Aerial imagery: the new

mapping? Rachel Eddy looks at why 2D and 3D aerial imagery is becoming the preferred mapping for many emerging GIS markets.

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> With the widespread availability of geographic information, virtually

everyone is now familiar with viewing maps on their PC screens. For those who find GIS-type vector maps hard to use, familiar 'street atlas' style raster maps provide an alternative for simple viewing applications. However, the more recent advent of detailed,

country-wide aerial photography introduces an arguably more useful and certainly more familiar 'base map'.

Such material not only reveals ground detai; it also contains accurate elevation data with which to view terrain in 3D reality. It makes its use all the more appealing for both traditional mapmakers and a new breed of GIS end-users.

It adds up to a quiet revolution, even in a country such as Britain that is regarded as the best mapped country in the world, thanks to the work of Ordnance Survey over many decades. Yet even here, the new breed of seamless, nation-wide aerial photomap is proving itself a major asset in all sorts of markets, as the examples cited here demonstrate..

Whether a simple aerial view or a sophisticated virtual reality fly-through, we now have a resource whose detail, accuracy and easy interpretation brings mapping closer to the real world.

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Imaginative architects

Take, for example, Edinburgh-based RMJM (www.rmjm.com), a leading architectural practice and an

innovator in its use of presentation imagery. RMJM receives aerial photography on file so it can be incorporated in PowerPoint presentations or imported into AutoCAD. "Aerial photographs are more immediately identifiable and much more appealing to our



clients than a map" says Mike Summers, RMJM's CAD manager. 3D visualisations of proposed developments are created in 3D Studio software. The results allows clients and other interested parties to view schemes from any angle and have proved invaluable for projects where there is a high level of public awareness, e.g., the new Scottish Parliament building and Glasgow's M74 extension.

"Aerial photographs and 3D computer generated scenes really



bring the proposed scene to life. Conventional models still play their part, but computer imaging is much less costly and gives us the flexibility to change things, show alternative designs and even show a time sequence over the construction period" says Jonathan Messer of RMJM.

Environmental assessment

Looking at the impact of both natural and man-made processes on the environment is of growing importance. Halcrow, which is best known as a top civil engineering company (www.halcrow.com), has championed aerial imagery and employed it widely in its multidisciplinary activities, including environmental impact assessment.

In addition to 'off the shelf' commercial aerial data such as the Millennium Map, the company also commissions aerial surveys to provide extra detail from oblique views, as well as video coverage for special projects. It also makes extensive use of historical aerial imagery for land use change assessment and cliff recession monitoring.

However, it is the emergence of 3D visualisation data that is revolutionising much of its work. In a project for the Environment Agency, Halcrow uses a range of terrain data (LiDAR, IFSAR) matched to aerial imagery for flood management. As well as providing accurate elevations to assess flood risk, features such as

At the quarry face

Another industry closely involved in the landscape is quarrying. Here, the world's largest aggregate producer,



Hanson (www.hansonplc.com), operates more than 100 sand, gravel and rock quarries throughout the UK

Hanson generates 3D models of its extraction sites to calculate volumes, plan operations and make environmental impact assessments. Using a specially developed modelling package called LSS from McCarthy Taylor, Hanson creates Digital Terrain Models from survey information and quarry designs.

With the arrival of nationwide aerial photography and terrain data, Hanson has been able to significantly improve site planning. Aerial photography is digitally matched to terrain data, allowing the imagery to be draped over the DTM to create 3D views of the landscape from angle or elevation.

"With aerial photography and terrain data that we can simply buy data off the shelf, all sorts of opportunities open up for work that was simply not viable before" says Simon McCurdy, senior geologist at Hanson.

Presenting information in a familiar, easy to understand way is vitally important as extraction work is always a sensitive issue.For Hanson, this is one area where imagery comes into its own.

"By creating real life 3D imagery, we can show planners and residents the view of an extraction site from any vantage point; we can even provide fly-throughs from any direction and show changes over time as extraction and restoration progresses. It is a very powerful tool, helping us allay any fears people may have about the environmental impact" says McCurdy. river embankments can be visualised to assess the environmental impact of proposed construction.



Elsewhere, Halcrow uses a combination of height data and aerial photography to replicate landscapes and yield crucial information such as line-of-sight. Such 3D visuals have helped identify potential windfarm locations and assess sites for a Meteorological Office weather radar station. More detailed modelling is used at feature level to view bridges, highways and historic buildings in detail, and even assess tree stands for the Forestry Commission.

"Halcrow finds that aerial photographs provide a wealth of information to the casual user in a way that a conventional map can not. Add the 3D element, and you get as close as you can to actually being on site. It really is impacting the way we work, allowing us to research, plan and deliver results much more quickly" says Rollo Home, Halcrow's market sector manager for geomatics.

Road map to the future

Much of the rock extracted by Hanson (see box left) ends up being delivered for big infrastructure projects such as highways



construction. Bullen Consultants (www.bullen.co.uk), which designs and project manages such projects, is inevitably involved in proposals that attract keen public interest.

"Aerial photographs have proved particularly useful during public consultation exercises. It is difficult for the public to relate to engineering drawings but, by using aerial photos as a base, they can immediately see features they recognise which really adds interest" says Dominic Stones, Bullen's senior assistant engineer.

In the North East, Bullen is involved in the preliminary stages of proposed road improvements - e.g. the A66 corridor and Haydon Bridge on the A69 - that have implications for important cultural heritage sites. The Scheduled Ancient Monument status of these sites means that Bullen undertakes its own detailed archaeological research to frame proposals that avoid or minimise impact. By revealing land markings not evident on the ground, aerial imagery has proved to be a valuable tool in determining approximate locations and boundaries.

The company has taken a keen interest in the latest developments in terrain mapping. Modelling in 3D is essential for planning major developments, but detailed topographical land surveys can be expensive. With the availability of Intermap DTMs and DSMs for the entire British mainland, things are set to change for good.

"We took a 1km sample of Intermap terrain data covering an area we had already surveyed" says Dominic Stones. "We were immediately able to compare the datasets and highly impressed by the general accuracy of the Intermap data. Because it is readily available countrywide, it is a significant development that should save us much time and effort when embarking on future projects."

