

Accelerating the planning process with 3D city model

Nottingham City Council

The Challenge

- Create a 3D city-scale digital twin to support the planning process

The Benefits

- A single source for all planning information
- Quicker decision making in planning process
- Improved transparency and engagement
- Greater ROI from ArcGIS and 2D data holdings

Nottingham City Council has created an immersive, interactive and highly-detailed 3D model of the entire city to support development planning. This advanced digital twin enables planners to understand proposed new developments more easily, have more interactive discussions with developers and accelerate the planning process.

The Challenge

Nottingham City Council was an early pioneer in the field of 3D urban planning. It began to use digital 3D modelling techniques nearly 20 years ago, primarily for long-term strategic planning and major regeneration schemes. As demand for 3D visualisations grew, the council realised that it needed to replace its desktop software with a more flexible, web-based approach, and it started to explore the 3D capabilities of Esri's ArcGIS system.

First the council developed a couple of lightweight public applications using ArcGIS, including an app for helping tourists to discover and appreciate the vast network of caves that lies beneath the historic city centre. Soon, though, a bold ambition arose to create a detailed 3D digital twin of the entire city, covering more than 73 square kilometres and depicting thousands of historic and modern buildings, open spaces and infrastructure.

The Solution

Building on its prior experience, using its existing ArcGIS licenses and leveraging its accumulated knowledge and 3D data, Nottingham City Council created an extensive and immersive 3D cityscape that could be accessed and shared via the Internet. It developed this digital twin using ArcGIS Online, hosted in the cloud, receiving support from Esri UK's Professional Services team to create the pilot solution and optimise the generation of 3D data at Level of Detail 2 (LoD2).

Far more than just a 3D model, the citywide digital twin embeds and visualises a vast amount of contextual information, including 2D data on conservation areas and flood plains, and street-level videos from CCTV cameras. The solution also includes a 3D photo-realistic mesh from Bluesky and live traffic data, both of which are streamed directly from Esri's Living Atlas of the World.

The Nottingham City Digital Twin is now used for site assessments and is fully embedded within the council's pre-application planning process. When developers submit planning proposals, their plans and Building Information Modelling (BIM) files are incorporated directly into the digital twin. Planners can then click on different points on the 3D city map to visualise the proposed new street views, see potential constraints and identify other issues that might present planning concerns.

In recognition of the enormous value that can be gained from the use of urban digital twins, Nottingham City Council has now received government funding, from the Department of Levelling Up, Housing and Communities PropTech Innovation Fund, to develop this capability further to drive public engagement, and help other UK Local Planning Authorities establish 3D capabilities. With support from Esri UK, it will be creating demonstrators, learning resources and tools that other councils can leverage to develop their own digital twins and transform their planning processes cost-effectively.

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“We are proud to be leveraging our investment in Esri technology and maximising the value of our existing 2D data in a 3D environment to modernise the planning process and increase user engagement.”

Mick Dunn, GIS Service Manager, Nottingham City Council



The 3D digital twin of Nottingham with integrated planning information, created with ArcGIS Online

The Benefits

A single source for all planning information

For the first time, Nottingham City Council’s planners can see all the information they need relating to the pre-planning application process in a single GIS application. Whether they need information on flood risks, listed buildings or traffic congestion—relating to a residential development in Mapperley Park or an office block in Lace Market—everything is visible in a highly-detailed, city-sized digital twin. “Our 3D, ArcGIS model of Nottingham is a UK first, in terms of the level of detail that it delivers and the size of the urban area that it covers,” says Mick Dunn, GIS Service Manager at Nottingham City Council. “We have successfully fused together traditional 2D planning information with a state-of-the-art 3D GIS environment, to create a single, comprehensive digital twin of the city of Nottingham.”

Quicker decision making in planning process

Using the Nottingham City Digital Twin, planners can now make faster, well-informed decisions about the potential impacts of new developments on the city’s distinctive character and skyline. “Having this tool allows planners to understand proposals better,” explains Dunn. “Planning proposals can therefore be approved faster, allowing construction to start sooner and developers to realise their commercial goals more quickly.”

Improved transparency and engagement

Planners can use the Nottingham City Digital Twin in meetings with developers to improve the transparency of the planning process and support interactive discussions about any modifications that need to be made to plans. In addition, the digital twin can be used by members of planning committees to make complex information clearer and improve understanding of the impacts of new developments. “The next logical step is to make the Nottingham City Digital Twin publicly accessible, to improve transparency with everyone, which is what we are planning to do soon,” shares Dunn.

Greater ROI from ArcGIS and 2D data holdings

Dunn is justly proud of Nottingham City Council’s achievements and recognises that the development of the Nottingham City Digital Twin has significantly increased the return on investment that the council gains from ArcGIS licenses and staff training. The digital twin has given the council an exciting new platform, based on familiar technology, that can be used as the foundation for other value-adding planning tools in the future. “We are proud to be leveraging our investment in Esri technology and maximising the value of our existing 2D data in a 3D environment to modernise the planning process and increase user engagement,” Dunn concludes.

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