



# Quality Marking Services Limited

[www.qmarkings.co.uk](http://www.qmarkings.co.uk)



 egis road operation  
M40

## M40 Motorway Safety Improvement Scheme utilising

 **HyperLine™**  
the way to a brighter future

 **HyperLine™ ULTRA**  
the way to a brighter future

 **LifeLine™**

## INTRODUCTION

Line markings are a fundamental contribution to road safety. Essentially, they turn a non-descript, black surface into a road; shaping a driver's perception of space and influencing behaviour.

During the hours of darkness, the retro-reflectivity of road markings on the highway is essential to enable the driver to follow highway geometry. The miniature glass spheres embedded within road markings return light from a vehicle's headlights back to the driver and it is this feature which is particularly important during adverse wet weather or on unlit carriageways where visibility of the road is greatly reduced.

The M40 motorway is one of the principal arteries linking London and the southeast to Birmingham and the greater northwest region. The (Design, Build, Finance and Operate) DBFO Area 30 (M40) network operations and maintenance contract was originally awarded to Egis as a partner within UK Highways M40 Limited and covers the majority of the route, starting at Junction 1A on the M25 Orbital to Junction 15 for Warwick. The operational and maintenance project consists of 123km of 3-lane motorway and 7km of 4-lane motorway in both directions with the current maintenance contract running until January 2027.

Egis collaborates very closely with UK Highways M40, Highways England and other stakeholders undertaking core services of Network Management, Accident and Emergency Response, Winter Maintenance, Safety Inspections, Cyclical and Routine Maintenance including the replacement of Road Marking and Road Studs.

As a business, Egis looks for effective treatments which provide best performance and cost savings. To ensure high drive comfort and safety standards, the pavement surface is regularly inspected with a pro-active maintenance routine.

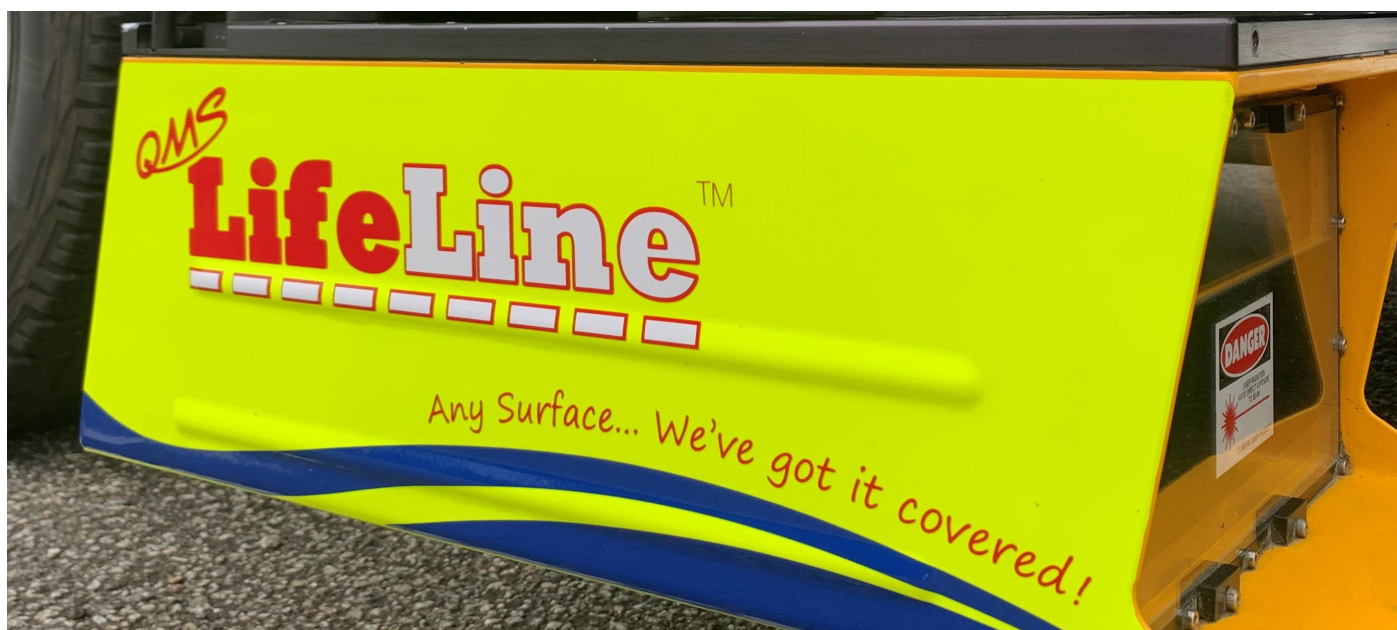
Quality Marking Services has differentiated itself within the line marking industry by innovatively developing environmentally sustainable line markings that demonstrate high retro-reflectivity performance from the day of installation and throughout service lifetime.

Believing in better is a major component of continual improvement and ingrained within the QMS culture. Always abreast of technology enhancements, the decision was taken early 2019 to develop a new service by investing in survey equipment. **QMS LifeLine™** is an award-winning service offering, utilising a mobile retro-reflectometer driven at traffic speeds, to test and record line markings and road studs, producing a fully detailed condition survey of the network and enabling improvements in the strategic maintenance programme.

All road markings and studs are assessed in accordance with **Design Manual for Roads and Bridges, CS 126 Inspection and assessment of road markings and road studs and BSEN:ISO 1436.**

Requiring no Traffic Management, the **QMS LifeLine™** survey is undertaken whilst driving according to traffic conditions. Scanning the road at over 400 times per second, **QMS LifeLine™** utilises the latest technology Laserlux LLG7 equipment, automatically adjusting height from the surface to maintain 30 metre geometry and accuracy of readings.

**QMS LifeLine™** is GPS and Marker Post enabled, precisely measuring visibility and retro-reflectivity levels of road markings and road studs. Arrows, letters and ancillary markings are pinpointed with GPS reference for their location. The condition of road markings and



QMS LifeLine™ laser survey equipment



symbols can also be detailed with user intervention. The technology simultaneously counts and categorises road studs to assist with future maintenance planning.

The survey vehicle, including the Laserlux LLG7 equipment, is maintained within the traffic lane during testing without the need to travel the equipment directly on top of the road marking. Safety for the driver and passing motorists is ensured as positioning within the traffic lane is no different to the standard driving position.

The road network is also captured on forward facing video enabling visual verification of surface conditions and providing a valuable record of additional information. The references embedded within the video files link directly to the spreadsheet and KML files for easy viewing and identification.

## RESULTS 2019

Egis Road Operation M40 identified that replacement and renewal line marking programmes based on visual inspections were subject to human bias and could not be independently or retrospectively audited. They commissioned the **QMS LifeLine™** survey of their whole network in May 2019 in order to use the intelligence gained for enhanced asset management.

On presentation of the results the variety of viewing formats made the data very quick and easy to interpret. The accurate retro-reflectivity performance and asset condition mapping enabled a new maintenance strategy to be implemented.

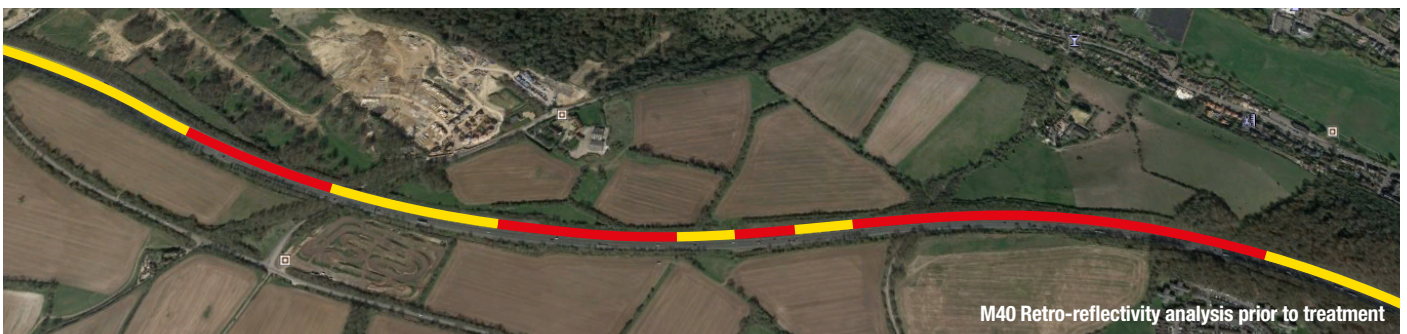
The detailed breakdown of the pavement asset meant it was simple to instigate a location-specific maintenance regime rather than a blanket “overspray” or “remove/replace” of line markings.

The Egis M40 technical team decided to trial our award winning **QMS HyperLine™ ULTRA** on lane lines rather than using their traditional treatment with the aim of improving lane guidance with high visibility markings especially during wet conditions.

Quality Marking Services developed and introduced the proprietary **QMS HyperLine™** system for the overmarking / rejuvenation of existing markings in 2006. This system was awarded “Road Marking Product of the Year” in 2009 with **QMS HyperLine™ ULTRA** achieving RSMA “Innovation of the Year” in 2016 and continues to excel with its durable performance.



**QMS HyperLine™** is a cold applied, high-performance road marking system containing no solvents, no lead chromates and no volatile organic compounds (VOCs). The reflective glass beads are locked into the resin by the electronically controlled application of sprayed acrylic resin to the highway substrate. Drying in less than one minute, the capillary action of the resin film around each individual bead ensures that they remain firmly embedded within the pavement surface material resulting in an extremely high-performance road marking which retains outstanding retro-reflectivity values throughout the functional life of the line.



## INSTALLATION PROCESS

Proven on high-speed networks for over 17 years, **QMS HyperLine™** is considered the highest performing, most environmentally friendly and cost-effective line marking maintenance solution currently available.

**QMS HyperLine™** is suitable for the overspraying of raised rib edge lines and lane lines (flat or profiled) and contains glass beads manufactured from recycled glass otherwise destined for landfill.

**QMS HyperLine™ ULTRA** is designed specifically for lane lines in locations where greater retro-reflectivity performance is required. The base material is the identical solvent free, acrylic resin with the addition of a unique formulation of multi-sized glass beads with a higher refractive index. These specially selected glass beads concentrate the beam of light more than ordinary beads increasing the power of retro-reflective performance.

The acrylic resin locks the beads into the line and due to the size of the beads they protrude above the water level providing enhanced wet-night visibility. The light reflected back to the driver from the vehicle's headlights is therefore intensified because **QMS HyperLine™ ULTRA** creates an exceptionally bright contrast to the dark-night road surface, especially in wet conditions.



Enhancing safety in all aspects of line marking maintenance is paramount at Quality Marking Services. The liquid resin and glass beads are pumped into the machine tanks with minimal manual handling, greatly reducing the risk of back injuries when loading the **QMS HyperLine™** installation vehicle.

**QMS HyperLine™** is installed by two operatives from the safety of inside a vehicle and the spray arms protected by two conspicuity marked side impact bars. The crew communicates via noise cancelling, touch free headphones and are both able to see the laser guidance system marking the centre and edge of each line for accurate positioning.

There is absolutely zero risk of skin burns from either dangerously hot plant or molten material as **QMS HyperLine™** is cold applied by the operative controlling the electronically regulated spray applied system.

## ENVIRONMENTAL BENEFIT

The **QMS HyperLine™** system is cold applied, with no gas or diesel fuel burnt for the installation process. 39,000 linear metres can be completed in one shift due to the rapid installation speed so the combination of these factors results in less diesel usage by traffic management crews and workforce plant, significantly reducing greenhouse emissions.

Quality Marking Services can demonstrate a minimal environmental impact during initial manufacture of raw material plus a significant reduction in the total environmental burden in comparison to other materials by using **QMS HyperLine™** for the rejuvenation of line markings. This includes the recycled glass otherwise destined for landfill in the bead component of standard **QMS HyperLine™**

### CO<sub>2</sub> output combining both resin and beads:

<b>QMS HyperLine™</b>	0.741kg/m <sup>2</sup>
Sprayed thermoplastic	3.92 kg/m <sup>2</sup>



**Result: 81% reduction in carbon dioxide emissions**





Undertaking effective carriageway maintenance should not come at the cost of the environment. The trial section of lane line rejuvenation in 2019 using **QMS HyperLine™ ULTRA** saved 10,092kg of carbon dioxide pollution in comparison to the same section being sprayed using thermoplastics.

Adrian Smith, General Manager, Egis Road Operation M40 summarised the positive benefits of **QMS HyperLine™ ULTRA** trial.

*“Egis Road Operation are committed to road user safety. QMS HyperLine™ is an excellent example how we work with our supply chain to challenge and push the boundaries ensuring the highest level of safety for the road user alongside our commitment to the environment. Early tests demonstrate meeting all our objectives and this is a product we are really pleased to be associated with”*

## RESULTS 2020

Junction 1A is a four-lane section of the M40 motorway that adjoins the M25 network and suffers from particularly high traffic volumes and the subsequent risk of collisions.

Minimum performance thresholds set by Highways England are the levels at which road markings must be replaced. The night-time brightness of **QMS HyperLine™ ULTRA** over the particularly wet winter of 2019/2020 inspired Egis, on behalf of UK Roads M40, to change their maintenance. By utilising the **QMS HyperLine™** systems the higher performing products increase safety, continually improving measures in an effort to reduce accidents.

Using a combination of evidence-based information on the status of line markings in 2019 plus accident statistics, the Operations and Maintenance Team developed an enhanced programme for 2020 whilst saving on the cost of line maintenance.

**QMS HyperLine™** was selected to overspray the existing profiled edge lines and **QMS HyperLine™ ULTRA** for the lane lines. In addition to the four-lane section at junction 1A, three-lane sections were also completed utilising the **QMS HyperLine™** systems.

The M40 Motorway is an extremely busy and constantly trafficked route which is rarely empty. For the travelling vehicles the speed of installation meant no sections of the network had to be closed as all works were undertaken with mobile traffic management keeping disruption to flow disruption to an absolute minimum, with no time spent running vehicles in queuing traffic, thus reducing the impact on pollution.

Installation summary			
Product		Carriageway length	Shifts
<b>QMS HyperLine™</b>	Edge line	108,446m	13
<b>QMS HyperLine™ ULTRA</b>	Lane line	124,185m	



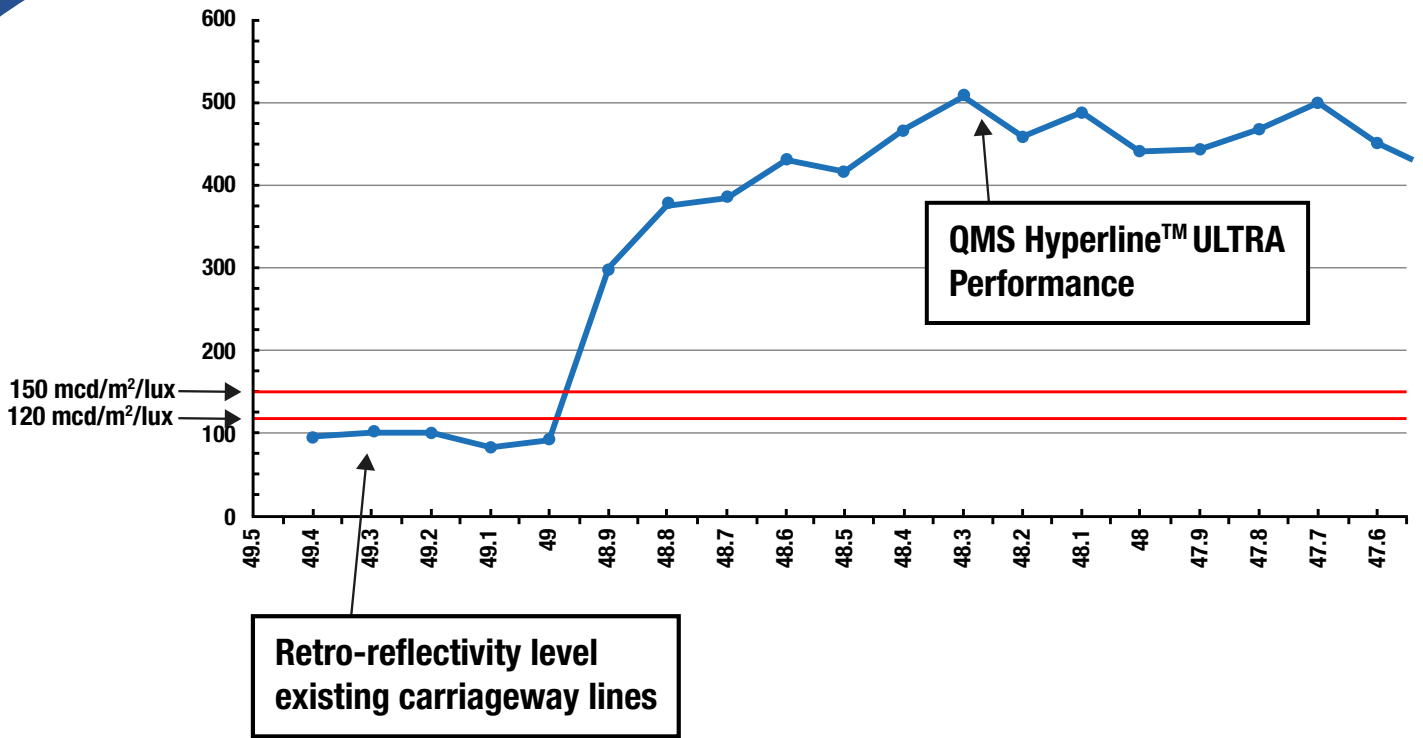
Installation under mobile traffic management

Following completion, the immediate result improved night-time lane definition is clearly visible.

Post-installation retro-reflectivity results:		
Lane Lines	<b>QMS HyperLine™ ULTRA</b>	Av. 425 mcd/m <sup>2</sup> /lux
Edge Lines	<b>QMS HyperLine™</b>	Av. 350 mcd/m <sup>2</sup> /lux



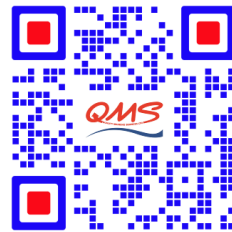
Clear lane definition utilising QMS HyperLine™ systems



Odometer	Performance	1st Limit	2nd Limit
49.5		120	150
49.4	95.5	120	150
49.3	102.6	120	150
49.2	103.1	120	150
49.1	88.2	120	150
49	92.4	120	150
48.9	298.7	120	150
48.8	379	120	150
48.7	387.9	120	150
48.6	433.2	120	150
48.5	417.5	120	150
48.4	464.9	120	150
48.3	511.2	120	150
48.2	459.3	120	150

Retro-reflective performance comparison between existing lines (49.4 to 49) and after installation of QMS HyperLine ULTRA™ (48.9 to 48.2)

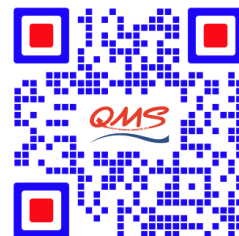
The installation of QMS HyperLine™ and QMS HyperLine ULTRA™ on the M40 Motorway followed by the QMS LifeLine™ retro-reflectivity survey can be viewed by scanning the QR codes below with your smart phone camera.



**QMS HyperLine™**  
the way to a brighter future



**QMS HyperLine™ ULTRA**  
the way to a brighter future



**QMS LifeLine™**



## SUMMARY

Real value is gained by highway markings which are proven to make a significant visual improvement when first installed and that continue to maintain high performance levels.

The **QMS HyperLine™** system was designed, and developed with results verified by repeated independent surveys, to consistently exceed highways specification standards. This is because, at QMS, we believe that a minimum level should be the lowest level road markings are permitted to deteriorate before they are replaced.

The powerful formulation of the **QMS HyperLine™** acrylic resin locks in the glass beads on application resulting in outstanding retro-reflective performance at a lower financial cost than conventional treatments.



Greg Clark, Managing Director, QMS  
Helen Egner, National Business Development Manager, QMS  
Adrian Smith, General Manager, Egis road operations M40

Egis is committed to protecting the environment. **QMS HyperLine™** is the largest source of CO<sub>2</sub> savings to the goal of becoming carbon neutral by 2050. In two years, line rejuvenation using the **QMS HyperLine™** system has saved 99 tonnes of carbon dioxide pollution in comparison to the same sections being treated using hot applied sprayed thermoplastics.

Continually increasing traffic volumes challenge the highways industry which needs to improve safety measures with restricted budgets. **QMS HyperLine™** achieves higher retro-reflectivity whilst reducing money spent on line marking maintenance.

The reduction of collisions is a key safety imperative and Egis continues in its commitment to exploring innovations to achieve this goal. Data shows a reduction of collisions along the four-lane section at J1A of the M40 motorway since the installation of **QMS HyperLine™** on the near and off-side edge line and **QMS HyperLine™ ULTRA** on the lane lines.

Durable line markings with sustainable high-performance result in fewer interventions and reduce operational risk. Early indications demonstrate that the enhanced lane guidance throughout all weather conditions has achieved the desired safety improvements.

*“Obtaining a contract to provide our award winning road marking systems on behalf of Egis Road Operations M40 provided a fantastic opportunity to demonstrate the visible differences of high performance road markings”*  
Greg Clark, Managing Director, QMS

The **QMS HyperLine™** system ensures a highly visible line marking for road users during the hours of darkness incorporating sustainability, performance, cost savings and environmental benefits.

Nearly two decades of experience on other major networks have demonstrated direct savings from less future visits and proven durability. Combined with the added value of cutting CO<sub>2</sub> emissions, helping to safeguard our planet and reduce pollution, there are multiple safety, environmental and advantages economic of utilising the **QMS HyperLine™** systems.

*“Egis Road Operation are committed to being CO<sub>2</sub> neutral by 2050. The highways industry is making great strides in technological advancements, therefore it is our responsibility to make use of all the opportunities that are available to help us achieve our goal.*

***QMS have a unique formulation which is proving advantageous in environmental terms and achieves excellent retro-reflectivity performance levels. This has raised safety standards and given us cost savings too.”***

Adrian Smith, M40 General Manager

*With COMMITMENT,  
MOTIVATION and  
DETERMINATION you  
can ACHIEVE SUCCESS.*

# QMS

QUALITY MARKING SERVICES LTD

[www.qmarkings.co.uk](http://www.qmarkings.co.uk)

For further information, please scan the QR codes with your smart phone camera.



QMS **HyperLine™**



QMS **LifeLine™**

For FREE advice and quotation:

Tel: 01626 836 777 • Fax: 01626 836 774

[info@qmarkings.co.uk](mailto:info@qmarkings.co.uk) • [www.qmarkings.co.uk](http://www.qmarkings.co.uk)

Proud to be supporting the Lighthouse Club



Any Surface...  
We've got it covered!

