MOTT MACDONALD

Geodesign: Beyond maps and software

Helen Pickard – Global GIS Practice Leader

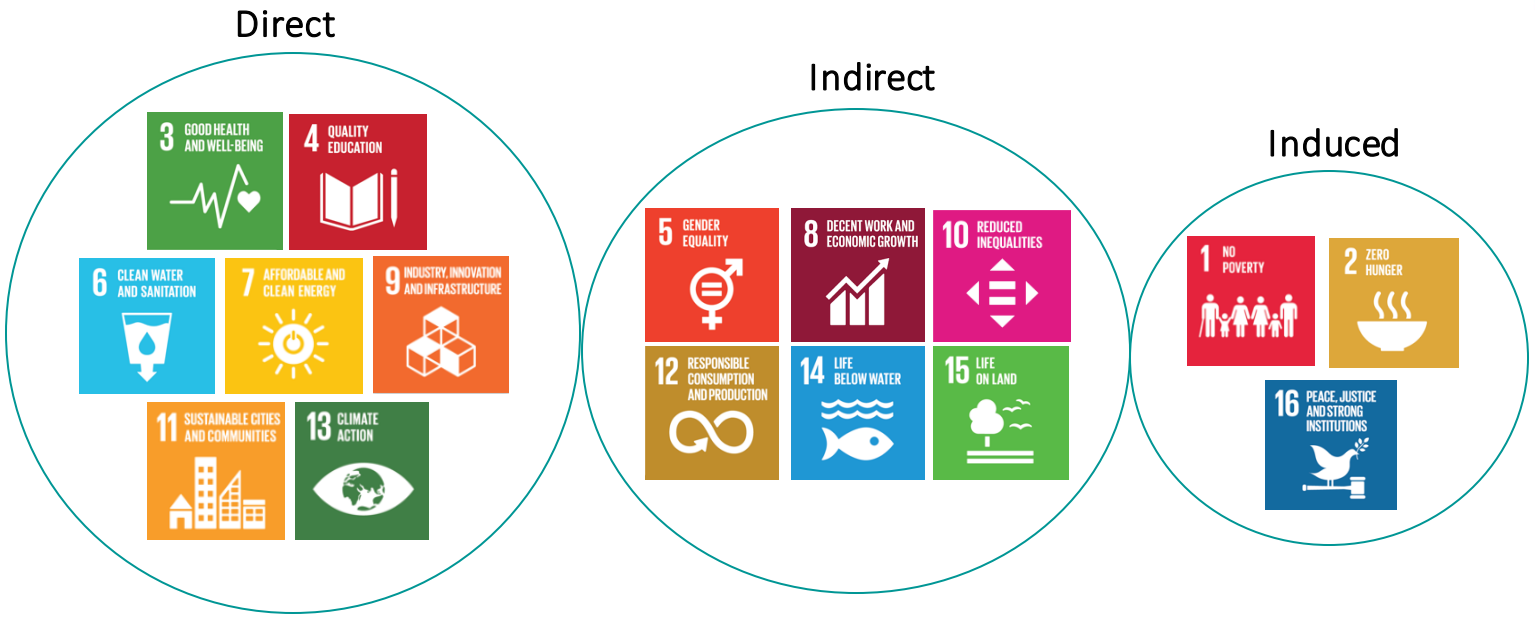
1. A digital journey
2. The people challenge
3. Case Studies

Improving daily lives through better informed design.

Introducing Mott MacDonald

a global engineering, management and development consultancy focused on guiding our clients through many of the planet's most intricate challenges.

Sustainable Development Goals & AEC



At Mott MacDonald we recognise that in order to deliver positive outcomes, whether directly, indirectly or induced, we must work in partnership with others.

Cambridge Office

100 years of Water

GIS Services

Beyond map production

1
Information Management Coordination

Collaboration through BIM

2
Data Sourcing

Knowledge and expertise,

3
Data

Data management, manipulation, analysis and extraction

4
Custom Tools

Automation, Efficiencies & innovations

Desktop / mobile / web

.

5
Solutions

Alternative workflow methods

6
Professional

Professional delivery of data and tools to clients

7
Advisory Consultant

On GIS implementation, custom tools within client organisation, and training

8
Maps

Maps become a by product of improved working methods

ArcGIS & the GIS Practice - 2019

Approx. number around 2010

40
741
Members of the GIS Yammer Group.

6
62
Different divisions

20
300
Desktop daily users

12
134
Offices.
Cambridge, UK = 13%
Iselin, NJ = 7.7%

0
775
AGOL Users

4
24
Countries

15
85
GIS professionals

80
1545
Unique Desktop users in 2019.

Drivers

Improving technology

hardware, systems & software

Leadership

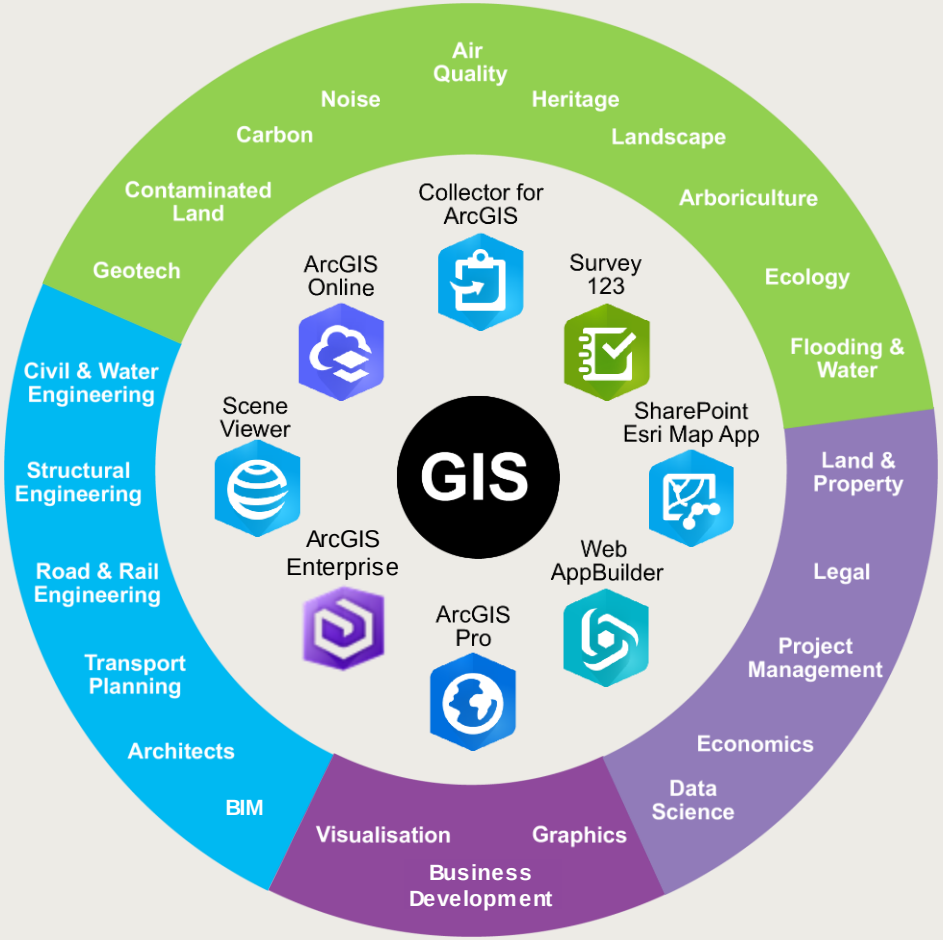
Seizing opportunity & benefit

Systems based

Connected systems analysis

Digital Twin

Build twice


Air Quality
Noise
Heritage
Carbon
Landscape
Contaminated Land
Arboriculture
Collector for ArcGIS
Geotech
ArcGIS Online
Survey 123
Ecology
Flooding & Water
Civil & Water Engineering
Scene Viewer
SharePoint Esri Map App
GIS
Land & Property
Structural Engineering
ArcGIS Enterprise
Web AppBuilder
Legal
Road & Rail Engineering
ArcGIS Pro
Project Management
Transport Planning
Economics
Architects
Data Science
BIM
Visualisation
Graphics
Business Development

So?

Heathrow Expansion

Heathrow's runways are full. Operating at 98% capacity for over a decade.

For Britain to secure its economic future and its status as an international aviation hub, it must expand at Heathrow.

80 airlines fly direct to over 180 destinations worldwide.

To expand to meet demand in a way that creates a positive impact on the community, environment, and economy.

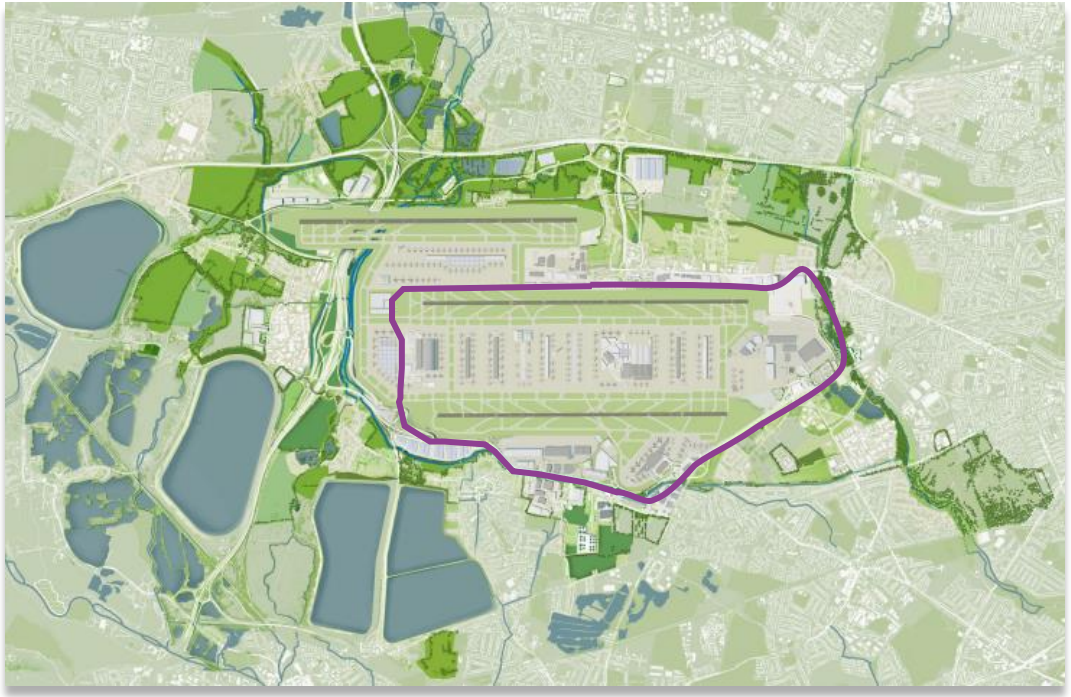
Heathrow 2.0 launched 2017 aiming to:

Inspire & enable a positive future for the aviation sector.

Sustainability is at the heart

- A 2018 roadmap for carbon neutral growth,
- Carbon neutral by 2020
- Airport infrastructure to be zero carbon by 2050.

Collaborative Design



Illustrative preferred masterplan as of June 2019 consultation
Contains OS data @ Crown copyright and database rights 2018

Towards an operational Digital Twin

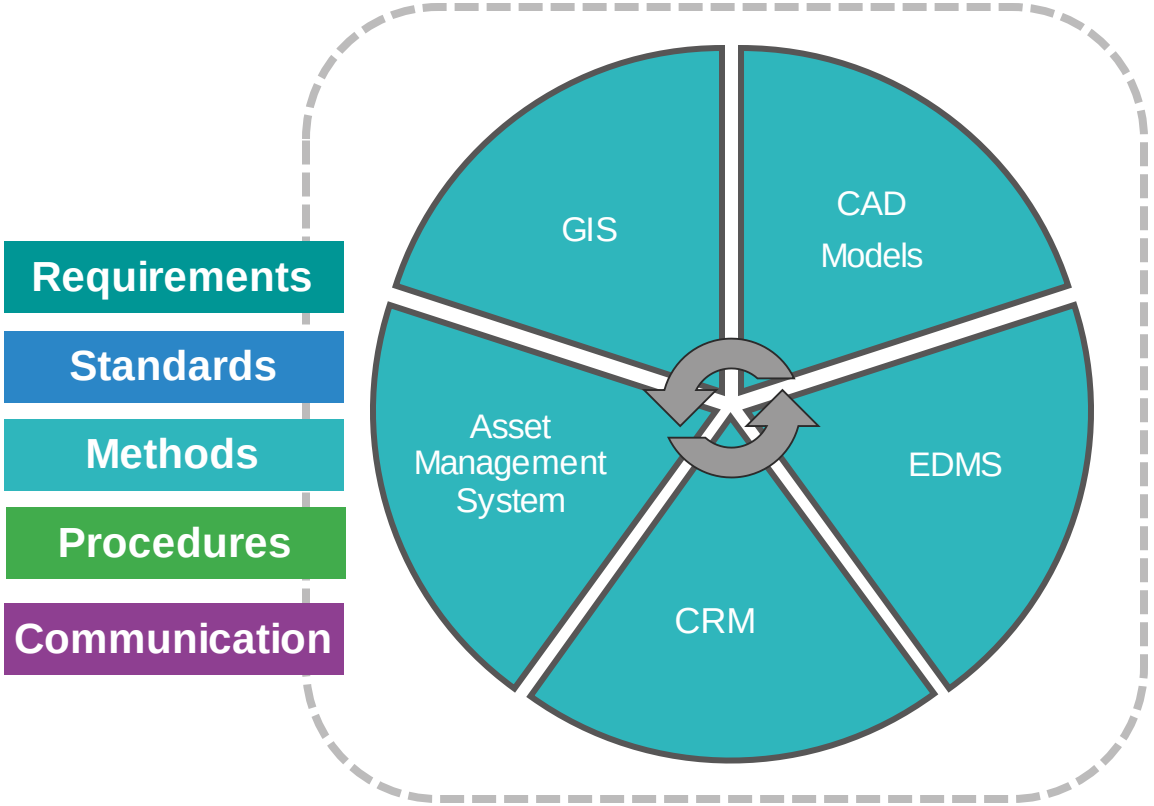
To leverage value from their digital assets, allowing:

- work in a safe environment;
- design & plan in a collaborative environment; and
- operate a fully integrated asset system.

To build, maintain and re-use a digital representation of current and future assets.

Stakeholders will be able trust the data they hold and have confidence to make excellent decisions based on the ‘one version of the truth’.

Data management and the ‘Collaborative’ Data Environment



Prioritising Investment

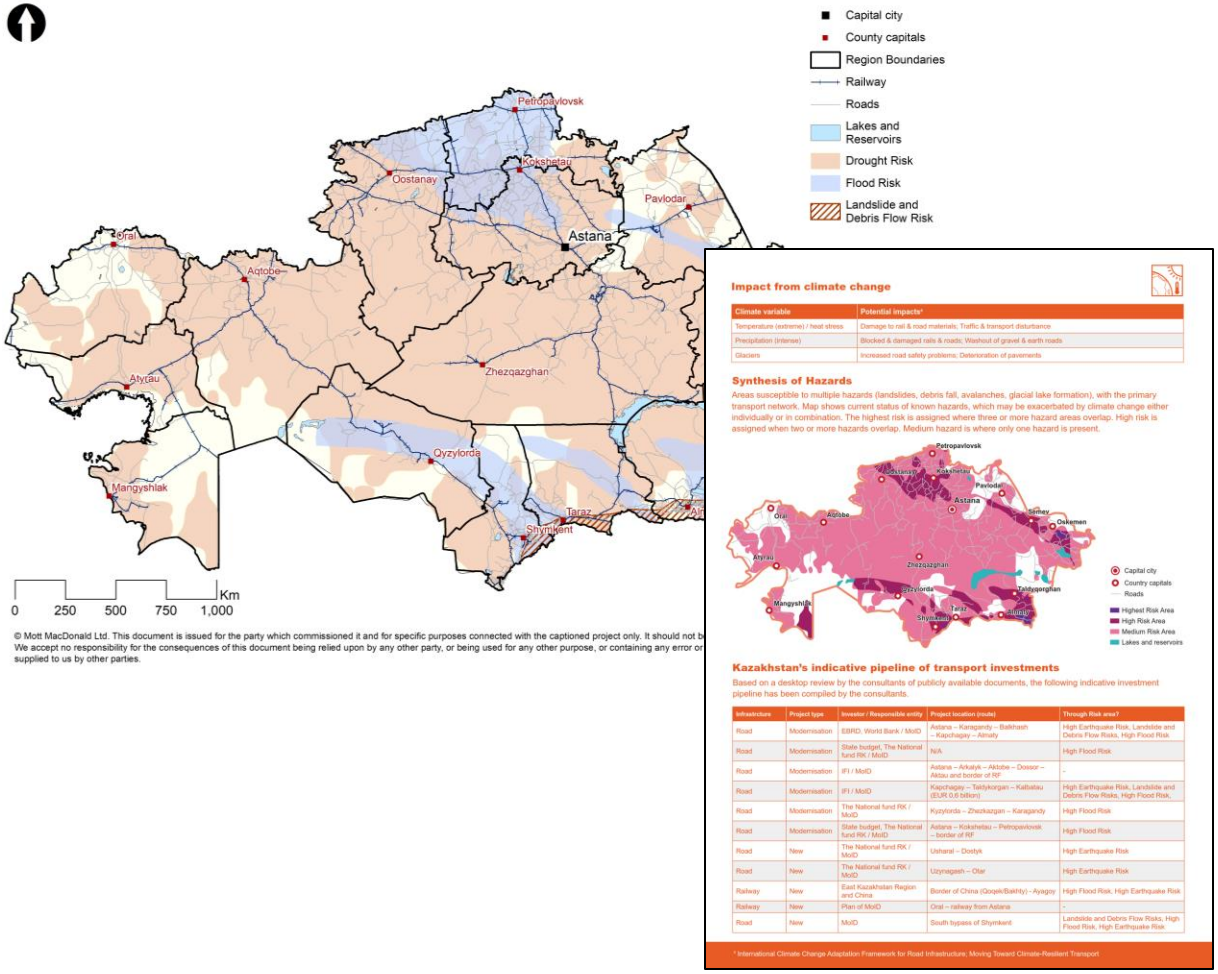
Project
Assessment of Risks to Transport Infrastructure of Climate Change

Client
Confidential Bank

Location
Central Asia

Expertise
GIS;
Transport Assessments;
Climate Resilience

Solution



Impact from climate change

Climate variable	Potential impacts*
Temperature (extreme) / heat stress	Damage to rail & road materials; Traffic & transport disturbance
Precipitation (intense)	Blocked & damaged rails & roads; Washout of gravel & earth roads
Glaciers	Increased road safety problems; Deterioration of pavements

Synthesis of Hazards

Areas susceptible to multiple hazards (landslides, debris fall, avalanches, glacial lake formation), with the primary transport network. Map shows current status of known hazards, which may be exacerbated by climate change either individually or in combination. The highest risk is assigned where three or more hazard areas overlap. High risk is assigned when two or more hazards overlap. Medium hazard is where only one hazard is present.

Kazakhstan's indicative pipeline of transport investments

Based on a desktop review by the consultants of publicly available documents, the following indicative investment pipeline has been compiled by the consultants.

Infrastructure	Project type	Investor / Responsible entity	Project location (route)	Through Risk area?
Road	Modernisation	EBRD, World Bank / MoID	Astana – Karaganda – Balkhash – Kapchagay – Almaty	High Earthquake Risk, Landslide and Debris Flow Risks, High Flood Risk
Road	Modernisation	State budget, The National fund RK / MoID	N/A	High Flood Risk
Road	Modernisation	IFI / MoID	Astana – Arkalyk – Aktobe – Dossor – Aktau and border of RF	-
Road	Modernisation	IFI / MoID	Kapchagay – Taldykorgan – Kalbatau (EUR 0,6 billion)	High Earthquake Risk, Landslide and Debris Flow Risks, High Flood Risk,
Road	Modernisation	The National fund RK / MoID	Kyzylorda – Zhezkazgan – Karagandy	High Flood Risk
Road	Modernisation	State budget, The National fund RK / MoID	Astana – Kokshetau – Petropavlovsk – border of RF	High Flood Risk
Road	New	The National fund RK / MoID	Usharal – Dostyk	High Earthquake Risk
Road	New	The National fund RK / MoID	Uzynagash – Otar	High Earthquake Risk
Railway	New	East Kazakhstan Region and China	Border of China (Goqek/Bakhty) - Ayagoy	High Flood Risk, High Earthquake Risk
Railway	New	Plan of MoID	Oral – railway from Astana	-
Road	New	MoID	South bypass of Shymkent	Landslide and Debris Flow Risks, High Flood Risk, High Earthquake Risk

* International Climate Change Adaptation Framework for Road Infrastructure; Moving Toward Climate-Resilient Transport

#StopSoilErosion

is key to the achievement of the

SUSTAINABLE DEVELOPMENT GOALS

Impact

mpering

Thanks to the financial support of

European Commission

Ministry of Finance of the Russian Federation

Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

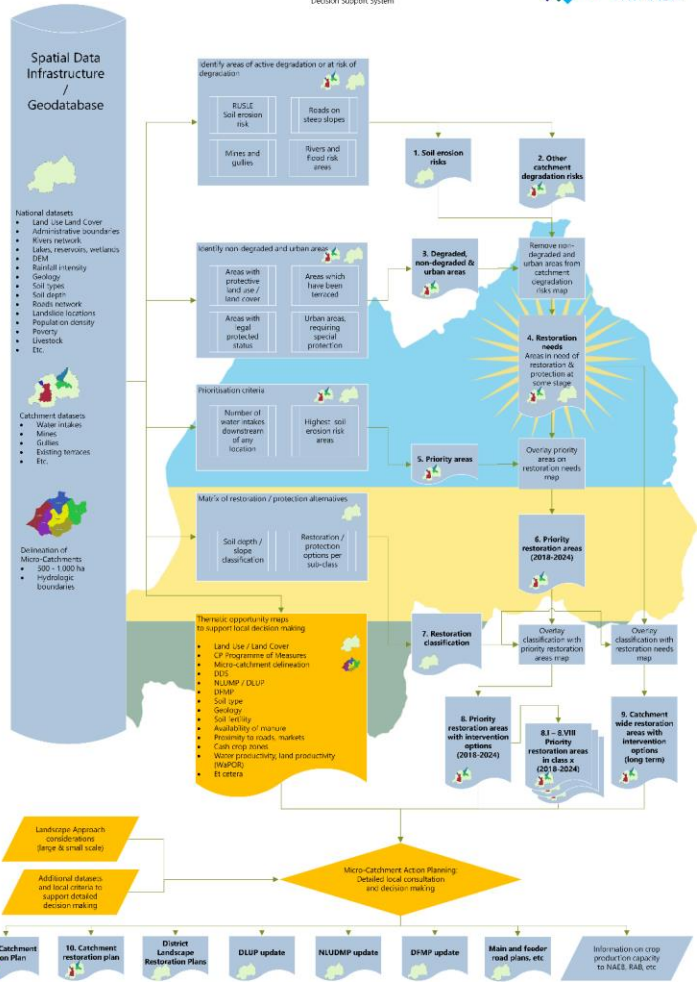
Swiss Confederation

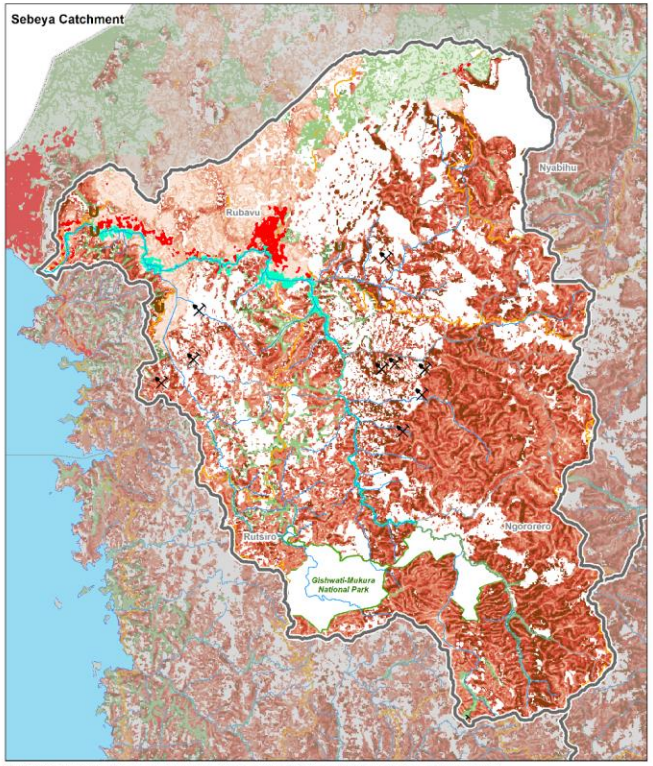
Ministry of Economic Affairs of the Netherlands

CROM DSS

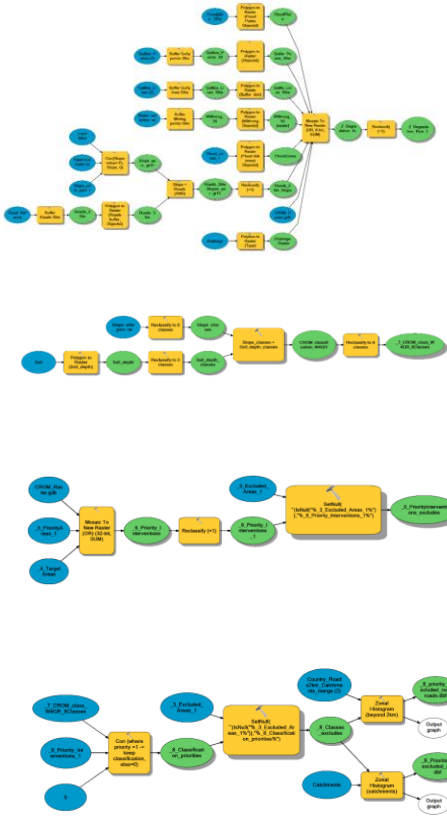
Catchment-based landscape Restoration Opportunities Mapping Decision Support System

WATER for GROWTH RWANDA



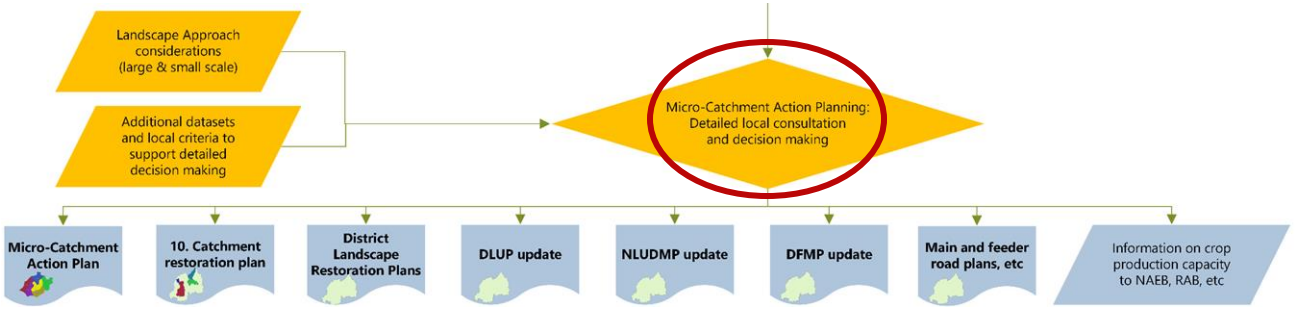


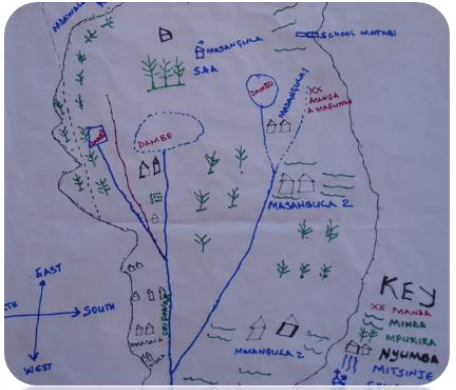
9. Catchment wide restoration areas with intervention options (long term)



Participatory decision-making: Micro-Catchment Action Plans

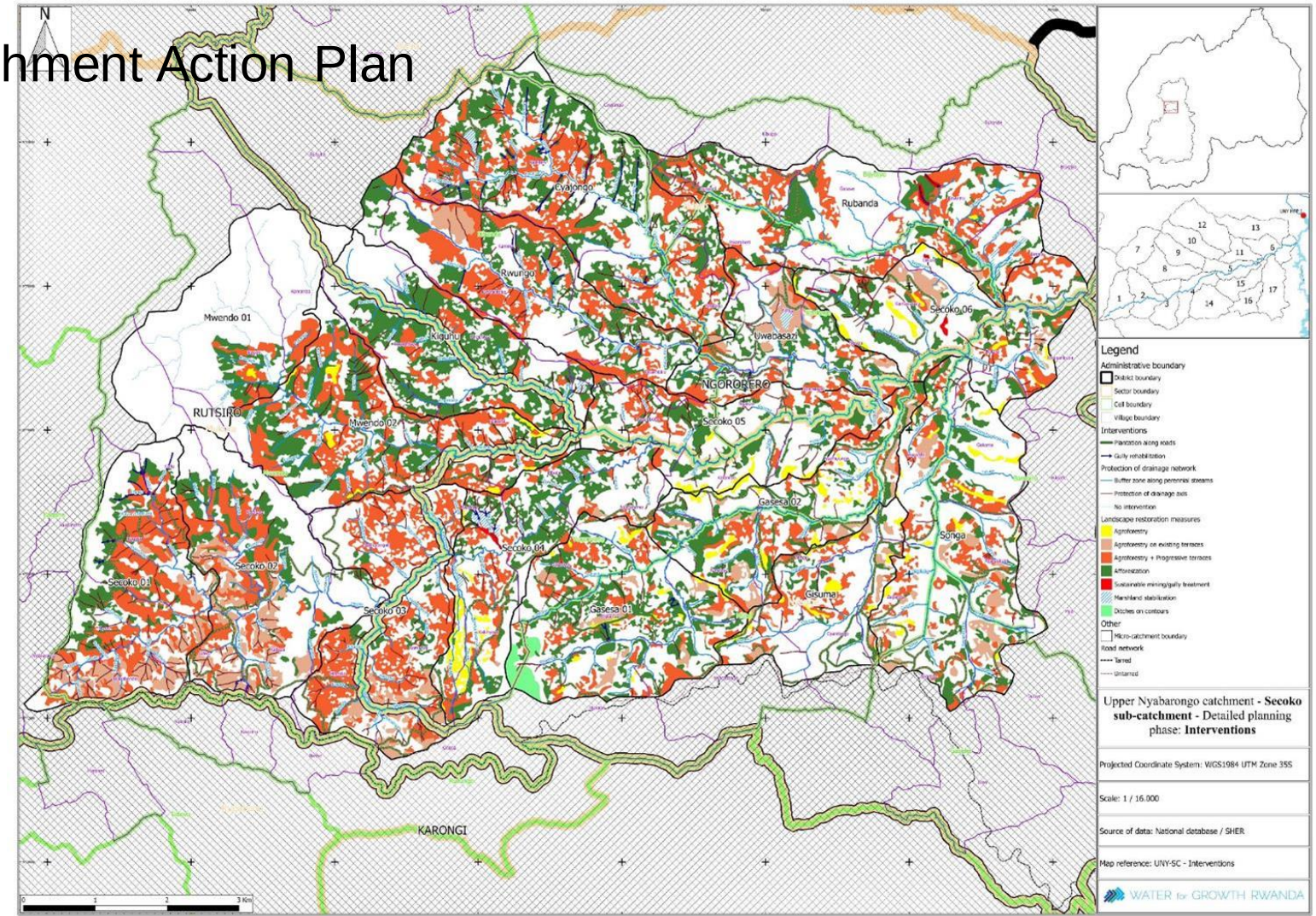
Global science, local solutions





Micro-Catchment Action Plan

Result of participatory process with communities / land owners



Smart Map for Natural Capital of UAE - MOCCAE

Task:

Identify local biologically rich ecosystems and the services they provide to the indigenous environment
Carry out an economic valuation of these services.

Map this data to inform better decision-making on land use, investment opportunities and business improvement.

Evaluating 15 ecological services of terrestrial, coastal and marine habitats.

Outcome

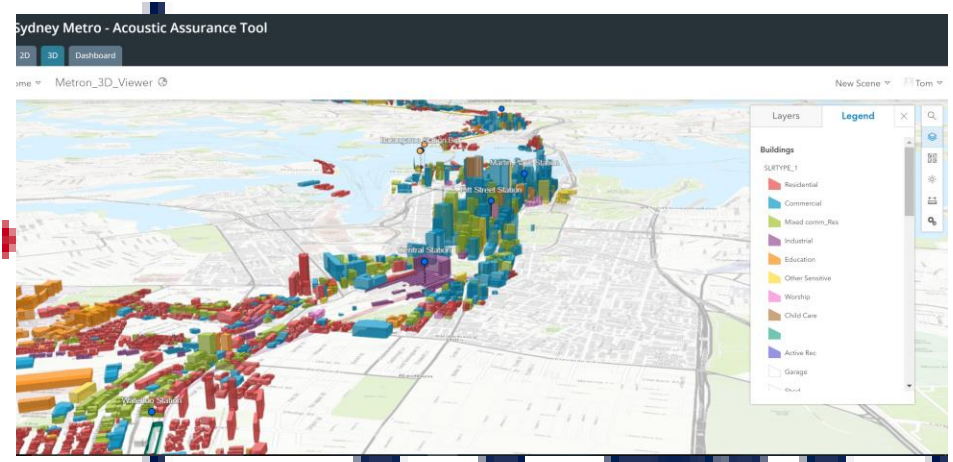
An interactive Smart Map that provides spatial information on the natural capital and ecosystem services of the UAE.

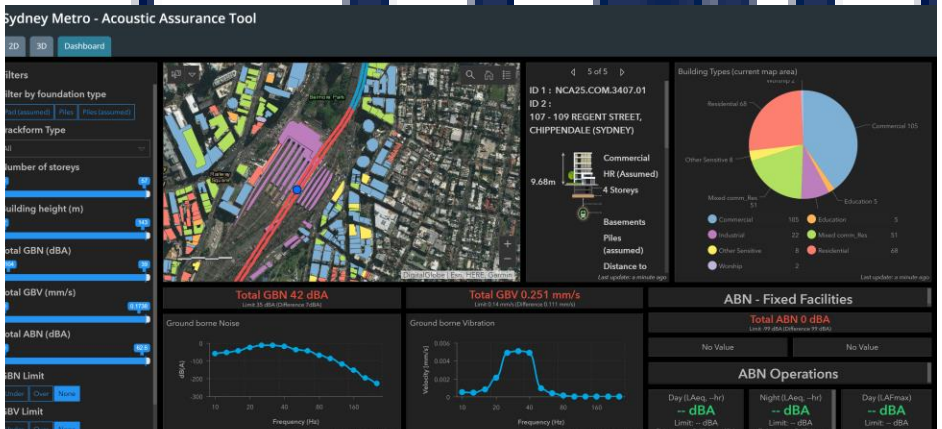
Allow users to view, upload and download information.

Model future urban development that factors in impacts of CC.

Evaluate the effects on ecosystem services of pre-determined scenarios

Sydney Metro Noise & Vibration Assurance Tool





Opportunity

- 30 Km extension of metro under Sydney Harbour and CBD
- 6 new stations
- Delivered by METRON Joint Venture

Provide a dynamic, scalable and accessible solution for the client to ensure the noise & vibration requirements of the largest infrastructure project in Australia are met and effectively communicated

Outcome

A single source of truth for all the noise & vibration requirements for the largest infrastructure project in Australia.

The Acoustic Assurance Tool will set a precedent for the way Noise & Vibration requirements are managed and delivered for major infrastructure projects

Next Challenges

GIS can be at the heart of design and build

Data:

- Who owns it?
- How can it be shared & accessed
- Infrastructure is inter-connected
- Resilient smart infrastructure & cities need data

DECODE - DEcentralised Citizen-owned Data Ecosystems

Solid – empowers

MOTT MACDONALD

Thank you

Group GIS leader, tasked with:

"unlocking the full potential of GIS today for ourselves, our clients and their clients, and taking us to the ‘GIS of tomorrow’"