



Geospatial
Commission

NUAR PROJECT UPDATE

November 2023



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The background to NUAR

A significant proportion of our utility, building and transport infrastructure is buried underground, including around 4 million kilometres of pipes, sewers, and electricity and telecoms cables.¹ It is estimated that a hole is dug every seven seconds to access these pipes and cables for repairs, upgrades and installations. This busy and usually unseen environment suffers from an estimated 60,000 accidental strikes per year, leading to injury, project delays, and disruption to traffic and local economies. The total direct and indirect costs of these accidental strikes are estimated to be £2.4 billion a year.²

Owners of underground pipes and cables (asset owners) are legally required to make their data available to certain companies or agencies undertaking work around the road network ('excavators') free of charge. However, this requires asset owners to continually respond to numerous requests for data from excavators directly and via intermediaries, and for excavators to contact multiple asset owners and intermediaries to confirm the presence of underground apparatus, in a given area, to support safe working. Once requested, data is provided in different formats, scales and to varying timeframes.



Kate Cassalli, Head of Infrastructure Programmes, Thames Water

When I heard about NUAR, I signed up straight away. What a game changer!

Thames Water already have over 50 active users on the platform and we are using it to help keep our teams safe and our planning more effective, through identification of other assets so there are no surprises.

This process is time consuming for both asset owners, who are supplying the data, and for excavators, who need access to the data.

These inconsistencies also make it challenging for all relevant underground asset data to be reconciled into a single plan on asset locations, increasing the risk of accidents and meaning projects take longer, cause more disruption to the public, and cost more.

Government-led programme

The National Underground Asset Register (NUAR) is a government-led programme that is delivering a new digital map that will revolutionise the way we install, maintain, operate and repair the pipes and cables buried beneath our feet. It underpins the government's priority to get the economy growing; expediting projects like new roads, new houses and broadband roll-out.

In 2019-20, two pilots were carried out in North East England and London to test the feasibility of creating a national map. These pilots were built upon two industry-led proofs of concept: (1) the Highways Asset Data Exchange System (HADES), led by Thames Water, which tested bringing together utility data at two sites in

London into a single map; and (2) the North East Underground Infrastructure Hub (NEUIHub), an initiative developed through Northumbrian Water Group's Innovation Festival.

Through these pilots, it was determined that technology is not a barrier - there are a number of organisations which have the skills and expertise required to develop the technical solution. However, if creation of a single map was to be successful, legitimate concerns raised by asset owners related to security, commercial sensitivities, liabilities and safety needed to be addressed.

Delivering NUAR

Following the pilots, a subsequent phase of work commenced to bring together owners of underground assets, legal teams, future users, the National Protective Security Authority and the National Cyber Security Centre, technical experts and other stakeholders across various sectors to address these challenges.

Working in collaboration, a new data sharing framework was created to support voluntary data sharing, which identified and refined important technical requirements to ensure data shared through the platform is safeguarded and protected against misuse.

A Data Model Governance Group was set up to establish the NUAR data model and transform asset owner data from all of the pilot participants to test it. Further research was also carried out to update the economic case and to understand how NUAR will work alongside other safe digging practices once in place.

Having addressed the challenges identified through the pilots, a competitive invitation to tender was launched in late spring 2021. Through this exercise, AtkinsRéalis was appointed to lead the delivery of the new service. AtkinsRéalis and their supply chain (Ordnance Survey, 1Spatial and GeoPlace), together with other partners (Greater London Authority, Ordnance Survey Northern Ireland and Welsh Government) commenced work in September 2021.

Current Practices³



Excavators most commonly request data from between 6 and 10 asset owners per project



On average, it takes excavators 6.1 days to receive and process all the data they require to carry out a job



Large utility companies reported some of the highest costs for sharing data with excavators, whilst local authorities reported some of the lowest

David Capon, HAUC (UK), Co-Chair

The NUAR data is key for our industry and will provide a platform to drive better planning and execution of works.

Last autumn, we shared that in the first year of the delivery programme:

- The team engaged extensively with asset owners from North East England, Wales and London as well as other stakeholders, via webinars, conferences, user groups and meetings
- The two part legal framework which underpins the NUAR programme (the Data Exploration Agreement and Data Distribution Agreement) was finalised and proved to be fit for purpose - with organisations from across all sectors signing up
- Development of the platform commenced, the emerging service met the required criteria against the Government Service Standard⁴ for a 'private beta' and the first datasets were processed
- We took part in the development of the emerging Open Geospatial Consortium Model for Underground Data Definition and Integration (MUDDI)⁵
- A public consultation was run to invite views on shaping the future operating model of NUAR - which received over 160 responses
- We identified a key milestone toward achieving the intended benefits would be the delivery of a 'minimum viable product' (MVP) for North East England, Wales and London and committed to delivering this in spring 2023

The NUAR programme is now celebrating two years since work commenced on development of the service and significant progress has been made.



Accelerating delivery

Over the past year, we have increased our engagement with asset owners and other stakeholders, launched and enhanced the NUAR MVP, and made it available to participating asset owners and their supply chains across England and Wales.

We have also been developing a sustainable service that delivers the envisaged increased efficiency, reduced asset strikes and reduced disruptions for citizens and businesses, and provides opportunities to increase benefits further.

Engagement

Following on from the engagement in the first year, we have continued to:

- hold security workshops to refine measures
- engage with international underground asset initiatives to learn and share best practice
- feed into the MUDDI model for development purposes
- give regular updates on our progress
- attend conferences
- hold webinars and hosted round tables to engage and increase the knowledge around NUAR's potential

Our stakeholder engagement widened to include asset owners across England, Wales and Northern Ireland, and our onboarding leads set up asset owner community groups across these areas.

Edward Hobbs, Housing Growth Officer, Lewisham Council

The immediacy with which the asset data is displayed is an enormous improvement on the previous methods by which the information was acquired.

Where previously, each asset owner would be approached individually, using NUAR allows us to instantly gather information from all parties and have it displayed together on one platform.

We continue to use these asset owner groups, as well as webinars and workshops to share progress reports, present platform features and collect feedback. Where appropriate, feedback has been incorporated into the development of the platform.

To date, we have actively engaged with over 680 asset owners, which equates to an estimated 96% of all of these organisations in England, Wales and Northern Ireland. 347 of these have formally signed up to work with us, and are at various stages of the process to have their data accessible to others via NUAR.

Platform development

Designed in collaboration with those who will use it, the digital map gives planners and excavators standardised, secure access to the data they need, when they need it, to carry out their work effectively and safely.

It has been developed as a single, secure data-sharing service for the location and characteristics of underground assets that provides workers with an interactive, standardised digital view of the underground assets in a given location.

A number of asset owners started to test the emerging service in December 2022 and in April 2023 we delivered on our commitment to launch the NUAR MVP in North East England, Wales and London.⁶ It included all core functionality to meet the 'safe dig' use case, allowing users to both plan for future adoption and provide valuable feedback to enhance the service further.

In June 2023, the Geospatial Commission published the UK Geospatial Strategy 2030.⁷ In the strategy, we committed to releasing the MVP version of NUAR beyond North East England, Wales and London to the remaining regions in England and Northern Ireland by spring 2024 and to fully operationalise the service by the end of 2025.

Due to rapid progress made in partnership with asset owners, we were able to expand MVP coverage to the East and West Midlands in August 2023 and in November 2023 expanded the MVP to cover the remaining regions in England.

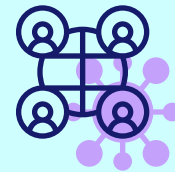
The NUAR MVP now provides access to data from 176 organisations across the whole of England and Wales, including all of the major energy and water providers, such as Welsh Water, Cadent Gas and UK Power Networks, several major telecommunications companies, including CityFibre and Virgin Media O2, as well as smaller providers of these services, transport organisations and local authorities. This means that together with the Scottish Community Apparatus Data Vault, all areas of Great Britain are now covered by a standardised digital service for sharing and accessing subsurface utility data.



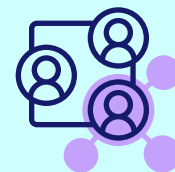
The value of NUAR



The emerging service will improve the efficiency and safety of works, by providing secure, instant access to comprehensive privately and publicly owned location data about underground assets, in a given location



There are currently over 1,000 'super users' accessing the NUAR MVP in advance of the service being made available to more users in an organisation



The user recommendation rate for NUAR is 8.8/10



NUAR's estimated benefits have increased from £350 million per annum to £490 million per annum, largely driven by a change in profiling assumptions

In November 2023, Greater London became the first area to include data from all major asset owners and all local authorities. The local authority data gives users digital access to data showing the location of critical assets, such as traffic signals, lamp posts, and street furniture, not previously widely available to excavators.

In parallel to releasing and expanding the MVP, we have also been enhancing the service based on user feedback and introducing new features while also making improvements to data quality and currency. For example, we have added functionality to allow asset owners' contractors to utilise NUAR and for observations on real world conditions to be fed back via the service. Enhancements to the platform will continue until NUAR is fully operational, including increasing the number of users per organisation who are able to utilise the service.

It should be noted that whilst the MVP can be, and is being, used in business-as-usual practices, this should be to complement rather than replace them at this stage. The intention of the MVP remains to allow users to both plan for future adoption and provide valuable feedback to enhance the service further. Importantly, as with existing practices around statutory records, NUAR is never intended to replace requirements for ground investigation and safe digging practices as outlined in HSG47.

Public consultation response

Last autumn, we published the government's response to the 2022 consultation on the future operating model of NUAR.⁸ In total 164 responses were received representing a wide range of interested groups, including local authorities, utility companies, surveyors, regulators and members of the public.

Our response highlighted key findings including the view that legislative reform would be needed to ensure workers are able to access complete data through NUAR; a preference for the NUAR database to continue to be controlled by government due to commercial and security risk; and calls to explore opportunities for NUAR data to be accessed for other use cases or by other user groups. There was no consensus on who should fund NUAR in the operational phase but general agreement that those who benefit from the service should contribute. In our response, we committed to:

- Developing a charging framework that takes into account the comments raised by respondents
- Continuing to explore potential legislative reform
- Considering opportunities for the wider market to enhance the NUAR service



Maximising the value of NUAR

As committed in the government's response to the public consultation, we have been working on developing a charging framework taking into account comments raised by respondents; we have been exploring legislative reform; and we have been considering opportunities for the wider market to enhance the NUAR service, above and beyond the safe dig use case.

In order to maximise the benefit of NUAR - giving users the data they need, when they need it - and in order to deliver a sustainable service, we are currently working to update existing legislation across England, Wales and Northern Ireland.

Simplifying and updating existing data sharing obligations

In order to avoid as many accidental asset strikes as possible, improving worker safety and reducing delays to the public and businesses, workers require access to comprehensive data showing the location of buried pipes and cables.

In response to our 2022 public consultation, the majority of respondents stated that they believed legislative reform would be required for workers to access all the data they need through NUAR. A number of concerns were

voiced that, without legislation, some owners of underground assets may fail to share their data or fail to keep it up-to-date.

In such scenarios, workers - those who diligently plan and carry out excavations in line with safe digging practices - would be directly impacted and disadvantaged. For example, they would have to request missing data separately, wait for it to be received, then resolve any discrepancies in terms of scale, format or quality prior to completing works. Worker safety would continue to be placed at risk particularly when responding to emergency works, when time is of the essence making it not always possible to wait for data to be received and compiled.

These concerns have been played out in our work so far. Whilst we have achieved success with a large number of asset owners voluntarily sharing their asset data so far, it has become increasingly clear that a proportion of asset owners will not do so in a timely manner without legislation being in place.

To address this issue, we are working to update existing legislation to take advantage of the opportunities provided by the data and technology developments that have happened since it was laid. To simplify and expedite the process by which asset data is shared, we are proposing that the reforms will require owners of buried assets to share their data in a prescribed manner through NUAR.

NUAR would then provide access to this data to appropriate users as and when it is required. This will result in the time taken for excavators to get all the location data they need to carry out safe digging being reduced from circa six days to circa 60 seconds - 24 hours a day, 365 days a year.



In 2024, we will be publishing further information on this requirement. We will also ensure asset owners have ample time to prepare to meet it. Furthermore, in the current phase of delivery we have made a data transformation service available, free of charge. This service works with asset owners to map their data to the NUAR data model, and documents these mappings in the form of a Data Ingestion Specification which is agreed and shared with each organisation.

Asset owners not yet fully participating should note that they can still take advantage of this free service, but that this is currently time limited to September 2024. We will work with commercial organisations to ensure there are data transformation services available for those that require it in the future once the free service ceases.

Ensuring a sustainable service

The updated legislation will also ensure a sustainable ongoing service through the introduction of a reasonable charge on those who benefit from the service, rather than the taxpayer.

Whilst we will be further consulting on the future charging model in due course, it is envisaged that owners of buried assets as data owners will be charged a fair and reasonable fee, and that access to the data for the purposes of safe digging will remain free at the point of use.

We are exploring suitable models for this new charging structure and will ensure those

Brian Weatherall, Drainage and Coastal Protection Manager, Durham County Council

We are using NUAR probably every day, I would struggle to find fault with it. If our old system was a horse and cart, NUAR is an F1 car.

affected are given ample notice of the model adopted prior to fees being introduced.

An option currently under consideration is a tier-based approach, taking into account each organisation's estimated level of benefit from NUAR. Reflecting the proportionate approach we intend to take in our charging model, this would mean those currently having to deal with the most requests for information will contribute more to the running costs of NUAR.

Based upon responses to our 2022 public consultation and our current estimate of costs, we believe that the charges to individual asset owners will be considerably less than the costs incurred in meeting their current obligations to provide information relating to their underground assets on a piecemeal basis, as and when requested.

It is also our current intention to explore the possibility of reduced charges, or an exemption from the requirement to pay a charge, for some organisations, such as local authorities and small and micro businesses. Further, in line with Managing Public Money, it is envisaged that charges will be based on a not-for-profit, cost recovery model.⁹ In general terms, this means the sum of all charges collected should generally cover, but not exceed, the costs of running the service.

In the responses to the 2022 public consultation, there was a preference for the database containing all of the data to be controlled by government due to significant commercial and security risks of any data misuse or breach. As such, it is further envisaged that NUAR will continue to be overseen by the Geospatial Commission and run by a public sector body under its direction.



What's next?

Platform development

We will continue to work with asset owners and other stakeholders to enhance the NUAR service, both in terms of functionality, and data currency and completeness until the platform is fully operational across England, Wales and Northern Ireland by the end of 2025.

This will include expanding MVP coverage to Northern Ireland by spring 2024, while deepening coverage elsewhere and making improvements to features based on user feedback.

We are also working on specialised map views to support the display of detailed annotations, custom styling and additional information like cross-section drawings. We will continue to develop the observations “feedback loop” for which we have already delivered a first version and we will continue to improve the overall user experience, particularly for users on mobile devices.

We will also be publishing our harmonised data model, based on a cutting edge emerging international standard. This will allow anyone to contribute to the standardisation



Steven Gruffudd King, Abnormal Loads Officer, North and Mid Wales Trunk Road Agent

In the Agency we need to obtain utility asset plans every day, so NUAR is set to save us a lot of time.

and improvement of data which benefits everyone. This and further development of the data upload service will also support asset owners to adhere to future data sharing requirements, and the development of data transformation services for those asset owners who may require them.

Exploring potential market opportunities and increased benefits

Since the inception of NUAR, we have regularly been contacted by individuals and organisations interested in accessing NUAR data for purposes beyond what is currently permitted. Further, in the public consultation, 75% of respondents stated that they were supportive of expanding the prescribed use cases for NUAR beyond ‘safe digging’.

Many respondents also identified specific additional use cases which could help maximise the value and benefit of the data held within NUAR. We have also been contacted by data service providers seeking information on how they can support asset owners in complying with NUAR requirements and ensuring NUAR data is used in as many excavations as possible.

Whilst a significant amount of consideration has happened to date on this, we have intentionally focused our efforts on delivering the critical safe dig use case.

However, with the MVP now available across the whole of England and Wales, and work progressing on updating existing legislation, we believe that now is the right time to explore the potential market opportunities and increased benefits that could be realised through widening secure and controlled access to the vital national asset that stakeholders believe NUAR will become.

Through feedback, and the public consultation, we have identified a number of opportunities where additional value could be delivered. This includes making NUAR data:

- available to other user groups for safe digging purposes (e.g. surveyors, land owners and members of the public)
- available to support other use cases (e.g. electric vehicle chargepoint rollout, flood risk planning, emergency response, conveyancing, property development, etc.)
- accessible via third party intermediaries / APIs, rather than solely via the NUAR user interface

However, these opportunities do not come without constraints and risks, and we envisage that they have the support of, among others, the asset owner and national security communities to warrant consideration.

Over the next year we will be carrying out discovery work, collaborating with individuals and organisations who are interested in such opportunities to test the feasibility and value of these propositions. We will also include provision in the updates to existing legislation to make it possible for NUAR data to be securely accessed for purposes other than safe digging (such as those outlined above should they prove feasible and of high value).

It should be noted that we envisage this would be enacted only where an opportunity proves to have significant economic and/or social value and wide-ranging support from asset owners and the support of, among others, asset owners and other stakeholders.

Brian Foxton, Group Engineer - Street Management, Hackney Council

The system is already proving to be a useful tool for the Hackney engineers in determining underground assets and how they impact local authority planned works.

The speed of acquiring even basic information has proven to be a great asset in the planning stages of projects.

Collaborating with stakeholders

As work in these areas progresses, we will endeavour to share details and seek views from the asset owner community and other interested parties. Where appropriate, this will include consulting on various aspects, as well as providing information on our implementation timelines and the support available to users.

We look forward to continuing to collaborate with asset owners and other stakeholders as we take forward this transformative initiative.

How to get involved

The Geospatial Commission invites all public and private sector asset owners operating in England, Wales or Northern Ireland who have not yet fully signed up to NUAR to please contact us to start this process.

Additionally, if you work for an organisation which would like to be involved in the discovery work to determine if and/or how additional benefit could be delivered via increased use of NUAR data, please get in touch.

Email: Nuar.Support@atkinsrealis.com

NUAR project timeline

Aug 2018

NUAR research phase starts

Apr 2019

NUAR pilot projects start

Apr 2020

NUAR pilot projects completed

May 2020

NUAR preparation phase starts

Sep 2021

NUAR platform build phase starts

Nov 2021

NUAR economic case published

Apr 2022

Public consultation on the NUAR future operating model

Oct 2022

Government response to NUAR consultation

Dec 2022

First users start testing NUAR platform

Apr 2023

Platform MVP operational in North East England, Wales and London

Aug 2023

NUAR MVP operational in East and West Midlands

Nov 2023

NUAR MVP operational in rest of England

Spring 2024

NUAR MVP operational in Northern Ireland

End of 2025

NUAR fully operational

Endnotes

- 1 Based on a collection of sources including Metje et al (2015)
- 2 UK Government (2021) National Underground Asset Register (NUAR) - Economic Case Summary
- 3 Government response to the National Underground Asset Register (NUAR) consultation (2022)
- 4 UK Government (2022) Service Standard
- 5 Open Geospatial Consortium MUDDI (Model for Underground Data Definition and Integration) Standards Working Group
- 6 Geospatial Commission - NUAR available to users in first UK locations - 5 April 2023
- 7 UK Geospatial Strategy 2030 - Department for Science, Innovation and Technology - 3 August 2023
- 8 Cabinet Office - Government response to the National Underground Asset Register (NUAR) consultation - 24 October 2022
- 9 HM Treasury Managing Public Money (May 2023)

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