GHD Digital

Transform for good

GHD delivers professional services across global markets

GHD is one of the worlds leading professional services companies providing engineering, architecture, environmental and construction professional services.

GHD Digital complements our core offerings and deliver services in:

- Digital engineering transformation;

- Asset management & optimisation;

- Environmental assessments;

- Water and energy demand planning, option analytics; and

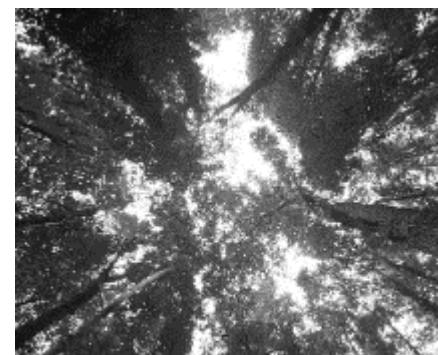- Infrastructure, Transport and Urbanisation design and delivery.

WATER

ENERGY & RESOURCES
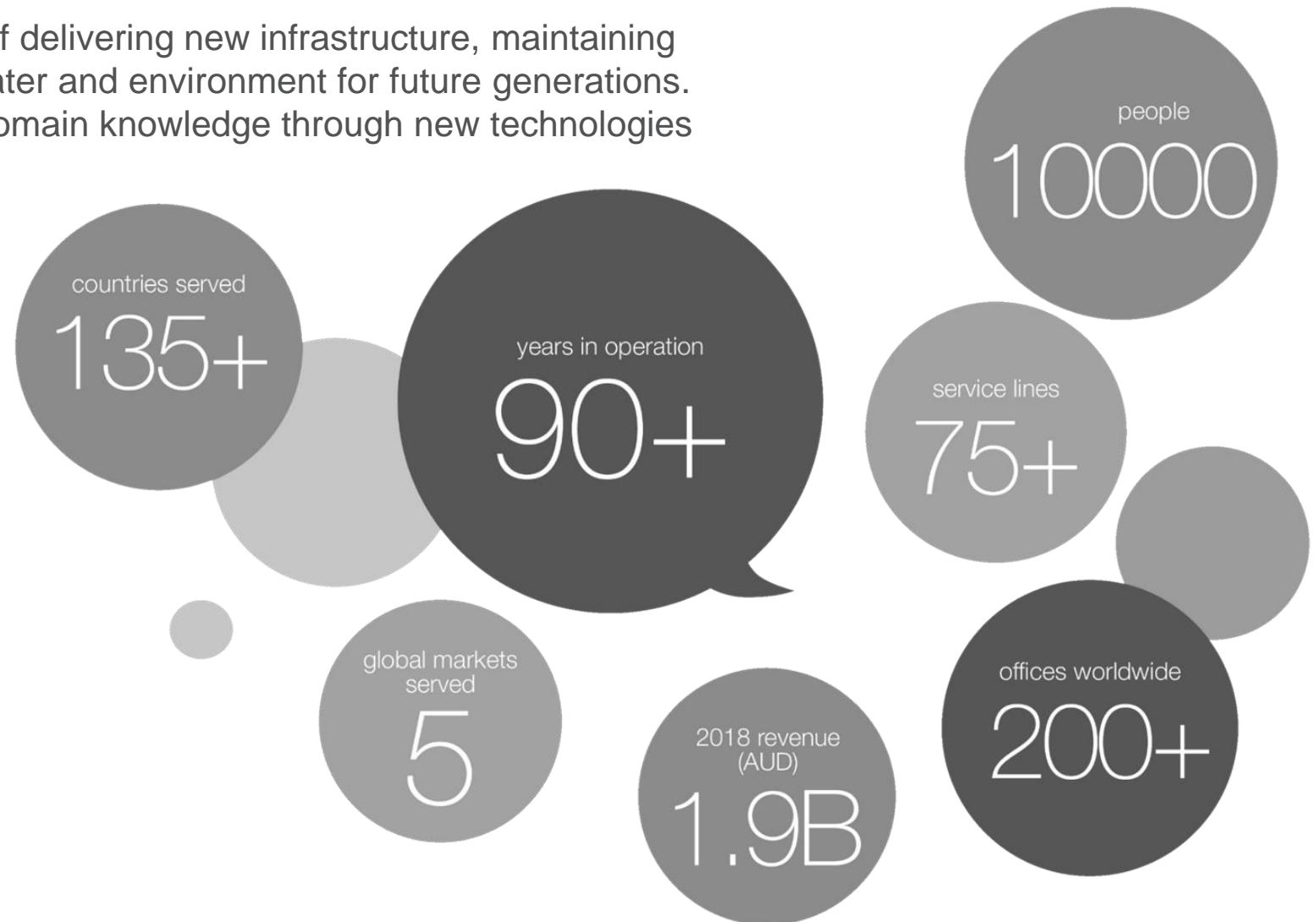
PROPERTY & BUILDINGS

ENVIRONMENT

TRANSPORTATION

Our Value

GHD understands the complexity of delivering new infrastructure, maintaining the built form and managing our water and environment for future generations. Our digital offering combines our domain knowledge through new technologies to generate new value.

countries served
135+

years in operation
90+

people
10000

service lines
75+

global markets served
5

2018 revenue (AUD)
1.9B

offices worldwide
200+

GHD Digital – Our Practices

I want to start digitally enabling my organisation

I need to understand what data I have and how to enhance it

I want to transform my current processes

Digital Platform

GLOBAL SOFTWARE SOLUTIONS CENTRE (GSSC)
Reimagining your business and shaping solutions that match your needs

Digital Lab

Enable innovation and co-creation for better business outcomes
- Innovation Advisory
- Accelerator 4.0
- Digital Labs Delivery
- Design Thinking
- Smart Seeds

Digital Intelligence

Provide insights and intelligence to drive critical decision-making
- Location Intelligence
- Data Strategy & Governance
- Data Insight Enablement
- Data Visualisation
- Machine Learning
- Predictive Analytics
- Artificial Intelligence & Optimisation

Digital Experience

Deliver transformation outcomes through enhanced digital strategy and experience
- Digital Engineering/BIM
- Digital Asset Management
- Digital Risk & Cyber Security
- Connected Infrastructure/ Automation
- Augmented, Virtual & Mixed Reality

Key Achievements

- **Confidential Client:** Co-creation of innovation program and technical delivery of a 'connected site' communication and data infrastructure for optimising equipment use, safety and decision making across locations to minimise downtime and expenditure.

- **Forrestfield Airport Link (FAL):** Deployment of a geospatial data inventory solution to streamline stakeholder visualisations, improve design through digital twinning and reduce the time for design approvals.

- **City of Melbourne Data Roadmap:** Development of a 3 year roadmap to improve people, process, data and technology maturity to sustain CoM as a leading smart city

- **PowerCor Data Governance and Training VR:** Deliver of a detailed audit of data assets and improve training and decision making through implementation of Virtual Reality training modules

- **City of Melbourne Analytics for Land Use and Infrastructure Modelling**: Delivery of a spatial demographic forecasting platform to support strategic land use assessments

- **RMIT Enterprise Facilities Analytics**: Delivery of an Information and control dashboard to optimise data insights for site wide energy, water, air monitoring and asset performance.

- **Peel Food Zone**: Development of a multi criteria analysis framework to determine the optimal food growing zones and industry opportunity sites to secure future food production zones.

Geocoded data unearthing Victoria

The Department of Environment, Land, Water and Planning (DELWP) brings together Victoria's planning, local government, environment, energy, suburban development, forests, emergency management, climate change and water functions into a single department. Its aim is to strengthen connections between the environment, community, industry and economy.

The challenge is to maintain Victoria's liveability with a population that is expected to almost double by 2050, while responding to climate change and protecting the natural environment, infrastructure and heritage for future generations.

Challenge

ELWP, together with the Victorian Environmental Protection Agency (EPA) and the State Library of Victoria, wanted to create a tool which enabled Victorian property owners to identify and investigate the quality of land and groundwater in their property. This tool would require the development of a geocoded land use dataset from historic Sands and McDougall business directories dating from 1860 through to 1974.

The land use data was captured and analysed to feature in the new "Victoria Unearthed" online map system being developed in response to **recommendation 14.1** from the 2016 Independent Inquiry into the EPA.

Solution

GHD worked with property data specialists Lotsearch to bring sense and structure to the various forms of data, manage the data effectively and bring disparate data sets together. We relied on leading edge data analytics and business intelligence technology to help the client see patterns and find insights in the data.

The result included the categorisation of historic land uses based on potential contamination, a data cleanse, geocoding of the structured data and manual inspections to fix multiple geocoding errors.

Throughout the project's lifecycle the team monitored and measured data quality, developed meta data and a data dictionary to assist with product data descriptors and delivered a final geocoded dataset for publication.

Benefits

The data was shared via the public, interactive online Victoria Unearthed Map which was developed in response to recommendation 14.1 from the 2016 Independent Inquiry into the EPA. DELWP, EPA and the Victorian public were provided with a highly valuable framework for a spatial dataset.

The dataset assisted with identifying current and historical land uses which have the potential to cause land contamination. The governing agencies are also now moving towards the establishment of a comprehensive, time-aware spatial dataset representing historical land use across Victoria.

Hunter Water innovation

Hunter Water is a State Owned Corporation (SOC) providing drinking water, wastewater, recycled water and some stormwater services to a population approaching 600,000 people in homes and businesses across the Lower Hunter.

Hunter Water has approximately 4950km of pressure water mains, varying in size from 20mm to 1350mm, with the oldest pipes dating from the original Walka Water Works scheme installed in the late nineteenth century.

Challenge

The risks associated with the close proximity of pressure pipelines in the community have been demonstrated through several recent failures. There is increasing community expectation regarding management of infrastructure in ways that minimise such risk. These pressures are expected to grow over time as development encroaches on pipelines and infrastructure ages.

Pipe failures have caused significant property damage in the Hunter region, and in some instances were hazardous to the community. Hunter Water were able to estimate the likelihood of failure based on failure rate curves. However, the consequence of failure was unknown, so knowing which assets to prioritise for replacement was unclear.

Solution

GHD have developed an innovative methodology for assessing the consequences of catastrophic water main failure. Over 250 km of trunk water mains (over 250 mm diameter) needed assessing. This was conducted by taking break flow rates from Hunter Water's existing water supply network hydraulic models every five metres, which showed very large possible instantaneous flows (well in excess of 5,000 L/s) that could occur in some locations of the network.

GHD modelled the inundation areas and the nature of flooding at almost 60,000 individual locations. For roads, the flooding hazard area was estimated for each type of road (motorway, arterial and local road). Using unsupervised machine learning algorithms, together with supplied red blue green alpha (RGBA) imagery and classification of LiDAR strikes, GHD prepared a spatial model of surface roughness. Fences on the side and rear boundaries of residential properties were also included in the TUFLOW 2D flooding model. These models ran on multiple computers for weeks to process the significant number of simulations required. Open channel drainage was included in the model. Underground drainage might be included in future iterations, given the models potentially overestimate flooding impacts in some locations. Some of the initial sensitivity analysis at calibration sites did include underground drainage.

Benefits

Hunter Water is now using this information to identify and prioritise locations for mitigation measures as well as cross checking against inundation information from recent break events, to allow further refinement of the model.

Using Spatial data to optimise land use for WA

The Planning for Peel Food Zone (PFZ) study area is located in the Peel Region, just northeast of Mandurah and about 50 km south of Perth, Western Australia (WA). Land in the area is currently under-utilised, with extensive cattle grazing and hay farming being the predominant land uses. The region is reasonably well serviced, and within close proximity to workforce and export pathways.

The Department of Agriculture and Food Western Australia (DAFWA) and the Peel Development Commission identified that the study area is in a prime position for intensive agricultural industries, as part of the Transform Peel initiative.

Challenge

DAFWA engaged GHD Digital's Location Intelligence Team to perform a spatial Multi-Criteria Analysis (MCA) of land suitable for intensive agriculture in the Peel Region. The MCA considered six agricultural scenarios:

- Soil-based irrigated horticulture (annual)
- Soil-based irrigated horticulture (perennial)
- Soil-based irrigated in-ground horticulture (covered)
- Non soil-based irrigated horticulture (closed) – e.g. greenhouses
- Closed-loop intensive livestock
- Dryland grazing and pasture (predominantly the current situation)

The six agricultural scenarios require different considerations. The GHD Digital Team worked with DAFWA to develop a list of considerations including:

- Access to roads
- Access to electricity
- Distance to human habitation and waterways
- Phosphorus export risk
- Land capability (soil)
- Groundwater availability
- Flood risk
- Lot area
- Internet access
- Depth to maximum groundwater level

Solution

These criteria considerations had their attributes scored and relative importance weighted in a workshop engaging project staff from DAFWA, Peel Development Commission and Department of Water. Following this input, the relevant layers were processed into raster (grid cell) format in order to be overlaid seamlessly, before applying scores and weights of suitability and importance.

Land deemed 'no-go zones', or hard constraints, included Conservation Wetlands, existing native vegetation, Aboriginal Heritage Sites, townsite zoned land, Crown land, reserves and contaminated sites. These were excluded from consideration for any of the six scenarios.

Benefits

The result of the project was six suitability surfaces – each relating to a particular agricultural scenario.

The findings will guide planners and the relevant shires in their allocation of PFZ land. The suitability maps produced through this study will ensure each parcel of land is optimised from environmental, infrastructure, human impact and productivity perspectives. This provides farmers and the agricultural industry with the right information to maximise food production whilst minimising environmental impact. The Peel Region is the fastest growing region within WA and will benefit from the additional food supply and new jobs created as a result of these findings, while the Australian economy as a whole would benefit from PFZ's proximity to export routes.

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