Matter 7 Hearing Statement

Local Plan Examination in Public 2019

The Strategy, Housing Growth Areas and Safeguarded Land for Washington

This matter considers the strategic policies (SP3, SS2 and SS3) and the Housing Growth Areas (HGA1-HGA6) for Washington.

Hellens Group

Issue 1 – Strategic Policies

Q1.2 Are Policies SP3 and SS2 justified and effective?

2.1 To be justified a policy must be *"the most appropriate strategy, when considered against the reasonable alternatives, based on proportionate evidence"*. To be effective it must be *"deliverable over the plan period and based on effective joint work on cross-boundary strategic priorities"* (paragraph 182 of the NPPF 2012). Policy SP3 relates to the strategy for the Washington sub-area which includes the metropolitan area of Washington and the village of Springwell. The Policy proposes a number of economic, town centre and strategic housing growth policies which include Green Belt releases. Hellens Group supports the Council's approach to Green Belt release and the recognition at paragraph 4.28 of the Regulation 19 Draft Core Strategy that *"without alterations to the Green Belt, the plan would not be able to accommodate housing needs, especially in the north of the city (Washington and North sub-areas)."*

2.2 Turning to national planning policy, the NPPF states that Green Belt boundaries should only be altered in exceptional circumstances, through the preparation or review of the Local Plan (paragraph 83 of NPPF). Paragraph 4.26 to 4.29 describe the process that has been gone through to establish these exceptional circumstances. The approach clearly outlines how the policy of Green Belt release is justified and effective.

2.3 Paragraphs 4.26 and 4.27 discuss the approach taken with regard to 'identifying alternative sources of land supply'. It makes it clear that *"the decision to amend Green Belt boundaries should only arise after all reasonable and acceptable efforts have been taken to maximise the amount of development within the urban area, optimising densities and ensuring all land is appropriately used."* (paragraph 4.26 of the Draft Core Strategy). The Draft Core Strategy goes on to discuss that it has assessed maximising land in the urban area, developing employment sites and increasing densities but that notwithstanding, a shortfall in larger family dwellings and bungalows remains. In our view, the Draft Core Strategy's approach is justified by a proportionate evidence base that is aligned with national planning policy.

2.4 Paragraph 4.27 states that the Draft Core Strategy, through its Duty to Cooperate discussions, has requested 'assistance' from neighbouring areas in terms of meeting its housing needs without having to encroach into the Green Belt but has been unable to successfully commute that need to another authority. This is a reasonable and proportionate step to take and demonstrates that the policy is effective as it is based on effective joint working on strategic priorities.

2.5 The NPPF does not contain guidance on what constitutes exceptional circumstances, albeit it does state, at paragraph 84 that:

"When drawing up or reviewing Green Belt boundaries local planning authorities should take account of the need to promote sustainable patterns of development. They should consider the consequences for sustainable development of channelling development towards urban areas inside the Green Belt boundary, towards towns and villages inset within the Green Belt or towards locations beyond the outer Green Belt boundary."

2.6 The Draft Core Strategy at paragraph 4.28 states that following an assessment of non-Green Belt supply and Duty to Cooperate discussions: *"to meet the identified shortfall, the council has concluded that the most sustainable solution requires us to amend the Green belt Boundary".*

2.7 It is therefore clear that the Council has taken a proportionate and justified approach to Green Belt release which; first identified the need for housing; then identified the maximum level of supply achievable in the LPA area and in neighbouring areas; then assessed the most sustainable strategy for delivering the residual housing need; and finally concluded that Green Belt release, in the least sensitive areas, is the most appropriate and sustainable strategy given the range of alternatives. This is the basis for Policies SP3 and SS2 and this is justified and effective.

Issue 2 – Identification of Sites

Q2.1 Do the Green Belt assessments support the HGAs and areas of Safeguarded Land in Washington and demonstrate exceptional circumstances for the removal of land from the Green Belt?

2.8 As set out above, Hellens Group's view is the Draft Core Strategy has demonstrated exceptional circumstances and is justified in this respect. The Council has undertaken a thorough assessment of Green Belt sites, first establishing the exceptional circumstances for a Green Belt release then reviewing the specific areas amd boundary changes that might be required to achieve this.

2.9 The 'Review of the Sunderland Green Belt Part 1: Exceptional Circumstances for Releases Land from the Green Belt' (SD33) sets out the exceptional circumstances that have triggered a Green Belt review in Sunderland. This is summarised in paragraphs 4.26 to 4.29 of the Draft Core Strategy. The 'Review of the Sunderland Green Belt Part 2: Boundary Assessment and Recommendations' (SD34) discusses the specific Green Belt boundary and where changes could be accommodated.

2.10 SD34 recognises that the Green Belt boundary is tightly drawn around Springwell Village (paragraph 4.52) and that for Springwell to grow and retain its distinctive identity and local facilities, some growth should be delivered here.

2.11 Springwell Village is surrounded by Green Belt which is a significant impediment to future growth in the settlement. National planning policy supports the provision of housing in villages. Section 3 (Supporting a Prosperous Rural Economy) of the NPPF sets out that planning policies should support economic growth in rural areas in order to create jobs and prosperity by taking a positive approach to sustainable new development. It sets out that plans should promote the retention and development of local services and community facilities in villages, such as local shops, meeting places, sports venues, cultural buildings, public houses and places of worship. Paragraph 55 of the NPPF states that *"to promote sustainable development in rural areas, housing should be located where it will enhance or maintain the vitality of rural communities."*

2.12 The PPG provides further detail on 'how local authorities should support sustainable rural communities' in line with paragraph 55 of the NPPF. Paragraph 1 (Reference ID: 50-001-20140306) states local authorities should recognise the issue facing rural areas in terms of housing supply and affordability and the role of housing in supporting the broader sustainability of villages and smaller settlements. The PPG states rural housing is essential to ensure viable use of local facilities such as public houses, places of worship, schools and cultural venues. Springwell Village has several key services such as the local shops and primary school which could be supported through the sensitive introduction of new housing. We therefore fully endorse the Draft Core Strategy in its recognition that Springwell Village should be afforded some growth in the plan.

2.13 Hellens Group submitted alongside its Regulation 18 and Regulation 19 representations a 'Springwell Village Housing Needs Assessment' which demonstrated that Green Belt release was needed in the village to support the services and facilities in Springwell. It concluded that if Hellens Group's interests were allocated in the plan it would have positive implications for both the demographic profile of the village and, consequently, the vitality of the village itself. It would also assist with alleviating affordability issues.

2.14 Again, it is clear that the Council has taken a proportionate and justified approach here which started with an identification of housing need and supply and concluded with a thorough Green Belt review which included multiple stages of analysis. This approach to HGAs is justified and effective.

Q2.2 If exceptional circumstances have been demonstrated have these been clearly articulated in the Plan?

2.15 The Draft Core Strategy summarises the approach at paragraph 4.26 to 4.29 but also makes reference to the evidence base documents which support it at Appendix 2 including the various iterations of Green Belt Review that have taken place since 2017. In our view this is clearly articulated and also concise.

Q2.3 Are the configuration and scale of the HGAs and areas of Safeguarded Land justified taking into account development needs and the Green Belt assessments?

2.16 There is a clear lineage of evidence that supports the Draft Core Strategy. The Stage 1 Green Belt Review established the need for a review and justified the approach in light of national planning policy. Stage 2 assessed the boundaries, identifying areas that are important to the integrity of the Green Belt and areas that could form the basis for a more detailed review. Stage 3 assessed specific sites, their boundaries and the contribution that they could make to meeting development needs. This is supported by a wider package of evidence including the Strategic Housing Land Availability Assessment and the Strategic Housing Market Assessment which assess housing supply and need respectively. Overall, there is a clear chronology of Council decision-making which justifies the HGAs in Washington.

Issue 3 - HGA1 – South West Springwell

Q3.1 Is the Council satisfied that the landscape, heritage, biodiversity, access, transport, drainage and other constraints are capable of being mitigated so that development of the site would be acceptable?

2.17 The Council can be completely satisfied that there are no technical issues which represent constraints to the delivery of HGA1. This is because the promoter, Hellens Group, has undertaken a significant level of technical work up-front, including:

- A landscape and visual assessment (2013 submitted with Regulation 18 and 19 representations);
- An Appraisal of the Springwell Green Belt (2013 submitted with Regulation 18 and 19 representations);
- Habitat and Protected Species Risk Assessment (2018 appended to this hearing statement);
- A Ground Investigation Preliminary Risk Assessment (2014) and Full Site Investigation;
- An Archaeological Desk-based Assessment and Heritage Statement (2016 submitted with Regulation 18 and 19 representations);
- Design Statement (2014 submitted with Regulation 18 and 19 representations);
- Noise Impact Assessment (2014 submitted with Regulation 18 and 19 representations);
- Transport Statement (2018 appended to this hearing statement)
- Agricultural Land Classification Report (2018, appended to this hearing statement)
- Topographic survey (2013, submitted with Regulation 18 and 19 representations)

2.18 A significant amount of the technical evidence has therefore been gathered and demonstrates clearly that the site is deliverable and that there are no constraints which would preclude delivery of the allocation

2.19 Hellens Group control all of the land necessary to access the site and all land necessary to provide an access junction capable of accommodating the likely capacity of the site. The site sits in Flood Zone 1 and there is a low risk of flooding. The site's location on the edge of the existing settlement and its relatively small scale, demonstrates that there will be existing services such as sewer connections, electricity and gas that any development can connect to or extend into.

2.20 The site is not affected by any NPPF footnote 9 constraints with the exception of the Green Belt. The landscape and visual impact assessment work undertaken by Hellens Group alongside the Council's Green Belt assessment work demonstrates that the site is suitable for release from the Green Belt without undermining its central integrity.

3.2 Are all the policy requirements within HGA1 necessary and clear to the decision maker?

2.21 Whilst HGA1 is detailed, our view is that it is clear and provides an adequate level of information for the decision-taker. Notwithstanding, the wording of clause (v) is not necessarily clear:

"be of high architectural quality to protect long distance views to the southern edge of the development from the south;"

2.22 It is not necessarily clear what the Council means by protecting long distance views from the south. Clarity should be provided with reference to, for example, buffer planting or building orientation.

3.3 Is the site deliverable?

2.23 The definition of deliverable as per the Planning Practice Guidance is whether a site is suitable, available and achievable.

Suitability

2.24 The PPG states (Reference ID: 3-019-20140306) that *"the following factors should be considered to assess a site's suitability for development now or in the future:*

- *physical limitations or problems such as access, infrastructure, ground conditions, flood risk, hazardous risks, pollution or contamination;*
- *potential impacts including the effect upon landscapes including landscape features, nature and heritage conservation;*
- *appropriateness and likely market attractiveness for the type of development proposed;*
- *contribution to regeneration priority areas;*
- *environmental / amenity impacts experienced by would be occupiers and neighbouring areas.*

2.25 We therefore consider these points in more depth.

2.26 Our client's site has no physical issues which affect its suitability for housing development. The site is not in an area at risk of flooding (Flood Zone 1), does not suffer from contamination or ground stability issues and is not affected by air pollution or odour. The evidence we've submitted with our Regulation 19 representations demonstrate this. The site has a safe access to the adopted highway for both pedestrians and vehicles and is accessible to public transport. Local services and public transport in Springwell are accessible by foot and bicycle within Institute of Highways standards.

2.27 HGA1 is not in an area protected for its ecological or historical importance and there are no listed buildings which will be harmed by the site (again, as demonstrated by the heritage assessment we submitted with our Regulation 19 representations).

2.28 The site is attractive to the market and this is demonstrated by our client's interest in the site and initial discussions with local housebuilders. Our client can confirm that the site is deliverable and there will be demand for housing in this location.

2.29 The site is not in a regeneration area however it will not undermine the regeneration of other areas of Tyne and Wear. The Green Belt Review Stage 1 concludes that this is the case demonstrating that the need is specific to this location and not the wider Tyne and Wear area. The site can offer landscape and visual improvements along the western boundary.

2.30 The site is of a scale that it can deliver homes whilst protecting the amenity of existing and prospective residents. Adequate set back distances can be achieved within the site to ensure privacy and overlooking is not an issue.

2.31 In conclusion we are confident that the site is a suitable and sustainable location for housing growth.

Availability and Achievability

2.32 In terms of 'achievability' and 'availability' we can confirm that the site is available for housing now and development is achievable in the next five years following planning permission being secured. There are no land ownership or legal issues which would preclude or slow development.

2.33 In our view the site is suitable, achievable and available. **As per the PPG the site is deliverable.**

Issue 9. Infrastructure

9.1 Will the infrastructure to support the scale of development proposed in Washington be provided in the right place and at the right time, including that related to transport, the highway network, health, education and open space?

2.34 Site HGA1 is self-contained and can deliver the infrastructure that is required to support its delivery including drainage, access and internal roads and utility connections. The Council has in place a range of measures to collect planning obligation monies to mitigate the impact of development in Washington as set out in the Planning Obligations Supplementary Planning Document.

Issue 10. Delivery

10.1 Are the assumptions about the rate of delivery of houses from sites in Washington realistic (anticipated delivery is shown in Appendices A, B, F and O of the SHLAA)?

2.35 The SHLAA (Appendix B, 2017) assumes that HGA1 will come forward over two years between 2023 and 2025. Our view is that the site could come forward sooner but that this assumption is prudent given the uncertainties around Local Plan adoption etc…

Appendix 1

AGRICULTURAL LAND CLASSIFICATION REPORT

Subject: Land at Springwell, Gateshead

Client: Hellens Group Ltd

Date: 6th June 2018

Author: Robert Sullivan

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1. Introduction

1.1 Robert Sullivan of GSC Grays has been retained by the Hellens Group Ltd to prepare an Agricultural Land Classification Report on an area of land at Springwell, Gateshead.

1.2 Robert Sullivan is a fully qualified independent Agronomist providing advice to farmers across the North East of England and Scottish Borders on all aspect of arable crop production. He is both BASIS (able to advise on pesticides) and FACTS (able to advise on fertilisers) qualified.

1.3 Robert has have been providing this service to clients since 1990, having initially worked for ADAS (at that time part of the Ministry of Agriculture – now known as DEFRA). Between 2002 and 2017 he worked for Strutt & Parker becoming Head of Farming for the North East of England in Scotland, before joining GSC Grays in July 2017. He has in excess of 28 years' experience in managing soils and assessing soil types.

1.4 His current role is Company Director and Head of Farm Business Services for GSC Grays based from our office in Chester le Street, Co Durham.

2. Land Classification

2.1. Appendix 1 to this report is a map which shows the land classification across the North East of England in general terms. From this map it appears that the land at Springwell. Gateshead is classified as Grade 3.

2.2. On viewing the website www.magic.defra.gov.uk, which shows more detailed land classification, it shows that none of the land at Springwell has been classified since 1988. The majority of land that has been classified in the vicinity of the land at Springwell is shown to be Grade 3b. A copy of this map is shown at Appendix 2.

2.3. An assessment of the agricultural land classification has been undertaken based on the "Agricultural Land Classification of England & Wales: Revised Guidelines & Criteria for Grading the Quality of Agricultural Land October 1988", taking into account the information shown on the "magic" website, which is appended to this report.

2.4. A site visit was undertaken on the 4th June 2018 where a total of 15 soil pits were dug to make the assessment discussed in more detail below. Photos of the fields where the soil pits were dug can be found in Appendix 3. Locations of the various soil pits are shown in Appendix 4, whilst the photos of each soil pit are shown at Appendix 5.

2.5. The main limiting factors used in the Agricultural Land Classification (ALC) system, which influence the grade of land, are:

- Climatic limitations
- Site limitations
- Soil limitations
- Interactive limitations

Climatic Limitations

2.6. The climatic criteria are always considered first when classifying land. The general principle followed is to assign increasing degrees of limitation through agricultural use as rain fall increases and average temperature decreases. Thus, in climatic terms, the poorest areas are both the wettest and coldest and conversely the climate is regarded as more favourable as temperature increases and rainfall moderates.

2.7. In addition, local climatic factors will be taken into account. Differences in the aspect, gradient and elevation of the land can significantly modify the overall climate, particularly in relation to temperature, exposure and frost risk.

2.8. In this instance, the location assessed has relatively little climatic limitation both in general and localised terms.

Site Limitations

2.9. The assessment of site factors is primarily concerned with the way in which the topography influences the use of agricultural machinery and hence the cropping of the potential land. Flood risk is also regarded as a site limitation and is usually associated with well-defined topographic features.

2.10. Gradient – this can influence the ALC of the site due to this affecting the type of machinery that can be safely and efficiently operated.

Grades 1 – 3A have a gradient limit of 7°; Grade 3B a limit of 11°; Grade 4 a limit of 18° and Grade 5 greater than 18°:

The gradient at Springwell varies only slightly across the site. The majority of the area is flat or slightly sloping and therefore is not a limiting factor when assessing the ALC of this site.

2.11. Micro Relief – complex changes of slope angle and direction over short distances, or the presence of boulders or rock outcrops can severely limit the use of agricultural machinery. The micro relief of the majority of the site at Springwell is not a limiting factor when assessing the ALC of this site.

2.12. Flooding – the risk of flooding appears to be minimal on the majority of this site and therefore is not a limiting factor when assessing the ALC of this site.

Soil Limitations

2.13. Soil Texture & Structure – Having undertaken an assessment of the soil texture of the site, the majority of the site has been assessed as a sandy loam.

A well-structured soil is characterised by clearly identifiable stable peds (structural units) with a high proportion of pores and fissures which allow easy movement of air, water and roots through the soil. Sandy soils are inherently weakly structured and are prone to surface capping. They are more easily worked than clay soils but readily form compacted layers if cultivated or traversed when wet. They may also be susceptible to erosion and drought.

On assessing the soil structure, it was evident that the soil structure would in general be classified as poor throughout the soil profile due to noticeable compaction within all of the soil pits. More detailed comments are given in Appendix E for each Soil Pit.

Soil texture and structure are significant parameters in assessment of droughtiness and wetness. The courser sandy soils found on this site are very susceptible to drought stress in dry periods. This is discussed in more detail later in the report.

2.14. Soil Depth – this is an important factor in determining the available water capacity of a soil. It also affects cropping by influencing the range and type of cultivations that can be carried out.

Having undertaken an assessment of the site it is evident that the depth of topsoil is between 20 and 30 cm. This would suggest that the land is somewhere between Grade 3a and Grade 3b.

2.15. Stoniness – stones can have significant impact on cultivations, harvesting and crop growth and also reduces the available water capacity of a soil.

Having undertaken an assessment of the site it is very evident in the stone content throughout the site is significant with stones larger than 2 cm making up in excess of 25% of the top 25 cm of soil and stones larger than 6 cm making up in excess of 10% of the same depth of soil. The stones in question are in general sandstone in nature. Such quantities of stones within a soil profile would suggest that the land is somewhere between Grade 3a and Grade 3b.

Interactive Limitations

2.16. Soil Wetness – this is not an influencing factor when assessing the ALC for this site.

2.17. Soil droughtiness – this is likely to have a significant limitation to crop growth in areas of relatively low rainfall, or high evapotranspiration, or where the soil holds only small reserves of moisture available to plant roots.

Soil droughtiness is assessed through taking account of crop rooting and foliar characteristics to obtain an estimate of the average Soil Moisture Balance for winter wheat and maincrop potatoes at a given location. The Soil Moisture Balance is calculated on the basis of two parameters:

- Crop-adjusted available water capacity of the soil profile
- Moisture deficit

The methodology used to calculate the Soil Moisture Balance is outlined in detail at Appendix 6 and includes the calculations undertaken to determine the figures stated in 2.18 below.

2.18. The Moisture Balances for Wheat and Potatoes on the Springwell site are calculated as follows:

Soil Pits 1-15 – Wheat at -37.5 mm and Potatoes at -38.9 mm

The table below outlines the Grade of soil according to droughtiness:

Grade/Subgrade	Moisture Balance Limits (mm)		
	Wheat		Potatoes
1	+30	And	+10

2	+5	And	-10
3a	-20	And	-30
3b	-50	And	-55
4	<-50	Or	<-55

To be eligible for Grades 1 to 3b the Moisture Balances must be equal to, or exceed, the stated minimum values for both Wheat and Potatoes.

As a result, the whole site would be classified as Grade 3b according to droughtiness. All the Soil Pits do not exceed the minimum values for Grade 3a for either Wheat or Potatoes.

2.16. Irrigation – this is not a limiting factor when assessing the ALC for this site

2.17. Soil Erosion – this is not a limiting factor when assessing the ALC for this site.

3. Discussion

3.1 It is evident that the land within the site area has been in permanent pasture or in the case of field 1, not actively farmed for many years.

3.2 It was evident that the majority of land in the locality was also in permanent grass – which does give a good indication of the quality of the soil. It is understood that this is due to the droughty nature of the land in preference to growing arable crops.

3.3 Having undertaken an assessment of the various limitations to determine the Agricultural Land Classification of the land at Springwell, Gateshead it is evident that all the land should be classified as no better than Grade 3B.

3.4 Grade 3B is deemed to be moderate quality agricultural land capable of producing moderate yields of a narrow range of crops, principally cereals and grass, or a lower range of a wider range of crops or high yields of grass which can be grazed or harvested over most of the year.

3.5 All of the land in this report is in permanent grass. This correlates with the agricultural land classification assessment of the land being Grade 3B.

3.6 In summary on completing the Agricultural Land Classification Assessment the land at Springwell, Gateshead is deemed to be Grade 3b.

Signed: 

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Dated: 11th June 2018

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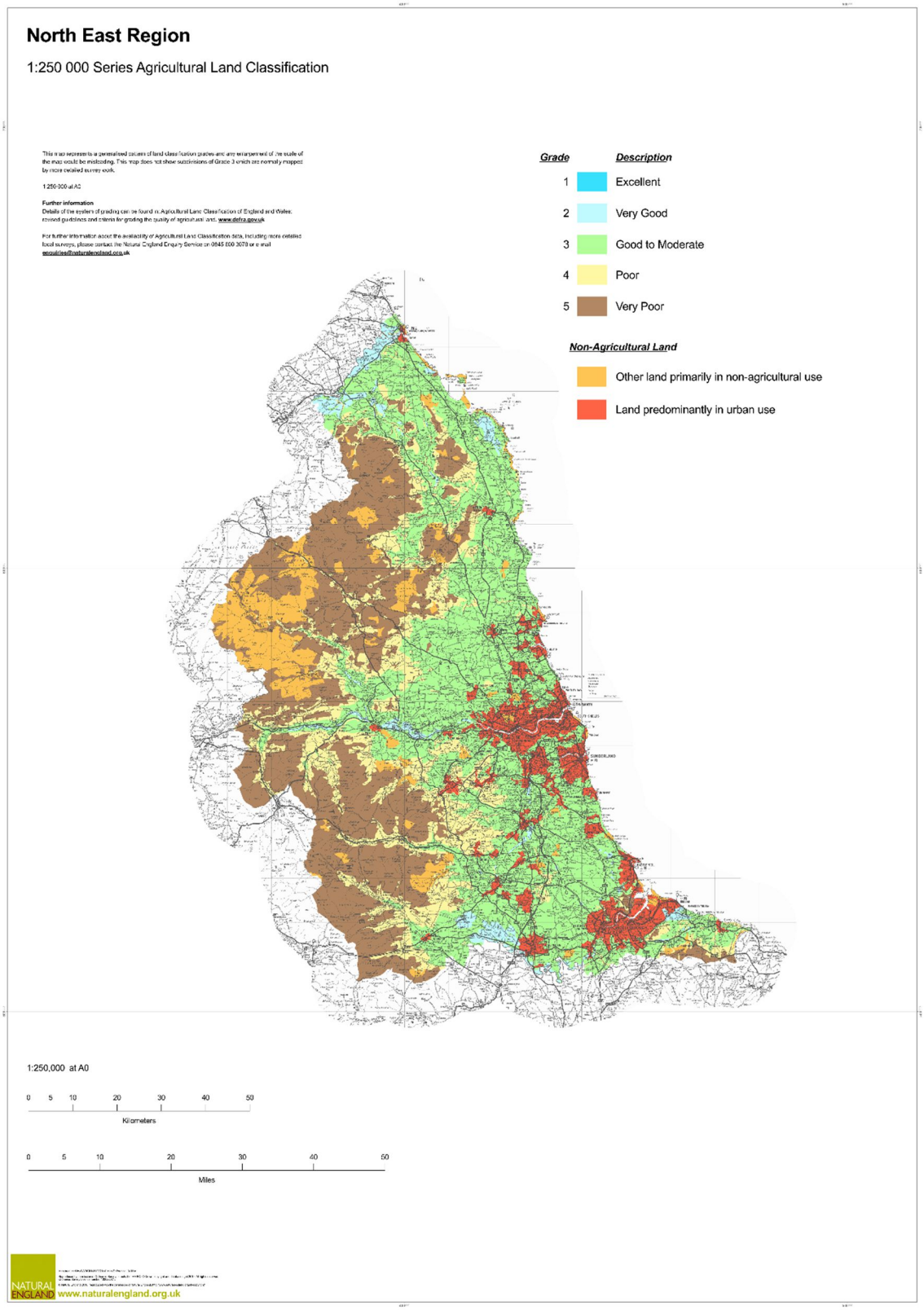
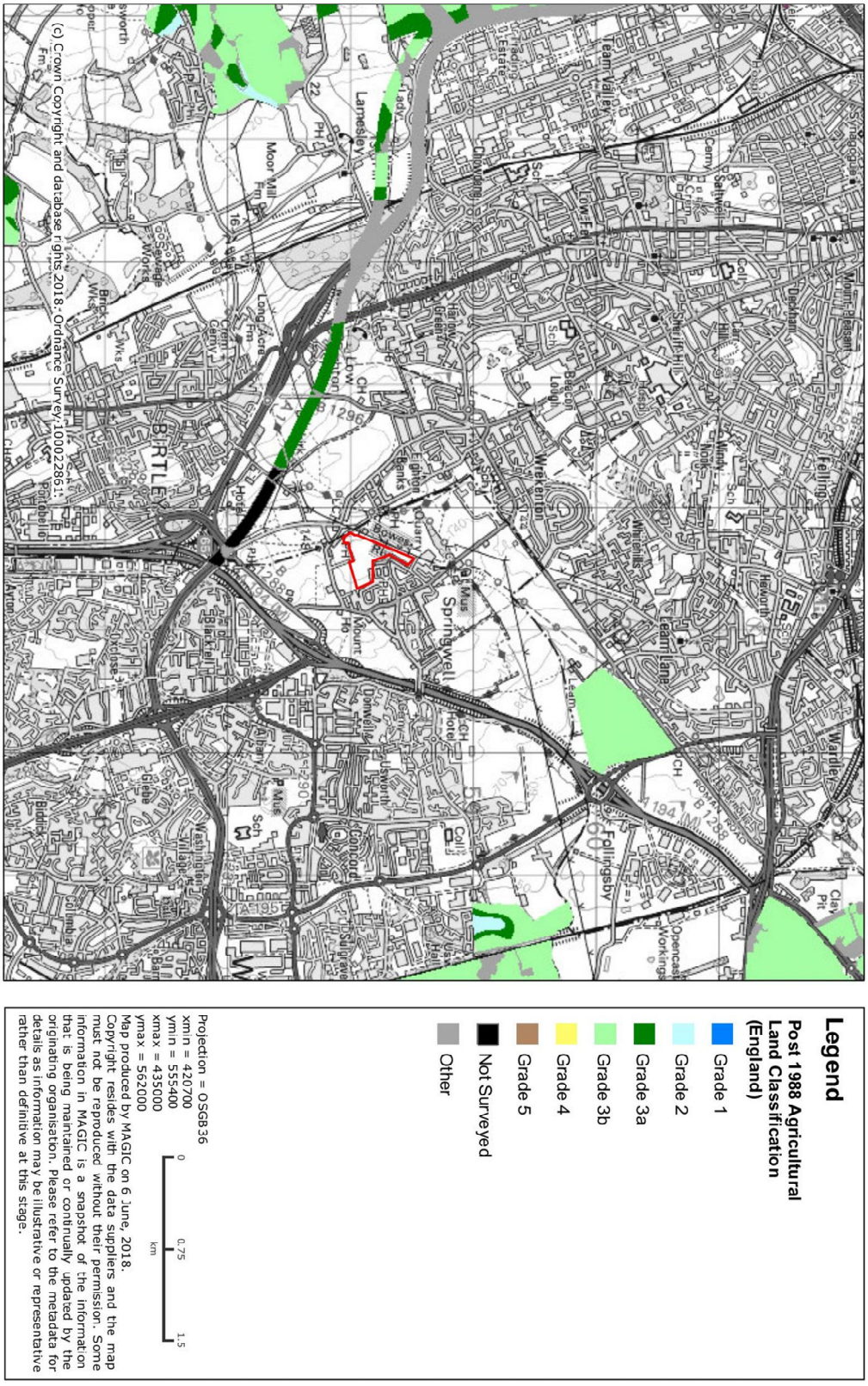
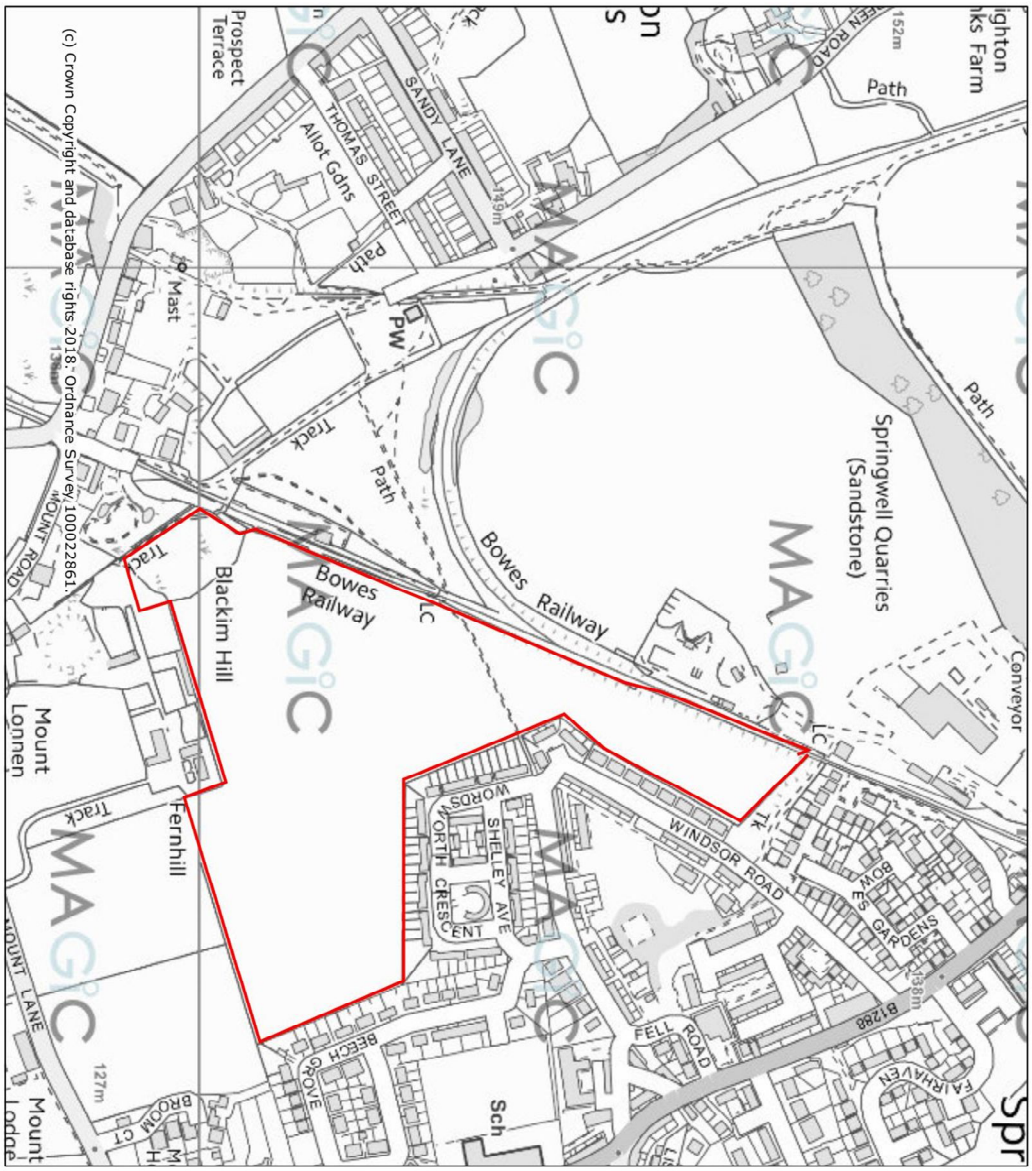
Appendix One – Agricultural Land Classification Map (North East Region)

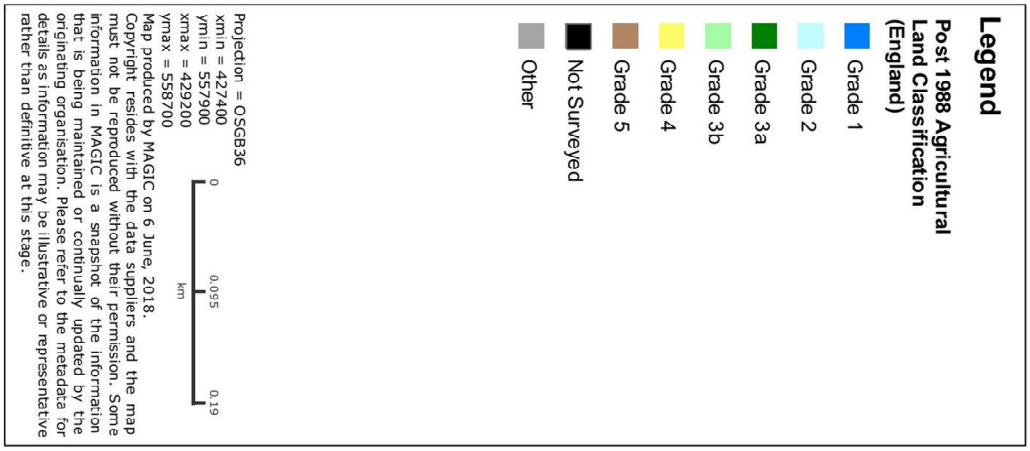


Appendix Two – Agricultural Land Classification Map (Lizard Lane)



Land at Springwell



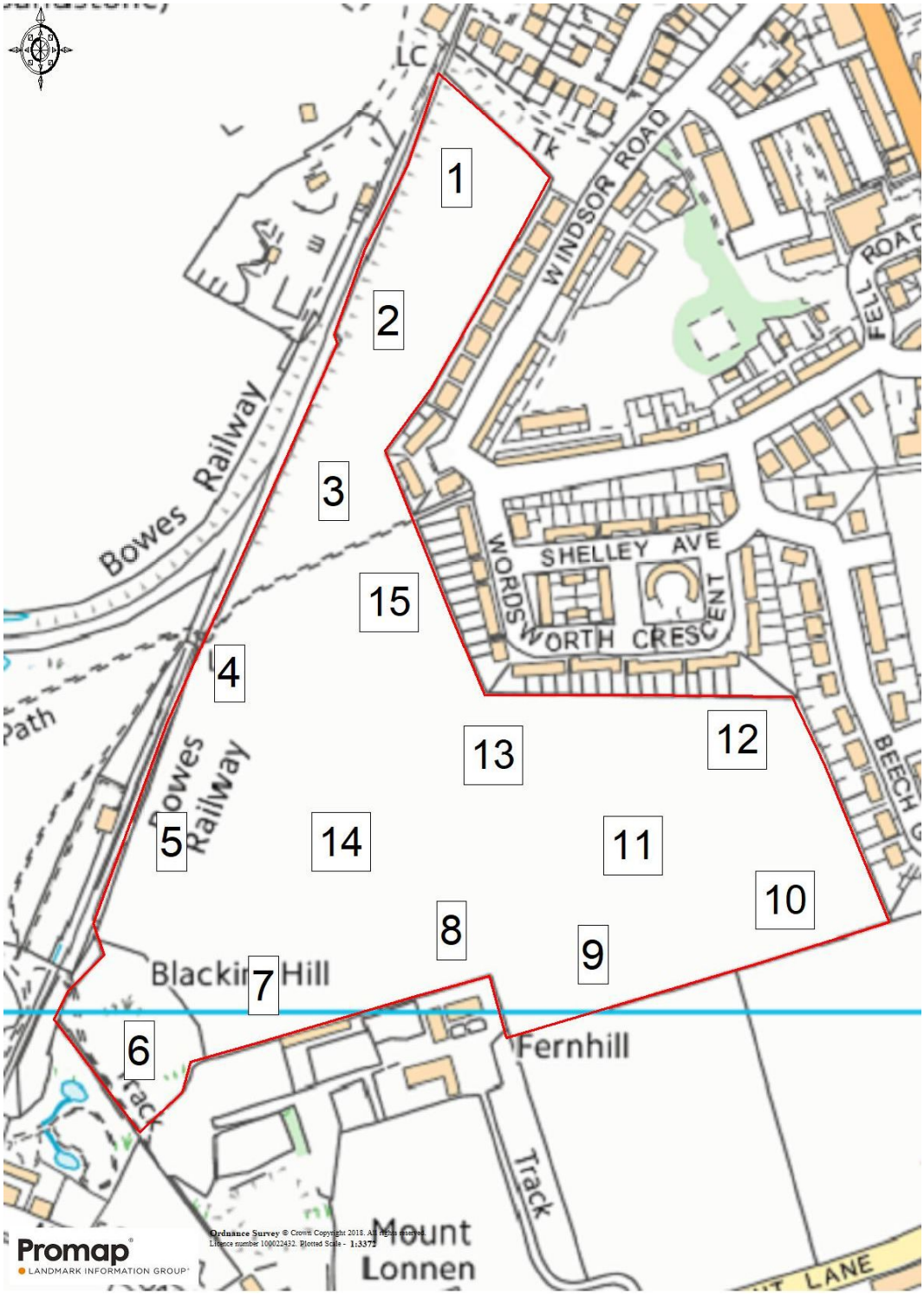


Appendix Three – Photos of Fields

Field 1 – This is an area that has not been actively farmed for a number of years, as the land overgrown with significant infestations of brambles and bracken, along with ragwort being visible across the whole field.

Field 2 – This is a field of permanent pasture which has been extensively grazed soley with horses. There is significant evidence of buttercup, ragwort, docks, thistles etc. across the whole field parcel. Areas throughout the field are shown to have significant poaching from the numerous horses on the land as a result of the recent wet spring.

Appendix Four – Soil Pit Locations



Appendix Five – Photos of Soil Pits

Soil Pit 1 – This is loamy sand over a sandy loam with noticeable stones evident throughout the soil profile. The soil is of poor structure and is compacted throughout the soil profile.

Soil Pit 2 – This is loamy sand over a sandy loam with noticeable stones evident throughout the soil profile. The soil is of poor structure and is compacted throughout the soil profile.

Soil Pit 3 – This is loamy sand over a sandy loam with noticeable stones evident throughout the soil profile. The soil is of poor structure and is compacted throughout the soil profile.

Soil Pit 4 – This is loamy sand over a sandy loam with noticeable stones evident throughout the soil profile. The soil is of poor structure and is compacted throughout the soil profile. The size of stones found within the soil profile are shown in the second photo with a 10p piece shown for comparison.

Soil Pit 5 – This is loamy sand over a sandy loam with noticeable stones evident throughout the soil profile. The soil is of poor structure and is compacted throughout the soil profile.

Soil Pit 6 – This is loamy sand over a sandy loam with noticeable stones evident throughout the soil profile. The soil is of poor structure and is compacted throughout the soil profile.

Soil Pit 7 – This is loamy sand over a sandy loam with noticeable stones evident throughout the soil profile. The soil is of poor structure and is compacted throughout the soil profile.

Soil Pit 8 – This is loamy sand over a sandy loam with noticeable stones evident throughout the soil profile. The soil is of poor structure and is compacted throughout the soil profile.

Soil Pit 9 – This is loamy sand over a sandy loam with noticeable stones evident throughout the soil profile. The soil is of poor structure and is compacted throughout the soil profile.

Soil Pit 10 – This is loamy sand over a sandy loam with noticeable stones evident throughout the soil profile. The soil is of poor structure and is compacted throughout the soil profile.

Soil Pit 11 – This is loamy sand over a sandy loam with noticeable stones evident throughout the soil profile. The soil is of poor structure and is compacted throughout the soil profile.

Soil Pit 12 – This is loamy sand over a sandy loam with noticeable stones evident throughout the soil profile. The soil is of poor structure and is compacted throughout the soil profile.

Soil Pit 13 – This is loamy sand over a sandy loam with noticeable stones evident throughout the soil profile. The soil is of poor structure and is compacted throughout the soil profile.

Soil Pit 14 – This is loamy sand over a sandy loam with noticeable stones evident throughout the soil profile. The soil is of poor structure and is compacted throughout the soil profile.

Soil Pit 15 – This is loamy sand over a sandy loam with noticeable stones evident throughout the soil profile. The soil is of poor structure and is compacted throughout the soil profile.

Appendix Six – Methodology for Calculating Droughtiness of Soils

Extract Taken from Ministry of Agriculture, Fisheries & Food - Agricultural Land Classification for England & Wales, October 1988

Droughtiness

To achieve full yield potential a crop requires an adequate supply of soil moisture throughout the growing season. Soil moisture requirements vary considerably betweren crops and according to growth stage. The potential demand for moisture generally rises as leaf cover, and hence transpiration, increases. In addition, deep rooting crops are ablve to explot the moisture reserves of a larger volume of soil than shallow rooting crops. Thus the extent to which yield is depressed when moisture is in short suppy is influenced by the crop type, amount and duration of the shortfall, and the growth stage at which it occurs.

Droughtiness is most likely to be a significant limitation to crop growth in areas with relatively low rainfall or high evapotranspiration, or where the soil holds only small reserves of moisture available to plant roots. The severity of the limitation in an area depends on the relationship between the soil properties and climatic factors and the moisture requirements of the crops grown. These relationships are complex, and the degree of moisture stress varies from year to year according to the weather.

In the ALC system the methods used to assess droughtiness is based on work by Thomasson (1979). It provides an indication of the average drought risk based on two reference crops, winter wheat and maincrop potatoes. These crops have been selected because they are widely grown and, in terms of their susceptibility to drought, are representative of a broad range of crops. The method used to assess droughtiness takes account of crop rooting and foliar characteristics to obtain an estimate of the average soil moisture balance (MB) for the reference crops at a given location. MB is calculated on the basis of two parameters namely:

i. Crop-adjusted available water capacity of the soil profile (AP)
ii. Moisture deficit (MD).

Crop-Adjusted Available Water Capacity (AP)

AP is a measure of the quantity of water held in the soil profile which can be taken up by a specified crop. The water storage capacity of soil is strongly influenced by texture, structure, organic matter content and stone content. The methods used to calculate crop-adjusted AP values for wheat and potatoes is described in Appendix 4. Table 14 gives available water values for different combinations of texture and structure. A distinction is made according to textures in the topsoil and subsoil, to take account of the higher organic matter content of topsoils. These values are used to calculate the amount of available water, adjusted for stone content, in each soil horizon within the rooting depth of the crop concerned. The horizon values are added together to give a total crop-adjusted AP (in mm). Typically, wheat will root to about 120cm and horizon values are summed to this depth.

However, allowance is made for the fact that the root system of winter wheat is less well developed, and therefore less efficient at water extraction, in the subsoil below 50cm. Thus, below that depth only easily available (as opposed to total available) water is taken into account. For potatoes the values for total water available are used for all horizons down to the full rooting depth of 70cm.

Although crop-adjusted AP provides a measure of the amount of available water retained in a soil, it does not allow for the fact that the rate at which moisture is conducted to roots from surrounding soil not occupied by roots varies between soil types, especially in relation to texture and structure. Hydraulic conductivity is generally adequate, in terms of moisture supply, in medium and fine textured soils over a wide range of soil moisture content. However, in the case of the coarser sands and loamy sands the conductivity is adequate when the soil is at or near to field capacity but decreases very rapidly as the soil dries because there are few medium or fine pores through which moisture can be transmitted (Salter and Williams 1965; Craull 1985). This factor, in combination with low AP, makes such soils extremely susceptible to drought stress because wilting point is reached more rapidly and frequently in dry periods. Allowance is made for this limitation in the droughtiness assessment by reducing by 20% the AP of subsoil horizons with coarse sand, medium sand, loamy coarse sand or loamy medium sand textures.

Where significant subsoil compaction occurs, root penetration is generally restricted and moisture reserves in the soil below a severely compacted, very poorly structured horizon will make a negligible contribution to plant growth. In such cases the calculation of AP should be limited to the soil horizons above the compacted layer.

Moisture Deficit (MD)

The moisture deficit terms used in the ALC droughtiness assessment is a crop-related meteorological variable which represents the balance between rainfall and potential evapotranspiration calculated over a critical portion of the growing season.

In lowland situations a deficit will typically develop in April or May and will reach a maximum in July, August or September; thereafter it will decrease as temperatures, and hence evapotranspiration, decline in the autumn. Potential Soil Moisture Deficits (SMD) under grass are greater than for arable crops which do not attain full ground cover early in the growing season. For example, winter wheat does not usually develop full leaf cover until the end of April. Maincrop potatoes have negligible leaf cover until mid-May and full cover is not usually achieved until the end of June. A method for deriving MD values (in mm) for wheat and potatoes from end-of-month and mid-month accumulated values of SMD as follows:

MD (Winter Wheat) = mid-July SMD – 1/3 April SMD
MD (Potatoes) – August SMD – 1/3 June SMD – 1/3 mid-May SMD

Crop-adjusted values of MD based on these formulae are used for droughtiness assessment in the ALC system and are obtained by means of the data for Tyne and Wear (with Northumberland) as shown in the table entitled "Soil Moisture Deficit Data" later in this Appendix.

Moisture Balance (MB)

Droughtiness limits for grades and subgrades are defined in terms of moisture balances (MB, in mm) for wheat and potatoes which are calculated using the following formulae:

MB (Wheat) = AP (Wheat) – MD (Wheat)
MB (Potatoes) = AP (Potatoes) – MD (Potatoes)

The MB limits for each grade and sub grade are shown in Table 8. To be eligible for Grades 1 to 3b the MBs must be equal to, or exceed, the stated minimum values for *both* wheat and potatoes. If the MB for *either* crop is less (i.e. more negative) than that shown for Subgrade 3b, the soil is Grade 4 on droughtiness. It should be noted that soils with sand topsoils are not eligible for Grades 1, 2 or 3a and those with loamy sand topsoils are not eligible for Grade 1

Table 8 – Grade According to Droughtiness

Grade / Subgrade	Moisture Balance Limits (mm)		
	Wheat		*Potatoes*
1	+30	*And*	+10
2	+5	*And*	-10
3a	-20	*And*	-30
3b	-50	*And*	-55
4	<-50	*or*	<-55

Appendix 4

The Calculation of Crop-Adjusted Soil Available Water Capacity (AP) for Wheat and Potatoes

The Concept and Estimation of 'Available Water'

The total amount of soil water available to plants (TA_v) is considered to be the volumetric soil water content between 0.05 and 15 bar suction or, in the case of sands and loamy sands, 0.10 and 15 bar suction. These suctions approximate to the conditions of *field capacity*, when all excess water has drained away under the influence of gravity, and *wilting point*, when the plants can extract no more moisture from the soil. The TA_v of any soil layer can be measured in the laboratory from representative undisturbed cores (Avery and Bascomb, 1982), but as this method is both expensive and time-consuming, values of TA_v for combinations of texture and structure, which can be assessed in the field, are given in Table 14. The values are based on a dataset[1] of about 3,600 TA_v measurements from different layers in over 1,000 soil profiles throughout England and Wales.

The Calculation of Crop-Adjusted Available Water Capacity (AP)

The amount of soil water that is available to a growing crop depends on both soil properties and crop rooting patterns. The rooting models used to assess AP for ALC purposes are based on those of Thomasson (1979). These suggest that, under favourable conditions, cereals will root to about 120cm, whereas potato roots rarely extend below 70cm. However, the root systems of cereals are less well developed below 50cm and their ability to extract water below this depth is thus diminished. Below 50cm therefore, the model for calculating cereal available water capacity uses only the volume of 'easily available water' (EA_v) held in the soil between 0.05 and 2.0 bar suction. EA_v values for texture and structure combinations are given in brackets in Table 14.

[1] This dataset was collected by staff of the Soil Survey and Land Research Centre and is stored in LandIS, a computerised Land Information System based at their Headquarters at Silsoe Campus, Silsoe, Beds, MK45 4DT.

For wheat, the soil available water capacity in millimetres is calculated by multiplying either the TA_v or the EA_v (whichever is applicable) of each soil layer by its thickness, adding the products for all layers to a depth of 120cm and dividing the result by 10. This can be expressed as follows:

$$\text{AP wheat (mm)} = \frac{TA_{vt} \times LT_t + \sum(TA_{vs} \times LT_{50}) + \sum(EA_{vs} \times LT_{50\text{-}120})}{10}$$

where

TA_{vt} is Total Available Water (TA_v) for the topsoil texture

TA_{vs} is Total Available Water (TA_v) for each subsoil layer

EA_{vs} is Easily Available Water (EA_v) for each subsoil layer

LT_t is thickness (cm) of topsoil layer

LT_{50} is thickness (cm) of each subsoil layer to 50cm depth

$LT_{50\text{-}120}$ is thickness (cm) of each subsoil layer between 50 and 120cm depth

$\sum$ means 'sum of'

For potatoes no adjustments using EA_v are necessary. The soil available water capacity is calculated simply by multiplying the TA_v of each layer by its thickness, adding the products to a depth of 70cm and dividing by 10. Thus:

$$\text{AP potatoes (mm)} = \frac{TA_{vt} \times LT_t + \sum(TA_{vs} \times LT_{70})}{10}$$

where
LT_{70} is thickness (cm) of each subsoil layer to 70cm depth

Adjustments to Soil Available Water Capacity to Take into Account the Presence of Stones, Rock or a Very Poorly Structured Horizon

The values for TA_v and EA_v given in Table 14 are for the fine earth fraction of soils (material less than 2mm in diameter) and adjustments are therefore necessary to take into account the presence of stones in soil layers. Such adjustments are only made for layers with less than 70% stones by volume and further modification of AP is necessary where gravelly layers (defined as containing at least 70% rounded stones by volume) or massive, fissured or shattered rock material (defined as having at least 70% angular stones by volume) occur within the model rooting depths.

Where massive, non-rootable rock of any kind restricts rooting, then soil available water is calculated only for those layers above the rock. Usually, however, massive rock is overlain by a transitional layer of fissured or shattered rock material that can be exploited by roots to a limited extent. The amount of available water in such layers depends on their lithology and values for different types are given in Table 15[1]. Where layers of gravel, fissured or shattered rock occur within 120cm depth, the appropriate TA_v or EA_v values from Table 15 are used in the calculation of soil available water capacity.

The values for rocks given in Table 15 are also used when adjusting TA_v or EA_v values for stony soil layers with less than 70% stones by volume. Adjustments are made as follows:

$$\text{Stone-adjusted } TA_v \text{ or } EA_v = \frac{A_{vf} \times \%f + (A_{vr} \times \%\ \text{Stones})}{100}$$

where
f is fine earth component, i.e. (100-% volume of stone)
A_{vf} is TA_v or EA_v (as appropriate) of fine earth component
A_{vr} is TA_v or EA_v (as appropriate) of stone component

Where the soil has a severely compacted layer with very poor structure which generally restricts root penetration, soil available water is calculated only for layers above the compacted layer.

[1] There is little information on the amount of available water in different rocks and the values used in Table 15 are mostly estimates based on a few, as yet unpublished measurements. They should be regarded as tentative values and should only be used where actual site measurements are unavailable.

Table 14 – Estimation of Available Water (%) from Texture Class, Horizon and Structural Conditions

Texture Class	Topsoil TA_v	Subsoil TA_v (EA_v in brackets)		
		Good[1]	Moderate[1]	Poor[1]
Clay	17	21 (15)	16 (8)	13 (7)
Silty Clay	17	21 (15)	15 (8)	12 (7)
Sandy Clay	17	19 (14)	15 (10)	13 (8)
Sandy Clay Loam	17	19 (14)	15 (10)	13 (8)
Clay Loam	18	21 (14)	16 (10)	12 (7)
Silty Clay Loam	19	21 (12)	17 (10)	12 (6)
Silt Loam	23	23 (17)	22 (14)	15 (9)
Fine Sandy Silt Loam	22	22 (16)	21 (15)	15 (9)
Medium Sandy Silt Loam	19	19 (13)	17 (11)	15 (9)
Coarse Sandy Silt Loam	19	23 (17)	19 (11)	15 (7)
Fine Sandy Loam	18	22 (17)	18 (13)	17 (11)
Medium Sandy Loam	17	17 (13)	15 (11)	11 (8)
Coarse Sandy Loam	17	22 (15)	16 (11)	11 (8)
Loamy Fine Sand	18	15 (13)	15 (13)	*
Loamy Medium Sand	13	12 (9)	9 (6)	*
Loamy Coarse Sand	11	11 (7)	8 (6)	*
Fine Sand	*	14 (12)	14 (12)	*
Medium Sand	12	7 (5)	7 (5)	*
Coarse Sand	*	5 (4)	5 (4)	*
Marine Light Silts[2]		22 (30)	28 (22)	*
	All Horizons			
Organic Sands	23 (16)			
Organic Loams	28 (20)			
Organic Clays	23 (16)			
Peaty Sands	39 (36)			
Peaty Loams	27 (18)			
Sandy Peats	45 (30)			
Loamy Peats	35 (26)			
Humified Peats	33 (24)			
Fibrous and Semi-Fibrous Peats	44 (35)			

1 Criteria for good, moderate and poor structural conditions are given in Figures 9, 10 & 11.

2 Use these figures only for subsoils in marine alluvium where textures are fine sandy silt loam, fine sandy loam or loamy fine sand *and* most of the sand is finer than 0.1mm.

* Rare occurrences for which there are no data.

Table 15 – Available Water in Stones and Rocks (%)

Rock, Gravel or Stone Type	TA_v	EA_v
All hard rocks or stones (i.e. those which cannot be scratched with a finger nail)	1	0.5
Soft, medium or coarse grained sandstones	3	2
Soft 'weathered' igneous or metamorphic rocks or stones	4	2
Soft oolitic or dolomitic limestones	4	3
Soft fine grained sandstones	5	3
Soft, argillaceous or silty rocks or stones	8	5
Chalk or chalk stones	10	7
Gravel[1] with non-porous (hard) stones	2	1
Gravel[1] with porous stones (mainly soft stone types listed above)	5	3

[1] Gravel with at least 70% rounded stones by volume

SOIL MOISTURE DEFICIT DATA

Week ending		Mean Air Temperature		30 cm Soil Temperature		Soil Moisture Deficit (Wheat-Medium AWC)
4.4.17		Actual °C	Diff from Normal	Actual °C	Diff from Normal	mm
	Cleveland (with Durham)	11.4	5.2	9.2	3.1	14.7
	Durham	10.5	4.7	9.2	3.4	9.6
	Northumberland	9.4	4.3	8.5	2.7	7.4
	Tyne & Wear (with Nth'land)	10.6	4.5	9.4	3.3	9.7
11.4.17	Cleveland (with Durham)	9.2	2.2	9.6	2.2	28.8
	Durham	8.9	2.3	9.7	2.9	21.6
	Northumberland	8.3	2.2	9.1	2.4	20.3
	Tyne & Wear (with Nth'land)	9.3	2.4	10.2	3	23.4
18.4.17	Cleveland (with Durham)	8.1	1.1	9.5	2.1	36.5
	Durham	7.4	0.9	9.4	2.6	26.8
	Northumberland	6.7	0.6	9.1	2.4	28.8
	Tyne & Wear (with Nth'land)	7.7	0.8	9.9	2.7	33.2
25.4.17	Cleveland (with Durham)	8.5	1.5	9.7	2.4	44.7
	Durham	8.1	1.5	9.8	3.1	34.8
	Northumberland	7.6	1.5	9.6	2.9	34.9
	Tyne & Wear (with Nth'land)	8.7	1.8	10.4	3.2	40.6
2.5.17	Cleveland (with Durham)	8	0.2	9.6	1.2	54.6
	Durham	7.9	0.6	9.8	2.1	43.6
	Northumberland	7.7	0.9	9.6	2	46
	Tyne & Wear (with Nth'land)	8.1	0.5	10.4	2.3	52.6
9.5.17	Cleveland (with Durham)	8.9	-0.7	10.3	-0.7	71.8
	Durham	8.7	-0.5	10.6	0.7	61.6
	Northumberland	8.7	0	10.7	0.9	64.1
	Tyne & Wear (with Nth'land)	8.9	-0.6	11.5	1.1	70.6
16.5.17	Cleveland (with Durham)	11.6	2	11	0	79.7
	Durham	11.3	2.1	11.6	1.7	63.9
	Northumberland	10.7	2.1	11.7	1.9	73.1
	Tyne & Wear (with Nth'land)	11.5	2	12.3	1.8	81.4
23.5.17	Cleveland (with Durham)	12.3	2.7	12.2	1.2	86.6
	Durham	11.5	2.3	12.4	2.4	70.3
	Northumberland	10.6	2	12.2	2.4	77.9
	Tyne & Wear (with Nth'land)	11.7	2.2	12.9	2.5	87.3

30.5.17	Cleveland (with Durham)	17.1	7.5	14.7	3.7	100.7
	Durham	16.4	7.2	15.1	5.1	84.8
	Northumberland	15.7	7.1	14.3	4.5	95
	Tyne & Wear (with Nth'land)	16.3	6.8	15.3	4.9	102.5
6.6.17	Cleveland (with Durham)	14.2	1.6	14.9	1	76.7
	Durham	13	0.9	15.2	2.3	57
	Northumberland	12.3	0.9	14.7	2.4	53.5
	Tyne & Wear (with Nth'land)	13.3	1.1	15.5	2.2	69.5
13.6.17	Cleveland (with Durham)	14.6	1.5	14.9	0.5	82.1
	Durham	13.8	1.2	14.4	1.1	54.8
	Northumberland	13.3	1.5	14.2	1.4	57.4
	Tyne & Wear (with Nth'land)	14.1	1.5	14.8	1	76.9
20.6.17	Cleveland (with Durham)	18.2	5.1	16.4	2	108.2
	Durham	17.1	4.6	16	2.6	75.3
	Northumberland	16.2	4.3	15.2	2.5	79.4
	Tyne & Wear (with Nth'land)	17.3	4.7	16.2	2.4	101.3
27.6.17	Cleveland (with Durham)	15.3	2.2	16.9	2.5	101.2
	Durham	14.2	1.7	16.9	3.5	66.6
	Northumberland	13.5	1.7	16.3	3.5	77.5
	Tyne & Wear (with Nth'land)	14.4	1.8	17.1	3.3	100.5
4.7.17	Cleveland (with Durham)	14	-0.1	15.7	0.3	79.9
	Durham	13.2	-0.3	15.4	1.1	39.9
	Northumberland	12.6	-0.2	14.9	1.1	38.1
	Tyne & Wear (with Nth'land)	13.4	-0.2	15.7	1	68.6
11.7.17	Cleveland (with Durham)	15.8	1	16.6	0.5	87.3
	Durham	14.4	0.2	16.2	1.2	45.6
	Northumberland	13.6	0	15.5	0.9	45.2
	Tyne & Wear (with Nth'land)	14.4	0	16.3	0.9	77.8
18.7.17	Cleveland (with Durham)	16.3	1.4	16.6	0.5	108.9
	Durham	15.3	1.1	16.4	1.4	64.2
	Northumberland	14.5	0.9	16.1	1.5	62.3
	Tyne & Wear (with Nth'land)	15.4	1	16.8	1.4	97.1
25.7.17	Cleveland (with Durham)	15.1	0.3	16.7	0.6	92
	Durham	14.5	0.3	16.6	1.7	46.3
	Northumberland	14	0.4	16.3	1.7	53.2
	Tyne & Wear (with Nth'land)	14.4	0	17.1	1.7	90.9
2.8.17	Cleveland (with Durham)	15	0.2	16.3	0.3	89.7
	Durham	14.3	0.1	15.9	1.1	45
	Northumberland	13.8	0.4	15.6	0.9	49.9
	Tyne & Wear (with Nth'land)	14.3	0	16.1	0.9	91.2

8.8.17	Cleveland (with Durham)	15	0.1	15.9	0.1	87.5
	Durham	14.2	-0.1	15.2	0.5	43.8
	Northumberland	13.7	0.4	15	0.2	46.6
	Tyne & Wear (with Nth'land)	14.3	-0.1	15.1	0.1	91.6
15.8.17	Cleveland (with Durham)	14.9	0	15.4	-0.4	101.5
	Durham	14.3	0	14.8	0.1	51.7
	Northumberland	13.5	0.2	14.8	-0.1	48.3
	Tyne & Wear (with Nth'land)	14.5	0.1	14.8	-0.3	96.8
22.8.17	Cleveland (with Durham)	15.9	1	15.7	-0.1	109.2
	Durham	15.3	1	15.6	0.9	55.9
	Northumberland	14.3	1	15.4	0.5	57.4
	Tyne & Wear (with Nth'land)	15.3	0.9	15.8	0.8	108.1
29.8.17	Cleveland (with Durham)	16.5	1.6	16	0.2	113.4
	Durham	15.7	1.4	16	1.3	61.3
	Northumberland	14.8	1.5	15.8	0.9	65.2
	Tyne & Wear (with Nth'land)	15.9	1.5	16.3	1.2	113.6

Calculations of the Crop-Adjusted Available Water Capacity (AP)

Soil Data – Soil Pits 1-15

Layer	Depth (cm)	Texture	Structural Condition	Stones
Topsoil	0-30	Medium loamy sand	Poor	20%
Subsoil 1	30-60	Loamy medium sand	Poor	20%
Subsoil 2	60-120	Loamy medium sand	Poor	20%

Variables

		%
From Table 14	Topsoil TA_v	13
	Subsoil 1 TA_v	9
	Subsoil 1 EA_v	6
	Subsoil 2 TA_v	0
	Subsoil 2 EA_v	0
From Table 15	TA_v stones	3
	EA_v stones	2

Calculation: AP Wheat

	Cm		
Topsoil	0-30	$\frac{(13 \times 90) + (3 \times 10)}{100}$	$\times 30 = 360$
Subsoil 1	30-50	$\frac{(9 \times 90) + (3 \times 10)}{100}$	$\times 20 = 168$
Subsoil 1	50-60	$\frac{(6 \times 90) + (2 \times 10)}{100}$	$\times 10 = 56$
Subsoil 2	60-120	$\frac{(0 \times 90) + (2 \times 10)}{100}$	$\times 60 = 12$

AP Wheat =	$\frac{360 + 168 + 56 + 12}{10}$	= 59.6mm

Calculation: AP Potatoes

	Cm		
Topsoil	0-30	$\frac{(13 \times 90) + (3 \times 10)}{100}$	$\times 30 = 360$
Subsoil 1	30-60	$\frac{(9 \times 90) + (3 \times 10)}{100}$	$\times 30 = 252$
Subsoil 2	60-70	$\frac{(0 \times 90) + (2 \times 10)}{100}$	$\times 10 = 2$

AP Potatoes =	$\frac{360 + 252 + 2}{10}$	= 61.4mm

Moisture Deficit (MD) (Winter Wheat) = Mid July soil moisture deficit = 97.1mm
(as shown in the Soil Moisture Deficit table)

Moisture Deficit (MD) (Potatoes) = August soil moisture deficit = 100.3mm
(as shown in the Soil Moisture Deficit table)

Moisture Balance (MB) Calculations

MB (Wheat) = AP (Wheat) – MD (Wheat)
MB (Potatoes) = AP (Potatoes) – MD (Potatoes)

Soil Pits 1-15

MB (Wheat) = 59.6 – 97.1 = -37.5mm
MB (Potatoes) = 61.4 – 100.3 = -38.9mm

Appendix 2

PENN Associates

environmental enterprise

Client	Hellens Group
Project	Site B
	Springwell, Sunderland
Scope	Preliminary Ecological Appraisal
Date	February 2018
Status	Client issue

Contents

Plans

Appendices

Report Control	Penn Associates Ecology Ltd Whiteshield House Dipton Mill Road Hexham NE46 1RT T: 01434 602120 pa@pennassociates.com		
Client	Hellens Group		
Project	Springwell Site B, Sunderland		
Document Title	Preliminary Ecological Appraisal Report		
Document Ref	2547 PAEL Springwell Site B PEAR		
Issue	**Author**	**Date**	**Remarks**
1	Dr R Penn MCIEEM CEnv	17 Nov 14	Client Issue (as Phase 1 report)
2	Dr R Penn MCIEEM CEnv	26-Feb-18	Client Issue (PEAR)

0.0 Summary

0.1 Client and Scope of Report

This report, which was commissioned by the Hellens Group, presents the results of a preliminary ecological appraisal[1] of land (referred to as 'the site') which is proposed for residential development. The objectives of the appraisal were to establish baseline ecological conditions, identify the importance of the features present, the need for further surveys to ensure compliance with planning policy, and to identify any critical ecological constraints as well as opportunities which should be taken into consideration in any development proposals for the site.

0.2 Site Location and General Character

The site is located to the west of Springwell village, Sunderland (GR: NZ284581) with the Bowes heritage railway line forming the western boundary with Springwell Quarry beyond. Land to the north and east of the site is developed for housing with an area of unmanaged grassland present north west of the site; land to the south is agricultural (horse-grazed pasture). The site itself is located adjacent to commercial stables and is used for horse grazing.

0.3 Survey Method

Desktop data relating to the site was purchased from the Local Biological Records Centre, with additional information sourced from the Natural England website[2]. A site survey comprising a phase 1 habitat survey along with a protected species risk assessment was undertaken in February 2018. An assessment of the survey results is made using the CIEEM ecological assessment criteria with the main impacts on designated wildlife sites, habitats, protected and priority species identified.

0.4 Designated Sites

International and European Wildlife Sites: There are no sites designated as being of International or European wildlife importance within a 7km search distance of the site.

Nationally Designated Wildlife Sites: The site is identified on the UK Government Magic website as being located within a SSSI impact risk zone, however, there is no requirement for the local planning authority to consult with Natural England for planning applications, other than those related to aviation developments.

Locally Designated Wildlife Sites (1km search distance): there are three Local Wildlife Sites (LWS) located within 1km search distance of the site including, at c.100m from the site, Springwell Pond. All the Local Wildlife Sites are accessible by public rights of way from the proposed development site and it is considered that there is the potential for indirect impacts on them arising from the proposed development.

The site is located within/adjacent to a designated wildlife corridor which is afforded protection under existing and draft local planning policy.

[1] Guidelines for Preliminary Ecological Appraisal; Chartered Institute of Ecology and Environmental Management (CIEEM) 2nd ed 2017

[2] www.natureonthemap.naturalengland.org.uk (referred to as Magic mapping)

0.5 Requirement for further survey(s)

Recommendations are made for further surveys, for example for protected species, where this is considered necessary to inform a planning decision, in accordance with UK planning guidance which states that *'It is essential that the presence or otherwise of protected species, and the extent that they may be affected by the development, is established before the planning permission is granted, otherwise all relevant material considerations may not have been addressed in making a decision*[3]*'* *(*para 93*).*

Table 0.1 Schedule of Further Surveys Required

Type	Extent	Timing	Trigger/Frequency	
Habitats				
Habitat checking survey	Entire Site	Optimal timing: April - Sept	If 12 months elapses from date of initial site survey	Suitably Qualified Ecologist
Species				
Bat	Entire Site	Activity: April – Sept Roost: May - August	Activity survey (walked transect and 5-day static recording) on 2-3 occasions during the active season to establish the extent and location of bat foraging and commuting routes, species present and abundance.	Suitably Qualified Ecologist
Breeding birds	Entire site	Bird breeding season (typically April, May June)	3 surveys (April, May and June) by a Suitably Qualified Ecologist (SQE) to characterise the bird population present, breeding numbers and locations	Suitably Qualified Ecologist
Water vole	Wetlands adjacent to site with pre-existing records	Optimal timing: April - Sept	1-3 surveys to establish if water voles are currently active within proximity to the site, and inform an impact assessment and if required, mitigation strategy	Suitably Qualified Ecologist
Great Crested Newt	Wetlands within 500m of the site	Mid-March – Mid June with at least 2 surveys during the period Mid-April – Mid May (subject to access).	Minimum 4 surveys with up to 6 surveys if GCN confirmed as present to inform an impact assessment and if required, mitigation strategy	Suitably Qualified and Licensed Ecologist

[3] ODPM Circular 06/2005 Biodiversity and Geological Conservation – Statutory Obligations and their Impact within the Planning System

0.6 Evaluation of ecological features

The tables below summarise the ecological significance of the site in terms of the confirmed or likely presence of habitats and species.

Table 5.2 Evaluation of Habitats on Site[4]

Ref	Name	Area[5]	Protected/ Priority Status[6]	Evaluation[7]
B2.2	Semi-improved (neutral) grassland	1.0ha	No	Local
A2	Scrub	0.1ha	No	Local
C3.1	Tall ruderal	0.7ha	No	Local
J2.4	Fence line	-	No	Negligible

Table 5.3 Evaluation of Species on Site[8]

Species/ Species Group	Protected/ Priority Status[9]	Status on Site	Evaluation
Bat	Protected	Negligible risk – roosting bats due to absence of PRF's High risk – foraging and commuting	Not evaluated on current data
Water vole	Protected	Records of presence within proximity of the site, most recently in 2015	Not evaluated on current data
Badger	Protected	Low risk	No evidence of current usage
Red squirrel	Protected	Low risk	No evidence of current usage
Reptiles	Protected (partial)	Low risk	No evidence of current usage
Birds	Priority	High risk of breeding birds within all the habitats present within the site.	Not evaluated on current data
Great crested newt	Protected	Great crested newt confirmed present within 150m of the site. Negligible risk breeding within site. Foraging potential requires further assessment.	Not evaluated on current data
Invertebrates	Priority species	Potential presence	Not evaluated on current data
Small mammals	Priority species	Potential presence	Not evaluated on current data

[4] Refer to Appendix 2 for assessment criteria
[5] Estimated from aerial photography and site survey
[6] Defined as habitats included in the List of Habitats and Species of Principal Importance in England under Section 41 of the Natural Environment and Rural Communities Act 2006.
[7] Refer to Appedix 2 for assessment criteria
[8] Refer to Appendix 2 for assessment criteria
[9] Defined as habitats included in the List of Habitats and Species of Principal Importance in England under Section 41 of the Natural Environment and Rural Communities Act 2006.

0.7 Biodiversity Mitigation

National planning policy states that '*if significant harm resulting from a development cannot be avoided (through locating on an alternative site with less harmful impacts), adequately mitigated, or, as a last resort, compensated for, then planning permission should be refused'*[10]. In 2018 the UK Government adopted a policy of *embedding an 'environmental net gain' principle for development, including for housing and infrastructure development*[11].

A hierarchy of biodiversity mitigation options are proposed in the body of the report which are broadly proportionate to the scale of impact predicted from the proposed development. Where a client plans to embed ecological mitigation within a planning application, this should be made explicit by them in any planning application submitted to the planning authority; for example, by illustrating the proposals on the site masterplan or landscape plan, and/or by submitting a Habitat Maintenance and Management Plan as part of the planning application package.

[10] para 118 National Planning Policy Framework; UK Government Dept for Communities and Local Department 2012

[11] A Green Future: Our 25 Year Plan to Improve the Environment; UK Government2018

1.0 Introduction

This report, which was commissioned by the Hellens Group LLP ('the client'), details the results of a preliminary ecological appraisal[12] of land ('the site') which is proposed for development. The objectives of the appraisal were to:

- Establish baseline ecological conditions and determine the importance of the features present
- Establish any requirement for further survey
- Identify any critical ecological constraints as well as opportunities which can be used to inform the development proposals for the site
- Identify the potential ecological impacts of the development based on current knowledge of the proposed development
- Propose outline mitigation measures which seek to avoid, reduce or compensate for adverse ecological development impacts.

The purpose of the Preliminary Ecological Appraisal Report (PEAR) is to provide baseline data regarding the site and its environs which can be used by the client and relevant members of the project team to assess site feasibility and key ecological constraints and opportunities along with the need or otherwise for further ecological surveys e.g. for protected species. CIEEM guidance is that for most projects, the PEAR will not, in itself be sufficient to support a planning application, but will form the basis of an Ecological Impact Assessment (EcIA report) which can be prepared once the scheme has been finalised, additional surveys undertaken where required and biodiversity mitigation embedded within the development scheme in accordance with legal requirements and planning policy. However, for small-scale development schemes on sites with limited ecological constraints, and where biodiversity mitigation is embedded into the development proposals at the planning application stage, then the planning authority may determine a planning application based on the information presented in a PEAR.

PAEL initially undertook a Phase 1 Habitat Survey and Protected Species Risk Assessment on behalf of the client in November 2014. This report was updated and presented in the format of a PEAR by PAEL in February 2018.

1.1 Site Location and General Character

The site is located to the west of Springwell village, Sunderland with the Bowes heritage railway line forming the western boundary and a hard rock quarry beyond the railway line. Land to the north and east of the site is residential in character with land to the south in agriculture. The central grid reference of the site is GR: NZ284581 and the site sits at an elevation of c. 140m AOD.

1.2 Development Proposals

PAEL does not hold any information on the nature and extent of the proposed development. A primary Zone of Influence (ZoI) for the development of 1km from the site boundary is defined based on the assumption that ecological effects are restricted to direct impacts including habitat loss along with indirect impacts comprising increases in light levels, noise and other disturbance sources related to human activity. It is also recognised when assessing potential development impacts, that some could extend beyond this primary ZoI e.g. surface water pollution and this is reflected in the report where relevant.

[12] Guidelines for Preliminary Ecological Appraisal (2nd ed) Chartered Institute of Ecology and Environmental Management (CIEEM) 2017

1.3 Consultations

PAEL have undertaken no consultations with the local planning authority or other organisations in respect to this site on behalf of the client.

Figure 1.1 Site Location

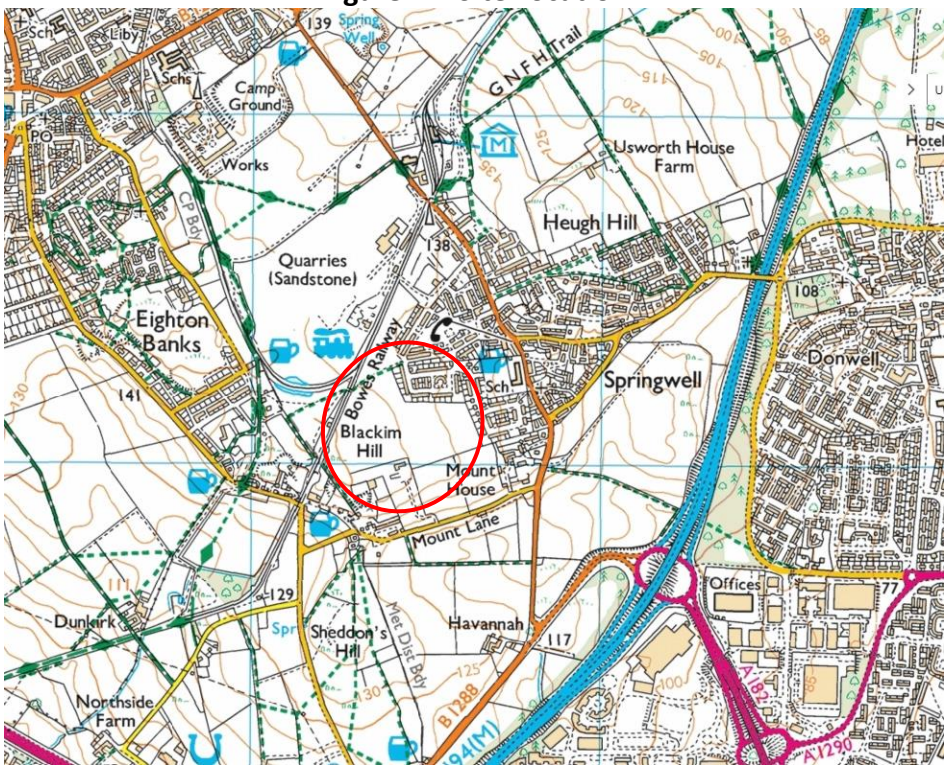


Figure 1.2 Survey Boundary

2.0 Designated Wildlife Sites

The UK contains areas of land which are of wildlife significance at an international, European, national and local level. There are systems in place for identifying, designating and legally protecting such areas of land. Table 2.1 sets out the main wildlife designations relevant to the site and the legal framework which underpins them. Land may also be given a non-statutory designation which may be afforded weight in the planning system e.g. Local Wildlife Sites. More details on the nature of protection afforded to such sites through the legal and planning systems are provided in Appendix 1. The presence of a designated wildlife site within or close to a proposed development site can have implications on development proposals if there is the potential for the development to impact on the conservation status of the wildlife site.

Table 2.1 Wildlife Site Types and Legal Framework for England of Relevance to the Site

Abbrev	Site Type	Description	Legal Framework
Local Sites			
LWS	**Local Wildlife Site**	Local Wildlife Sites (LWSs) are identified and selected for their local nature conservation value. They protect threatened species and habitats acting as buffers, stepping stones and corridors between nationally-designated wildlife sites.	No legal protection but may be afforded protection under planning policy

2.1 Information Sources consulted regarding Designated Wildlife Sites

The location and extent of statutorily protected wildlife sites and was checked on the UK Government Magic website [13]. Data on the location of Local Wildlife Sites within 1km of the site and pre-existing records of protected and priority species was initially supplied by the North East Environmental Records Information Centre (ERIC) on the 6-Oct-14 with the information updated on the 19-Feb-18.

2.2 International and European Wildlife Sites (7km search distance)

There are no sites designated as being of International or European wildlife importance within a 7km search distance of the site.

2.3 Nationally Designated Wildlife Sites (5km search distance)

The site is identified on the UK Government Magic website as being located within a SSSI impact risk zone, however, there is no requirement for the local planning authority to consult with Natural England for planning applications, other than those related to aviation developments.

2.4 Locally Designated Wildlife Sites (1km search distance)

There are three Local Wildlife Sites located within 1km search distance of the site as shown on Figure 2.1 and listed in Table 2.2.

[13] http://www.magic.gov.uk/magicmap.aspx

Figure 2.1: Location of Non-Statutory Wildlife Sites within 1km Search Distance

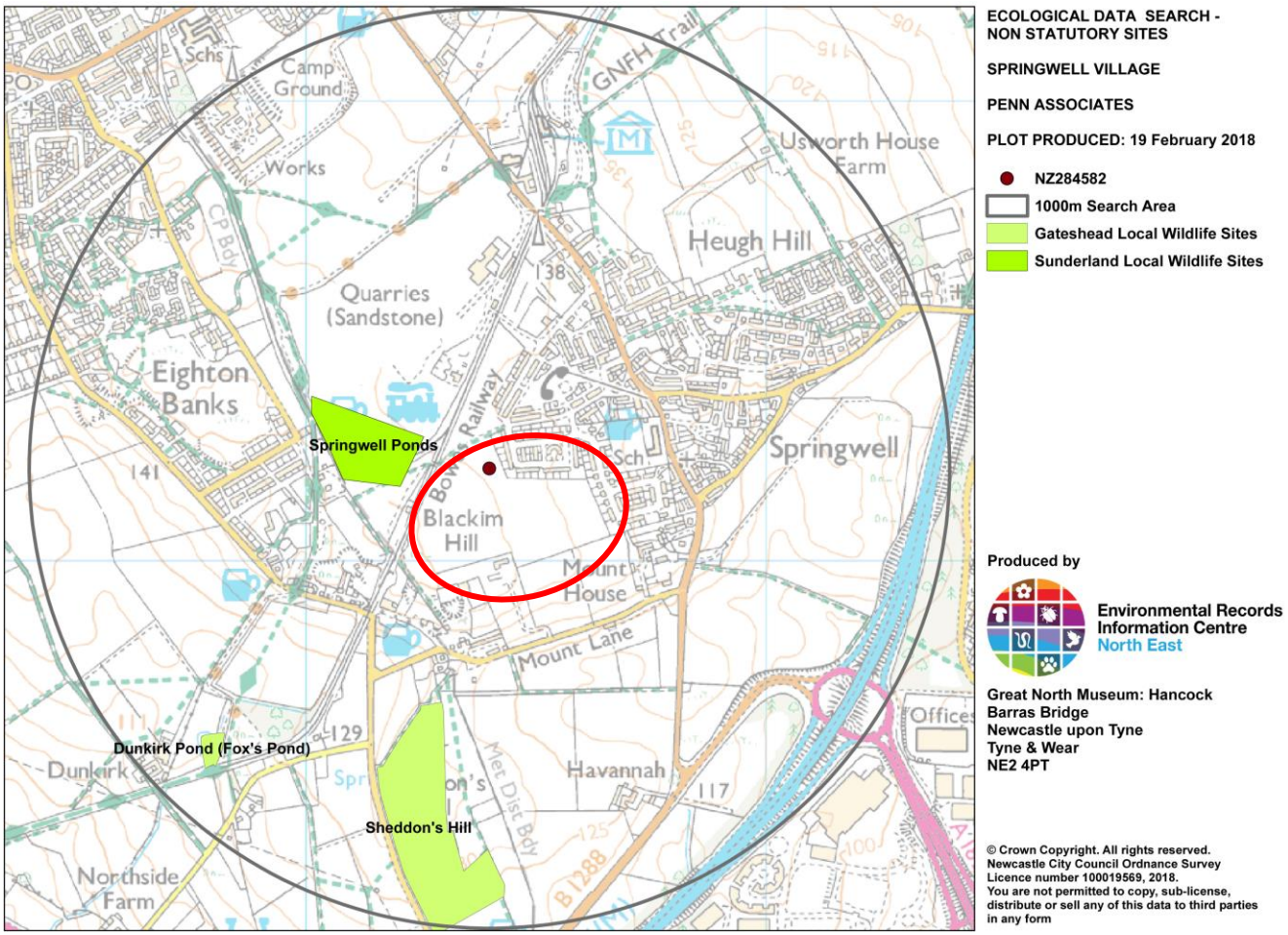


Table 2.2 Locally Designated Wildlife Sites

Site Name	Summary of Interest	Distance
Local Sites	Within 1km	
	Gateshead District	
Springwell Ponds	Pond resulting from construction of the Bowes railway which has led to water retention along the northern and southern railway embankments. A large population of great crested newt was recorded in 2012 with water vole recorded as present, most recently in 2007. There are also records of invertebrates (wall and small heath butterflies) with species indicative of lowland fen e.g. Sphagnum – a bog moss and marshy grassland species.	120m
	Sunderland District	
Sheddons Hill	Sheddons Hill is of local heritage importance on account of the presence of mesolithic flints and within more recent history, the location of mass Miners Meetings in the Great Miners Strike of 1844. The site contains areas of lowland heath land with skylark present.	380m
Dunkirk Pond	Also known as Foxes Pond, this wetland has populations of palmate, smooth newts and common frog recorded in 1986.	590m

2.5 NERC Act S41 Habitats of Principal Importance

The Natural Environment and Rural Communities (NERC) Act came into force on 1st Oct 2006. Section 41 (S41) of the Act requires the Secretary of State to publish a list of habitats and species which are of principal importance for the conservation of biodiversity in England. The list has been drawn up in consultation with Natural England, as required by the Act. The S41 list is used to guide decision-makers such as public bodies, including local and regional authorities, in implementing their duty under section 40 of the Natural Environment and Rural Communities Act 2006, to have regard to the conservation of biodiversity in England, when carrying out their normal functions.

Fifty-six habitats of principal importance are included on the S41 list. These are all the habitats in England that were identified as requiring action in the UK Biodiversity Action Plan (UK BAP) and continue to be regarded as conservation priorities in the subsequent UK Post-2010 Biodiversity Framework. They include terrestrial habitats such as upland hay meadows to lowland mixed deciduous woodland, and freshwater and marine habitats such as ponds and subtidal sands and gravels.

NERC Habitats of Principal Importance Mapped within the Site

The Magic website[14] maps UK priority habitats for conservation, although coverage should not be regarded as comprehensive or definitive. No S41 habitats of principal importance are mapped within or adjacent to the site.

[14] http://www.magic.gov.uk/magicmap.aspx

3.0 Habitat Survey

An extended phase 1 habitat survey was undertaken of the site with the aim of recording and mapping the type of semi-natural vegetation and wildlife habitat present.

3.1 Habitat Survey Method

The site was walked over by a suitably qualified ecologist (SQE) who recorded the type and extent of habitats, characteristic and notable species and general habitat condition in accordance with the NCC 1990 methodology[15]. Table 3.1 sets out details of the timing of the survey and the surveyor.

Table 3.1 Survey Details

Date	Surveyor	Time	T°C	Wind speed	Precipitation Cloud cover
10/11/2014	Rachel Penn MCIEEM, CEnv	14.30 -16.00	10°C	-	Dry/light precipitation
22/02/2018	Rachel Penn MCIEEM CEnv	12.30 -13.30	12°C	Light breeze	2/8th cloud. Dry

3.2 Limitations of Survey

An initial site visit was undertaken in November with a second visit undertaken in mid-February 2018; these survey timings are both sub-optimal being at a time of year when most plants are dormant and may not be visible or capable of identification. Some animals remain active although summer migrant birds would not be present, and the activity of other species would be reduced by the cold temperatures and absence of food. Given the nature of habitats on site and its relatively small size it is considered that the habitats present could be identified with confidence to Phase 1 categories although some notable species would not be observed.

There were no access constraints to the survey which will record only what is visible at the time of survey. Habitats and species presence change over time and are influenced by site management operations hence the results of this survey are time-limited.

It is advised that checking surveys are conducted if the results of this report are to be used to inform a planning or management decision more than 12 months after the date of the Phase 1 habitat survey, or if other activities have occurred which could impact on the ecological status of the site e.g. changes in management including cessation of current management practices.

3.3 Habitats present on and adjacent to the Site

The habitats recorded within the survey area are listed in Table 3.2 and then described with their location and extent are illustrated in Plan 1. Incidental observations of species observed during the site survey are given in Table 3.3.

[15] Nature Conservancy Council. Handbook for Phase 1 Habitat Survey. A technique for environmental audit 1990

Table 3.2: Schedule of Habitats Present on Site

NVC Code	Name	Approximate Area[16]	UK Priority Habitat Status[17]
B4	Improved (neutral) grassland	7.6ha	No
A2	Trees and scrub	240m^2	No
C3.1	Tall ruderal	0.1ha	No
J2.4	Fence line	-	No
	Total	**7.7ha**	

Table 3.3: Schedule of Animals Species observed during Site Survey

Common Name	Scientific Name	Number	Habitat	UK Priority Species Status[18]
Robin	*Erithacus rubecula*	1	Scrub on N boundary	No
Wren	*Troglodytes troglodytes*	1	Scrub on N boundary	No
Gulls (common/black-headed)	*Larus sp*	c.50	Roosting and feeding within site on grassland	No
Ring-necked Pheasant	*Phasianus colchicus*	1 male	Feeding within site on grassland	No
Magpie	*Pica pica*	4	Feeding within site on grassland and roosting in trees on W boundary	No
Pigeon	*Columba livia*	c.25	Roosting and feeding within site on grassland	No
Great tit	*Parus major*	6	Gorse scrub on SW boundary	No
Coot	*Fulica atra*	1	Pond (P1)	No

Improved (neutral) grassland

The site comprises an area of improved and heavily horse-grazed pasture with perennial rye grass (*Lolium perenne*), creeping buttercup (*Ranunculus repens*), ragwort (*Senecio sp*), common nettle (*Urtica dioica*), daisy (*Bellis perennis*) and dock (*Rumex sp*) recorded. The land was heavily poached and waterlogged adjacent to stables associated with Fernhill farm buildings on the southern boundary. The site faces south and is gently sloping in a southerly direction. The site boundaries are mostly defined by post and rail/wire fencing with fenced garden boundaries present on the northern (part) and eastern site boundary, and a c. 2m high metal palisade fence between the site and the Bowes railway line to the west. The grassland was in use by a large flock of mixed gulls and pigeons for roosting and feeding at the time of survey in 2018.

[16] Estimated from aerial photograph and site survey

[17] Defined as habitats included in the List of Habitats and Species of Principal Importance in England under Section 41 of the Natural Environment and Rural Communities Act 2006 and taking into account habitat condition as assessed on site.

[18] Defined as habitats included in the List of Habitats and Species of Principal Importance in England under Section 41 of the Natural Environment and Rural Communities Act 2006 and taking into account habitat condition as assessed on site.

Trees and Scrub

The northern and southern boundary support scattered hawthorn (*Crataegus monogyna*) and elder (*Sambucus nigra*) scrub to a height of c. 5m. There is a group of semi-mature whitebeam (*Sorbus aria*) and willow (S*alix sp*) trees to c.8m on the western site boundary.

Tall ruderal

The land slopes up towards the northern boundary where there is a belt of tall ruderal vegetation supporting rosebay willow (*Epilobium angustifolium*), cleavers (G*alium aparine*), bramble (*Rubus fruticosus agg*), white dead nettle (*Lamium album*), hogweed (*Heracleum sphondylium*) as well as grasses (false-oat grass and cocksfoot) and dock (*Rumex sp*). A public right of way crosses the ruderal habitat.

Site Photographs

Site looking northeast

Pigeons roosting on site

Robin in scrub on northern boundary

Trees on western site boundary

Habitats Adjacent to the Site

Urban (housing) – land directly north and east of the site supports residential development.
Grassland (semi-improved and unimproved) – land due west of the site forms part of the Bowes railway with the tracks present. The railway embankments support unimproved grassland (acidic) with lowland heath plants also present including heather (*Calluna vulgaris*), broom (*Cystisus scoparius*), Yorkshire fog (*Holcus lanatus*), yarrow (*Achillea millefolium*), sheep's fescue (*Festuca ovina*), knapweed (*Centaurea sp*). Land north of the site is semi-improved grassland (currently unmanaged).

Railway line adjacent to the site with Ponds P1 and P2

Bare ground (landfill site) – land north west of the railway line is a former sandstone quarry now being infilled with landfill.

Ponds – located either side of the railway line are two large ponds (P1 and P2 on Figure 4.1) each approximately 80 -100m in length and c. 15m wide. These ponds support fen vegetation with reedmace (*Typha latifolia*) and areas of willow carr. The ponds are surrounded by areas of long grassland with cocksfoot, knapweed, creeping buttercup present around the southern ponds.

Pond 3 is an area of standing water in a heavily overgrazed horse pasture. There was no floating or emergent vegetation present and the 'ponds' were shallow (estimated to be less than 10cm) and appear impermanent in character, predicted to dry up during dry weather.

Ponds 4 and 5 (Figure 4.1) could not be observed from public rights of way accessed during the site survey; they appeared to be in a private garden.

Northern Pond (P1)

Southern Pond (P2)

P3

Trees and shrubs – there are areas of broad-leaved plantation woodland and shrubs south of the ponds with hazel (*Corylus avellana*), rowan (*Sorbus aucuparia*), alder (*Alnus glutinosa*), elder (*Sambucus nigra*), ash (*Fraxinus excelsior*) present. There is an area of gorse-dominated (*Ulex europaeus*) scrub present on the south western site boundary.

4.0 Protected, Priority and Legally Controlled Species Survey and Risk Assessment

Several plant and animal species are afforded special protection through legislation. This can make it illegal to undertake works that have the potential to harm or disturb these species, hence it is important that the status of these species on the site is fully understood. Where there is a risk of any of these species being present, it is advised that no works are undertaken without the client having a sound understanding of their potential legal implications. Many aspects of wildlife legislation apply regardless of the planning status of a site with a summary of key areas of wildlife legislation presented in Appendix 1. The client should request further advice if they have any queries or concerns about their activities in the context of wildlife law.

4.1 Risk Assessment Process

This report presents the results of a risk assessment undertaken to identify the risk of certain animal species that are afforded special statutory protection in the UK being present on site, drawing on a review of pre-existing data sources and a site visit. The risk assessment process is based on the weighing up a range of factors that influence species presence e.g. habitat type, connectivity, species ecology and distribution, habitat management etc. and assigning a level of probability to species presence on the site. Where a risk of protected species presence is identified then further surveys are typically recommended to confirm the presence and status of a species so that a mitigation strategy can be devised if required, and/or measures are proposed to avoid the risk of an adverse impact on the species of interest e.g. through appropriate timing of works.

The assessment process also considers the potential for national and regional priority[19] species groups to be present within the site based on desktop records, species observations made during the site visit and a habitat assessment. Given that over 900 species are listed under section 41 of the NERC Act 2006 with many additional species identified as regional priorities in the UK and local Biodiversity Action Plan as well as regional red data books etc., and that many species groups require specialist survey techniques to identify their presence then this risk process should be regarded as indicative of the likely presence of species-groups based on the habitat characteristics of a site.

4.1.1 Desk-top Study

Desktop data on the distribution of protected[20] and priority species was reviewed to establish the potential for the species listed in table 4.2 to be present on the site with this information sourced from the Environmental Records Information Centre North East (ERIC) as detailed in section 2.0 of this report.

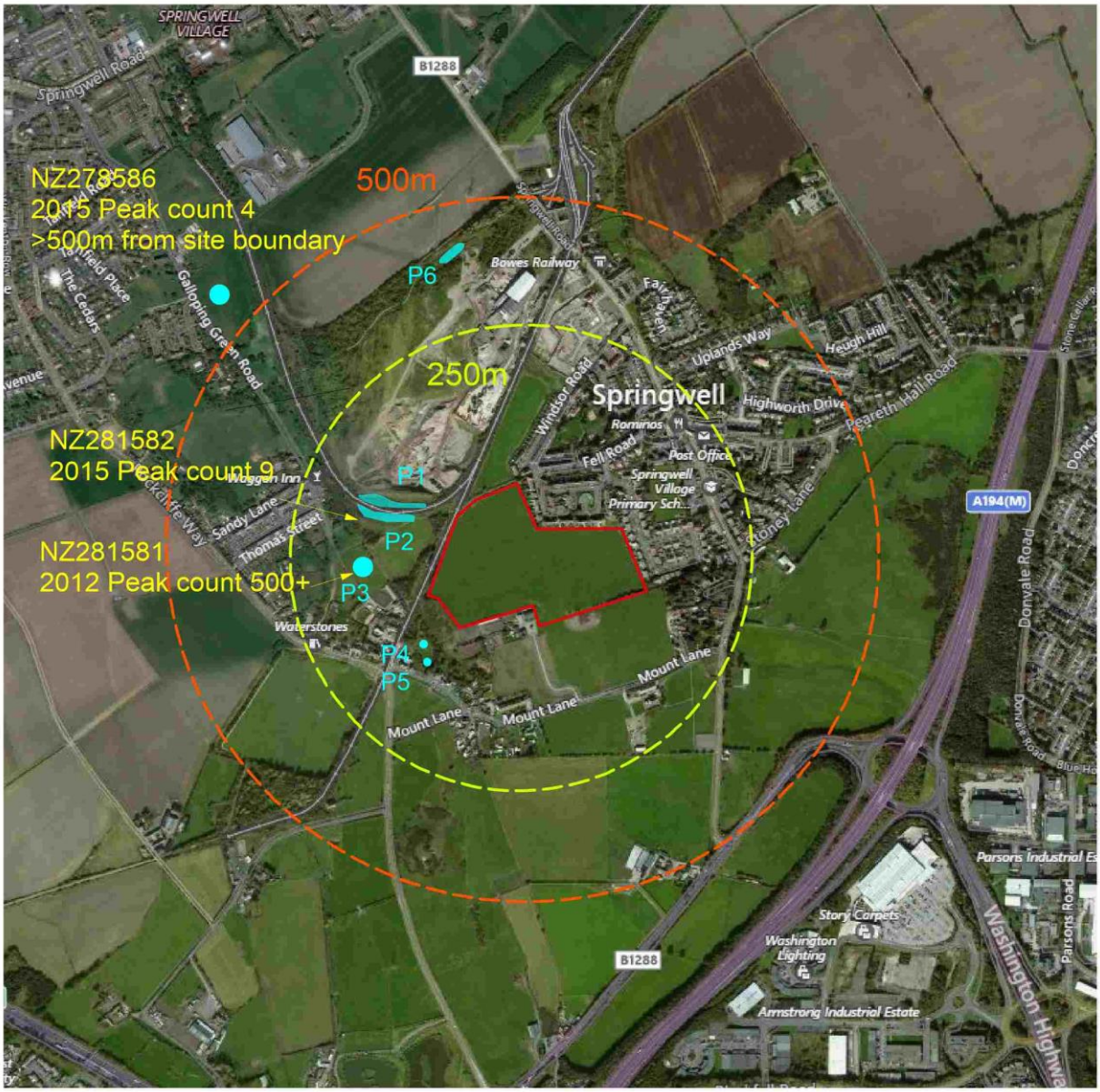
The absence of a record for a locality cannot be taken as confirmation that the species is absent; rather it may reflect lack of survey effort. It should also be noted that data records reflect historic rather than current distribution. Pre-existing data therefore needs to be interpreted in an informed manner, however, these datasets do provide valuable information regarding the general distribution of species within any given region.

[19] Defined as species included in the List of Habitats and Species of Principal Importance in England under Section 42 of the Natural Environment and Rural Communities (NERC) Act 2006.

[20] Protected species are those defined as species afforded special protection (listed on schedule 1 or schedule 5) under the Wildlife and Countryside Act 1981 (as amended), the Badger Act 1992 (England and Wales) and European Protected Species as defined in the Conservation of Habitats and Species Regulations 2017.

A summary of the data provided by ERIC is presented in Appendix 3 with the location of pre-existing great crested newt records illustrated on Figure 4.1.

Figure 4.1 Locations of Pre-existing Great Crested Newt Records[21]



4.1.2 Habitat Assessment

During the site walk-over survey an assessment of the potential value of the habitats on site for species listed in table 4.2 is made; observations of faunal activity are also noted e.g. droppings, footprints, burrows etc. Trees and other built structures were visually assessed at a group level for their potential to host roosting using ground-based observation techniques i.e. a visual observation of the form and structure of the tree/building with binoculars (Opticron 8x32) used to permit close examination for features that are commonly used by bats for roosting and sheltering.

[21] Source: North East Environmental Records Information Centre (ERIC) data consultation

Potential roost features include (but are not limited to);

- Natural/manmade cavities
- cracks/splits in major limbs/mortar
- loose bark/tiles/roofing felt/barge boards and fascia's etc
- bird and bat boxes

Field signs that may indicate use of trees by bats include;

- Scratches and staining around entry point
- Bat droppings around entrance
- Audible squeaking
- Flies around entry point
- Distinctive smell of bats
- Smoothing of surfaces around cavity

4.1.3 Search Distance

The distance over which the presence of a species is significant in terms of the risk assessment varies from species to species depending upon a species typical home range, commuting and foraging distance etc. A search distance of 500m from the site boundary is used for great crested newts (GCN) which is derived from assumed maximum GCN foraging distances[22]; whereas the presence of an otter record, for example, within 1km of the site would be regarded as significant where there is potential habitat connectivity for this species. Search distances might extend beyond 1km where more mobile species are known to have local populations e.g. curlew.

4.1.4 Requirement for Reassessment

Note that the results of the risk assessment and faunal surveys are applicable only at the time at which they are undertaken. The biodiversity status of a site changes with both the passage of time and site conditions, therefore, should there be a change in site conditions or a significant lapse of time prior to development starting then checking surveys for protected species may be required to confirm their status on site, and hence ensure compliance with relevant protected species legislation.

4.2 Results of Species Risk Assessment

A risk assessment for protected species, which have the potential to be present within the site or proximity to it is presented in Table 4.2 using data obtained from the desk-top site assessment and the site survey. Where a low or greater risk of a species being present is identified then further consideration is given to the species in the impact assessment and/or recommendations are made for further survey, with the survey results being required to inform the mitigation of development impacts, where necessary. Where the risk of a species being present is assessed as negligible then no further consideration is given to the species in this assessment.

[22] English Nature 2001. Great Crested Newt Mitigation Guidelines

Table 4.2 Risk Assessment for selected legally protected species within the site

Species	Conservation Status	Summary of Pre-existing Data, Survey Records and habitat Assessment for Site	Risk Assessment
Mammals			
Bat *Vespertillionidea*	EPS WCA (Sch 5)	ERIC hold 1 bat records within 1km of the site for the OS square NZ2758 which covers the south western part of the data search area. The record is an unconfirmed report of several 100 bats in flight. There are no built structures within the site which could support bats. None of the trees within the site boundary contained potential bat roost features. There are buildings adjacent to the site which could host roosting bats e.g. residential development of Springwell, Eighton Banks, former engine house associated with Bowes railway and farm buildings etc. The site could potentially support commuting and foraging bats with the western and northern boundaries assessed as being the habitat of greatest suitability for commuting and foraging bats.	Negligible risk – roosting bats due to absence of PRF's[23] Moderate risk – foraging and commuting
European otter *Lutra lutra*	EPS WCA (Sch 5)	Site located 3km from the River Team and associated watercourses and over 5km from the River Wear. No sizeable watercourses within 1km of the site although ponds associated with Springwell Quarries within c.250m of the site could support transient otters. No ERIC records of otter within 1km of the site. No suitable habitats for otter within the site	Negligible risk presence on site
Water vole *Arvicola amphibious*	WCA (Sch 5)	ERIC has 13 water vole records for Springwell ponds (north and south) and Springwell quarry pond over the period 2001 – 2013.	Records of presence within proximity of the site, most recently in 2015
Eurasian badger *Meles meles*	Badger Act	No evidence of badger activity within the site, either in the form of track ways, dung heaps or setts etc. Habitat within the site could provide potentially suitable foraging habitat for badgers but the risk of badger setts within the site is assessed as negligible due to the absence of cover. There are a no ERIC records for badgers within 1km of the site.	Low risk
Red squirrel *Sciurus vulgaris*	WCA (Sch 5)	ERIC holds a single red squirrel record dating from 2009 for east Springwell, some 600m east of the site; they also hold a grey	Low risk of presence within site

[23] PRF Potential Roost Features

Species	Conservation Status	Summary of Pre-existing Data, Survey Records and habitat Assessment for Site	Risk Assessment
		squirrel record from 2006 indicating that the red and greys may be co-existing in the area. The site has negligible suitability for red squirrel with no suitable woodland habitat but there is scattered woodland in proximity to the site, including woodland blocks within Springwell Quarry, which could potentially support red squirrels	
Schedule 1 bird species	WCA (Sch 1)	ERIC holds a single barn owl record (dead bird Dec 2010) from Lean Lane c.1km north of the site suggesting the species has been active within the area. No potential nest sites suitable for schedule 1 birds were observed within the site.	Negligible risk of nesting activity within the site. Site potentially suitable (but sub-optimal due to low vegetation growth) for barn owl foraging if populations are present within proximity.
Birds (including breeding birds)	WCA	ERIC identified a single NERC s41 species (skylark) in 2010 within 1km of the site at Sheddons Hill c.600m from the site. High potential for other birds, including priority bird species, to be present within the site, principally species associated with woodland, scrub and grassland habitats.	High risk of breeding birds in tree, scrub and tall ruderal habitat; low risk within the improved grassland due to low cover and high disturbance by grazing horses.
Herptiles			
Reptiles	WCA (Sch 5 partial)	No ERIC records of reptiles within 1km search distance of the site. Site of low suitability for reptiles due to distance from established populations and lack of bare ground habitats, but potential for presence on adjacent land e.g. railway embankments and Springwell quarry.	Low risk
Great crested newts (GCN) *Triturus cristatus*	WCA (Sch 5) EPS	There are no water bodies on the site which could host breeding great crested newts (GCN) but the site does contain grassland and scrub habitats within which GCN newt could hibernate and forage. ERIC records indicate the presence of a small population (<10 in 2012) of great crested newts at Springwell South pond (P2 on Fig 4.1) which is 130m west of the site. GCN larvae and a single female adult were identified as being present at GR NZ281581 in 2012 (P3 c.130m west of site) – this was observed to be an area of waterlogging in a heavily overgrazed horse pasture which appears sub-optimal for GCN breeding and hibernation. Four further ponds (P1, P4-6) were identified from aerial photography and OS mapping within 500m of the site	Great crested newt confirmed present within 150m of the site. Risk of foraging great crested newts within the site.

Species	Conservation Status	Summary of Pre-existing Data, Survey Records and habitat Assessment for Site	Risk Assessment
		but with no pre-existing GCN records held by ERIC for these ponds.	

Key:
EPS – European Protected Species afforded protection under Conservation of Habitats and Species Regulations 2017
WCA (Sch 5/1) Species listed on Schedule 5/1 of the Wildlife and Countryside Act 1981 (as amended)

4.3 Risk assessment for Priority Species present within 1km of Site

The Natural Environment and Rural Communities (NERC) Act came into force on 1st Oct 2006. Section 41 (S41) of the Act requires the Secretary of State to publish a list of habitats and species which are of principal importance for the conservation of biodiversity in England. Over 900 species of principal importance were included on the S41 list; these are the species found in England which were identified as requiring action under the UK BAP and which continued to be regarded as conservation priorities under the UK Post-2010 Biodiversity Framework.

Based on the desktop data reviewed for the site and the habitat assessment it is considered that the following priority species groups have the potential to be present on or adjacent to the site.

Table 4.3 Priority Species Groups potentially present within the ZoI of the proposed Development

Species Group	Pre-existing Data	Potential Habitat Area
Birds	Skylarks recorded on Sheddon Hill, south of the site (ERIC record) 2007.	Grassland
Invertebrates	Wall and small heath butterflies and shaded broad-bar moth have been recorded (2002 – 2009) near Springwell Ponds and the Bowes Railway (ERIC records).	Hedgerows/scrub/footpaths with bare soils e.g. railway embankments and tall ruderal vegetation within and adjacent to site.
Small mammals	Records of the European hedgehog within 1km of the site from East Springwell dating from 2012 ((ERIC records)	Hedgerows/scrub/grassland margins

4.4 Legally Controlled Species

Certain non-native plant and animal species are a threat to nature conservation due to their invasive nature and impact on native species and habitats. Schedule 9 of the Wildlife and Countryside Act 1981 (as amended) lists plant and animal species currently present in England and Wales which are of current concern. No Schedule 9 were observed within the site.

Desktop data records the presence of the following schedule 9 species within proximity to the site but no evidence of these was seen during the site survey:

- Grey squirrel (*Sciurus carolinensis*).

5.0 Policy Context, Assessment Methodology and Significance Criteria

In this section, the significance of the biodiversity features identified within the ZoI of the site is evaluated and potential impacts of development[24] on the ecology of the site is assessed in the context of current wildlife legislation and national planning policy.

5.1 Planning Policy Context

5.1.1 National Policy and Planning Context

The UK Government published 'A Green Future: Our 25 Year Plan to Improve the Environment' January 2018 which includes the following policy: *1. The UK Government will embed an 'environmental net gain' principle for development, including housing and infrastructure.*

The National Planning Policy Framework[25] states that '*when determining planning applications, local planning authorities should aim to conserve and enhance biodiversity'* and that '*if significant harm resulting from a development cannot be avoided (through locating on an alternative site with less harmful impacts), adequately mitigated, or, as a last resort, compensated for, then planning permission should be refused* (para 118)'.

Measures which can be taken at the development design stage to avoid, reduce or compensate for adverse development impacts are therefore identified in this report with the aim of informing the development design and the planning decision in the context of national planning policy.

5.1.2 Sunderland Planning Policy

The City of Sunderland Unitary Development Plan 1998 is currently the adopted plan for the site, with policy CN1 setting out nature conservation policy and the site covered by a wildlife corridor designation (policy C23). However, emerging policy contained in the Sunderland City Council's Core Strategy and Development Plan 2015-2033 (undated draft) is also afforded weight in planning decisions with policy E7 the key policy relating to biodiversity, with policies E6, E8 and E9 also relevant. Note that the proposed development site is located within/adjacent to designated green infrastructure corridors and within proximity to a Local Wildlife Site, and as such paras 6 and 8 of policy E7 (see below) are of particular relevance, as well as para 1 which requires development to deliver net gains in biodiversity.

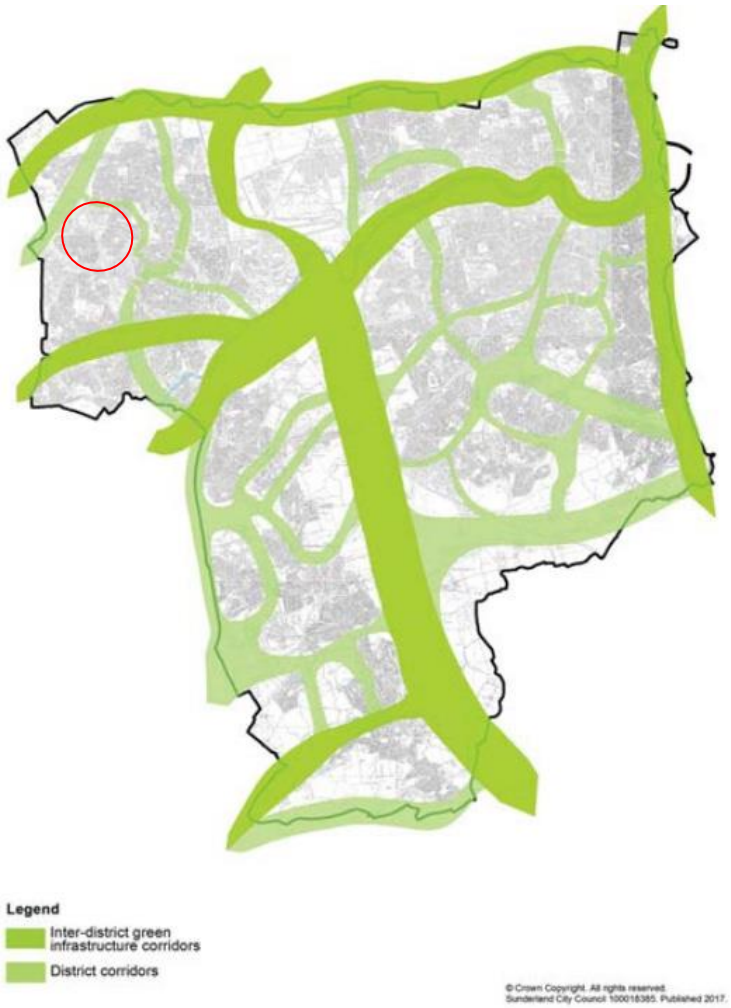
Sunderland City Council's Core Strategy and Development Plan 2015-2033 (undated draft)
Policy E7: Biodiversity and Geodiversity

1. Where appropriate development proposals must demonstrate how they will: i) avoid/minimise adverse impacts on biodiversity and geodiversity in accordance with the mitigation hierarchy; and ii) provide net gains in biodiversity
2. Development proposals will be approved where harm to biodiversity or geodiversity is avoided (through locating on an alternative site with less harmful impacts), there is adequate mitigation or, as a last resort, significant compensation for any loss.
3. Where development which is likely to adversely affect biodiversity and/or geodiversity is to be approved, the council will require planning conditions and/or obligations to secure the provision, maintenance and monitoring of appropriate mitigation and/or compensation measures.
4. Proposals for development or land use that would adversely affect an Internationally Designated Site or Candidate Internationally Designated Site, either individually or in combination with other plans or projects,

[24] Based on PAEL's current knowledge of development proposals
[25] Department for Communities and Local Government 2012. National Planning Policy Framework

will only be permitted, where the developer can demonstrate that there are imperative reasons of overriding public interest, including those of a social or economic nature, and; there is no alternative solution.
5. Proposals for development or land use that would adversely affect a Site of Special Scientific Interest, either directly or indirectly, will only be permitted where; the reasons for the development, including the lack of an alternative solution, clearly outweigh the nature conservation value of the site and the national policy to safeguard the national network of such sites.
6. Proposals for development or land use that would adversely affect a Local Wildlife Site or Local Geological Site, either directly or indirectly, will only be permitted where; i) the developer can demonstrate that there are no reasonable alternatives, and; ii) the case for development clearly outweighs the need to safeguard the intrinsic value of the site.
7. Proposals for development or land use that would adversely affect the ecological, recreational and/or educational value of a Local Nature Reserve will only be permitted where: i) the developer can demonstrate that there are no reasonable alternatives; and ii) the case for development clearly outweighs the need to safeguard the ecological, recreational and/or educational value of the site.
8. Development proposals that would have a significant adverse impact on the value and integrity of a Wildlife Corridor will only be permitted where suitable replacement land is provided to retain the value and integrity of the corridor

Figure 5.1 Green Infrastructure Corridor (extract from Sunderland Core Strategy (draft)) with general site location added (red shape).



5.2 Evaluation and Impact Assessment Methodology

The assessment methodology adopted, which is based on the Guidelines for Ecological Impact Assessment in the UK and Ireland (CIEEM 2016) approach, comprises:

- Identifying need for further survey(s)
- Evaluation of ecological features
- Predicting ecological impacts and effects arising from development
- Outlining biodiversity mitigation in accordance with the mitigation hierarchy.

5.2.1 Requirement for further survey(s)

Recommendations are made for further surveys, for example for protected species, where this is considered necessary to inform a planning decision, in accordance with UK planning guidance which states that *'It is essential that the presence or otherwise of protected species, and the extent that they may be affected by the development, is established before the planning permission is granted, otherwise all relevant material considerations may not have been addressed in making a decision*[26]*'* (para 93).

Table 5.1 Schedule of Further Surveys Required

Type	Extent	Timing	Trigger/Frequency	
Habitats				
Habitat checking survey	Entire Site	Optimal timing: April - Sept	If 12 months elapses from date of initial site survey	Suitably Qualified Ecologist
Species				
Bat	Entire Site	Activity: April – Sept Roost: May - August	Activity survey (walked transect and 5-day static recording) on 2-3 occasions during the active season to establish the extent and location of bat foraging and commuting routes, species present and abundance.	Suitably Qualified Ecologist
Breeding birds	Entire site	Bird breeding season (typically April, May June)	3 surveys (April, May and June) by a Suitably Qualified Ecologist (SQE) to characterise the bird population present, breeding numbers and locations	Suitably Qualified Ecologist
Wintering Birds	Entire site	Nov- February	4 surveys; one a month between November and February	Suitably Qualified Ecologist
Water vole	Wetlands adjacent to site with pre-existing records	Optimal timing: April - Sept	1-3 surveys to establish if water voles are currently active within proximity to the site, and inform an impact assessment and if required, mitigation strategy	Suitably Qualified Ecologist (assuming non-intrusive methods to be adopted). Suitably licensed ecologist

[26] ODPM Circular 06/2005 Biodiversity and Geological Conservation – Statutory Obligations and their Impact within the Planning System

				required where there is a risk of disturbance
Great Crested Newt	Wetlands within 500m of the site	Mid-March – Mid June with at least 2 surveys during the period Mid-April to Mid-May (subject to access).	Minimum 4 surveys with up to 6 surveys if GCN confirmed as present to inform an impact assessment and if required, mitigation strategy	Suitably Qualified and Licensed Ecologist

5.2.2 Evaluation of ecological features

The importance of each ecological feature identified as being present within the site through the baseline study is defined using professional judgement based on habitat and species information currently available, on a geographical scale (refer to Appendix 2) which ranges from features of international scale to those which are of value at a site level. The evaluation ranking needs to be reviewed following any additional surveys recommended.

Table 5.2 Evaluation of Habitats on Site[27]

Ref	Name	Area[28]	Protected/ Priority Status[29]	Evaluation[30]
B4	Improved (neutral) grassland	7.6ha	B4	Within site
A2	Trees and scrub	240m^2	A2	Within site
C3.1	Tall ruderal	0.1ha	C3.1	Within site
J2.4	Fence line	-	J2.4	Negligible

Table 5.3 Evaluation of Species on Site[31]

Species/ Species Group	Protected/ Priority Status[32]	Status on Site	Evaluation
Bat	Protected	Negligible risk – roosting bats due to absence of PRF's High risk – foraging and commuting	Not evaluated on current data
Water vole	Protected	Records of presence within proximity of the site, most recently in 2015	Not evaluated on current data
Badger	Protected	Low risk	No evidence of current usage
Red squirrel	Protected	Low risk	No evidence of current usage

[27] Refer to Appendix 2 for assessment criteria
[28] Estimated from aerial photography and site survey
[29] Defined as habitats included in the List of Habitats and Species of Principal Importance in England under Section 41 of the Natural Environment and Rural Communities Act 2006.
[30] Refer to Appedix 2 for assessment criteria
[31] Refer to Appendix 2 for assessment criteria
[32] Defined as habitats included in the List of Habitats and Species of Principal Importance in England under Section 41 of the Natural Environment and Rural Communities Act 2006.

Reptiles	Protected (partial)	Low risk	No evidence of current usage
Birds	Priority	High risk of breeding birds within trees, scrub and tall ruderal habitats	Not evaluated on current data
Great crested newt	Protected	Great crested newt confirmed present within 150m of the site. Negligible risk breeding within site. Foraging potential requires further assessment.	Not evaluated on current data
Invertebrates	Priority species	Potential presence	Not evaluated on current data
Small mammals	Priority species	Potential presence	Not evaluated on current data

5.2.3 Predicting ecological impacts and effects arising from development

Development impacts on each ecological feature of local or greater value is predicted for all phases of the project, e.g. construction and operation based on PAEL's current knowledge of the development proposals. Where limited or no information has been provided regarding development proposals, then only generalised, potential impacts can be considered; and a further iteration of this report may be required prior to submission of this report to the planning authority.

Table 5.3 Predicted Development Impacts on Ecological Features on Site[33]

	Habitat Loss	**Habitat Gain**	**Disturbance**	**Change in Management**
Designated Wildlife Sites	None	None	Highly probable	None
Ancient Woodland	None	None	None	None
Habitats				
Improved (neutral) grassland	Highly probable	Not known	Highly probable	Highly probable
Trees and scrub	Highly probable	Not known	Highly probable	Highly probable
Tall ruderal	Highly probable	Not known	Highly probable	Highly probable
Species				
Bat	Probable – loss of vegetation	Not known	Probable	Probable
Water vole	None	Not known	Possible	None
Badger	Possible but low risk of presence	Not known	Probable but low risk of presence	Probable but low risk of presence
Red squirrel	Possible but low risk of presence	Not known	Probable but low risk of presence	Probable but low risk of presence
Reptiles	Possible but low	Not known	Probable but	Probable but low

[33] Refer to Appendix 2 for assessment criteria

	risk of presence		low risk of presence	risk of presence
Birds	Highly probable	Not known	Highly probable	Highly probable
Great crested newt	Possible – potential foraging habitat	Not known	Possible	Possible
Invertebrates	Highly probable	Not known	Highly probable	Highly probable
Small mammals	Highly probable	Not known	Highly probable	Highly probable
Legally Controlled Species	Not currently present	Potential to be introduced	N/A	N/A

6.0 Biodiversity Mitigation

6.1 Biodiversity Mitigation Approach

Measures which can be taken at the development design stage to avoid, reduce or compensate for adverse development impacts are identified below, along with opportunities for biodiversity enhancement. This information is provided to assist the client in complying with national planning policy which states that '*if significant harm resulting from a development cannot be avoided (through locating on an alternative site with less harmful impacts), adequately mitigated, or, as a last resort, compensated for, then planning permission should be refused'*[34]. In 2018 the UK Government adopted a policy of *embedding an 'environmental net gain' principle for development, including for housing and infrastructure development*[35].

Where a client plans to adopt the proposed ecological mitigation within a planning application, this should be made explicit by them in any planning application submitted to the planning authority; for example, by illustrating the proposals on the site masterplan or landscape plan, and/or by submitting a Habitat Maintenance and Management Plan as part of the planning application package.

6.2 Biodiversity Mitigation Proposals

A hierarchy of biodiversity mitigation options are proposed in Table 6.1 which are broadly proportionate to the scale of impact predicted from the proposed development. The table lists only a range of options, with other measures being available on consultation by the client with PAEL if required.

[34] Para 118 National Planning Policy Framework; UK Government Dept for Communities and Local Department 2012
[35] A Green Future: Our 25 Year Plan to Improve the Environment; UK Government2018

Table 6.1 Biodiversity Mitigation Options for the Proposed Development (based on current survey data[36])

Biodiversity Mitigation Hierarchy	
	Mitigation Options
Avoid	Retain semi-natural habitats within the site Adopt a site lighting regime consistent with the Bat Conservation Trust Guidelines[37] Do not introduce species listed on schedule 9 of the WCA; adopt appropriate biosecurity measures when bringing plant and machinery onto the site Incorporate design and recreational provision measures e.g. buffer zones and alternative accessible green space for dog walking etc to reduce risk of additional disturbance impacts on adjacent Local Wildlife Site (LWS)
Reduce	Retain some of the above habitats, with appropriate sized buffer zones and alternative recreational provision between built development and retained habitats to maintain their ecological functionality, with priority placed on the retention of semi-natural habitats on the western and northern site boundaries, to reduce the risk of impacts on the designated wildlife corridor and LWS
Compensate	Create new areas of biodiversity-rich habitat, equivalent to or greater than the area of habitat being lost with features incorporated to attract and retain those protected and priority species identified as confirmed or potentially present on the site
Enhance	Incorporate biodiversity design features into the new buildings including bat roosts and bird nest sites[38]

6.3 Residual Impacts

Development of the site would result in the small but permanent net loss of green space which cannot be mitigated for and which could contribute to further declines in biodiversity across the UK in line with current trends in various biological indicators, for example, the status of UK priority species and insects of the wider countryside[39] and farmland, woodland and wetland bird species[40].

6.4 Cumulative Impacts

PAEL are aware that land north of this site is also under consideration by the Hellens Group for development, as such the risk of cumulative impacts on the biodiversity of this area is noted.

[36] Note that where a requirement for further surveys is identified in this report then biodiversity mitigation measures will require reassessment to reflect the results of the additional surveys

[37] Bat Conservation Trust. (January 2008). Bats and Lighting in the UK (Version 2). Bat Conservation Trust, London

[38] Williams, C. (2010). Biodiversity for Low and Zero Carbon Buildings: A Technical Guide for New Build. RIBA, London. Gunnell K, Williams C and Murphy B (2013) Designing for Biodiversity: A Technical Guide for New and Existing Buildings

[39] UK Biodiversity Indicators 2017 2017 Department for Environment, Food and Rural Affairs

[40] Wild bird populations in the UK, 1970-2015 Revised 29th June 2017 Department for Environment, Food and Rural Affairs

Plan 1: Habitat Plan

Key

Survey boundary

Grassland - improved neutral

Tall ruderal

Trees and shrubs (location, numbers and spread indicative)

Scale (approximate)

0 100m

Project: Springwell Site B
Client: Hellens Group LLP
Title: Habitat Plan Site B

Date: 23.02.18
Ref: 2467 habitat site B

Appendix 1: Summary of Wildlife Legislation and Relevant Planning Context

1.0 National and Regional Planning and Legislative Context

The UK Government's national approach to planning policy is set out in the National Planning Policy Framework (NPPF) (March 2012). The UK Governments Biodiversity 2020 Strategy, published by DEFRA in 2011, sets a context within which the NPPF should be viewed. Specifically, Biodiversity 2020 aims to:

Para 8: Halt overall biodiversity loss, support healthy well-functioning ecosystems and establish coherent ecological networks, with more and better places for nature for the benefit of wildlife and people.

This is consistent with the Governments Environment White Paper, The Natural Choice (June 2011) which aims to:

- *shifts emphasis from piecemeal conservation action towards a more integrated landscape-scale approach*

- *value the natural environment in decision making and thereby unlock growth in the green economy and reconnect people with nature.*

The UK Government published 'A Green Future: Our 25 Year Plan to Improve the Environment' January 2018 which includes the following policy: *1. The UK Government will embed an 'environmental net gain' principle for development, including housing and infrastructure.*

1.1 National Planning Policy Framework

The NPPF reflects the commitments set out in the Biodiversity 2020 strategy stating that:

Para 109: '*the planning system should contribute to and enhance the natural and local environment by:*

- *Protecting and enhancing valued landscapes, geological conservation interest and soils;*
- *Recognizing the wider benefits of ecosystem services;*
- *Minimising impacts on biodiversity and providing net gains in biodiversity where possible, contributing to the Government's commitment to halt the overall decline in biodiversity, including by establishing coherent ecological networks that are more resilient to current and future pressures'.*

Para 118. When determining planning applications, local planning authorities should aim to conserve and enhance biodiversity by applying the following principles:

● *if significant harm resulting from a development cannot be avoided (through locating on an alternative site with less harmful impacts), adequately mitigated, or, as a last resort, compensated for, then planning permission should be refused;*

● *proposed development on land within or outside a Site of Special Scientific Interest likely to have an adverse effect on a Site of Special Scientific Interest (either individually or in combination with other developments) should not normally be permitted. Where an adverse effect on the site's notified special interest features is likely, an exception should only be made where the benefits of the development, at this site, clearly outweigh both the impacts that it is likely to have on the features of the site that make it of special scientific interest and any broader impacts on the national network of Sites of Special Scientific Interest;*

● *development proposals where the primary objective is to conserve or enhance biodiversity should be permitted;*

● *opportunities to incorporate biodiversity in and around developments should be encouraged;*

● *planning permission should be refused for development resulting in the loss or deterioration of irreplaceable habitats, including ancient woodland and the loss of aged or veteran trees found outside ancient woodland, unless the need for, and benefits of, the development in that location clearly outweigh the loss; and*

● *the following wildlife sites should be given the same protection as European sites: – potential Special Protection Areas and possible Special Areas of Conservation; – listed or proposed Ramsar sites; and – sites identified, or required, as compensatory measures for adverse effects on European sites, potential Special Protection Areas, possible Special Areas of Conservation, and listed or proposed Ramsar sites.*

2.0 Natural Environment and Rural Communities Act 2006 (NERC)

Section 41(3) (a) and (b) of the NERC Act 2006 requires the Secretary of State to promote the taking of steps by others to further the conservation of habitats and species identified as priorities under Section 41 of the Act. In addition to the above, Section 40(1) of the NERC Act 2006 introduced the 'biodiversity duty' which requires that;

'*Every public authority* [including Local Planning Authorities] *must, in exercising its functions, have regard, so far as is consistent with the proper exercise of those functions, to the purpose of conserving biodiversity*'.

Certain habitats and species are afforded the status of habitats of principal importance as required under the Natural Environment and Rural Communities Act (2006) (NERC). Priority is placed upon the protection and enhancement of habitats and species of principal importance.

3.0 Designated Sites including European Sites (Natura 2000 Sites)

3.1 Sites of International Importance for Wildlife

With regard to the identification and protection of internationally designated wildlife sites, the UK Government is bound by the EC Birds and Habitats Directives and the Ramsar Convention. Planning authorities are required to follow procedures set out in the Conservation of Habitats and Species Regulations 2017 when considering planning application that could impact on the conservation status of Special Areas of Conservation (SACsP, Special Protection Areas (SPAs) and Ramsar Sites.

3.2 Sites of European Importance for Wildlife

Special Areas of Conservation (SACs) are strictly protected sites designated under the EC Habitats Directive. Article 3 of the Habitats Directive requires the establishment of a European network of important high-quality conservation sites that will make a significant contribution to conserving the 189 habitat types and 788 species identified in Annexes I and II of the Directive (as amended).

Special Protection Areas (SPAs) are strictly protected sites classified in accordance with Article 4 of the EC Birds Directive, which came into force in April 1979. They are classified for rare and vulnerable birds (as listed on Annex I of the Directive), and for regularly occurring migratory species

Under the European site protection regime, a relevant authority may only grant consent for a project where it is sure that it will not have an adverse effect on the integrity of the site unless three derogation tests are met.

3.3 Sites of National and Local Importance for Wildlife

The National Planning Policy Framework (NPPF) states that when determining planning applications, local planning authorities should aim to conserve and enhance biodiversity by applying the following principles:

Proposed development on land within or outside a Site of Special Scientific Interest (SSSI) likely to have an adverse effect on the SSSI (either individually or in combination with other developments) should not normally be permitted. Where an adverse effect on the site's notified special interest features is likely, an exception should only be made where the benefits of the development, at this site, clearly outweigh both the impacts that it is likely to have on the features of the site that make it of special scientific interest and any broader impacts on the national network of SSSO.

With regard to locally designated sites, the NPPF states that:
'*Local planning authorities should set criteria-based policies against which proposals for any development on or affecting protected wildlife sites will be judged*'.

4.0 Species

Many species of British wildlife are legally protected or are afforded protection from the potentially harmful effects of some development through the planning system. The following section provides a brief overview of the protection afforded to species commonly encountered during development.

4.1 Birds

All wild birds are protected against killing or injury under the WCA 1981 (as amended). This protection extends to bird's nests during the breeding season, which makes it an offence to:

- Kill, injure or take any wild bird (with certain exceptions for recognised game or pest species)
- Take, damage or destroy the nests of any wild bird while it is in use or being built
- Take or destroy the egg of any wild bird

Birds that are listed on Schedule 1 of the Act receive additional protection against intentional or reckless disturbance during the breeding season. This makes it an offence to disturb these species at or near to their nesting site.

4.2 European Protected Species

Several species are identified as European Protected Species (EPS) under the Conservation of Habitats and Species Regulations 2017. A full list of EPS is provided in Schedule 2 of the Regulations but it includes all UK bat species, otter and great crested newts.

In summary, this legislation makes it an offence to:

- Intentionally/deliberately kill, disturb, injure or capture the species
- Intentionally or recklessly damage, destroy or obstruct access to any breeding site or resting place.
- Possess or control any live or dead specimen or anything derived from a European Protected Species.

If an activity is likely to result in any of the above offences, derogation from the legal protection can, under certain restricted circumstances, be issued in the form of a European Protected Species licence.

EPS licences will only be issued if the following if the application complies with the following tests:

- The consented operation must be for "preserving public health or public safety or other imperative reasons of overriding public interest including those of a social or economic nature and beneficial consequences of primary importance for the environment";
- There must be "no satisfactory alternative"; and
- The action authorised "will not be detrimental to the maintenance of the population of the species concerned at a favourable conservation status in their natural range"

4.3 Protected Animals

Some British animals receive protection under the Wildlife and Countryside Act (WCA) 1981 (as amended) with species listed on Schedule 5 afforded special protection. For most Schedule 5 species, the Act makes it an offence to intentionally kill, injure, or take, possess, or trade in the species and prohibits interference with places used for shelter or protection, or intentionally disturbing animals occupying such places.

4.3.1 Reptiles

Common lizard, slow worm, grass snake and adder are protected only from unlawful killing under the Wildlife and Countryside Act 1981 (as amended). The rarer reptiles, including smooth snake and sand lizard are fully protected and any works affecting them can only be carried out if a Natural England licence has been issued.

4.3.2 Badgers

Badgers are protected under the Protection of Badgers Act 1992. It is illegal to:

- Kill, injure, take, possess of cruelly ill-treat a badger or to attempt to do so;
- Interfere with badger sett by damaging or destroying it;
- Obstruct access to or any entrance of a badger sett;
- Disturb a badger when it is occupying a sett

A badger sett is *'any structure or place that displays signs indicating current use by a badger. Natural England, the Government's statutory nature conservation body, classifies a sett as active if it has been occupied within the last 12 months'.*
Operations that might cause disturbance of an active sett entrance can be carried out under licence from Natural England.

4.4 Planning Legislation as it Relates to Protected Species

For activities requiring planning permission, the presence of protected species, such as those listed above, is a material consideration which must be fully considered by the Local Authority when granting planning permission. Local Authorities have been issued with ODPM Circular 06/2005 Biodiversity and Geological Conservation – Statutory Obligations and their Impact within the Planning System, which provides further guidance on the application of the law as it relates to planning and nature conservation in England. Of particular note is the statement in Part IV Conservation of Species Protected by Law para 93:

'It is essential that the presence or otherwise of protected species, and the extent that they may be affected by the development, is established before the planning permission is granted, otherwise all relevant material considerations may not have been addressed in making a decision'.

5.0 Trees and Hedgerows

5.1 Hedgerow Regulations (1997)

The Hedgerow Regulations gives local planning authorities (LPA) the right to designate 'important hedgerows' provided they meet certain specified criteria. Removal of designated 'important hedgerows' is prohibited under the Act. The status of hedgerows within the site under these regulations has not been checked as part of this survey, but can be either done directly by the land owners with the LPA or by PAEL on request.

5.2 The Town and Country Planning (Tree Preservation) (England) Regulations 2012

Local planning authorities can place Tree Preservation Orders on trees and tree groups of high landscape and amenity value, which places restrictions upon tree works that an owner can legally undertake, including tree felling. The status of trees within the site under these regulations has not been checked as part of this survey, but can be either done directly by the land owners with the LPA or by PAEL on request.

Appendix 2: Ecological Evaluation and Impact Assessment Criteria

Table A2.1 Criteria used to Evaluate Biodiversity Features

Level of Value	Example of Definitions
International	An internationally important site e.g. Special Protection Area (SPA), Special Area of Conservation (SAC) or RAMSAR. A regularly occurring population of an internationally important species (listed on Annex IV of the Habitats Directive).
National (UK)	A nationally designated site e.g. a Site of Special Scientific Interest (SSSI) or a site considered worthy of such a designation. A viable area of a habitat type listed in Annex 1 of the Habitats Directive or of smaller areas of such habitat which are essential to maintain the viability of a larger site. Any regularly occurring population of a nationally important species, e.g. listed on Schedules 5 & 8 of the Wildlife and Countryside Act (1981). A feature identified as a priority in the UKBAP.
Regional (North-east England)	Areas of internationally or nationally important habitats which are degraded but are considered readily restored. High quality, viable areas of key habitat identified in the local BAP. Species occurring regularly in regionally important numbers (<1% of the regional population).
County	Viable areas of key/priority habitat identified in the LBAP, or smaller areas of such habitat which are essential to maintain the viability of a larger whole. A site designated as a Local Nature Reserve (LNR) or Local Wildlife Sites (LWS). A regularly occurring, locally significant number of nationally important species.
Local	A good example of a common or widespread habitat in the local area. Nationally important species which are present infrequently or in low numbers.
Within site	Areas of heavily modified or managed vegetation of low species diversity or low value as habitat to species of nature conservation interest. Common or widespread species

Table A2.2 Criteria used to describe the Sensitivity of the Receptor

Sensitivity	Criteria used to assess Sensitivity of the Ecological Receptor
High	The receptor has very little ability to absorb the proposed development impact change without fundamentally altering its present character
Moderate	The receptor has moderate capacity to absorb the proposed development impact without fundamentally altering its present character
Low	The receptor has some capacity to absorb the proposed development impact without fundamentally altering its present character

Table A2.3 Criteria used to describe Magnitude of Impact on Ecological Receptors

Magnitude	Criteria used to assess Magnitude of Impact
Substantial	Total loss or major alternation to key elements of the baseline conditions such that the feature is fundamentally changed
Moderate	Loss or alternation to key element of the baseline condition such that the feature is materially changed
Minor	A minor shift away from the baseline condition of the feature. The change will be discernible but will not materially change the conservation status of the feature.
Negligible	Very little change from the baseline condition.

Table A2.4 Matrix used to Define Significance of Effect on Ecological Receptor

Magnitude	Sensitivity		
	High	Moderate	Low
Substantial	Substantial (adverse/beneficial)	Substantial - moderate (adverse/beneficial)	Moderate – minor (adverse/beneficial)
Moderate	Substantial - moderate (adverse/beneficial)	Moderate – minor (adverse/beneficial)	Minor (adverse/beneficial)
Minor	Moderate – minor (adverse/beneficial)	Minor (adverse/beneficial)	Minor - negligible
Negligible	Negligible	Negligible	Negligible

Appendix 3: ERIC Data (protected and priority species within km of NZ284582)

Latin Name	Common Name	Abundances	Location Name	Date	Grid Reference
Bufo	Common Toad		Dunkirk Farm	1986	NZ278576
Bufo bufo	Common Toad		Gateshead, Tyne & Wear	21/04/2012	NZ284571
Bufo bufo	Common Toad		Gateshead, Tyne & Wear	01/05/2012	NZ284571
Bufo bufo	Common Toad		Gateshead, Tyne & Wear	25/05/2012	NZ284571
Bufo bufo	Common Toad		Gateshead, Tyne & Wear	27/03/2012	NZ284571
Lissotriton helveticus	Palmate Newt		Dunkirk Farm	1986	NZ278576
Lissotriton helveticus	Palmate Newt		Gateshead, Tyne & Wear	21/04/2012	NZ284571
Lissotriton helveticus	Palmate Newt		Gateshead, Tyne & Wear	01/05/2012	NZ284571
Lissotriton helveticus	Palmate Newt		Gateshead, Tyne & Wear	25/05/2012	NZ284571
Lissotriton helveticus	Palmate Newt		Gateshead, Tyne & Wear	27/03/2012	NZ284571
Lissotriton vulgaris	Smooth Newt		Dunkirk Farm	1986	NZ278576
Lissotriton vulgaris	Smooth Newt		Gateshead, Tyne & Wear	21/04/2012	NZ284571
Lissotriton vulgaris	Smooth Newt		Gateshead, Tyne & Wear	01/05/2012	NZ284571
Lissotriton vulgaris	Smooth Newt		Gateshead, Tyne & Wear	25/05/2012	NZ284571
Lissotriton vulgaris	Smooth Newt		Gateshead, Tyne & Wear	27/03/2012	NZ284571
Rana temporaria	Common Frog		Dunkirk Farm	1986	NZ278576
Triturus cristatus	Great Crested Newt	500+ Count	Sunderland	04/07/2012	NZ281581
Triturus cristatus	Great Crested Newt			2015	NZ2858
Triturus cristatus	Great Crested Newt	4 Count		29/04/2015	NZ278586
Triturus cristatus	Great Crested Newt	9 Count		13/04/2015	NZ281582
Triturus cristatus	Great Crested Newt	2 Count		28/05/2015	NZ281582
Triturus cristatus	Great Crested Newt		Springwell (south pond)	2004	NZ281582
Accipiter nisus	Sparrowhawk	1 Count	South Leam Farm Gateshead	14/12/2010	NZ2959
Alauda arvensis	Skylark		Sheddons Hill	08/08/2007	NZ282574
Tyto alba	Barn Owl	1 Count	South Leam Farm Gateshead	14/12/2010	NZ2959
Calluna vulgaris	Heather		Sheddons Hill	08/08/2007	NZ282574
Campanula rotundifolia	Harebell		Sheddons Hill	08/08/2007	NZ282574
Dactylorhiza fuchsii	Common Spotted-orchid		Donwell	18/01/1992	NZ2957
Hyacinthoides non-	Bluebell		Donwell	11/05/1992	NZ2957

scripta					
Nardus stricta	Mat-grass		Sheddons Hill	08/08/2007	NZ282574
Potentilla erecta	Tormentil		Sheddons Hill	08/08/2007	NZ282574
Ranunculus flammula	Lesser Spearwort		Sheddons Hill	08/08/2007	NZ282574
Solidago virgaurea	Goldenrod		Sheddons Hill	08/08/2007	NZ282574
Coenonympha pamphilus	Small Heath	2 Count	Springwell Pond	15/07/2002	NZ2858
Coenonympha pamphilus	Small Heath	7 Count	Springwell Pond	01/07/2001	NZ2858
Coenonympha pamphilus	Small Heath	2 Count	Springwell Pond	28/07/2001	NZ2858
Coenonympha pamphilus	Small Heath	3 Count	Springwell Pond	05/08/2001	NZ2858
Coenonympha pamphilus	Small Heath	6 Count	Springwell	10/07/2005	NZ2858
Coenonympha pamphilus	Small Heath	2 Count	Wrekenton-Bowes Railway	09/07/2007	NZ280575
Coenonympha pamphilus	Small Heath	1 Count	Eighton Banks	22/07/2008	NZ278578
Coenonympha pamphilus	Small Heath	1 Count	Springwell Bowes Tip	16/07/2009	NZ2859
Lasiommata megera	Wall	2 Count	Springwell	25/08/2000	NZ282582
Lasiommata megera	Wall	4 Count	Washington Springwell Pond	05/09/2000	NZ282582
Lasiommata megera	Wall	9 Count	Springwell Pond	28/08/2001	NZ2858
Lasiommata megera	Wall	5 Count	Springwell Foxys Pond	28/08/2001	NZ277576
Lasiommata megera	Wall	1 Count	Springwell	08/09/2001	NZ287587
Lasiommata megera	Wall	11 Count	Eighton Banks (Foxy'S Pond)	18/08/2002	NZ277576
Lasiommata megera	Wall	5 Count	Springwell (Sheddon'S Hill)	05/08/2002	NZ2857
Lasiommata megera	Wall	3 Count	Springwell Pond	18/08/2002	NZ2858
Lasiommata megera	Wall	2 Count	Wrekenton Old Railway Line	10/06/2006	NZ2857
Lasiommata megera	Wall	1 Count	Springwell Ponds, Near Washington	03/09/2004	NZ281582
Lasiommata megera	Wall	2 Count	Wrekenton Bowes Railway	03/06/2007	NZ280575
Scotopteryx chenopodiata	Shaded Broad-bar	1 Count	Springwell Pond	21/07/2002	NZ282582
Cladonia	Cup Lichen		Sheddons Hill	08/08/2007	NZ282574

Sphagnum fallax	Flat-topped Bog-moss		Old Bowes Railway	01/11/2010	NZ281582
Arvicola amphibius	European Water Vole		River Don at East House Railway	June 2007 - September 2007	NZ2959
Arvicola amphibius	European Water Vole		River Don at East House Railway	01/06/2013 - 31/08/2013	NZ2959
Arvicola amphibius	European Water Vole		Springwell Pond at Thompsons of Prudhoe	01/07/2001	NZ2813558235
Arvicola amphibius	European Water Vole		Springwell Pond at Thompsons of Prudhoe	01/07/2001	NZ2813558235
Arvicola amphibius	European Water Vole		NZ283587	28/08/2007	NZ2835058750
Arvicola amphibius	European Water Vole		NZ281582	28/08/2007	NZ2815058250
Arvicola amphibius	European Water Vole		NZ2858	18/06/2009	NZ2850058500
Arvicola amphibius	European Water Vole		Dunkirk	19/07/2006	NZ278575
Arvicola amphibius	European Water Vole		Springwell Quarries	21/07/2006	NZ282587
Arvicola amphibius	European Water Vole		Springwell Quarry	12/08/2009	NZ282587
Arvicola amphibius	European Water Vole		Springwell Pond 2	28/08/2007	NZ2810258229
Arvicola amphibius	European Water Vole		NZ25NE Pond at Thompsons of Prudhoe	01/07/2001	NZ281582
Arvicola amphibius	European Water Vole		Springwell Pond 1	28/08/2007	NZ2830458729
Capreolus capreolus	Roe Deer	1 Count		24/07/2009	NZ2786758029
Erinaceus europaeus	West European Hedgehog	1 Count of Several	Springwell	13/07/2010	NZ2958
Erinaceus europaeus	West European Hedgehog		Albany Washington	27/06/2011	NZ2957
Erinaceus europaeus	West European Hedgehog		Washington	05/07/2012	NZ2958
Erinaceus europaeus	West European Hedgehog		Washington	06/10/2012	NZ2958
Erinaceus europaeus	West European Hedgehog	2 Adult 1 Count of Juvenile		2006	NZ2859
Erinaceus europaeus	West European Hedgehog			2006	NZ290585
Sciurus carolinensis	Eastern Grey Squirrel		A194	10/08/2006	NZ2959
Sciurus vulgaris	Eurasian Red Squirrel	1 Count		23/04/2009	NZ289581
Vespertilionidae	Bats	100 + Count of alive	Wrekenton, Gateshead	31/12/2012	NZ2758

Appendix 3

Land North of Mount Lane, Springwell Village

Preliminary Transport Assessment

A090892

Hellens Group Limited
16 March 2018
Prepared on behalf of WYG Group Limited.

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1.0 Introduction

1.1 Commission

WYG Group Limited ("WYG") has been commissioned by Hellens Group Limited ("the developer") to provide highways and transport advice in relation to the promotion of land to the north of Mount Lane, Springwell Village ("the site") for residential development.

The site has been submitted to Sunderland City Council (SCC) for allocation as housing within their Draft Housing Release Sites, which will form part of the emerging Sunderland Local Plan and its accompanying evidence base.

1.2 The Site and Surrounding Area

The site is located on the western edge of the existing residential area of Springwell Village. The site lies on elevated farmland to the north of Mount Lane, within close proximity of the centre of Springwell Village (which includes shops and a primary school) and with good access to public transport services. The location of the site is shown on Figure 1.

The site, which is the land edged red on the site location plan, occupies approximately 25 acres and is irregular in shape. The site is bounded by:

- The residential area of Springwell Village to the east;
- Mount Lane to the south, with Mount Lodge and arable land beyond;
- Stables to the southwest; and
- Bowes Railway Scheduled Ancient Monument to the north and northwest.

Vehicular access to the site is currently restricted to gated field access points from Mount Lane. A public footpath runs across the northern section of the site between Wordsworth Crescent and Galloping Green Road.

1.3 The Development Proposal

The site is being promoted for allocation as housing. It is anticipated that approximately 250 dwellings can be delivered on the site, comprising a mix of detached and semi-detached properties, including 3, 4 and 5 bed family properties.

The land edged blue on the site location plan is to be dedicated to Northumbrian Water Limited (NWL) to provide a covered reservoir which will store water to ultimately serve 55,000 households on Wearside.

1.4 Purpose of this Report

This report has been commissioned by the developer to help appraise and better understand the effects of the development proposal from a highways and transport perspective. The report is to be submitted to SCC to inform the allocation of the site for housing within their Draft Housing Release Sites.

The purpose of this report is to provide sufficient information on highways and transport matters to allow the identification of any issues or infrastructure requirements that may require further assessment as part of a planning application.

Included in this report is an overview of the relevant national and local planning policies, a description of how the proposed development can be safely and suitably accessed by the main modes of transport, an examination of the level of accessibility of the proposed development by the main modes of sustainable travel, a forecast of the traffic flows likely to be generated by the proposed development, and a preliminary assessment of the likely traffic impact of the proposed development on the operation of the local road network.

In preparing this report, full consideration has been given to the national planning policy contained within the National Planning Policy Framework[1] (NPPF) and Planning Practice Guidance[2] (PPG). Due consideration has also been given to the relevant local policy published by SCC, including their Draft Core Strategy and Development Plan[3] (DCSDP), and the latest guidance set out for Highways England to follow, specifically, Circular 02/2013[4].

1.5 Structure of this Report

This report is structured as follows:

- Chapter 2 identifies national and local planning policy that is relevant to the proposed development from a highways and transport perspective.

[1] *National Planning Policy Framework,* Department of Communities and Local Government, 2012.
[2] *Planning Practice Guidance*, Department of Communities and Local Government, 2014.
[3] *Draft Core Strategy and Development Plan 2015-2033*, Sunderland City Council, 2017.
[4] *Circular 02/2013: The Strategic Road Network and the Delivery of Sustainable Development,* Department for Transport, 2013.

- Chapter 3 presents an outline transport strategy to demonstrate how the proposed development can be safely and suitably accessed by the main modes of transport.
- Chapter 4 examines the level of accessibility of the proposed development by the main modes of sustainable travel.
- Chapter 5 sets out an estimate of the traffic flows likely to be associated with the proposed development during the weekday AM and PM peak hours.
- Chapter 6 considers the likely traffic impact of the proposed development on the operation of the local road network and the requirement for any mitigation measures.
- Chapter 7 presents model results from an operational assessment of the A194(M) / A182 / B1288 Roundabout.
- Chapter 8 summarises and concludes the outcomes of the report.

2.0 Transport and Planning Policy

2.1 Introduction

This Chapter identifies national and local planning policy that is relevant to the proposed development from a highways and transport perspective.

2.2 National Policy

2.2.1 National Planning Policy Framework

The NPPF was published by the Department of Communities and Local Government (DCLG) on 27 March 2012. The NPPF sets out how the planning system will contribute to achieving sustainable development. In effect, this means planning is required to perform the following three specific roles:

- An economic role, contributing to building a strong, responsive and competitive economy.
- A social role, supporting strong, vibrant and healthy communities.
- An environmental role, protecting and enhancing the natural, built and historic environment.

The central tenet of the NPPF is the presumption in favour of sustainable development. This effectively means that development proposals that accord with the development plan should be approved without delay. Where the development plan is out-of-date or absent, proposals should be approved unless the adverse impacts would significantly and demonstrably outweigh the benefits when assessed against the NPPF, or specific policies in the NPPF indicate development should be restricted (for example, if the site is subject to certain environmental designations).

The NPPF sets out twelve core land-use planning principles that should be taken into account when making planning decisions. One of the principles states that planning should actively manage patterns of growth to make fullest possible use of public transport, walking and cycling, and focus significant development in locations which are or can be made sustainable.

Paragraph 32 of the NPPF states that all developments that generate significant amounts of movement should be supported by a Transport Statement or Transport Assessment. Plans and decisions should take account of whether:

- The opportunities for sustainable transport modes have been taken up depending on the nature and location of the site, to reduce the need for major transport infrastructure;
- Safe and suitable access to the site can be achieved for all people; and
- Improvements can be undertaken within the transport network that cost effectively limit the significant impacts of the development. Development should only be prevented or refused on transport grounds where the residual cumulative impacts of development are severe.

Paragraph 34 of the NPPF states that:

> *"Plans and decisions should ensure developments that generate significant movement are located where the need to travel will be minimised and the use of sustainable transport modes can be maximised. However this needs to take account of policies set out elsewhere in this Framework, particularly in rural areas."*

Furthermore, Paragraph 35 of the NPPF states that developments should be located and designed where practical to:

- Accommodate the efficient delivery of goods and supplies;
- Give priority to pedestrian and cycle movements, and have access to high quality public transport facilities;
- Create safe and secure layouts which minimise conflicts between traffic and cyclists or pedestrians, avoiding street clutter and where appropriate establishing homes zones;
- Incorporate facilities for charging plug-in and other ultra-low emission vehicles; and
- Consider the needs of people with disabilities by all modes of transport.

2.2.2 Planning Practice Guidance

The PPG was launched by the DCLG on 6 March 2014. It brings together many areas of English planning guidance into a new stream-lined format, which is linked to the NPPF. The PPG replaces previous planning practice guidance documents. The guidance is a key material consideration in the decision-making process, set within the overarching NPPF.

The PPG provides advice on when Transport Assessments, Transport Statements and Travel Plans are required, and what they should contain. Paragraph 002 (Reference ID: 42-002-20140306) states that:

> *"Travel Plans, Transport Assessments and Statements are all ways of assessing and mitigating the negative transport impacts of development in order to promote sustainable development. They are required for all developments which generate significant amounts of movements."*

Paragraph 005 (Reference ID: 42-005-20140306) goes on to explain that the primary purpose of a Travel Plan is to identify opportunities for the effective promotion and delivery of sustainable transport initiatives (eg walking, cycling, public transport and tele-commuting), in connection with both proposed and existing developments and through this to thereby reduce the demand for travel by less sustainable modes.

Transport Assessments and Transport Statements primarily focus on evaluating the potential transport impacts of a development proposal. The Transport Assessment or Transport Statement may propose mitigation measures where these are necessary to avoid unacceptable or "severe" impacts, which may be a reason for refusal, in accordance with the NPPF.

2.2.3 Circular 02/2013: The Strategic Road Network and the Delivery of Sustainable Development

Circular 02/2013 sets out the way in which Highways England will engage with communities and the development industry to deliver sustainable development and, thus, economic growth, whilst safeguarding the primary function and purpose of the Strategic Road Network. The Circular reinforces Highways England's role as a delivery partner to promote sustainable economic growth.

In examining development proposals, the Circular sets out how Highways England will seek to apply the following:

- Assessment of development impact.
- Travel Plans.
- Demand management.
- Capacity enhancements.

Paragraph 9 of the Circular states that:

> *"Development proposals are likely to be acceptable if they can be accommodated within the existing capacity of a section (link or junction) of the strategic road network, or they do not increase demand for use of a section that is already operating at over-capacity levels, taking account of any travel plan, traffic management and/or capacity enhancement measures that may be agreed. However, development should only be prevented or refused on transport grounds where the residual cumulative impacts of development are severe."*

The Strategic Road Network: Planning for the Future[5] was published by Highways England in September 2015 and provides additional information and clarification to Circular 02/2013 in respect of the assessment of the impacts of development on the Strategic Road Network.

2.3 Local Policy

2.3.1 Introduction

In respect of the site, the current statutory development plan comprises the Unitary Development Plan[6] (UDP) (adopted in 1998) and the UDP Alteration No. 2[7] (adopted in 2007). The policies of the UDP and Alteration No.2 were "saved" in 2009.

Upon adoption, the emerging Sunderland Local Plan will replace all of the current documents which comprise the statutory development plan.

2.3.2 Draft Core Strategy and Development Plan

The DCSDP has been prepared for public consultation as part of the emerging Sunderland Local Plan. It sets out an overarching strategy for future change and growth in the city and includes development policies and site allocations, land use designations and development management policies. The Core Strategy and Development Plan (CSDP) will, once it is adopted, become part of the city's statutory planning framework; guiding decisions on all development and regeneration activity over the period to 2033.

[5] *The Strategic Road Network: Planning for the Future*, Highways England, 2015.
[6] *City of Sunderland Unitary Development Plan*, Sunderland City Council, 1998.
[7] *UDP Alteration No. 2 (Central Sunderland)*, Sunderland City Council, 2007.

Policy SS2 ("Principles of sustainable development") of the DCSDP states that proposals for development will be considered favourably where, amongst other things, it can be demonstrated that they:

- Must be designed to a high standard, are accessible by all and create safe places; and
- Make best use of existing facilities and infrastructure, particularly in encouraging accessibility by walking, cycling and public transport, whilst making appropriate provision for new or additional infrastructure requirements.

Policy CC1 ("Sustainable travel") of the DCSDP states that the council will promote sustainable travel and seek to enhance connectivity for all users by, amongst other things, focusing development close to public transport links and enhancing opportunities for walking and cycling.

Policy CC5 ("Local road network") of the DCSDP states that to ensure that development has no adverse impact on the Local Road Network, proposals must ensure that:

- Where a new vehicular access is accepted in principle, the number of access points will be kept to a minimum and new access points will be designed and constructed in accordance with the current highway design standards;
- They have safe and adequate means of access, egress and internal circulation/turning arrangements for all modes of transport relevant to the proposal;
- Where an existing access is to be used, substandard access will be improved and/or upgraded in accordance with the current standards for the category of road;
- They are assessed and determined against current standards for the category of road having regard to the capacity, safety and geometry of the highway network;
- They have safe and convenient access for sustainable transport modes relevant to its location; and
- They will not create a significant or severe impact with potential risk to highway users or be detrimental to the safety of the highway network.

Policy CC6 ("New development and transport") of the DCSDP states that all types of development across the city will be expected to:

- Provide safe and convenient access for all road users, in a way which would not:
  - Compromise the free flow of traffic on the public highway, pedestrians or any other transport mode, including public transport and cycling; or
  - Exacerbate traffic congestion on the existing highway network or increase the risk of accidents or endanger the safety of road users including pedestrians, cyclists, and other vulnerable road users.
- Incorporate pedestrian and cycle routes within and through the site, linking to the wider sustainable transport network;
- Submit a Transport Assessment/Transport Statement and a Travel Plan. This must demonstrate that appropriate mitigation measures can be delivered to ensure that there is no detrimental impact to the existing highway;
- Include a level of vehicle parking and cycle storage for residential and non-residential development, in accordance with the council's parking standards;
- Provide an appropriate level of electric vehicle parking and charging infrastructure to suit development requirements; and
- Safeguard the existing network of Definitive Public Rights of Way. If this cannot be accommodated then a diversion and/or alternative route shall be provided.

2.4 Summary

In this Chapter, national and local planning policy that is relevant to the proposed development from a highways and transport perspective has been identified. The remainder of this report will demonstrate how the proposed development can accord with the provisions of the NPPF and Circular 02/2013 (given the proximity of the site to the Strategic Road Network) and the draft local policies of the CSDP.

3.0 Outline Transport Strategy

3.1 Introduction

This Chapter presents an outline transport strategy to demonstrate how the proposed development can be safely and suitably accessed by the main modes of transport. The outline transport strategy is also illustrated on Figure 2.

3.2 Vehicular Access

Vehicular access to the site can be achieved, which accords with the relevant design standards and is within land under the control of the developer and/or the adopted public highway. In particular, vehicular access can be provided via a new junction on Mount Lane, along the southern boundary of the site, with an appropriate junction stagger distance to Broom Court to the east (45m) and Mount Lodge to the west (98m).

A preliminary access scheme has been prepared in accordance with the relevant design standards. The preliminary access scheme is shown on WYG Drawing A090892/C003 ("General Arrangement"). It briefly comprises the provision of a new simple priority T-junction on Mount Lane for traffic turning into and out of the site. A residential access road can be provided into the site, which meets Mount Lane at the perpendicular. The residential access road would have a minimum carriageway width of 6.7m and 10.0m kerb radii. A maximum 1 in 40 (2.5%) gradient would be provided for the initial 10m length, with a maximum 1 in 12 (8.3%) gradient thereafter. Adequate visibility splays (in excess of 2.4m by 43.0m) would be provided from the residential access road along Mount Lane in both directions.

The preliminary access scheme also demonstrates how a potential access could be provided from the residential access road to serve the land edged blue on the site location plan which is to be dedicated to NWL. It is envisaged that infrequent access would be required for a maintenance vehicle to service a potential future covered reservoir.

Swept path analysis of the preliminary access scheme has been carried out to demonstrate that an 11.2m long refuse vehicle would be able to safely and satisfactorily access and egress the site from Mount Lane. The swept path analysis is shown on WYG Drawing A090892/C003 ("Swept Path Analysis of Articulated Lorry").

The preliminary access scheme set out in this section can be built to adoptable standards and there are no land ownership or topographical constraints which would affect its delivery.

3.3 Pedestrian and Cycle Access

Safe and attractive pedestrian and cycle links can be provided between the site and the wider area, with appropriate provision for disabled people and those with restricted mobility. In particular:

- To the south of the site, the vehicular site access onto Mount Lane (as described in the previous section) can be made available for use by pedestrians and cyclists. Minimum 2.0m wide footways can be provided along both sides of the residential access road, extending along the northern side of Mount Lane, to tie into the existing provision to the east and west. This would provide direct pedestrian access from the site to the existing bus stops on Mount Lane.
- The public footpath that runs across the northern section of the site can be safeguarded, enhanced and incorporated within the site layout. To the east, this would provide a direct walking route from the site to the local services and amenities in Springwell Village. To the west, this would provide a walking route from the site to the existing bus stops on Rockcliffe Way and, onwards, to the local services and amenities in Wrekenton.

The pedestrian and cycle routes set out above can be built to adoptable standards and there are no land ownership or topographical constraints which would affect their delivery.

3.4 Public Transport Access

Delivery of the pedestrian and cycle connections set out in the previous section would ensure that convenient and safe access is provided from the site to the existing public transport services in the local vicinity.

Future residents of the proposed development would be able to gain access on foot to existing bus stops on Mount Lane, B1288 Springwell Road and Rockcliffe Way. The existing services operating from these bus stops provide a combined daytime frequency of at least every 6 minutes to Gateshead town centre and Newcastle city centre, amongst other destinations, on Mondays to Saturdays and at least every 12 minutes on Sundays.

It would not be necessary to route or divert either new or existing bus services through the site for the proposed development to be adequately served by public transport.

3.5 Summary

In this Chapter, it has been demonstrated that vehicular access to the site can be provided from Mount Lane, within land under the control of the developer and/or the adopted public highway, and which accords with the relevant design standards. Furthermore, good quality pedestrian and cycle connections can be provided between the site and the surrounding areas, with the new routes fully integrated with the existing networks.

The site is well located in relation to existing public transport services. Delivery of the new pedestrian and cycle routes set out in this Chapter would ensure that future residents of the proposed development would be able to gain access on foot to existing bus stops, which provide access to direct services to Gateshead, Newcastle and Sunderland (amongst other destinations).

Delivery of the outline transport strategy presented in this Chapter is considered to be achievable and viable. As a result, it has been demonstrated how the proposed development can be safely and suitably accessed by the main modes of transport.

4.0 Accessibility

4.1 Introduction

This Chapter examines the level of accessibility of the proposed development by the main modes of sustainable travel (eg walking, cycling and public transport) in relation to local services and amenities. The examination takes into consideration the outline transport strategy previously presented in Chapter 3 of this report.

4.2 Walking

The site is located on the western edge of the existing residential area of Springwell Village, within close proximity of the village centre. Future residents of the proposed development would therefore benefit from being located within reasonable walking distance of local services and amenities.

Table 4.1, overleaf, sets out average walking distances and times from the centre of the site to local services and amenities. Walking distances have been measured based on the shortest possible route between the centre of the site and the facility using a dedicated footway or footpath. The walking distances have been rounded to the nearest 50m. Walking times have been calculated based on an average walking speed of 4.8kph (3.0mph) and have been rounded to the nearest minute.

Table 4.1: Average Walking Distances and Times from the Centre of the Site

Category	Sub-Category	Facility	Walking Distance	Walking Time
Education	Early Years and Primary	Springwell Village Primary School	650m	8 minutes
	Early Years and Primary	Fell Dyke Community Primary School	1.8km	23 minutes
	Secondary and Further Education	Cardinal Hume Catholic School	2.3km	29 minutes
Retail	Local Convenience	Nisa Local	650m	8 minutes
	Fast-Food Takeaway	Pizza Rominos	600m	8 minutes
	Hair and Beauty	Beauty Over The Road	600m	8 minutes
	Supermarket	Farmfoods	1.7km	21 minutes
	Post Office	Wrekenton Post Office	1.7km	21 minutes
	Local Convenience	SPAR Wrekenton	1.7km	21 minutes
	Supermarket	Lidl	1.8km	23 minutes
Healthcare	GP Surgery	Wrekenton Health Centre	1.7km	21 minutes
	Optician	Wrekenton Eye Centre	1.7km	21 minutes
	Pharmacy	LloydsPharmacy	1.7km	21 minutes
	Dental Practice	Wrekenton Dental Practice	1.9km	24 minutes
Leisure	Park	Seldom Seen Park	350m	4 minutes
	Public House	The Guide Post	550m	7 minutes
	Community Centre	Springwell Village Hall	550m	7 minutes
	Public House	The Waggon Inn	650m	8 minutes
	Social Club	Springwell Social Club	700m	9 minutes

Table 4.1 demonstrates that:

- The site is well located in relation to a range of education facilities (from early years to further education). For example, the walking distance from the centre of the site to the nearest primary school is approximately 650m.
- The site is conveniently located in relation to retail facilities. For example, the walking distance from the centre of the site to the nearest convenience store is approximately 650m.

- The site is reasonably located in relation to a range of healthcare facilities. For example, within 2.0km walking distance of the centre of the site there is a GP surgery, dental practice, optician and pharmacy.
- The site is well located in relation to a range of leisure facilities. For example, within 1.0km walking distance of the centre of the site there is a park, public house, community centre and social club.

The existing pedestrian infrastructure in the vicinity of the site provides good-quality linkages between the site and the local services and amenities identified in Table 4.1. Continuous footway provision is present alongside most local roads. Clearly defined pedestrian routes provide convenient and safe access to Springwell Village and Wrekenton.

As previously set out in Chapter 3 of this report, safe and attractive pedestrian links can be provided between the site and the wider area, with appropriate provision for disabled people and those with restricted mobility. Following the provision of the new pedestrian linkages (including a new footway alongside the northern side of Mount Lane), and safeguarding the public footpath that runs across the northern section of the site, the proposed development would be permeable and well-integrated with the existing pedestrian network. The proposed development would therefore accord with Policies SS2, CC1 and CC6 of the DCSDP.

4.3 Cycling

Based on the distances given in Table 4.1, the site has been demonstrated to provide a good level of accessibility to a wide range of local services and amenities within a short bike ride (less than 10 minutes).

Table 4.2, overleaf, sets out average cycling distances and times from the centre of the site to significant education, retail, employment and leisure facilities within the wider area. Cycling distances have been rounded to the nearest 100m. Cycling times have been calculated based on an average cycling speed of 18.0kph (11.2mph) and have been rounded to the nearest minute.

Table 4.2: Average Cycling Distances and Times from the Centre of the Site

Category	Facility	Cycling Distance	Cycling Time
Education	Sunderland College Washington Campus	2.8km	9 minutes
	Oxclose Community Academy	3.6km	12 minutes
	Lord Lawson of Beamish Academy	4.0km	13 minutes
	Joseph Swan Academy	4.3km	14 minutes
Retail	Armstrong Retail Park	3.0km	10 minutes
	Galleries Shopping Centre	3.7km	12 minutes
	Peel Retail Park	5.2km	17 minutes
	Gateshead town centre	6.2km	21 minutes
Employment	Parsons Industrial Estate	2.4km	8 minutes
	Portobello Industrial Estate	3.0km	10 minutes
	Bentall Business Park	4.3km	14 minutes
	Team Valley Trading Estate	5.3km	18 minutes
Leisure	Wrekenton Library	1.8km	6 minutes
	Washington Leisure Centre	4.2km	14 minutes
	Saltwell Park	4.7km	16 minutes
	Gateshead International Stadium	6.8km	23 minutes

Table 4.2 demonstrates that Gateshead town centre can be reached within reasonable cycling distance of the site, along with a range of significant education, retail, employment and leisure facilities in the areas surrounding the site.

The Sunderland Cycling Map[8] shows that a number of roads surrounding the site are designated as advisory cycle routes (including B1288 Springwell Road, Peareth Hall Road and Galloping Green Lane). Furthermore, the Bowes Railway Path Cycle Route (Regional Cycling Route 11) passes within 200m of the western boundary of the site. From Tanfield Railway Museum in the west to Jarrow in the east, the predominately traffic-free cycle route follows the line of the historic Bowes Railway. It provides convenient access from the site to the National Cycle Network, becoming a joining route for National Cycling Routes 14 and 725.

As previously set out in Chapter 3 of this report, the proposed development can enhance opportunities for cycling by incorporating cycle routes within and through the site, linking to

[8] *Stockton Walking and Cycle Map*. Available at: http://www.tyneandwearltp.gov.uk/maps/ (Accessed 12 March 2018).

the wider sustainable transport network. The proposed development would therefore accord with Policies SS2, CC1 and CC6 of the DCSDP.

4.4 Public Transport

The site is well located in relation to existing public transport services. The closest bus stops in relation to the site are as follows:

- To the east of the site, a series of bus stops are located along B1288 Springwell Road. The bus stops provide access to the Number 23, 56, N56, X1 and X1A services. The straight-line distance from the centre of the site to the nearest bus stop is approximately 400m.
- To the southeast of the site, a bus stop is located on the northern side of Mount Lane, close to the junction with B1288 Springwell Road. The bus stop provides access to the Number 23 service. The straight-line distance from the centre of the site to the bus stop is approximately 400m.
- To the west of the site, a series of bus stops are located along Rockcliffe Way. The bus stops provide access to the Number 23, TB10 and X25 services. The straight-line distance from the centre of the site to the nearest bus stop is approximately 450m.

Table 4.3, overleaf, provides a summary of the services available from the bus stops outlined above, including details of the typical frequencies and destinations served.

Table 4.3: Bus Services, Destinations and Frequencies

Service Number	Route Description	Daytime Service Frequency		
		Monday to Friday	Saturday	Sunday
23	Washington to Barley Mow Mount Lane – Eighton Banks – Wrekenton – Birtley Crematorium – Lansbury Drive – Durham Road – Barley Mow Estate	1 per day	1 per day	No service
56	Sunderland to Newcastle Sunderland Interchange – Wheatsheaf – Southwick – Nissan Factory – Sulgrave – Concord Bus Station – Donwell – Springwell Village – Wrekenton – Queen Elizabeth Hospital – Gateshead Interchange – New Bridge Street	Every 12 minutes	Every 12 minutes	Every 20 minutes
N56	Sunderland to Newcastle Sunderland Interchange – Fawcett Street – Wheatsheaf – Southwick – Washington Retail Park – Washington Galleries Bus Station – Albany – Concord Bus Station – Donwell – High Usworth – Springwell Village – Wrekenton – Queen Elizabeth Hospital – Gateshead Interchange – New Bridge Street	No service	No service	1 per day
TB10	Fewster Square to Queen Elizabeth Hospital Fewster Square – Wrekenton – Black Lane Estate – Eighton Banks – Wrekenton – Beacon Lough Estate – Queen Elizabeth Hospital – Windy Nook – Felling Square – Windy Nook – Beacon Lough Estate – Wrekenton – Fewster Square	Every 60 minutes	Every 60 minutes	No service
X1	Easington Lane to Newcastle Easington Lane – Hetton-le-Hole Interchange – Houghton-le-Spring – Newbottle – Herrington Burn – Shiney Row – Washington Galleries Bus Station – Springwell Village – Queen Elizabeth Hospital – Gateshead Interchange – Newcastle Eldon Square	Every 12 minutes	Every 12 minutes	Every 30 minutes
X1A	Picktree Village to Newcastle Picktree Village – Washington Hospital – Rickleton – Harraton – Fatfield – Fatfield Fallowfield Way – Washington Arts Centre – Glebe – Washington Galleries Bus Station – Springwell Village – Wrekenton - Queen Elizabeth Hospital – Gateshead Interchange – Newcastle Eldon Square	2 per day	No service	No service
X25	Langley Park to Newcastle Langley Park Stringer Terrace – Witton Gilbert – Sacriston – Waldridge Park Estate – Chester-le-Street Black Horse – Chester-le-Street – Portobello Road – Eighton Banks – Wrekenton – Queen Elizabeth Hospital – Newcastle Monument – Newcastle Eldon Square	Every 30 minutes	Every 30 minutes	No service

In combination, on Monday to Saturday, the bus services set out in Table 4.3 provide the following:

- A 5-minute direct daytime service to Newcastle city centre;
- A 6-minute direct daytime service to Gateshead town centre; and
- A 12-minute direct daytime service to Sunderland city centre.

In addition to the bus services set out in Table 4.3, a number of school bus services pass within the vicinity of the site. These services are as follows:

- The Number S460 service to St Robert of Newminster Catholic School and Sixth Form College can be accessed from bus stops on B1288 Springwell Road.
- The Number S872, S873 and S874 services to Lord Lawson of Beamish Academy can be accessed from bus stops on B1288 Springwell Road, Mount Lane or Rockcliffe Way.

Following delivery of the outline transport strategy previously presented in Chapter 3 of this report, future residents of the proposed development would be able to gain access on foot to existing bus stops on Mount Lane, B1288 Springwell Road and Rockcliffe Way. The proposed development would therefore accord with Policies SS2 and CC1 of the DCSDP.

4.5 Summary

In this Chapter, it has been demonstrated that the location of the site is suitable for residential development. The site is well served by existing public transport services. This factor, in conjunction with the delivery of the measures previously set out in Chapter 3 of this report to improve pedestrian and cycle connectivity, would ensure that all future residents of the proposed development would be able to access local amenities and services by sustainable modes of travel. The use of sustainable transport modes would therefore be maximised and the need to travel to and from the site by private car would be minimised.

5.0 Development Traffic Flows

5.1 Introduction

This Chapter sets out an estimate of the traffic flows likely to be associated with the proposed development.

The traffic flows have been estimated based on a proposed development of 250 residential dwellings. The weekday AM and PM peak periods (07:00-10:00 hours and 16:00-19:00 hours) have been considered for this estimate, as these periods are likely to represent the maximum impact expected on the local road network from the proposed development, with regards to the known and anticipated peak patterns of demand for the transport system and development-generated trips.

5.2 Vehicle Trip Generation

The vehicle trip generation associated with the proposed development has been estimated using average vehicle trip rates derived from the TRICS database (v7.4.4), following interrogation for survey sites based on the parameters set out in Table 5.1, below.

Table 5.1: TRICS Vehicle Trip Rate Calculation Selection Parameters

Land Use Category:	03 - Residential
Land Use Sub-Category:	A - Houses Privately Owned
Regions:	All Regions (excluding Greater London, Ireland and Northern Ireland)
Parameter:	Number of Dwellings
Actual Range:	81 to 491 (units:)
Range Selected by User:	75 to 500 (units:)
Date Range:	>01/01/2000
Survey Days:	Monday to Thursday
Location:	Edge of Town
Location Sub-Category:	Residential Zone
Use Class:	C3
Population within 1 mile:	<25,000
Calculation Factor:	1 Dwelling

The sites selected from TRICS have been reviewed to ensure that the trip rates are comparable to the proposed development in terms of accessibility, scale and location. The full TRICS output is attached to this report at Appendix A.

The average vehicle trip rates are set out in Table 5.2, below, for the weekday AM and PM peak periods.

Table 5.2: Average Weekday Vehicle Trip Rates

Time		Vehicle Trip Rates (Vehicle Trips per Dwelling)		
		Arrivals	Departures	Total
Weekday AM Peak Period	07:00-08:00	0.080	0.301	0.381
	08:00-09:00	0.164	0.434	0.598
	09:00-10:00	0.172	0.219	0.391
Weekday PM Peak Period	16:00-17:00	0.321	0.213	0.534
	17:00-18:00	0.401	0.232	0.633
	18:00-19:00	0.297	0.241	0.538

The contents of Table 5.2 represent the average vehicle trips rates for the proposed development. The highest hourly total values during the weekday AM and PM peak periods have been highlighted in orange. The peak hours for the proposed development on the local transport network are identified to be:

- Weekday AM peak hour: 08:00 to 09:00 hours.
- Weekday PM peak hour: 17:00 to 18:00 hours.

With regards to the weekday AM and PM peak hours identified, and considering the proposed number of dwellings, the resulting vehicle trip generation is shown in Table 5.3, below.

Table 5.3: Vehicle Trip Generation

Land Use	Units	Vehicle Trip Generation (Vehicle Trips)					
		AM Peak Hour			PM Peak Hour		
		Arr.	Dep.	Total	Arr.	Dep.	Total
Residential	250 Dwellings	41	109	150	100	58	158

5.3 Vehicle Trip Distribution

The vehicle trip distribution associated with the proposed development has been estimated based on the 2011 Census dataset, "WU03EW - Location of usual residence and place of work by method of travel to work (MSOA level)". The destination of travel to work for people who live in Sunderland 007, Sunderland 010 and Gateshead 021 middle layer super output areas (MSOAs) has been considered, as these areas collectively represent a reasonable proxy to the proposed development. Destinations have been broken down in to MSOAs for the districts of County Durham, Gateshead, Newcastle upon Tyne, South Tyneside and Sunderland; for other destinations, the local authority district has been used

The number of vehicle trips to each destination has been expressed as a percentage of the total and then assigned to routes on the highway network to give the vehicle trip distribution to and from the site. Where a choice of routes is available, the proportion of trips using each route has been split to reflect the likely preferred choice of travel time and distance during the weekday AM and PM peak hours.

The vehicle trip distribution for the proposed development is summarised in Table 5.4, overleaf, for the weekday AM and PM peak hours.

Table 5.4: Vehicle Trip Distribution

ID	Route	Vehicle Trip Distribution			
		AM Peak Hour		PM Peak Hour	
		Arr.	Dep.	Arr.	Dep.
1	Rockcliffe Way (North)	17.7%	23.9%	20.7%	17.9%
2	B1288 Springwell Road	7.1%	7.1%	7.1%	7.1%
3	Stoney Lane	3.5%	3.5%	3.5%	3.5%
4	A194(M) (North)	18.6%	18.6%	18.6%	18.6%
5	Parsons Road	0.6%	0.6%	0.6%	0.6%
6	A1290 Havannah Road	1.5%	1.5%	1.5%	1.5%
7	Armstrong Road	0.6%	0.6%	0.6%	0.6%
8	Blackfell Road	0.6%	0.6%	0.6%	0.6%
9	A1231 Sunderland Highway (East)	21.8%	21.8%	21.8%	21.8%
10	A182 Washington Highway	9.0%	9.0%	9.0%	9.0%
11	A1231 Sunderland Highway (West)	1.0%	1.0%	1.0%	1.0%
12	A194(M) (South)	8.8%	8.8%	8.8%	8.8%
13	B1288	0.0%	0.0%	0.0%	0.0%
14	Rockcliffe Way (South)	9.3%	3.0%	6.2%	9.1%
Total		100.0%	100.0%	100.0%	100.0%

The Vehicle Trip Distribution can be seen on Figure 3 and Figure 4 for the weekday AM and PM peak hour, respectively.

The primary differentiation in the vehicle trip distribution for the proposed development between the weekday AM and PM peak hours, and arrivals and departures, is the choice of routes to and from the A1. Queuing and delay on the A1231 entry to the A1 northbound, and A1231 exit from the A1 southbound, is such that alternatively routes become more attractive during certain peak times.

5.4 Development Traffic Flows

The vehicle trip generation associated with the proposed development (see Table 5.3) has been assigned to the local road network using the vehicle trip distribution set out in Table 5.4. All the vehicle trips have been assigned to arrive and depart the site from Mount Lane,

in accordance with the preliminary access scheme previously presented in Chapter 3 of this report.

The resulting Development Traffic Flows can be seen on Figure 5 and Figure 6 for the weekday AM and PM peak hour, respectively.

5.5 Summary

In this Chapter, the traffic flows likely to be associated with the proposed development have been estimated during the weekday AM and PM peak hours. The remainder of this report considers the likely impact of these traffic flows on the operation of the local road network and the requirement for any mitigation measures.

6.0 Impact on the Local Road Network

6.1 Introduction

This Chapter considers the likely traffic impact of the proposed development on the operation of the local road network and the requirement for any mitigation measures.

6.2 Development Traffic Flows

It has been previously identified in Chapter 5 of this report that the proposed development is predicted to generate 150 two-way vehicle trips during the weekday AM peak hour and 158 two-way vehicle trips during the weekday PM peak hour. Once exiting the site on to Mount Lane, the majority of the trips are predicted to head east towards B1288 Springwell Road and, onwards, to the A194(M) and A182 Washington Highway.

The Development Traffic Flows shown on Figures 5 and 6 identify that to the west of the proposed site access, the proposed development is expected to result in a maximum increase of 43 two-way vehicle trips on Mount Lane during the weekday AM and PM peak hours. To the east of the proposed site access, the proposed development is expected to result in a maximum increase of 116 two-way vehicle trips on Mount Lane during the weekday AM and PM peak hours.

A threshold of 30 two-way peak hour vehicle trips can be used as a point of reference for identifying a potential material traffic impact on the operation of the highway network. This threshold has been applied to the development traffic flows to help identify a number of junctions where the proposed development has the potential to result in a material traffic impact.

A summary of the development traffic flows at each of the identified junctions is shown in Table 6.1, overleaf, for the weekday AM and PM peak hours, along with further consideration of the potential material impact of those traffic flows.

Table 6.1: Development Traffic Flow by Junction

Junction		Dev. Traffic Flow (Two-Way Vehicle Trips)		Potential Material Traffic Impact as a result of the Proposed Development?	
Name	Type	AM Peak	PM Peak		
Mount Lane / Broom Court	Simple Priority T-Junction	109	116	**No**	Predominantly through traffic, with negligible impact on turning flows.
B1288 Springwell Road / Mount Lane	Simple Priority T-Junction	109	116	**Yes**	Potential material impact on turning flows.
B1288 / B1288 Springwell Road	Ghost Island Priority Junction	93	99	**Yes**	Potential material impact on turning flows.
A194(M) / A182 / B1288	Grade-Separated Two Bridge Roundabout	93	99	**Yes**	Potential material impact on turning flows.
A182 / A1231	Grade-Separated Two Bridge Roundabout	34	36	**No**	Minor impact on turning flows in comparison with existing flows, and given the form and capacity of the junction.
Mount Lane / Mount Road	Simple Priority T-Junction	40	43	**No**	Predominantly through traffic, with negligible impact on turning flows.
Rockcliffe Way / Mount Lane	Simple Priority T-Junction	40	43	**Yes**	Potential material impact on turning flows.

On the basis of the information presented in Table 6.1, it is considered that the proposed development has the potential to result in a material traffic impact at the following four junctions:

- B1288 Springwell Road / Mount Lane Junction.
- B1288 / B1288 Springwell Road Junction.
- A194(M) / A182 / B1288 Roundabout.
- Rockcliffe Way / Mount Lane Junction.

A preliminary assessment of the traffic impact of the proposed development at each of the above four junctions is considered in turn in the following sections.

6.3 B1288 Springwell Road / Mount Lane Junction

The B1288 Springwell Road / Mount Lane Junction is a simple priority T-junction. Within the vicinity of the junction, B1288 Springwell Road and Mount Lane are both single-carriageway roads, with one lane in either direction, subject to 30mph speed limits. Visibility along B1288 Springwell Road from Mount Lane is good in both directions.

It is predicted that the proposed development would result in a maximum increase of 109 two-way vehicle trips at the B1288 Springwell Road / Mount Lane Junction during the weekday AM and PM peak hours. Most of the vehicle trips (approximately 85%) would turn right out of, and left into, Mount Lane.

The impact of the proposed development on the operation of the B1288 Springwell Road / Mount Lane Junction would be assessed in detail at the planning application stage and the requirement for any mitigation would be identified, as necessary, to avoid an unacceptable or severe impacts. The methodology for the assessment would be discussed and agreed with SCC in the preparation of a Transport Assessment.

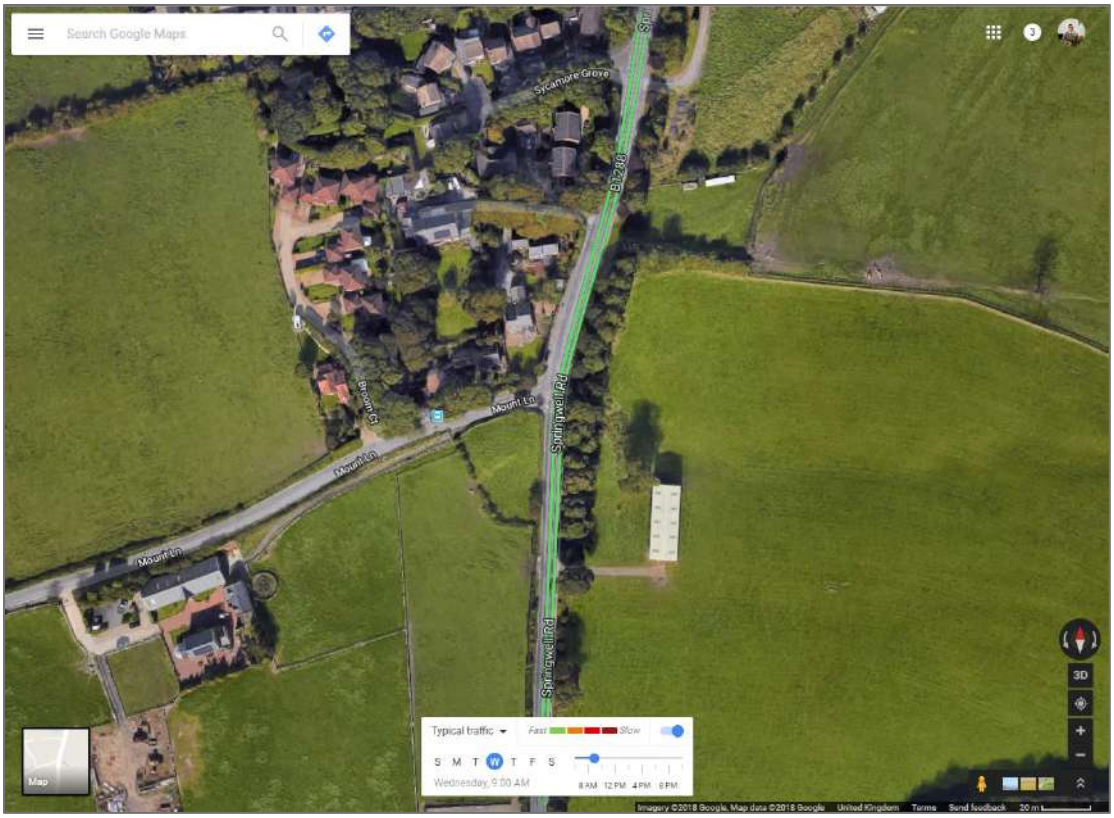
Notwithstanding the above, based on our professional experience and knowledge of the local road network, it is considered that the likely impact of the proposed development on the operation of the B1288 Springwell Road / Mount Lane Junction would not be a barrier to its delivery, given the substantial spare capacity that is observed to exist at the junction. On-site observations suggest that very little queuing and delay is experienced by traffic entering and exiting the junction at present during the weekday AM and PM hours.

For the purposes of this report, Google Traffic has been used to indicate the levels of congestion which typically occur at each of the key junctions. Google Traffic works by analysing the GPS-determined locations transmitted to Google by a large number of mobile phone users. By calculating the speed of users along a length of road, Google is able to generate a live traffic map. Google processes the incoming raw data about mobile phone device locations and then excludes anomalies such as a postal vehicle that makes frequent stops. When a threshold of users in a particular area is noted, the overlay along roads and highways on the Google map changes colour:

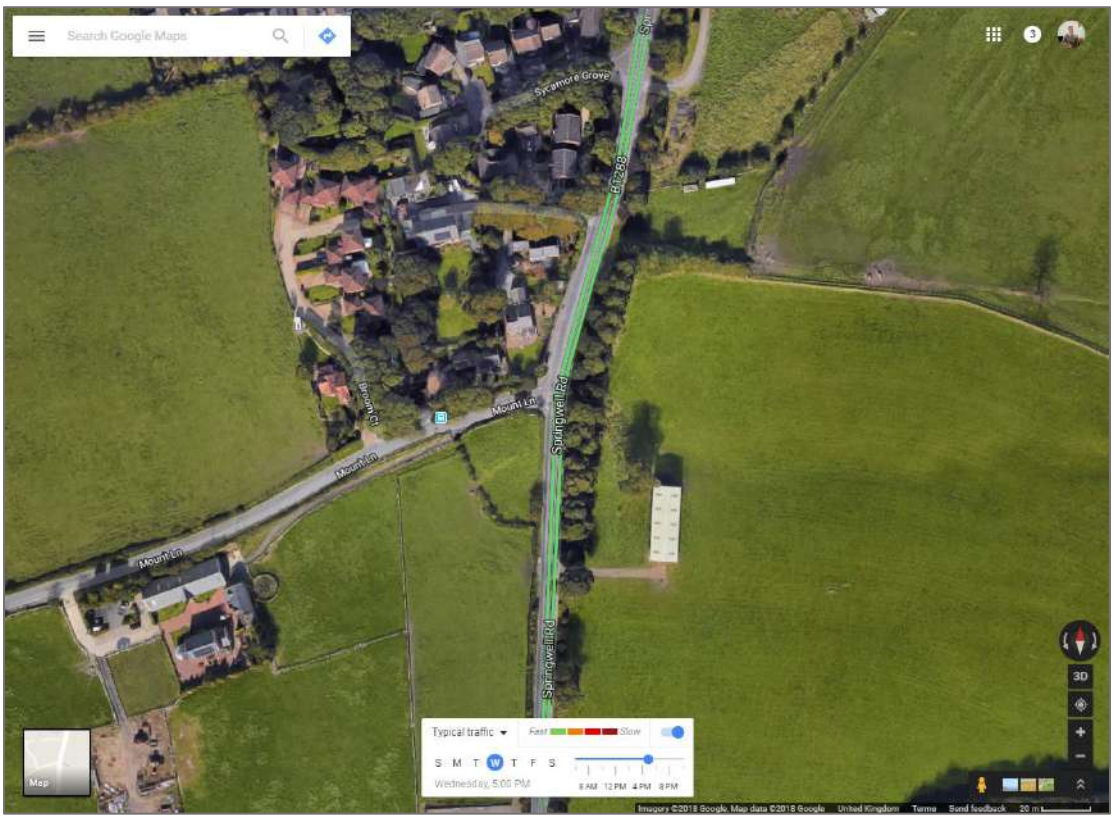
- **Green:** No traffic delays.
- **Orange:** Medium amount of traffic.
- **Red:** Traffic delays. The darker the red, the slower the speed of traffic on the road.
- **Grey:** No data available.

Screenshot 1, below, and Screenshot 2, overleaf, show typical traffic conditions at the B1288 Springwell Road / Mount Lane Junction during the weekday AM and PM peak hour, respectively. The screenshots from Google Traffic show that traffic typically passes through the junction without any material delay, thus indicating that spare capacity exists at present. This is consistent with on-site observations. It is therefore considered likely that the traffic flows associated with the proposed development would be satisfactorily accommodated within the existing form and capacity of the junction, without the requirement for any mitigation.

Screenshot 1: Google Traffic – B1288 Springwell Road / Mount Lane Junction – Weekday AM Peak Hour



Screenshot 2: Google Traffic – B1288 Springwell Road / Mount Lane Junction – Weekday PM Peak Hour



6.4 B1288 / B1288 Springwell Road Junction

The B1288 / B1288 Springwell Road Junction is a ghost island priority junction. Within the vicinity of the junction, the B1288 and B1288 Springwell Road are both single-carriageway roads, with one lane in either direction, subject to the national speed limit. The approach to the junction from B1288 Springwell Road flares to two lanes. A right-turn storage bay capable of accommodating approximately seven vehicles is provided on the B1288. Visibility along the B1288 from B1288 Springwell Road is adequate in both directions.

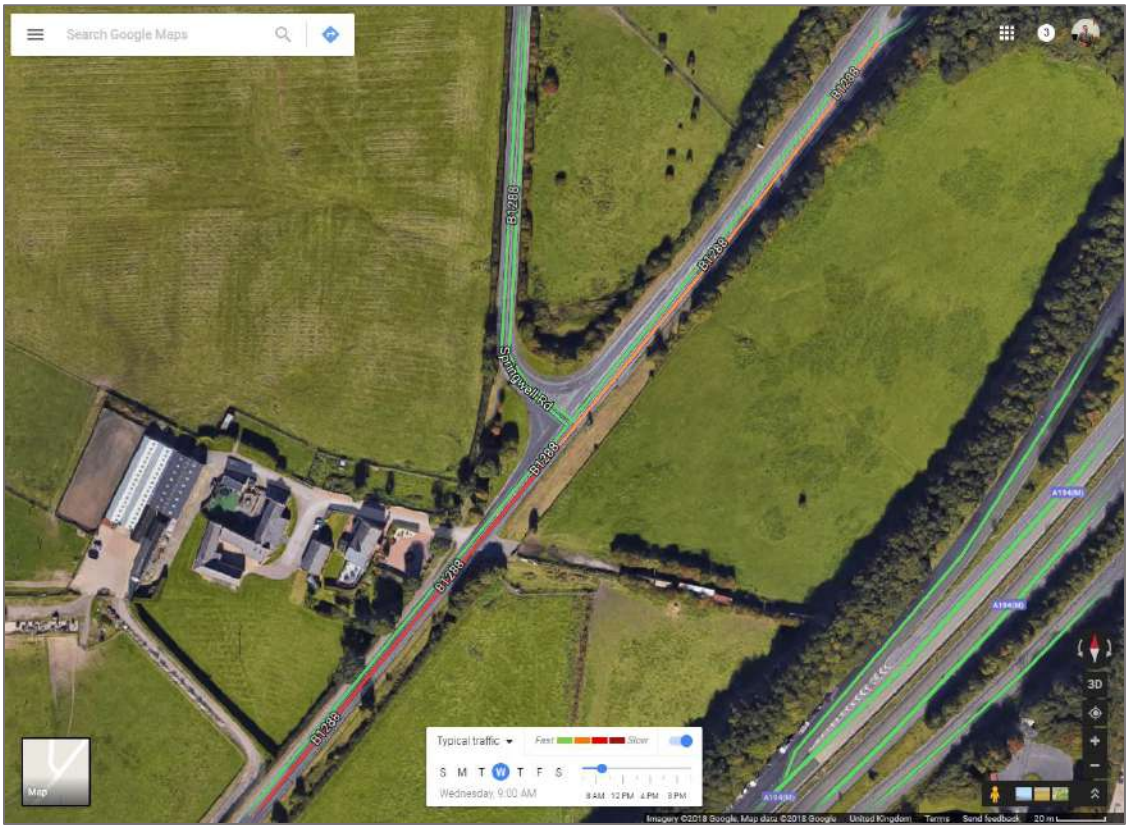
It is predicted that the proposed development would result in a maximum increase of 99 two-way vehicle trips at the B1288 / B1288 Springwell Road Junction during the weekday AM and PM peak hours. All the vehicle trips would turn left out of, and right into, B1288 Springwell Road.

The impact of the proposed development on the operation of the B1288 / B1288 Springwell Road Junction would be assessed in detail at the planning application stage and the requirement for any mitigation would be identified, as necessary, to avoid an unacceptable or severe impacts. The methodology for the assessment would be discussed and agreed with SCC in the preparation of a Transport Assessment.

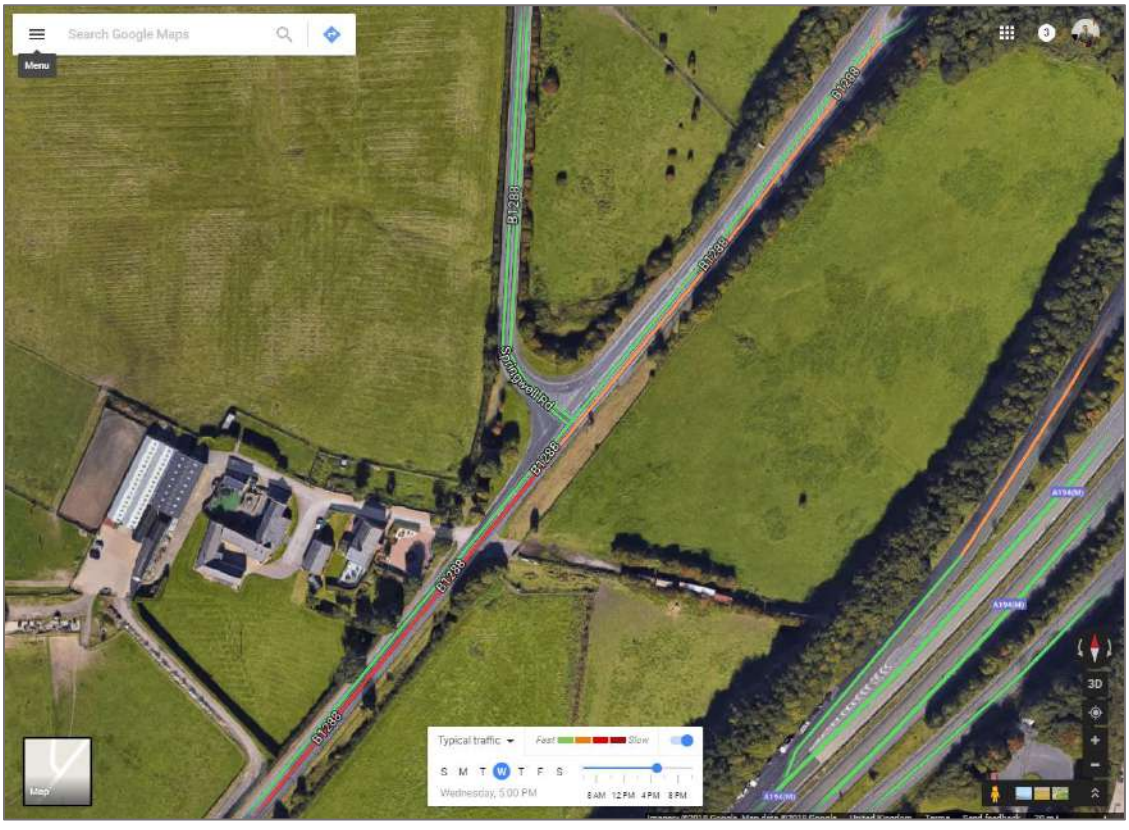
Notwithstanding this, based on our professional experience and knowledge of the local road network, it is considered that the likely impact of the proposed development on the operation of the B1288 / B1288 Springwell Road Junction would not be a barrier to its delivery, given the spare capacity that is observed to exist at the junction. On-site observations suggest that only minor queuing and delay is experienced by traffic entering and exiting the junction from B1288 Springwell Road at present during the weekday AM and PM hours. Whilst some delay is observed to be experienced by southbound traffic on the B1288, this is the result of queuing at the downstream junction with the A1231 which will not be materially affected by the proposed development. These observations are supported typical traffic conditions shown on Google Traffic.

Screenshot 3 and Screenshot 4, overleaf, show typical traffic conditions at the B1288 / B1288 Springwell Road Junction during the weekday AM and PM peak hour, respectively. The screenshots from Google Traffic show that whilst some delay is experienced by southbound traffic on the B1288, traffic typically enters and exits the junction from B1288 Springwell Road without any material delay, thus indicating that spare capacity exists at present. This is consistent with on-site observations. It is therefore considered likely that the traffic flows associated with the proposed development would be satisfactorily accommodated within the existing form and capacity of the junction, without the requirement for any mitigation.

Screenshot 3: Google Traffic – B1288 / Springwell Road Junction – Weekday AM Peak Hour



Screenshot 4: Google Traffic – B1288 / Springwell Road Junction – Weekday PM Peak Hour



6.5 A194(M) / A182 / B1288 Roundabout

The A194(M) / A182 / B1288 Roundabout is a grade-separated two bridge roundabout, with the A194(M) passing over the junction. The roundabout has four arms, with two circulating lanes. There are entry and exit slip-roads to the A194(M) northbound and southbound. All of the arms of the junction provide two lane entries and exits, with the exception of the A182 approach which has three lanes. The junction is subject to the national speed limit.

It is predicted that the proposed development would result in a maximum increase of 99 two-way vehicle trips at the A194(M) / A182 / B1288 Roundabout during the weekday AM and PM peak hours. All the vehicle trips would enter and exit the junction from the B1288. In terms of the merge and diverge facilities on the A194(M), the proposed development would result in a maximum increase of less than 30 two-way vehicle trips on each of the entry and exit slip-roads during the weekday AM and PM peak hours.

The impact of the proposed development on the operation of the B1288 / B1288 Springwell Road Junction would be assessed in detail at the planning application stage and the requirement for any mitigation would be identified, as necessary, to avoid an unacceptable or severe impacts. The methodology for the assessment would be discussed and agreed with SCC and Highways England in the preparation of a Transport Assessment.

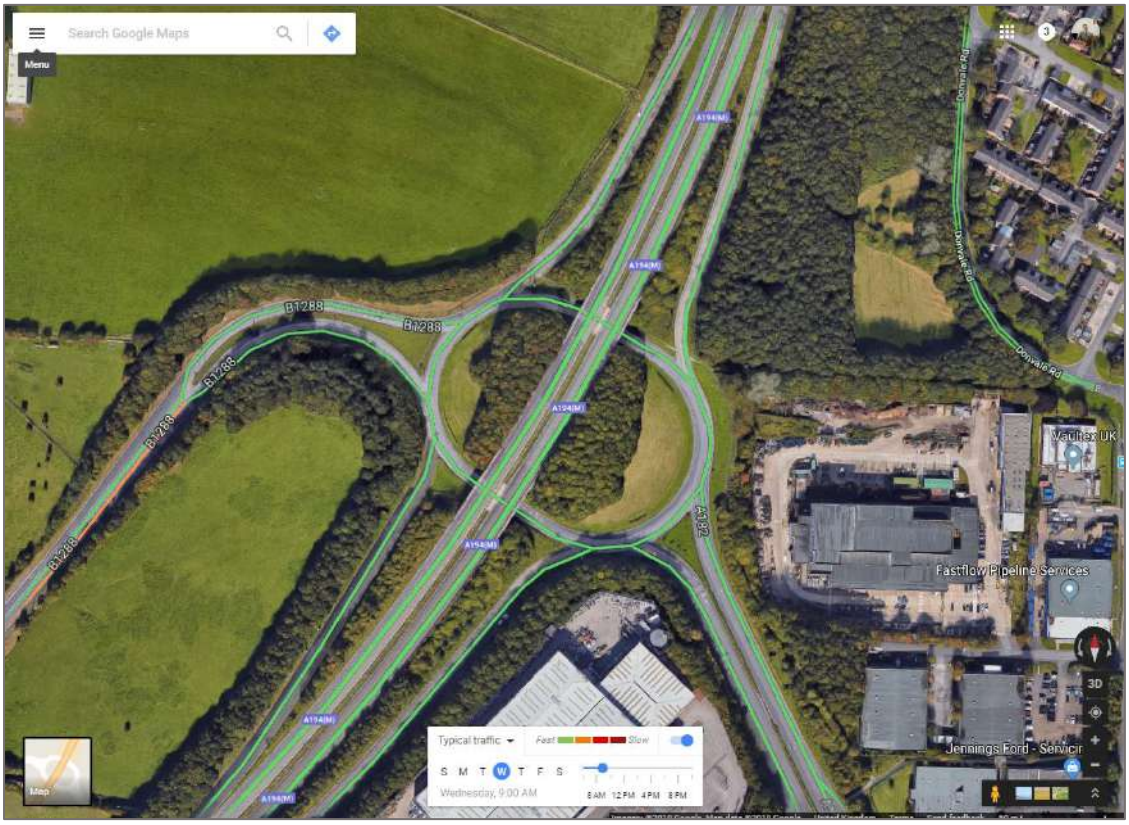
Notwithstanding the above, based on our professional experience and knowledge of the local road network, it is considered that the likely impact of the proposed development on the operation of the A194(M) / A182 / B1288 Roundabout would not be a barrier to its delivery, given the spare capacity that is observed to exist at the junction. On-site observations suggest that only minor queuing and delay is experienced by traffic entering and exiting the junction at present during the weekday AM and PM hours. These observations are supported typical traffic conditions shown on Google Traffic.

Screenshot 5 and Screenshot 6, overleaf, show typical traffic conditions at the A194(M) / A182 / B1288 Roundabout during the weekday AM and PM peak hour, respectively. The screenshots from Google Traffic show that traffic typically passes through the junction without any material delay, thus indicating that spare capacity exists at present. This is consistent with on-site observations.

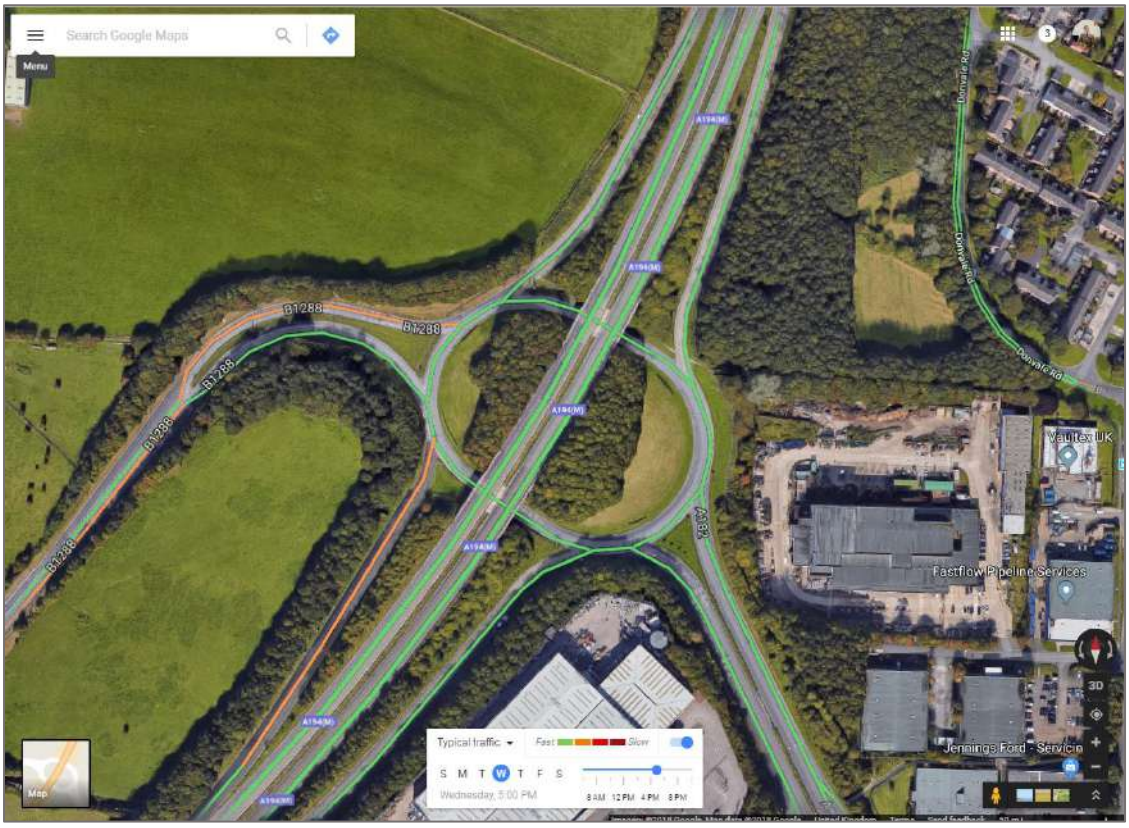
To provide further technical support to the above, a preliminary assessment of the impact of the proposed development on the operation of the A194(M) / A182 / B1288 Roundabout has been undertaken using the Junctions 9 program. The model results, which are presented in the subsequent Chapter of this report, indicate that the traffic flows associated with the

proposed development would be satisfactorily accommodated within the existing form and capacity of the junction, without the requirement for any mitigation.

Screenshot 5: Google Traffic – A194(M) / A182 / B1288 Roundabout – Weekday AM Peak Hour



Screenshot 6: Google Traffic – A194(M) / A182 / B1288 Roundabout – Weekday PM Peak Hour



6.6 Rockcliffe Way / Mount Lane Junction

The Rockcliffe Way / Mount Lane Junction is a simple priority T-junction. Within the vicinity of the junction, Rockcliffe Way and Mount Lane are both single-carriageway roads, with one lane in either direction, subject to 30mph speed limits. Visibility along Rockcliffe Way from Mount Lane is good in both directions.

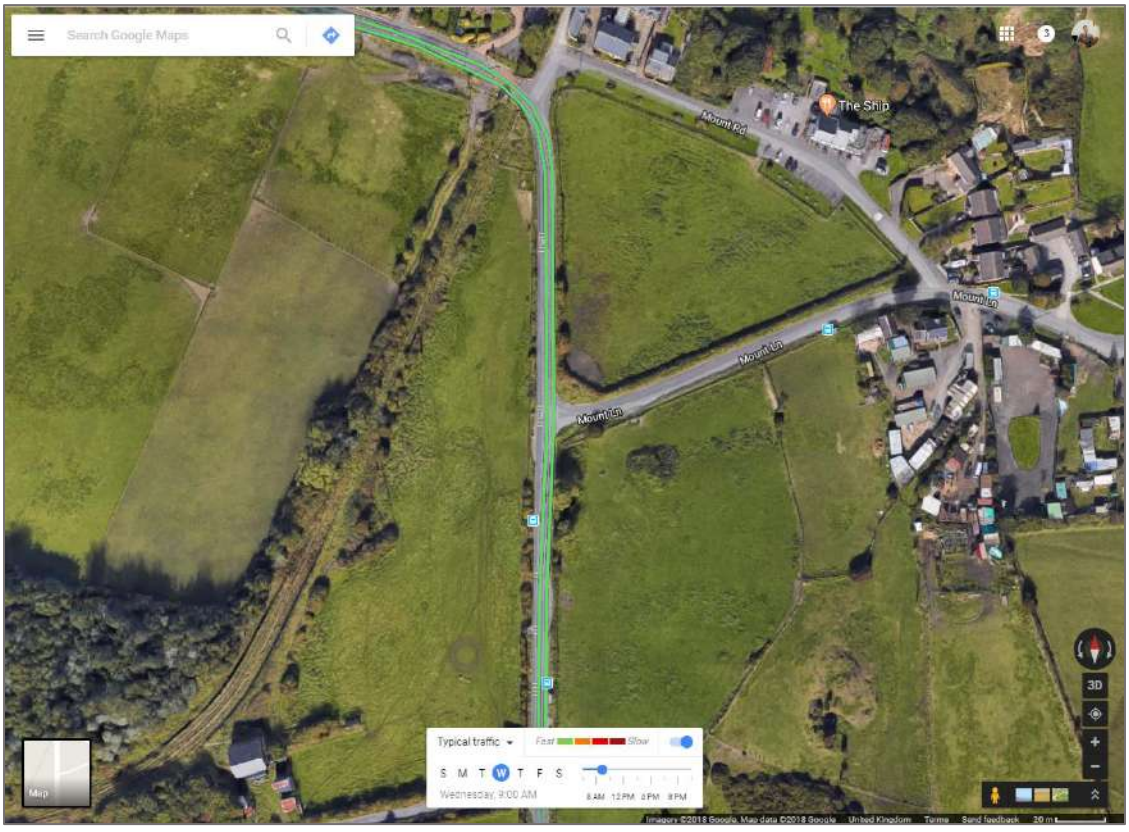
It is predicted that the proposed development would result in a maximum increase of 43 two-way vehicle trips at the Rockcliffe Way / Mount Lane Junction during the weekday AM and PM peak hours. Most of the vehicle trips (approximately 67%) would turn right out of, and left into, Mount Lane.

The impact of the proposed development on the operation of the Rockcliffe Way / Mount Lane Junction would be assessed in detail at the planning application stage and the requirement for any mitigation would be identified, as necessary, to avoid an unacceptable or severe impacts. The methodology for the assessment would be discussed and agreed with Gateshead Council in the preparation of a Transport Assessment.

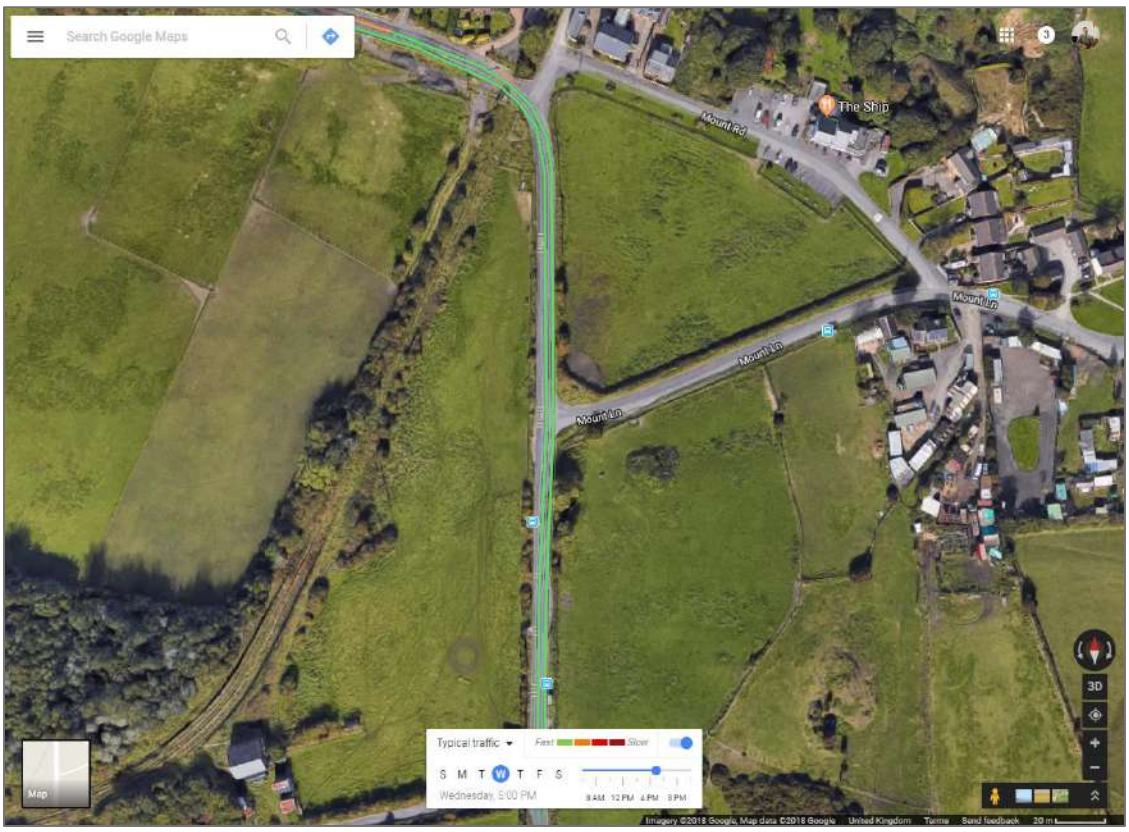
Notwithstanding this, based on our professional experience and knowledge of the local road network, it is considered that the likely impact of the proposed development on the operation of the Rockcliffe Way / Mount Lane Junction would not be a barrier to its delivery, given the spare capacity that is observed to exist at the junction. On-site observations suggest that very little queuing and delay is experienced by traffic entering and exiting the junction at present during the weekday AM and PM hours. These observations are supported typical traffic conditions shown on Google Traffic.

Screenshot 7, below, and Screenshot 8, overleaf, show typical traffic conditions at the B1288 / B1288 Springwell Road Junction during the weekday AM and PM peak hour, respectively. The screenshots from Google Traffic show that traffic typically passes through the junction without any material delay, thus indicating that spare capacity exists at present. This is consistent with on-site observations. It is therefore considered likely that the traffic flows associated with the proposed development would be satisfactorily accommodated within the existing form and capacity of the junction, without the requirement for any mitigation.

Screenshot 7: Google Traffic – Rockcliffe Way / Mount Lane Junction – Weekday AM Peak Hour



Screenshot 8: Google Traffic – Rockcliffe Way / Mount Lane Junction – Weekday PM Peak Hour



6.7 Summary

In this Chapter, it has identified that there are four junctions on the local road network where the proposed development has the potential to result in a material traffic impact. The impact of the proposed development at each of the identified junctions would be assessed in detail at the planning application stage and the requirement for any mitigation would be identified, as necessary, to avoid an unacceptable or severe impacts. The methodology for the assessments would be discussed and agreed with the relevant authorities in the preparation of a Transport Assessment.

Notwithstanding the above, based on our professional experience and knowledge of the local road network (including on-site observations and an operational assessment of the A194(M) / A182 / B1288 Roundabout), it is considered likely that the traffic flows associated with the proposed development would be satisfactorily accommodated within the existing form and capacity of each of the identified junctions, without the requirement for any mitigation. The traffic impact of the proposed development would therefore not be a barrier to its delivery and the development proposal would accord with Policies CC5 and CC6 of the DCSDP.

7.0 A194(M) / A182 / B1288 Roundabout

7.1 Introduction

This Chapter describes the approach undertaken to survey existing traffic flows at the A194(M) / A182 / B1288 Roundabout and to predict future traffic flows. The model results from an operational assessment of the A194(M) / A182 / B1288 Roundabout are then presented.

7.2 Existing and Future Traffic Flows

7.2.1 Traffic Surveys

A manual classified turning count (MCC) survey has been undertaken to record the volume and classification of existing traffic at the A194(M) / A182 / B1288 Roundabout. The MCC survey was undertaken by an independent specialist survey company on Tuesday 20th February 2018, during the weekday AM and PM peak periods (07:00 to 10:00 hours and 16:00 to 19:00 hours). There were no recorded incidents or disruptions likely to affect the results and the weather conditions were recorded as being cloudy. Data was collected in 15 minute intervals and classified to the COBA specification[9]. Video files were provided for validation purposes. A copy of the MCC survey data is available on request.

7.2.2 Analysis Periods

The analysis periods considered for the operational assessment of the A194(M) / A182 / B1288 Roundabout are the weekday AM and PM peak hours. These 'hypothetical' peak hours represent the maximum possible combination of existing and future traffic flows at the junction during the weekday AM and PM peak periods.

The traffic flows during the weekday AM and PM peak hours have been identified as follows:

- The peak hours for the existing traffic flows have been identified from the MCC survey undertaken, based on the busiest periods recorded at the junction. The weekday AM and PM peak hours have been identified to be 07:30 to 08:30 hours and 16:30 to 17:30 hours, respectively.

[9] *COBA 11 Manual, Part 4: Traffic Input to COBA*, Department for Transport, 2004.

- The future traffic flows associated with the proposed development have been considered on the basis of the weekday AM and PM peak hours which were previously identified in Chapter 5 of this report (08:00 to 09:00 hours and 17:00 to 18:00 hours).

7.2.3 Assessment Years

The following years have been considered for the operational assessment of the A194(M) / A182 / B1288 Roundabout:

- 2018 Base Year - representing the existing situation.
- 2033 Future Year – representing the end period of the DCSDP.

7.2.4 Background Traffic Growth

To robustly represent future traffic conditions at the A194(M) / A182 / B1288 Roundabout, NTM/TEMPro (TEMPro v7.2 / NTM AF15 Dataset) has been used to derive locally-adjusted traffic growth factors for the 2033 future year. The parameters which were applied are set out in Table 7.1, below.

Table 7.1: NTM/TEMPro Selection Parameters

Base Year	Future Year	Area	Area Type	Road Type
2018	2033	Sunderland	Urban	All

The resulting outputs from NTM/TEMPro are attached to this report as Appendix B and are summarised in Table 7.2, below.

Table 7.2: NTM/TEMPro Traffic Growth Factors

Base Year	Future Year	Traffic Growth Factor	
		AM Peak Hour	PM Peak Hour
2018	2033	1.1455	1.1383

7.2.5 Assessment Scenarios

Within this Chapter, a "2018 Base" scenario will be presented to accurately reflect current conditions at the A194(M) / A182 / B1288 Roundabout and to serve as a benchmark for future year assessment scenarios. The impact of the proposed development will then be considered in the context of two alternative future year scenarios ("2033 No Development" and "2033 With Development") enabling a comparative analysis to take place.

The assessment scenarios are described in detail below:

- **2018 Base** – This scenario represents the existing situation. The traffic flows have been derived from the MCC survey data, with the weekday AM and PM peak hours identified for the junction. The fully classified survey data has been converted into equivalent Passenger Car Unit (PCU) values, using Department for Transport recommended factors from TAL 1/06[10]. The 2018 Base Traffic Flows can be seen on Figure 7 and Figure 8 for the weekday AM and PM peak hour, respectively.
- **2033 No Development** – This scenario represents a future year situation without the proposed development taking place. The traffic flows have been derived by applying locally-adjusted traffic growth factors from NTM/TEMPro to the traffic flows in the 2018 Base scenario. The 2033 No Development Traffic Flows can be seen on Figure 9 and Figure 10 for the weekday AM and PM peak hour, respectively.
- **2033 With Development** – This scenario represents a future year situation with the proposed development taking place. The traffic flows have been derived by adding the traffic flows associated with the proposed development to the traffic flows in the 2033 No Development scenario. The 2033 With Development Traffic Flows can be seen on Figure 11 and Figure 12 for the weekday AM and PM peak hour, respectively.

7.3 Operational Assessment

7.3.1 2018 Base Year Operational Assessment

A Junctions 9 (v9.0.2) model has been developed in order to assess the existing operation of the A194(M) / A182 / B1288 Roundabout. The model of the existing junction layout has been developed in accordance with digital OS mapping, Google Maps data and observations made on site. The traffic demand has been assigned to routes within the model based on the "Direct" method of entry, using surveyed flows, turning proportions and HGV percentages, as derived from the MCC survey undertaken on Tuesday 20th February 2018.

Amongst other performance indicators and statistics, the Junctions 9 program calculates the maximum ratio of flow to capacity (RFC) for each arm. The software also calculates the maximum average queue length (Q) for each arm (measured in PCU) and the maximum average delay (D) experienced per PCU for each arm (measures in seconds).

[10] *Traffic Advisory Leaflet 1/06: General Principles of Traffic Control by Light Signals*, Department for Transport, 2006.

The RFC is an indicator of the likely performance of a turning movement at a junction under a given set of traffic flows. A RFC value of 1.00 is normally considered to represent the capacity threshold, although a RFC value greater than this can also be considered acceptable in certain circumstances (for instance, if the associated queue is accommodated without affecting upstream junctions). When considering the impact of a proposed development on a junction, in accord with NPPF, the most tangible indicators of severity are queuing and delay, those being what are experienced by drivers on the ground.

The 2018 base year results from the Junctions 9 model are summarised in Table 7.3, below, for the weekday AM and PM peak hours, and are presented in full at Appendix C. The summary results for each arm are the highest modelled values over all time segments.

Table 7.3: 2018 Base Year Junctions 9 (v9.0.2) Assessment – A194(M) / A182 / B1288 Roundabout

Arm	AM Peak Hour			PM Peak Hour		
	Queue	Delay	RFC	Queue	Delay	RFC
2018 Base – Existing Layout						
A194(M) Southbound Off-Slip	0.7	3.2	0.40	1.2	4.9	0.54
A182 Washington Highway	0.7	1.8	0.42	0.4	1.5	0.28
A194(M) Northbound Off-Slip	0.1	3.9	0.10	0.2	3.6	0.15
B1288	1.2	4.7	0.55	1.4	4.1	0.59

The assessment indicates that the A194(M) / A182 / B1288 Roundabout operates within practical capacity in the 2018 Base scenario. During the weekday AM and PM peak hours, for each arm, the maximum calculated RFC value is below the normal practical capacity threshold value of 1.00.

The modelled operation of the A194(M) / A182 / B1288 Roundabout (in terms of queue lengths and delays) are consistent with observations made from the video surveys undertaken and those on site. The Junctions 9 model is therefore considered to be an adequate base for the purpose of the future year operational assessment.

7.3.2 2033 Future Year Operational Assessment

An assessment of the impact of the proposed development on the 2033 future year operation of the A194(M) / A182 / B1288 Roundabout has been undertaken, using the Junctions 9 model from the 2018 base year assessment.

The 2033 future year results from the Junctions 9 model are summarised in Table 7.4, below, for the weekday AM and PM peak hours, and are presented in full at Appendix C.

Table 7.4: 2033 Future Year Junctions 9 (v9.0.2) Assessment – A194(M) / A182 / B1288 Roundabout

Arm	AM Peak Hour			PM Peak Hour		
	Queue	Delay	RFC	Queue	Delay	RFC
2033 No Development – Existing Layout						
A194(M) Southbound Off-Slip	1.0	3.8	0.48	1.9	7.0	0.66
A182 Washington Highway	1.0	2.1	0.49	0.5	1.7	0.34
A194(M) Northbound Off-Slip	0.2	4.1	0.12	0.3	4.1	0.19
B1288	2.1	6.9	0.67	2.3	5.8	0.70
2033 With Development – Existing Layout						
A194(M) Southbound Off-Slip	1.1	4.1	0.50	2.1	7.6	0.68
A182 Washington Highway	1.0	2.2	0.50	0.6	1.8	0.35
A194(M) Northbound Off-Slip	0.2	4.1	0.12	0.3	4.2	0.20
B1288	2.5	7.8	0.71	2.5	6.2	0.72

The 2033 future year operational assessment of the A194(M) / A182 / B1288 Roundabout indicates the following:

- The junction is predicted to operate within practical capacity in the 2033 No Development scenario. During the weekday AM and PM peak hours, for each arm, the maximum calculated RFC value is predicted to be below the normal practical capacity threshold value of 1.00.
- In the 2033 With Development scenario, the junction is predicted to continue to operate within practical capacity during the weekday AM and PM peak hours. For each arm, the maximum average queue length of <3PCU is predicted to be accommodated without affecting upstream junctions.
- In comparison with the 2033 With Development scenario, the inclusion of traffic flows associated with the proposed development is predicted to have no discernible impact on the future junction conditions during the weekday AM and PM peak hours. For example, for each arm, the maximum average queue length and maximum average delay is predicted to increase by <1PCU and <1 second, respectively.

7.4 Summary

In this Chapter, the model results from an operational assessment of the A194(M) / A182 / B1288 Roundabout have been presented. The results indicate that the changes in traffic flows associated with the proposed development would be satisfactorily accommodated

within the 2033 future year operation of the junction. The traffic impact of the proposed development on the operation of the A194(M) / A182 / B1288 Roundabout would therefore not be a barrier to its delivery and mitigation would not be required.

8.0 Summary and Conclusions

This report has been prepared by WYG, on behalf of the developer, to help appraise and better understand the effects of residential development on land to the north of Mount Lane, Springwell Village. The report is to be submitted to SCC to inform the allocation of the site for housing within their Draft Housing Release Sites, which will form part of the emerging Sunderland Local Plan and its accompanying evidence base.

This report provides initial information on highways and transport matters to allow the identification of any issues or infrastructure requirements that may require further assessment as part of a planning application. Included in this report is an overview of the relevant national and local planning policies, a description of how the proposed development can be safely and suitably accessed by the main modes of transport, an examination of the accessibility of the proposed development by the main modes of sustainable travel, a forecast of the traffic flows likely to be generated by the proposed development, and a preliminary assessment of the likely impact of the proposed development on the operation of the local road network.

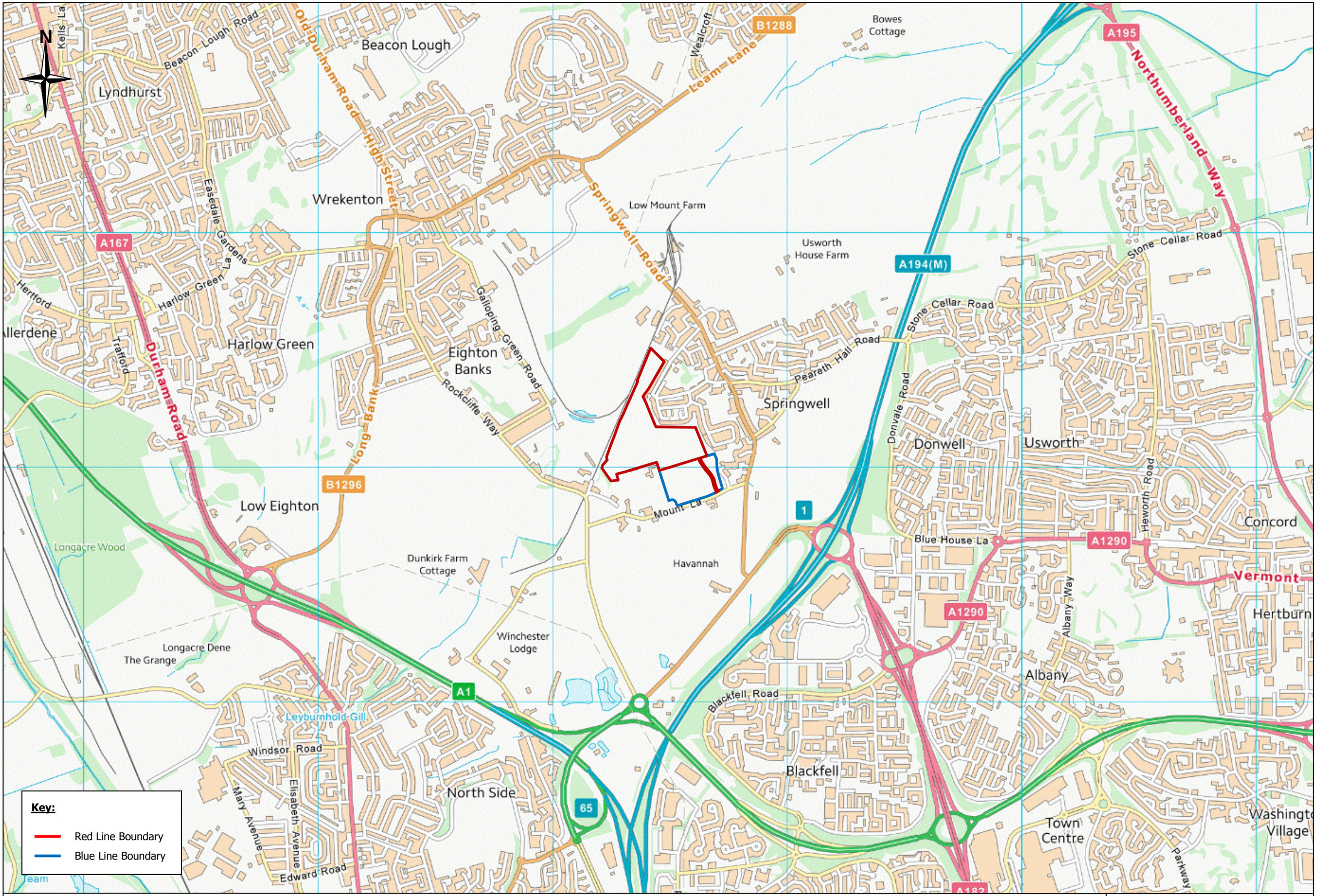
Based on the work undertaken, it is considered that the site can be safely and suitably accessed by pedestrians, cyclists, public transport users and motorists, and the proposed development is deliverable from a highways and transport perspective. In particular:

- Vehicular access to the site can be provided from Mount Lane, within land under the control of the developer and/or the adopted public highway, and which accords with the relevant design standards. The proposed development would accord with Policy CC5 of the DCSDP.
- The site is located on the western edge of the existing residential area of Springwell Village, within close proximity of the village centre. Future residents of the proposed development would therefore benefit from being located within reasonable walking and cycling distance of a range of local services and amenities.
- Good quality pedestrian and cycle connections can be provided between the site and the surrounding areas, with appropriate provision for disabled people and those with restricted mobility. New routes can be fully integrated with the existing networks (including a new footway along the northern side of Mount Lane) and the public footpath that runs across the northern section of the site can be safeguarded, enhanced and incorporated within the site layout.

- The site is well located in relation to existing public transport services. Delivery of the pedestrian and cycle routes set out in this report would ensure that future residents of the proposed development would be able to gain access on foot to existing bus stops on Mount Lane, B1288 Springwell Road and Rockcliffe Way, which provide access to direct services to Gateshead, Newcastle and Sunderland (amongst other destinations). It would not be necessary to route or divert either new or existing bus services through the site for the proposed development to be adequately served by public transport. The proposed development would accord with Policy CC1 of the DCSDP.
- Following the delivery of the outline transport strategy presented in this report, all future residents of the proposed development would be able to access local amenities and services by sustainable modes of travel. The proposed development would be permeable and well-integrated with the sustainable transport network. The use of sustainable transport modes would therefore be maximised and the need to travel to and from the site by private car would be minimised. The proposed development would accord with Policy SS2 of the DCSDP.
- The initial analysis presented in this report has considered the likely traffic impact of the proposed development on the operation of the local road network. Four junctions have been identified where the proposed development has the potential to result in a material traffic impact. The impact of the proposed development at each of these junctions would be assessed in detail at the planning application stage and the requirement for any mitigation would be identified, as necessary, to avoid an unacceptable or severe impacts.
- Notwithstanding the above, based on our professional experience and knowledge of the local road network (including on-site observations and an operational assessment of the A194(M) / A182 / B1288 Roundabout), it is considered likely that the traffic flows associated with the proposed development would be satisfactorily accommodated within the existing form and capacity of each of the identified junctions, without the requirement for any mitigation. The traffic impact of the proposed development would therefore not be a barrier to its delivery and the development proposal would accord with Policies CC5 and CC6 of the DCSDP.

Considering all of the above, it is concluded that the location of the site is suitable for residential development and delivery of the outline transport strategy presented in this report is achievable and viable. **Allocation of the site for housing would therefore represent a sustainable form of development, in accordance with the NPPF and local policies, from a highways and transport perspective.**

Figures



Land North of Mount Lane, Springwell Village

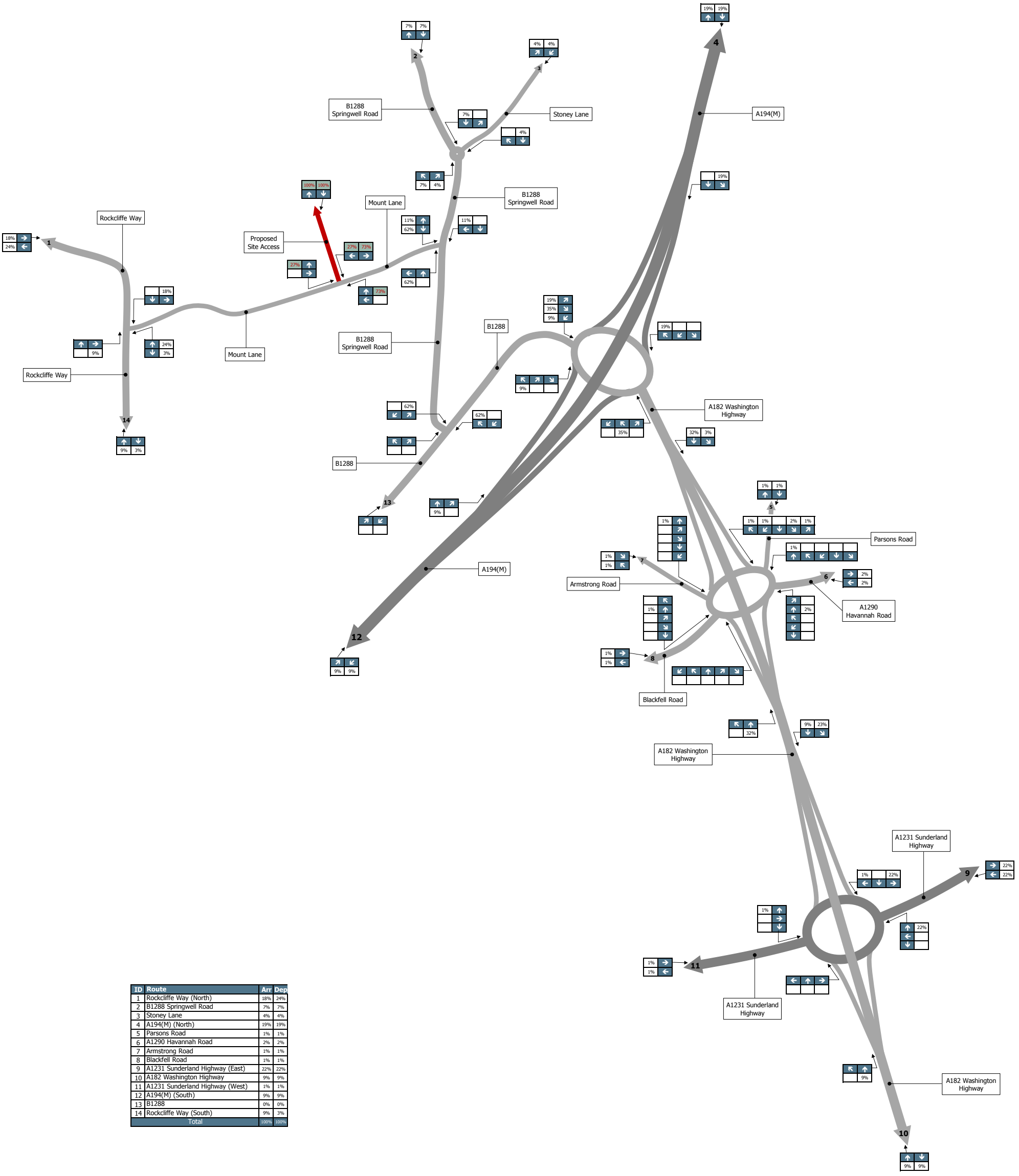
Site Location

Figure 1

Land North of Mount Lane, Springwell Village

Outline Transport Strategy

Figure 2

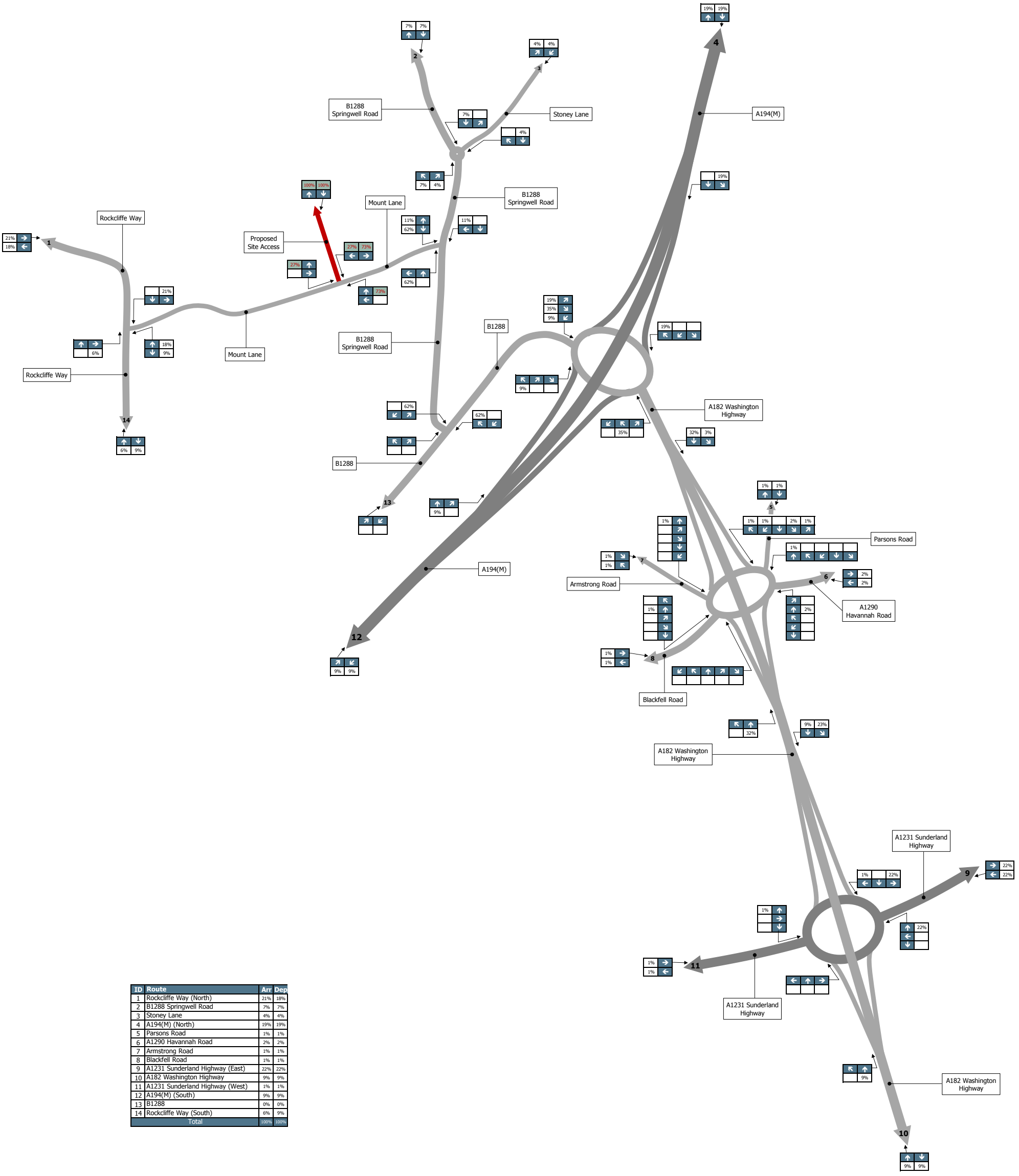


ID	Route	Arr	Dep
1	Rockcliffe Way (North)	18%	24%
2	B1288 Springwell Road	7%	7%
3	Stoney Lane	4%	4%
4	A194(M) (North)	19%	19%
5	Parsons Road	1%	1%
6	A1290 Havannah Road	2%	2%
7	Armstrong Road	1%	1%
8	Blackfell Road	1%	1%
9	A1231 Sunderland Highway (East)	22%	22%
10	A182 Washington Highway	9%	9%
11	A1231 Sunderland Highway (West)	1%	1%
12	A194(M) (South)	9%	9%
13	B1288	0%	0%
14	Rockcliffe Way (South)	9%	3%
Total		100%	100%

Land North of Mount Lane, Springwell Village

Vehicle Trip Distribution - Weekday AM Peak Hour

Figure 3

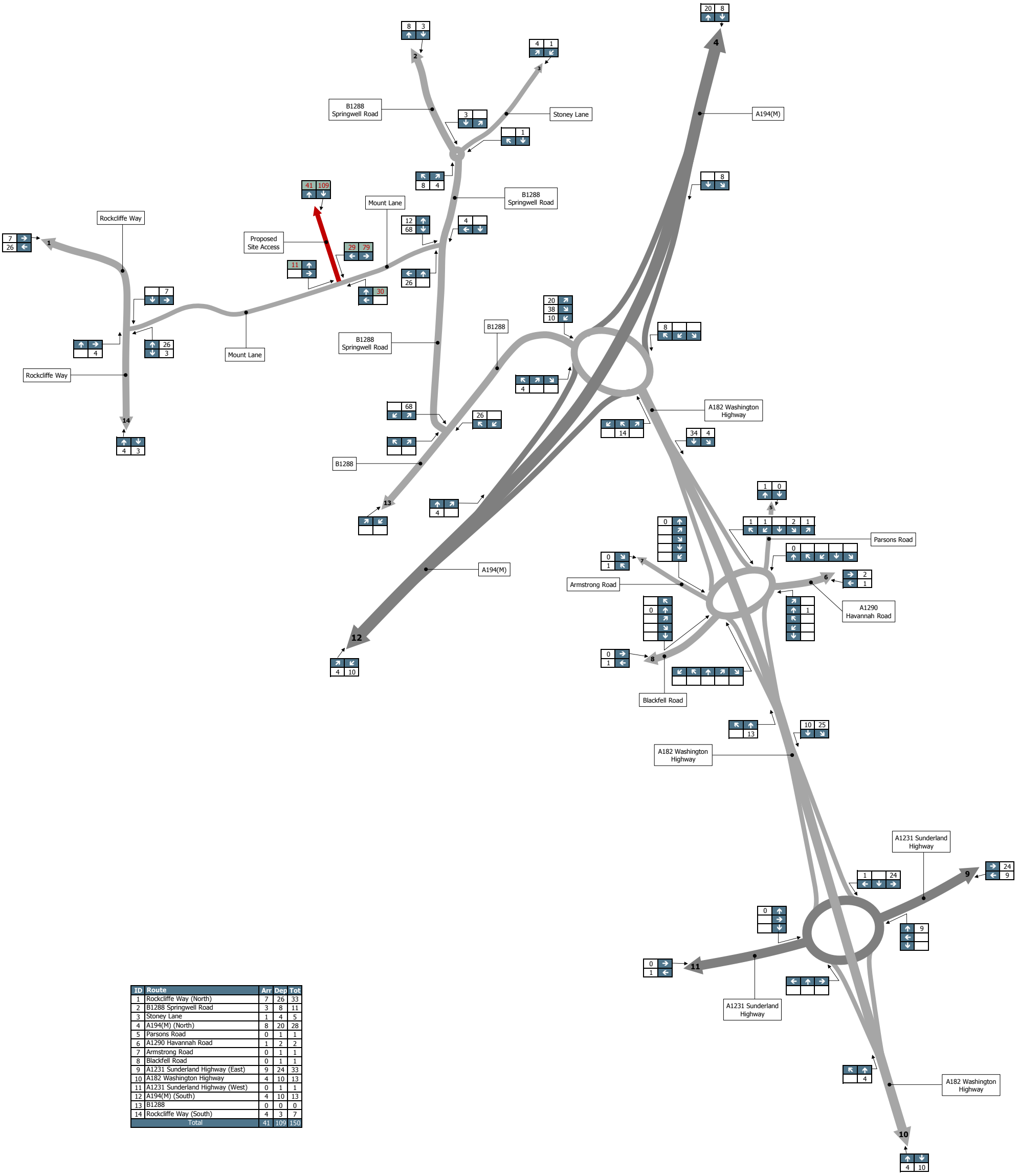


ID	Route	Arr	Dep
1	Rockcliffe Way (North)	21%	18%
2	B1288 Springwell Road	7%	7%
3	Stoney Lane	4%	4%
4	A194(M) (North)	19%	19%
5	Parsons Road	1%	1%
6	A1290 Havannah Road	2%	2%
7	Armstrong Road	1%	1%
8	Blackfell Road	1%	1%
9	A1231 Sunderland Highway (East)	22%	22%
10	A182 Washington Highway	9%	9%
11	A1231 Sunderland Highway (West)	1%	1%
12	A194(M) (South)	9%	9%
13	B1288	0%	0%
14	Rockcliffe Way (South)	6%	9%
Total		100%	100%

Land North of Mount Lane, Springwell Village

Vehicle Trip Distribution - Weekday PM Peak Hour

Figure 4

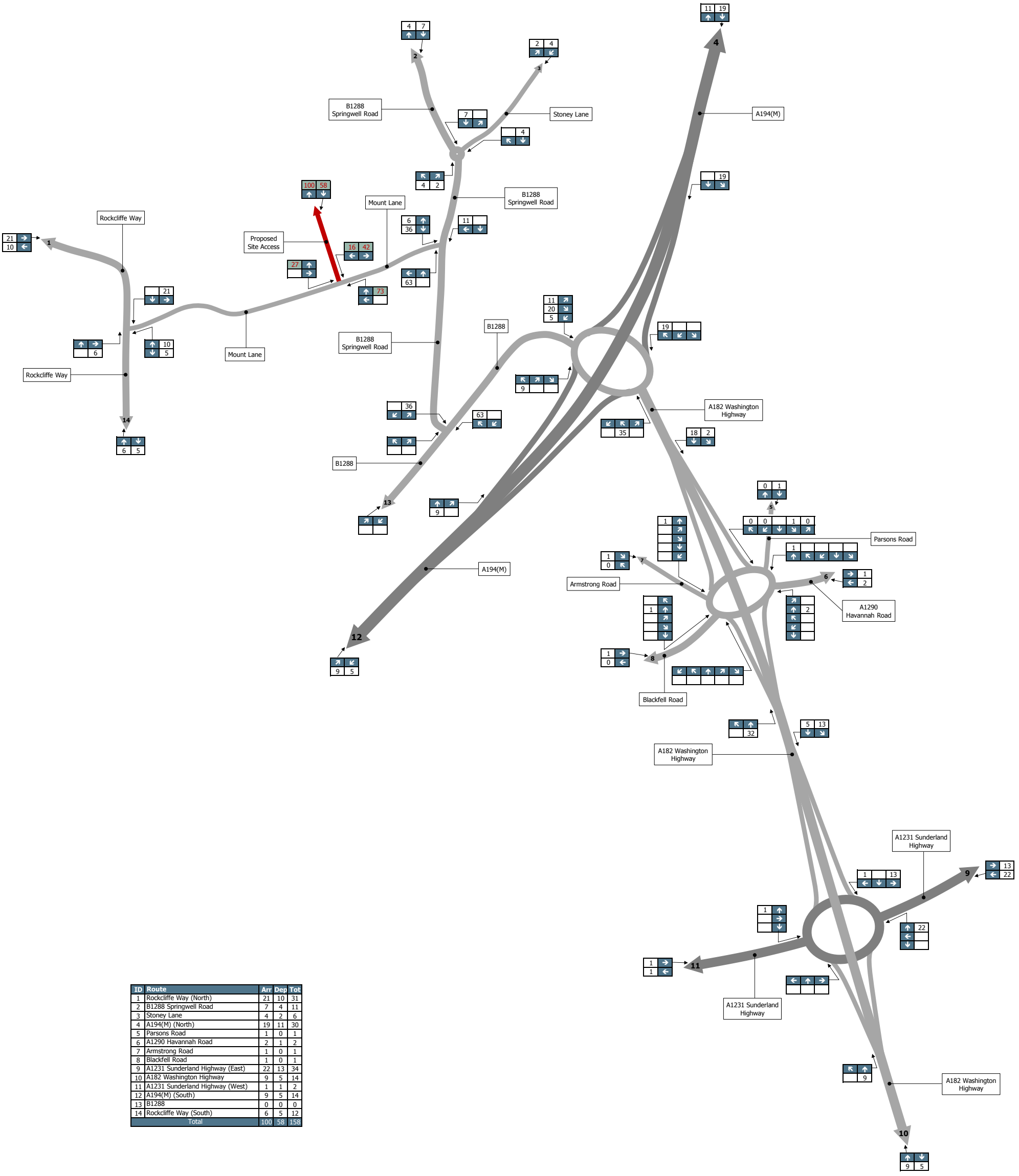


ID	Route	Arr	Dep	Tot
1	Rockcliffe Way (North)	7	26	33
2	B1288 Springwell Road	3	8	11
3	Stoney Lane	1	4	5
4	A194(M) (North)	8	20	28
5	Parsons Road	0	1	1
6	A1290 Havannah Road	1	2	2
7	Armstrong Road	0	1	1
8	Blackfell Road	0	1	1
9	A1231 Sunderland Highway (East)	9	24	33
10	A182 Washington Highway	4	10	13
11	A1231 Sunderland Highway (West)	0	1	1
12	A194(M) (South)	4	10	13
13	B1288	0	0	0
14	Rockcliffe Way (South)	4	3	7
	Total	41	109	150

Land North of Mount Lane, Springwell Village

Development Traffic Flows - Weekday AM Peak Hour

Figure 5

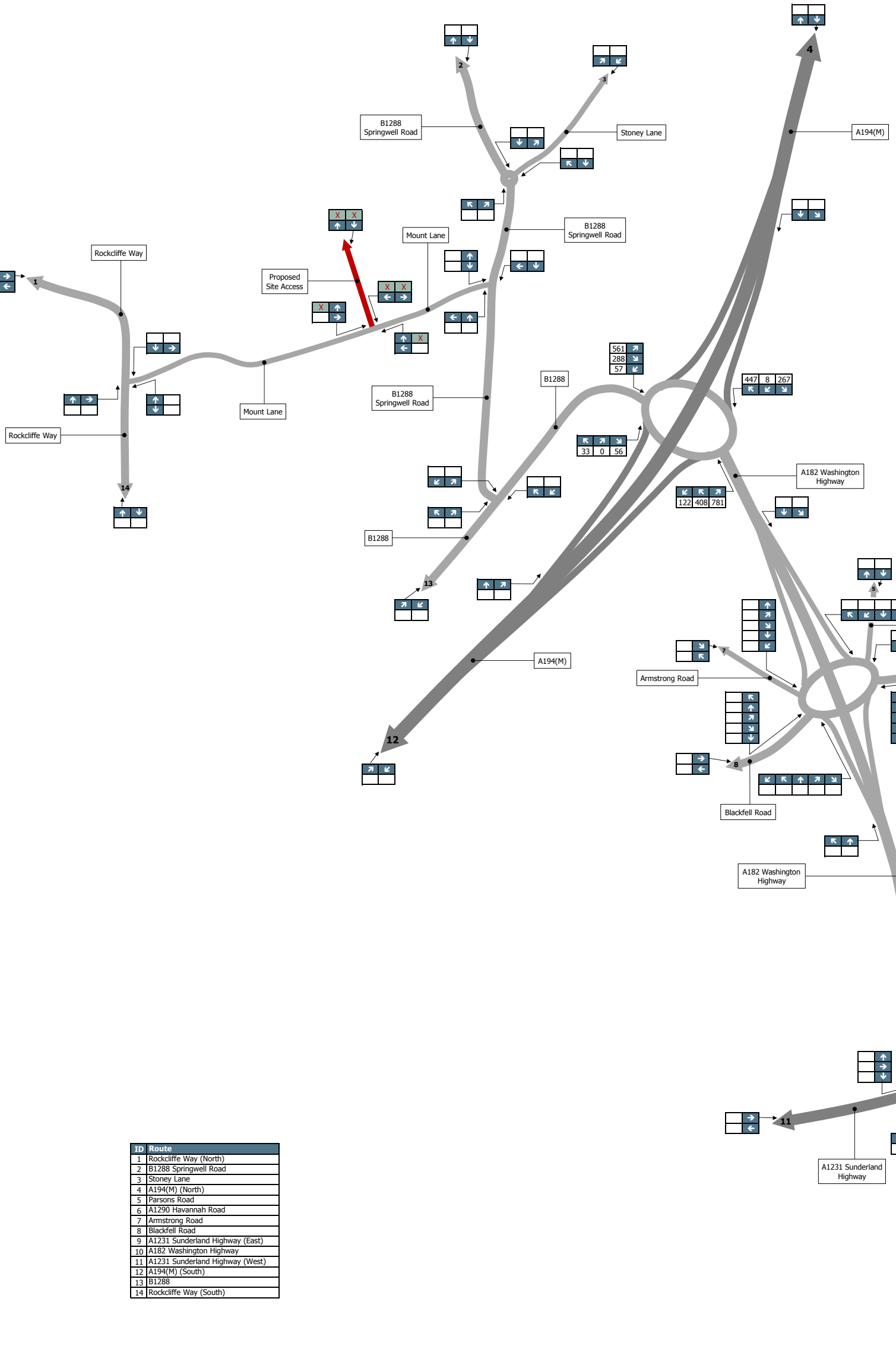


ID	Route	Arr	Dep	Tot
1	Rockcliffe Way (North)	21	10	31
2	B1288 Springwell Road	7	4	11
3	Stoney Lane	4	2	6
4	A194(M) (North)	19	11	30
5	Parsons Road	1	0	1
6	A1290 Havannah Road	2	1	2
7	Armstrong Road	1	0	1
8	Blackfell Road	1	0	1
9	A1231 Sunderland Highway (East)	22	13	34
10	A182 Washington Highway	9	5	14
11	A1231 Sunderland Highway (West)	1	1	2
12	A194(M) (South)	9	5	14
13	B1288	0	0	0
14	Rockcliffe Way (South)	6	5	12
Total		100	58	158

Land North of Mount Lane, Springwell Village

Development Traffic Flows - Weekday PM Peak Hour

Figure 6

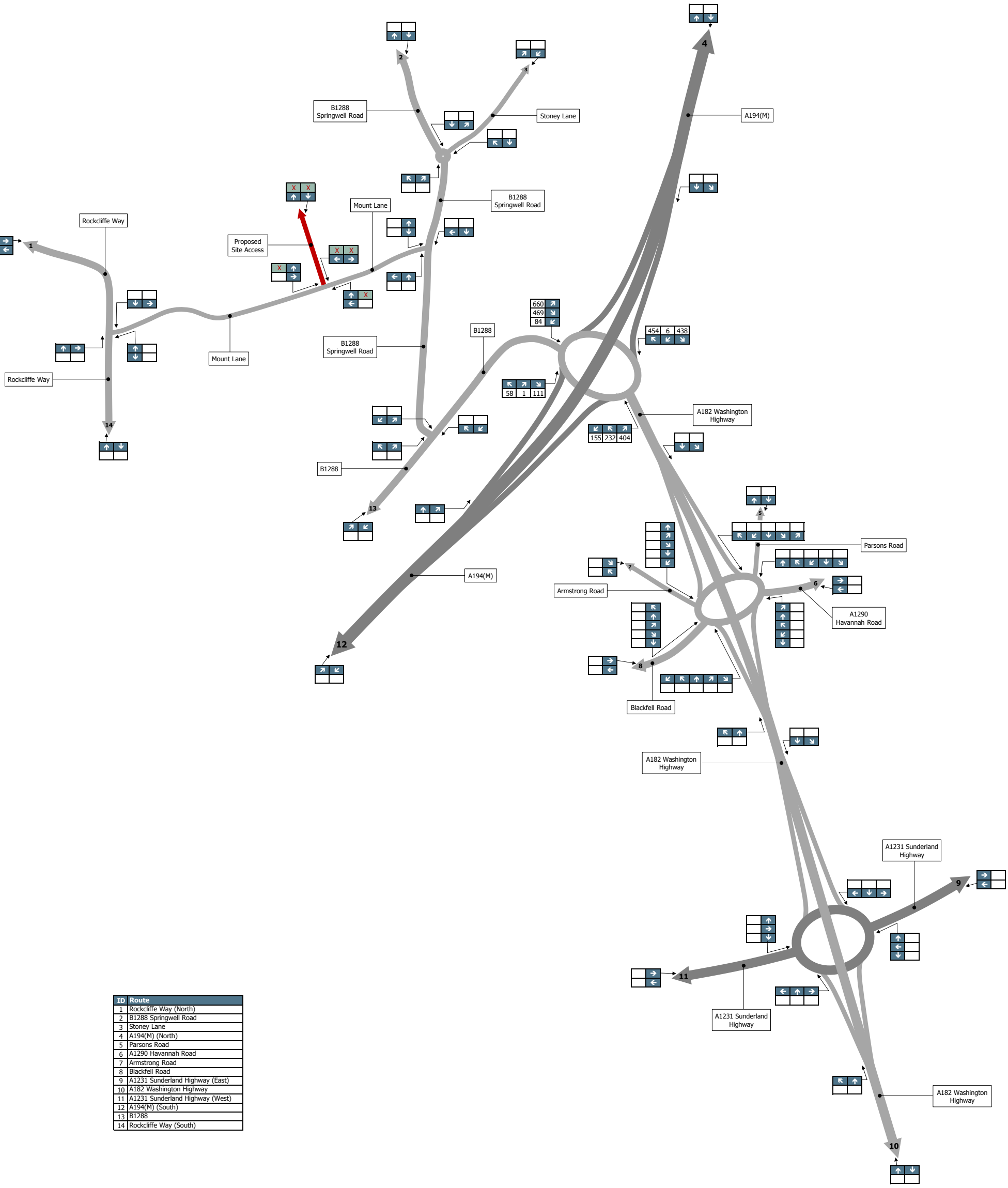


ID	Route
1	Rockcliffe Way (North)
2	B1288 Springwell Road
3	Stoney Lane
4	A194(M) (North)
5	Parsons Road
6	A1290 Havannah Road
7	Armstrong Road
8	Blackfell Road
9	A1231 Sunderland Highway (East)
10	A182 Washington Highway
11	A1231 Sunderland Highway (West)
12	A194(M) (South)
13	B1288
14	Rockcliffe Way (South)

Land North of Mount Lane, Springwell Village

2018 Base Traffic Flows - Weekday AM Peak Hour

Figure 7

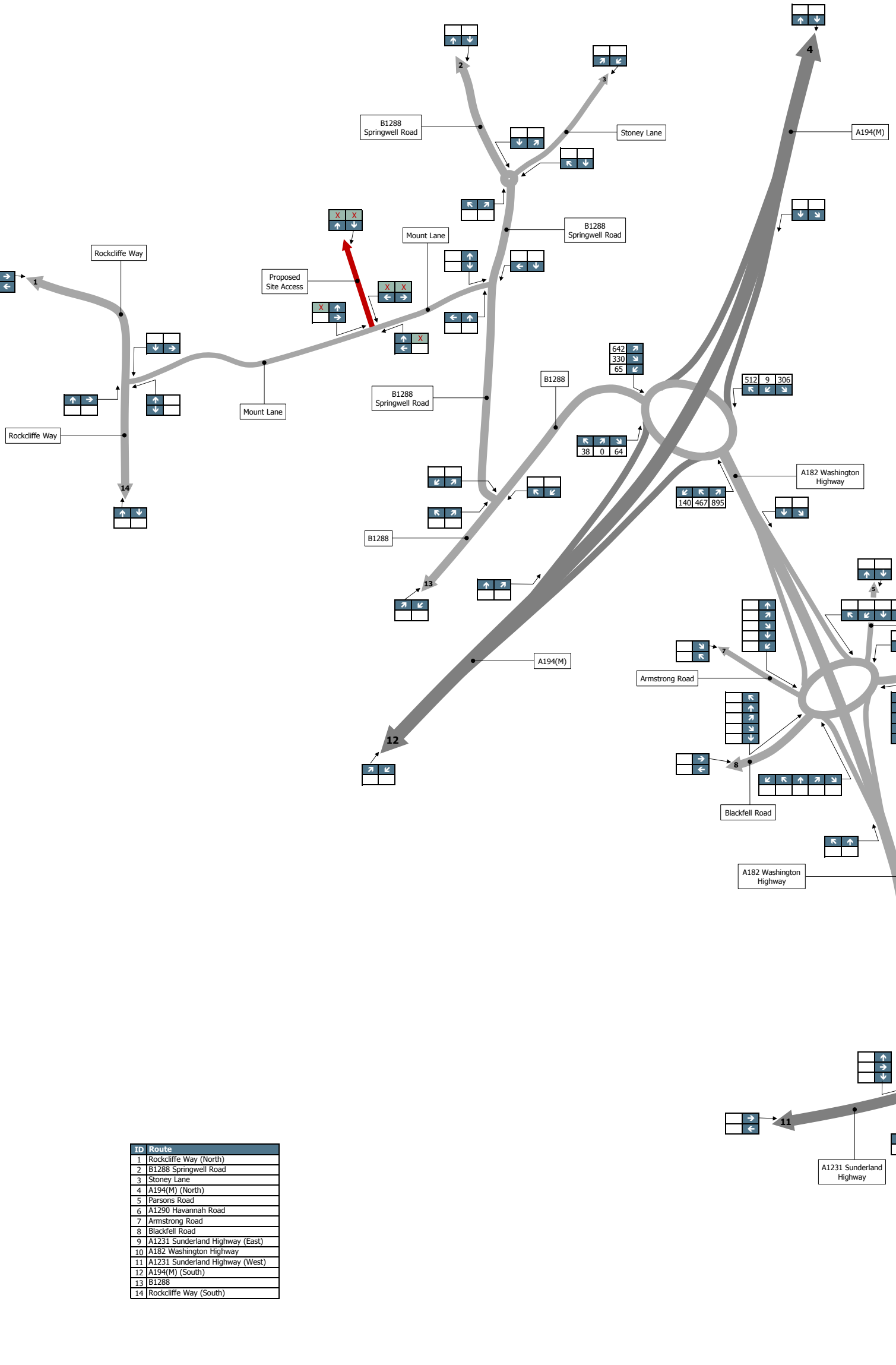


ID	Route
1	Rockcliffe Way (North)
2	B1288 Springwell Road
3	Stoney Lane
4	A194(M) (North)
5	Parsons Road
6	A1290 Havannah Road
7	Armstrong Road
8	Blackfell Road
9	A1231 Sunderland Highway (East)
10	A182 Washington Highway
11	A1231 Sunderland Highway (West)
12	A194(M) (South)
13	B1288
14	Rockcliffe Way (South)

Land North of Mount Lane, Springwell Village

2018 Base Traffic Flows - Weekday PM Peak Hour

Figure 8

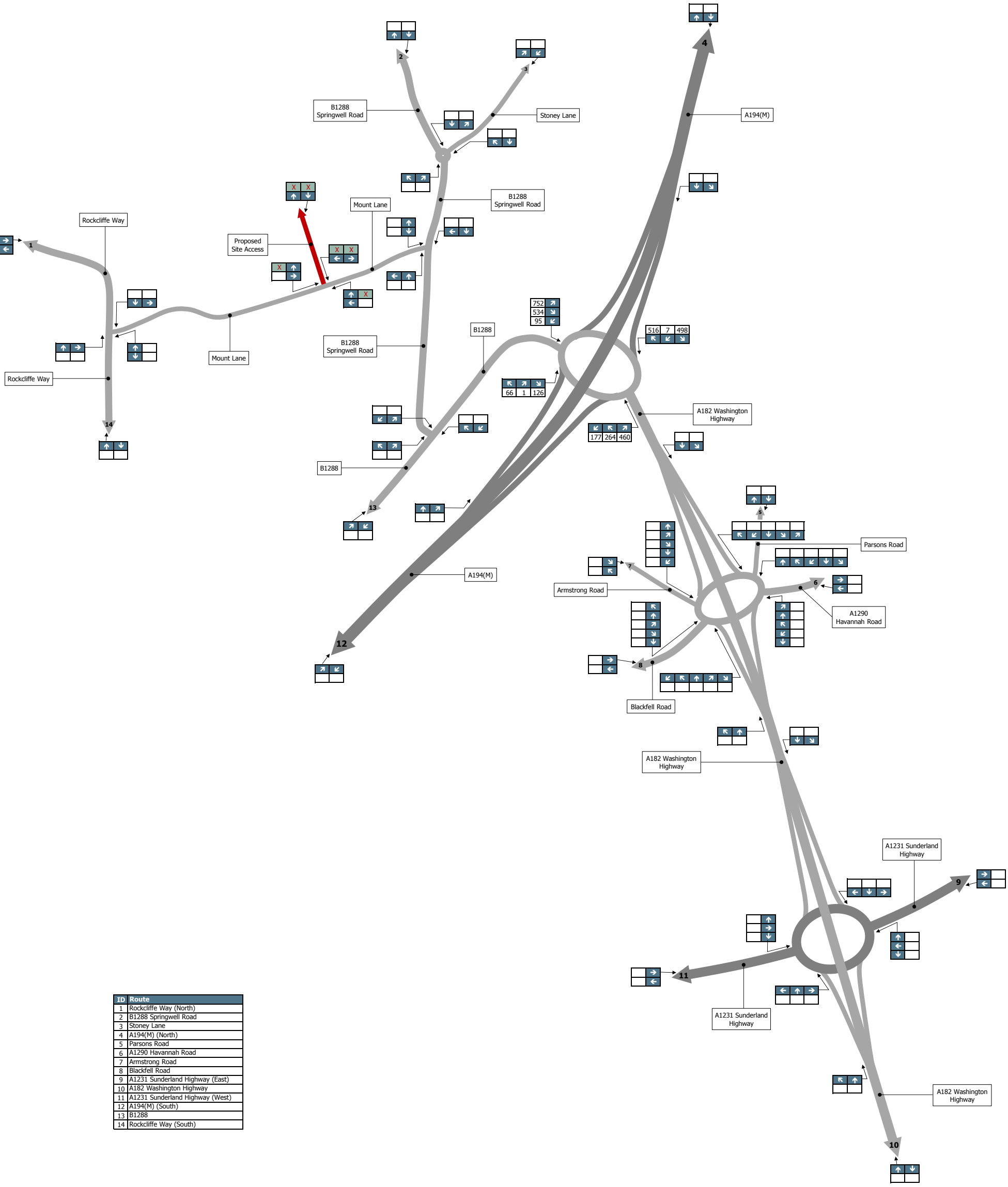


ID	Route
1	Rockcliffe Way (North)
2	B1288 Springwell Road
3	Stoney Lane
4	A194(M) (North)
5	Parsons Road
6	A1290 Havannah Road
7	Armstrong Road
8	Blackfell Road
9	A1231 Sunderland Highway (East)
10	A182 Washington Highway
11	A1231 Sunderland Highway (West)
12	A194(M) (South)
13	B1288
14	Rockcliffe Way (South)

Land North of Mount Lane, Springwell Village

2033 No Development - Weekday AM Peak Hour

Figure 9

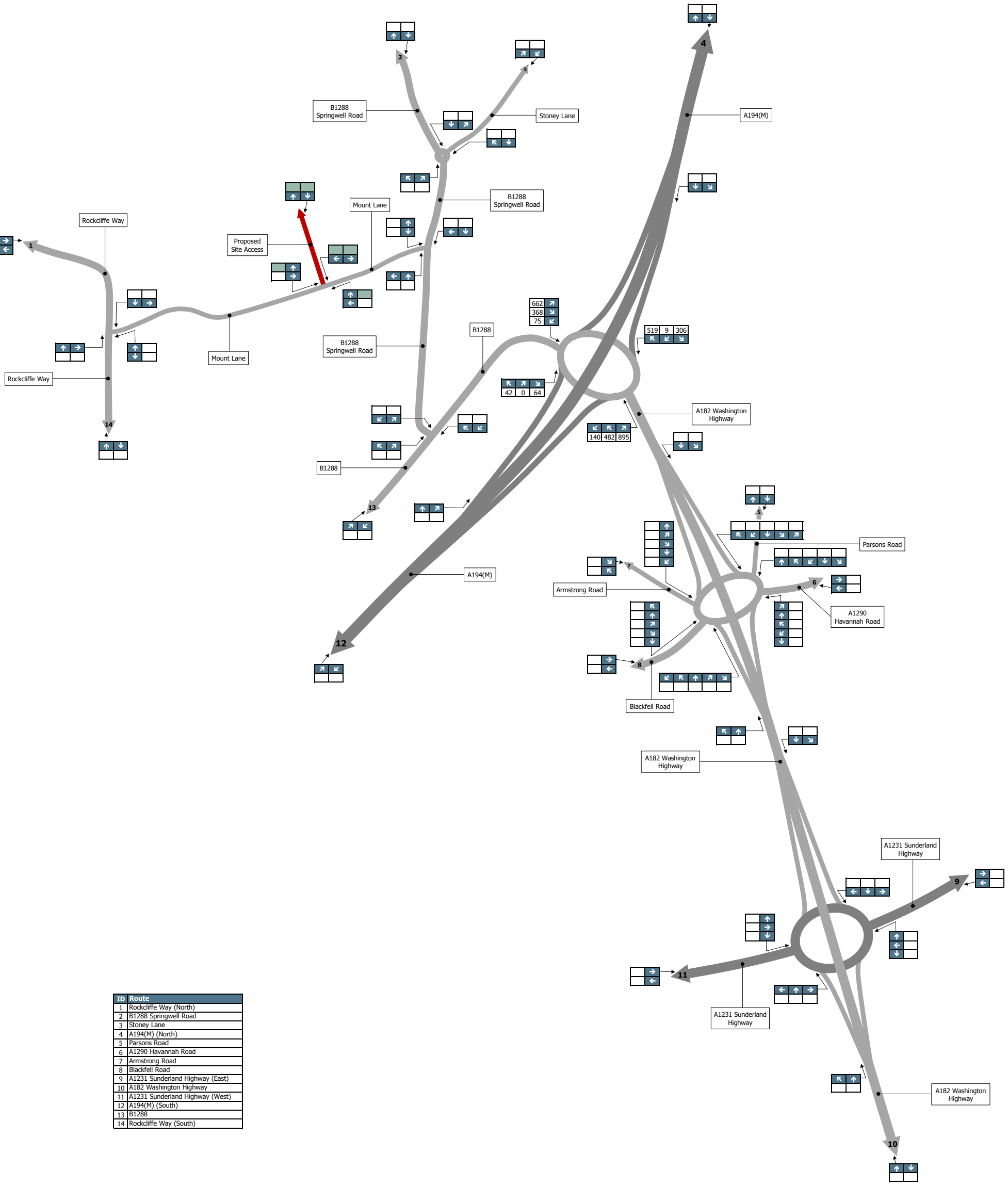


ID	Route
1	Rockcliffe Way (North)
2	B1288 Springwell Road
3	Stoney Lane
4	A194(M) (North)
5	Parsons Road
6	A1290 Havannah Road
7	Armstrong Road
8	Blackfell Road
9	A1231 Sunderland Highway (East)
10	A182 Washington Highway
11	A1231 Sunderland Highway (West)
12	A194(M) (South)
13	B1288
14	Rockcliffe Way (South)

Land North of Mount Lane, Springwell Village

2033 No Development - Weekday PM Peak Hour

Figure 10

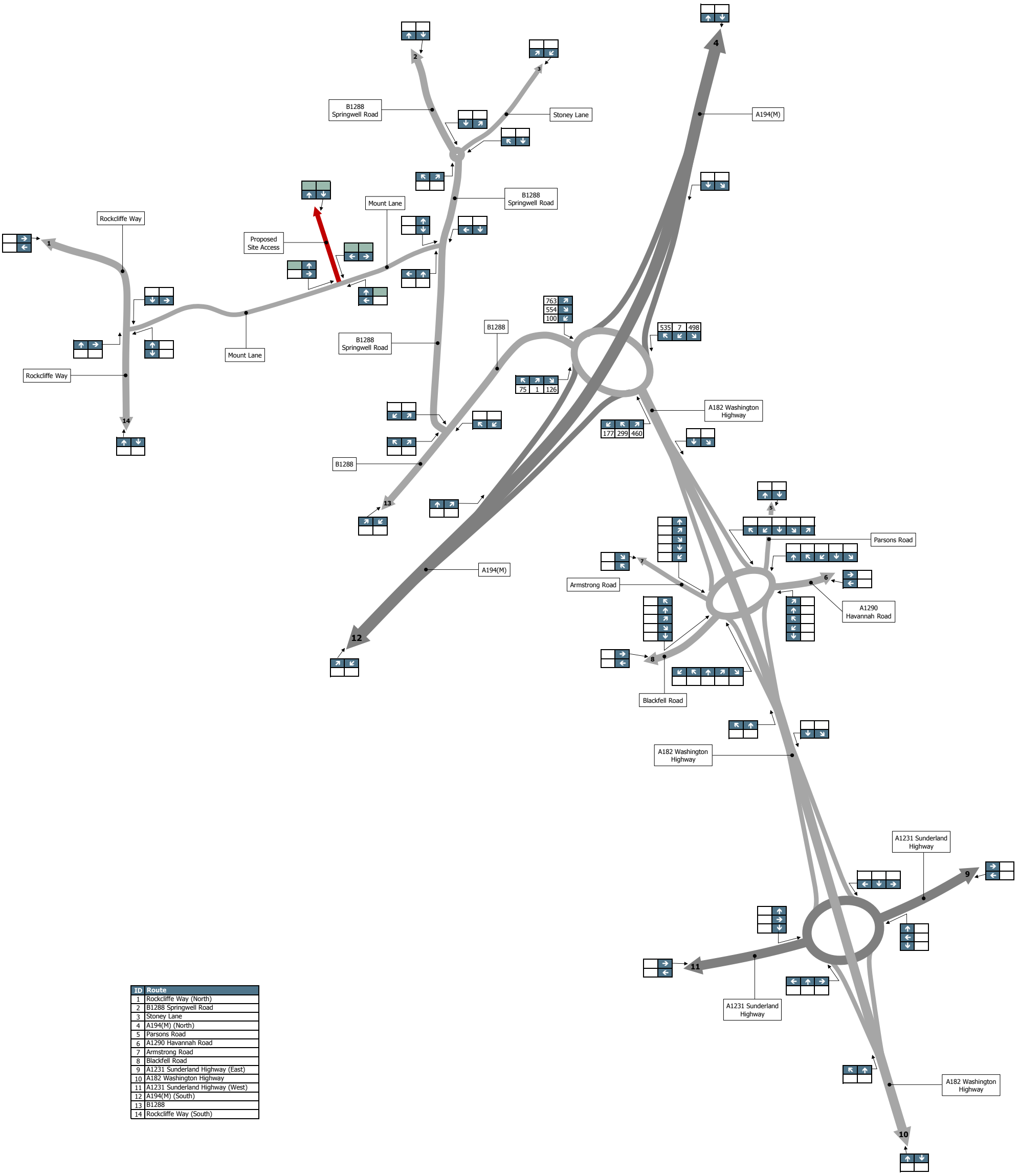


ID	Route
1	Rockcliffe Way (North)
2	B1288 Springwell Road
3	Stoney Lane
4	A194(M) (North)
5	Parsons Road
6	A1290 Havannah Road
7	Armstrong Road
8	Blackfell Road
9	A1231 Sunderland Highway (East)
10	A182 Washington Highway
11	A1231 Sunderland Highway (West)
12	A194(M) (South)
13	B1288
14	Rockcliffe Way (South)

Land North of Mount Lane, Springwell Village

2033 With Development - Weekday AM Peak Hour

Figure 11



ID	Route
1	Rockcliffe Way (North)
2	B1288 Springwell Road
3	Stoney Lane
4	A194(M) (North)
5	Parsons Road
6	A1290 Havannah Road
7	Armstrong Road
8	Blackfell Road
9	A1231 Sunderland Highway (East)
10	A182 Washington Highway
11	A1231 Sunderland Highway (West)
12	A194(M) (South)
13	B1288
14	Rockcliffe Way (South)

Land North of Mount Lane, Springwell Village

2033 With Development - Weekday PM Peak Hour

Figure 12

Drawings

DO NOT SCALE: CONTRACTOR TO CHECK ALL DIMENSIONS AND REPORT ANY OMISSIONS OR ERRORS

Notes:

Topographic survey shown provided by Hellens Group Limited
Job Title: Land North of Mount Lane, Springwell Village
Drawing Title: OGL Survey
Drawing No: 002 Rev A
Date: 22/7/2014

30.0m

Potential access for NWL land

Hedge

AREA RESERVED FOR NWL
2.9ha approx.

90m centreline radius

6.7m wide site access road with 2.0m wide footways

Proposed footway to tie into existing

R10m

2.4m x 43m Visibility Splay

Mount Lane

Access to Broom Court

R10m

2.4m x 43m Visibility Splay

45m junction spacing

EP

Mount Lane

98m junction spacing

Access to Mount Lodge

EP

Mount Lane

EP

Proposed footway to tie into existing

Extent of highway boundary

REV	DESCRIPTION	BY	CHK	APP	DATE

Client:

HELLENS GROUP LIMITED

2 St. JAMES GATE
NEWCASTLE UPON TYNE
TYNE & WEAR
NE1 4AD

TEL: +44 (0)191 255 7300
FAX: +44 (0)191 255 7301
e-mail: newcastle@wyg.com

Project:

LAND NORTH OF MOUNT LANE,
SPRINGWELL VILLAGE

Drawing Title:

PRELIMINERY ACCESS SCHEME FROM MOUNT LANE
GENERAL ARRANGEMENT
SHEET 1 OF 2

Scale @ A1	Drawn	Date	Checked	Date	Approved	Date
1:500	AS	02.03.18	EA	02.03.18	AA	02.03.18

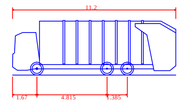
Project No.	Office	Type	Drawing No.	Revision
A090892	91	18	C003	

I:\PROJECTS\A090501 - A091000\A090892 - MOUNT LANE, SPRINGWELL\DRAWINGS\WHITE YOUNG GREEN\A090892_C003_PROPOSED ACCESS MOUNT LANE.DWG
Andrew.stubbs

DO NOT SCALE: CONTRACTOR TO CHECK ALL DIMENSIONS AND REPORT ANY OMISSIONS OR ERRORS

Notes:

Topographic survey shown provided by Hellens Group Limited
Job Title: Land North of Mount Lane, Springwell Village
Drawing Title: OGL Survey
Drawing No: 002 Rev A
Date: 22/7/2014



Phoenix 2 Duo (P2-15W with Elite 6x4 chassis)

Overall Length	11.200m
Overall Width	2.530m
Overall Body Height	3.751m
Min Body Ground Clearance	0.304m
Track Width	2.500m
Lock to Lock Time	4.00s
Kerb to Kerb Turning Radius	9.500m

REV	DESCRIPTION	BY	CHK	APP	DATE

Client:

HELLENS GROUP LIMITED

2 St. JAMES GATE
NEWCASTLE UPON TYNE
TYNE & WEAR
NE1 4AD

TEL: +44 (0)191 255 7300
FAX: +44 (0)191 255 7301
e-mail: newcastle@wyg.com

Project:

LAND NORTH OF MOUNT LANE,
SPRINGWELL VILLAGE

Drawing Title:

PRELIMINERY ACCESS SCHEME FROM MOUNT LANE
SWEPT PATH ANALYSIS OF ARTICULATED LORRY
SHEET 2 OF 2

Scale @ A1	Drawn Date	Checked Date	Approved Date
1:250	AS 02.03.18	EA 02.03.18	AA 02.03.18

Project No.	Office	Type	Drawing No.	Revision
A090892	91	18	C003	

I:\PROJECTS\A090501 - A091000\A090892 - MOUNT LANE, SPRINGWELL\DRAWINGS\WHITE YOUNG GREEN\A090892_C003_PROPOSED ACCESS MOUNT LANE.DWG
Andrew.stubbs

Appendices

Appendix A - TRICS Vehicle Trip Rates

Calculation Reference: AUDIT-705112-180307-0349

TRIP RATE CALCULATION SELECTION PARAMETERS:

Land Use : 03 - RESIDENTIAL
Category : A - HOUSES PRIVATELY OWNED
VEHICLES

Selected regions and areas:

02	SOUTH EAST		
	ES	EAST SUSSEX	1 days
	EX	ESSEX	1 days
	WS	WEST SUSSEX	1 days
03	SOUTH WEST		
	WL	WILTSHIRE	1 days
04	EAST ANGLIA		
	CA	CAMBRIDGESHIRE	1 days
	SF	SUFFOLK	1 days
05	EAST MIDLANDS		
	LN	LINCOLNSHIRE	1 days
	NT	NOTTINGHAMSHIRE	1 days
06	WEST MIDLANDS		
	WM	WEST MIDLANDS	1 days
08	NORTH WEST		
	CH	CHESHIRE	1 days
	LC	LANCASHIRE	1 days
09	NORTH		
	TW	TYNE & WEAR	1 days
11	SCOTLAND		
	AS	ABERDEENSHIRE	1 days
	FI	FIFE	1 days

Secondary Filtering selection:

Parameter: Number of dwellings
Actual Range: 81 to 491 (units:)
Range Selected by User: 75 to 500 (units:)

Public Transport Provision:
Selection by: Include all surveys

Date Range: 01/01/00 to 27/03/17

Selected survey days:

Monday	3 days
Tuesday	4 days
Wednesday	2 days
Thursday	5 days

Selected survey types:

Manual count	13 days
Directional ATC Count	1 days

Selected Locations:

Edge of Town	14

Selected Location Sub Categories:

Residential Zone	14

Secondary Filtering selection:

Use Class:

C3	14 days

Population within 1 mile:

5,001 to 10,000	4 days
10,001 to 15,000	2 days
15,001 to 20,000	6 days
20,001 to 25,000	2 days

Secondary Filtering selection (Cont.):

Population within 5 miles:

25,001 to 50,000	2 days
75,001 to 100,000	2 days
100,001 to 125,000	3 days
125,001 to 250,000	6 days
250,001 to 500,000	1 days

Car ownership within 5 miles:

0.6 to 1.0	6 days
1.1 to 1.5	8 days

Travel Plan:

Not Known	4 days
Yes	1 days
No	9 days

PTAL Rating:

No PTAL Present	14 days

LIST OF SITES relevant to selection parameters

1 AS-03-A-01 DETACHED/SEMI D. ABERDEENSHIRE
BERRYMUIR ROAD

PORTLETHEN
Edge of Town
Residential Zone
Total Number of dwellings: 104
Survey date: THURSDAY *10/02/00* *Survey Type: DIRECTIONAL ATC COUNT*

2 CA-03-A-01 SEMI D./TERRACED CAMBRIDGESHIRE
FALLOWFIELD
CHESTERTON
CAMBRIDGE
Edge of Town
Residential Zone
Total Number of dwellings: 124
Survey date: TUESDAY *06/02/01* *Survey Type: MANUAL*

3 CH-03-A-02 HOUSES/FLATS CHESHIRE
SYDNEY ROAD

CREWE
Edge of Town
Residential Zone
Total Number of dwellings: 174
Survey date: TUESDAY *14/10/08* *Survey Type: MANUAL*

4 ES-03-A-01 MIXED HOUSES/FLATS EAST SUSSEX
OLD MALLING WAY
SOUTH MALLING
LEWES
Edge of Town
Residential Zone
Total Number of dwellings: 491
Survey date: THURSDAY *29/03/01* *Survey Type: MANUAL*

5 EX-03-A-01 SEMI-DET. ESSEX
MILTON ROAD
CORRINGHAM
STANFORD-LE-HOPE
Edge of Town
Residential Zone
Total Number of dwellings: 237
Survey date: TUESDAY *13/05/08* *Survey Type: MANUAL*

6 FI-03-A-03 MIXED HOUSES FIFE
WOODMILL ROAD

DUNFERMLINE
Edge of Town
Residential Zone
Total Number of dwellings: 155
Survey date: MONDAY *30/04/07* *Survey Type: MANUAL*

7 LC-03-A-29 DETACHED/SEMI D. LANCASHIRE
REVIDGE ROAD
FOUR LANE ENDS
BLACKBURN
Edge of Town
Residential Zone
Total Number of dwellings: 185
Survey date: THURSDAY *10/06/04* *Survey Type: MANUAL*

8 LN-03-A-01 MIXED HOUSES LINCOLNSHIRE
BRANT ROAD
BRACEBRIDGE
LINCOLN
Edge of Town
Residential Zone
Total Number of dwellings: 150
Survey date: TUESDAY *15/05/07* *Survey Type: MANUAL*

LIST OF SITES relevant to selection parameters (Cont.)

9 NT-03-A-03 SEMI DETACHED NOTTINGHAMSHIRE
B6018 SUTTON ROAD

KIRKBY-IN-ASHFIELD
Edge of Town
Residential Zone
Total Number of dwellings: 166
Survey date: WEDNESDAY *28/06/06* *Survey Type: MANUAL*

10 SF-03-A-02 SEMI DET./TERRACED SUFFOLK
STOKE PARK DRIVE
MAIDENHALL
IPSWICH
Edge of Town
Residential Zone
Total Number of dwellings: 230
Survey date: THURSDAY *24/05/07* *Survey Type: MANUAL*

11 TW-03-A-01 SEMI DETACHED TYNE & WEAR
LEECHMERE ROAD
HILLVIEW
SUNDERLAND
Edge of Town
Residential Zone
Total Number of dwellings: 81
Survey date: WEDNESDAY *18/09/02* *Survey Type: MANUAL*

12 WL-03-A-01 SEMI D./TERRACED W. BASSETT WILTSHIRE
MAPLE DRIVE

WOOTTON BASSETT
Edge of Town
Residential Zone
Total Number of dwellings: 99
Survey date: MONDAY *02/10/06* *Survey Type: MANUAL*

13 WM-03-A-03 MIXED HOUSING WEST MIDLANDS
BASELEY WAY
ROWLEYS GREEN
COVENTRY
Edge of Town
Residential Zone
Total Number of dwellings: 84
Survey date: MONDAY *24/09/07* *Survey Type: MANUAL*

14 WS-03-A-04 MIXED HOUSES WEST SUSSEX
HILLS FARM LANE
BROADBRIDGE HEATH
HORSHAM
Edge of Town
Residential Zone
Total Number of dwellings: 151
Survey date: THURSDAY *11/12/14* *Survey Type: MANUAL*

TRIP RATE for Land Use 03 - RESIDENTIAL/A - HOUSES PRIVATELY OWNED
VEHICLES
Calculation factor: 1 DWELLS
BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. DWELLS	Trip Rate	No. Days	Ave. DWELLS	Trip Rate	No. Days	Ave. DWELLS	Trip Rate
00:00 - 01:00	1	104	0.019	1	104	0.010	1	104	0.029
01:00 - 02:00	1	104	0.000	1	104	0.000	1	104	0.000
02:00 - 03:00	1	104	0.019	1	104	0.010	1	104	0.029
03:00 - 04:00	1	104	0.029	1	104	0.019	1	104	0.048
04:00 - 05:00	1	104	0.000	1	104	0.010	1	104	0.010
05:00 - 06:00	1	104	0.000	1	104	0.029	1	104	0.029
06:00 - 07:00	1	104	0.019	1	104	0.125	1	104	0.144
07:00 - 08:00	14	174	0.080	14	174	0.301	14	174	0.381
08:00 - 09:00	14	174	0.164	14	174	0.434	14	174	0.598
09:00 - 10:00	14	174	0.172	14	174	0.219	14	174	0.391
10:00 - 11:00	14	174	0.151	14	174	0.186	14	174	0.337
11:00 - 12:00	14	174	0.196	14	174	0.185	14	174	0.381
12:00 - 13:00	14	174	0.213	14	174	0.193	14	174	0.406
13:00 - 14:00	14	174	0.183	14	174	0.172	14	174	0.355
14:00 - 15:00	14	174	0.183	14	174	0.181	14	174	0.364
15:00 - 16:00	14	174	0.306	14	174	0.227	14	174	0.533
16:00 - 17:00	14	174	0.321	14	174	0.213	14	174	0.534
17:00 - 18:00	14	174	0.401	14	174	0.232	14	174	0.633
18:00 - 19:00	14	174	0.297	14	174	0.241	14	174	0.538
19:00 - 20:00	1	104	0.260	1	104	0.327	1	104	0.587
20:00 - 21:00	1	104	0.212	1	104	0.144	1	104	0.356
21:00 - 22:00	1	104	0.317	1	104	0.115	1	104	0.432
22:00 - 23:00	1	104	0.154	1	104	0.087	1	104	0.241
23:00 - 24:00	1	104	0.096	1	104	0.029	1	104	0.125
Total Rates:			3.792			3.689			7.481

Parameter summary

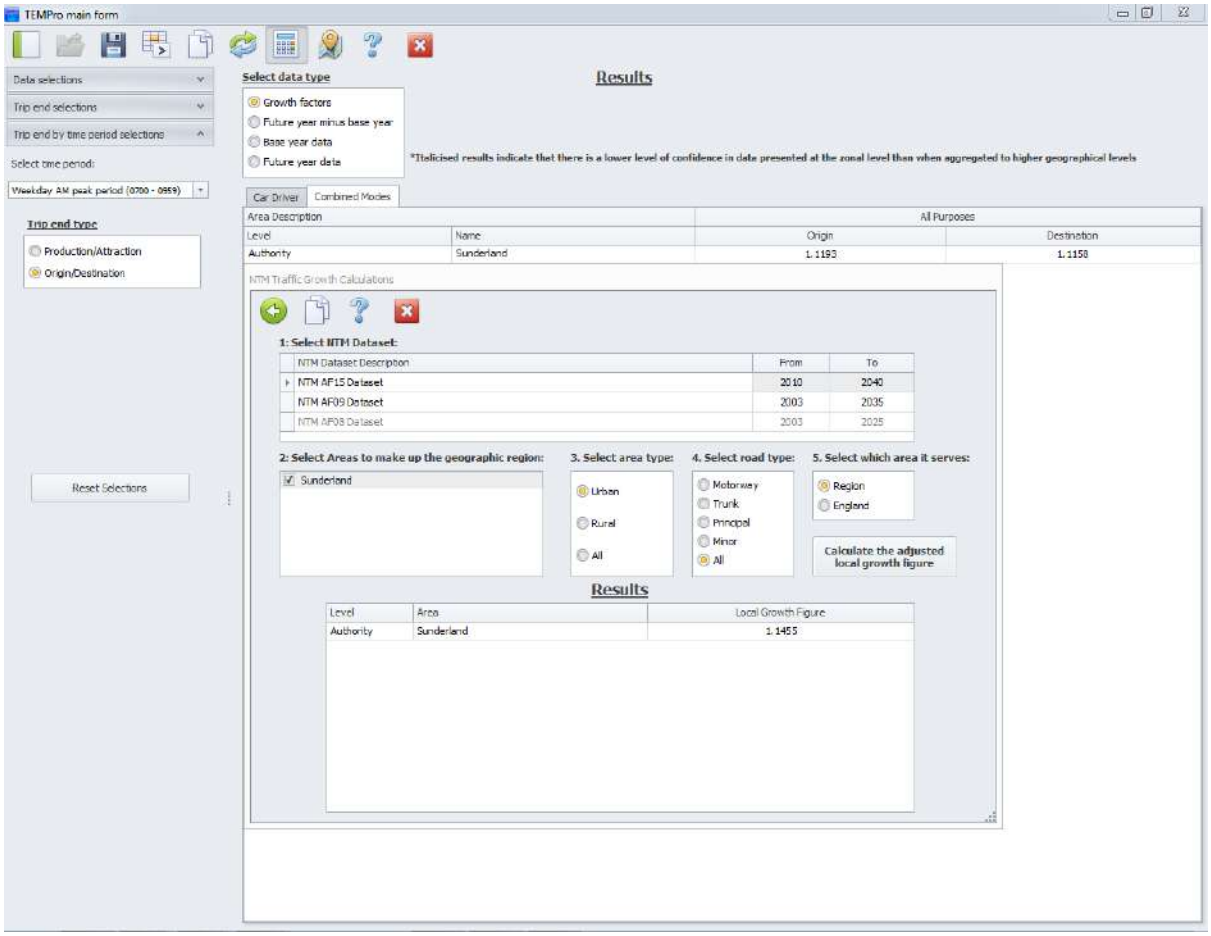
Trip rate parameter range selected:	81 - 491 (units:)
Survey date date range:	01/01/00 - 27/03/17
Number of weekdays (Monday-Friday):	17
Number of Saturdays:	0
Number of Sundays:	0
Surveys automatically removed from selection:	2
Surveys manually removed from selection:	0

Appendix B - NTM/TEMPro Local Traffic Growth Factors

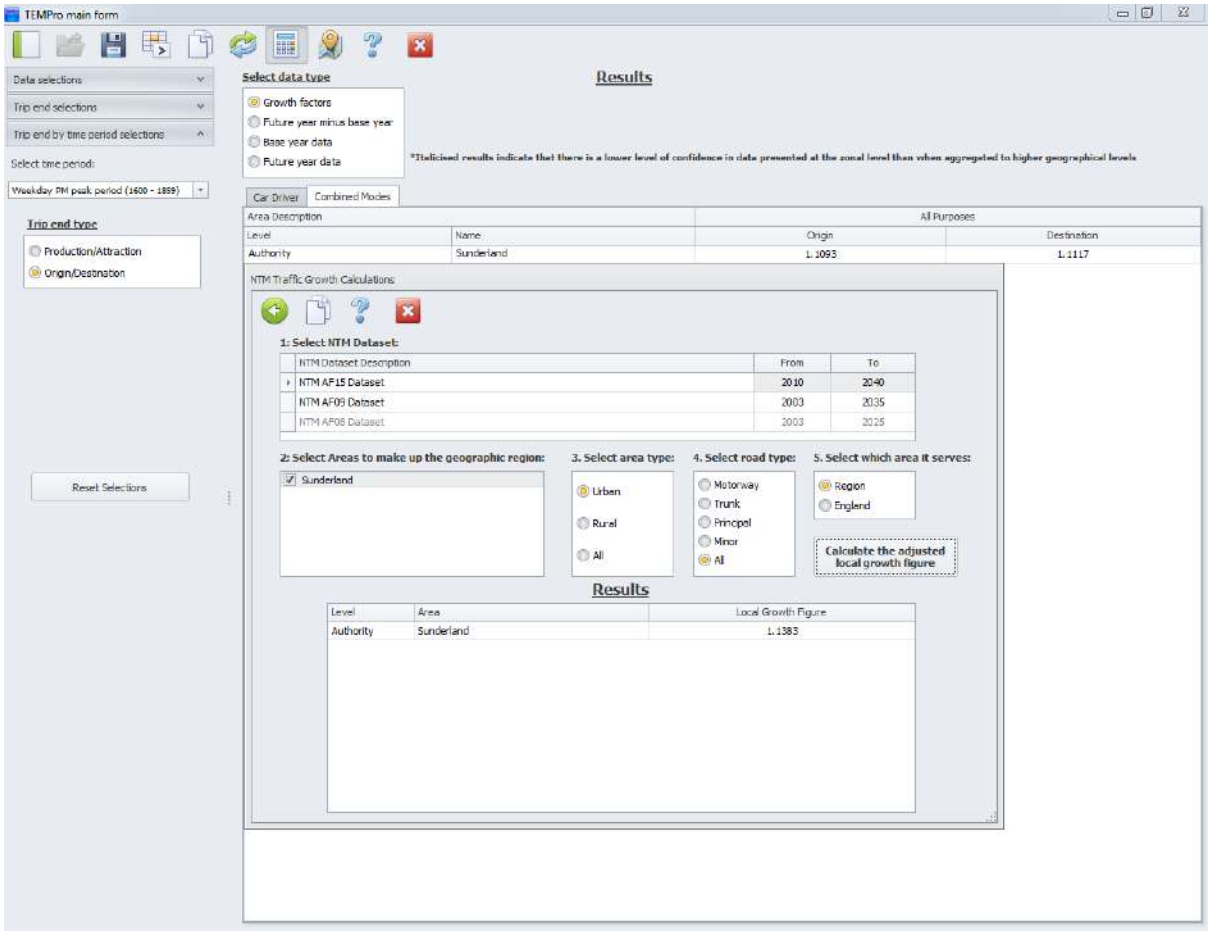
NTM/TEMPro Local Traffic Growth Factors

Source: TEMPro v7.2 / NTM AF15 Dataset.

Factor 1: 2018 to 2033 Traffic Growth Factor – Weekday AM Peak Period (07:00-09:59):



Factor 2: 2018 to 2033 Traffic Growth Factor – Weekday PM Peak Period (16:00-18:59):



Appendix C - Junction Operational Assessment

Junctions 9

ARCADY 9 - Roundabout Module

Filename: A194(M)_A182_B1288 Interchange.j9
Path: I:\Projects\A090501 - A091000\A090892 - Mount Lane, Springwell\Analysis\Traffic Models\J1. A194(M)_A182_B1288 Interchange\Existing
Report generation date: 07/03/2018 16:13:07

Summary of junction performance

	Weekday AM Peak Hour			Weekday PM Peak Hour		
	Queue (PCU)	Delay (s)	RFC	Queue (PCU)	Delay (s)	RFC
	Existing Layout - 2018 Base					
Arm 1	0.7	3.17	0.40	1.2	4.87	0.54
Arm 2	0.7	1.80	0.42	0.4	1.54	0.28
Arm 3	0.1	3.94	0.10	0.2	3.58	0.15
Arm 4	1.2	4.67	0.55	1.4	4.09	0.59
	Existing Layout - 2033 No Development					
Arm 1	1.0	3.82	0.48	1.9	6.97	0.66
Arm 2	1.0	2.14	0.49	0.5	1.73	0.34
Arm 3	0.2	4.08	0.12	0.3	4.08	0.19
Arm 4	2.1	6.88	0.67	2.3	5.83	0.70
	Existing Layout - 2033 With Development					
Arm 1	1.1	4.10	0.50	2.1	7.58	0.68
Arm 2	1.0	2.19	0.50	0.6	1.78	0.35
Arm 3	0.2	4.10	0.12	0.3	4.23	0.20
Arm 4	2.5	7.84	0.71	2.5	6.19	0.72

Values shown are the highest values encountered over all time segments. Delay is the maximum value of average delay per arriving vehicle.

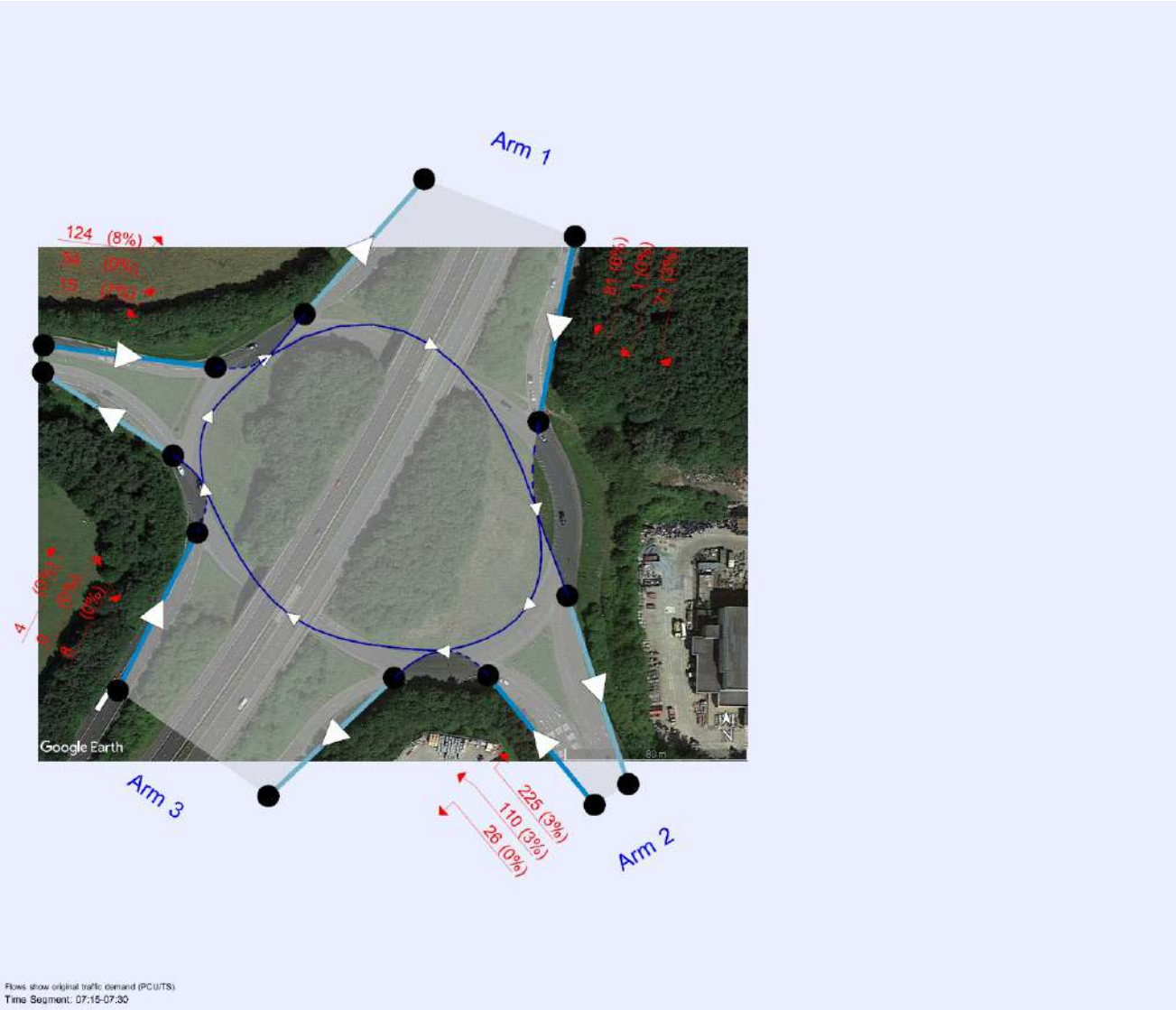
File summary

File Description

Title	A194(M) / A182 / B1288 Interchange
Location	
Site number	J1
Date	26/02/2018
Version	
Status	Existing Layout
Identifier	
Client	Hellens Group
Jobnumber	A090892
Enumerator	WYG\ewan.anderson
Description	

Units

Distance units	Speed units	Traffic units input	Traffic units results	Flow units	Average delay units	Total delay units	Rate of delay units
m	kph	PCU	PCU	perTimeSegment	s	-Min	perMin



The junction diagram reflects the last run of Junctions.

Analysis Options

Calculate Queue Percentiles	Calculate residual capacity	RFC Threshold	Average Delay threshold (s)	Queue threshold (PCU)
		0.85	36.00	20.00

Demand Set Summary

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time period length (min)	Time segment length (min)
D1	2018 Base	Weekday AM Peak Hour	DIRECT	07:15	08:45	90	15
D2	2018 Base	Weekday PM Peak Hour	DIRECT	16:15	17:45	90	15
D3	2033 No Development	Weekday AM Peak Hour	DIRECT	07:15	08:45	90	15
D4	2033 No Development	Weekday PM Peak Hour	DIRECT	16:15	17:45	90	15
D5	2033 With Development	Weekday AM Peak Hour	DIRECT	07:15	08:45	90	15
D6	2033 With Development	Weekday PM Peak Hour	DIRECT	16:15	17:45	90	15

Analysis Set Details

ID	Name	Network flow scaling factor (%)
A1	Existing Layout	100.000

Existing Layout - 2018 Base, Weekday AM Peak Hour

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction Type	Arm order	Junction Delay (s)	Junction LOS
1	A194(M) / A182 / B1288 Interchange	Large Roundabout	1, 2, 3, 4	3.03	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Arms

Arms

Arm	Name	Description
1	A194(M) Southbound Off-Slip	
2	A182 Washington Highway	
3	A194(M) Northbound Off-Slip	
4	B1288	

Roundabout Geometry

Arm	V - Approach road half-width (m)	E - Entry width (m)	l' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit only
1	6.70	6.70	0.0	50.0	65.0	26.0	
2	11.70	11.70	0.0	45.0	65.0	22.0	
3	6.70	7.10	25.7	45.0	65.0	24.0	
4	7.30	7.30	0.0	45.0	65.0	29.0	

Large Roundabout Data

Arm	Circulating flow (PCU/TS)	Entry-to-exit separation (m)
1	218.30	120.70
2	253.50	50.70
3	835.50	115.60
4	443.10	48.20

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Arm	Final slope	Final intercept (PCU/TS)
1	1.100	631.004
2	1.540	1067.755
3	0.543	523.365
4	0.924	658.619

The slope and intercept shown above include any corrections and adjustments.

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time period length (min)	Time segment length (min)
D1	2018 Base	Weekday AM Peak Hour	DIRECT	07:15	08:45	90	15

Vehicle mix varies over time	Vehicle mix source	PCU Factor for a HV (PCU)	O-D data varies over time
✓	HV Percentages	2.00	✓

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Scaling Factor (%)
1		✓	100.000
2		✓	100.000
3		✓	100.000
4		✓	100.000

Origin-Destination Data

07:15 - 07:30

Demand (PCU/TS)

		To			
		1	2	3	4
From	1	0.00	70.50	1.00	81.30
	2	224.90	4.00	26.00	109.50
	3	0.00	8.00	0.00	4.00
	4	123.60	54.00	14.50	0.00

07:30 - 07:45

Demand (PCU/TS)

		To			
		1	2	3	4
From	1	0.00	57.80	2.00	99.20
	2	219.50	4.00	36.30	111.80
	3	0.00	10.60	0.00	4.00
	4	160.20	53.00	14.00	0.00

07:45 - 08:00

Demand (PCU/TS)

		To			
		1	2	3	4
From	1	1.00	81.30	1.00	98.90
	2	209.60	4.00	31.00	108.80
	3	0.00	19.60	0.00	10.80
	4	157.50	67.40	16.00	1.00

08:00 - 08:15

Demand (PCU/TS)

		To			
		1	2	3	4
From	1	0.00	55.10	2.00	120.60
	2	189.60	3.00	27.00	99.00
	3	0.00	16.30	0.00	10.30
	4	122.00	78.00	13.00	0.00

08:15 - 08:30

Demand (PCU/TS)

		To			
		1	2	3	4
From	1	0.00	72.60	3.00	127.90
	2	162.70	3.00	27.80	88.50
	3	0.00	9.00	0.00	8.00
	4	120.80	89.50	14.00	0.00

08:30 - 08:45

Demand (PCU/TS)

		To			
		1	2	3	4
From	1	1.00	66.90	3.50	92.30
	2	160.10	6.00	21.30	75.50
	3	0.00	17.00	0.00	14.30
	4	116.00	73.30	12.00	1.00

Vehicle Mix

07:15 - 07:30

Heavy Vehicle Percentages

		To			
		1	2	3	4
From	1	0	3	0	6
	2	3	0	0	3
	3	0	0	0	0
	4	8	0	7	0

07:30 - 07:45

Heavy Vehicle Percentages

		To			
		1	2	3	4
From	1	0	4	0	11
	2	4	0	3	4
	3	0	25	0	0
	4	5	6	0	0

07:45 - 08:00

Heavy Vehicle Percentages

		To			
		1	2	3	4
From	1	0	3	0	3
	2	3	0	0	4
	3	0	12	0	22
	4	6	1	0	0

08:00 - 08:15

Heavy Vehicle Percentages

		To			
		1	2	3	4
From	1	0	6	0	9
	2	2	0	0	4
	3	0	7	0	11
	4	5	4	0	0

08:15 - 08:30

Heavy Vehicle Percentages

		To			
		1	2	3	4
From	1	0	4	0	7
	2	2	0	8	6
	3	0	0	0	0
	4	5	6	0	0

Heavy Vehicle Percentages

08:30 - 08:45

		To			
		1	2	3	4
From	1	0	8	33	6
	2	3	40	5	1
	3	0	0	0	8
	4	9	1	0	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max delay (s)	Max Queue (PCU)	Max LOS
1	0.40	3.17	0.7	A
2	0.42	1.80	0.7	A
3	0.10	3.94	0.1	A
4	0.55	4.67	1.2	A

Main Results for each time segment

07:15 - 07:30

Arm	Total Demand (PCU/TS)	Circulating flow (PCU/TS)	Capacity (PCU/TS)	RFC	Throughput (PCU/TS)	End queue (PCU)	Delay (s)	LOS
1	152.80	80.18	542.80	0.282	152.39	0.4	2.408	A
2	364.40	96.52	919.07	0.396	363.73	0.7	1.663	A
3	12.00	418.86	295.95	0.041	11.96	0.0	3.168	A
4	192.10	236.45	440.03	0.437	191.29	0.8	3.806	A

07:30 - 07:45

Arm	Total Demand (PCU/TS)	Circulating flow (PCU/TS)	Capacity (PCU/TS)	RFC	Throughput (PCU/TS)	End queue (PCU)	Delay (s)	LOS
1	159.00	81.55	541.29	0.294	158.96	0.4	2.546	A
2	371.60	115.13	890.41	0.417	371.53	0.7	1.800	A
3	14.60	434.39	287.52	0.051	14.58	0.1	3.855	A
4	227.20	234.06	442.24	0.514	226.91	1.1	4.378	A

07:45 - 08:00

Arm	Total Demand (PCU/TS)	Circulating flow (PCU/TS)	Capacity (PCU/TS)	RFC	Throughput (PCU/TS)	End queue (PCU)	Delay (s)	LOS
1	182.20	107.85	512.35	0.356	182.08	0.6	2.804	A
2	353.40	117.85	886.21	0.399	353.46	0.7	1.742	A
3	30.40	423.31	293.53	0.104	30.33	0.1	3.943	A
4	241.90	234.19	442.12	0.547	241.75	1.2	4.673	A

08:00 - 08:15

Arm	Total Demand (PCU/TS)	Circulating flow (PCU/TS)	Capacity (PCU/TS)	RFC	Throughput (PCU/TS)	End queue (PCU)	Delay (s)	LOS
1	177.70	110.38	509.57	0.349	177.69	0.6	2.928	A
2	318.60	135.55	858.95	0.371	318.68	0.6	1.708	A
3	26.60	412.19	299.57	0.089	26.63	0.1	3.581	A
4	213.00	208.97	465.44	0.458	213.36	0.9	3.728	A

08:15 - 08:30

Arm	Total Demand (PCU/TS)	Circulating flow (PCU/TS)	Capacity (PCU/TS)	RFC	Throughput (PCU/TS)	End queue (PCU)	Delay (s)	LOS
1	203.50	115.51	503.92	0.404	203.37	0.7	3.166	A
2	282.00	144.84	844.63	0.334	282.08	0.5	1.659	A
3	17.00	382.13	315.89	0.054	17.05	0.1	3.015	A
4	224.30	174.79	497.03	0.451	224.32	0.9	3.466	A

08:30 - 08:45

Arm	Total Demand (PCU/TS)	Circulating flow (PCU/TS)	Capacity (PCU/TS)	RFC	Throughput (PCU/TS)	End queue (PCU)	Delay (s)	LOS
1	163.70	109.35	510.70	0.321	163.90	0.5	2.783	A
2	262.90	109.96	898.36	0.293	262.99	0.4	1.463	A
3	31.30	336.13	340.87	0.092	31.25	0.1	3.008	A
4	202.30	184.11	488.42	0.414	202.42	0.7	3.318	A

Existing Layout - 2018 Base, Weekday PM Peak Hour

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction Type	Arm order	Junction Delay (s)	Junction LOS
1	A194(M) / A182 / B1288 Interchange	Large Roundabout	1, 2, 3, 4	3.64	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Arms

Arms

[same as above]

Roundabout Geometry

[same as above]

Large Roundabout Data

Arm	Circulating flow (PCU/TS)	Entry-to-exit separation (m)
1	364.90	120.70
2	277.70	50.70
3	535.60	115.60
4	262.00	48.20

Slope / Intercept / Capacity

[same as above]

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time period length (min)	Time segment length (min)
D2	2018 Base	Weekday PM Peak Hour	DIRECT	16:15	17:45	90	15

Vehicle mix varies over time	Vehicle mix source	PCU Factor for a HV (PCU)	O-D data varies over time
✓	HV Percentages	2.00	✓

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Scaling Factor (%)
1		✓	100.000
2		✓	100.000
3		✓	100.000
4		✓	100.000

Origin-Destination Data

16:15 - 16:30

Demand (PCU/TS)

		To			
		1	2	3	4
From	1	0.00	99.20	0.00	107.80
	2	95.40	2.00	33.30	57.30
	3	1.00	23.90	4.60	11.00
	4	184.80	85.80	19.00	1.00

16:30 - 16:45

Demand (PCU/TS)

		To			
		1	2	3	4
From	1	0.00	119.60	1.00	119.70
	2	122.90	2.00	42.90	69.00
	3	0.00	25.00	8.40	17.30
	4	162.90	90.00	20.30	1.00

16:45 - 17:00

Demand (PCU/TS)

		To			
		1	2	3	4
From	1	0.00	103.40	2.00	112.70
	2	83.80	3.00	47.10	52.00
	3	0.00	30.30	5.60	14.90
	4	164.20	116.40	19.00	0.00

17:00 - 17:15

Demand (PCU/TS)

		To			
		1	2	3	4
From	1	0.00	107.50	1.00	115.10
	2	105.00	6.00	40.30	58.00
	3	0.00	28.30	0.00	16.60
	4	165.50	134.00	22.30	0.00

17:15 - 17:30

Demand (PCU/TS)

		To			
		1	2	3	4
From	1	0.00	107.00	2.00	106.00
	2	92.00	5.00	25.00	53.00
	3	1.00	27.00	0.00	9.00
	4	167.80	128.60	22.00	1.00

17:30 - 17:45

Demand (PCU/TS)

		To			
		1	2	3	4
From	1	0.00	104.90	2.00	102.00
	2	84.80	5.00	21.00	46.00
	3	0.00	33.00	1.50	14.30
	4	158.70	128.00	20.00	0.00

Vehicle Mix

16:15 - 16:30

Heavy Vehicle Percentages

		To			
		1	2	3	4
From	1	0	3	0	8
	2	0	0	10	4
	3	0	4	100	0
	4	3	4	0	0

16:30 - 16:45

Heavy Vehicle Percentages

		To			
		1	2	3	4
From	1	0	3	0	7
	2	2	0	8	1
	3	0	0	100	6
	4	3	1	5	0

16:45 - 17:00

Heavy Vehicle Percentages

		To			
		1	2	3	4
From	1	0	2	0	3
	2	4	0	12	2
	3	0	3	67	27
	4	5	2	0	0

17:00 - 17:15

Heavy Vehicle Percentages

		To			
		1	2	3	4
From	1	0	1	0	5
	2	0	0	3	2
	3	0	4	0	14
	4	3	2	5	0

17:15 - 17:30

Heavy Vehicle Percentages

		To			
		1	2	3	4
From	1	0	0	0	0
	2	0	0	0	2
	3	0	0	0	0
	4	0	1	0	0

17:30 - 17:45

Heavy Vehicle Percentages

		To			
		1	2	3	4
From	1	0	1	0	1
	2	5	0	0	2
	3	0	6	100	8
	4	1	2	0	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max delay (s)	Max Queue (PCU)	Max LOS
1	0.54	4.87	1.2	A
2	0.28	1.54	0.4	A
3	0.15	3.58	0.2	A
4	0.59	4.09	1.4	A

Main Results for each time segment

16:15 - 16:30

Arm	Total Demand (PCU/TS)	Circulating flow (PCU/TS)	Capacity (PCU/TS)	RFC	Throughput (PCU/TS)	End queue (PCU)	Delay (s)	LOS
1	207.00	135.80	466.19	0.444	206.16	0.8	3.641	A
2	188.00	131.87	863.30	0.218	187.71	0.3	1.370	A
3	40.50	262.83	373.85	0.108	40.37	0.1	2.930	A
4	290.60	126.66	561.29	0.518	289.50	1.1	3.399	A

16:30 - 16:45

Arm	Total Demand (PCU/TS)	Circulating flow (PCU/TS)	Capacity (PCU/TS)	RFC	Throughput (PCU/TS)	End queue (PCU)	Delay (s)	LOS
1	240.30	146.61	455.78	0.527	239.98	1.2	4.370	A
2	236.80	150.23	835.63	0.283	236.68	0.4	1.543	A
3	50.70	314.36	330.88	0.153	50.63	0.2	3.576	A
4	274.20	158.20	526.58	0.521	274.19	1.1	3.653	A

16:45 - 17:00

Arm	Total Demand (PCU/TS)	Circulating flow (PCU/TS)	Capacity (PCU/TS)	RFC	Throughput (PCU/TS)	End queue (PCU)	Delay (s)	LOS
1	218.10	174.23	429.18	0.508	218.19	1.1	4.373	A
2	185.90	139.35	852.03	0.218	186.01	0.3	1.421	A
3	50.80	251.64	383.17	0.133	50.83	0.2	3.093	A
4	299.60	122.78	565.55	0.530	299.55	1.2	3.501	A

17:00 - 17:15

Arm	Total Demand (PCU/TS)	Circulating flow (PCU/TS)	Capacity (PCU/TS)	RFC	Throughput (PCU/TS)	End queue (PCU)	Delay (s)	LOS
1	223.60	190.44	413.57	0.541	223.47	1.2	4.874	A
2	209.30	138.33	853.56	0.245	209.27	0.3	1.412	A
3	44.90	283.99	356.20	0.126	44.92	0.2	3.109	A
4	321.80	139.29	547.39	0.588	321.51	1.4	4.086	A

17:15 - 17:30

Arm	Total Demand (PCU/TS)	Circulating flow (PCU/TS)	Capacity (PCU/TS)	RFC	Throughput (PCU/TS)	End queue (PCU)	Delay (s)	LOS
1	215.00	183.69	420.07	0.512	215.14	1.1	4.396	A
2	175.00	131.10	864.47	0.202	175.07	0.3	1.312	A
3	37.00	257.14	378.59	0.098	37.05	0.1	2.637	A
4	319.40	125.05	563.06	0.567	319.52	1.3	3.714	A

17:30 - 17:45

Arm	Total Demand (PCU/TS)	Circulating flow (PCU/TS)	Capacity (PCU/TS)	RFC	Throughput (PCU/TS)	End queue (PCU)	Delay (s)	LOS
1	208.90	187.51	416.39	0.502	208.93	1.0	4.383	A
2	156.80	125.53	872.86	0.180	156.83	0.2	1.299	A
3	48.80	237.85	394.67	0.124	48.76	0.2	2.813	A
4	306.70	124.29	563.89	0.544	306.81	1.2	3.548	A

Existing Layout - 2033 No Development, Weekday AM Peak Hour

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction Type	Arm order	Junction Delay (s)	Junction LOS
1	A194(M) / A182 / B1288 Interchange	Large Roundabout	1, 2, 3, 4	3.99	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Arms

Arms

[same as above]

Roundabout Geometry

[same as above]

Large Roundabout Data

Arm	Circulating flow (PCU/TS)	Entry-to-exit separation (m)
1	250.10	120.70
2	290.40	50.70
3	957.10	115.60
4	507.60	48.20

Slope / Intercept / Capacity

[same as above]

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time period length (min)	Time segment length (min)
D3	2033 No Development	Weekday AM Peak Hour	DIRECT	07:15	08:45	90	15

Vehicle mix varies over time	Vehicle mix source	PCU Factor for a HV (PCU)	O-D data varies over time
✓	HV Percentages	2.00	✓

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Scaling Factor (%)
1		✓	100.000
2		✓	100.000
3		✓	100.000
4		✓	100.000

Origin-Destination Data

07:15 - 07:30

Demand (PCU/TS)

		To			
		1	2	3	4
From	1	0.00	80.80	1.10	93.10
	2	257.60	4.60	29.80	125.40
	3	0.00	9.20	0.00	4.60
	4	141.60	61.90	16.60	0.00

07:30 - 07:45

Demand (PCU/TS)

		To			
		1	2	3	4
From	1	0.00	66.20	2.30	113.60
	2	251.40	4.60	41.60	128.10
	3	0.00	12.10	0.00	4.60
	4	183.50	60.70	16.00	0.00

07:45 - 08:00

Demand (PCU/TS)

		To			
		1	2	3	4
From	1	1.10	93.10	1.10	113.30
	2	240.10	4.60	35.50	124.60
	3	0.00	22.50	0.00	12.40
	4	180.40	77.20	18.30	1.10

08:00 - 08:15

Demand (PCU/TS)

		To			
		1	2	3	4
From	1	0.00	63.10	2.30	138.10
	2	217.20	3.40	30.90	113.40
	3	0.00	18.70	0.00	11.80
	4	139.80	89.30	14.90	0.00

08:15 - 08:30

Demand (PCU/TS)

		To			
		1	2	3	4
From	1	0.00	83.20	3.40	146.50
	2	186.40	3.40	31.80	101.40
	3	0.00	10.30	0.00	9.20
	4	138.40	102.50	16.00	0.00

08:30 - 08:45

Demand (PCU/TS)

		To			
		1	2	3	4
From	1	1.10	76.60	4.00	105.70
	2	183.40	6.90	24.40	86.50
	3	0.00	19.50	0.00	16.40
	4	132.90	84.00	13.70	1.10

Vehicle Mix

07:15 - 07:30

Heavy Vehicle Percentages

		To			
		1	2	3	4
From	1	0	3	0	6
	2	3	0	0	3
	3	0	0	0	0
	4	8	0	7	0

07:30 - 07:45

Heavy Vehicle Percentages

		To			
		1	2	3	4
From	1	0	4	0	11
	2	4	0	3	4
	3	0	25	0	0
	4	5	6	0	0

07:45 - 08:00

Heavy Vehicle Percentages

		To			
		1	2	3	4
From	1	0	3	0	3
	2	3	0	0	4
	3	0	12	0	22
	4	6	1	0	0

08:00 - 08:15

Heavy Vehicle Percentages

		To			
		1	2	3	4
From	1	0	6	0	9
	2	2	0	0	4
	3	0	7	0	11
	4	5	4	0	0

08:15 - 08:30

Heavy Vehicle Percentages

		To			
		1	2	3	4
From	1	0	4	0	7
	2	2	0	8	6
	3	0	0	0	0
	4	5	6	0	0

08:30 - 08:45

Heavy Vehicle Percentages

		To			
		1	2	3	4
From	1	0	8	33	6
	2	3	40	5	1
	3	0	0	0	8
	4	9	1	0	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max delay (s)	Max Queue (PCU)	Max LOS
1	0.48	3.82	1.0	A
2	0.49	2.14	1.0	A
3	0.12	4.08	0.2	A
4	0.67	6.88	2.1	A

Main Results for each time segment

07:15 - 07:30

Arm	Total Demand (PCU/TS)	Circulating flow (PCU/TS)	Capacity (PCU/TS)	RFC	Throughput (PCU/TS)	End queue (PCU)	Delay (s)	LOS
1	175.00	91.83	525.33	0.333	174.48	0.5	2.679	A
2	417.40	110.43	894.58	0.467	416.50	0.9	1.931	A
3	13.80	479.59	291.29	0.047	13.75	0.0	3.242	A
4	220.10	270.80	410.26	0.536	218.89	1.2	4.934	A

07:30 - 07:45

Arm	Total Demand (PCU/TS)	Circulating flow (PCU/TS)	Capacity (PCU/TS)	RFC	Throughput (PCU/TS)	End queue (PCU)	Delay (s)	LOS
1	182.10	93.29	523.76	0.348	182.05	0.6	2.849	A
2	425.70	131.80	862.73	0.493	425.59	1.0	2.138	A
3	16.70	497.54	283.66	0.059	16.68	0.1	3.940	A
4	260.20	268.04	412.65	0.631	259.65	1.8	6.150	A

07:45 - 08:00

Arm	Total Demand (PCU/TS)	Circulating flow (PCU/TS)	Capacity (PCU/TS)	RFC	Throughput (PCU/TS)	End queue (PCU)	Delay (s)	LOS
1	208.60	123.44	491.49	0.424	208.42	0.8	3.273	A
2	404.80	134.81	858.24	0.472	404.88	0.9	2.044	A
3	34.90	484.80	289.08	0.121	34.82	0.2	4.082	A
4	277.00	268.29	412.43	0.672	276.67	2.1	6.885	A

08:00 - 08:15

Arm	Total Demand (PCU/TS)	Circulating flow (PCU/TS)	Capacity (PCU/TS)	RFC	Throughput (PCU/TS)	End queue (PCU)	Delay (s)	LOS
1	203.50	126.49	488.23	0.417	203.48	0.8	3.410	A
2	364.90	155.25	827.77	0.441	365.01	0.8	1.993	A
3	30.50	472.10	294.48	0.104	30.53	0.1	3.703	A
4	244.00	239.40	437.33	0.558	244.75	1.3	4.893	A

08:15 - 08:30

Arm	Total Demand (PCU/TS)	Circulating flow (PCU/TS)	Capacity (PCU/TS)	RFC	Throughput (PCU/TS)	End queue (PCU)	Delay (s)	LOS
1	233.10	132.22	482.09	0.484	232.89	1.0	3.817	A
2	323.00	165.81	812.03	0.398	323.12	0.7	1.909	A
3	19.50	437.73	309.09	0.063	19.56	0.1	3.110	A
4	256.90	200.23	471.09	0.545	256.96	1.3	4.417	A

08:30 - 08:45

Arm	Total Demand (PCU/TS)	Circulating flow (PCU/TS)	Capacity (PCU/TS)	RFC	Throughput (PCU/TS)	End queue (PCU)	Delay (s)	LOS
1	187.40	125.29	489.51	0.383	187.71	0.7	3.200	A
2	301.20	125.85	871.60	0.346	301.34	0.5	1.630	A
3	35.90	385.05	331.48	0.108	35.84	0.1	3.150	A
4	231.70	210.92	461.87	0.502	231.90	1.1	4.128	A

Existing Layout - 2033 No Development, Weekday PM Peak Hour

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction Type	Arm order	Junction Delay (s)	Junction LOS
1	A194(M) / A182 / B1288 Interchange	Large Roundabout	1, 2, 3, 4	5.02	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Arms

Arms

[same as above]

Roundabout Geometry

[same as above]

Large Roundabout Data

Arm	Circulating flow (PCU/TS)	Entry-to-exit separation (m)
1	415.40	120.70
2	316.10	50.70
3	609.70	115.60
4	298.20	48.20

Slope / Intercept / Capacity

[same as above]

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time period length (min)	Time segment length (min)
D4	2033 No Development	Weekday PM Peak Hour	DIRECT	16:15	17:45	90	15

Vehicle mix varies over time	Vehicle mix source	PCU Factor for a HV (PCU)	O-D data varies over time
✓	HV Percentages	2.00	✓

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Scaling Factor (%)
1		✓	100.000
2		✓	100.000
3		✓	100.000
4		✓	100.000

Origin-Destination Data

16:15 - 16:30

Demand (PCU/TS)

		To			
		1	2	3	4
From	1	0.00	112.90	0.00	122.70
	2	108.60	2.30	37.90	65.20
	3	1.10	27.20	5.20	12.50
	4	210.40	97.70	21.60	1.10

16:30 - 16:45

Demand (PCU/TS)

		To			
		1	2	3	4
From	1	0.00	136.10	1.10	136.30
	2	139.90	2.30	48.80	78.50
	3	0.00	28.50	9.60	19.70
	4	185.40	102.40	23.10	1.10

16:45 - 17:00

Demand (PCU/TS)

		To			
		1	2	3	4
From	1	0.00	117.70	2.30	128.30
	2	95.40	3.40	53.60	59.20
	3	0.00	34.50	6.40	17.00
	4	186.90	132.50	21.60	0.00

17:00 - 17:15

Demand (PCU/TS)

		To			
		1	2	3	4
From	1	0.00	122.40	1.10	131.00
	2	119.50	6.80	45.90	66.00
	3	0.00	32.20	0.00	18.90
	4	188.40	152.50	25.40	0.00

17:15 - 17:30

Demand (PCU/TS)

		To			
		1	2	3	4
From	1	0.00	121.80	2.30	120.70
	2	104.70	5.70	28.50	60.30
	3	1.10	30.70	0.00	10.20
	4	191.00	146.40	25.00	1.10

17:30 - 17:45

Demand (PCU/TS)

		To			
		1	2	3	4
From	1	0.00	119.40	2.30	116.10
	2	96.50	5.70	23.90	52.40
	3	0.00	37.60	1.70	16.30
	4	180.60	145.70	22.80	0.00

Vehicle Mix

16:15 - 16:30

Heavy Vehicle Percentages

		To			
		1	2	3	4
From	1	0	3	0	8
	2	0	0	10	4
	3	0	4	100	0
	4	3	4	0	0

16:30 - 16:45

Heavy Vehicle Percentages

		To			
		1	2	3	4
From	1	0	3	0	7
	2	2	0	8	1
	3	0	0	100	6
	4	3	1	5	0

16:45 - 17:00

Heavy Vehicle Percentages

		To			
		1	2	3	4
From	1	0	2	0	3
	2	4	0	12	2
	3	0	3	67	27
	4	5	2	0	0

17:00 - 17:15

Heavy Vehicle Percentages

		To			
		1	2	3	4
From	1	0	1	0	5
	2	0	0	3	2
	3	0	4	0	14
	4	3	2	5	0

17:15 - 17:30

Heavy Vehicle Percentages

		To			
		1	2	3	4
From	1	0	0	0	0
	2	0	0	0	2
	3	0	0	0	0
	4	0	1	0	0

17:30 - 17:45

Heavy Vehicle Percentages

		To			
		1	2	3	4
From	1	0	1	0	1
	2	5	0	0	2
	3	0	6	100	8
	4	1	2	0	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max delay (s)	Max Queue (PCU)	Max LOS
1	0.66	6.97	1.9	A
2	0.34	1.73	0.5	A
3	0.19	4.08	0.3	A
4	0.70	5.83	2.3	A

Main Results for each time segment

16:15 - 16:30

Arm	Total Demand (PCU/TS)	Circulating flow (PCU/TS)	Capacity (PCU/TS)	RFC	Throughput (PCU/TS)	End queue (PCU)	Delay (s)	LOS
1	235.60	154.39	443.86	0.531	234.42	1.2	4.510	A
2	214.00	149.86	835.04	0.256	213.65	0.4	1.489	A
3	46.00	298.99	347.98	0.132	45.84	0.2	3.233	A
4	330.80	144.10	538.76	0.614	329.18	1.6	4.394	A

16:30 - 16:45

Arm	Total Demand (PCU/TS)	Circulating flow (PCU/TS)	Capacity (PCU/TS)	RFC	Throughput (PCU/TS)	End queue (PCU)	Delay (s)	LOS
1	273.50	166.85	432.45	0.632	272.91	1.8	5.897	A
2	269.50	170.88	804.43	0.335	269.34	0.5	1.727	A
3	57.80	357.70	303.26	0.191	57.70	0.3	4.082	A
4	312.00	180.16	500.35	0.624	311.94	1.7	4.892	A

16:45 - 17:00

Arm	Total Demand (PCU/TS)	Circulating flow (PCU/TS)	Capacity (PCU/TS)	RFC	Throughput (PCU/TS)	End queue (PCU)	Delay (s)	LOS
1	248.30	198.31	403.63	0.615	248.41	1.7	5.950	A
2	211.60	158.66	822.22	0.257	211.75	0.4	1.551	A
3	57.90	286.48	357.51	0.162	57.94	0.2	3.429	A
4	341.00	139.82	543.32	0.628	340.95	1.7	4.600	A

17:00 - 17:15

Arm	Total Demand (PCU/TS)	Circulating flow (PCU/TS)	Capacity (PCU/TS)	RFC	Throughput (PCU/TS)	End queue (PCU)	Delay (s)	LOS
1	254.50	216.57	386.91	0.658	254.22	1.9	6.970	A
2	238.20	157.34	824.15	0.289	238.16	0.4	1.552	A
3	51.10	323.10	329.61	0.155	51.12	0.2	3.473	A
4	366.30	158.48	523.44	0.700	365.68	2.3	5.834	A

17:15 - 17:30

Arm	Total Demand (PCU/TS)	Circulating flow (PCU/TS)	Capacity (PCU/TS)	RFC	Throughput (PCU/TS)	End queue (PCU)	Delay (s)	LOS
1	244.80	209.08	393.77	0.622	245.07	1.7	6.063	A
2	199.20	149.28	835.88	0.238	199.29	0.3	1.421	A
3	42.00	292.73	352.75	0.119	42.06	0.1	2.897	A
4	363.50	142.26	540.71	0.672	363.76	2.1	5.115	A

17:30 - 17:45

Arm	Total Demand (PCU/TS)	Circulating flow (PCU/TS)	Capacity (PCU/TS)	RFC	Throughput (PCU/TS)	End queue (PCU)	Delay (s)	LOS
1	237.80	213.56	389.66	0.610	237.87	1.6	5.993	A
2	178.50	142.96	845.07	0.211	178.54	0.3	1.393	A
3	55.60	270.78	369.47	0.150	55.54	0.2	3.099	A
4	349.10	141.48	541.55	0.645	349.33	1.9	4.751	A

Existing Layout - 2033 With Development, Weekday AM Peak Hour

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction Type	Arm order	Junction Delay (s)	Junction LOS
1	A194(M) / A182 / B1288 Interchange	Large Roundabout	1, 2, 3, 4	4.41	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Arms

Arms

[same as above]

Roundabout Geometry

[same as above]

Large Roundabout Data

Arm	Circulating flow (PCU/TS)	Entry-to-exit separation (m)
1	273.80	120.70
2	299.00	50.70
3	968.10	115.60
4	507.60	48.20

Slope / Intercept / Capacity

[same as above]

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time period length (min)	Time segment length (min)
D5	2033 With Development	Weekday AM Peak Hour	DIRECT	07:15	08:45	90	15

Vehicle mix varies over time	Vehicle mix source	PCU Factor for a HV (PCU)	O-D data varies over time
✓	HV Percentages	2.00	✓

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Scaling Factor (%)
1		✓	100.000
2		✓	100.000
3		✓	100.000
4		✓	100.000

Origin-Destination Data

07:15 - 07:30

Demand (PCU/TS)

		To			
		1	2	3	4
From	1	0.00	80.80	1.10	95.00
	2	257.60	4.60	29.80	129.00
	3	0.00	9.20	0.00	5.50
	4	146.60	71.30	19.00	0.00

07:30 - 07:45

Demand (PCU/TS)

		To			
		1	2	3	4
From	1	0.00	66.20	2.30	115.50
	2	251.40	4.60	41.60	131.60
	3	0.00	12.10	0.00	5.50
	4	188.60	70.20	18.40	0.00

07:45 - 08:00

Demand (PCU/TS)

		To			
		1	2	3	4
From	1	1.10	93.10	1.10	115.20
	2	240.10	4.60	35.50	128.20
	3	0.00	22.50	0.00	13.30
	4	185.50	86.70	20.70	1.10

08:00 - 08:15

Demand (PCU/TS)

		To			
		1	2	3	4
From	1	0.00	63.10	2.30	140.10
	2	217.20	3.40	30.90	117.00
	3	0.00	18.70	0.00	12.70
	4	144.80	98.80	17.30	0.00

08:15 - 08:30

Demand (PCU/TS)

		To			
		1	2	3	4
From	1	0.00	83.20	3.40	148.40
	2	186.40	3.40	31.80	105.00
	3	0.00	10.30	0.00	10.10
	4	143.40	112.00	18.40	0.00

08:30 - 08:45

Demand (PCU/TS)

		To			
		1	2	3	4
From	1	1.10	76.60	4.00	107.60
	2	183.40	6.90	24.40	90.10
	3	0.00	19.50	0.00	17.30
	4	137.90	93.40	16.10	1.10

Vehicle Mix

07:15 - 07:30

Heavy Vehicle Percentages

		To			
		1	2	3	4
From	1	0	3	0	6
	2	3	0	0	3
	3	0	0	0	0
	4	8	0	7	0

07:30 - 07:45

Heavy Vehicle Percentages

		To			
		1	2	3	4
From	1	0	4	0	11
	2	4	0	3	4
	3	0	25	0	0
	4	5	6	0	0

07:45 - 08:00

Heavy Vehicle Percentages

		To			
		1	2	3	4
From	1	0	3	0	3
	2	3	0	0	4
	3	0	12	0	22
	4	6	1	0	0

08:00 - 08:15

Heavy Vehicle Percentages

		To			
		1	2	3	4
From	1	0	6	0	9
	2	2	0	0	4
	3	0	7	0	11
	4	5	4	0	0

08:15 - 08:30

Heavy Vehicle Percentages

		To			
		1	2	3	4
From	1	0	4	0	7
	2	2	0	8	6
	3	0	0	0	0
	4	5	6	0	0

08:30 - 08:45

Heavy Vehicle Percentages

		To			
		1	2	3	4
From	1	0	8	33	6
	2	3	40	5	1
	3	0	0	0	8
	4	9	1	0	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max delay (s)	Max Queue (PCU)	Max LOS
1	0.50	4.10	1.1	A
2	0.50	2.19	1.0	A
3	0.12	4.10	0.2	A
4	0.71	7.84	2.5	A

Main Results for each time segment

07:15 - 07:30

Arm	Total Demand (PCU/TS)	Circulating flow (PCU/TS)	Capacity (PCU/TS)	RFC	Throughput (PCU/TS)	End queue (PCU)	Delay (s)	LOS
1	176.90	103.52	509.61	0.347	176.35	0.6	2.819	A
2	421.00	114.69	887.57	0.474	420.08	0.9	1.973	A
3	14.70	485.04	291.59	0.050	14.65	0.1	3.249	A
4	236.90	270.79	410.27	0.577	235.48	1.4	5.384	A

07:30 - 07:45

Arm	Total Demand (PCU/TS)	Circulating flow (PCU/TS)	Capacity (PCU/TS)	RFC	Throughput (PCU/TS)	End queue (PCU)	Delay (s)	LOS
1	184.00	105.15	507.90	0.362	183.94	0.6	3.006	A
2	429.20	136.08	855.92	0.501	429.08	1.0	2.190	A
3	17.60	502.93	284.18	0.062	17.58	0.1	3.912	A
4	277.20	268.04	412.65	0.672	276.52	2.1	6.899	A

07:45 - 08:00

Arm	Total Demand (PCU/TS)	Circulating flow (PCU/TS)	Capacity (PCU/TS)	RFC	Throughput (PCU/TS)	End queue (PCU)	Delay (s)	LOS
1	210.50	135.29	476.30	0.442	210.30	0.8	3.481	A
2	408.40	139.09	851.47	0.480	408.49	1.0	2.092	A
3	35.80	490.30	289.42	0.124	35.71	0.2	4.097	A
4	294.00	268.29	412.42	0.713	293.58	2.5	7.845	A

08:00 - 08:15

Arm	Total Demand (PCU/TS)	Circulating flow (PCU/TS)	Capacity (PCU/TS)	RFC	Throughput (PCU/TS)	End queue (PCU)	Delay (s)	LOS
1	205.50	138.46	472.98	0.434	205.48	0.8	3.633	A
2	368.50	159.66	821.05	0.449	368.62	0.8	2.039	A
3	31.40	477.69	294.64	0.107	31.43	0.1	3.716	A
4	260.90	239.40	437.33	0.597	261.85	1.6	5.376	A

08:15 - 08:30

Arm	Total Demand (PCU/TS)	Circulating flow (PCU/TS)	Capacity (PCU/TS)	RFC	Throughput (PCU/TS)	End queue (PCU)	Delay (s)	LOS
1	235.00	144.14	467.03	0.503	234.77	1.1	4.096	A
2	326.60	170.10	805.61	0.405	326.73	0.7	1.951	A
3	20.40	443.22	308.93	0.066	20.46	0.1	3.121	A
4	273.80	200.23	471.09	0.581	273.89	1.5	4.798	A

08:30 - 08:45

Arm	Total Demand (PCU/TS)	Circulating flow (PCU/TS)	Capacity (PCU/TS)	RFC	Throughput (PCU/TS)	End queue (PCU)	Delay (s)	LOS
1	189.30	137.11	474.39	0.399	189.65	0.7	3.392	A
2	304.80	130.17	864.66	0.353	304.95	0.6	1.658	A
3	36.80	390.58	330.74	0.111	36.74	0.1	3.171	A
4	248.50	210.92	461.87	0.538	248.74	1.2	4.449	A

Existing Layout - 2033 With Development, Weekday PM Peak Hour

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction Type	Arm order	Junction Delay (s)	Junction LOS
1	A194(M) / A182 / B1288 Interchange	Large Roundabout	1, 2, 3, 4	5.34	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Arms

Arms

[same as above]

Roundabout Geometry

[same as above]

Large Roundabout Data

Arm	Circulating flow (PCU/TS)	Entry-to-exit separation (m)
1	428.10	120.70
2	328.00	50.70
3	636.50	115.60
4	298.20	48.20

Slope / Intercept / Capacity

[same as above]

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time period length (min)	Time segment length (min)
D6	2033 With Development	Weekday PM Peak Hour	DIRECT	16:15	17:45	90	15

Vehicle mix varies over time	Vehicle mix source	PCU Factor for a HV (PCU)	O-D data varies over time
✓	HV Percentages	2.00	✓

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Scaling Factor (%)
1		✓	100.000
2		✓	100.000
3		✓	100.000
4		✓	100.000

Origin-Destination Data

16:15 - 16:30

Demand (PCU/TS)

		To			
		1	2	3	4
From	1	0.00	112.90	0.00	127.40
	2	108.60	2.30	37.90	74.00
	3	1.10	27.20	5.20	14.70
	4	213.10	102.70	22.90	1.10

16:30 - 16:45

Demand (PCU/TS)

		To			
		1	2	3	4
From	1	0.00	136.10	1.10	140.90
	2	139.90	2.30	48.80	87.30
	3	0.00	28.50	9.60	21.90
	4	188.10	107.50	24.40	1.10

16:45 - 17:00

Demand (PCU/TS)

		To			
		1	2	3	4
From	1	0.00	117.70	2.30	133.00
	2	95.40	3.40	53.60	67.90
	3	0.00	34.50	6.40	19.20
	4	189.60	137.60	22.90	0.00

17:00 - 17:15

Demand (PCU/TS)

		To			
		1	2	3	4
From	1	0.00	122.40	1.10	135.70
	2	119.50	6.80	45.90	74.80
	3	0.00	32.20	0.00	21.10
	4	191.10	157.60	26.70	0.00

17:15 - 17:30

Demand (PCU/TS)

		To			
		1	2	3	4
From	1	0.00	121.80	2.30	125.30
	2	104.70	5.70	28.50	69.10
	3	1.10	30.70	0.00	12.50
	4	193.70	151.50	26.30	1.10

17:30 - 17:45

Demand (PCU/TS)

		To			
		1	2	3	4
From	1	0.00	119.40	2.30	120.80
	2	96.50	5.70	23.90	61.10
	3	0.00	37.60	1.70	18.50
	4	183.40	150.80	24.00	0.00

Vehicle Mix

16:15 - 16:30

Heavy Vehicle Percentages

		To			
		1	2	3	4
From	1	0	3	0	8
	2	0	0	10	4
	3	0	4	100	0
	4	3	4	0	0

16:30 - 16:45

Heavy Vehicle Percentages

		To			
		1	2	3	4
From	1	0	3	0	7
	2	2	0	8	1
	3	0	0	100	6
	4	3	1	5	0

16:45 - 17:00

Heavy Vehicle Percentages

		To			
		1	2	3	4
From	1	0	2	0	3
	2	4	0	12	2
	3	0	3	67	27
	4	5	2	0	0

17:00 - 17:15

Heavy Vehicle Percentages

		To			
		1	2	3	4
From	1	0	1	0	5
	2	0	0	3	2
	3	0	4	0	14
	4	3	2	5	0

17:15 - 17:30

Heavy Vehicle Percentages

		To			
		1	2	3	4
From	1	0	0	0	0
	2	0	0	0	2
	3	0	0	0	0
	4	0	1	0	0

17:30 - 17:45

Heavy Vehicle Percentages

		To			
		1	2	3	4
From	1	0	1	0	1
	2	5	0	0	2
	3	0	6	100	8
	4	1	2	0	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max delay (s)	Max Queue (PCU)	Max LOS
1	0.68	7.58	2.1	A
2	0.35	1.78	0.6	A
3	0.20	4.23	0.3	A
4	0.72	6.19	2.5	A

Main Results for each time segment

16:15 - 16:30

Arm	Total Demand (PCU/TS)	Circulating flow (PCU/TS)	Capacity (PCU/TS)	RFC	Throughput (PCU/TS)	End queue (PCU)	Delay (s)	LOS
1	240.30	160.63	437.10	0.550	239.03	1.3	4.767	A
2	222.80	155.78	826.15	0.270	222.42	0.4	1.534	A
3	48.20	312.40	339.66	0.142	48.02	0.2	3.337	A
4	339.80	144.09	538.77	0.631	338.06	1.7	4.583	A

16:30 - 16:45

Arm	Total Demand (PCU/TS)	Circulating flow (PCU/TS)	Capacity (PCU/TS)	RFC	Throughput (PCU/TS)	End queue (PCU)	Delay (s)	LOS
1	278.10	173.24	425.70	0.653	277.43	1.9	6.342	A
2	278.30	176.74	795.97	0.350	278.13	0.6	1.783	A
3	60.00	371.05	296.51	0.202	59.90	0.3	4.227	A
4	321.10	180.15	500.36	0.642	321.02	1.8	5.138	A

16:45 - 17:00

Arm	Total Demand (PCU/TS)	Circulating flow (PCU/TS)	Capacity (PCU/TS)	RFC	Throughput (PCU/TS)	End queue (PCU)	Delay (s)	LOS
1	253.00	204.71	397.25	0.637	253.12	1.8	6.406	A
2	220.30	164.66	813.37	0.271	220.46	0.4	1.595	A
3	60.10	299.89	348.87	0.172	60.14	0.2	3.571	A
4	350.10	139.82	543.32	0.644	350.06	1.9	4.816	A

17:00 - 17:15

Arm	Total Demand (PCU/TS)	Circulating flow (PCU/TS)	Capacity (PCU/TS)	RFC	Throughput (PCU/TS)	End queue (PCU)	Delay (s)	LOS
1	259.20	222.93	380.78	0.681	258.88	2.1	7.584	A
2	247.00	163.31	815.31	0.303	246.95	0.4	1.601	A
3	53.30	336.57	321.88	0.166	53.32	0.2	3.610	A
4	375.40	158.48	523.44	0.717	374.71	2.5	6.186	A

17:15 - 17:30

Arm	Total Demand (PCU/TS)	Circulating flow (PCU/TS)	Capacity (PCU/TS)	RFC	Throughput (PCU/TS)	End queue (PCU)	Delay (s)	LOS
1	249.40	215.49	387.50	0.644	249.71	1.8	6.548	A
2	208.00	155.21	826.98	0.252	208.10	0.3	1.465	A
3	44.30	306.16	344.26	0.129	44.37	0.1	3.004	A
4	372.60	142.27	540.71	0.689	372.88	2.3	5.395	A

17:30 - 17:45

Arm	Total Demand (PCU/TS)	Circulating flow (PCU/TS)	Capacity (PCU/TS)	RFC	Throughput (PCU/TS)	End queue (PCU)	Delay (s)	LOS
1	242.50	219.87	383.54	0.632	242.58	1.8	6.452	A
2	187.20	148.87	836.10	0.224	187.24	0.3	1.430	A
3	57.80	284.19	360.42	0.160	57.74	0.2	3.214	A
4	358.20	141.48	541.55	0.661	358.45	2.0	4.991	A