Drone Surveying
and GIS-as-a-Service

Introduction

MKO is Ireland's largest Planning and Environmental consultancy. Our team of 200+ experienced professionals work across the planning, environmental, ecology and related fields.

We deliver challenging and complex projects for our clients and have an unrivaled track record of success. We add real value to our clients' projects through our multi-disciplinary expertise and broad range of nationwide experience.

Our success and growth rests entirely on the knowledge, skills, ambition and integrity of our people, and we value these qualities most highly. We are forward-thinking and work with a can-do attitude, which nurtures people, ideas and opportunities to help maximise potential. Through our work, we aim to leave a legacy we can all be proud of.

SERVICES

Drone Surveying
Thermal Drone Surveys
Digital Twins
Topographic Surveys and 3D Models
Additional Services

GIS-as-a-Service
Online Capabilities
Spatial Analysis and Multi-Criteria Evaluation
Map Production
Field Data Collection
Site Selection and Identification
Data Management and Infrastructure Support

THERMAL DRONE SURVEYS

MKO combines innovative drone surveying capabilities with expert spatial data analytics to comprehensively understand the environment and infrastructural assets in your area of interest. Our drone services enable the identification and analysis of information and trends which are not detectable via traditional ground-based surveying methods.

Our MKO team of IAA certified pilots are qualified to safely conduct drone surveys anywhere across the island of Ireland, providing flexible and real-time data acquisition of any site in the country.

We can deliver your project data via an interactive online GIS platform, which facilitates intuitive analysis, sharing and understanding of complex spatial data. See our Online Mapping Service to discover its full potential.

Insights invisible to the naked eye

Our drone fleet is equipped with three different cameras with the following technical specifications:

- **2 x RGB** (Red, Green, Blue) sensors:
  - Wide RGB camera to generate accurate, georeferenced maps and 3D models – Digital Twins.
  - Telescopic RGB high-resolution camera capable of reaching sub-millimeter-level resolution (40 X zoom).
- **Thermal Sensor:** An uncooled Long Wave InfraRed microbolometer thermal camera, enabling the temperature measurement of any object in the line-of-sight with a thermal sensitivity of less than 30mk.

The option of acquiring images or videos from all three cameras simultaneously makes our thermal drone an efficient and valuable surveying tool. Spatial analysis of the various multiwavelength data streams (Thermal and RGB) in combination with the power of Machine Learning can provide insights that are unattainable from other monitoring and surveying methods.

How can this service be used for your project?

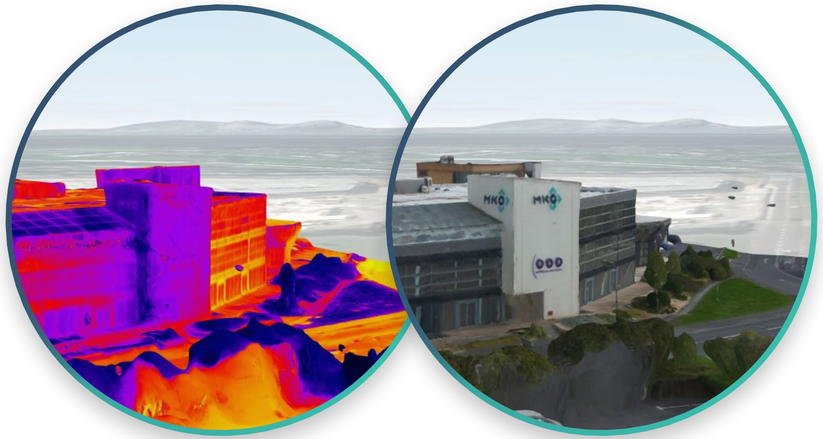
This service can provide a visual, quantifiable and technical edge to your project. The services detailed in this brochure provide value, efficiency and accuracy for monitoring all stages of project life cycle; for example:

- **Planning, Consenting and EIAR**:
  - Planning Surveys – e.g. Digital Twins, Terrain Models and Maps
  - Environmental, Ecology, Ornithology Monitoring
  - Visual – Visualisations and streetscape Flythroughs
- **Construction Phase:**
  - Digital Twins - Progress Monitoring During Construction
  - Ecological and Environmental Compliance
- **Operational Monitoring & Marketing:**
  - Infrastructure Asset Monitoring
  - Compliance - Biodiversity Net Gain and Environmental Monitoring
  - Interactive marketing tools

Drone Data Visualisation and Delivery

Depending on the application and on your preference, the list of outputs that you will receive may include:

- 2D georeferenced maps
- 3D models
- Vector files
- Images and videos



DIGITAL TWINS

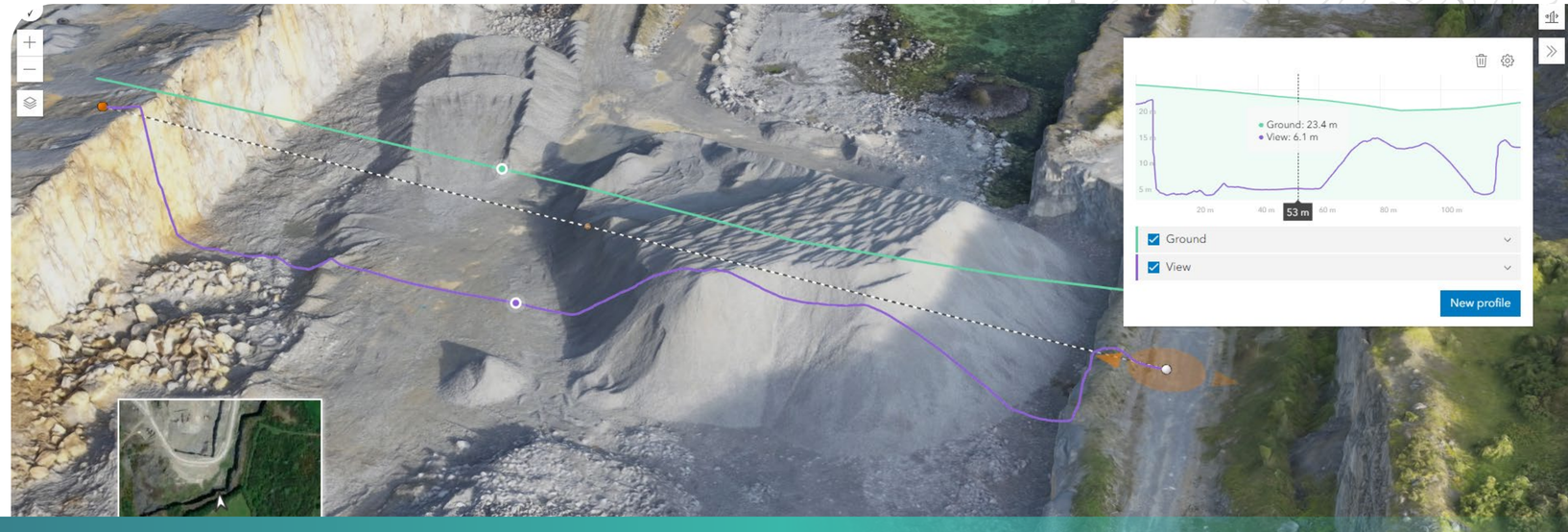
The ‘Digital Twin’ is an accurate and detailed replication of physical objects, structures or environments in a digital format.

In the context of our drone surveying service, the Digital Twin is a virtual replica of the surveyed area, created through a seamless integration of drone-collected data, advanced software, and state-of-the-art 3D modeling techniques.

The benefits of Digital Twins include:

- **Visualise Reality**:
  Immerse yourself in a precise 3D representation of your surveyed area, gaining unparalleled insights into its terrain, structures and objects.
- **Precision Analysis:**
  Conduct meticulous measurements, simulations and analyses for a wide spectrum of applications, from construction and land development to environmental monitoring and asset management.
- **Strategic Planning:**
  Utilise the digital twin to plan projects, monitor progress and optimise resource allocation, facilitating informed decision-making.
- **Effective Communication:**
  Enhance collaboration by sharing realistic renditions of the site with stakeholders and ensuring seamless project coordination.

See an example of a Digital Twin of the here **MKO Galway Office,** as well as a Digital Twin of a neighboring infrastructure project currently under construction **Crown Square Plaza.**



TOPOGRAPHIC SURVEYS AND 3D MODELS

MKO uses its drones to perform aerial photogrammetry and 3D modelling.

When detailed spatial analysis is needed, a sequence of high-resolution photos can be captured from above and then processed to generate:

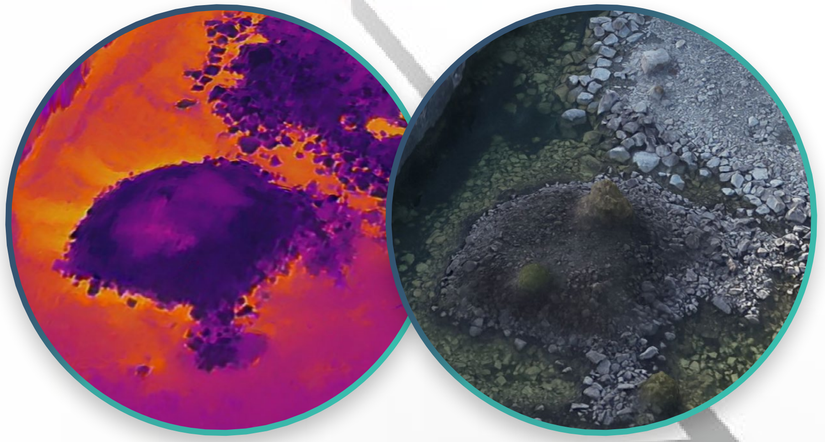
- **Dense Point Clouds**
- **3D Models**
- **Digital Surface Models or Digital Terrain Models**
- **Orthomosaics**

MKO can partner the aerial survey with GPS ground control points or with RTK correction to reduce the horizontal and vertical error up to 1cm when extreme accuracy is required.

The outputs can be delivered in any format depending on your needs, and further analysis can be produced.

Among the most frequently requested are:

- **Contour lines**
- **CAD drawings**
- **3D vector models for CAD environment**
- **Water accumulation and flow analysis**
- **Shadowing, aspect and slope measurements**



ADDITIONAL SERVICES

Solar and Wind Infrastructure Monitoring

Wind turbine blades and solar panels are susceptible to substantial wear and tear due to prolonged exposure to the elements or incorrect installation. Manual inspection of such infrastructure can be dangerous, timely and expensive.

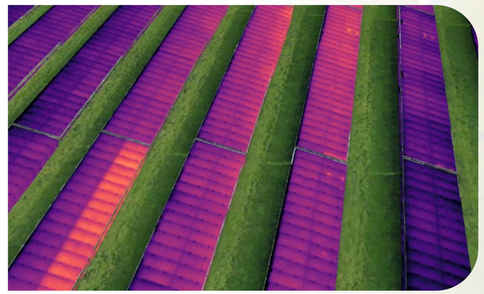
Our drone equipped with a thermal sensor provides a highly accurate, quantitative and time-effective alternative. Mapping the infrastructure with a thermal sensor enables early detection of issues that are not visible with a regular camera and could potentially be missed by a manual inspection.

EXAMPLE

- **Solar Panels** – Disconnected panels or strings of panels, bypass diodes, broken or malfunctioning cells, and potential induced degradation.
- **Turbine Blades** – Delamination, fractures and micro-cracks, debonding, water or humidity infiltration, and erosion.

This innovative solution for infrastructure monitoring enables accurate planning of maintenance activities, supports decision-making processes, and ultimately maximises energy yields from renewable energy.

Our Interactive Mapping Portal demonstrates the outputs of a recent thermal survey of a solar farm. The images below clearly show degradation to some panels which informs maintenance teams where to spend time.



Ecology project support: Rhododendron Invasive Species Mapping

Accurately identifying and mapping plant species is a challenging task faced by the MKO Ecology Team, particularly young invasive rhododendron. Early detection of the growth of this invasive plant is a key factor in monitoring its abundance and capacity to spread, as well as assessing whether containment actions must be carried out to preserve the natural ecosystem.

Our MKO drone has been deployed for an experimental research survey project in Connemara National Park. Rhododendron saplings were only mapped previously using traditional ground based surveys but never accurately mapped using remote sensing tools.

The drone captured high-resolution RGB images at different heights that were processed to produce highly detailed maps. A supervised, color-based algorithm was then applied to identify individual invasive saplings and assign coordinates to each of them, as the maps were perfectly georeferenced. The Ecology Team made use of this valuable information when it was time to return to the site, already knowing where to look for high density of rhododendron plants they could refer to the **Online Project** in real time.

This promising technique has shown its potential in terms of speed, reliability, and replicability, and MKO is already looking forward to applying the same procedure for other invasive species as well.

Ornithology Project Support – nests and roosts detection

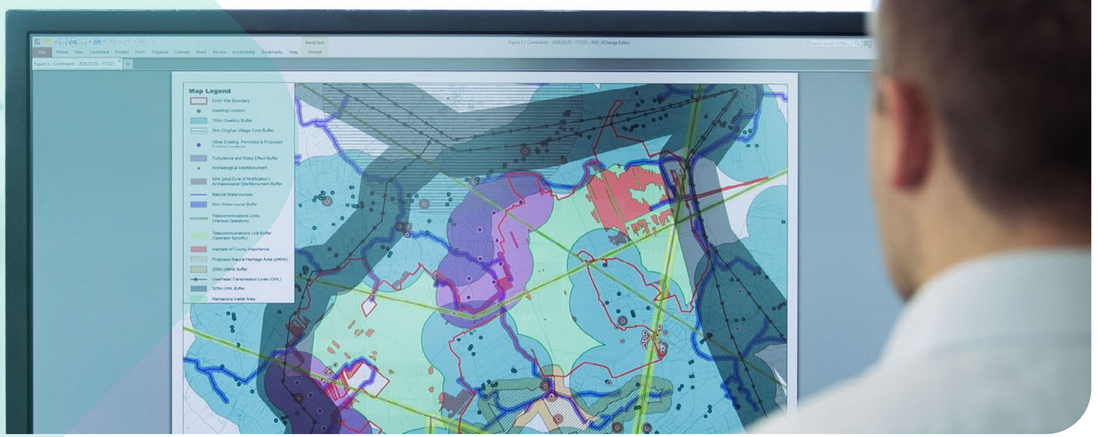
The thermal drone can assist our Ornithology Team to confirm bird presence from afar. The drone provides a new perspective from previously inaccessible environments.

Multiple thermal inspections have been conducted over the sites where buzzard nests were suspected to be located from preliminary ground surveys. Since the nests were easily hidden within the vegetation and canopy, the thermal camera helped our operators to better identify the nests and exclude false positives. In addition, as the detection was performed in real time, both the standard and the thermal cameras recorded the survey, allowing a post-operational check.

Heat Loss Detection and Building Efficiency Analysis

MKO has successfully trialled thermal aerial survey experiments over the rooftops of large industrial estates with our new drone, detecting hotspots and heat sources, as well as areas where energy efficiency was deteriorated from water infiltration.

Spatial analysis of the thermal data enables identification of the exact location of high temperature signatures, providing invaluable insights to facilitate implementation of systems to capture heat loss and improve energy efficiency of buildings. Please get in touch to discuss how MKO can help you with analysis of the energy efficiency of your building.



ONLINE CAPABILITIES

Location intelligence is a vital component of any project, and our strong experience with Geographical Information Systems (GIS) allows MKO to provide quality and professional support to your business.

With the increasing reliance on cloud-based platforms, our online mapping services offer seamless integration of your spatial data utilising interactive web-based maps. Our web mapping applications are user-friendly and accessible, allowing you to share information, engage stakeholders and gain insights from anywhere, at any time. Harness the power of the web to showcase your data in a visually compelling manner and enhance collaboration within your organisation.

- **Spatial Data Websites**
  These websites are created utilising a variety of ArcGIS Online applications such as Storymaps, ArcGIS Hub and Experience Builder. Vital project information and spatial data is shared with clients to inform them of project progress and detail.

- **Web Map Portals**
  Web Map Portals are an excellent option for presenting spatial project data without the need for text and graphics. MKO has years of experience creating these with their benefits being the interactive nature and ability to include huge amounts of information including vector and raster data, and information captured with our drone.

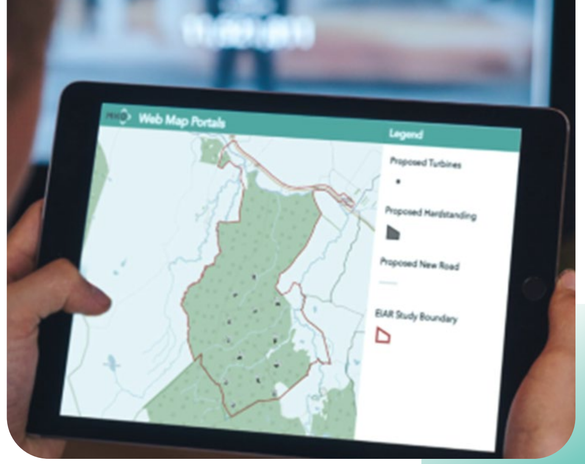
- **Interactive Dashboards**
  Interactive Dashboards are mapping platforms enriched with infographics which update in real-time as the data changes and evolves. An example of how this may be utilised is in the case of a wind energy developer needing to track community survey results in real-time as they are submitted. Updating infographics related to this data will provide efficient and reliable summaries for community liason work.

Whether you need to assess potential risks, select the most suitable routes, or rank alternative options, our advanced spatial analysis techniques provide you with the insights needed to make sound decisions that align with your goals.

SPATIAL ANALYSIS AND MULTI-CRITERIA EVALUATION

Making informed decisions often requires weighing multiple criteria simultaneously

Our multicriterial analysis expertise allows you to evaluate different factors and their relationships to identify the best possible outcomes.



MAP PRODUCTION

At the heart of our offerings lies our expertise in map production. Our team of skilled GIS specialists crafts visually appealing and highly accurate maps tailored to your specific needs. Whether you require maps for urban planning, environmental analysis, or business expansion, we ensure that our maps are fit for purpose and where needed, packed with valuable information.

FIELD DATA COLLECTION

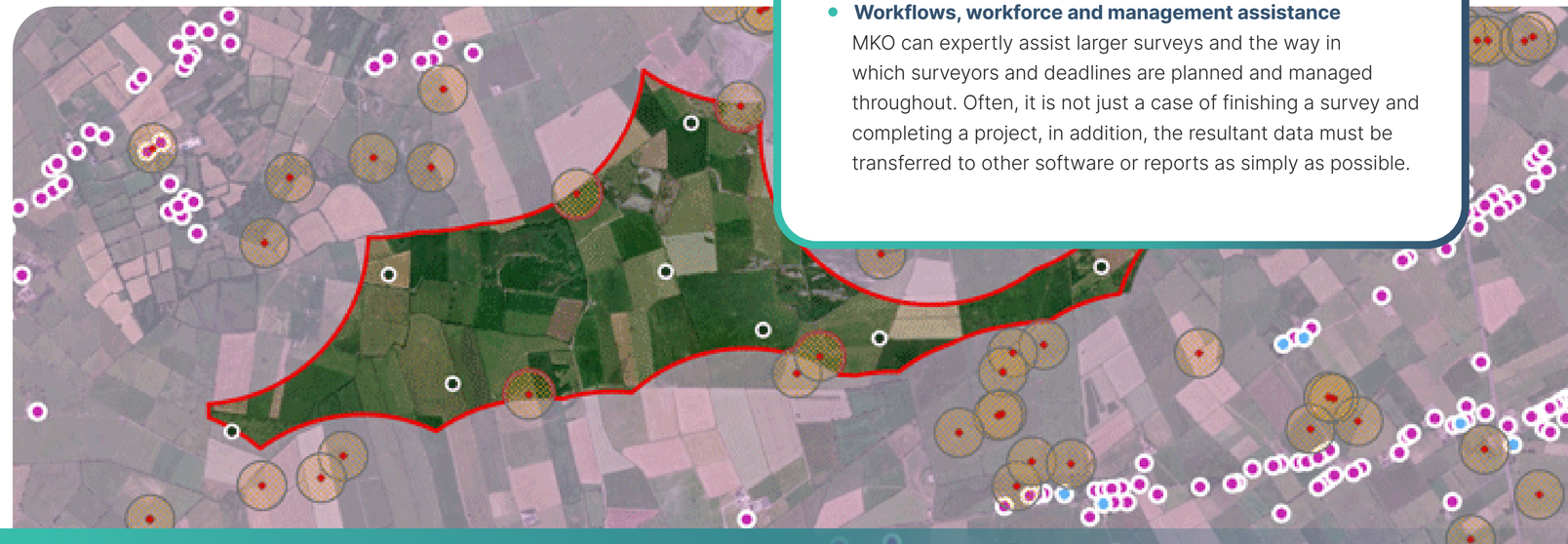
Survey support is another vital aspect of our services. We can assist you in designing and implementing surveys to enable your organisation to collect valuable on-the-ground data efficiently. By combining traditional survey methods with GPS technology and mobile data collection tools, we ensure that you obtain accurate and reliable spatial data that can be seamlessly integrated into your GIS workflows.

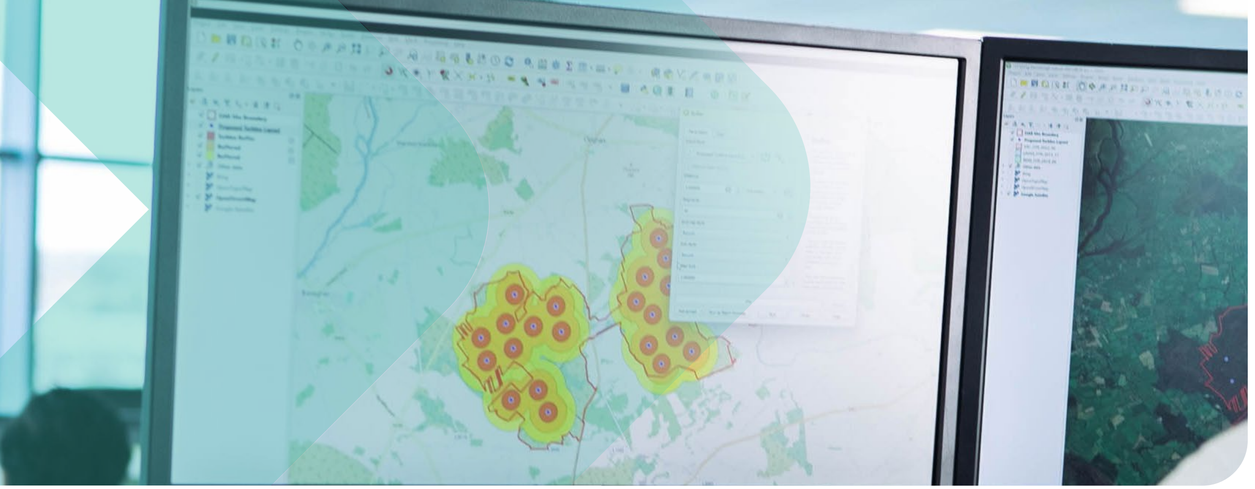
- **Field Maps support**
  Field Maps is a map centric data collection app that allows a location point and basemap to be followed while collecting information. This information can be in the form of photos, survey results and notes, as well as point, linear or polygon data. This application can be applied to your project skillfully and allow survey work to be conducted seamlessly.

- **Survey123 support**
  Survey123 has been used expertly across several projects, ensuring standardised feedback is collected. This application allows professionals to support most feedback methods, for example, standard queries, prepopulated surveys, multiple choice answers, imagery, file attachments and more. These surveys can be operated independently on a phone or tablet, or embedded into an interactive website if needed.

- **QuickCapture support**
  QuickCapture allows much quicker surveys to be conducted, where time constraints and survey area size are obstacles. Comprehensive back-end configuration and planning are required up front, but once out in the field, this application can greatly assist projects.

- **Workflows, workforce and management assistance**
  MKO can expertly assist larger surveys and the way in which surveyors and deadlines are planned and managed throughout. Often, it is not just a case of finishing a survey and completing a project, in addition, the resultant data must be transferred to other software or reports as simply as possible.





SITE SELECTION AND IDENTIFICATION

MKO has extensive experience in site identification. Leveraging advanced geospatial techniques, we can assist you in identifying optimal locations for various purposes.

Whether you are seeking the perfect site for a retail store, renewable energy development, or housing development, our team will perform rigorous analyses, considering factors such as proximity to resources, development constraints, land zoning, demographic patterns and accessibility, to guide you towards the most advantageous choices.

MKO has conducted site identification for many clients, specifically in wind and solar, expanding our offering in renewables expertise.

DATA MANAGEMENT AND INFRASTRUCTURE SUPPORT

Data management is a critical component of any GIS operation.

Our team understands the importance of organised and efficient data workflows. We can help you establish robust data management systems, ensuring that your data is properly organised, validated and accessible when you need it. From data capture and integration to database design and maintenance, we offer comprehensive solutions to streamline your GIS data operations.

Our GIS infrastructural support ensures that your spatial systems run smoothly and efficiently. We can assist in the design, implementation and maintenance of GIS infrastructures tailored to your specific needs.

Whether you require on-premises solutions or prefer to harness the power of cloud-based platforms, our team has the expertise to guide you through the process and optimise your GIS environment for maximum performance.

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