



EREWASH LOCAL PLAN DEVELOPMENT ASSESSMENT V5.2



SYSTRA

EREWASH LOCAL PLAN

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IDENTIFICATION TABLE

Client/Project owner	Erewash Borough Council
Project	Erewash Local Plan
Study	Erewash Local Plan Development Assessment V5.2
Type of document	Report
Date	07/09/2023
Reference number	111083
Number of pages	32

APPROVAL

Version	Name		Position	Date	Modifications
1	Author	Ralph Jay	Senior Consultant	16/09/2022	Changes recommended by the client Updated for National Highways information
	Checked by	Helen O'Mara	Associate Director	16/09/2022	
2	Author	Ralph Jay	Senior Consultant	07/12/2022	
	Checked by	Duncan Irons	Director	12/12/2022	
3	Author	Ralph Jay	Senior Consultant	25/01/2023	
	Checked by	Helen O'Mara	Associate Director	30/01/2023	
4	Author	Duncan Irons	Director	06/02/2023	
	Checked by	Helen O'Mara	Associate Director	07/02/2023	
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	Checked by	Helen O'Mara	Associate Director	07/09/2023	

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1. INTRODUCTION

1.1 Overview

- 1.1.1 SYSTRA has been commissioned by Erewash Borough Council to undertake a strategic transport assessment to support the Erewash Local Plan using the East Midlands Gateway Model (EMGM).
- 1.1.2 The Local Plan developments have been tested in a single 2037 assessment year. This year has been chosen because it is the final year of the current Local Plan.
- 1.1.3 This document reports the methodology and outputs from the Reference Case and With Local Plan Developments modelling. The document should be read in conjunction with the accompanying Figures Document which contains the graphical outputs of the assessments.

1.2 East Midlands Gateway Model

- 1.2.1 The East Midlands Gateway Model (EMGM) is a multimodal transport model built following the guidance in TAG Unit M2. EMGM has all the expected demand responses (time of day, main mode, destination, route/sub-mode) arranged in the standard hierarchy order. The East Midlands Gateway modelling suite is comprised of the following elements:
 - SATURN Highway Model;
 - CUBE Voyager Public Transport Model;
 - Cube Variable Demand Model including destination, mode choice, trip frequency and time of day responses;
 - Park and Ride model; and,
 - TRICs based Trip End Model.
- 1.2.2 The model includes the authorities of Nottingham City, Ashfield, Broxtowe, Erewash, Gedling, Rushcliffe, Derby City, Amber Valley, South Derbyshire, Charnwood and North-West Leicestershire. All strategic roads, major A, B and important minor roads are modelled in these areas. The model boundary is shown in Figure 1 of the figures document.
- 1.2.3 Erewash Borough is located in the middle of the EMGM modelled area, as shown in Figure 2 of the figures document. The model has undergone rigorous validation checks for the area covering Erewash Borough where it meets the vehicle count validation criteria. The AM peak achieves a 84% validation, whilst the PM peak has a 81% validation rate. Both of these values are slightly below the recommended TAG target of 85% however the model has been accepted at this level of validation by all the relevant authorities.

2. REFERENCE CASE

- 2.1.1 A 2037 Reference Case has been developed for the assessment of the Erewash Local Plan. The Reference Case represents information for the future year scenario taking into account all committed developments and infrastructure schemes up to 2037 but excluding the developments associated with the Erewash Local Plan.
- 2.1.2 All Reference Case assumptions have been agreed with the relevant Local Authorities and are detailed in Appendix A.

2.2 Reference Case Land Use Assumptions

- 2.2.1 A number of proposed developments are expected to be completed or under development between 2016 and the 2037 Reference Case year. The developments and associated land use quantities that have been specifically included in the Reference Case modelling are provided in Appendix A. The Reference Case also includes the following assumptions:
 - Growth constrained to TEMPRO 7.2 growth assumptions between 2016 and 2037, applied to those areas outside of Erewash. This is applied at a ward/district level within the simulated modelled area and at a regional level outside this area;
 - Within the Erewash borough TEMPRO 7.2 growth was applied from 2016 to 2021 only to avoid duplication of growth with the Local Plan developments;
 - East Midlands Airport growth to 2037; and
 - HS2 Toton is not included (following publication of the DfT’s Integrated Rail Plan in November 2021 which changes assumptions on HS2)), but the Innovation Campus developments adjacent to the proposed station site are included.
- 2.2.2 The Reference Case only includes development expected between 2017 and 2037. If part of the development has been built before this the generations will be included within the 2016 Base Year. Any identified infrastructure improvements associated with these developments will also be included in the modelling.

2.3 Highway Trip Growth

- 2.3.1 Table 1 below outlines the growth in highway trips between the 2016 base and the 2037 Reference Case for the AM and PM peaks. There is a 20% growth in highway trips between 2016 and 2037 in the AM peak and 19% in the PM peak compared to the 2016 base year for the whole of the EMGM.

Table 1. Growth in Highway Trips (pcus/hr)

PEAK	2016 BASE YEAR	2037 REFERENCE	% CHANGE FROM BY
AM Peak	321,220	385,055	20%
PM Peak	323,893	385,983	19%

2.4 Junction Congestion

- 2.4.1 Junction congestion is measured by determining the ratio of the volume of traffic to the capacity of traffic that can be accommodated by a junction. A Volume to Capacity (V/C) percentage of 85% is considered to be the threshold at which the junction is approaching its effective operational capacity, therefore increasing the likelihood of operational problems including congestion and associated delays and queues. A V/C percentage of 100% indicates that the junction is operating above its theoretical maximum capacity.
- 2.4.2 Figures 3 and 4 show the junctions which are forecast to have a maximum V/C ratio (%) of 75% or higher in the Reference Case. The yellow dots indicate junctions which are approaching the 85% threshold. The orange dots represent junctions with a V/C over 85% but under 100% and are therefore considered congested and red dots show junctions severely congested with a V/C of 100% or more.
- 2.4.3 By 2037 there is sporadic congestion across Erewash. The biggest concentration of congested junctions are in and around Ilkeston, but there is also congestion along the A52 corridor and at M1 J25.

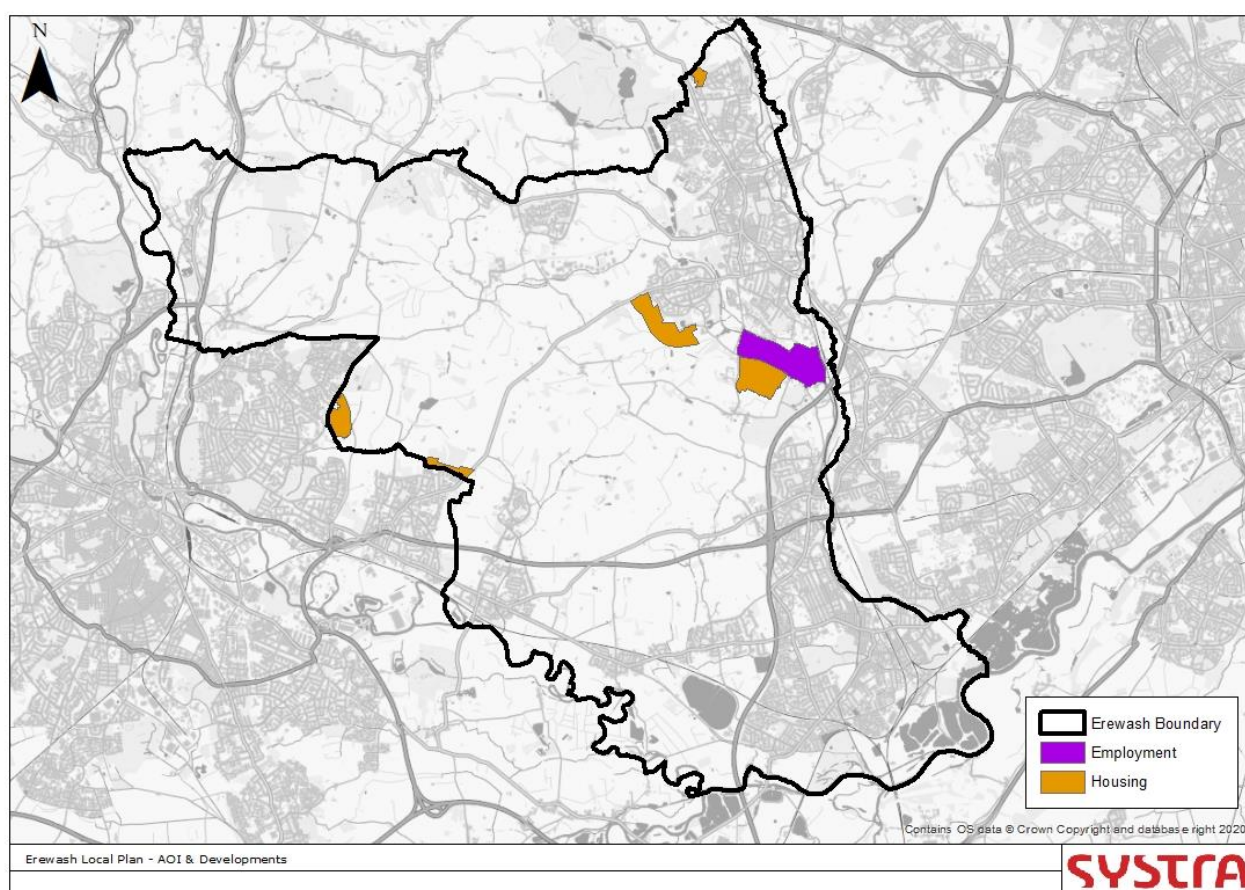
3. EREWASH LOCAL PLAN NO MITIGATION

3.1 Local Plan Proposals

3.1.1 The review of the Erewash Local Plan (also referred to as the Core Strategy Review) includes a number of residential and employment developments that are mainly concentrated in the eastern part of the borough in and around the towns of Ilkeston and Kirk Hallam.

3.1.2 The East Midlands Gateway Model is a strategic model, typically only developments greater than 200 houses or equivalent are explicitly coded into the model. The development locations can be seen in the Figure below and Figure 5 in the accompanying document.

Erewash Local Plan Developments



3.1.3 The developments that have been specifically included in the model are as follows:

- **South Stanton:** 1,000 homes, a primary school and village centre on Low’s Lane;
- **North Stanton:** 80Ha of mixed B2 and B8 employment to the north of the southern residential site;
- **Acorn Way:** 600 home residential development off of Morley Road;
- **Spondon:** Development consisting of 200 homes, accessed from Dale Road;
- **Kirk Hallam:** A development including 1,300 homes, a primary school and a local centre off of the Kirk Hallam relief road; and

- **Cotmanhay:** A 250 home residential development to the north of Cotmanhay.

3.1.4 The modelling specifically includes 3,350 of the 5,870 planned houses and all of the 80ha of employment development with the remainder of the Local Plan growth accommodated in the modelling as generalised growth to represent the smaller infill developments. There are also two infrastructure schemes included in this Local Plan scenario including:

- Improvements to the Sowbrook Lane/Ilkeston Road/Lows Lane junction, converting it from a priority junction to a roundabout; and
- The Kirk Hallam Link Road which is a single lane road that runs to the west of Kirk Hallam between Sowbrook Lane and the A6096 and provides access to the Kirk Hallam site. The junctions at each end are modelled as simple give way junctions, with the Link Road being the minor arm, due to uncertainty over the final design.

3.2 Key Highway Impacts – 2037 With Local Plan

Trip Distribution

3.2.1 Figures 6 and 7 show the distribution of development trips across the network in the AM and PM peaks respectively.

3.2.2 The traffic from the Erewash Local Plan developments primarily utilises the A6096 to access the west towards Derby. The east, towards Nottingham, is accessed using Sowbrook Lane/Lows Lane. Traffic towards the south uses Quarry Hill Road or the A52 to access the M1 at Junction 25. Northbound traffic makes use of both the A6007 and the A6096.

Reassignment

3.2.3 The addition of Local Plan development traffic to the highway network may indirectly affect the routing of background traffic not directly related to the Local Plan traffic as changes to delays and speeds along existing routes can lead to reassignment of background traffic onto alternative routes. Figure 8 shows the background traffic reassignment impact of the Erewash Local Plan developments in the AM peak with Figure 9 showing the PM peak. Blue lines represent roads which background traffic is moving away from whilst orange lines represent roads which experience an increase in traffic due to the reassignment impact.

3.2.4 Background trips move away from the followings routes:

- M1 Northbound (from Junction 24) (AM);
- M1 Southbound (from Junction 26) (PM);
- Nottingham Road (B5010) Southbound;
- Ladywood Road (A6096) to Cat and Fiddle Lane;
- Quarry Hill Road, south of Longfield Lane; and
- A6007.

3.2.5 The following roads show an increase in background traffic movements as traffic reassigns to these routes:

- M1 Southbound (from Junction 26) (AM);
- M1 Northbound (from Junction 24) (PM);
- Ladywood Road (A6096) between Cat and Fiddle Lane and Kirk Hallam;
- Sowbrook Lane and Lows Lane;
- A52 Eastbound;
- High Lane (A609) Westbound;
- Belper Road (A609) Westbound; and
- Cat and Fiddle Lane.

3.2.6 The Kirk Hallam Link Road only has small amounts of background traffic using it, this is due to the heavy demand from the development site and limited capacity on the road.

Overall Flow Change

3.2.7 The overall flow change on the network is a combination of traffic directly generated by the sites and traffic which is reassigned as a consequence of the additional Local Plan development traffic.

3.2.8 Figure 10 shows the AM flow change compared to the Reference Case. Figure 11 shows the same information for the PM peak. Red lines represent roads which experience a net increase in traffic whilst green lines represent roads which experience a net reduction in traffic.

3.2.9 Both peaks show an increase in traffic within Erewash itself and along minor routes linking to Derby City due to the local plan schemes.

3.2.10 During the AM peak there is increased traffic on the M1 between junction 24 and junction 26 in the northbound direction, however there is a decrease in flows in the southbound direction. There is also an increase in vehicles using the A52 in the eastbound direction as well as along the A610 in the westbound direction.

3.2.11 In the PM the flow change shows different patterns with the flows in the southbound direction along the M1 between junction 26 and junction 24. However, the overall impact of the Erewash Local Plan on the Strategic Road Network (SRN) is minimal as the area has limited access to these routes with the majority of traffic using more minor routes to access local locations including Derby City and Nottingham.

Junction Congestion

3.2.12 Junction congestion is measured by determining the ratio of the volume of traffic to the capacity of traffic that can be accommodated by a junction. A Volume to Capacity (V/C) percentage of 85% is considered to be the threshold at which the junction is approaching its effective operational capacity, therefore increasing the likelihood of operational problems including congestion and associated delays and queues. A V/C percentage of 100% indicates that the junction is operating above its theoretical maximum capacity.

3.2.13 Figures 12 and 13 show the junctions which are forecast to have a maximum V/C ratio (%) of 85% or higher in the Reference Case and experience an increase in congestion once the Local Plan developments are in place. Figures 14 and 15 show the junctions which do not have a

V/C ratio of 85% or higher in the Reference Case but do once the Erewash Local Plan developments are in place, for the AM and PM peak hours respectively.

3.2.14 The figures show a number of junctions are exceeding effective operational capacity during the AM peak and eight junctions which are forecast to be pushed past operational capacity in the with local plan scenario compared to the Reference Case:

- Derby Road / Morley Road / Lime Lane junction on the boundary of the Borough and Derby;
- Hill Top / A608 / Lime Lane / Brookside Road junction on the boundary of the Borough and Derby;
- Station Road / Beech Lane junction southwest of West Hallam;
- Chalons Way / Park Road / Nottingham Road / Stanton Road / Derby Road roundabout in Ilkeston;
- Ilkeston Road / Lows Lane / Littlewell Lane / Sowbrook Lane junction south of Ilkeston;
- The junction of the Kirk Hallam link road and Sowbrook Lane;
- Heanor Road / Church Street junction in the north of Ilkeston; and
- M1 junction 25 - southwestern section of the gyratory.

3.2.15 In the PM the figures show that three junctions are forecast to be pushed past operational capacity in the with local plan scenario compared to the Reference Case:

- The junction of the Kirk Hallam link road and Ladywood Road;
- Morley Road / Locko Road junction on the boundary of the Borough and Derby; and
- Alfreton Road / Duffield Road junction south of Little Eaton.

3.2.16 The total congestion of junctions in the borough is shown in Figure 16 for the AM peak and Figure 17 for the PM peak. This includes junctions that are predicted to be congested in 2037 without the Erewash Local Plan due to wider growth outside Erewash together with congestion caused directly by Local Plan development traffic and also the background traffic redistribution impacts of these generations..

Network Statistics

3.2.17 Highway indicators provide a way of gauging the overall impact of the trips associated with the development site across the Erewash Borough. A brief explanation of key indicators is provided below:

- **Over Capacity Queues** – reflects the change in overall congestion and is the time spent queuing at junctions that are over capacity. As traffic levels increase we expect to see a growing number of junctions reaching capacity and the time spent queuing at these overcapacity junctions increasing;
- **Total Travel Time** – Total travel time across the highway network simulation area expressed in pcu hours;
- **Total Travel Distance** – Total distance travelled across the highway network simulation area expressed in pcu kilometres; and

- **Average Speed** - Expressed as kilometres per hour for all traffic within the highway model simulation area for each peak period. Increased traffic levels lead to more delays resulting in lower average speeds.

3.2.18 The Erewash Borough network statistics for the with Local Plan Scenario are provided in Table 2 and Table 3.

3.2.19 During both peaks there is a significant change in congestion within Erewash (denoted by the overcapacity queues statistic). This change in congestion (45% in the AM peak and 69% in the PM peak) is the result both the direct increases in highway traffic generated by the development and also the redistribution of background traffic as a result of the Local Plan. To reach 100% mitigation of the congestion impacts of the Local Plan over the Erewash Borough this congestion indicated should be returned to the 2037 Reference Case level.

3.2.20 As this Local Plan scenario includes the Kirk Hallam Link Road some of the congestion impacts of the local plan have already been addressed as a result of the additional capacity this Link Road provides over and above the current road network.

3.2.21 These statistics also indicate that traffic is taking longer and travelling further to get around the network leading to a reduced average speed.

Table 2. With Development Scenario Network Statistics (AM Peak)

INDICATOR	2037 REFERENCE	LOCAL PLAN NO MITIGATION	CHANGE (%)
Over Capacity Queues (congestion – PCU hrs/hr)	613	887	45%
Total Travel Time (PCU hrs)	7,846	8,540	9%
Total Travel Distance (PCU kms)	389,730	401,483	3%
Average Speed km/hr	49.7	47.0	-5%

Table 3. With Development Scenario Network Statistics (PM Peak)

INDICATOR	2037 REFERENCE	LOCAL PLAN NO MITIGATION	CHANGE (%)
Over Capacity Queues (congestion – PCU hrs/hr)	438	740	69%
Total Travel Time (PCU hrs)	8,193	8,826	8%
Total Travel Distance (PCU kms)	411,679	420,288	2%
Average Speed km/hr	50.2	47.6	-5%

4. MITIGATION OVERVIEW

4.1 Overview of the Local Plan no mitigation scenario

- 4.1.1 The Local Plan scenario includes all of the Erewash Local Plan developments alongside the proposed Kirk Hallam Link Road as this provides access to one of the Local Plans largest residential sites, however this route has limited impacts on background traffic within the Local Plan no mitigation scenario due to the junction capacities at either end of the route which limit its attractiveness. As expected the majority of the impact is centred around Kirk Hallam and Stanton where the largest developments are located.
- 4.1.2 There are large increased in flows on Sowbrook Lane, Lows Lane and Cat and Fiddle Road as traffic seeks to access the three main routes into Derby; A52, Derby Road and the A6096.
- 4.1.3 The junctions that are most affected are the following, consideration of potential mitigation at these locations could be explored further:
- Ladywood Road (A6096) / Cat and Fiddle Lane junction;
 - Stanton Road (A6096) / Little Hallam Lane junction;
 - Stanhope Street / Dale Road / Main Street junction;
 - Rushy Lane / Derby Road / Bostock's Lane junction;
 - M1 J25;
 - Belper Road (A609) / Common Lane junction;
 - Sowbrook Lane / Ilkeston Road / Lows Lane junction;
 - Lows Lane / Littlewell Lane junction; and
 - Quarry Hill Road / Longfield Lane junction.

4.2 Mitigation Schemes

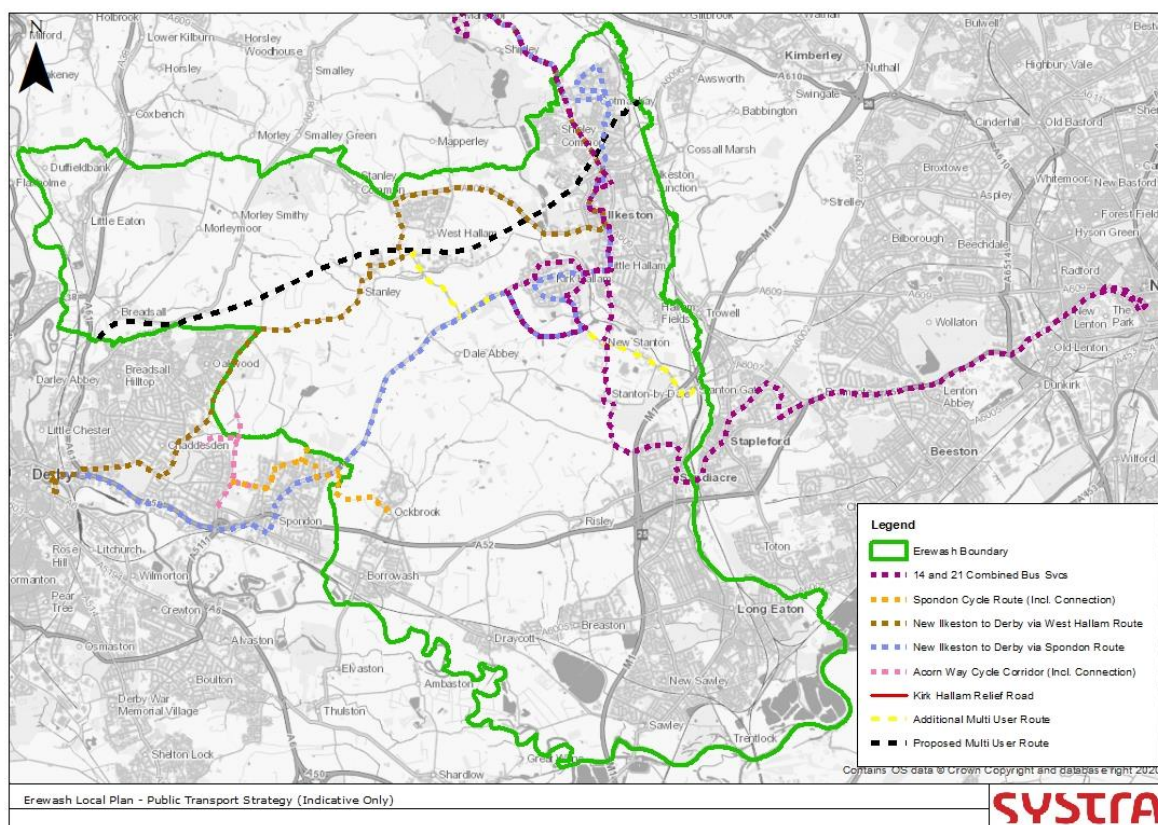
- 4.2.1 Three phases of mitigation have been modelled to reduce the highway impact of the Erewash Local Plan as described below:
- **Phase 1: Kirk Hallam Link Road improvements** – Improvements to the junctions at both ends of the Kirk Hallam Link Road. The improvements are shown in Appendix C and include the replacement of the priority junctions at either end of the route with roundabout junctions. The speed on the Link Road has also been increased to 40mph. The additional capacity that these changes provide will effectively change the role of the road from being limited to providing access for development traffic, to one of which is providing a bypass route and extracts background traffic from Kirk Hallam and the surrounding area.
 - **Phase 2: Public Transport and Active Mode** –Phase 1 with additional public transport and cycle schemes to better serve the borough and new developments. These schemes are shown in the figure below and include the following;
 - Two new bus routes from Ilkeston to Derby to complement the existing Ilkeston Flyer and Black Cat services;
 - a new service following the route and stopping pattern of the existing Ilkeston flyer and runs from the Ilkeston train station to Kirk Hallam, along the new Kirk Hallam Link Road and then down the A6096,

through Spondon into the centre of Derby. This service will run every 30 minutes (shown in blue); and

- a new service following the route and stopping pattern of the Black Cat and also runs from Ilkeston train station, through West Hallam and Stanley. The service runs every 30 minutes (shown in Brown).
- A bus route from Nottingham to Heanor via Sandiacre and Kirk Hallam. This is an amalgamation of the existing 14 and 21 routes. The service will run every 20 minutes (shown in purple);
- An active modes trail running from Cotmanhay via West Hallam to the A61 at Breadsall (shown in black);
- A cycle route connecting the above trail to the Erewash canal cycle highway, via the Kirk Hallam development (shown in yellow);
- An extension of the existing cycle route 66 around the north of Spondon to Ockbrook (shown in orange); and
- A cycle route from Derby Road to the Acorn Way and Brook Farm developments (shown in pink).
- Introduction of two new rail services using the Maid Marion line between Mansfield and Derby and Mansfield and Leicester.

○ **Phase 3 – Highway Enhancements** – capacity enhancements at key congested junctions within the borough. The details of these measures are described in Section 4.3.

Phase 2 Mitigation schemes



4.3 Phase 3 Highway Mitigation Measures

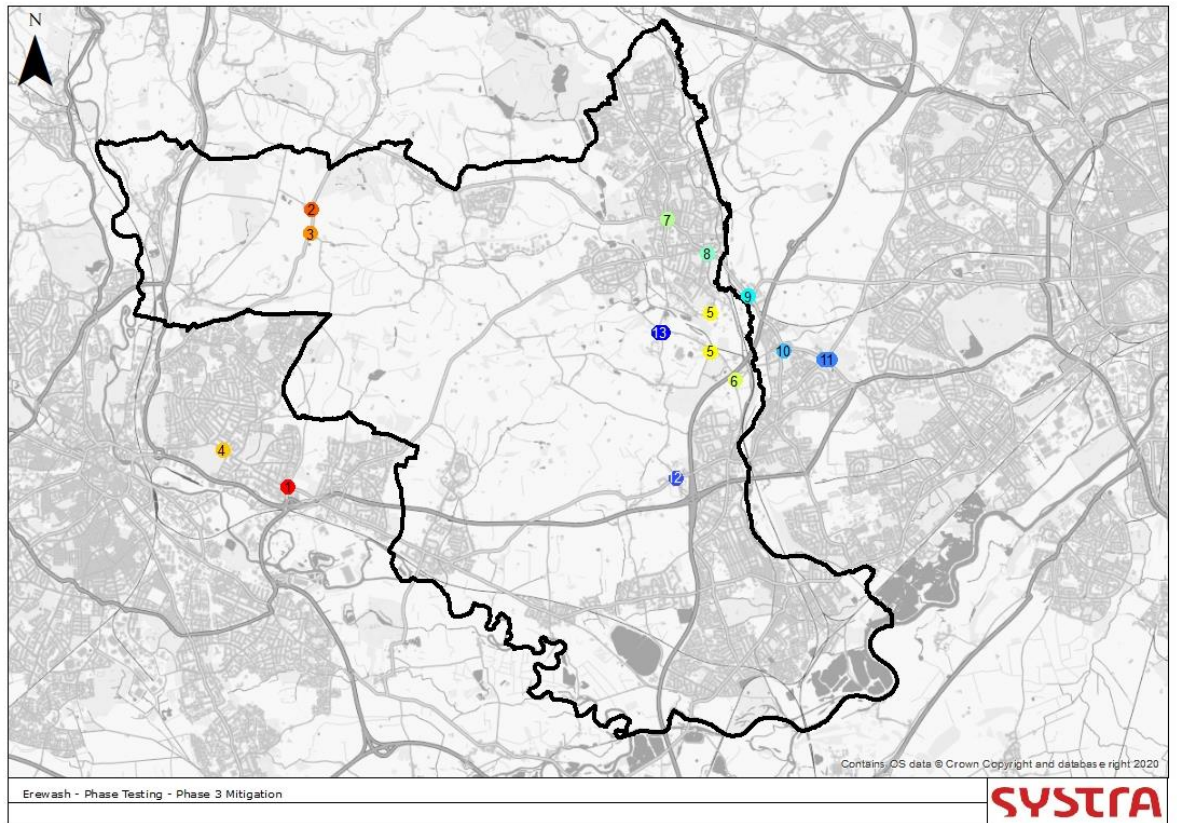
The highway mitigation measures have been identified through assessment of the modelling results from the with Local Plan scenario in conjunction with Derbyshire County Council, Derby City Council, Nottinghamshire County Council and National Highways. The junctions identified for mitigation are described in Table 4 and shown in the figure below, which is also Figure 18 in the accompanying document.

Table 4. Mitigation Proposals

JUNCTION	AUTHORITY	ISSUE	MITIGATION
1 - Acorn Way/Derby Rd/Raynesway	Derby City	High levels of congestion from Acorn Way in the AM to access Raynesway and Derby Road Eastbound. High congestion from Raynesway in the PM to all directions.	Convert roundabout into a signalised junction with bus priority.
2 - Brick Kiln Lane/Morley Road	Derbyshire	High levels of congestion at Brick Kiln Lane Approach in both peaks.	Convert to a signalised Junction
3 - Main St/Church Lane	Derbyshire	High levels of congestion at Church Lane approach in both peaks	Convert to a signalised Junction
4 - Reginald Rd/Nottingham Rd	Derby City	High levels of congestion at Reginald Rd approach in both peaks	Convert to a signalised Junction
5 - Crompton Road/Merlin Way/Low's Lane	Derbyshire	Congestion at various junctions on Low's Lane	Reopen between Merlin Way and Low's Lane
6 - Stanton Gate/Ilkeston Rd	Derbyshire	Congestion at from Stanton Gate approach in both peaks	Upgrade to roundabout
7 - White Lion Square	Derbyshire	Heavy congestion from multiple arms in both peaks	Signalise

JUNCTION	AUTHORITY	ISSUE	MITIGATION
8 - Thurman Street/Nottingham Road	Derbyshire	Congestion from Thurman Street in both peaks and also Nottingham Rd eastbound in the PM.	Signalise
9 - Stapleford Road/Nottingham Road	Nottinghamshire	This junction is already heavily congested and affects the adjacent junction.	Signalise
10 - Ilkeston Road/Stapleford Road/Pasture Road	Nottinghamshire	Congestion from Stapleford Rd in the PM	Enlarge roundabout to increase capacity
11 - Ilkeston Road/Coventry Lane/Hickings Lane	Nottinghamshire	Congestion on Ilkeston Rd in the AM peak	Signalise
12 - Bostock's Lane/Rushy Lane/Derby Road	Derbyshire	Congestion on North and south arms	Optimise signal timings
13 - Sowbrook Lane/Low's Lane/Ilkeston Road/Littlewell Lane	Derbyshire	Congestion on Littlewell Lane and between junctions	Convert both junctions to a roundabout

Phase 3 Mitigation Sites



5. MITIGATION TRANSPORT IMPACTS

5.1 Phase 1 Mitigation Impacts

5.1.1 Phase 1 mitigation improves the capacity of the Kirk Hallam Link Road by enhancing the junctions to Sowbrook Lane and Ladywood Road. This scheme consists of the provision of roundabout junctions at either end of the Link Road and an increase of the speed on the Link Road to 40mph. These changes effectively alter the role of the Link Road from a development access route to a bypass that accommodates background traffic movements from Kirk Hallam and the surrounding area.

Flow Change

5.1.2 Figures 19 and 20 show the flow change after the implementation of the Phase 1 mitigation scheme compared to the no mitigation Local Plan scenario. Increases in traffic flow can be seen in red and decreases in green. As expected there is a shift of traffic away from the existing Kirk Hallam residential area and onto the proposed Link Road as a result of traffic rerouting following the improvements to the Kirk Hallam Link Road capacity.

Congestion Change

5.1.3 Figures 21 and 22 show the change in congestion as a result of the phase 1 mitigation. In the AM peak there is a reduction in congestion on a number of junctions within Kirk Hallam as traffic reassigns to the Kirk Hallam Link Road. This includes the two junctions accessing the Link Road which have had an increase in capacity. The PM peak has a lower level of congestion overall and so the impacts of the change to the link road have less of an impact on the congestion levels. There is a reduction in congestion on the northern junction of the Kirk Hallam Link Road.

Network Statistics

5.1.4 Highway indicators provide a way of gauging the overall impact of the trips associated with the Local Plan developments across Erewash. A brief explanation of key indicators is provided below:

- **Over Capacity Queues** – is the time spent queuing at junctions that are over capacity and reflects the change in overall congestion on the highway network in Erewash. As traffic levels increase we expect to see a growing number of junctions reaching capacity and the time spent queuing at these overcapacity junctions increasing;
- **Total Travel Time** – Total travel time across the highway network simulation area expressed in pcu hours;
- **Total Travel Distance** – Total distance travelled across the highway network simulation area expressed in pcu kilometres; and

- **Average Speed** - Expressed as kilometres per hour for all traffic within the highway model simulation area for each peak period. Increased traffic levels lead to more delays resulting in lower average speeds.

5.1.1 The network statistics for the Erewash Borough are shown in Table 5 and Table 6. These tables show the percentage mitigated, which shows how far the mitigation proposal has taken the statistics back to the reference case.

Table 5. Mitigation Scheme Phase 1 Network Statistics (AM Peak)

INDICATOR	REFERENCE CASE	LOCAL PLAN NO MITIGATION	PHASE 1 MITIGATION	CHANGE (%)	% MITIGATED
Over Capacity Queues (congestion – PCU hrs/hr)	613	887	864	-3%	8%
Total Travel Time (PCU hrs)	7,846	8,540	8,497	0%	6%
Total Travel Distance (PCU kms)	389,730	401,483	401,499	0%	0%
Average Speed km/hr	49.7	47.0	47.3	1%	11%

Table 6. Mitigation Scheme Phase 1 Network Statistics (PM Peak)

INDICATOR	REFERENCE CASE	LOCAL PLAN NO MITIGATION	PHASE 1 MITIGATION	CHANGE (%)	% MITIGATED
Over Capacity Queues (congestion – PCU hrs/hr)	438	740	738	0%	1%
Total Travel Time (PCU hrs)	8,193	8,826	8,747	-1%	12%
Total Travel Distance (PCU kms)	411,679	420,288	419,217	0%	12%
Average Speed km/hr	50.2	47.6	48	1%	12%

5.1.2 These suggest that whilst the enhancements to the capacity of the Link Road junctions result in greater use of the Link Road it only has small benefits to the wider area. The AM peak sees a reduction in congestion of almost 3% which mitigates the impact of the local plan by 8%.

This is accompanied by small reductions in travel time and distance travelled suggesting that the link road is instrumental in this reduction in congestion.

- 5.1.3 The PM peak has a much smaller impact with the congestion reducing by 0.3% which mitigates the local plan by 0.7%. Again we see a reduction in travel time and distance travelled.
- 5.1.4 Overall, the capacity improvements to Kirk Hallam Link Road have a small positive impact especially in the more heavily congested AM peak network, however, most of these benefits are included in the no mitigation scenario and the improvements to the capacity of this route have only provide a small level of additional benefit.

5.2 Phase 2 Mitigation Impacts

- 5.2.1 The Phase 2 mitigation focuses on active modes and public transport. A variety of schemes have been implemented including improved cycle networks, a multi user trail, two new bus services plus improvements to existing bus services and the introduction of new rail services along the Maid Marion line as detailed in 4.2 above.

Public Transport Patronage

- 5.2.2 Table 7 below shows the overall change in person trips on the public transport services. The data displays the overall change in demand by mode as well as providing information on the bus services that have been implemented in the mitigation and the demand at Ilkeston Railway station.

Table 7. PT Patronage (daily persons)

MODE	AM PEAK				PM PEAK			
	Ph1	Ph2	Change	% Change	Ph1	Ph2	Change	% Change
Rail	15,326	15,699	373	2%	16,296	16,744	448	3%
Bus	31,576	31,653	77	0%	27,103	27,114	11	0%
Net	12,485	12,396	-89	-1%	10,898	10,811	-87	-1%
Mitigation bus services	451	805	354	78%	353	657	304	86%
Ilkeston Rail Station	433	530	97	22%	74	221	147	199%

- 5.2.3 This shows a general increase in both rail and bus based public transport as a result of the increased provision, however, some of this patronage is extracted from the Nottingham Express Transit (NET) services

Flow Change

- 5.2.4 Figures 23 and 24 show the flow change after the implementation of the active models and public transport mitigation compared to the with Local Plan scenario. These plots will also include the benefits gained from the Phase 1 mitigation to improve the capacity of the Kirk Hallam Link Road.
- 5.2.5 The reduction in traffic from the public transport improvement is gained by small decreases in highway movements across the majority of roads in the area and as such these changes are not significant enough to show on these plots over and above the impact of the Kirk Hallam Link Road.

Congestion Change

- 5.2.6 Figures 25 and 26 show the change in congestion resulting from the Phase 2 mitigation compared to the Local Plan scenario. Both peaks show a reduction in congestion on routes within Kirk Hallam mainly resulting from the implementation of the Kirk Hallam Link Road in Mitigation Phase 1.

Network Statistics

- 5.2.7 Highway indicators provide a way of gauging the overall impact of the trips associated with the Local Plan across Erewash. A brief explanation of key indicators is provided below:
- **Over Capacity Queues** – reflects the change in overall congestion and is the time spent queuing at junctions that are over capacity. As traffic levels increase we expect to see a growing number of junctions reaching capacity and the time spent queuing at these overcapacity junctions increasing;
 - **Total Travel Time** – Total travel time across the highway network simulation area expressed in pcu hours;
 - **Total Travel Distance** – Total distance travelled across the highway network simulation area expressed in pcu kilometres; and
 - **Average Speed** - Expressed as kilometres per hour for all traffic within the highway model simulation area for each peak period. Increased traffic levels lead to more delays resulting in lower average speeds.
- 5.2.8 The network statistics for the Erewash Boundary are shown in Table 8 and 0. These figures are cumulative impacts as the scenarios also include the mitigation measures in Phase 1.

Table 8. Mitigation Scheme Phase 2 Network Statistics (AM Peak)

INDICATOR	REFERENCE CASE	LOCAL PLAN NO MITIGATION	PHASE 2 MITIGATION	CHANGE (%)	% MITIGATED
Over Capacity Queues (congestion – PCU hrs/hr)	613	887	859	-3%	10%
Total Travel Time (PCU hrs)	7,846	8,540	8,498	0%	6%
Total Travel Distance (PCU kms)	389,730	401,483	401,848	0%	-3%
Average Speed km/hr	49.7	47.0	47.3	1%	11%

Table 9. Mitigation Scheme Phase 2 Network Statistics (PM Peak)

INDICATOR	REFERENCE CASE	LOCAL PLAN NO MITIGATION	PHASE 2 MITIGATION	CHANGE (%)	% MITIGATED
Over Capacity Queues (congestion – PCU hrs/hr)	438	740	728	-2%	4%
Total Travel Time (PCU hrs)	8,193	8,826	8,789	0%	6%
Total Travel Distance (PCU kms)	411,679	420,288	420,266	0%	0%
Average Speed km/hr	50.2	47.6	47.8	0%	8%

- 5.2.9 These assessments show the bus and active mode mitigation results in a reduction in local congestion depicted by the Over Capacity Queues indicator in the both peaks compared to the Phase 1 Mitigation.
- 5.2.10 The AM peak sees a reduction in congestion of 3.2% which mitigates the impact of the local plan by 10.2%. We also see a reduction in travel time but a very small increase in distance suggesting that a small amount of rerouting is occurring.
- 5.2.11 The PM peak sees a reduction in congestion of 1.6% which mitigates the impact of the local plan by 4%. Travel time and distance travelled also reduces marginally.
- 5.2.12 This reduction in congestion is the result of the transfer from car to active and public transport modes associated with the proposed mitigation. This is not focused in a particular area so there is little improvement to individual junctions but see an improvement across the network as a whole.

5.3 Phase 3 Mitigation Impacts

- 5.3.1 The Phase 3 mitigation focuses on highway improvement to junctions that have been identified in previous phases of modelling as being congested as a result of the proposals in the Erewash Core Strategy Review. The junctions with mitigation measures being tested are described previously in Table 4, these changes include improvements to junction capacity, optimisation of traffic signals, and changes to junction design and have been developed in conjunction with the local authorities and National Highways.

Flow Change

- 5.3.2 Figures 27 and 28 show the flow change after the inclusion of the additional Phase 3 highway improvement schemes compared to the with Local Plan scenario. The highway mitigation measures result in rerouting throughout the network to routes that have received an increase

in capacity as a result of the Phase 3 enhancements. Part of the rerouting is traffic moving away from the A52 between the M1 junction 25 and Spondon roundabout to local more direct routes that were previously congested.

Congestion Change

- 5.3.3 Figures 29 and 30 show the change in congestion resulting from the Phase 3 mitigation compared to the no mitigation with Local Plan scenario.
- 5.3.4 The AM peak shows reduction in congestion across the borough, with a much wider impact in the west of the borough and mainly concentrated within Ilkeston and Kirk Hallam. The Phase 3 highway mitigation provides significant additional congestion relief over and above the earlier phases including the Kirk Hallam Link Road.
- 5.3.5 The PM peak shows similar significant decreases in congestion to the AM peak, however, there is predicted to be an increase in congestion at two junctions in the vicinity of the Ilkeston station. Neither of these junctions were improved in this phase of mitigation and this increase in congestion is likely to be the result of changes in traffic routing as a result of the increase in capacity on other parts of the network.

Network Statistics

- 5.3.6 Highway indicators provide a way of gauging the overall impact of the trips associated with the Local Plan developments across Erewash. A brief explanation of key indicators is provided below:
 - **Over Capacity Queues** – reflects the change in overall congestion and is the time spent queuing at junctions that are over capacity. As traffic levels increase we expect to see a growing number of junctions reaching capacity and the time spent queuing at these overcapacity junctions increasing;
 - **Total Travel Time** – Total travel time across the highway network simulation area expressed in pcu hours;
 - **Total Travel Distance** – Total distance travelled across the highway network simulation area expressed in pcu kilometres; and
 - **Average Speed** - Expressed as kilometres per hour for all traffic within the highway model simulation area for each peak period. Increased traffic levels lead to more delays resulting in lower average speeds.
- 5.3.7 The network statistics for the Erewash Borough are shown in Table 100 and Table 11. These figures are cumulative impacts as the scenarios also include the mitigation measures in Phases 1 and 2.

Table 10. Mitigation Scheme Phase 3 Network Statistics (AM Peak)

INDICATOR	REFERENCE CASE	LOCAL PLAN NO MITIGATION	PHASE 3 MITIGATION	CHANGE (%)	% MITIGATED
Over Capacity Queues (congestion – PCU hrs/hr)	613	887	785	-11%	37%
Total Travel Time (PCU hrs)	7,846	8,540	8,493	-1%	7%
Total Travel Distance (PCU kms)	389,730	401,483	402,810	0%	-11%
Average Speed km/hr	49.7	47.0	47.4	1%	15%

Table 11. Mitigation Scheme Phase 3 Network Statistics (PM Peak)

INDICATOR	REFERENCE CASE	LOCAL PLAN NO MITIGATION	PHASE 3 MITIGATION	CHANGE (%)	% MITIGATED
Over Capacity Queues (congestion – PCU hrs/hr)	438	740	599	-19%	47%
Total Travel Time (PCU hrs)	8,193	8,826	8,686	-2%	22%
Total Travel Distance (PCU kms)	411,679	420,288	420,355	0%	-1%
Average Speed km/hr	50.2	47.6	48.4	2%	31%

5.3.8 The AM peak has a change in congestion of 11.5% which mitigates the impact of the Local Plan by 37% overall. There are small reductions in travel time and speed but a marginal increase in distance suggesting that people are taking slightly longer routes but the reduction in congestion reduces the travel time.

5.3.9 In the PM peak we see a 19.1% change in congestion which mitigates the impact of the local plan by 47%. Similar to the AM peak we again see a reduction in travel time and speed with an increase in distance.

5.3.10 Overall whilst full mitigation is not achieved, the provision of the Link Road as part of the core Local Plan scenario has already significantly reduced the impact of the development schemes and the remaining congestion caused by the Local Plan is made up of small changes spread over a wide area which will require more local small scale interventions that cannot be

modelled at this strategic level and could be addressed as part of the detailed planning application stage for each site.

5.4 Phase 3 Comparison Against Reference Case

- 5.4.1 In order to get a full appreciation of the impact of the developments with the full mitigation measures this section provides an overview of the impact on average speeds, average travel time, queues, traffic flow and congestion compared to the reference case.

Speed Change

- 5.4.2 Figures 31 and 32 show the changes in speed between the Phase 3 Mitigation Scheme and the without Local Plan Reference Case, in kph. The green bars show an increase in congested speed, whilst the red bars show a decrease.
- 5.4.3 In both peaks there is a decrease in speed along Ladywood Road near the Kirk Hallam development. This is due to the delay at the junction of the new link road and the junction with Cat and Fiddle Lane, which was not mitigated in the phase 3 measures. The Cat and Fiddle Lane arm of the junction also decreases in speed. There is potential in the area of the junction for future mitigation measures. Mitigation measures on Sowbrook Lane have resulted in an increased speed in this area. There is a decrease in speed in Morley from development traffic and reassignment in the area.
- 5.4.4 On the strategic network there are no significant speed changes on the roads. There is a small decrease in speed at the north-western section of the junction of the M1 and A52. This is a small decrease at the main point where the borough's traffic accesses the strategic network.

Time Change

- 5.4.5 The changes in travel times between the Phase 3 Mitigation Scheme and the Reference Case are shown in Figures 33 and 34, in seconds. Decreases in travel time are shown with green bars and increases with red bars
- 5.4.6 There are minor changes to travel time across the borough, mostly in the vicinity of the Kirk Hallam link road, but also within the Stanton development. On the rest of the network, particularly the strategic network, the changes in travel time are not significant.
- 5.4.7 There is a decrease in time on Cat and Fiddle Lane, despite also showing a decrease in speed. This is a result of a shortening of the link from the addition of an intermediate node from a new development.

Queue Changes

- 5.4.8 The difference in queues between the Phase 3 Mitigation Scheme and the Reference Case are shown in Figures 35 and 36, in PCUs. The green bars show a decrease in queue lengths, whilst the red bars show an increase

- 5.4.9 In the AM peak the most significant increase in queues is on Cat and Fiddle Lane where the increase in traffic from the Kirk Hallam development makes it difficult for traffic to exit from the minor arm. There is also an increase in queues in Morley. The Morley junction is partially constrained by buildings, so is less easily mitigated in future studies.
- 5.4.10 In the PM peak Cat and Fiddle Lane also has an increase in queues, along with the Ladywood Road westbound arm of the same junction. There is an increase in the queue length on the Bostocks Lane arm of the junction of the M1 and A52 from the borough development traffic accessing the strategic network.

Flow Change

- 5.4.11 The flow change between the Phase 3 Mitigation Scheme and the Reference Case are shown in Figures 37 and 38, measured in PCUs. Increases in the number of PCUs are shown with red bars and decreases are shown with green bars
- 5.4.12 In the AM peak there is significant increases in traffic across the entire network despite measures having been put in place to mitigate the impact of the local plan. There are some areas of reduction of flow where traffic has reassigned from parallel routes, due to increased congestion at key junctions. Within the borough this is most evident within Ilkeston and around Kirk Hallam where the new link road provides a new route, along with the route into Morley.
- 5.4.13 The PM peak shows a similar pattern of change to the AM peak. The biggest difference is the greater decrease in traffic on the A52 in both directions. Traffic to and from Derby is choosing to access the borough via Ladywood Road or Derby Road.

Congestion Changes

- 5.4.14 The changes in congestion between the Phase 3 Mitigation Scheme and the Reference Case are shown in Figures 39 and 40, measured in volume over capacity percentage. Red dots are junctions where congestion has increases, whilst blue dots are areas of decrease.
- 5.4.15 In the AM peak there is an overall increase in congestion across the borough with the mitigation measures in place. There are a few decreases in congestion, such as south Ilkeston, where traffic has either reassigned or nearby increases in congestion are throttling traffic.
- 5.4.16 In the PM peak there is also a pattern of an increase in congestion across the borough with spots of decrease, such as south Ilkeston.
- 5.4.17 Following the mitigation some junctions which were already a problem such as Cat and Fiddle/ Ladywood Road are still an issue and would require further mitigation efforts. Additionally there are junctions which have now become congested following the mitigation as the traffic reassigns to different routes.

6. STUDY CONCLUSIONS

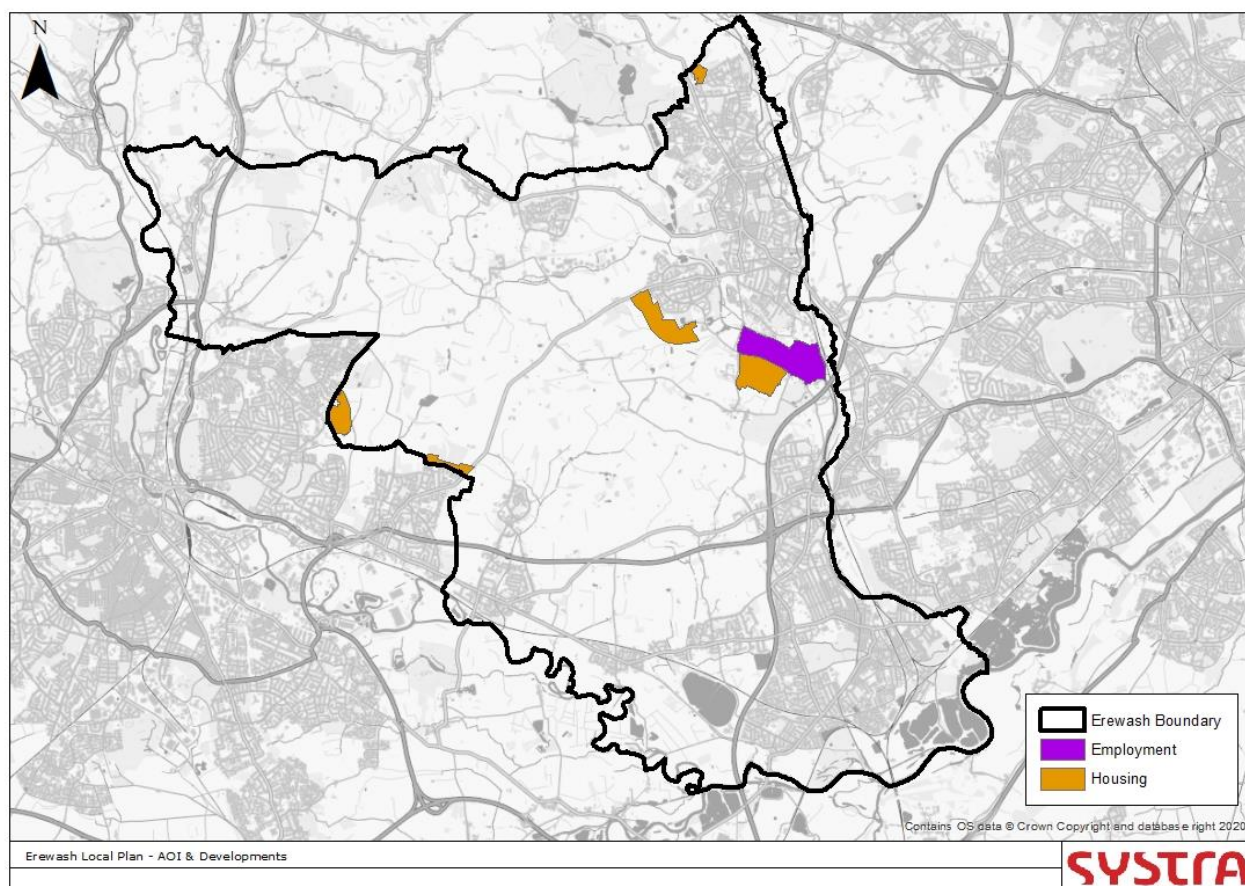
6.1 Study Overview

6.1.1 This study provides a strategic transport assessment to support the Erewash Local Plan using the East Midlands Gateway Model (EMGM). The Local Plan developments have been tested in a single 2037 assessment year. This year has been chosen because it is the final year of the current Local Plan.

6.2 Local Plan Proposals

6.2.1 The review of the Erewash Local Plan (also referred to as the Core Strategy Review) includes a number of residential and employment developments that are mainly concentrated in the eastern part of the borough in and around the towns of Ilkeston and Kirk Hallam (see Figure below).

Erewash Local Plan Developments



6.2.2 The developments that have been specifically included in the model are as follows:

- **South Stanton:** 1,000 homes, a primary school and village centre on Low’s Lane;
- **North Stanton:** 80Ha of mixed B2 and B8 employment to the north of the southern residential site;

- **Acorn Way:** 600 home residential development off of Morley Road;
- **Spondon:** Development consisting of 200 homes, accessed from Dale Road;
- **Kirk Hallam:** A development including 1,300 homes, a primary school and a local centre off of the Kirk Hallam relief road; and
- **Cotmanhay:** A 250 home residential development to the north of Cotmanhay.

6.2.3 The modelling specifically includes 3,350 of the 5,870 planned houses and all of the 80ha of employment development with the remainder of the Local Plan growth accommodated in the modelling as generalised growth to represent the smaller infill developments. The Kirk Hallam Link Road provides access to the Kirk Hallam site and has been included in the no mitigation assessments of the Local Plan.

6.2.4 The modelling assessments show the Erewash Local Plan sites impact the highway network throughout the borough and also on routes leading into Derby and Nottingham City. However, the key congestion impacts are in and around Ilkeston and Kirk Hallam where the majority of the key development sites are located.

6.2.5 Due to the limited access to the Strategic Road Network (SRN) from Erewash, the impact of the Local Plan on the M1 and A52 is limited.

6.3 Mitigation Proposals

6.3.1 The mitigation aims to reduce the impact on the local road network in terms of congestion caused directly by the introduction of the developments associated with Erewash Local Plan. Three phases of mitigation have been modelled to reduce the highway impact of the Erewash Local Plan as described below:

- **Phase 1: Kirk Hallam Link Road improvements** – Improvements to the junctions at both ends of the Kirk Hallam Link Road. The improvements are shown in Appendix Cand include the replacement of the priority junctions at either end of the route with roundabout junctions. The speed on the Link Road has also been increased to 40mph.
- **Phase 2: Public Transport and Active Mode** –Phase 1 with additional public transport and cycle schemes to better serve the borough and new developments. These schemes are shown in the figure below and include the following;
 - Two new bus routes from Ilkeston to Derby to complement the existing Ilkeston Flyer and Black Cat services;
 - a new service following the route and stopping pattern of the existing Ilkeston flyer and runs from the Ilkeston train station to Kirk Hallam, along the new Kirk Hallam Link Road and then down the A6096, through Spondon into the centre of Derby. This service will run every 30 minutes (shown in blue); and
 - a new service following the route and stopping pattern of the Black Cat and also runs from Ilkeston train station, through West Hallam and Stanley. The service runs every 30 minutes (shown in Brown).
 - A bus route from Nottingham to Heanor via Sandiacre and Kirk Hallam. This is an amalgamation of the existing 14 and 21 routes. The service will run every 20 minutes (shown in purple);
 - An active modes trail running from Cotmanhay via West Hallam to the A61 at Breadsall (shown in black);

- A cycle route connecting the above trail to the Erewash canal cycle highway, via the Kirk Hallam development (shown in yellow);
 - An extension of the existing cycle route 66 around the north of Spondon to Ockbrook (shown in orange); and
 - A cycle route from Derby Road to the Acorn Way and Brook Farm developments (shown in pink).
 - Introduction of two new rail services using the Maid Marion line between Mansfield and Derby and Mansfield and Leicester.
- **Phase 3 – Highway Enhancements** – capacity enhancements at key congested junctions within the borough. The details of these measures are described in Section 4.3.

6.3.2 The Phase 1 mitigation increases the capacity on Kirk Hallam Link Road which enables the road to perform a by-pass function that accommodates background traffic from Kirk Hallam and the surrounding area in addition to a development access. This results in additional background traffic using the Link Road which previously travelled through the centre of Kirk Hallam. However as the impacts of the Link Road are included in the with Local Plan assessments the impact of increased capacity along this route has a minimal impact on the congestion within the borough as a whole; the road is already providing mitigation as an intrinsic element of the Erewash Core Strategy Review proposals.

6.3.3 The Phase 2 public transport and active mode mitigation results in a modal transfer away from the private car to more sustainable active and public transport modes with an overall increase in the use of rail and bus services predicted. However, these trips are removed from throughout the network and are not concentrated on any specific areas or junctions and therefore the impact on highway congestion is limited.

6.3.4 The Phase 3 highway mitigation measures are targeted on specific congestion locations and result in significant reductions in congestion at a number of critical junctions within Ilkeston, Kirk Hallam and the wider Erewash Borough.

6.4 Overall Mitigation Levels

6.4.1 The change in overall congestion within the Erewash Borough (as indicated by the Over Capacity Queues model statistic) is shown in Table 12.

Table 12. Local Plan Congestion Impacts Summary

INDICATOR	REFERENCE CASE	NO MITIGATION	PHASE 3 MITIGATION	CHANGE (%)	% MITIGATED
AM Peak	613	887	785	-11%	37%
PM Peak	438	740	599	-19%	47%

6.4.2 These statistics show that the Erewash Local Plan developments result in a moderate increase in highway congestion within the borough with no mitigation in place, however this congestion is reduced significantly due to the inclusion of the Kirk Hallam Link Road as a core element of the Local Plan proposals.

6.4.3 Overall whilst the full mitigation package (Phases 1 to 3) do not mitigate all of the congestion the remaining highway issues caused by the Local Plan are made up of low levels of congestion change spread over a wide area which will require more local small scale interventions that cannot be modelled at this strategic level and could be addressed as part of the detailed planning application stage for each site.

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