Field Survey Planning in Remote Areas Using Imagery and Route Analysis

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Simon Ross, Brett Shaver
Agenda

- Project Overview
- Project Requirements
- GIS Solution
- Conclusions
- Further Developments
Project Overview

- Environmental & Social Impact Assessment (ESIA) for Oil & Gas Development
- Multiple baseline field studies (due diligence, ecology, water resources)
- GIS critical throughout project lifecycle from planning through reporting
Project Requirements: Overview

“Identify survey locations and develop a journey management plan in accordance with client Health & Safety protocols for remote areas”

Project Delivery

- Visit representative sites to establish baseline environmental conditions.

Health & Safety Protocols

- Pre-determined detailed trip itinerary.
- Required rest stop locations, driving time limits, speed restrictions, daylight.
- Avoid dangerous areas, road conditions.

Efficiency

- Conduct field survey efficiently at lowest cost.
Project Requirements: Journey Documentation

Plan Requirements

- Paper maps of predetermined daily routes
- Paper tabular itinerary documenting all road junctions and survey/rest stops
- Pre-loaded GPS for navigation
The Solution: Project Delivery

Identify Survey Sites

- Acquire satellite imagery
- Share project data on web-GIS viewer
- Enable specialists to identify survey points

"The process is very easy and surprisingly enjoyable."

Initial Route Planning

- Are the sites accessible?
- How long will it take to get to them?
- Estimated total trip time: 4 days
The Solution: Health & Safety Restrictions

Building Network Dataset

- Digitized routes to sites from imagery
- Ensured connectivity to main road network
- Avoided potential vehicle hazards
- Assigned speed limits based on road surface
The Solution: Route Optimization

Health & Safety Requirements

- Fixed start / stop times
- Driving time limits

Route Optimization

- Acceptable 3-day route identified
- GIS database ready for route map and itinerary production
The Solution: Journey Documentation

Health & Safety Requirements

- Paper maps of daily route
- Tabular itinerary
- Pre-loaded GPS for navigation

GIS Solutions

- Data driven pages and map templates
- Automated route calculation templates
- GPS data export tool

<table>
<thead>
<tr>
<th>RouteID</th>
<th>WaypointID</th>
<th>PointType</th>
<th>Surface</th>
<th>Speed</th>
<th>Description</th>
<th>LegDist_KM</th>
<th>ArrivalTime</th>
<th>DepartureTime</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>D1SP</td>
<td>Start Point</td>
<td>Surfaced</td>
<td>60</td>
<td>Leave point, heading southwest and turn right onto heading northwest.</td>
<td>0.000</td>
<td>13:00</td>
<td>13:00</td>
</tr>
<tr>
<td>5</td>
<td>D1J1</td>
<td>Junction</td>
<td>Surfaced</td>
<td>60</td>
<td>At junction with dirt road, turn right onto the slip road to head northeast.</td>
<td>2.944</td>
<td>13:02</td>
<td>13:02</td>
</tr>
<tr>
<td>13</td>
<td>D1J2</td>
<td>Junction</td>
<td>Surfaced</td>
<td>60</td>
<td>Turn left and head north at town of EMomote.</td>
<td>11.157</td>
<td>13:14</td>
<td>13:14</td>
</tr>
<tr>
<td>20</td>
<td>D1J3</td>
<td>Junction</td>
<td>Surfaced</td>
<td>60</td>
<td>North of D1J2, fork left remaining on blacktop road.</td>
<td>7.255</td>
<td>13:21</td>
<td>13:21</td>
</tr>
<tr>
<td>32</td>
<td>D1J4</td>
<td>Junction</td>
<td>Surfaced</td>
<td>60</td>
<td>Turn right onto gravel/surfaced track running through small farming settlement.</td>
<td>6.216</td>
<td>13:27</td>
<td>13:27</td>
</tr>
<tr>
<td>36</td>
<td>D1J5</td>
<td>Junction</td>
<td>Gravel</td>
<td>20</td>
<td>Turn right onto gravel heading to well site.</td>
<td>1.153</td>
<td>13:31</td>
<td>13:31</td>
</tr>
<tr>
<td>38</td>
<td>D1S1</td>
<td>Stop</td>
<td>Gravel</td>
<td>20</td>
<td>STOP - entrance route. Leave site along.</td>
<td>0.395</td>
<td>13:32</td>
<td>14:17</td>
</tr>
</tbody>
</table>
Conclusions

Real Project Summary (8 Day Survey)
- 47 Survey Points
- 179 Road / Track Junctions
- 1500 Total GPS points
- 127 Survey and Route maps

Conclusions
- GIS web-viewer enhanced site selection
- GIS routing reduced survey days by 20% (10 days – 8 days)
- Cost savings covered GIS development of road network data
- Repeatable methodology for future surveys
Further Developments

- Replaced manual field collection with tablets
  - Collector App
  - Backup mapping and GPS source
  - Automation of site reporting

- Use custom road network for live navigation
  - Navigator App
  - Get maximum ROI from road network development
Questions

Simon Ross
Technical Director | GIS and Remote Sensing
Oxford, UK
T| +44 1865 384 819
M| +44 7912 631 716
E| simon.ross@erm.com

Brett Shaver
Project Scientist | GIS and Remote Sensing
Boston, Massachusetts
T| +1 617 646 7827
M| +1 603 320 0263
E| brett.shaver@erm.com