Proactive Management Review

Contract Year 14

April 2022 to March 2023

Connect Plus

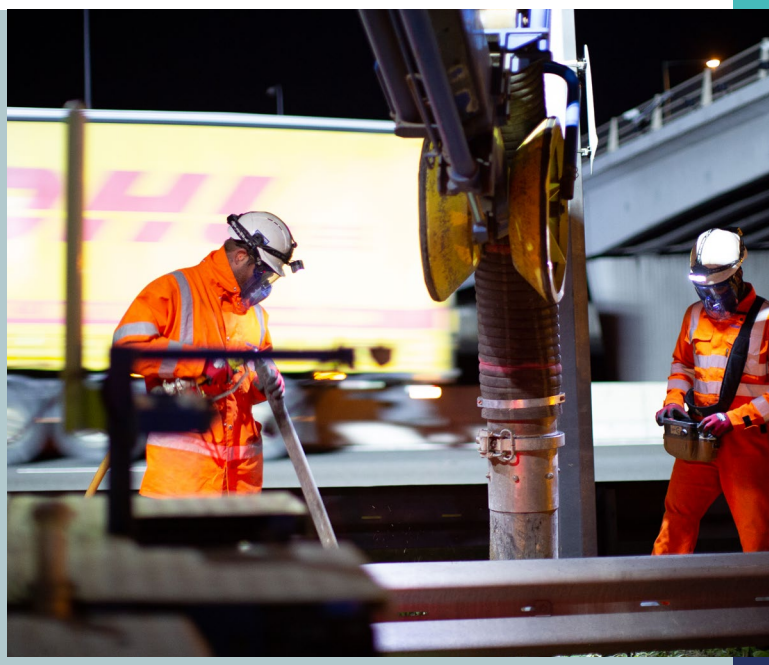
Connect Plus Services

A Balfour Beatty, Atkins & Egis joint venture

Contents

Executive summary

Our supplementary PMR brochure highlights the case studies that we are submitting to the PMR panel for this qualifying year (CY14 April 2022 – March 2023).



As it has in the previous years, the brochure also includes a progress update on three case study submissions from CY13 – climate vulnerability, Healthier Highways and Gade Valley Viaduct. It also includes a snapshot of some of the work and innovations that we're currently undertaking, and may consider for submission in the future.

Together with National Highways, our framework contractors and our supply chain we have achieved so much this year – from introducing a revolutionary machine that can deploy or collect a cone in ten seconds, removing the need for this to be done manually by operatives, to launching our carbon plan on our next step towards a net zero network, the innovation we are applying across our network is industry leading.

This has been recognised externally by our industry peers where, over the course of the year, we have won several awards including a Special Recognition Award for our work with Healthier Highways and Gade Valley Viaduct, at the South East Alliance awards earlier this year..

The following case studies will showcase some of these activities, and more, highlighting the outstanding work our teams have produced over the past year.

Project updates

In this section of the brochure, we've looked at three of the case studies submitted in CY13, and have provided an update on the progress that is being made in each area.

1. Climate vulnerability
2. Healthier Highways
3. Gade Valley Viaduct

Climate vulnerability

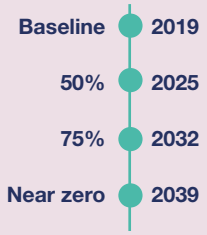
During the summer and winter period of 2022/23 we noted a number of impacts from climate change around the network. As a result, we worked closely with asset managers and concentrated our focus on:

- Updating the climate vulnerability assessment
- Creating a climate risk assessment
- Creating a climate impact register

In the last year, the sustainability team has facilitated a series of climate vulnerability workshops with the asset teams, to improve their knowledge and understanding of the climate change impacts the M25 is facing.

Climate resilience in the carbon strategy

As part of the carbon strategy, released in 2022, it is recognised that climate resilience plays a key part in the future of the network. We understand the need to identify and invest in solutions that will reduce the impact of climate change, and ensure our network is resilient to future changes in climate. Our goals and objectives state that by 2039 we will reduce our vulnerability to climate change across the network compared to our 2019 baseline.

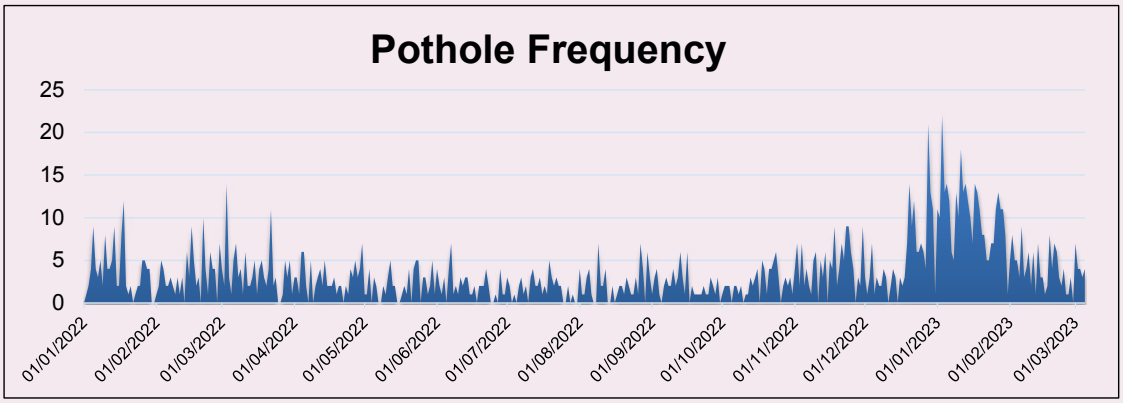


2025 Reduce incidents attributable to climate related events by 50%
2032 Reduce incidents attributable to climate related events by 75%
2035 Reduce the length of carriageway that has an observed significant susceptibility to flooding
2039 Reduce to near zero all unplanned lane closures due to incidents attributable to climate related events

Climate impact register

During 2022, it was recognised that we were experiencing more climate impacts than usual and they were affecting many different assets through all seasons. In light of this, the sustainability team created a climate impact register to record all information about any climate related impacts experienced around the network. They included incidents of concrete buckling and rutting following the record high temperatures of 40.3 degrees celsius in the South East. We also recorded information regarding fires, including the wild fire on the A2 near Denton Bridge Footbridge. The fire destroyed the boundary fence leaving our land open and accessible, as well as burning the understory of vegetation. Following a site visit by the arboricultural and landscape manager, it was agreed that no intervention was required, however the site will be reassessed in Spring to check on the vegetation growth.

The graph on the following page shows the frequency of potholes from the beginning of 2022. It is clear to see that throughout the winter into 2023 there is an increase. Following the hot summer there have been significant temperature changes in the winter which have put the pavement under great strain.



Climate risk assessment

In order to form a logical method and process to not only manage these potential impacts, but to develop mitigations and the level of risk associated with them, our teams agreed that a climate risk assessment (CRA) was required.

Risk Count and Severity

				Consequence Rating						
Asset	Risks	Significant Events	Non-Significant Events	Minor Adverse	Moderate Adverse	Major Adverse	Hotter Summer Risks	Wetter Winter Risks	Extreme Weather Risks	Costs
Road Technology	4	0	3	4	0	0	3	0	1	0
Pavement	8	0	8	8	0	0	5	3	0	0
Structures	9	0	5	6	0	0	3	5	1	0
Drainage	5	0	2	5	0	0	2	1	0	0
End Users	3	0	3	3	0	0	1	1	1	0
Environmental Receptors	3	0	3	3	0	0	3	0	0	0
Tunnels	4	1	3	4	0	0	1	3	0	0
Linear	4	0	3	4	0	0	0	2	1	0
Geotechnical	1	1	0	0	1	0	0	1	0	£1,000,000+
Depots	1	0	1	1	0	0	0	0	1	0
Signs	1	0	1	1	0	0	0	0	1	0

Tasks

Asset	Tasks	Tasks Completed	Tasks Overdue
Road Technology	0	0	0
Pavement	0	0	0
Structures	0	0	0
Drainage	0	0	0
End Users	0	0	0
Environmental Receptors	0	0	0
Tunnels	0	0	0
Linear	0	0	0
Geotechnical	0	0	0
Depots	0	0	0

The information recorded in the CRA falls under several headings, including: risk ID; risk event title; risk owner; potential impact; mitigations; and potential cost.

The summary page, shown above, summarises by asset the ratings, risk counts and severities. Moving forward this will become a valuable tool that will enable us to share information not only within our business, but with other areas of the strategic road network, further improving our resiliance to climate change.

Climate vulnerability assessment

The climate vulnerability assessment has been updated this year, following a review by both the sustainability team and asset leads. Looking at the impacts and mitigation allows us to start to prioritise those impacts that will need to be addressed first.

The update also now includes more detail regarding specific impacts, as well as updated information about those that were previously recorded.

Undertaking annual reviews of the assessment is showing real benefits. It has helped us to document climate impacts, identify how to mitigate their effects and how to plan more robustly for the future. Starting our adaption and mitigation early strongly benefits asset management before the impacts are keenly felt.

This work has highlighted the benefits of collaboration between the sustainability team, our asset managers, our service delivery and our M25 supply chain. We truly believe that we are leading the way on how we are assessing impacts on the SRN, and in gathering and recording information. There is no denying the importance and significance of climate change, and therefore, engaging with our peers about what the future holds is essential.

Healthier Highways

Healthier Highways has developed from small beginnings into a wide-ranging collaborative culture-change initiative to improve health protection for everyone working on the M25. The programme has been developed and is delivered by Steve Perkins Associates working in partnership with Connect Plus, Connect Plus Services and the M25 Framework contractors, Tarmac, Milestone, Octavius, Jacksons, and R&W. The five pillars of the programme are Engage, Equip, Prevent, Manage and Lead.

This past year we've delivered:

- Regular presentations and workshops for the Community via community e-newsletters, health and safety forums, Lunch and Learn presentations and our Microsoft Team for downloading resources available to the whole community.
- Delivered additional presentations and workshops to the internal Framework teams of Jacksons, Milestone and Octavius and the Milestone national HSW team to highlight health risks and encourage more reporting of health exposures and control improvements.
- Our regular quarterly awards for the best health 'Don't Walk By' submission have kept health protection on the agenda of managers, supervisors, and operatives. In addition, we reviewed the site tour/inspection templates of all Framework contractors and advised on improvements to increase the focus on health protection.
- Delivered a review and case study on the Musculo-skeletal health benefits of the Automated Cone Laying Machine (ACLM) implemented on the M25.

- Completed user data gathering and delivered our final report on the Eave Active Hearing Protection and Noise Monitoring system. This 2-year trial was setup through the M25 innovation board. We concluded that provided a local on-site champion proactively reviewed data with operatives then improved hearing protection and noise control interventions were successfully achieved. However, the Eave system would benefit from the addition of radio communications for mobile highways works such as surfacing. And the large amounts of data generated do need to be acted on in an effective way it may be considered as 'guilty knowledge' by regulators and insurers.

- Previous Gap Analysis work identified health risk assessment writing and reviewing as an area that required improvement across the community. We developed new guidance for this which was reviewed and approved by the Healthier Highways leadership team. The final guidance has been provided to CP, CPS and the Framework contractors to support their own internal systems and processes.

- Working collaboratively with Toppesfield and FM Conway we produced a new toolbox talk sheet and visual checking standards for dust control in road planing works. This provides managers, supervisors and operatives with easy-to-understand information on the health risks of dust exposure and how to effectively control these using the engineering controls available on large planers.

- We supported Octavius in the final review and report on the trial of the Feraru Dynamics HAV sentry vibration monitoring gloves, which directly measures vibration received by the user and highlights when limits are exceeded. User feedback was positive and initial benefits for vibration exposure management were established.

- We conducted a progress review with CPS and Framework contractors of their action plans from previous health gap analysis work. Progress had been made and there was improvement in the scoring of all six leading health indicators. This work was then extended to include seven Tier 2 contractors of these main Tier 1 contractors. Examples were identified of positive health protection further down the supply chain and all participants responded well to the process. We will follow up on the Tier 2 action plans next year.

- A health culture assessment workshop was delivered at both Strategic and Community HSW forums to score progress in improving health culture. It was pleasing to see the average community score move from Reactive (in 2019) to Calculative (in 2022). This reflects the progress made in all five aspects of the Healthier Highways framework.

- The top level Connect Plus HSW policy was reviewed and amended to include specific reference to health protection and exposure control.

- External presentations demonstrating the health leadership of the M25 through its Healthier Highways programme were delivered at a number of conferences including, Action on Site Health Summit, SHW Live, OH 2022, Safe Highways Live and Highways UK.

- Healthier Highways for National Highways SE Region was launched at the SE Alliance day and we (M25 Healthier Highways team) were delighted to be recognised with a special award from the Regional Director at the evening awards dinner.

- Mel Clarke, the National Highways HSW Director publicly voiced support for improving health protection following presentations we delivered to her about Healthier Highways on the M25. It is encouraging to see the M25's leadership on health protection beginning to be recognised at Board level within National Highways.

- Healthier Highways continued to be shaped and progressed by the collaborative leadership team from CP, CPS, Framework Contractors, National Highways and SPA, and the team met regularly throughout the year.

Gade Valley Viaduct

On the 12 December, work finally completed at the Gade Valley Viaduct (GVV), after six years on site.

The GVV is a continuous 11 span structure, approximately 440 meters long, carrying dual 4-lane carriageways of the M25 between junctions 20 and 21. Work began in 2016 with the first phase completing in 2019. The team, which includes Connect Plus, Octavius Infrastructure Ltd, Connect Plus Services, COWI and National Highways, have worked seamlessly, sharing knowledge to create innovative and efficient solutions.

This project produced many industry firsts and other incredible achievements. The team fully embraced social value, working with local residents and other stakeholders, donating equipment, speaking at schools – the list is endless. Over the course of the project over £17m worth of social value was added.

The project boasted a robust safety record of which everyone was incredibly proud – working c.500,000 hours without any lost time injuries.

Started in **2015** with ECI

2015 Installed 1000 No strain gauges

Reduced the scope for phase 1 by 1/3

2017 Start of phase 1 – bottom flange strengthening

2019 Start of phase 2 – Static and Transverse Stiffeneer strengthening

Other work – bearings, Multi Element Joint Replacement, Corrosion Protection, Drainage Repairs

Completed December 2022

Collaborative working was key with so many suppliers involved, including BS Steels, Alltask, Mistras, Civil Safety, SMS, Techjont and Atkins.

Gade Valley is a project that we are all proud of. The team helped to create a work setting that fostered exceptional levels of cooperation and trust between the client, the principal contractor and all subcontractors.

Team members thrived in this environment where personal and professional development was encouraged and health and wellbeing were top of mind. Teams were encouraged to take part in various joint charity activities, helping to build bonds between people from different cultures and backgrounds, not something that is often seen in this industry.

Case studies

The following case studies highlight some of the many innovations, industry best practices and new products that we are implementing and trialling across the network.

From excelling in safety innovation, to taking the next steps on our journey to net zero, these case studies provide an example of the range of work we're undertaking.

1

EXCELLING IN SAFETY INNOVATION

The introduction of the Falcon Automated Cone Laying Machine (ACLM) to the M25 network has been an innovative first for the highways industry and the UK.

The revolutionary machinery can deploy or collect a cone in ten seconds, removing the need for this to be done manually by operatives. It has been developed and supplied in collaboration by Highway Care and SENN Engineering before being introduced onto the M25 network.

Traffic Management will always remain a crucial aspect of road maintenance, and employing a machine centric approach to this task will not only help reduce the amount of time our crews are exposed to live highways environments, but it will also reduce the repetitive musculoskeletal strain that this process creates.

The need

According to REMA (Reflective Equipment Manufacturers' Association) there are an estimated 2 million cones in use on the UK's road network.

The manual cone laying process involves two operatives - one worker picking from a stack of cones and lifting it at shoulder height or above. The operative will then turn while holding the weight of the cone and pass it to his partner who is standing in the footwell of the moving vehicle. The second operative then takes the weight of the cone before turning, leaning forward and placing it on the road towards the lane of live traffic.

To remove the traffic management, this operation is reversed. This repetitive combination of forward leaning, bending, twisting, one armed lifting, and lifting from shoulder height or above, results in significant musculoskeletal strain for both operatives when cones are being laid or removed. It is often carried out continuously throughout a complete shift, and over a series of shifts, compounding the risk of injury and permanent physical damage. Operatives can deploy up to 5t of cones per shift, 5 nights a week, 48 weeks a year, and over a typical 20-year career, they can lift c. 24,000t.

Other key risks include:

- Operative hearing damage associated with close proximity to travelling/high-speed vehicles. Ear protection has been developed to mitigate but removing operatives from regular close proximity is more effective.
- Risk of serious injury/fatality from working adjacent to travelling/high-speed vehicles, likely at night and in potentially poor weather conditions.
- Operatives are at risk when those travelling vehicles accidentally collide or come within close proximity of the working vehicle.

Deliverables and benefits

We were keen to find a solution to this industry-wide safety risk and, in an innovative first for the highways industry and the UK, the Automated Cone Lane Machine (ACLM) was pioneered. Following an investment from National Highways' Innovation Designated Funds programme, the ACLMs have received regulatory acceptance and were introduced to our network in 2022.

As part of the project, National Highways engaged with the traffic management community and stakeholders to develop the first generation ACLM specification – a minimum performance standard against which any systems need to be developed. In addition, a testing standard and matrix was developed to effectively evaluate the performance of the first systems in meeting the specification.

Using the approved specification and evaluation criteria, a prototype machine was developed, which was then utilised for the thorough assessment and validation period. It was put through its paces in a comprehensive series of off and on-road tests to expose the system to a range of real-world situations, including various road types, pavement, and weather conditions.

The ACLMs entered service on the M25 network in May 2022 and their advantages in reducing MSD risk have been recognised by both management and operatives:

- *Technical Officer for CPS, Dale Hicks, said of the ACLM: "The guys at the end of shift are refreshed, still alert, not fatigued – when you have manhandled 400 cones in a shift you are tired."*
- *Danny Morton, a traffic management foreman and highways maintenance operative for CPS, said: "It's the way forward. Taking that physical aspect out of the job, with all the twisting and turning and manual handling, you are not going to have problems down the road with your back and elbows."*

Some of the many benefits of the ACLM in operation include:

- Operatives are removed from a position of risk to one of safety
- Manual handling eliminated (>5t per shift)
- Risk of hearing damage eliminated
- Improved working conditions
- Greater accuracy in cone placement through automation
- Tapering activities are supported
- Operatives are upskilled in the use of technology
- Loading/unloading manual handling eliminated
- The body build design of the ACLM accommodates key TM equipment i.e., sign frames/sign plates/sandbags/lamps
- It has the capability to complete extended closures based on cone capacity
- It removes the possibility of operatives being a distraction hazard
- Creates opportunities for efficiencies in resource through a simplified operation

In addition, we have found that the ACLM is able to reduce the time an impact protection vehicle (IPV) is in a live lane, protecting the TM crew whilst the cone taper is established by up to 66%. On ALR sections of the M25 where Signalling for Road Works is enabled, the use of the ACLM is possible without deploying temporary signage, further reducing operative exposure and road user risk.

In an industry with skilled labour shortages and undesirable working conditions, the opportunity for operatives to be upskilled to operate technology focused equipment advances and broadens the industry to a more diverse workforce with less reliance on physical capabilities.

From a future benefits perspective the expectation is that other TM companies and construction contractors will begin to introduce this technology, and understand the value in creating a safe environment for all road users.

The development and deployment of the ACLM vehicles will have a lasting impact on the way the highways industry approaches innovation projects, creating a collaborative approach that is being utilised as a structure for future projects. Thanks to the robust specification, development process, testing and regulatory acceptance, the ACLMs can be deployed for any National Highways or local authority road maintenance or improvement project. The evidence base from deployment on the M25 network provides a compelling case for introducing them more widely, which could have a significant benefit to reducing MSD risk for colleagues across the highways industry.

2
COLLABORATION IN SCHEME DELIVERY

The delivery challenge at Dartford is considerable, with several key projects due for delivery over the next 5-10 years on multiple sites including the QE2 Bridge, both the Dartford East and West Tunnels, and also in the surrounding area. Projects cover National Highways improvements, renewals schemes, M&E and often 3rd party works.

To optimise productivity whilst ensuring the highest health and safety standards, together with minimising any disruption to the road user, it was agreed that a collaborated and integrated approach was needed.

We have an ageing asset that requires a robust maintenance plan such as ours, to ensure it remains serviceable for future generations.

The Need

We identified early in the process that the volume of projects at Dartford should be managed together, with an integrated approach, to minimise disruption to the customer. We have an ageing asset that requires a robust maintenance plan, to ensure it remains serviceable for future generations. As well as regular maintenance, some of the components are approaching their end of life and need full replacement.

The integrated programme details each priority scheme and helps to maximise opportunities for our teams, whilst keeping roadspace requirements to acceptable levels.

It was important that throughout the work, key stakeholders were not only kept informed but that we worked together with them to plan and coordinate works.

Deliverables and benefits

The teams involved have worked together to produce a collaborative programme, reviewing the asset and delivery need. The programme enables all parties to easily see the interdependencies between projects and enable them to fine tune all phases of projects to optimise delivery and give greater certainty. The programme is regularly reviewed by the teams to accommodate change as the plans evolve and to support decision making. It is having a positive impact on delivery and reducing the impact of works to the roaduser. The following outlines some of the work that has been successfully undertaken as a result during the year.

Structures
There have been a number of investigative surveys within the Dartford east and west tunnels, to enable detailed designs and technical approvals. This has included drone surveys in the east tunnel invert, to produce detailed imagery and models of the area under the road deck.

Early procurement of replacement secondary lining panels for west tunnel
For the procurement of middle and lower secondary lining panels, two set of panels were procured with the first batch of 106 panels, and second of 82 panels. This early procurement was undertaken to reduce the installation programme time, as there is an eight-week lead time for the manufacture of panels. All the panels have been vested and a certificate of vesting has been signed by all parties.

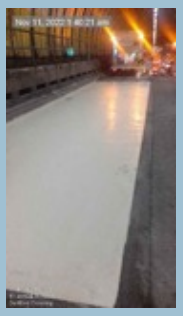
205 bearing jackets installed on the QE2 bridge
Freyssinet bearing protection jackets were installed to keep dust and debris from sliding surfaces, reduce exposure to the elements and prevent water entering the pots. This is an improvement on the previous stainless-steel covers that provided inadequate protection from the elements. The new bearing jackets will maximise service life.

Replacing wheel box parts on QE2 Bridge underdeck gantries
On the main QEII Bridge, the soffit of the deck spanning over the River Thames is accessed via eight underdeck maintenance gantries. These gantries have now been in service for over 25 years. It was therefore important maintain the gantry wheel trolley assemblies, and ensure that all load paths back to the structure had not been compromised with age and continuous operation, ensuring safe future use.

First phase of waterproofing within the east tunnel
Pavement/waterproofing failures during January and February last year resulted in unplanned tunnel closures. Following investigation, it was evident that the subsurface drainage and mastic joint had reached the end of their service life. Several areas of immediate concern were recorded, and waterproofing works programmed to prevent breakup of the surface over the winter period and prevent additional unplanned closures.

Replacement of the QEII bridge northern pylon bearings
The pylon pot bearings support the deck between the two shortest cables either side of each pylon. The N1 bearings are free to articulate and accommodate the movement from the main 450m span. We noticed the first signs of internal seal failure and elastomer leakage during a site visit in December 2019, and started to progress a scheme to design replacement bearings. Works began in November 2022, with the construction of a temporary platform around the base of the pylon to allow the new bearing, weighing half a tonne, to be craned onto the platform. The north east bearing was replaced in January this year, followed shortly by the north west bearing in February.

The works were delivered under full bridge closures during extended hour night shifts. They involved jacking the bridge to a height of 16mm to allow the existing bearing to be removed, and the new one to be moved into position using 4mm rollers. The bearing brackets were then installed and bolted into position. The team, which included Jackson, Freyssinet, Stead & Wilkins, COWI and Connect Plus Services, had to work in a confined space around the bearing. A post works inspection was carried out during March 2023 with a further inspection planned later this year, after minor painting around the bearings is completed.



From top;
205 bearing jackets installed on the QE2 bridge; replacing wheel box parts on QE2 Bridge underdeck gantries; first phase of waterproofing within the east tunnel.

QE2 Bridge painting started, and methodologies trialled
A QEII Bridge paint strategy was submitted to National Highways in 2011/12 to comply with the contract, and further developed following the principal inspection in 2017, when a paint condition survey was undertaken. Following this, we trialled compatible paints, accessed via rolling road blocks to reach the maintenance gantries during daytime hours. Then last year, we trialled access using lane closures at night to reach the maintenance gantries. The findings from the access trials found that we need to develop a method of access where we can reach the maintenance gantries during the day without the need for rolling road blocks or lane closures. Early Contractor Involvement (ECI) is progressing the development of an access strategy to the maintenance gantries/ underside of the deck, to improve the efficiency of the painting of the QEII Bridge.

During the painting trial, 4 bays were patch painted on Spans S10 and S11 including the following elements: splice plate/ bolt clusters, deck soffit/plate girders, lower flange, lower half of the anchor boxes and the parapet coping. Following the trial, production data including run rates, impact of weather and other events on production has been analysed. The learning from the trial is being fed into the access strategy to develop an optimum solution for painting the QE2 bridge going forward.

Pre- defined assets (PDA)
The renewals team have been planning the renewal of all tunnel lighting. The current solution is approaching it's end of life and as new, more energy efficient products enter the marketplace, we realised this presented an opportunity to reduce our carbon emissions. We made the decision, therefore, to replace them with LEDs.

In addition to surveying, designing and planning this big project we delivered multiple other projects such as replacing the pumps, renewing the foam tanks, installation of new GERDA boxes, as well as repairing fire doors.

The survey works have been done using the latest available technology to capture all of the required detail and create a 3D model of the tunnel. This model will reduce the need for physical site surveys resulting in fewer tunnel closures, which is of course a great benefit to our customer.

Improvement works
The A282 Junction 1a Littlebrook Interchange provides a key link between Dartford, Kent, London and to and from the A282/M25 corridor. More vehicles currently use the road than originally intended with heavy queues at peak times.

Our work to improve the junction has included widening the westbound carriageway on the south overbridge, allowing the current two-lane arrangement to be replaced with three lanes, turning the nearside lane into a dedicated left turn lane at the western roundabout, providing access to the A282 northbound entry slip road and the Dartford crossing.

The scheme was opened before the Christmas embargo, to mitigate disruption to key retail stakeholders at their busiest time of year, despite being delayed by the Just Stop Oil protests. To minimise disruption, the works were phased with ECI works to maintain the existing lanes whilst in construction. The scheme successfully collaborated with critical renewals schemes, to minimise disruption to the travelling public.

Communicating with key stakeholders
Throughout the programme of works at Dartford, we have always maintained a strong focus on the customer experience. Specifically, consideration has been given to owners and operators of oversized vehicles, who feel the greatest impact.

Discussions were held with key stakeholders, such as Royal Mail, to notify them of planned work in the east tunnel, together with other disruptive works at the crossing. When the east tunnel is closed (this includes closures of the QEII bridge where the east tunnel becomes a contraflow), high-sided vehicles that exceed 4.8m in height cannot use the smaller-bore west tunnel. This results in these vehicles taking a considerable diversion clockwise around the M25, as the only other suitable alternative. Increasing the driving distance for HGVs, could further impact drivers in terms of reaching their permitted driving hours. There is also the added pressure of meeting deadlines, that additional journey times can bring, especially for large organisations such as Royal Mail, who work to tight schedules. To help ease these issues where possible, our teams checked for works around the southern quadrant of the network, between Dartford and Heathrow, to ensure no other works were taking place adding further time to their journeys. In addition, when it is feasible to do so, we implement closures from 11pm instead of the usual 10pm, allowing high-sided vehicles additional time to use the east tunnel crossing.

A scheme-specific website was established early in the project to provide up to date information, with all other communications directing customers back to this central source where possible. We've worked closely with the National Highways press office, and the communications and partnership teams to issue regular social media updates, webpage updates and traffic bulletins. In addition, we've been in regular email contact with key transportation stakeholders, continuing to update them on planned works. Regular emails are also sent to our own stakeholder list for the Dartford area.

Additional schemes we've been working on

Stocktake action 9
Working on behalf of National Highways in collaboration with our framework contractor, Milestone Infrastructure, we delivered a project to retrofit additional signage for the emergency areas within all lane running sections of the motorway. We worked to achieve National Highways commitment to Government to have this completed in the South East before 30th September 2022. The scheme was to ensure that road users can always identify the next place of relative safety, to increase safety on these sections of the network.

National Highways chose the Area 5 team to undertake this work not just within Area 5, but also within Areas 3 and 4. This was following our positive performance on the Area 5 EA Bay retrofit scheme. The team yet again proved their efficiency and dedication by achieving the target. Though the scheme is deemed of low complexity in terms of the build there were several challenges to meet throughout the process.

Working across the wider region, specifically liaising with other Areas and experiencing delays in receipt of information, was a particular challenge. There were also environmental challenges to overcome, as well as challenges in securing roadspace.

The team successfully worked through these challenges, and completed the scheme on 28th Sept 2022, two days before the target completion date. In total we installed 264 signs across Areas 3, 4 and 5.

Shepperton noise barrier
Following the identification of 15 noise important areas (NIA), we were asked by National Highways to produce a feasibility report and preliminary design for a noise barrier on a section of the M3 near Shepperton. There are over seven thousand homes within these NIAs so reducing the level of road noise was incredibly important for the wellbeing of local residents.

We installed a timber noise barrier, approximately 280 meters long, alongside the verge of the east and westbound carriageway. From the design and construction stage to the completion, the team achieved excellent stakeholder communication with the local residents association, MP for Shepperton Kwasi Kwarteng who has campaigned for the introduction of noise-reducing measures along this section of the network, and also with Manor Mead, a school for children with severe and complex learning difficulties, and with whom the team have built up a strong relationship. We received some great feedback from both the school and local residents.

"Please pass our thanks to the contractors on site at Manor Mead. They were polite, friendly, helpful and very understanding of our pupils needs. This is not always the case with external contractors, but they were excellent and a pleasure to work with."

Communication at Pinks Hill
The Pinks Hill balancing pond, originally constructed in the 1960s, is situated adjacent to the A20 in Swanley, Kent. Work to increase the pond's capacity and improve drainage is ongoing and expected to complete later this year. A communication strategy has been implemented to manage engagement with residents and stakeholders, considering sensitivities around historical flooding events that have previously resulted in complaints, claims and a risk of reputational damage.

The balancing pond serves an overly large catchment area and is elevated above the nearby High Firs housing estate. Despite desilting the pond periodically, several flooding events, dating back to at least 2005, have led to numerous customer complaints and property damage claims.

Pre-construction surveys and site clearance works were delivered in Summer 2022, with the main construction phase starting this year. A number of letter drops have been undertaken since December 2021 to keep residents informed and updated on our progress. There is a direct public interface to be considered, with regular passers-by using the footway around the perimeter of the pond. We've produced customer contact cards for the site team to hand out to customers, providing them with details on how to get in touch with any questions or complaints. Our customer enquiries team also proactively contact residents who have been affected historically, giving them periodical updates on the project.

In March 2023 we informed Laura Trott, MP for Sevenoaks and Swanley, via email of the start of the main works this year and we plan to update again in May, on the progress we've since made. We're also planning a joint communications piece with Swanley Town Council around landscaping and planting work that's currently underway as part of the scheme, and which is due to complete soon.

Continued engagement has helped contribute to a minimal number of complaints received since work began in earnest in Summer last year. To date, we've received only two items of correspondence – one enquiry and one complaint – between April 2022 and March 2023.

3

BEARING MANAGEMENT IMPROVEMENT

Bridge bearings represent a significant part of the M25 structures asset portfolio and a programme of bearing replacement is included within the AMFP.

However, there is a strategic need to ensure functional bearings are protected against severe deterioration and in-situ enhanced maintenance adopted to extend the service life of these vital components.

This reflects a change from the traditional approach of replacing bearings when they reach a poor condition as ascertained through visual inspection, and moves to a far more performance-based evaluation, utilising monitoring data and recognising bearing service life may be significantly longer if extensive repair and maintenance interventions are undertaken to address key deterioration mechanisms.

The need

Bridge bearings are installed between bridge superstructures (decks) and the supporting substructures (abutments and piers). Bearings allow the superstructure to articulate independently and without generating excessive loads into any structural elements. However, as bearings allow movement, they are susceptible to lower service lives than other parts of a bridge and are frequently located where water penetration and high humidity levels are present.

Replacement of bridge bearings can be highly complex and extremely costly, requiring extensive temporary works to support a bridge deck in a raised position. This can also impact network availability if temporary works encroach close to trafficked areas. Consequently, bearing replacement schemes must be carefully developed to minimise disruption to road users.

Deliverables and benefits

Due to the large number of bearing articulated bridges on the M25 network, it is essential to utilise innovative and proactive maintenance of the existing bearing stock. Traditional maintenance measures (including lubrication and cleaning) are unlikely to be effective in all locations, therefore targeted enhanced maintenance utilising innovative protection, sealing and dehumidifying methods has been developed. These techniques are being employed in conjunction with structural analysis and monitoring, to verify both required performance levels and optimum intervention windows, prior to ‘jumping to’ full replacement.

Bearing articulated bridges represent the majority of bridges on the strategic road network (SRN). Therefore, the innovation processes being developed on the M25 are directly applicable to the SRN and represent significantly enhanced network availability in the future, together with substantial cost savings. It is also anticipated that optimising the way bearing replacements are delivered will reduce works on site, and the associated safety benefits.

This year there have been several approaches developed for bearing management, including:

- Extensive analytical and on-site articulation monitoring for the bridges at Merstham Interchange.
- Completion of bearing refurbishment at Gade Valley Viaduct
- Bearing refurbishment and protection of a number of structures including the M11, Junction 4 viaducts and Mar Dyke Interchange slip-road viaduct abutments.

In addition, protective bearing covers have been installed to the QEII Bridge. Simple displacement gauges installed to bridges to allow tracking of bearing movement is also being rolled out, to enhance the routine inspections. This will allow inspectors and asset managers to capture bridge displacements and identify the level of movement (reflecting the service levels provided by the bearings).

Enhanced maintenance and management have been undertaken to six further structures this financial year, in addition to completion of bearing refurbishment and localised replacement at Gade Valley Viaduct. Bearing covers are also being used at all current bearing replacement schemes to safeguard new bearings against corrosion and accelerated deterioration. These works are expected to largely mitigate the need for full bearing replacement at these structures, resulting in an approximate saving of £3m. In total, including previous years works, additional bearing enhancement has been undertaken on approximately 15 structures which aligns with our strategic asset management approach.

These approaches all form part of the bearing management hierarchy being introduced on the M25. Our routine structures inspection programme provides detailed understanding of bearing condition, supporting an intervention prioritisation process presented in the AMFP. However, the management hierarchy considers opportunities for employing maintenance and monitoring to locations where visual condition is deteriorating. For bearings in damp environments there is frequently extensive corrosion to metal elements that, while aesthetically poor, may not impact overall performance. These locations have been targeted for enhanced protection, including extensive refurbishment of the metallic elements and ongoing protection with a bearing cover.

At locations where the visual condition of bearings is poor, or where there is no provision for bearing replacement, monitoring has been used in conjunction with structural assessment to understand how the bridge is behaving (and therefore the requirements of the bearings to articulate). Displacement and digital image monitoring has been used at Merstham Interchange to show the articulation requirements at the bearing close to the fixed point is low, and the structure can accommodate sufficient movement through flexing of the piers. At bearings further from the fixed point, the monitoring shows the bridge is currently articulating appropriately, indicating current risk is low. These procedures have significantly reduced the scope of bearing replacements and focused works on locations where the greatest structural risk reduction will be achieved.

4

BUILDING A STRATEGIC RELATIONSHIP WITH SHELL

Connect Plus has formed an exciting strategic relationship with Shell who, with over 100 years' experience, are the world's leading supplier of bitumen and bitumen pavement products.

Shell is currently undertaking extensive modelling of pavement life using real-world data from the M25. This modelling will provide Connect Plus with greater confidence in the life expectancy of materials utilised on the M25 project and inform the selection of life enhancing products.

This strategic relationship will benefit both National Highways and Connect Plus with less disruption to the travelling public, a reduction in carbon, and improved safety for road users and our workerforce.

The need

We wanted to test the linear regression assumptions, and the deterministic methodology to pavement life modelling that it uses on the M25, against the probabilistic pavement modelling methodology utilised by Shell.

We envisage that this extensive modelling activity will provide us with greater confidence in the life expectancy of the materials we use, and inform the selection of life enhancing products.

With greater confidence in these materials (for example, additives that reduce oxidisation of bitumen), the time between intrusive works on the M25 could potentially be extended, but without loss of pavement performance, or contract compliance.

Reduction of these intrusive works will benefit everyone using the M25 network.

Deliverables and benefits

In September 2022, Connect Plus and Shell signed a memorandum of understanding, and a workshop was held together with other industry-leading organisations. The workshop discussed our respective approach to pavement modelling and other related matters such as the use of longer-life materials, carbon modelling, carbon capture and storage etc.

Thereafter, the Shell and Connect Plus pavement teams began a period of exchanging M25 pavement performance data and local weather data such that the three pavement models utilised by Shell could be modified to accurately reflect the M25 Project.

Shell have modified their models to reflect this real-world data from the M25 and have commenced a period of complex modelling and Monte Carlo simulations. A Monte Carlo simulation is a model used to predict the probability of a variety of outcomes, when the potential for random variables is present. Monte Carlo simulations help to explain the impact of risk and uncertainty in prediction and forecasting models. Whilst this activity continues, initial indications are positive.

Further workshops were held in December 2022 to discuss the materials used on the M25 and the failure modes that drive resurfacing schemes, and again in February this year to further exchange best practice and refine the modelling approaches being taken.

In addition to the pavement modelling activity, Shell have been undertaking analysis of an extensive number of M25 pavement core samples to test the properties of the bitumen at various levels within the binder course. Various bitumen properties are assessed including oxygen levels which are an indicator of embrittlement of the binder course. High oxygen levels have been noted in areas where there is poor bonding between the binder course and adjacent layer.

This analysis will provide us with greater confidence in the life expectancy of binder course material. Testing is still on-going with the aim of developing a risk-based assessment of leaving the binder course in place during resurfacing only works.

In Bangalore, Shell have developed a laboratory based accelerated pavement testing machine which simulates both load and weather data, including UV light, temperature precipitation etc. The Shell machine has been commissioned and is now operational, and M25 pavement core samples will shortly be tested by Shell. This accelerated testing will provide Connect Plus with further information on the expected life of pavement materials.

In further planned phases of collaboration between Connect Plus and Shell, the analysis of M25 binder and pavement samples referred to above, will further inform the probabilistic pavement modelling being undertaken by Shell.

The announcement of the signing of the MOU was shared with the National Highways press office at the time of release.

5

DELIVERING IMPROVEMENT THROUGH PROJECT BOAT

Project Boat is a group of improvement projects that are being delivered by the M25 Community. These projects will deliver efficiency benefits through improved planning, together with a reduction in interventions through innovative methods and materials. Current forecasted savings are in the region of £50m over the remainder of the contract.

The need

In 2021, we identified a number of potential improvement areas that are critical in terms of positively impacting the financial model. These improvements can only be achieved with all our community members working together collectively. Aside from the financial benefits, the improvements focus on improved planning and more effective interventions, that will ultimately benefit our customer with reduced disruption and closures.

The name 'Project Boat' was adopted in light of our work with a company called 'Will It Make the Boat Go Faster'. The Will it Make the Boat Go Faster team have supported the M25 community and helped to build the momentum needed to deliver our improvement goals.

J13 Community Hub Opening – July 2022

Deliverables and benefits

Following identification of the improvement areas during 2021, 2022 saw Project Boat become a united and focussed area for improvement within the M25 Community. We establish dedicated teams, structured to ensure successful delivery.

The improvement areas vary in their maturity and purpose, with some acting as enablers to other groups. The following is a summary of the activities and achievements of each of the focus areas (or Boats).

Planning Boat

This group is focused on how we plan better to improve our delivery. The key tool for this is the Optimatics software that will enable us to create an integrated community programme and to support the implementation of this plan through a Community Planning Hub (CPH). You can learn more about Optimatics in the Optimisation case study.

As well as creating the CPH, the Planning Boat has also been involved in data collection for software trials and identification of benefit savings, following implementation of both Optimatics and the CPH. Savings will be generated by increasing the number of shared closures (ultimately reducing the number of overall closures), and from reducing weather-related cancellations by increasing the volume of works delivered during Spring, Summer and Autumn. We're forecasting these improvements will deliver £18m of savings over the remainder of the contract.

Innovation Boat

The innovation boat has been focussing on the creation of a long-life pavement strategy which includes the trial phases of Durable Enhanced Asphalt (DEA) and anti-ageing binder.

Durable enhanced asphalt (DEA)

DEA is a material specification that has been developed by the M25 Community with the aim to deliver durability improvements in the surface course. The current life expectancy for Cl 942 is 9-12 years.

The DEA Clause materials are expected to remain serviceable for 16-20 years. This has the potential to save an entire intervention cycle in lanes 1 and 2 over the term of the contract. DEA is a high binder content, low void surfacing material. This material can also be used on bridge decks due to its low void content.

A limited roll out of DEA was implemented on the network last year under a departure from standard and an alternative proposal. We are now rolling it out in lanes 1 and 2 on the M25, as part of project boat.

In March, DEA was also laid in the carpark of the junction 13 M25 Community Hub. As well as being a great way to improve the finish of the carpark, it provided another opportunity to trial the materials in a safe off-network location.

The purpose of these trials is to get approval for an alternative aggregate source, to reduce transportation of aggregate around the network by road, and also to produce the new asphalt mix at lower temperatures, known as a warm mix rather than hot, that reduces the energy (and therefore carbon) required to heat the asphalt.

Performance data from the trials has been shared with National Highways, which could potentially inform the future strategy of long-life materials.

In 2023/24 we will be implementing our strategy in anticipation of removing future interventions, which is predicted to deliver £19m savings over the remainder of the contract.

Anti-ageing binder – Shell AgeSafe

Anti-Aging Binder is an innovative bitumen additive product specially designed to retain the performance of asphalt mixture by slowing the rate of bitumen aging during mixing, laying, compaction and in-service. The additive slows the oxidation of bitumen and delays the onset of fretting and aggregate loss, enabling the original characteristics of binder to be retained for longer during its life.

As part of a drive to introduce long life pavement material on the M25 network, with our framework contractor, Tarmac, we trialled Shell AgeSafe off-site at the Harper Lane asphalt plant. After successful testing and monitoring, Shell AgeSafe was implemented on the network during 22/23.

All of Tarmacs cl.942 surface course used in lanes 3, 4 and low trafficked lane 2, included Shell AgeSafe, and no departure was required. The next steps will be to implement this product on the M25 in the outer lanes over the coming year.

AMFP certainty (maximising outputs)

This group helped to refocus the pavement value management process on reducing the number of under-utilised pavement shifts. This was achieved by deferring works, or bringing them forward. Early indications from the value management process have shown an improvement in the forecasted cost per lane/km. The new pavement value management process has been successfully implemented in this year's AMFP and predicts to save £8m over the remainder of the contract.

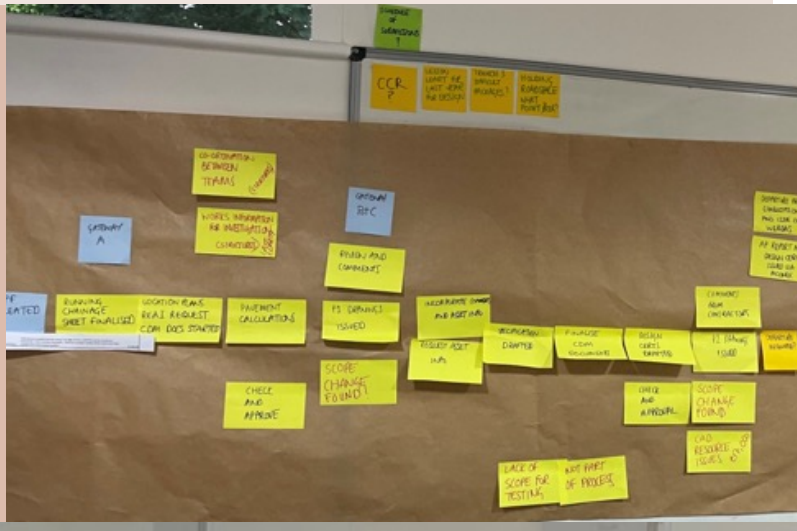
Contract Boat

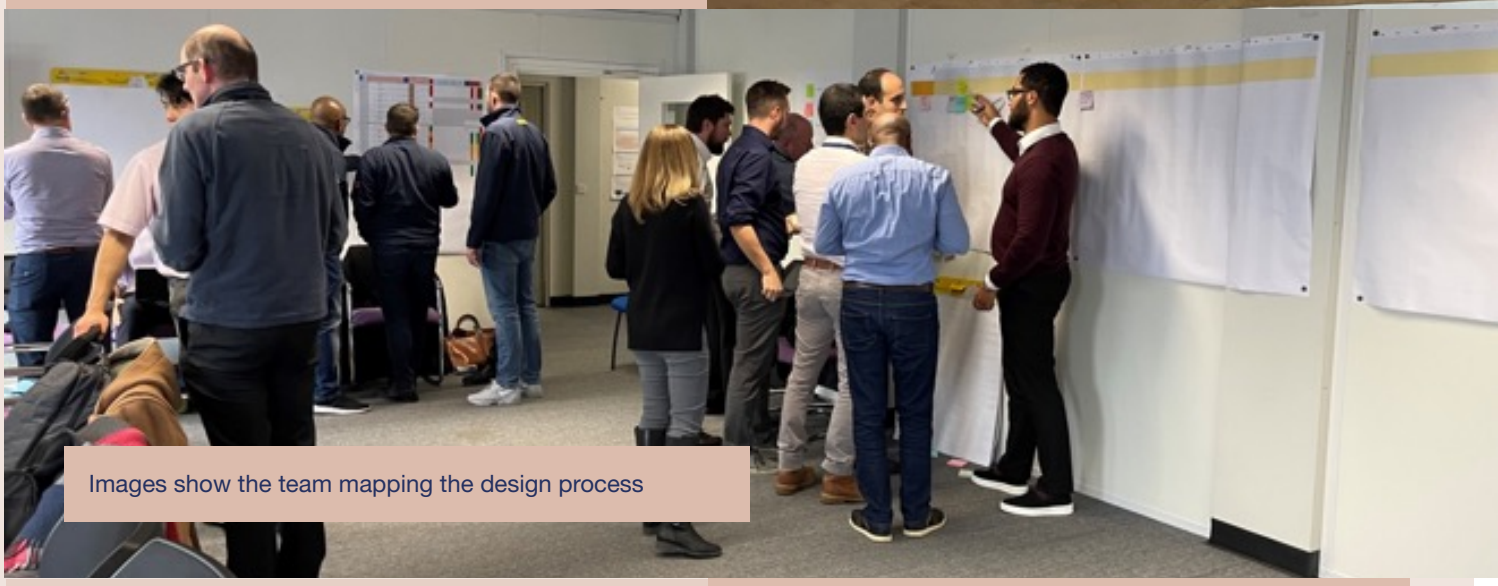
This group has been focusing on how to procure traffic management in a way that will increase innovation, improve quality and improve efficiency. This is currently at an early stage and will be further developed throughout the course of the year.

Design Boat

This group is focussed on using lean to review our design processes, in order to improve delivery in terms of time and quality. One of the key highlights coming from this work has been the use of collaborative planning for structures, to focus on the 23/24 delivery programme.

This project is an enabler for the Planning Boat – where programme certainty for design will be critical to delivering an integrated plan.





Images show the team mapping the design process

Time and space

This area recognises that not only do we need to create time to enable these improvement activities, but that we also need to create an environment that is conducive to collaboration. The M25 Community Hub at junction 13, which opened in July 2022, was created by this group. They are also working on raising the awareness of Lean tools within the Community, and this work will continue into 2023.

The work across Project Boat, and all the individual boats, will continue into 2023 when the focus will shift to implementation of the improvements savings that we have committed to in the 23/24 AMFP document.

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6

OPTIMISATION OF WORK PLANNING ON OUR NETWORK

To deliver works efficiently on our network and reduce disruption to our customers, we need to consider our whole approach to work planning.

Over the past two years, there has been a significant focus on improving the 7-day accuracy of road space bookings, however, we now understand that a more fundamental change to how works are planned is required, if we are to deliver the target of 90% accuracy by 2025. Using programme optimisation tools and methods and bringing together a central planning function for the M25, will be a core part of how these improvements will be delivered.

The need

There is a strong desire and need to be more efficient in how works are carried out on the M25 network. We are therefore introducing a centralised approach to work planning, which includes programme optimisation and the use of artificial intelligence, into how we plan for all works taking place on the network.

To date, work has been restricted to core working hours as specified in our DBFO contract. These working hours are also further restricted by traffic flows, however, in some locations around the M25 network, the traffic flows are much lower and could accommodate either an earlier start time or a later finish.

We also want to reduce the overall number of road closures required to deliver our programme of renewals, maintenance and improvement works. By introducing programme optimisation, we are confident that the number of closures required to deliver our works can be reduced.

Historically, the planning of work has been undertaken independently, with coordination typically occurring when road space is booked. This can lead to re-work and difficulty in delivering the programme. In this process, sharing happens through manual coordination activities, running at approximately 10% of all bookings.

Effective work planning across the M25 Community requires an integrated approach across all work types and with the active involvement of all parties.

Deliverables and benefits

Our approach to programme optimisation in 2022 has been developed in a number of areas.

Optimatics: Programme optimisation tool

A proof-of-concept model for programme optimisation was developed in 2022 in collaboration with Optimatics. Using proven genetic algorithm technology which has been applied to the optimisation of multi-billion-pound investment programmes in the water industry for several years, we have developed a tool which has demonstrated that the volume of closures required to complete the annual programme of work can be reduced by up to 20%. This will in turn drive an improvement in the accuracy of published road work information. The tool tests millions of programme options within a few minutes, giving us the ability to test multiple scenarios for the delivery plan in a short space of time.

In addition to reducing exposure to road workers and reducing customer impact, this new approach reduces traffic management costs and aborted shifts due to late notice works clashes.

The work we've undertaken has included the integration of CPS business rules and data into the optimiser platform, via a series of scripts, and configuration of the programme scheduling formulation. The business rules include:

- Road closure proximities
- Diversion rules
- Work zone clash rules
- Sharing protocols – what types of work can share closures?
- Seasonality
- Embargo dates
- Programme constraints e.g., fixed dates
- Contractor work capacity constraints

We then identified the required datasets and developed an appropriate data management process for maintaining and updating of the data. We have also tested and validated the tool's functionality on a dummy data set, and performed optimisation on the 2021 AMFP.

The benefits of optimisation are expressed as a series of KPIs aiming to find the trade-off between feasibility of a programme schedule given limited road capacity due to spatial clashes, and benefits of minimising road closures.

The proof of concept has shown us that it is possible to reduce clashes between road works by approximately 5% and reduce the number of road closures required by approximately 20%.

The proof of concept is now being developed into a business-as-usual tool for use across the M25 network. We believe the benefits will be significant over the remainder of the contract and will include:

- Savings from sharing Traffic Management
- A reduction in risk cost from improved planning
- Reduction in out of season working by up to 30%
- Savings from reducing the number of shifts required for completion of work
- Reduction in the number of worker hours spent in a live highways environment
- Reduction in the number of road closures meaning less disruption to the travelling public
- Reduction in contractor capacity constraints, the optimisation process balances workload over time for each contractor, so that resources are used evenly, improving contractor performance and efficiency.

Community planning hub
The process of forming the Community Planning Hub (CPH) began earlier in the year when we started to run collaborative road space sharing meetings. Working together in this way helped to deliver over £500k of cost savings through increased sharing of road closures. This led to further discussions around the possibility of forming a dedicated team that included representatives from CPS and our framework contractors.

The CPH will be a central team comprised of experts from across the M25 community. Not only will the team be responsible for all road space bookings, but they will also cover all aspects of work planning - from annual work planning to detailed scheduling of shifts. This will include:

- Programme planning – development of optimised forward plan including maintenance works.
- Logistics – detailed planning of resources to execute works.
- Third party works – 'horizon scanning' for future third party schemes that could impact integrated plan.
- TM Planning – detailed planning of TM to mitigate clashes and maximise efficiency.

Work is ongoing and we're confident of delivering results over the coming year.

Working window optimisation: Alchera
Alchera is a software tool that can predict traffic counts on the network, directly alongside the Paymech implications of closure timings.

The project has completed significant preparatory works in the past year, by working to understand the nature of closures around the network. The team have engaged with planners and project managers to ensure we trial this approach with appropriate works. We are initially looking at works around the Dartford area that could benefit from this planning approach, and they are due to commence in the second quarter of 2023.

During the year we have also configured the Alchera platform, by building in historical data sets on traffic volumes and flows, that will allow for future projections and calculations to be undertaken. To enrich the data even further, several datasets will be included, such as weather, to improve the accuracy of the predictions and refine the model. As the platform is used to predict, these predictions will be compared to actual events that have occurred, to enable the platform to learn from the comparison.

The introduction of the Alchera platform will enhance the planning process, as it will encourage planners and project teams to think outside of established ways of working and challenge the norms. It will take into account all opportunities to work outside of the current working windows and be more efficient in project delivery.

During the 2022/2023 financial year, we have also engaged with National Highways to establish how we can refine the process that allows for departures from the standard closure windows. As we use the Alchera platform, it may require multiple departures and therefore a refined process may be required. Further engagement will be required with the National Highways Regional Operational Centres (ROCs), to prepare them for the potential changes to the start and finish times of our closures.

1,500 Traffic count trial
The application of a 1,200 vehicle count is a historic method of determining the point where the impact of road works will not be felt on traffic flows. However, this standard reflects outdated methods of working and may put unnecessary constraints on working windows.

CPS, together with traffic management companies on the M25, have been trialling the impact of using a count of 1,500 vehicles per open lane, as the trigger for installing traffic management. Trials have so far focussed on sections of the road that contain hard shoulders. Using video footage, over 80 trials have been undertaken and reviewed by a Safety Review Group including Connect Plus, CPS and National Highways, with no major concerns raised.

During 2023, the trial will be extended to all-lane running sections of the M25 and, if successful, we will aim to make this the new operating standard for traffic counts – further increasing the opportunity for extended working windows and enabling the overall reduction in the number of shifts needed.

National Highways are aware of our work to optimise the way we plan work on the M25, and the potential to extend it to other parts of the SRN. Those involved include Mel Clarke, Duncan Smith and Christine Allen.

7

PROCURING COFA 3

It is a contractual obligation to follow a regulated procurement process for establishing a Call-Off Framework Agreement (COFA), for the delivery of improvement works.

To take this a step further and to engage with a supply chain that were informed and excited, we designed an elaborate and targeted Early Market Engagement (EME) programme. Not only did our programme promote the opportunity and grow our supplier base, but it also highlighted both ours and National Highways' space in the market as potential clients.

We consulted extensively with National Highways to both shape the strategy for EME, and to identify improvements to the existing COFA contract, alongside the incumbent contractors, through a series of workshops and feedback sessions. Improvements incorporated into COFA 3 also included weaving the requirements of the Project Road Objectives into the contract and the procurement process. Overall, with the consideration given, COFA 3 will be a much-improved vehicle for delivering National Highways' requirements on the M25 network**.**

The need

We are obligated to procure a Call Off Framework Agreement (COFA) for delivering improvement works on the network on behalf of National Highways. We believe that establishing a robust supply chain that is aligned in its approach is essential to successful and efficient delivery of both Connect Plus funded renewals and National Highways funded improvements on the network. Understanding our future suppliers' needs, while communicating ours is the cornerstone of our approach to building this aligned supplier base.

It was therefore necessary to exploit the opportunity for conversation that was presented when procurement of the third iteration of the Call Off Framework Agreement was due in 2022. This was to generate interest in the framework opportunity for tier 1 contractors and to engage with suppliers at all other levels of the supply chain, whilst also creating a buzz around the M25 project and National Highways, within the marketplace. Similarly, there was an opportunity, before the procurement process started, to engage with our existing suppliers and with National Highways, to identify the challenges they had experienced in the previous five years of the COFA 2 framework. After identifying these challenges our aim was to make improvements to the operation of the COFA contract, and to incorporate ideas that would help us achieve the Project Road Objectives.

Deliverables and benefits

Workshops and feedback sessions

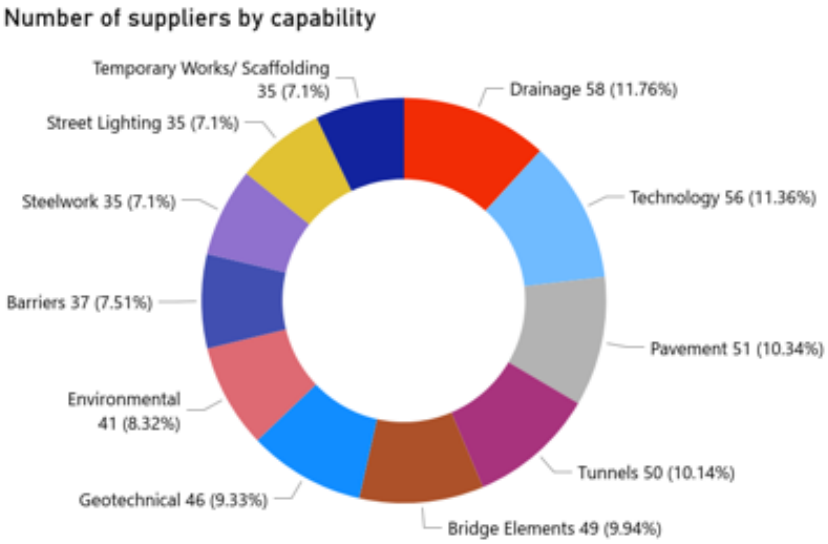
Several months before the formal procurement process began, we consulted our incumbent COFA contractors, Connect Plus Services and National Highways through a series of workshops and feedback sessions to review how the existing COFA contract was working and what could be improved. This intelligence was used to define focus areas which we then engaged with National Highways on, to arrive at an agreed strategy. For example, recognised best practice was carried forward from the success of delivering the Gade Valley Viaduct project, under an incentivised form of cost reimbursable contract, this now forms the preferred contract strategy for packages under COFA 3.

Early market engagement campaign

Between February and May 2022, we undertook the EME campaign for COFA 3, starting with a Prior Information Notice officially announcing the future opportunity. Rather than passively following process to comply with the relevant procurement regulations, we made the decision to include an expression of interest form, which collected data on interested suppliers and sought interest from all corners of the market-place including SMEs. Recognising that while there was no direct opportunity, tier 2 and 3 suppliers would be able to work as subcontractors to future framework contract holders, and other contractors present on the M25 and nationally.

Registration required suppliers to categorise themselves as tier 1 main works contractors, or specialists in tiers 2 and 3. They were required to provide company details such as specialisms, size and whether they had previously worked for Connect Plus or National Highways directly or indirectly.

A total of 141 registrations were made from across the UK and Europe, with a full array of specialisms, as detailed here.



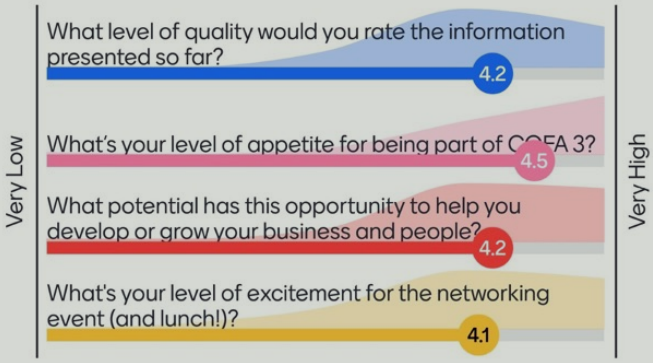
In-person supplier day

Following the campaign, we hosted an in-person supplier day, with invitations based on the data collected through registration. Invitations were prioritised using several criteria including giving priority to those suppliers that had not previously worked with us and/or National Highways. This was done with the intention of growing our collective supplier base.

68 businesses attended the supplier day at a beautiful venue in Surrey, during which Connect Plus and National Highways showcased the COFA 3 opportunity, and hosted the suppliers at a networking event. This event presented a fantastic opportunity for suppliers to learn more about the project and ask further questions, as well as creating an environment for sharing knowledge and best practice.

Before the event, we asked those companies attending if they would be happy for us to share their contact details, which we then published in advance. This helped the suppliers to make connections with other organisations.

We took a live survey during the course of the day, so that we could gauge how successful the day had been.



Market sounding questionnaire

All suppliers that had registered for the event were asked to complete a detailed, online Market Sounding Questionnaire (MSQ) in the days that followed. This exercise aimed to collect critical information about the suppliers' views on particular subjects. Those subjects included the proposed contract risk profile, the cultural focus that we promote and the number of framework contracts that should be awarded given the nature and volume of works communicated. We received responses from 53 attendees, which we used to inform our contracting strategy and other decisions.

The MSQ also provided the basis for one-to-one meetings which we scheduled with tier 1 suppliers. The meetings were with suppliers that were likely to participate in the procurement directly, and that were not already part of our direct supply chain. These meetings were the final opportunity for further dialogue and marketing on our part, during the EME phase.

As a result of this measured approach to EME, 51 potential suppliers registered to respond to the first phase of procurement which was open to all. Eleven responses were submitted and evaluated including all the suppliers with whom we'd had one-to-one meetings. This generated healthy competition and helped to clearly identify those capable and competent companies that we then invited to tender for the second phase of procurement.

Phase two of procurement

In the second phase of procurement, we published our final documents for COFA 3 and the questions and criteria for evaluation. These were developed alongside National Highways and in consultation with its Central Procurement Team. The team selected for setting the technical questions and evaluation was meticulously assembled based on relevant experience and cultural competency, whilst also considering each member's future involvement in COFA 3 delivery, so that procurement formed part of mobilisation. The resulting documents took the Project Road Objectives into account, with a variety of questions, including:

- The respondents' approach to reducing their environmental impact, including carbon
- How respondents would contribute to generating social value
- How SMEs would be engaged should a tenderer be successful

Our industry leading approach has been shared with National Highways throughout the process.

This structured and purposeful approach to EME was undertaken following consultation with National Highways at regional and national levels. Several senior National Highways personnel attended the in-person event and helped to shape the MSQ.

8

CONTINUING OUR DIGITAL JOURNEY

The M25 DBFO team are continuing with a roadmap of digital initiatives to digitise manual activity on the network and use more advanced technology to make works more efficient and to also remove employees from harm's way.

We are working with our M25 community to learn from tried and tested technology, but also trialling new technology to accelerate benefits.

The need

As technology advances in wider society, the highways industry has traditionally been slow in adopting and utilising these new practices. However, there is now a strong desire to use technology to improve how works are undertaken and improve the overall health and safety of our workforce. We are bringing forward advances that will reduce time taken to reopen the road following an incident, automate the identification and analysis of road defects and improve cyber security of critical national infrastructure data for our community. In addition to these new advances are lean initiatives, that will help to make our processes more efficient, whilst utilising technology that will help us to improve further and reduce boots on the ground.

Deliveries and benefits

There are a variety of projects underway, that are aligned to our digital strategy which provides a vision of a Digital M25 in 2025 and beyond.

Below are some example projects and the benefits they are delivering.

Computer vision technology

This technology is currently being trialled on the M25 network. It takes imagery from our annual video inspection survey and uses algorithms to identify and categorise defects seen on the video footage. The specific technology used is an Atkins product, one of Connect Plus Services' parent companies. We are currently working with them to advance the technology, so that it can eventually replace part of our annual long stop inspection programme, and therefore reduce the risk involved. Longer term this technology, combined with appropriate cameras, could be fitted to the weekly inspection vehicles, providing an automated 'live' weekly view of the condition of the network.

Strengthening our digital resilience

Whilst the use of technology on our network continues to grow, it is vital that we ensure that the data we gather, together with the resulting analysis, is stored safely. We have recently enhanced the IT support and information security capability on the project, by utilising a wider parent company joint venture support model. This model broadens the team of people able to respond to an IT incident, or any information security breach. In addition, it also adds security monitoring of systems, additional firewalls to protect unwanted access and a professional support and tracking tool for IT business support tickets and requests.

This brings a range of benefits, but most importantly one of improved security for the management of our internal processes.

Digital glasses
In an innovative first to the UK highways industry, Augmented Reality Smart Glasses (AR glasses) have been rolled out to the maintenance, tunnel and incident support teams. This follows rigorous trials and testing which began in October 2021 and completed in October 2022. Fixed onto the user's safety hard hat, the AR glasses have become part of the teams' everyday use.

The AR glasses present a new platform that offers an exciting opportunity. Using a specially designed forward facing camera and remote user functionality, images and video with sound can be taken of the asset or incident, then transmitted to an offsite specialist. Specialist teams or individuals in any location are able see what the operative is seeing whilst out on the network, and provide them with immediate feedback and instruction through headphones or by using onscreen mark ups.

This advanced technology could change the way the industry works, creating an innovative digital solution to some of the longstanding challenges we face.

Crucial benefits can be demonstrated in:

Time efficiency
Remotely connecting an operative on-site to an expert engineer off-site, removes any time delay that can be caused by the engineer having to attend site. It allows the most qualified and experienced person to assess the scenario and advise site teams on what action to take. Speeding up not only the response time but also, in some instances, the overall time it takes to reopen the road after an incident, helping to maintain a free-flowing network for our customers.

Reduced number of people on site
Given the quality of the image and resource that the platform provides, less people are needed onsite. In addition to incidents, stakeholders can also dial into audits and surveys without having to attend in person.

Reduced health and safety risks
Removing the time it takes for experts to travel to the scene, means that our operatives are spending less time on a live network, which was cited as the biggest personal risk to our work-force at our interactive safety stand down a couple of years ago. The innovate design also means there is no additional health and safety risk to the person carrying out the work or hosting the safety tour. The glasses are attached to their hard hat, meaning they are 'hands-free' whilst also being 100% aware of their surroundings.

Cost saving
In addition to the health and safety benefits, there is also a cost-saving aspect to the AR glasses. A reduction in the need for specialist engineers travelling to site results in reduced costs related to travel and time, as well as costs incurred through delayed work.

Discussing the glasses and their benefits, Carl Snell, O&M Manager, Connect Plus Services, said: "The glasses have totally changed the way we work. It's amazing technology to be able to see in so much detail what our crews are seeing onsite and to be able to talk to them, giving them expert engineering support. It has seen us close out many category 2 defects first time."

Mitchell Buzec, Structures Operative, Connect Plus Services, said: "They have helped us enormously. Not only can I get live advice, but we have saved a tremendous amount of time and fuel travelling back and forth."

ArcGIS
Innovation in digital technology comes from right across our M25 Community. Jackson Civil Engineering recently won a national Constructing Excellence award for its innovative use of technology.

The award-winning project saw the team link different software systems to create a multipurpose digital platform on ArcGIS. The digital platform enabled the team to plot the location of 1,050 manhole covers on the M25 network, and identify opportunities to share road space closures to carry out inspections and repairs.

By integrating digital assets, the team:
- Reduced disruption to motorists by sharing 242 existing closures
- Reduced the risk to the workforce by saving 36,000 additional person-hours on the network
- Generated a direct financial saving of more than £445,000 in reduced traffic management costs

The ArcGIS system offers a big advantage in terms of being able to visualise a range of information layers against different types of maps. It's currently being further developed to offer an even greater selection of layers, creating a flexible system that can be used on many projects.

In addition to the drainage projects, CPS are also using ArcGIS to geo-reference data, and are improving the system further by adding dashboards for progress reporting. The GIS apps have been used to collect data on litter picking, which avoids duplication of effort when revisiting locations, and identifying litter hotspots and changing trends. This means resources can then be allocated appropriately and proactive action taken to address growing hotspots.

Elements of the broader digital improvement programme have been deployed elsewhere, but not specifically on the English SRN. For example, the digital glasses have been deployed on the Dublin tunnel network for remote engineer inspections, via Egis, and the computer vision technology is being deployed on local council road networks. The team are keeping National Highways up to date on the programme of work and specific initiatives.

During 2022 the programme was presented to the Digital Services directorate.

Growing our partnership with sensat

Sensat and Connect Plus have, over the last few years, formed a strategic partnership to digitise the M25 network and improve the management of the UK's busiest motorway. Over the last year we have added the arterial routes to the original M25 ring, to give a more accurate representation of the network. Sensat's digital models provide our community with a detailed, up-to-date view of the entire network, allowing access to real time data for all work planning.

Much of this is done remotely, without the need for teams to be roadside. The digital models also enable us to plan and execute maintenance and improvement works more efficiently, minimising disruptions and reducing overall project costs.

The Sensat platform is available to the whole M25 Community, and allows for better communication and collaboration between our contractors, as well as any other key stakeholders. This ensures that everyone involved in the M25 is kept informed and up to date on the status of the project.

Over the past 6 months, 15 different organisations have used Sensat to work more efficiently and in a much safer environment.

By reducing the frequency and duration of road closures and disruptions, Sensat has also helped to enhance the experience of the road user. In addition, it has helped to minimise traffic congestion and reduce carbon emissions.

Traffic management

The CPS traffic management (TM) team use the Sensat platform primarily to carry out digital rehearsals for planned traffic management, as well as responding to unplanned TM on the network such as incident response.

By using Sensat's accurate measurement tools, the team can quickly and easily establish lane widths and whether reduced lane widths or even full closures are required.

Prior to Sensat, 90% of these shifts would be originally responded to using google earth to assess the location, with a follow up on-site verification. Sensat has superseded this due to more reliable and accurate data and measurement functions, which has reduced the number of shifts on site, therefore reducing the number of staff on site and its associated health and safety benefits.

A computer aided design (CAD) drawing is produced for every TM shift on the network, planned or unplanned, detailing TM layouts with each drawing taking approximately 4 hours to produce. By using Sensat, these CAD drawings can be stored and visualised on the platform in their native format, meaning the information is visible to all TM teams, without the need for technical CAD software licences.

Not only does this reduce repetition of work in creating new drawings, it also ensures that this information remains the IP of Connect Plus and therefore available to everyone in the M25 Community.

Reducing replication of CAD work could save 4 hours on 5 TM shifts per night.

Employee onboarding/scheme orientation and familiarisation
Sensat can be used during site inductions and briefings to provide a detailed, up to date and visual overview of the entire programme and its planned works in one space.

It helps give employees a clear understanding of the site constraints, hazards and tasks, and means they can be walked through the project in a real world environment. Planning and coordination of logistics can be undertaken with a top down, highly accurate and up to date view, representing works visually and then communicating these with the whole site team. We're able to mark up specific assets, work zones and access routes in the platform, to provide teams with a clear view of all the scheduled works. We can use time-box markups to schedule these and keep a record of past, present and future works being undertaken.

It also allows stakeholders and sub-contractors to 'hit the ground running' and 'digitally rehearse' site works to enable collaboration on decisions, by using Sensat as a virtual and easy to understand digital twin of the entire site.

As well as site familiarisation, Sensat can also be used to forward plan, helping to reduce clashes and increase efficiency.

Design validation
Being able to accurately identify structures and assets within the Sensat platform has also led to a reduction in the number of site visits for the structures and design teams. Users are able to remotely interrogate the orientation and positioning of assets, take spot measurement checks and extract data, as well as being confident that they have an up-to-date digital representation of the assets they need to work on.

There have been specific examples where it has not been necessary for inspectors to visit site at all, as there has been adequate information in the Sensat platform. Another example of protecting our workforce by keeping them away from a live highways environment.

Incident response
The traffic management team has been able to quickly respond to incidents on the network as they occur before having to deploy response teams to the area in question. By using Sensat to understand the context of the location, response teams can accurately measure lanes in order to put together TM plans, rather than having to develop plans once on site.

In the case of a recent embankment slippage the saving realised through this digital first methodology was in excess of £170,000, realised through a combination of benefits including a reduction in planning time, traffic management time, scheme delivery and charges.

Interface mapping and recording
Sensat allows us to create clear and easy to understand interface boundaries for stakeholders and project managers to clearly see clashes and locations, and understand how their work may impact an interface. The platform allows decisions to be made with more confidence by understanding exactly where the critical interfaces are. We are able to measure out and keep a record of exclusion zones in the platform, updating interface zones and changes of land packages overtime, to keep everyone up to date with timeboxing these markups.

With the use of the constantly updated base map, the interface management team will be able to see how the site changes, and the impact these changes may have on interfaces and scheduled work. Users can drop into each markup and see the next steps they need to address, such as contacting the relevant interface manager before starting works, thus mitigating the risk of delays and clashes.

National Highways are aware of our journey with Sensat. In the past, they have requested access for their staff from Areas 3 and 4 to the M25 model. The Junction 10 team from National Highways have previously been given access to the model with great feedback.

In recent months, the M25 team have given a presentation to National Highways, who are considering a single network model on the uses and advantages of the Sensat model.

10

A CHANGING ENVIRONMENT

Our environment and sustainability team are responsible for the soft estate, environmental assessment, environmental designated funds schemes and sustainability.

The team apply best practice methods, support behaviour changes and strategies, and aim to reduce our impact on the natural environment. Through the management of the soft estate, they manage the highway verge to protect and enhance the wildlife and vital habitats that can be found across our network.

Over the past year the team has been working on several exciting projects, including:

- Setting up a land administration function to manage land enquiries.
- Developing our approach to the flooding assessment process
- Combining the management of the asset management forward plan (AMFP) and service delivery soft estate into one management system, under the arboriculture and landscape manager.
- Launching 'stepping-stones', a project aimed at providing habitat for pollinators and their larvae
- Building on our sustainability roadmap

Land administration function

The need

To enable us to work more efficiently, we identified the need for a central resource to deal with all land enquiries.

The function covers many areas including:

- Reviewing National Highways land disposal proposals and coordinating input from the asset team
- Assisting the third-party function with land ownership and boundary information
- Supplying land data to the asset and design teams
- Identifying boundary encroachments
- Dealing with land ownership/responsibility queries
- Off-network access to assets
- Identification of mapping and contract errors

What we've delivered

We have invested in Microsoft Dynamics 365 case management system. This system enables us to track the progress of enquiries and collate information in a shared location. We set up a dedicated email inbox to ensure information relating to cases is not lost in personal inboxes. Linking the system to a dedicated email means that emails and documents can be linked in individual cases, and so easily retrieved as one set of information.

The GIS on-site collector app, used by tree inspectors has also been updated, to provide more granular information that can be used for correspondence to third party land-owners. In addition, we've developed functionality that will enable the completion of tree removals by the inspector on site. This will be rolled out in the early part of this year.

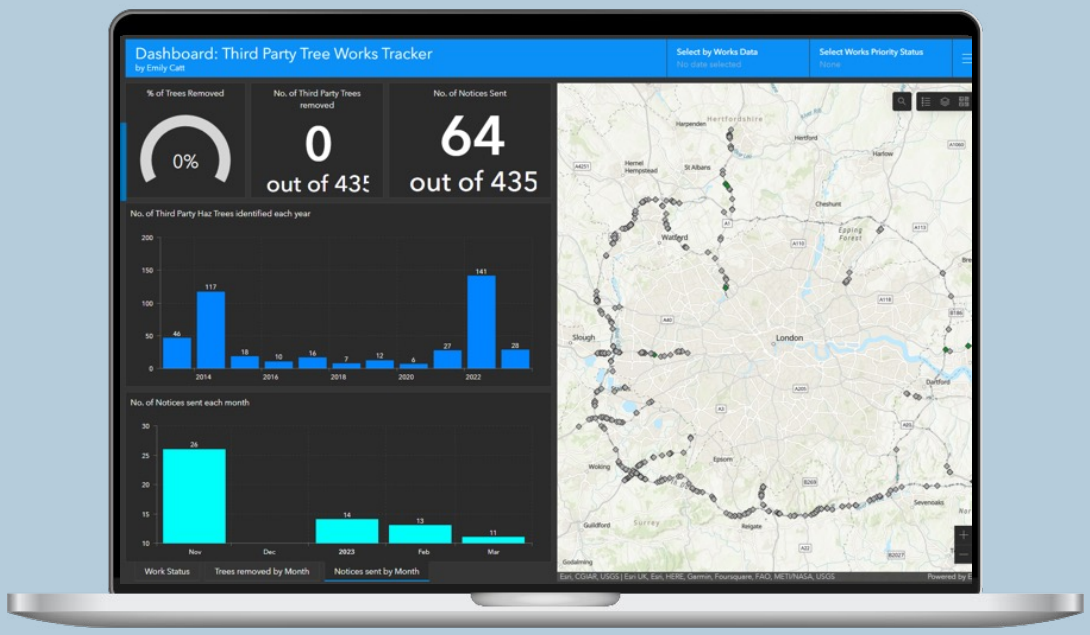
We have also set up a third-party tree works tracker and over the coming months we will be inputting data on the removal of the trees. The oversight of correspondence between the land coordinator and third parties will be managed through the case management system.

Over the coming months we will start to see the many benefits from installing this new case management system including reputational benefit with National Highways, as our land queries will be dealt with in a more efficient and timely manner, with a reduced risk of PPEs.

In addition, the overall process will become much simpler, and we will be in a position to provide greater transparency and accountability. The ability to produce management information and reports will be simplified, with an increased ability to retrieve historical information, and it will enable collaborative working between Connect Plus, the lands forum team and the National Highways lands/ property teams.

Moving forward we aim to further develop the GIS system to include the following functionality:

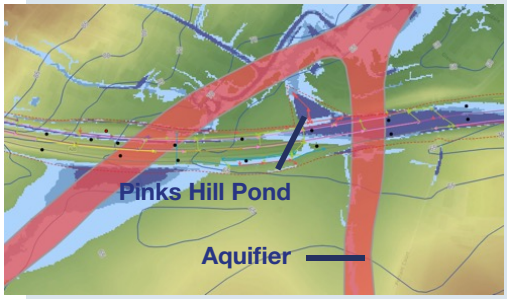
- When section 154 (relating to overhanging trees and/or vegetation) notices are sent, the dots will change colour so it's easier to visually see progress being made.
- The number of letters sent will be shown on the dashboard by month.
- The dots will change colour again once a site audit has confirmed the removal of the tree or completion of work.
- The site visit form will be further updated to distinguish between when tree removal is required, and when only removal of a limb is required. This will enable better information to be given to the third party, and will ensure that trees are not removed unnecessarily.

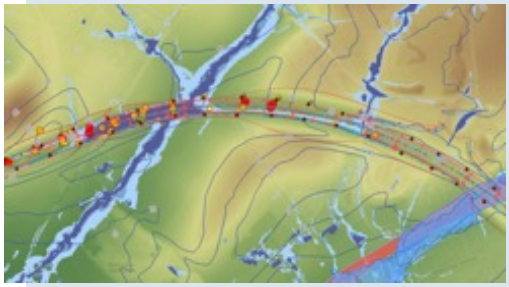


Developing our approach to the flooding assessment process

The need

In the past years there has been an increased number of extreme rainfall events, with extended periods of heavy rain leading to incidents of flooding. In light of this, we agreed that it was necessary to develop a means of visualising the relationship between land elevation and the groundwater environment, to help improve our understanding of how water moves from land adjacent to the drainage network. We have therefore started to develop our flood investigation process, which includes assessing the riparian management of third-party land, and how it can potentially affect our network.





What we've delivered

To support this process we have developed a GIS water environment viewer. These images show the Pinks Hill Pond Area, with EA flooding data, the line of the aquifer, lidar information and contours.

The second image shows the flooding hotspot at junction 9 and the drainage system, in relation to EA flooding data, lidar and contour data.

We are also starting to trial a new approach to flooding assessment that includes third party riparian management.

This new system is helping us to improve our understanding of the water environment. We are only at the start of the journey, but are confident that over the coming months we will start to see increasing benefits.

More efficient management of soft estates

The need

In order to improve the quality and efficiency of soft estate management in both service delivery and the AMFP, we have agreed that both should be combined into one management system, led by the arboriculture and landscape manager. In addition, those soft estate activities previously programmed by the five depot managers, have also been brought under the control of the soft estate manager.

The works are being managed this way to create efficiencies around the works timetable and traffic management. In addition, a number of GIS developments have been made to improve oversight and planning of the surveys and works.

What we've delivered

We've started to hold fortnightly integrated management meetings, to review the programme and monitor the development of tender packages, tender adjudication, and work planning.

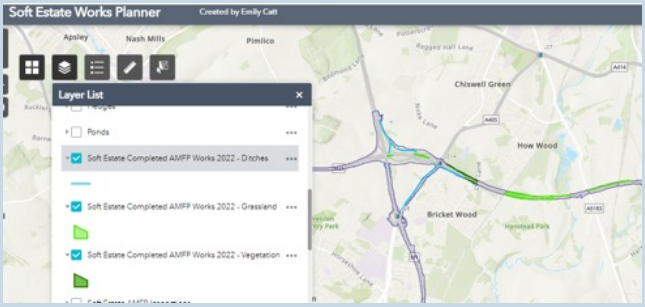
We've also promoted our soft estate supervisor to the role of manager, with responsibility for managing the soft estate framework contractors, tender awards and overseeing the programme. In addition, we've recruited a dedicated soft estate supervisor to oversee all routine maintenance works.

New dashboards have been developed on GIS, to aid the oversight of soft estate and tree surveys, together with AMFP soft estate works.

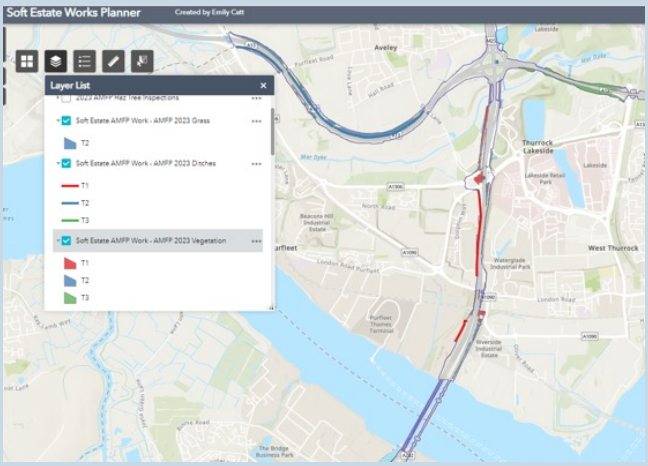
We are able to share the location of injurious weeds with the framework contractor, by giving them access to the GIS system. The system has been developed so that the contractor can 'tick off' the works on the collector app, enabling the team to monitor progress. As the record is date stamped, it means the team can plan site inspections to assess the effectiveness of the treatment at an appropriate period of time after application.

We have also created inspection trackers. These allow the oversight of inspections in real time. The network has been divided into junction-to-junction sections and the surveyor updates the system at the end of the survey day, noting if the section is fully or partially completed. This ensures the survey areas are fully covered, and sections are not missed if there is insufficient time to complete a survey in a single day.

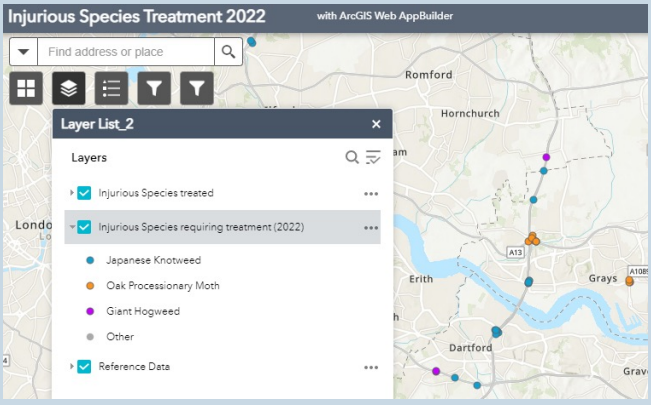
Over the coming months, we are planning to include the number of km/month on the tracker, so that we can monitor progress month by month.



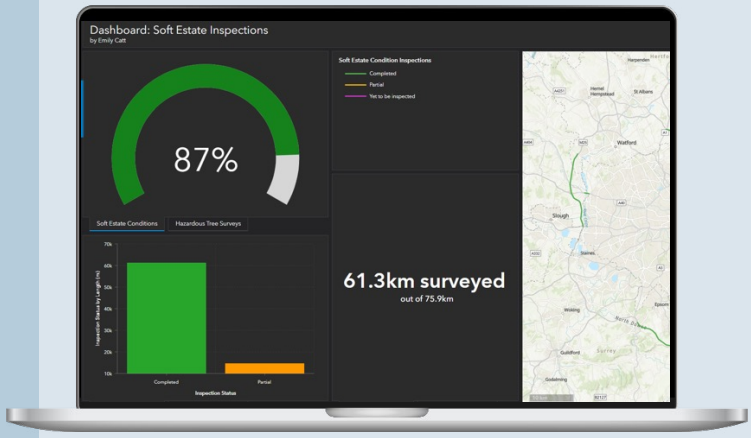
Excerpt from Soft Estate Works Planning showing completed soft estate works for 2022 according to plot type



Excerpt from Soft Estate Works Planning showing planned soft estate works for 2023 according to tender package



Excerpt from Injurious weed species treatment



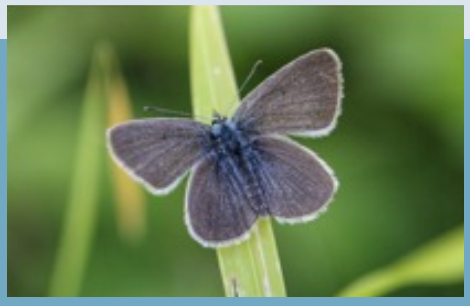
Soft Estate Survey Tracker

Our stepping-stones project

The need

Our stepping-stones project, which falls in-line with National Highways biodiversity plan, aims to provide habitat for pollinators and their larvae and, if possible, identify any scarce and protected species that could potentially be using the site. By enhancing the sites for pollinators, we are also creating habitat for predatory insects such as carabid beetles (carabidae), assassin flies (asilidae) etc. as well as bats, birds and insectivorous terrestrial mammals.

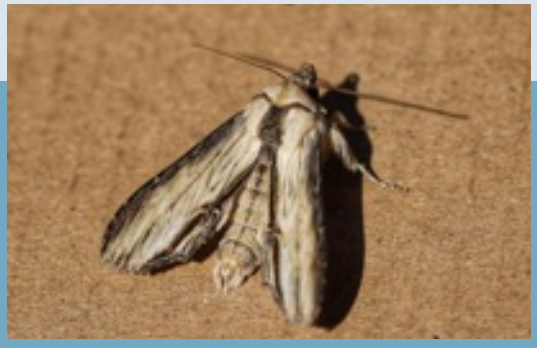
The decline of the UK's flying insects by 60% in the last 20 years, is thought to be attributed to factors such as climate change, farming practices and habitat fragmentation, to name but a few. We feel passionate about doing something to halt that decline, the free service that winged insects provide through pollination alone is valued at £400 million annually, and this doesn't include the other free services such as pest control and nutrient cycling.



What we've done

This year we identified two sites that could be enhanced to benefit the pollinators. The first site was situated at a balancing pond site between junctions 22 and 21a of the M25, and the enhancements were designed with the Small Blue Butterfly (Cupido minimus) in mind. It's the smallest butterfly in the UK and listed as near threatened. It's mainly a southern species but has a few coastal colonies in North Scotland and Southwest Wales.

The larvae are monophagous and will only feed on Kidney Vetch (Anthyllis vulneraria) which is a poor competitor with other wildflower species so can quickly be crowded out. It also relies on soil disturbance for germination. At the site we re-seeded 800m^2 of poor grassland with a wildflower mix, which included Kidney Vetch. We also created some soil mounds where we planted additional Kidney Vetch and various other species plugs. The males use these mounds to oversee their territories.



The second site we worked on is situated at junction 16 of the M25. Our aim here was to create a habitat for the Striped Lychnis Moth (Shargacucullia lychniti) which is listed as a UK BAP priority species. This means that it has been identified as being a most threatened species and requires conservation action under the UK Biodiversity Action Plan. In addition, it is also listed as nationally scarce A, these are species which have been recorded from 16-30 10km squares since 1980.

It is only found in Oxfordshire, Buckinghamshire, Berkshire, Hampshire, West Sussex and recently a single sighting in Wiltshire. The nearest colony to our site is found six miles to the North. We have enhanced the site by planting 100 Dark Mullein (Verbascum nigra) which is the Moths sole larval food plant. Later this year we plan to survey the site for the larvae which should hopefully be found on the flower spikes, we will also light trap for the adult Moths in July.

Included in our stepping-stone project, is the area of grasslands below the QE2 bridge. We have undertaken research and found that four scarce bumblebees and two Red Data Book moth species have been recorded within 1.5 miles of the site.

The bumblebee species are the:

- Shrill Carder Bee (Bombus sylvarum)
- Red-shanked Carder Bee (Bombus ruderarius)
- Brown-banded Carder Bee (Bombus humilis)
- Moss Carder Bee (Bombus muscorum),

The two recorded Red Data Book moths are the:

- Marsh Mallow Moth (Hydraecia osseola)
- Straw Belle Moth (Aspitates gilvaria)

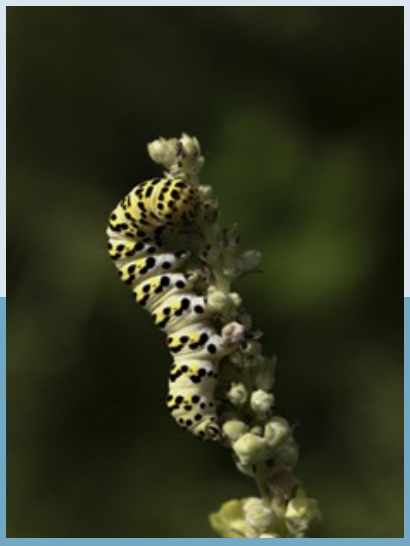
We plan to survey the site a number of times between June and October, assisted by the Bumblebee Conservation Trust.

We will use light trapping to survey the Marsh Mallow Moth, and a visual survey for the Straw Belle moth, as it is a day flying species. Light trapping is a great way to learn more about the wildlife living in our local area. It's easily repeatable and harmless to the insects involved. By gently capturing them in a jar, the insects can be released back into their habitat once they've been recorded. It is a simple but effective way of collecting a lot of data in a short amount of time.

We also have a plan this year to potentially increase the herbaceous layer diversity in some of the Woodland plots across the network. Despite a growing awareness that the herbaceous layer serves a special role in maintaining the structure and function of woodland, this stratum remains an underappreciated aspect of woodland ecosystems, and its importance as a habitat for pollinators.

Flower rich woodlands are essential habitat for many species of Hoverfly, while plants such as Dog Violet (Viola Riviniana) are the sole larval food for the near threatened Dark Green Fritillary (Speyeria aglaja).

We have also worked with the invertebrate charity Bug-life, to add our pollinator enhancement sites to their B-lines data base.



Building on our sustainability roadmap

The need

Sustainability is becoming increasingly important as we learn more about what we need to change and adapt, to maintain a healthy environment and planet. We need to push our environmental and social responsibilities beyond business as usual. We have developed our sustainability roadmap to track our actions and ensure we meet them; it sets out the main framework for the wider, longer-term goals, with smaller actions that we can track on a quarterly basis.

We incorporate National Highways' imperatives into our Sustainability Roadmap, for example, development goal 3: good health and wellbeing, is a huge part of the safety imperative. We have a strong focus on staff mental wellbeing, especially during the pandemic, which has been tracked and recorded through the Roadmap. We have designated mental health first aiders and a focused mental health awareness week.

Customer remains the focus of multiple goals and, therefore, actions such as reducing the number of environmental incidents, increasing awareness of STEM ambassadors and using bioremediation to clear spillages.

Delivery of our maintenance contract has been elevated in the last few years, with the introduction of a measure for social value. This ensures that the communities around our network are at the forefront of our activities in multiple different ways. To bring carbon to the fore in the design process we have introduced our designers carbon tool. The tool encourages designers to consider their carbon footprint during the design stage, and understand the changes they can make to reduce carbon emissions.

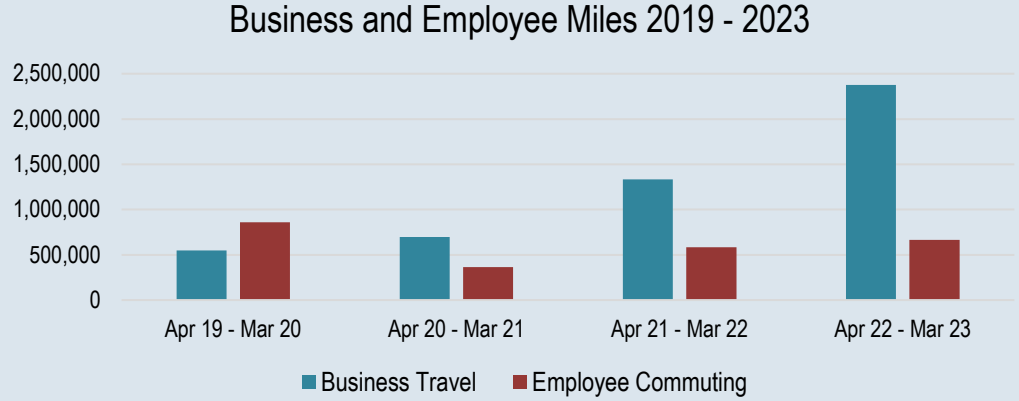
What we've done

Green travel plan

One of our goals is to implement a green travel plan. The first edition was written in 2020 and since then we have been building on the data collected to further understand the impact our business has with regards to our travel.

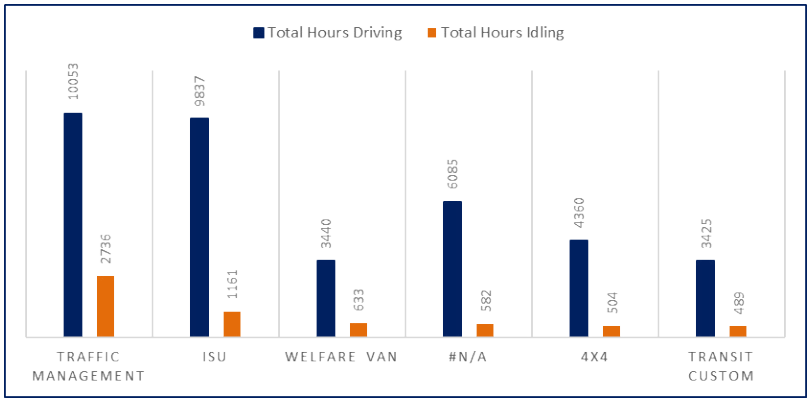
The plan now includes our commuting, staff business travel between offices, the fuel reduction strategy of our business fleet, and the locations of our supply chain. The graph below shows how our commuting and business travel has changed since the pandemic.

The plan, together with a travel survey we undertook, has given us a greater understanding of how commuting has decreased, and how the potential for change in commuting vehicles from fossil fuel to electric vehicles may develop. The analysis of how commuting and travel is adapting and changing for the M25 allows us to understand our sustainable savings from the reduction of time in the office to three days a week from five.



Fuel and energy reduction

Another transport priority is to reduce vehicle idling within CPS. Our sustainability data analyst is now completing a lean project to tackle this issue, together with various other disciplines across CPS. The graph shows which vehicles in the business are idling the most, compared to their driving time.



There are not only huge environmental benefits from reducing idling and therefore emissions, but there are cost saving benefits also. With the price of fuel rapidly rising in the current market, reducing the amount of fuel we use is imperative. From April 2022 to March 2023, we spent £46,517 on idling. Whilst occasional idling is expected due to weather conditions and work required, by analysing the dashboard data we can identify where it is unnecessary. The dashboard is the beginning of a change in mindset for our workforce.

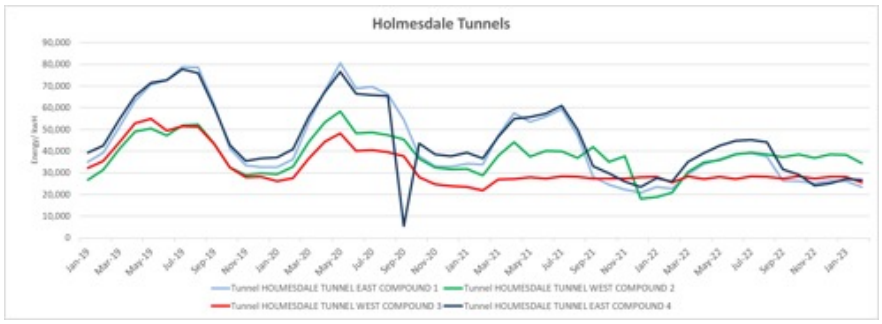
Our energy priority has two goals: to reduce depot energy consumption and reduce network energy consumption. There are several projects now in place to remove, reduce and replace the lighting on the network, and we have so far reduced the network energy by 3.59% between March 2022 and March 2023. This figure is reported to National Highways via the monthly OPM/MMM.

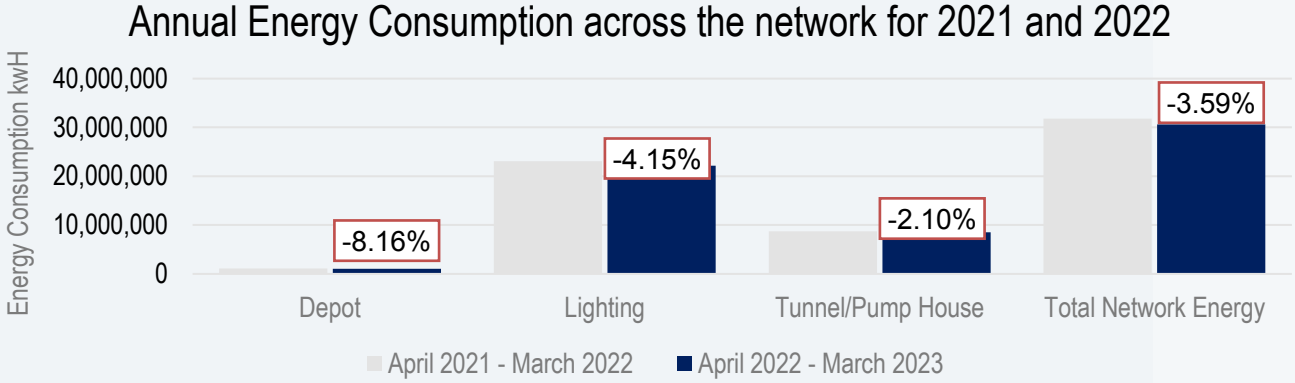
As a next step we would like to install wind turbines at the Dartford depot. We have received quotes to do this and, moving forward, we will be discussing options with National Highways.

We have also been analysing the consumption within the tunnels and have identified that in the Holmesdale Tunnel, the energy use appears to have plateaued since the end of 2021. Investigations into this issue are ongoing, but the benefit of doing such analysis is that we are able to identify if our usage is changing. Typically, the tunnels use more energy in the summer months to ensure the change in light when you enter and exit the tunnel is not too great for the driver's vision.

Similarly to fuel reduction, energy consumption reduction not only benefits the environment with lower emissions, but also reduces costs.

With the remove, reduce, replace strategy we have saved 1,140,359kWh in 2022/23 compared to 2021/22. This is hugely beneficial to the company as well as massive environmental savings, especially as the energy used is renewable.





Building on our sustainability roadmap

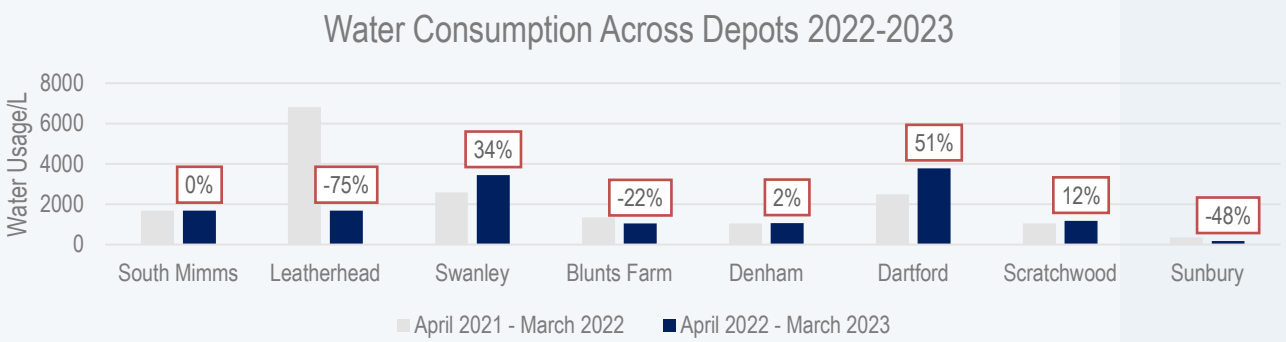
PDA supply chain

We have a commitment to hold quarterly sustainability forums for the M25 community. To enhance our collaboration and communication with the PDA contractors, last year we launched a PDA sustainability forum, aimed at our smaller contractors. These forums have continued throughout 2022 and into 2023, covering a range of topics including social value, biodiversity, plant and fleet and climate. We're thrilled at how engaged our PDA supply chain have become within these forums and their contribution is significant.

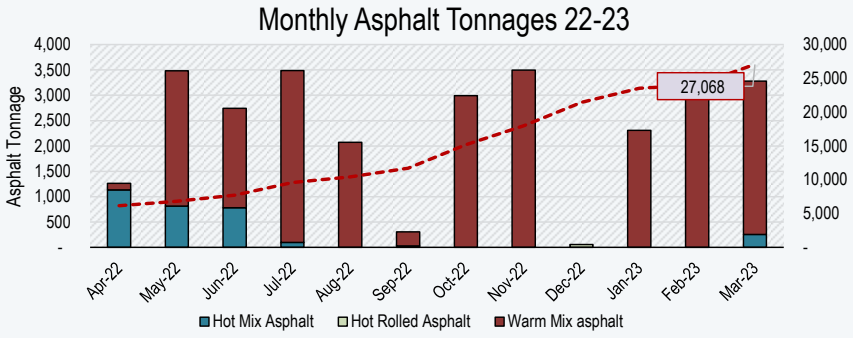
The benefits of engaging with our supply chain in forums, and with National Highways reporting, means that we are constantly enhancing and improving the quality of our data. Scoring them on the Jaggaer systems not only benefits us in terms of data quality, it also gives the contractors an incentive to improve their data inputting.

Sustainable solutions

For the sustainability goal, life below water, we have actions to continually monitor depot water consumption, to identify opportunities and deliver savings. We are now able to analyse our data more granularly and identify trends and changes. We have seen a 19% reduction in our water consumption between 2022 and 2023, due to the repair of a severe leak in Leatherhead. The graph below shows the consumption by depot. Sites with increased use are currently being investigated.



We seek to identify other sustainable innovations and savings that can be implemented on the network. For example, when resurfacing the M25 network over 90% of the asphalt used was warm mix instead of hot mix. Per tonne of material this saves 4kg of carbon. The graph below shows the monthly asphalt tonnages. The team are currently developing a plan to use Durable Enhanced Asphalt (DEA) this year, a material with a longer lifespan therefore requiring fewer interventions.



The environment and sustainability team have made great efforts over the past year to build relationships and engage with other parts of the business and across the framework community. We are keen to eliminate any silos and ensure we are working in collaboration to do the very best we can. This is becoming evident in parts of our work where we are really starting to realise the benefits, such as with our water and energy use. We have identified the issues and then worked with other departments – facilities and our energy and tunnels teams in this instance – to identify the problem, find a solution and act on it as quickly as possible.

11

OUR JOURNEY TO NET ZERO

National Highways launched its plan for net zero highways in 2021. We recognise the importance of setting a strategy that enables us to act now, but we also realise that it must be done in a sustainable and planned way

Over the past year we have launched our carbon strategy and plan, and we have focused on predicting our carbon emissions with our new carbon tool for design, together with our 30-year carbon profile as part of the asset management forward plan.

We have worked collaboratively as one community, engaging with designers, asset managers and service delivery teams to further analyse our carbon emissions and identify carbon hotspots.

The need

Greenhouse gas emissions are the primary cause of global climate change, it is widely recognised that to avoid the worst impacts of climate change, we need to urgently reduce emissions. Transport represents 28% of the UK's greenhouse gas (GHG) emissions.

GHG emissions is of critical interest to all our stakeholders, who expect us to have a comprehensive sustainability and carbon strategy in place, to help us reduce our impacts.

We recognise as part of our carbon strategy, the importance of setting a strategy that enables us to act now, but we also realise that it must be done in a sustainable and planned way; it is what our people, our supply chain and customers expect of us.

Setting the context

Our carbon approach focuses on the reduction of emissions. We aim to be net zero and near zero carbon for many of our operations, as well as in the materials we use. We have set ourselves a net zero target, rather than a carbon neutral goal. This will ensure we focus on using innovation to reduce our emissions, so that we can be as close as possible to near zero schemes.

Our carbon commitment recognises we are on a journey to reduce emissions to net zero. As new products and solutions become available, the road will become clearer. Our carbon strategy provides a snapshot of where we stand today, however, we commit to continually improving so that we can refine our course into the future.

Over the year we have achieved a lot in terms of sustainability and carbon management including:

- Finalising our carbon strategy
- Producing our carbon statement
- Refining our carbon tool for design
- Developing a sustainability library
- 30-year forward plan carbon profile

A growing team

Our sustainability team has grown in the past year and now includes our head of environment and sustainability, a sustainability manager, a carbon manager and sustainability data analyst. Having a larger more focused team has meant we can undertake a more concentrated approach to carbon reduction. Our team, and the business a whole, is focussed on understanding, analysing and reducing the amount of greenhouse gases (GHG) that we are emitting. Understanding our impact on the world in terms of climate change directly links to the GHG emissions emitted by the work we do now and in the future.

We are confident in the quantity and quality of our data, and that it allows us to create robust baselines and targets.

Carbon strategy

After a concentrated focus on collecting the data from our carbon management, last year we were able to develop our carbon strategy. We are confident in the quantity and quality of our data, and that it allows us to create robust baselines and targets.

Our carbon strategy was developed over the last year with CPS leading in writing and creating the targets and strategies and Connect Plus supporting where required. The carbon strategy was developed using the GOST method – goal, objective, strategy, tactic.

The strategy mirrors the National Highways net zero plan, and has been categorised into the following key areas:

1. Our business operations: we aim to reduce our own energy consumption and emissions from both our office and depot operations.

2. Our maintenance and construction: we will reduce emissions that come from our construction sites and from the manufacture, transport, and use of materials such as asphalt, cement and steel.

3. Road user emissions: the largest source of emissions comes from vehicles travelling on our network – this is largely outside of our control. We will therefore focus on improving network efficiency and journey reliability.

4. Our climate resilience: We need to identify and invest in solutions that will reduce the impact of climate change, and ensure our network is resilient to future changes in climate.

The carbon strategy is a long-term project and sets out our aims to reach net zero in the future. We are aware that it is going to require influence and leadership to encourage the business to change from business as usual if we are to meet these ambitious targets.

Carbon statement

Following agreement of the carbon strategy, the carbon statement was launched at the end of 2022. It is based on initial pragmatic goals that will support future adoption of the strong science and evidence-based targets.

The statement has been shared across the business and we've put in place a communications plan to support the roll-out more widely and to keep the business informed when key targets are met.

Planned activities include:

- Webinars
- Targeted emails
- News items on SharePoint
- Lunch and learn sessions

Carbon literacy training

Following the launch of our carbon statement, we held our first session of carbon literacy training to provide an understanding of the basic science of climate change, and how it will affect our industry now and in the future.

The course was initially offered to senior leaders from across the M25 and provided strategies for influencing others to take action on climate change, together with tools to effectively lead a carbon culture throughout our community. We believe that it is important to drive behavioural change from within and ensure that carbon is part of the agenda in every discussion.

With the help of our sustainability data analyst, we have created a new tool called the carbon tool for design.

Carbon tool for design

In 2021/22 we launched our carbon management records on Aconex, which was based around the National Highways carbon calculator. It was in the format of a form, rather than a tool, and we quickly identified that it was not fit for purpose, as there was no mechanism for the design team to learn about carbon emissions for their schemes.

With the help of our sustainability data analyst, we have created a new tool called the carbon tool for design. This is an interactive excel tool, similar to the National Highways carbon calculator, based around materials, energy transport and waste. Using these categories, we can identify higher carbon factors, and seek lower carbon alternative materials or methods of working.

On the tool's homepage there are a number of different graphs to show a scheme's carbon hotspots, as well as also being able to quantify the carbon emissions.

As part of launching this new carbon tool for design, we reviewed the materials that were incorporated, and as a result there is an ongoing project to add specific supplier carbon factors and more options into the tool, so we can accurately estimate the carbon emissions from our schemes.

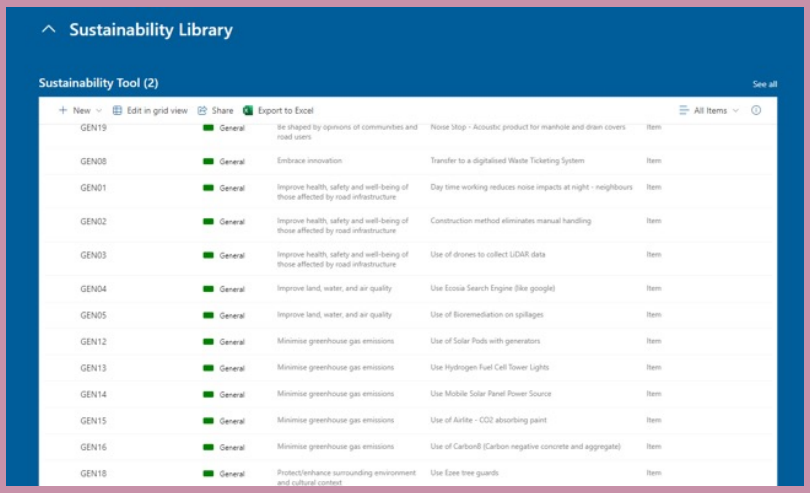
Example of the carbon tool

Sustainability library

To support the carbon strategy and the carbon tool for design, we are aware that we need to encourage and engage with the design team to identify how they can reduce the carbon in their schemes. To support this, we have created a sustainability library in our SharePoint hub, Compass.

This library is a live register of the different innovations and methods we have used, and are still using, to promote and consider sustainability within design. For example, for our fencing under 'minimise greenhouse gas emissions', we have listed the use of Cemfree, an ultra low carbon concrete, as an innovation.

The library will be more qualitative than the carbon tool, and is inspired by the National Highways sustainability goals and the UN sustainable development goals.



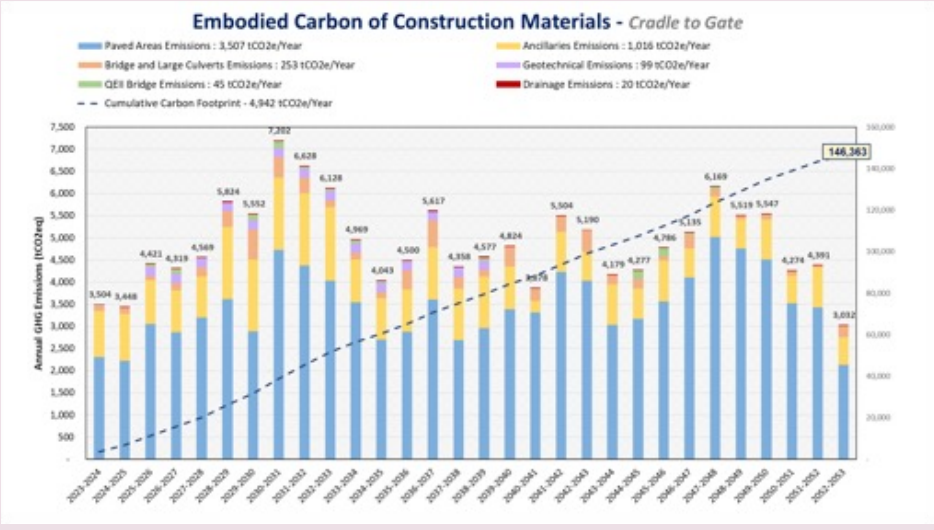
We truly believe that we are leading the way in the South East with our carbon strategy and, following a request from National Highways, we will be working with the region to share our findings.

30-year forward plan carbon profile

In 2021/22, we created our second carbon profile for the asset management forward plan (AMFP), which captured the construction materials for some of our assets.

For this year we have increased the scope of information presented in the AMFP, as we are aware of how important sustainability is and the impact it can have on our assets.

The higher level of information in the chapter this year includes:



- **Energy reduction.** Capturing the energy reduction on the contract so far through network lighting, depot energy use and tunnels, as well as plans for future energy reduction.
- **Climate vulnerability.** Capturing a summary of the potential risks and impacts to our assets.
- **Carbon strategy and accounting.** Capturing the new strategy, supporting National Highways with their net zero plan, and avoiding emissions from long-life pavement and road user emissions.

In addition to the increased scope within the sustainability, environment and carbon chapter, we also updated our 30-year carbon profile for materials used on the network.

The profile has been improved this year to include the majority of asset classes with only a few minor classes being excluded, due to the format of the data. The scope of this work will be further expanded to include broader emissions from the construction process, such as travel and machinery.

Looking ahead

This part of the brochure highlights some of the other, sometimes smaller projects and innovations that our teams are currently working on.

It is our belief that some of these projects will progress throughout the year and potentially develop into full case studies, showing real benefits in the future.

1. Climate vulnerability
2. A customer centric mindset
3. Our journey to net zero
4. Daily visual management
5. Operatives timesheet

Climate vulnerability

To build on the work that has been undertaken this year and further understand the potential impacts on the network, there are several updates to progress this for the future:

- Climate resilience in the carbon reduction roadmap
- Climate impacts compared to weather warnings
- Climate vulnerability workshop

Climate resilience in the carbon reduction roadmap:
As climate resilience is part of the carbon strategy, it has a key place in the carbon reduction roadmap which is being developed this year. It will link the targets for climate resilience as explained above with the roadmap to reach these targets year on year. As part of this work we are currently developing the climate baselines for the targets from the 2022 data we have.

Climate Impacts compared to weather warnings:
To support the above baselining project and roadmap, we are currently investigating the link between weather warnings issued by the Met Office in the South East and the relationship with climate impacts. This work will need further development and will play a key part in setting our 2022 baselines for the climate resilience section in the carbon strategy.

Climate vulnerability workshop:
It has been identified within the business that we need to link both the assets and service delivery to understand the impacts of climate from both sides. Therefore, we have organised a climate vulnerability workshop for May 2023 to focus on the impacts, mitigation and risks of climate change as a business and to create a better understanding from the business. This will play a vital role in monitoring, preparing and planning for further climate change and the impacts associated with it.

A customer centric mindset

Embedding a customer centric mindset across the network is fundamental to futureproofing our customer experience.

Whilst customers are considered throughout the project lifecycle, there is scope for this to be heightened to achieve an optimum experience for stakeholder groups around our network.

Our approach

Our approach to 'customer' requires a mindset change as opposed to rolling out an initiative. Putting ourselves in the customer's shoes needs to become second nature and more embedded in the way we design, plan and deliver works.

Following a notable amount of exploration into the business' current customer approach, multiple workshops, presentations and discussions with project teams, we are in the process of building the customer strategy and tactical plan about how we will achieve this.

We are at the outset of this process, but a flavour of the types of tactics we will be implementing can be found below.

Data

We are currently building a new 'customer' layer on our GIS system which can be overlaid and interrogated when designing, planning and delivering works. The 'customer' layer will allow designers and project teams to better understand historic customer feedback, requests, and sentiment at locations of interest around the network.

Analysis of historic data will also provide a better understanding of trends, whether they are seasonal, location specific or something we hadn't anticipated. This will allow a more informed approach to planning works, building on all of the positive collaboration and planning already underway.

Network-wide engagement

We have access to many communications channels across the M25 network and will be deploying the most effective channel for each target audience. This is important because each target audience (group of employees) will interface or have the potential to impact on customers in different ways.

Some of the tools and techniques we are currently exploring are as follows:

- Customer training and inductions for new staff
- Customer focussed webinars
- Focus groups
- Celebrating customer success stories more widely
- A more embedded customer 'stage' within each project lifecycle stage
- And many more

Next steps

Once the 'customer' strategy is defined, we will work across the organisation to embed our customer vision.

A more customer centric approach will also further align to the National Highways Customer imperative, taking a proactive approach to the customer experience, and working to enhance the reputation of works taking place on the network.

We look forward to providing further updates on this activity in due course.

Our journey to net zero

We recognise that this is only the beginning of our carbon journey, and there is a long road ahead for all of us to achieve net zero and reduce our impacts. To support us with this journey, we are in the process of creating a carbon management plan and a carbon reduction roadmap.

Our carbon management plan will be in a format that will support accreditation of PAS 2080, and the uptake of science-based targets. In its current format, it will include the following chapters:

- Background/introduction
- Carbon culture, leadership and responsibilities
- Carbon management process
- Targets, baselines, monitoring and reporting
- Quantification
- Value chain engagement and communication

Supporting the carbon strategy further is the carbon reduction roadmap, which is also in the process of being created. We recognise that the ambitious targets we have set, will not be met unless they are properly considered with a roadmap in place. The roadmap will be transparent and set out the baselines, targets, the year-on-year reduction to meet those targets and the progress towards meeting them.

Daily visual management

Daily stand-up meetings and visual management are a foundation of lean deployment. They establish a daily discussion of performance, engaging the team in proactive performance management and drive continuous improvement. This project will establish a digital visual management solution to support daily performance meetings across service delivery in all the depots, using a four-tier approach. The solution will ensure there is an up-to-date view on the performance of each depot, understanding of areas where improvement is needed and enable better planning of reactive and planned works.

Operatives timesheet

We will be introducing digital timesheets to all frontline colleagues. This will allow operatives to enter their time worked into an electronic system, which will then be approved via an electronic workflow. It also introduces integration through to R12, so that payment can be made more efficiently. The new system will also reduce paper usage and streamline inefficient manual processing of timesheets by the finance team.

Connect Plus
Connect Plus House, St Alban's Road
South Mimms, Potters Bar
Hertfordshire EN6 3NP

0203 386 8500
enquiries@connectplusm25.co.uk
www.connectplusm25.co.uk

Connect Plus