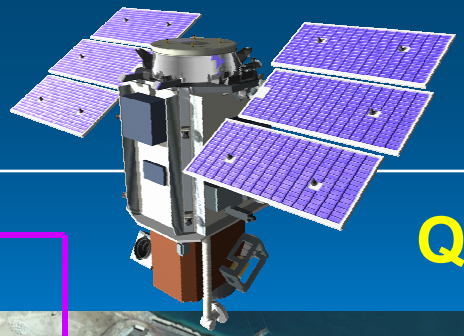
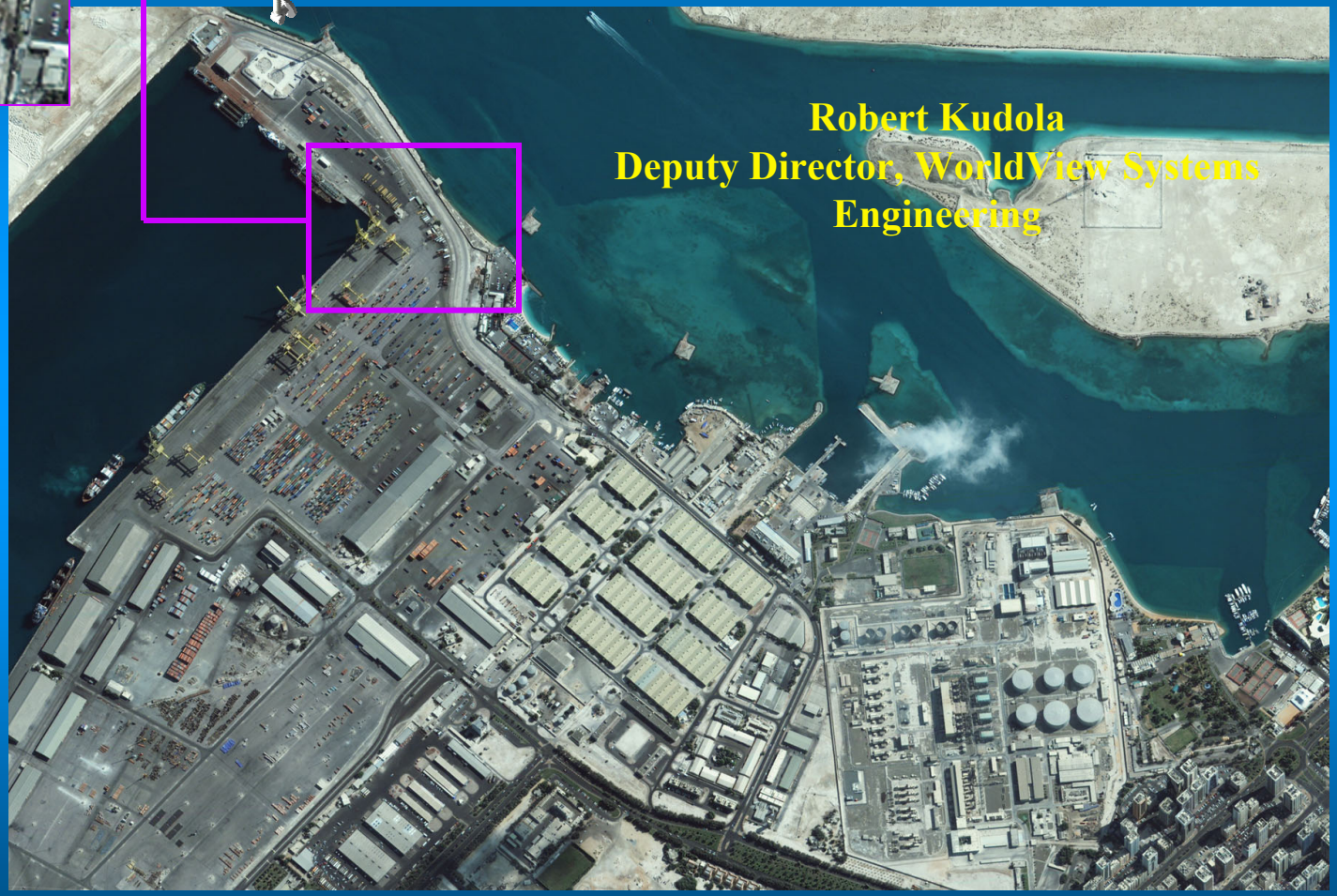


DIGITALGLOBE™

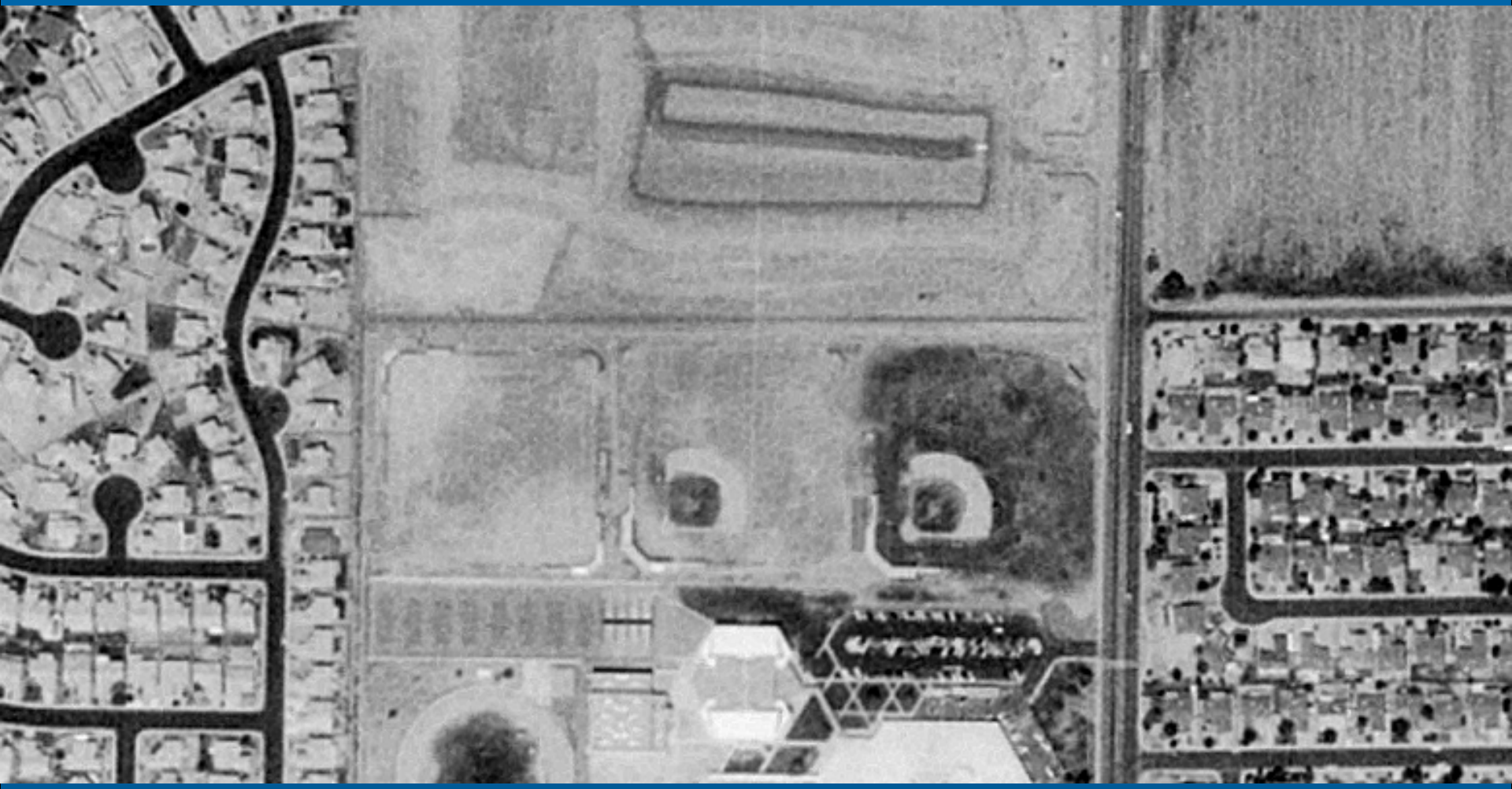
QuickBird Applications



Robert Kudola
Deputy Director, WorldView Systems Engineering

USGS DOQQ, I meter, Pan, Area 2

DIGITALGLOBE™



DigitalGlobe DOQQ, 2-foot, Pan, Area 2

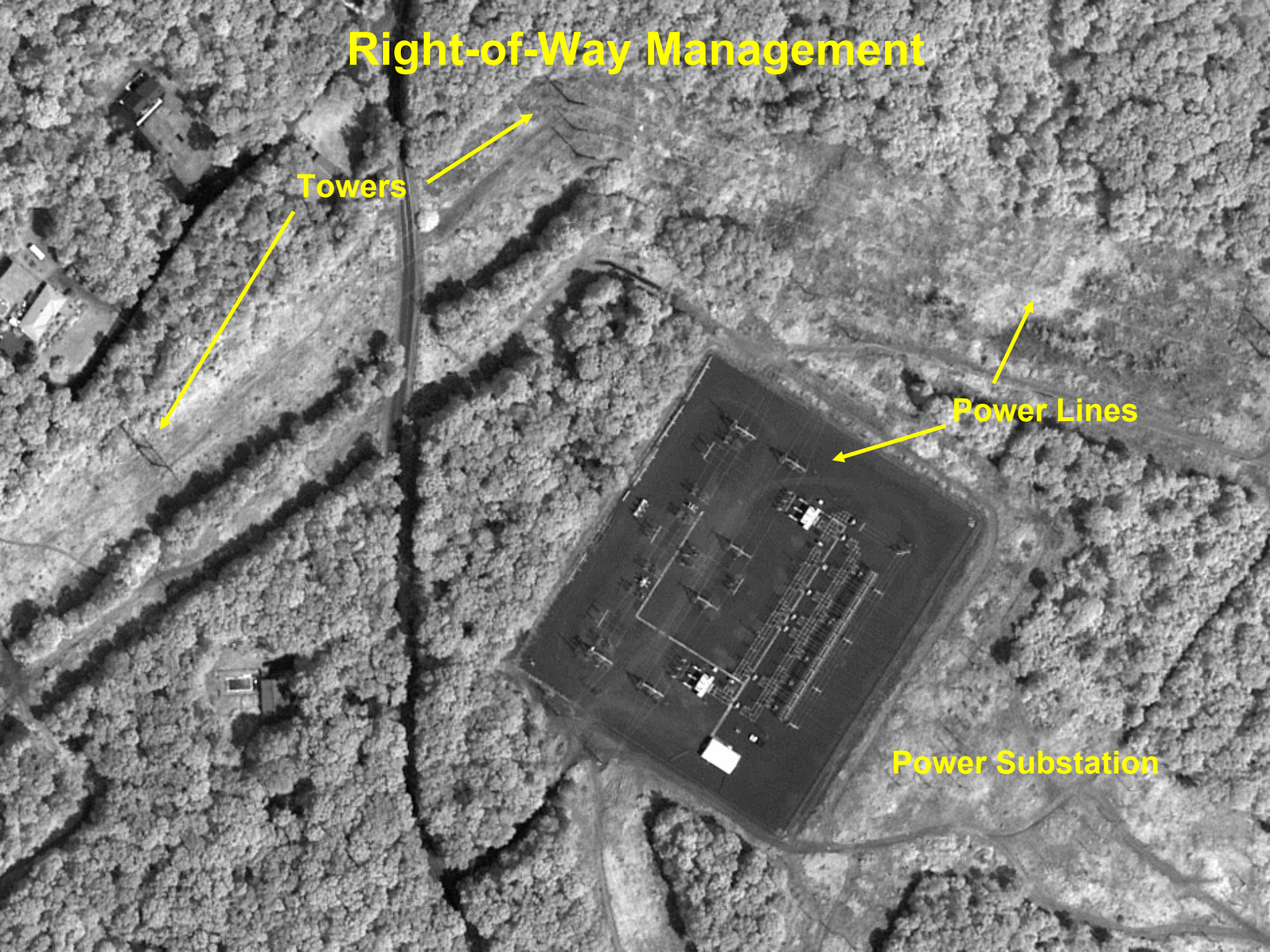
DIGITALGLOBE™

DigitalGlobe DOQQ, 2-foot, Color, Area 2

DigitalGlobe DOQQ, 2-foot, CIR, Area 2

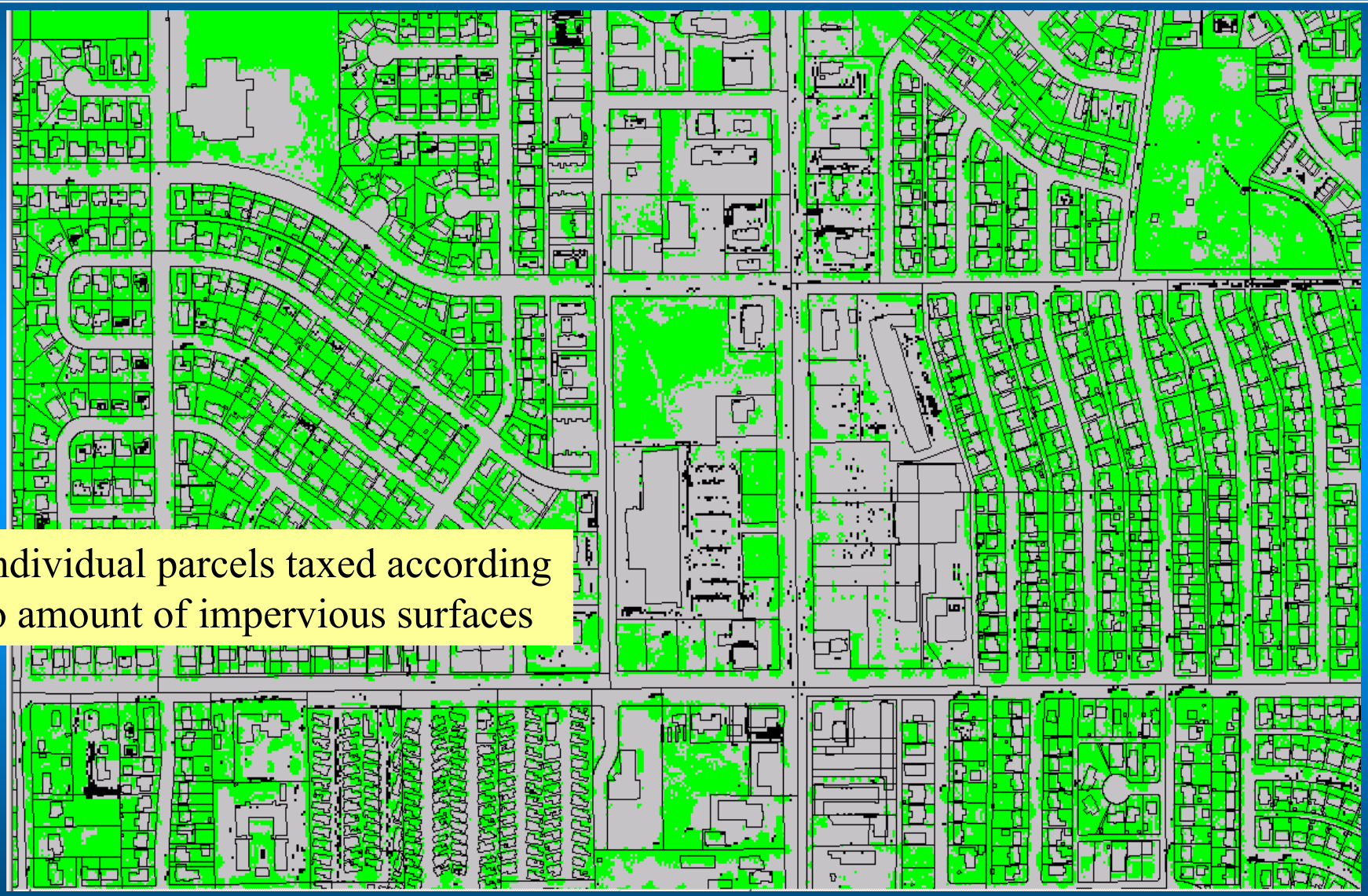
DIGITALGLOBE™

Right-of-Way Management

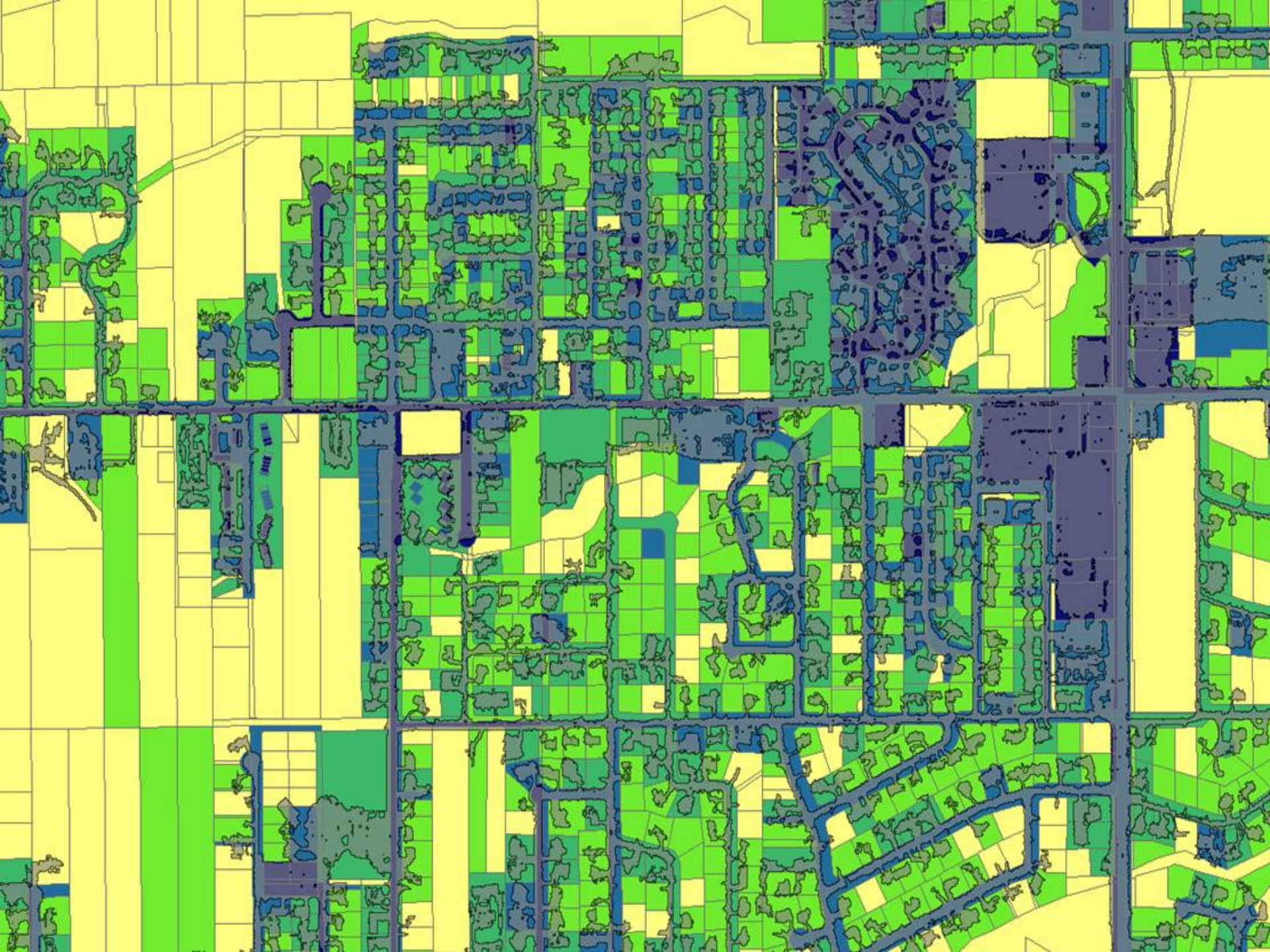


Taxation Based on Contribution to Storm Water Runoff

DIGITALGLOBE™



Individual parcels taxed according to amount of impervious surfaces



Attributes Simply Added to Existing GIS and Billing Database

DIGITALGLOBE™

Attributes of PARCEL

PIN	MAILSTRNBR	PRPSTRDIR	MAILSTRNAM	PRPSTRTYP	MAILCTYNAM	PRPZIP5	MAILSTENAM	PERIMETER	PARC_AREA	IMP_AREA	PER_IMP
39-271-00-010	09155	W	35TH	AVE	WHEAT RIDGE	80033	CO	179.77564	1151.586561	394.394842	34.247955
39-271-00-010	09155	W	35TH	AVE	WHEAT RIDGE	80033	CO	515.8763	15262.735952	8586.850418	56.260230
39-291-01-014	03582		SIMMS	ST	WHEAT RIDGE	80033	CO	498.59464	11041.802045	5195.359034	47.051731
39-291-05-030	03044	W	C WEST 113TH	AVE	WESTMINSTER	80033	CO	795.19802	19854.696315	1353.500692	6.817030
39-271-00-011	09125	W	35TH	AVE	WHEAT RIDGE	80033	CO	512.91858	13611.099883	4827.070777	35.464223
39-252-05-018	03520		OTIS	ST	WHEAT RIDGE	80033	CO	398.97472	9332.438391	2799.957641	30.002423
39-291-06-098	11672	W	36TH	AVE	WHEAT RIDGE	80033	CO	386.98206	9021.259233	4022.368001	44.587656
39-261-00-138	03515		PIERCE	ST	WHEAT RIDGE	80033	CO	406.73366	9623.755179	3198.325106	33.233650
39-281-12-004	03685		KIPLING	ST	WHEAT RIDGE	80033	CO	353.69476	4444.579012	2771.824824	62.364170
39-281-12-012	03656		KLINE	ST	WHEAT RIDGE	80033	CO	269.25664	2936.095687	2115.628923	72.055857
39-252-08-010	03505		OTIS	ST	WHEAT RIDGE	80033	CO	423.34859	10504.056376	3915.087860	37.272152
39-291-06-099	11652	W	36TH	AVE	WHEAT RIDGE	80033	CO	397.44958	9299.239186	5328.748318	57.303057
39-262-02-147			PO BOX 371062	ST	DENVER	80033	CO	457.66524	12011.612696	2874.645749	23.932221
39-262-03-013	03521		ALLISON	ST	WHEAT RIDGE	80033	CO	416.22516	10088.838184	4343.978100	43.057268
39-291-06-058	11818	W	36TH	AVE	WHEAT RIDGE	80033	CO	467.86026	13116.031153	4027.231886	30.704653
39-291-06-100	11632	W	36TH	AVE	WHEAT RIDGE	80033	CO	404.59032	9572.830247	4423.059553	46.204304
39-261-00-139	03504		QUAY	ST	WHEAT RIDGE	80033	CO	361.51812	7889.893872	2468.638463	31.288614
39-291-06-101	03583		SIMMS	ST	WHEAT RIDGE	80033	CO	405.91595	9879.060661	1360.980260	13.776414
39-272-13-013		W	P.O. BOX 1886	AVE	WHEAT RIDGE	80033	CO	582.91568	18965.730447	2442.318646	12.877535
39-251-00-042	05707	W	35TH	AVE	WHEAT RIDGE	80212	CO	408.91382	9063.901033	1568.446558	17.304321
39-252-00-032	03555		HARLAN	ST	WHEAT RIDGE	80033	CO	376.12902	7214.332441	4657.042987	64.552653
39-252-00-032	03555		HARLAN	ST	WHEAT RIDGE	80033	CO	131.96527	689.831898	443.054520	64.226447
39-262-02-120	07801	W	35TH	AVE	WHEAT RIDGE	80033	CO	250.99851	3920.082219	1645.345720	41.972225
39-282-03-003	03520		OWENS	ST	WHEAT RIDGE	80033	CO	425.0106	11290.072463	3255.343705	28.833683
39-262-04-010	03525		ALLISON	CT	WHEAT RIDGE	80033	CO	425.58119	10246.289628	3313.506379	32.338598
39-282-03-002	10762	W	35TH	PL	WHEAT RIDGE	80033	CO	425.89657	10972.953456	2804.345340	25.556887
39-262-02-133	00024	W	HILLSIDE	AVE	WHEAT RIDGE	80033	CO	282.54777	4987.698241	4987.693721	99.999909
39-282-03-001	10742	W	35TH	PL	WHEAT RIDGE	80033	CO	424.41292	10862.938263	4802.566839	44.210569
39-281-07-001	10710	W	35TH	PL	WHEAT RIDGE	80033	CO	344.38827	5809.776581	2319.724414	39.927945
39-281-07-001	10710	W	35TH	PL	WHEAT RIDGE	80033	CO	320.85319	4317.018396	1503.991444	34.838662
39-291-05-004	12500		32ND	RD	WHEAT RIDGE	80033	CO	392.53647	9239.953732	2081.400555	22.526093
39-281-07-002	10692	W	35TH	PL	WHEAT RIDGE	80033	CO	421.69741	10673.914836	4409.734451	41.313188
39-251-03-015	03510		CHASE	ST	WHEAT RIDGE	80212	CO	393.21833	8189.352618	2608.979219	31.858186

Record: 5144 Show: All Selected Records (0 out of 15794 Selected.) Options

Results

DIGITALGLOBE™

Results for impervious as measured by DG's algorithm:

Test Area	Residential 1	Residential 2	Residential 3
Number of parcels	249	92	22
Accuracy rate (%.)	4.1	4.2	9.5
Standard Deviation	6.4	6.4	7.5
of the accuracy rate			
Total Number of parcels	363		
Combined accuracy rate	4.5		
Combined Std. Dev.	6.5		

Results for impervious as manually digitized by WMD

Test Area	Residential 1	Residential 2	Commercial	Industrial
Number of parcels	48	95	14	49
Accuracy rate (%)	4.2	4.3	3.9	4.7
Standard Deviation	6.3	4.1	5.3	6.9
of the accuracy rate				
Total Number of parcels	206	Residential only:	143	
Combined accuracy rate	4.5		4.3	
Combined Std. Dev.	6.0		4.9	

Results are similar between existing manual digitizing methods and image processing methods

Efficiency of New Methodology

DIGITALGLOBE™

Source of data collection	Algorithm		Air photo digitized		Site plan digitized	
	Residential	New construction residential	Residential	New construction residential	Residential	New construction residential
Number of parcels	50	50	50	50	50	50
Impervious collection time per parcel	1/2 sec.	1/2 sec.	2 min.	2 min.	10 min.	10 min.
Total time to collect impervious	25 sec.	25 sec.	100 min.	100 min.	500 min.	500 min.
Field verification time per parcel	35 min.	3.6 min.	35 min.	3.6 min.	35 min.	3.6 min.
Total field verification time	1,750 min.	180 min.	1,750 min.	180 min.	1,750 min.	180 min.
Total investigation time	1,750.4 min.	180.4 min.	1,850 min.	280 min.	2,250 min.	680 min.
Total investigation time per parcel	35 min.	3.6 min.	37 min.	5.6 min.	45 min.	13.6 min.
Revenue generated per parcel	$54.00	$54.00	$54.00	$54.00	$54.00	$54.00
Total revenue generated	$2,700.00	$2,700.00	$2,700.00	$2,700.00	$2,700.00	$2,700.00
Revenue generated / hour	**$92.50**	**$900.00**	**$87.58**	**$578.57**	**$72.00**	**$238.94**

Additional Benefits

DIGITALGLOBE™

- Map newly developed areas efficiently and accurately
- Update existing database using image processing techniques
  - Change detection and location of parcels to be updated
  - Derive impervious surface information and update billing system
- Impervious Surface Maps are a very important input to hydrologic modeling packages (e.g., HEC-1 & 2, HEC RAS, SWMM)
- Conducive to GIS analysis and modeling
  - impervious, elevation, slope, landcover and landuse, surface friction, etc.
- Important for Watershed Master Planning
- Drinking Water Source Protection
- Helps stormwater managers make well-informed and timely decisions

DigitalGlobe: Acquisition of Mobile to Pensacola

DIGITALGLOBE™

QuickBird Acquisition: 21 September 2004

QuickBird imaged a diagonal strip from west of Mobile to Pensacola on 21 September 2004 n t approximately 30 degrees off-nadir.

The collected imagery enables a detailed analysis of post-Hurricane Ivan damage.

Naval Air Station Pensacola

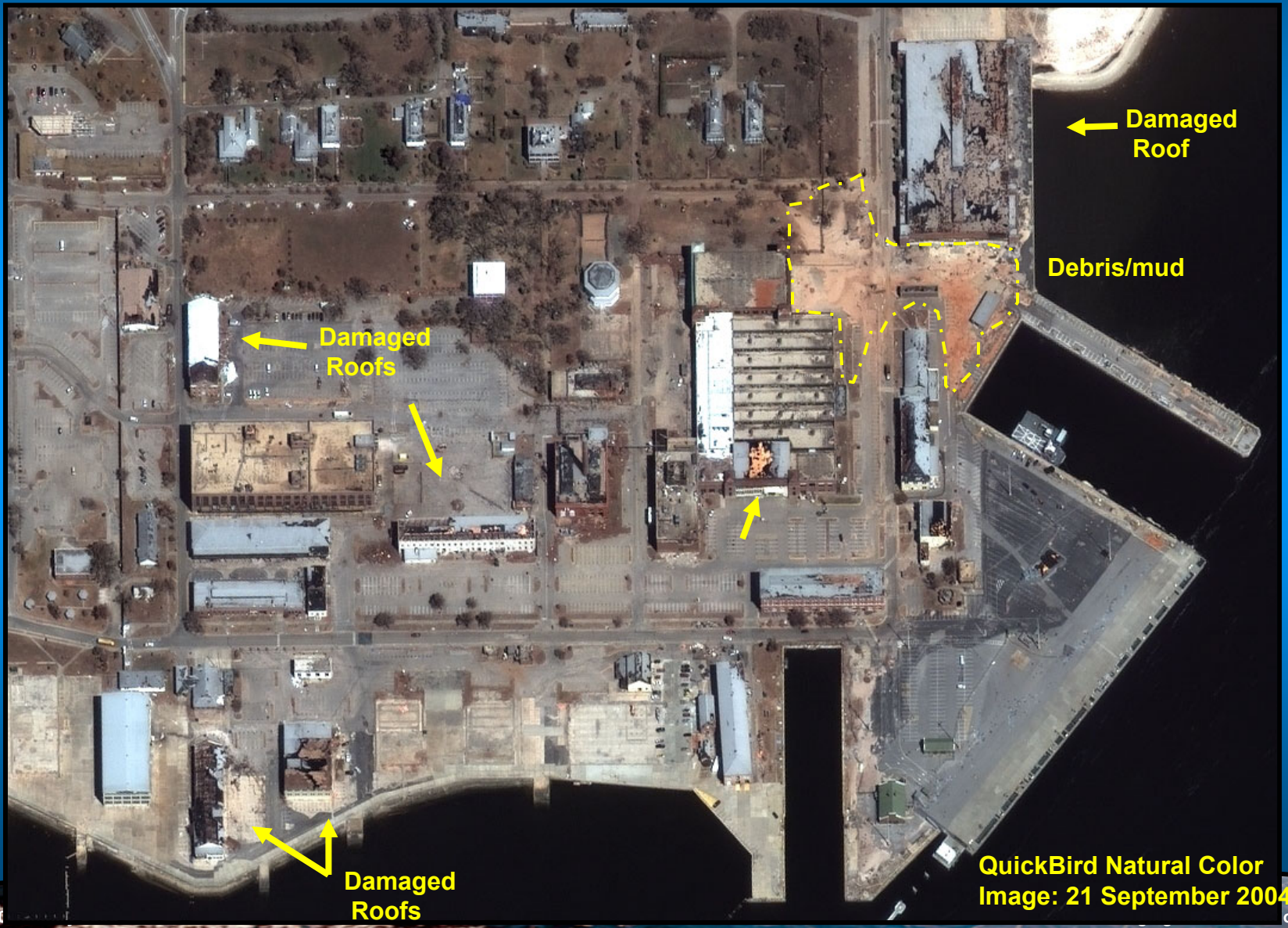
DIGITALGLOBE™

QuickBird Natural Color Image: 21 September 2004

mpany

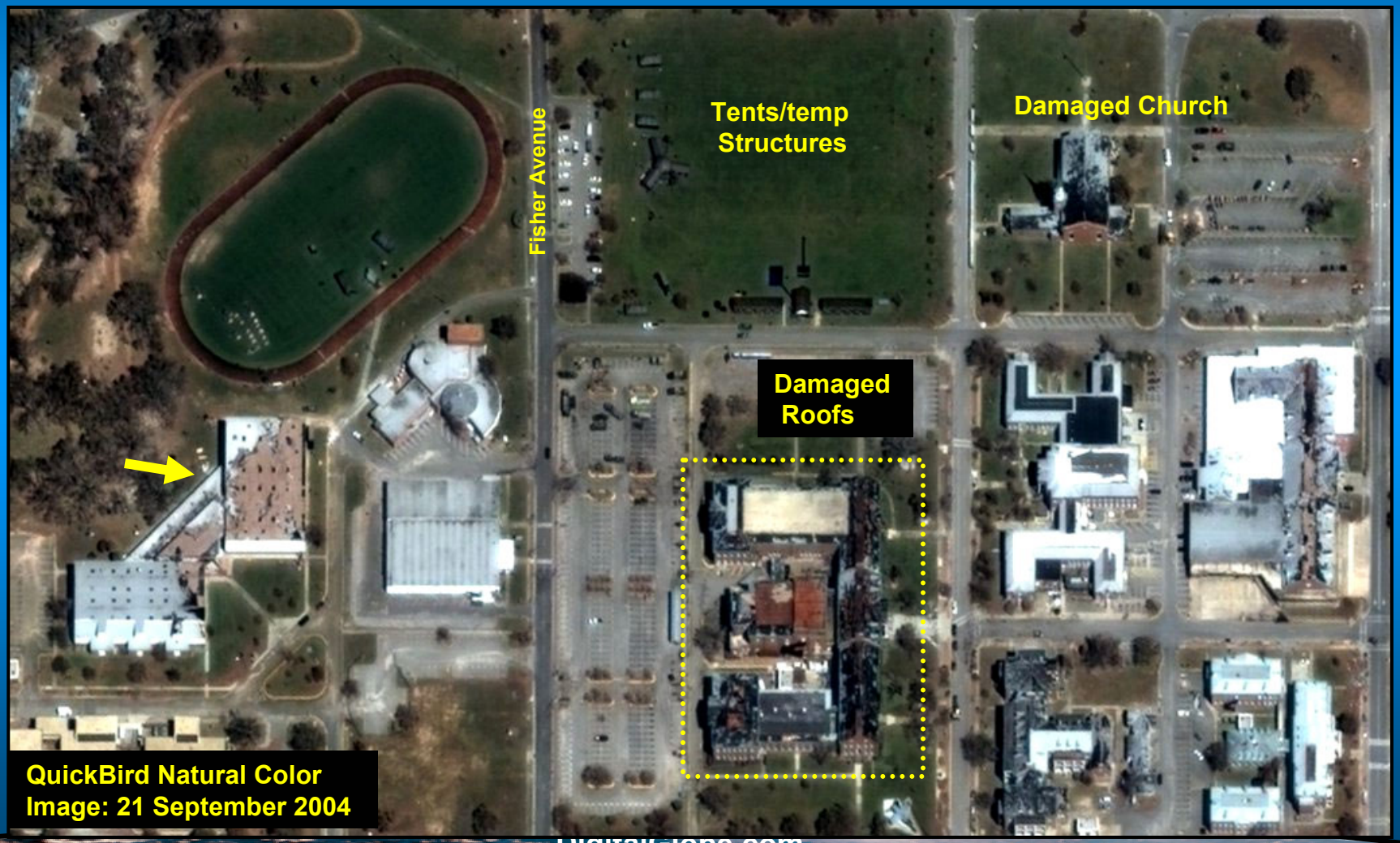
Naval Air Station Pensacola

DIGITALGLOBE™



Naval Air Station Pensacola

DIGITALGLOBE™



Gulf Islands National Seashore Cut Off By Ivan Storm Surge

DIGITALGLOBE™

Gulf Islands National Seashore Cut Off By Ivan

DIGITALGLOBE™

Bayou Chico: Storm Damage

DIGITALGLOBE™

QuickBird Satellite Imagery Taken at 280 miles: 2-fiit Resolution

NOAA's Aerial Imagery Taken at 7500 feet: 1-foot Resolution

Bayou Chico: Storm Damage

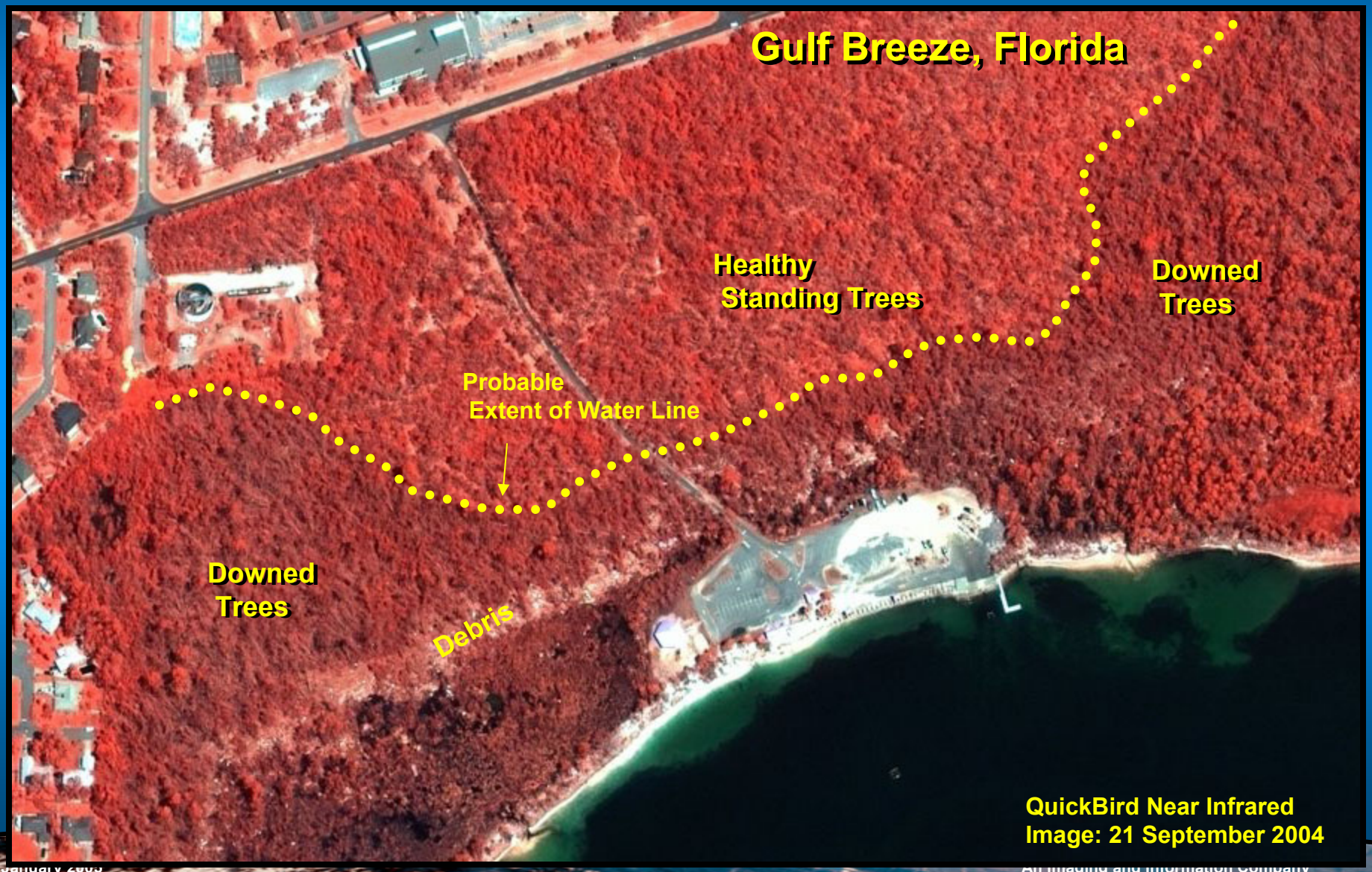
QuickBird Natural Color
Image: 21 September 2004

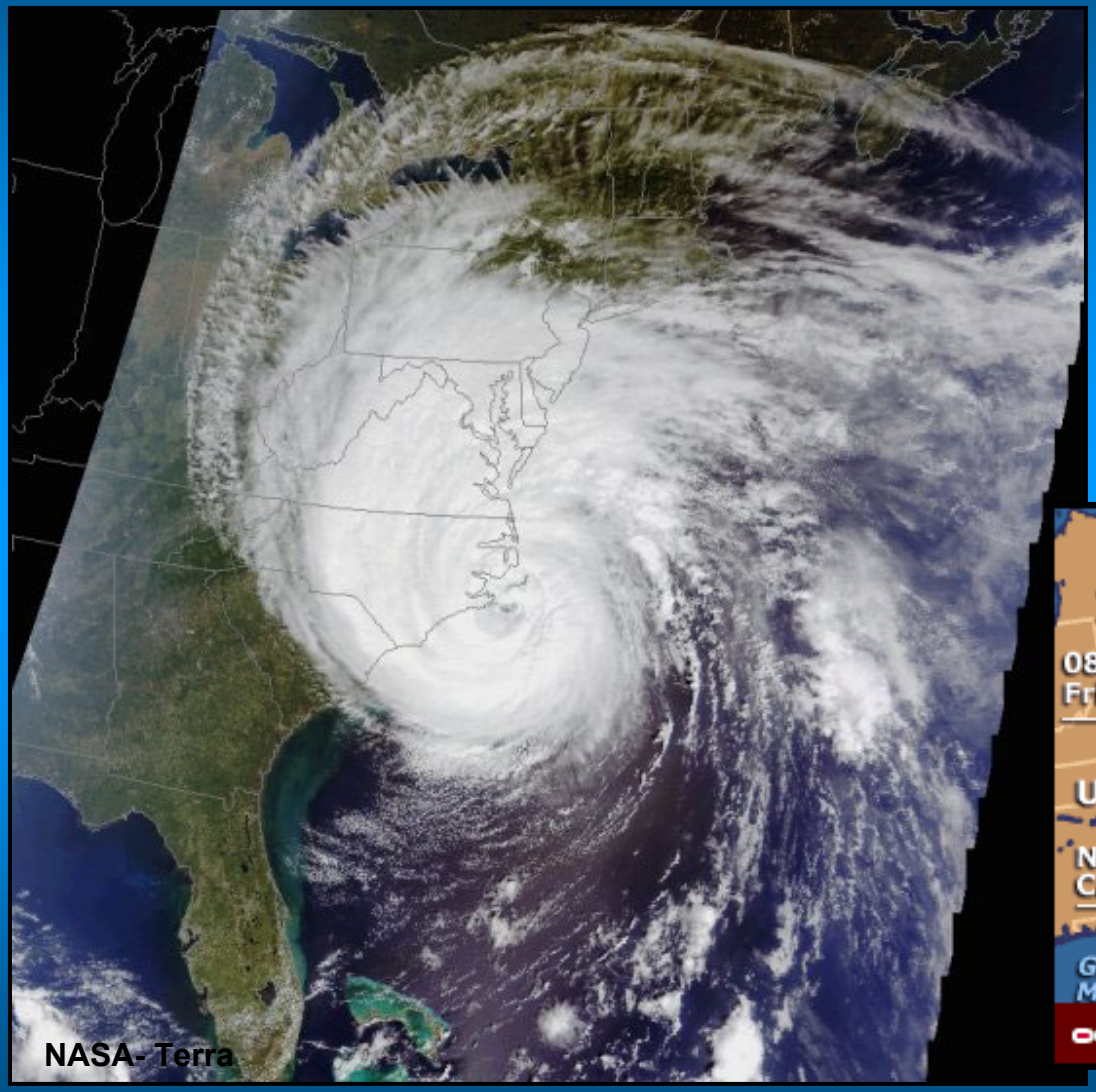
Multispectral Imagery Reveals Tree Damage

DIGITALGLOBE™

Multispectral Imagery Reveals Tree Damage

DIGITALGLOBE™

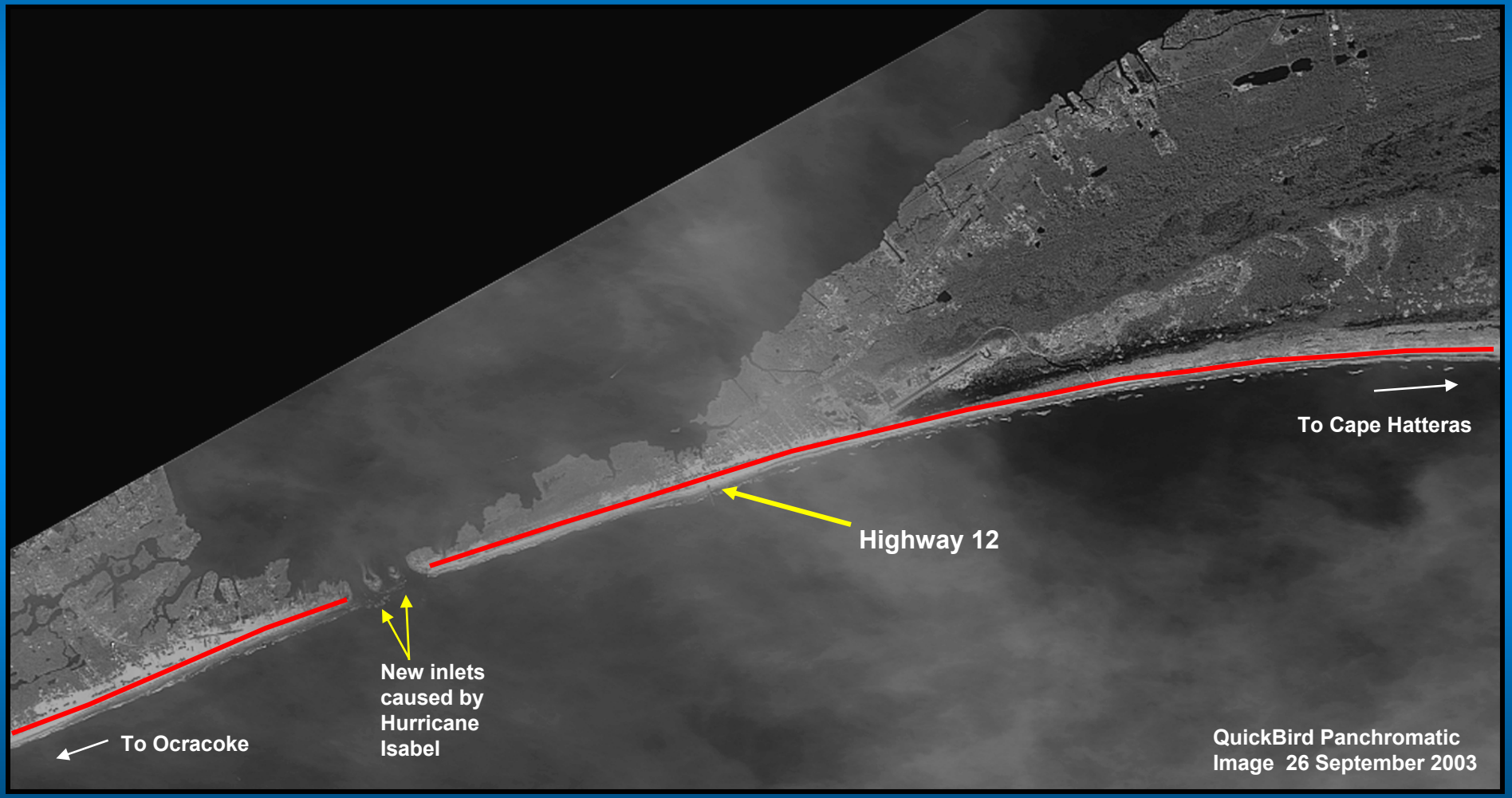




Hurricane Isabel (Category 3) Takes Aim at North Carolina Outer Banks September 19, 2003

Hurricane Isabel, North Carolina

DIGITALGLOBE™



Hurricane Isabel, North Carolina

DIGITALGLOBE™

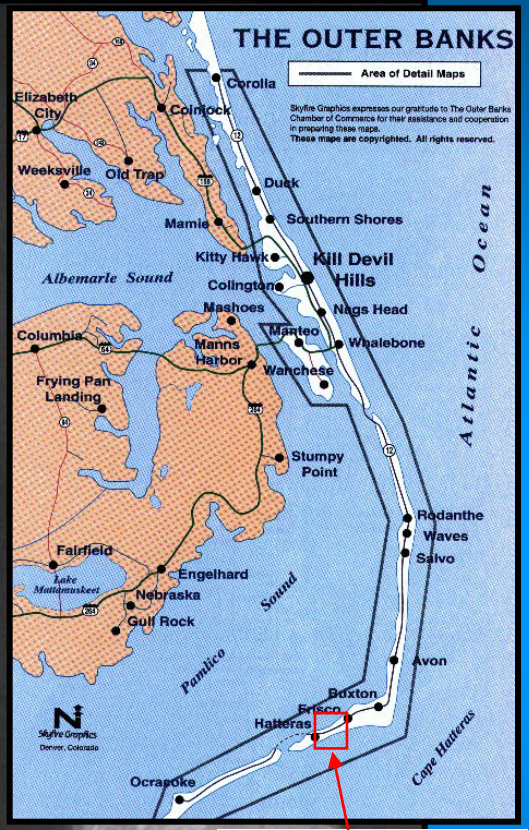
N

N.C. Highway 12

Water depth approx 10 feet

Washed away road (~2,000 feet wide)

N.C. Highway 12



Approximate location of new inlet

QuickBird Panchromatic Image 26 September 2003

Hurricane Isabel, Cape Hatteras

DIGITALGLOBE™

QuickBird Multispectral Image
26 September 2003

Hurricane Isabel, Cape Hatteras

DIGITALGLOBE™

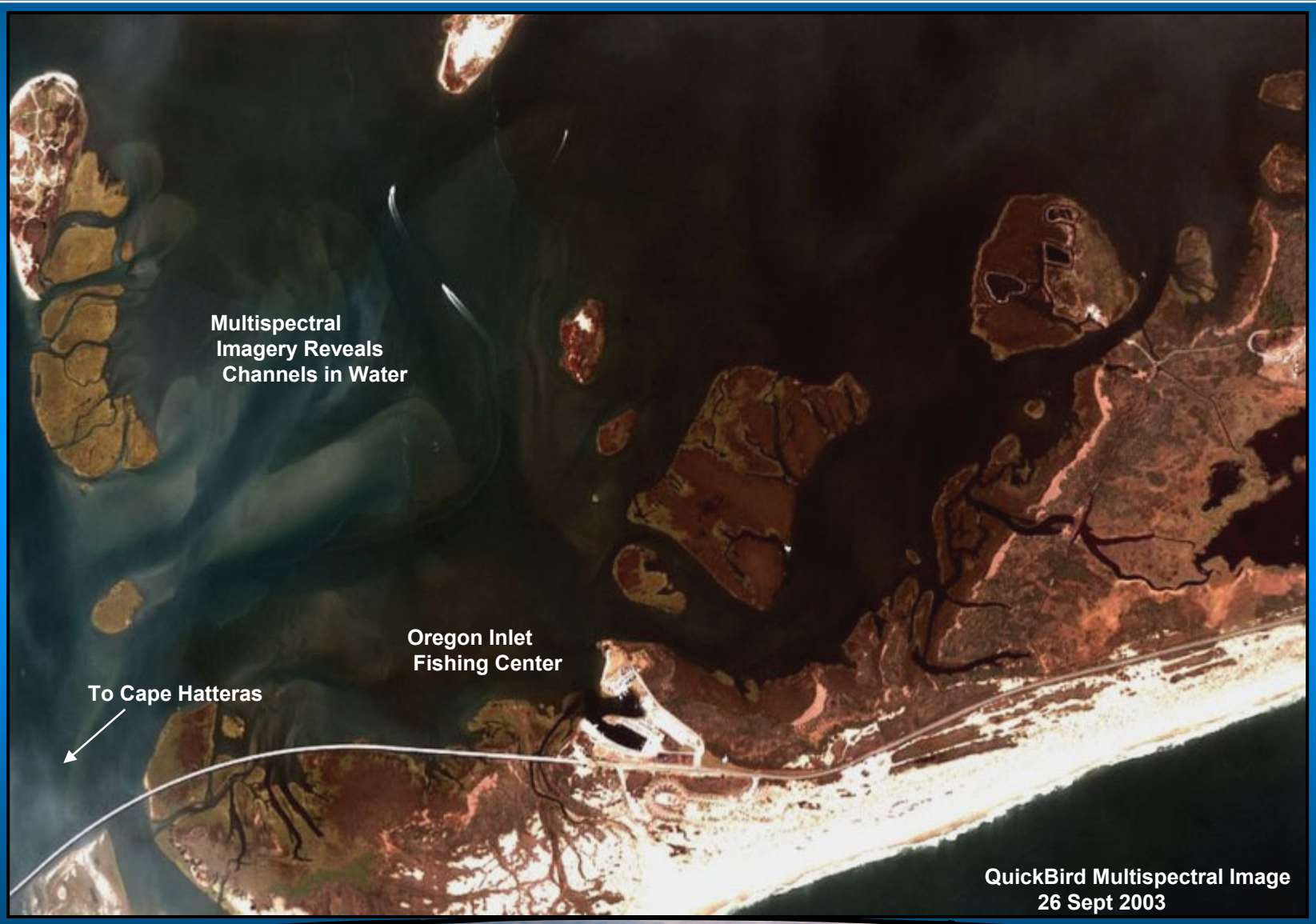
Hurricane Isabel, Cape Hatteras

DIGITALGLOBE™

Even at 46 degrees off nadir, QuickBird imagery reveals details of damage, repairs in area

Oregon Inlet, North Carolina

DIGITALGLOBE™



Hurricane Isabel, Nags Head

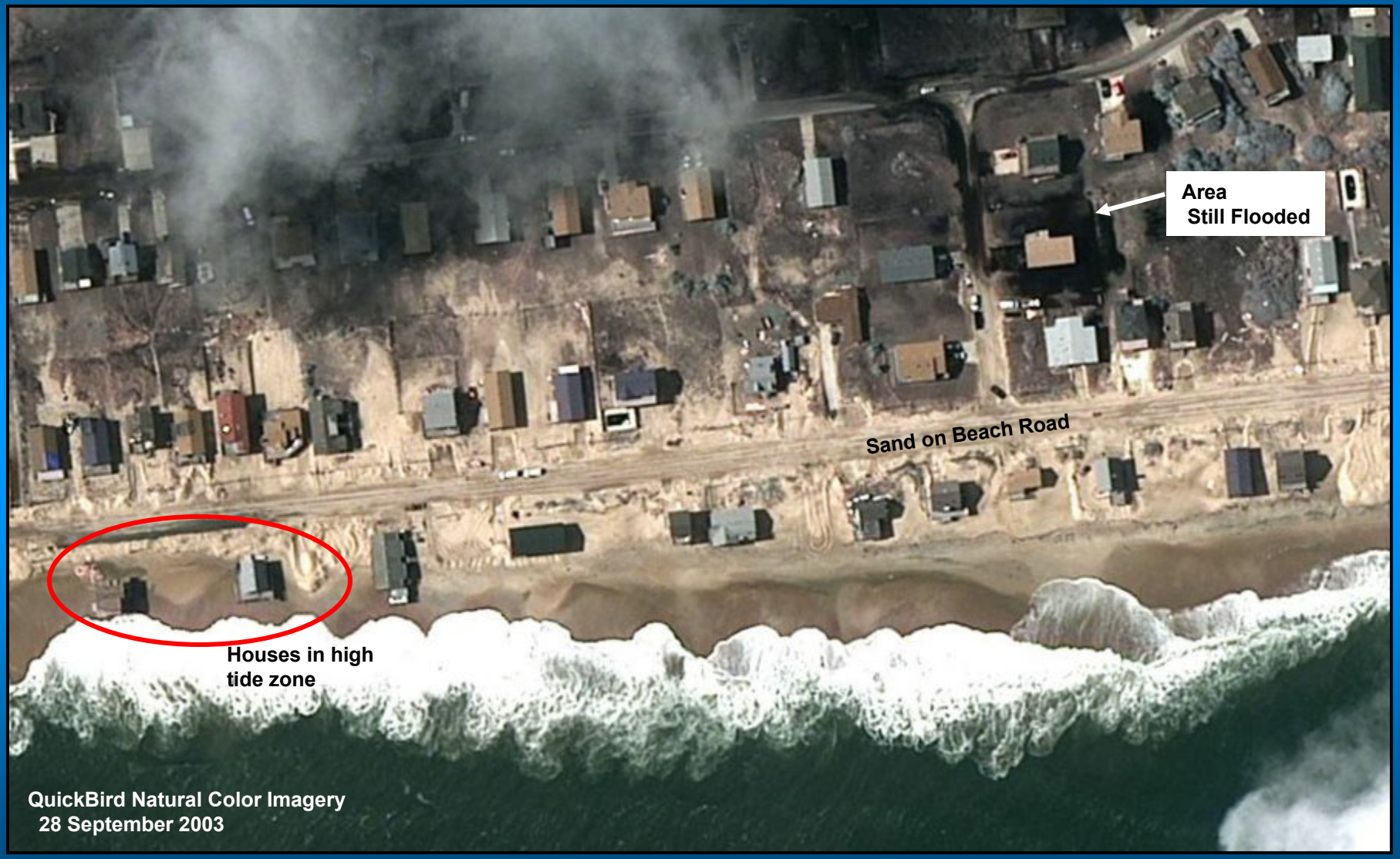
DIGITALGLOBE™

Hurricane Isabel, Kitty Hawk

DIGITALGLOBE™

Hurricane Isabel, Kitty Hawk

DIGITALGLOBE™



Hurricane Isabel, Nags Head

DIGITALGLOBE™

Hurricane Isabel, Nags Head

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Hurricane Isabel, Nags Head

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Hurricane Isabel, Kitty Hawk

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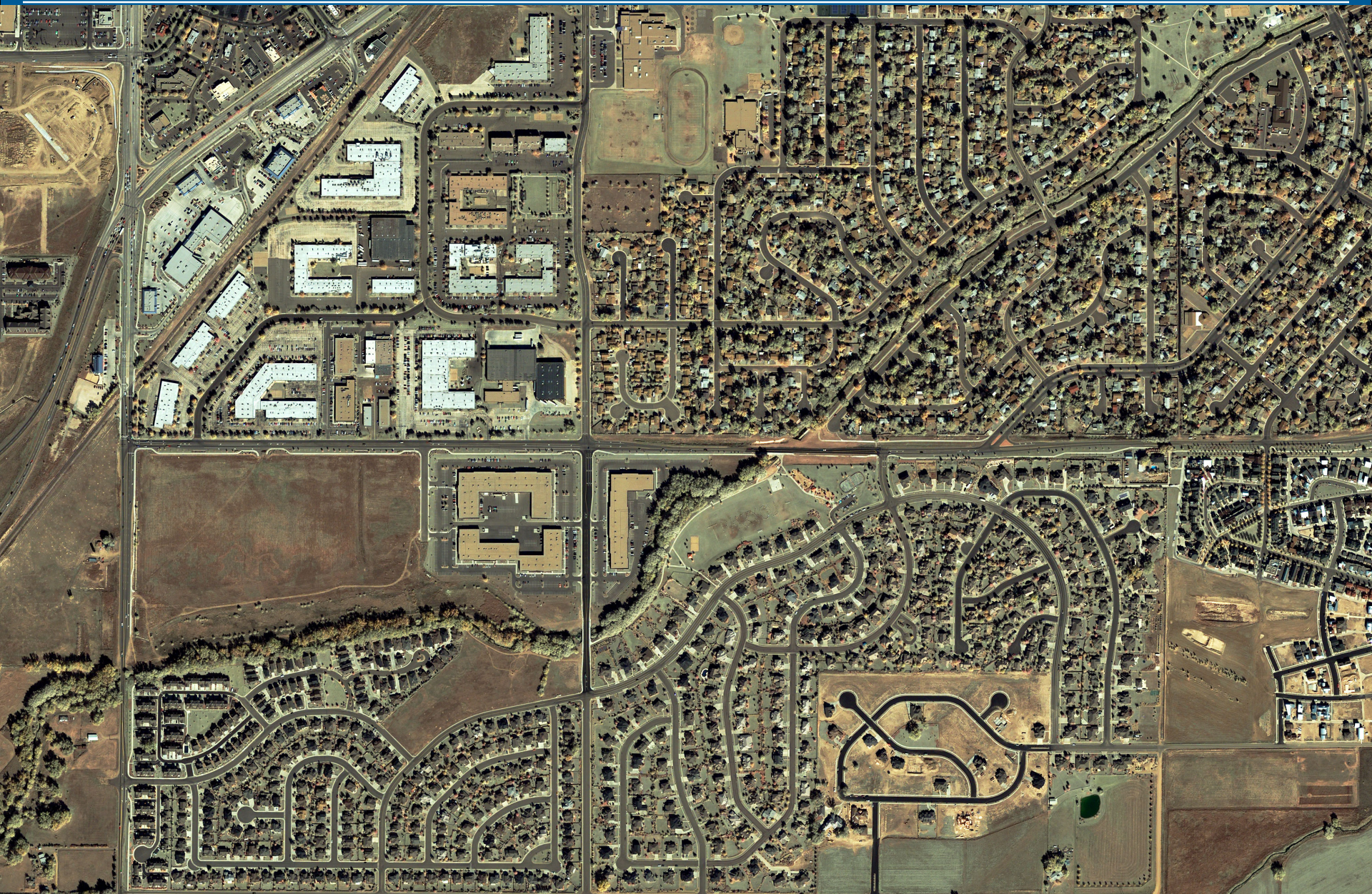
Hurricane Isabel, Nags Head

DIGITALGLOBE™

Thank You

DIGITALGLOBE™



THANK YOU