

East Midlands Gateway 2  
Design Approach Document

# Appendix 1: Highway Works Design Approach Document



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## Introduction

**8.1** The East Midlands Gateway 2 (EMG2) development, located south of East Midlands Airport (EMA) near M1 Junction 23A, proposes large-scale improvements to the strategic road network (SRN) at M1 Junction 24. Small-scale works on the SRN are proposed at the EMG1 site access junction. On the local road network improvements are proposed to the A453 Hunter Road roundabout, to form the access into EMG2, and on the A453 westbound exit from the J23A Finger Farm roundabout. In addition various active travel works are proposed.

**8.2** Figure 8.1 below shows the overall location of the highway works in the context of EMG2 and the existing road network.

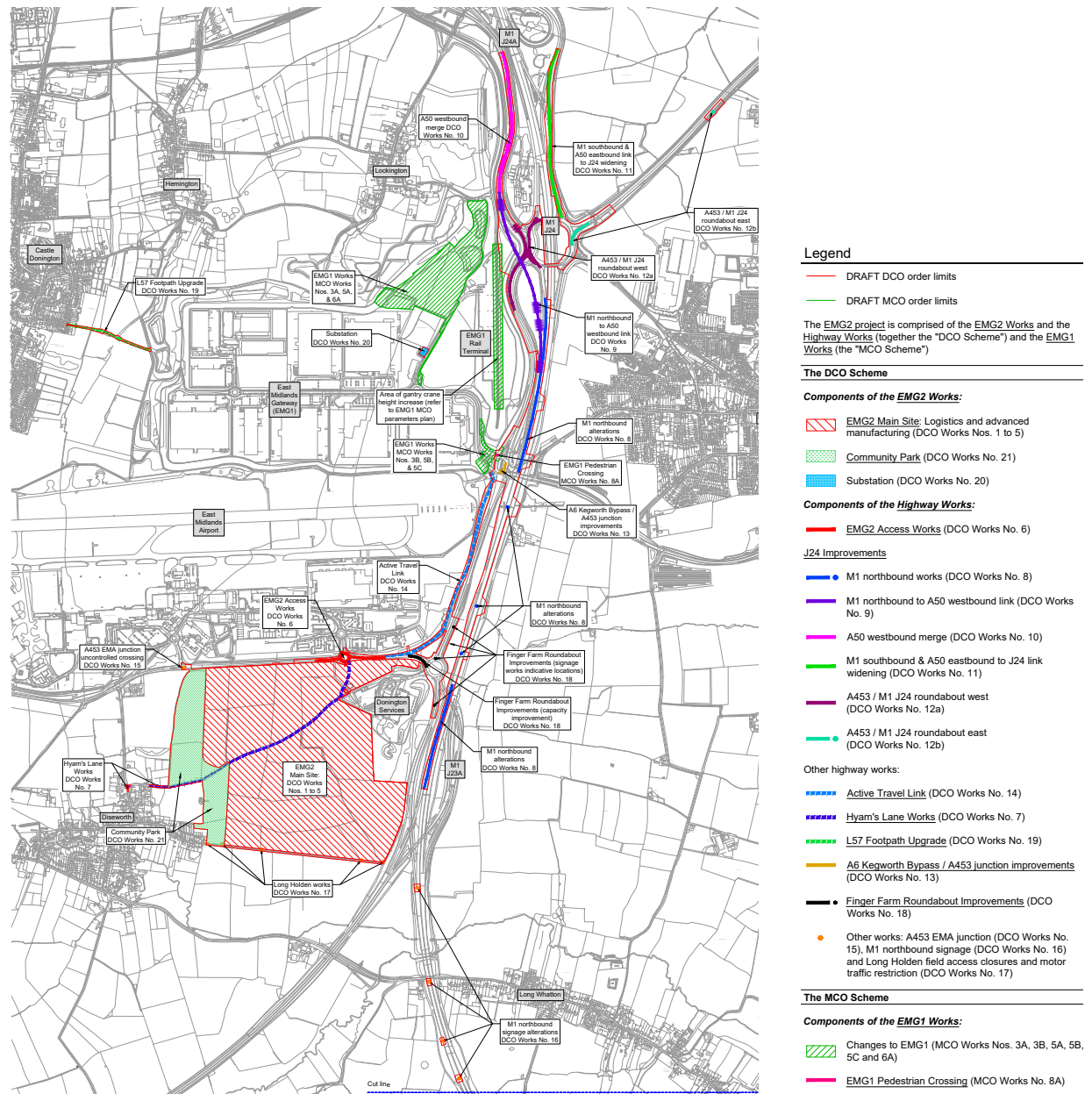


Figure 8.1 Location Plan

## Principles of Good Road Design

**8.3** DMRB standard GG 103 sets out 10 principles of good road design. This standard states that good road design:

- makes roads safe and useful;
- is inclusive;
- makes roads understandable;
- fits in context;
- is restrained;
- is environmentally sustainable;
- is thorough;
- is innovative;
- is collaborative; and
- is long-lasting.

**8.4** The ten principles of good road design have been taken into account in the design for the highway works, and each is assessed in detail in this report.

## Scheme overview

**8.5** The EMG2 highway works are defined in Schedule 1 of the draft DCO (Document DCO 3.1) and are shown on the Components Plan (Document DCO 2.7) (an extract being found at Figure 8.1 above) and the Highways Plans (Document DCO 2.8) and comprise the following:

- A453 access junction works to the EMG2 Main Site (DCO Works No. 6);
- Hyams Lane works (DCO Works No. 7);
- Works to the M1 northbound (DCO Works No. 8);
- Construction of link road from the M1 northbound to the A50 westbound (DCO Works No. 9);
- Works to the A50 westbound (DCO Works No. 10);
- Works to the link road from the M1 southbound and A50 eastbound to the M1 Junction 24 (DCO Works No. 11);

- Works to the west side of the M1 Junction 24 roundabout and A453 northbound approach (DCO Works No. 12a);
- Works to the east side of the M1 Junction 24 roundabout and A453 southbound approach (DCO Works No. 12b);
- Improvements to the A6 Kegworth bypass / A453 junction (DCO Works No. 13);
- Construction of the Active Travel Link between the EMG1 access junction and the A453 west of Finger Farm roundabout (DCO Works No. 14);
- Provision of an uncontrolled crossing of the A453 at the EMA signalised access junction (DCO Works No. 15);
- Works to M1 northbound signage on the approach to M1 Junction 23A (DCO Works No. 16);
- Works to Long Holden (DCO Works No. 17);
- Works to the J23A Finger Farm roundabout (DCO Works No. 18); and
- Upgrade to public footpath L57 to a cycle track (DCO Works No. 19).

## Makes roads safe and useful

**8.6** GG 103 states that “Safety is fundamental to good road design; it is integral to both the usefulness of its function and the confidence of road users and their well-being. Good design creates safe roads which support and link to other wider imperatives, both nationally and locally, and that are fundamentally useful, meeting users’ need for mobility effectively”.

## M1 JUNCTION 24

**8.7** M1 Junction 24 experiences congestion at peak times with queues from the signalised roundabout junction blocking back onto the M1 northbound mainline as well as on the A50 eastbound and A453 north & southbound approaches. This congestion is forecast to worsen. There is a cluster of PICs at the M1 northbound exit slip road.

**8.8** The works on the SRN at Junction 24 will deliver a significant capacity improvement to the junction and will take the key M1 northbound to A50 westbound movement out of the signalised roundabout junction and a new bridge over the A453 will be constructed to accommodate this new link. This is the only movement between the M1 and A50 that uses the signalised junction with all other movements between these two major roads already having direct free-flow links. The capacity improvement to the NB exit will reduce the potential for PICs to occur on this part of the network.

**8.9** An alternative bridge, that would have seen the M1 northbound to A50 westbound link crossing under the A453, was considered but ruled out principally on the grounds that (a) it would be highly disruptive to construct and (b) it would require surface water pumping which requires frequent maintenance and presents a safety risk if it were to fail.

**8.10** Departures from standard are required due to the overall constraints of the existing road network, these will be subject to a rigorous safety risk assessment and departure from standard approval process.

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## A6 KEGWORTH BYPASS / A453 JUNCTION AND ACTIVE TRAVEL WORKS

**8.11** The capacity improvement to the A6 Kegworth bypass / A453 junction is required as mitigation for traffic generated by the EMG2 main site. As discussed further below a signalised pedestrian crossing at the EMG1 exit road of Wilders Way is also proposed at this junction. These two elements of highway works are independent of each other.

**8.12** The provision of an active travel link from the A453/A6/EMG1 junction south to EMA and the proposed EMG2 site will fill a gap in good-quality cycle provision.

**8.13** The active travel link will connect into the upgrade of Hyams Lane, providing pedestrian and cycle connectivity through to Diseworth. Footpath L57 will also be upgraded to provide cycle connectivity between Castle Donington and EMG1.

**8.14** Overall the active travel works will provide a much-improved network of high-quality pedestrian and cycle routes between EMG1, EMG2, EMA, Kegworth, Castle Donington and Diseworth, promoting active travel and improving safety by providing off-carriageway and off-road facilities.

## FINGER FARM ROUNDABOUT AND EMG2 ACCESS JUNCTION

**8.15** The capacity improvement to the Finger Farm roundabout will cater for the traffic generated by the EMG2 proposals. The A453 Hunter Road roundabout will be modified to provide access into the EMG2 main site, and the A453 entries and exits will be widened to provide additional capacity.

## SUMMARY

**8.16** The highway works will:

- improve safety and reduce collisions at M1 Junction 24;
- reduce delays particularly at M1 Junction 24 and make journey times more reliable;
- help sustainable economic growth by supporting employment development opportunities, particularly for EMG2 and the proposed additional works within EMG1; and
- improve facilities for active travel users, notably cyclists, thus providing vulnerable users with a safer environment.

**8.17** A stage 1 road safety audit will be undertaken for the scheme in collaboration with NH and LCC.

## Is inclusive

**8.18** GG 103 states that “Inclusive environments facilitate dignified and equal use by all. An inter-disciplinary design process involves and places people’s needs and views at its heart, nurturing well-being and creating a shared sense of ownership of the road. All users and communities are considered carefully in order to reduce barriers to access and participation, particularly mindful of the most vulnerable.”

**8.19** The provision of the active travel works referred to above will significantly enhance the network of active travel routes and fill the following gaps in a good-quality active travel network:

- Castle Donington to EMG1, EMG2 and Kegworth; and
- EMG1 (and villages to the north of EMG1) and Kegworth to EMA, EMG2 and Diseworth.

**8.20** The active travel works will enable national cycle route no. 15 to be extended from Diseworth to Kegworth via EMG2 and EMG1.

**8.21** The wider EMG2 project will provide new footpath and bridleway connections around the EMG2 main site which will provide improved facilities for leisure and commuter users.

**8.22** The additional signalised crossing at the EMG1 access junction will link the existing bus interchange to a new drop-off lay-by in the EMG1 development. This will allow drivers to drop off bus passengers in a safe location when leaving the EMG1 site.

**8.23** Overall these facilities will provide leisure and commuter routes for vulnerable road users connecting together the key local employment sites and local villages.



## Makes roads understandable

- 8.24** GG 103 states that “Easy to read, a good road is intuitive to use so as to be safe and efficient for all. ‘Self-explaining roads’ focus on the essentials and eliminate unnecessary and confusing clutter to make them legible, while responding to place and enhancing both environmental and economic outcomes.”
- 8.25** The highway works will be designed so that the layouts are as intuitive as possible, for example by having spiral lane markings through junctions clearly marked and signed so drivers do not have to change lanes unnecessarily.
- 8.26** Consideration has been given to the locations of signage on the northbound approach to Junction 24. A directional signage strategy has been produced that will provide clear and concise signing for this section of the M1. The strategy also covers changes to directional signage on the M1 northbound approach to Junction 23A, on the A453 and on the A50.
- 8.27** Directional signage will be provided for pedestrians and cyclists using the active travel works and for the local footpath and bridleway network. The active travel works will extend national cycle route no. 15 from Diseworth to Kegworth via EMG2 and EMG1 thus improving route understanding for cyclists.
- 8.28** Care will be taken at detailed design stage to ensure that appropriate clear signage is provided and unnecessary signage is avoided, thus minimising clutter.

## Fits in context

- 8.29** GG 103 states that “The aesthetic quality of a road and its design in relation to the places through which it passes, is integral to its function and the experience of those that use it. Good road design demonstrates sensitivity to the landscape, heritage and local community, seeking to enhance the place while being true to structural necessities. It builds a legacy for the future.”
- 8.30** The majority of the highway works will be widening of existing road corridors contained within the existing highway boundary. However, the M1 northbound to A50 westbound will be a new link passing over the A453 on a bridge. As the design of this link develops it will be integrated into the existing landscape as sensitively as possible, with varying earthwork slopes and providing a good-quality soft landscaping scheme. Sustainable drainage features will be provided alongside the new link.



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**8.31** The new bridge structure is adjacent to a strategic rail freight interchange, the M1 motorway and the A453 and A50 SRN routes. The bridge, therefore would not look significantly out-of-place, however, its impact should be minimised so as not to provide a further visual block. The ‘weight’ of the structure is to be minimised, however, a cable-stayed bridge structure would in itself create a visual impact and would be highly visible from the surrounding area and would look out of place when compared to the adjacent SRN.

**8.32** The bridge deck width is increased slightly from the minimum as the deck is intended to be straight, whereas there is a plan curve to the carriageway. This is to be kept to a minimum which minimises the effect of shadow on the roadway below. Curved girders were considered, however, the challenges associated with the low construction depth likely preclude this option due to the risk of buckling and instability, particularly during construction. The overall effect will present an elevation with a traditional appearance, with weathering steel that will create an even deep brown finish, under the shadow of the cantilevering concrete deck.

**8.33** The parapets will be normal containment in metal, with rails and mesh infill, the mesh will be barely visible. A galvanized finish will dull to a light grey rapidly and tend not to be intrusive against the sky. The abutments will be mass concrete, and allow a certain degree of flexibility in appearance. A simple feature finish such as vertical fluting can be used which would be in keeping with other bridge substructures nearby. The wingwalls of the abutments may be formed either in reinforced earth or concrete.

**8.34** The active travel works will be designed as far as possible to minimise significant engineering interventions such as earthworks and they will be landscaped to provide suitable boundary treatments that fit in context with the existing landscape.

**8.35** The effects on heritage assets can be appropriately managed and mitigated.

### Is restrained

**8.36** GG 103 states that “Functional, but responding positively and elegantly to the context, good road design allows for the expression of the character and identity of the places and communities through which a road passes. Good road design can enhance a sense of place and add to what we have inherited, particularly through the use of appropriate materials and traditions, but does not make unnecessary superficial or superfluous visual statements”.

**8.37** As discussed above the majority of the highway works will be widening of existing road corridors contained within the existing highway boundary. The M1 northbound to A50 westbound is the exception to this as it will be a new link. The alignment of this link has been designed to closely follow the existing road alignments of the M1, A453 and A50 on plan thus minimising the impact of the new link and is contained within the areas surrounded by existing road and rail infrastructure. The vertical alignment of the new link, whilst being elevated to cross the A453, is designed to be integrated into the existing landscape as sensitively as possible.

**8.38** Overall the highway works seek to provide a scheme of a scale compatible with an overarching sustainability and environmental driver to retain a compact overall junction layout that sits within the general footprint of the existing highway network.

**8.39** For the new M1 northbound to A50 westbound link consideration was given to a feature bridge over the A453 such as a cable-stayed bridge but this would be an unnecessary visual statement not in keeping with the surrounding area.

## Is environmentally sustainable

- 8.40** GG 103 states that “Making an important contribution to the conservation and enhancement of the natural, built and historic environment, good road design seeks to achieve net environmental gain. It is multi-functional, resilient and sustainable, allowing for future adaptation and technical requirements, while minimising waste and the need for new materials.”
- 8.41** As discussed above the highway works seek to provide a scheme of a scale compatible with an overarching sustainability and environmental driver to retain a compact overall junction layout that sits within the general footprint of the existing highway network. By constructing a bridge over the A453 avoids temporary works to the A453 which reduces the material and carbon cost and minimises disruption to traffic during the works.
- 8.42** The highway works are included within the Environmental Impact Assessment (EIA) process for the wider EMG2 project. As part of the EIA process design influence and mitigation / enhancement measures are integrated as early as possible.
- 8.43** As discussed below Segro are collaborating with promoters of other strategic developments in the surrounding area to deliver highway works that can be readily adapted to cater for future demands rather than replaced.
- 8.44** The active travel works will provide a much-improved network of high-quality pedestrian and cycle routes between EMG1, EMG2, EMA, Kegworth, Castle Donington and Diseworth, promoting active travel and enabling a shift to sustainable transport modes.

**8.45** The drainage design will make use of sustainable drainage (SuDs) and landscaping will be provided to match the surrounding environment.

**8.46** The EMG project is committed to delivering meaningful biodiversity improvements across the whole project, and a Biodiversity Net Gain (BNG) assessment has been used to inform the scheme design. This demonstrates that the project should have the ability to deliver beyond the 10% net gain goal for habitat area, hedgerows, and watercourses. This has been calculated using the Statutory Biodiversity Metric and covers the EMG Main Site, Highways Works, and EMG1 areas. Within highway works, it may not be possible to achieve 10% BNG in isolation due to land availability, design and safety constraints, but opportunities will be explored during the detailed design stage. Impacts will be avoided and minimised wherever possible, and new habitats will include species-rich grassland, scrub, and woodland, delivering long-term benefits for nature across the wider development.

## Is thorough

**8.47** GG 103 states that “The result of robust processes that create a continual cycle of improvement, good road design starts with an in-depth understanding of people, place and context; learning from best practice worldwide. The design of all elements of the road environment are considered together and integrated into a responsive design.”

**8.48** Segro and their consultant team have worked hard to understand the local environment and context of the proposed highway works. Segro are already inherently embedded in the local community given that they own, operate and maintain the EMG1 site and have regular

liaison with the local community. The ongoing consultation process (as discussed further below) will continue to further the understanding of the local environment and context and the design will respond to this engagement as appropriate.

## Is innovative

**8.49** GG 103 states that “Responding positively to change, good road design captures opportunities for betterment and develops in tandem with emerging new technologies. Designing to a standard is not the same as achieving good design; an innovative and resourceful approach that is mindful of context is necessary to achieve better outcomes.”

**8.50** As discussed below Segro as promoter of EMG2 are actively engaged with key stakeholders and other developers to provide a scheme on the SRN that forms part of a long-lasting solution to M1 Junction 24. This combined developer-led approach is in itself innovative, and given the developers are inherently invested in the local area a holistic approach to the scheme design that fits with the wider strategic planning context has been achieved.

**8.51** The detailed design of the highway works will make best use of emerging technologies, standards and products to minimise environmental impact.

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### Is collaborative

- 8.52** GG 103 states that “Collaboration ensures roads are useful to and accepted by the communities they serve. Collaborative working requires a rigorous process that identifies dependencies and wider opportunities, and facilitates effective communication and engagement from the start. Community engagement will be led by a local sense of culture, place and value.”
- 8.53** Segro, as promoter of the EMG2 project, have engaged with key statutory stakeholders, local authorities, local communities and other parties in the development of the overall EMG2 project. This has included statutory consultation prior to the submission of the scheme development consent order.
- 8.54** The need to improve M1 Junction 24 is recognised by NH, local highway authorities, the East Midlands Freeport and the East Midlands Combined Authority, and the principle of improving the junction as set out in the highway design for the Segro EMG2 project has received broad support from these parties.
- 8.55** The active travel works have received broad support from these parties and local communities.
- 8.56** The enhanced public right of way network around the EMG2 main site has also received broad support during the consultation, and following the consultation process changes have been made to (a) provide a bridleway connection between Hyams Lane and Long Holden to provide a loop from and back to Diseworth, and (b) change the status of Long Holden from an all-purpose highway to a bridleway to restrict access to walkers, cyclists, horse riders and private access to adjacent land.

- 8.57** Engagement with NH and LCC, as well as other local stakeholders as appropriate, will continue as the scheme is developed and the detailed design of the highway works will go through a full technical approval process following the making of the DCO before construction.

### Is long-lasting

- 8.58** GG 103 states that “With quality materials and careful detailing, good road design brings lasting value. The design process requires sufficient time for challenges to be resolved before delivery and is adaptable to future needs and technologies as part of the commitment to whole-life operation, management and maintenance.”
- 8.59** Segro, as promoter of the EMG2 project, have engaged with other developers of strategic sites around the area of M1 Junction 24 and have worked with them to develop a scheme for Junction 24 that can be added to by others (the longer term proposals envisage a new bridge over the M1 south of J24 to provide a local link road into Kegworth) and would therefore not be abortive if other developments are brought forward.
- 8.60** Detailed consideration has been given to the operation of the M1 northbound between Junctions 23A and 24 and how this is affected by the EMG2 highway works and how technology may be deployed.
- 8.61** The design process will take maintenance needs into account from the outset and the maintenance and repair statement (MRS) will be provided to document how access for maintenance is to be provided. The detailed design process will continue following making of the DCO with NH involved in the technical approval process.

- 8.62** The new bridge structure crossing the A453 has been designed with due regard to the long-term maintenance requirements by designing as an integral bridge and it will be designed to a 120-year design life.

- 8.63** The drainage strategy for the highway works makes an allowance of 40% for climate change adaption thus providing a long-lasting drainage system.

- 8.64** The enhanced network of footpaths and bridleways around the EMG2 main site will be dedicated as public rights of way thus ensuring their long-term status.



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