

# FUGRO



## Virtual World Asset Management



# The world is changing faster than ever before.

The world's infrastructure and energy sources need to adapt to face the future.

Over the coming decades, climate change, population growth and urbanization will increase demand for energy, water, large-scale construction, infrastructure and natural resources.



# Utilities are Looking to Solve BIG Problems

Ensure Reliability, Safety, Reduce Wildfires, Storms, Floods, Regulations, Compliance, Risk Mitigation and Digital Transformation



## REDUCING POWER LINE ASSOCIATED WILDFIRE RISKS

### REDUCING POWER LINE ASSOCIATED WILDFIRE RISKS

Technology and Innovation | 21 June 2018 | By Fugro Media

Managing and maintaining power infrastructure networks is becoming increasingly demanding for utility providers with extreme weather events, such as prolonged droughts, presenting a complex set of challenges. Fugro's expertise in asset management and innovation has combined to create a unique and comprehensive digital solution to nature's problems.

The challenge of how to manage and maintain critical power infrastructure networks is central both to utilities and the communities they serve. As power cables wind their way across urban and rural environments, nature's impact is not seasonal and though weather events but in the less dramatic, but just as inevitable, spread of natural vegetation.



#### MOST POPULAR

##### Helping To Close The Ocean Data Gap

By Fugro Media

##### Bridge Manages With Ingenuity

By Fugro Media

Fugro's leading expertise in ocean water geotechnical site characterizations has saved time, cost and congestion during

##### Acceleration For Fugro's Hydrographic Training

By Fugro Media

Fugro's Applied Hydrographic Survey training course has achieved world-class ISO 9001:2015 accreditation from the



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Need Solutions

Proven – Reliable – Sustainable – Defensible



Roames service combines innovative mapping techniques with cutting-edge data processing, data analytics and cloud computing capabilities to deliver an accurate and dynamic 4D virtual model of assets.



Over 1.5 Million Networks Miles

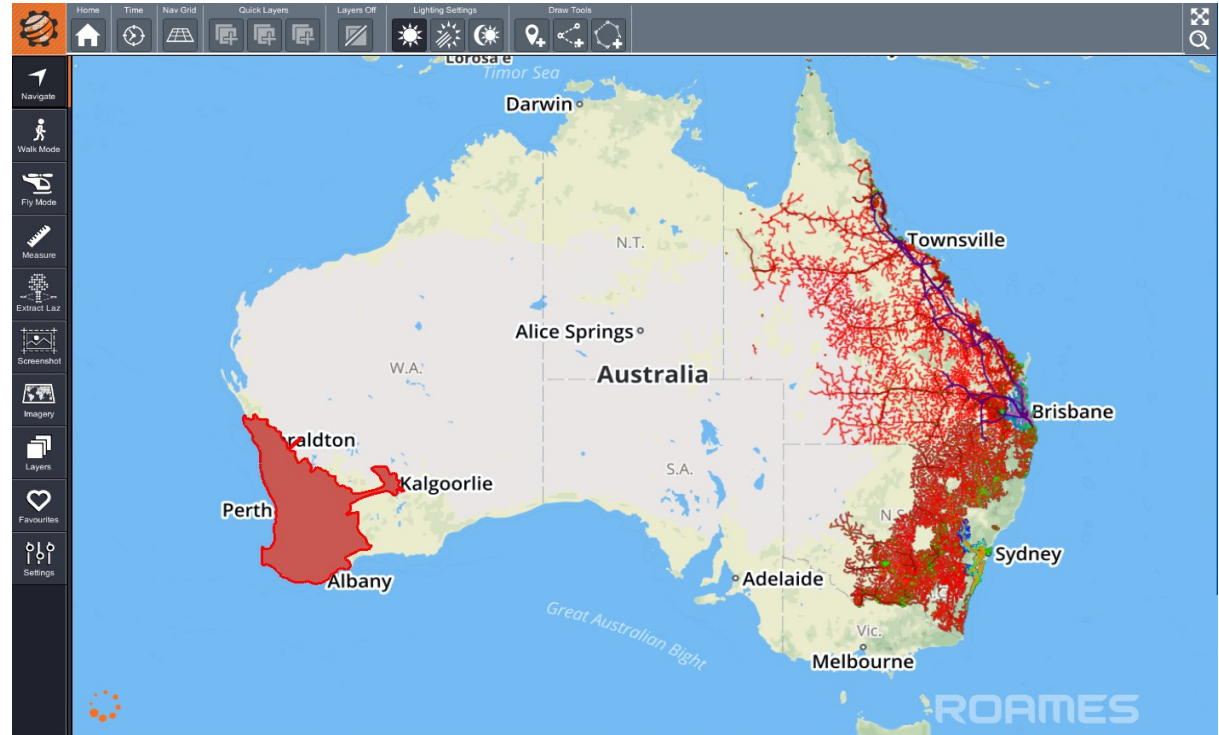




# Built for a Utility by a Utility

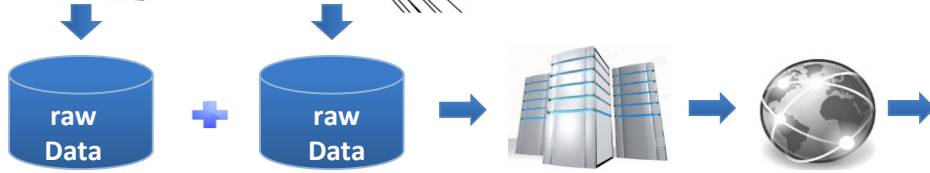
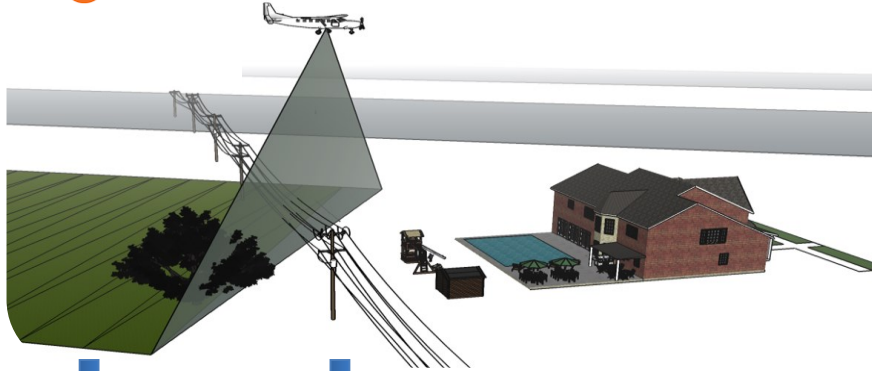
## ROAMES

- **Bush Fire**
- Asset Management
- Vegetation Management
- Risk Management
- Asset Condition
- Tree Specie Solutions
- **Disaster Management**



# 4D Virtual World Asset Management – Digital Utility

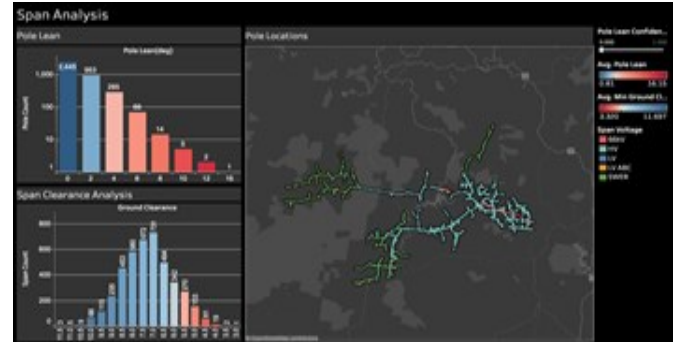
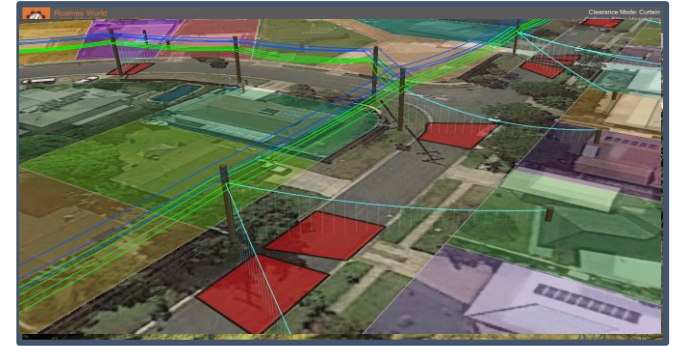
ROAMES



Acquisition

Processing  
and Algorithms

## Asset Analytics and Visualization



# Asset Matching



ROAMES v1.10.10 (64-bit) - Excel

Utilities

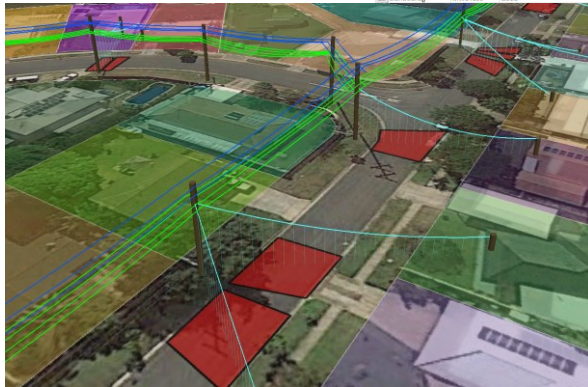
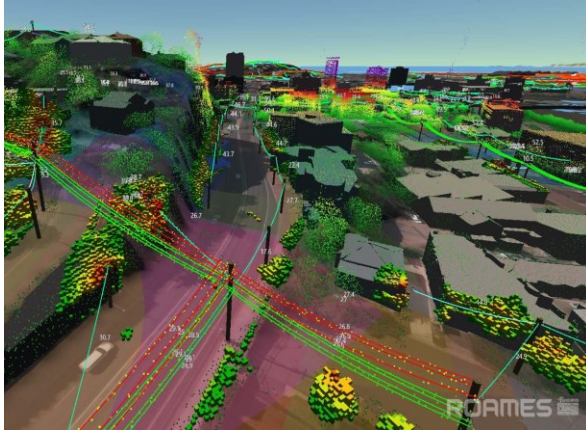
Reset Filters Refresh Attributes Columns  
Export Settings Roames World

Network Selection		Pole Data				Matched Pole Details				Pole Condition					
Substation(s)	Circuit Id	Captured Date	Pole Height (m)	Pole Lean	Pole Lean Confidence	Pole Voltages	Pole Confidence	Depot	Pole FNO	Match Confidence	Match Distance (m)	Material	Condition Category	Condition Task	Condition Task Description
8	Llanbedrog MW08102	10-7-2015	8.33	0	0	0 LV ABC		0.99 North Wales	81172027	0.998		3.26 Wood			
9	Llanbedrog MW08101	10-7-2015	9.58	0.81	0	1 LV		1 North Wales	81105363	0.999		0.81 Wood			
10	Llanbedrog MW08102	10-7-2015	9.39	0.67	0.99	LV ABC		1 North Wales	81142122	0.997		0.99 Wood			
11	Llanbedrog MW08101	10-7-2015	8.82	1.55	1	1 LV ABC		1 North Wales	81144118	0.999		3.45 Wood			
12	Llanbedrog MW08101	10-7-2015	8.47	3.35	1	1 LV		1 North Wales	81144113	0.999		3.45 Wood			
13	Llanbedrog MW08101	10-7-2015						North Wales	81133467			Wood			
14	Llanbedrog MW08101	10-7-2015	8.73	0.55	0.99	LV ABC		1 North Wales	81133466	0.998		2.39 Wood			
15	Llanbedrog MW08101	10-7-2015	8.58	0	0	1 LV ABC		1 North Wales	81133462	0.998		1.74 Wood			
16	Llanbedrog MW08101	10-7-2015	8.7	1.23	1	1 LV ABC		1 North Wales	81133407			2.31 Wood			
17	Llanbedrog MW08101	10-7-2015	8.99	1.76	1	1 LV ABC		1 North Wales	81133456			2.46 Wood			
18	Llanbedrog MW08101	10-7-2015	8.61	1.99	0.94	LV ABC		1 North Wales	81133455			3.52 Wood			
19	Llanbedrog MW08101	10-7-2015	8.66	0	0	1 LV ABC		1 North Wales	81133453			2.67 Wood			
20	Llanbedrog MW08101	10-7-2015	8.79	0	0	1 LV ABC		1 North Wales	81133448	0.998		1.92 Wood			
21	Llanbedrog MW08101	10-7-2015	9.16	0.16	1	1 LV ABC		1 North Wales	81109186			1.06 Wood			
						LV ABC		1 North Wales	81109185			3.63 Wood			
						1 LV ABC		1 North Wales	81109184	0.999		6.07 Wood			
						11kV		1 North Wales	81108115	0.989		17.97 Wood			
						11kV		1 North Wales	81108109			4.16 Wood			
						11kV		1 North Wales	81108105			6.14 Wood			
						11kV		1 North Wales	81108100			5.76 Wood			
						11kV		1 North Wales	81108085	0.999		1.91 Wood			
						11kV		1 North Wales	81108081	0.999		3.26 Wood			
						11kV		1 North Wales	81108058			2.12 Wood			
						11kV		1 North Wales	81108049	0.998		5.48 Wood			
						11kV		1 North Wales	81107826	0.954		3.99 Wood			
						11kV		1 North Wales	81107823	0.602		28.71 Wood			
						11kV		0.99 North Wales	81082219			3.95 Wood			





# Risk Management



ROAMES Network Summary All Network Span: 1138

Utilities: Reset Filters, Refresh Attributes, Columns, Export, Settings, Roames World

Substation(s)	Circuit Id	Capture Status	Captured Date	Span Length	Pole A ENID	Pole B ENID	Span Id	Span Voltage	Minimum Ground Clearance	Number of Conductors	Total Conductor Length	Intrusion Rating	Intrusion Volume
10	Llanbedrog MW04201	Good	15-7-2015	42.74	12541358	12541359	5011315	LV ABC	6.5	1	42.74	0	0
9	Llanbedrog MW04201	Good	15-7-2015	48.17	83027765	83027766	5011302	LV ABC	48.44	1	48.44	37.57	231
30	Llanbedrog MW04202	Good	10-7-2015	22.47	83029295	84809847	5011366	LV ABC	1	1	23.84	24.64	49.3
31	Llanbedrog MW04202	Good	15-7-2015	52.93		80323733	5011398	LV ABC	7.30	1	53.54	14.18	146.2
32	Llanbedrog MW04202	Good	15-7-2015	33.9	12538523	12538521	5011400	LV ABC	7.00	1	34.34	45.86	152.8
33	Llanbedrog MW04202	Good	15-7-2015	49.03	12538265	12538260	5011403	LV	6.96	2	98.29	38.67	179.3
34	Llanbedrog MW04202	Good	15-7-2015	40.23	12538523	12538528	5011402	LV ABC	6.40	1	40.83	0	0.3
35	Llanbedrog MW04201	Good	10-7-2015	54.91	12538939	12538930	5011403	LV ABC	1	1	54.98	0	21.8
36	Llanbedrog MW04201	Good	10-7-2015	46.41	12541210	12541211	5011404	LV ABC	4.36	1	46.35	72.12	138.5
37	Llanbedrog MW04201	Good	10-7-2015	40.05	83021771	83021773	5011405	LV ABC	6.30	1	40.38	0	35.1
38	Llanbedrog MW04202	Good	15-7-2015	43.45	12538704	12538690	5011405	LV ABC	3.86	1	43.93	0	49.8
39	Llanbedrog MW04201	Good	10-7-2015	47.59	12541217	12541207	5011407	LV ABC	6.02	1	47.53	10.56	81
40	Llanbedrog MW04202	Good	15-7-2015	40.97	12538892	12538890	5011408	LV ABC	5.70	1	40.4	0	3.6
21	Llanbedrog MW04201	Good	10-7-2015	47.66	12541209	12541210	5011409	LV ABC	5.86	1	48	0	22.5
22	Llanbedrog MW04201	Good	10-7-2015	38.3	12541407	12541400	5011410	LV ABC	6.5	1	38.58	38.22	190.1
23	Llanbedrog MW04202	Good	15-7-2015	30.99	12538716	12538714	5011411	LV ABC	5.77	1	31.08	0	44
24	Llanbedrog MW04201	Good	10-7-2015	49.33	12541217	12541218	5011412	LV ABC	7.20	1	49.25	10.56	52
25	Llanbedrog MW04201	Good	10-7-2015	43.81	12541236	12541237	5011414	LV ABC	5.44	1	44.82	36.61	185.9
26	Llanbedrog MW04201	Good	10-7-2015	36.1	12541216	12541217	5011413	LV ABC	7.15	1	36.4	0	35.1
27	Llanbedrog MW04201	Good	10-7-2015	34.18	12541219	12541218	5011414	LV ABC	5.87	1	34.85	10.56	107.1
28	Llanbedrog MW04203	Good	10-7-2015	83.83	12538648	12538648	5011452	LV	5.30	2	165.04	87.9	262.4
			15-7-2015	72.54	12538641	83093947	5011453	LV ABC	5.36	1	72.52	27.19	176.8
			10-7-2015	60.04	12538523	12538528	5011454	LV ABC	6.45	1	60.66	0	6.8
			10-7-2015	40.36	12538735	12538646	5011455	LV	2	120.95	13.2	44.9	
			10-7-2015	72.02	12538629	83093902	5011456	LV ABC	1	1	72.22	0	1
			10-7-2015	53.61	12538663	12538664	5011457	LV	1	1	53.62	0	11.8
			15-7-2015	50.53	12538469	12538473	5011458	LV ABC	6.60	1	50.89	14.4	46.4

Summary: Pole Summary, Intrusion Summary



# Asset Condition Assessment



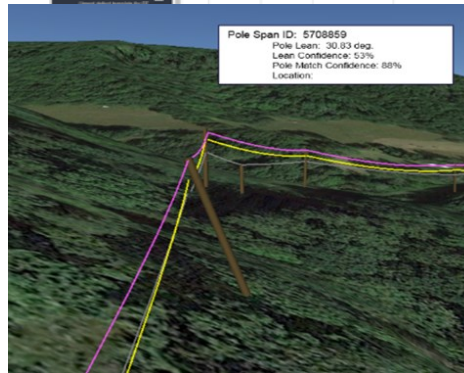
Reports X Tab View

All Poles Essential ... X

Choose Dept: Dmpg

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Latitude	Longitude	Contractor Pole_ID	WASP_ID	Label	Image #1 Close Pole Head - On Approach	Image 2# Close Pole Head - (Plan View)	Image #3 Close Pole Head - (Plan View)
-30.280319	152.668953	8987062	1539982	47312	hyperlink[\"_././Aerial%20Photos/Pole%20Top8987062_approach.jpg\", \"8987062_approach.jpg\"]		hyperlink[\"_././Aerial%20Photos/Pole%20Top8987062_depart.jpg\", \"8987062_depart.jpg\"]
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-30.287864	152.672393	8987066	1529979	60388	hyperlink[\"_././Aerial%20Photos/Pole%20Top8987066_approach.jpg\", \"8987066_approach.jpg\"]		hyperlink[\"_././Aerial%20Photos/Pole%20Top8987066_depart.jpg\", \"8987066_depart.jpg\"]
-30.292074	152.671936	8987069	1539816	47236	hyperlink[\"_././Aerial%20Photos/Pole%20Top8987069_approach.jpg\", \"8987069_approach.jpg\"]		hyperlink[\"_././Aerial%20Photos/Pole%20Top8987069_depart.jpg\", \"8987069_depart.jpg\"]
-30.244424	152.678743	8987070	1539772	47229	hyperlink[\"_././Aerial%20Photos/Pole%20Top8987070_approach.jpg\", \"8987070_approach.jpg\"]		hyperlink[\"_././Aerial%20Photos/Pole%20Top8987070_depart.jpg\", \"8987070_depart.jpg\"]
-30.158887	152.578259	8987075	1533802	60880	hyperlink[\"_././Aerial%20Photos/Pole%20Top8987075_approach.jpg\", \"8987075_approach.jpg\"]		hyperlink[\"_././Aerial%20Photos/Pole%20Top8987075_depart.jpg\", \"8987075_depart.jpg\"]
-30.160000	152.576228	8987076	1525891	60879	hyperlink[\"_././Aerial%20Photos/Pole%20Top8987076_approach.jpg\", \"8987076_approach.jpg\"]		hyperlink[\"_././Aerial%20Photos/Pole%20Top8987076_depart.jpg\", \"8987076_depart.jpg\"]
-30.288279	152.811655	8988221			hyperlink[\"_././Aerial%20Photos/Pole%20Top8988221_approach.jpg\", \"8988221_approach.jpg\"]		hyperlink[\"_././Aerial%20Photos/Pole%20Top8988221_depart.jpg\", \"8988221_depart.jpg\"]
				3107	hyperlink[\"_././Aerial%20Photos/Pole%20Top8988222_approach.jpg\", \"8988222_approach.jpg\"]		hyperlink[\"_././Aerial%20Photos/Pole%20Top8988222_depart.jpg\", \"8988222_depart.jpg\"]
				3481	hyperlink[\"_././Aerial%20Photos/Pole%20Top8988223_approach.jpg\", \"8988223_approach.jpg\"]		hyperlink[\"_././Aerial%20Photos/Pole%20Top8988223_depart.jpg\", \"8988223_depart.jpg\"]
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				3135	hyperlink[\"_././Aerial%20Photos/Pole%20Top8988225_approach.jpg\", \"8988225_approach.jpg\"]		hyperlink[\"_././Aerial%20Photos/Pole%20Top8988225_depart.jpg\", \"8988225_depart.jpg\"]



**ROAMES**



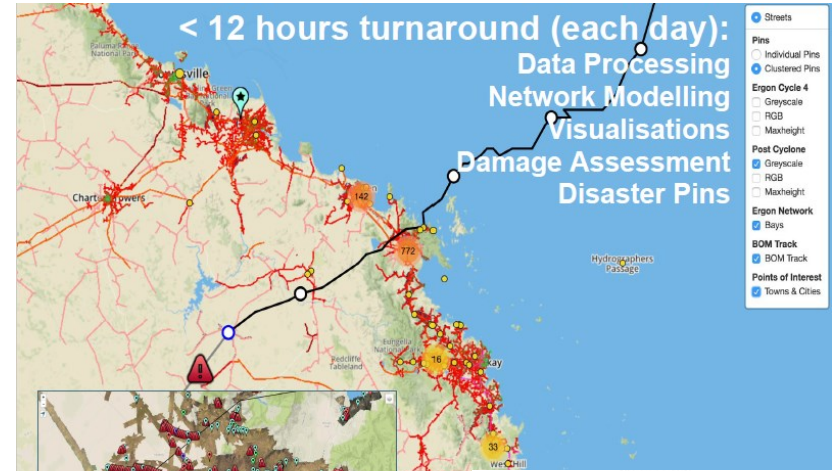
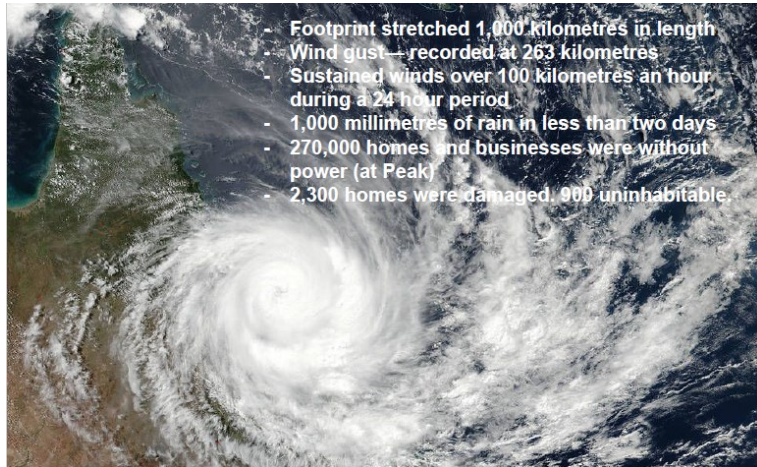


# Disaster Management Solutions

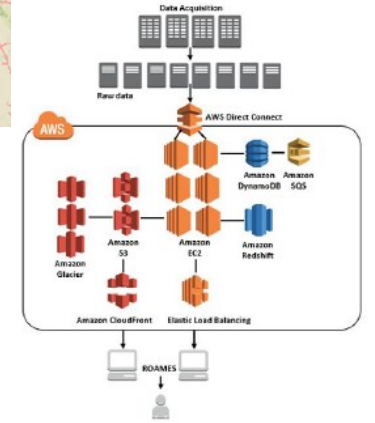
## FUGRO'S ROAMES SOLUTION SUPPORTS ERGON ENERGY'S RESPONSE TO CYCLONE DEBBIE

Soon after Tropical Cyclone Debbie struck Queensland, Australia, Fugro deployed its Roames solution to detect the damage to the electricity distribution network and support Ergon Energy's recovery efforts.

Brisbane, Australia  
07 Apr 2017

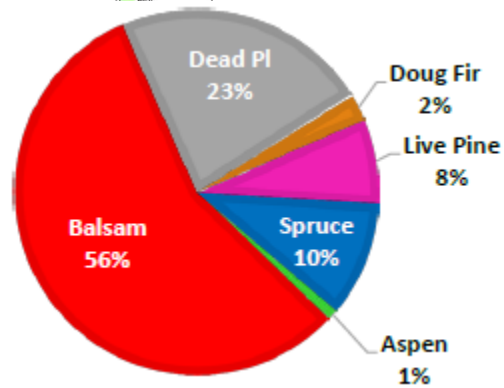
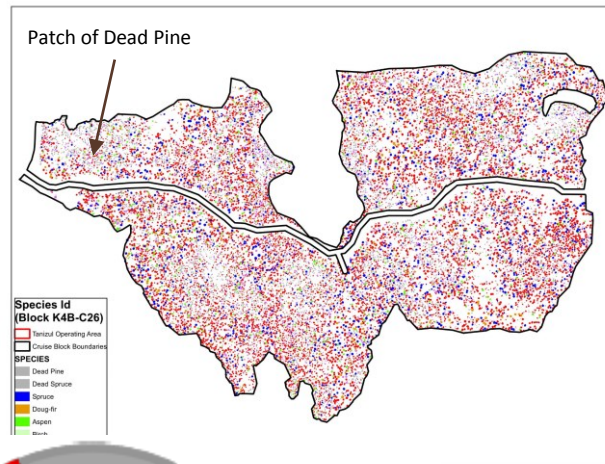
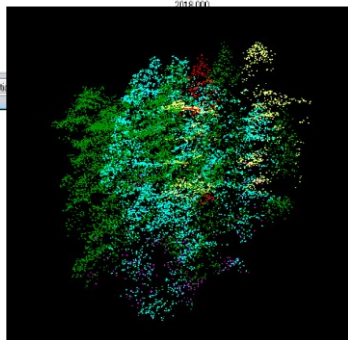
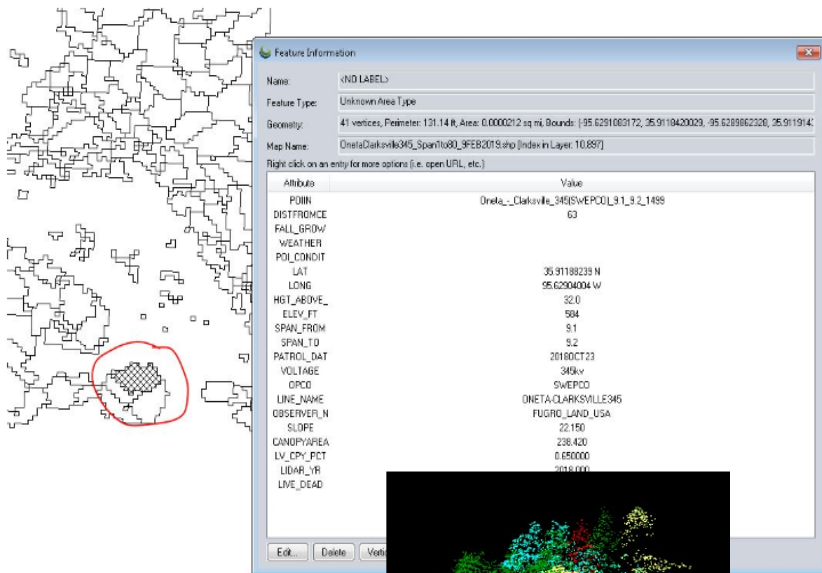


**ROAMES**





# Tree Specie Solutions



# Big Data and Predictive Analytics

The screenshot displays the Roames software interface, which is used for network maintenance and predictive analytics. The interface is divided into several sections:

- Navigation and Filters:** At the top, there are tabs for 'Files', 'Drive', 'Reports', 'Insight', 'Assets', and 'Data'. Below these are filters for 'Client', 'VZ Program Type', 'Region', 'Sub Region', 'Depot', 'VZ No', 'VZ Name', and 'Cycle No'.
- Table:** A large table lists various Vegetation Zones (VZ) with columns for VZ No, VZ Name, Cycle No, Bio Region, VZ EQ Bay Count, VZ Capt Bay Count, VZ Capt Pole Count, and VZ Captured Network KM. The table shows 90 rows of data.
- Insight Panel:** A sidebar on the left contains a search bar and a list of categories: Network Maintenance, Old, Other, Vegetation, Applications, and VZ MET Optimisation.
- Chart:** A line chart titled 'Total difference in Cost: \$-2,467,336' compares 'Current Cost' (red line) and 'Scenario Cost' (blue line) from FY 17/18 to FY 22/23. The y-axis represents 'Cost' from \$16,000,000 to \$23,000,000.
- Map:** A map of Australia shows various regions highlighted in different colors, corresponding to the data in the table. A legend on the right indicates 'Roames Fil...' and 'Scenario Program'.
- Data Table:** Below the chart is a detailed table with columns: Nameplate, VZ No, VZ Name, Program, Region, Customers, B, Cost, LL, LL/km, Growth Rate, Scenario Cycle, Scenario RBD, Scenario LL, Pred LLKM, and Status. It lists various projects like 'VZ-1000787 F078c-DULACCA SWER' and 'VZ-1000786 356 FC-Wier'.

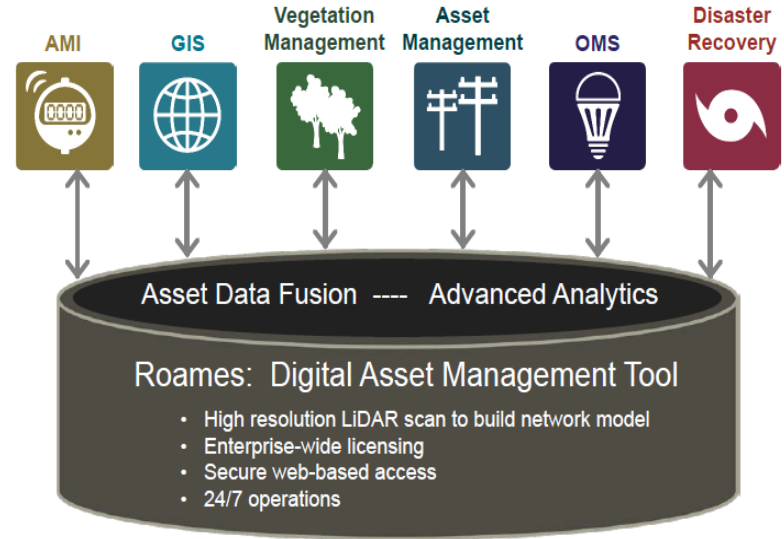




# Realized Benefits



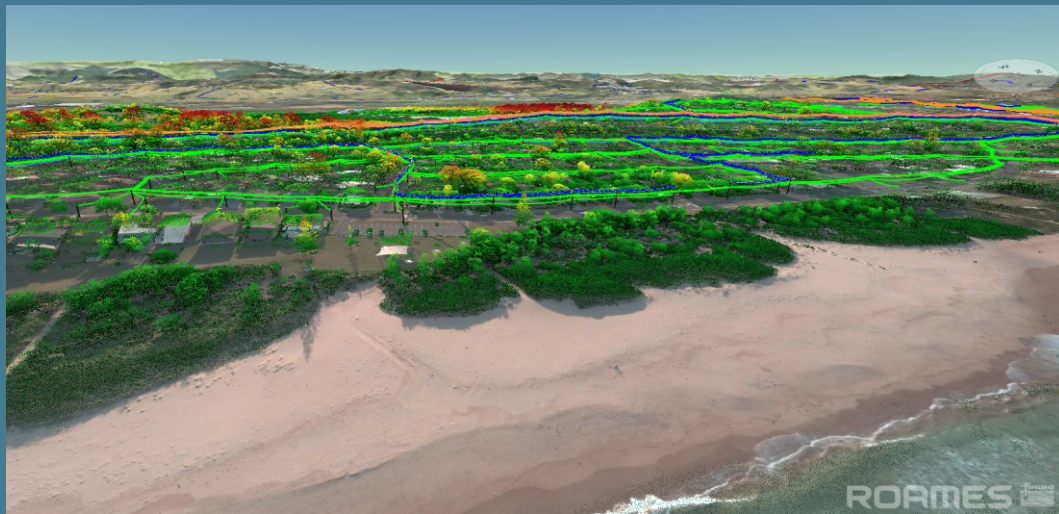
- Increase Reliability
- Increase Safety
- Reduce Risks
- Reduce Costs
- Deliver at Scale
- Annual Audit of Network



Creates a Single Version of Truth for the Enterprise



# QUESTIONS / DISCUSSION



Anthony D. Palizzi  
Fugro USA Land, Inc.  
Regional Manager Power, Americas  
[a.palizzi@fugro.com](mailto:a.palizzi@fugro.com)  
+1 303.378.0684