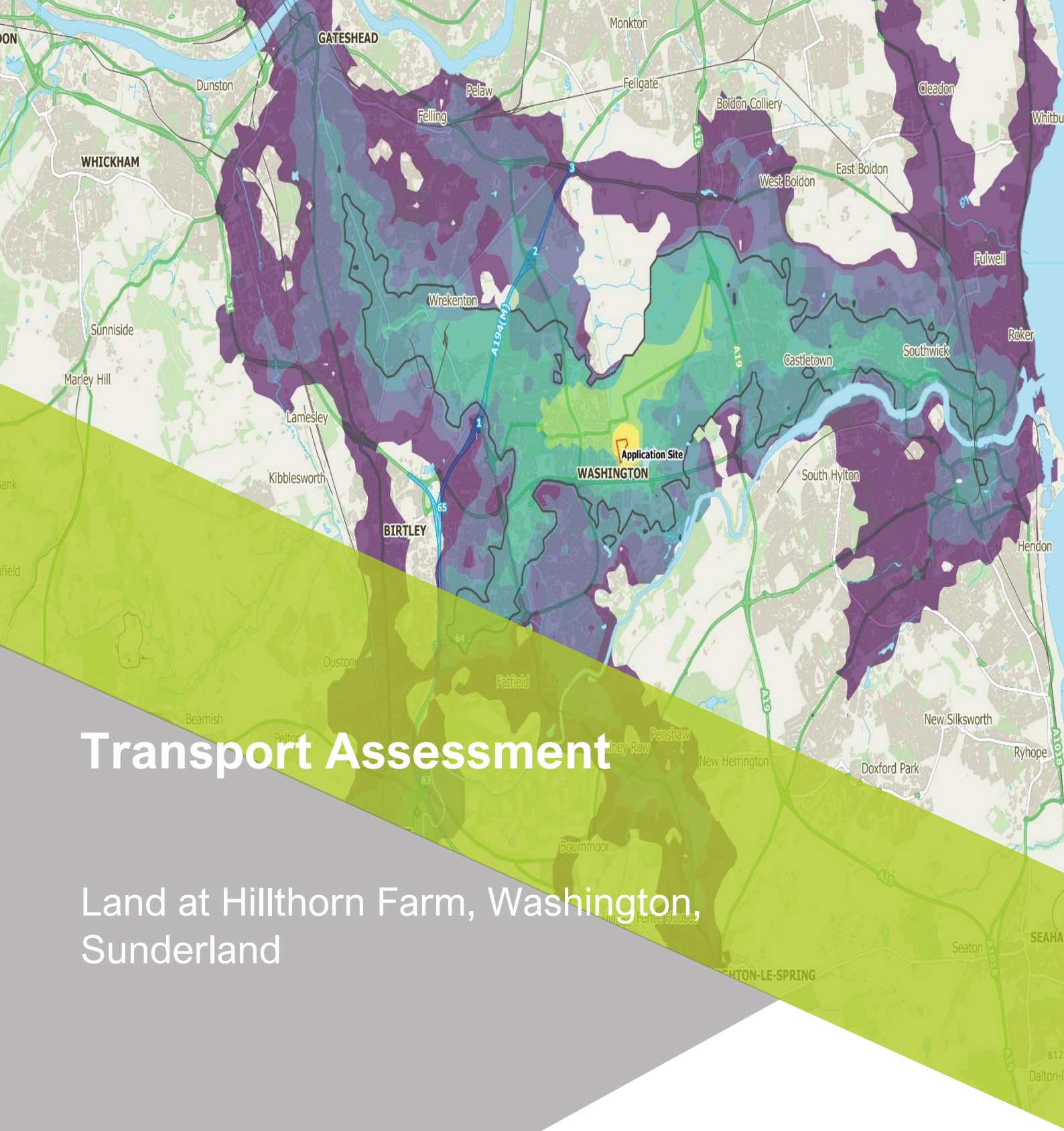

Transport Assessment

Land at Hillthorn Farm, Washington, Sunderland

Job Ref:	BR-516-0001
Revision:	03
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1. Introduction

1.1 Background

1.1.1 Calibro has been appointed by *Rolton Kilbride* (herein referred to as "the Applicant") to provide an appraisal of the traffic and transport implications of a proposed Renewable Energy Centre on Land at Hillthorn Farm, Washington, Sunderland.

1.1.2 The proposals comprise the construction of a modern energy production facility with capacity to process 215,000 tonnes of residual (i.e. non-recyclable) waste per annum via the highly efficient and low-emission process of gasification. The proposed development will enable existing and planned future commercial land-uses in the locality to easily access a secure source of renewable energy, and it is understood that the Applicant has commenced discussions with nearby industrial customers that may be interested in taking the future energy generated by the facility.

1.1.3 The operation of the facility shall necessitate the delivery of residual waste to the Plant and the export of inert ash, which can be reused for as a component of cement or as a secondary aggregate in the building of roads. However, the site's location near to the high-capacity and high-speed strategic road network allows for the efficient transportation of waste and close to its origins, minimising vehicular mileage and the associated environmental costs.

1.1.4 This report has therefore been prepared with the purpose of providing the Local Planning and Highway Authorities with an evidence base that establishes the magnitude and severity of the transport-related development effects. The assessment process has been undertaken with due regard to best practice and current policy, particularly in respect of relevant local and national policy.

1.1.5 In this regard, the assessment draws occasional reference to the following principal documents:

- LTP3: The Third Local Transport Plan for Tyne and Wear (Strategy 2011 – 2021);
- National Planning Policy Framework (NPPF);

- National Planning Practice Guidance (NPPG): Transport Evidence Bases in Plan Making and Decision Taking; and
- National Planning Practice Guidance (NPPG): Overarching Principles on Travel Plans, Transport Assessments and Statements.

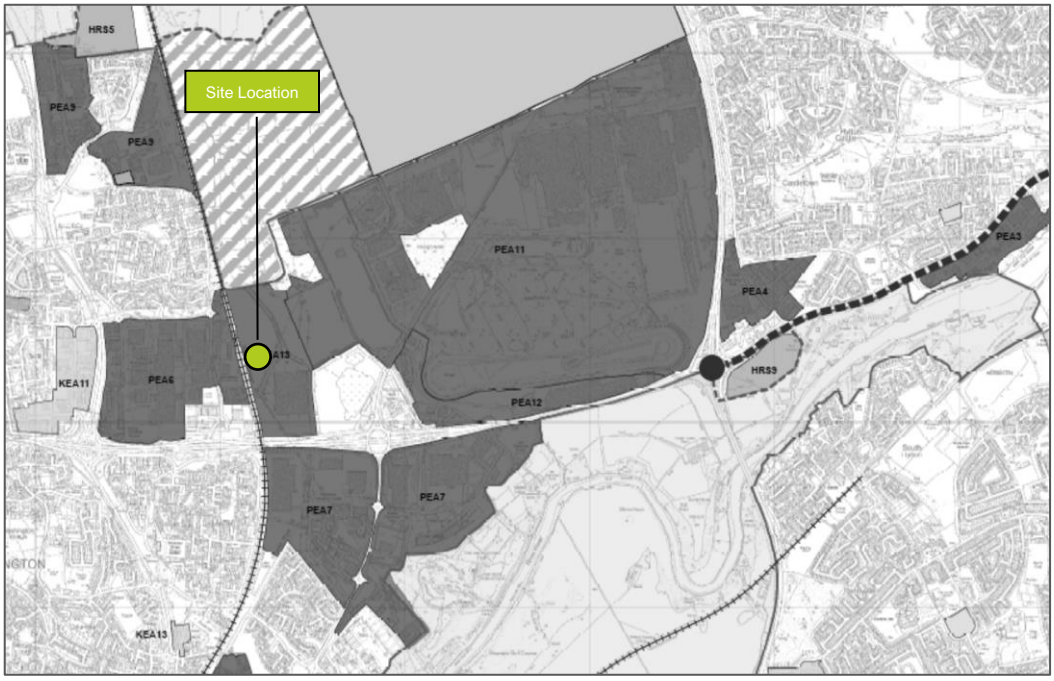
1.2 Site Location

1.2.1 The application site forms part of the A19 Ultra Low Carbon Vehicle Enterprise Zone, Site 3: Hillthorn Farm. Hillthorn Farm comprises former agricultural land located to the west of the Sunderland Nissan Plant and immediately east of the disused Leamside Railway.

1.2.2 According to assumptions made within the planning application for enabling infrastructure works (15/00671/HYE), Site 3 of the Enterprise Zone is anticipated to accommodate some 95,400sqm of industrial uses in total.

1.2.3 The application site is shown in its strategic context below.

Figure 1.1 – Strategic Site Context (Extract of Policies Map, Draft Core Strategy)



1.2.4 The application site forms a triangular parcel of land comprising some 3.17 hectares of allocated employment land plus a 3-metre corridor indicating the alignment of electricity connection route. The site defined at its southern and eastern boundaries by Infiniti Drive, which is a purpose-built industrial road constructed to serve the envisaged needs of the Hillthorn Farm employment area. The disused Leamside Railway line delineates the site's western boundary whilst the northern boundary abuts an area of land currently used as the compound associated with the construction of the Phase 1b infrastructure works involving the A1290.

1.2.5 The application site is shown in its local context below.

Figure 1.2 – Local Site Context

1.2.6 The application site does not currently benefit from a direct means of vehicular access, although the site enjoys extensive frontage access onto the newly constructed Infiniti Drive, which is a purpose-built industrial estate road with contiguous footways on either side of the carriageway.

1.3 Structure of the Report

1.3.1 This report has been prepared as a Transport Assessment to provide the planning and highway authorities with the evidence they require to consider the implications of a planning application for the proposed construction of a Renewable Energy Centre (REC) on land at Hillthorn Farm, Washington.

1.3.2 The suggested parameters of this assessment were set out in an informal scoping email to the Local Highway Authority on 31st July 2017, and an offer was also made to meet on site. Regrettably, and despite a number of requests, a response was not forthcoming.

1.3.3 Nevertheless, this report has adopted what is considered to be a robust scope in the interests of providing a suitable evidence base that allows the local highway authority to provide a positive consultation response to the forthcoming application.

1.3.4 In this way, the report sets out the various considerations under the following structure:

Section 2. Development Proposals

This section of the report outlines those elements of the proposed development that are pertinent to transport, movement and accessibility.

Section 3. Travel Credentials: Non-Car Access

The non-car accessibility credentials of the application site are considered within this section of the report. An accessibility model has been created to inform the analysis and to show the site's relationship to key trip producers. This is supplemented by a review of the interconnecting infrastructure.

Section 4. Travel Credentials: Car-Borne Access

This section of the report considers the geometry of the vehicular highway network in the locality of the application site and considers whether it is suitable to accommodate the physical requirements of the expected vehicular movements generated by day-to-day operation of the proposed development.

Section 5. Baseline Traffic Demand

This section of the report identifies the cumulative baseline traffic conditions on the study area highway network, upon which the magnitude and severity of the development effects will be considered later in this report.

Section 6. Development Effects

This section of the report evaluates the trip generation potential of the proposed development, including distribution and assignment methodologies.

Section 7. Development Impact

This section of the report considers the impact of the proposed development in respect of the net change in traffic demand throughout the study area highway network, and the resultant capacity performance of the highway junctions.

Section 8. Travel Planning

The requirements for a Travel Plan are identified within this section of the report.

Section 9. Summary and Conclusion

A summary of the salient findings of the report are provided within this section and these are used to evidence an overarching conclusion regarding the suitability of the proposed development.

2. Development Proposals

2.1 Application Details

2.1.1 A detailed description of the proposed development is provided at Chapter 3 of the Environmental Statement and within the Planning Statement prepared by Pegasus Group which accompany the planning application. However, an extract of the development site layout is shown below whilst a larger scale plan is contained at Appendix 1.

Figure 2.1 – Development Site Layout

2.1.2 In respect of traffic and transport, the salient elements of the proposed scheme may be summarised as follows: -

a) Vehicular access shall be achieved via a newly constructed priority T-junction towards the western limits of Infiniti Drive. Further details regarding the detail of the junction are provided in the subsequent section of this report.

b) The proposed development shall incorporate two processing lines, each with the capacity to process 100,000 tonnes of Refuse Derived Fuel (RDF) per annum. Notwithstanding, to ensure a rigorous assessment, this assessment assumes an

annual process rate of 215,000 tonnes per annum;

c) The facility shall be operational 24-hours a day, 7-days a week although deliveries will be restricted to weekdays (7am to 7pm) and Saturday mornings (7am to 2pm). Allowing for shut-down and maintenance periods, the total number of operational days shall be 313 each year;

d) The facility will create a total of 35 jobs which shall comprise of the following mix. The facility will operate three shifts of 8-hours (6am>2pm, 2pm>10pm and 10pm>6am);

Table 2-1 Anticipated Staff Numbers

Job Role	Number of Staff
Plant Manager	x1
Operations Manager	x1
Maintenance Manager	x1
SHE Advisor / Chemist	x1
Administration Staff	x1
Operations Shift Team Leaders	x1 per shift (5 total)
Plant Operatives	x3 per shift (15 total)
Maintenance Staff	x6
Day Operatives	x4
Total	35 staff

e) The proposed development incorporates parking for up to 35 vehicles which allows for the doubling of demand that occurs during shift changeovers and allowances for visitors. The facility also incorporates parking for one coach, which may be occasionally used as part of arranged education visits.

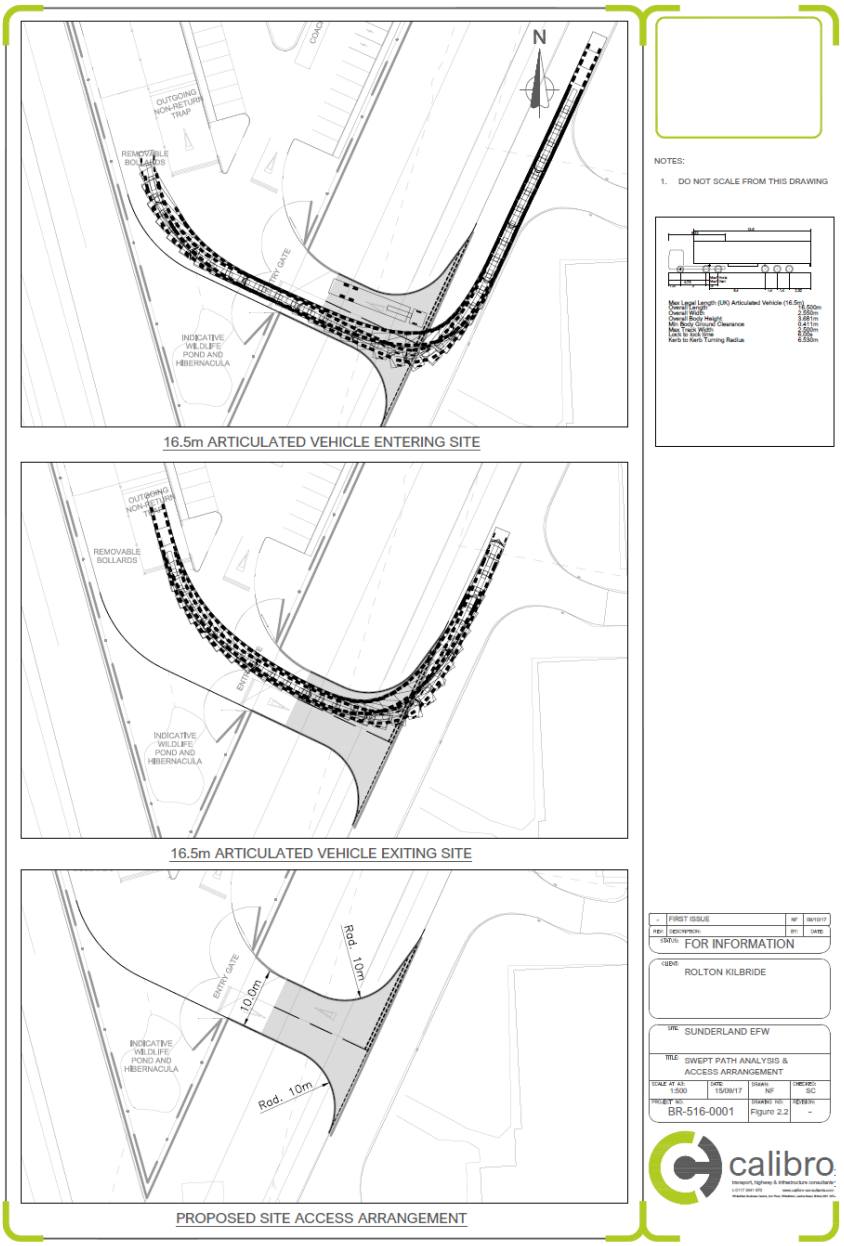
2.2 Vehicular Access

Means of Access

2.2.1 Vehicular access to the site shall be via a newly constructed priority T-junction onto Infiniti Drive, located towards the western extent of the site. Given the position of the site, the junction will accommodate right-turning vehicles on the inbound and left-turning outbound vehicles. To reflect this, the junction has been designed with 10-metre connecting onto a 10-metre access.

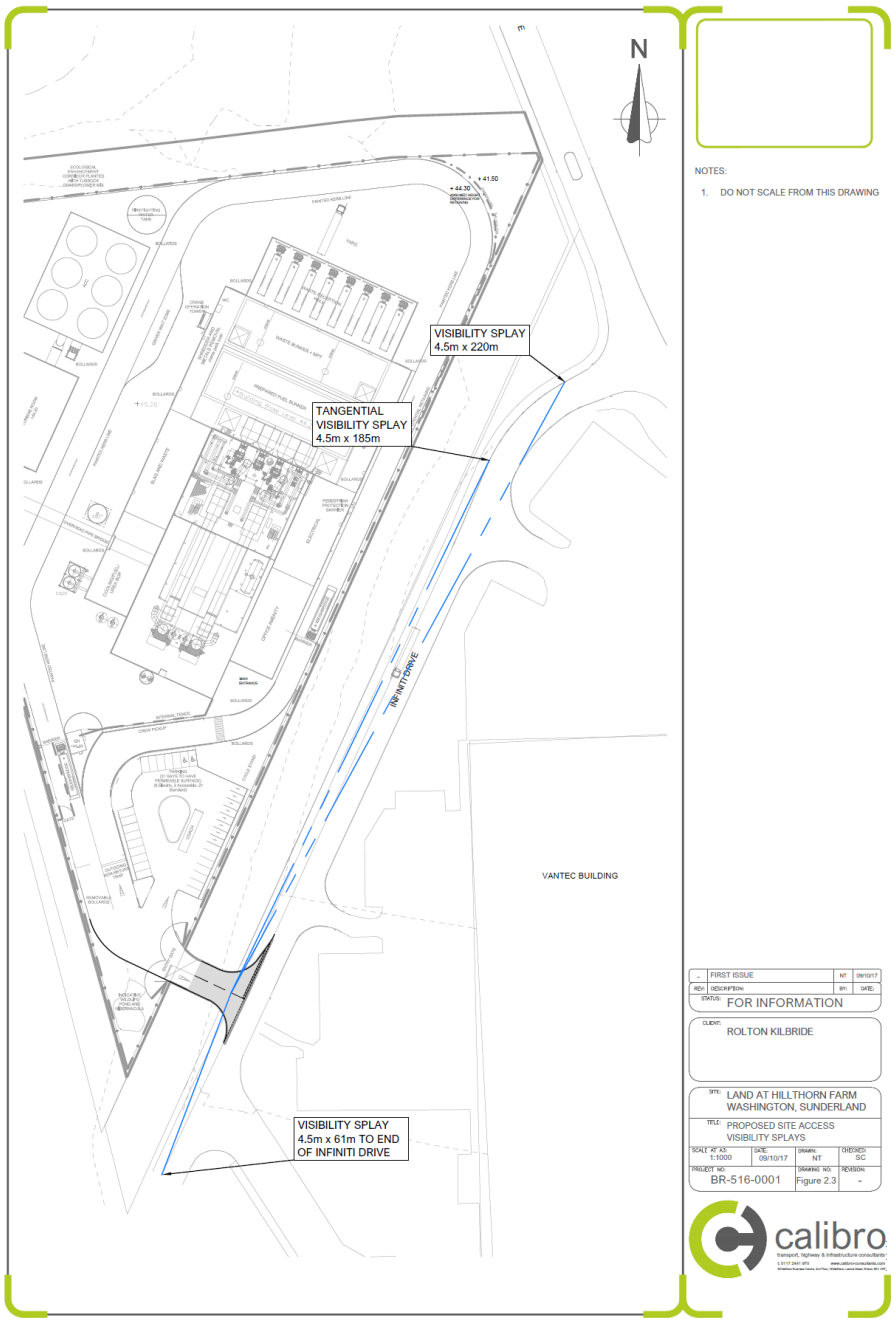
2.2.2 The geometry of the access has been assessed in respect of the swept-path requirements of the vehicles most likely to be visiting the proposed facility and in this respect, we have assumed a 16.5-metre FTA Design articulated goods vehicle. The results of the analysis are shown below and to scale at Appendix 2. They confirm that the articulated vehicles are able to enter and exit the site concurrently, without conflict and therefore without jeopardising the safe and efficient movement of vehicles on the public highway.

Figure 2.2 – Swept Path Analysis



2.2.3 In respect of visibility, the achievable envelope would exceed that suggested by even the most onerous guidance, which is the Design Manual for Roads and Bridges (DRMB) and which suggests a visibility envelope of 70-metres from a 4.5-metre set-back for a 30mph road. As shown below (and to scale on the plan at Appendix 3), the achievable splay would be in excess of 200-metres.

Figure 2.3 – Visibility Splay Analysis



On-Site Circulation

2.2.4 Upon entering the site, all deliveries will be directed northwards along the western boundary of the site to an automated weighbridge and barrier-control entry system. The position of the barrier-control ensures that there is sufficient space to stack five articulate vehicles away from the public highway, although it is noted that such demand is improbable (refer to Section 6.).

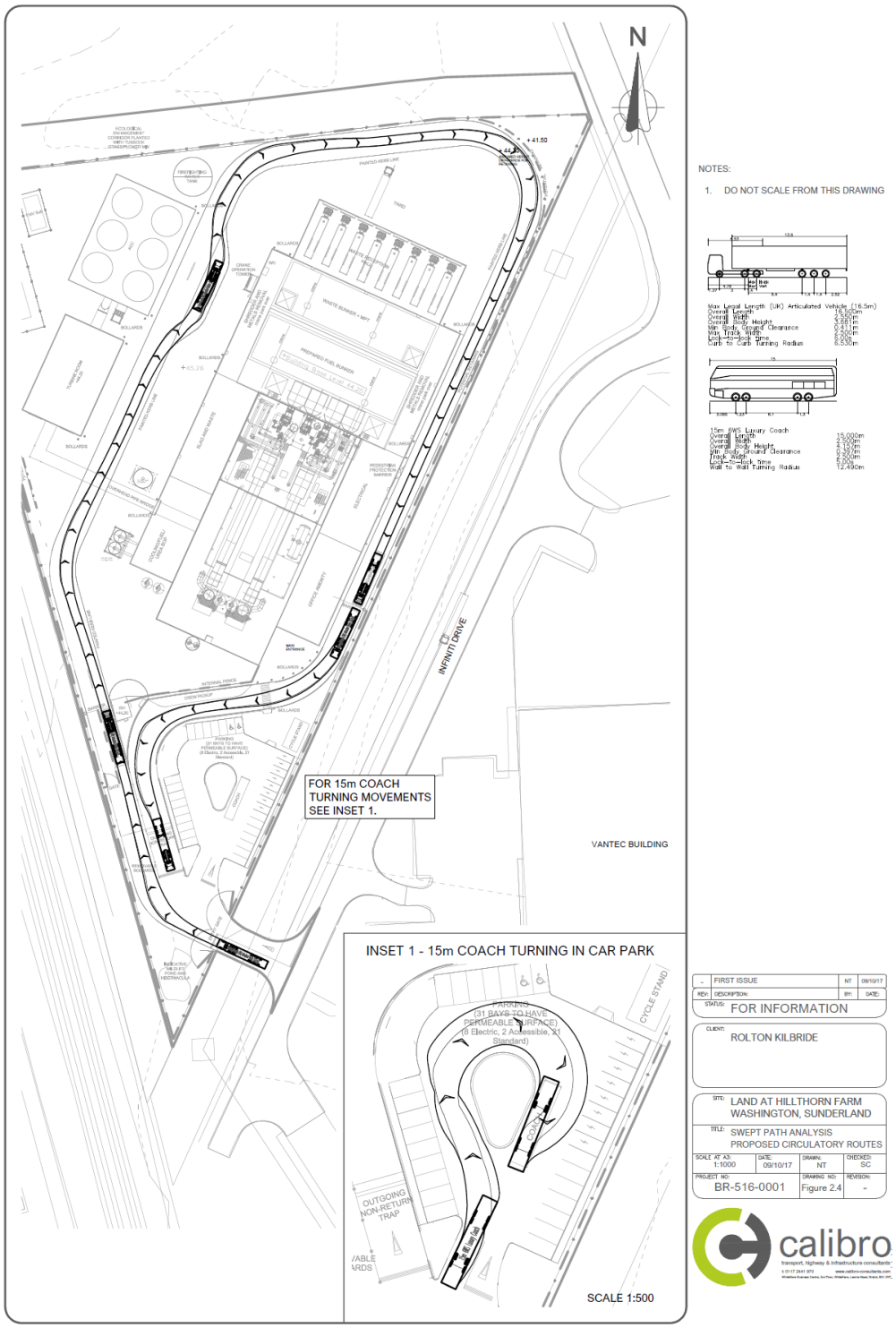
2.2.5 A clockwise one-way system will operate within the site, directing deliveries to the enclosed reception area to the north of the building, where waste will be deposited in a bunker that has capacity to ensure the continued operation of the facility for up to three days should there be no deliveries. In this way, the facility avoids the need for vehicles to deliver waste in convoy. Vehicles will then exit the enclosed reception building and continue in a clockwise direction to an automated weighbridge and barrier control located adjacent to the administrative office, before exiting onto Infiniti Drive.

2.2.6 Articulated vehicles arriving to collect the inert ash that is produced by the gasification process or otherwise to collect metals removed from the waste-stream for recycling, shall broadly follow the same circulation route albeit that collections shall occur along the long edges of the building.

2.2.7 For all other traffic, including staff and visitors, a dedicated car park shall be accessible prior to the operational areas controlled by the automated barrier entry system. In this way, smaller vehicles avoid conflict with larger goods vehicles. Priority walk routes are provided between the car parking area and the facility.

2.2.8 The proposed circulation routes are illustrated on the plan below, and to scale on the plan at Appendix 2.

Figure 2.4 – Proposed Circulation Routes



2.3 Goods Vehicle Routing (Off Site)

2.3.1 The application site forms part of the A19 Ultra Low Carbon Vehicle Enterprise Zone, Site 3: Hillthorn Farm anticipated to accommodate some 95,400sqm of industrial uses in total. To the east lies the Nissan Sunderland car manufacturing plant and to the west is a large area of commercial uses lying to the south of Glover Road and along the northern section of Spire Road, including the Bentall Business Park and Tower Road estate.

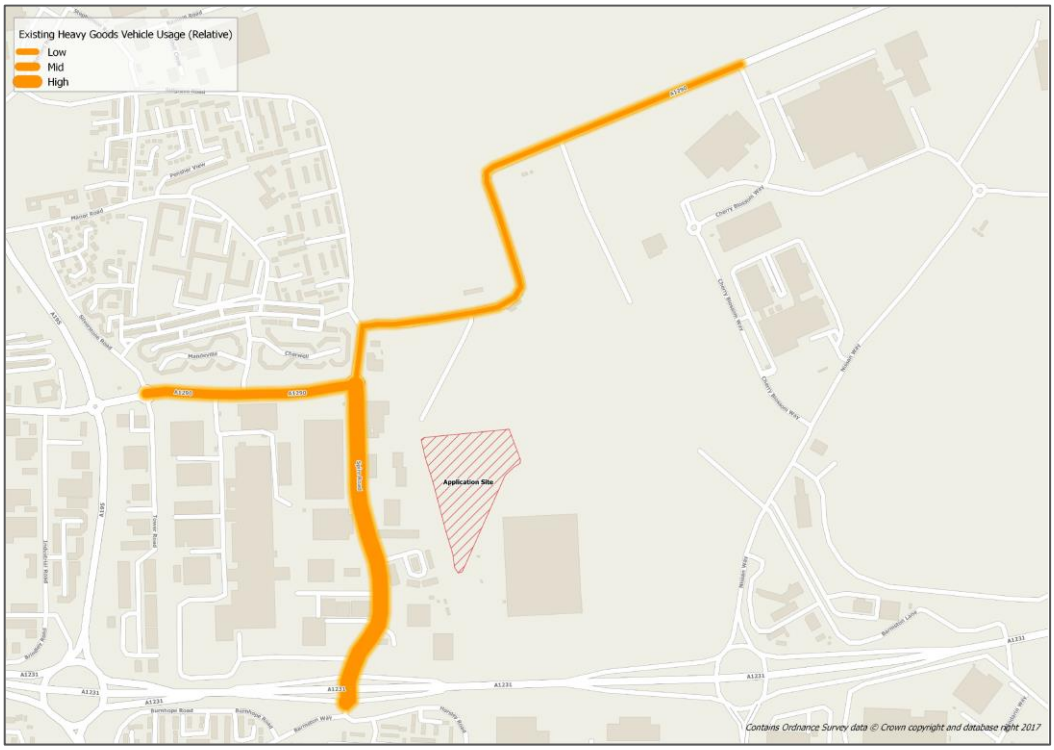
2.3.2 The surrounding area therefore has a recognised semi-industrial character and the road network will have an established use by heavy goods vehicles, which will implicitly be expected to increase as a result of development within the PEA.

2.3.3 In relation to the proposed development, heavy goods vehicles are anticipated to arrive via the A19 to the north or the A1231-Sunderland Highway to the south. However, the origins of waste arisings are expected to fluctuate over time and a flexible routing system is therefore required.

2.3.4 To inform the routing of goods vehicles, the relative composition of goods vehicle traffic on Spire Road, Glover Road and A1290-Washington Road has been explored by reference to traffic surveys undertaken in 2016 (refer to Section 5. for further information). Note that the surveys on Glover Road were undertaken close to the junction with Spire Road and therefore omit of traffic generated by the Tower Road and Bentall Business Parks with a destination to the west. Actual goods vehicles numbers are therefore likely to be higher.

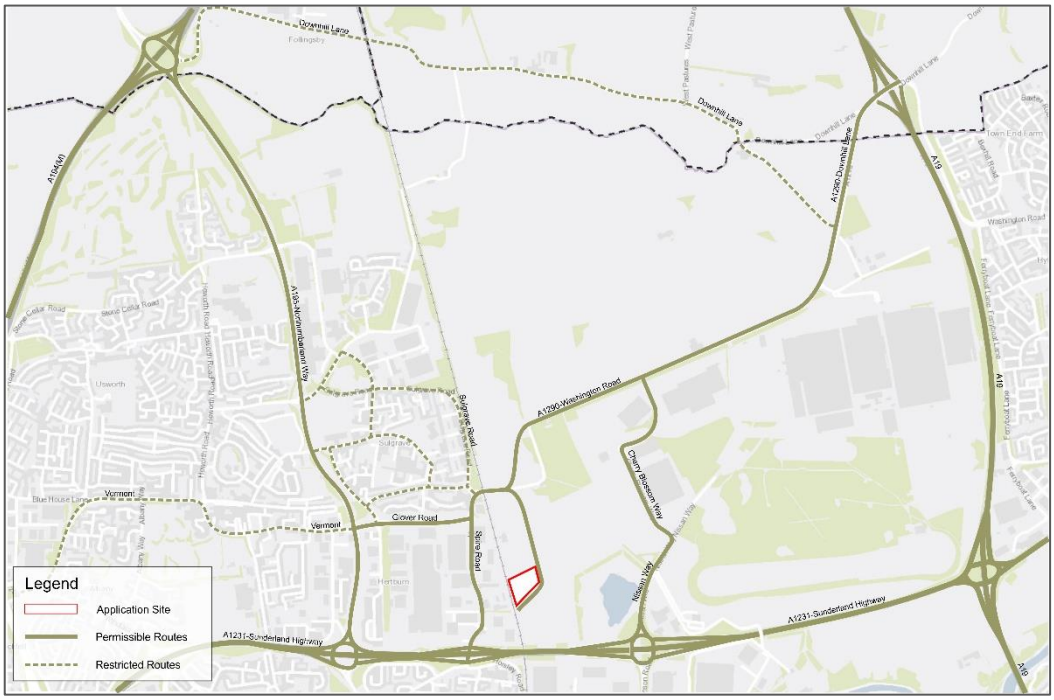
2.3.5 The results are shown graphically below and clearly indicate that goods vehicles frequently travel along Spire Road and Glover Road and to a lesser degree along the western section of the A1290-Washington Road.

Figure 2.5 – Existing Road Use by Heavy Goods Vehicles



2.3.6 In addition to the existing levels of use considered above, it is considered that the geometry of the roads and local environs are suitable for the continued use by goods vehicle traffic. Thus, taking this into account, the following goods vehicle routing is proposed.

Figure 2.6 – Proposed Goods Vehicle Routing



2.4 Pedestrian & Cycle Access Arrangements

2.4.1 Pedestrian and cycle access is provided via the proposed access road onto Infiniti Drive, located towards the site's western extent.

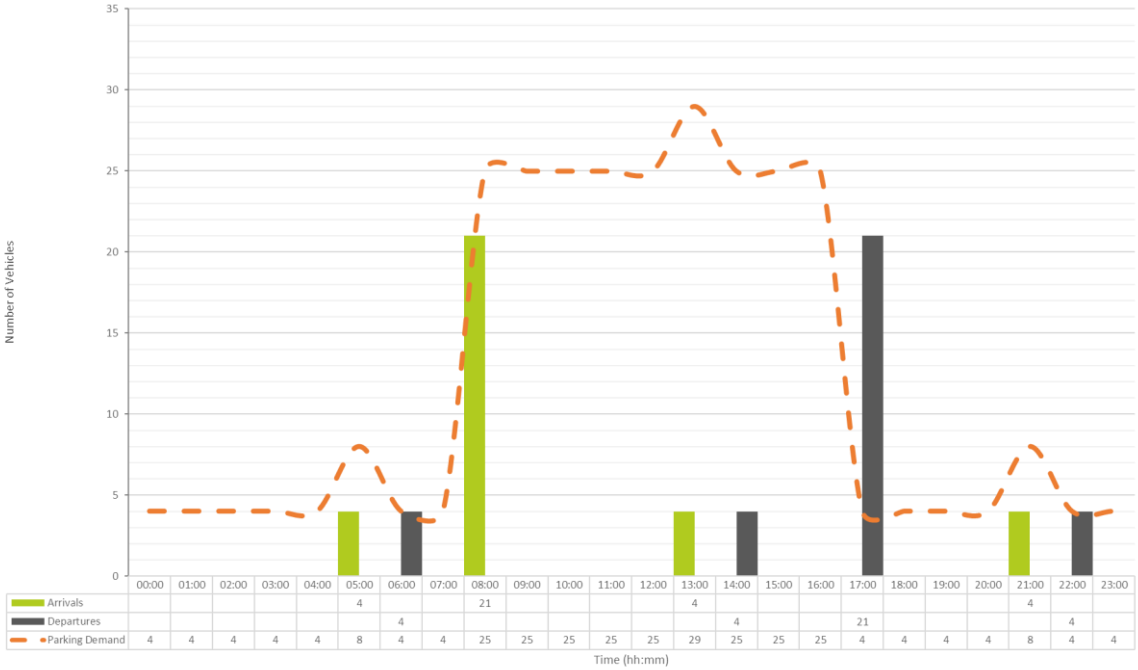
2.4.2 The proposals therefore afford direct, convenient and safe access for pedestrians and cyclists.

2.5 Parking Provision

2.5.1 The application site is covered by Sunderland City Council's Supplementary Planning Guidance (SPD) entitled *Development Control Guidelines* which was adopted in June 2000. However, the operation of the site falls to be sui generis and consequently there are no appropriate standards on which to appraise the provision.

2.5.2 Nevertheless, the proposals include 33 car parking spaces, inclusive of two disabled bays and eight electric vehicle charging bays. This has been calculated on the basis of the employment schedule identified at Section 2.1 which suggests (as illustrated in the below graph) that peak parking demand will generated around the 2pm shift changeover, where demand for 29 car parking spaces will arise. The residual spaces would ensure sufficient space for visitors.

Graph 2.1 Car Parking Demand Profile



	00:00	01:00	02:00	03:00	04:00	05:00	06:00	07:00	08:00	09:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
Arrivals						4			21					4								4		
Departures							4								4			21					4	
Parking Demand	4	4	4	4	4	8	4	4	25	25	25	25	25	29	25	25	25	4	4	4	4	8	4	4

3. Travel Credentials: Non-Car Access

3.1 Introduction

3.1.1 The non-car accessibility credentials of the application site have been considered by way of GIS-based modelling, using centralised travel networks and public transport data to identify the catchment of each mode.

3.2 Access by Foot

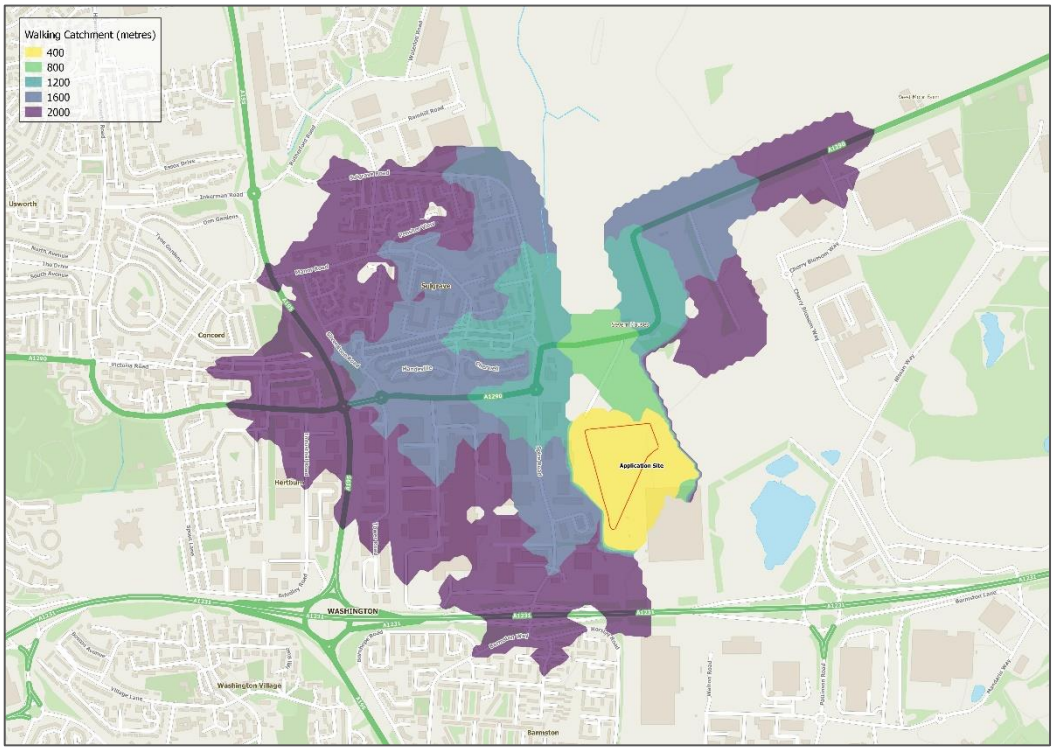
3.2.1 The application site is connected via a well-formed and maintained network of footways that provide connectivity to the nearby bus stops (refer to Section 3.4) retail, and residential areas from which potential staff may reside.

3.2.2 Indeed, it is noted that there is a contiguous footway along both sides of Infiniti Drive that enable onward connectivity between the application site and the nearby residential areas of Sulgrave, Hertburn and Barmston. The footway is newly constructed and is therefore of excellent quality, with a smooth surface, illuminated to modern standards and dropped-kerb crossings with tactile paving. The route is the main desire line for the existing Ventec building, opposite.

3.2.3 The Institute of Highways & Transportation (IHT) Guidance entitled *Guidelines for Providing for Journeys on Foot* identifies 2-kilometres as the preferred maximum distance for commuting trips. The accessible areas within these thresholds have been identified by way of a GIS-based accessibility model which has been constructed with reference to the available travel infrastructure.

3.2.4 The results are provided below and at a larger scale at Appendix 4.

Figure 3.1 – Modelled Walk Catchment



3.2.5 The results of the above analysis indicate that future staff of the proposed facility would be able to travel from Sulgrave, Hertburn and the northern fringes of Barmston.

3.2.6 The application site therefore affords sufficient opportunities to travel by foot in line the various local and national sustainable transport policies. Indeed, the site's allocation for employment use suggests that the local authorities implicitly accept the accessibility credentials of the site and broad compliance with policy.

3.3 Accessibility by Bike

3.3.1 The industry-standard distance over which cycling is feasible for most of the population is 5-kilometres, although it is noted that there will always be a part of the population that have a natural propensity to cycle and will be willing and able to travel further by bike.

3.3.2 The application site within close proximity to a 'traffic free path' that runs from the Sulgrave Road to the north-west and connects to Route 7 of the National Cycle Network to the southeast, or towards Boldon in the northeast. This is shown by the Sunderland Cycle Map which is extracted below for convenience. A larger scale copy is provided at Appendix 5.

Figure 3.2 – The Sunderland Cycle Map (Extract)

3.3.3 Allied to the above, many of the roads in the locality are of sufficient geometry and with relatively low traffic speeds and volume that enable informal cycling to occur within the carriageway of the road, without detriment to safety.

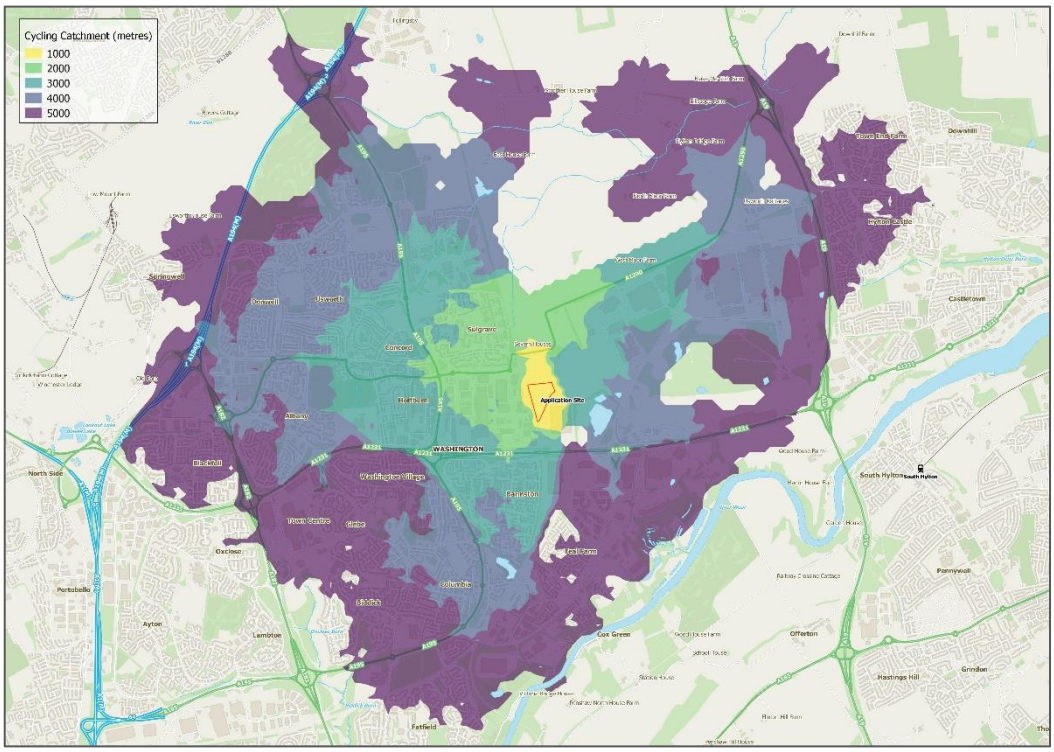
3.3.4 Indeed, a review of Strava data demonstrates that roads not included in the Sunderland Cycle Map are still frequently used by cyclists, including Glover Road, Sulgrave Road, Northumberland Way and Spire Way.

Figure 3.3 – STRAVA Heatmap (extracted 27th August 2018)

3.3.5 A review of personal injury accidents (refer to Section 4.3) also confirms that there is no unacceptable safety risk involving cyclists along these routes and, as such, they have been incorporated within the accessibility model which has been used to identify the geographical areas that are accessible within 5-kilomtres of the application site.

3.3.6 The results are illustrated below whilst a larger scale plan is provided at Appendix 4

Figure 3.4 – Modelled Cycle Catchment



3.3.7 On the basis of the model results, residents of the proposed development would be able to access a significant geographical area by bike, including as far as Blackfell and Springwell to the west, Columbia and Fatfield to the south, and Hylton Castle and Downhill to the east.

3.3.8 On this basis, the application site would afford an opportunity for journeys to and from the site to be undertaken by bike, in line with current local and national sustainable transport policy objectives.

3.4 Accessibility by Bus

3.4.1 It is accepted that public transport accessibility comprises two principal aspects:

1. Access to public transport which is concerned with how far the development is from the public transport network and the level of service on that network; and

2. Access by public transport which takes account of where the services go and the opportunities to access amenities located within the catchment areas served.

3.4.2 In the case of the first criterion, the application site is located just 360-metres from the nearest bus stop which is located on immediately west of the junction between Infiniti Drive and the A1290-Washington Road. The distance to the nearest serviced bus stops is therefore compliant with the maximum desirable distance of 400-metres identified by the Institute of Highways & Transportation (IHT) document entitled *Planning for Public Transport in Developments*.

3.4.3 In respect of bus frequencies and the areas serviced, the following table demonstrates that the application site would be accessible by a number of frequent bus services throughout the week, whilst the subsequent Figure illustrates the frequency service of each bus stop in the locality.

Table 3-1 Bus Service Frequencies

Service	Route	Mon - Fri			Sat	Sun
		Start	Freq.	End	Freq.	Freq.
50	Durham - Washington - South Shields	06:17	30mins	18:25	30mins	60mins
	South Shields - Washington - Durham	07:11	30mins	18:30	30mins	60mins
56	Sunderland - Concord - Springwell - Newcastle	05:32	10mins	23:30	12mins	20mins
	Newcastle – Springwell – Concord- Sunderland	06:09	10mins	00:27	12mins	20mins

3.4.4 On the basis of the below, bus travel represents a viable alternative to car use for future residents, visitors and staff associated with the development of the application site.

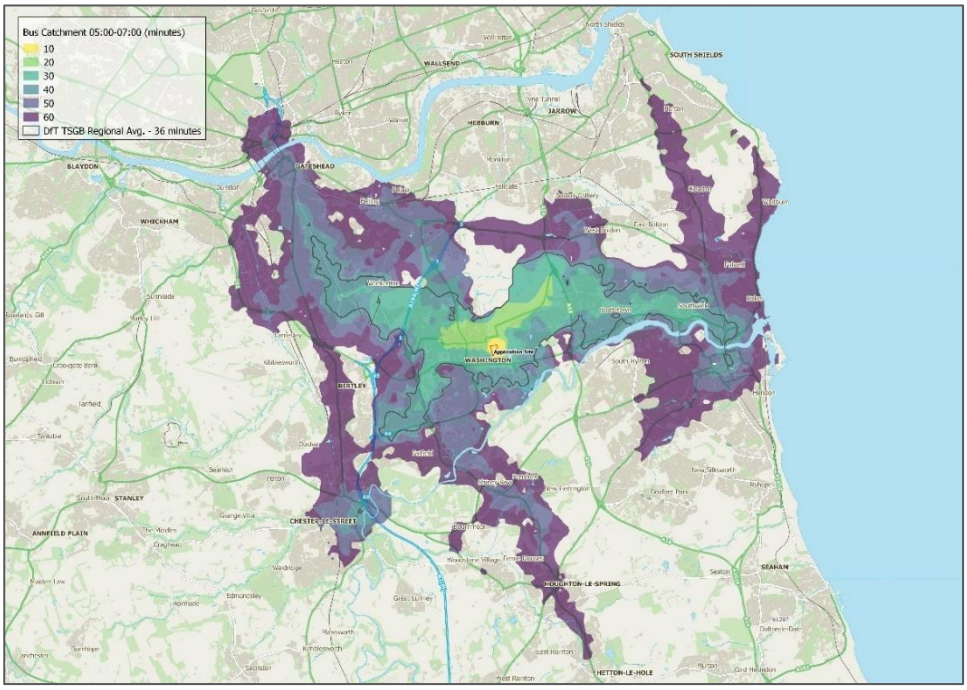
3.4.5 Further analysis has been undertaken to ascertain the value of the available bus services in the context of the geographical areas that would be accessible within a bus journey of 36-minutes, which reflects the average bus journey for commuter journeys in the North East[1].

3.4.6 The results are provided in the following three Figures which represent the accessible catchments during the three shift changeover periods (6am, 2pm and 10pm). Larger scale copies of the plans are available at Appendix 4.

3.4.7 The results confirm that it is possible to commute from the whole of the built-up area of Sunderland, Chester-Le-Street, Houghton-Le-Spring, Gateshead and South Shields.

3.4.8 In this respect, the location of the application site affords adequate opportunities to travel by bus.

Figure 3.5 – Weekday Morning (06:00>08:00hrs) Bus Catchment



[1] *Table TSGB0111 – Average Time Taken to Travel to Work by Region of Workplace and Usual Method of Travel - Transport Statistics Great Britain*

Figure 3.6 – Weekday Afternoon (13:00>15:00hrs) Bus Catchment

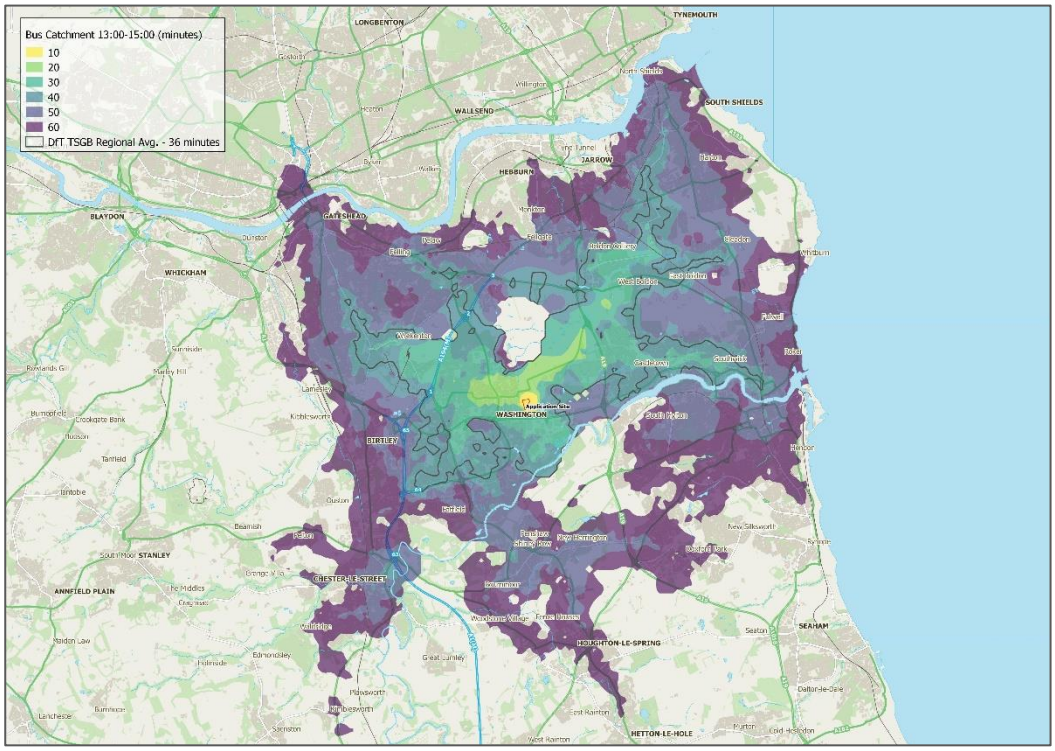
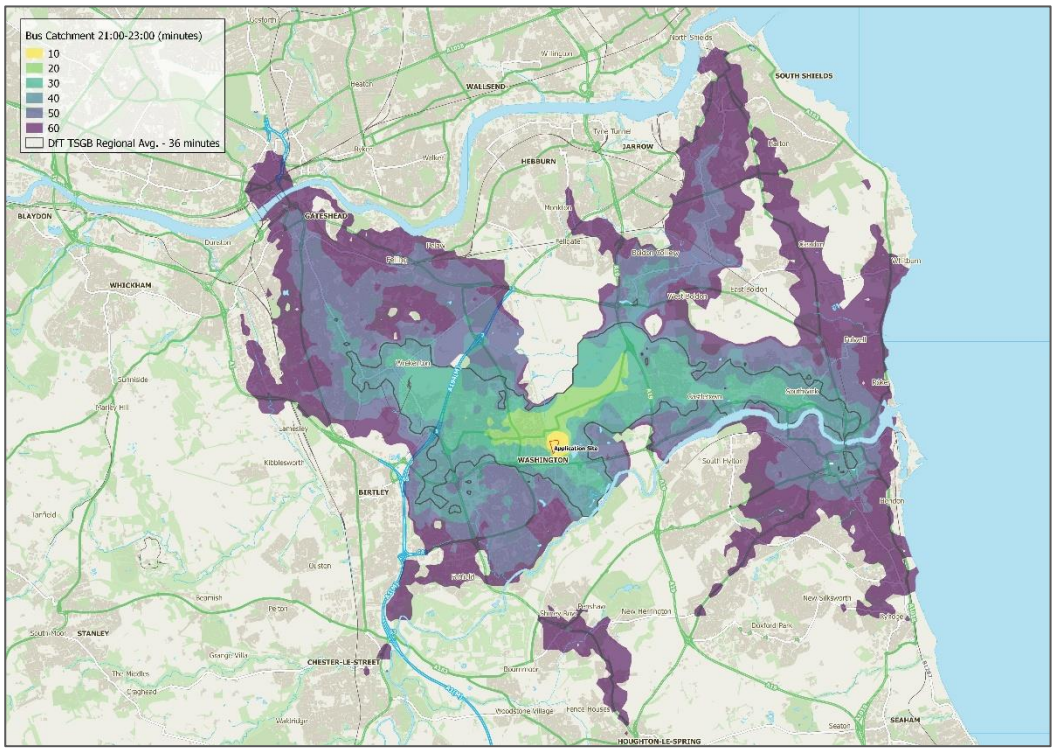


Figure 3.7 – Weekday Evening (21:00>23:00hrs) Bus Catchment



3.5 Access by Rail

3.5.1 The proposed development would, by virtue of its operation, not be dependent upon access by rail. Nevertheless, visitors could travel by train to Chester-le-Street, Heworth Dunston or Newcastle Central where a relatively short and inexpensive bus or taxi ride can be used for the interconnecting part of the journey.

3.6 Section Conclusion

3.6.1 The analysis presented above confirms that the location of the application site is in an accessible area that would allow employees of the facility the opportunity to travel by non-car travel modes, in line with the objectives of sustainable travel policies.

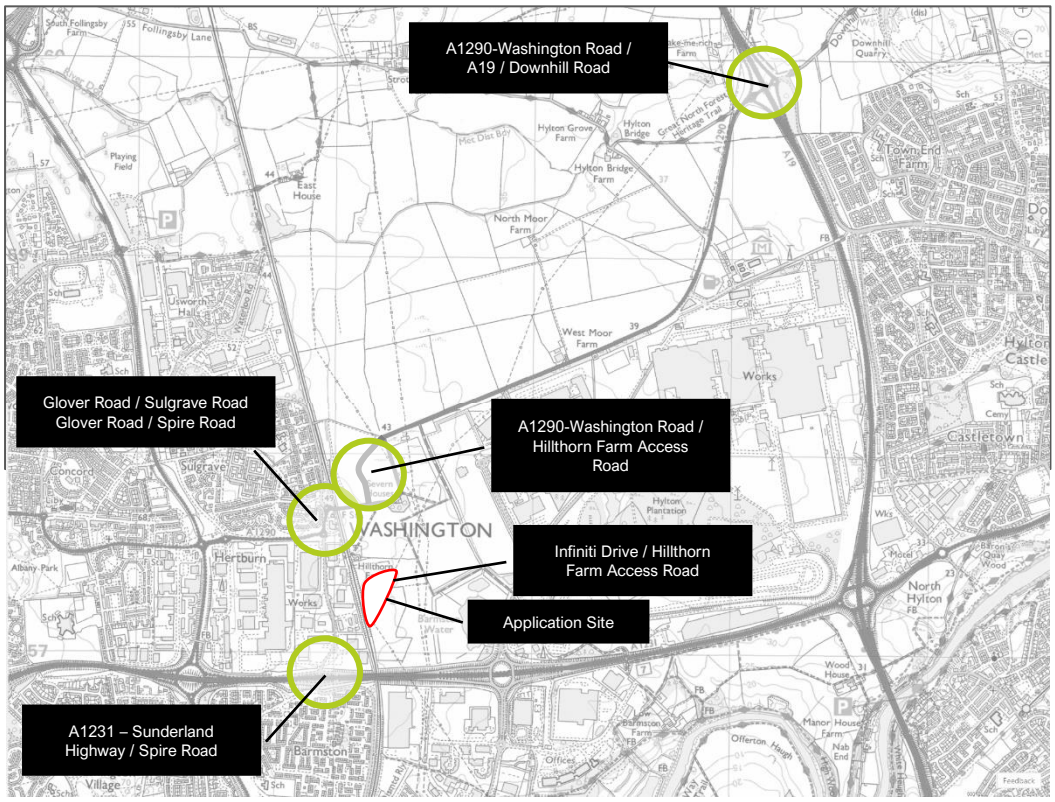
4. Travel Credentials: Car-Borne Access

4.1 Introduction

4.1.1 This section of the report provides a critique of the baseline highway network in vicinity of the application site, with particular reference to the geometry of the roads and safety performance.

4.1.2 At the time of writing, the A1290-Washington Road Phase 1b infrastructure improvement works were underway and the completed scheme has therefore been incorporated within the baseline infrastructure network considered by this assessment. Consequently, the study area highway network assumed by this assessment includes the junctions and interconnecting links identified on the plan below.

Figure 4.1 – Assumed Study Area Highway Network



4.2 Appraisal of Highway Geometry

Junction 1: Infiniti Drive / Hillthorn Farm Access Road

4.2.1 Infiniti Drive is a single-lane two-way carriageway road that has been built to industrial estate standards to as part of the infrastructure works designed to facilitate the development of the A19 Ultra Low Carbon Vehicle Enterprise Zone Site 3 known as Hillthorn Farm, which is anticipated to comprise some 95,000sqm of commercial use.

4.2.2 The road abuts the southern boundary of the application site and provides exclusive as access to the Vantec industrial building located opposite. The carriageway is some 7.3-metres wide and is accompanied by contiguous footways on either side, with the southern footway measuring circa 2-metres and the northern footway being suitable for shared pedestrian/cycle use at around 3-metres. The character of the road is pictured below for context.

Photograph 4.1 Photograph looking southwest along Infiniti Drive

4.2.3 At the north-eastern corner of the application site, Infiniti Drive connects onto the Hillthorn Farm Access Road via a Priority T-junction. At this location, the Hillthorn Farm Access Road runs broadly on a north>south alignment but transitions just south of the junction to enable future access to the nearby Nissan Sunderland Plant.

4.2.4 The junction accommodates a ghost right turn lane on the main road (Hillthorn Farm Access Road) approach whilst the minor road approach (Infiniti Drive) is provided as a single lane entry. The junction appears to have been designed with 15-metre radii to facilitate movement by articulate goods vehicles but, nevertheless, the existing use of the

junction by goods vehicles connected with the operation of the nearby Vantec building demonstrates its suitability for use by such vehicles.

4.2.5 Visibility from the minor road approach also appears to be compliant with current design guidelines, which is to be expected given that the road would have recently undergone a technical approval process with the requisite safety audits undertaken.

4.2.6 The junction is pictured below for context.

Photograph 4.2 Photograph looking south along Hillthorn Farm Access Road

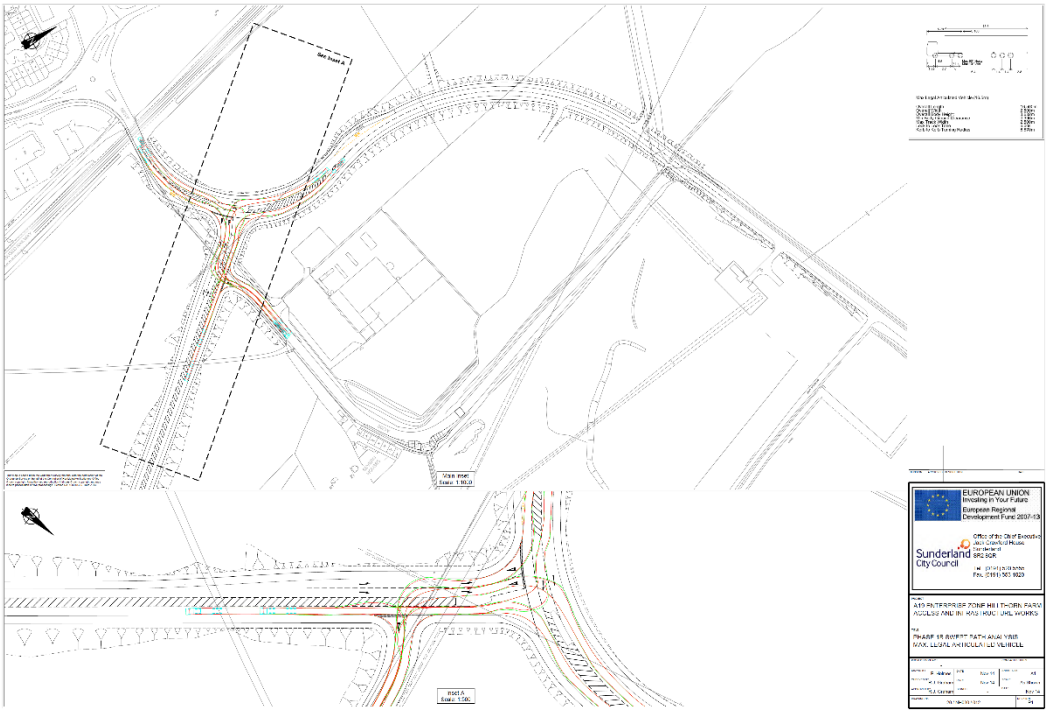
4.2.7 On the basis of the above, it is evident that the geometry of the existing junction onto Infiniti Drive is suitable for use by the sorts of vehicles that may be attracted to the proposed development.

Junction 2: Hillthorn Farm Access Road / A2190-Washington Road

4.2.8 At the time of writing, construction of the Phase 1b improvement of the junction between the Hillthorn Farm Access Road and the A1290-Washington Road were at an advanced stage. The final arrangement will comprise a new priority T-junction onto a realigned A2190-Washington Road which will avoid the existing tight S-bend arrangement to the east. As part of the proposals, a priority T-junction will be created onto the Hillthorn Farm Access Road just south of the realigned A1290-Washington Road to maintain access to the nearby Elms Tree Farm Nursery.

4.2.9 The arrangement is shown in the below figure which has been extracted from the Transport Assessment that was submitted alongside the planning application for the infrastructure works.

Figure 4.2 – Infiniti Drive / A1290-Washington Road Improvements



4.2.10 It is evident from the above that the junction will provide a flared two-lane entry on the Hillthorn Farm Access Road approach, with the nearside being delineated for left-turning traffic and the offside lane for right-turning traffic travelling towards the A19. On the main road (A1290-Washington Road), a ghost right turn lane will be provided to accommodate traffic turning onto Infiniti Drive from the west.

4.2.11 The junction serving the Elms Tree Farm access is, to all intents provided as a left-in / right-out junction as there is no right-turn facility from the Hillthorn Farm Access Road. However, this reflects the fact that this is an unlikely manoeuvre.

4.2.12 The swept-path analyses included within the above figure confirm that the junction has been designed to accommodate articulated goods vehicles and it is therefore implicit that the junction would be suitable in the context of serving the proposed development, not least since the design would have recently been subject to a formal technical approval process including independent consideration of safety.

Junction 2: A1290-Washington Road / Sulgrave Road (Mini Roundabout)

4.2.13 Located some 180-metres west of the Hillthorn Farm Access Road junction, the A1290-Washinton Road connects with Glover Road and Sulgrave Road at a three-arm mini roundabout junction. The roundabout has an Inscribed Circumference Diameter (ICD) of circa 30-metres with a kerb central island of 4-metres, leaving a circulatory carriageway of around 13-metres.

4.2.14 All approaches are provided as flared single-lane entries. The entry width of the A1290-Washington Road is some 7.5-metres whilst Glover Road is around 6.5-metres, and Sulgrave Road some 10.5-metres. All are sufficient to cater for large articulated goods vehicles and buses, although on-site observations suggest goods vehicles travelling between Glover Road and the A1290-Washington Road, almost exclusively.

4.2.15 Kerbed islands are provided on all approaches and the island on Glover Road incorporates a staggered pedestrian crossing with dropped-kerb and tactile paving, with high-visibility railings. The junction is street-lit and contiguous footways are provided along the southern side of the A1290-Washington Road which connect to the application site, and both sides of Glover Road.

4.2.16 The junction is shown in the photograph below for context.

Photograph 4.3 View looking north towards Sulgrave Road

4.2.17 On site observations indicated that large vehicles were able to manoeuvre through the junction with relative ease and the geometry of the junction is therefore suitable in the context of accommodating the type of traffic that would be expected in connection with the proposed development.

Junction 3: Glover Road / Spire Road (Roundabout)

4.2.18 Broadly 100-metres south of the Sulgrave Road mini-roundabout is the four-arm roundabout that connects Glover Road, Spire Road and the access to the Washington Community Fire Station.

4.2.19 The junction has an ICD of around 36-metres and a kerbed central island of around 18-metres, leaving a circulatory carriageway width of 9-metres which is sufficient to enable two heavy goods vehicles to pass side-by-side with relative ease. This is facilitated where demand requires by the flared single-lane entries provided on Glover Road and Spire Road. However, on-site observations made during the weekday evening peak hour indicate that the junction operates in almost free-flow whilst HGV demand was not sufficient to create side-by-side movements. This would nevertheless be restricted during free-flow conditions by the relatively short flare lengths.

4.2.20 Indeed, wear patterns on the Spire Road approach indicate that, despite an entry width of around 7-metres, the approach operates as a single lane entry for the predominant movements between the westbound and northbound exits onto Glover Road.

4.2.21 Kerbed central islands are provided on all approaches which incorporate dropped-kerb crossings and tactile paving is provided over the Glover Road approaches. The junction is street-lit and contiguous footways are provided on all sides of the junction.

4.2.22 The below photograph is provided for context.

Photograph 4.4 View looking south at Glover Road / Spire Road Mini Roundabout

Junction 4: Spire Road / A1231-Sunderland Highway Westbound Slips

4.2.23 Located some 700-metres south of the Glover Road / Spire Road roundabout is the priority T-junction that is created where the westbound off-slip to the A1231-Sunderland Highway connects onto Spire Road. The junction sits directly opposite the on-slip to the A1231.

4.2.24 The on-slip approaches the Spire Road as a two-lane entry of some 6-metres, which is sufficient to accommodate two goods vehicles travelling side-by-side. Whilst the lanes are not delineated as such, the nearside lane is used almost exclusively for left-turning vehicles travelling northbound (towards the application site), whilst the offside lane primarily accommodates traffic turning right towards the residential area of Barmston.

4.2.25 The main road (Spire Road) is provided with two ahead lanes of circa 3.5-4-metres width, with a ghost right-turn lane provided in the centre to accommodate traffic travelling from the south to the on-slip of the A1231-Sunderland Highway.

4.2.26 Visibility from the minor road approach is provided over a distance of around 90-metres to the south (towards Barmston) and around 120-metres to the north (towards the application site). Indeed, it is possible to see the roundabout serving the Peed Retail Park to the north.

4.2.27 The below photograph is provided context.

Photograph 4.5 View looking south towards A1231 Eastbound Slip Road Junctions

4.2.28 On the basis of the above and taken together with on-site observations it is considered that the geometry of the junction is suitable to accommodate the type of traffic that would be associated with the proposed development.

Junction 5: Spire Road / A1231-Sunderland Highway Eastbound Slips

4.2.29 A short distance south of the A1231-Sunderland Highway westbound off-slip is a mirrored access arrangement that provides access via the eastbound carriageway of the A1231-Sunderland Highway.

4.2.30 Visibility from the minor road approach is achievable over a distance of some 50-metres to the south and around 70-metres to the north.

4.2.31 The below photograph is provided for context.

Photograph 4.6 View looking north towards A1231 Westbound Slip Road Junctions

4.2.32 On the basis of the above and taken together with on-site observations it is considered that the geometry of the junction is suitable to accommodate the type of traffic that would be associated with the proposed development.

Junction 6: A1290-Downhill Lane / A19

4.2.33 The Downhill Lane junction of the A19 has recently been upgraded to traffic-signal control from a dumbbell roundabout arrangement. The original consultation document prepared by Highways England suggests that the improvements were, at least partially implemented to accommodate the increasing demands associated with the Nissan Sunderland plant and other surrounding development, which infers inclusion of the Primary Employment Area of Hillthorn Farm.

4.2.34 The new junction comprises two traffic-signal controlled interchanges that control traffic flow between the southbound and northbound off-slips from the A19, together with the A1231-Downhill Lane flow. By virtue of its recent upgrade and its inclusion within the strategic trunk road network, the junction exhibits compliance with the current guidance contained within the Design Manual for Roads and Bridges (DMRB) and is accompanied by high-friction anti-skid surface treatment on all approaches.

4.2.35 The photographs below provide the context of the slip road approaches.

Photograph 4.7 View looking north from A19 Northbound Slip Road

Photograph 4.8 View looking north towards A19 Southbound Slips

4.2.36 On the basis of the above and taken together with on-site observations it is considered that the geometry of the junction is suitable to accommodate the type of traffic that would be associated with the proposed development.

Junction 8: A1290-Downhill Lane / Downhill Lane

4.2.37 Immediately east of the A19-Southbound off-slip is a priority T-junction that is created where Downhill Lane connects onto the A1290. It does so via a single-lane entry with capacity for two vehicles to wait at the give-way markings. Visibility to the north extends to the A19-southbound off-slip junction and around 65-metres to the south, albeit that the including of a central reserve affords a two-stage exit for right-turning traffic.

4.2.38 At this location the A1290 flares to two-lanes in connection to the A19-Southbound off-slip junction, whilst a short right-turn flare is provided on the off-side to accommodate traffic turning onto Downhill Lane.

4.2.39 The layout of the junction is shown in the photograph below for context.

Photograph 4.9 View looking north from Downhill Lane junction

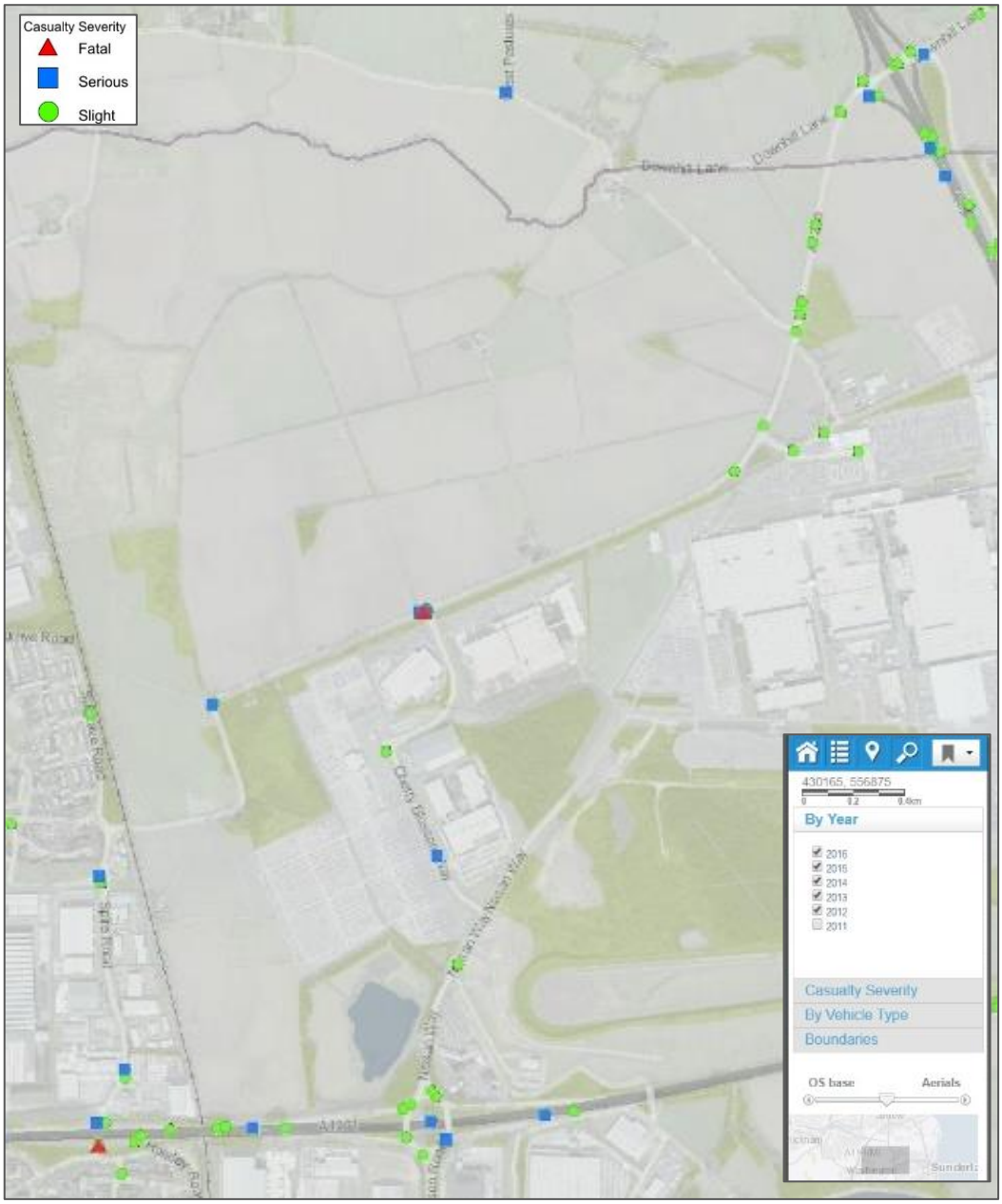
4.2.40 The junction has recently been upgraded as part of the A19 Downhill Lane junction improvements. Whilst the proposed development is unlikely to attract goods vehicles via the junction, on-site observations indicate that goods vehicles could pass through the junction with relative ease.

4.3 Highway Safety Risks

4.3.1 Personal Injury Accident (PIA) data for the identified highway network has been obtained for the latest five-year period available from the Local Highway Authority's online portal at www.gis2.gateshead.gov.uk/Gateshead/RRS/. The data covers the most recent five-year period available on via the platform, which is from 2012 to 2016.

4.3.2 The full data output is contained at Appendix 6 of this report together with summary tables of the accident severities, frequencies and causation factors. The analysis confirms that there were no patterns that were naturally suggestive of a deficiency in the layout of the highway network that has manifested in to an unacceptable safety risk.

Figure 4.3 – Personal Injury Accident Plot (2012>2016)



4.3.3 The accident record of the A19-Downhill Lane junction has been ignored given the recent and significant upgrade of the junction.

Risk Assessment

4.3.4 The accident data has also been reviewed in the context of the risk assessment matrix provided in the Institute of Highways & Transport (IHT) *'Road Safety Audit'* document, published in October 2008. The assessed risk of an accident occurring is related to various factors including vehicle demand, the speed of traffic and geometric properties of the highway.

4.3.5 The assessed '*severity'* of a collision is determined by impact speed, the type of vehicles involved in the collision and the protection afforded to victims. The resultant risk is categorised within the standard matrix below as *'low', 'medium', 'high',* or *'very high'.*

Table 4-1 IHT Risk Assessment Matrix

		Frequency of Collision			
Severity		More than one per year	One every 1-4 years	One every 5-10 years	Less than one per 10 years
	Fatal	Very High	High	High	Medium
	Serious	High	High	Medium	Medium
	Slight	High	Medium	Medium	Low
	Damage	Medium	Medium	Low	Low

4.3.6 Typically, it is accepted that a *'low risk'* is immaterial and consideration of mitigation would not be required. Where *'medium risk'* ratings are indicated, mitigation is not a pre-requisite but practical solutions should be considered where possible. *'High risk'* ratings indicate that mitigation would be desirable whereas a *'very high risk'* would require immediate intervention.

4.3.7 The level of risk assessed for the accidents experienced at each junction is shown in the below table.

Table 4-2 Resultant Classification of Risk

Junction	Number of Recorded Accidents		
	Slight	Serious	Fatal
Sulgrave Road / Glover Road Mini-Roundabout	0	0	0
Glover Road / Spire Road Roundabout	1	1	0
A1231-Sunderland Highway Westbound Off-Slip	0	1	0
A1231-Sunderland Highway Westbound Off-Slip	1	0	1

4.3.8 Relating the above to the safety performance of the study network, it is evident that there is a low risk of slight and serious injury at all junctions, save for the eastbound off-slip of the A1231-Sunderland Highway where there is also a high risk of fatal injury. This is however related to one fatality which may not be consistent with the junction's longer-term safety record.

4.3.9 As such, the existing performance of the study area highway network is considered to be acceptable in the context of highway safety, particularly in view that the forecasted change in traffic flows (refer to Section 6.) is not anticipated to materially or discernibly alter the pattern or frequency of accidents on the surrounding highway network.

4.3.10 Consequently, the proposed development can be accommodated in the context of highway safety.

5. Baseline Traffic Demand

5.1 Introduction

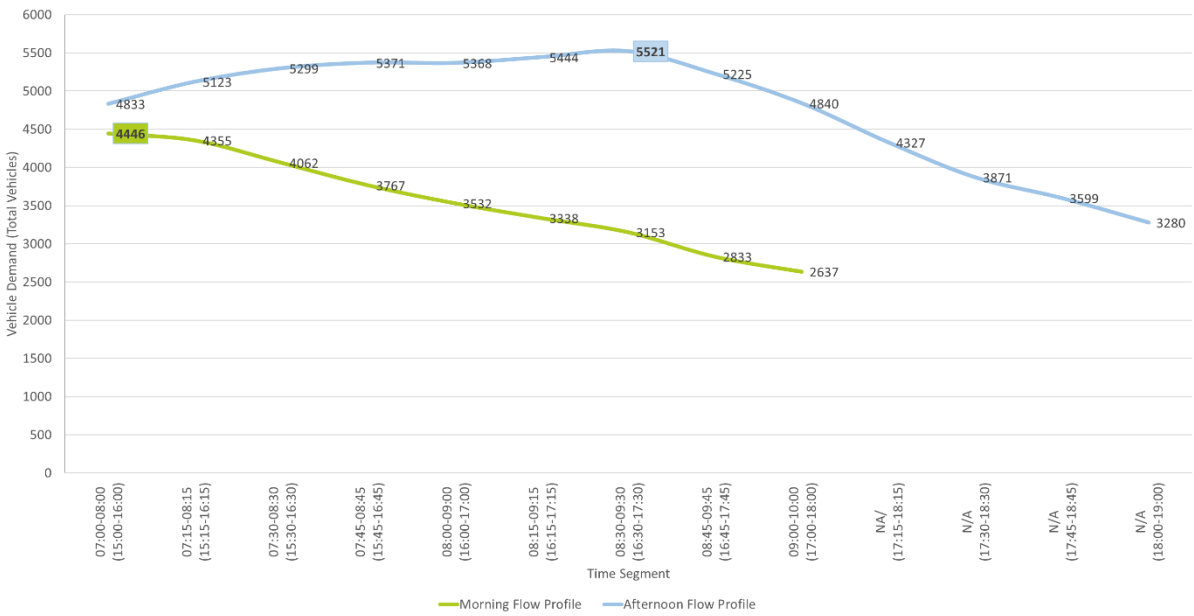
5.1.1 This section of the report identifies the cumulative baseline traffic conditions on the study area highway network, upon which the magnitude and severity of the development effects will be considered later in this report.

5.2 Existing Traffic Demand

5.2.1 Existing traffic demand was surveyed by an independent data collection company for all junctions identified within the study area highway network on Tuesday 5th July 2016; this being a neutral day void of Bank or School Holidays and any major roadworks. The raw survey data is provided at Appendix 7.

5.2.2 Analysis of the survey data identifies the periods of greatest demand on the network to exist between 07:00 and 08:00hrs, and 16:30 to 17:30hrs on a typical weekday and these have been adopted for the purpose of this assessment. This is illustrated by the demand profile shown below.

Graph 5-1 Weekday Network Peak Hour Analysis



5.2.3 Existing peak hour flows are shown on the network diagrams at Appendix 8.

5.3 Baseline Traffic Demand

5.3.1 It is the working assumption of the Development Team that construction could commence in the Autumn of 2018 and with construction and commissioning continuing until the Autumn of 2021. For the purpose of rigour therefore, this assessment has adopted a year of opening of 2022.

Traffic Growth Forecasts

5.3.2 In line with NPPG, the TEMPro database has been used to identify a suitable allowance for ambient traffic growth to the anticipated year of opening using the Sunderland 007 Middle Super Output Area (MSOA), which covers the entire application site and study area highway network, as shown below.

Figure 5.1 – TEMPro Geographic Study Area

5.3.3 All roads to the the west of the application site assumed ambient growth rates in line with a Principal Road within an urban setting, whereas the A1290-Washington Road east of the application site assumed growth in line with a Principal Road in a rural location.

5.3.4 The resultant growth factors are summarised below for the weekday morning and evening peaks.

Table 5-1 Tempro Growth Rates

Principle Roads (2016 > 2022)		
	AM	PM
Urban Area	1.0618	1.0565
Rural Area	1.0582	1.0529

5.3.5 For clarity, the full selection criteria for the traffic growth factors are provided at Appendix 9 whilst the forecasted 2022 ambient traffic demand scenario is indicated by the flow diagrams contained at Appendix 10 of this report.

Committed Development

5.3.6 In line with paragraph 015 of National Planning Practice Guidance[2] (NPPG), this assessment undertakes a cumulative assessment of impacts against a baseline inclusive of committed development in the area. NPPG defines committed development as *"development that there is a reasonable degree of certainty will proceed within the next 3 years"*.

5.3.7 In this context, it is understood that there is a shortage of land in the Washington area to accommodate large footplate commercial buildings and this underpins the allocation of the Hillthorn Farm A19 Ultra Low Carbon Vehicle Enterprise Zone. The infrastructure works to the A1290-Washington Road will unlock occupier interest in the PEA and these works were nearing completion at the time of writing.

5.3.8 Whilst no planning applications were live at the time of writing, the assessment robustly assumes that the Hillthorn Farm A19 Ultra Low Carbon Vehicle Enterprise Zone will be fully occupied at the anticipated opening year and reference has therefore been made to the trip generations identified within the Transport Assessment that accompanied the planning application for the A1290 infrastructure works (15/00671/HYE).

5.3.9 In this respect, we note that the trip generations derived within the assessment were applied to a floorspace schedule that had been previously agreed with the Local Highway Authority. These were identified from a rudimentary masterplan which is shown in the below figure, with associated floorspaces identified in the proceeding table.

[2] *National Planning Practice Guidance: Overarching Principles on Travel Plans, Transport Assessments and Statements, 6 March 2014*

Figure 5.2 – Hillthorn Farm PEA Masterplan

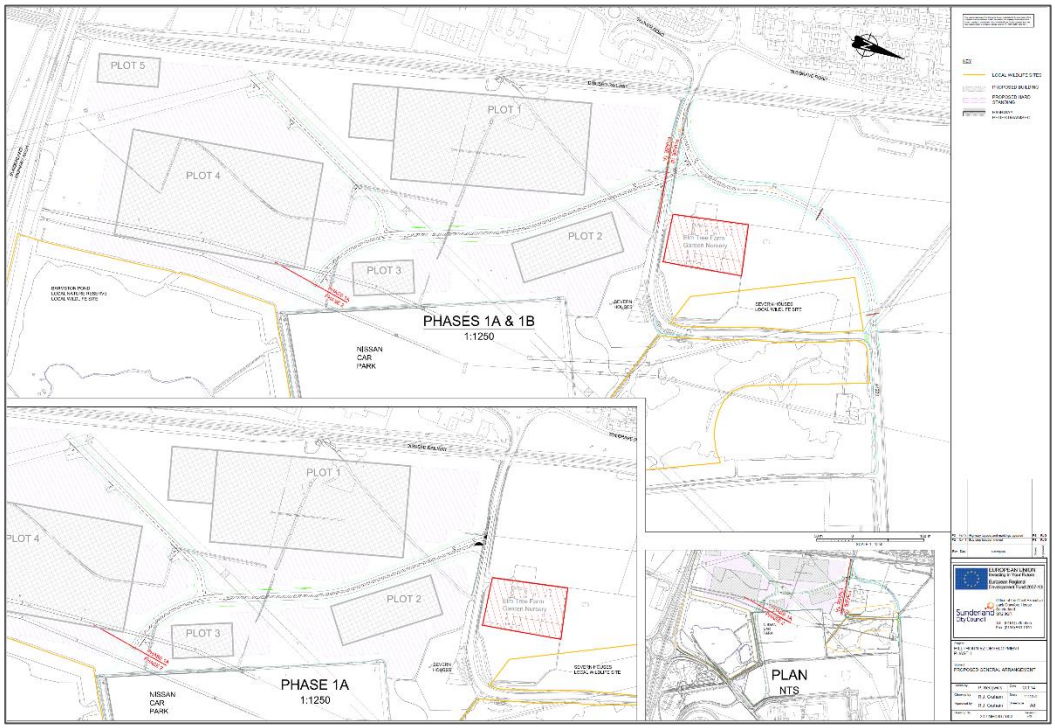


Table 5-2 Hillthorn Farm Development Schedule

Plot #	Land-Use Classification	Gross Floor Area	Parking Spaces
Plot 1	B8 (Warehouse)	39,500sqm	200
Plot 2	B1 / B2 (General Industry)	8,400sqm	110
Plot 3	B1 / B2 (General Industry)	3,700sqm	45
Plot 4	B8 (Warehouse)	40,500sqm	170
Plot 5	B1 / B2 (General Industry)	3,300sqm	40
Elms Tree Farm Nursery	Sui Generis	75sqm	N/A

5.3.10 Plot 4 is the modern Vantec distribution warehouse which has already been constructed and was considered separately within the Transport Assessment for the infrastructure works. For clarity, the trip generation potential of the Vantec building has been ignored for the purpose of this assessment since its associated traffic generation is captured within the 2016 traffic surveys.

5.3.11 The trip generation potential of the remaining development plots were identified with reference to the TRICS database and, in the case of the Elms Tree Farm Nursery, a first principles assessment which yielded the following allowances.

Table 5-3 Committed Development Allowanced (Extracted)

Peak Period	Arrivals	Departures	Two-Way
Morning Peak	98 (10)	67 (18)	165 (28)
Evening Peak	48 (10)	104 (19)	152 (29)

**figures in brackets indicate HGVs*

Resultant 2022 Baseline Demand

5.3.12 Combination of the 2022 ambient traffic demand and committed development trips provides an indication of the 2022 cumulative baseline, which has been adopted for the purpose of traffic impact assessment and in line with NPPG.

5.3.13 The resultant 2022 baseline traffic demand is shown on the network diagrams contained at Appendix 11.

5.4 Highway Capacity Assessment: 2022 Baseline Demand

Junction 1: Hillthorn Farm Access Road / A1290-Washington Road

5.4.1 The Phase 1b infrastructure improvement of the Hillthorn Farm Access Road junction onto a realigned A1290-Washington Road has been modelled within PICADY using geometric properties taken from the Transport Assessment that was submitted in support of that scheme. Since the proposals were subsequently consented it is implicit that the modelling parameters were deemed acceptable by the Local Highway Authority.

5.4.2 The most salient outputs of the model are taken to be the Ratio of Flow to Capacity (RFC), Queue length and Vehicle Delay. In the case of the RFC measurement, a result below 0.9 indicates that the junction operates below capacity whilst a figure of between 0.9 and

1.0 indicates that the junction is nearing or at capacity. A result greater than 1.0 indicates that the junction is operating beyond its theoretical limit of capacity.

5.4.3 The detailed results are provided at Appendix 12 of this report whilst a summary of the salient outputs are provided below.

Table 5-4 Hillthorn Farm Access Road / A1290 '2022 Baseline Demand' Capacity

	Weekday Morning Peak			Weekday Evening Peak		
	Queue (PCU)	Delay (s)	RFC	Queue (PCU)	Delay (s)	RFC
Access Road - Left Turn	0.3	10.39	0.21	0.5	11.84	0.31
Access Road - Right Turn	0.2	12.81	0.18	0.3	13	0.22
A1290-Right Turn	0.6	14.88	0.35	0.5	15	0.29

5.4.4 The above results confirm that the Hillthorn Farm Access Road junction onto the realigned A1290-Washington Road junction would operate well within theoretical capacity in the 2022 baseline scenario (i.e. without development). Indeed, the model calculates a maximum RFC value of just 0.35 which, in simple terms, is suggestive of the junction operating with some 65% reserve capacity.

Junction 2: A1290-Washington Road / Sulgrave Road / Glover Road

5.4.5 The existing mini-roundabout junction comprising of the A1290-Washington Road, Sulgrave Road and Glover Road has been modelled via a linked lane simulation model, incorporating the Glover Road / Spire Road Roundabout to south, within the industry standard modelling software ARCADY. With the analysis adopting the geometric properties from models included within the Transport Assessment that supported the planning application for the Phase 1b infrastructure improvements to the A1290 mentioned previously. As previously mentioned, the grant of planning permission indicates acceptance of the modelling parameters by the Local Highway Authority.

5.4.6 ARCADY is based on similar principles to PICADY and adopts the similar measures to indicate a junction's performance, namely the RFC, Delay and Queue Length.

5.4.7 The detailed results are provided at Appendix 13 of this report whilst a summary of the salient outputs are provided below.

Table 5-5 Sulgrave Road / Glover Road '2022 Baseline Demand' Capacity

	Weekday Morning Peak			Weekday Evening Peak		
	Queue (PCU)	Delay (s)	RFC	Queue (PCU)	Delay (s)	RFC
A1290	0.7	2.66	0.306	0.6	2.99	0.355
Glover Road	0.5	2.52	0.262	0.3	2.43	0.254
Sulgrave Road	0.1	2.28	0.079	0.1	2.02	0.073

5.4.8 The model results presented above confirm that the mini-roundabout junction would operate well within theoretical limits of capacity across both the weekday morning and evening peak periods, in the 2022 year of opening. Indeed, the worst-case RFC value of 0.355 is suggestive of the junction operating with around 65% reserve capacity.

Junction 3: Glover Road / Spire Road

5.4.9 The linked lane simulation ARCADY model has also been constructed to assess the operation of the Glover Road / Spire Road roundabout, using geometric parameters taken from the consented Transport Assessment submitted in support of the planning application for the realignment of the A12290-Washington Road. The detailed results are included at Appendix 13 whilst a summary of the salient measurements is provided below.

Table 5-6 Glover Road / Spire Road '2022 Baseline Demand' Capacity

	Weekday Morning Peak			Weekday Evening Peak		
	Queue (PCU)	Delay (s)	RFC	Queue (PCU)	Delay (s)	RFC
Glover Road North	0.5	3.69	0.334	0.8	4.42	0.426
Fire Station Access	0	4.69	0.007	0	3.35	0.012
Spire Road	0.6	2.92	0.288	0.7	3.25	0.321
Glover Road West	0.4	3.06	0.252	0.3	3.04	0.289

5.4.10 On the basis of the above, the proposed improvement of the Glover Road / Spire Road junction is anticipated to operate well within its theoretical capacity in both weekday peak periods, with maximum queues of 0.8 and a worst-case RFC of 0.426 which is suggestive of the junction operating with around 57% reserve capacity.

Junction 4: Spire Road/Barmston Way / A1231-Sunderland Highway Westbound Slip Road

5.4.11 The westbound slip road of the A1231-Sunderland Highway has been modelled using PICADY and using geometric measurements taken from on-site observations in combination with on-line aerial imagery. The detailed results of the model are provided at Appendix 14 of this report whilst a summary of the most salient outputs is provided below.

Table 5-7 A1231 Westbound Slip '2022 Baseline Demand' Capacity

	Weekday Morning Peak			Weekday Evening Peak		
	Queue (PCU)	Delay (s)	RFC	Queue (PCU)	Delay (s)	RFC
A1231 Off Slip North	0.1	10.45	0.11	0.2	9.59	0.2
A1231 Off Slip South	2.5	28.43	0.72	1.8	27.7	0.63
Spire Road / Barmston Way North	1	11.25	0.49	3.7	23.03	0.78

5.4.12 The results presented above indicate that the junction is anticipated to operate within theoretical capacity limits in both the weekday morning and evening peak periods in the year of opening. Indeed, the calculated worst-case RFC of 0.78 indicates that the junction operates with 22% reserve capacity and this correlates to a queue of just four vehicles.

Junction 5: Spire Road/Barmston Way / A1231-Sunderland Highway Eastbound Slip Road

5.4.13 On-site observation and aerial imagery have also been used to identify geometric measurements in the construction of a PICADY model for the A1231-Sunderland Highway eastbound slip road junction.

5.4.14 The detailed results of the junction assessment are provided at Appendix 15 of this report whilst a summary of the most salient outputs is provided below.

Table 5-8 A1231 Eastbound Slip '2022 Baseline Demand' Capacity

	Weekday Morning Peak			Weekday Evening Peak		
	Queue (PCU)	Delay (s)	RFC	Queue (PCU)	Delay (s)	RFC
A1231 Off Slip North	1.9	19.72	0.66	1.5	16.87	0.61
A1231 Off Slip South	0.1	13.12	0.11	0.6	15.38	0.35
Spire Road / Barmston Way South	0.1	7.42	0.12	0.1	8.9	0.09

5.4.15 The model results presented above indicate that the junction is anticipated to operate within its theoretical capacity across both the weekday morning and evening peak periods, during the baseline scenario. Indeed, the calculated worst-case RFC of just 0.66 indicates that the junction operates with 34% reserve capacity and this correlates to a queue of just two vehicles.

5.5 A19-Downhill Lane Junctions

5.5.1 Capacity assessment has not been undertaken of the A19-Downhill Lane junction in view of the nominal increase in traffic demand calculated at Table 7-1 of this report.

6. Development Trip Generation

6.1 Introduction

6.1.1 This section of the report identifies the trip generation potential of the proposed Renewable Energy Centre at key periods throughout the day. The magnitude and severity of the resultant changes are discussed later at Section 7.

6.2 Development Trip Generation

6.2.1 Given the Sui Generis nature of the proposed development, its trip generation potential has been assessed by reference to a first-principles calculation that reflects the average operational parameters, including the annual throughput of the facility, its opening times and the typical payload of vehicles transport material to and from the facility.

6.2.2 Whilst it is accepted that the real-world traffic scenario would fluctuate around the theoretical average, it is implicit that, whilst there will be some occasions when the trip generation will exceed the average, this will be balanced by occasions when the trip generation shall be less.

6.2.3 For the purpose of rigour, the assessment calculates the trip generation potential of the development on the basis of a hypothetical annual capacity of up to 215,000 tonnes. The ultimate capacity of the facility will be controlled by way of post-planning licencing needed to operate the facility.

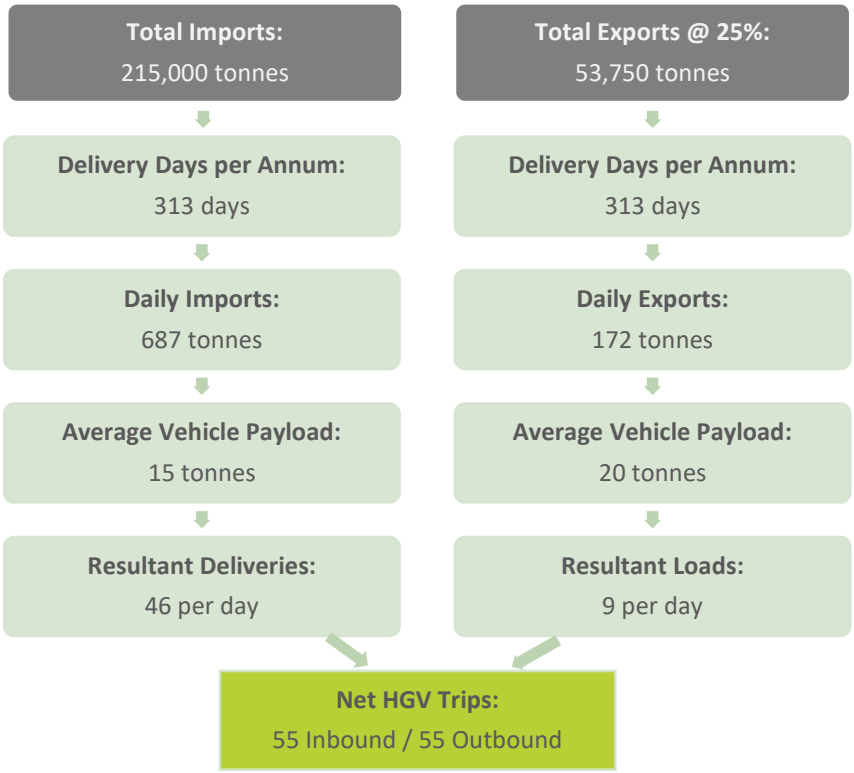
6.2.4 Other factors included within the first-principles calculation are as follows: -

- For the purposes of this assessment it is assumed that the operation of the facility shall generate residual materials at a combined ratio of 25%, equating to 53,750 tonnes per annum (215000 x 25%);
- Whilst articulated goods vehicles will be used in the transportation of residual waste, the assessment assumed a reduced average payload of just 15 tonnes per vehicle. This has the effect of increasing the number of deliveries for the purpose of rigour;
- Ash and metals will be exported from the site using articulated goods vehicles with average payloads of 20 tonnes per vehicle;

- The site will operate 7 days a week, with deliveries restricted to 5.5-days per week (Monday > Saturday 2pm). Total operating days per annum shall be 313 days, taking into account shut down and maintenance requirements;
- All deliveries and exports shall be restricted to 7am to 7pm (12hrs) on weekdays and 7am to 2pm (5hrs) on Saturdays; and
- The facility will employ a total of 35 site, with the majority working through the day and supplemented by 3 shifts.

6.2.5 On the basis of the above it is possible to identify the number of good vehicle trips as follows. Detailed trip generation calculations are included at Appendix 9 of this report.

Figure 6.1 – First Principles Trip Generation Calculation



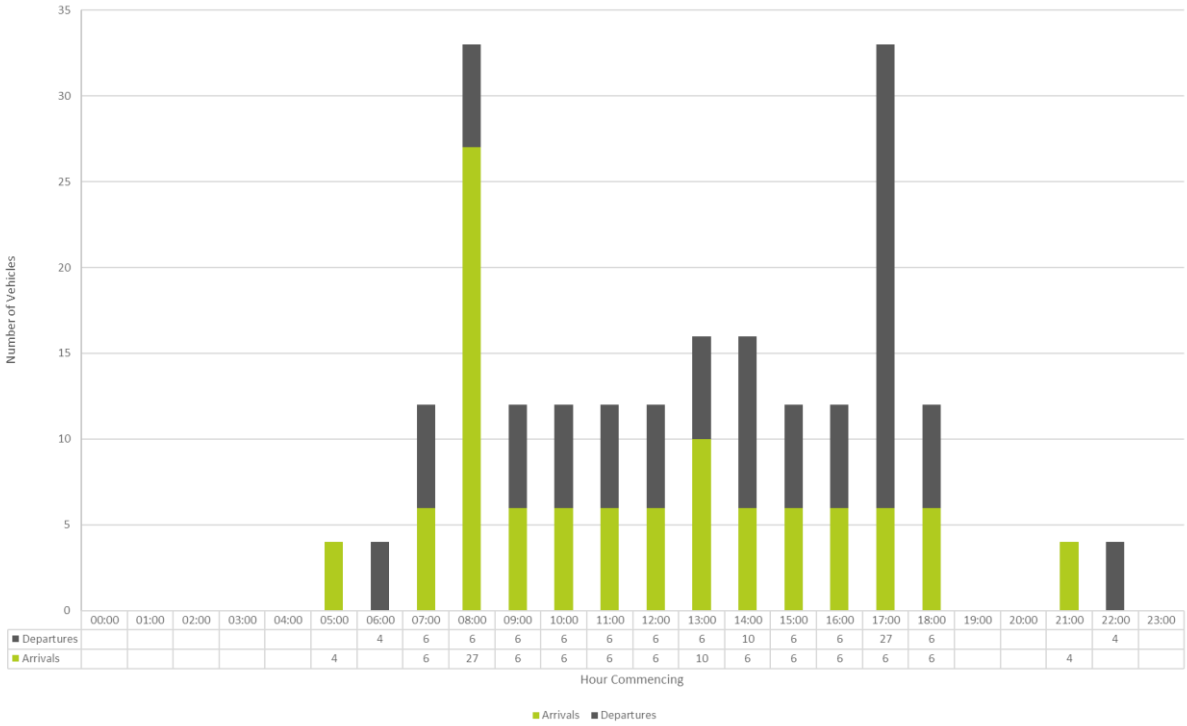
6.2.6 As above, the proposed facility is anticipated to generate a total of 110 two-way good vehicle movements per day (55 inbound / 55 outbound). However, the capacity of the waste bunker ensures that the facility can continue to operate for up to three days without deliveries occurring.

6.2.7 This also avoids the need for deliveries to convoy at any time during the prescribed delivery window (7am>7pm on Weekdays and 7am>12pm Saturdays) such that good vehicle movements will be spread evenly throughout the period.

6.2.8 Notwithstanding, in the interests of adding further rigour to the assessment, it has been assumed that maximum hourly trip generation of goods vehicles shall be equivalent to one-tenth of the daily rate, which reflects the fact that some trips may be delayed arriving or departing the site.

6.2.9 When combined with the movement of staff (as identified previously at Graph 2.1), the total trip generation potential of the proposed facility is as follows.

Graph 5.1 Development Trip Generation Potential



6.2.10 Note that the above incorporates an assumption that the hourly trip generation of goods vehicles shall be equitant to one-tenth of the daily trip generation and, as such, combination of the hourly trip generations presented in the graph above will exaggerate the total.

6.3 Development Trip Distribution & Assignment

6.3.1 The distribution of staff trips has been undertaken with reference to the assumptions adopted within the Transport Assessment that supported the planning application for the A1290-Washington Road improvement works (ref: 15/00671/HYE) which, by virtue of the planning permission, have previously been accepted by the Local Highway Authority.

6.3.2 The distribution of goods vehicle traffic reflects observed proportions of goods vehicle movements on the highway network but assuming that all trips arriving or departing to the west of the site will travel via Spire Road to the A1231-Sunderland Highway. This being the quickest route to the high-capacity and high-speed road network.

6.3.3 The resultant trip distribution is as follows. Detailed traffic calculations are included at Appendix 9 of this report.

Table 6-1 Resultant Trip Distribution

Origin / Destination	Staff Distribution	HGV Distribution
Glover Road	33.%	27.1%
A1231-Sunderland Highway (West)	15.%	16.8%
A1231-Sunderland Highway (East)	13%	35.5%
A19 Southbound	27%	15.8%
A19 Northbound	8%	4.7%
Downhill Lane	4%	-%
TOTAL	100%	100%

6.3.4 The development traffic flows, having been assigned to the network as above, are shown on the network flow diagrams contained at Appendix 16 of this report for the weekday morning and evening peak hours.

6.3.5 It is noteworthy that the '2022 Baseline Demand' scenario makes no adjustment for Plot 1, in this regard it is considered that the following analysis is worst case.

7. Development Impact

7.1 Introduction

7.1.1 This section of the report considers the relative effects of the associated change in traffic demand across the study area highway network.

7.2 Traffic Impact (Magnitude of Change)

7.2.1 Traffic flows derived previously for the 'with' and 'without' development scenarios have been compared here to identify the likely magnitude of change in flows resultant from the proposed development. This has been undertaken for each highway link of each of the junctions considered in the study area. The results are summarised below.

Table 7-1 Traffic Impact

Junction	AM Peak 2022 Baseline	PM Peak 2022 Baseline	AM Peak + Dev't	PM Peak + Dev't	AM % Change	PM % Change
Hillthorn Farm Access Road / A1290-Washington Road	946	1,141	984	1,179	**+4.0%**	**+3.3%**
A1290-Washington Road / Sulgrave Road / Glover Road	1,412	1,278	1,441	1,304	**+2.0%**	**+2.0%**
Glover Road / Spire Road / Fire Station Access	1,107	1,302	1,128	1,325	**+1.9%**	**+1.8%**
A1231-Sunderland Highway Eastbound / Spire Road	1,065	1,434	1,086	1,452	**+1.9%**	**+1.2%**
A1231-Sunderland Highway Westbound / Spire Road	1,001	1,349	1,014	1,360	**+1.2%**	**+0.8%**
A19 Northbound / A1290-Downhill Lane	1,858	1,470	1,865	1,477	**+0.4%**	**+0.4%**
A19 Southbound / A1290-Downhill Lane	1,811	1,925	1,819	1,936	**+0.5%**	**+0.6%**
A1290-Downhill Lane / Downhill Lane	1,274	1,471	1,274	1,471	**+0.0%**	**+0.0%**

7.2.2 The impact analysis presented above indicates that the development proposals would result in a negligible increase in traffic flows in both weekday and evening peak periods, although it is noteworthy that the calculated changes are well within the day-to-day fluctuation in traffic flows that is anticipated and any effect of the development is therefore nominal.

7.3 Highway Capacity Assessment: With Development Scenario

Junction 1: Hillthorn Farm Access Road / A1290-Washington Road

7.3.1 The existing PICADY model of the junction has been updated to reflect the 'with development' traffic flow scenario and the detailed results are provided at Appendix 12 of this report, whilst a summary of the salient outputs are provided below.

Table 7-2 Hillthorn Farm Access Road / A1290 'With Development' Capacity

	Weekday Morning Peak			Weekday Evening Peak		
	Queue (PCU)	Delay (s)	RFC	Queue (PCU)	Delay (s)	RFC
Access Road - Left Turn	0.4	11.4	0.23	0.6	13.13	0.34
Access Road - Right Turn	0.2	13.21	0.19	0.3	13.56	0.25
A1290-Right Turn	0.7	16.05	0.4	0.5	16	0.32

7.3.2 The above results confirm that the Hillthorn Farm Access Road junction would operate well within theoretical limits of capacity, with the development in situ in assumed year of opening. Indeed, the model calculates a maximum RFC value of just 0.34 which, in simple terms, is suggestive of the junction operating with some 66% reserve capacity.

Junction 2: A1290-Washington Road / Sulgrave Road / Glover Road

7.3.3 Traffic demand matrices have also been updated in the ARCADY model of the above junction in order to assess the operation of the junction with the development in situ. The detailed results are provided at Appendix 13 of this report whilst a summary of the salient outputs are provided below.

Table 7-3 Sulgrave Road / Glover Road 'With Development' Capacity

	Weekday Morning Peak			Weekday Evening Peak		
	Queue (PCU)	Delay (s)	RFC	Queue (PCU)	Delay (s)	RFC
A1290	0.5	2.8	0.318	0.5	3.06	0.358
Glover Road	0.6	2.65	0.272	0.4	2.55	0.27
Sulgrave Road	0.2	2.18	0.079	0.1	2.14	0.073

7.3.4 The model results presented above confirm that the existing junction would operate well within theoretical capacity across both the weekday morning and evening peak periods in the anticipated year of opening. Indeed, the worst-case RFC value of 0.358 is suggestive of the junction operating with around 64% reserve capacity.

Junction 3: Glover Road / Spire Road

7.3.5 The traffic demand matrices of the ARCADY model constructed for the Glover Road / Spire Road roundabout junction have been updated to reflect a 'with development' scenario and the detailed results are included at Appendix 13, whilst a summary of the salient measurements is provided below.

Table 7-4 Glover Road / Spire Road 'With Development' Capacity

	Weekday Morning Peak			Weekday Evening Peak		
	Queue (PCU)	Delay (s)	RFC	Queue (PCU)	Delay (s)	RFC
Glover Road North	0.7	3.68	0.353	1	4.58	0.424
Fire Station Access	0	5.1	0.008	0	3.29	0.012
Spire Road	0.4	3	0.301	0.5	3.15	0.332
Glover Road West	0.3	3.11	0.258	0.4	3.09	0.289

7.3.6 On the basis of the above, the Glover Road / Spire Road roundabout junction is anticipated to operate well within theoretical limits of capacity in both the weekday morning and evening peak periods, with the development in situ. Indeed, the calculated worst-case RFC of just 0.424 is suggestive of the junction operating with some 58% reserve capacity and this correlates to a queue of just one vehicle.

Junction 4: Spire Road / A1231-Sunderland Highway Westbound Slip Road

7.3.7 The detailed results of the updated model for the A1231-Sunderland Highway westbound slip road junction are provided at Appendix 14 of this report whilst a summary of the most salient outputs is provided below.

Table 7-5 A1231 Westbound Slip 'With Development' Capacity

	Weekday Morning Peak			Weekday Evening Peak		
	Queue (PCU)	Delay (s)	RFC	Queue (PCU)	Delay (s)	RFC
A1231 Off Slip North	0.1	10.52	0.11	0.2	9.67	0.2
A1231 Off Slip South	2.7	30.29	0.74	1.9	28.73	0.65
Spire Road / Barmston Way North	1	11.35	0.49	3.8	23.59	0.79

7.3.8 The model results presented above indicate that the junction is anticipated to operate within theoretical capacity limits in both the weekday morning and evening peak periods, with the development in situ. Indeed, the calculated worst-case RFC of 0.79 indicates that the junction operates with 21% reserve capacity and this correlates to a queue of just four vehicles.

Junction 5: Spire Road / A1231-Sunderland Highway Eastbound Slip Road

7.3.9 The detailed results of the updated model for the eastbound slip road from the A1231-Sunderland Highway are provided at Appendix 15 of this report whilst a summary of the most salient outputs is provided below.

Table 7-6 A1231 Eastbound Slip 'With Development' Capacity

	Weekday Morning Peak			Weekday Evening Peak		
	Queue (PCU)	Delay (s)	RFC	Queue (PCU)	Delay (s)	RFC
A1231 Off Slip North	2	20.44	0.67	1.5	17.16	0.61
A1231 Off Slip South	0.1	13.22	0.11	0.6	15.48	0.35
Spire Road / Barmston Way South	0.1	7.46	0.12	0.1	8.97	0.1

7.3.10 The model results presented above indicate that the existing junction is anticipated to operate within theoretical capacity for both the weekday morning and evening peak periods, with the development in situ. Indeed, it is noted that the calculated worst-case RFC of just 0.67 is indicative of the junction operating with circa 33% reserve capacity and this correlates to a queue of just two vehicles.

7.4 Section Conclusion

7.4.1 It is evident from the above analyses that the proposed development could be accommodated within the capacity of the existing highway network and that the relative change in performance would be indiscernible and immaterial.

8. Travel Planning

8.1.1 The sustainability credentials of the development proposals have been proven previously at Section 3. of this report and whilst a Travel Plan is not required to make the proposal acceptable in planning terms, and neither does it breach the threshold of creating *significant movement*[3] , the Applicant wishes to maximise the sustainability of travelling to and from the application site via an informal travel plan.

8.1.2 In this way, a Travel Plan Framework has been prepared to support the current planning application and which sets out the various measures, administrative, management and budgetary responsibilities related to the running of the Travel Plan.

8.1.3 The nature of the proposed facility and the shift pattern of working represents a constraint to promoting non-car travel modes, given that many staff will be travelling in the hours of darkness when safety concerns are increased, or when public transport opportunity diminish. Nevertheless, the Travel Plan addresses this through focused measures aimed at promoting car sharing amongst staff and free recharging facilities for staff with electric vehicles.

8.1.4 Full details of the strategy can be found within the Travel Plan Framework contained at Appendix 17.

[3] *NPPF and NPPG identifies that Travel Plans should be required for developments that generate significant amounts of movement.*

9. Summary and Conclusion

9.1 Report Summary

9.1.1 Calibro has been appointed on behalf of the Applicant to consider the traffic and transportation implications associated with the development on land at Hillthorn Farm, Sunderland. To this end, this report has considered the various transport-related effects and its findings may be summarised as follows: -

a) The application site forms part of the A19 Ultra Low Carbon Vehicle Enterprise Zone - Site 3 known as Hillthorn Farm which is allocated for commercial use. The proposed Renewable Energy Centre will create a sustainable supply of energy and heat to nearby industrial users or to the National Grid, from residual waste.

b) The non-car travel credentials of the application site have been reviewed within the use of GIS-based accessibility modelling tools which have determined the accessible catchments for each mode and the various amenities located within. The report concludes that the Application Site is in a location that affords the opportunity to travel to the site from a wide area within which a large proportion of future staff may reside.

c) The geometry of the study area highway network has also been considered in respect of current design guidance and the type of vehicles that are likely to be generated by the proposed development. In this respect, the assessment concludes that there are issues that would preclude the grant of planning permission for the proposed development.

d) The prevailing safety risks of travelling on the adjoining highway network have been evaluated by review of personal accident data for the most recent five-year available. This has confirmed that there are no clusters of accidents that might otherwise be suggestive of a deficiency in the layout or geometry of the highway network that has manifested themselves in an unacceptable safety risk. Moreover, the scale of development and its associated impacts are not sufficient to result in a material worsening of this risk.

e) Baseline traffic flows were calculated from surveyed traffic movements adjusted to allow for growth in ambient traffic to 2022, reflecting the fact that forecasted opening in late 2021. Further allowances were made for the full occupation of the Hillthorn Farm A19 Ultra Low Carbon Vehicle Enterprise Zone and the traffic baseline therefore forms a robust basis on which to judge the relative impacts of the proposed development.

f) A first-principles assessment of the trip generation potential of the proposed facility was undertaken using a series of robust allowances, including the artificial increase of the throughput of the facility to 215,000 tonnes per annum. Resultant traffic flows were assigned through the network.

g) The relative change in traffic flows was considered and the results of the analysis indicates that the effects of the development would be well within the day-to-day fluctuation in traffic that might be anticipated. In this regard, the significance of the impact would be nominal at worst.

h) Notwithstanding the relative change in traffic demand, capacity analyses were undertaken at key junctions in the highway network which confirmed that the proposed development could be accommodated within the existing capacity of the network.

i) Whilst the development proposals do not breach the threshold of "creating significant movement" as identified within the NPPF, the Applicant is committed to maximising the sustainability credentials fot he development and proposes to operate an informal Travel Plan at the site. A Framework Travel Plan has therefore been prepared that concentrates on the potential for car sharing whilst provides free-to-use charging points to encourage staff to operate electric vehicles.

9.2 Report Conclusion

9.2.1 The evidence presented throughout this Transport Assessment demonstrates that the anticipated development effects could be accommodated within the modelled capacity of the highway network. Indeed, the magnitude of any change resultant from the development proposals is described as nominal and would be immaterial in the context of the safe and efficient operation of the adjoining public highway network.

9.2.2 The assessment also demonstrates that the Application Site is located where it would afford future staff a range of opportunities to travel by non-car modes. The development proposals therefore clearly accord with the principles of sustainable development.

9.2.3 Consequently, the over-riding conclusion of this report is that there can be no defensible reasons to refuse planning permission on grounds of highway capacity, highway safety or accessibility.

9.2.4 In this regard, the proposed development should be allowed.

Appendix 1
Development Site Layout

Appendix 2
Swept-Path Analysis

Appendix 3
Visibility Splay Analysis

Appendix 4

Accessibility Catchment Plans

Appendix 5
Sunderland Cycle Map

Appendix 6

Personal Injury Accident Data Plot

Appendix 7

2016 Raw Traffic Survey Data

Appendix 8

2016 Surveyed
Traffic Flow Diagrams

Appendix 9

Detailed Traffic Calcualtions

Appendix 10

2022 Ambient
Traffic Flow Diagrams

Appendix 11

2022 Baseline
Traffic Flow Diagrams

Appendix 12

Capacity Analysis:
Hillthorn Farm Access Road / A1290-Washington Road

Appendix 13
Capacity Analysis: Linked Roundabouts

Appendix 14

Capacity Analysis:
Glover Road Roundabout

Appendix 15

Capacity Analysis:
A1231-Sunderland Highway (Westbound)

Appendix 16

Capacity Analysis:
A1231-Sunderland Highway (Eastbound)

Appendix 17
Travel Plan Framework

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