	-0.17	-0.43
80	Wearmouth Bridge/St Mary's Way EB	0.34	0.29	0.32	0.28	-0.01	-0.01
81	WB St Mary's Way/Wearmouth Bridge	0.46	0.77	0.46	0.58	0.01	-0.19
82	SB Wearmouth Bridge/West Wear Street	0.72	0.61	0.57	0.44	-0.15	-0.17
83	Chester Road/St Marks's Road	0.26	0.45	0.22	0.27	-0.04	-0.18
84	Kayll Road/Chester Road	0.97	0.79	0.77	0.70	-0.19	-0.09
85	Ettrick Grove/Chester Road	0.36	0.37	0.37	0.36	0.01	-0.01
86	The Broadway/Springwell Road	1.00	1.02	0.91	0.92	-0.10	-0.11
87	Chester Road/Grindon Lane	0.57	0.55	0.58	0.53	0.01	-0.02
88	Chester Road/Pennywell Road	0.79	0.91	0.82	0.77	0.02	-0.14
89	Chester Road/Greenwood Road	0.74	0.81	0.61	0.66	-0.13	-0.15
90	Chester Road/Prestbury Road	0.31	0.38	0.33	0.36	0.03	-0.02
91	Prestbury Road/Hylton Road	0.21	0.25	0.24	0.22	0.03	-0.03
92	Hylton Road/Waterford Green	0.23	0.25	0.20	0.24	-0.03	-0.01
93	Hylton Road/Grindon Lane	0.47	0.71	0.42	0.71	-0.05	0.00
94	Hylton Road/Portsmouth Road	0.27	0.32	0.24	0.31	-0.04	-0.01
95	Hylton Road/Font Road	0.51	0.81	0.56	0.73	0.04	-0.08
96	Hylton Road/Kayll Road	0.84	0.87	0.56	0.74	-0.29	-0.14
97	St Luke's Terrace/St Luke's Road	0.15	0.26	0.12	0.20	-0.03	-0.06
98	Pallion New Road/Lisburn Terrace	0.26	0.35	0.23	0.35	-0.03	0.00
99	Trimdon Street/ Silksworth Row	0.91	0.98	0.84	0.99	-0.08	0.01
100	Hylton Road/Rutland Street	0.22	0.26	0.20	0.28	-0.01	0.02
101	Hylton Road/St Marks Road North	0.30	0.38	0.28	0.34	-0.03	-0.04
102	A1018/Dame Dorothy Street	0.63	0.52	0.59	0.48	-0.04	-0.04
103	A1018/Sheepfolds North	0.50	0.49	0.47	0.51	-0.03	0.02
104	Church Street/Dame Dorothy Street	0.69	0.38	0.48	0.29	-0.21	-0.09
105	North Bridge Street/Roker Avenue	0.76	0.79	0.60	0.73	-0.16	-0.06
106	Roker Avenue/Fulwell Road	0.88	0.96	0.79	0.81	-0.09	-0.15
107	Roker Avenue/Church Street	0.72	0.52	0.62	0.60	-0.10	0.08
108	Dame Dorothy Street/Harbour View	0.32	0.22	0.30	0.20	-0.02	-0.02
109	Roker Baths Road/Fulwell Road	0.43	0.35	0.41	0.27	-0.03	-0.08
110	Roker Terrace/St George's Terrace	0.26	0.20	0.25	0.18	-0.01	-0.02
111	Whitburn Road/Chichester Road	0.21	0.16	0.20	0.17	-0.01	0.01
112	Whitburn Road/Dykeland's Road	0.98	1.00	0.55	0.66	-0.43	-0.34
113	Newcastle Road/A1018	0.42	0.52	0.40	0.49	-0.02	-0.03
114	A1018/Dovedale Road	0.45	0.63	0.33	0.49	-0.12	-0.14
115	Newcastle Road/Chalton Road	0.88	0.93	0.76	0.91	-0.12	-0.02
116	Newcastle Road/Newhaven Avenue	0.23	0.22	0.20	0.22	-0.02	0.00
117	Newcastle Road/Crozier Street	0.26	0.29	0.25	0.27	-0.01	-0.02
118	Southwick Road/Stadium Way	0.41	0.49	0.34	0.45	-0.08	-0.04
119	Queens Road/Kier Hardie Way	0.60	0.72	0.53	0.77	-0.07	0.05
120	Southwick Road/B1291	0.76	0.76	0.72	0.75	-0.04	0.00
121	A1231/Camden Street	0.41	0.53	0.39	0.58	-0.02	0.05
122	Camden Street/Trafford Road	0.18	0.25	0.17	0.24	0.00	-0.02
123	Wessington Way/Queens Road	0.57	0.68	0.45	0.53	-0.12	-0.15
124	Wessington Way/A1231	0.85	0.80	0.43	0.45	-0.43	-0.35
125	Northern Way/Dean Terrace	0.79	0.87	0.59	0.64	-0.20	-0.23
126	Northern Way/North Hylton Road	0.28	0.22	0.27	0.21	-0.02	-0.01
127	Old Mill Road/Wembley Road	0.11	0.12	0.14	0.12	0.02	0.00
128	Hylton Road/Castletown Way	0.80	0.83	0.82	0.79	0.03	-0.05
129	North Hylton Road/Radlett Road	0.55	0.37	0.44	0.41	-0.11	0.04
130	Castletown Way/Riverside Road	0.55	0.56	0.36	0.62	-0.18	0.06
131	Wessington Way/Castletown Way	1.01	0.91	0.77	0.79	-0.23	-0.12
132	Wessington Way/Colima Avenue	0.95	0.95	0.91	0.87	-0.04	-0.07
133	Grange Road/Barons Quay Road	0.26	0.27	0.21	0.18	-0.05	-0.09
134	Wessington Way/Ferryboat Lane	1.00	0.86	0.92	0.80	-0.08	-0.05
135	Washington Road/Ferryboat Lane	0.76	0.74	0.70	0.62	-0.06	-0.11

Scenario:		Without Mitigation		With Mitigation		Absolute Difference	
136	Washington Road/Blackwood Road	0.71	0.88	0.64	0.87	-0.07	-0.01
137	Washington Road/Canterbury Road	0.18	0.16	0.20	0.16	0.02	0.00
138	Washington Road/Hylton Lane	0.82	0.71	0.67	0.64	-0.15	-0.08
139	Washington Road/Craigavon Road	0.70	0.76	0.71	0.74	0.01	-0.02
140	Washington Road/Rotherfield Road	0.40	0.32	0.30	0.29	-0.10	-0.03
141	Kingsway Road/Hylton Lane	0.13	0.15	0.12	0.13	0.00	-0.02
142	A1290/Downhill Lane	0.19	0.23	0.21	0.19	0.02	-0.04
143	A1290/Nissan Sight	0.64	0.27	0.38	0.21	-0.26	-0.05
144	A1290/Cherry Blossom Way	0.21	0.18	0.20	0.18	-0.01	0.00
145	Nissan Way/A1231	0.18	0.26	0.17	0.24	-0.01	-0.02
146	Sunderland Highway/ SB Pattinson Road	0.22	0.15	0.18	0.16	-0.03	0.00
147	NB Pattinson Way/A1231	0.56	0.77	0.51	0.74	-0.06	-0.04
148	Sunderland Highway/ NB Nissan Way	0.22	0.25	0.19	0.23	-0.03	-0.02
149	Glover Road/Spire Road	0.13	0.16	0.12	0.16	-0.01	0.00
150	A1231/Spire Road	0.14	0.35	0.14	0.32	0.00	-0.03
151	A1231/Horsley Road	0.20	0.16	0.20	0.14	0.00	-0.02
152	Northumberland Way SB on-slip/Sunderland Hwy	0.21	0.38	0.22	0.40	0.01	0.01
153	Northumberland Way /Sunderland Hwy off-slip	0.22	0.24	0.22	0.23	-0.01	-0.01
154	Northumberland Way NB on-slip/Sunderland Hwy	0.16	0.18	0.16	0.19	0.01	0.01
155	Northumberland Way NB/Sunderland Hwy off-slip	0.22	0.22	0.22	0.21	-0.01	0.00
156	Washington Hwy SB off-slip/A1231	0.91	0.81	0.76	0.77	-0.15	-0.04
157	Sunderland Hwy EB off-slip/Washington Hwy SB	0.87	0.51	0.59	0.49	-0.28	-0.02
158	Washington Hwy NB off-slip/A1231	0.64	0.71	0.57	0.55	-0.07	-0.16
159	A1231 WB off-slip/Washington Hwy	0.83	0.92	0.80	0.83	-0.03	-0.09
160	A182 - Salter's Ln	0.33	0.13	0.30	0.14	-0.03	0.02
161	A182 - Murton Ln	1.27	1.40	1.04	1.03	-0.23	-0.36
162	WB A182 - B1284	1.16	1.08	1.18	1.09	0.02	0.01
163	SB A182 - B1284	0.56	0.61	0.43	0.60	-0.14	-0.01
164	A182 - Caroline St	0.06	0.14	0.06	0.13	0.00	-0.01
165	A182 - Regent St	0.06	0.14	0.06	0.13	0.00	-0.01
166	A182 - The Bungalows	0.30	0.28	0.27	0.26	-0.03	-0.02
167	B1260 - B1284	0.26	0.25	0.27	0.27	0.01	0.02
168	B1284 - Cygnet Way	0.28	0.19	0.23	0.21	-0.06	0.02
169	A690 - Slip Roads/ Cygnet Way	0.69	0.45	0.52	0.42	-0.17	-0.02
170	A182 - B1260	0.72	1.01	0.60	1.02	-0.11	0.01
171	B1404 - B1260	0.32	0.31	0.32	0.24	0.00	-0.07
172	B1404 - Salters Lane	0.28	0.14	0.28	0.13	-0.01	-0.01
173	A1052 - Dairy Lane	0.34	0.25	0.32	0.31	-0.02	0.06
174	A1052 - Britannia Terrace	1.03	1.15	1.00	1.06	-0.02	-0.08
175	A690 - A1052 NB off slip	0.89	0.54	0.79	0.55	-0.09	0.01
176	A690 - A1052 A1052 Dairy Lane entry	0.41	0.26	0.38	0.28	-0.03	0.01
177	A690 - A1052 SB off slip	0.71	0.64	0.76	0.70	0.06	0.06
178	A690 - A1052 A182 entry	0.86	0.77	0.96	0.83	0.09	0.06
179	A690 - B1404 - NB parallel slip	0.19	0.14	0.19	0.15	0.00	0.01
180	A690 - B1404 - A182 Hillside Way	0.14	0.14	0.13	0.12	-0.01	-0.02
181	A690 - B1404 - A182 SB off slip	0.07	0.15	0.11	0.16	0.04	0.01
182	A690 - B1404 - Lake Road entry	1.02	1.03	1.02	1.00	0.00	-0.03
183	Vigo Ln - Picketree Ln	1.01	1.03	1.00	1.02	-0.01	0.00
184	Picketree Ln - Bonemill Ln	0.63	0.49	0.59	0.48	-0.03	-0.01
185	Bonemill Ln/ Vigo Ln	0.44	0.36	0.42	0.36	-0.02	0.00
186	A182 - Coaley Ln	0.95	1.00	0.95	1.00	0.00	0.00
187	A182 - B1286	1.03	0.88	0.99	0.89	-0.05	0.01
188	A182 - A183	1.13	1.04	1.04	0.84	-0.08	-0.19

4.4.3 In Phase 0, The following junctions were identified as having an RFC of greater than 1.0 in the 'without mitigation' scenario, with supporting commentary on whether these had increased or decreased in RFC following the introduction of the mitigation measures:

- A182 Murton Lane: in the AM and PM, RFC decreases from 1.27 to 1.04 and 1.40 to 1.06 respectively, however both are still above an RFC of 1.0.

- Westbound A182 – B1284: in both the AM and the PM, RFC marginally increases from 1.16 to 1.18 and 1.08 to 1.09 respectively.
- A182 – B1260: in the AM, RFC reduces from 0.72 to 0.60, however in the PM, the RFC marginally increases from 1.01 to 1.02 and remains slightly above 1.0.
- A1052 Britannia Terrace: in the AM and PM, RFC decreases from 1.03 to 1.01 and 1.15 to 1.06 respectively, however both are still above an RFC of 1.0.
- A690 – B1404 – Lake Road Entry - in the AM and PM, RFC does not change and decreases from 1.03 to 1.00 respectively, however both are still above an RFC of 1.0.
- Vigo Lane – Picktree Lane - in the AM and PM, RFC marginally decreases from 1.01 to 1.00 and 1.03 to 1.02 respectively, however both are still above an RFC of 1.0.
- A182 – Coaley Lane - in the AM and PM, RFC does not change in either period, with the PM still above an RFC of 1.0.

4.4.4 Whilst the above highlights the junctions that experience a change with and RFC above 1.0, the overall impact of the introduction of the mitigation measures is positive, improving the operation of the majority of junctions across the network.

## 4.5 Phase 1 Results

4.5.1 Phase 1 estimates the number of trips increasing on the local network from between 6,000 – 7,000 trips during the morning and evening peak hours.

4.5.2 **Table 4** outlines the results for both the with and without mitigation scenarios. The comparison of both schemes indicates where junction RFCs have reduced (highlighted in **GREEN**) or increased (highlighted in **RED**).

**Table 4 Comparison of Results: 'Without Mitigation' vs 'With Mitigation': Phase 1**

Scenario:		Without Mitigation		With Mitigation		Absolute Difference	
Ref	Junction	AM	PM	AM	PM	AM	PM
1	A19 NB off-Slip/A1290 Downhill Ln	0.94	0.81	0.67	0.69	-0.26	-0.12
2	Sunderland Highway/A19	0.80	1.01	0.62	0.78	-0.18	-0.24
3	A19/A183 W	0.43	0.34	0.41	0.33	-0.02	-0.01
4	A19N on-slip/A183W	0.84	0.62	0.76	0.54	-0.08	-0.08
5	A19S off-slip/Parkside south	0.94	1.03	0.95	0.98	0.01	-0.05
6	A19N off-slip/Durham Rd	0.68	0.87	0.67	0.84	-0.01	-0.03
7	A19/Durham Road	0.54	0.50	0.54	0.51	0.01	0.01
8	A19N on-slip/Durham Road	1.07	1.00	1.01	0.89	-0.07	-0.12
9	City Way/Emperor Way	0.39	0.69	0.40	0.51	0.01	-0.18
10	City Way/Monarch Way	1.14	0.86	0.40	0.38	-0.74	-0.48
11	City Way/Camberwell Way	0.48	1.62	0.41	0.38	-0.07	-1.24
12	City Way/Doxford Park Way	0.84	0.99	0.99	0.83	0.15	-0.16
13	Doxford Park Way/Silksworth Way	0.71	0.96	0.84	0.88	0.13	-0.08
14	Doxford Park Way/Half Farm Road	0.05	0.05	0.05	0.05	0.00	0.00
15	Doxford Park Way/Burdon Road	0.20	0.30	0.25	0.38	0.05	0.08
16	Burdon Road/Bardon Lane	0.11	0.12	0.19	0.24	0.09	0.12
17	Burdon Road/Bevan Avenue	0.08	0.08	0.17	0.13	0.08	0.05
18	Burdon Lane/Ryhope Street South	0.31	0.25	0.18	0.16	-0.13	-0.09
19	Ryhope Street South/Black Road	0.49	0.29	0.10	0.12	-0.39	-0.17
20	Ryhope Street South/Bevan Avenue	0.61	0.50	0.30	0.70	-0.31	0.20
21	Stockton Road/The Village	0.41	0.35	0.14	0.16	-0.27	-0.19
22	The Village/ Robson Pl	0.14	0.18	0.15	0.15	0.01	-0.03
23	See View/A1018	0.54	0.60	0.56	0.52	0.02	-0.08
24	A1018/B1287	0.66	0.64	0.61	0.54	-0.06	-0.10
25	Ryhope Road/See View	0.31	0.43	0.37	0.35	0.06	-0.07
26	Ryhope St/Nelson St	0.43	0.26	0.08	0.06	-0.35	-0.20
27	Toll Bar Road/Fenside Road	0.38	0.37	0.30	0.36	-0.09	-0.01
28	B1405/Salterfen Road	0.77	0.66	0.71	0.65	-0.05	-0.02

Scenario:		Without Mitigation		With Mitigation		Absolute Difference	
29	A1018/Salterfen Road	0.70	0.61	0.66	0.53	-0.05	-0.08
30	Toll Bar Road/Carmere Road	0.14	0.11	0.11	0.11	-0.02	0.00
31	Toll Bar/Hollycarrside Road	0.56	0.22	0.20	0.15	-0.36	-0.07
32	Tunstall Village Green/Burdon Road	0.53	0.57	0.45	0.41	-0.08	-0.16
33	Tunstall Village Lane/Tunstall Village Rd	0.25	0.38	0.27	0.34	0.02	-0.04
34	Maple Avenue/Paddock Lane	0.20	0.43	0.25	0.35	0.05	-0.09
35	Tunstall Hope Road/Paddock Lane	0.36	0.67	0.38	0.60	0.01	-0.07
36	Toll Bar Road/Leechmere Road	0.53	0.47	0.34	0.40	-0.19	-0.06
37	Leechmere Way/Toll Bar Road	0.33	0.35	0.26	0.38	-0.06	0.03
38	Leechmere/Toll Bar North	0.28	0.24	0.23	0.24	-0.05	-0.01
39	Leechmere Road	0.21	0.17	0.24	0.21	0.03	0.04
40	Leechmere Road/Tunstall Road	1.13	1.05	1.02	0.94	-0.10	-0.11
41	Premier Road/Essex Way	1.12	1.06	1.00	0.95	-0.12	-0.12
42	Warwick Terrace/Silksworth Lane	0.56	0.73	0.72	0.81	0.16	0.08
43	Silksworth Lane/North Moor Lane	0.39	0.46	0.60	0.55	0.21	0.09
44	Silksworth Lane/Silksworth Road	0.63	0.93	0.69	0.88	0.06	-0.05
45	Silksworth Way/Silksworth Road	0.73	0.84	0.80	0.96	0.08	0.12
46	Essex Way/Langley Road	0.61	0.54	0.48	0.57	-0.13	0.03
47	A690/West Park	1.00	0.52	0.61	0.50	-0.39	-0.02
48	West Park/Herrington Road	0.65	0.68	0.69	0.51	0.05	-0.17
49	A690/Herrington Road	1.11	1.05	0.92	0.97	-0.19	-0.08
50	A690/North Moor Lane	1.11	1.06	0.95	0.90	-0.16	-0.16
51	Durham Road/Premier Road	1.01	1.00	0.99	0.84	-0.02	-0.17
52	A690/Barnes Park Road	0.49	0.34	0.39	0.33	-0.10	-0.01
53	Queen Alexandra Road/Silksworth Lane	0.63	0.62	0.43	0.50	-0.20	-0.12
54	Durham Road/Richard Avenue	0.44	0.48	0.44	0.41	0.00	-0.07
55	Durham Road/Ettrick Grove	0.94	0.88	0.57	0.58	-0.37	-0.30
56	Ryhope Road/Ocean Road South	0.72	0.73	0.65	0.64	-0.07	-0.09
57	A1018/Ocean Road South	0.80	0.67	0.65	0.51	-0.15	-0.15
58	Queen Alexandra Rd/Ashbrooke Range	0.50	1.00	0.34	0.37	-0.16	-0.63
59	The Cedars/Ryhope Road	0.59	0.44	0.37	0.29	-0.22	-0.15
60	St Alban's Street/Commercial Road	0.93	0.83	0.80	0.70	-0.13	-0.13
61	Commercial Road/Robinson Terrace	0.90	0.77	0.77	0.67	-0.14	-0.10
62	Ryhope Road/Mowbray Road	0.48	0.33	0.39	0.30	-0.09	-0.03
63	Commercial Road/White House Road	0.93	0.77	0.78	0.69	-0.15	-0.08
64	A690/Barnes Park Road	0.49	0.34	0.39	0.33	-0.10	-0.01
65	Park Road/A1231	0.18	0.21	0.21	0.22	0.02	0.01
66	Burn Park/Eden House Road	0.47	0.56	0.44	0.51	-0.03	-0.05
67	New Durham Road/Burn Park Road	0.24	0.41	0.23	0.18	-0.01	-0.22
68	Burn Park/Derby Street	0.22	0.18	0.22	0.19	0.00	0.01
69	Chester Road/The Royalty	0.31	0.30	0.21	0.24	-0.10	-0.06
70	Chester Road/St Michael Way	1.00	0.88	0.97	0.81	-0.03	-0.06
71	Grange Terrace/ Thornhill Cres	0.62	0.56	0.54	0.58	-0.08	0.02
72	A1231/A690	0.91	0.61	0.61	0.53	-0.31	-0.08
73	A690/St Michaels Way	0.71	0.67	0.56	0.43	-0.15	-0.24
74	SB St Michaels Way/ A690	0.56	0.68	0.49	0.60	-0.07	-0.09
75	Mary St/St Michael's Way	0.37	0.46	0.37	0.48	0.00	0.02
76	A1231/Belvedere Road	0.69	0.65	0.80	0.71	0.11	0.06
77	Lawrence St/Hendon Road	0.89	0.61	0.77	0.58	-0.12	-0.03
78	Borough Road/A1018	0.75	0.59	0.60	0.56	-0.15	-0.03
79	WB West Wear Street/Wearmouth Bridge	0.76	0.96	0.56	0.50	-0.20	-0.46
80	Wearmouth Bridge/St Mary's Way EB	0.35	0.31	0.35	0.29	0.00	-0.01
81	WB St Mary's Way/Wearmouth Bridge	0.50	0.80	0.51	0.63	0.01	-0.17
82	SB Wearmouth Bridge/West Wear Street	0.75	0.65	0.58	0.47	-0.18	-0.18
83	Chester Road/St Marks's Road	0.52	0.86	0.24	0.30	-0.28	-0.56
84	Kayll Road/Chester Road	0.95	0.83	0.82	0.75	-0.13	-0.09
85	Ettrick Grove/Chester Road	0.36	0.36	0.35	0.37	0.00	0.01
86	The Broadway/Springwell Road	1.02	1.04	0.97	1.00	-0.05	-0.04
87	Chester Road/Grindon Lane	0.72	0.68	0.59	0.56	-0.13	-0.12
88	Chester Road/Pennywell Road	0.81	1.01	0.82	0.80	0.01	-0.21
89	Chester Road/Greenwood Road	0.90	0.88	0.72	0.72	-0.17	-0.15
90	Chester Road/Prestbury Road	0.33	0.72	0.36	0.39	0.03	-0.33
91	Prestbury Road/Hylton Road	0.22	0.27	0.28	0.23	0.06	-0.03
92	Hylton Road/Waterford Green	0.28	0.28	0.24	0.28	-0.04	0.00



Scenario:		Without Mitigation		With Mitigation		Absolute Difference	
93	Hylton Road/Grindon Lane	0.54	0.81	0.47	0.77	-0.07	-0.03
94	Hylton Road/Portsmouth Road	0.36	0.36	0.29	0.35	-0.07	0.00
95	Hylton Road/Font Road	0.52	0.81	0.62	0.77	0.10	-0.04
96	Hylton Road/Kayll Road	0.83	0.92	0.63	0.82	-0.20	-0.10
97	St Luke's Terrace/St Luke's Road	0.20	0.30	0.15	0.24	-0.05	-0.06
98	Pallion New Road/Lisburn Terrace	0.30	0.40	0.28	0.41	-0.02	0.01
99	Trimdon Street/ Silksworth Row	0.98	0.96	0.86	1.01	-0.12	0.05
100	Hylton Road/Rutland Street	0.20	0.26	0.22	0.29	0.02	0.03
101	Hylton Road/St Marks Road North	0.40	0.44	0.30	0.33	-0.10	-0.11
102	A1018/Dame Dorothy Street	0.73	0.60	0.65	0.50	-0.07	-0.10
103	A1018/Sheepfolds North	0.58	0.52	0.52	0.54	-0.06	0.02
104	Church Street/Dame Dorothy Street	0.90	0.46	0.59	0.33	-0.31	-0.13
105	North Bridge Street/Roker Avenue	0.81	0.93	0.64	0.77	-0.16	-0.16
106	Roker Avenue/Fulwell Road	0.91	0.96	0.82	0.84	-0.09	-0.13
107	Roker Avenue/Church Street	0.78	0.60	0.68	0.59	-0.10	-0.01
108	Dame Dorothy Street/Harbour View	0.39	0.25	0.36	0.22	-0.03	-0.03
109	Roker Baths Road/Fulwell Road	0.45	0.41	0.41	0.29	-0.04	-0.12
110	Roker Terrace/St George's Terrace	0.34	0.23	0.31	0.19	-0.03	-0.03
111	Whitburn Road/Chichester Road	0.28	0.20	0.26	0.19	-0.02	0.00
112	Whitburn Road/Dykeland's Road	0.98	1.00	0.67	0.80	-0.31	-0.20
113	Newcastle Road/A1018	0.50	0.56	0.44	0.51	-0.07	-0.05
114	A1018/Dovedale Road	0.57	0.71	0.33	0.54	-0.24	-0.17
115	Newcastle Road/Chalton Road	0.90	1.00	0.86	0.94	-0.05	-0.06
116	Newcastle Road/Newhaven Avenue	0.25	0.23	0.22	0.23	-0.03	0.00
117	Newcastle Road/Crozier Street	0.29	0.41	0.27	0.28	-0.02	-0.13
118	Southwick Road/Stadium Way	0.52	0.59	0.42	0.49	-0.11	-0.11
119	Queens Road/Kier Hardie Way	0.62	0.70	0.59	0.80	-0.03	0.10
120	Southwick Road/B1291	0.87	0.82	0.80	0.78	-0.07	-0.04
121	A1231/Camden Street	0.50	0.55	0.44	0.60	-0.07	0.06
122	Camden Street/Trafford Road	0.21	0.25	0.20	0.27	-0.01	0.02
123	Wessington Way/Queens Road	0.66	0.67	0.51	0.55	-0.15	-0.12
124	Wessington Way/A1231	0.96	0.86	0.48	0.48	-0.48	-0.38
125	Northern Way/Dean Terrace	0.85	0.92	0.69	0.72	-0.16	-0.20
126	Northern Way/North Hylton Road	0.37	0.26	0.32	0.24	-0.05	-0.02
127	Old Mill Road/Wembley Road	0.11	0.14	0.14	0.14	0.04	0.00
128	Hylton Road/Castletown Way	0.75	0.79	0.88	0.80	0.13	0.02
129	North Hylton Road/Radlett Road	0.60	0.35	0.48	0.41	-0.12	0.06
130	Castletown Way/Riverside Road	0.56	0.58	0.40	0.65	-0.16	0.07
131	Wessington Way/Castletown Way	1.03	0.97	0.94	0.89	-0.10	-0.08
132	Wessington Way/Colima Avenue	1.01	0.99	0.93	0.96	-0.09	-0.03
133	Grange Road/Barons Quay Road	0.24	0.35	0.21	0.22	-0.03	-0.12
134	Wessington Way/Ferryboat Lane	1.03	0.93	0.97	0.87	-0.06	-0.06
135	Washington Road/Ferryboat Lane	0.82	0.78	0.79	0.67	-0.03	-0.11
136	Washington Road/Blackwood Road	0.78	0.96	0.63	0.88	-0.15	-0.07
137	Washington Road/Canterbury Road	0.18	0.18	0.22	0.17	0.03	-0.01
138	Washington Road/Hylton Lane	0.85	0.78	0.71	0.74	-0.14	-0.04
139	Washington Road/Craigavon Road	0.77	0.81	0.74	0.82	-0.02	0.01
140	Washington Road/Rotherfield Road	0.49	0.36	0.33	0.33	-0.17	-0.03
141	Kingsway Road/Hylton Lane	0.16	0.20	0.16	0.17	0.00	-0.04
142	A1290/Downhill Lane	0.23	0.37	0.21	0.25	-0.02	-0.13
143	A1290/Nissan Sight	0.55	0.50	0.41	0.26	-0.14	-0.23
144	A1290/Cherry Blossom Way	0.20	0.51	0.21	0.22	0.01	-0.29
145	Nissan Way/A1231	0.19	0.25	0.18	0.24	-0.01	-0.01
146	Sunderland Highway/ SB Pattinson Road	0.27	0.17	0.24	0.17	-0.04	0.00
147	NB Pattinson Way/A1231	0.69	0.77	0.55	0.77	-0.14	0.00
148	Sunderland Highway/ NB Nissan Way	0.33	0.25	0.25	0.24	-0.08	-0.01
149	Glover Road/Spire Road	0.13	0.18	0.13	0.17	0.00	-0.01
150	A1231/Spire Road	0.15	0.37	0.14	0.33	-0.01	-0.04
151	A1231/Horsley Road	0.20	0.17	0.20	0.15	0.00	-0.02
152	Northumberland Way SB on-slip/Sunderland Hwy	0.24	0.39	0.24	0.42	0.00	0.03
153	Northumberland Way /Sunderland Hwy off-slip	0.24	0.29	0.24	0.27	-0.01	-0.02
154	Northumberland Way NB on-slip/Sunderland Hwy	0.16	0.21	0.18	0.22	0.02	0.01
155	Northumberland Way NB/Sunderland Hwy off-slip	0.24	0.25	0.24	0.25	0.00	0.00
156	Washington Hwy SB off-slip/A1231	1.01	0.81	1.00	0.80	-0.01	-0.01

Scenario:		Without Mitigation		With Mitigation		Absolute Difference	
157	Sunderland Hwy EB off-slip/Washington Hwy SB	0.85	0.55	0.61	0.49	-0.24	-0.06
158	Washington Hwy NB off-slip/A1231	0.65	0.69	0.60	0.60	-0.05	-0.08
159	A1231 WB off-slip/Washington Hwy	0.84	0.93	0.78	0.86	-0.05	-0.07
160	A182 - Salter's Ln	0.34	0.12	0.33	0.14	0.00	0.03
161	A182 - Murton Ln	1.28	1.41	1.02	1.01	-0.26	-0.40
162	WB A182 - B1284	1.20	1.20	1.20	1.16	0.00	-0.04
163	SB A182 - B1284	0.50	0.47	0.41	0.49	-0.09	0.02
164	A182 - Caroline St	0.06	0.13	0.06	0.10	0.00	-0.03
165	A182 - Regent St	0.05	0.09	0.06	0.10	0.01	0.01
166	A182 - The Bungalows	0.49	0.22	0.48	0.35	-0.01	0.12
167	B1260 - B1284	0.31	0.25	0.31	0.28	0.00	0.03
168	B1284 - Cygnet Way	0.34	0.21	0.27	0.23	-0.06	0.02
169	A690 - Slip Roads/ Cygnet Way	0.81	0.47	0.58	0.42	-0.24	-0.05
170	A182 - B1260	1.11	1.16	0.88	1.05	-0.23	-0.10
171	B1404 - B1260	0.44	0.38	0.33	0.34	-0.11	-0.04
172	B1404 - Salters Lane	0.29	0.14	0.28	0.14	0.00	-0.01
173	A1052 - Dairy Lane	0.32	0.26	0.34	0.31	0.02	0.06
174	A1052 - Britannia Terrace	1.01	1.17	1.01	1.07	0.00	-0.09
175	A690 - A1052 NB off slip	0.86	0.64	0.85	0.59	-0.01	-0.04
176	A690 - A1052 A1052 Dairy Lane entry	0.40	0.31	0.41	0.30	0.00	0.00
177	A690 - A1052 SB off slip	0.67	0.64	0.72	0.69	0.05	0.05
178	A690 - A1052 A182 entry	0.84	0.76	0.91	0.82	0.07	0.06
179	A690 - B1404 - NB parallel slip	0.18	0.15	0.20	0.16	0.02	0.00
180	A690 - B1404 - A182 Hillside Way	0.16	0.15	0.14	0.13	-0.01	-0.02
181	A690 - B1404 - A182 SB off slip	0.06	0.15	0.10	0.16	0.04	0.02
182	A690 - B1404 - Lake Road entry	1.02	1.03	1.02	1.03	0.00	0.00
183	Vigo Ln - Picktree Ln	1.01	1.04	1.01	1.03	-0.01	-0.01
184	Picktree Ln - Bonemill Ln	0.72	0.54	0.74	0.52	0.02	-0.02
185	Bonemill Ln/ Vigo Ln	0.49	0.41	0.48	0.38	-0.01	-0.03
186	A182 - Coaley Ln	0.95	1.03	0.95	1.01	0.00	-0.02
187	A182 - B1286	0.95	0.87	1.01	0.96	0.06	0.09
188	A182 - A183	1.20	1.06	1.10	0.93	-0.10	-0.13

4.5.3 In Phase 1, the following junctions were identified as having an RFC of greater than 1.0 in the 'without mitigation' scenario, with supporting commentary on whether these had increased or decreased in RFC following the introduction of the mitigation measures:

- Sunderland Highway/A19: in the AM and PM, RFC decreases from 0.80 to 0.62 and 1.01 to 0.78 respectively, with the PM peak falling below and RFC of 1.0.
- A19S off-slip/Parkside South: in the AM, RFC increases from 0.94 to 0.95 however reduces from 1.03 to 0.98 in the PM peak, with the PM falling below an RFC 1.0.
- A19N on-slip/Durham Road: in the AM and PM, RFC decreases from 1.07 to 1.00 and 1.01 to 0.89 respectively, however the AM still has an RFC of greater than 1.0 and the PM reduces to below an RFC 1.0.
- City Way/Monarch Way: in the AM and PM, RFC decreases significantly from 1.14 to 0.86 and 0.40 to 0.38 respectively.
- City Way/Camberwell Way: in the AM and PM, RFC decreases significantly from 0.48 to 0.41 and 1.62 to 0.38 respectively.
- Leechmere Road/Tunstall Road: in the AM and PM, RFC decreases from 1.13 to 1.02 and 1.06 to 0.94 respectively, however the AM period is still above an RFC of 1.0.
- Premier Road/Essen Way: in the AM and PM, RFC decreases from 1.12 to 1.00 and 1.06 to 0.95 respectively, however the AM period is still above an RFC of 1.0.

- A690/West Park: in the AM and PM, RFC decreases from 1.00 to 0.61 and 0.52 to 0.50 respectively, with the AM falling below an RFC of 1.0.
- A690/Herrington Road: in the AM and PM, RFC decreases from 1.11 to 0.92 and 1.05 to 0.97 respectively, with both periods falling below an RFC 1.0.
- Durham Road/Premier Road: in the AM and PM, RFC decreases from 1.01 to 0.99 and 1.00 to 0.84 respectively, with both periods falling below an RFC 1.0.
- Queen Alexandra Rd/Ashbrooke Range: in the AM and PM, RFC decreases from 0.50 to 0.34 and 1.00 to 0.37 respectively, with the PM period falling below an RFC 1.0.
- Chester Road/St Michael Way: in the AM and PM, RFC decreases from 1.00 to 0.97 and 0.88 to 0.81 respectively, with the AM period falling below an RFC 1.0.
- The Broadway/Springwell Road: in the AM and PM, RFC decreases from 1.02 to 0.97 and 1.04 to 1.00 respectively, with the AM period falling below an RFC 1.0.
- Chester Road/Pennywell Road: in the AM, RFC increases from 0.81 to 0.97 and in the PM decreases from 1.01 to 0.80 respectively, with the PM period falling below an RFC 1.0.
- Trimdon Street/ Silksworth Row: in the AM, RFC decreases from 0.98 to 0.86 and in the PM increases from 0.96 to 1.01 respectively, with the PM period increasing above an RFC 1.0.
- Whitburn Road/Dykeland's Road: in the AM and PM, RFC decreases from 0.98 to 0.67 and 1.00 to 0.80 respectively, with the PM period falling below an RFC 1.0.
- Newcastle Road/Chalton Road: in the AM and PM, RFC decreases from 0.90 to 0.86 and 1.00 to 0.94 respectively, with the PM period falling below an RFC 1.0.
- Wessington Way/Castletown Way: in the AM and PM, RFC decreases from 1.03 to 0.94 and 0.97 to 0.89 respectively, with the AM period falling below an RFC 1.0.
- Wessington Way/Colima Avenue: in the AM and PM, RFC decreases from 1.01 to 0.93 and 0.99 to 0.96 respectively, with the AM period falling below an RFC 1.0.
- Wessington Way/Ferryboat Lane: in the AM and PM, RFC decreases from 1.03 to 0.93 and 0.93 to 0.87 respectively, with the AM period falling below an RFC 1.0.
- Washington Hwy Southbound off-slip/A1231: in the AM and PM, RFC marginally decreases from 1.01 to 1.00 and 0.81 to 0.80 respectively.
- A182 Murton Lane: in the AM and PM, RFC decreases from 1.28 to 1.02 and 1.41 to 1.01 respectively, however both are still above an RFC of 1.0.
- Westbound A182 – B1284: in both the AM, RFC marginally increases from 1.20 to 1.21 and decreases in the PM from 1.20 to 1.16, however both are still above an RFC of 1.0.
- A182 – B1260: in the AM and RFC reduces from 1.11 to 0.88 and 1.16 to 1.05 respectively, with the AM period falling below an RFC 1.0.
- A1052 Britannia Terrace: in the AM and PM, RFC decreases from 1.01 to 1.00 and 1.17 to 1.07 respectively, however both are still above an RFC of 1.0.
- Vigo Lane – Picktree Lane: in the AM and PM, RFC marginally decreases from 1.01 to 1.00 and 1.04 to 1.03 respectively, however both are still above an RFC of 1.0.

- A182 – Coaley Lane - in the AM RFC does not change, however in the PM period RFC reduced from 1.03 to 1.01, with both periods still above an RFC of 1.0.
- A182 - B1286: in the AM and PM, RFC marginally increases from 0.95 to 1.01 and 0.87 to 0.96 respectively, with AM being pushed above an RFC of 1.0.
- A182 - A183: in the AM and PM, RFC decreases from 1.20 to 1.10 and 1.06 to 0.93 respectively, however the AM period still has an RFC greater than 1.0.

4.5.4 Whilst the above highlights the junctions that experience a change with and RFC above 1.0, the overall impact of the introduction of the mitigation measures is positive, improving the operation of the majority of junctions across the network.

## 4.6 Phase 2 Results

4.6.1 10,000 additional trips are estimated to be within the network for the Phase 2 scenarios.

4.6.2 **Table 5** outlines the results for both the with and without mitigation scenarios. The comparison of both schemes indicates where junctions have improved or worsened.

**Table 5 Comparison of Results: 'Without Mitigation' vs 'With Mitigation': Phase 2**

Scenario:		Without Mitigation		With Mitigation		Absolute Difference	
Ref	Junction	AM	PM	AM	PM	AM	PM
1	A19 NB off-Slip/A1290 Downhill Ln	0.93	0.87	0.73	0.76	-0.20	-0.11
2	Sunderland Highway/A19	0.86	1.04	0.65	0.84	-0.21	-0.20
3	A19/A183 W	0.46	0.36	0.43	0.33	-0.04	-0.03
4	A19N on-slip/A183W	0.86	0.64	0.79	0.57	-0.08	-0.08
5	A19S off-slip/Parkside south	0.99	1.05	0.95	1.01	-0.05	-0.04
6	A19N off-slip/Durham Rd	0.71	0.87	0.70	0.88	-0.01	0.01
7	A19/Durham Road	0.57	0.51	0.57	0.53	-0.01	0.02
8	A19N on-slip/Durham Road	1.11	1.02	1.04	0.95	-0.07	-0.07
9	City Way/Emperor Way	0.41	0.77	0.46	0.59	0.05	-0.17
10	City Way/Monarch Way	1.26	0.91	0.47	0.43	-0.80	-0.48
11	City Way/Camberwell Way	1.03	2.11	0.46	0.44	-0.57	-1.67
12	City Way/Doxford Park Way	0.95	1.04	1.02	0.97	0.06	-0.07
13	Doxford Park Way/Silksworth Way	0.68	1.01	0.77	0.98	0.08	-0.03
14	Doxford Park Way/Half Farm Road	0.06	0.05	0.05	0.05	-0.01	0.00
15	Doxford Park Way/Burdon Road	0.38	0.37	0.31	0.50	-0.07	0.13
16	Burdon Road/Bardon Lane	0.11	0.17	0.32	0.35	0.21	0.18
17	Burdon Road/Bevan Avenue	0.29	0.11	0.30	0.22	0.01	0.10
18	Burdon Lane/Ryhope Street South	0.81	0.28	0.32	0.20	-0.48	-0.08
19	Ryhope Street South/Black Road	0.71	0.42	0.25	0.16	-0.46	-0.26
20	Ryhope Street South/Bevan Avenue	0.96	0.67	0.60	0.89	-0.35	0.22
21	Stockton Road/The Village	0.44	0.40	0.20	0.21	-0.24	-0.20
22	The Village/ Robson PI	0.26	0.18	0.14	0.15	-0.12	-0.03
23	See View/A1018	0.93	0.59	0.61	0.51	-0.32	-0.08
24	A1018/B1287	0.80	0.70	0.69	0.60	-0.11	-0.10
25	Ryhope Road/See View	0.21	0.47	0.37	0.38	0.16	-0.09
26	Ryhope St/Nelson St	0.61	0.35	0.09	0.07	-0.52	-0.28
27	Toll Bar Road/Fenside Road	0.43	0.40	0.30	0.36	-0.13	-0.04
28	B1405/Salterfen Road	0.91	0.77	0.80	0.72	-0.11	-0.05
29	A1018/Salterfen Road	0.80	0.71	0.73	0.60	-0.07	-0.10
30	Toll Bar Road/Carmere Road	0.12	0.12	0.11	0.12	-0.01	0.01
31	Toll Bar/Hollycarrside Road	0.95	0.35	0.39	0.17	-0.56	-0.18
32	Tunstall Village Green/Burdon Road	0.90	0.79	0.63	0.52	-0.27	-0.28
33	Tunstall Village Lane/Tunstall Village Rd	0.29	0.49	0.37	0.42	0.08	-0.07
34	Maple Avenue/Paddock Lane	0.25	0.59	0.28	0.46	0.03	-0.14
35	Tunstall Hope Road/Paddock Lane	0.40	0.81	0.42	0.72	0.02	-0.09
36	Toll Bar Road/Leechmere Road	0.47	0.47	0.38	0.44	-0.09	-0.03
37	Leechmere Way/Toll Bar Road	0.32	0.33	0.29	0.37	-0.04	0.04
38	Leechmere/Toll Bar North	0.31	0.25	0.27	0.26	-0.04	0.01
39	Leechmere Road	0.21	0.16	0.25	0.20	0.03	0.04
40	Leechmere Road/Tunstall Road	1.21	1.09	1.06	1.02	-0.15	-0.08
41	Premier Road/Essen Way	1.26	1.11	1.04	1.01	-0.22	-0.10

Scenario:		Without Mitigation		With Mitigation		Absolute Difference	
42	Warwick Terrace/Silksworth Lane	0.51	0.82	0.72	0.82	0.21	0.00
43	Silksworth Lane/North Moor Lane	0.27	0.43	0.61	0.53	0.34	0.09
44	Silksworth Lane/Silksworth Road	0.58	0.96	0.74	0.91	0.16	-0.05
45	Silksworth Way/Silksworth Road	0.68	0.82	0.98	1.00	0.30	0.18
46	Essen Way/Langley Road	0.70	0.56	0.51	0.59	-0.19	0.03
47	A690/West Park	0.98	0.76	0.65	0.51	-0.33	-0.25
48	West Park/Herrington Road	0.59	0.79	0.73	0.66	0.14	-0.13
49	A690/Herrington Road	1.30	1.33	1.00	1.01	-0.29	-0.33
50	A690/North Moor Lane	1.16	1.11	1.02	1.00	-0.14	-0.11
51	Durham Road/Premier Road	1.03	1.00	1.01	0.87	-0.02	-0.13
52	A690/Barnes Park Road	0.71	0.41	0.44	0.37	-0.28	-0.03
53	Queen Alexandra Road/Silksworth Lane	0.71	0.60	0.44	0.53	-0.27	-0.07
54	Durham Road/Richard Avenue	0.56	0.55	0.45	0.45	-0.11	-0.10
55	Durham Road/Etrick Grove	0.95	0.91	0.74	0.73	-0.22	-0.18
56	Ryhope Road/Ocean Road South	0.78	0.80	0.68	0.64	-0.10	-0.16
57	A1018/Ocean Road South	0.92	0.66	0.70	0.53	-0.22	-0.14
58	Queen Alexandra Rd/Ashbrooke Range	0.96	1.00	0.44	0.51	-0.53	-0.49
59	The Cedars/Ryhope Road	0.81	0.54	0.41	0.32	-0.40	-0.22
60	St Alban's Street/Commercial Road	1.03	0.90	0.92	0.78	-0.10	-0.12
61	Commercial Road/Robinson Terrace	0.95	0.83	0.87	0.74	-0.08	-0.09
62	Ryhope Road/Mowbray Road	0.60	0.41	0.42	0.32	-0.18	-0.08
63	Commercial Road/White House Road	0.98	0.83	0.89	0.76	-0.10	-0.08
64	A690/Barnes Park Road	0.71	0.41	0.44	0.37	-0.28	-0.03
65	Park Road/A1231	0.25	0.23	0.22	0.23	-0.03	0.00
66	Burn Park/Eden House Road	0.46	0.62	0.45	0.55	-0.01	-0.07
67	New Durham Road/Burn Park Road	0.28	0.53	0.23	0.30	-0.05	-0.23
68	Burn Park/Derby Street	0.20	0.20	0.22	0.19	0.02	-0.01
69	Chester Road/The Royalty	0.36	0.33	0.24	0.27	-0.12	-0.06
70	Chester Road/St Michael Way	1.01	0.91	1.00	0.84	0.00	-0.06
71	Grange Terrace/ Thornhill Cres	0.80	0.66	0.59	0.64	-0.21	-0.02
72	A1231/A690	0.94	0.66	0.64	0.57	-0.30	-0.10
73	A690/St Michaels Way	0.80	0.76	0.60	0.46	-0.21	-0.30
74	SB St Michaels Way/ A690	0.57	0.71	0.51	0.61	-0.06	-0.11
75	Mary St/St Michael's Way	0.39	0.48	0.39	0.49	0.00	0.00
76	A1231/Belvedere Road	0.78	0.79	0.83	0.78	0.04	-0.01
77	Lawrence St/Hendon Road	0.94	0.68	0.85	0.65	-0.08	-0.03
78	Borough Road/A1018	0.81	0.68	0.69	0.61	-0.12	-0.07
79	WB West Wear Street/Wearmouth Bridge	0.88	1.01	0.60	0.54	-0.28	-0.47
80	Wearmouth Bridge/St Mary's Way EB	0.39	0.32	0.38	0.32	-0.01	0.00
81	WB St Mary's Way/Wearmouth Bridge	0.67	0.82	0.53	0.63	-0.13	-0.19
82	SB Wearmouth Bridge/West Wear Street	0.71	0.69	0.59	0.49	-0.12	-0.19
83	Chester Road/St Marks's Road	0.71	0.93	0.29	0.47	-0.42	-0.46
84	Kayll Road/Chester Road	0.92	0.90	0.89	0.81	-0.03	-0.09
85	Etrick Grove/Chester Road	0.36	0.33	0.35	0.38	0.00	0.05
86	The Broadway/Springwell Road	1.04	1.06	1.00	1.01	-0.04	-0.05
87	Chester Road/Grindon Lane	0.83	0.75	0.67	0.58	-0.16	-0.17
88	Chester Road/Pennywell Road	0.82	1.03	0.84	0.84	0.02	-0.19
89	Chester Road/Greenwood Road	0.94	0.98	0.81	0.74	-0.14	-0.24
90	Chester Road/Prestbury Road	0.37	0.90	0.36	0.39	-0.01	-0.51
91	Prestbury Road/Hylton Road	0.24	0.28	0.29	0.26	0.05	-0.02
92	Hylton Road/Waterford Green	0.30	0.32	0.27	0.30	-0.03	-0.02
93	Hylton Road/Grindon Lane	0.56	0.90	0.49	0.84	-0.07	-0.06
94	Hylton Road/Portsmouth Road	0.39	0.37	0.35	0.35	-0.04	-0.02
95	Hylton Road/Font Road	0.65	0.84	0.67	0.79	0.02	-0.06
96	Hylton Road/Kayll Road	0.92	0.93	0.70	0.86	-0.22	-0.07
97	St Luke's Terrace/St Luke's Road	0.20	0.35	0.19	0.32	-0.02	-0.03
98	Pallion New Road/Lisburn Terrace	0.31	0.44	0.31	0.44	0.00	0.00
99	Trimdon Street/ Silksworth Row	1.00	0.92	0.94	1.01	-0.06	0.09
100	Hylton Road/Rutland Street	0.18	0.25	0.22	0.29	0.05	0.05
101	Hylton Road/St Marks Road North	0.48	0.47	0.32	0.40	-0.16	-0.08
102	A1018/Dame Dorothy Street	0.75	0.65	0.70	0.55	-0.05	-0.10
103	A1018/Sheepfolds North	0.59	0.54	0.55	0.55	-0.04	0.01
104	Church Street/Dame Dorothy Street	0.95	0.53	0.65	0.37	-0.29	-0.16
105	North Bridge Street/Roker Avenue	0.85	0.97	0.68	0.81	-0.17	-0.16

Scenario:		Without Mitigation		With Mitigation		Absolute Difference	
106	Roker Avenue/Fulwell Road	0.92	0.97	0.88	0.83	-0.05	-0.14
107	Roker Avenue/Church Street	0.81	0.64	0.68	0.62	-0.12	-0.02
108	Dame Dorothy Street/Harbour View	0.41	0.27	0.39	0.24	-0.02	-0.03
109	Roker Baths Road/Fulwell Road	0.47	0.45	0.43	0.29	-0.04	-0.16
110	Roker Terrace/St George's Terrace	0.36	0.25	0.33	0.22	-0.03	-0.03
111	Whitburn Road/Chichester Road	0.30	0.21	0.28	0.21	-0.02	0.00
112	Whitburn Road/Dykeland's Road	0.85	1.00	0.69	0.90	-0.16	-0.10
113	Newcastle Road/A1018	0.56	0.58	0.47	0.52	-0.09	-0.05
114	A1018/Dovedale Road	0.62	0.84	0.38	0.66	-0.24	-0.19
115	Newcastle Road/Chalton Road	0.96	1.02	0.89	0.98	-0.07	-0.04
116	Newcastle Road/Newhaven Avenue	0.27	0.23	0.23	0.24	-0.04	0.00
117	Newcastle Road/Crozier Street	0.30	0.46	0.27	0.28	-0.03	-0.18
118	Southwick Road/Stadium Way	0.65	0.66	0.50	0.55	-0.16	-0.10
119	Queens Road/Kier Hardie Way	0.66	0.70	0.61	0.80	-0.06	0.10
120	Southwick Road/B1291	0.90	0.85	0.87	0.82	-0.03	-0.03
121	A1231/Camden Street	0.54	0.57	0.48	0.62	-0.06	0.04
122	Camden Street/Trafford Road	0.23	0.28	0.21	0.29	-0.02	0.01
123	Wessington Way/Queens Road	0.76	0.68	0.55	0.57	-0.21	-0.12
124	Wessington Way/A1231	0.99	0.89	0.53	0.53	-0.47	-0.36
125	Northern Way/Dean Terrace	0.86	0.96	0.76	0.80	-0.10	-0.16
126	Northern Way/North Hylton Road	0.39	0.27	0.35	0.25	-0.04	-0.02
127	Old Mill Road/Wembley Road	0.11	0.16	0.15	0.16	0.04	0.00
128	Hylton Road/Castletown Way	0.77	0.78	0.87	0.85	0.10	0.07
129	North Hylton Road/Radlett Road	0.64	0.36	0.50	0.42	-0.14	0.06
130	Castletown Way/Riverside Road	0.57	0.58	0.42	0.65	-0.15	0.07
131	Wessington Way/Castletown Way	1.04	0.99	0.94	0.93	-0.09	-0.06
132	Wessington Way/Colima Avenue	1.02	1.00	0.95	0.99	-0.07	-0.01
133	Grange Road/Barons Quay Road	0.21	0.40	0.24	0.30	0.03	-0.10
134	Wessington Way/Ferryboat Lane	1.06	0.95	0.99	0.92	-0.07	-0.03
135	Washington Road/Ferryboat Lane	0.84	0.83	0.83	0.70	-0.01	-0.12
136	Washington Road/Blackwood Road	0.76	0.98	0.67	0.91	-0.09	-0.07
137	Washington Road/Canterbury Road	0.20	0.17	0.23	0.18	0.03	0.01
138	Washington Road/Hylton Lane	0.85	0.80	0.68	0.77	-0.17	-0.03
139	Washington Road/Craigavon Road	0.83	0.83	0.79	0.87	-0.04	0.04
140	Washington Road/Rotherfield Road	0.56	0.37	0.35	0.35	-0.22	-0.02
141	Kingsway Road/Hylton Lane	0.17	0.22	0.18	0.18	0.01	-0.04
142	A1290/Downhill Lane	0.26	0.46	0.22	0.29	-0.04	-0.17
143	A1290/Nissan Sight	0.53	0.66	0.39	0.33	-0.14	-0.33
144	A1290/Cherry Blossom Way	0.24	0.80	0.20	0.34	-0.04	-0.45
145	Nissan Way/A1231	0.18	0.28	0.19	0.25	0.01	-0.03
146	Sunderland Highway/ SB Pattinson Road	0.32	0.17	0.27	0.18	-0.05	0.00
147	NB Pattinson Way/A1231	0.74	0.78	0.63	0.80	-0.10	0.02
148	Sunderland Highway/ NB Nissan Way	0.39	0.24	0.31	0.25	-0.08	0.01
149	Glover Road/Spire Road	0.15	0.18	0.13	0.19	-0.01	0.00
150	A1231/Spire Road	0.16	0.39	0.15	0.34	-0.01	-0.05
151	A1231/Horsley Road	0.20	0.19	0.20	0.15	0.00	-0.04
152	Northumberland Way SB on-slip/Sunderland Hwy	0.26	0.40	0.27	0.44	0.00	0.04
153	Northumberland Way /Sunderland Hwy off-slip	0.25	0.32	0.25	0.30	0.00	-0.03
154	Northumberland Way NB on-slip/Sunderland Hwy	0.18	0.23	0.19	0.23	0.01	0.00
155	Northumberland Way NB/Sunderland Hwy off-slip	0.26	0.28	0.25	0.27	-0.01	-0.01
156	Washington Hwy SB off-slip/A1231	1.02	0.80	0.99	0.83	-0.03	0.03
157	Sunderland Hwy EB off-slip/Washington Hwy SB	0.86	0.58	0.61	0.52	-0.25	-0.06
158	Washington Hwy NB off-slip/A1231	0.67	0.66	0.61	0.62	-0.07	-0.03
159	A1231 WB off-slip/Washington Hwy	0.85	0.94	0.79	0.89	-0.06	-0.04
160	A182 - Salter's Ln	0.42	0.16	0.42	0.20	0.00	0.03
161	A182 - Murton Ln	1.29	1.43	1.03	1.02	-0.26	-0.41
162	WB A182 - B1284	1.22	1.20	1.22	1.20	0.00	0.00
163	SB A182 - B1284	0.49	0.46	0.42	0.47	-0.07	0.01
164	A182 - Caroline St	0.06	0.12	0.06	0.10	0.01	-0.02
165	A182 - Regent St	0.06	0.09	0.06	0.10	0.01	0.01
166	A182 - The Bungalows	0.54	0.23	0.50	0.27	-0.05	0.04
167	B1260 - B1284	0.32	0.25	0.31	0.27	-0.01	0.02
168	B1284 - Cygnet Way	0.35	0.23	0.28	0.23	-0.07	0.00
169	A690 - Slip Roads/ Cygnet Way	0.86	0.51	0.61	0.43	-0.25	-0.08

Scenario:		Without Mitigation		With Mitigation		Absolute Difference	
170	A182 - B1260	1.16	1.18	0.96	1.17	-0.20	-0.01
171	B1404 - B1260	0.49	0.39	0.34	0.37	-0.15	-0.02
172	B1404 - Salters Lane	0.29	0.16	0.28	0.15	-0.01	-0.01
173	A1052 - Dairy Lane	0.32	0.28	0.34	0.32	0.02	0.04
174	A1052 - Britannia Terrace	1.03	1.17	1.02	1.08	-0.01	-0.09
175	A690 - A1052 NB off slip	0.82	0.68	0.83	0.62	0.01	-0.06
176	A690 - A1052 A1052 Dairy Lane entry	0.39	0.32	0.40	0.32	0.01	-0.01
177	A690 - A1052 SB off slip	0.67	0.62	0.71	0.70	0.04	0.08
178	A690 - A1052 A182 entry	0.85	0.74	0.91	0.84	0.06	0.10
179	A690 - B1404 - NB parallel slip	0.16	0.16	0.19	0.16	0.03	0.00
180	A690 - B1404 - A182 Hillside Way	0.19	0.15	0.15	0.13	-0.04	-0.02
181	A690 - B1404 - A182 SB off slip	0.06	0.13	0.09	0.17	0.04	0.04
182	A690 - B1404 - Lake Road entry	1.02	1.03	1.02	1.03	0.01	0.00
183	Vigo Ln - Picktree Ln	1.04	1.03	1.01	1.04	-0.03	0.00
184	Picktree Ln - Bonemill Ln	0.86	0.73	0.86	0.60	0.00	-0.13
185	Bonemill Ln/ Vigo Ln	0.58	0.60	0.56	0.43	-0.02	-0.18
186	A182 - Coaley Ln	0.86	1.03	0.90	1.02	0.04	-0.01
187	A182 - B1286	0.92	0.74	1.03	0.96	0.12	0.22
188	A182 - A183	2.00	1.10	1.16	1.00	-0.84	-0.11

4.6.3 In Phase 2, the following junctions were identified as having an RFC of greater than 1.0 in the 'without mitigation' scenario, with supporting commentary on whether these had increased or decreased in RFC following the introduction of the mitigation measures:

- Sunderland Highway/A19: in the AM and PM, RFC decreases from 0.86 to 0.65 and 1.04 to 0.84 respectively, with the PM period falling below an RFC of 1.0.
- A19S off-slip/Parkside south: in the AM and PM, RFC decreases marginally from 0.99 to 0.95 and 1.05 to 1.01 respectively, with the PM period remaining above an RFC of 1.0.
- A19N on-slip/Durham Road: in the AM and PM, RFC decreases from 1.11 to 1.04 and 1.02 to 0.95 respectively, with the AM period remaining above an RFC of 1.0.
- City Way/Monarch Way: in the AM and PM, RFC decreases significantly from 1.26 to 0.47 and 0.91 to 0.43 respectively, with the AM falling below an RFC of 1.0.
- City Way/Camberwell Way: in the AM and PM, RFC decreases significantly from 1.03 to 0.46 and 2.11 to 0.44 respectively, with both periods falling below an RFC of 1.0
- City Way/Doxford Park Way: in the AM period, RFC increases from 0.95 to 1.02 and in the PM decreases from 1.04 to 0.97 respectively, with the AM increasing above an RFC of 1.0 and the PM decreasing below this.
- Doxford Park Way/Silksworth Way: in the AM period, RFC increases from 0.68 to 0.77 and in the PM decreases from 1.01 to 0.98 respectively, with the AM increasing above an RFC of 1.0 and the PM decreasing below this.
- Leechmere Road/Tunstall Road: in the AM and PM, RFC decreases from 1.21 to 1.06 and 1.09 to 1.02 respectively, with both time periods being above an RFC of 1.0.
- Premier Road/Essen Way: in the AM and PM, RFC decreases from 1.26 to 1.06 and 1.09 to 1.02 respectively, with both time periods being above an RFC of 1.0.
- A690/Herrington Road: in the AM and PM, RFC decreases from 1.30 to 1.00 and 1.33 to 1.01 respectively, with both periods staying above an RFC 1.0.

- A690/North Moor Lane: in the AM and PM, RFC decreases from 1.16 to 1.02 and 1.11 to 1.00 respectively, with both periods staying above an RFC 1.0.
- Durham Road/Premier Road: in the AM and PM, RFC decreases from 1.03 to 1.00 and 1.01 to 0.87 respectively, with the PM period falling below an RFC 1.0.
- Queen Alexandra Rd/Ashbrooke Range: in the AM and PM, RFC significantly decreases from 0.96 to 0.44 and 1.00 to 0.51 respectively, with the PM period falling below an RFC 1.0.
- St Alban's Street/Commercial Road: in the AM and PM, RFC decreases from 1.03 to 0.92 and 0.90 to 0.78 respectively, with the AM period falling below an RFC 1.0.
- Chester Road/St Michael Way: in the AM and PM, RFC decreases from 1.01 to 1.00 and 0.91 to 0.84 respectively.
- Westbound West Wear Street/Wearmouth Bridge: in the AM and PM, RFC decreases from 0.88 to 0.60 and 1.01 to 0.54 respectively, with the PM falling below an RFC 1.0.
- The Broadway/Springwell Road: in the AM and PM, RFC decreases from 1.04 to 1.00 and 1.06 to 1.01 respectively, with both periods remaining above an RFC 1.0.
- Chester Road/Pennywell Road: in the AM, RFC marginally increases from 0.82 to 0.84 and in the PM decreases from 1.03 to 0.84 respectively, with the PM period falling below an RFC 1.0.
- Trimdon Street/ Silksworth Row: in the AM, RFC decreases from 1.00 to 0.94 and the PM increases from 0.92 to 1.01 respectively, with the PM period increasing above an RFC 1.0.
- Whitburn Road/Dykeland's Road: in the AM and PM, RFC decreases from 0.85 to 0.69 and 1.00 to 0.90 respectively, with the PM period falling below an RFC 1.0.
- Newcastle Road/Chalton Road: in the AM and PM, RFC decreases from 0.96 to 0.89 and 1.02 to 0.98 respectively, with the PM period falling below an RFC 1.0.
- Wessington Way/Castletown Way: in the AM and PM, RFC decreases from 1.04 to 0.94 and 0.99 to 0.93 respectively, with the AM period falling below an RFC 1.0.
- Wessington Way/Colima Avenue: in the AM and PM, RFC decreases from 1.02 to 0.95 and 1.00 to 0.99 respectively, with the AM period falling below an RFC 1.0.
- Wessington Way/Ferryboat Lane: in the AM and PM, RFC decreases from 1.06 to 0.95 and 0.99 to 0.92 respectively, with the AM period falling below an RFC 1.0.
- Washington Hwy Southbound off-slip/A1231: in the AM, RFC marginally decreases from 1.02 to 0.99 and in the PM marginally increases from 0.80 to 0.83, with the AM peak falling below an RFC of 1.0.
- A182 Murton Lane: in the AM and PM, RFC decreases from 1.29 to 1.03 and 1.43 to 1.02 respectively, however both are still above an RFC of 1.0.
- WB A182 – B1284: in both the AM and PM, no change in RFC is noted and both remain above an RFC of 1.0.
- A182 – B1260: in the AM, RFC reduces from 1.16 to 0.96, however in the PM, the RFC marginally decreases from 1.18 to 1.17 and remains above an RFC of 1.0.



- A1052 Britannia Terrace: in the AM and PM, RFC decreases from 1.03 to 1.02 and 1.17 to 1.08 respectively, however both are still above an RFC of 1.0.
- A690 - B1404 - Lake Road entry: in the AM, RFC marginally increases from 1.02 to 1.03 and in the PM decreases 1.03 to 1.02 respectively, however both are still above an RFC of 1.0.
- Vigo Lane – Picktree Lane: in the AM and PM, RFC marginally decreases from 1.04 to 1.01 and 1.03 to 1.03 respectively, however both are still above an RFC of 1.0.
- A182 – Coaley Lane - in the AM, RFC increases from 0.86 to 0.90, however in the PM period RFC decreases from 1.03 to 1.02, with the PM still above an RFC of 1.0.
- A182 - B1286: in the AM and PM, RFC increases from 0.92 to 1.03 and 0.74 to 0.96 respectively, with AM increasing above an RFC of 1.0.
- A182 - A183: in the AM and PM, RFC decreases from 2.00 to 1.16 and 1.10 to 1.00 respectively, however both time periods still have an RFC greater than 1.0.

4.6.4 Whilst the above highlights the junctions that experience a change with and RFC above 1.0, the overall impact of the introduction of the mitigation measures is positive, improving the operation of the majority of junctions across the network.

## 4.7 Phase 3 Results

4.7.1 The final analysis Phase 3 has nearly 12,000 additional trips during the evening peak hour and over 10,000 during the morning peak hour.

4.7.2 **Table 6** outlines the results for both the with and without mitigation scenarios. The comparison of both schemes indicates where junctions have improved or worsened.

**Table 6 Comparison of Results: 'Without Mitigation' vs 'With Mitigation': Phase 3**

Scenario:		Without Mitigation		With Mitigation		Absolute Difference	
Ref	Junction	AM	PM	AM	PM	AM	PM
1	A19 NB off-Slip/A1290 Downhill Ln	0.95	0.90	0.76	0.76	-0.19	-0.14
2	Sunderland Highway/A19	0.86	1.04	0.65	0.85	-0.21	-0.19
3	A19/A183 W	0.45	0.37	0.41	0.32	-0.04	-0.05
4	A19N on-slip/A183W	0.86	0.67	0.80	0.56	-0.05	-0.11
5	A19S off-slip/Parkside south	0.95	1.06	0.92	1.03	-0.03	-0.03
6	A19N off-slip/Durham Rd	0.64	0.87	0.61	0.89	-0.03	0.03
7	A19/Durham Road	0.51	0.51	0.51	0.54	0.00	0.03
8	A19N on-slip/Durham Road	1.12	1.03	1.07	0.96	-0.05	-0.07
9	City Way/Emperor Way	0.39	0.79	0.41	0.65	0.02	-0.14
10	City Way/Monarch Way	1.21	0.93	0.41	0.45	-0.79	-0.48
11	City Way/Camberwell Way	0.49	2.36	0.45	0.46	-0.03	-1.91
12	City Way/Doxford Park Way	0.86	1.05	1.01	1.01	0.15	-0.05
13	Doxford Park Way/Silksworth Way	0.78	1.02	0.75	1.00	-0.03	-0.01
14	Doxford Park Way/Half Farm Road	0.10	0.06	0.06	0.05	-0.04	-0.01
15	Doxford Park Way/Burdon Road	0.36	0.41	0.42	0.58	0.05	0.17
16	Burdon Road/Bardon Lane	1.13	0.21	0.76	0.44	-0.36	0.23
17	Burdon Road/Bevan Avenue	0.82	0.14	0.42	0.25	-0.40	0.11
18	Burdon Lane/Ryhope Street South	0.88	0.33	0.44	0.23	-0.45	-0.10
19	Ryhope Street South/Black Road	0.63	0.57	0.35	0.25	-0.28	-0.33
20	Ryhope Street South/Bevan Avenue	1.00	0.74	0.65	0.97	-0.35	0.23
21	Stockton Road/The Village	0.44	0.50	0.22	0.24	-0.22	-0.25
22	The Village/ Robson Pl	0.22	0.18	0.14	0.16	-0.08	-0.03
23	See View/A1018	0.91	0.60	0.67	0.53	-0.24	-0.07
24	A1018/B1287	0.81	0.72	0.78	0.61	-0.03	-0.12
25	Ryhope Road/See View	0.22	0.49	0.40	0.40	0.18	-0.09
26	Ryhope St/Nelson St	0.55	0.39	0.10	0.10	-0.45	-0.29
27	Toll Bar Road/Fenside Road	0.41	0.38	0.29	0.37	-0.12	-0.02
28	B1405/Salterfen Road	0.93	0.86	0.90	0.78	-0.04	-0.08

Scenario:		Without Mitigation		With Mitigation		Absolute Difference	
29	A1018/Salterfen Road	0.83	0.75	0.78	0.63	-0.05	-0.11
30	Toll Bar Road/Carmere Road	0.12	0.11	0.11	0.12	-0.01	0.01
31	Toll Bar/Hollycarrside Road	0.87	0.39	0.47	0.24	-0.41	-0.15
32	Tunstall Village Green/Burdon Road	0.95	0.85	0.79	0.60	-0.16	-0.25
33	Tunstall Village Lane/Tunstall Village Rd	0.32	0.52	0.45	0.50	0.13	-0.02
34	Maple Avenue/Paddock Lane	0.31	0.74	0.35	0.54	0.05	-0.19
35	Tunstall Hope Road/Paddock Lane	0.46	0.92	0.55	0.76	0.09	-0.16
36	Toll Bar Road/Leechmere Road	0.52	0.44	0.37	0.44	-0.15	0.00
37	Leechmere Way/Toll Bar Road	0.36	0.35	0.28	0.39	-0.08	0.05
38	Leechmere/Toll Bar North	0.29	0.25	0.27	0.26	-0.03	0.02
39	Leechmere Road	0.21	0.17	0.23	0.20	0.02	0.04
40	Leechmere Road/Tunstall Road	1.40	1.10	1.08	1.04	-0.32	-0.07
41	Premier Road/Essex Way	1.21	1.12	1.05	1.03	-0.16	-0.09
42	Warwick Terrace/Silksworth Lane	0.59	0.84	0.72	0.81	0.13	-0.03
43	Silksworth Lane/North Moor Lane	0.39	0.45	0.70	0.54	0.31	0.09
44	Silksworth Lane/Silksworth Road	0.66	0.98	0.75	0.92	0.09	-0.06
45	Silksworth Way/Silksworth Road	0.90	0.85	0.98	0.99	0.08	0.14
46	Essex Way/Langley Road	0.59	0.59	0.50	0.61	-0.09	0.02
47	A690/West Park	1.01	0.76	0.51	0.51	-0.50	-0.25
48	West Park/Herrington Road	0.60	0.79	0.70	0.74	0.10	-0.05
49	A690/Herrington Road	1.17	1.20	0.99	1.01	-0.19	-0.19
50	A690/North Moor Lane	1.14	1.11	1.02	1.02	-0.12	-0.09
51	Durham Road/Premier Road	1.04	1.01	1.01	0.91	-0.03	-0.10
52	A690/Barnes Park Road	0.68	0.46	0.46	0.40	-0.22	-0.06
53	Queen Alexandra Road/Silksworth Lane	0.74	0.60	0.46	0.55	-0.28	-0.05
54	Durham Road/Richard Avenue	0.57	0.55	0.46	0.47	-0.11	-0.08
55	Durham Road/Ettrick Grove	0.98	0.93	0.81	0.75	-0.17	-0.18
56	Ryhope Road/Ocean Road South	0.81	0.84	0.67	0.61	-0.14	-0.24
57	A1018/Ocean Road South	0.93	0.66	0.67	0.53	-0.25	-0.13
58	Queen Alexandra Rd/Ashbrooke Range	0.72	1.00	0.40	0.58	-0.32	-0.43
59	The Cedars/Ryhope Road	0.77	0.55	0.41	0.33	-0.36	-0.22
60	St Alban's Street/Commercial Road	1.02	0.93	0.98	0.82	-0.05	-0.12
61	Commercial Road/Robinson Terrace	0.96	0.86	0.91	0.77	-0.05	-0.09
62	Ryhope Road/Mowbray Road	0.55	0.43	0.43	0.35	-0.12	-0.07
63	Commercial Road/White House Road	0.98	0.86	0.92	0.79	-0.07	-0.08
64	A690/Barnes Park Road	0.68	0.46	0.46	0.40	-0.22	-0.06
65	Park Road/A1231	0.23	0.24	0.23	0.24	0.00	0.00
66	Burn Park/Eden House Road	0.52	0.63	0.46	0.56	-0.06	-0.07
67	New Durham Road/Burn Park Road	0.30	0.56	0.22	0.31	-0.08	-0.24
68	Burn Park/Derby Street	0.22	0.21	0.20	0.20	-0.02	-0.01
69	Chester Road/The Royalty	0.37	0.35	0.26	0.29	-0.11	-0.06
70	Chester Road/St Michael Way	1.01	0.94	1.00	0.85	-0.01	-0.08
71	Grange Terrace/ Thornhill Cres	0.74	0.70	0.60	0.68	-0.14	-0.02
72	A1231/A690	0.95	0.69	0.64	0.59	-0.31	-0.10
73	A690/St Michaels Way	0.84	0.79	0.62	0.48	-0.22	-0.31
74	SB St Michaels Way/ A690	0.56	0.72	0.50	0.63	-0.05	-0.09
75	Mary St/St Michael's Way	0.39	0.49	0.39	0.50	-0.01	0.01
76	A1231/Belvedere Road	0.72	0.84	0.85	0.81	0.13	-0.03
77	Lawrence St/Hendon Road	0.94	0.71	0.87	0.67	-0.06	-0.04
78	Borough Road/A1018	0.80	0.74	0.70	0.62	-0.10	-0.11
79	WB West Wear Street/Wearmouth Bridge	0.90	1.02	0.60	0.55	-0.30	-0.47
80	Wearmouth Bridge/St Mary's Way EB	0.39	0.32	0.39	0.32	0.00	0.01
81	WB St Mary's Way/Wearmouth Bridge	0.66	0.82	0.54	0.64	-0.12	-0.18
82	SB Wearmouth Bridge/West Wear Street	0.72	0.70	0.59	0.50	-0.13	-0.21
83	Chester Road/St Marks's Road	0.85	0.95	0.33	0.55	-0.53	-0.40
84	Kayll Road/Chester Road	0.91	0.91	0.93	0.84	0.02	-0.07
85	Ettrick Grove/Chester Road	0.36	0.33	0.34	0.37	-0.02	0.05
86	The Broadway/Springwell Road	1.03	1.07	1.00	1.01	-0.03	-0.06
87	Chester Road/Grindon Lane	0.74	0.76	0.73	0.58	0.00	-0.18
88	Chester Road/Pennywell Road	0.81	1.03	0.82	0.84	0.01	-0.18
89	Chester Road/Greenwood Road	0.91	1.01	0.81	0.72	-0.10	-0.28
90	Chester Road/Prestbury Road	0.34	0.95	0.36	0.38	0.01	-0.57
91	Prestbury Road/Hylton Road	0.25	0.29	0.31	0.28	0.07	-0.01
92	Hylton Road/Waterford Green	0.32	0.35	0.28	0.34	-0.03	-0.01

Scenario:		Without Mitigation		With Mitigation		Absolute Difference	
93	Hylton Road/Grindon Lane	0.57	0.93	0.50	0.88	-0.07	-0.05
94	Hylton Road/Portsmouth Road	0.40	0.38	0.36	0.37	-0.05	-0.01
95	Hylton Road/Font Road	0.69	0.89	0.71	0.81	0.02	-0.08
96	Hylton Road/Kayll Road	0.88	0.91	0.73	0.86	-0.15	-0.05
97	St Luke's Terrace/St Luke's Road	0.22	0.37	0.19	0.33	-0.02	-0.04
98	Pallion New Road/Lisburn Terrace	0.31	0.47	0.30	0.47	-0.01	0.00
99	Trimdon Street/ Silksworth Row	1.01	0.98	0.98	1.00	-0.03	0.02
100	Hylton Road/Rutland Street	0.18	0.25	0.23	0.31	0.05	0.05
101	Hylton Road/St Marks Road North	0.49	0.48	0.34	0.43	-0.15	-0.05
102	A1018/Dame Dorothy Street	0.76	0.67	0.71	0.58	-0.05	-0.09
103	A1018/Sheepfolds North	0.60	0.54	0.56	0.55	-0.04	0.01
104	Church Street/Dame Dorothy Street	0.96	0.57	0.68	0.39	-0.28	-0.18
105	North Bridge Street/Roker Avenue	0.88	0.98	0.72	0.84	-0.16	-0.14
106	Roker Avenue/Fulwell Road	0.93	0.98	0.87	0.84	-0.06	-0.14
107	Roker Avenue/Church Street	0.84	0.65	0.71	0.60	-0.13	-0.04
108	Dame Dorothy Street/Harbour View	0.41	0.28	0.39	0.25	-0.02	-0.03
109	Roker Baths Road/Fulwell Road	0.48	0.46	0.43	0.29	-0.06	-0.17
110	Roker Terrace/St George's Terrace	0.36	0.26	0.34	0.23	-0.02	-0.03
111	Whitburn Road/Chichester Road	0.30	0.21	0.28	0.22	-0.02	0.00
112	Whitburn Road/Dykeland's Road	0.85	1.00	0.71	0.91	-0.14	-0.10
113	Newcastle Road/A1018	0.56	0.58	0.48	0.54	-0.08	-0.05
114	A1018/Dovedale Road	0.62	0.86	0.40	0.69	-0.22	-0.18
115	Newcastle Road/Chalton Road	0.96	1.03	0.88	0.99	-0.08	-0.04
116	Newcastle Road/Newhaven Avenue	0.27	0.23	0.23	0.24	-0.04	0.01
117	Newcastle Road/Crozier Street	0.31	0.48	0.27	0.30	-0.04	-0.17
118	Southwick Road/Stadium Way	0.64	0.67	0.50	0.57	-0.14	-0.10
119	Queens Road/Kier Hardie Way	0.67	0.70	0.61	0.83	-0.06	0.13
120	Southwick Road/B1291	0.90	0.85	0.88	0.84	-0.02	-0.01
121	A1231/Camden Street	0.57	0.59	0.47	0.62	-0.10	0.03
122	Camden Street/Trafford Road	0.23	0.30	0.21	0.30	-0.02	0.00
123	Wessington Way/Queens Road	0.76	0.69	0.54	0.56	-0.22	-0.13
124	Wessington Way/A1231	1.00	0.90	0.52	0.54	-0.48	-0.36
125	Northern Way/Dean Terrace	0.88	0.96	0.78	0.81	-0.10	-0.14
126	Northern Way/North Hylton Road	0.39	0.27	0.35	0.26	-0.04	-0.01
127	Old Mill Road/Wembley Road	0.11	0.16	0.15	0.16	0.04	0.00
128	Hylton Road/Castletown Way	0.78	0.79	0.88	0.84	0.10	0.05
129	North Hylton Road/Radlett Road	0.66	0.37	0.51	0.42	-0.15	0.05
130	Castletown Way/Riverside Road	0.57	0.58	0.43	0.66	-0.14	0.08
131	Wessington Way/Castletown Way	1.04	0.99	0.92	0.92	-0.12	-0.07
132	Wessington Way/Colima Avenue	1.02	1.00	0.95	0.99	-0.07	-0.01
133	Grange Road/Barons Quay Road	0.21	0.40	0.25	0.31	0.04	-0.09
134	Wessington Way/Ferryboat Lane	1.06	0.96	0.99	0.94	-0.07	-0.02
135	Washington Road/Ferryboat Lane	0.85	0.85	0.86	0.73	0.02	-0.12
136	Washington Road/Blackwood Road	0.77	0.99	0.70	0.90	-0.07	-0.08
137	Washington Road/Canterbury Road	0.20	0.18	0.24	0.19	0.04	0.01
138	Washington Road/Hylton Lane	0.84	0.82	0.70	0.80	-0.15	-0.02
139	Washington Road/Craigavon Road	0.82	0.85	0.80	0.89	-0.02	0.04
140	Washington Road/Rotherfield Road	0.55	0.37	0.36	0.37	-0.18	0.00
141	Kingsway Road/Hylton Lane	0.17	0.23	0.18	0.19	0.01	-0.04
142	A1290/Downhill Lane	0.27	0.48	0.22	0.30	-0.04	-0.18
143	A1290/Nissan Sight	0.53	0.69	0.39	0.35	-0.15	-0.34
144	A1290/Cherry Blossom Way	0.27	0.86	0.20	0.38	-0.06	-0.47
145	Nissan Way/A1231	0.18	0.30	0.19	0.25	0.01	-0.05
146	Sunderland Highway/ SB Pattinson Road	0.35	0.18	0.29	0.18	-0.06	0.00
147	NB Pattinson Way/A1231	0.74	0.78	0.65	0.80	-0.09	0.01
148	Sunderland Highway/ NB Nissan Way	0.41	0.24	0.33	0.25	-0.08	0.01
149	Glover Road/Spire Road	0.15	0.20	0.14	0.19	-0.02	-0.01
150	A1231/Spire Road	0.16	0.39	0.15	0.34	-0.01	-0.05
151	A1231/Horsley Road	0.20	0.20	0.20	0.15	0.00	-0.05
152	Northumberland Way SB on-slip/Sunderland Hwy	0.26	0.40	0.27	0.44	0.00	0.05
153	Northumberland Way /Sunderland Hwy off-slip	0.26	0.33	0.25	0.30	-0.01	-0.03
154	Northumberland Way NB on-slip/Sunderland Hwy	0.19	0.23	0.19	0.23	0.00	0.01
155	Northumberland Way NB/Sunderland Hwy off-slip	0.26	0.28	0.25	0.27	-0.01	-0.01
156	Washington Hwy SB off-slip/A1231	1.02	0.79	0.99	0.83	-0.02	0.04

Scenario:		Without Mitigation		With Mitigation		Absolute Difference	
157	Sunderland Hwy EB off-slip/Washington Hwy SB	0.85	0.60	0.60	0.52	-0.25	-0.07
158	Washington Hwy NB off-slip/A1231	0.66	0.64	0.60	0.63	-0.06	-0.02
159	A1231 WB off-slip/Washington Hwy	0.84	0.94	0.78	0.91	-0.06	-0.03
160	A182 - Salter's Ln	0.44	0.18	0.43	0.21	-0.01	0.03
161	A182 - Murton Ln	1.29	1.43	1.00	1.02	-0.29	-0.41
162	WB A182 - B1284	1.20	1.21	1.23	1.20	0.03	-0.01
163	SB A182 - B1284	0.48	0.47	0.40	0.47	-0.08	0.01
164	A182 - Caroline St	0.06	0.13	0.07	0.10	0.01	-0.03
165	A182 - Regent St	0.06	0.09	0.07	0.10	0.01	0.01
166	A182 - The Bungalows	0.60	0.22	0.52	0.28	-0.08	0.06
167	B1260 - B1284	0.38	0.25	0.33	0.26	-0.04	0.01
168	B1284 - Cygnet Way	0.40	0.23	0.30	0.22	-0.10	-0.01
169	A690 - Slip Roads/ Cygnet Way	0.96	0.51	0.65	0.44	-0.32	-0.07
170	A182 - B1260	1.01	1.18	0.90	1.18	-0.11	0.00
171	B1404 - B1260	0.96	0.40	0.54	0.37	-0.41	-0.03
172	B1404 - Salters Lane	0.81	0.15	0.40	0.14	-0.40	-0.01
173	A1052 - Dairy Lane	0.32	0.28	0.34	0.31	0.02	0.03
174	A1052 - Britannia Terrace	1.05	1.17	1.01	1.10	-0.04	-0.07
175	A690 - A1052 NB off slip	0.86	0.69	0.83	0.61	-0.02	-0.08
176	A690 - A1052 A1052 Dairy Lane entry	0.41	0.33	0.40	0.31	-0.01	-0.01
177	A690 - A1052 SB off slip	0.78	0.63	0.76	0.70	-0.02	0.08
178	A690 - A1052 A182 entry	0.96	0.75	0.96	0.84	0.00	0.09
179	A690 - B1404 - NB parallel slip	0.17	0.16	0.19	0.16	0.02	0.00
180	A690 - B1404 - A182 Hillside Way	0.21	0.15	0.17	0.13	-0.04	-0.02
181	A690 - B1404 - A182 SB off slip	0.03	0.13	0.07	0.17	0.04	0.04
182	A690 - B1404 - Lake Road entry	1.01	1.03	1.01	1.03	0.00	0.00
183	Vigo Ln - Picktree Ln	1.04	1.03	1.02	1.04	-0.03	0.01
184	Picktree Ln - Bonemill Ln	0.86	0.74	0.87	0.64	0.01	-0.10
185	Bonemill Ln/ Vigo Ln	0.58	0.61	0.56	0.46	-0.02	-0.15
186	A182 - Coaley Ln	1.00	1.03	0.95	1.02	-0.05	-0.01
187	A182 - B1286	0.93	0.74	1.02	0.95	0.09	0.21
188	A182 - A183	1.29	1.11	1.17	1.01	-0.12	-0.10

4.7.3 In Phase 3, the following junctions were identified as having an RFC of greater than 1.0 in the 'without mitigation' scenario, with supporting commentary on whether these had increased or decreased in RFC following the introduction of the mitigation measures:

- Sunderland Highway/A19: in the AM and PM, RFC decreases from 0.86 to 0.65 and 1.04 to 0.85 respectively, with the PM period falling below an RFC of 1.0.
- A19S off-slip/Parkside south: in the AM and PM, RFC decreases marginally from 0.95 to 0.92 and 1.06 to 1.03 respectively, with the PM period remaining above an RFC of 1.0.
- A19N on-slip/Durham Road: in the AM and PM, RFC decreases from 1.12 to 1.07 and 1.03 to 0.96 respectively, with the AM period remaining above an RFC of 1.0.
- City Way/Monarch Way: in the AM and PM, RFC decreases significantly from 1.21 to 0.41 and 0.93 to 0.45 respectively, with the AM falling below an RFC of 1.0.
- City Way/Camberwell Way: in the AM and PM, RFC decreases significantly from 0.49 to 0.45 and 2.36 to 0.46 respectively, with both periods falling below an RFC of 1.0
- City Way/Doxford Park Way: in the AM period, RFC increases from 0.86 to 1.01 and in the PM decreases from 1.05 to 0.91 respectively, with the AM increasing above an RFC of 1.0.

- Doxford Park Way/Silksworth Way: in the AM period, RFC increases from 0.78 to 0.75 and in the PM decreases from 1.02 to 1.00 respectively, with the PM remaining above an RFC of 1.0.
- Burdon Road/Bardon Lane: in the AM, RFC decreases from 1.13 to 0.76 and in the PM peak, increases from 0.21 to 0.44, with the AM period falling below an RFC of 1.0.
- Leechmere Road/Tunstall Road: in the AM and PM, RFC decreases from 1.40 to 1.08 and 1.10 to 1.04 respectively, with both time periods being above an RFC of 1.0.
- Premier Road/Essen Way: in the AM and PM, RFC decreases from 1.21 to 1.05 and 1.12 to 1.03 respectively, with both time periods being above an RFC of 1.0.
- A690/Herrington Road: in the AM and PM, RFC decreases from 1.30 to 1.00 and 1.33 to 1.01 respectively, with both periods staying above an RFC 1.0.
- A690/West Park: in the AM and PM, RFC decreases significantly from 1.01 to 0.51 and 0.76 to 0.51 respectively, with the AM period falling below an RFC 1.0.
- A690/Herrington Road: in the AM and PM, RFC decreases from 1.17 to 0.99 and 1.20 to 1.01 respectively, with the AM period falling below an RFC 1.0.
- A690/North Moor Lane: in the AM and PM, RFC decreases from 1.14 to 1.02 and 1.11 to 1.02 respectively, with both periods staying above an RFC 1.0.
- Durham Road/Premier Road: in the AM and PM, RFC decreases from 1.04 to 1.01 and 1.01 to 0.91 respectively, with the PM period falling below an RFC 1.0.
- Queen Alexandra Rd/Ashbrooke Range: in the AM and PM, RFC significantly decreases from 0.72 to 0.40 and 1.00 to 0.58 respectively, with the PM period falling below an RFC 1.0.
- St Alban's Street/Commercial Road: in the AM and PM, RFC decreases from 1.02 to 0.98 and 0.93 to 0.82 respectively, with the AM period falling below an RFC 1.0.
- Chester Road/St Michael Way: in the AM and PM, RFC decreases from 1.01 to 1.00 and 0.94 to 0.85 respectively.
- Westbound West Wear Street/Wearmouth Bridge: in the AM and PM, RFC decreases from 0.90 to 0.60 and 1.02 to 0.55 respectively, with the PM falling below an RFC 1.0.
- The Broadway/Springwell Road: in the AM and PM, RFC decreases from 1.03 to 1.00 and 1.06 to 1.01 respectively, with both periods remaining above an RFC 1.0.
- Chester Road/Pennywell Road: in the AM, RFC marginally increases from 0.81 to 0.82 and in the PM decreases from 1.01 to 0.72 respectively, with the PM falling below an RFC 1.0.
- Chester Road/Greenwood Road: in the AM and PM, RFC decreases from 0.91 to 0.81 and 1.01 to 0.72 respectively, with the PM falling below an RFC 1.0.
- Trimdon Street/ Silksworth Row: in the AM, RFC decreases from 1.01 to 0.98 and the PM increases from 0.98 to 1.00 respectively, with the AM decreasing below and RFC of 1.0 and the PM period increasing above an RFC 1.0.
- Whitburn Road/Dykeland's Road: in the AM and PM, RFC decreases from 0.85 to 0.71 and 1.00 to 0.91 respectively, with the PM period falling below an RFC 1.0.
- Newcastle Road/Chalton Road: in the AM and PM, RFC decreases from 0.96 to 0.88 and 1.03 to 0.99 respectively, with the PM period falling below an RFC 1.0.

- Wessington Way/A1231: in the AM and PM, RFC decreases significantly from 1.00 to 0.52 and 0.90 to 0.54 respectively, with the AM period falling below an RFC 1.0.
- Wessington Way/Castletown Way: in the AM and PM, RFC decreases from 1.04 to 0.92 and 0.99 to 0.92 respectively, with the AM period falling below an RFC 1.0.
- Wessington Way/Colima Avenue: in the AM and PM, RFC decreases from 1.02 to 0.99 and 1.00 to 0.99 respectively, with the AM and PM periods falling below an RFC 1.0.
- Wessington Way/Ferryboat Lane: in the AM and PM, RFC decreases from 1.06 to 0.99 and 0.96 to 0.94 respectively, with the AM period falling below an RFC 1.0.
- Washington Hwy Southbound off-slip/A1231: in the AM, RFC marginally decreases from 1.02 to 0.99 and in the PM marginally increases from 0.79 to 0.83, with the AM peak falling below an RFC of 1.0.
- A182 Murton Lane: in the AM and PM, RFC decreases from 1.29 to 1.00 and 1.43 to 1.02 respectively, however both are still above an RFC of 1.0.
- WB A182 – B1284: in the AM, RFC increases from 1.20 to 1.23 however decreases from 1.21 to 1.20 in the PM, with both remaining above an RFC of 1.0.
- A182 – B1260: in the AM, RFC reduces from 1.01 to 0.90, however in the PM, the RFC remains the same at 1.18. Both remain above an RFC of 1.0.
- A1052 Britannia Terrace: in the AM and PM, RFC decreases from 1.05 to 1.01 and 1.17 to 1.10 respectively, however both are still above an RFC of 1.0.
- A690 - B1404 - Lake Road entry: in the AM, RFC remains the same at 1.01 1.03 respectively, however both are still above an RFC of 1.0.
- Vigo Lane – Picktree Lane: in the AM, RFC decreases from 1.04 to 1.02 however in the PM this increases from 1.03 to 1.04. Both are still above an RFC of 1.0.
- A182 – Coaley Lane - in the AM and PM, RFC decreases from 1.00 to 0.95 and 1.03 to 1.02 respectively, with the AM peak falling below an RFC of 1.0.
- A182 - B1286: in the AM and PM, RFC increases from 0.93 to 1.02 and 0.74 to 0.95 respectively, with AM increasing above an RFC of 1.0.
- A182 - A183: in the AM and PM, RFC decreases from 1.29 to 1.17 and 1.11 to 1.01 respectively, however both time periods still have an RFC greater than 1.0.

4.7.4 Whilst the above highlights the junctions that experience a marginal worsening in performance with the introduction of the mitigation measures, the overall impact is positive, improving the operation of many of the junction modelled.

## 4.8 Summary

4.8.1 This section of the report has presented the results of the assessment. A plan of each of the time periods and phases is included in **Appendix A**.

4.8.2 The following section of the report presents a summary of the assessment undertaken and conclusions.

## 5. Summary & Conclusion

### 5.1 Summary

- 5.1.1 This second Addendum Report has detailed the results of an assessment of the Local Plan mitigation measures proposed as part of the CSDP. It includes schemes which the Infrastructure Delivery Plan identifies as 'essential' to the delivery of the CSDP and other schemes which the council is confident will be completed within the plan period. The previous Addendum Report detailed the results of the "without mitigation" measures, which highlights the junctions in **Table 7** as being at or over capacity.

**Table 7 Junctions identified as being at or over capacity in Phase 3 without mitigation measures**

Ref	Junction	Without Mitigation		Absolute Difference		Percentage Difference	
		AM	PM	AM	PM	AM	PM
2	Sunderland Highway/A19	0.86	1.04	0.65	0.85	-0.21	-0.19
5	A19S off-slip/Parkside south	0.95	1.06	0.92	1.03	-0.03	-0.03
8	A19N on-slip/Durham Road	1.12	1.03	1.07	0.96	-0.05	-0.07
10	City Way/Monarch Way	1.21	0.93	0.41	0.45	-0.79	-0.48
11	City Way/Camberwell Way	0.49	2.36	0.45	0.46	-0.03	-1.91
12	City Way/Doxford Park Way	0.86	1.05	1.01	1.01	0.15	-0.05
13	Doxford Park Way/Silksworth Way	0.78	1.02	0.75	1.00	-0.03	-0.01
16	Burdon Road/Bardon Lane	1.13	0.21	0.76	0.44	-0.36	0.23
40	Leechmere Road/Tunstall Road	1.40	1.10	1.08	1.04	-0.32	-0.07
41	Premier Road/Essen Way	1.21	1.12	1.05	1.03	-0.16	-0.09
47	A690/West Park	1.01	0.76	0.51	0.51	-0.50	-0.25
49	A690/Herrington Road	1.17	1.20	0.99	1.01	-0.19	-0.19
50	A690/North Moor Lane	1.14	1.11	1.02	1.02	-0.12	-0.09
51	Durham Road/Premier Road	1.04	1.01	1.01	0.91	-0.03	-0.10
58	Queen Alexandra Rd/Ashbrooke Range	0.72	1.00	0.40	0.58	-0.32	-0.43
60	St Alban's Street/Commercial Road	1.02	0.93	0.98	0.82	-0.05	-0.12
70	Chester Road/St Michael Way	1.01	0.94	1.00	0.85	-0.01	-0.08
79	WB West Wear Street/Wearmouth Bridge	0.90	1.02	0.60	0.55	-0.30	-0.47
86	The Broadway/Springwell Road	1.03	1.07	1.00	1.01	-0.03	-0.06
88	Chester Road/Pennywell Road	0.81	1.03	0.82	0.84	0.01	-0.18
89	Chester Road/Greenwood Road	0.91	1.01	0.81	0.72	-0.10	-0.28
99	Trimdon Street/ Silksworth Row	1.01	0.98	0.98	1.00	-0.03	0.02
112	Whitburn Road/Dykeland's Road	0.85	1.00	0.71	0.91	-0.14	-0.10
115	Newcastle Road/Chalton Road	0.96	1.03	0.88	0.99	-0.08	-0.04
124	Wessington Way/A1231	1.00	0.90	0.52	0.54	-0.48	-0.36
131	Wessington Way/Castletown Way	1.04	0.99	0.92	0.92	-0.12	-0.07
132	Wessington Way/Colima Avenue	1.02	1.00	0.95	0.99	-0.07	-0.01
134	Wessington Way/Ferryboat Lane	1.06	0.96	0.99	0.94	-0.07	-0.02
156	Washington Hwy SB off-slip/A1231	1.02	0.79	0.99	0.83	-0.02	0.04
161	A182 - Murton Ln	1.29	1.43	1.00	1.02	-0.29	-0.41
162	WB A182 - B1284	1.20	1.21	1.23	1.20	0.03	-0.01
170	A182 - B1260	1.01	1.18	0.90	1.18	-0.11	0.00

Ref	Junction	Without Mitigation		Absolute Difference		Percentage Difference	
		AM	PM	AM	PM	AM	PM
174	A1052 - Britannia Terrace	1.05	1.17	1.01	1.10	-0.04	-0.07
182	A690 - B1404 - Lake Road entry	1.01	1.03	1.01	1.03	0.00	0.00
183	Vigo Ln - Picktree Ln	1.04	1.03	1.02	1.04	-0.03	0.01
186	A182 - Coaley Ln	1.00	1.03	0.95	1.02	-0.05	-0.01
188	A182 - A183	1.29	1.11	1.17	1.01	-0.12	-0.10

5.1.2 This Addendum Two report has built upon the previous assessment, which includes additional development trips, however with the addition of the proposed mitigation measures. Should these be constructed, modelling has been shown to reduce the impact of the additional development traffic across the modelled area. However, the following junctions in **Table 8** remain at or above the capacity, and therefore should be considered for improvement in the future:

**Table 8 Junctions identified as being at or over capacity in Phase 3 with mitigation measures**

Ref	Junction	With Mitigation		Absolute Difference		Percentage Difference	
		AM	PM	AM	PM	AM	PM
5	A19S off-slip/Parkside south	0.95	1.06	0.92	1.03	-0.03	-0.03
8	A19N on-slip/Durham Road	1.12	1.03	1.07	0.96	-0.05	-0.07
12	City Way/Doxford Park Way	0.86	1.05	1.01	1.01	0.15	-0.05
13	Doxford Park Way/Silksworth Way	0.78	1.02	0.75	1.00	-0.03	-0.01
40	Leechmere Road/Tunstall Road	1.40	1.10	1.08	1.04	-0.32	-0.07
41	Premier Road/Essen Way	1.21	1.12	1.05	1.03	-0.16	-0.09
49	A690/Herrington Road	1.17	1.20	0.99	1.01	-0.19	-0.19
50	A690/North Moor Lane	1.14	1.11	1.02	1.02	-0.12	-0.09
51	Durham Road/Premier Road	1.04	1.01	1.01	0.91	-0.03	-0.10
70	Chester Road/St Michael Way	1.01	0.94	1.00	0.85	-0.01	-0.08
86	The Broadway/Springwell Road	1.03	1.07	1.00	1.01	-0.03	-0.06
161	A182 - Murton Ln	1.29	1.43	1.00	1.02	-0.29	-0.41
162	WB A182 - B1284	1.20	1.21	1.23	1.20	0.03	-0.01
170	A182 - B1260	1.01	1.18	0.90	1.18	-0.11	0.00
174	A1052 - Britannia Terrace	1.05	1.17	1.01	1.10	-0.04	-0.07
182	A690 - B1404 - Lake Road entry	1.01	1.03	1.01	1.03	0.00	0.00
183	Vigo Ln - Picktree Ln	1.04	1.03	1.02	1.04	-0.03	0.01
186	A182 - Coaley Ln	1.00	1.03	0.95	1.02	-0.05	-0.01
188	A182 - A183	1.29	1.11	1.17	1.01	-0.12	-0.10

5.1.3 Implementation of the proposed mitigation measures therefore has reduced the number of junctions requiring improvement.

## 5.2 Conclusion

5.2.1 The results of the modelling exercise have indicated that the implementation of the schemes modelled would likely improve the overall network across Sunderland. However, in isolated locations, the impact of traffic re-routing on the network, taking advantage of the improvements assessed, will worsen these locations.

5.2.2 Whilst most affected junctions experience a marginal change, only one junction experiences a material change in RFC of greater than 5% across all both time periods, as is highlighted below:

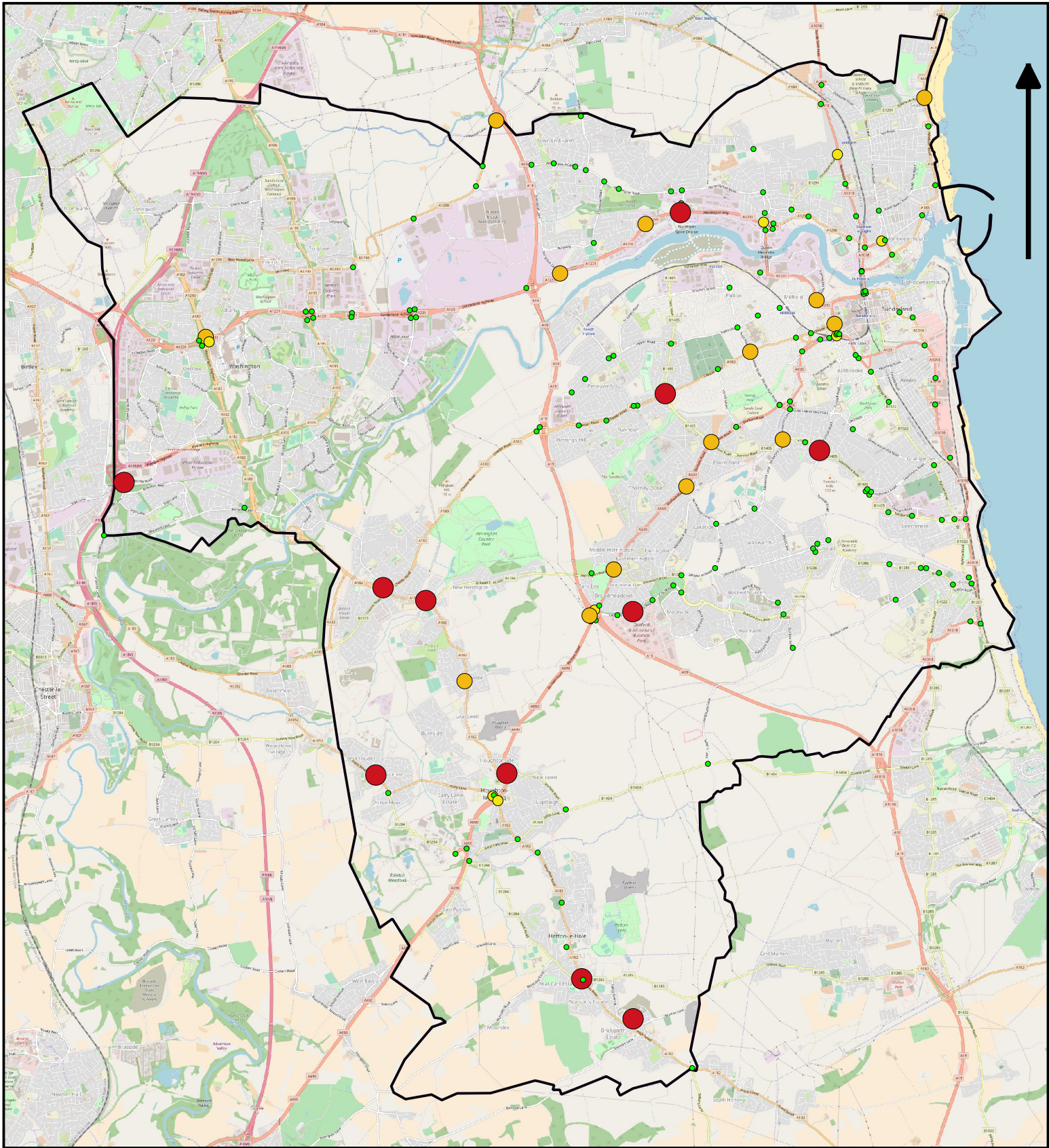
- City Way/Doxford Park Way: with an RFC rising from 0.86 to 1.01 in the AM peak.



- 5.2.3 The overall impact of the implementation across the network however is positive, despite localised changes brought about by re-routing.
- 5.2.4 Finally, the results of the assessment undertaken in this report consider several junctions that may require further mitigation measures to help reduce the impact of future developments on road capacity. The details of such mitigation measures may be assessed through developer supported Transportation Assessments and subsequent developer contributions. As full details of these transport interventions are not currently available and subject to a planning application for a specific development site, these currently cannot be tested.
- 5.2.5 It is recommended that where such sites come forward, any developer contributions should be targeted at the sites highlighted in the previous two tables to mitigate the effects of further deteriorations of the operational capacity of these junctions.

# Appendix A

## Heat Map Locations of Junctions



## Key

### Phase 0

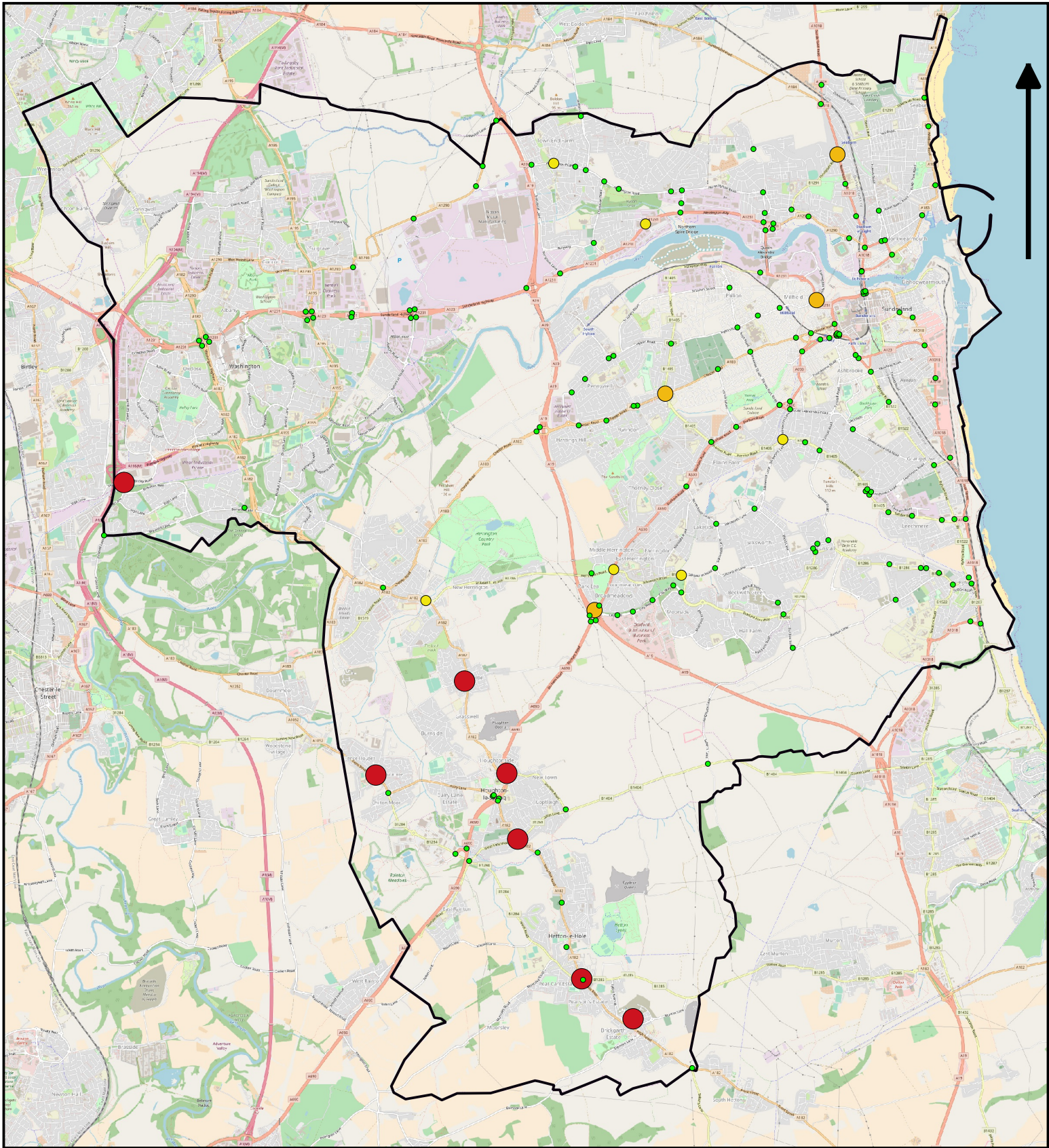
- A
- B
- C
- D
- SCC

OpenStreetMap

## Phase 0 AM

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### Key

#### Phase 0

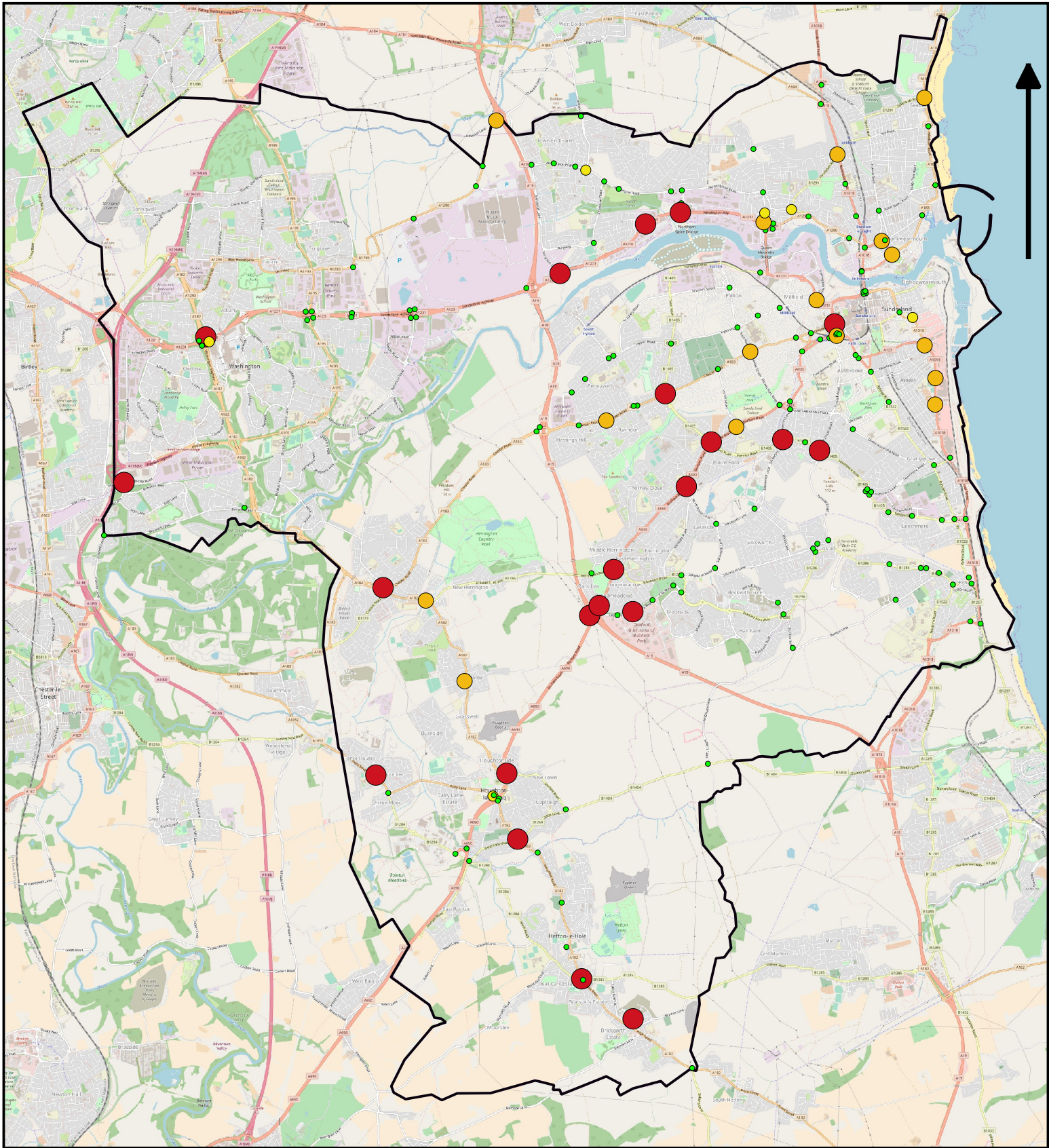
- A
- B
- C
- D
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### Phase 0 PM

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**Key**

**Phase 1**

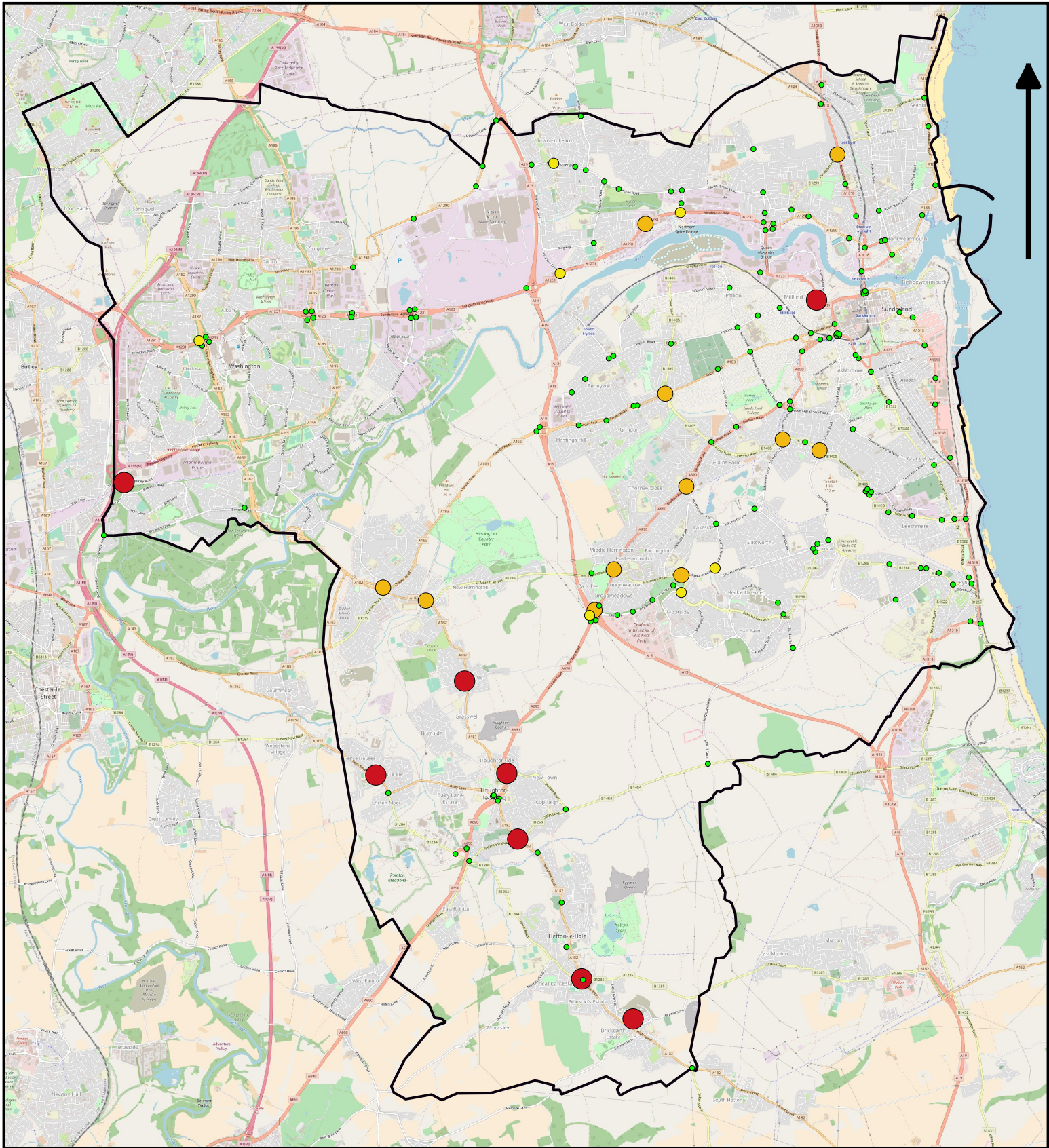
- A
- B
- C
- D
- SCC

OpenStreetMap

**Phase 1 AM**

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### Key

#### Phase 1

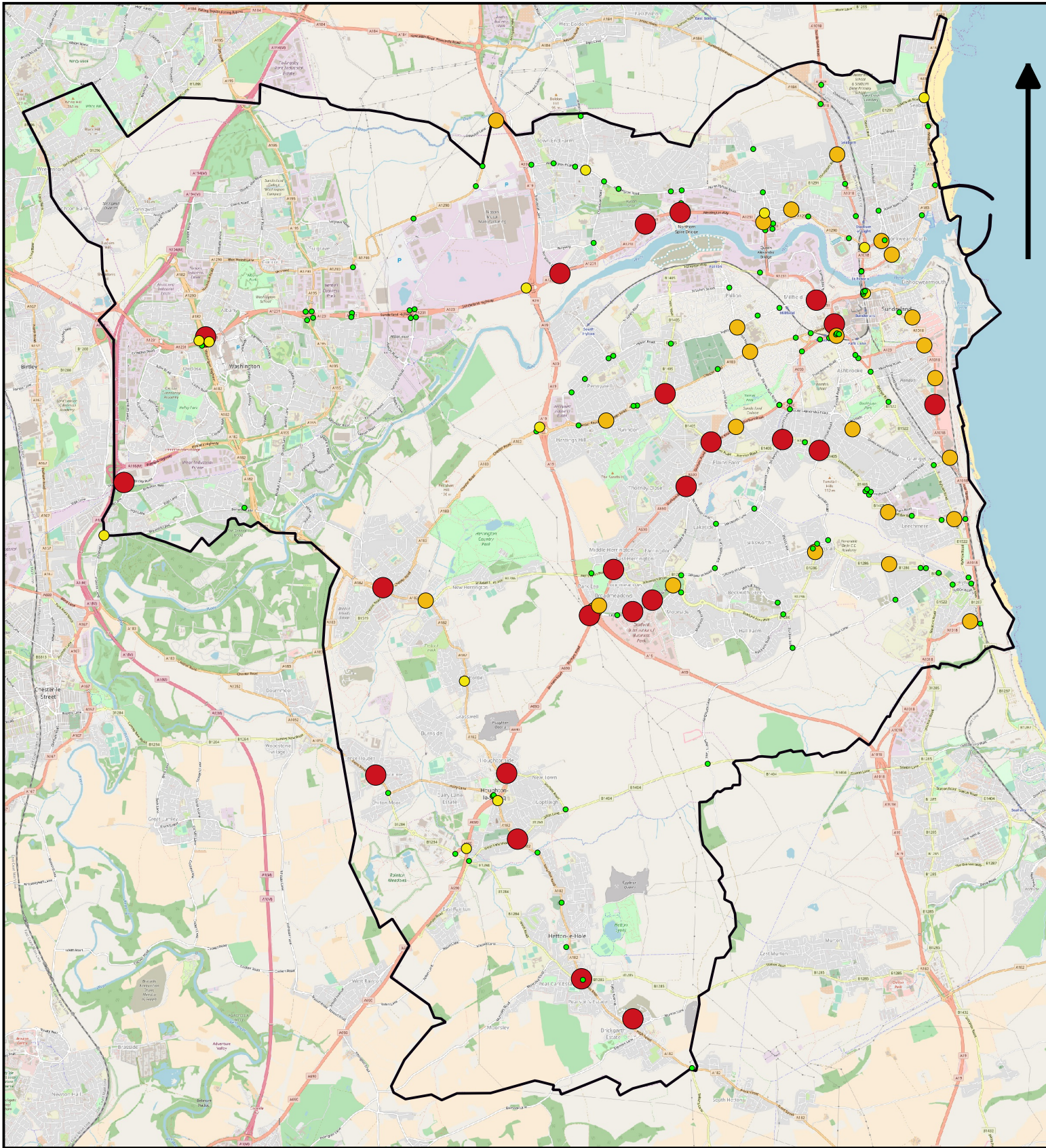
- A
- B
- C
- D
- SCC

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### Phase 1 PM

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### Key

#### Phase2

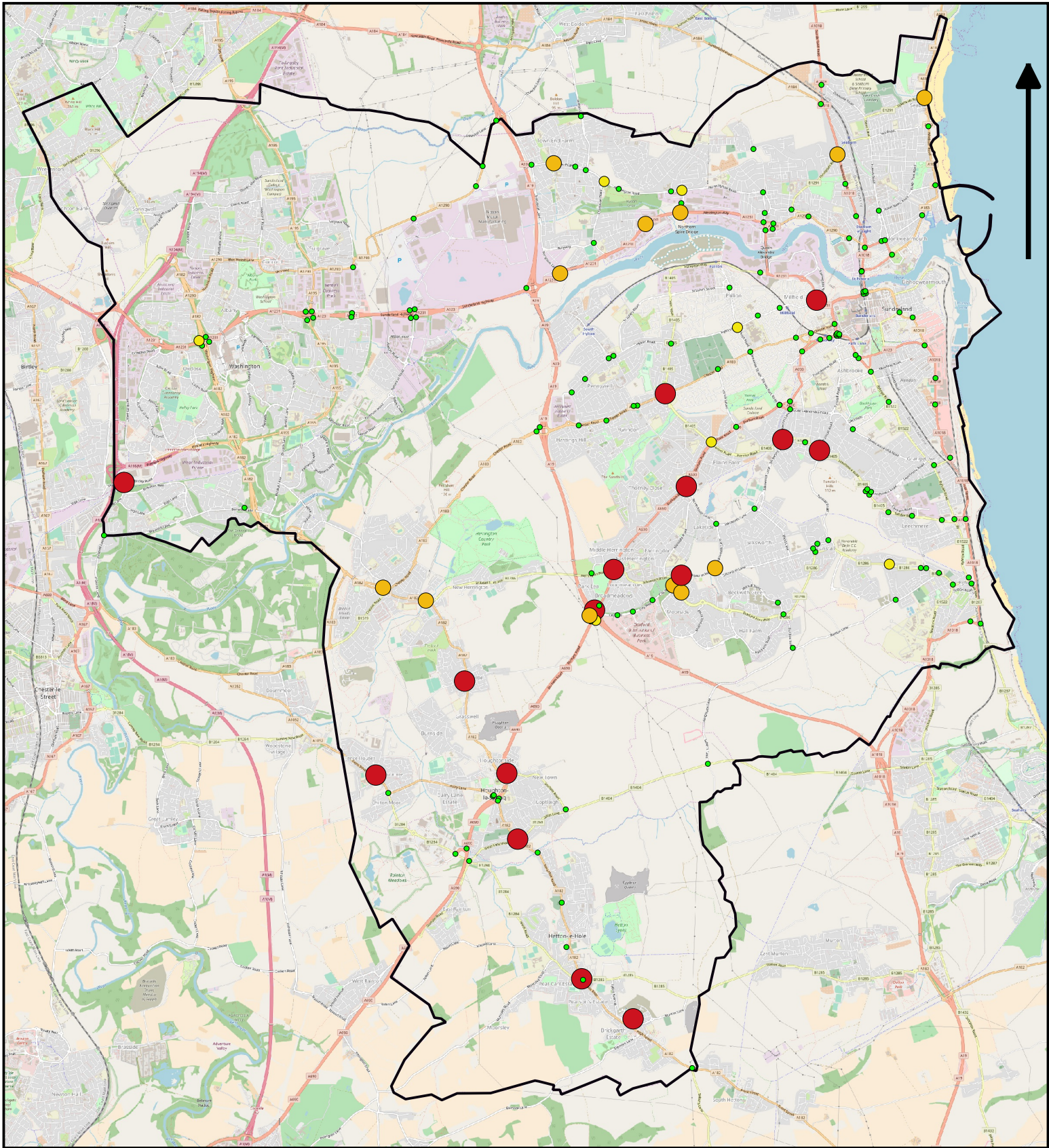
- A
- B
- C
- D
- SCC

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### Phase 2 AM

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**Key**

**Phase2**

- A
- B
- C
- D
- SCC

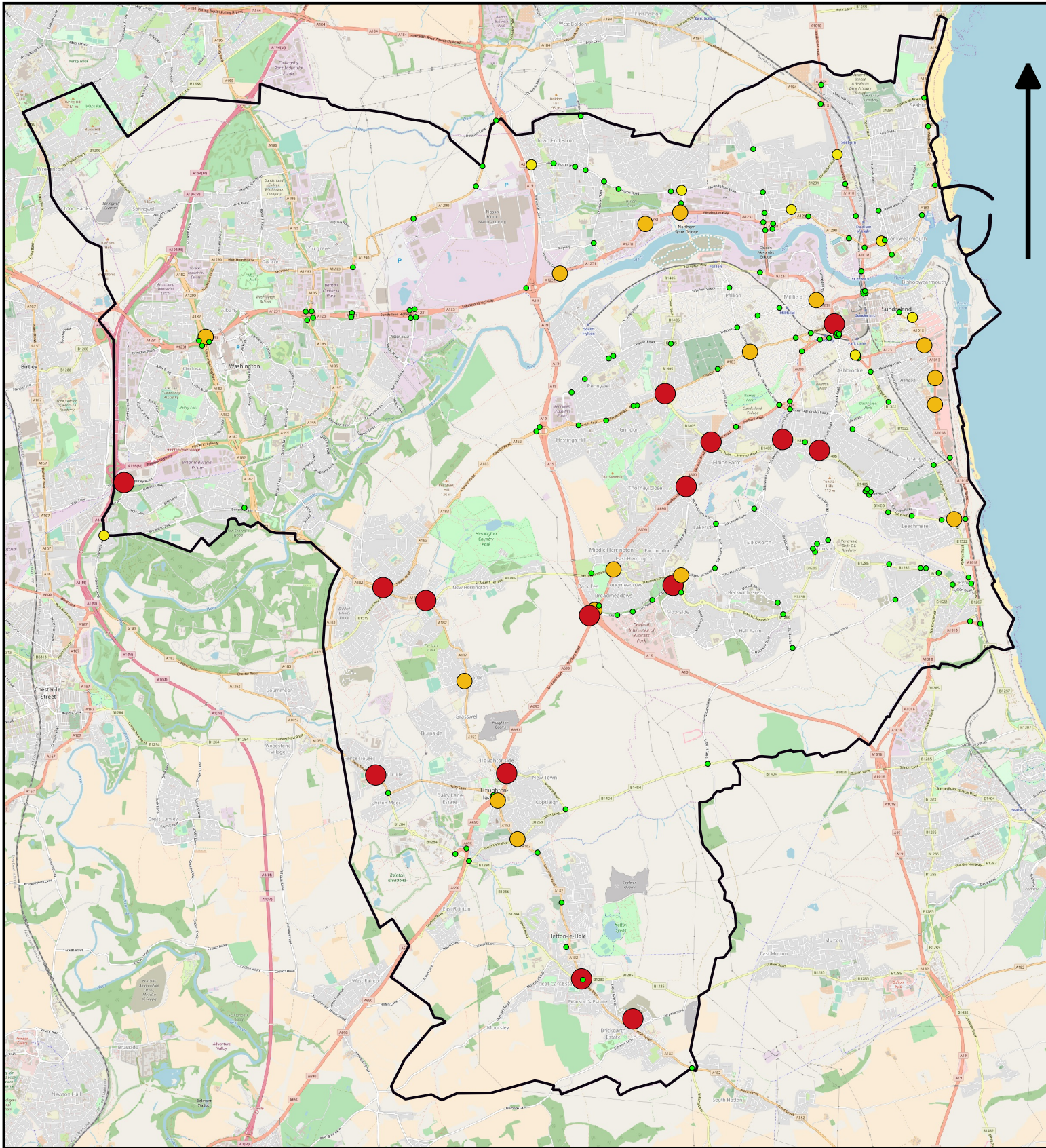
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**Phase 2 PM**

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**Key**

**Phase3**

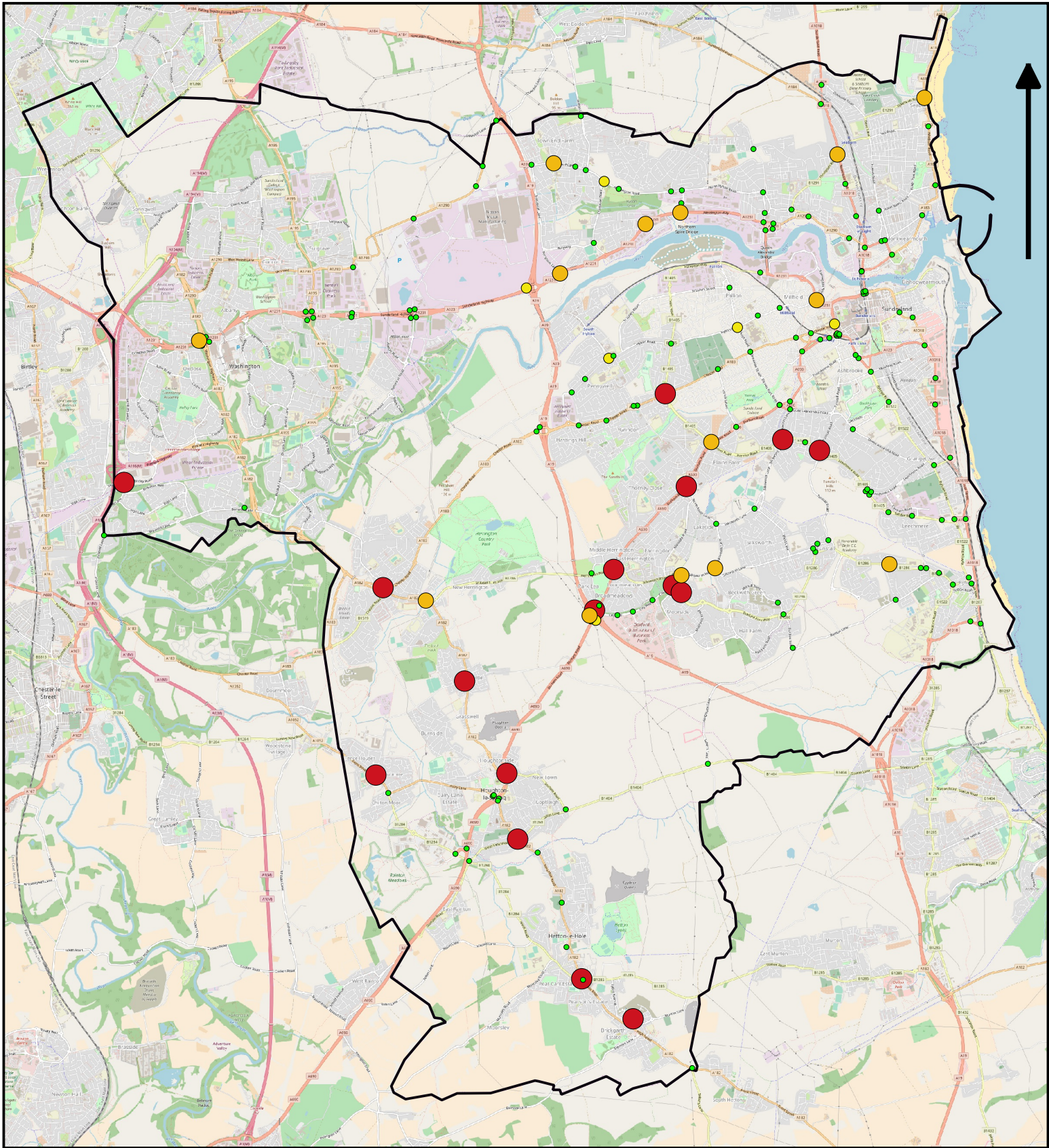
- A
- B
- C
- D
- SCC

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**Phase 3 AM**

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## Key

### Phase3

- A
- B
- C
- D
- SCC

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## Phase 3 PM

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