

LM JV transforms HS2 working practices with all project information in one platform

Reducing uncertainty and increasing control

Project
HS2

Location
West Midlands, United Kingdom



Summary

Two of Europe's most prominent engineering and construction companies at the forefront of major infrastructure project delivery, Laing O'Rourke and J. Murphy and Sons Ltd (Laing Murphy Joint Venture or LM JV) have come together as a main contractor to deliver a dynamic enabling works programme for sectors N1 and N2 of HS2's phase one infrastructure build across the West Midlands.

As leaders in rail infrastructure delivery, tunnelling, bridge construction, civil engineering, offsite manufacturing and digital engineering, LM JV is applying some of the latest techniques and best of breed technologies to help prepare the route for Britain's new high-speed rail line. To complement the diverse requirements of a project of this scale, innovation lies at the heart, so embracing digital design and emerging technologies is key to its success.

As part of its approach to transform the way infrastructure is built, LM JV worked with Sensat to visualise 80km of the HS2 route, creating a digital twin that allows teams to access all project information in one platform, and ensure everyone is working on the same, quality-assured project data to make assured decisions, without having to be on site.

80km

of the HS2 route was
visualised by Sensat



The project

As one of Europe's largest infrastructure projects, HS2 has been designed to cope with growing travel demand in the UK, and will connect 25 stations and around 30 million people, serving 100 million commuters a year across its network. As one of the main phase one contractors, LM JV are in the advanced stages of delivering a dynamic enabling works programme for sectors N1 and N2 of HS2's phase one infrastructure build across the West Midlands.

To ensure important details have been considered, planned for, and nothing missed, detailed planning and consultation are vital across all stakeholders and parties to achieve the best outcome for each project phase. With a project of this size and scale, the tiniest mistake—such as incorrect



measurements, misaligned buildings, unaccounted trees, cabling or fences—can lead to costly and timely consequences down the road, so data accuracy is key.

LM JV required partners that could help it better understand the overall HS2 route, each site environment and its potential constraints, as well as what it was dealing with day to day—in order to mitigate risk, make fast decisions and track project progress against delivery milestones. By capturing (with unmanned aerial vehicles) and combining

The project

highly-accurate 2D and 3D data of the N1 And N2 route (with a tolerance of +/- 62 mm), Sensat created a digital twin of the route in its platform, where files can be uploaded anytime to provide a complete and up-to-date overview of past, present and future site and route information all in one place.

Sensat provides a golden assurance record, where all LM JV's project teams now have immediate and direct access to an exact virtual replica of the project and specific sites from anywhere, no matter where they are working from or based. This reduces the need for site visits and allows everyone to work off the same information to connect and collaborate, all the while getting more programme clarity and certainly from enhanced programme coordination.



Challenges

75%

time reduction in some meetings

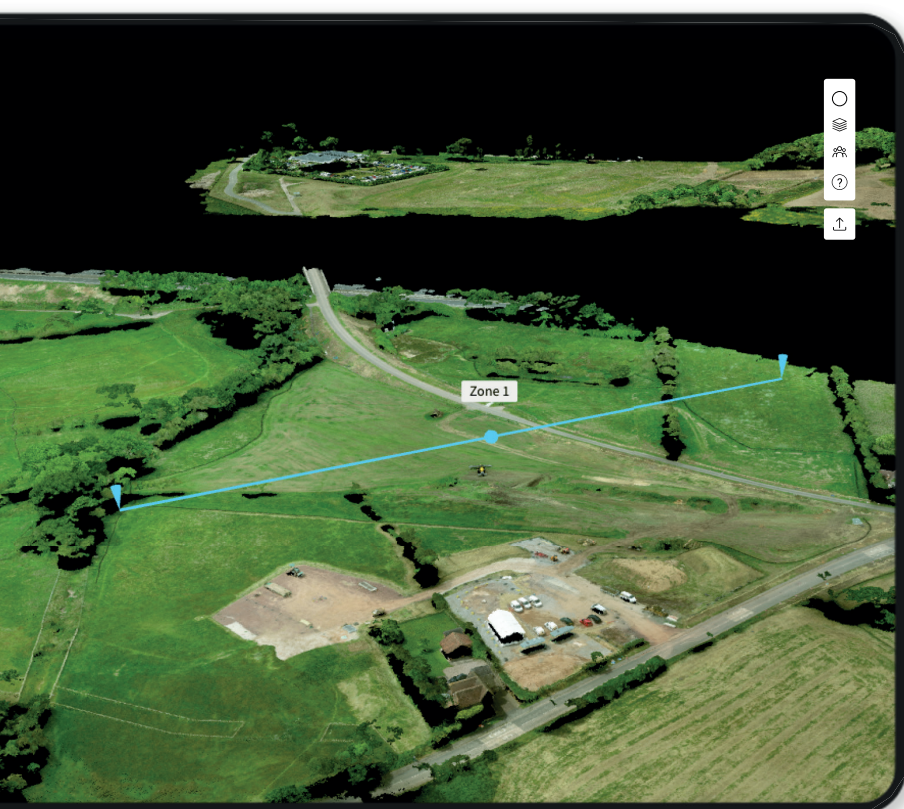
Up-to-date route visualisation and single source of truth

Platform users working across a range of roles for both LM JV and HS2, now have access to up-to-date visual records of the HS2 route, where they can get up to speed, work with far greater certainty and collaborate more effectively. As a single source of truth and guaranteed assurance record for route checks, users can quickly and easily see site state of play and zoom in on detailed 3D visualisations of the same site on different dates—thanks to Sensat’s timeline capability—so everyone knows exactly what happened and when.

With key project information aggregated into a single platform, including Sensat captured data integrated with design files for example, Sensat becomes a single resource that ensures consistency and accuracy for the project. Project stakeholders no longer need to scrutinise multiple disparate and siloed files and surveys, where data has been collected at different times and across different project levels that can go out of date quickly—causing a drag on programme efficiency from discovery and dissection. Sensat clearly presents all information and data together,

which can be managed in folders and surfaced when needed. This means users can easily identify any potential pitfalls and contractions, show how much a project has progressed and enable effective site coordination and decision-making about the next steps.

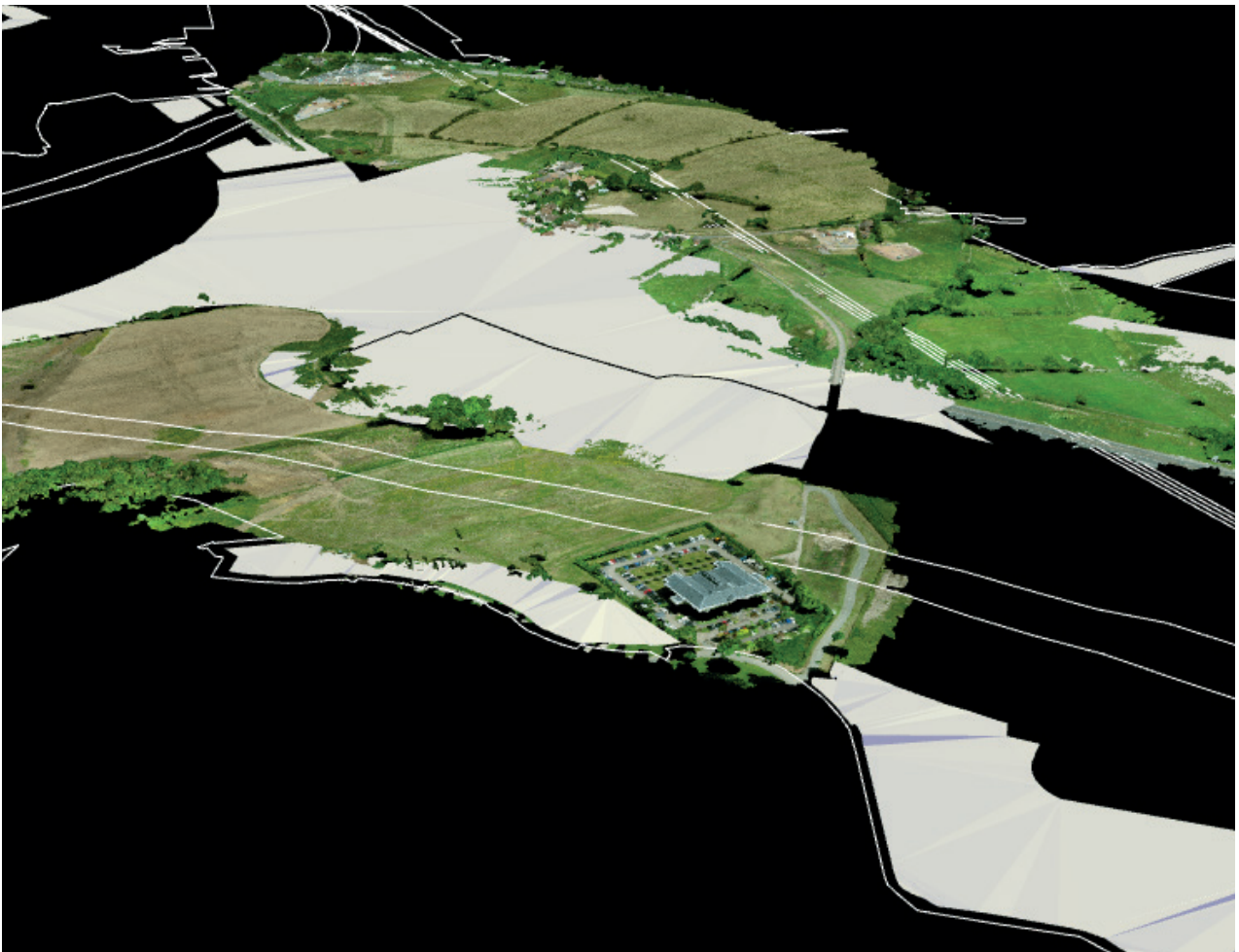
Sensat has made it possible for LM JV to inspect multiple sites immediately, without the time, cost, safety and environmental impacts of actually going on-site and travelling between sites. Users can view up-to-date images and visualised data from the comfort of their desktops and still be confident in their decision making. Anecdotally, it’s been said that Sensat has cut some meeting times for LM JV and HS2 by up to 75%.



Challenges

Comprehensive audit trails

As well as supporting project management, Sensat's timeline feature populated with data uploaded from across the lifecycle of the project, enabled LM JV's users to create an effective audit trail of work and events, to track what had been done and manage things such as supply chain conversations. With all data in one place, and accessible over time periods, platform users can easily access and review chronological records of project information.



Subcontractors and suppliers could also be monitored more consistently—over the felling of trees, for example, or for construction progress. And, providing an immutable assurance record, checks were made over time in Sensat on what was done, when, so any disputes that occur can be resolved faster.

Challenges

23km

can be scanned by Sensat per day
to a width of 200m

Detailed 3D visualisation and collaboration for everyone

Sensat's easy-to-use interface provides incredibly detailed data visualisations for LM JV. Anyone, anywhere with access to the project within the platform, can simply log on to Sensat's web-based interface at any time and pull up the data and visualisations they need, annotate and mark these up, and also collaborate and communicate within the platform for faster answers, decisions, and more solution creativity. Alongside other tools, this has been extremely useful for the team.

Moreover, the platform can integrate multiple data sets and systems. For example, subterranean infrastructure data can be uploaded so that above-ground works can be planned around them. Accessing the point cloud within Sensat, means analysis and measurement for earthworks are now being done remotely, meaning further time and cost savings. And, as a 'Golden Record' for LM JV, consistently high standards of data and information can be built up over time, meaning resource, time and costs can be continually optimised, and information can be passed over to the next stage of the HS2 project.



Challenges

Removing usual site survey headaches

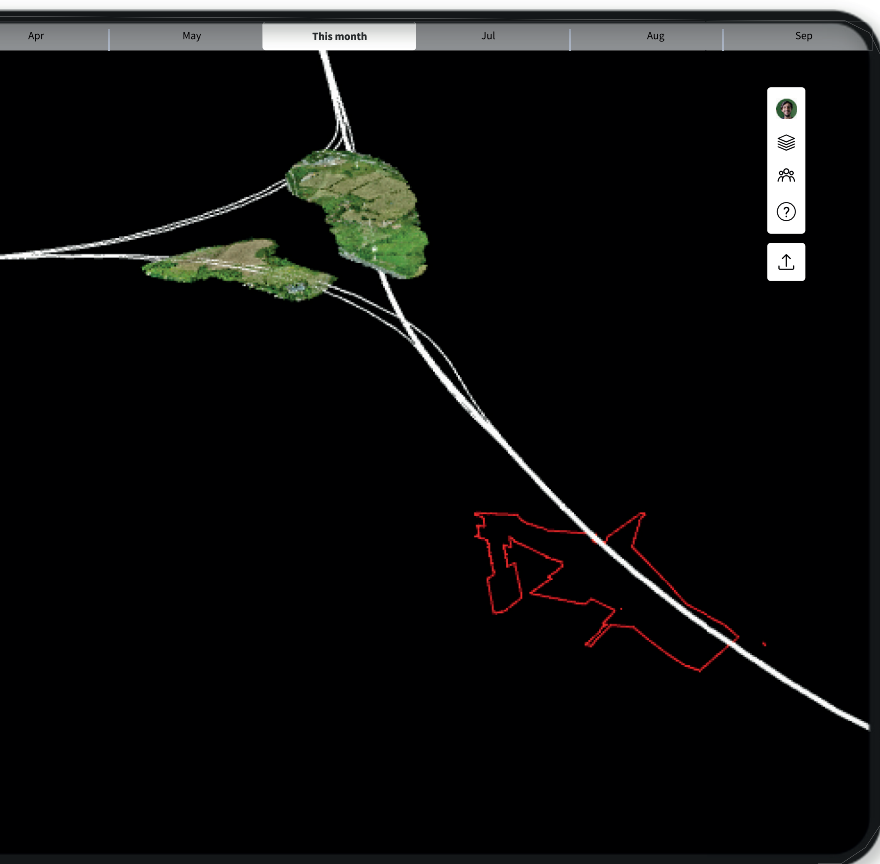
It normally takes significant time, money and carbon waste to programme overheads with physical and manual site walkthroughs and surveys, which also potentially put employees in harm's way. Sensat is able to provide and process quality-assurance data quickly and sustainably—in days rather than months, avoiding putting workers at risk and huge costs.

With Sensat Continuous, all LM JV's data is updated regularly across the 80km route. Sensat scans the route regularly, and can cover over 23km per day to a width of 200m, enabling highly efficient and accurate ongoing data capture, which, once loaded in the platform can identify everything from surrounding vegetation to misplaced fencing, that can be taken into account from planning to build and marked up for clearance.

Flying freely over terrain with UAVs to capture data, simply eliminates many of the headaches traditionally associated with surveys, and reduces internal surveyors going on-site, meaning fewer site visits and reduced costs, especially for aspects like geo-referencing, as this can now be done in Sensat's platform. The same ground that Sensat covers would take three to five surveyors to do over a longer period of time. Getting access rights

or actually gaining access is also easier with drones, which can be flown into difficult-to-reach places, such as over boggy terrain or under bridges, meaning far fewer health and safety risks, and no concerns over accidents or trespassing.

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Conclusion

Using Sensat enabled LM JV to do more remote planning and project monitoring more sustainably, with a reduction in the amount of time spent out on site. Users can now inspect up-to-date data and information from their desks, track and monitor project progress and productivity, as well as be confident in the decisions they make.

Summary table

Challenge	→	Solution
To better understand the overall HS2 route, each site environment and its potential constraints.		Sensat created a digital twin of the route, where files can be uploaded anytime to provide a complete and up-to-date overview of past, present and future site and route information all in one place.
Bringing together multiple disparate and siloed files and surveys, where data has been collected at different times and across different project levels that can go out of date quickly.		Sensat clearly presents all information and data together, which can be managed in folders and surfaced when needed. Users can view multiple sites, and easily identify any potential pitfalls and contractions, as well as show how much a project has progressed and enable effective site coordination and decision-making about the next steps.
Keeping a comprehensive audit trail, when data and information can be with multiple contractors and in multiple locations.		Sensat's timeline feature enables users to create an effective audit trail of work, as well as manage the supply chain conversations. Subcontractors and suppliers can be monitored more consistently and checks can be made over time on what was done, when, and to what standards, so any disputes that occur can be resolved faster.
Removing manual site walkthroughs and surveys to save time, money and carbon waste to programme overheads.		Sensat provides an easy-to-use tool that everyone can understand, avoiding bottlenecks to effective decision-making.