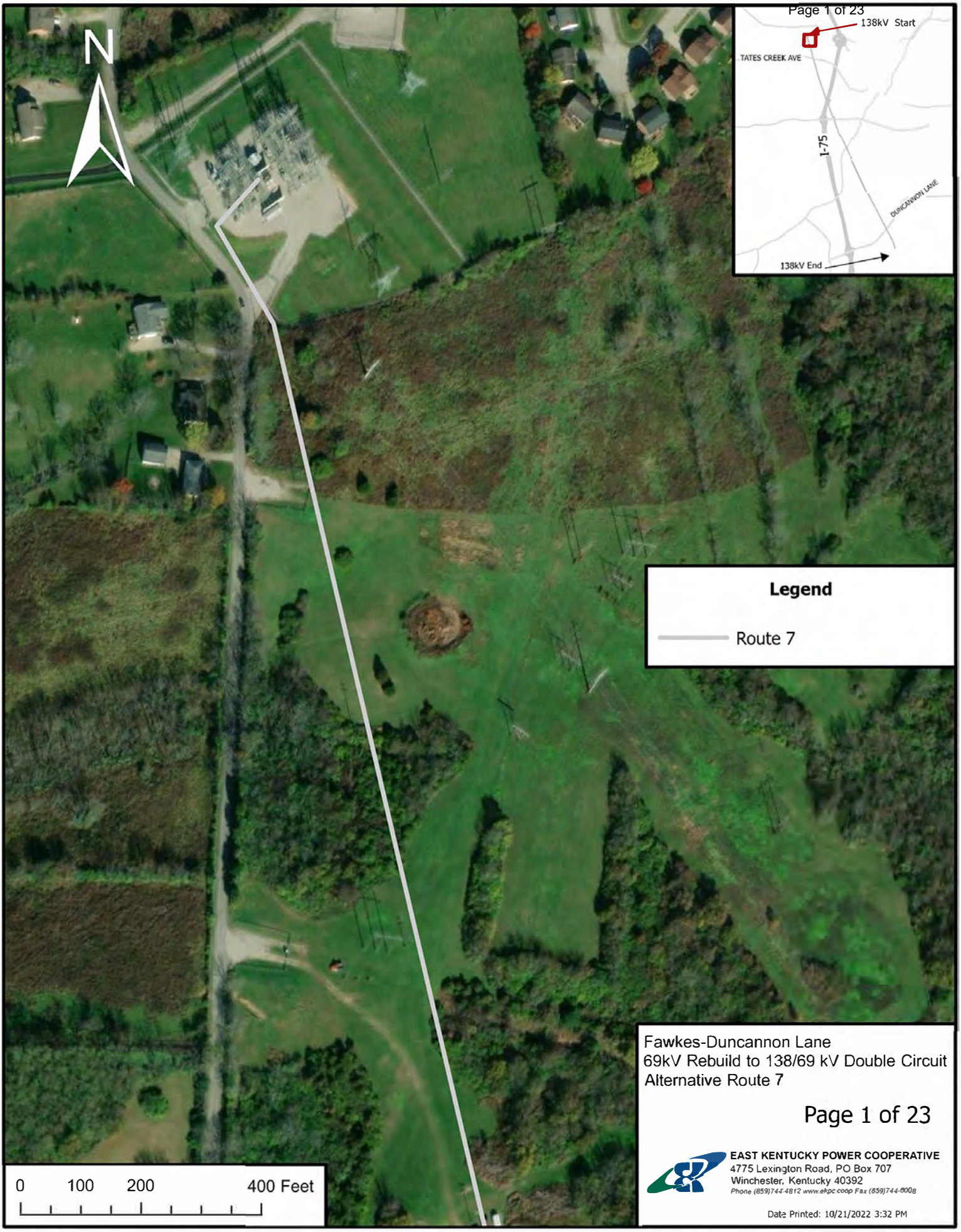
EXHIBIT 10
ALTERNATE ROUTE MAP



Fawkes-Duncannon Lane
69kV Rebuild to 138/69 kV Double Circuit
Alternative Route 7

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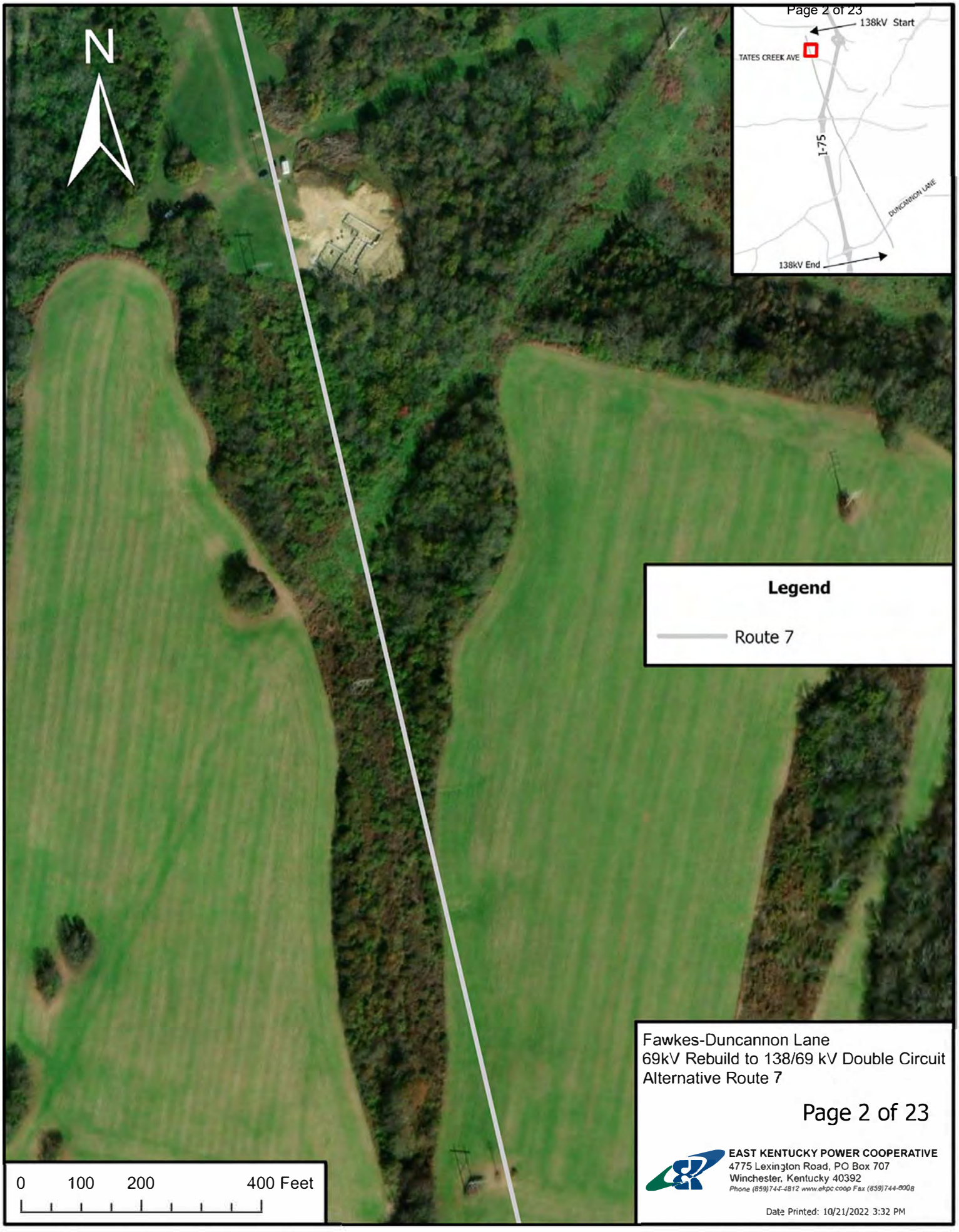
N
138kV Start
TATES CREEK AVE
I-75
DUNCANNON LANE
138kV End
Legend
Route 7
0
100
200
400 Feet
Fawkes-Duncannon Lane
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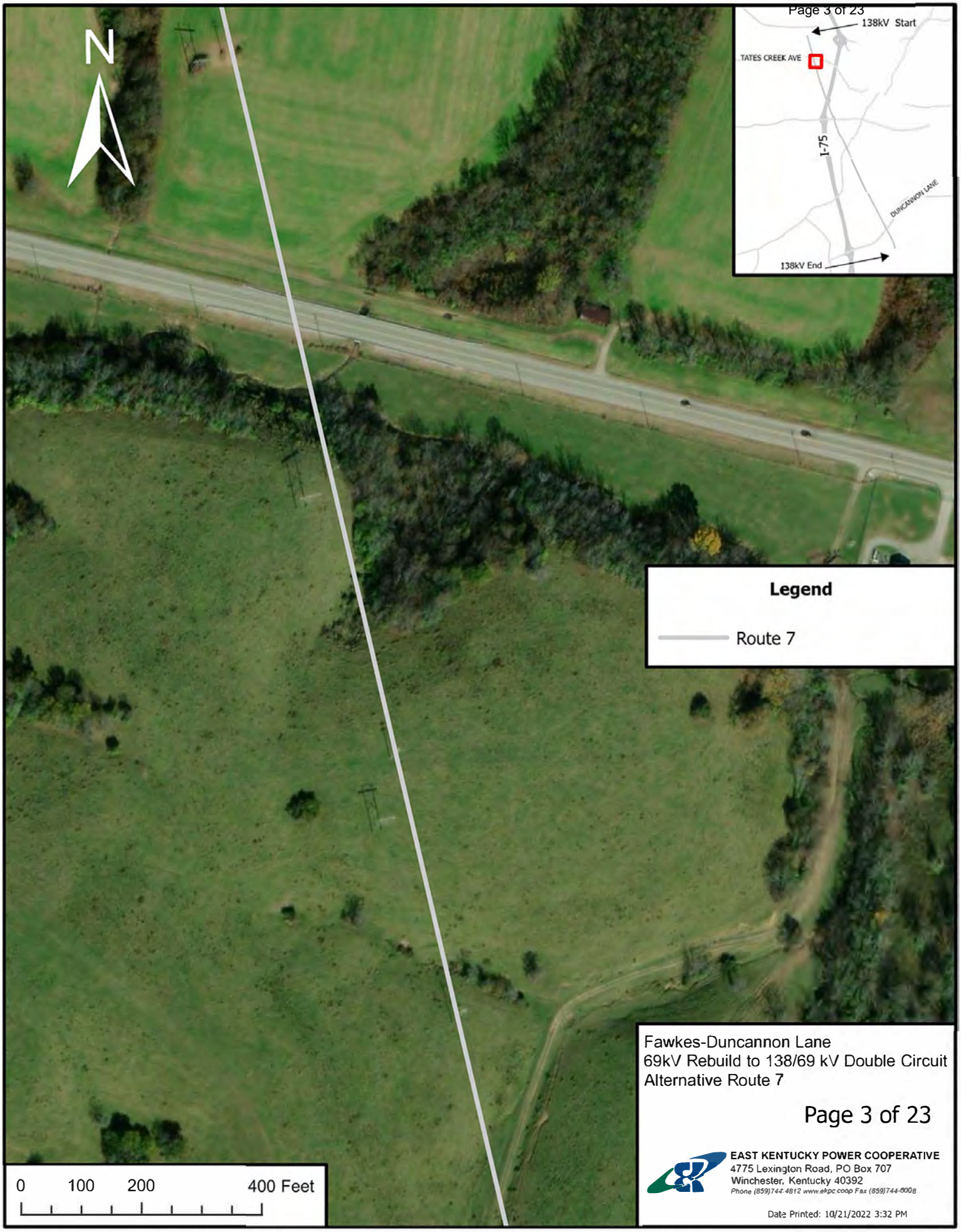

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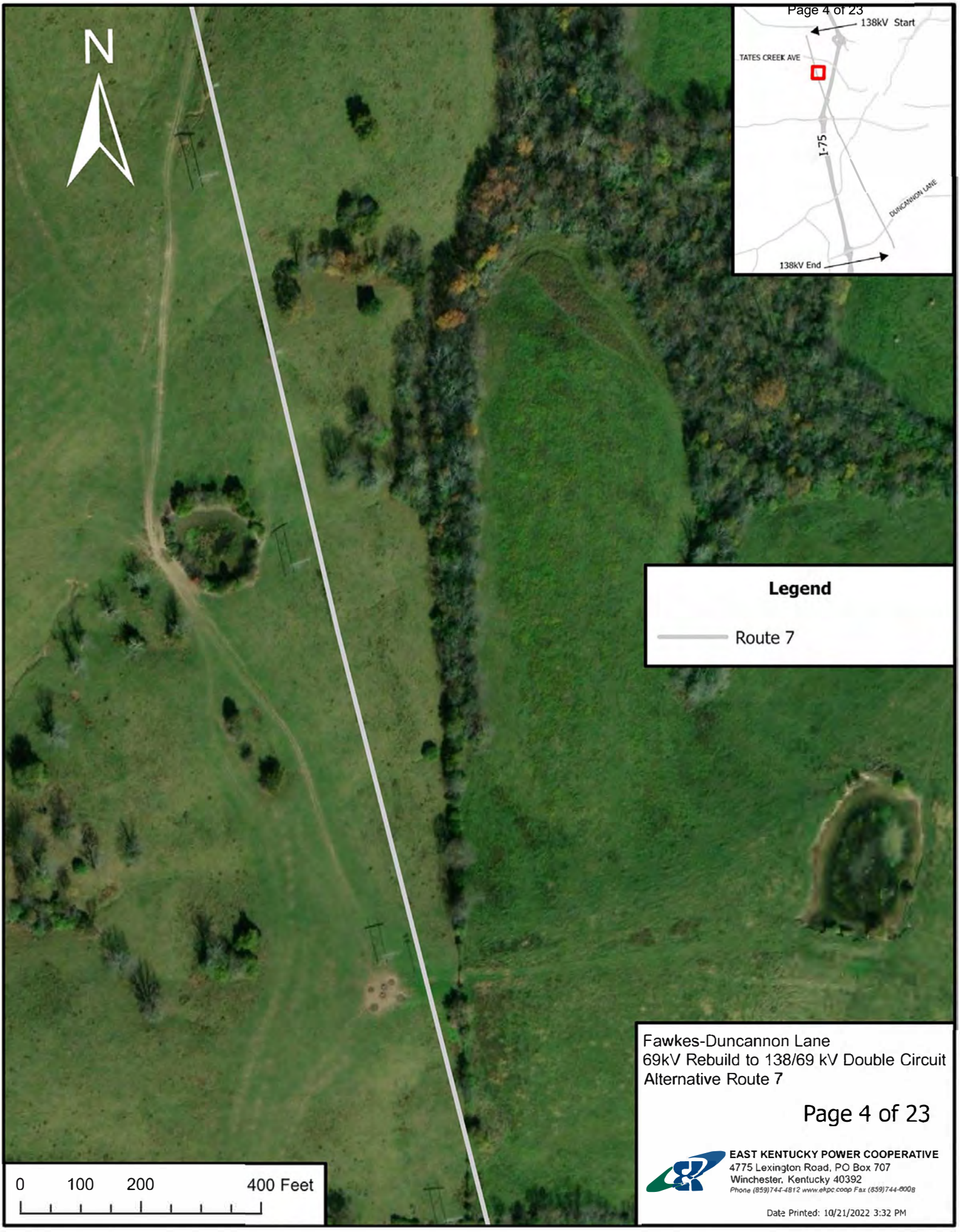

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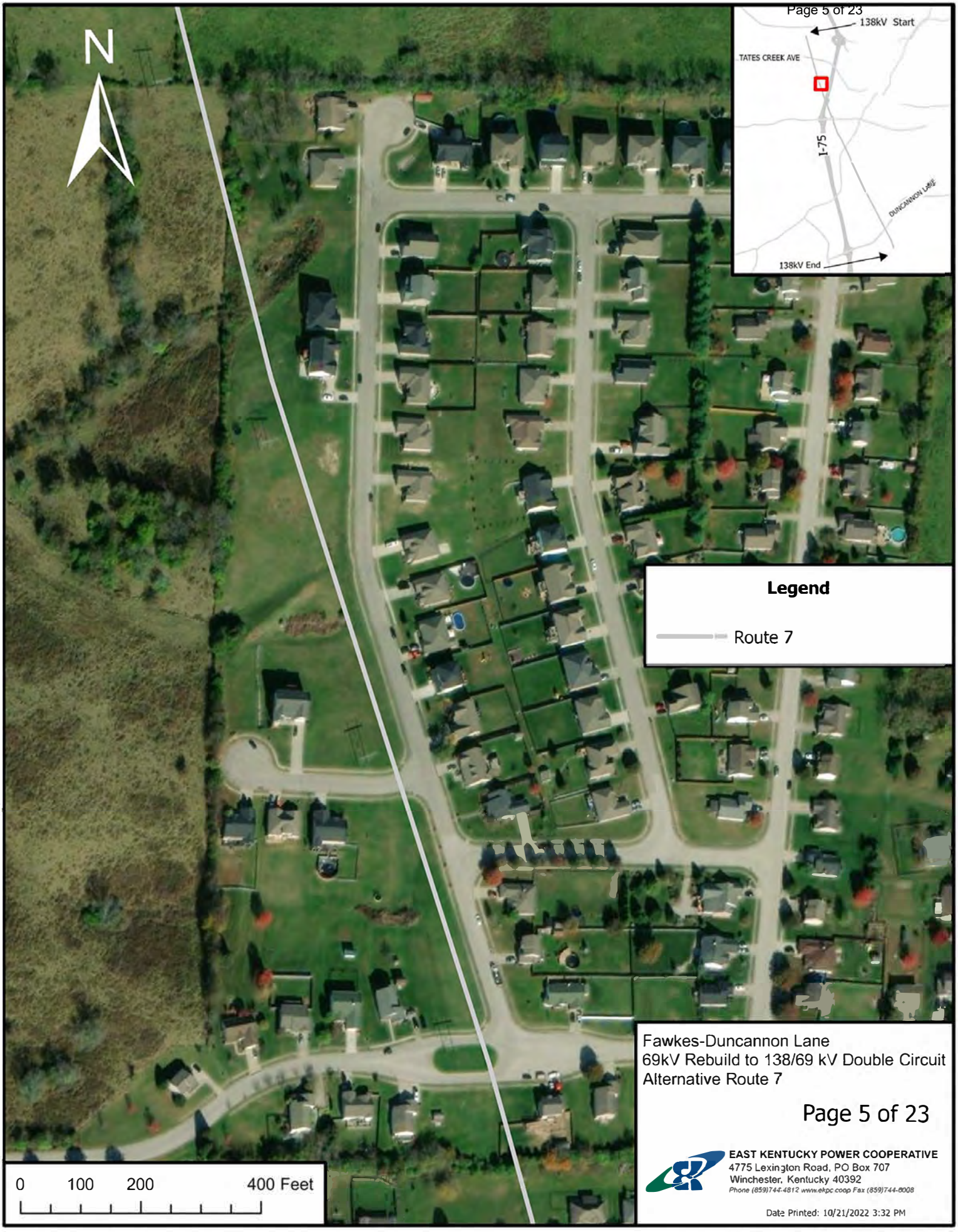

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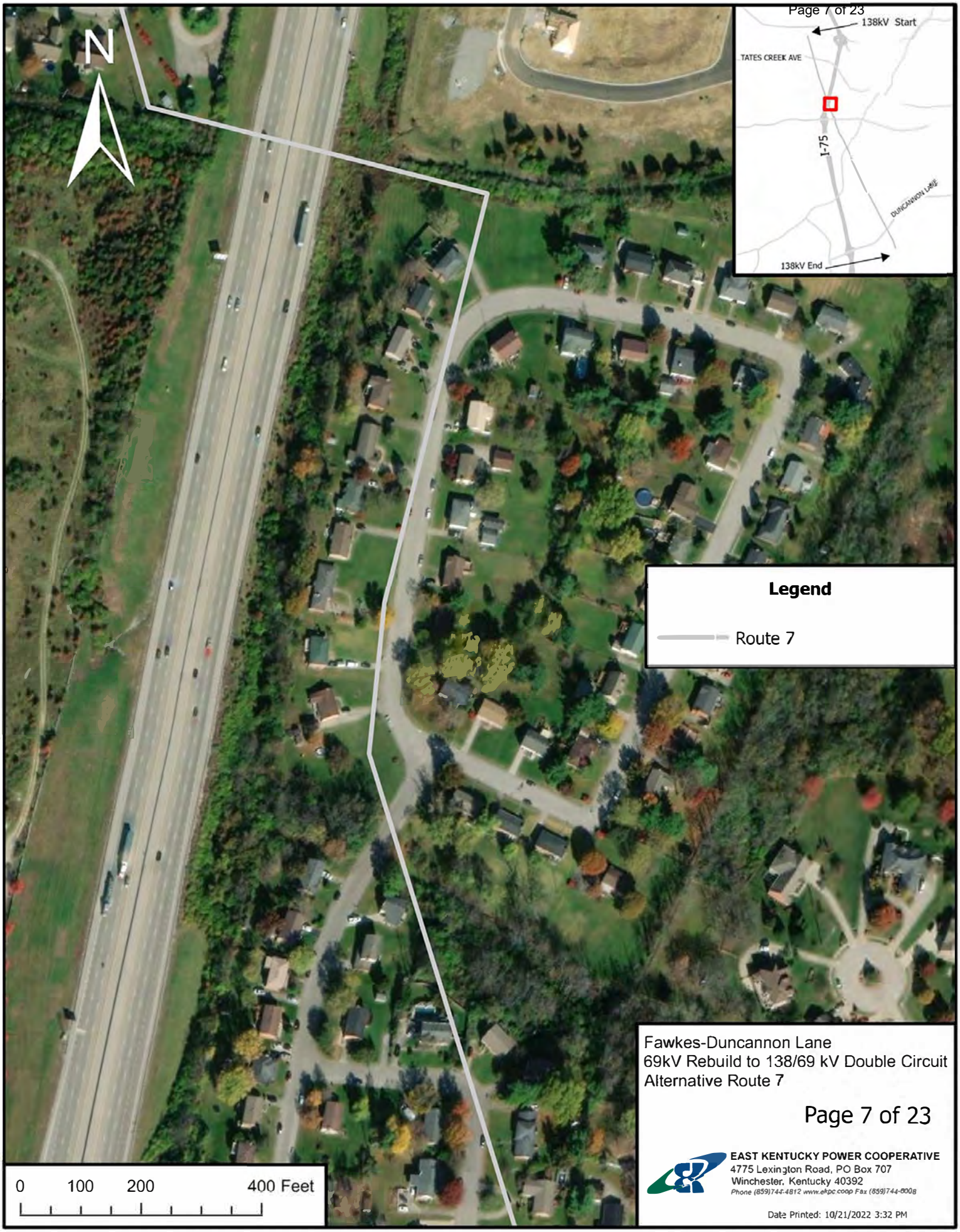

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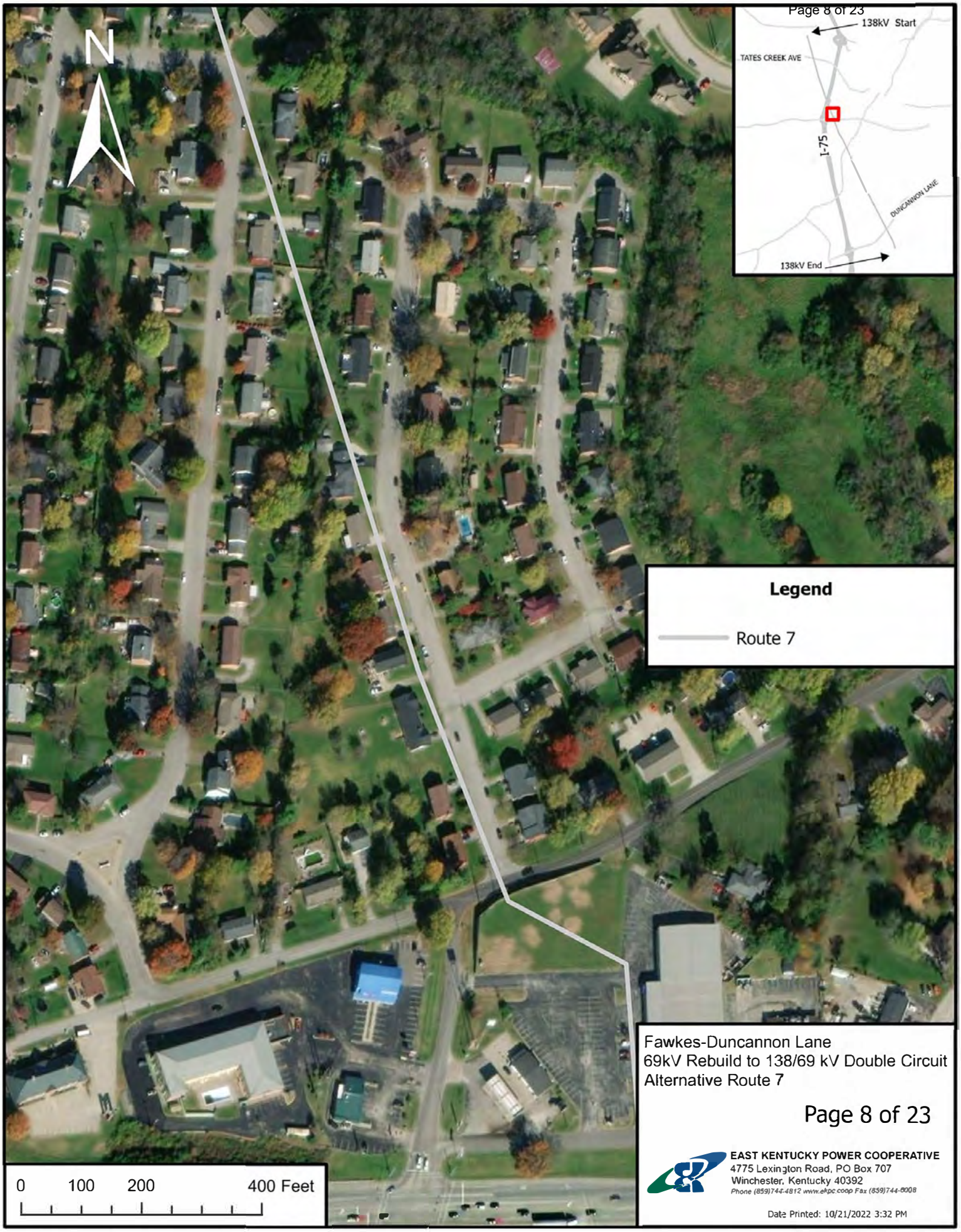

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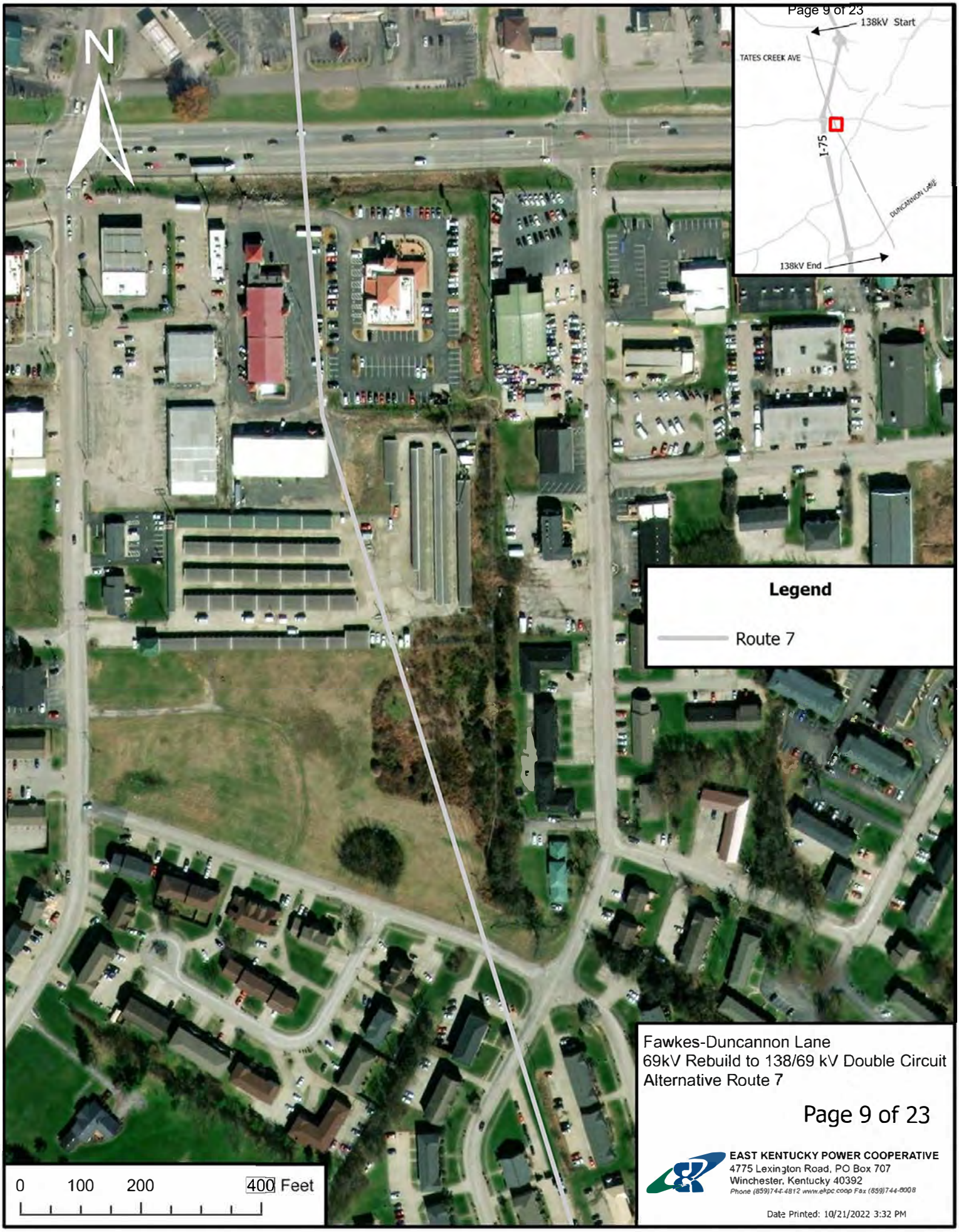

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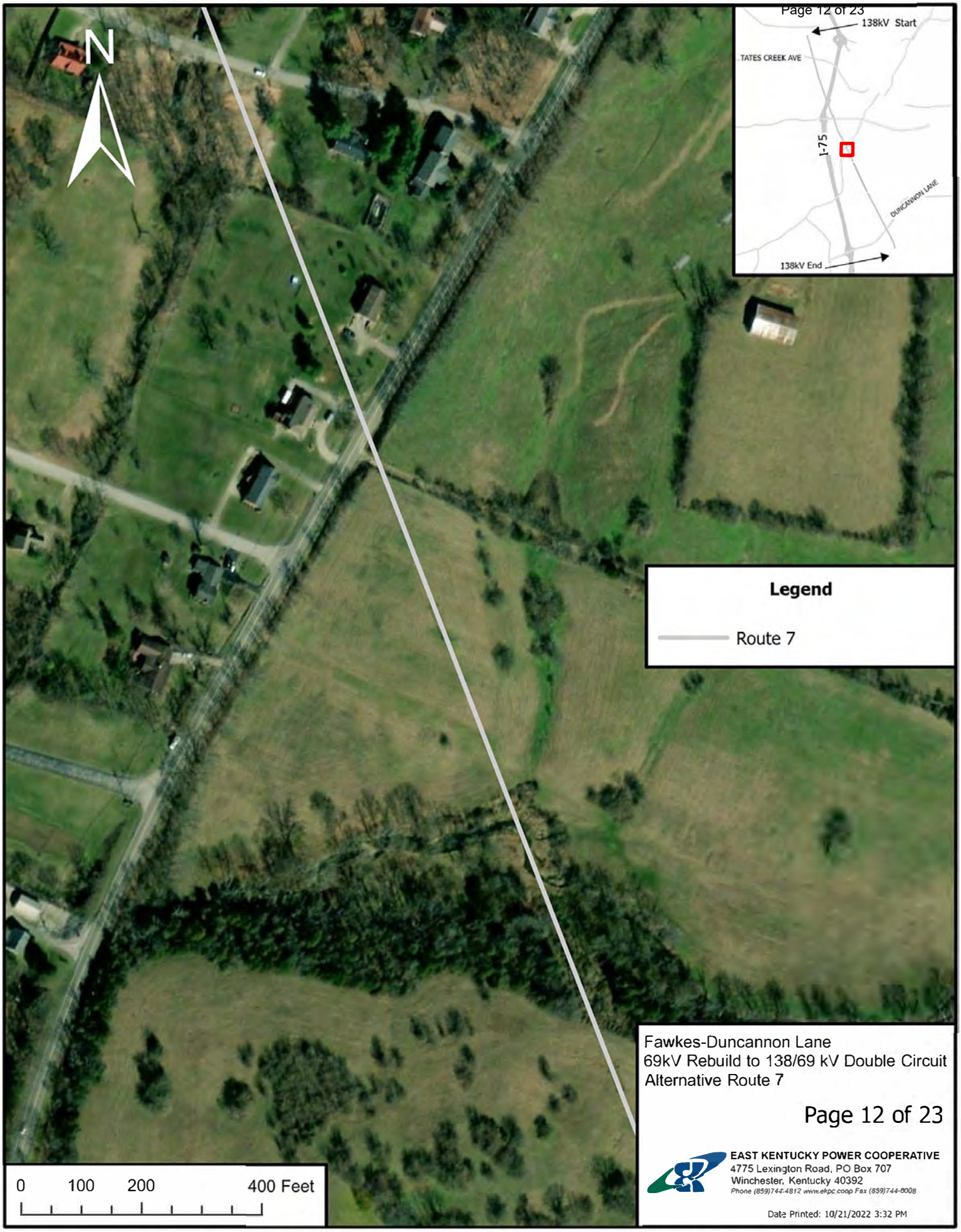

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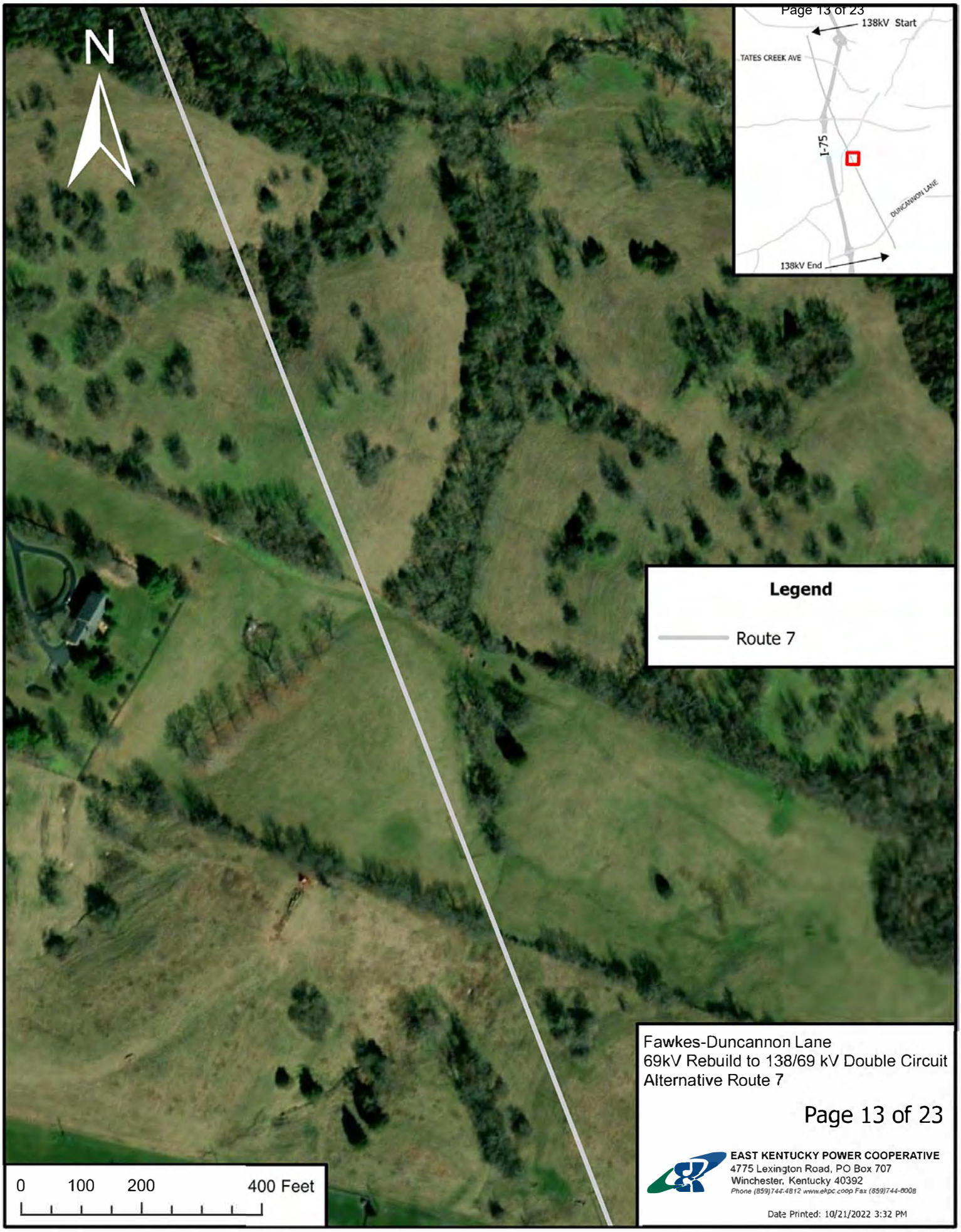

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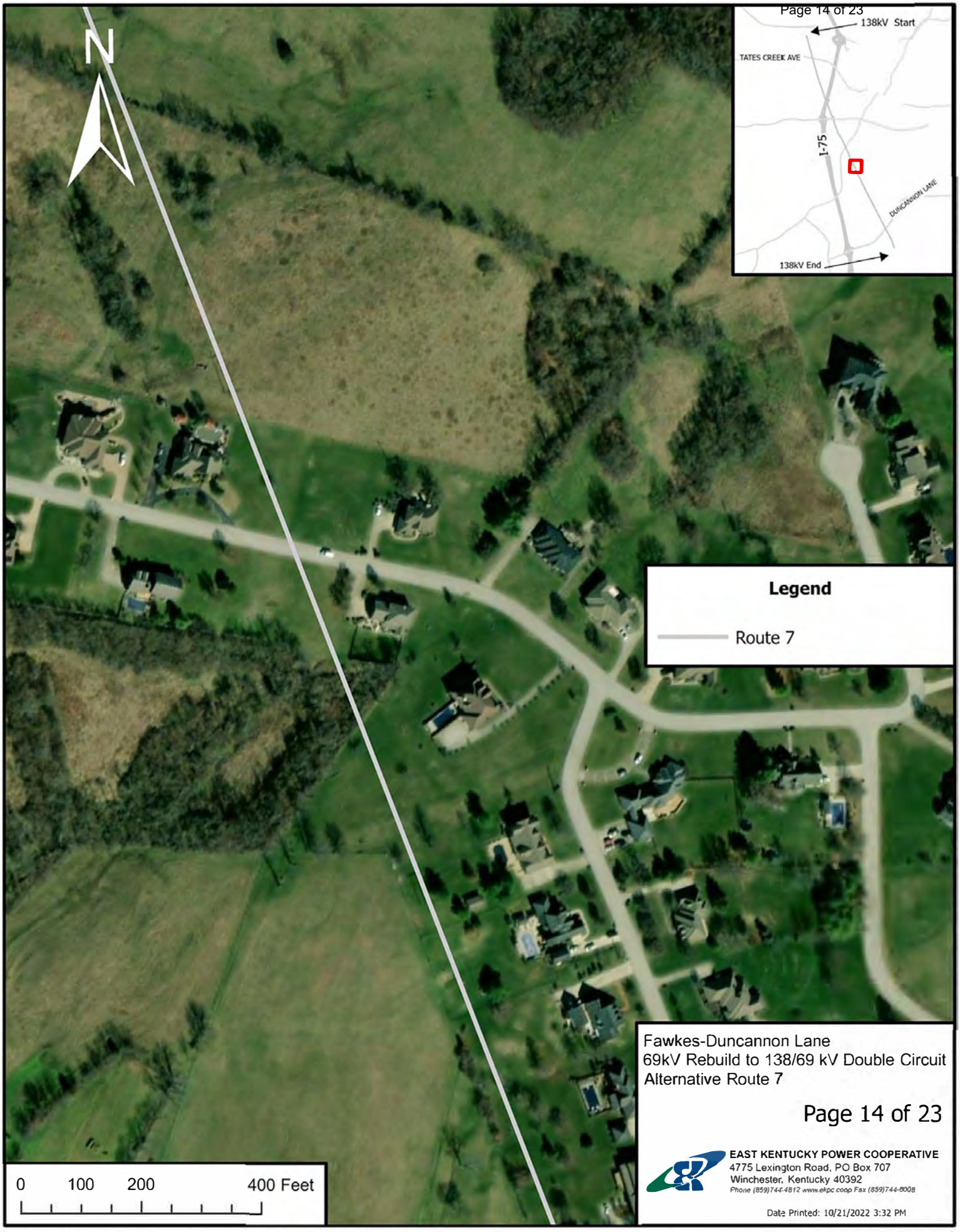

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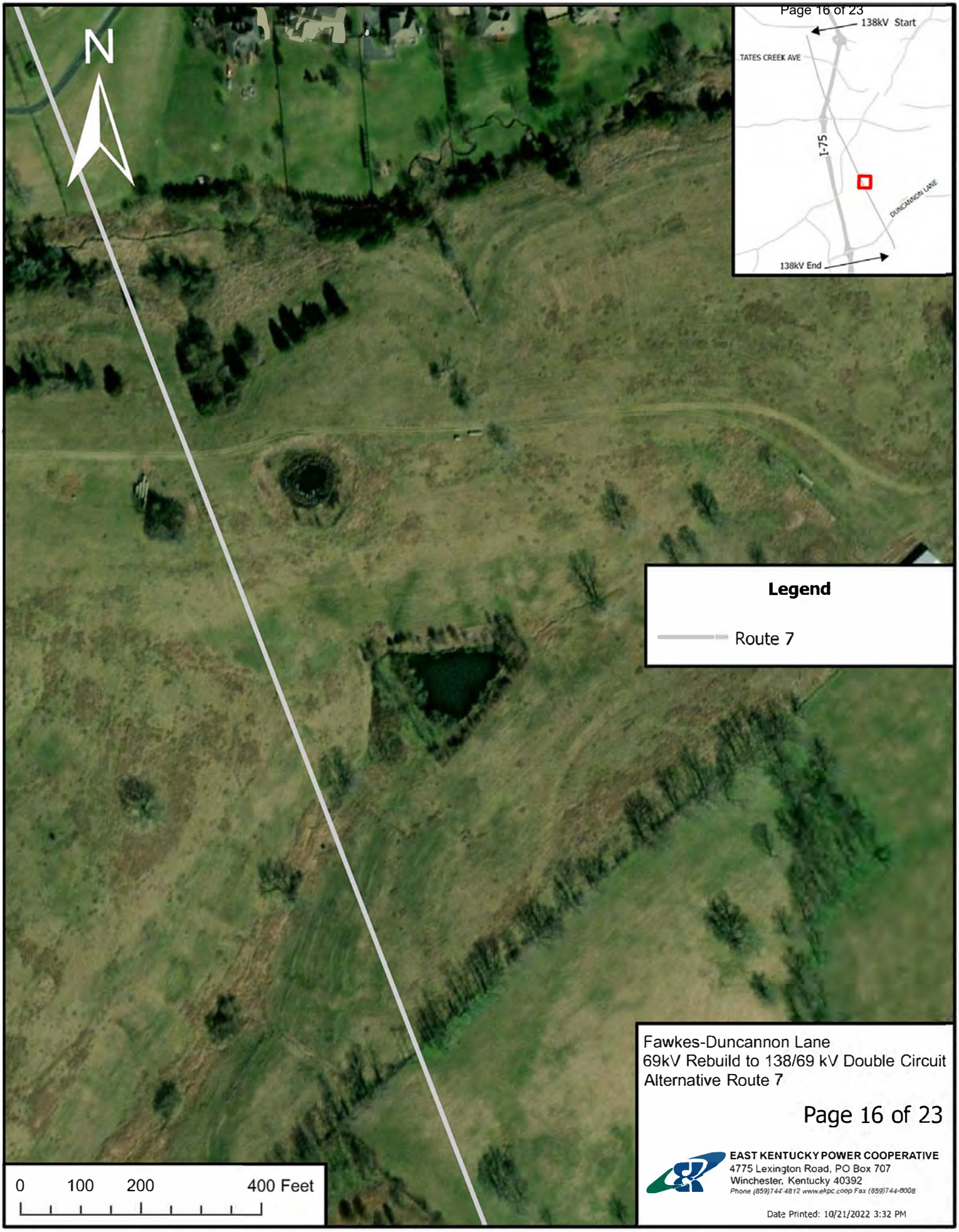

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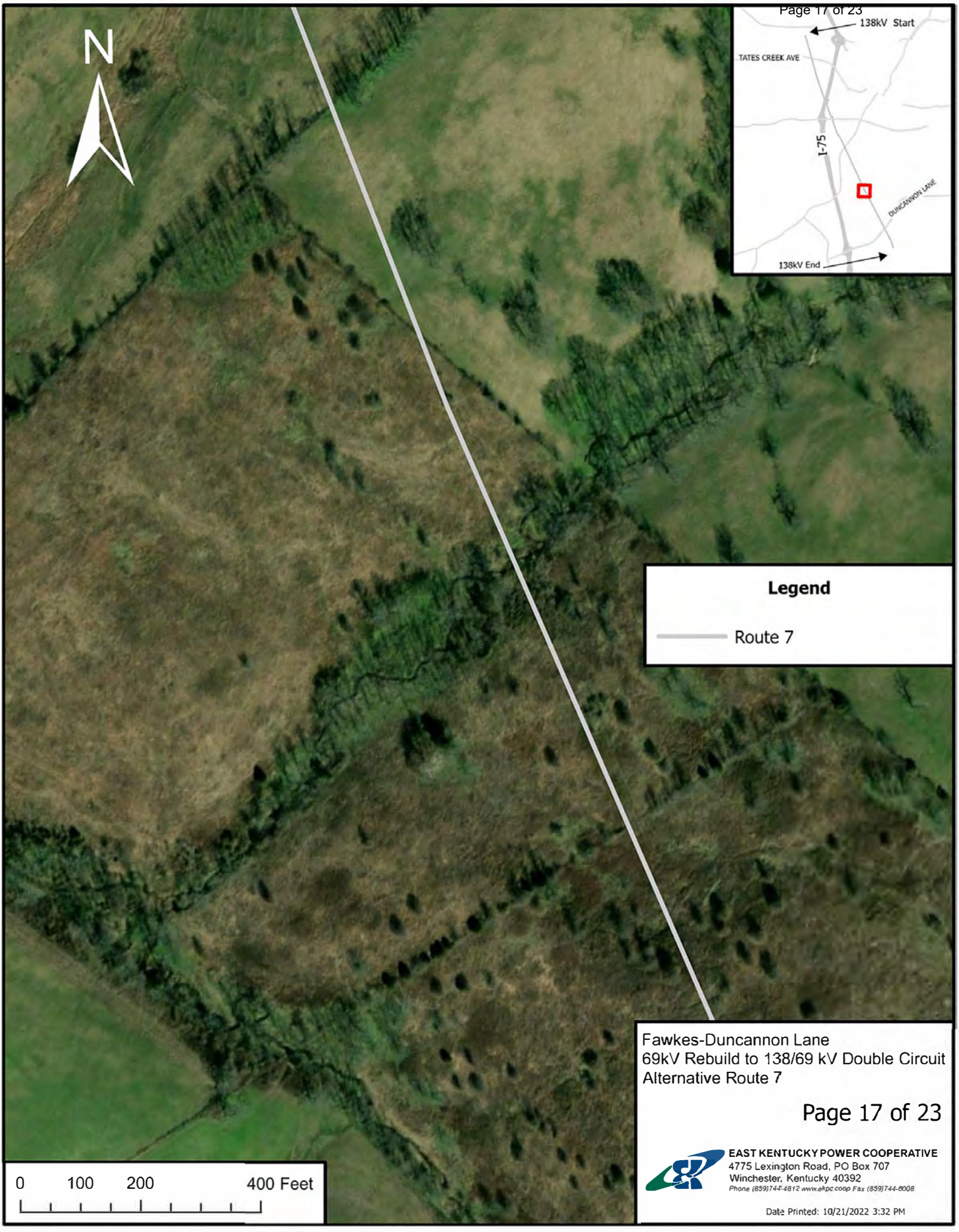

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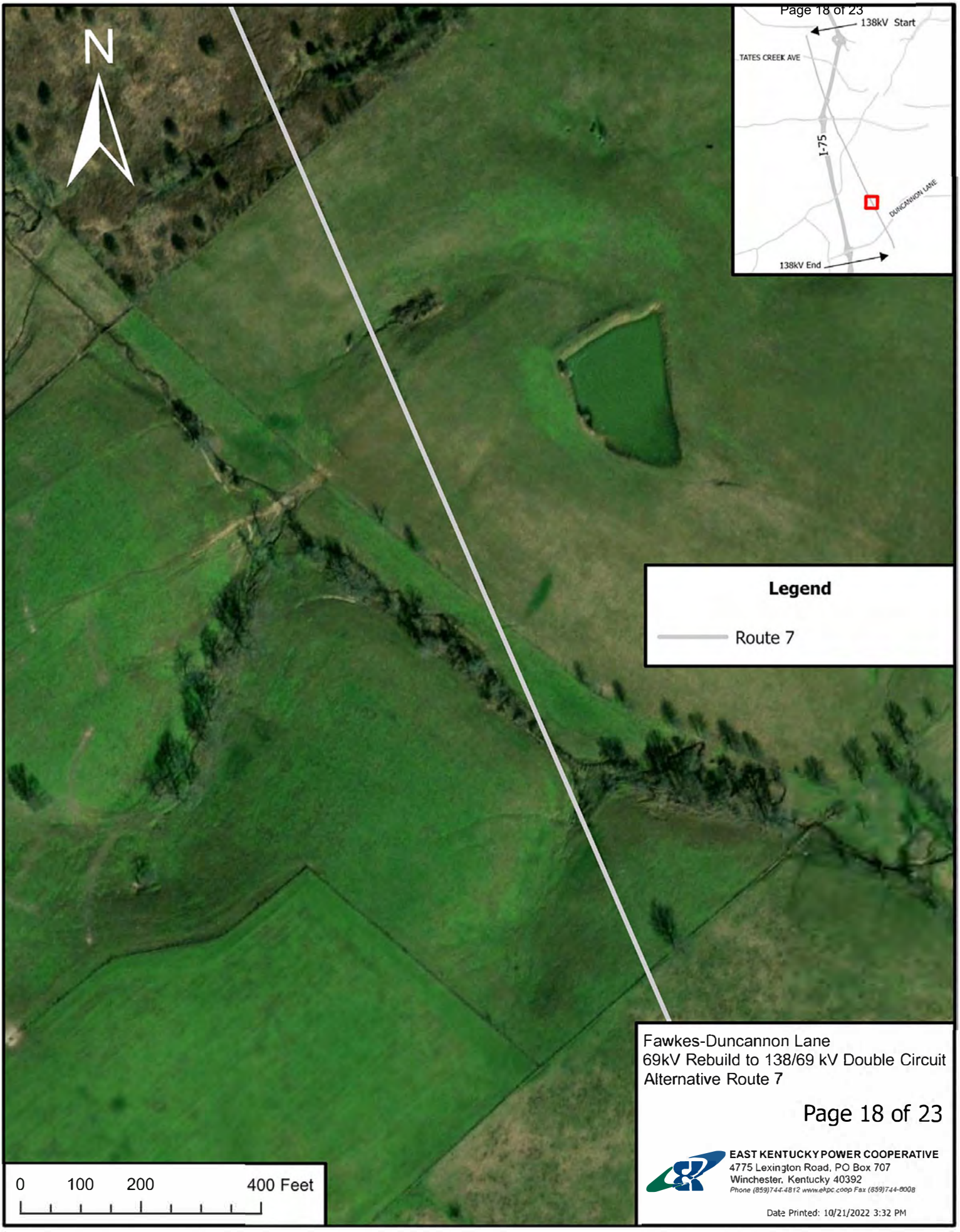

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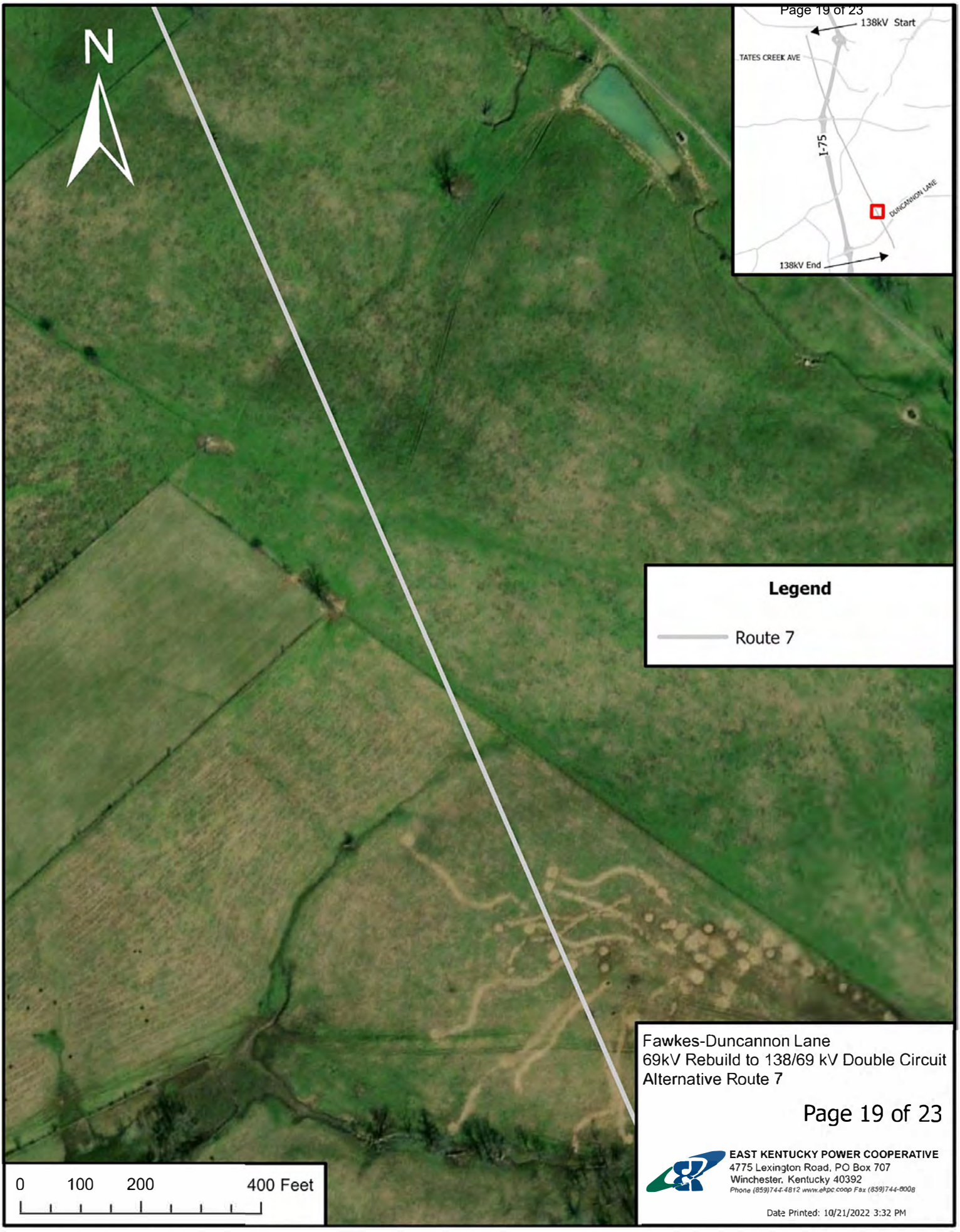

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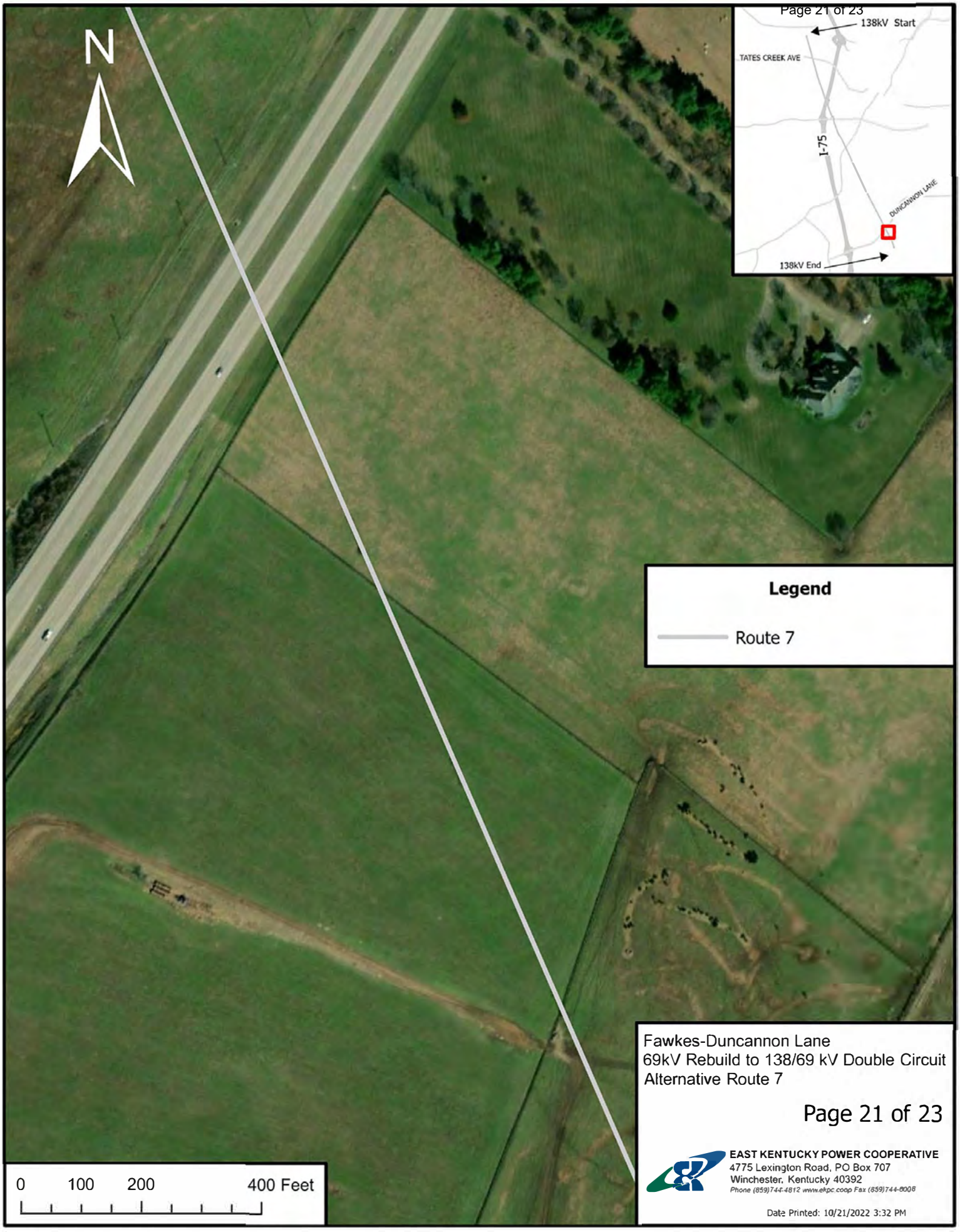

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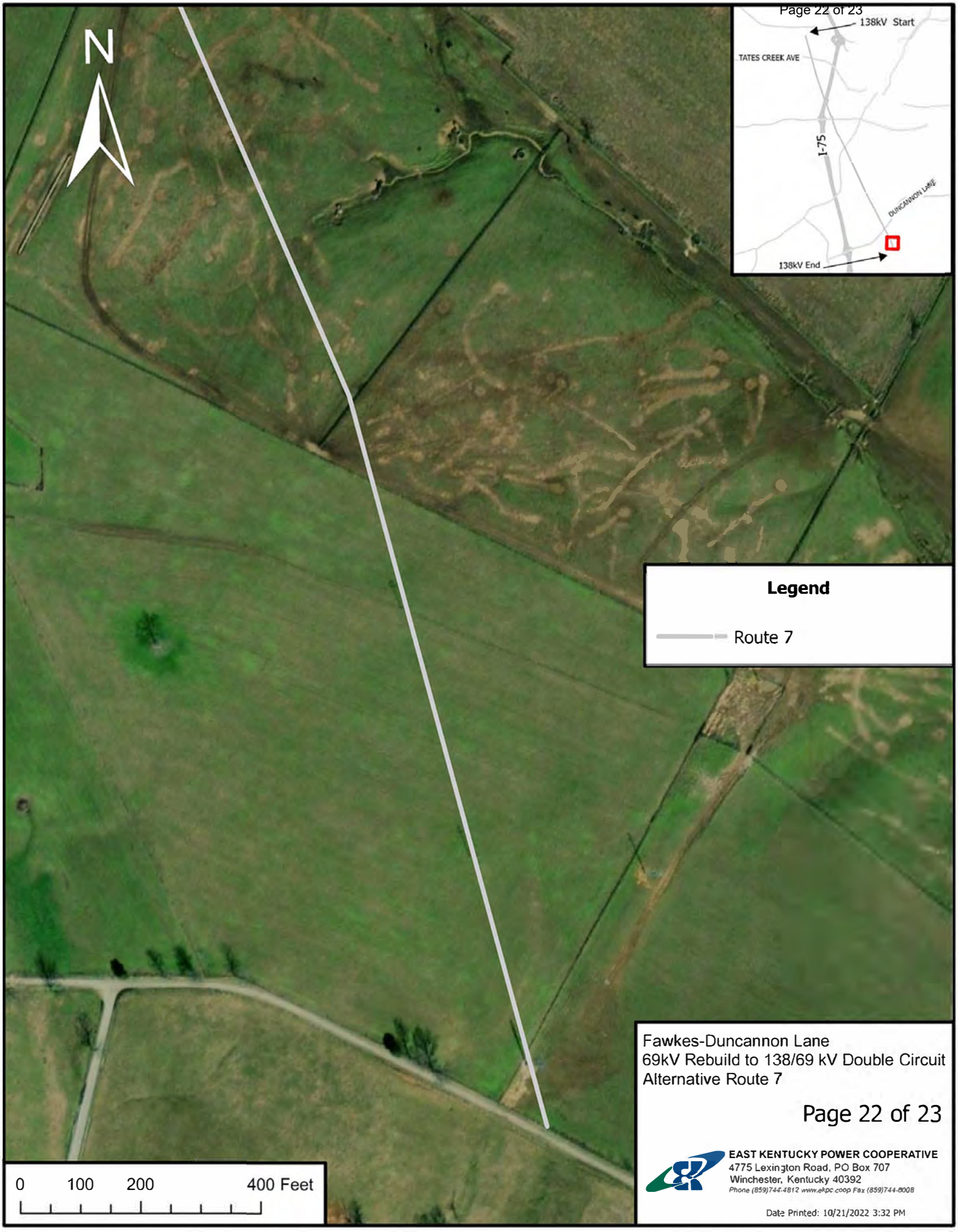

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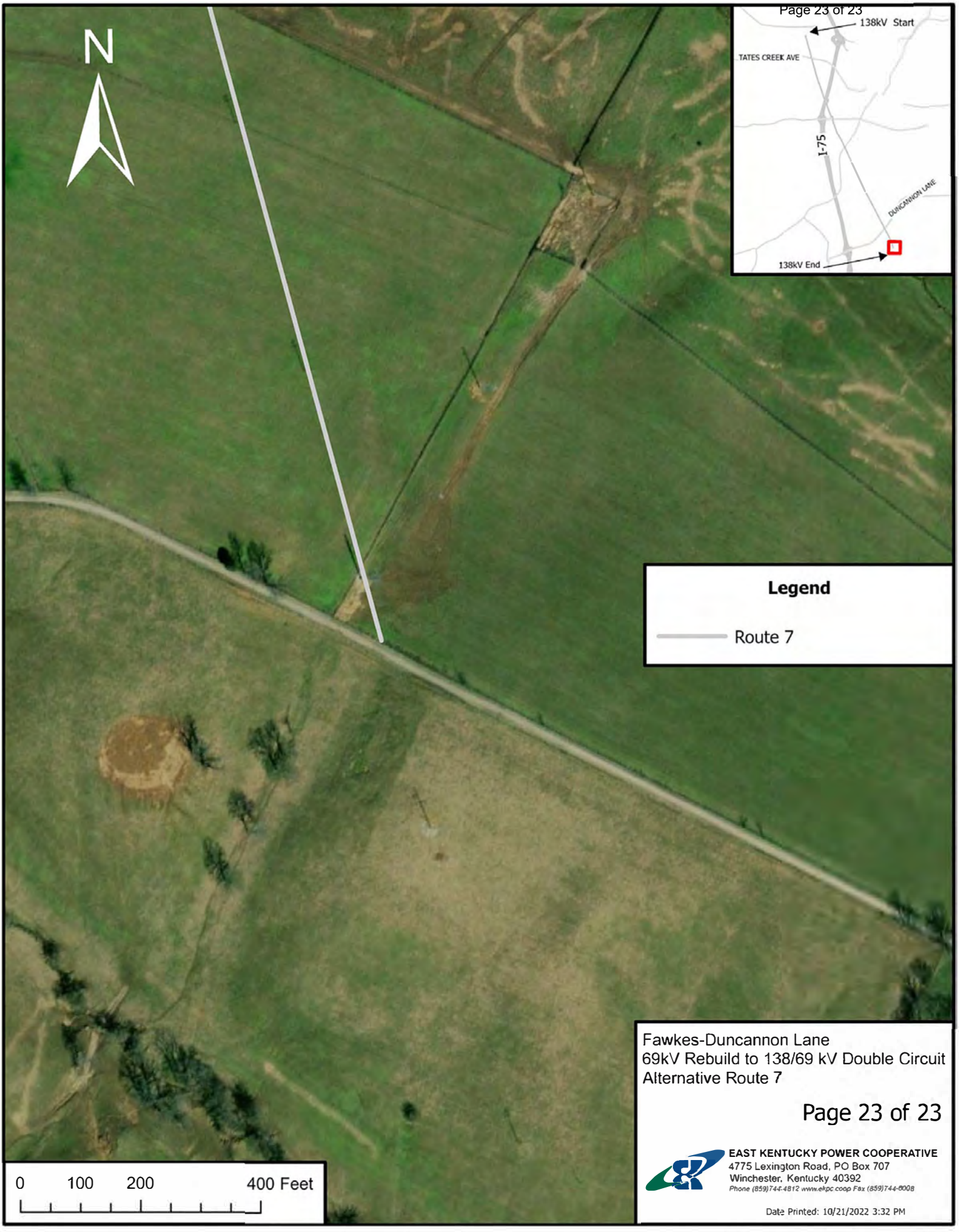

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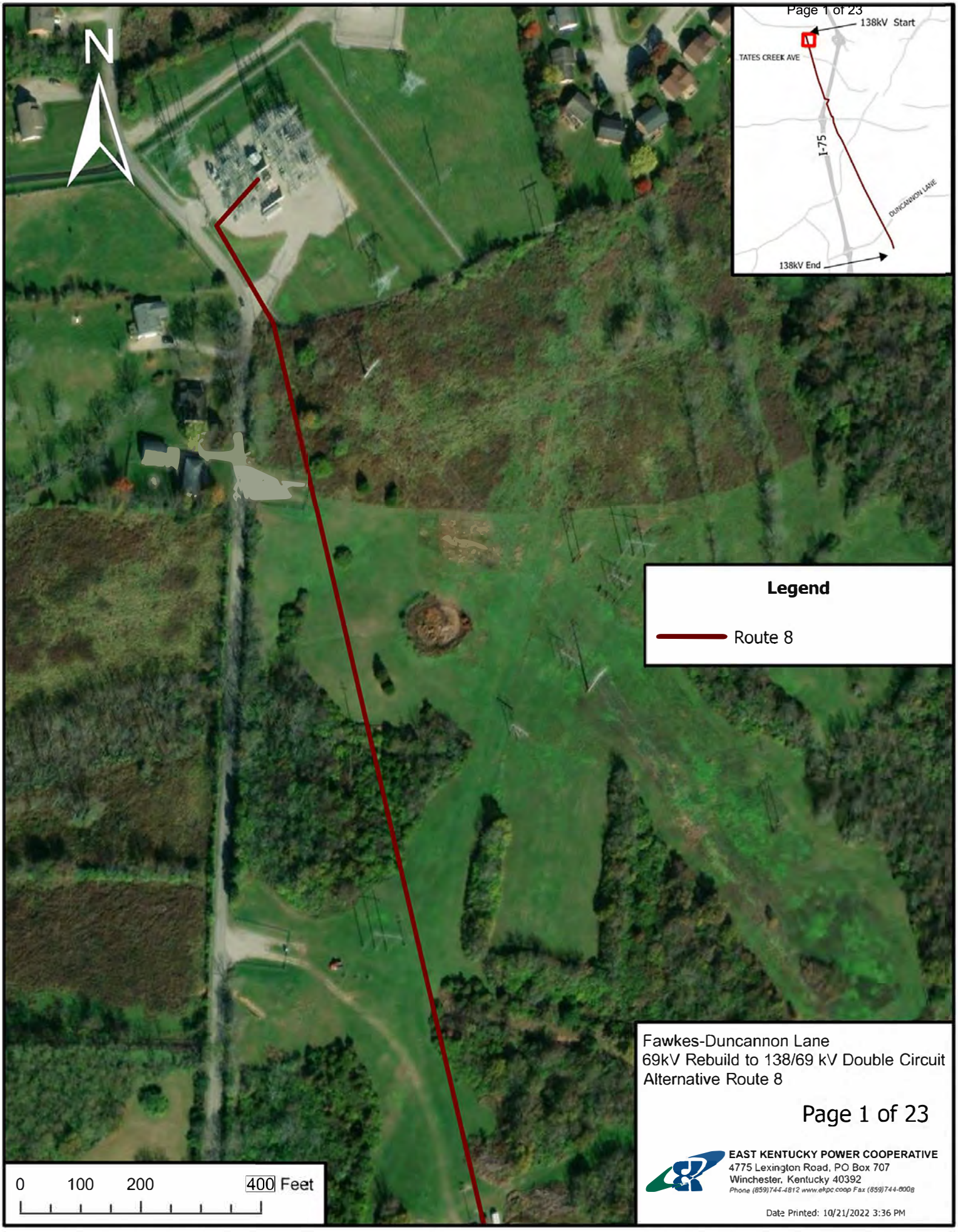
EXHIBIT 11
ALTERNATE ROUTE MAP



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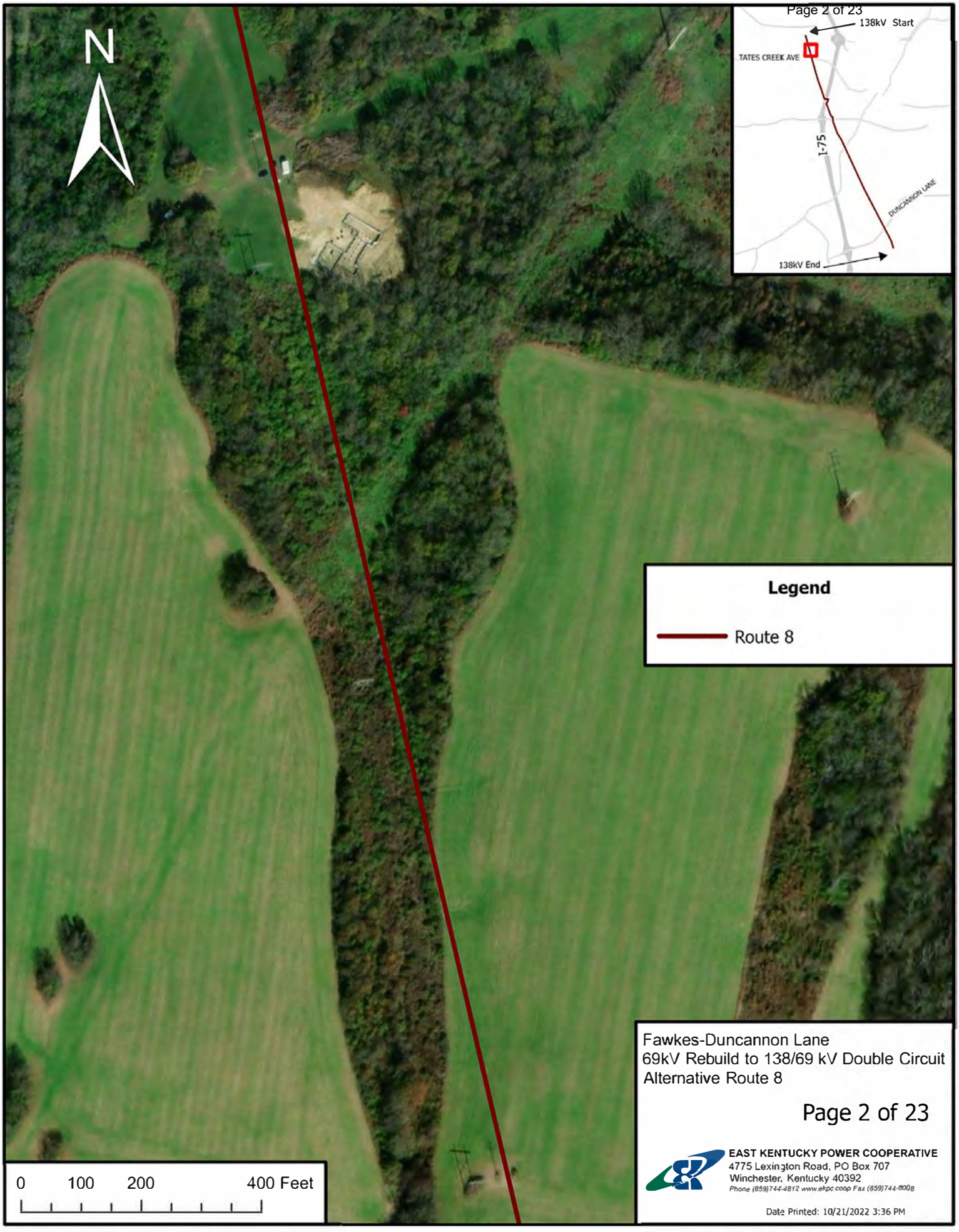

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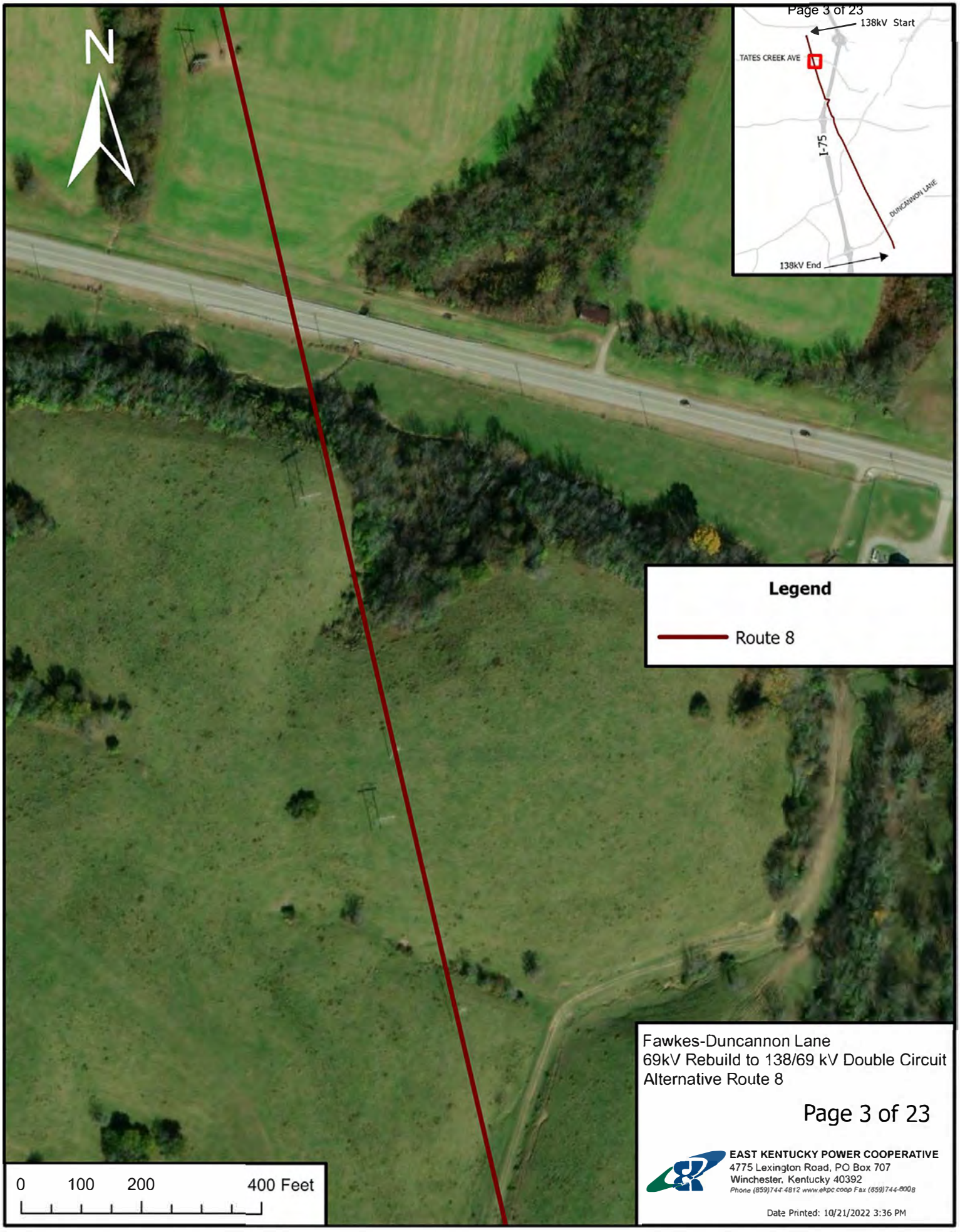

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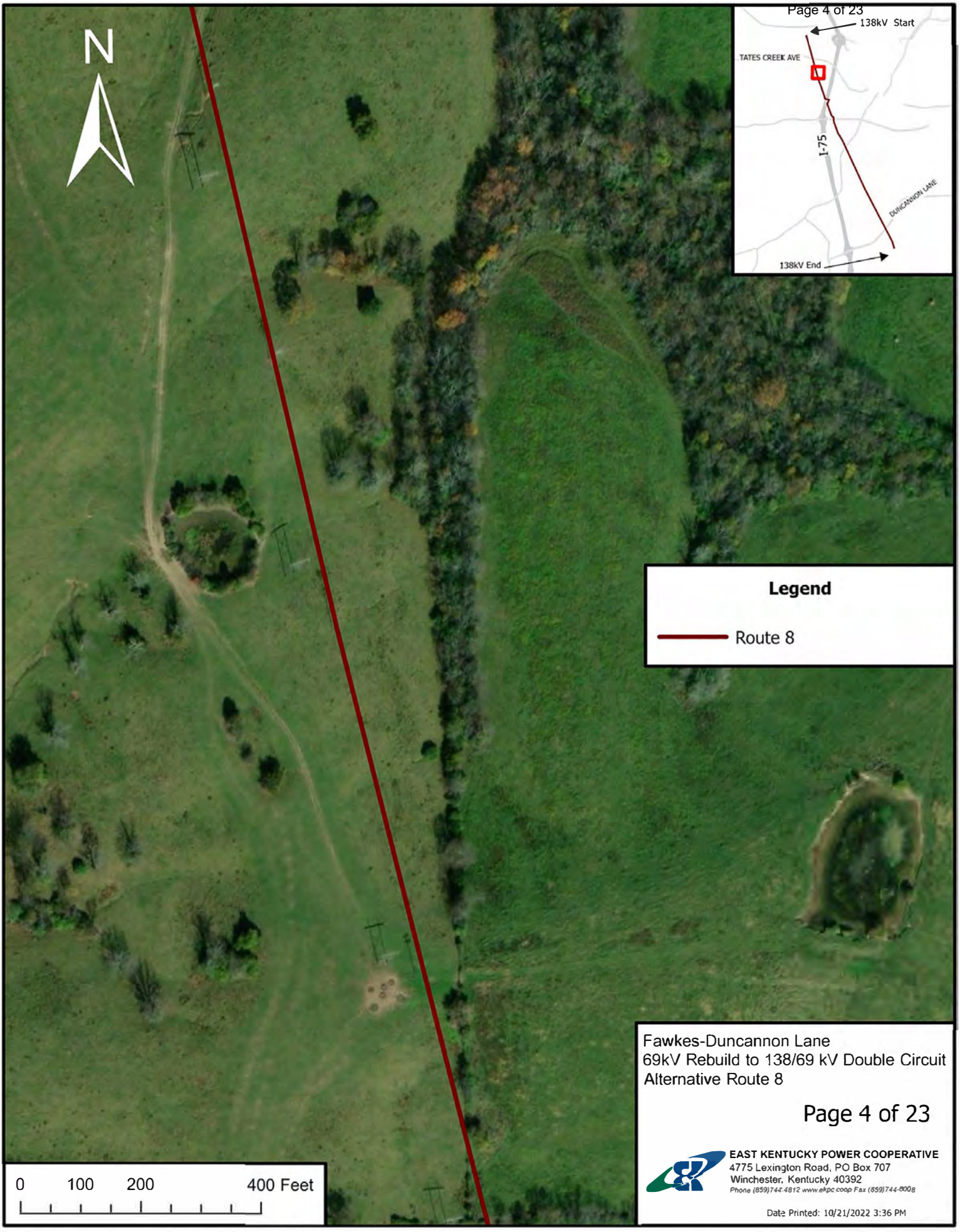

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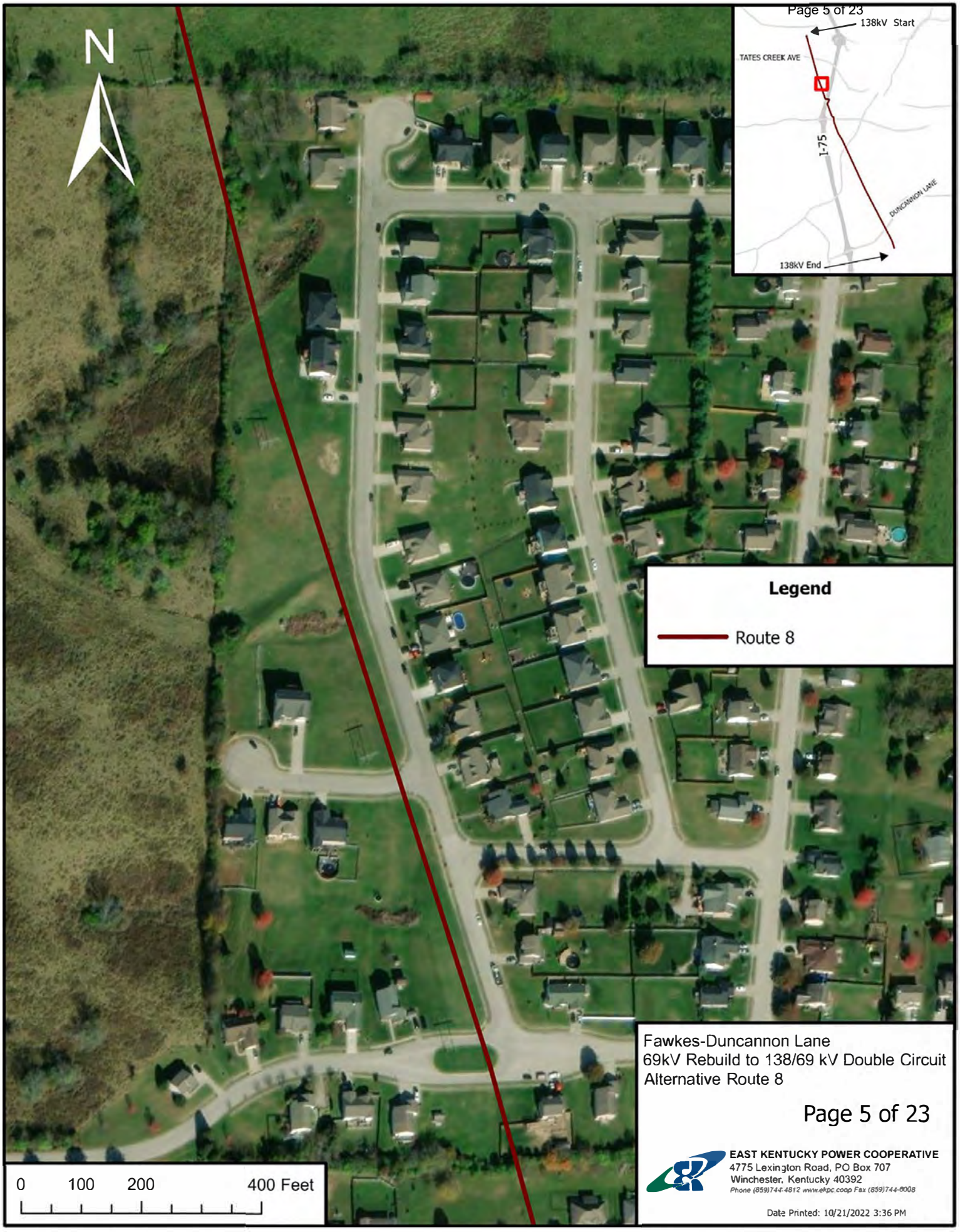

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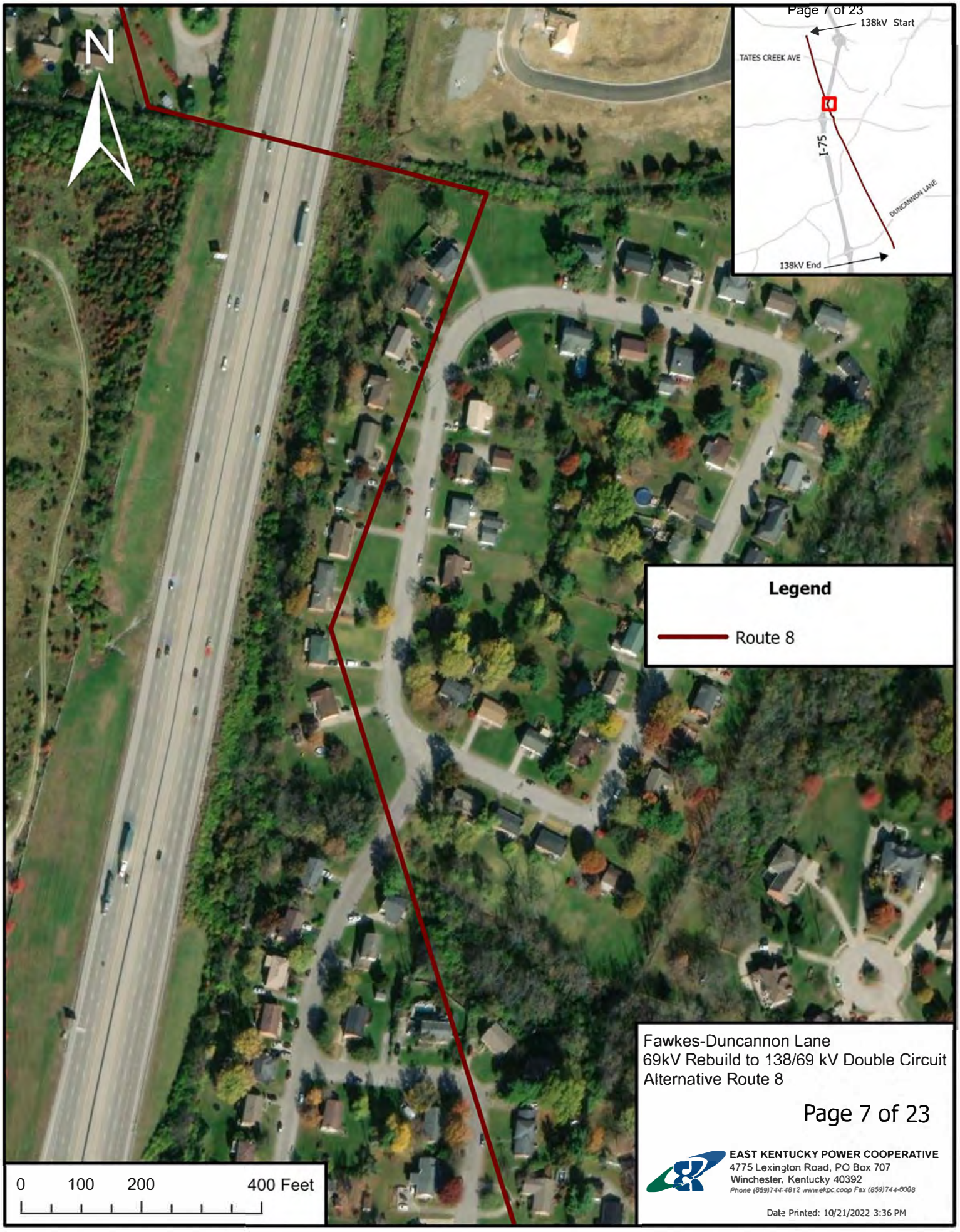

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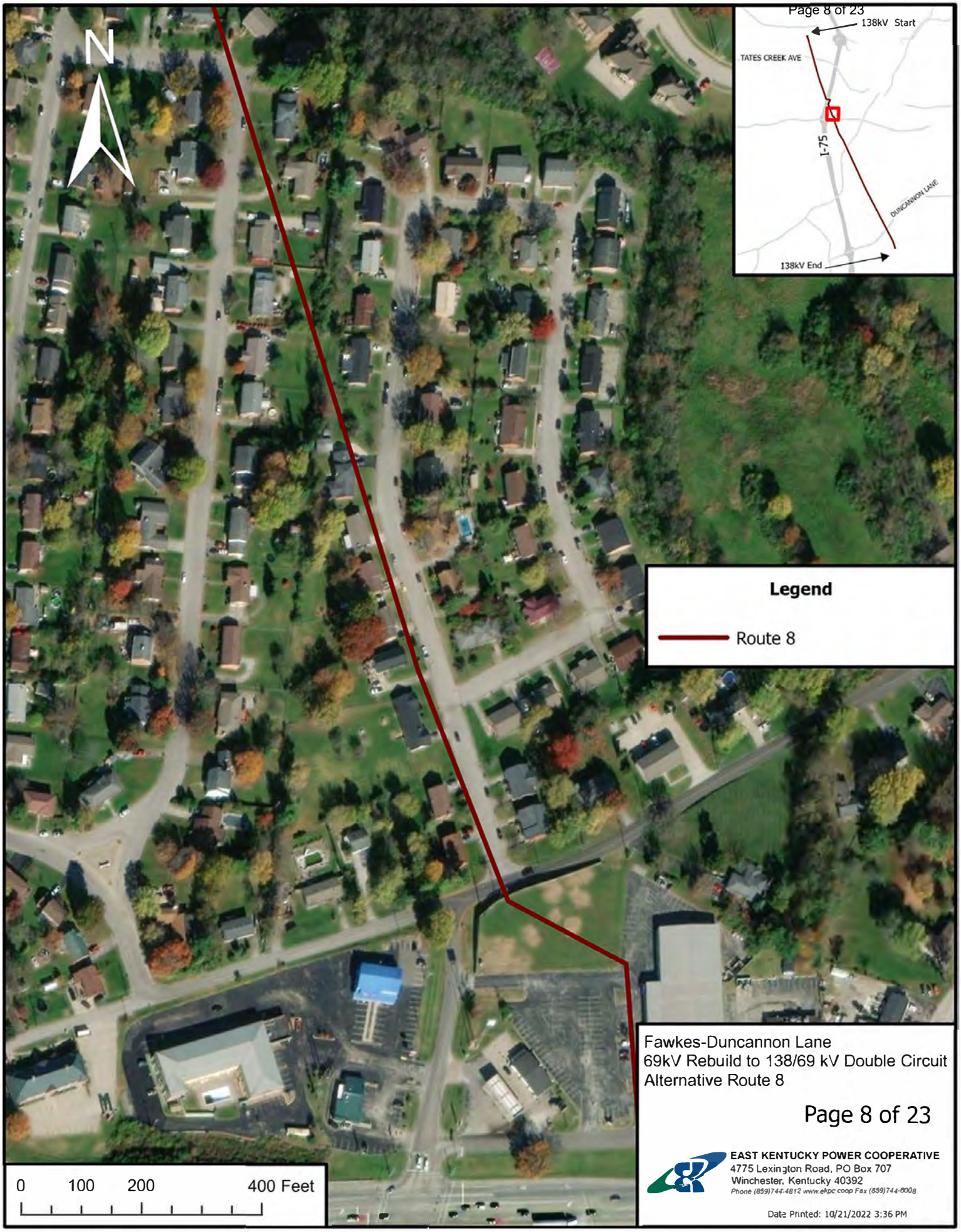

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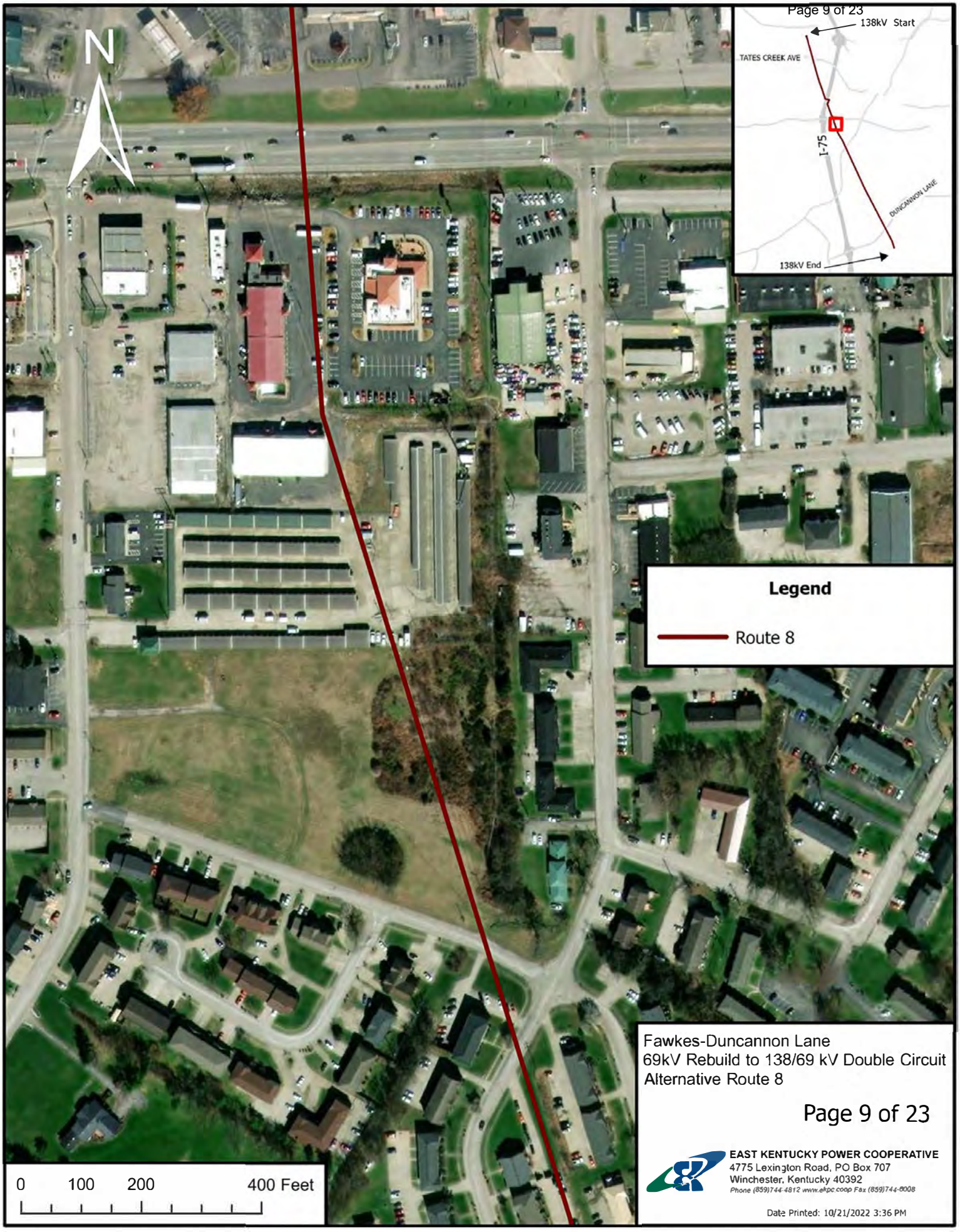

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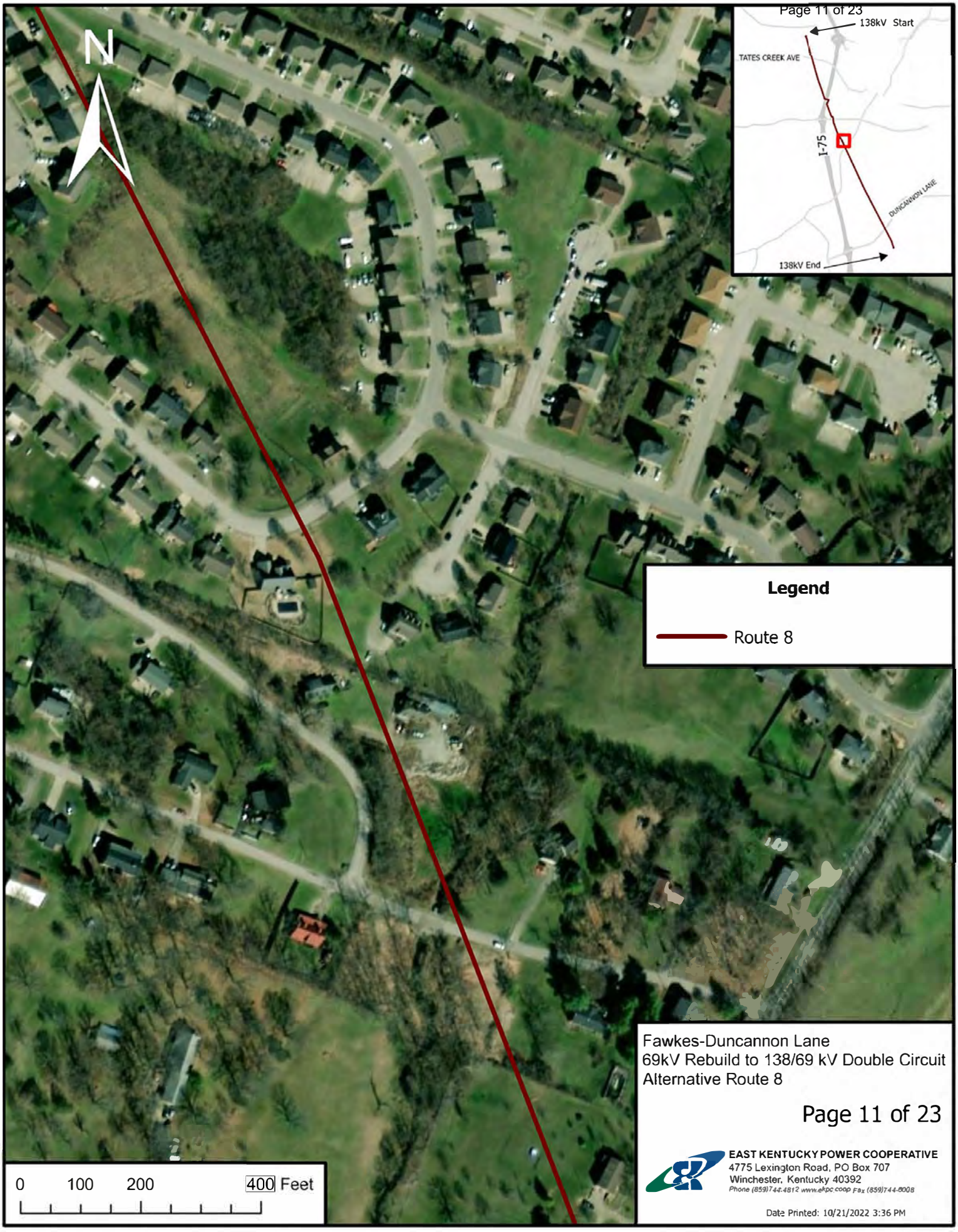

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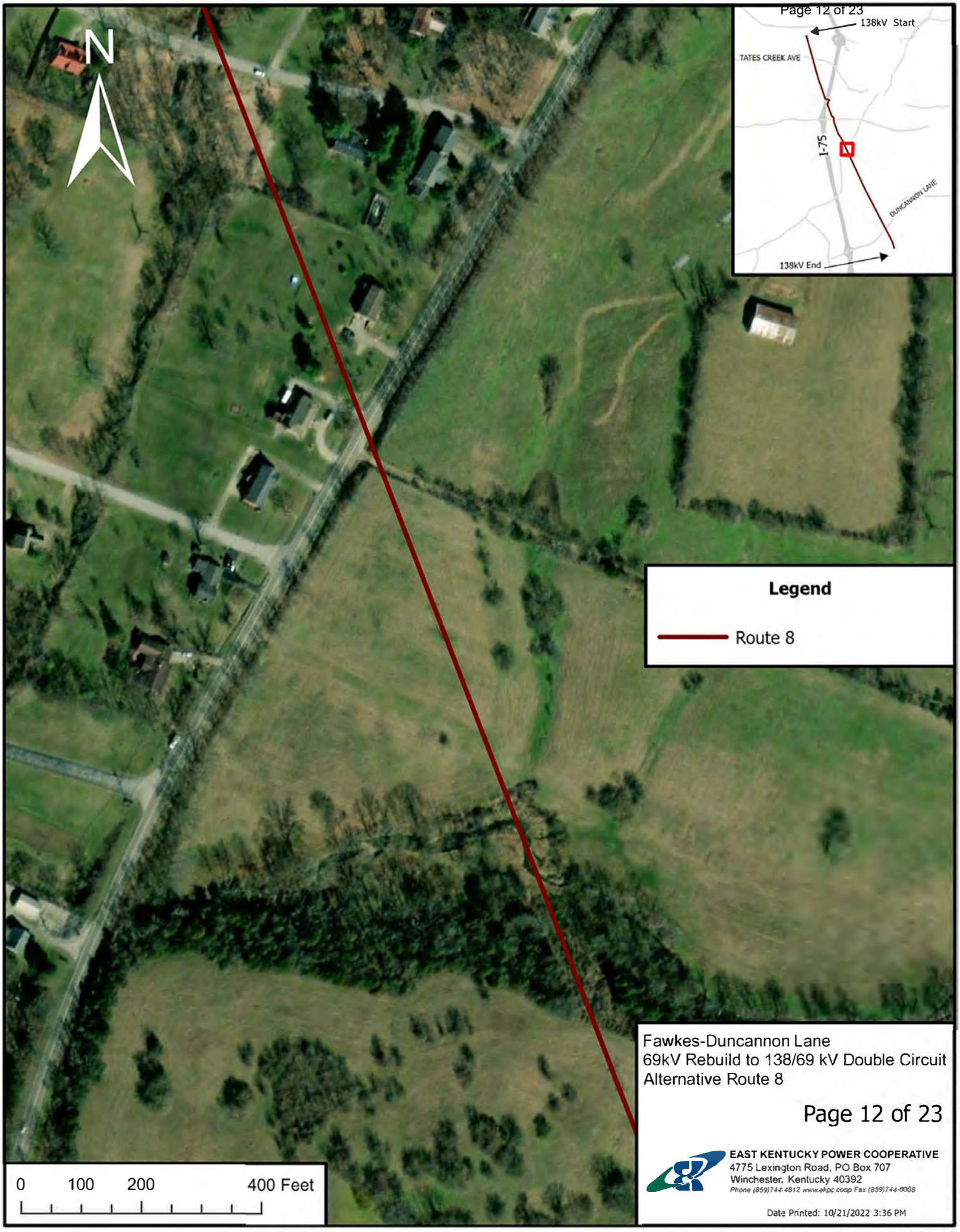

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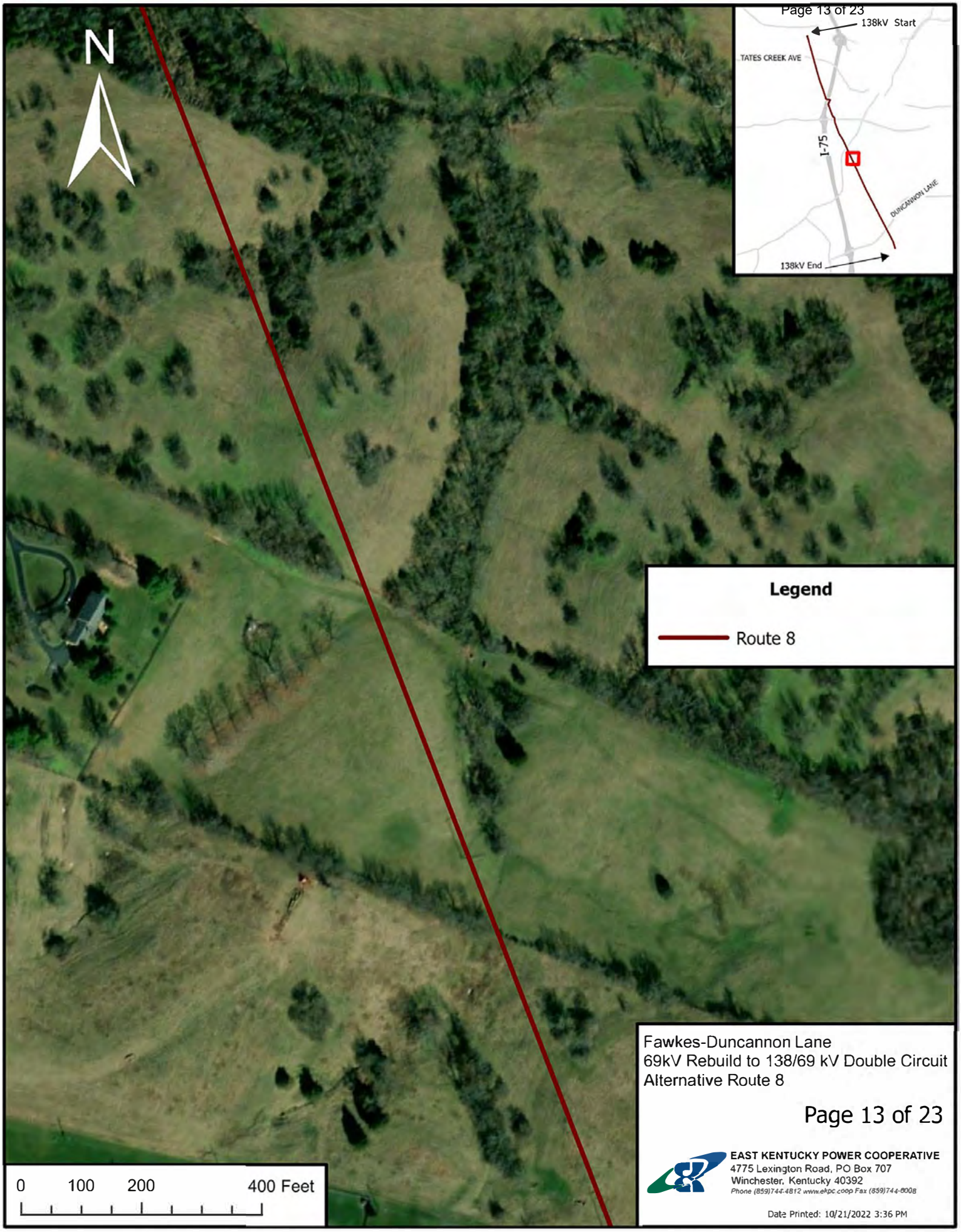

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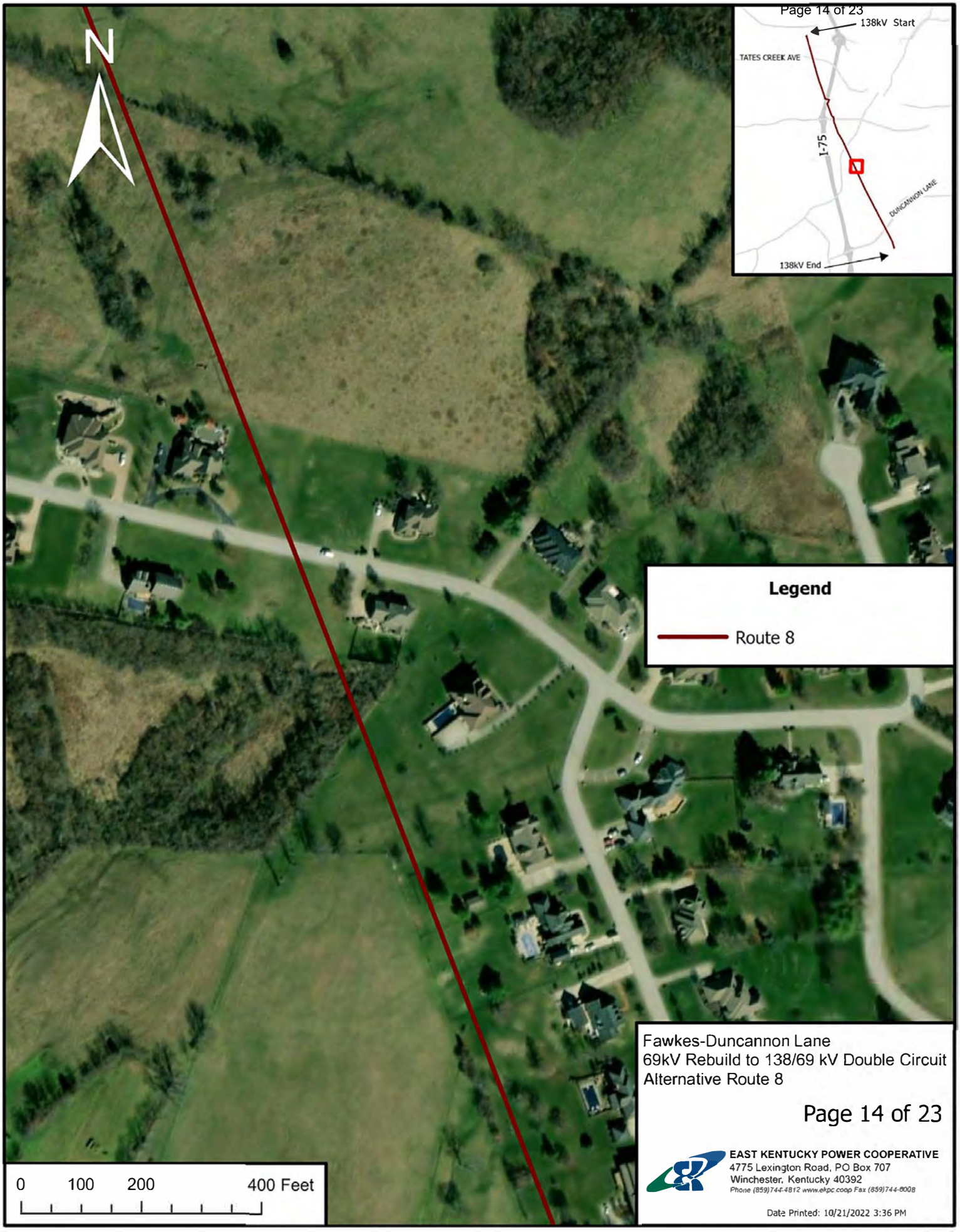

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Alternative Route 8

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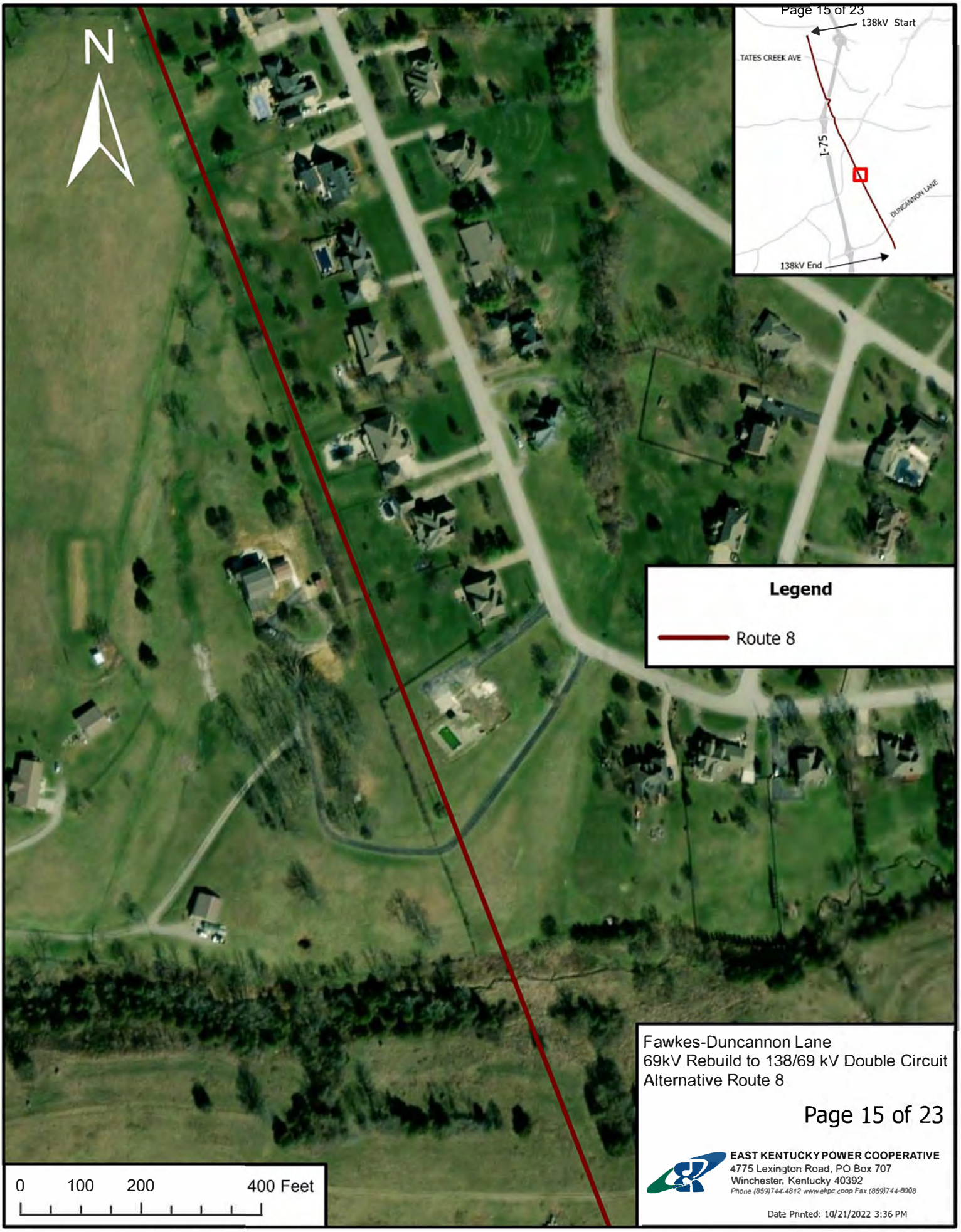

Fawkes-Duncannon Lane
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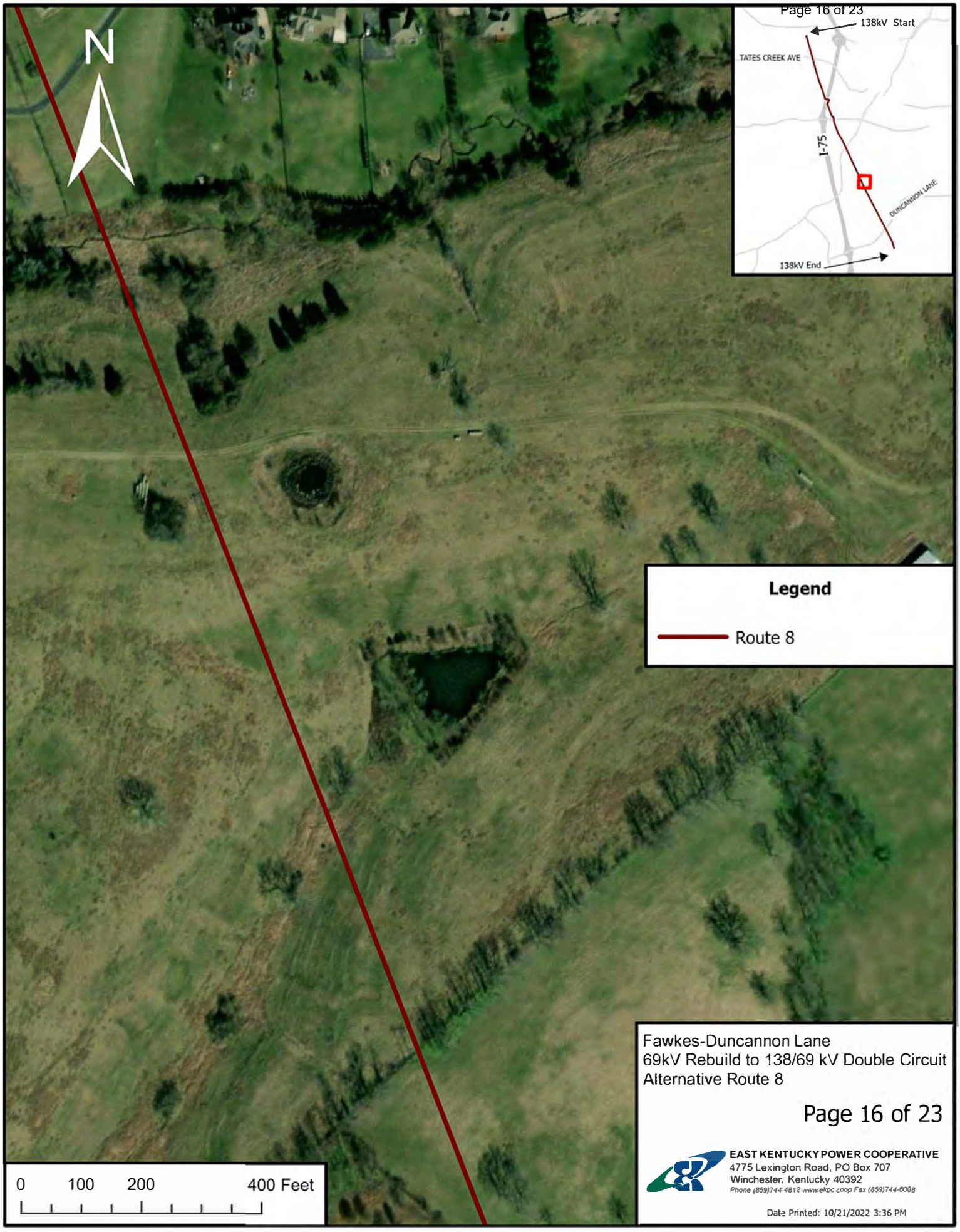

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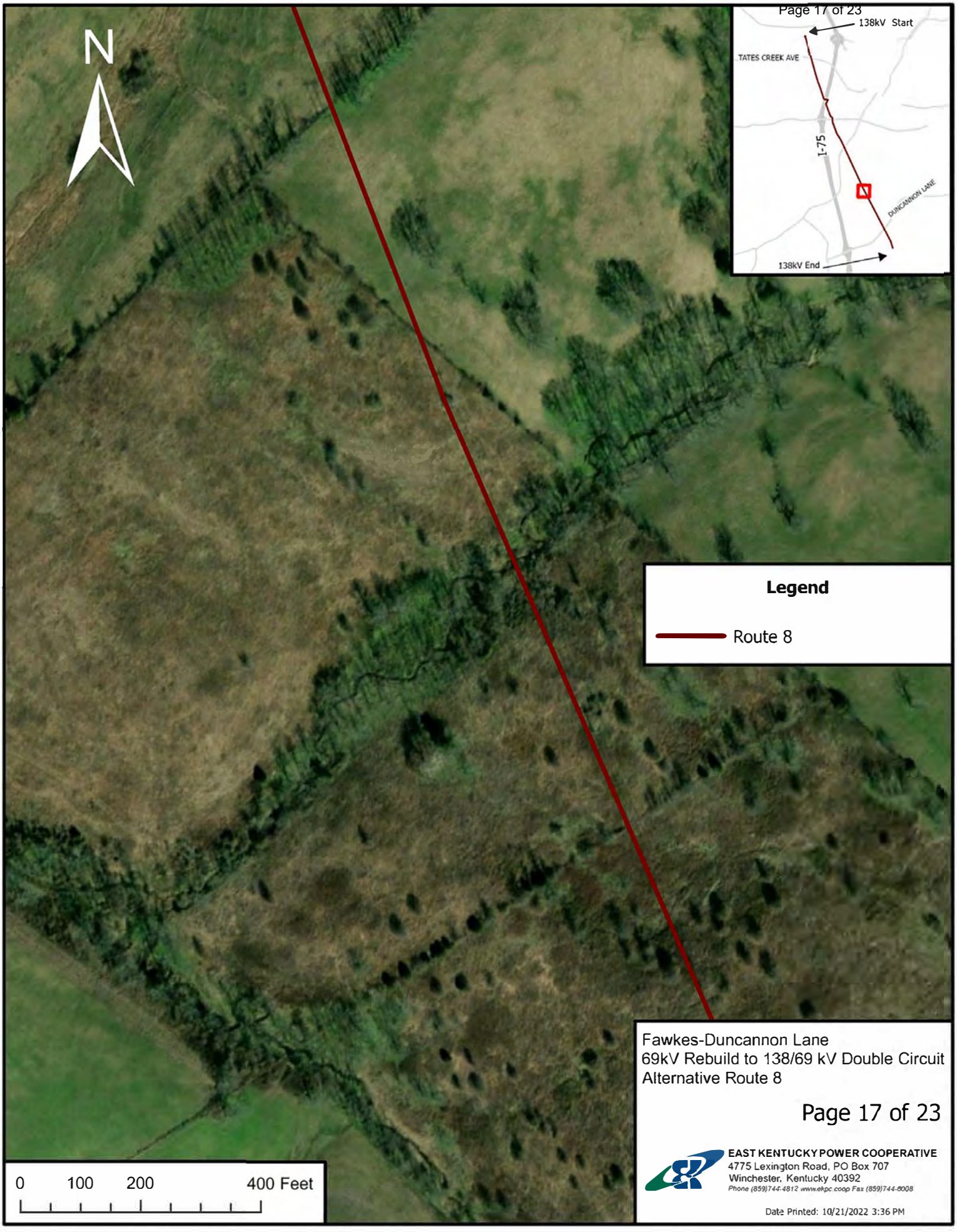

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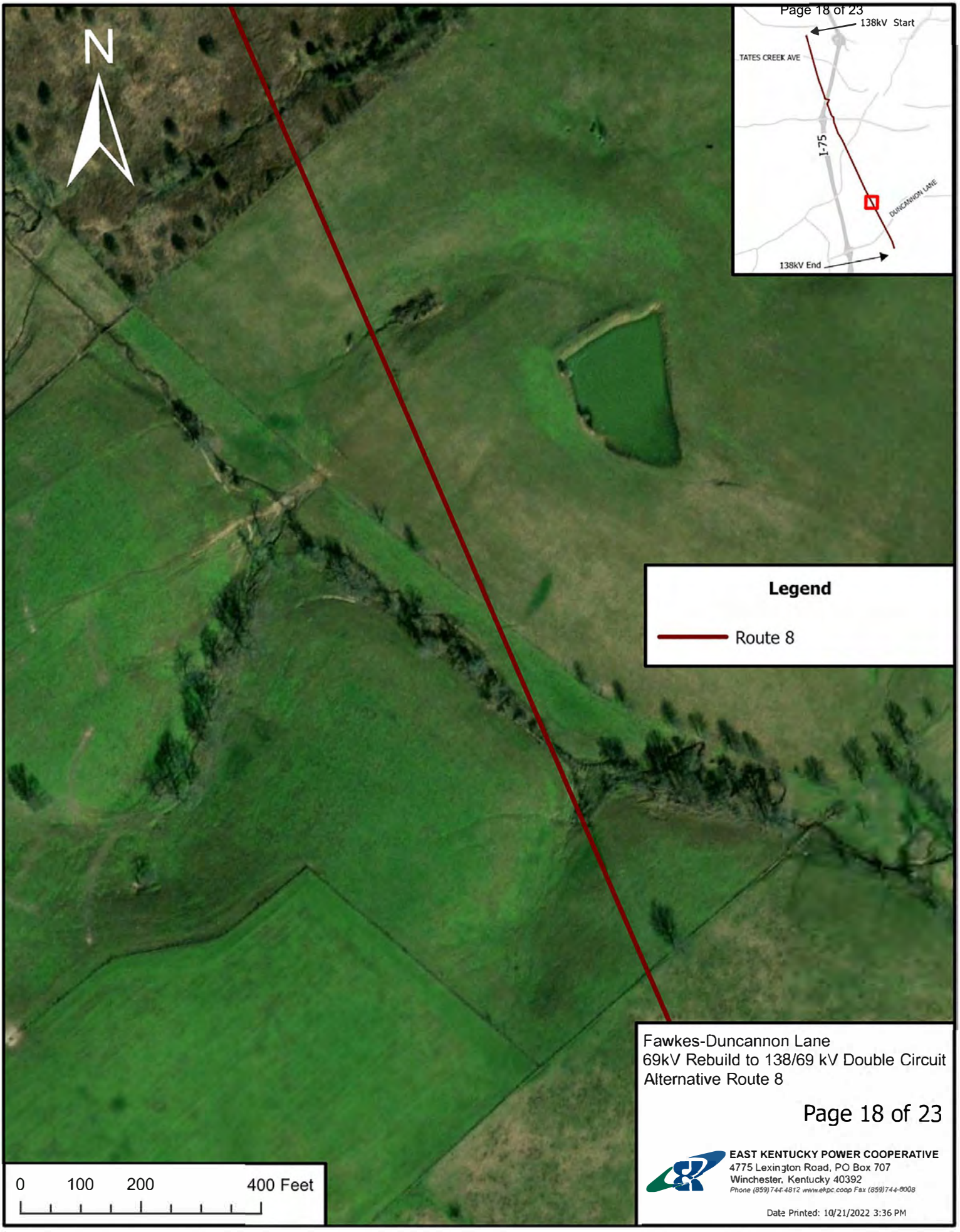

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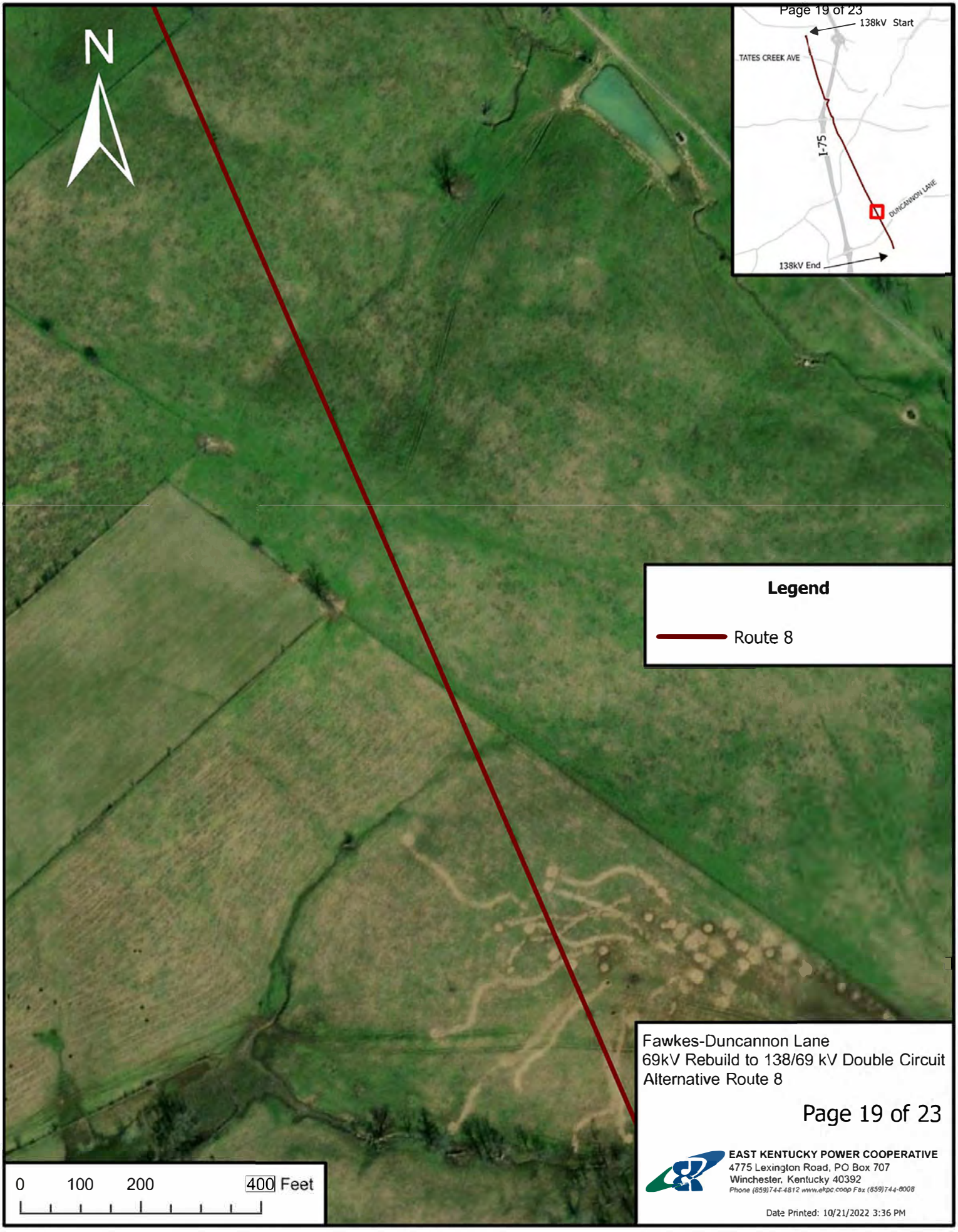

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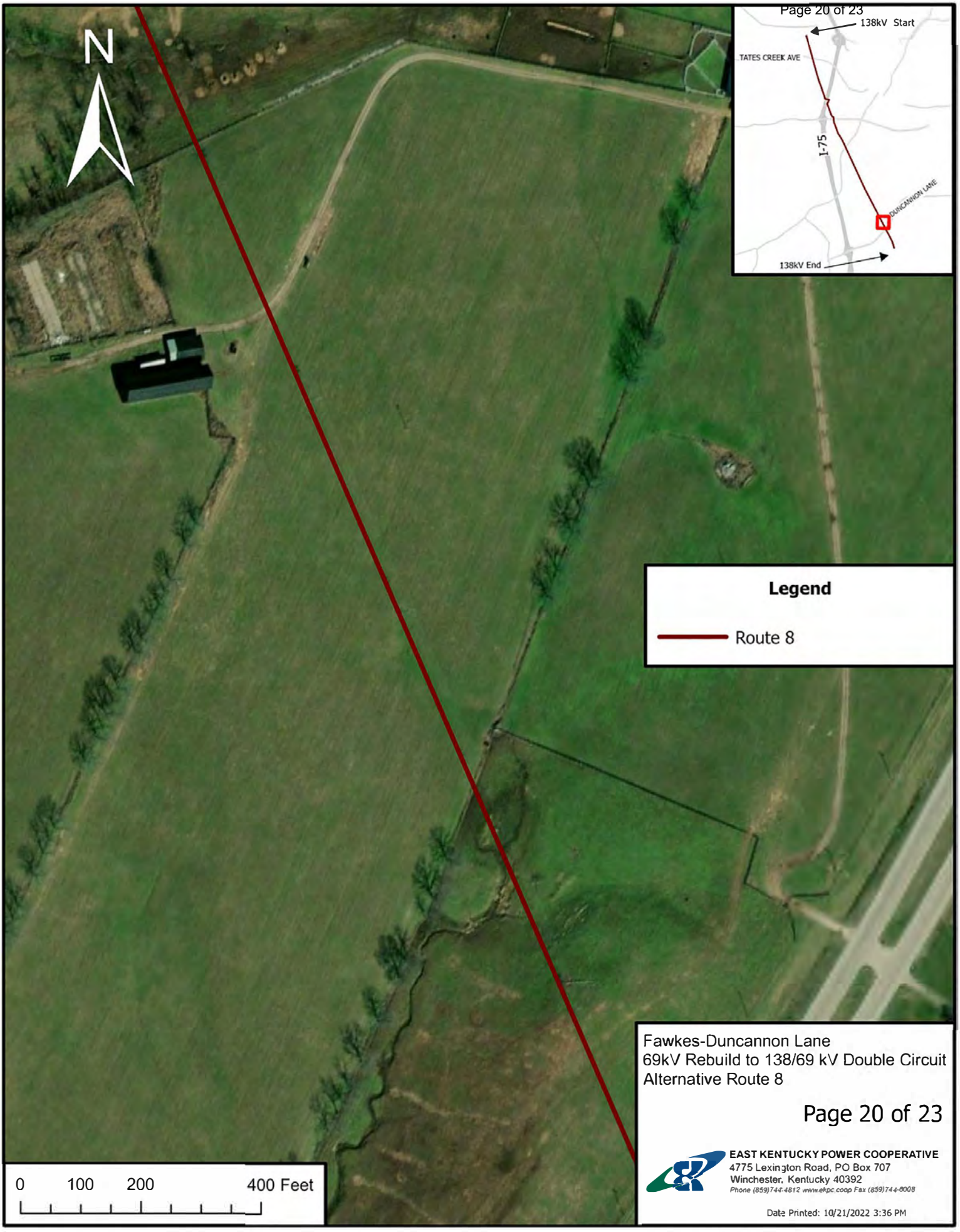

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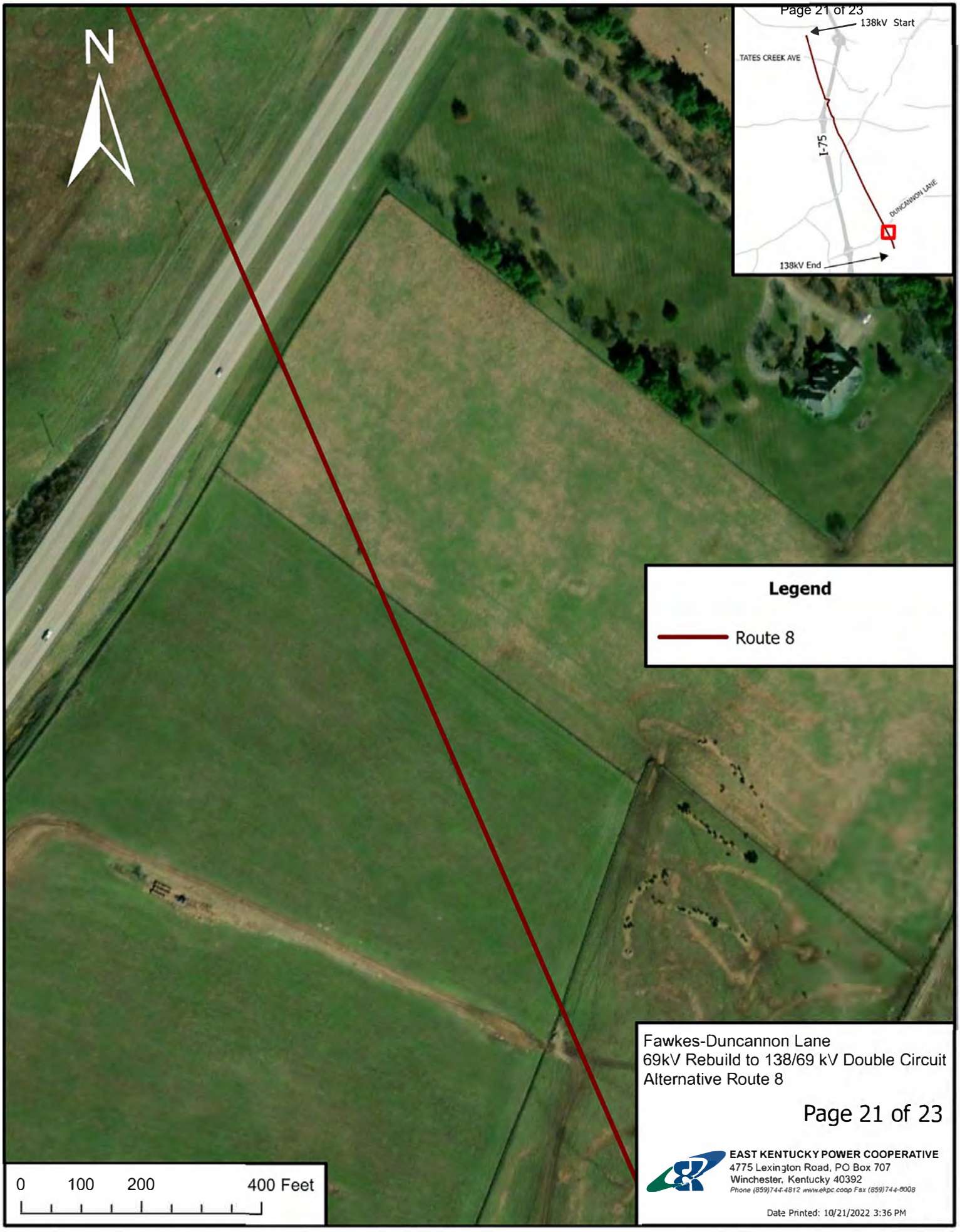

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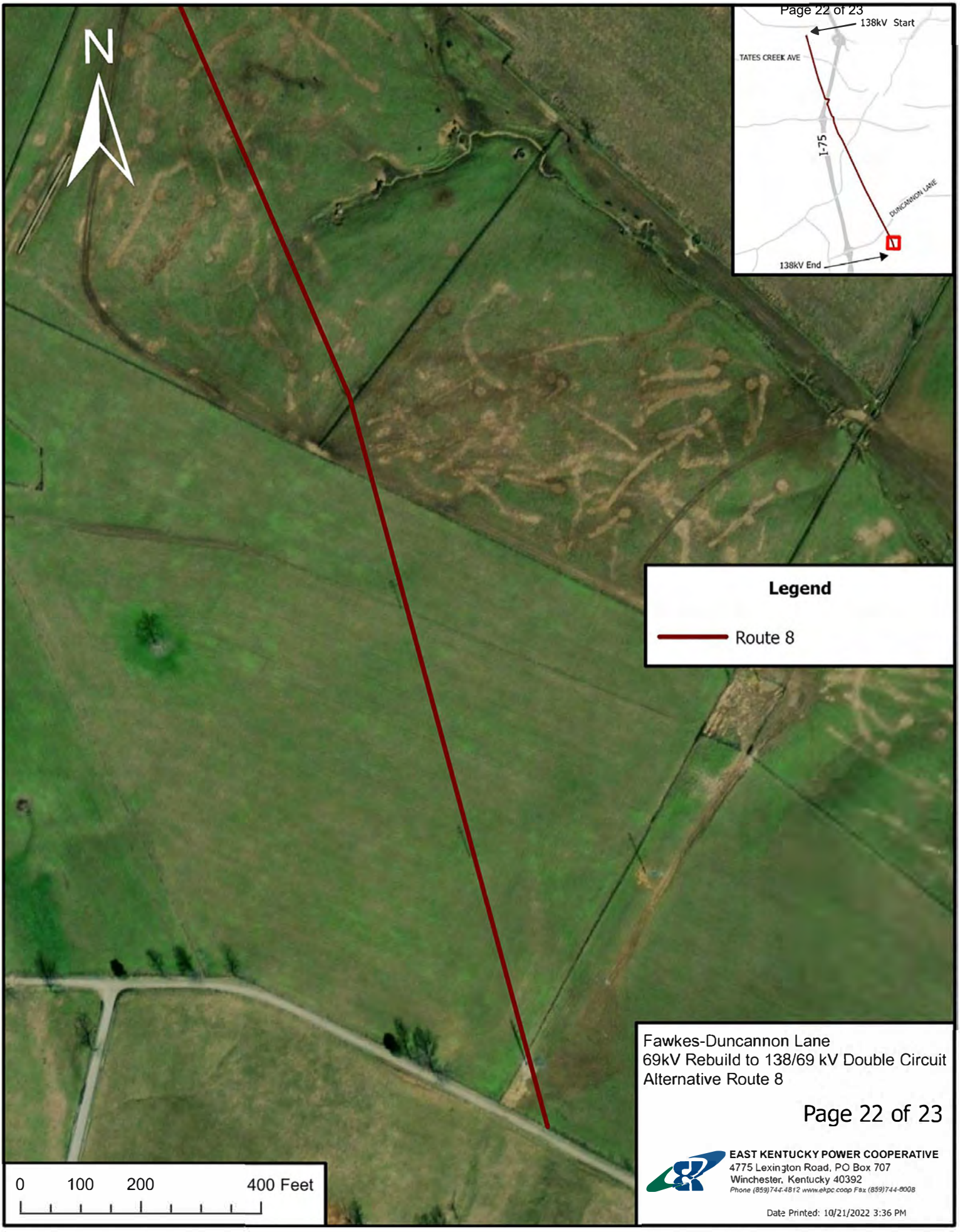

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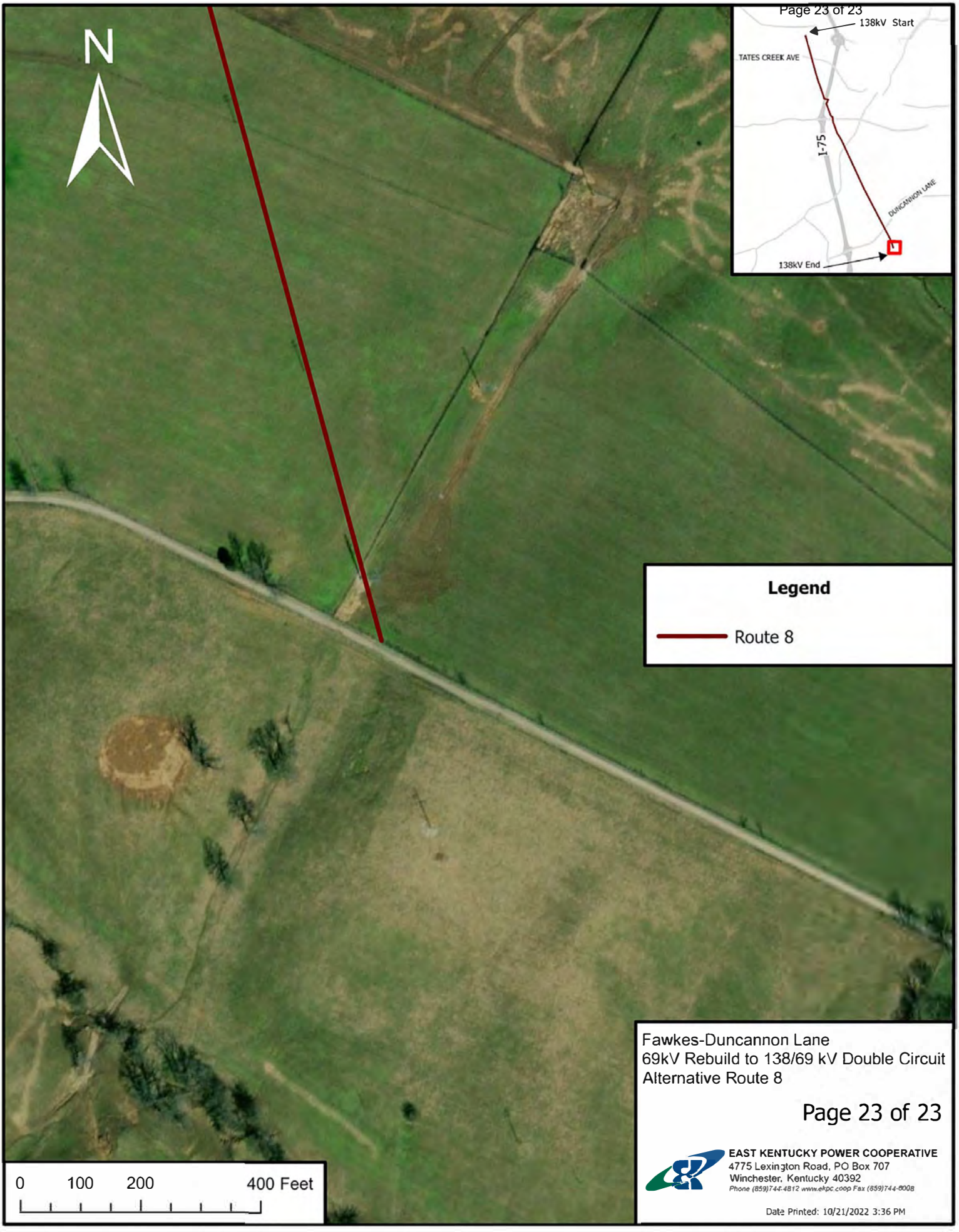

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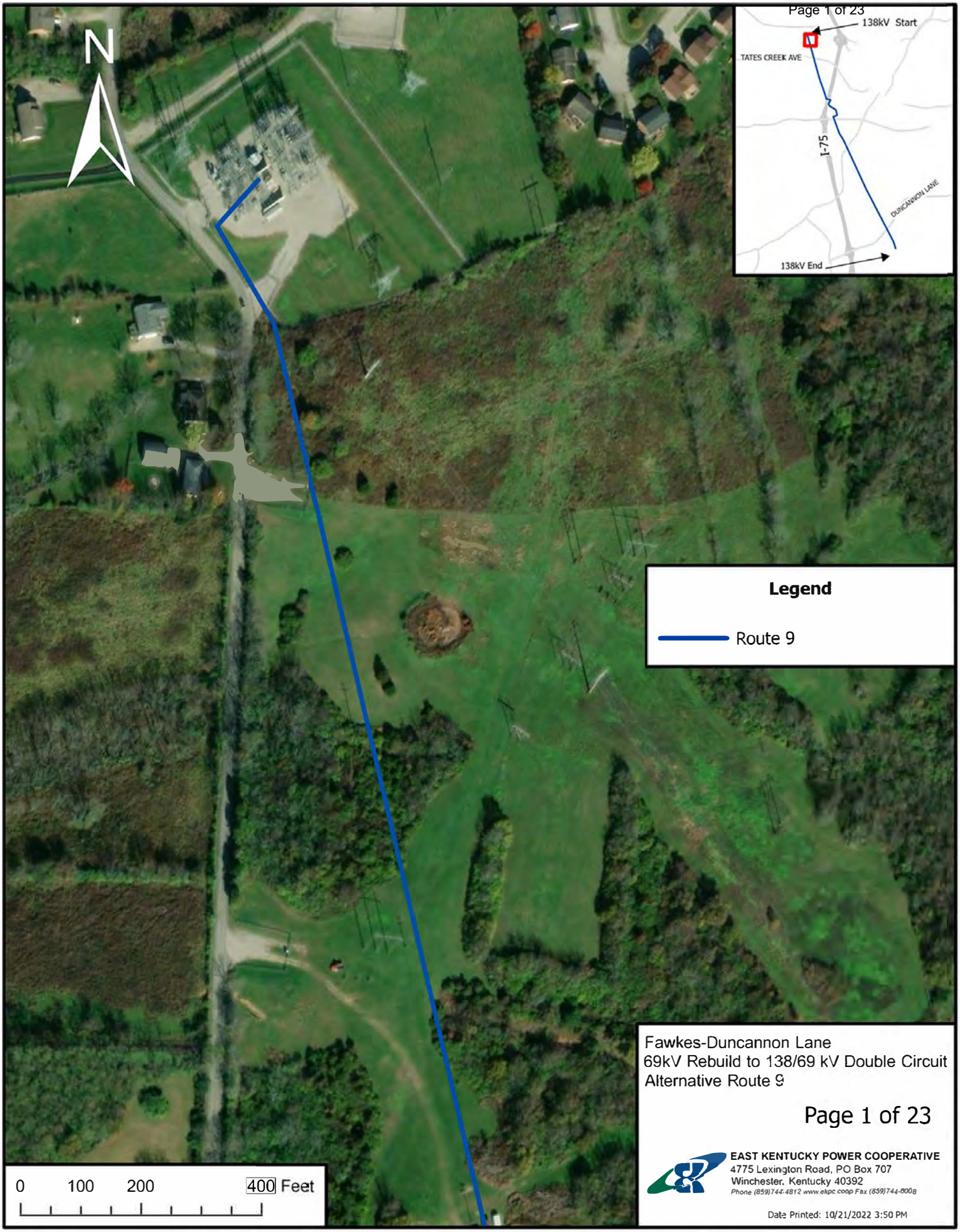
EXHIBIT 12
ALTERNATE ROUTE MAP



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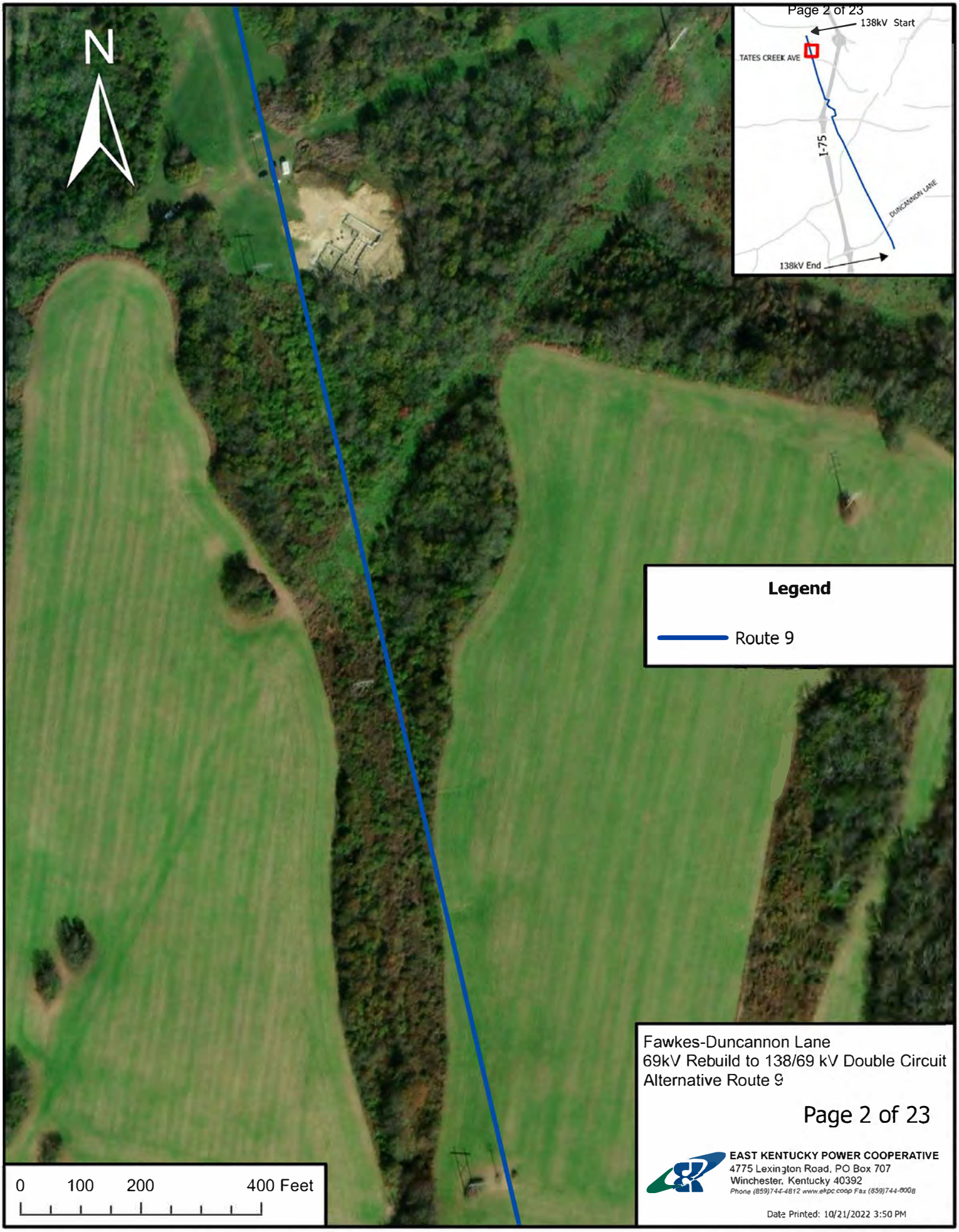

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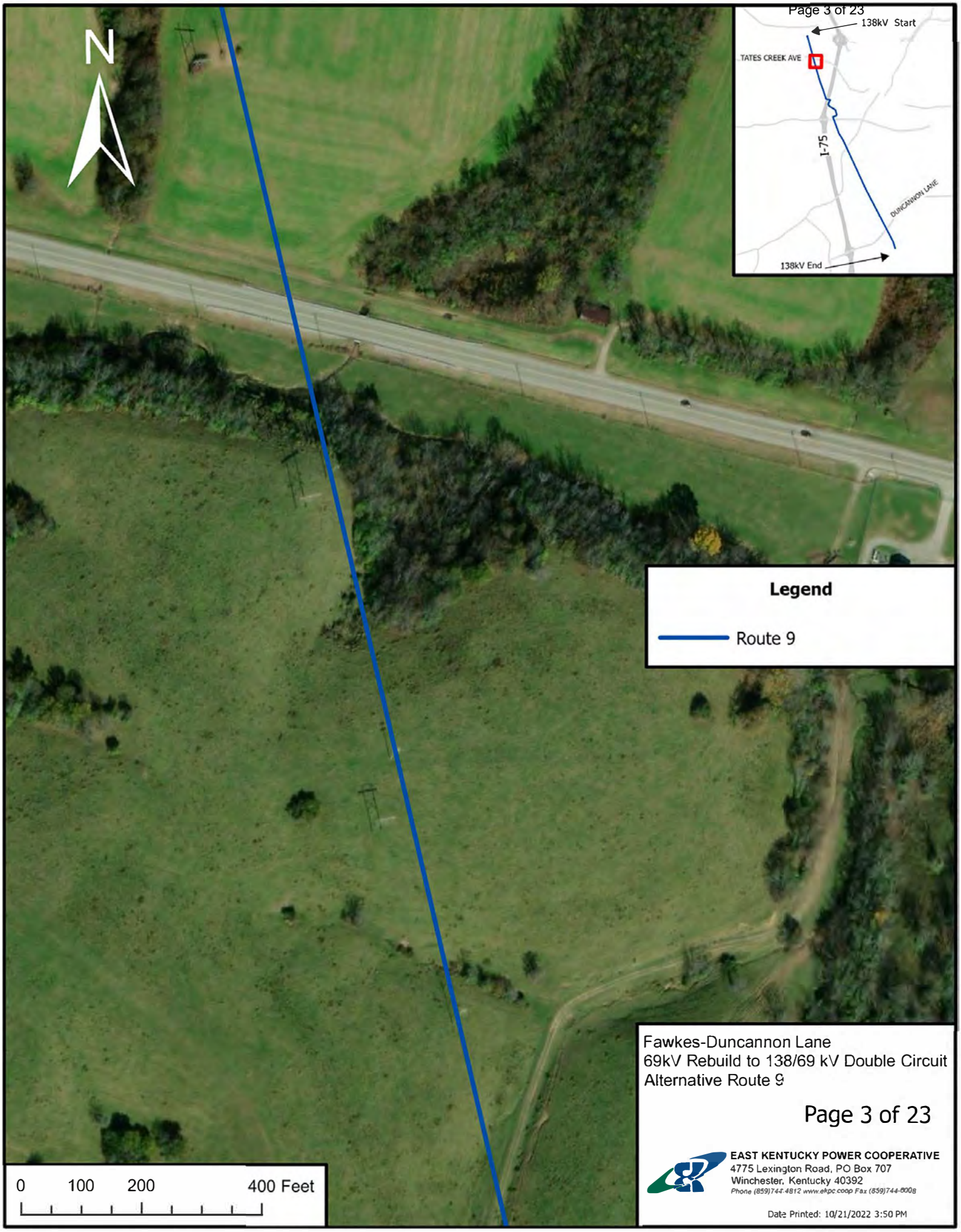

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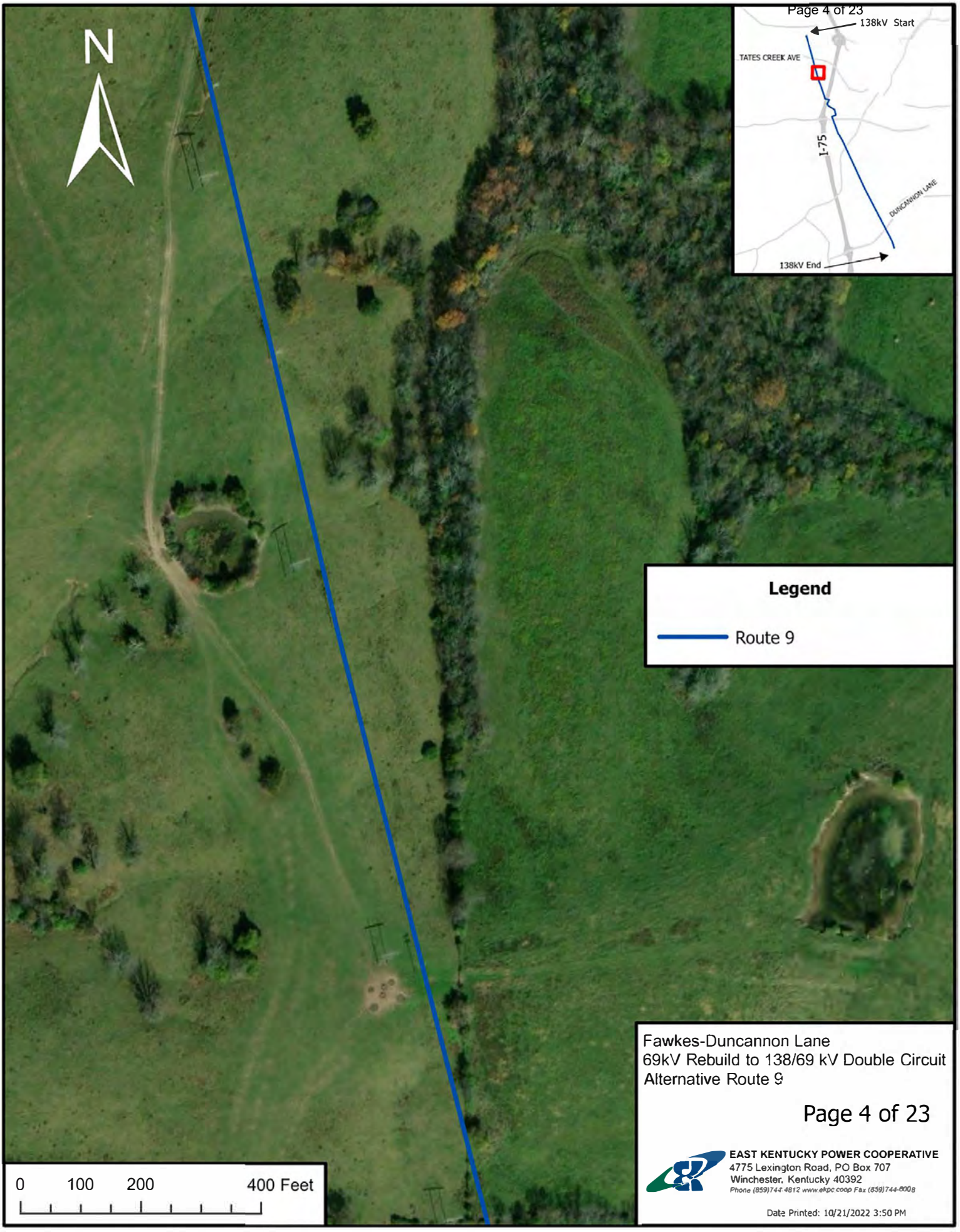

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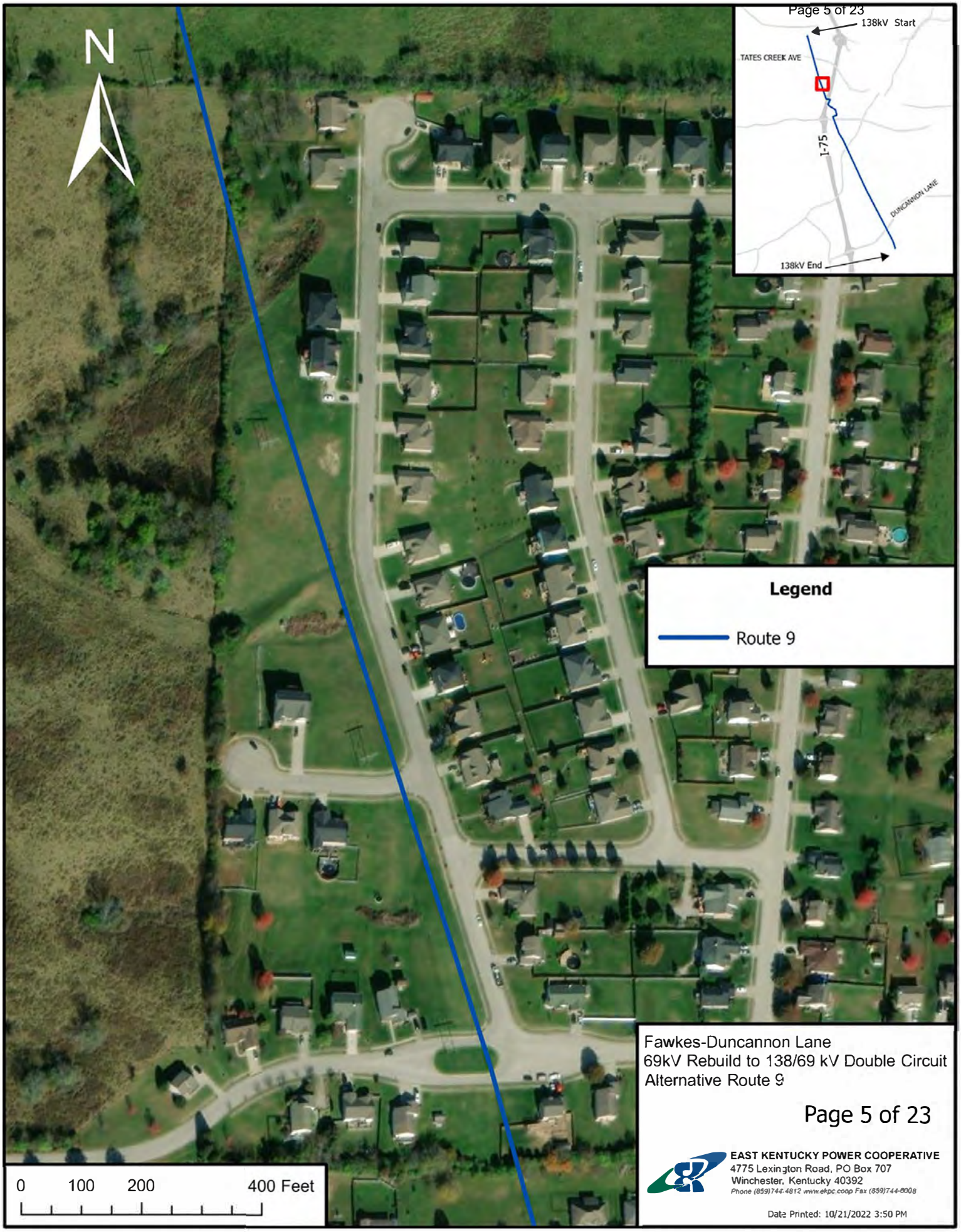

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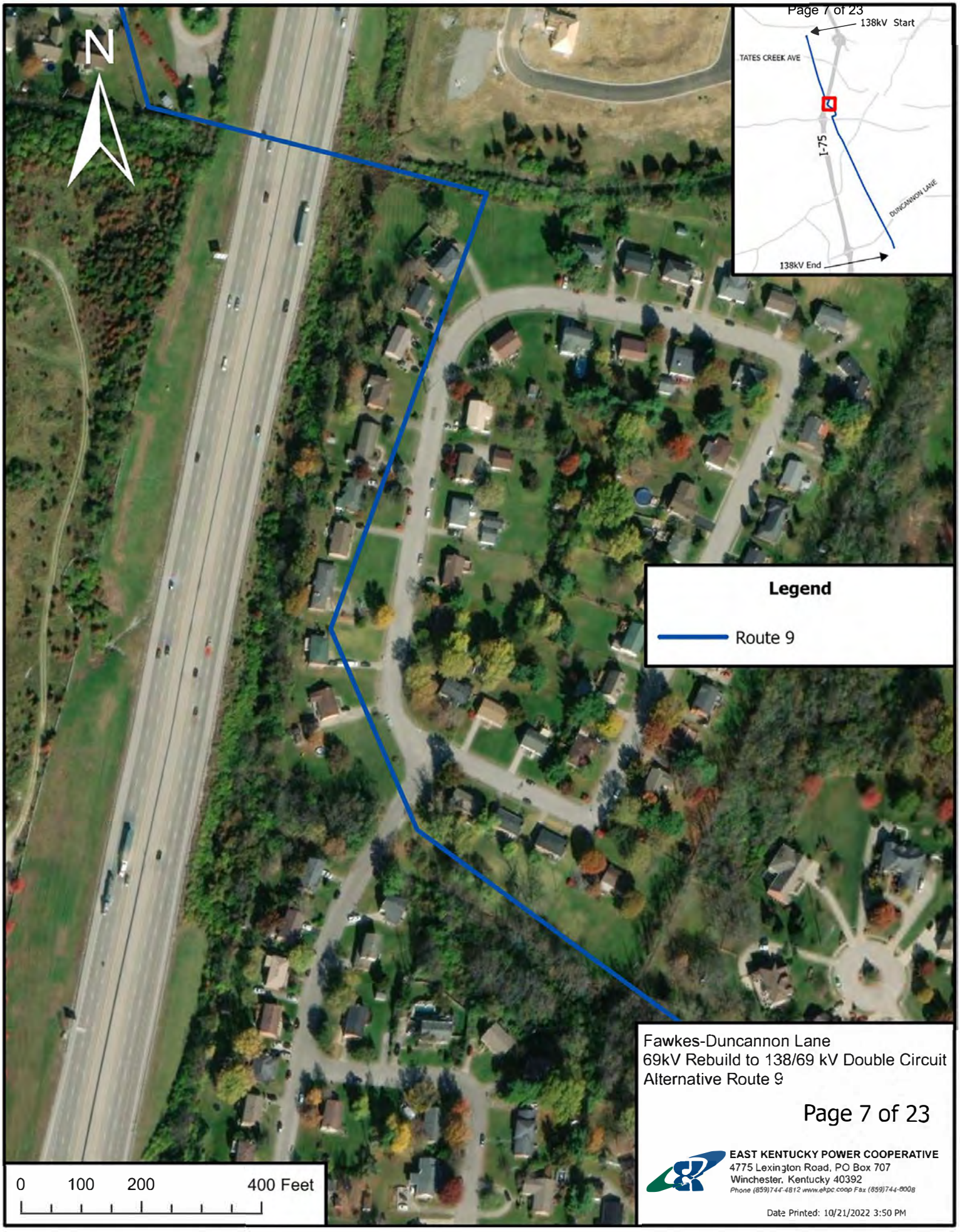

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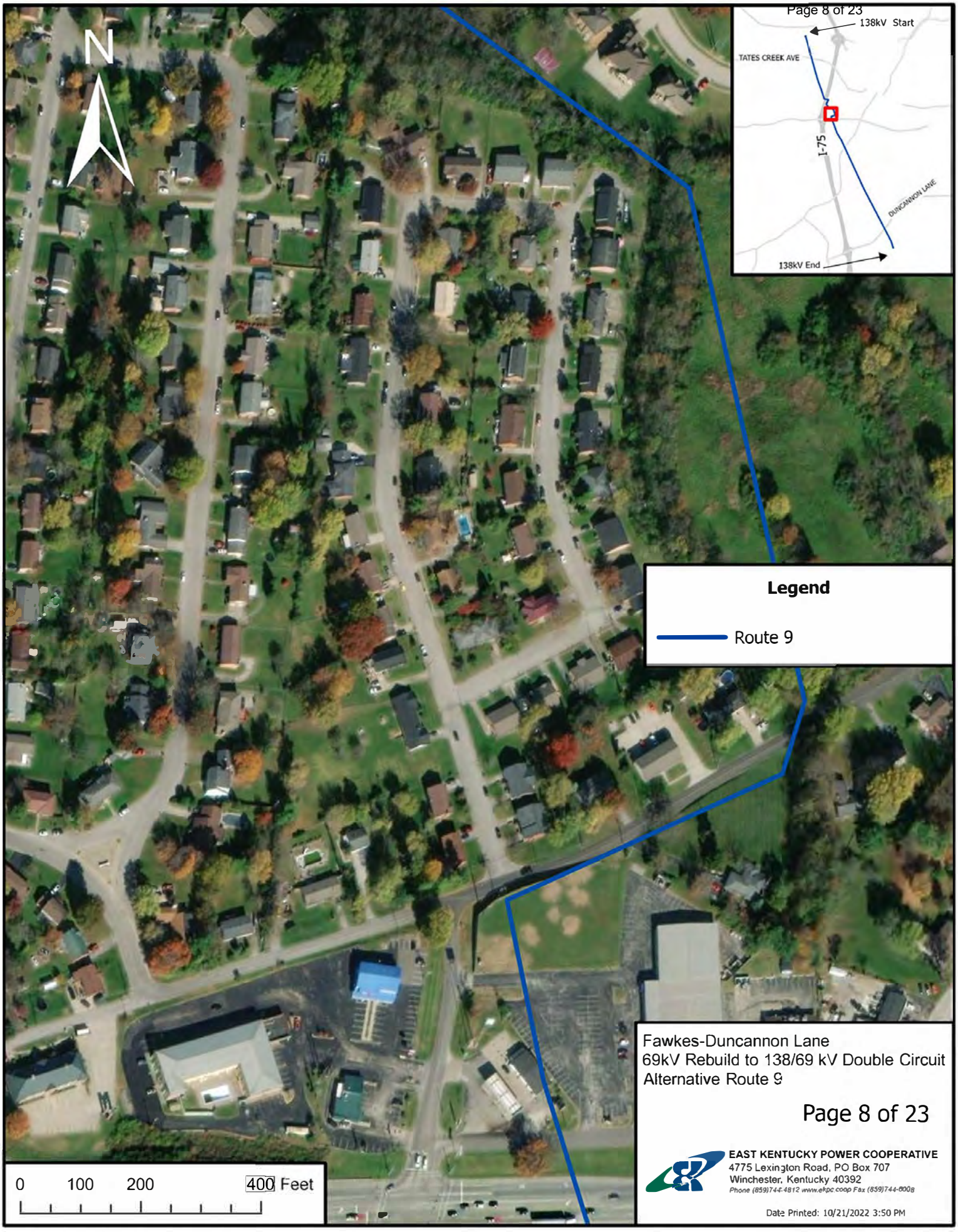

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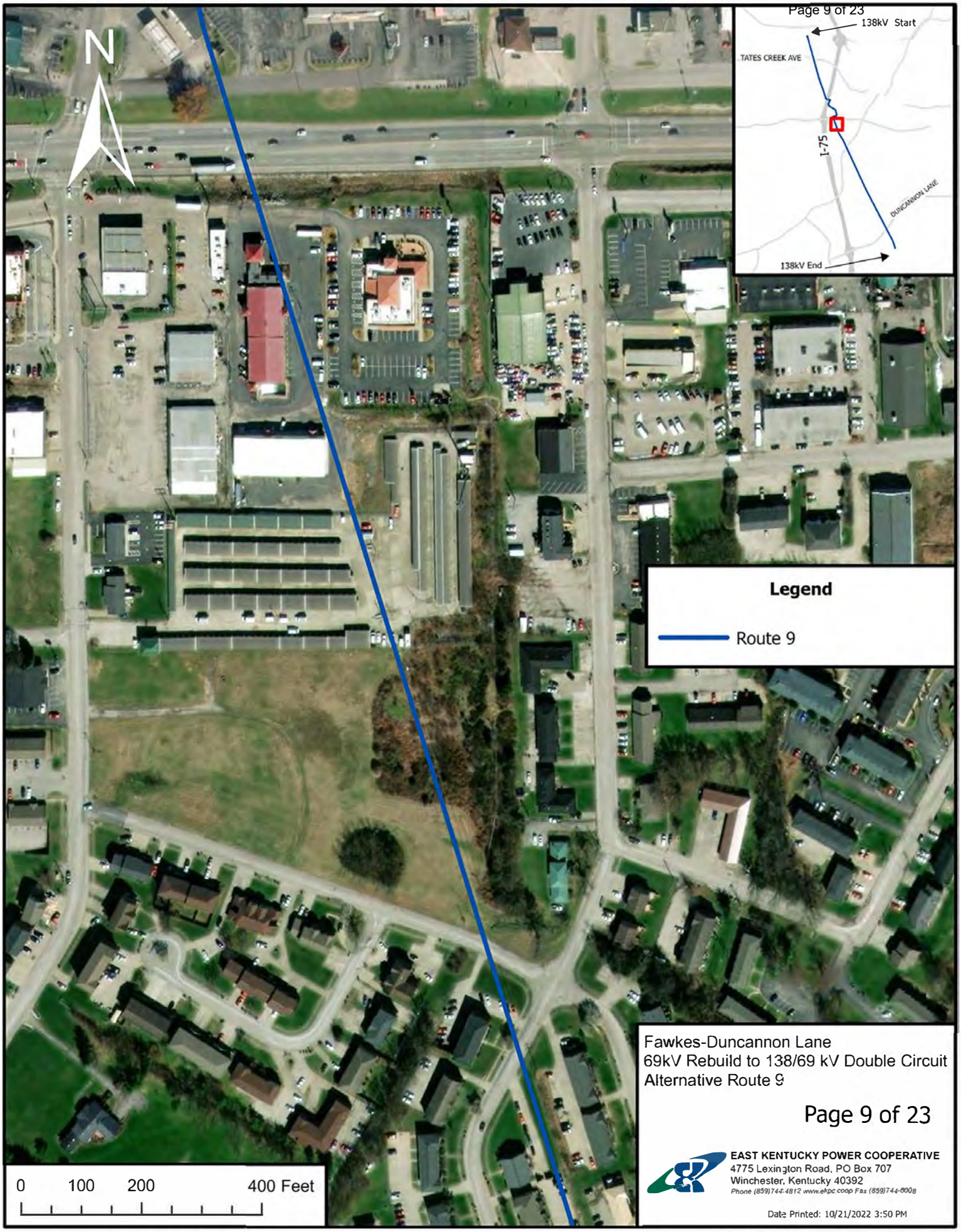

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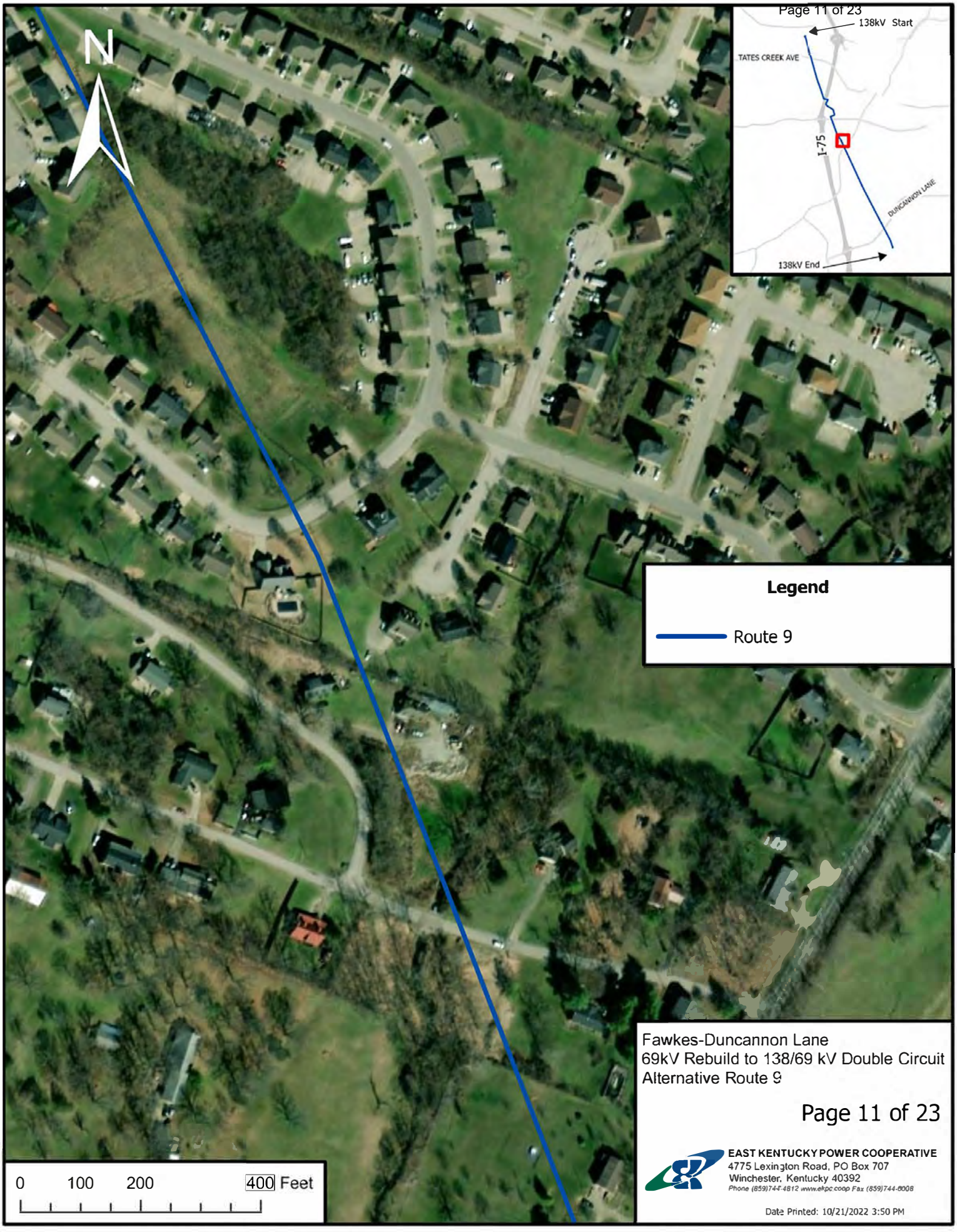

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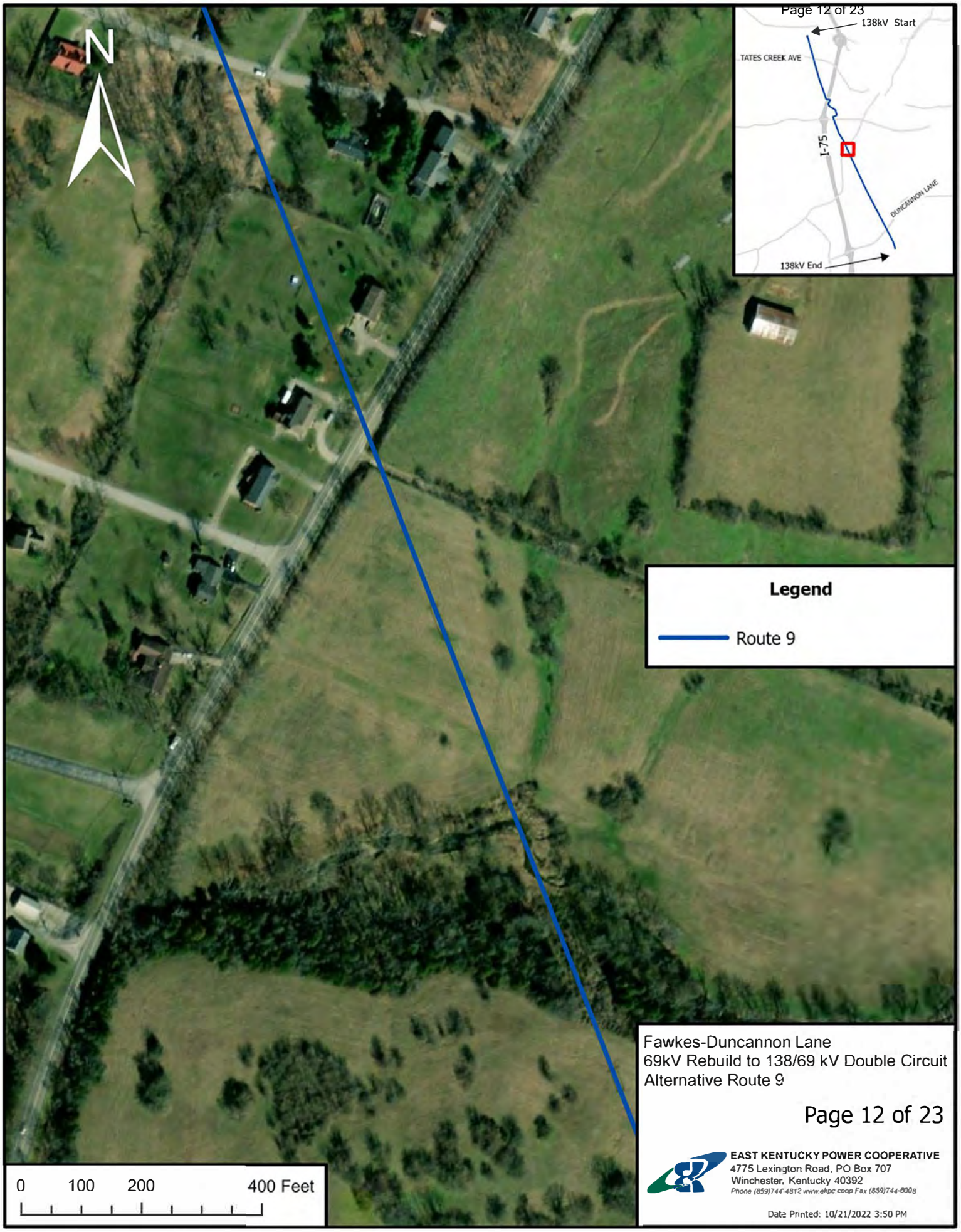

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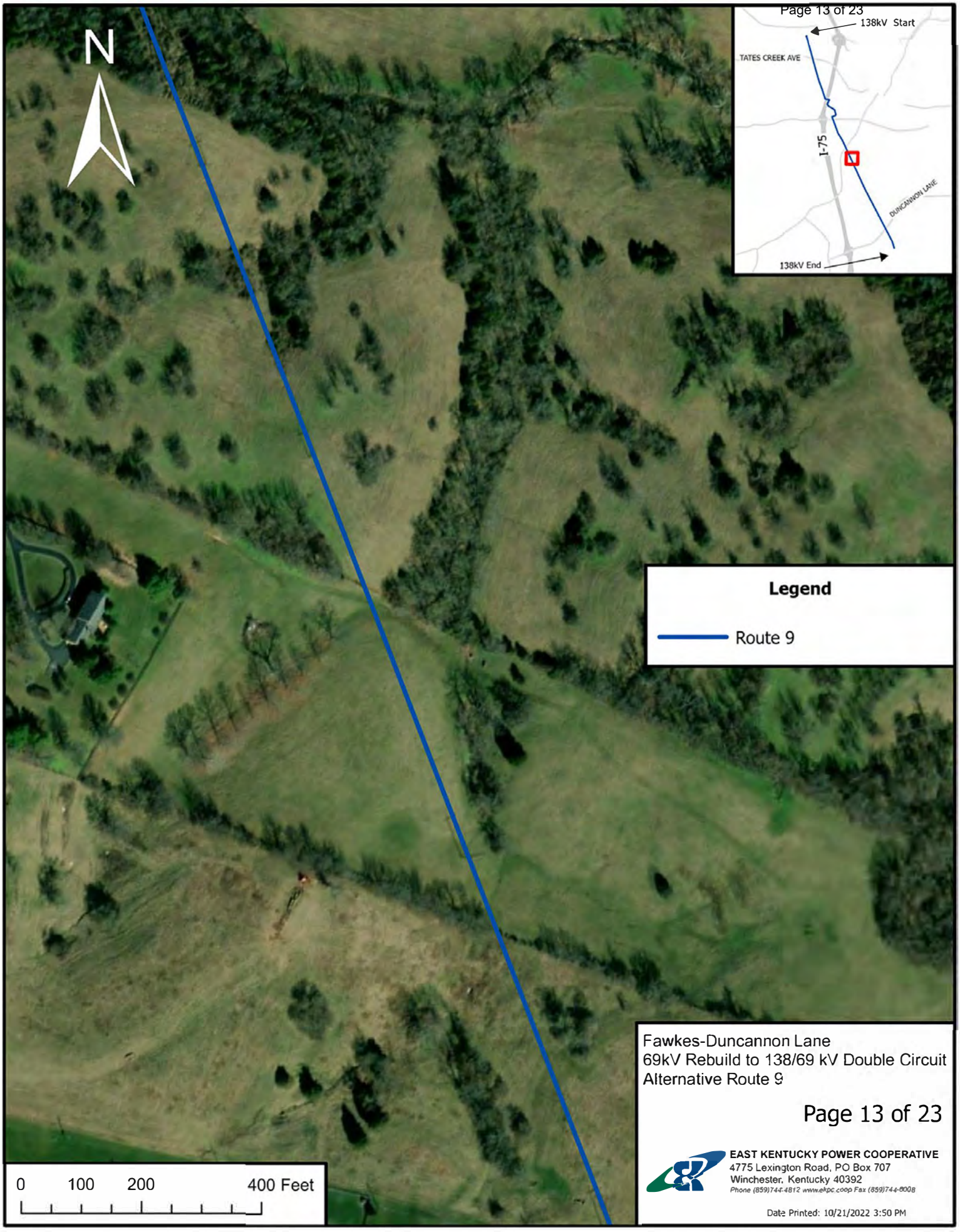

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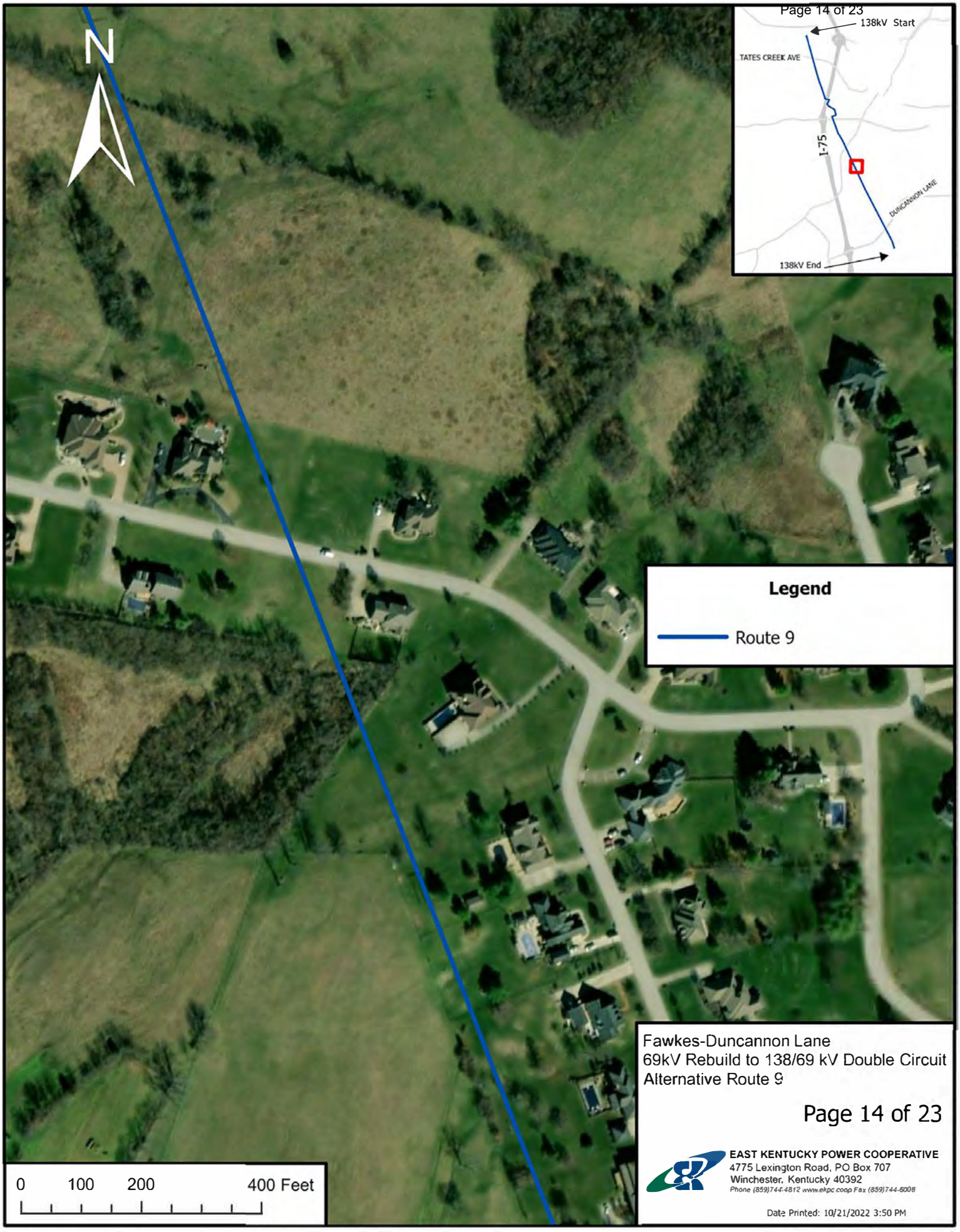

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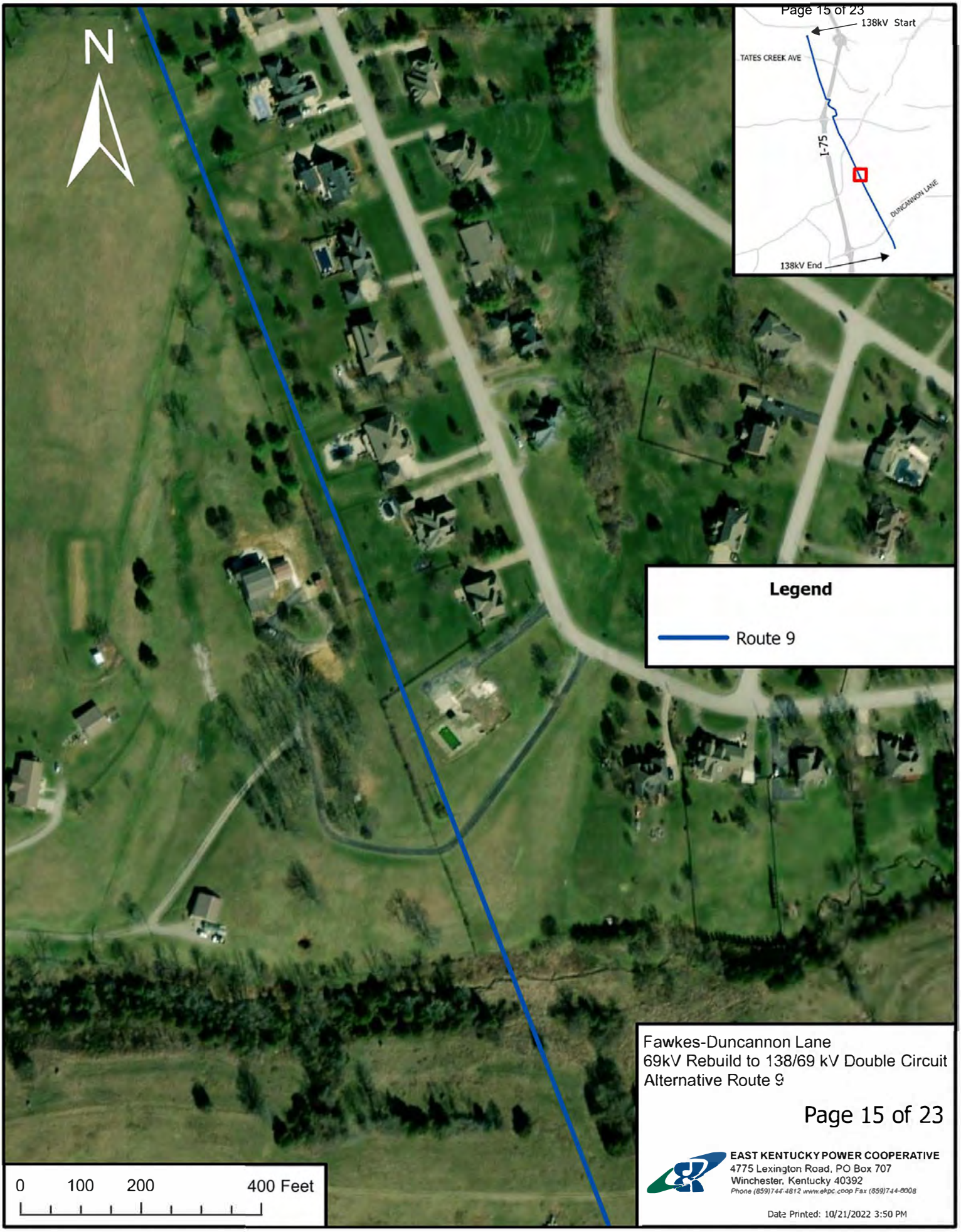

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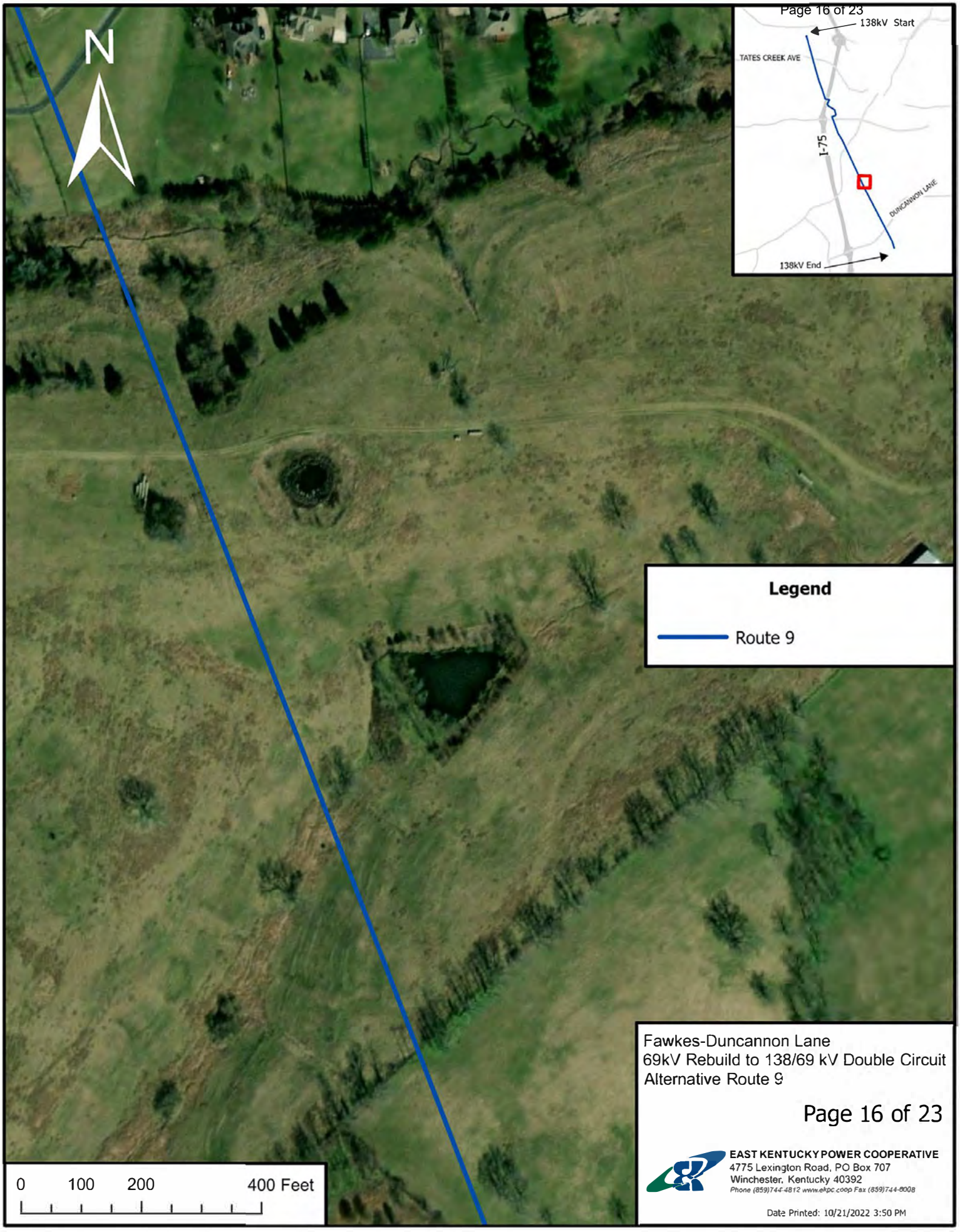

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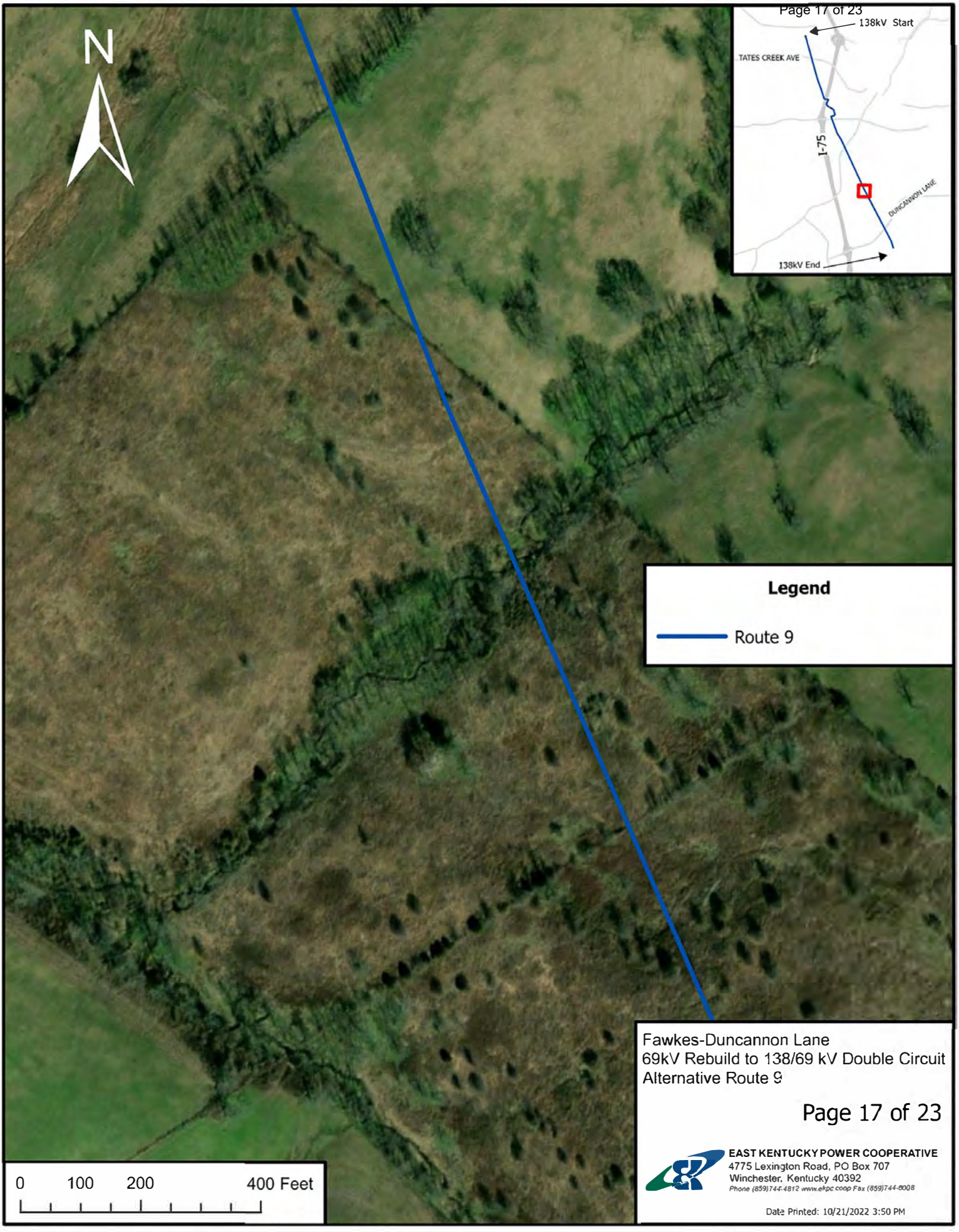

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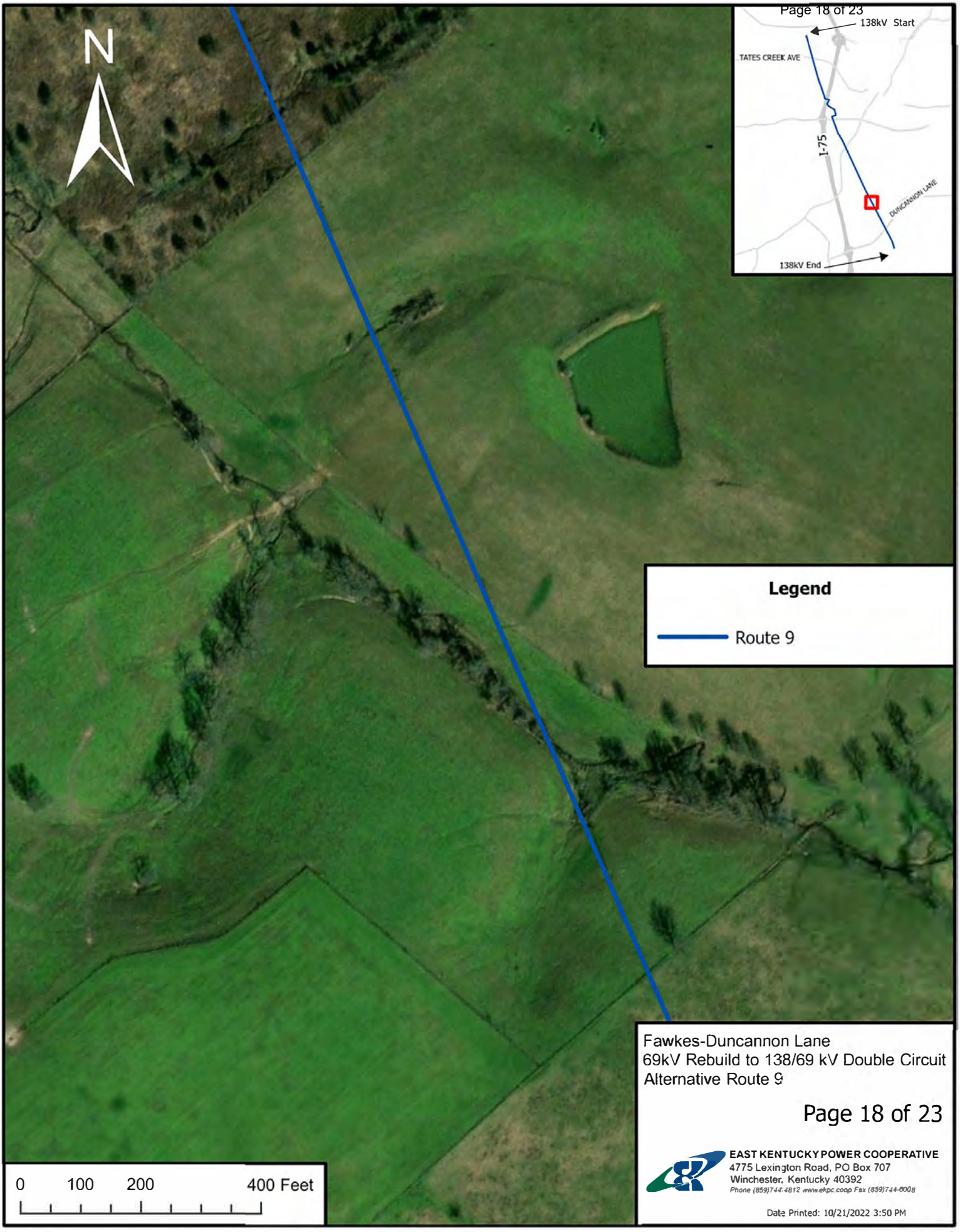

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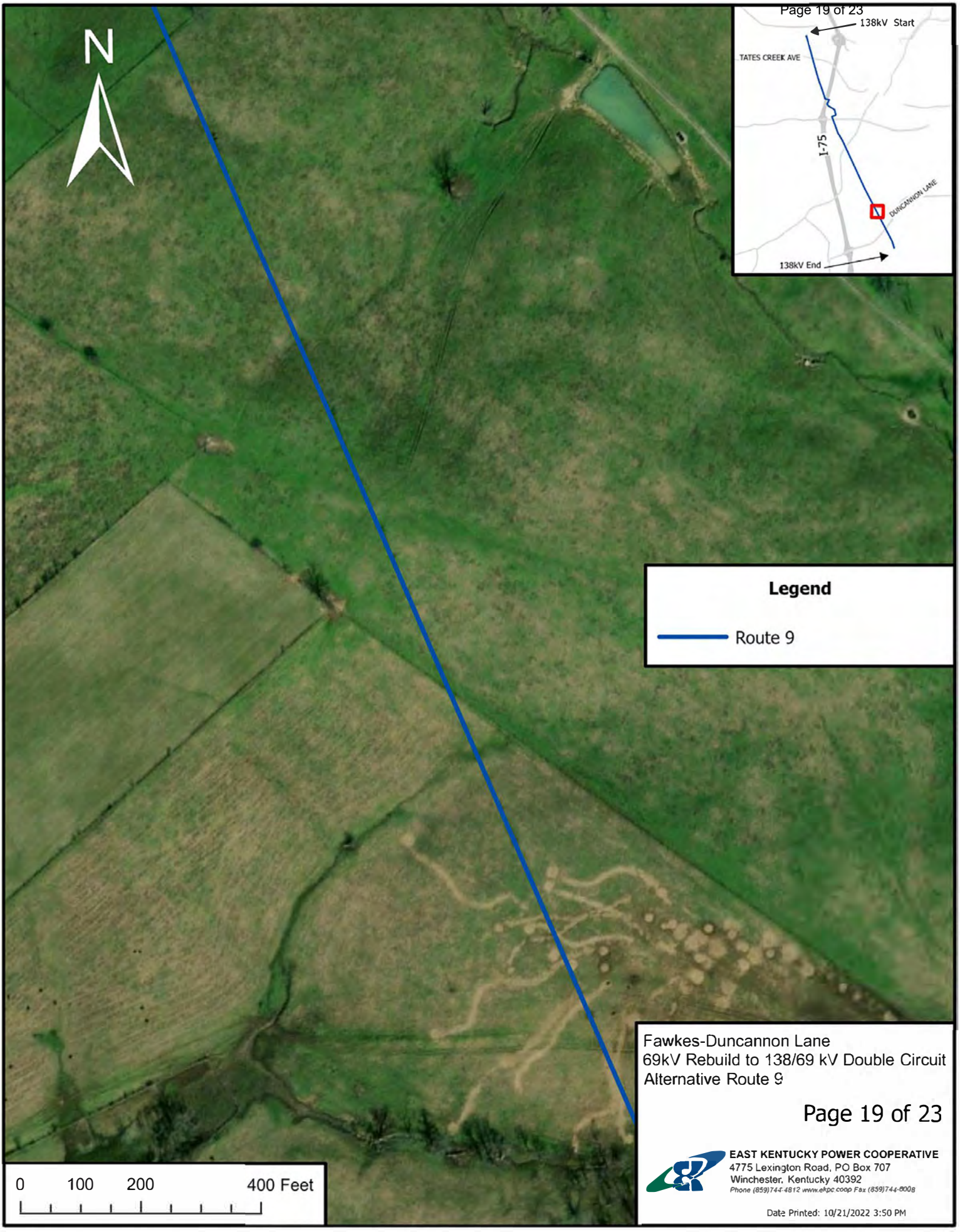

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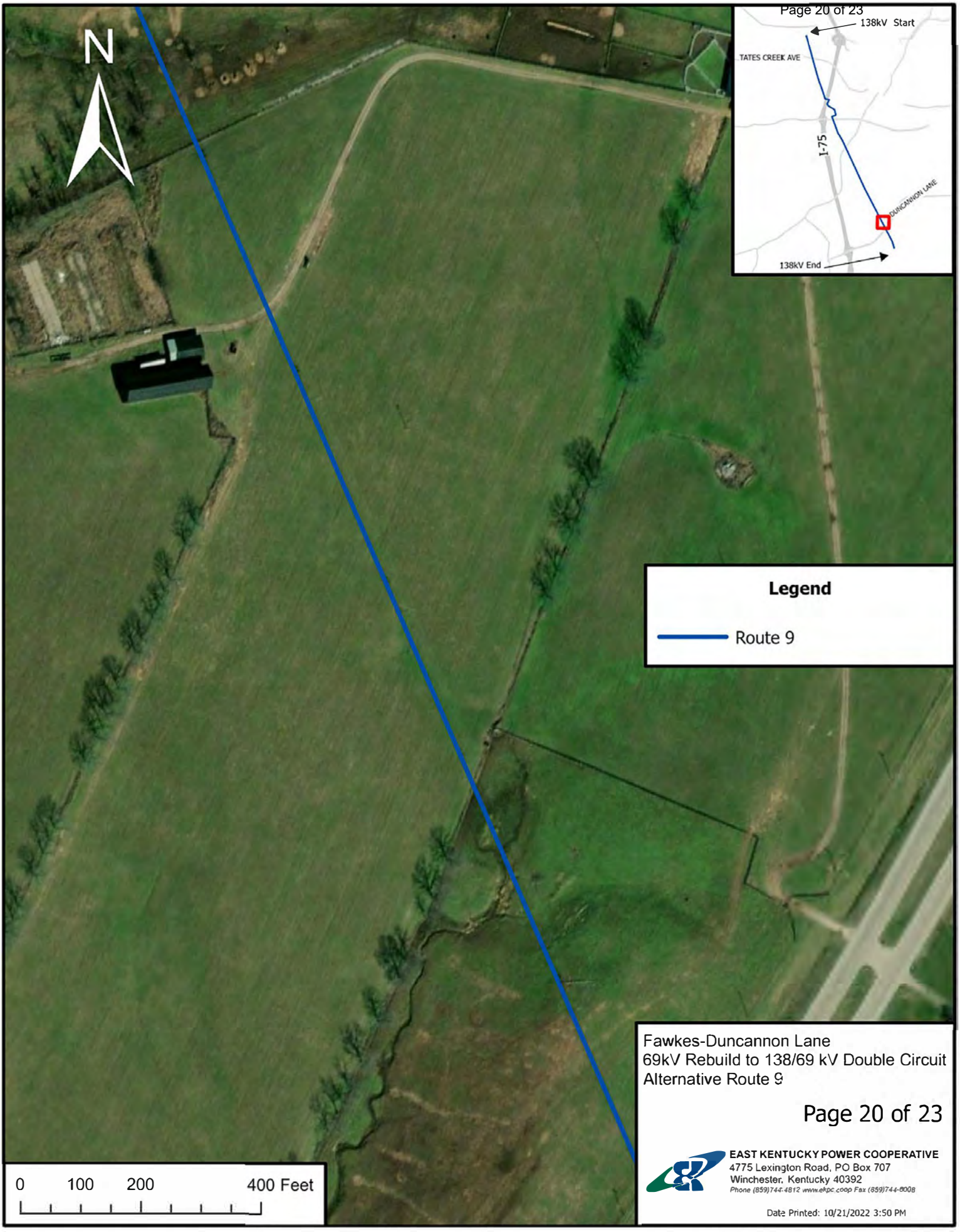

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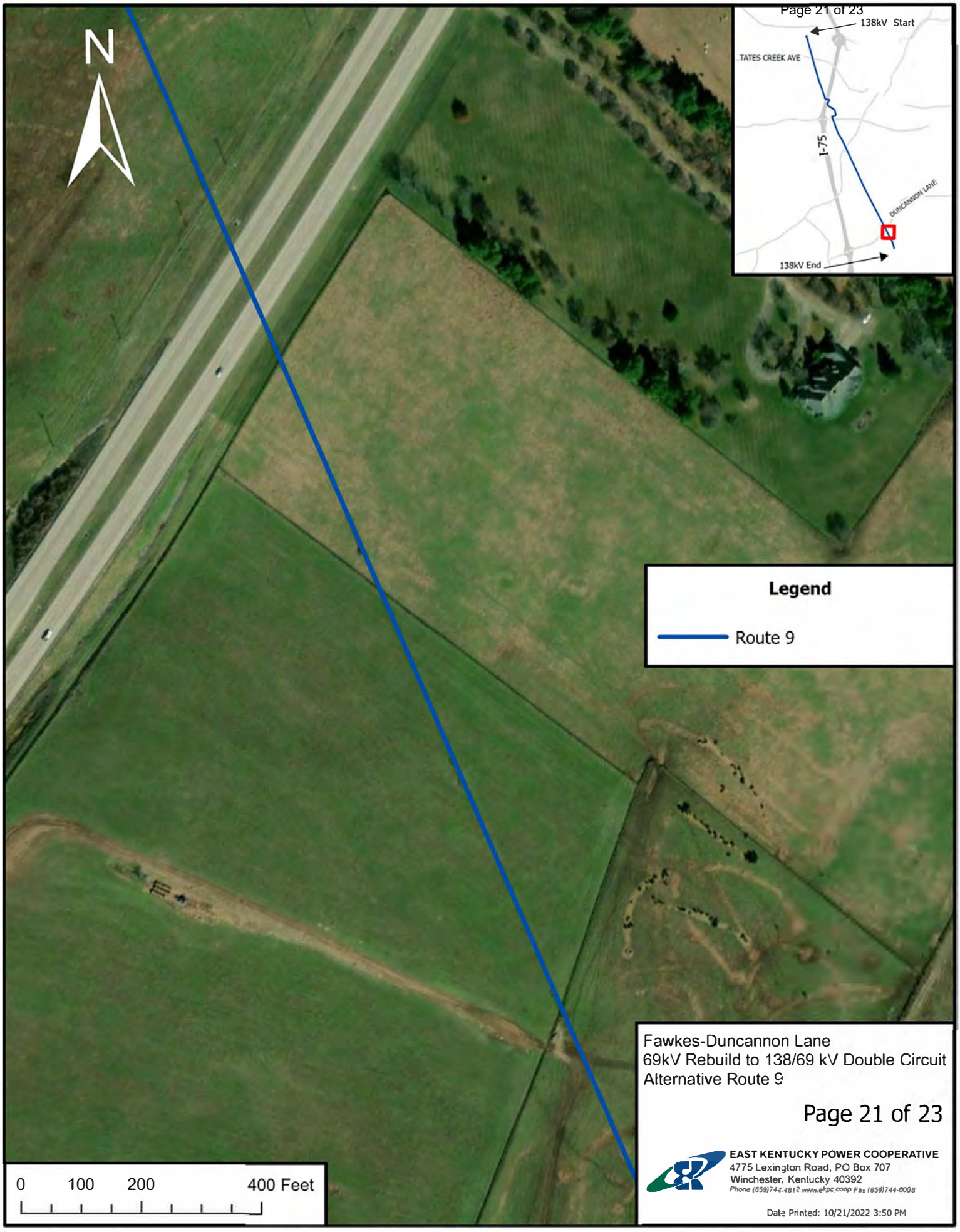

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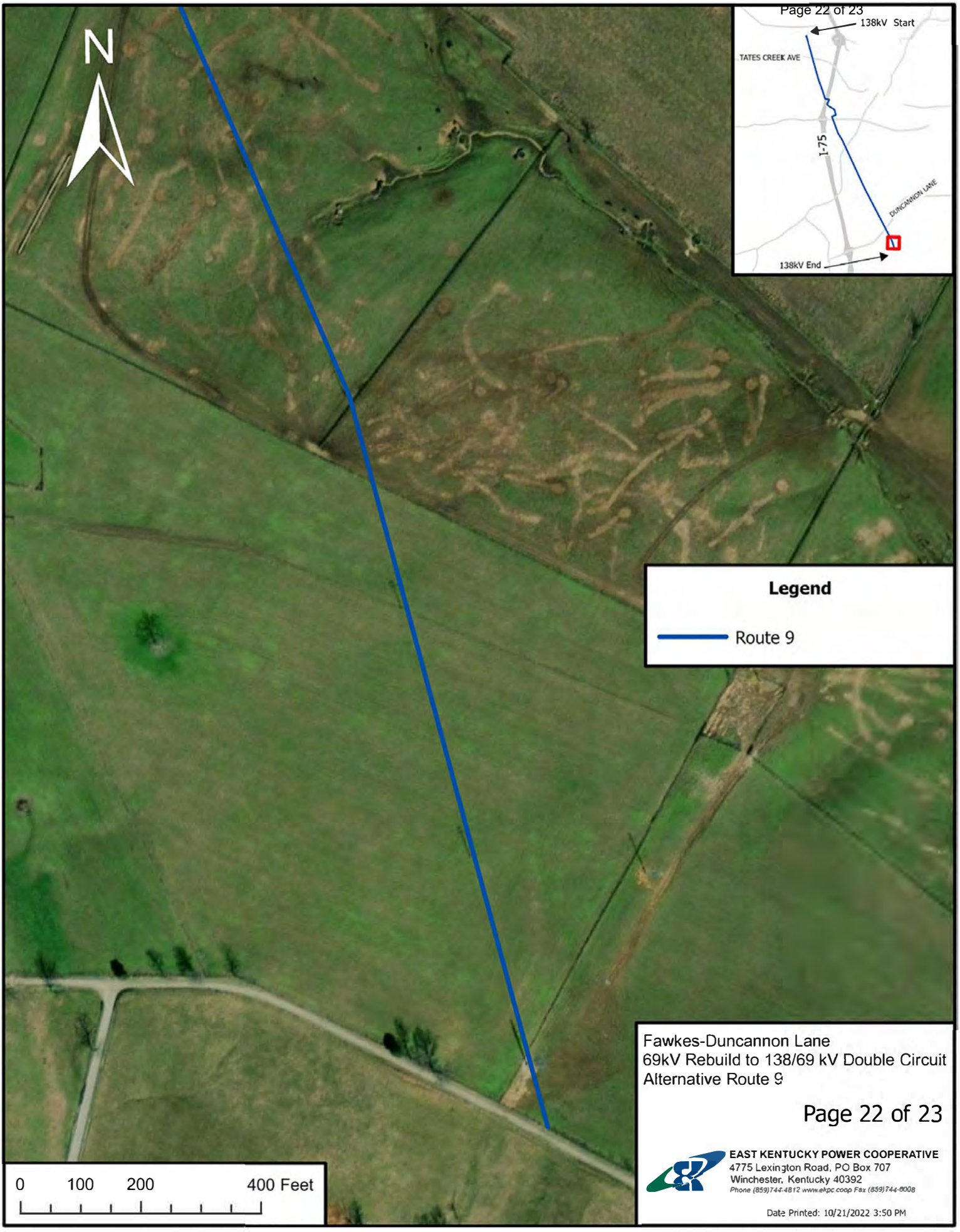

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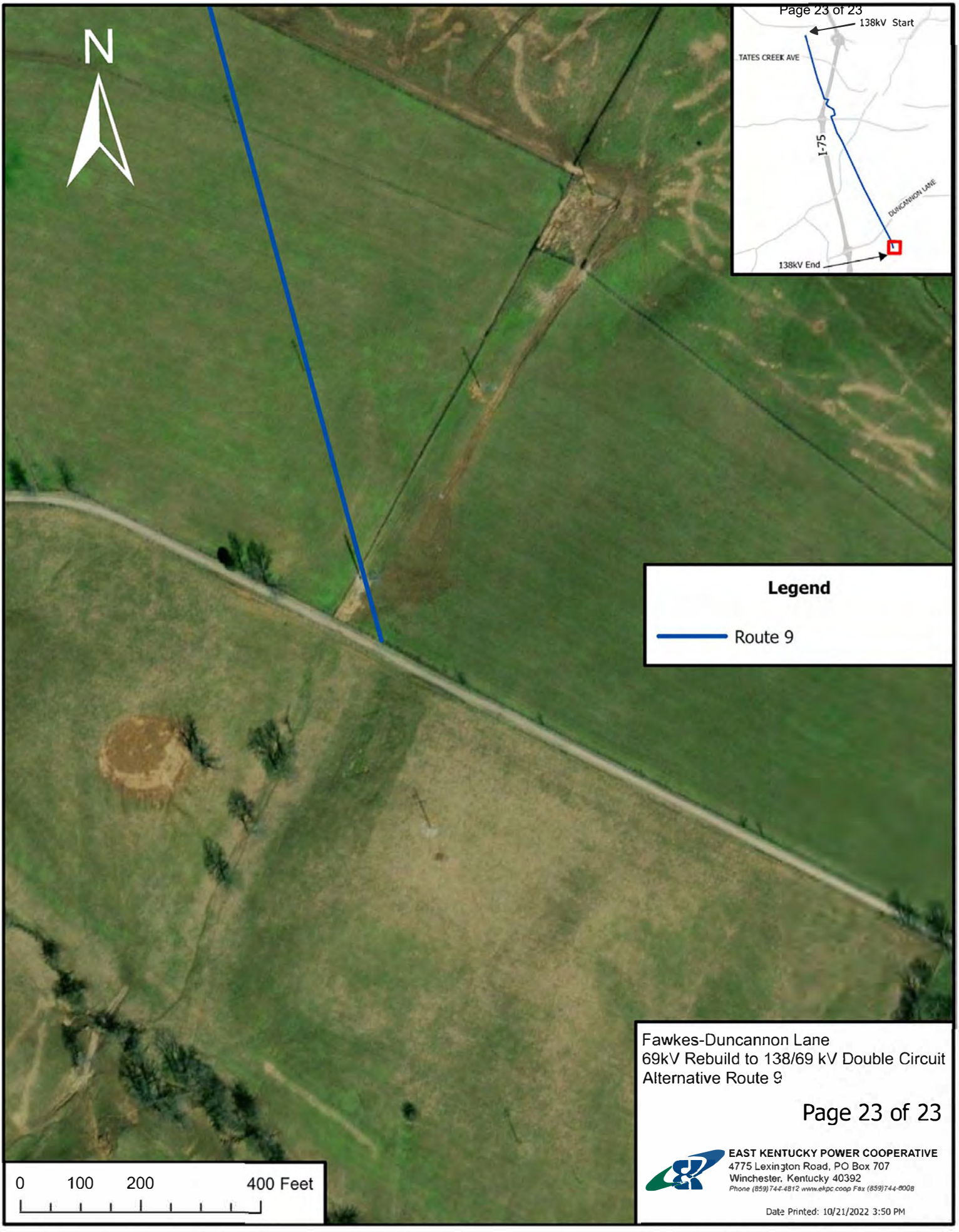

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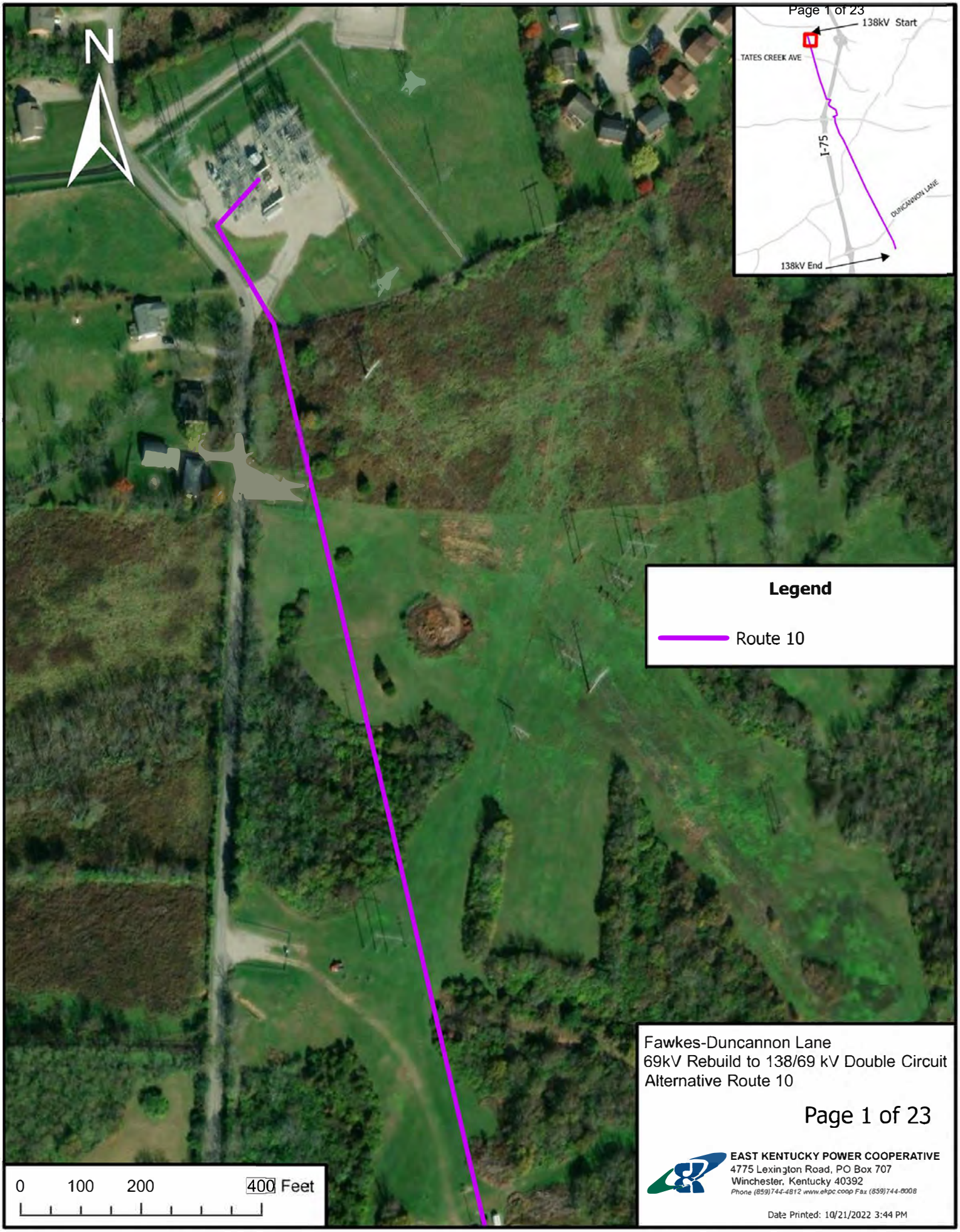
EXHIBIT 13
ALTERNATE ROUTE MAP



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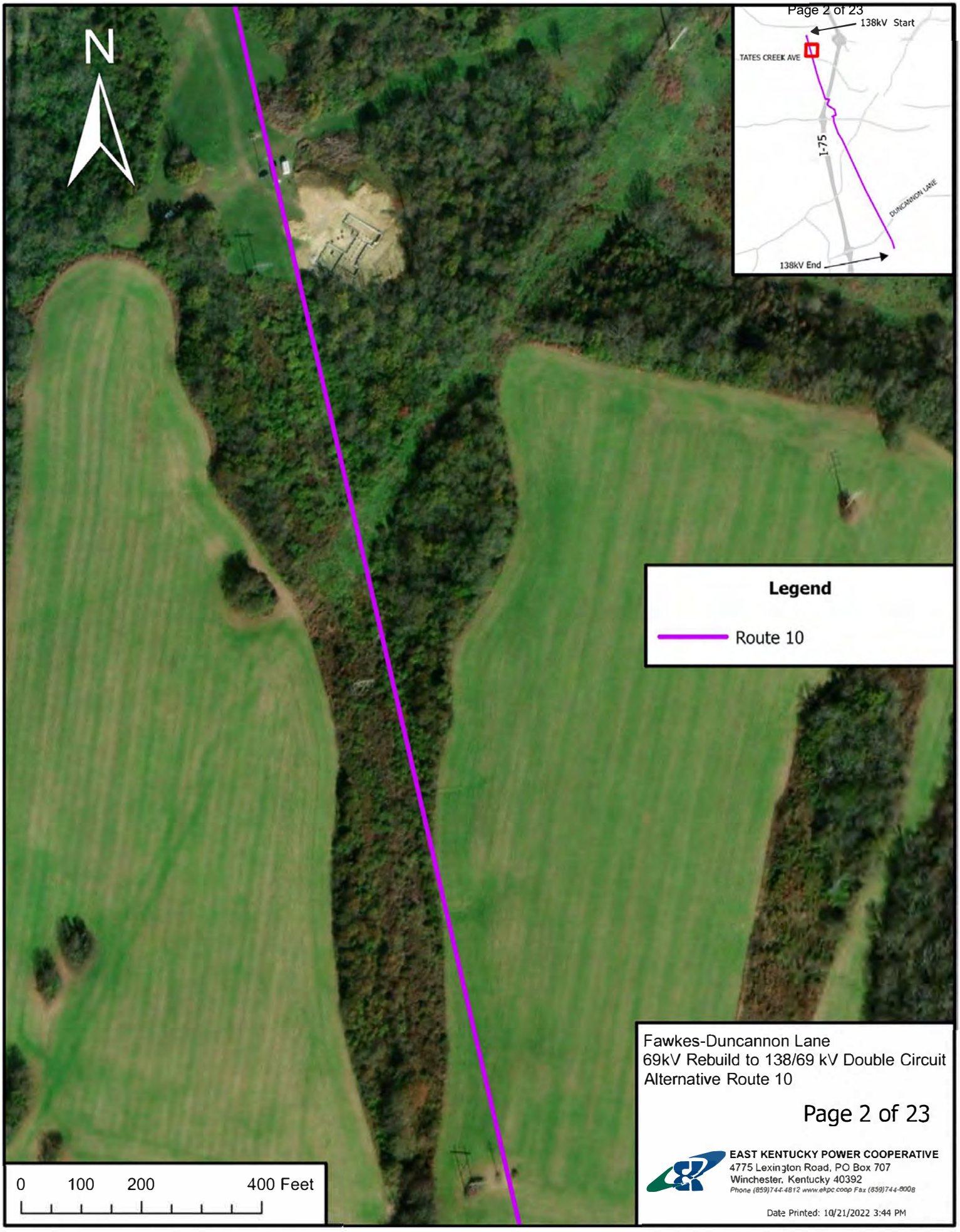

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Phone (859)744-4812 www.ekpc.coop Fax (859)744-6008

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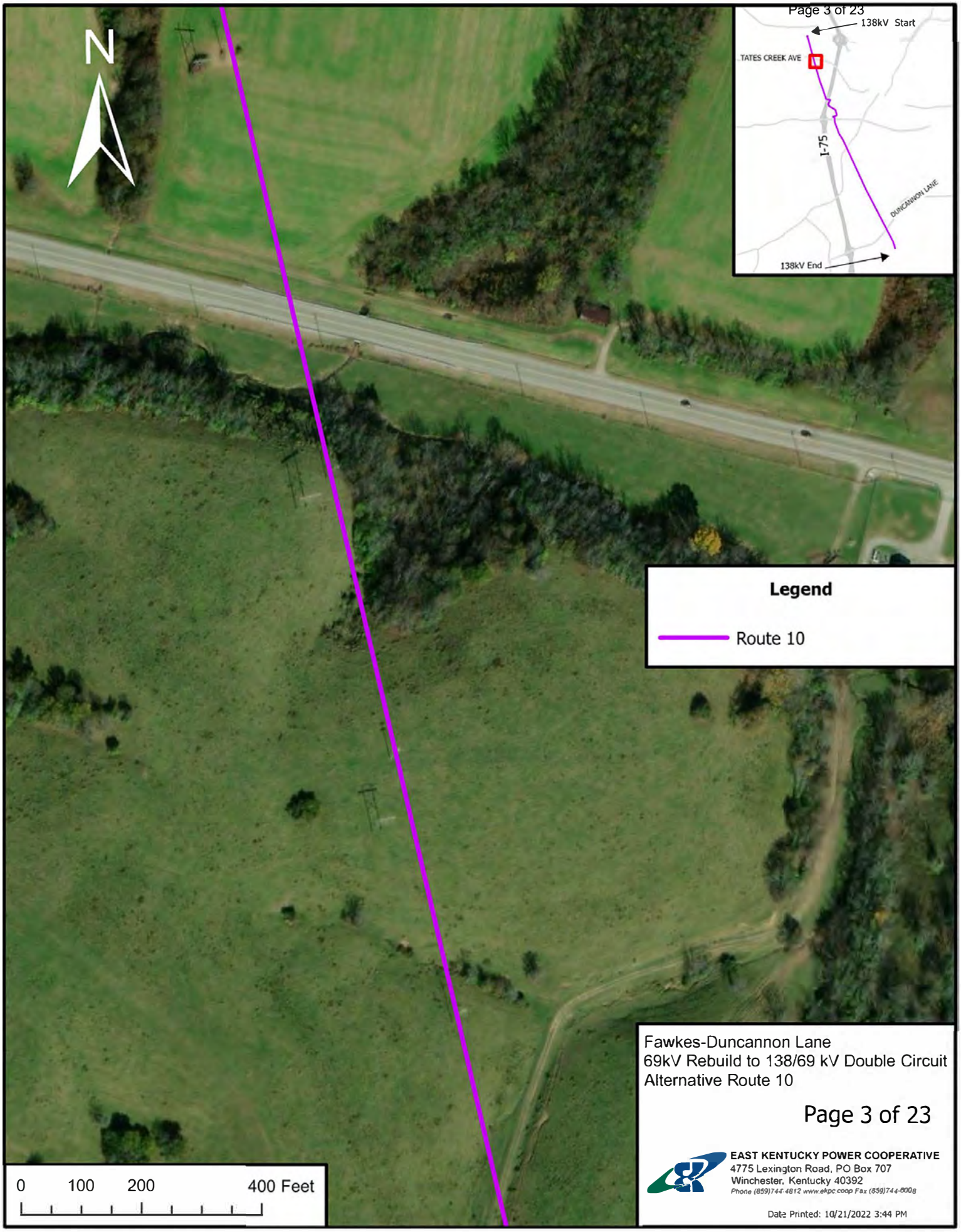

Fawkes-Duncannon Lane
69kV Rebuild to 138/69 kV Double Circuit
Alternative Route 10

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EAST KENTUCKY POWER COOPERATIVE
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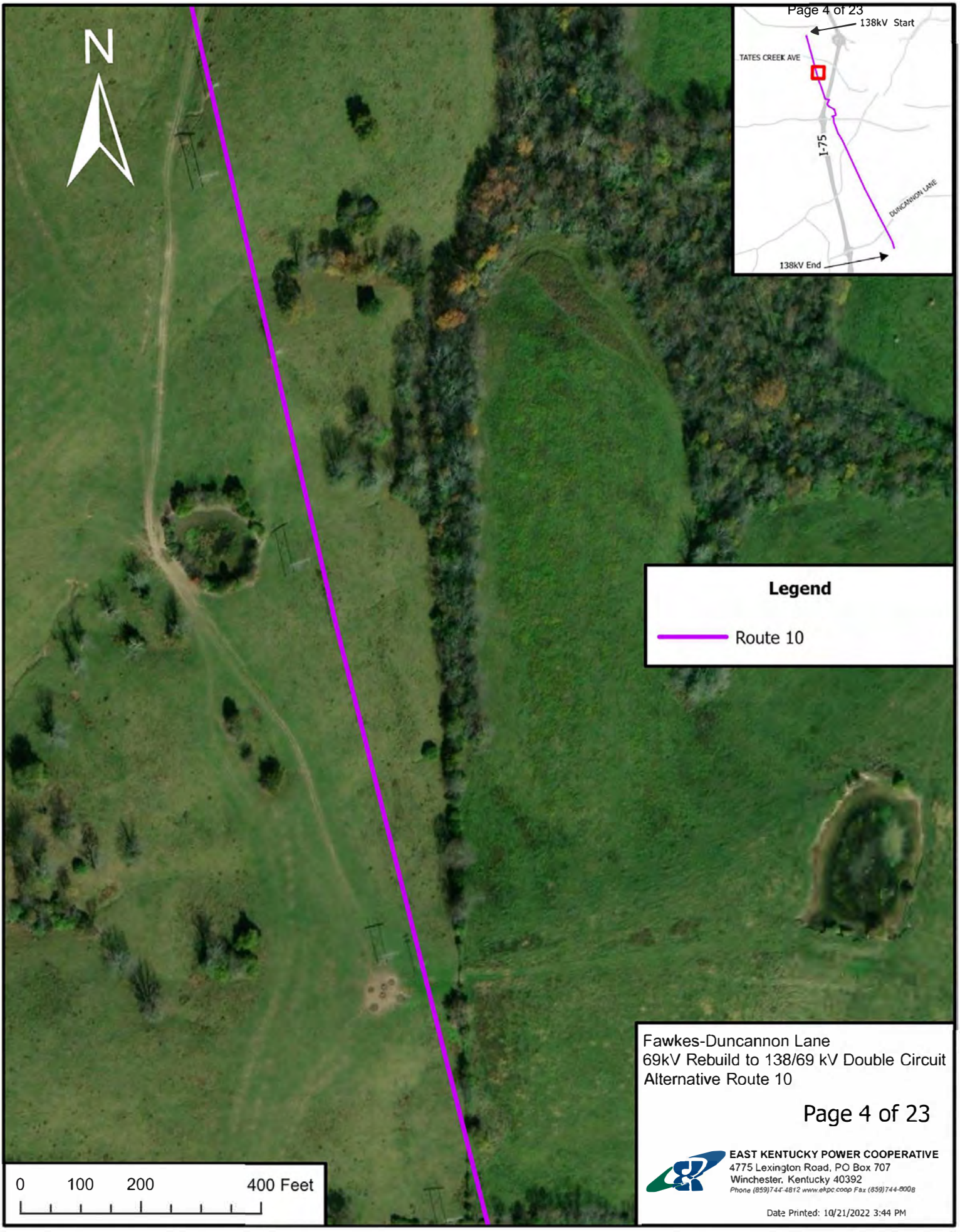

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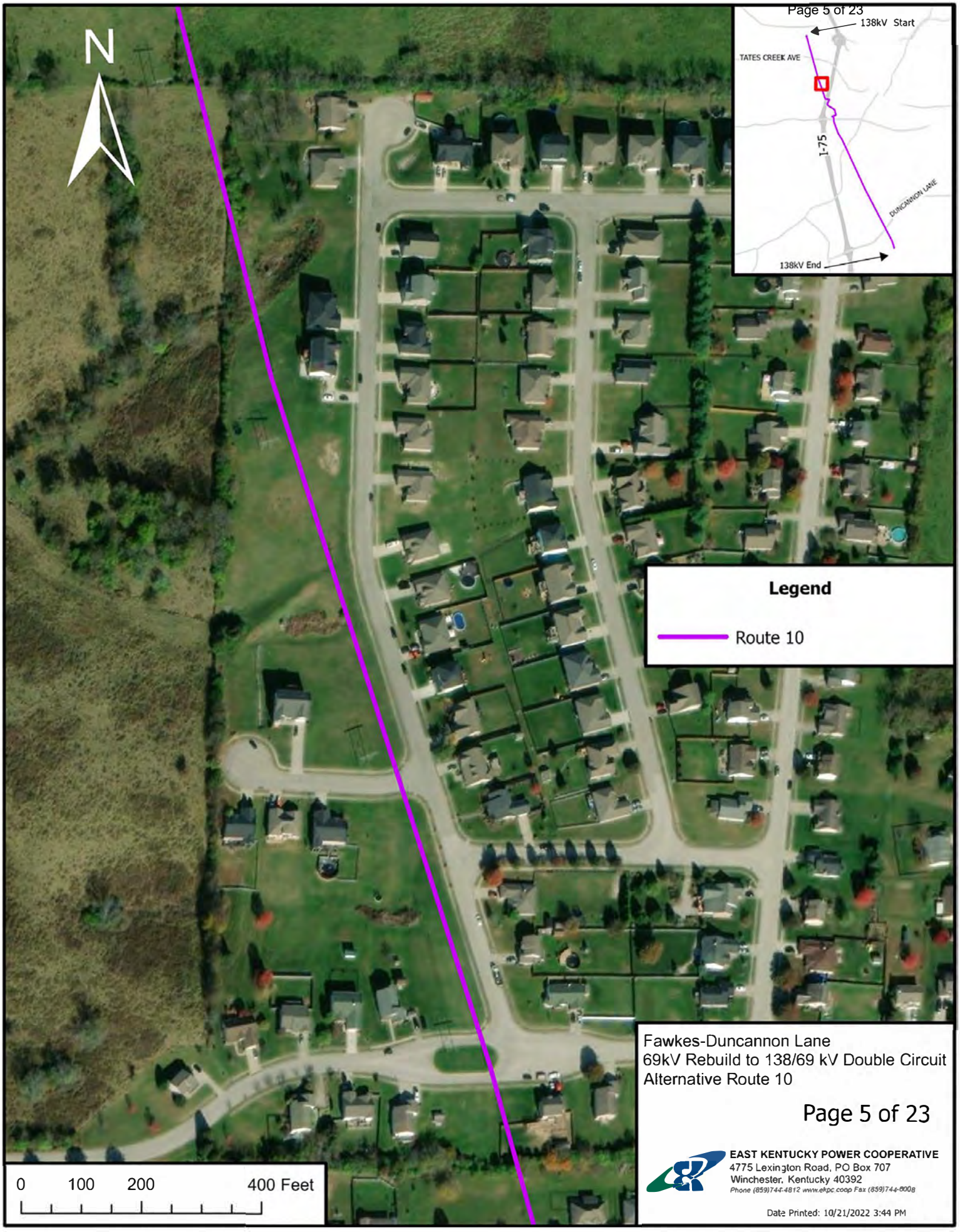

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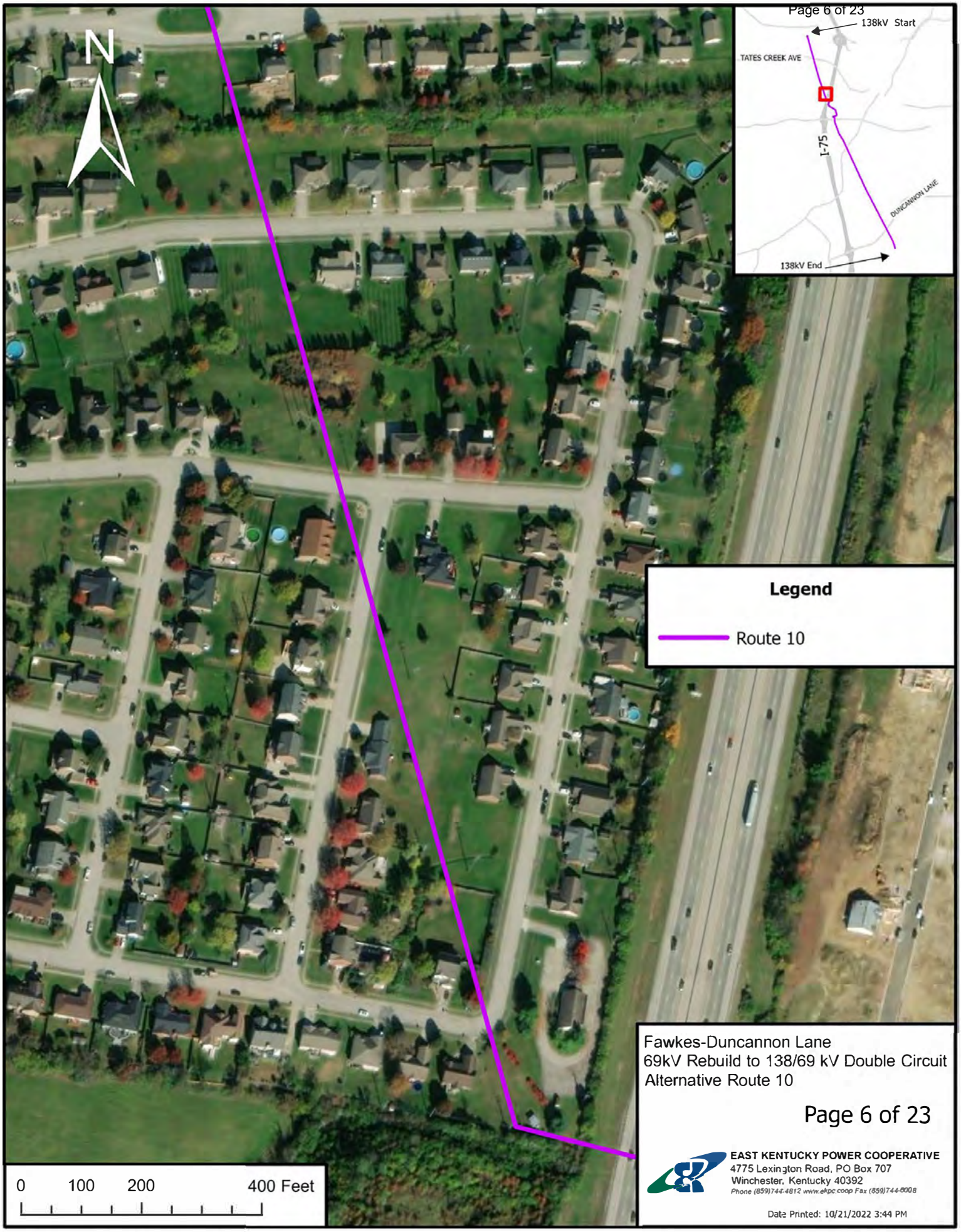

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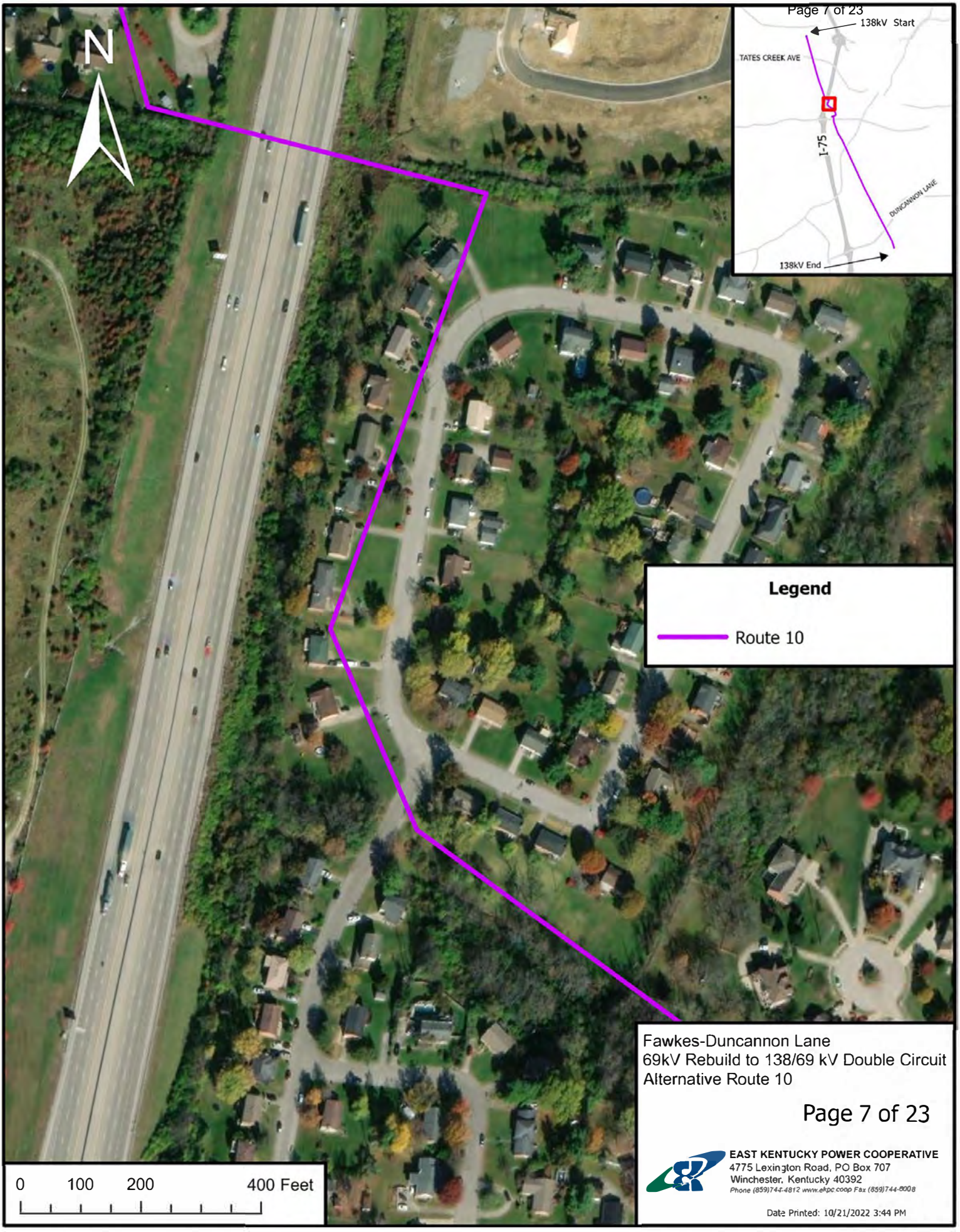

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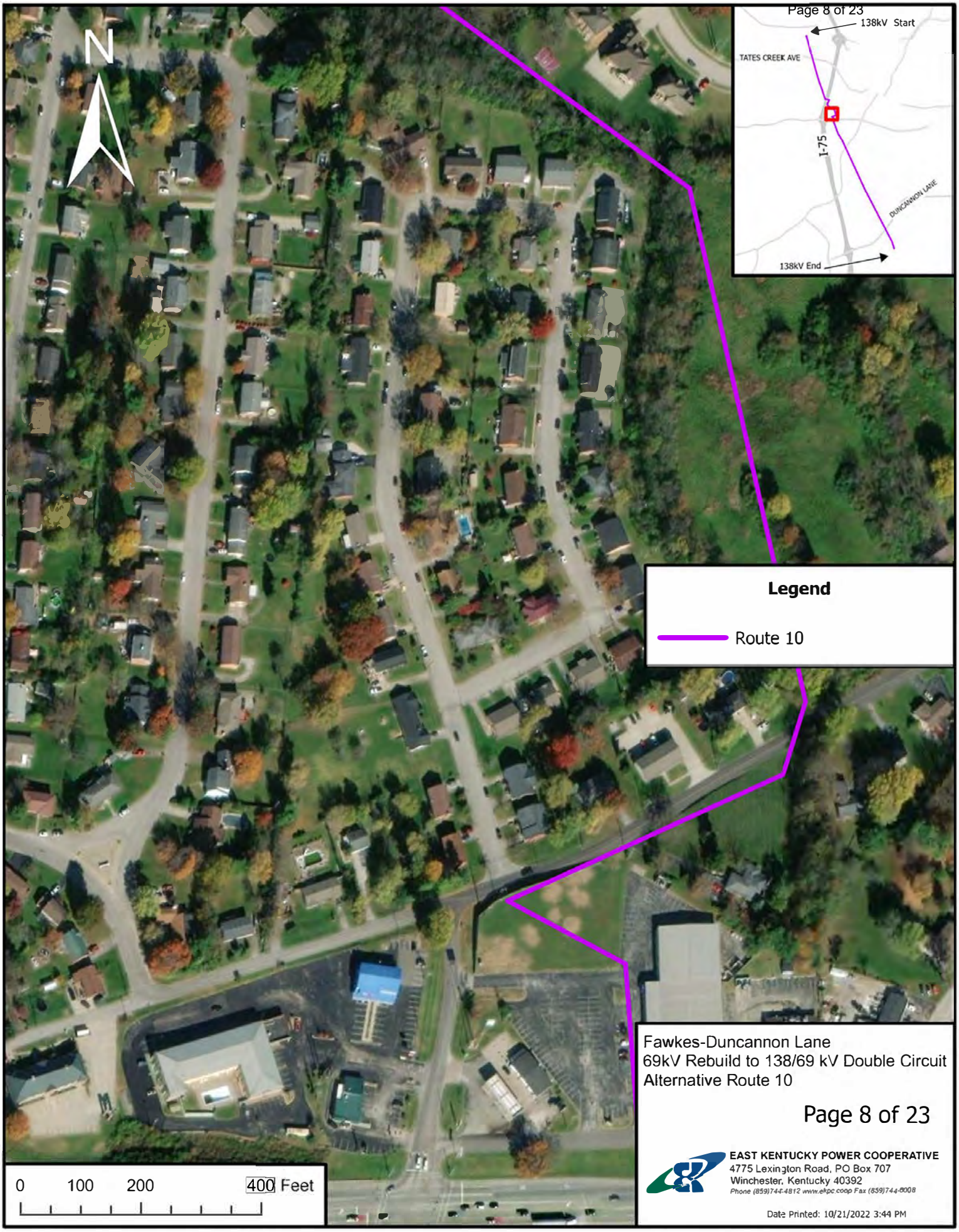

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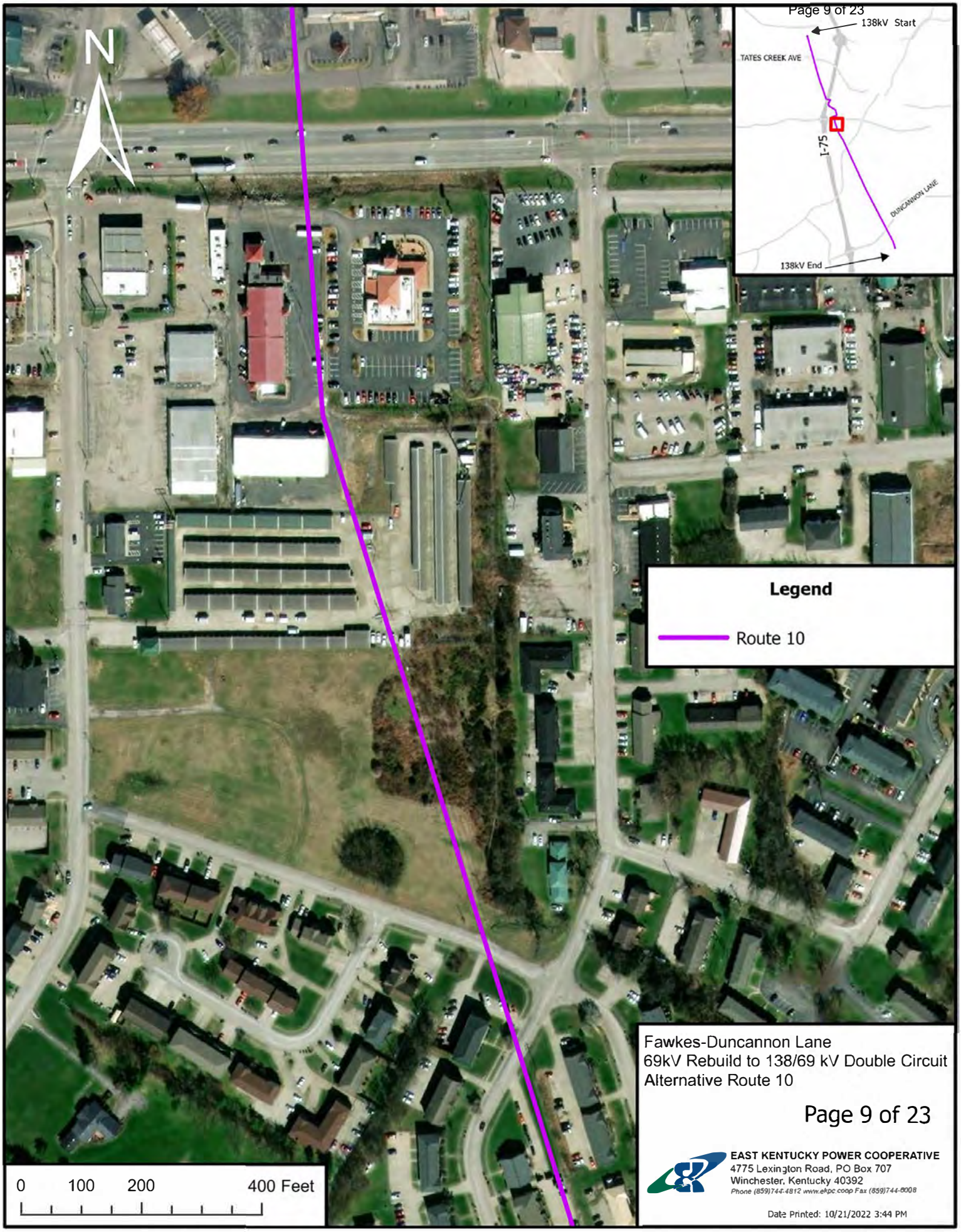

Fawkes-Duncannon Lane
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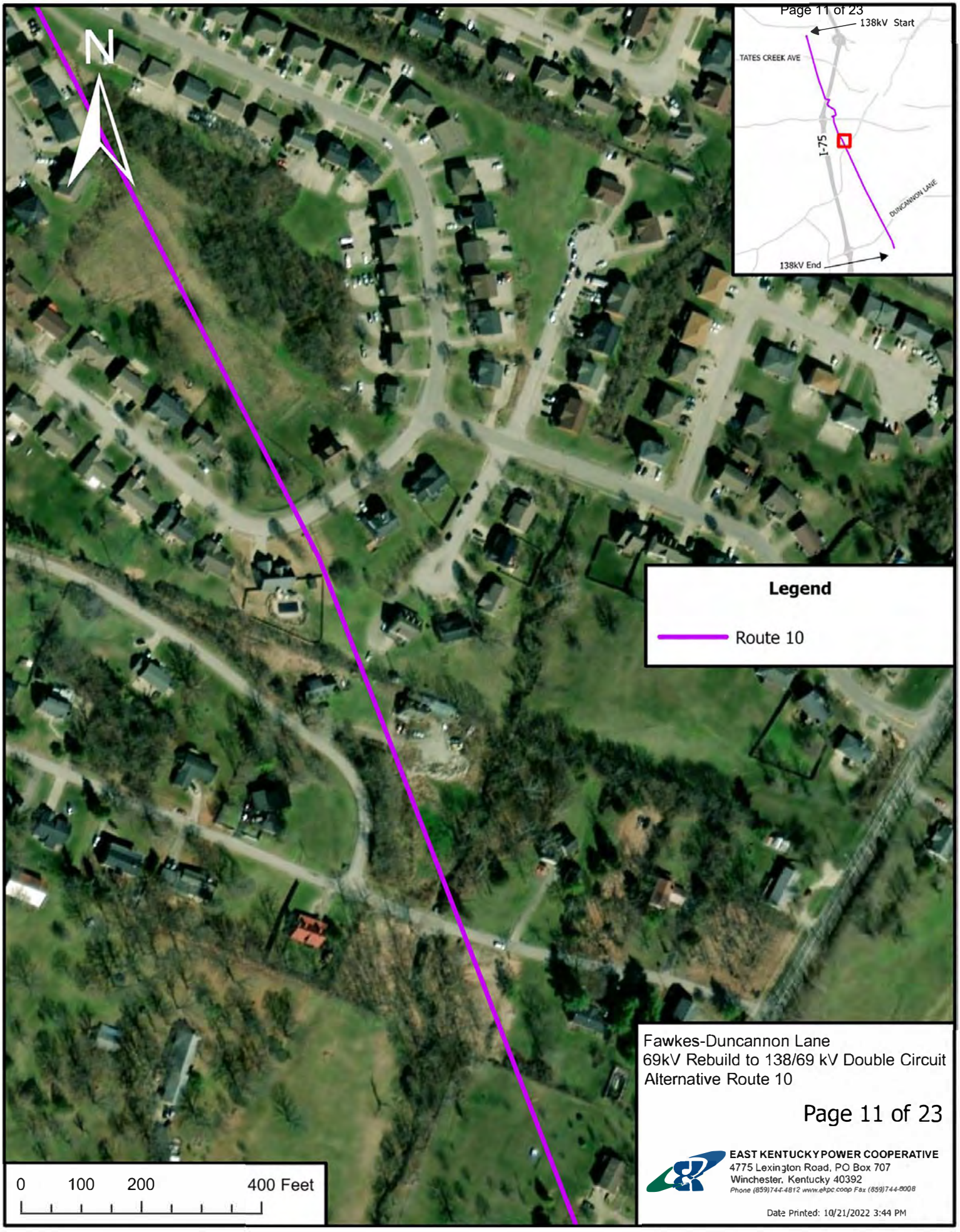

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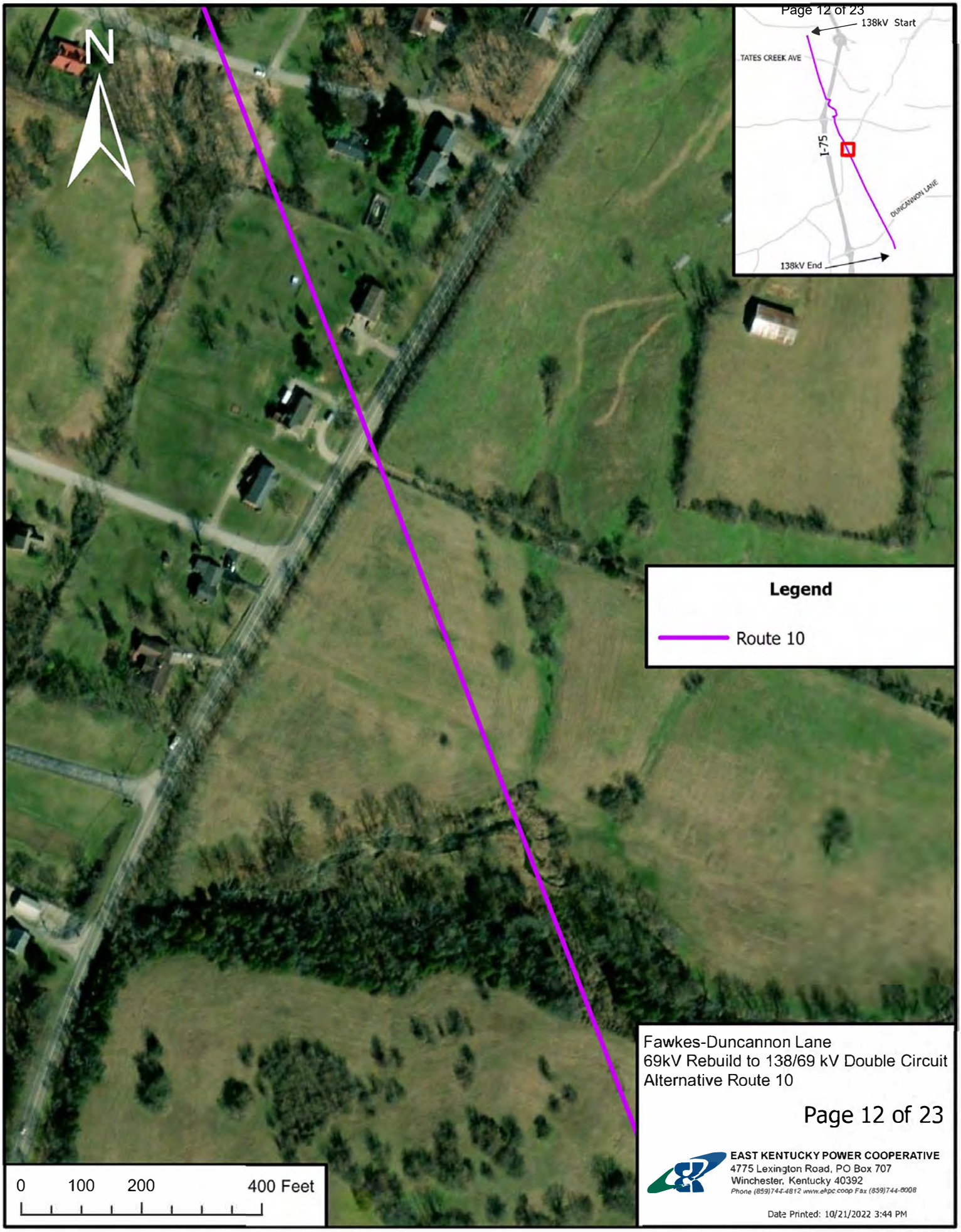

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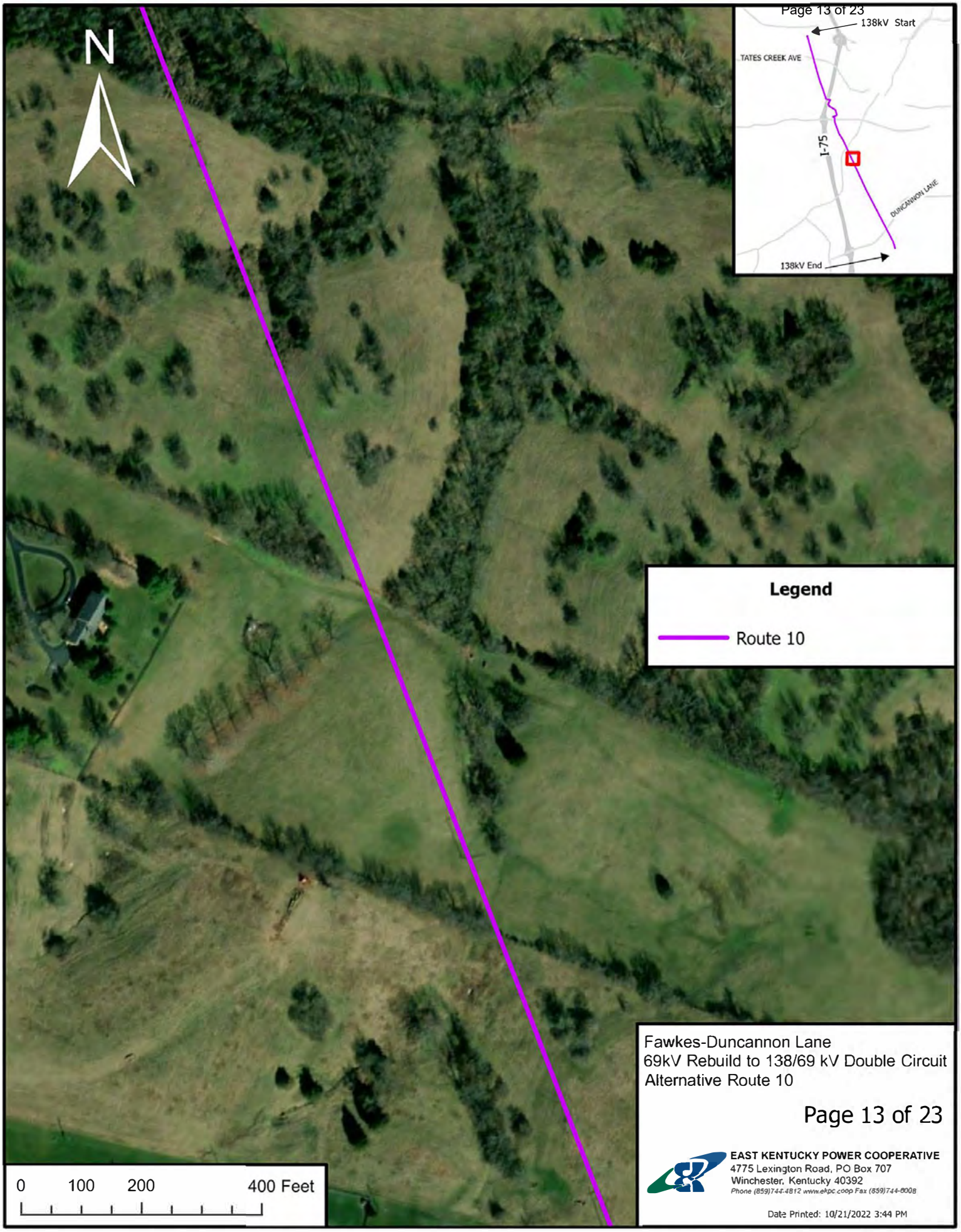

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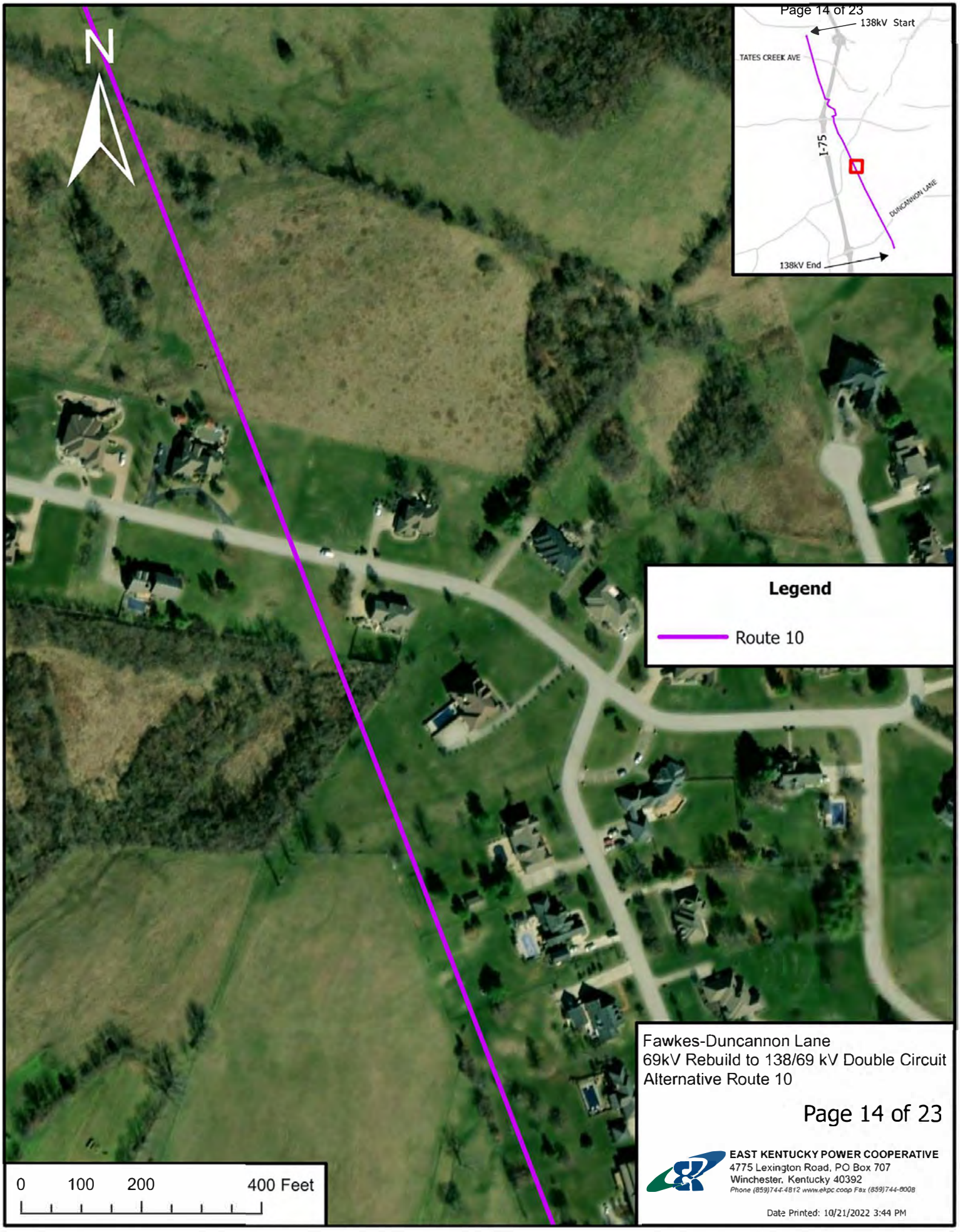

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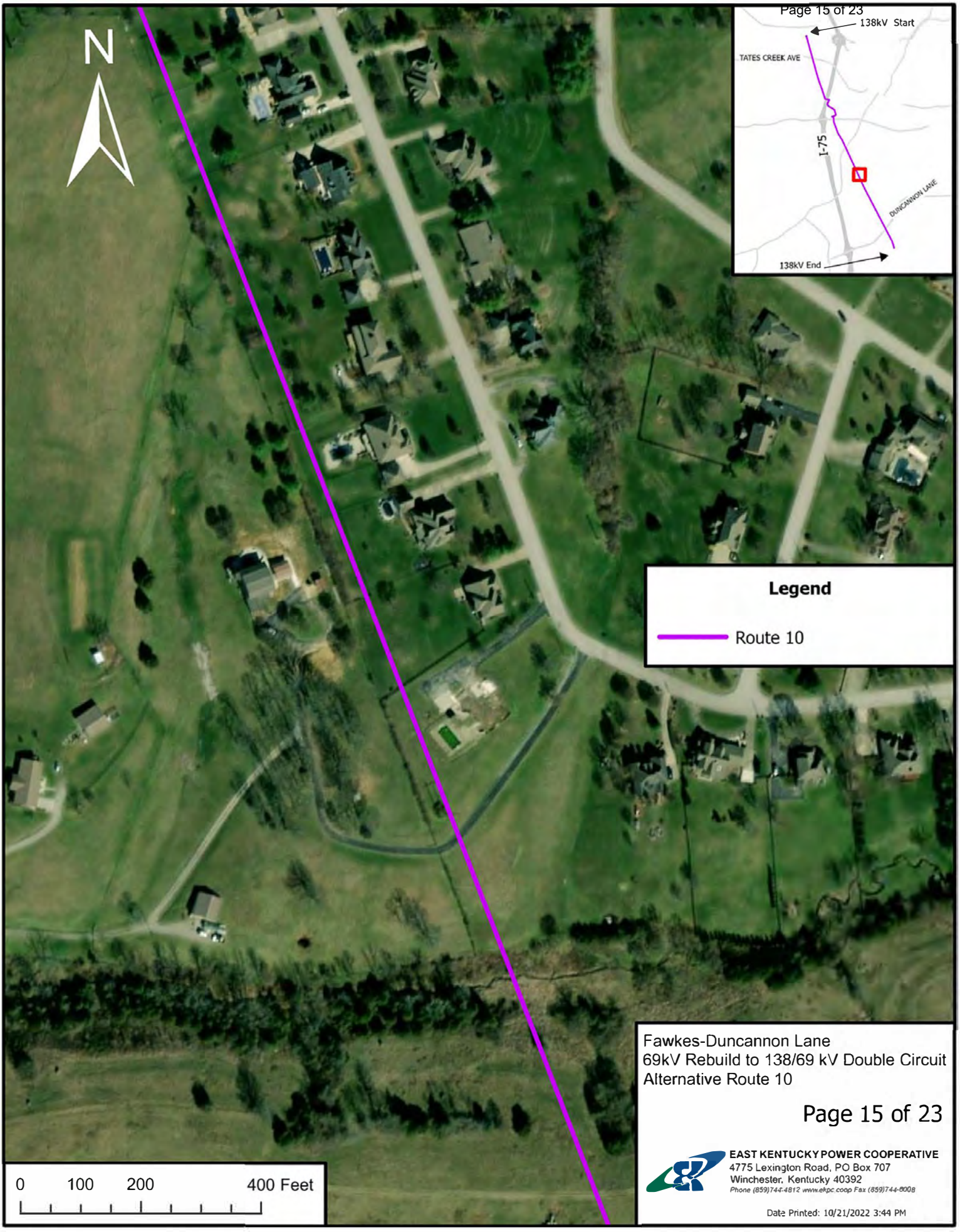

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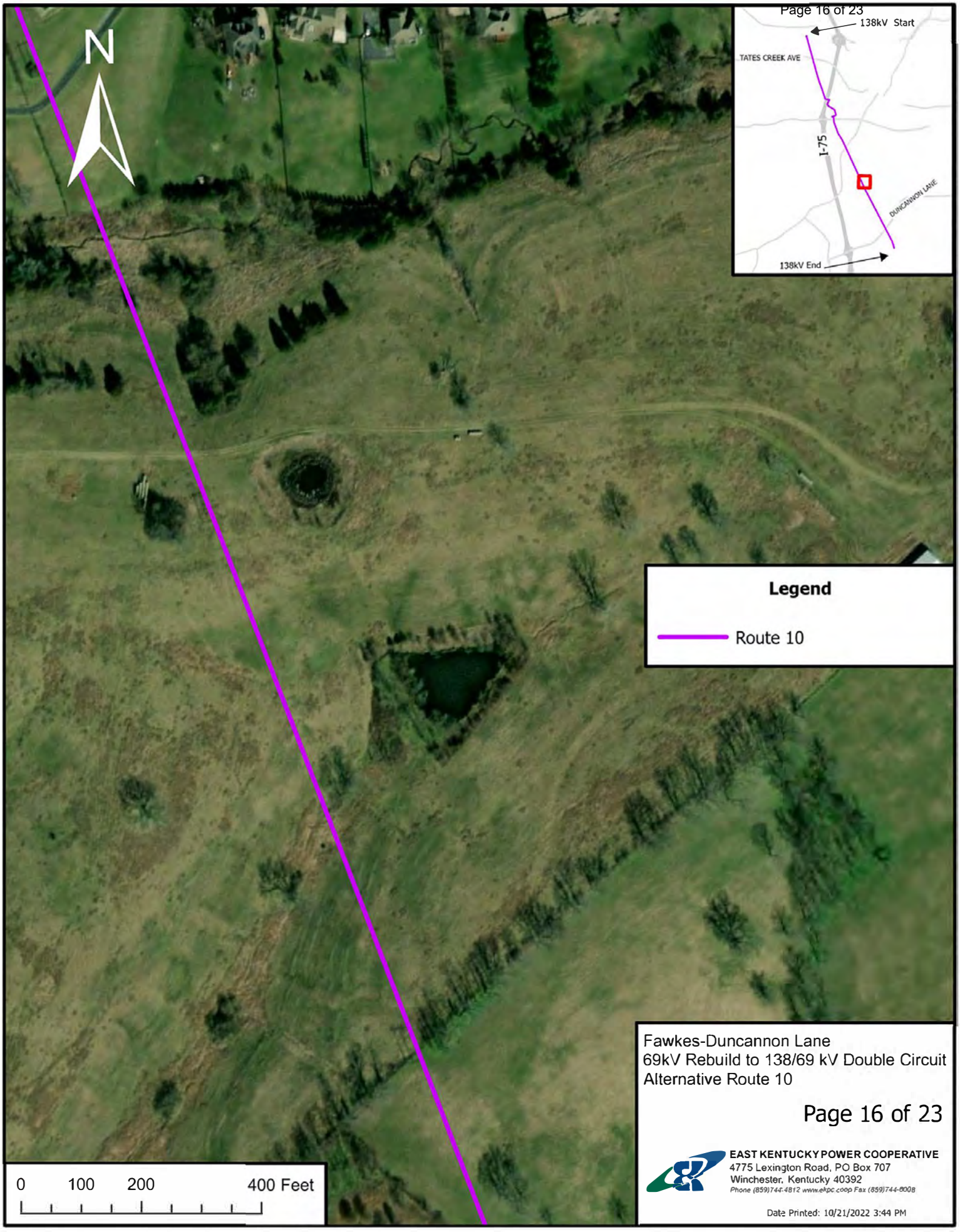

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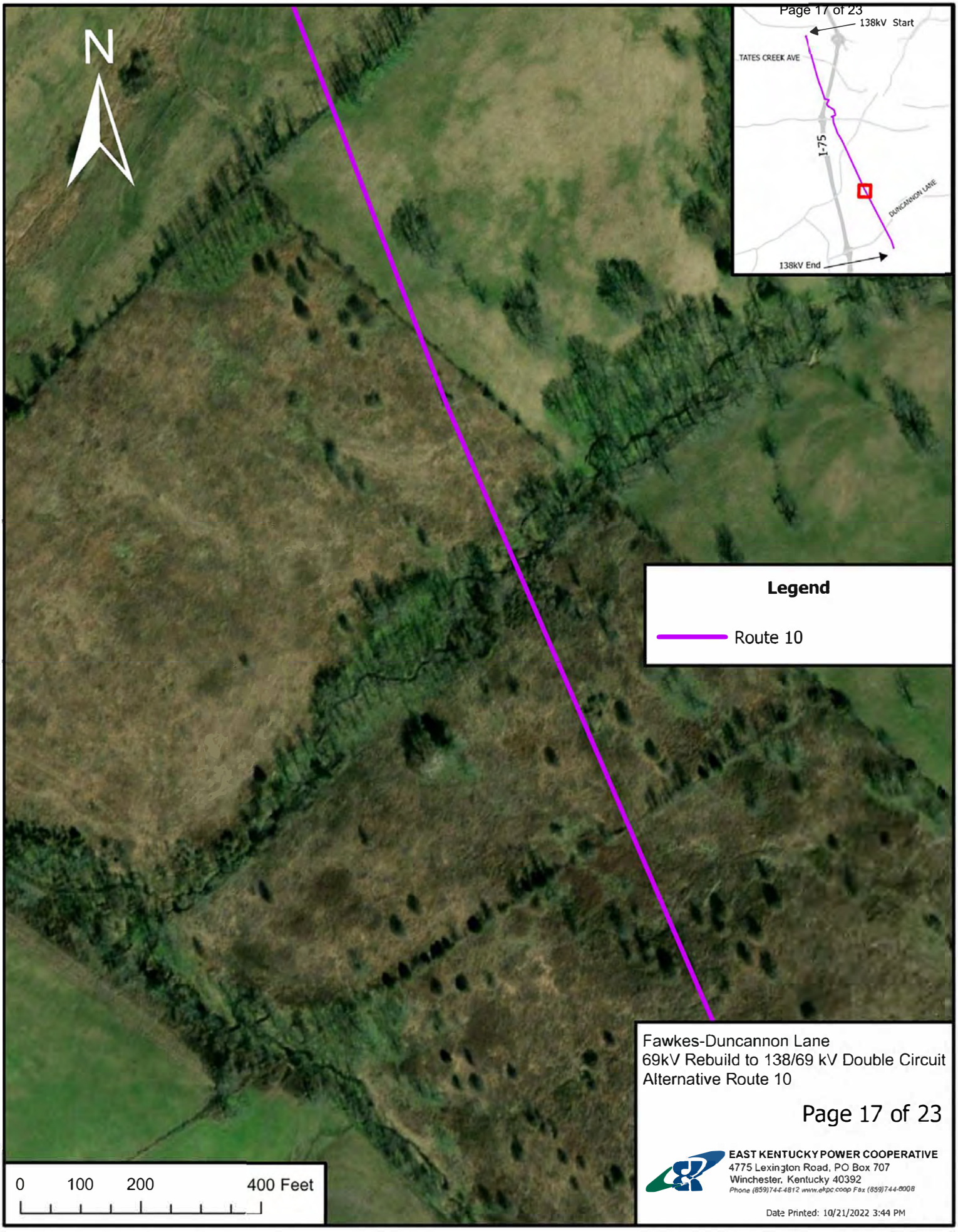

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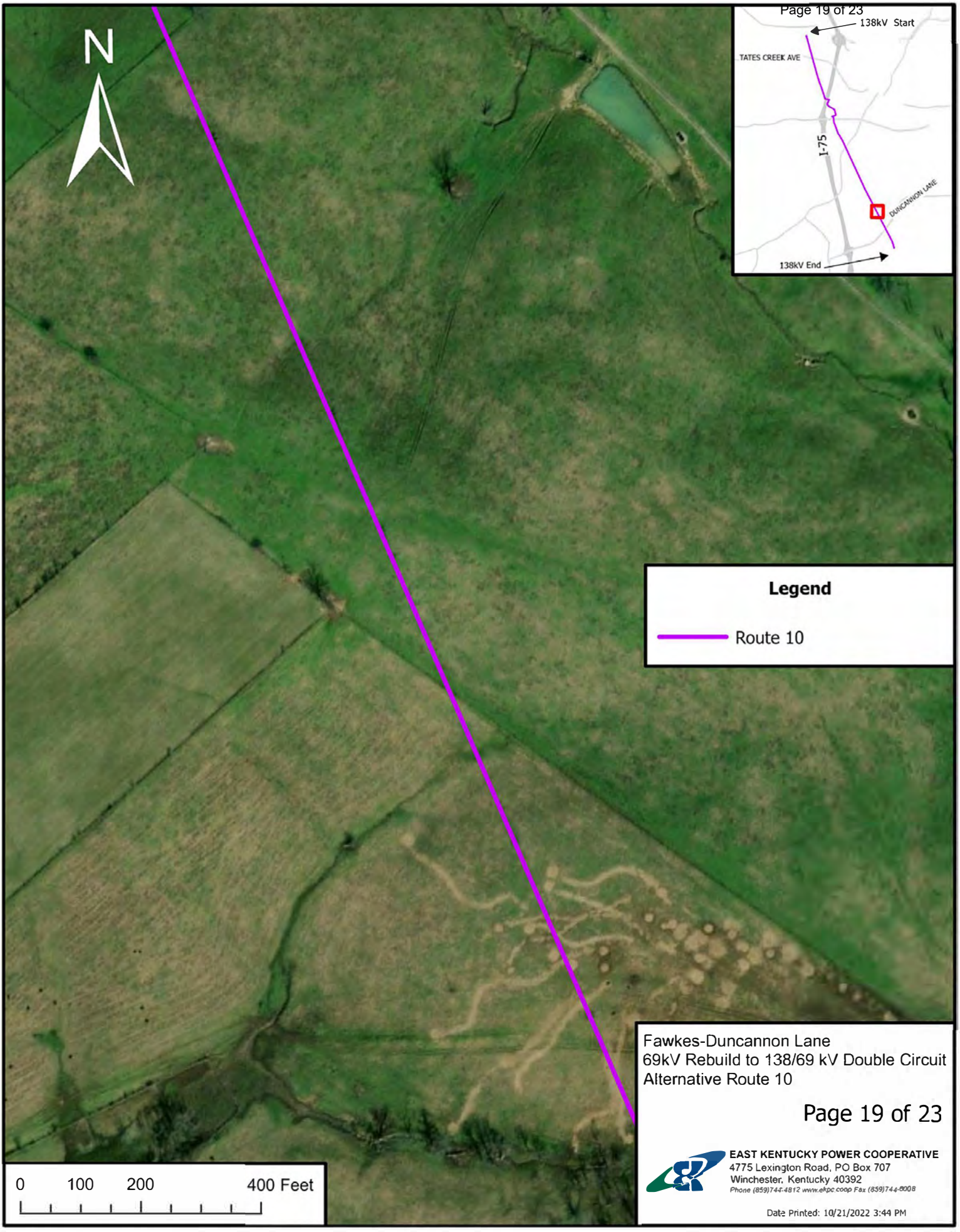

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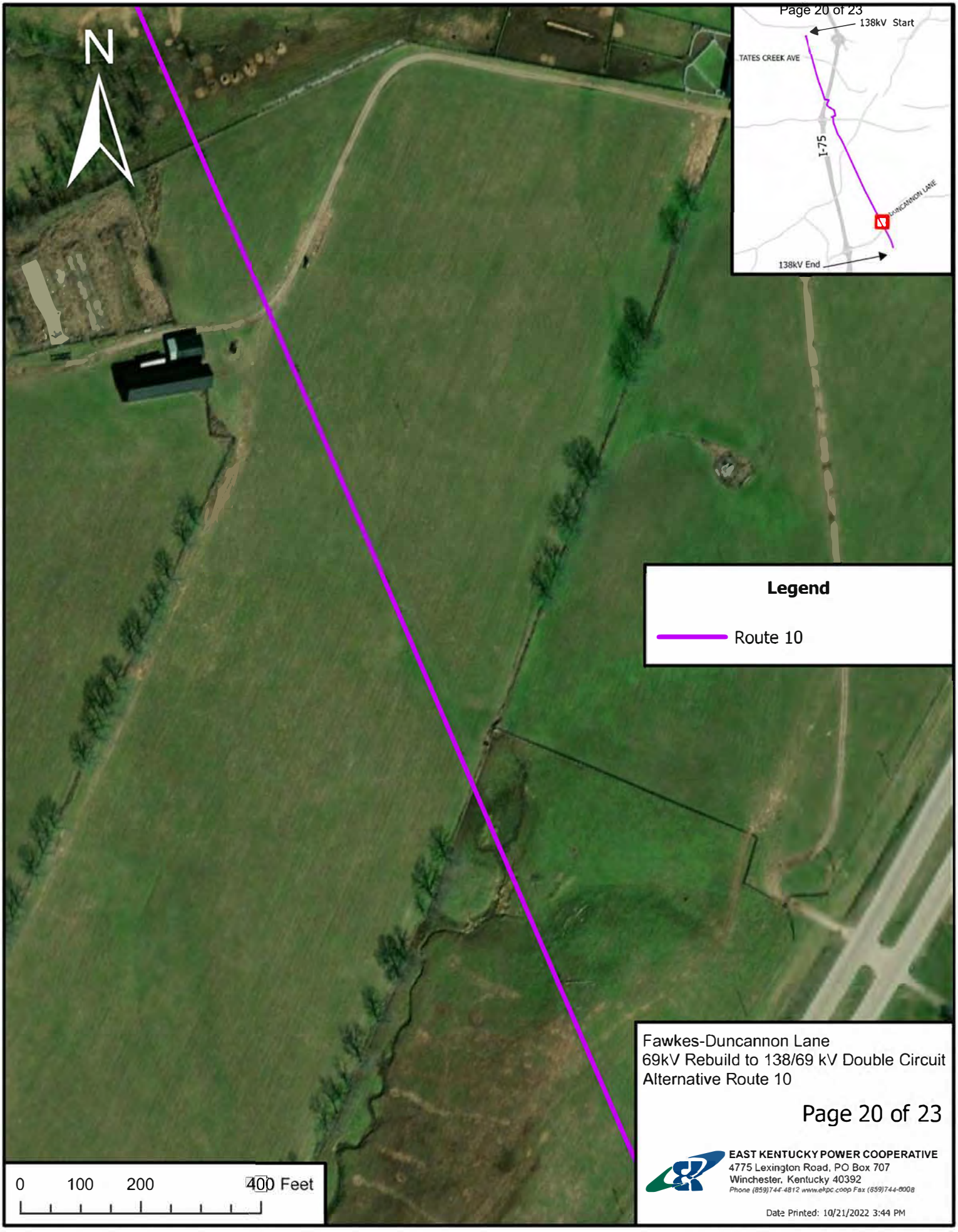

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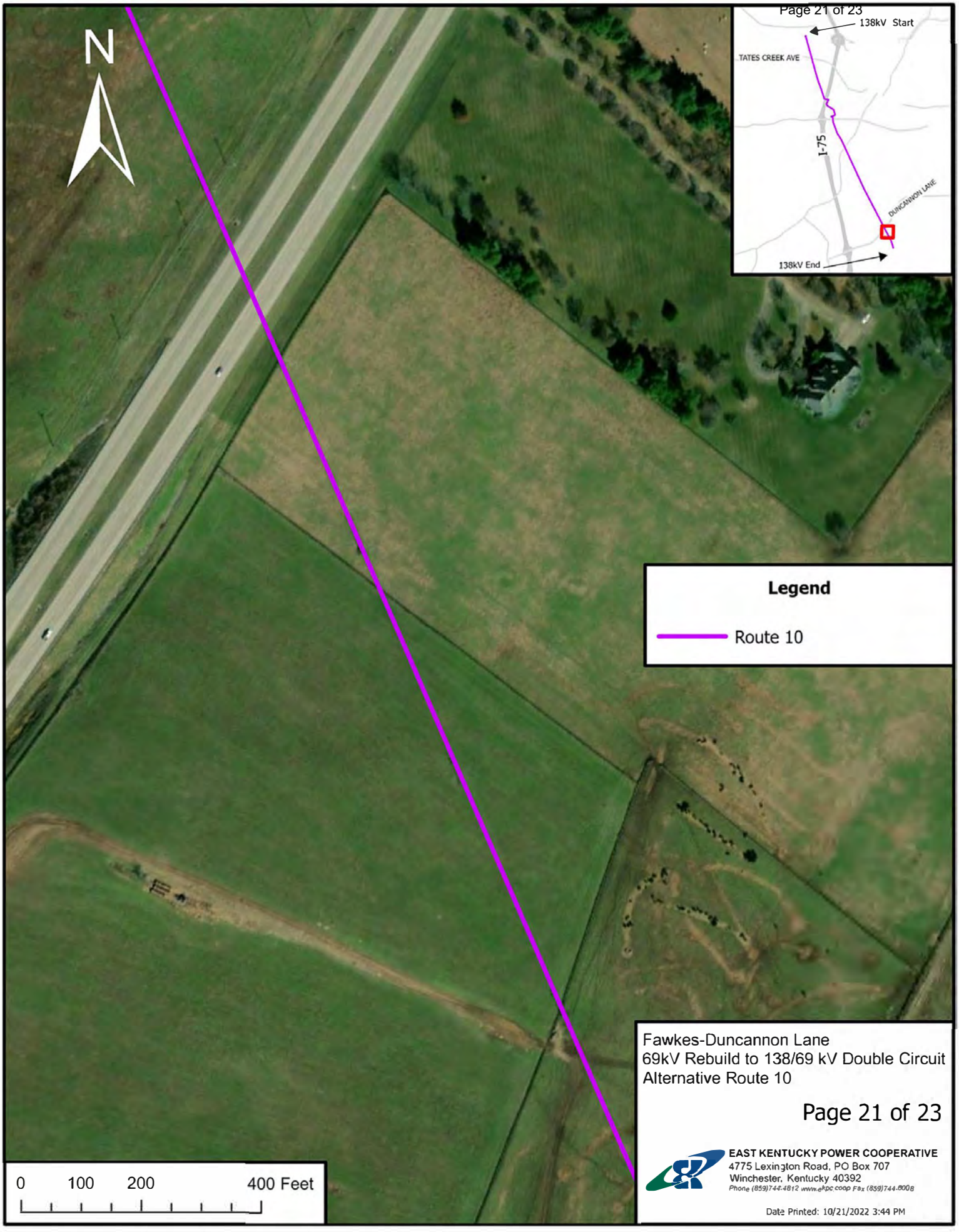

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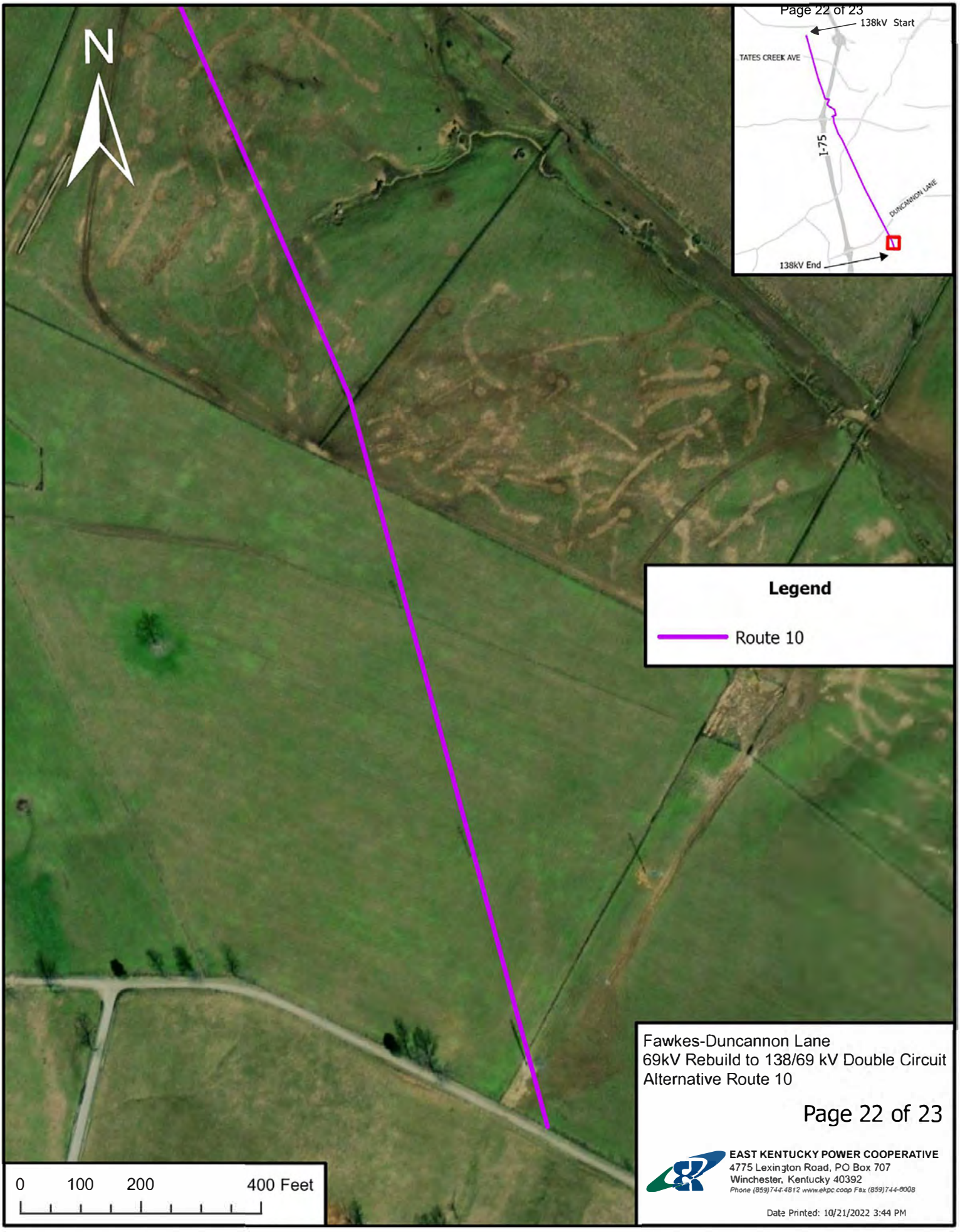

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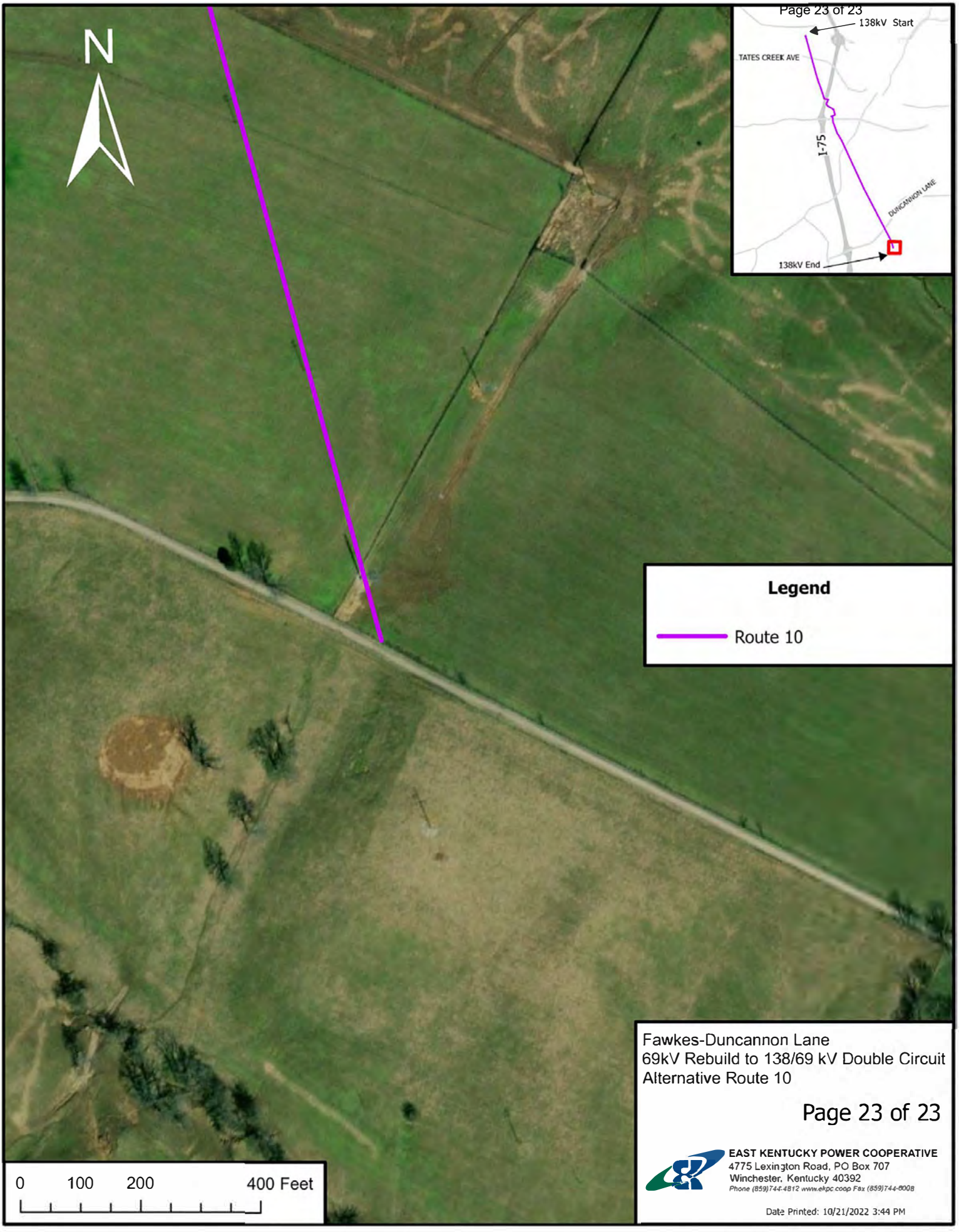

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EXHIBIT 14

VERIFICATION FOR MAILING NOTICE/SAMPLE NOTICE/LIST OF PROPERTY OWNERS

VERIFICATION PURSUANT TO 807 KAR 5:120 SECTION 2(3)

The undersigned, Nick Comer, first being duly sworn, deposes and says that he is the External Affairs Manager of East Kentucky Power Cooperative, Inc., that he was responsible for mailing, first class mail, the notice of the proposed construction to each property owner, according to the Madison County property value administrator records, over whose property the transmission line right-of-way is proposed to cross. The notice was mailed on October 10, 2022, to the property owners at the owner's address as indicated by the Madison County property valuation administrator records. The notice contained the information required by 807 KAR 5:120 Section 2(3), including the Kentucky Public Service Commission's docket number, a description of the project, a map showing the proposed route of the transmission line, the address and telephone number of the Executive Director of the Kentucky Public Service Commission, a description of the property owners' rights to intervene in the proceeding and a the right to request a public hearing. A sample copy of the notice is attached to this Verification as well as a list of the property owners – names and addresses – to whom notice was sent.

NICK COMER

STATE OF KENTUCKY)
)sct
COUNTY OF CLARK)

Subscribed, sworn and acknowledged to before me by Nick Comer this 24th day of October, 2022.

Terri K. Combs KYNP17358
NOTARY PUBLIC, STATE AT LARGE

MY COMMISSION EXPIRES: 12/20/2024

TERRI K. COMBS
Notary Public
Commonwealth of Kentucky
Commission Number KYNP17358
My Commission Expires Dec 20, 2024

EAST KENTUCKY POWER COOPERATIVE

October 10, 2022

A & K Properties 1 LLC
249 Taylors Fork
Richmond KY 40475

Subject: Fawkes-Duncannon transmission line rebuild project

East Kentucky Power Cooperative (EKPC) soon will conduct a project in Madison County, Ky., to rebuild an existing 69-kilovolt electric transmission line as a 138-kilovolt and 69-kilovolt double-circuit electric transmission line. Enclosed is a map displaying the route of the line. This is the same transmission line project that was the subject of a public open house meeting that was conducted on Sept. 20, 2022, in Richmond, Ky.

The line will extend approximately 7 miles from EKPC's Fawkes Substation, near the intersection of Goggins Lane and Tates Creek Road, southeast to a location near Parrish Road and Duncannon Lane. EKPC plans to utilize the existing 100 feet of right-of-way for the rebuilt transmission line. This project will use a mix of single- and double-pole construction. EKPC plans to use galvanized steel poles for this project. This project will help to maintain reliable electric service for Blue Grass Energy members and provide voltage support for growing commercial and industrial electric load in the area.

The transmission line will require a certificate of public convenience and necessity to be issued by the Kentucky Public Service Commission (PSC). This process will proceed on PSC Docket 2022-00314. EKPC plans to file the application on or about Oct. 14, 2022. You have the right to intervene in these proceedings should you desire and to request a local public hearing. Should you have any questions concerning this process, please contact Linda C. Bridwell, Executive Director, Kentucky Public Service Commission, PO Box 615, 211 Sower Boulevard, Frankfort, Kentucky 40602-0615, telephone (502) 564-3940.

Sincerely,

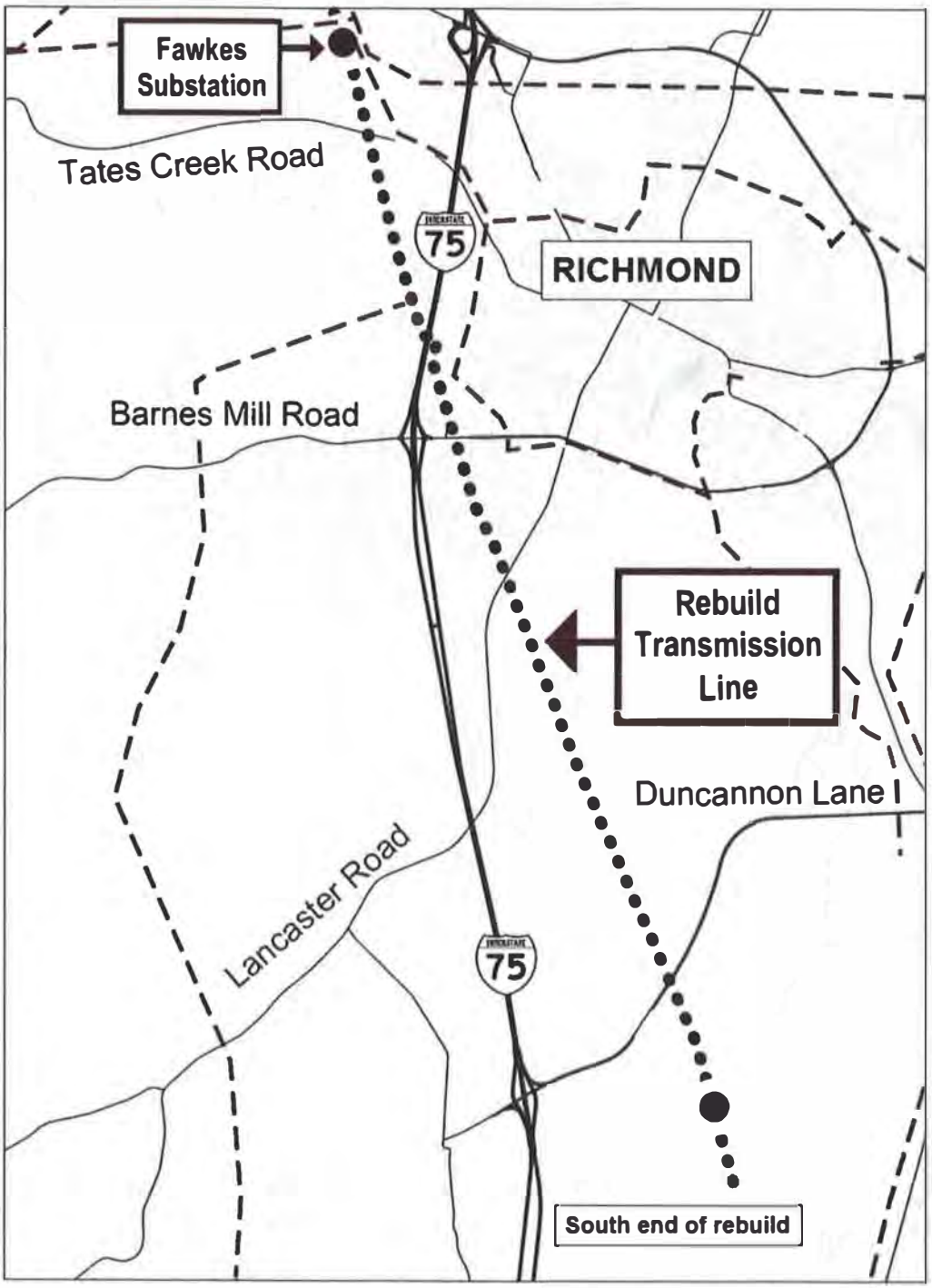
Bill Sharp, Right-of-Way Agent
Power Delivery-Expansion

Enclosure: Map of line route

4775 Lexington Rd. 40391
P.O. Box 707, Winchester,
Kentucky 40392-0707

Tel. (859) 744-4812
Fax: (859) 744-6008
www.ekpc.coop

FAWKES-DUNCANNON TRANSMISSION LINE REBUILD PROJECT, MADISON COUNTY, KY.



EAST KENTUCKY POWER COOPERATIVE
A Touchstone Energy Cooperative

FID	ParcelID	FNAME	LNAME	ADDRESS	CITY	ST	ZIP
4	0055-0002-0041	University Church Of Christ		461 Tobiano Drive	Richmond	KY	40475
5	0055-0002-0042	Mark A. & Kellie I.	Benton	284 Percheron Dr	Richmond	KY	40475
6	0042-0000-0010-I	Sonny	Joseph	9430 Turkey Lake Rd Ste 204	Orlando	FL	32819
7	0041-0000-0021-01	City Of Richmond		239 West Main St	Richmond	KY	40475
8	0055-0000-001A	Martha H.	Dorman	895 Brooksglen Dr	Roswell	GA	30075
9	0055-0003-0072	Lance	Patterson	441 Bay Berry Lane	Richmond	KY	40475
10	0055-0003-0073	Tony & Tamatha	Meade	437 Bay Berry Ln	Richmond	KY	40475
11	0055-0003-0075	Jeffery S.	Rosiska	425 Bay Berry Lane	Richmond	KY	40475
12	0055-0003-0077	Justin W. & Nicole M.	Penman	421 Bay Berry Ln	Richmond	KY	40475
13	0055-0003-0079	Gregory V.	Rehme	200 Sweet Maple Dr	Richmond	KY	40475
14	0055-0002-0094	William	Kendrick	356 Palomino Drive	Richmond	KY	40475
15	0055-0002-0095	Bryan Edward & Phyllisteen	Floyd	360 Palomino Dr	Richmond	KY	40475
16	0055-0002-0165	Lillie	Hall	553 Paso Fino Dr	Richmond	KY	40475
17	0055-0002-0078	Robert & Charlotte	Hollon	557 Paso Fino Dr	Richmond	KY	40475
18	0055-0002-0117	John & Katrina	Walker	120 Welsh Dr	Richmond	KY	40475
19	0055-0002-0126	Dennis H.	Martin	131 Welsh Drive	Richmond	KY	40475
20	0055-0002-0125	Stephen K. & Tina L.	Minerich	129 Welsh Drive	Richmond	KY	40475
21	0055-0002-0116	Jewel Violet	Scott	116 Welsh Dr	Richmond	KY	40475
22	0055-0002-0115	Darin	Kelly	112 Welsh Drive	Richmond	KY	40475
23	0055-0002-0114	Douglas & Perla	Weckesser	108 Welsh Dr	Richmond	KY	40475
24	0055-0002-0111	Carrington O. & Laurel S.	Conley	253 Percheron Dr	Richmond	KY	40475
25	0055-0002-0110	Anna	Fife	440 Tobiano Drive	Richmond	KY	40475
26	0055-0002-0016	City Of Richmond		PO Box 1268	Richmond	KY	40476-1268
27	0055-0002-0017	Merry Kay	Winter	365 Palomino Drive	Richmond	KY	40475
28	0055-0003-0059	Jeremy & Laura	Meadows	117 Covington Way	Richmond	KY	40475
29	0055-0003-0003	James Darrell & Anita Carol	Ford	108 Covington Way	Richmond	KY	40475
30	0055-0003-0004	Myles W. & Mari	Foster	112 Covington Way	Richmond	KY	40475
31	0055-0003-0084	Rebecca M.	Clontz	201 Sweet Maple Dr	Richmond	KY	40475
32	0041-0000-0008	Kentucky Utilities Co		1 Quality Street	Lexington	KY	40507
33	0041-0000-0011-EB1	Robert	Stephens	PO Box 35	Richmond	KY	40476
34	0041-0000-0011-EC	Bryan S &	Browning	4956 Goggins Lane	Richmond	KY	40475
35	0041-0000-0021	New Idea Construction & Homes LLC		324 Old Garrard Rd	Berea	KY	40403
37	0041-0000-0009-01	Jason M. & Brittany C.	Vaughn	940 Cobble Dr	Richmond	KY	40475
39	0041-0000-0009-04	Robert L & Sharron	Fields	4925 Goggins Ln	Richmond	KY	40475
40	0057-0000-0035-B	Thomas J. III & Merrilyn M. Black Trst		1068 Parrish Rd	Richmond	KY	40475
41	0058-0000-0006	Malcolm M. Jr. & Javena C.	Conlee	1099 Parrish Rd	Richmond	KY	40475
42	0070-0000-0008	James W. & Wanda	Ramsey	625 Duncannon Ln	Richmond	KY	40475
43	0057-0000-0015-A	James W.	Ramsey	625 Duncannon Ln	Richmond	KY	40475
44	0057-0000-0011	Wanda	Ramsey	625 Duncannon Ln	Richmond	KY	40475
46	0057-0000-0011-A	J.W. & Wanda	Ramsey	625 Duncannon Ln	Richmond	KY	40475
47	0056-0002-0026	Deron & Bonita	Cobb	219 Eric Dr	Richmond	KY	40475
48	0056-0002-0025	Paul Nolan & Nancy Lynn	Graham	217 Eric Dr	Richmond	KY	40475
49	0056-0002-0024	Scott	Blair	215 Eric Dr	Richmond	KY	40475
50	0056-0002-0023	Anthony Philip & Melissa Dawn	Blose	213 Eric Dr	Richmond	KY	40475
51	0056-0002-0020	James & Lola	Lewis	207 Eric Dr	Richmond	KY	40475
52	0056-0002-0019	Kevin & Marsha	Minor	205 Eric Dr	Richmond	KY	40475
54	0056-0000-0022	Cody R. & Emily K.B.	Stallons	118 Meridian Way Ste 2	Richmond	KY	40475
55	0056-0000-0021	Johnna Leann & Micah David	Forman	1585 Lancaster Rd	Richmond	KY	40475
56	0056-0001-0014	Johnnie M. & Sharon Hill	Isaacs	112 Richland Dr	Richmond	KY	40475
57	0056-0001-0016	Steve C. & Lori J.	Hendricks	114 Richland Dr	Richmond	KY	40475
58	0056-0001-0015	Hanan N. & Ahmand K Abelrahman	Budeiri	115 Richland Dr	Richmond	KY	40475
59	0056-0000-0019	David T. & Melissa L.	McFaddin	306 Reynolds Dr	Richmond	KY	40475
60	0056-0002-0017	Curtis C. & Joyce W.	Davis	117 Richland Dr	Richmond	KY	40475
61	0056-0002-0027	Kim Love Wilson Realty LLC		119 Freybrook Dr	Richmond	KY	40475
62	0056-0002-0028	Sammy & Patricia	Hammons	223 Eric Dr	Richmond	KY	40475
63	0056-0002-0022	Ross Gardiner	Cummins	211 Eric Dr	Richmond	KY	40475
64	0056-0002-0021	Ben L. & Sally E.	Bentley	209 Eric Dr	Richmond	KY	40475
65	0056-0000-0031-MM	Sam Jess & Patricia	Hammons	223 Eric Dr	Richmond	KY	40475
66	0056-0000-0031-L	Sammy J. & Patricia	Hammons	223 Eric Dr	Richmond	KY	40475
68	0056-0000-0023	Linda Carnes & Clint A.	Wimberly	205 Richland Dr	Richmond	KY	40475
69	0056-0005-0018	BT Rental Properties LLC		11650 Highway 52 E	Paint Lick	KY	40461
71	0056-0005-0056	Davis Properties Of Kentucky LLC		160 Frankie Dr	Richmond	KY	40475
72	0056-0005-0055	A & K Properties 1 LLC		249 Taylors Fork	Richmond	KY	40475
74	0056-0005-0053	JCM Construction Inc		214 Stanford	Lancaster	KY	40444
75	0056-0005-0052	Shane Gregory	Blankenship	403 Sara Leigh Dr	Richmond	KY	40475
79	0056-0005-0133	James M. & Brittany Strong	Collins	343 Timothy Way	Richmond	KY	40475
81	0056-0005-0144	Barry	Metcalf	334 Timothy Way	Richmond	KY	40475-2644
82	0056-0005-0143	Anthony C. & Elinda A.	Bustos	332 Timothy Way	Richmond	KY	40475
83	0056-0005-0129	Brenda L Dilley & Larry W Hefley Jr		1006 Robin Way	Richmond	KY	40475
84	0056-0005-0057	Akshay	Johar	164 25th Avenue	Seattle	WA	98122
86	056A-0001-0013	Joanie	Finn	100 Vervain Ct Apt 7	Richmond	KY	40475
87	056A-0003-0002	Larry V. & Keeley E.	Gadd	106 Armitage Dr	Richmond	KY	40475
89	056A-0004-0014	John M. & Davida	Wooton	1426 Lancaster Rd	Richmond	KY	40475
90	056A-0004-0012	Stephen	Sebastian	1422 Lancaster Road	Richmond	KY	40475
93	0056-0005-0131	Johnny R. Jr	Baker	347 Timothy Way	Richmond	KY	40475
94	0056-0005-0037	Nathaniel P & Heather N.	Justice	336 Timothy Way	Richmond	KY	40475
95	0056-0000-0024-B	James & Martha A.	Carnes	1321 Lancaster Road	Richmond	KY	40475
96	0056-0005-0091	Christopher O. & Winter S.	Garrett	520 Breezewood Cir	Richmond	KY	40475
97	0056-0005-0092	William Edwin Jr	Luxon	PO Box 660	Richmond	KY	40476-0660
98	0056-0005-0093	Strack Family Properties LLC		209 Bay Colony Ct	Richmond	KY	40475
99	0056-0005-0094	Herbert	Harrison	238 Maryland Dr Apt 1	Richmond	KY	40475
100	0056-0005-0095	Jackson Rental Group LLC		3357 Blackford Parkway	Lexington	KY	40509
101	R002-0005-0009	Patel Chirag & Falguniben Chirag		2005 Pleasant Pointe Ct	Richmond	KY	40475

102	R002-0005-0008	Waffle House Inc		PO Box 6450	Norcross	GA	30091
103	R002-0005-0010	Casa Fiesta LLC		240 Eastern Bypass	Richmond	KY	40475
104	R002-0008-0006	Caywood & Eric Baker	Metcalf	214 Stanford St	Lancaster	KY	40444
105	0056-0005-0090	David A. & Karen	Farson	412 Lewis Dr	Richmond	KY	40475
106	0056-0005-0012	Devere Rentals LLC		200 Angel Spur Rd	Berea	KY	40403
109	0056-0005-0014	Bert H.	King	1681 South Wilderness Road	Mt Vernon	KY	40456
110	0056-0005-0013	Add Four Properties LLC		2105 Patchen Lake Ln	Lexington	KY	40505
111	0056-0005-0098	David B. & Cindy L.	Chaffin	841 Ridgefield Rd	Richmond	KY	40475
112	0056-0005-0085	JHV Construction LLC		175 Holly Hill Dr	Richmond	KY	40475
113	0056-0000-0006-A	Four Pointe Apartments LLC		160 W Main St Ste 200	New Albany	OH	43054
114	0056-0005-0087	Caywood & Mark	Metcalf	206 Wayne Dr Ste A	Richmond	KY	40475
116	R002-0015-0015	Homestyle Properties LLC		111 General Nelson Dr	Richmond	KY	40475
118	0056-0000-0006-A	Four Pointe Apartments LLC		160 W Main St Ste 200	New Albany	OH	43054
119	R001-0014-0004	Gary G. & Aleta C.	Blevins	PO Box 891	Richmond	KY	40476
119	R001-0014-0004	Gary G. & Aleta C.	Blevins	304 Martin Dr.	Richmond	KY	40476
120	R002-0006-0003	Harry W.	Ridley	102 Eastern Hills Drive	Richmond	KY	40475
121	R002-0006-0002	Joshua	Reichert	100 Eastern Hills Dr	Richmond	KY	40475
122	R002-0006-0013	Michelle L.	Turner	122 Eastern Hills Dr	Richmond	KY	40475
123	R002-006A-0011	Joel Sebastian	Coronado	113 Eastern Hills Dr	Richmond	KY	40475
124	R002-0006-0030	Fritz Investments LLC		108 Hickory Dr	Richmond	KY	40475
125	R002-0002-0001	Robert & Patricia	Swanagin	126 Millstone Drive	Richmond	KY	40475
126	R002-0002-0002	Robert W. & Bonnie G.	Harris	124 Millstone Dr	Richmond	KY	40475
127	R002-006A-0010	Jose L. & Aleyda Camacho	Varela-Lbarra	111 Eastern Hills Drive	Richmond	KY	40475
128	R002-0006-0012	Deborah L.	Addessi	2116 Winterberry Dr	Lexington	KY	40504
129	R001-0014-0006	Jennifer & Steve	Napier	400 Martin Drive	Richmond	KY	40475
130	R001-0014-0005	Seth W. & Kelsey L.	Johnson	308 Martin Dr	Richmond	KY	40475
131	R002-0006-0011	Willie J. & Marilyn	Morris	118 Eastern Hills Drive	Richmond	KY	40475
132	R002-0006-0010	Jimmy L. & Brenda K.	Givens	114 Eastern Hills Drive	Richmond	KY	40475
133	R002-0006-0009	Christopher Michael	Tomlin	112 Eastern Hills Dr	Richmond	KY	40475
135	R001-0016-0001	Michael L.	Easter	101 Ross Drive	Richmond	KY	40475
138	R001-0015-0001	Scott & Wilma	Deyo	501 Martin Drive	Richmond	KY	40475
139	R001-0014-0013	Susan	Cromer	414 Martin Drive	Richmond	KY	40475
140	R001-0014-0012	William E. & Reyne O.	Johnson	412 Martin Drive	Richmond	KY	40475
141	R001-0014-0011	Marvin & Betty	Howe	410 Martin Dr	Richmond	KY	40475
142	R002-0003-0006	Lawrence & Joyce	Land	117 Millstone Drive	Richmond	KY	40475
143	R002-0003-0005	Felicia A & James White	Wilkerson	119 Millstone Dr	Richmond	KY	40475
144	R002-0003-0004	Behareh A. & Cetareh L. Zadeh Trust		124 C McKinley Rd	Jamestown	KY	42629
145	R002-0003-0003	Farrell B. & Eileen F.	Lear	123 Millstone Drive	Richmond	KY	40475
146	R002-0003-0002	John Conte et al		125 Millstone Drive	Richmond	KY	40475
152	R001-0016-0008	Linda F.	Dombrowski	133 Millstone Dr	Richmond	KY	40475
153	R002-0006-0008	Dena	Spivey	110 Eastern Hills Drive	Richmond	KY	40475
154	R002-0006-0007	Mathew Ryan	Baesler	108 Eastern Hills Dr	Richmond	KY	40475
155	R002-0006-0006	Ridgeline Premier Properties LLC		2012 Long Meadow Court	Richmond	KY	40475
156	R001-0015-0006	Richard M. & Martha G.	Bogard	409 Martin Drive	Richmond	KY	40475
157	R001-0014-0010	Ashley R. & Lane D.	Tincher	408 Martin Drive	Richmond	KY	40475
158	R001-0014-0009	Dwayne & Tracy	Wheatley	PO Box 1164	Richmond	KY	40475
159	R001-0014-0008	Gregory C. & Lou Anne	Robinson	404 Martin Dr	Richmond	KY	40475
160	R001-0014-0007	Karlie	Richardson	402 Martin Dr	Richmond	KY	40475
161	R002-0007-0011	Silver Star Foodmart LLC		168 Overlook Trail	Richmond	KY	40475
162	R001-0014-0015	Bobbie H. & Skylar	Bedell	504 Martin Dr	Richmond	KY	40475
163	0055-0012-0129	Amelia	Bernsten	635 Fourwinds Dr	Richmond	KY	40475
164	0055-0012-0130	K & L Developers LLC		145 N Estill Ave	Richmond	KY	40475
165	R002-0007-0012-02	C. Wesley & Lindsey	Morgan	1266 Willis Branch Rd	Richmond	KY	40475
166	R002-0007-0012-01	Shubh Shubh LLC		1215 Shafter Shepola Rd	Somerset	KY	42503
166	R002-0007-0012-01	Shubh Shubh LLC		237 Eastern Bypass	Richmond	KY	40475
0, 88	056A-0003-0001	Freda Caudill et al		145 Armitage Dr	Richmond	KY	40475
1, 115	R002-0005-0011	Bypass Storage Ky LLC		9515 Hillwood Dr	Las Vegas	NV	89134
113, 118	0056-0000-0006-A 0056-0005-0086 R001-0016-0010	Trifecta Blue LLC		PO Box 188	Richmond	KY	40476
137, 147, 148	R001-0014-0014 R002-0003-0001 R001-0016-0006	Snapp Homes & Rentals LLC		2336 Union City Rd	Richmond	KY	40475
149, 150, 151	R001-0016-0005 R001-0016-0009	Hager Rental Inc		474 Eastern Bypass	Richmond	KY	40475
2, 134	R002-0006-0031-A	Jimmy	Yang	1340 Flemingsburg Rd	Morehead	KY	40351
3, 136	R002-0006-0004	King Rentals LLC		104 Purcell Dr	Richmond	KY	40475
36, 38	0041-0000-0009-03 0041-0000-0009-02 0057-0000-0015	Courtney Snook	Perez	108 Anne St	Richmond	KY	40475
45, 53, 67	0056-0000-0029 0056-0000-0030 0056-0005-0017	Robert A. & Barbara	Cornelison	420 Duncannon Ln	Richmond	KY	40475
70, 107, 108, 117	0056-0005-0016 0056-0005-0015 0056-0005-0096-A	Hager Family Limited Partnership		474 Eastern Bypass	Richmond	KY	40475
73, 80	0056-0005-0054 0056-0005-0039 0056-0005-0051	Metcalf Associates Inc		214 Stanford	Lancaster	KY	40444
76, 77, 78, 85	0056-0005-0050 0056-0005-0048 0056-0005-0049	Simpson Farm LLC		188 Ford Lane	Nicholasville	KY	40356
91, 92	056A-0001-0015 056A-0001-0016	Willard G. & Wauthalena	Brown	103 Armitage Dr	Richmond	KY	40475
	0071-0000-0001	Lee Ann Moss	Shrout	1210 Parrish Ln	Richmond	KY	40475

0071-0000-0001-B	Brandenburg LLC	518 Allen Drive	Richmond	KY	40475

EXHIBIT 15
NEWSPAPER NOTICE AND PUBLISHER'S AFFIDAVIT

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Pam Bowlin

(Signature)

10/13/2022

Date

Heather Russell

(Notary Signature)

10/13/2022

Date

Application Exhibit 15
Case No. 2022-00314
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TRAINING

from page A1

or problems into a situation — we're there to help. So arming our deputies with some knowledge is important," Allen said.

The lieutenant said the training is something that has been needed for some time.

"We feel like this has been lacking over the years. We're trying to be more observant, because law enforcement is taught to handle things differently and recognize potential hazards or danger. For example, when someone puts their hands in their pockets, we are trained to not let them do that since they can have a weapon," Allen explained.

However, that law enforcement training can conflict when police are dealing with an individual on the autism spectrum.

"Someone on the spectrum may try to do things that we may consider suspicious (like putting their hands in their pockets) in order to make themselves comfortable in a stressful situation," Allen explained. "We need to be aware of that."

The sheriff's office has partnered with the The Autism Tribe organization, led by Executive Director Susan Mills, to provide education and tips regarding autistic individuals to ensure they are getting the help needed.

"We're really in debt to Autism Tribe. Mills is a great resource for us, we're very lucky to have partnered up with her — I think it's just something that's important to share," Allen said. "It was a big investment for us to invest in this kind of training, but we're seeing definite positive results."

Statistics show that individuals on the spectrum are seven times more likely to have encounters with emergency responders and law enforcement, according to the Autism Speaks website.

Furthermore, a study from 2019 highlighted that over 53% of participants with high functioning autism have had four or more encounters with police officers in their lifetime.

Allen said the training is vital as more people are being diagnosed with autism.

"We've spent so much of our training — learning protocols on traffic stops and domestics and things like that — we just saw a need, because more and more people are being diagnosed on the spectrum," said Allen. "The sheriff's office saw a need to close that gap with the autistic community. We want to make sure that we were helping them and giving our guys the knowledge to handle that situation appropriately."

He provided additional insight on the importance of autism sensitivity training within law enforcement.

"As we become more aware and realize there are people with mental health issues and people on the autism spectrum, there are some things that we may observe that may not necessarily be a threat to us. We need to handle it differently than someone that's trying to cause us harm," Allen explained.

"If they law enforcement sees an adult or child that wants to walk into another room, a deputy may think, 'I need to follow this person because they might want to get a weapon to hurt me.' Well, if it's someone on the autism spectrum, they just may need to go into a separate room and kind of calm down and cool off or get away from you," Allen added.

The training hits especially home for Allen, as his 12 year-old son is on the spectrum.

Despite his son being high functioning, he and his family are personally aware of the sensitivities and triggers that come with Autism Spectrum Disorder and how to handle situations that involve loud noises and how those on the spectrum may handle stress like avoiding eye contact.

"I can't imagine if I was in a car accident and was incapacitated," Allen said. "My son would, hopefully, have a police officer show up that is understanding and not just barking orders — it would be a struggle. My son is pretty high functioning on the autism spectrum, but he still has his things that trigger him."

Additionally, Allen provided tips for caregivers to help inform emergency responders that someone in the situation is on the autism spectrum.

"I think awareness is the biggest thing, honestly. Some suggestions I have, is if you call 911, make sure you let the dispatcher know that there's someone on the autism spectrum present, in the car or at the home," Allen stated.

"I try to do some things to identify a car or a residence to show that someone with autism may be inside, like the puzzle piece stickers or a license plate. Just having the person say 'Look, I've got someone on the spectrum involved,' so when the officers first arrive, they know how to approach the situation in a way that it's not stressful or triggering for a neuro-divergent person," Allen noted.

The training is just another way officers and deputies can prepare themselves to deal with emergency situations, Allen said.

"Officers and deputies understand that it's not always one plus one equals two. No situation is the same and Mike Coyle and the rest of us at the sheriff's office want to be prepared to best help everyone," Allen said.

The sheriff's office is already working on building an in-depth training library for law enforcement as a means to have a comprehensive guide to address emergency scenarios that may involve things such as mental health, autism, resisting arrest and more.

K9

from page A10

legislation — specifically if a K9 is shot/killed in the line of duty, the suspect would be charged with a felony," Wesley said.

Members of the committee witnessed these dogs in action through three main demonstrations. They placed an illegal substance underneath a car and the canine was able to find it in a matter of minutes.

They also demonstrated their ability to track by placing a set of keys in the grass which the dog then was able to find.

Lastly, officers demonstrated how these canines apprehend a suspect by having an officer simulate what can happen when a suspect is running away from officers.

The dogs are trained to attack certain areas of the body and are trained to bite a certain way so the suspect cannot get away.

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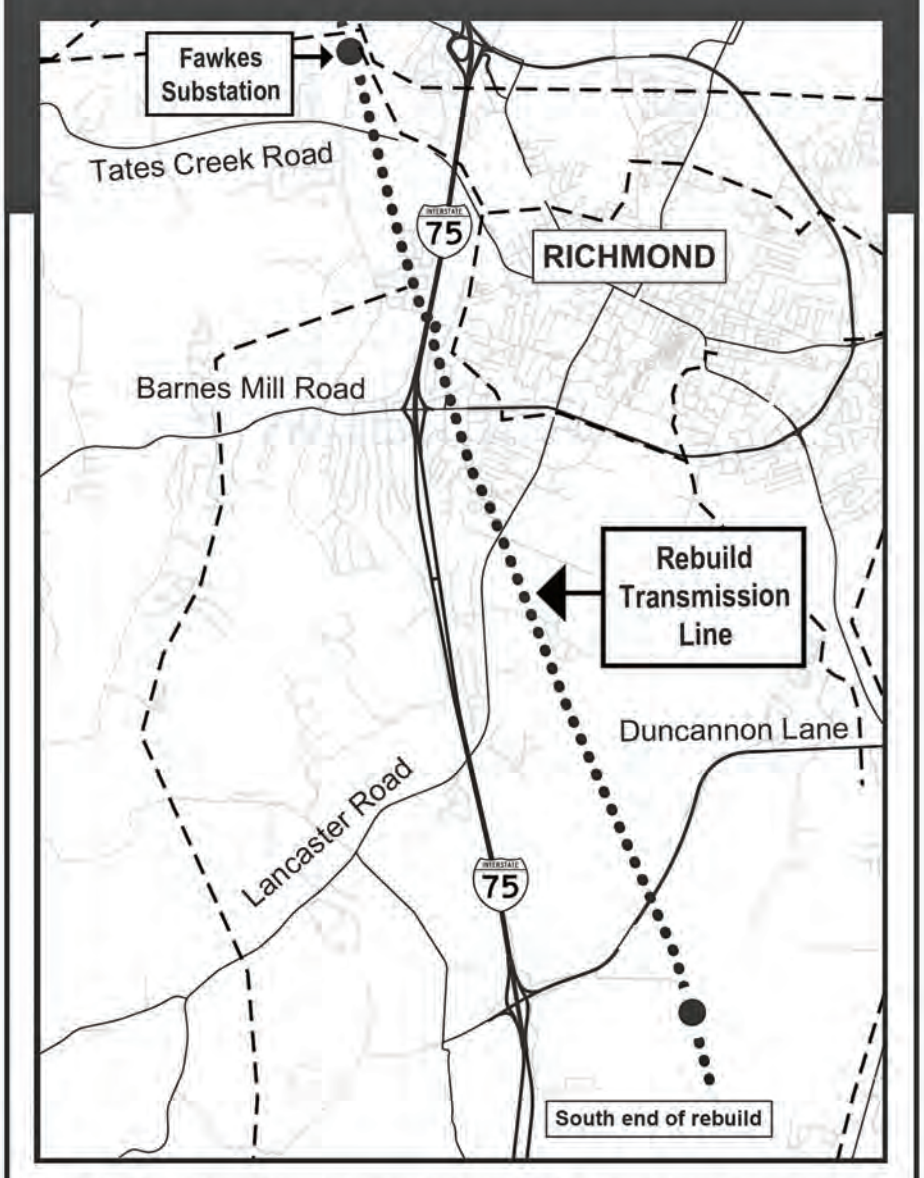
Notification of Intent to Construct Transmission Line



East Kentucky Power Cooperative (EKPC) soon will conduct a project in Madison County, Ky., to rebuild an existing 69-kilovolt electric transmission line as a 138-kilovolt and 69-kilovolt double-circuit electric transmission line. The line will extend approximately 7 miles from EKPC's Fawkes Substation, near the intersection of Goggins Lane and Tates Creek Road, southeast to a location near Parrish Road and Duncannon Lane. This project will help to maintain reliable electric service for Blue Grass Energy members and provide voltage support for growing commercial and industrial electric load in the area.

The transmission line will require a certificate of public convenience and necessity to be issued by the Kentucky Public Service Commission (PSC). This process will proceed on PSC Docket 2022-00314. EKPC plans to file the application on or about Oct. 14, 2022. You have the right to request a local public hearing and interested parties have the right to intervene in these proceedings. Should you have any questions concerning this process, please contact Linda C. Bridwell, Executive Director, Kentucky Public Service Commission, PO Box 615, 211 Sower Boulevard, Frankfort, Kentucky 40602-0615, telephone (502) 564-3940.

EAST KENTUCKY POWER COOPERATIVE
A Touchstone Energy Cooperative

EXHIBIT 16
TESTIMONY – DARRIN ADAMS

COMMONWEALTH OF KENTUCKY

BEFORE THE PUBLIC SERVICE COMMISSION

IN THE MATTER OF:

ELECTRONIC APPLICATION OF EAST KENTUCKY POWER COOPERATIVE, INC. FOR A (1) CERTIFICATE OF PUBLIC CONVENIENCE AND NECESSITY FOR THE CONSTRUCTION OF TRANSMISSION FACILITIES IN MADISON COUNTY KENTUCKY; (2) DECLARATORY ORDER CONFIRMING THAT A CERTIFICATE OF PUBLIC CONVENIENCE AND NECESSITY IS NOT REQUIRED FOR CERTAIN FACILITIES	)	**CASE NO. 2022-00314**

DIRECT TESTIMONY OF DARRIN ADAMS
ON BEHALF OF EAST KENTUCKY POWER COOPERATIVE, INC.

Filed: October 27, 2022

COMMONWEALTH OF KENTUCKY

BEFORE THE PUBLIC SERVICE COMMISSION

IN THE MATTER OF:

ELECTRONIC APPLICATION OF EAST KENTUCKY POWER COOPERATIVE, INC. FOR A (1) CERTIFICATE OF PUBLIC CONVENIENCE AND NECESSITY FOR THE CONSTRUCTION OF TRANSMISSION FACILITIES IN MADISON COUNTY KENTUCKY; (2) DECLARATORY ORDER CONFIRMING THAT CERTIFICATE OF PUBLIC CONVENIENCE AND NECESSITY IS NOT REQUIRED FOR CERTAIN FACILITIES	)	**CASE NO. 2022-00314**

VERIFICATION OF DARRIN ADAMS

COMMONWEALTH OF KENTUCKY)
)
COUNTY OF CLARK)

Darrin Adams, Director of Transmission Planning & System Protection for East Kentucky Power Cooperative, Inc., being duly sworn, states that he has supervised the preparation of his Direct Testimony and certain filing requirements in the above-referenced case and that the matters and things set forth therein are true and accurate to the best of his knowledge, information and belief, formed after reasonable inquiry.

Darrin Adams

The foregoing Verification was signed, acknowledged and sworn to before me this 26th day of October, 2022, by Darrin Adams.

Notary Commission No. KYNP38003

Commission expiration: 11/30/2025

GWYN M. WILLOUGHBY
Notary Public
Commonwealth of Kentucky
Commission Number KYNP38003
My Commission Expires Nov 30, 2025

Q. PLEASE STATE YOUR NAME, BUSINESS ADDRESS, AND OCCUPATION.

A. My name is Darrin Adams and my business address is East Kentucky Power Cooperative, Inc. ("EKPC"), 4755 Lexington Road, Winchester, Kentucky 40391. I am the Director of Transmission Planning & System Protection for EKPC.

Q. PLEASE STATE YOUR EDUCATION AND PROFESSIONAL EXPERIENCE.

A. I am a graduate of Transylvania University with a Bachelor of Arts degree in Liberal Studies, and a graduate of the University of Kentucky with a Bachelor of Science degree in Electrical Engineering. I am a licensed Professional Engineer in the Commonwealth of Kentucky and have nearly 30 years of experience in the electric utility industry. I have been employed at EKPC since 2004, and have been responsible for transmission planning activities throughout my career at EKPC. Prior to my current position at EKPC, I served as a senior engineer, as the Supervisor of Transmission Planning, as the Manager of Transmission Planning, and as the Director of Planning, Design, & Construction for Power Delivery. Prior to commencing employment with EKPC, I was employed at LG&E Energy/Kentucky Utilities for approximately 11 years in various roles in the transmission planning and operations areas of those companies.

Q. PLEASE PROVIDE A BRIEF DESCRIPTION OF YOUR DUTIES AT EKPC.

A. In my current role, I am responsible for overseeing the planning of the electric transmission line, transmission substation, and distribution substation facilities

necessary to reliably and economically deliver energy to EKPC's Owner-Member systems. In addition to the planning of EKPC-owned facilities, I oversee coordination of transmission-development plans with other electric utilities and the PJM Interconnection Regional Transmission Organization ("PJM").

Q. HAVE YOU PREVIOUSLY TESTIFIED BEFORE THE KENTUCKY PUBLIC SERVICE COMMISSION?

A. Yes, I have testified before the Commission on multiple occasions. Most recently, I provided direct testimony in Case No. 2015-00267, which involved EKPC's application for approval of acquisition of the Bluegrass Generating Station facilities in Oldham County, Kentucky. Regarding cases involving an application for a Certificate of Public Convenience and Necessity ("CPCN") for electric transmission lines, I have testified in Case No. 2006-00463 (requesting a CPCN for the construction of the J.K. Smith-West Garrard 345 kV line in Clark, Madison, and Garrard Counties) and in Case No. 2005-00089 and Case No. 2005-00458 (both cases requesting a CPCN for construction of the Cranston-Rowan County 138 kV line in Rowan County). In addition to the direct testimony supplied in these cases, I have previously sponsored responses to data requests related to transmission-planning topics in numerous EKPC cases that have come before the Commission.

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY IN THIS PROCEEDING?

A. My testimony will provide an explanation for the purpose and need for the proposed 138 kV electric transmission line from the existing EKPC Fawkes

substation to the new Madison County 69 kV Switching Station in the Duncannon Lane area, as well as the associated substation expansion and additions. I will describe the transmission-planning studies that were performed to determine these needs and provide a description of the results of those studies.

Q. ARE YOU SPONSORING ANY EXHIBITS?

A. Yes, I am sponsoring the report documenting the transmission-planning studies as Exhibit DA-1. This report was prepared under my direction and supervision.

Q. PLEASE DESCRIBE THE PROJECT THAT EKPC IS UNDERTAKING AS PART OF THIS APPLICATION.

A. EKPC is proposing to construct a double-circuit 138 kV and 69 kV transmission line to replace an existing single-circuit 69 kV line from the existing LG&E/KU Fawkes substation ("KU Fawkes") to the new EKPC Madison County 69 kV switching station in the Duncannon Lane area. This Project also entails the anticipated need for substation infrastructure upgrades and additions on the terminating ends of the proposed double-circuit line. On the northern end, EKPC will need to expand the EKPC Fawkes substation to provide necessary terminal equipment (138 kV circuit breaker, switches, bus work, etc.) for connection of the 138 kV line. On the southern end, EKPC is planning a new substation ("Madison County Switching Station") that could provide the ability to connect the new 138 kV line via a 138-to-69 kV step-down transformer to the existing KU Fawkes-West Berea 69 kV line that currently provides service to consumers in the area. This new substation will also provide a connection point for future distribution substation infrastructure to serve large commercial/industrial customers that may

locate at a large prospective industrial site near the Interstate 75/Duncannon Lane interchange south of Richmond, Kentucky. EKPC intends to construct the double-circuit 138 kV and 69 kV transmission line immediately to take advantage of the opportunity that exists due to a need to rebuild the existing KU Fawkes-Duncannon Lane Tap 69 kV line for reasons that I will describe further in my testimony. EKPC also intends to build the new Madison County Switching Station (with only 69 kV infrastructure initially, but with the ability to add 138 kV infrastructure when needs arise in the future) in the Duncannon Lane area to address existing reliability and system-protection issues, which I will also explain further in my testimony. Additionally, EKPC plans to build the New Industrial Substation at the industrial site near Interstate-75/Duncannon Lane to serve large commercial/industrial loads locating in the area. EKPC has no current timetable for the expansion of the EKPC Fawkes substation on the northern end nor the addition of 138 kV substation infrastructure on the southern end, which includes the 138 kV portion of the Madison County substation and the New Industrial Substation. These substation infrastructure upgrades/additions will be completed when a specific need arises (e.g., additional load development in the area, violation of EKPC transmission-planning criteria due to changes in system conditions in the area, or future identification of real-time operational or reliability concerns) that necessitates support from the new 138 kV line to the area.

Q. PLEASE DESCRIBE THE NEED FOR THE TRANSMISSION SYSTEM IMPROVEMENTS.

A. Consumers in southern Madison County are served by Blue Grass Energy, from the EKPC transmission system. Residential and industrial load growth has been healthy in this area and certain transmission lines and substations have begun to reach their capacity limits. Older facilities are approaching their end of service-life and must be replaced. Recent industrial growth and interest in the area by new industrial loads have also accelerated the need for improvements in the area infrastructure to reliably serve existing and expected loads. EKPC has developed a transmission plan for the area that will address aging infrastructure, prepare for imminent growth, and reduce local impact by opportunistically combining two transmission line projects on an existing line route.

A CPCN is needed immediately for the new 138 kV transmission line that is proposed as a second circuit on a planned rebuild of a 69 kV line that must be replaced now. The area plan also includes substation construction and modifications to an existing substation that will occur after this line construction to provide reliable service to existing customers and adequate flexibility to serve normal growth and expected industrial development.

EKPC seeks to obtain a CPCN for the new 138 kV transmission line and to assure that the substation projects included in the plan can be constructed how and when they are needed. Planning and execution for the substation projects must be managed around multiple risks to assure timely delivery of needed infrastructure. Those risks include regulatory requirements, environmental permitting, new industrial customer demand, critical equipment lead times, and availability of materials due to supply chain challenges. EKPC's planned strategy

requires that some flexibility be maintained in the technical specifications for two of the future substations. Consequently, for the purposes of this Application the scope and cost of those components are represented in ranges that will be refined during final scope development and execution.

Q. WHAT SPECIFIC STUDIES HAVE BEEN PERFORMED TO DETERMINE THE NEED FOR TRANSMISSION SYSTEM IMPROVEMENTS IN THE AREA?

A. EKPC's annual transmission-planning power-flow studies have identified a potential overload of the existing line conductors in the KU Fawkes-Duncannon Lane Tap 69 kV line section, occurring as soon as the upcoming 2022/23 winter peak-load period. In addition, as explained in Ms. LeMaster's testimony, a mechanical-loading analysis of this line section has determined that a number of the structures in the line section can be loaded either near or over their rated strength for certain conditions. Therefore, given both the electrical and mechanical loading issues identified, we have determined that the optimal solution to address both is to rebuild the 69 kV line section using larger conductors (795 MCM ACSR 'Drake') with new steel-pole structures. As I describe further below, EKPC recognized the opportunity to address future needs in the area south of Richmond served by our local owner-member distribution cooperative in conjunction with this necessary 69 kV line rebuild. Therefore, EKPC proposes a rebuild of the existing 69 kV line as a double-circuit 138 kV and 69 kV line in order to prepare for the addition of 138 kV support to the area.

Q. YOU STATED THAT THE THERMAL OVERLOAD OF THE KU FAWKES-DUNCANNON LANE TAP 69 KV LINE SECTION COULD OCCUR AS SOON AS THE 2022/23 WINTER PERIOD, BUT THE REBUILD OF THIS 69 KV LINE IS NOT SCHEDULED TO BE COMPLETED UNTIL DECEMBER 2024. WHY DID EKPC NOT IDENTIFY THIS NEED IN SUFFICIENT TIME TO COMPLETE THE REBUILD PRIOR TO THE EXPECTED TIMEFRAME FOR THE THERMAL OVERLOAD?

A. During EKPC's annual transmission-planning analysis that was conducted in 2021, the thermal overload of the KU Fawkes-Duncannon Lane Tap 69 kV line section was identified as first occurring in the 2025/26 Winter peak-load period. Therefore, EKPC began preparing to address the thermal overload prior to that timeframe, and identified the rebuild of the line with larger conductors as the optimal solution. When we conducted our annual transmission-planning analysis in 2022 with updated power-flow models, the thermal overload was identified in the model to occur in the earlier period of 2022/23 Winter. Our investigation of the reason for this accelerated date of overload determined that the load forecast for the substations served on the 69 kV system had increased by approximately 11 MW for the 2022/23 winter peak load period due to expected industrial load growth or additions in the area that were not known at the time of the 2021 studies.

The difference between the timeframe now identified for the potential thermal overload of the line section and the expected date to complete the rebuild

results in the possibility for real-time operational loading issues on the line section in the interim period. EKPC is assessing potential operational mitigation actions that can be taken to address the thermal loading as needed until the line rebuild is completed. These actions include possibly opening one or more 69 kV circuit breakers in the area to reduce the flow of power on the KU Fawkes-Duncannon Lane Tap 69 kV line section, calling for interruption of industrial customers in the area that are contracted to interrupt when requested, and/or taking actions to shed load as necessary.

Q. HAS EKPC SUBMITTED THIS PROJECT TO PJM FOR ITS REVIEW AS EKPC'S REGIONAL TRANSMISSION PLANNER?

A. Yes, EKPC has provided information regarding the thermal overload identified on the KU Fawkes-Duncannon Lane Tap 69 kV line. PJM has performed its own independent analysis to confirm the potential existence of the thermal overload and that EKPC's proposed solution of rebuilding the line section with 795 MCM ACSR "Drake" conductor both addresses the thermal overload and does not create any other potential planning-criteria violations on the transmission system. PJM Planning staff are in agreement that this is the optimal solution to address the identified thermal overload.

PJM has not evaluated EKPC's plan to rebuild this line section as a double-circuit 138 kV and 69 kV line. The addition of the 138 kV circuit is considered by PJM to be a supplemental project addressing a transmission owner-driven supplemental need (in this case preparing for future service to customers in the area and/or preparing for the need for future 138 kV support in the area). PJM

does not approve transmission-owner projects addressing supplemental needs. PJM facilitates presentation of these supplemental needs and associated projects by the transmission owner to the PJM stakeholder community and ensures that the supplemental projects do not create planning-criteria violations on the PJM and neighboring systems. EKPC plans to submit this supplemental need in December 2022 and the corresponding supplemental project in January 2023. Consequently, the Project is expected to be incorporated into EKPC's local plan in February 2023.

Q. PLEASE DESCRIBE THE NEED FOR ADDITIONAL CAPACITY IN THE AREA.

A. EKPC's transmission-planning studies show that the ability to serve incremental load in this area of the system is very limited. With system improvements that are already planned to be implemented in the area in the near future – including rebuilding the KU Fawkes-Duncannon Lane Tap and the other remaining sections of the Fawkes-West Berea 69 kV line – only 3 MW of incremental load can be supported without creating inadequate voltage levels during single-contingency conditions. This analysis is based on EKPC's current 50/50 probability load forecast, which is what is typically used for EKPC's transmission-planning studies. For weather conditions that are more severe than what EKPC considers normal, the system in the area may experience low-voltage and/or thermal-overload without any new future load additions or growth. EKPC must implement modifications to the transmission system in the area to continue to reliably and adequately serve any incremental load beyond the 3 MW amount per

our existing planning criteria. Therefore, the EKPC system is not presently capable of serving even a modest amount of incremental load, and certainly not load levels of the magnitude being contemplated in the vicinity. Additionally, higher load levels than assumed in the EKPC studies could lead to real-time operational issues that must be dealt with through system re-configuration and/or load interruptions until additional support is provided to the area.

Q. ARE THERE ANY PLANS FOR ECONOMIC DEVELOPMENT IN THE AREA?

A. EKPC and Blue Grass Energy have seen several expansions and industrial facility additions in the area within the past 12 months. This has added a significant amount of load on the EKPC 69 kV system, which has contributed to the need for the currently planned projects in the area, including the rebuild of the KU Fawkes-Duncannon Lane Tap 69 kV line section. Furthermore, EKPC has received numerous requests for information for service to potential large-load facilities that have expressed interest in locating at a nearby industrial development site over the past 12 months. It is also EKPC's understanding that Kentucky's Cabinet for Economic Development has noted at least 20 submittals for potential economic development projects for this site since January of 2020. These loads have ranged in demand levels from approximately 50 MW to in excess of 400 MW. EKPC has studied service for loads of those magnitudes and determined that 138 kV transmission infrastructure would be required to serve these loads – the 69 kV system cannot be upgraded practically and cost-efficiently

to serve loads at these levels. This is a key factor driving EKPC's proposed transmission expansion plan for the area.

Q. WHY IS EKPC PROPOSING THE FAWKES SUBSTATION UPGRADE?

A. The planned addition of the 138 kV circuit as part of the KU Fawkes-Duncannon Lane Tap 69 kV line rebuild will establish a new 138 kV circuit between those two locations. In order to terminate that 138 kV circuit and thereby connect it into the EKPC transmission system, EKPC will need to expand its own Fawkes 138 kV substation (which is adjacent to the KU Fawkes substation) to establish a new circuit-breaker position, as none are currently available at the EKPC substation. As part of the eventual expansion at the Fawkes substation, EKPC plans to split the 138 kV bus into two separate busses with a connecting bus-tie breaker between them to improve the reliability of the 138 kV system in the area and to reduce the likelihood of widespread outages for a substation bus fault or failure of a circuit-breaker at the substation. Also, EKPC will re-route some of the existing 138 kV lines terminating at the EKPC Fawkes substation to connect to the new portion of the substation in order to split these lines between the two busses to provide maximum reliability for the area.

Q. WHY IS EKPC PROPOSING THE MADISON COUNTY SWITCHING STATION AND THE NEW INDUSTRIAL SUBSTATION?

A. The Madison County 69 kV Switching Station that is proposed to be built in the vicinity of EKPC's existing Duncannon Lane distribution substation will provide immediate reliability and transmission-system protection benefits for service to existing consumers in the area. The KU Fawkes-West Berea 69 kV line is 26.5

miles in length (including radial transmission tap lines) and currently serves seven distribution substations with total 2022/23 winter forecasted peak load of nearly 107 MW (50/50 probability forecast). This line serves a substantial amount of industrial load. In fact, the line was one of the five highest circuits on EKPC's system in 2020 in terms of total megawatt-hours delivered to consumers. EKPC has continued to see significant additional industrial load growth on the circuit since 2020, so this circuit will continue to be one of EKPC's highest in terms of energy delivered. From a reliability standpoint, this circuit currently has a substantial level of exposure to outages for consumers due to the length of the line and the number of substations served from the line. Currently, a fault on the line will result in unplanned outages for all seven substations, resulting in loss of service to more than 5,700 consumers and up to 107 MW of demand.

Construction of the Madison County Switching Station will convert the KU Fawkes-West Berea 69 kV circuit into four circuits with no more than four distribution substations served from any one of these new circuits, and with no more than 9.6 miles of line exposure on any one circuit. This will greatly reduce the risk of outages for consumers served from this line. Furthermore, with the recent addition of the Speedwell Road substation at the end of a long radial tap connected to this line, the system protection scheme is a concern. Currently the relays and circuit breakers that are protecting the KU Fawkes-West Berea 69 kV line, including the radial tap to Speedwell Road, are located at the KU Fawkes and EKPC West Berea substations. Due to the distance between these substations, plus the radial taps and associated distribution substations that must

be included in the system-protection coordination, electric faults on the radial tap line to Speedwell Road may be slow to clear, and may lead to more widespread tripping that will impact consumers beyond the KU Fawkes and EKPC West Berea substations. The addition of the Madison County 69 kV Switching Station eliminates this issue by reducing the distance between circuit breakers, and in particular due to adding a dedicated circuit breaker for the radial tap line serving the Crooksville and Speedwell Road distribution substations. The 69 kV portion of the Madison County Switching Station must be built for local system support with or without the addition of the 138 kV KU Fawkes – Duncannon Lane Tap circuit.

In addition to these immediate benefits that would improve service to existing consumers, this substation location provides a key opportunity for future system support. This substation can be expanded in the future to add a 138-to-69 kV transformer that would allow EKPC to connect the existing 69 kV system in the area to EKPC's 138 kV system for needed support when the demand in the area exceeds the current capacity of the system. Furthermore, this substation would allow EKPC to connect potential additional distribution substations that may be needed in the area to support new industrial facilities. This substation is in an optimal location to address both existing EKPC reliability and system-protection issues and future load-serving requirements at or near the New Industrial Site.

The New Industrial Substation would be utilized to meet the needs of large industrial and commercial customers that locate in that area. This new

distribution substation would connect to the Madison County Switching Station, with necessary distribution transformers to meet the needs of the customer facilities in the area. The specific scope of the substation design (e.g., voltage level, number of transformers, nameplate rating of transformers, etc.) will be developed based on the needs of customers as they commit to locate in this area.

Q. WHY DOES EKPC BELIEVE A CPCN IS NOT REQUIRED FOR ANYTHING OTHER THAN THE 138 KV TRANSMISSION LINE CONSTRUCTION?

A. The proposed substation projects that I have described in my testimony are ordinary extensions in the normal course of business and therefore fall under the exception contained in 807 KAR 5:001 Section 15(3). EKPC plans to move forward with the new Madison County 69 kV Switching Station to address existing system reliability and system-protection concerns regardless of any future load growth in the area because it provides needed support even without any extension of 138 kV transmission infrastructure to the area. The EKPC Fawkes Expansion and the New Industrial Substation provide necessary substation infrastructure to meet future system needs in the area. EKPC plans to move forward very soon with the Madison County 69 kV Switching Station and, when necessary, with the remaining substation projects based on changes in system conditions in the area, particularly growth in the area's peak demand. Experience demonstrates that the long lead-times associated with transmission and substation projects can be a hinderance to economic development. EKPC's goal is to prudently and proactively prepare for system growth in order to minimize

potential schedule impediments to providing necessary electric infrastructure for potential economic development projects interested in locating in the area. These substation projects will not create wasteful duplication of equipment, property, or facilities, and will not conflict with existing service provided by other utilities operating in this area. Furthermore, the capital outlay for these substation projects is not of the magnitude to affect the financial condition of EKPC, and will not materially impact rates to consumers. In fact, the costs of the Project will not be recovered until EKPC's base rates are adjusted at some point in the future.

Q. DOES THIS CONCLUDE YOUR TESTIMONY?

A. Yes.

EXHIBITS

DA-1 Transmission Study Report

EXHIBIT DA-1
TRANSMISSION PLANNING STUDY

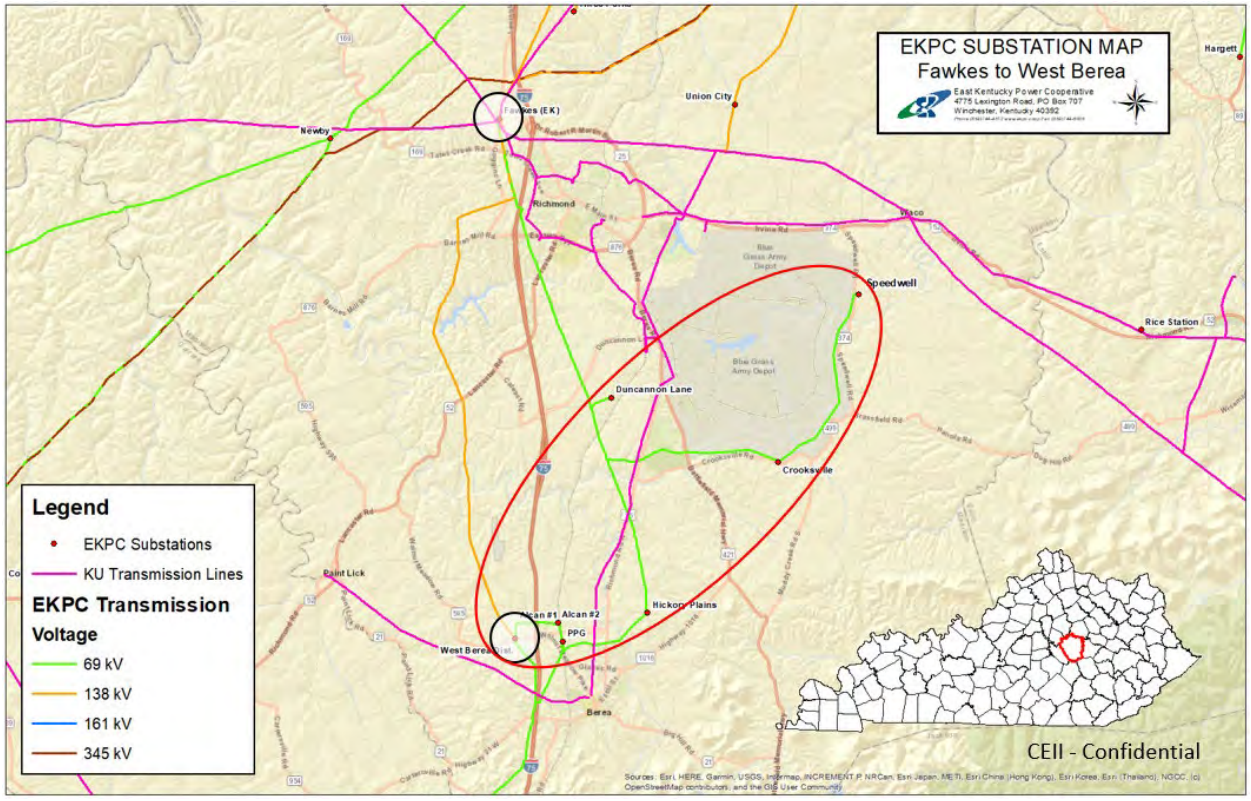
Richmond-Berea Area Transmission Needs Analysis

Table of Contents

1.0 Introduction

The East Kentucky Power Cooperative's (EKPC) transmission system in the Richmond and Berea areas of Madison County, Kentucky was evaluated by the EKPC Transmission Planning Team to determine future transmission system needs. A current system map of the area is shown in Figure 1.1.

Figure 1.1: EKPC's Richmond and Berea area transmission system map



The Richmond and Berea area transmission system is connected to the EKPC Bulk Electric System (BES) at the EKPC Fawkes transmission substation, located on the northern edge of Richmond. The area EKPC loads (load pocket is encircled in red on Figure 1-1) are served by the 69 kilo-volt (KV) system in the area via a 69 KV interconnection with Louisville Gas & Electric/Kentucky Utilities (LG&E/KU) at the KU Fawkes substation on the northern side of the area and a 138/69 KV transformer at the EKPC West Berea substation on the southern side of the area. These sources are shown by the shaded circles on Figure 1-1. The EKPC loads in the area are dependent on these connections for active and reactive power. If one or more of the connections are not available due to an unplanned outage or planned maintenance, the area may experience thermal loading and/or under-voltage issues.

2.0 AREA TRANSMISSION SYSTEM BACKGROUND

The existing 69 KV circuit from the KU Fawkes substation to the West Berea substation is 16.87 miles long, and is entirely EKPC-owned other than the 69 KV terminal equipment owned by LG&E/KU at the KU Fawkes substation. This circuit utilizes wood-pole construction dating back to 1956. Nearly 15 miles

of the circuit was constructed between 1956 and 1957. The original installed conductor wires in these sections of this circuit were replaced with larger (heavier) 556.5 MCM ACSR conductor in the mid-to-late 1980's. However, the original wood-pole structures were not replaced, resulting in significantly increased mechanical loading on these structures.

The other sections of the KU Fawkes-West Berea circuit (approximately 2 miles) were built between 1989 and 1991. Also, an additional 9.66 miles of radial tap lines serving 7 distribution substations are connected to the circuit. Table 2.1 shows the number of customers and the forecasted (50/50 probability) peak loading for each connected substation in 2022.

Table 2.1 Existing distribution substation customer count and peak loading

Substation Name	Number of Customers (5741 total)	Forecasted Peak Loading (106.9MW total)
Duncannon Lane	7	2.9 MW
Crooksville	1736	10.7 MW
Hickory Plains	3946	26.8 MW
PPG	1	6.2 MW
Alcan #1	46	18.8 MW
Alcan #2	4	14.6 MW
Speedwell Road	1	26.9 MW

The energy provided to this load pocket mainly serves industrial customers. This circuit ranked in the top five annually for Megawatt-hours delivered on the EKPC system, with nearly 234,000 delivered in 2020. This is due primarily to the large amount of industrial load on this circuit.

Due to the attractive geographic location of Richmond and Berea, and the availability of land in the area that can be developed for large industrial customers, there is a high likelihood for an increase in the electrical demand in the area. In particular, a potential large industrial site ("New Industrial Site") located adjacent to Interstate 75 and Duncannon Lane in Madison County has been the subject of numerous inquiries by potential large (50 MW or more) industrial customers. Therefore, EKPC's analysis of system needs in the area has included this potential for future large-load additions at the New Industrial Site as a consideration.

2.2 Area current planned transmission enhancements

The following transmission projects in the area are scheduled to be completed in 2022 to address violations of EKPC planning criteria that were identified in earlier planning studies for the area. The need for these projects is driven by upcoming industrial load additions in the area. The projects are:

- An upgrade of the existing West Berea 138/69 KV, 100 MVA auto-transformer to 150 MVA. An overload of the West Berea transformer was identified during an outage of the KU Fawkes-Duncannon Lane Tap 69 KV line section for 2022/23 winter peak-load conditions. This overload is driven by the addition of the industrial load at the Speedwell Road substation. The West Berea transformer upgrade is scheduled to be completed by December 2022.
- The addition of a 138 KV circuit breaker at the EKPC Fawkes substation. Low voltage levels were identified in the area for an outage of the EKPC Fawkes-KU Fawkes 138 KV tie-line during

2022/23 winter peak-load conditions, which currently results in an outage of the entire 138 KV bus at the EKPC Fawkes substation due to the absence of a 138 KV circuit breaker on the EKPC end of the tie-line. The addition of a 138 KV circuit breaker on the EKPC end terminal of the tie-line will therefore eliminate the resulting 138 KV bus outage. This project is scheduled to be completed by December 2022.

Additionally, the following distribution substation project has been approved and is currently in development by EKPC:

- Build the new Big Hill distribution substation, tapping the EKPC Three Links Junction-Tyner 69 KV line between the existing Three Links and Sand Gap distribution substations (southeast of Berea) to offload the Hickory Plains substation. The Hickory Plains distribution substation transformer is forecasted to overload in 2025/2026 winter. Additionally, Blue Grass Energy forecasts low voltage levels, conductor overloads, and reliability issues on its distribution system in the area. This area of the Blue Grass Energy distribution system is on the southeastern edge of the Blue Grass system, limiting ability to support service via distribution infrastructure upgrades/additions. Hickory Plains currently serves the largest number of consumers for the EKPC system. The planned Big Hill substation will address both the Hickory Plains substation overload issues and the Blue Grass Energy distribution-system equipment and reliability concerns in this area, as well as shifting some existing load presently served from the KU-Fawkes-West Berea line to another transmission source outside of this area. This project is scheduled to be completed by December 2025.

2.3 Fawkes-Duncannon Lane 69 KV Line Overload

EKPC transmission-planning studies project a thermal overload of the 7.48 mile, KU Fawkes-Duncannon Lane Tap 69 KV line section resulting from an outage of either the EKPC Fawkes-West Berea 138 KV line or the West Berea 138/69 KV transformer during winter peak-load conditions beginning in 2022/23 winter. The expected loading level in 2022/23 winter is 108% of the winter emergency rating of the existing 556.5 MCM ACSR conductor. In addition to the thermal issues due to electrical loading on this line section, a mechanical-loading analysis determined that 88% of the existing structures are mechanically loaded over 80% of rated strength (based on current code requirements), and 43% of these structures are loaded over 100% of rated strength. Furthermore, those percentages are based on strength rating of new poles, cross-arms, and braces. Given that most of the poles and cross-arms are over 65 years old, the mechanical-loading concerns are likely to be worse than indicated.

Several alternatives were considered to address the thermal overload of this line section. These included the following:

A. Increase the maximum operating temperature of the existing 556.5 MCM ACSR conductor in the KU Fawkes-Duncannon Lane Tap 69 KV line section from 212 degrees Fahrenheit to 302 degrees Fahrenheit.
B. Rebuild the KU Fawkes-Duncannon Lane Tap 69 KV line section using 795 MCM ACSR conductor.
C. Establish a new normally-open interconnection with LGE/KU south of the Crooksville Junction tap point.

D. Construct a new 138 KV line from the EKPC Fawkes substation to the Crooksville Junction tap point and construct a new 138/69 KV substation near this location for connection to the existing KU Fawkes-West Berea 69 KV circuit.

While all of these alternatives would eliminate the thermal overload of the KU Fawkes-Duncannon Lane 69 KV line section, either by increasing the thermal capacity of the line (Alternatives A and B) or by providing a new source into the area to reduce the flow from the KU Fawkes source (Alternatives C and D), only Alternative B would also fully address the aging condition and mechanical-loading concerns identified on this line section. Therefore, EKPC has selected Alternative B as the recommended project to address the issues identified for this line section. The rebuild of the line section is scheduled to be completed by December 2024.

2.4 Reliability Issues and Solutions

Transmission Line Condition Issues

In addition to the KU Fawkes-Duncannon Lane Tap 69 KV line section, most of the remaining sections of the KU Fawkes-West Berea 69 KV circuit have multiple verified structural loading issues, shown in Table 2.4. The Duncannon Lane Tap-Crooksville Tap-Hickory Plains-PPG line sections, including the 4.3-mile radial Crooksville tap line, additionally have recurring issues of leaning structures and poles, along with aging infrastructure concerns -- near the end of life for the wooden poles and cross-arms in these sections. Alternatives considered for addressing these concerns are:

A. Replace all structures on the circuit without replacement of the conductors and static wire.
B. Completely rebuild the circuit, replacing all of the structures and upgrading the conductors to 795 MCM ACSR.

Table 2.4: Mechanical Loading of KU Fawkes-West Berea Circuit

Line Section	Number of Structures	# of Structures above 120% Mechanical Loading	# of Structures above 100% Mechanical Loading	# of Structures above 80% Mechanical Loading
KU Fawkes-Hickory Plains	149	8	59	131
Hickory Plains-PPG Tap	39	2	4	15
PPG Tap-Alcan Tap	7	0	0	0
Alcan Tap-Alcan	10	0	0	1
Alcan-West Berea	18	2	4	14
Crooksville Tap-Crooksville	51	20	37	46
Total	274	34	104	207

EKPC has determined that a complete rebuild of the KU Fawkes-West Berea 69 KV circuit (excluding all radial tap lines other than the Crooksville 69 KV tap line) is the best option to improve reliability and address all of the aging infrastructure/structural loading concerns associated with this circuit. As discussed later, these rebuilds with larger conductor also improve the voltage profile in the area,

resulting in deferral of future low-voltage issues in the area. EKPC intends to complete the rebuild of all sections by December 2026.

System Protection Issues

With the addition of the new Speedwell Road substation on a 69 KV radial line extended from the existing Crooksville tap line, multi-phase faults will be slow to clear when they occur near the Speedwell Road substation due to the length of the radial tap line. This does not adhere to EKPC's System Protection requirements and will lead to sequential tripping and remote coordination issues. Sequential tripping is an issue where transmission line relays at one terminal are reliant on the opposite terminal's breaker operation before the associated relays will be able to properly observe and respond to specific fault conditions. This leads to significantly slower operation times and protection scheme reliability issues. Alternatives considered for addressing these system-protection concerns are:

A. Build a new 69 KV switching station near the Crooksville Junction location (where the Crooksville radial tap line connects to the KU Fawkes-West Berea 69 KV circuit).
B. Build a new 69 KV switching station ("Madison County") near the Duncannon Lane Tap location (where the Duncannon Lane radial tap line connects to the KU Fawkes-West Berea 69 KV circuit).

These locations were chosen because they are both (a) roughly in the center of the area between the KU Fawkes and West Berea substations and (b) near the point where the Crooksville/Speedwell Road radial tap line connects to the circuit.

EKPC has elected to build the new Madison County switching station near the Duncannon Lane tap location as the preferred option to address the system protection issues.

3.0 STUDY METHODOLOGY, CRITERIA AND ASSUMPTIONS

Power-flow analysis (using Siemens PSS/E version 34.8 software package) was performed to identify any additional future planning-criteria violations in the Richmond/Berea area after installation of EKPC's planned projects, and to mitigate those identified violations as necessary. Alternative plans were developed to maximize available capacity to support service to load in the area. Cost estimates were developed to compare relative costs of the alternative plans. The studies evaluated system performance under both normal (N-0) and single-contingency (N-1) conditions for multiple study years.

Further analysis was performed to determine the incremental load-serving capacity each alternative would provide to the study area. At the end of the process, there were no remaining violations in the study area and the incremental load-serving capacity was identified for each alternative. For each alternative, the associated projects, the estimated total cost in current-year dollars, and the incremental capacity provided are summarized below in Sections 6.6 and 6.7. The incremental load that could be served with each alternative was determined at the Duncannon Lane substation location, and could be higher or lower depending on the specific location where future load locates on the circuit. Duncannon Lane was selected because it is adjacent to the location (New Industrial Substation) where significant interest from prospective industrial customers has occurred and is also in a relatively central location within the load pocket.

Thermal loading and voltage values were monitored for the EKPC Richmond/Berea area and compared with applicable planning criteria. Neighboring utility systems in the Richmond and Berea area were monitored to assess impacts on existing tie lines, and impacts on the area due to possible new interconnections.

3.1 Study Cases

The power flow models used were:

- 2027 summer and 2027/28 winter
- 2032 summer and 2032/2033 winter

The power flow models listed above modeled the following generation off-line in each model:

- EKPC Cooper generators 1 and 2 offline, replacement power imported from northern PJM. This generation dispatch scenario, when coupled with a contingency, creates the worst-case power-flow conditions for the EKPC system in the Richmond-Berea area.

3.2 Monitored Area

The monitored area was comprised of EKPC and LG&E/KU transmission equipment two transmission stations from the EKPC Fawkes and West Berea transmission stations, plus any transmission stations from which new lines into the area were assumed to be constructed. All bus voltages and branch thermal loadings were identified per the study criteria in Table 3.5 below.

3.3 Contingencies Tested

Power-flow analysis was performed with normal system (N-0 condition) as well as during a single-contingency event (N-1 condition). The N-1 analysis included the outage of a single transmission line section, transmission circuit or transformer for both the EKPC and LG&E/KU transmission systems, and included any switching plans to restore substation load. Additionally, select contingencies for other neighboring utilities adjacent to EKPC's footprint were included. New N-1 contingencies associated with each alternative were included for the power-flow analysis of the alternative, as appropriate.

3.4 Power-Flow Solutions

Load flow solution parameters used for the analysis are summarized in Table 3.4.

Table 3.4: Power-Flow Solution Parameters

Contingency	Solution Methodology	Taps	Shunts	Area Interchange Control	DC Taps	Phase Shifters
N-0	FDNS*	Adjusting	Adjusting	Tie Lines and Loads	Adjusting	Locked
N-1	FDNS*	Adjusting	Adjusting	Tie Lines and Loads	Adjusting	Locked

*FDNS: Fixed Slope Decoupled Newton-Raphson

3.5 Study Criteria

The study criteria are summarized in Table 3.5.

Table 3.5: Study Criteria

Contingency	Voltage		Thermal	
	Normal (N-0)	Emergency (N-1)	Normal (N-0)	Emergency (N-1)
	0.94 p.u.	0.90 p.u.	Rate A	Rate B
N-0	X		X	
N-1		X		X

4.0 POWER FLOW ANALYSIS

Power-flow analysis was first performed with only the following EKPC planned projects in the Richmond/Berea area included in the base-case study models:

- An upgrade of the West Berea 138/69 KV, 100 MVA transformer to 150 MVA.
- An addition of a 138 KV circuit-breaker on the EKPC Fawkes-KU Fawkes 138 KV tie-line to eliminate a resulting bus outage for this contingency.
- Rebuild of the KU Fawkes-Duncannon Lane Tap 69 KV line section using 795 MCM ACSR conductor.
- The new Big Hill distribution substation connecting to the Three Links Junction-Tyner 69 KV line.

Additional analysis was then performed with the following projects:

- Rebuild of the remaining portions of the KU Fawkes-West Berea 69 KV circuit (the sections between Duncannon Lane Tap and West Berea) using 795 MCM ACSR, and rebuild of the radial 69 KV line from the Crooksville Junction location to the Crooksville distribution substation using 556 MCM ACSR.

No alternative plans were initially included. Study methodology, criteria, and assumptions discussed in Section 3 were used for the power-flow analysis.

4.1 N-0 Analysis Results

N-0 analysis simulations were performed using the study models. The simulation results indicated that there were no N-0 thermal loading or voltage violations in the study area. The power flows on all monitored elements were below 100% of Rate A, and all monitored voltages were above applicable voltage criteria.

4.2 N-1 Analysis Results

N-1 analysis simulations were performed using the study models. The power flow analysis results showed N-1 under-voltage violations in the study area, but no thermal overloads. Monitored EKPC elements that did not meet the applicable minimum voltage criterion of 90% of nominal voltage are summarized in Table 4.2. If an N-1 simulation created a voltage violation for multiple buses, then only the most severe violation was listed.

Table 4.2: 2027 N-1 Analysis Voltage Results

Season	Monitored Facility	N-1 Contingency	Base Case Voltage	Voltage with all incremental line section rebuilds
Winter	Alcan	Fawkes-West Berea 138 KV Line	0.8984	0.9064
Winter	Speedwell Road	KU Fawkes-Duncannon Lane Tap 69 KV Line Section	0.9000	0.9165

These results indicate that rebuilding the entire KU Fawkes-West Berea 69 KV line provides some marginal benefit to the bus voltages in the area during contingency conditions, in addition to addressing the condition and mechanical-loading concerns associated with the line.

4.3 Available Remaining Load-Serving Capacity

The base case N-1 simulation results with the planned improvements discussed above show that the transmission capacity is nearing full utilization based on the contingency voltage levels being near the 90% threshold. Further analysis determined that only 3 MW of additional load can be served on the 69 KV system in the area without creating an under-voltage violation.

5.0 ALTERNATIVE PLAN DEVELOPMENT

The results of the power-flow analysis without any additional future projects in the area other than those listed for inclusion in the base-case study models (including the rebuild of the entire Fawkes-West Berea 69 kV circuit and the Crooksville Junction-Crooksville 69 kV radial line section) identified no voltage or thermal violations. However, the results show that the system with those planned projects for the area provide minimal future load-serving capacity on the 69 KV system when an outage of a critical facility in the area occurs. This indicates the need for transmission reinforcements in the area to serve potential future load additions on the 69 KV system.

For the near under-voltage issues identified, possible mitigation options include installing local capacitor banks and/or an additional transmission connection to other sources in the region to provide an additional reactive power source to the area. All of these mitigation options will help increase ability to serve additional future load in the area, but connection of an additional source(s) into the load pocket provides much more margin for load additions in the area.

Preliminary alternatives to address the marginal voltage issues in the area were identified. From this initial set of alternatives, three alternatives were selected for testing based on feasibility, expected performance, and estimated cost. The selected alternatives for further analysis were:

- Alternative 1: Rebuild the KU Fawkes-Duncannon Lane Tap line section as double-circuit 138 & 69 KV and construct a new 138/69 KV substation near the Duncannon Lane Tap location to connect the new 138 KV line to the existing 69 KV circuit.
- Alternative 2: Build a new 138/69 KV substation at the EKPC Union City distribution substation location, and build a new 69 KV line from Union City to the Speedwell Road distribution substation.
- Alternative 3: Install a 69 KV, 30 MVAR capacitor bank at the West Berea transmission substation.

Contingency analysis was performed on the models to identify any necessary projects for each alternative to address any marginal issues trending toward becoming a planning-criteria violation.

5.1 Alternative Plan 1

Alternative Plan 1 was developed to add an additional 138 KV connection to the area from the EKPC Fawkes substation. As mentioned in section 2.3, rebuilding the Fawkes-Duncannon Lane Tap 69 KV line section is the recommended solution to mitigate an identified overload of that line section, as well as to address the reliability issues associated with the line section. Alternative Plan 1 assumes utilization of the existing rights-of-way and the necessary construction outage for the Fawkes-Duncannon Lane Tap 69 KV line section to rebuild it as a 138 & 69 KV double-circuit line instead of an in-kind replacement with a single-circuit 69 KV line. This takes advantage of efficiencies in the cost, land usage, and construction to provide additional support and load-serving capacity, and operational flexibility and reliability improvement to the area in tandem with completing the required rebuild of the 69 KV line section. The following projects in Table 5.1 were identified for Alternative Plan 1:

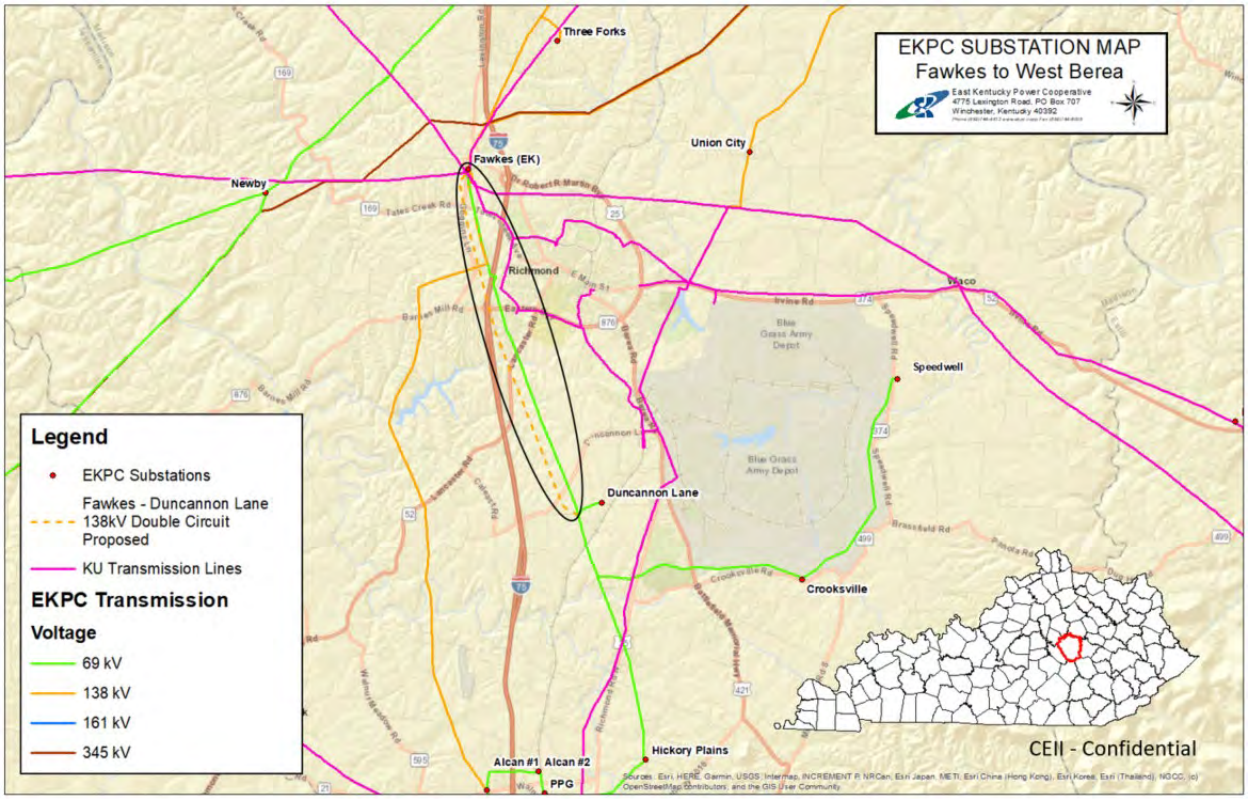
Table 5.1: Alternative Plan 1 Projects

Alternative Plan 1 Projects	Expected In-Service-Date
Modify the planned KU Fawkes-Duncannon Lane Tap 69 KV rebuild to rebuild as 138 KV & 69 KV double circuit.	December 2024
Modify the EKPC Fawkes substation to add a 138 KV terminal for the new Fawkes-Duncannon Lane Tap 138 KV line and to separate the substation into two 138 KV buses.	TBD*
Install a new 138/69 KV transformer and associated 138 KV bus at the Madison County switching station located near the Duncannon Lane Tap location.	TBD*

*The in-service date will be determined in the future based on load growth or other system conditions (such as operational or reliability needs for service to existing load) requiring execution of these projects. These projects were included in the 2027 models for this analysis.

The system configuration for Alternative Plan 1 is shown in Figure 5.1. The updates to the system configuration are inside of the oval.

Figure 5.1: Alternative Plan 1 Configuration



5.2 Alternative Plan 2

Alternative Plan 2 was developed to add an additional 69 KV connection to the area from the EKPC Union City substation northeast of Richmond. The following projects in Table 5.2 were identified for Alternative Plan 2:

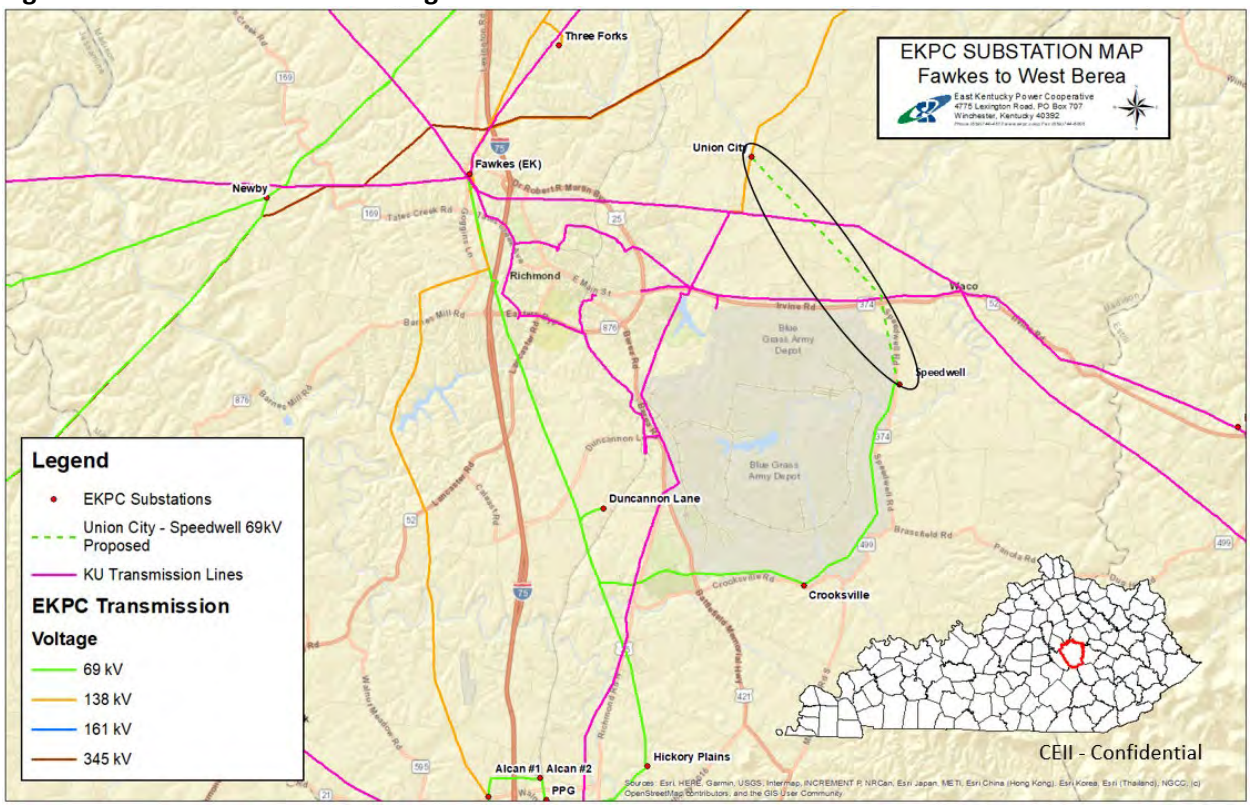
Table 5.2: Alternative Plan 2 Projects

Alternative Plan 2 Projects	Expected In-Service-Date
Build a new 138/69 KV transmission substation near the existing EKPC Union City distribution substation.	TBD*
Build a new 6.5 mile 69 KV line from Union City to the Speedwell Road distribution substation.	TBD*

*The in-service date will be determined in the future based on load growth or other system conditions (such as operational or reliability needs for service to existing load) requiring execution of these projects. These projects were included in the 2027 models for this analysis.

The system configuration for Alternative Plan 2 is shown in Figure 5.2. The updates to the system configuration are inside of the oval.

Figure 5.2: Alternative Plan 2 Configuration



5.3 Alternative Plan 3

Alternative Plan 3 was developed to provide additional voltage support to the area from the southern end. The following project in Table 5.3 was identified for Alternative Plan 3:

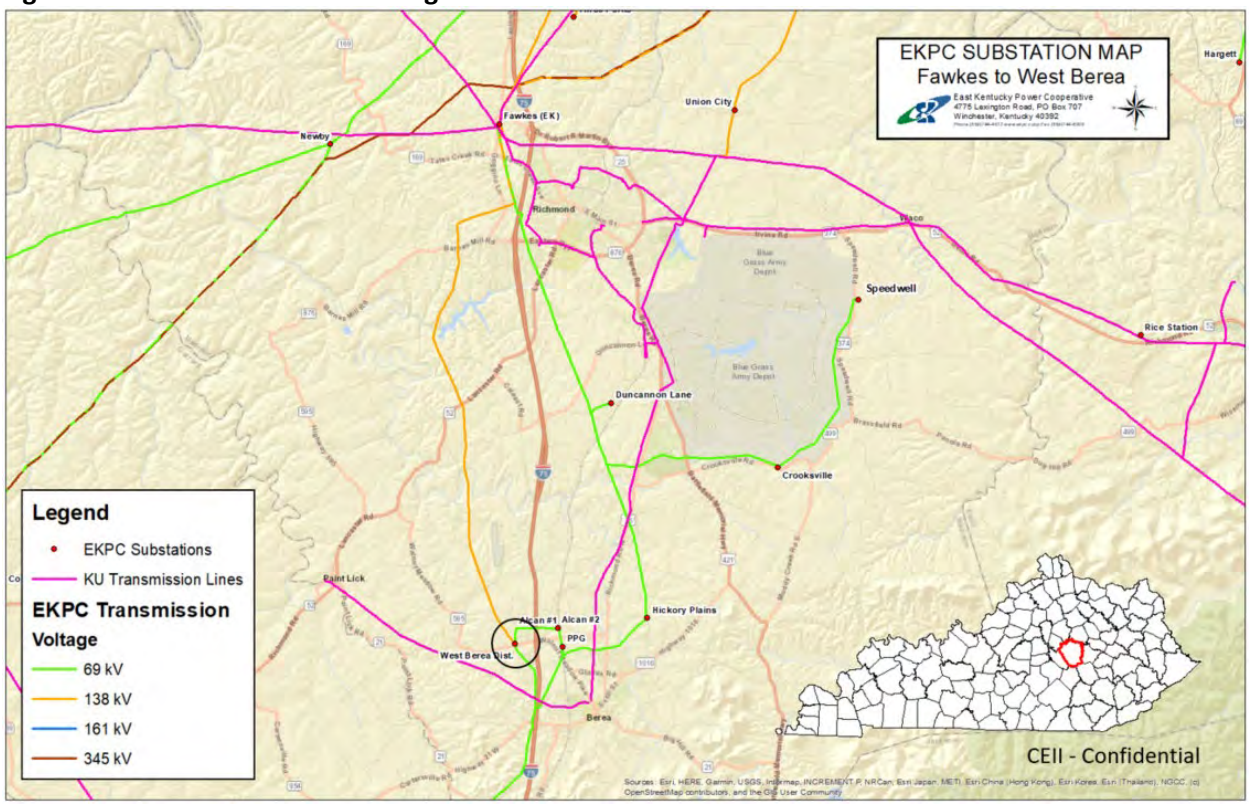
Table 5.3: Alternative Plan 3 Project

Alternative Plan 3 Project	Expected In-Service-Date
Install a new 69 KV, 30 MVAR (megavolt ampere of reactive power) capacitor bank at the EKPC West Berea substation.	TBD*

*The in-service date will be determined in the future based on load growth or other system conditions (existing-system or operational voltage concerns) requiring execution of this project. This project was included in the 2027 models for this analysis.

The system configuration for Alternative Plan 3 is shown in Figure 5.3. The system configuration is identical to its current configuration. The location of the system improvement is the existing West Berea substation, which is inside of the circle.

Figure 5.3: Alternative Plan 3 Configuration



5.4 Other Alternatives Considered

The following alternatives were considered as potential solutions to improve load-serving capacity issues on the 69 KV system in the area. However, they were eliminated from further consideration for miscellaneous reasons, including costs versus benefits, ability to sufficiently increase load-serving capacity in the area, ability to implement, etc.

1. Build a new Normally Open tie with KU near Crooksville (0.1 miles)
2. Build a new 69 KV line from Newby to Duncannon Lane Tap (10 miles)
3. Build a new normally-closed line from the LG&E/KU Lake Reba-Waco 69 KV line to Speedwell Road (6.5 miles)
4. Build a new 138 KV line from Union City and a 138/69 KV substation at Speedwell Road (6 miles)

Additionally, looping in the EKPC Fawkes-West Berea 138 KV line into the Madison County substation (3.75 miles of new double–circuit 138 kV line required) and installing a 138/69 KV transformer at Madison County was considered. However, this project does not eliminate the contingency of Fawkes-West Berea 138 KV, which is a critical outage in the area. In order to eliminate the critical contingency, support is needed in the area that is not vulnerable to the same outage. Therefore, this alternative to provide support to the 69 KV system in the area was excluded from further consideration.

6.0 POWER FLOW ANALYSIS OF ALTERNATIVE PLANS

Power-flow analysis was performed for Alternative Plans 1 through 3 described in Section 5 above.

6.1 Analysis of Alternative Plans

Models containing the alternative plans were developed for all of the study years used in the base case power-flow analysis. Power-flow analysis of the alternative plans was performed following the same methodology as the base case power-flow analysis (see Section 3). The contingency list was expanded as needed to include changes in the area system configuration created by each alternative plan.

6.2 Detailed Analysis Results

Detailed analysis was performed with the selected alternatives to analyze available incremental load-serving capacity issues on the 69 KV system in the area, and to identify any potential adverse impacts to the EKPC and neighboring LG&E/KU systems.

This analysis was performed on all models to identify the necessary projects for each alternative plan to resolve any identified thermal overloads, voltage violations and capacity issues through the study period (2027-2042). At the end of the process, there were no remaining violations in the study area.

Sections 6.3-6.5 present the detailed analysis results of the alternatives with the proposed future projects for each alternative plan modeled. The values shown in the results table are estimated year 2042 values, which were determined by extrapolating values obtained from the 2027 and 2032 models. These values show the performance of the system in the area with each alternative plan at the end of the study period.

6.3 N-0 Analysis Results

There were no N-0 violations identified in the base case analysis. Simulation results with the alternative plans showed no new violations.

6.4 N-1 Analysis Results

The N-1 analysis simulations showed that all of the alternative plans provide improved voltage support to the area. No new voltage or thermal violations were caused by the alternative plans.

6.5 N-1 Voltage Improvements

The N-1 voltage results for year 2042 with the alternative plans versus the base-case system are summarized in Table 6.5.

Table 6.5: N-1 Voltage Values for the Assumed Base-Case System and For Alternative Plans 1-3

Season	Monitored Bus	2042 Voltage (p.u.)			
		Base-Case System	Alternative Plan		
			1	2	3
Winter	Alcan (for EKPC Fawkes-West Berea 138 KV line outage)	0.9118	0.9532	0.9428	0.9729
Winter	Speedwell Road (for KU Fawkes - Duncannon Lane Tap 69 KV line section outage)	0.9273	0.9662	0.9821	0.9657

6.6 N-1 Additional 69 KV Load-Serving-Capacity Improvements

The N-1 incremental 69 KV load-serving capacity improvement results for year 2027 with the alternative plans are summarized in Table 6.6. This table provides the added MW capacity for load service on the 69 KV system (at Duncannon Lane) that each alternative provides.

Table 6.6: N-1 Capacity Improvements

Additional 69 KV MW Load Level That Can Be Served without Planning-Criteria Violations			
Base-Case System	Alternative Plan		
	1	2	3
3	55	34	20

Therefore, Alternative 1 provides the ability to serve significantly more additional load than the assumed base-case system, and provides almost three times the incremental capacity of Alternative 3 and about 60% more incremental capacity than Alternative 2.

6.7 Cost Estimate Comparison

The estimated total costs in 2022 dollars for the three alternative plans developed to provide additional load-serving capacity on the 69 KV system in the area is shown in Table 6.7 below. Additional breakdown of the estimated total cost of each alternative plan is provided in Appendix A.

Table 6.7: Alternative Plans Estimated Total Costs

Alt. Plan	Project Description	Cost Estimate (2022 $)
1	Build a new Madison County 138/69 KV transmission substation (at Duncannon Lane Tap) and rebuild the Fawkes-Duncannon Lane Tap 69 KV line as double-circuit 138 & 69 KV construction. Add a new 138 KV exit at the EKPC Fawkes substation to terminate the 138 KV line on the northern end.	$38,500,000 (1)
2	Build a new 138/69 KV transmission substation at Union City and a new 6.5 mile 69 KV line from Union City to Speedwell Road.	$24,980,000
3	Install a new 69 KV, 30MVAR (megavolt ampere of reactive power) capacitor bank at West Berea.	$590,000

(1) This cost only includes the incremental cost of the addition of the 138 KV circuit from Fawkes-Duncannon Lane Tap as part of the planned rebuild of the 69 KV line section.

Although the cost of Alternative 1 is the highest of the three alternative plans developed, it provides substantially more benefits than the other alternative plans. First, it provides much more capacity for future load growth on the 69 kV system in the area. Second, it utilizes existing rights-of-way to establish a new line into the area. Alternative 2 would likely require construction of several miles of new green-field transmission line to connect the Union City and Speedwell Road substations. Alternative 3 is a relatively easy plan to implement. However, it provides no ancillary benefits other than establishing a reactive power source on the southern end of the area. While this is beneficial in providing additional voltage support in the area, it would provide no benefits for reliability or operational flexibility. Therefore, it has very limited value from an operational perspective. Therefore, Alternative 1 is much preferred to Alternatives 2 or 3, despite the higher costs associated with this plan. Furthermore, the opportunity to begin implementing Alternative 1 exists now due to the need to rebuild the existing 69 kV line section. EKPC can begin the establishment of a 138 kV circuit from the Fawkes substation into the Duncannon Lane area while rebuilding the 69 kV circuit between those two locations, which would provide significant efficiency benefits now. If EKPC needs to establish this circuit in the future (for

instance, to serve a large amount of new load in the area), it will be much more difficult from a routing and construction perspective. Therefore, Alternative 1 is the recommended plan to increase load-serving capacity on the 69 kV system in the area.

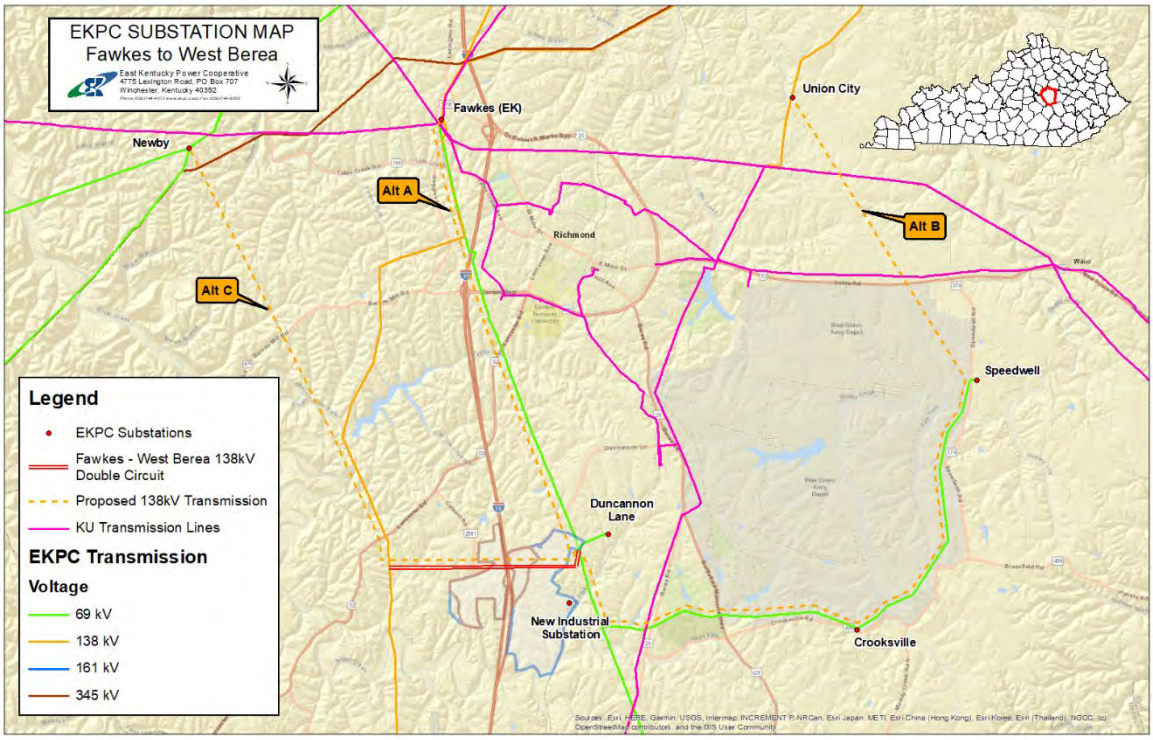
7.0 New Industrial Substation Large Load Service Capability

As discussed in section 2.1, a number of large (greater than 50 MW+ peak demand) potential industrial facilities have expressed interest in the New Industrial Site in Madison County, seen in Figure 7.2 below. Loads of this magnitude are more efficiently served from transmission facilities at higher voltages than 69 KV due to lower impedances and higher ratings increasing the power-flow capability into the area. Therefore, possible transmission alternatives to establish 138 kV facilities in the vicinity of the New Industrial Site were developed in order to serve loads in excess of 50 MW at that location. These additional alternatives were analyzed for load service capability and estimated cost (listed in Table 7.1, and shown in Figure 7.2), and provide 138 KV service to the site to adequately and reliably serve a large amount of load. A detailed breakdown of the estimated total costs of each alternative plan is included in Appendix B.

Table 7.1: New Industrial Site Large Load Service Capacity Alternatives

Alternative	Alternative Description	138 KV Load Amount Served (MW)	Cost Estimate (2022 $)
A	Build a new Fawkes-Madison County 138 KV line on existing Fawkes-Duncannon Lane Tap 69 KV line right-of-way (rebuild as double-circuit), and loop the existing Fawkes-West Berea 138 KV line into the Madison County substation to provide a redundant 138 KV feed.	179	$35.8M
B	Build a new Union City-Madison County 138 KV line and loop the existing Fawkes-West Berea 138 KV line into the Madison County substation to provide a redundant 138 KV feed.	103	$39.2M
C	Rebuild one of the two Dale-Newby 69 KV circuits as a 138 KV line, and build a new 138 KV line from Newby to the Madison County substation. Loop the existing Fawkes-West Berea 138 KV line into the Madison County substation to provide a redundant 138 KV feed.	113	$36.0M

Figure 7.2: New Industrial Site Large Load Service Capacity Configuration



8.0 CONCLUSION

With EKPC's current planned projects to address planning-criteria violations, along with reliability and system protection issues (as discussed in Sections 2.2-2.4), very limited capacity exists for future load-growth on the 69 KV system in the area (see Section 4.3). The addition of new industrial/commercial load or general load growth in the area of 3% of the current area loading (which equates to 3 MW) would result in unacceptable single-contingency voltages. This area of the EKPC system already serves many industrial facilities, and is likely to continue to see development of both expansions of existing industrial/commercial facilities and addition of new such facilities. Therefore, ensuring adequate capacity is in place is critical to be prepared to serve the additional electrical demand of these facilities.

EKPC's analysis shows that providing a new 138 KV line from the EKPC Fawkes substation to the Duncannon Lane area provides significant load-serving benefits for the area. An estimated total of 179 MW can be served at 138 KV in this area with this line addition. At 69 KV, an estimated incremental amount of 55 MW of load can be served if the 138 KV line is connected to the existing 69 KV circuit at Duncannon Lane Tap. This new 138 KV line would provide the largest load-serving capacity benefits of the alternatives considered for either 138 KV or 69 KV incremental-load service.

Furthermore constructing this new 138 kV line and connecting to the existing 69 kV circuit in the Duncannon Lane area in the future would provide improvements to reliability of service to the area and operational flexibility even without additional load growth in the area. This provides a new 138 kV line that would be a parallel line to the existing lines (Fawkes-West Berea 138 kV and 69 kV circuits) that currently serve the load pocket. This adds a new source into the area that would make scheduling of

necessary maintenance outages easier, as well as aiding in restoration efforts and maintaining adequate operational system performance during unplanned outages. Therefore, this line can provide value to the existing customers in the area in the future, even in the unlikely event that there is no load growth in the area.

Therefore, EKPC Transmission Planning recommends modifying the scope of the Fawkes-Duncannon Lane Tap single-circuit 69 KV rebuild to rebuild this line as a double-circuit 138 KV & 69 KV line at an incremental cost of $10,500,000. This will allow EKPC to take advantage of the existing rights-of-way to establish a new 138 KV path, as well as the efficiency of constructing both circuits simultaneously. EKPC plans to energize the 69 KV portion of the double-circuit as the replacement for the existing 69 kV line between the KU Fawkes and Duncannon Lane Tap terminating points; the 138 KV portion of the double-circuit would not be terminated at either end until load growth, other future system changes in the area, or increased operational/reliability concerns drives the need for the 138 KV circuit to be connected to the system. EKPC may elect to connect the conductors in the 138 KV circuit to the conductors in the 69 KV circuit in a "six-wire" configuration in order to energize the conductors to ensure that no problems (such as damaged insulators) with the 138 KV circuit that EKPC is unaware of exist until such time as the 138 kV circuit is ultimately terminated on each end.

Establishment of this 138 KV circuit now will prepare EKPC for future transmission needs to provide additional capacity and support to the area (see Section 6.6). EKPC will be able to terminate the new 138 KV circuit at each end relatively expediently when needed to provide additional support to the area, either for loads connecting to the existing 69 KV system or for a large load that would be served at 138 KV transmission voltage, or if EKPC determines that operational and/or reliability needs necessitate that the circuit should be energized.

APPENDIX A

Table A1: Alternative Plan 1 Cost Breakdown

Associated Project Description	Estimated Cost (2022$)
Rebuild the existing 69 KV line from KU Fawkes to Duncannon Lane Tap using 795 MCM ACSR conductor as a double-circuit 138 & 69 KV line.	$10,500,000[(1)]
Install 138 kV equipment at the Madison County switching station for termination of the new 138 kV line from Fawkes. Install a new 138/69 KV transformer and associated 138 kV and 69 kV equipment to connect the 138 kV and 69 kV busses at the switching station.	$16,500,000
Add necessary equipment at the EKPC Fawkes substation to establish a new 138 KV line exit and to split the bus into two separate 138 kV busses.	$11,500,000
Total	$38,500,000

(1) This is the estimated incremental cost of modifying the scope of the rebuild from a single-circuit 69 kV line to a double-circuit 138 & 69 kV line. The estimated total cost of the project is $19.0M.

Table A2: Alternative Plan 2 Cost Breakdown

Associated Project Description	Estimated Cost (2022$)
Build a new 138/69 KV transmission station with associated breakers near the existing Union City distribution substation.	$16,500,000
Build a new 6.5-mile 69 KV transmission line from Union City to Speedwell Road.	$8,480,000
Total	$24,980,000

Table A3: Alternative Plan 3 Cost Breakdown

Associated Project Description	Estimated Cost (2022$)
Install a new 69 kV, 30 MVAR capacitor bank at West Berea	$590,000
Total	$590,000

Appendix B

Table B1: Alternative Plan A Cost Breakdown

Associated Project Description	Estimated Cost (2022$)
Rebuild the existing 69 KV line from Fawkes to Duncannon Lane Tap using 795 MCM ACSR as a double-circuit 138 & 69 KV line.	$10,500,000
Build a new 138 KV transmission station ("Madison County") with associated breakers near the Duncannon Lane Tap location for termination of the new 138 kV line from Fawkes, the loop in of the existing Fawkes-West Berea 138 kV line, and future connection to distribution transformers for load service at the New Industrial Site.	$7,500,000
EKPC line work to loop the existing Fawkes-West Berea 138 KV into the Madison County 138 kV substation using 3.4 miles of double circuit 795 MCM ACSR.	$6,340,000
Add necessary equipment at the EKPC Fawkes substation to establish a new 138 KV line exit and to split the bus into two separate 138 kV busses.	$11,500,000
Total	$35,840,000 [(1)]

[(1)] This does not include the costs for the new distribution substation equipment needed to serve the New Industrial Site as the full scope will be unknown until an industrial customer chooses to locate at the New Industrial Site and provides its specific load profile.

Table B2: Alternative Plan B Cost Breakdown

Associated Project Description	Estimated Cost (2022$)
Build a new 138 KV transmission station ("Madison County") with associated breakers near the Duncannon Lane Tap location for termination of the new 138 KV line from Union City, the loop in of the existing Fawkes-West Berea 138 kV line, and future connection to distribution transformers for load service at the New Industrial Site.	$7,500,000
EKPC line work to loop the existing Fawkes-West Berea 138 KV into the Madison County 138 KV substation using 3.4 miles of double circuit 795 MCM ACSR.	$6,340,000
Build a new 14.5 mile 138 KV line from the Union City substation to the Madison County substation using 795 MCM ACSR	$17,860,000
Build a new 138 KV switching station at Union City	$7,500,000
Total	$39,200,000 (1)

(1) This does not include the costs for the new distribution substation equipment needed to serve the New Industrial Site as the full scope will be unknown until an industrial customer chooses to locate at the New Industrial Site and provides its specific load profile.

Table B3: Alternative Plan C Cost Breakdown

Associated Project Description	Estimated Cost (2022$)
Build a new 138 KV transmission station ("Madison County") with associated breakers near the Duncannon Lane Tap location for termination of the new 138 kV line from Newby, the loop in of the existing Fawkes-West Berea line, and future connection to distribution transformers for load service at the New Industrial Site.	$7,500,000
EKPC line work to loop the existing Fawkes-West Berea 138 KV into the Madison County 138 kV substation using 3.4 miles of double circuit 795 MCM ACSR.	$6,340,000
Build a new 9.7 mile 138 KV line from the Newby substation to the Madison County substation using 795 MCM ACSR	$11,950,000
Rebuild one of the two 11.1 mile double circuit Dale-Newby 69 KV lines as a 138 kV line using 795 MCM ACSR.	$9,990,000(1)
Add necessary 138 kV terminal equipment at the Dale substation for termination of the new Dale-Newby-Madison County 138 kV line	$200,000
Total	$35,980,000 (2)

(1) This is the incremental cost of rebuilding the double-circuit Dale-Newby 69 kV line as a double-circuit 138 & 69 kV line. EKPC already has plans to rebuild the line as double-circuit 69 kV, so this additional cost is what would be incurred for this alternative plan.

(2) This does not include the costs for the new distribution substation equipment needed to serve the New Industrial Site as the full scope will be unknown until an industrial customer chooses to locate at the New Industrial Site and provides its specific load profile.

EXHIBIT 17
TESTIMONY – LAURA LEMASTER

COMMONWEALTH OF KENTUCKY

BEFORE THE PUBLIC SERVICE COMMISSION

IN THE MATTER OF:

ELECTRONIC APPLICATION OF EAST KENTUCKY POWER COOPERATIVE, INC. FOR A (1) CERTIFICATE OF PUBLIC CONVENIENCE AND NECESSITY FOR THE CONSTRUCTION OF TRANSMISSION FACILITIES IN MADISON COUNTY KENTUCKY; (2) DECLARATORY ORDER CONFIRMING THAT CERTIFICATE OF PUBLIC CONVENIENCE AND NECESSITY IS NOT REQUIRED FOR CERTAIN FACILITIES	)	**CASE NO. 2022-00314**

DIRECT TESTIMONY OF LAURA LEMASTER
ON BEHALF OF EAST KENTUCKY POWER COOPERATIVE, INC.

Filed: October 27, 2022

COMMONWEALTH OF KENTUCKY

BEFORE THE PUBLIC SERVICE COMMISSION

IN THE MATTER OF:

ELECTRONIC APPLICATION OF EAST KENTUCKY POWER COOPERATIVE, INC. FOR A (1) CERTIFICATE OF PUBLIC CONVENIENCE AND NECESSITY FOR THE CONSTRUCTION OF TRANSMISSION FACILITIES IN MADISON COUNTY KENTUCKY; (2) DECLARATORY ORDER CONFIRMING THAT CERTIFICATE OF PUBLIC CONVENIENCE AND NECESSITY IS NOT REQUIRED FOR CERTAIN FACILITIES	)	**CASE NO. 2022-00314**

VERIFICATION OF LAURA LEMASTER

COMMONWEALTH OF KENTUCKY)
)
COUNTY OF CLARK)

Laura LeMater, Senior Engineer for East Kentucky Power Cooperative, Inc., being duly sworn, states that she has supervised the preparation of her Direct Testimony and certain filing requirements in the above-referenced case and that the matters and things set forth therein are true and accurate to the best of her knowledge, information and belief, formed after reasonable inquiry.

Laura LeMaster

Laura LeMaster

The foregoing Verification was signed, acknowledged and sworn to before me this ____ day of October, 2022, by Laura LeMaster.

Notary Commission No. KYNP188

Commission expiration: 1/8/2024

Q. PLEASE STATE YOUR NAME, BUSINESS ADDRESS, AND OCCUPATION.

A. Laura LeMaster, my business address is East Kentucky Power Cooperative ("EKPC"), 4775 Lexington Road, Winchester, KY 40391. I am a Senior Engineer in the Construction and Capital Project Department at East Kentucky Power.

Q. PLEASE STATE YOUR EDUCATION AND PROFESSIONAL EXPERIENCE.

A. I received my Bachelors and Masters Degrees in Civil Engineering from the University of Kentucky and I am a registered Professional Engineer in the Commonwealth of Kentucky. My professional experience includes time spent working as a project engineer at a structural engineering firm, and serving as a project engineer for Tetra Tech providing consulting services to clients on water and wastewater projects. I joined East Kentucky Power Cooperative in 2016, working as an engineer in the Production Engineering department, where I provided technical assistance to EKPC Production Facilities, including the execution of construction projects. In 2017, I joined the Construction and Capital Project Department.

Q. PLEASE PROVIDE A BRIEF DESCRIPTION OF YOUR DUTIES AT EKPC.

A. As a Senior Engineer in the Capital Construction Department, I manage capital construction projects for both generation and transmission projects on behalf of EKPC.

Q. HAVE YOU PREVIOUSLY TESTIFIED BEFORE THE KENTUCKY PUBLIC SERVICE COMMISSION?

A. No.

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY IN THIS PROCEEDING?

A. EKPC has developed a transmission plan for the area served by Blue Grass Energy in southern Madision County that addresses aging infrastructure, prepares for immenint load growth, and reduces local impact by opportunistically combining two transmission line projects on an existing line route, with the Kentucky Utilities Company ("KU") Fawkes – Duncannon Lane Tap 69 kV transmission line rebuild becoming a 138 kV and 69 kV double-circuit transmission line. This area plan also includes substation construction and modifications to provide reliable service to existing customers and adequate flexibility to service normal load growth and expected industrial development.

The purpose of my testimony is to provide information on the area transmission plan, and details about the KU Fawkes – Duncannon Lane Tap 69 kV transmission line rebuild to a 138 kV and 69 kV double-circuit transmission line and the associated substation projects. My testimony will include information regarding the 138 kV transmission line route selection process, project scope and costs as well as scope and planning level estimates on the substation projects.

Q. ARE YOU SPONSORING ANY EXHIBITS?

A. Yes. I am sponsoring the permit list, which is attached as Exhibit 1 to the Appliction; the proposed route map for the project which is attached as Exhibit 3

to the Application; the typical structure drawings, which are attached as Exhibit 4 to the Application; the alternate route maps which are attached as Exhibits 5 through 13 to the Appliciton; the siting study prepared by NV5 Geospatial, which is attached as Exhibit 18 to the Application and photos of the existing Fawkes – Duncannon Lane Tap 69 kV line condition, which are attached as Exhibit LL-1 to my testimony. Each of these exhibits were prepared by me or by subject matter experts acting under my management of the project.

Q. WHAT RELIEF IS EKPC SEEKING IN THIS PROCEEDING?

A. EKPC must rebuild a 69 kV electric transmission line that connects KU's Fawkes substation to the Duncannon Lane Tap Location, south of Duncannon Lane. The 69 kV transmission rebuild project does not require a Certificate of Public Convenience and Necessity ("CPCN"). As part of the rebuild, EKPC has the opportunity to double-circuit the new transmission line by adding a 138 kV transmission line that will tie into EKPC's Fawkes substation, which is adjacent to and interconnected with KU Fawkes. Adding the 138 kV transmission line as part of the 69 kV transmission line rebuild will result in overall project efficiencies, cost savings and less impact to the community. Importantly, this also allows EKPC to utilize the 69 kV transmission line's existing right of way to accommodate the 138 kV transmission line without impacting any new landowners. As Mr. Darrin Adams describes in his testimony, the 138 kV electric transmission line will provide important support for EKPC's existing transmission system while also allowing for anticipated load growth in the Richmond area. Without this line, EKPC's ability to serve new load in the future is significantly constrained. EKPC is requesting a

CPCN from the Commission for the additional 138 kV transmission line because of its voltage and length.

To fully implement the 138 kV electric transmission line, it will be necessary for EKPC to expand its Fawkes substation (the "Fawkes Expansion") and install a 138 kV to 69 kV step-down transformer and associated structures at the planned Madison County Switching Station ("Madison County Switching Station") near the Duncannon Lane Tap location. The construction of the Madison County Switching Station provides for the connection of the new 138 kV line to the KU Fawkes – West Berea 69 kV circuit and a source point for a new substation to be constructed to serve potential industrial customers (the "New Industrial Substation") in the industrial area south of Richmond along the I-75 Corridor. EKPC believes these substation projects would all qualify as extensions of EKPC's system in the ordinary course of business and that no CPCN is required for these investments.

EKPC understands that, when new industrial loads materialize, the need for timely installation or upgrading of electrical infrastructure is typically critical to the success of the new facility. Meeting that need is frequently challenging, particularly when the utility industry is experiencing supply chain issues that make it more difficult to obtain key components. Recognizing that it is very likely the area to be served by the 138 kV transmission line will see significant electrical load growth in the short-term, EKPC's plan for this area makes it possible to be ahead of the curve on meeting prospective customer demands. Proactively addressing regulatory obligations is critical to that effort. EKPC typically has twenty-four (24)

months or less to provide electrical infrastructure for a new industrial load. This would include the time to meet regulatory requirements, design, permit, obtain property or easement rights, procure materials, and construct. Currently, the lead time on power transfomers is approximately seventy-six (76) weeks. To include the time for design and to obtain a CPCN, it becomes extremely challenging for electric utilities to support economic development on typical customer timelines. For this reason, EKPC has developed an area plan that allows flexibility to both meet these current and future needs in the area. Accordingly, EKPC seeks a declaratory order from the Commission that no CPCN is required for the contemplated substation investments or, in the alternative, the issuance of a CPCN if such is required. Regardless of the Commission's determination regarding the 138 kV infrastructure, EKPC requests a declaratory order that a CPCN is not required for the 69 kV portion of Madison County Switching Station at this time. That work is necessary regarless of the status of the planned 138 kV transmission line.

Q. WHEN WAS THE ORIGINAL 69 kV TRANSMISSION LINE CONSTRUCTED?

A. The KU Fawkes – Duncannon Lane Tap 69 kV line section was originally built in 1957. In 1987 it was reconductored with a larger conductor (556.5 ACSR/TW).

Q. WHAT IS THE CURRENT PHYSICAL CONDITION OF THE 69 kV TRANSMISSION LINE?

A. The 69 kV line is approaching the end of its service-life and must be replaced. A mechanical loading analysis of this line section determined that, in accordance with current codes under NESC Medium loading, 40% of the structures could be loaded

over 100% of rated strength for new wooden poles, cross-arms, and braces. Given that most of the structures in this line section are more than sixty-five (65) years old, it is expected that the actual strength is less than the rated strength. EKPC has seen numerous structure and/or cross-arm failures in the past five years. Exhibit LL-1 shows photos of the current condition of some of the transmission structures.

Q. HAS THE NATURE OF THE LAND USES FOR THE PROPERTIES WHICH THE CURRENT TRANSMISSION LINE CROSSES CHANGED SINCE THE LINE WAS ORIGINALLY BUILT?

A. Yes. Madison County, and Richmond in particular, has experienced substantial growth and development since the era when the existing transmission line was built. While a substantial portion of the transmission line's route remains rural landscapes with primarily agrarian land uses, the stretch that runs through Richmond has become more developed and urbanized. That development took place with full knowledge of EKPC's existing transmission line and the easement rights on the properties over which the line crosses.

Q. PLEASE PROVIDE A DESCRIPTION FOR EACH ELEMENT OF THE PROPOSED PROJECT.

The KU Fawkes – Duncannon Lane Tap 69 kV rebuild to 138 kV and 69 kV double-circuit will include the removal and replacement of the existing 69 kV transmission infrastructure and the construction of the 138 kV transmission circuit (excluding substation work at each end). The double-circuit transmission line will include the installation of galvanized steel single pole structures with direct embed foundations as well as some self-supporting foundations and two-pole structures with direct

embed foundations. Both the 69 kV and 138 kV circuits will be constructed with three phase 795 MCM ACSR conductors. Standard structure drawings can be seen in Exhibit 4 to the Application. Preliminary structure locations are shown on the maps contained in Exhibit 3 to the Application. These structures are subject to relocation based on design considerations.

The 69 kV circuit will terminate on the north end into the KU Fawkes Substation (same termination location as the existing 69 kV line). On the south end, the 69 kV rebuild will terminate at a transmission structure noted on Sheet 24 of 24 in Exhibit 3, and connect to the existing EKPC 69 kV line from the Duncannon Lane Tap point to the Crooksville Tap point. The 138 kV circuit, for which EKPC is requesting the CPCN, will initially terminate on the south end at the same transmission structure as the 69 kV line, and on the north end, the 138 kV circuit will terminate at the transmission structure noted on Sheet 1 of 24 in Exhibit 3.

The 138 kV line will not initially be connected or operated at 138 kV, until the time that the EKPC Fawkes Expansion and the 138 kV structure at the Madison County Switching Station are complete. The 138 kV line construction from the proposed northern end of the 138 kV line to the EKPC Fawkes substation, approximately 0.4 miles, will be completed as part of the EKPC Fawkes Expansion project, and is included in that scope of work. During the period from completion of the 138 kV and 69 kV double-circuit rebuild until the execution of the substation work, which will provide termination locations for the 138 kV line, the 138 kV line will be electrically connected via jumpers to the 69 kV line along the 7.7 miles as

a safety precaution. Until the time the 138 kV line is terminated at the new substation locations, if it is not energized, EKPC's operations personnel could be unaware of a safety issue associated with the 138 kV line. For instance, if a section of the line were to fall or be contacted, there would be no SCADA indication. Energizing the new circuit temporarily at 69 kV line will provide the same protection and visibility for the future 138 kV line as the 69 kV line, maintaining safer operation of the circuit.

The EKPC Fawkes Expansion includes the addition of a new 138 kV single box structure, additional substation equipment and associated work, including but not limited to controls and the relocation of existing transmission line terminations, to provide additional system reliability.

The Madison County 69 kV Switching Station includes the construction of a switching station near the location where the Duncannon Lane radial tap line currently connects to the KU Fawkes – West Berea 69 kV line. The Madison County Switching Station is proposed as four termination points for the line segments in the area. The cost also includes a short section of 69 kV double- circuit line between the Crooksville Tap point and the Madison County Switching Station (approximately 1.3 miles) in order to establish the Crooksville/Speedwell Road tap as a separate circuit.

The installation of a new 138 – 69 kV transformer and/or necessary 138 kV bus work at the Madison County Switching Station may be executed based on future area load growth or other system conditions driving the need to provide additional support to the 69 kV system in the area. EKPC has executed a planning-

level review regarding the scope of this project, but full implementation would commence later, when system conditions warrant. Due to the very marginal load-serving capacity remaining on the 69 kV system, need for additional support to the 69 kV system is anticipated in the near-term. The cost estimate for the Madison County 138 – 69 kV step down transformer addition includes a breaker-and-a-half substation configuration, associated bus work and the purchase of a transformer.

Q. WHAT ARE THE ESTIMATED CONSTRUCTION COSTS FOR EACH ELEMENT OF THE PROPOSED PROJECT?

A. The KU Fawkes – Duncannon Lane Tap 69 kV rebuild to a 138 kV and 69 kV double-circuit is estimated at $19 million. A planning level cost estimate for rebuilding the 69 kV transmission line by itself is approximately $8.5 million. Therefore, the incremental cost of adding the 138 kV transmission line is approximately $10.5 million. This is far less than what would be required to construct a new 138 kV transmission line along a different route or even along the same route at a later point in time.

The estimated cost for the EKPC Fawkes Expansion is approximately $11.5 million. The cost estimate for the 69 kV portion of the Madison County Switching Station is approximately $7.5 million. The cost estimate to construct the Madison County Switching Station with a 138 – 69 kV Step Down Transformer and associated expansion for termination of a 138 kV line is approximately $16.5 million in total, or approximately $9 million dollars in incremental cost to identify only the cost of adding the 138 – 69 kV step down transformer and associated structures. The EKPC Fawkes Expansion Project and the Madison County

Switching Station costs are planning-level estimates at this time, as EKPC is still developing the final scope of these projects. The cost of the New Industrial Station will be dependent on the specific scope of the substation design (e.g. voltage levels, number of transformers, ratings and technical requirements of transformers, protection schemes, etc.) and will be refined based upon new load profiles and electrical requirements of the industry (or industries) to be served .Based on recent past experience, EKPC has determined an estimated range of cost for the New Industrial Station served from the 138 kV line, to be between $13 million to $19 million. These costs are based on an assumption that the substation will include two parallel transformers (either 138/25 kV, 55 MVA or 138/34.5 kV, 100 MVA with a spare).

Q. HOW IS EKPC PLANNING TO FINANCE THE COSTS OF THE PROPOSED PROJECT?

A. EKPC plans to initially finance the Project with general funds and later refinance the Project and other investments through long-term debt issued by the Rural Utilities Service or other lenders.

Q. WILL THE PROJECT MATERIALLY AFFECT THE FINANCIAL CONDITION OF EKPC?

A. The Project will not materially affect the financial condition of EKPC.

Q. PLEASE DESCRIBE THE PROCESS TAKEN BY EKPC TO EVALUATE THE BEST POSSIBLE ROUTE FOR THE TRANSMISSION LINE AND WHAT FACTORS WERE INCLUDED IN THAT ANALYSIS.

A. For a line of this type, EKPC follows the EPRI-Kentucky Tranmission Line Siting Methodology. EKPC engaged the experts at NV5 Geospatial to perform a Transmission Route Selection to determine the routing of the 138 kV line between the existing EKPC Fawkes Substation and the point where the Duncannon Lane Radial Tap intersects the KU Fawkes – West Berea 69 kV Circuit. The NV5 Geospatial Electrical Transmission Routing Selection Report is included in Exhibit A of the Application.

EKPC determined that the routing study was to be performed for the new 138 kV transmission line only. The 69 kV transmission line rebuild from KU Fawkes to the Duncannon Lane Tap point would best utilize the existing right-of-way and therefore was not included as part of the 138 kV Siting Study.

In accordance with the methodology, NV5 Geospatial developed Macro Corridors based on the GIS information from publically available data. The publically available data is used to identify features and a suitability value is assigned in accordance with the EPRI-KY Transmission Line Siting Methodology. Macro Corridors are developed for each of the three environments – Built, Natural and Engineering – and those values are utilized in the development of the Simple Average Alternative Corridor. The top five percent scores are utilized to create a final Phase 1 Study Area.

After the Phase 1 Study Area is developed, NV5 Geospatial created suitability surfaces in accordance with the EPRI – KY Transmission Line Siting Methodology. NV5 Geospatial completed a suitability surfaces analysis and provided weighting for features within the study area. The weighting and features

analyzed in the Suitability model were defined during the development of the KY Siting Model, with input from stakeholders throughout the Commonwealth. Suitability surfaces were created for each of the three environments: Built, Natural, and Engineering.

From the suitability surfaces, NV5 Geospatial developed the Composite Alternate Corridor. More information regarding the development of the Composite Alternate Corridor is included in the NV5 Geospatial report included in Exhibit 18 of the Application. The standard siting methodology utilizes the top 5% scores for the Alternate Corridor development; however, based on the congestion in the Barnes Mill Road/Eastern Bypass area, the team had concerns about the 5% composite corridor potentially minimizing the feasible transmission routes and elected to utilize the top 10% alternative corridors for routing. This allowed for a more inclusive and robust analysis.

Once EKPC received the Composite Corridor, two routing teams completed field reconnaissance to determine viable and constructible routes. Due to previous orders by the Kentucky Public Service Commission encouraging utilities to co-locate and/or rebuild electric transmission lines whenever reasonable,[1] neither team deviated the 138 kV proposed routing from the existing 69 kV where the 69 kV

[1] *See e.g. In the Matter of Application of East Kentucky Power Cooperative, Inc. for a Certificate of Public Convenience and Necessity to Construct a 138kV Electric Tranmsision Line in Rowan County, Kentucky* Case No. 2005-00089, Order, pp 5-7 (Ky. P.S.C. August 19, 2005); *In the Matter of Application of East Kentucky Power Cooperative, Inc. for a Certificate of Public Convenience and Necessity to Construct a 138kV Electric Tranmsision Line in Rowan County, Kentucky* Case No. 2005-00089, Order, pp 4-6 (Ky. P.S.C. Nov. 9, 2005); *Kentucky Utilities Co. v. Pub. Serv. Comm'n*, 390 S.W.2d 168, 175 (Ky. 1965); and *Kentucky Utilities Co. v. Pub, Serv. Comm'n*, 285 S.W.2d 885, (Ky. 1952).

right of way was within the 10% Composite corridor. However, both field routing teams reviewed possible route deviations from the existing 69 kV centerline in the heavily congested areas of Richmond. Of the 7.7 miles of rebuild included in the Project, the routes only deviated along the approximately 2 mile centerline , through the congested area of Richmond, from northwest of I-75 to Lancaster Road. This is shown on Figure 51 and 52 included with the siting study located at Exhibit 18 of the Application.

With EKPC's existing 69 kV right of way excluded from the analysis, a route through the middle of the Richmond Center commercial development was the only route noted by the field routing teams as a viable route which remained fully within the corridor.

EKPC felt it was prudent to evaluate the existing 69 kV right of way as an alternative route for the 138 kV transmission line in light of fact that the 69 kV rebuild was already slated to occur with an in-service date of December 2024, even though it did not fully remain in the siting study corridor. The model had the KU Fawkes – Duncannon Lane Tap 69 kV line classified as a "good" rebuild opportunity. However, due to the residences in proximity to the existing centerline, the methodology created avoidance areas around each of these houses, effectively preventing the corridor from following the existing right of way. The EPRI-KY Transmission Line Siting Methodology was not designed to take into account the fact that existing transmission lines may be located in areas that would otherwise be characterized as avoidance areas. EKPC elected to maintain the standard avoidance areas in the Composite Corridor development and address the impact in

the route scoring phase , so the full rebuild of the KU Fawkes – Duncannon Lane Tap 69 kV line along the existing centerline as a 138 kV and 69 kV double circuit was submitted to NV5 Geospatial for scoring. Slight variations to the existing 69 kV centerline route were submitted to NV5 Geospatial for scoring as well to attempt to maintain the line within the corridor where possible.

EKPC also chose to evaluate use of the EKPC Fawkes – West Berea 138 kV existing right of way as a potentially viable route, even though it is not within the Composite Corridor. EKPC determined that reviewing a potential rebuild opportunity using this right-of-way to minimize community impact might be beneficial. In all, 10 routes were provided to NV5 Geospatial for route scoring. A map showing all viable routes is included as Figure 51 and 52 of the NV5 Geospatial Report.

The Expert Judgement scoring criteria were established prior to receiving route scoring from NV5 Geospatial. The intent of Expert Judgement is to evaluate project factors or impacts that are specific to the area and the project in question but are not captured in the standard model. Each member of the project team developed their own unique expert judgement categories and weighting. EKPC discussed and determined the Expert Judgement criteria and weighting that would be utilized for the project. The team noted that the model did not take into account that the existing 69 kV line will be rebuilt with an in-service date of December 2024 as a factor for consideration. Also, the model does not quantify the difference between the newly impacted parcels versus those already impacted by the planned

69 kV rebuild. Due to this, in the Expert Judgement criteria originally developed, EKPC heavily weighted the direct community impact.

After the development of the original Expert Judgement criteria, NV5 Geospatial and EKPC discussed the factors contributing to the generation of avoidance areas, and NV5 Geospatial informed EKPC that the model could determine the newly impacted properties in comparison to previously impacted properties. EKPC requested that this be completed in regard to the Built environment (proximity to homes) and the Natural environment (natural forest). EKPC determined that if the siting model could quantitatively incorporate the newly impacted versus previously impacted properties in the route comparisons, this would be a superior evaluation to qualitatively evaluating and subjectively scoring this criteria in Expert Judgement. EKPC requested NV5 Geospatial to provide both the standardized scoring and the calibrated scoring (taking into account the newly impacted versus previously impacted properties).

EKPC reevaluated the Expert Judgement criteria after discussion with NV5 Geospatial regarding the ability of the model to quantitatively evaluate the newly impacted versus previously impacted properties in the built and natural environments. EKPC determined that the calibrated route scoring would be utilized for final route selection due to how well it specifically addressed the unique characteristics of this routing case. Additional information regarding the Expert Judgement critera development and process for this Project is included in Part XI of the NV5 Geospatial report.

Q. WHAT WAS THE OUTCOME OF THE SITING STUDY?

A. EKPC received the route scoring from NV5 Geospatial for both the standard and calibrated methodology. Based on the calibrated methodology, Routes 1, 2 and 8 were the three lowest scoring routes in the Simple Average (with lower scores representing more desirable routes), and were taken to Expert Judgement for scoring. Route 1 was a double-circuit of the 138 kV transmission line as part of the rebuild in the 69 kV right of way, utilizing the existing centerline, Routes 2 and 8 had minor deviations from Route 1. Upon review of the scoring provided, EKPC noted that Route 1 ranked the best in Simple Average, Built, Natural, and Engineering environments in the calibrated scoring. Also, Routes 2 and 8 deviations required additional structures, which are anticipated to be self-supporting structures, leading to additional impacts to the community and additional cost for construction. In both the standard scoring and calibrated scoring Routes 3 and 4, which were the deviations to the west of I-75 (through the Richmond Center and along the existing EKPC Fawkes-West Berea 138 kV right of way), scored the highest (ranked the worst). This ranking showed that further deviation from the existing 69 kV route indicated additional impacts in the community.

The Expert Judgement process is intended to allow transmission design experts to evaluate project and area specific factors or impacts that are not captured in the model. With the use of the calibrated model, EKPC was able to review comparable scoring to quantify factors that are important and unique to this project. Route 1 scored the lowest in all categories (Built, Natural, Engineering, and Simple Average), showing that Route 1 had the least impactful route in all categories. While EKPC did not utilize the Expert Judgement Scoring matrix that was

developed, the calibration and analysis to consider the already scheduled line rebuild was the Expert Judgement consideration and final step in the process. EKPC experts reviewed the outcome related to the factors they considered important in Expert Judgement and determined to forgo further scoring the routes because the calibration of the model was expressly intended to address the questions raised in Expert Judgement and the results were well aligned with factors previously identified. The calibrated route scoring clearly showed Route 1 as the preferred route and the project team determined that no further scoring in Expert Judgement was needed.

Q. THANK YOU FOR THAT VERY THOROUGH EXPLANATION. COULD YOU PERHAPS SUMMARIZE THE OUTCOME OF ALL THIS ANALYSIS?

A. Certainly. EKPC performed a full routing study that objectively considered and balanced impacts in accordance with a well established approach and methodology. In that process, EKPC was able to take into account and objectively analyze the fact that it already has right of way that is suitable for double circuit construction of the new 138 kV transmission line with the scheduled 69 kV transmission line rebuild. It is prudent and reasonable for this project specific factor to be incorporated into the routing study, and the resulting best route is to build a double-circuit construction of the 138 kV transmission line with the rebuilt 69 kV transmission line on the existing right of way.

Q. WHAT PERMITS WILL BE REQUIRED FOR THE PROJECT?

A. Please see Exhibit 1 of the Application for the list of permits and approvals required for the execution of the Fawkes – Duncannon Lane Tap 138 kV Transmission Line.

Q. HAS EKPC APPLIED FOR OR RECEIVED ANY OF THE PERMITS OR APPROVALS NECESSARY FOR THE PROJECT?

A. EKPC has not applied for any state or local permits.

Q. WILL THE PROJECT RESULT IN ANY UNNECESSARY DUPLICATION OF INVESTMENT OR THE CLUTTERING OF THE LANDSCAPE WITH UNNEEDED FACILITIES?

A. No. The electrical need for this Project is specifically related to demand that cannot be served by other existing electrical infrastructure. The rebuild of a single transmission circuit with a double-circuit line is the best strategy for efficient use of structures and minimal impact to landscapes.

Q. ARE THERE ANY PUBLIC UTILITIES, CORPORATIONS OR PERSONS WITH WHOM THE PROJECT IS LIKELY TO COMPETE?

A. No.

Q. WHAT BENEFITS WILL BE DERIVED FROM THE PROJECT?

A. This Project will avoid a predicted thermal overload on the KU Fawkes – Duncannon Lane Tap 69 kV line for contingency conditions beginning in 2022/2023 Winter. It will also replace aging infrastructure that has reached it's end of life and has been assessed as a necessary replacement for structural concerns. The clear benefit from the Project is to assure continued adequate and reliable service to Blue Grass Energy and the homes and businesses it serves both now and when imminent development increases demand in the area.

Q. WHAT IS THE TIMELINE FOR COMPLETION OF THE PROJECT?

A. The KU Fawkes – Duncannon Lane Tap 69 kV rebuild to 138 kV and 69 kV is scheduled to be completed by December 2024. This completion date is driven by recognition of the earliest possible timeframe to design, demolish, and reconstruct the line. Execution of the project in a timely manner is critical to minimize reliability exposure to the EKPC System and the Richmond area load pocket. The Madison County 69 kV Switching Station proposed in-service date is December 2025.

Q. DOES THIS CONCLUDE YOUR TESTIMONY?

A. Yes.

EXHIBIT LL-1
CURRENT CONDITION PHOTOGRAPHS

Exhibit LL-1
Photographs of existing Fawkes – Duncannon Lane Tap 69 kV Condition

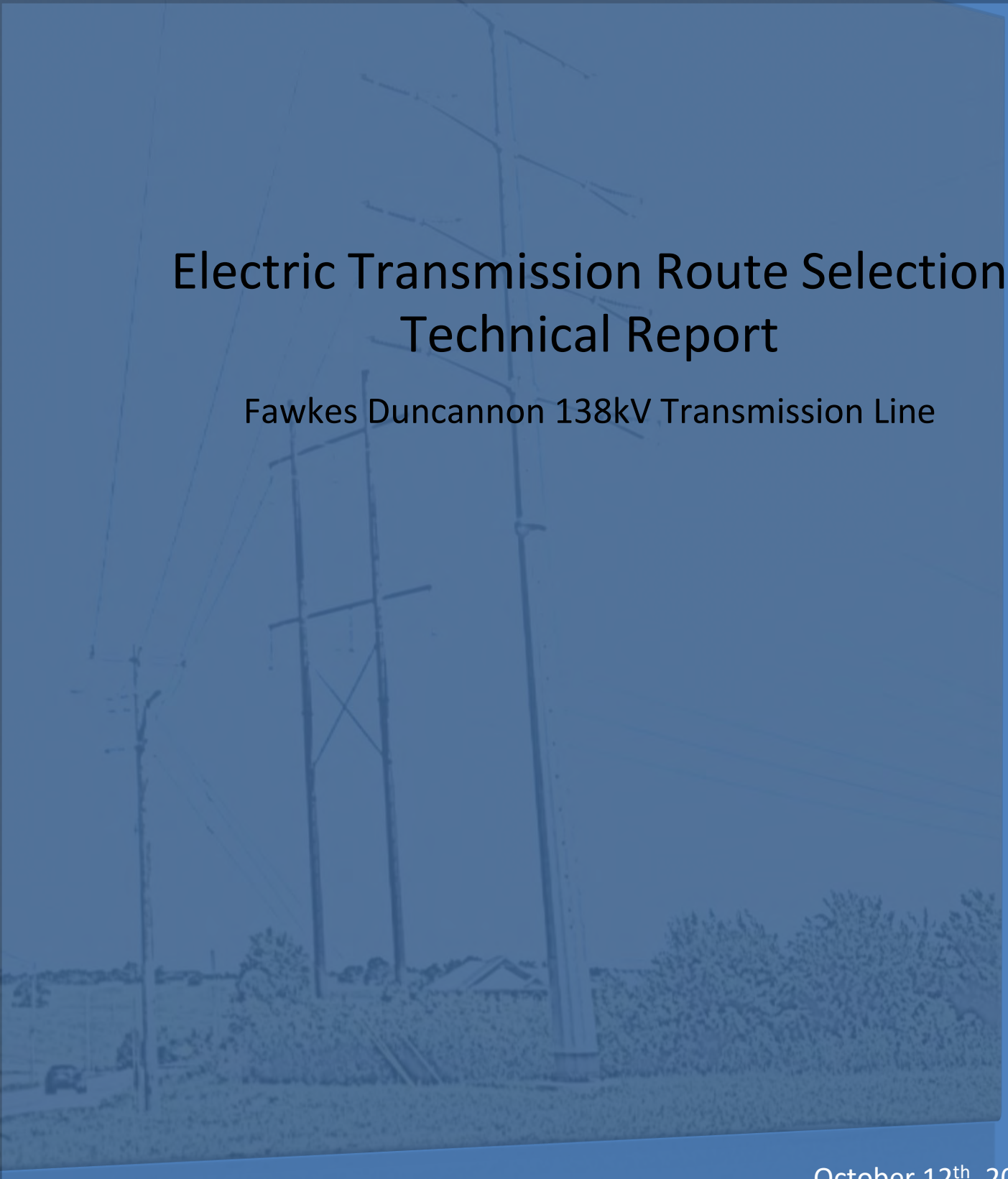
Cross Arm Failure – 2021 – BM – 55

Failed Structure – 2017

Structures Leaning

Structures Leaning

EXHIBIT 18
SITING REPORT



Electric Transmission Route Selection Technical Report

Fawkes Duncannon 138kV Transmission Line

October 12th, 2022

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List of Acronyms

EPA	Environmental Protection Agency
EPRI	Electric Power Research Institute
EKPC	East Kentucky Power Cooperative
DEM	Digital Elevation Model
DOT	Department of Transportation
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency
GIS	Geographic Information System
GTC	Georgia Transmission Corporation
NAIP	National Agriculture Imagery Program
NHD	National Hydrography Dataset
NRHP	National Register of Historic Places
OSRW	Outstanding State Resource Waters
PVA	Property Valuation Administrator
NV5	NV5 Geospatial
ROW	Right of Way
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
WMA	Wildlife Management Area

List of Units

cf/s	cubic feet per second
m	meter
kV	kilovolt

PART I: INTRODUCTION

East Kentucky Power Cooperative (EKPC) is an electric generation and transmission cooperative based in Winchester, Kentucky. EKPC is owned and governed by 16 member-owned cooperatives which provide service to over 1.1 million Kentuckians in 87 counties. Founded in 1941, EKPC operates base load power plants in Mason, Clark, Oldham and Pulaski Counties and landfill gas to electric facilities located in Boone, Laurel, Greenup, Pendleton, and Hardin Counties. EKPC also provides peaking generation with its combustion turbines in Clark County. Some generation for the system is provided through hydroelectric plants and all of the electricity is delivered through more than 2,800 miles of transmission lines.

EKPC elected to conduct a suitability study to determine the routing of a 138kV line between the existing Fawkes substation and a structure on the 69 kV Duncannon circuit in Madison County, Kentucky. The route for the proposed transmission line considers many diverse factors, including existing land uses and habitats, special geographic classifications (e.g. National or State Parks, military sites, floodplains, wetlands), existing infrastructure co-building opportunities, impact to local human communities, previously-confirmed cultural resources, and threatened or endangered species.

The first step in the methodology was the development of Macro Corridors, which defined an area for more detailed study between the proposed endpoints. A 0.5-meter NAIP imagery dataset was used to provide context for the Macro Corridors. The land cover dataset utilized was the latest the National Land Cover Dataset from 2019 per the standard Kentucky Transmission Line Siting methodology. Slope data was derived from the latest 2020 USGS 5-meter DEM available from the KYAPED domain. Road features were compiled from the latest US TIGER line files.

Once Macro Corridor data was compiled and prepped, the Macro Corridors were used to develop a study area of approximately 22 square miles, with a straight line distance of approximately 7 miles from the Fawkes substation to the existing 69 kV Duncannon Structure outside of Richmond, KY in Madison County.

Once the study area was identified, detailed dataset layers were developed for siting purposes. Using these detailed layers, Alternate Corridors were generated. For the purposes of this study, the study area represents a larger land area between the end points of the project, and through which corridors might be logically and practically identified. “Corridors” are defined as the most suitable areas for routing a transmission line within the study area. Corridors may vary greatly depending upon the resources encountered in the study area. “Routes” describe the potential centerline path of a transmission line, whereas a “corridor” is a more general area of sufficient width to contain the eventual right-of-way (ROW).

Per the Electric Power Research Institute-Kentucky (EPRI-KY) methodology described in Part III, four corridors(Built, Natural, Engineering, and Simple Average) are produced that represent different perspectives for routing transmission facilities with respect to the dataset layers. The Built Corridor seeks to avoid impacts to human development and historical / cultural resources. The Natural Corridor emphasizes protection of natural resources and avoiding impacts to natural plant and animal species. The Engineering Corridor maximizes co-location opportunities and avoids areas in which it would be geographically difficult to construct a new transmission line. Finally, the Simple Average Corridor weighs all criteria equally with no emphasis on any one group of criteria.

EKPC developed alternate route possibilities using the corridors identified through the above methodology. The possible alternate routes were evaluated and ranked, and analytical decisions were made based on the best practices of the EPRI model and EKPC stakeholders. The purpose of this report is to document the objective process for selecting a Preferred Route between the existing EKPC start and end locations.

PART II: PROJECT DESCRIPTION

EKPC utilized the EPRI-KY methodology to identify the preferred route for construction of a new 138 kV from the existing EKPC F a w k e s substation to the existing 69kV Duncannon Structure. The new transmission line would serve identified load growth and would provide increased system reliability for the area.

Figure 1 Typical land cover within the project AOI

PART III: OVERVIEW OF SUITABILITY ANALYSIS

EPRI-KY Methodology

The EPRI-KY methodology is a quantitative, computer-based methodology developed by EPRI and the commonwealth of Kentucky for use as a tool to evaluate the suitability of individual grid cells (15 feet by 15 feet) within a large area for locating transmission facilities. A study area was developed based on analysis of the geography between the endpoints of the proposed transmission line. Then, using more-detailed information for the grid cells within the study area, Alternate Corridors were developed for further evaluation. Within the Alternate Corridors, Alternate Routes were developed and analyzed to determine a Preferred Route.

The EPRI-KY methodology is an objective, comprehensive and consistent approach for routing a proposed transmission line. The EPRI-KY methodology provides a structured approach to apply quantitative stakeholder input and organize a vast amount of data. Figure 1 represents the EPRI-KY methodology.

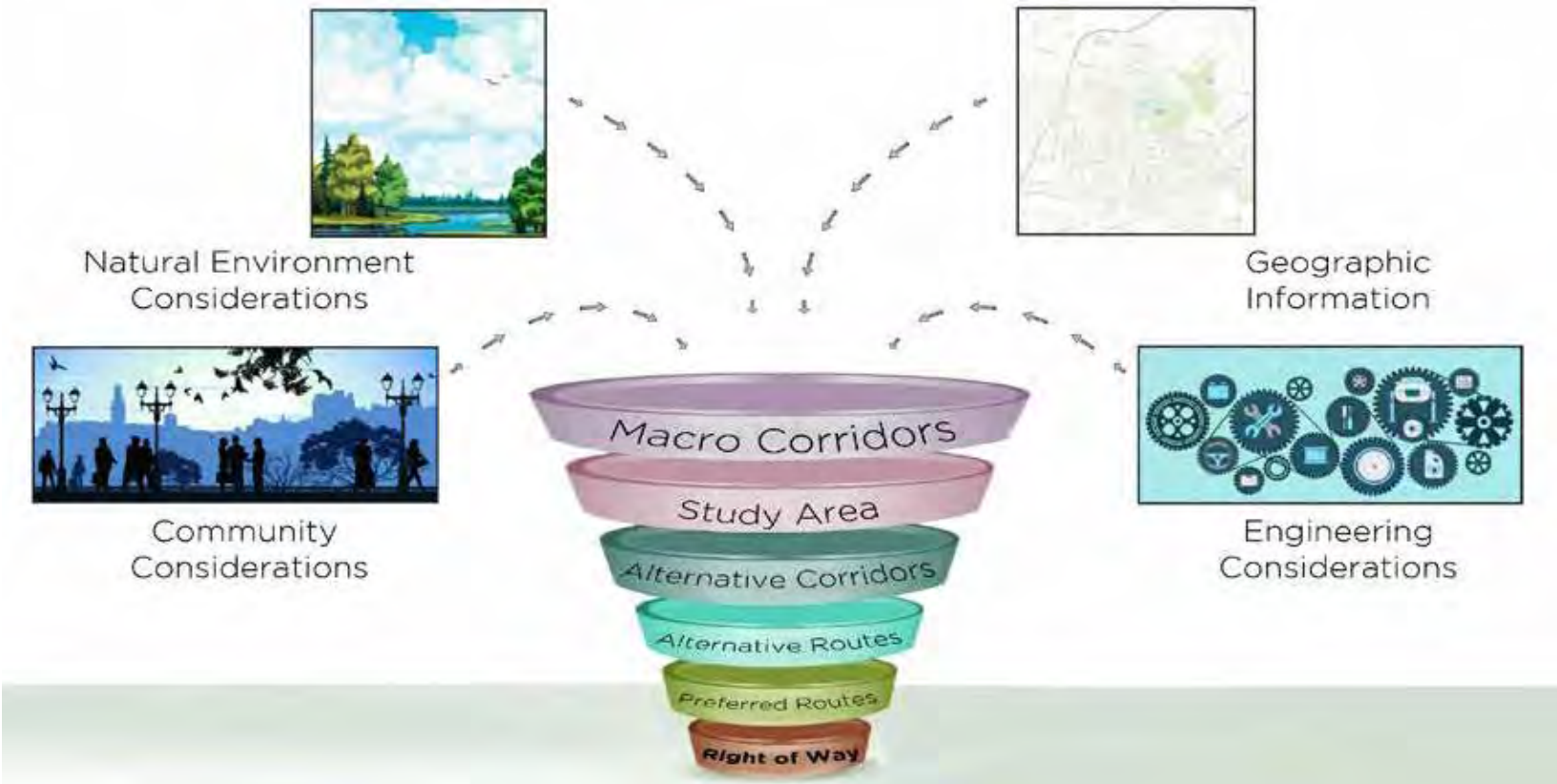


Figure 2: EPRI-KY Siting Methodology

The EPRI-KY methodology approaches corridor development by considering four broad environments:

- Built Environment minimizes the impact on people, places and cultural resources
- Natural Environment minimizes impacts to water resources, plants and animals
- Engineering Environment minimizes terrain restraints and construction variables
- Simple Average of Environments weighs each environment equally

Features within each of the environments were identified and evaluated to map the suitability of grid cells and develop Alternate Corridors. Simple Average Alternate Corridors were developed to consider all three environments equally. The environments are discussed in detail in the following sections.

The Siting Model

The siting model was developed using data collected during a stakeholder workshop in February 2006 in Lexington, Kentucky. The model was developed and tested by a project team of independent experts during the workshops. Stakeholders at the workshops represented a range of interests, such as environmental interest, historic preservation, homeowners' associations, agricultural groups, government agencies, and representatives of utility companies. The resulting model (shown in Table 1) includes data layers, features, layer weights and suitability values that were used for siting transmission lines. More information concerning these workshops is available in the Kentucky Transmission Line Siting Methodology (published by EPRI in 2007). Some minor adjustments can be made to this model for site specific and data availability reasons.

Co-location / Engineering		*Natural Environment*		*Built Environment*			
Linear Infrastructure	**86.2%**	**Floodplain**	**4.6%**	**Proximity to Buildings**	**16.8%**	**Proximity to Eligible Historic and Archeological Sites**	**31.0%**
Parallel Existing Transmission Lines	1	Background	1	Background	1	Background	1
Rebuild Existing Transmission Lines (good)	2.2	100 Year Floodplain	9	900-1200'	3.4	900-1200'	4.6
Background	4.4	**Streams/Wetlands**	**29.2%**	600-900'	5.7	600-900'	7.9
Parallel Interstates ROW	4.7	Background	1	300-600'	8	0-300'	8.6
Parallel Roads ROW	5.4	Streams < 5cfs+ Regulatory Buffer	6.2	0-300'	9	300-600'	9
Parallel Pipelines	5.6	Rivers/Streams > 5cfs+ Regulatory Buffer	7.1	**Building Density**	**8.4%**	*AVOIDANCE AREAS*	
Future DOT Plans	5.6	Wetlands + 30' Buffer	8.7	0 - 0.05 Buildings/Acre	1	Listed Archaeology Sites & Dist.	
Parallel Railway ROW	6.1	Outstanding State Resource Waters	9	0.05 - 0.2 Buildings/Acre	3	Listed NRHP Districts and Buildings	
Road ROW	7.2	**Public Lands**	**17.7%**	0.2 - 1 Buildings/Acre	5.6	City and County Parks	
Rebuild Existing Transmission Lines (bad)	8.6	Background	1	1 - 4 Buildings/Acre	8.5	Day Care Parcels	
Scenic Highways ROW	9	WMA - Not State Owned	5.1	> 4 Buildings/Acre	9	Cemetery Parcels	
Slope	**13.8%**	USFS (proclamation area)	6.2	**Proposed Development**	**3.9%**	School Parcels	
Slope 0-15%	1	Other Conservation Land	7.8	Background	1	Church Parcels	
Slope 15-30%	4	USFS (actually owned)	9	Proposed Development	9		
Slope 30-40%	6.7	State Owned Conservation Land	9	**Spannable Lakes and Ponds**	**4.0%**		
Slope >40%	9	**Land Cover**	**19.8%**	Background	1		
AVOIDANCE AREAS		Developed Land	1	Spannable Lakes and Ponds	9		
Non-Spannable Waterbodies		Agriculture	4.6	**Land Use**	**35.9%**		
Mines and Quarries (Active)		Forests	9	Commercial/Industrial	1		
Buildings		**Wildlife Habitat**	**28.7%**	Agriculture (crops)	3.5		
Airports		Background	1	Agriculture (other livestock)	4.6		
Military Facilities		Species of Concern Habitat	9	Silviculture	6		
Center Pivot Irrigation		*AVOIDANCE AREAS*		Other (forest)	6.7		
		EPA Superfund Sites		Equine Agri - Tourism	8		
		State and National Parks		Residential	9		
		USFS Wilderness Area					
		Wild/Scenic Rivers					
		Wildlife Refuge					
		State Nature Preserves					
		Designated Critical Habitat					

Table 1: KY EPRI Full Weighted Model

Data layers (green cells): Percentages represent relative importance, or weighting, of each layer in the siting process, as determined by stakeholders.

Features (yellow cells): Numbers between one and nine represent degrees of suitability, as determined by stakeholders, with one being most suitable for locating a transmission line and nine being least suitable for locating a line.

Areas of Least Preference (pink cells): Features to avoid when siting a transmission line, if possible, as determined by stakeholders.

Each stakeholder was assigned to a breakout group for one of the three environments based on their interest (Built, Natural or Engineering Environments). Guided by an independent expert from the project team, each of these groups developed a set of data layers (shown in green in Table 1) with component features (shown in yellow), as well as avoidance areas (shown as 'areas of least preference' at the bottom of each of the environment columns). For example, one of the data layers in the Natural Environment is floodplains, which has two component features: background and 100-year floodplain.

For each component feature, the stakeholders then used consensus-building techniques to develop a relative suitability value. Numbers between one and nine were used to represent degrees of suitability, with one being most suitable for locating a transmission line and nine being least suitable for locating a line. These values are cited in the EPRI-GTC Project Report (2006) as follows:

> Areas that have High Suitability for an Overhead Electric Transmission Line (1, 2, 3)
> - These are areas that do not contain known sensitive resources or physical constraints, and therefore should be considered as suitable areas for the development of corridors.
>
> Moderate Suitability for an Overhead Electric Transmission Line (4, 5, 6) - These are areas that contain resources or land uses that are moderately sensitive to disturbance or that present a moderate physical constraint to overhead electric transmission line construction and operation. Resource conflicts or physical constraints in these areas can generally be reduced or avoided using standard mitigation measures.
>
> Low Suitability for an Overhead Electric Transmission Line (7, 8, 9) - These are areas that contain resources or land uses that present a potential for significant impacts that cannot be readily mitigated. Locating a transmission line in these areas would require careful siting or special design measures. It is important to note that these areas can be crossed but it is not desirable to do so if other alternatives are available.

After assigning suitability values to features, stakeholders then weighted each data layer based on their view of its relative importance in the siting process. This was accomplished by conducting pair- wise comparisons. The result was a percentage weighting for each data layer within each environment, totaling 100 percent.

One of the first steps in implementing the EPRI-KY methodology is identifying local areas of least preference within the study area where, if possible, the project area avoids locating facilities (i.e., state boundary waterbodies, sensitive areas, permitting delays, unique considerations etc.). Once these local areas are determined, suitability mapping of macro corridors can begin.

Suitability Mapping

The methodology began with the proposed starting and ending locations as the basis for creating Macro Corridors. The area in this vicinity was divided into grid cells 98.45 feet by 98.45 feet in size.

Data from aerial photography, geographic information systems (GIS), publicly available datasets and other sources were used to identify features within each grid cell. Based on these features and the values of data layer weights determined in the EPRI-KY Siting Model, a suitability value was assigned to each cell. The suitability is constrained in resolution by the input raster cell size of 98.45 feet.

Since cells with lower suitability for locating a transmission line are assigned higher values, the methodology employs an algorithm that seeks to minimize the sum of values as it works its way from one endpoint to the other. The resulting corridor is referred to as the "optimal path".

Figure 3 through Figure 5 demonstrate the development of a sample optimal path using information from a hypothetical situation.

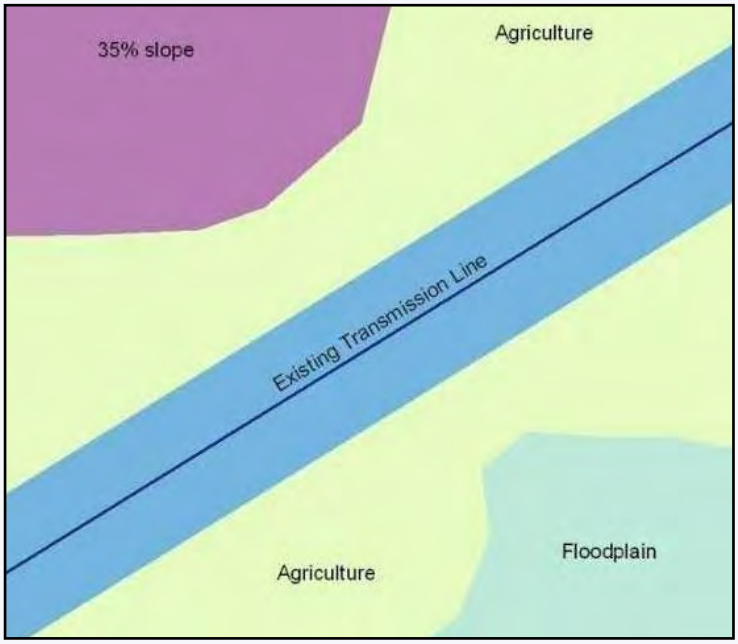


Figure 3 (Above): Feature Map of Example Area

Figure 3 displays an example area that has four features: an existing transmission line through the center of the area, surrounded by agricultural land with an area of steep slopes to the northwest and a floodplain to the southeast.

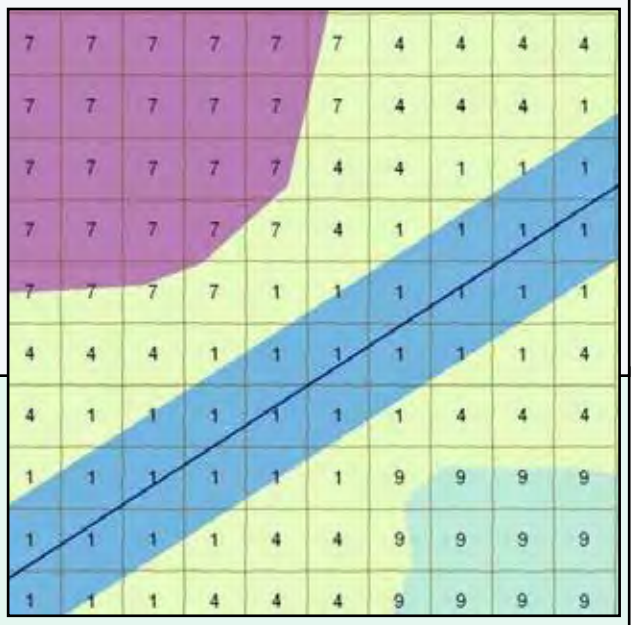


Figure 4 (Above): Grid Cell of Example Area with Suitability Values

In Figure 4, grid cells are overlain and assigned suitability values based on the features. The suitability values used in the example do not necessarily correspond to the Siting Model. The area of the existing line is considered highly suitable. Agricultural land is moderately suitable. Steep slopes and floodplains have low suitability values.

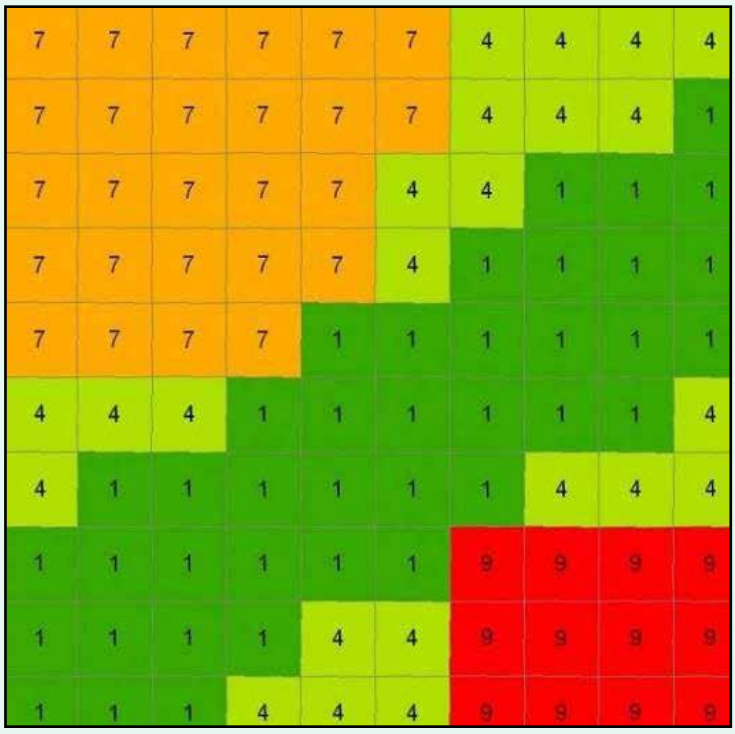


Figure 5: Suitability Map of Example Area

Finally, Figure 5 shows in green the most suitable corridor through the area for locating a transmission line. Light green areas are moderately suitable. The orange area has a moderate suitability value, and the red area is highly unsuitable. The most suitable corridor from East to West in this example was the one that follows the existing transmission line.

Developing Macro Corridors

As described above, the EPRI-KY methodology analyzed land tracts, or "grid cells," within the area to develop Macro Corridors. The analysis was based on GIS information that is readily available from public sources as well as data extracted from aerial photo interpretation. The data was then used to develop the grid cells. The numbers that were applied to the grid cells were taken from the siting model. The Macro Corridors developed from the model were the most suitable five percent of possible routes within the study area. Macro Corridors were then generated for each of the three environments (Built, Natural, and Engineering).

It should be noted that when generating Macro Corridors for each environment, data layers from the other two environments were taken into account. While the target environment was weighted much more heavily (five times so), values and weights from the other environments can affect Alternate Corridors generated for that respective environment. For example, when creating the engineering corridor, the engineering grid is given five times more weight than the built and natural grids when the three are added together. The equation would appear similar to ((Engineering Grid * 0.72) + (Built Grid * 0.14) + (Natural Grid * 0.14)) where 0.72 is five times greater than 0.14 and these three values add up to 1.

The final step in generating Macro Corridors was to equally weigh the three environments and generate a Simple Average Alternate Corridor. The equation for the Simple Average Corridor would look similar to ((Engineering Grid * 0.333) + (Built Gird * 0.333) + (Natural Grid * 0.333)). Once corridors are created, the top five percent scores of the overall corridors are extracted to a vector format and buffered for a final Phase 1 study area.

The macro corridors and present a larger 10,000 ft view of the suitability process. These corridors are fairly generic, do not take in much of the project specific nuances, and solely serve as the inputs to create the Phase 1 study area. To create a more detailed view and apply the EPRI-KY model, the next step in the process is to compile vector or raster data per the model at a much finer level of precision than the macro corridors. Whereas the macro corridors have cell resolution of 98.45 ft x 98.45 ft, the cell resolution of the Alternate corridors are much more detailed at a 15 ft x 15 ft resolution.

The following sections of this report provide information about features that were found within the study area, the creation and compilation of inputs to the EPRI-KY model for this specific project, suitability maps, Alternate Corridors, Alternate Routes geographies and score and the selection of a Preferred Route for construction of the proposed line.

PART IV: STUDY AREA DESCRIPTION

Study Area Location

The project study area is in central Madison County in central Kentucky. The study area includes part of the city of Richmond, which is the county seat and home of Eastern Kentucky University.

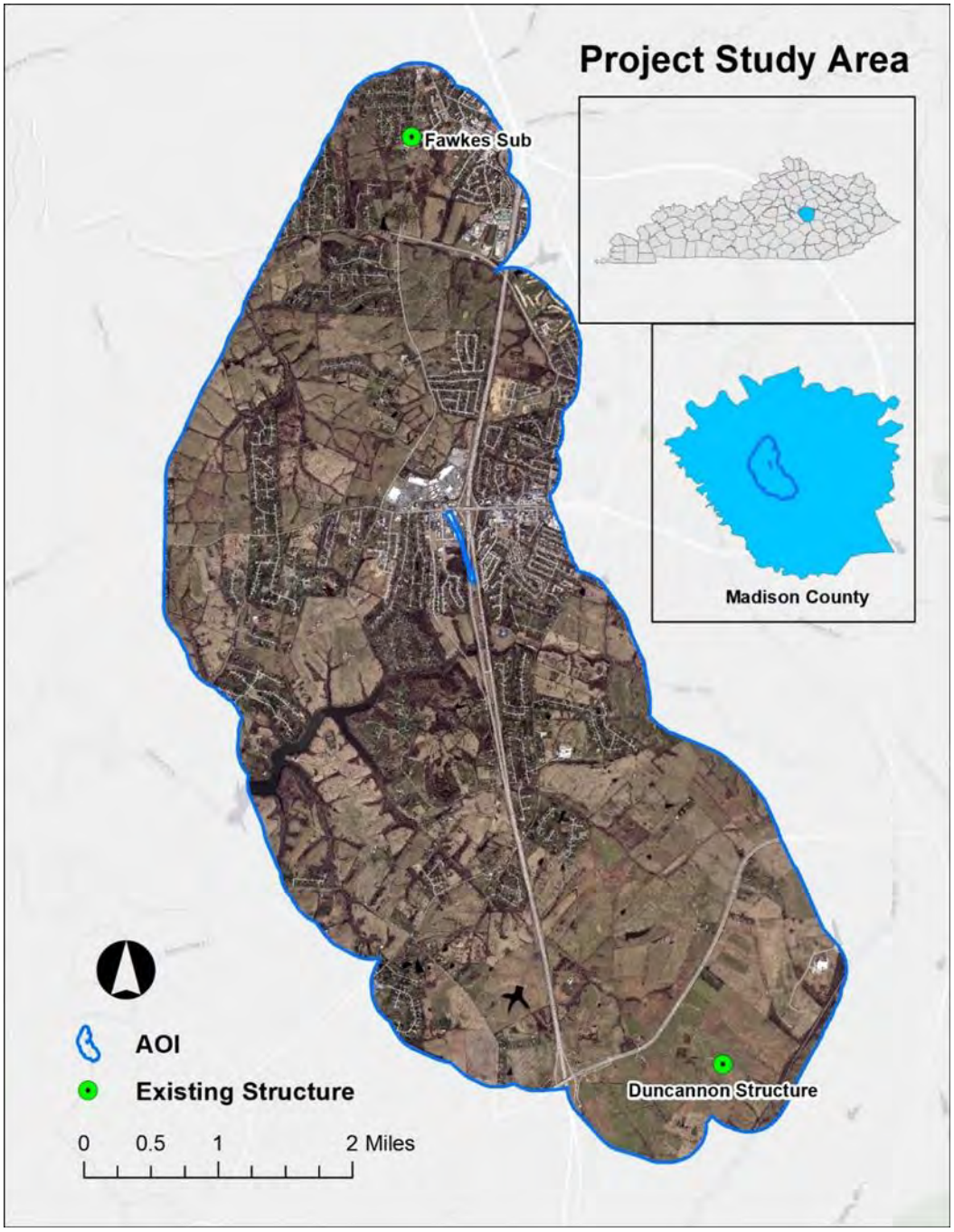


Figure 6: Project Study Area, Madison County Kentucky

Figure 7: Fawkes Substation Starting Location (NV5 Field Photo)


Figure 8: Looking south from Duncannon Lane at the existing 69kv EKPC Circuit (Google Street View Image)

Study Area Characteristics

Ecological Region

The project area is solely contained within the Outer Bluegrass region of the state which is an EPA- defined geographic and ecological region shown in Figure 9 below.

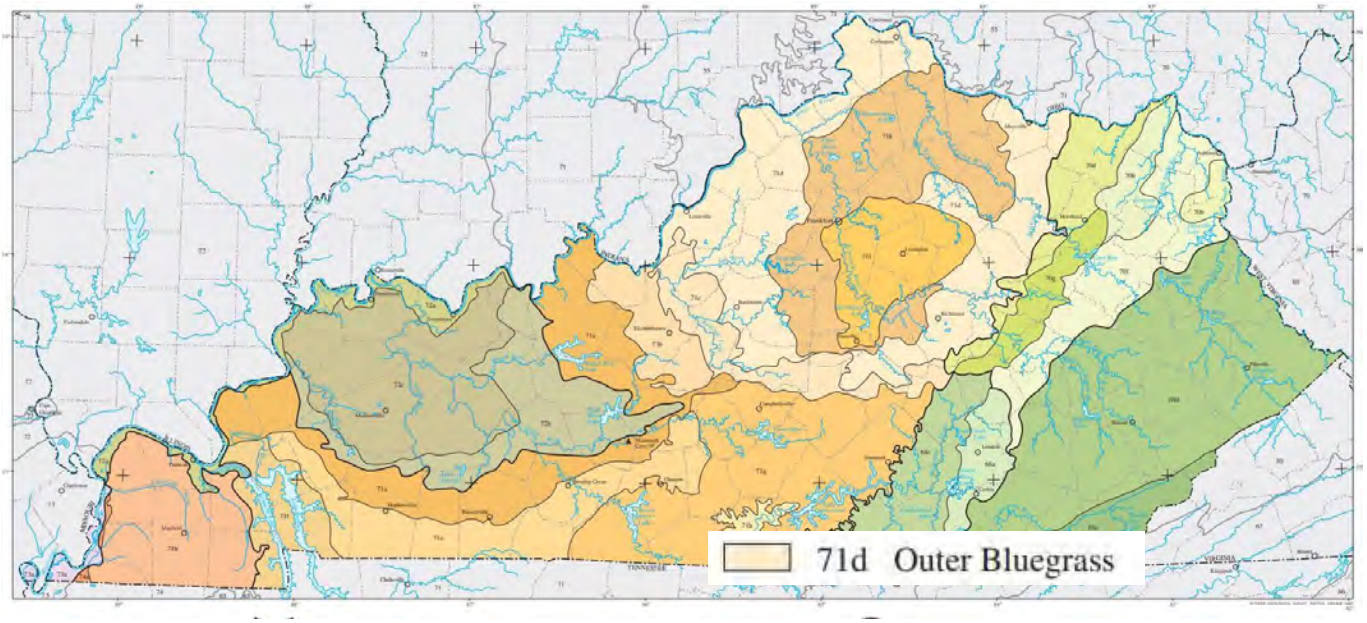


Figure 9 Ecological Regions of Kentucky. Source: http://ecologicalregions.info/data/ky/ky_front.pdf

"The rolling to hilly Outer Bluegrass contains sinkholes, springs, entrenched rivers, and intermittent and perennial streams. Local relief is variable but is usually less than in the geomorphically distinct Knobs–Norman Upland (71c). Discontinuous glacial outwash and leached, pre-Wisconsinan till deposits occur in the north from Louisville to Covington. Glacial deposits do not occur elsewhere in Kentucky. Ecoregion 71d is mostly underlain by Upper Ordovician limestone and shale. Natural soil fertility is higher than in the shale-dominated Hills of the Bluegrass (71k). Today, pastureland and cropland are widespread and dissected areas are wooded. At the time of settlement, open savanna woodlands were found on most uplands. On less fertile, more acidic soils derived from Silurian dolomite, white oak stands occurred and had barren openings. Cane grew along streams and was especially common in the east. Distinct vegetation grew in areas underlain by glacial drift (see summary table). Upland streams have moderate to high gradients and cobble, boulder, or bedrock substrates. Mean stream density is greater than in Ecoregion 71l but less than in Ecoregion 71k. Mean summer stream temperatures are much warmer than in Ecoregions 71b, 71c, and 71e. Concentrations of suspended sediment and nutrients can be high. - Source: http://ecologicalregions.info/data/ky/ky_front.pdf

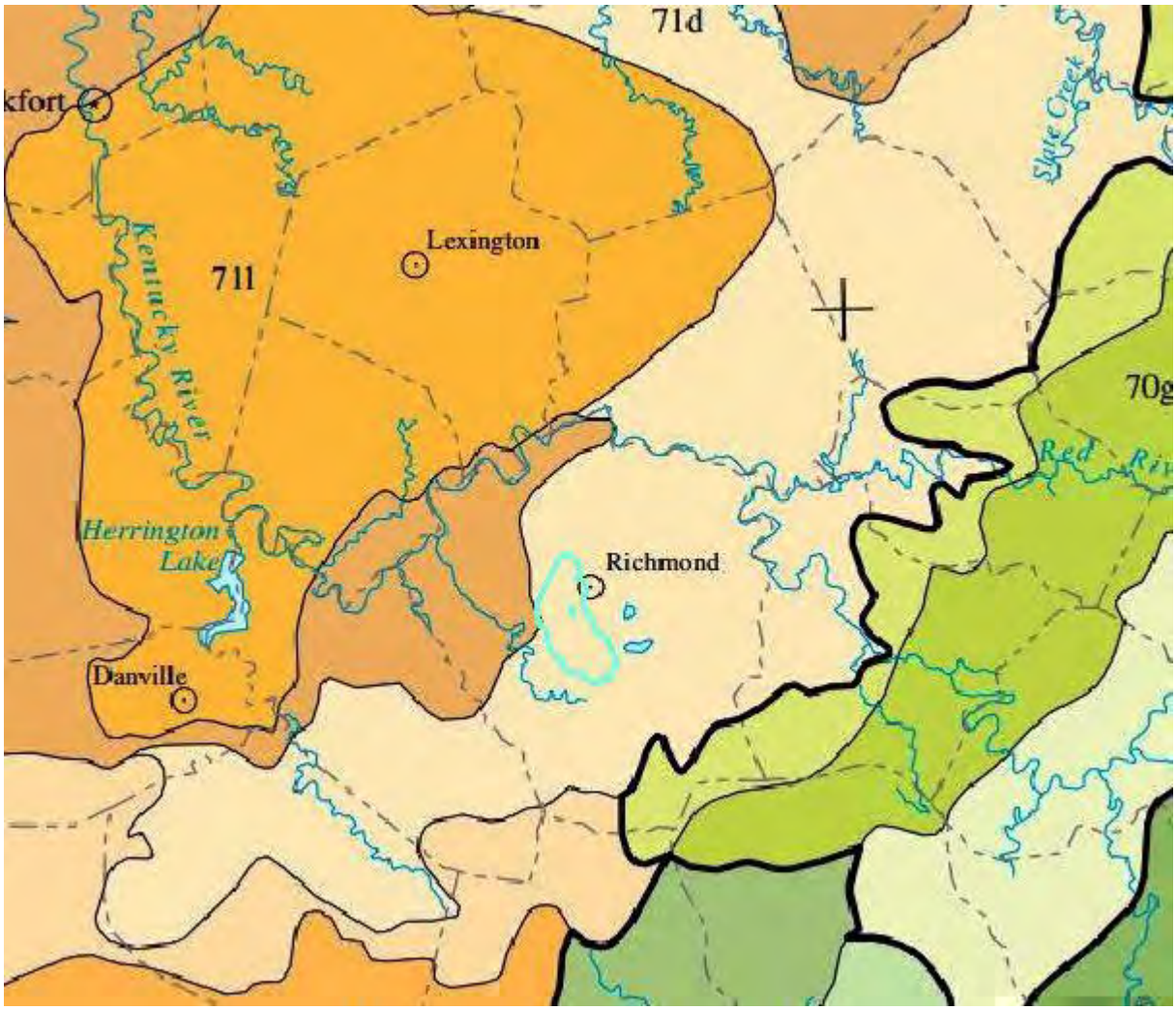


Figure 10: AOI Detail of Outer Bluegrass Ecoregion

Socioeconomics

According to the US Census, the Commonwealth of Kentucky's population growth from 2010 to 2020 was a 3.8% increase. Madison County experienced an 11% increase in population between 2010 and 2020, with a total 2020 population of 94,666 people. The county falls within the Richmond-Berea Micropolitan Statistical area and is part of the larger Lexington-Fayette-Richmond-Frankfort Combined Statistical Area. Richmond is the county seat and largest city in the area, with a population of 35,744. The 2020 Median household income was $51,649 with a 15.5% poverty level. Of note, Richmond is also home to Eastern Kentucky University, and next to the Bluegrass Army Depot.

Transportation

The AOI is bisected by Interstate 75 running North South through the study area. This divided highway is a major source of travel within the county, with other state and national highways also in the AOI.

Figure 11: Transportation Features Around Richmond (Google Earth Imagery)

Water Resources

The study area includes one major body of water. Wilgreen Lake is a reservoir constructed in 1966. It is a popular location for regional recreation, with fishing that entails largemouth bass, bluegill, red ear sunfish, green sunfish, white crappie, channel catfish, white sucker, and common carp (madisoncountyky.us). In addition to recreation, some areas of the lake have seen residential development in recent years.

Figure 12: Wilgreen Lake (NV5 Field Photo)

PART V: ENGINEERING ENVIRONMENT

Table 2 shows the Engineering Environment sub-model of the Kentucky tailored EPRI siting model. The sub-model incorporates those features whose presence or absence should be considered from the perspective of constructing a transmission line.

Co-location / Engineering	
Linear Infrastructure	**86.2%**
Parallel Existing Transmission Lines	1
Rebuild Existing Transmission Lines (good)	2.2
Background	4.4
Parallel Interstates ROW	4.7
Parallel Roads ROW	5.4
Parallel Pipelines	5.6
Future DOT Plans	5.6
Parallel Railway ROW	6.1
Road ROW	7.2
Rebuild Existing Transmission Lines (bad)	8.6
Scenic Highways ROW	9
Slope	**13.8%**
Slope 0-15%	1
Slope 15-30%	4
Slope 30-40%	6.7
Slope >40%	9
AVOIDANCE AREAS	
Non-Spannable Waterbodies	
Mines and Quarries (Active)	
Buildings	
Airports	
Military Facilities	
Center Pivot Irrigation	

Table 2: Engineering Environment Layers and Weights (Model Values)

Weights (Project-Adjusted Values)

Not all features are present within every study area. Each model and sub-model must be adjusted based on the contents of the study area for a particular project. Per the EPRI methodology, when a feature or layer is absent, the weights are adjusted accordingly and evenly across the remaining features or layers. The Engineering Environment data layers and their relative weights for the Fawkes Duncannon project are summarized in Table 3 Below. Items highlighted in gray are not present in the study area unless otherwise discussed below.

Co-location / Engineering	
Linear Infrastructure	**86.2%**
Parallel Existing Transmission Lines	1
Rebuild Existing Transmission Lines (good)	2.3
Background	4.6
Parallel Interstates ROW	4.9
Parallel Roads ROW	5.6
Parallel Pipelines	5.8
Future DOT Plans	5.8
Parallel Railway ROW	6.4
Road ROW	7.5
Rebuild Existing Transmission Lines (bad)	9
Scenic Highways ROW	-
Slope	**13.8%**
Slope 0-15%	1
Slope 15-30%	4
Slope 30-40%	6.7
Slope >40%	9
AVOIDANCE AREAS	
Non-Spannable Waterbodies	
Mines and Quarries (Active)	
Buildings	
Airports	
Military Facilities	
Center Pivot Irrigation	

Table 3: Engineering Environment Adjusted Layers and Weights

Engineering Perspective Features

Parallel Existing Transmission Lines - An area that is a buffer half the distance to the existing ROW of transmission lines with the AOI. For this study, all lines were used for paralleling with a 50' buffer on each side of the ROW.

Rebuild Existing Transmission Lines (Good) – "Good" Rebuild opportunities are those existing transmission lines and easements that are suitable for reconstruction as double-circuited. For this project there were two lines that EKPC owns that qualified; a 69 kV line and a 138 kV line. The 69kV line has a ROW of 100', and the 138 kV line has a ROW of 150'.

Background – Any area within the AOI that is not listed as a specified engineering features.

Parallel Interstates – A 50' buffer along the edges of Interstate 75 were used for this feature.

Parallel Roads ROW – Numerous opportunities exist within the AOI for paralleling roads features.

Parallel Pipelines - Kinder Morgan natural gas transmission pipelines exist in the northern portion of the AOI. This data was extracted from the National Pipeline Mapping Service.

Future DOT Plans – There is right of way and widening efforts along highway KY 52.

Parallel Railway ROW – One railway exists within the AOI, a CSX line in the SE corner of the study area.

Road ROW - there are numerous highways, business lanes, and residential roads within the AOI. Road data was extracted from the US Census Bureau Tigerline Network.

Rebuild Existing Transmission lines (Bad)- "Bad" transmission lines and easements that are not suitable for reconstruction as double-circuited. For this project there were a few LGE&E KU lines that were deemed "Bad" rebuild options. These lines have ROWs of 100'.

Avoidances

Non-Spannable Water Bodies – For 138 kV transmission lines, an acceptable distance of 400' is used to determine if a body of water can be spanned by the conductor(s). Spans of greater length are possible but may not be practical for this project. Using features extracted from aerial photography interpretation, as well as USGS water polygons it was determined that all bodies of water present on the AOI were spannable.

Mines and Quarries – None Present

Buildings - Numerous residential, government, business and agricultural buildings were found within the AOI.

Airports- None present in the AOI.

Military Facilities - Although the AOI is less than 2 miles from Blue Grass Army Depot, no military facilities were found within the study area.

Center Pivot Irrigation – Aerial photography interpretation was used to determine that there were no center pivots used for agriculture within the project study area.

Linear Infrastructure Features

High Suitability: Parallel Existing Transmission Lines

Opportunities for co-location that parallel existing transmission lines are the most desirable locations for routing new transmission lines. NV5 worked with EKPC to determine what the existing ROW for the transmission lines within the AOI are, as well as what the future ROW would be for the new line. The future EKPC line will have a 100' ROW therefore all parallel features will have an outside buffer half the ROW distance for 50'. Figure 13 displays the suitable ROW paralleling opportunities found within the study area, which were lines owned by EKPC and LGE & KU.

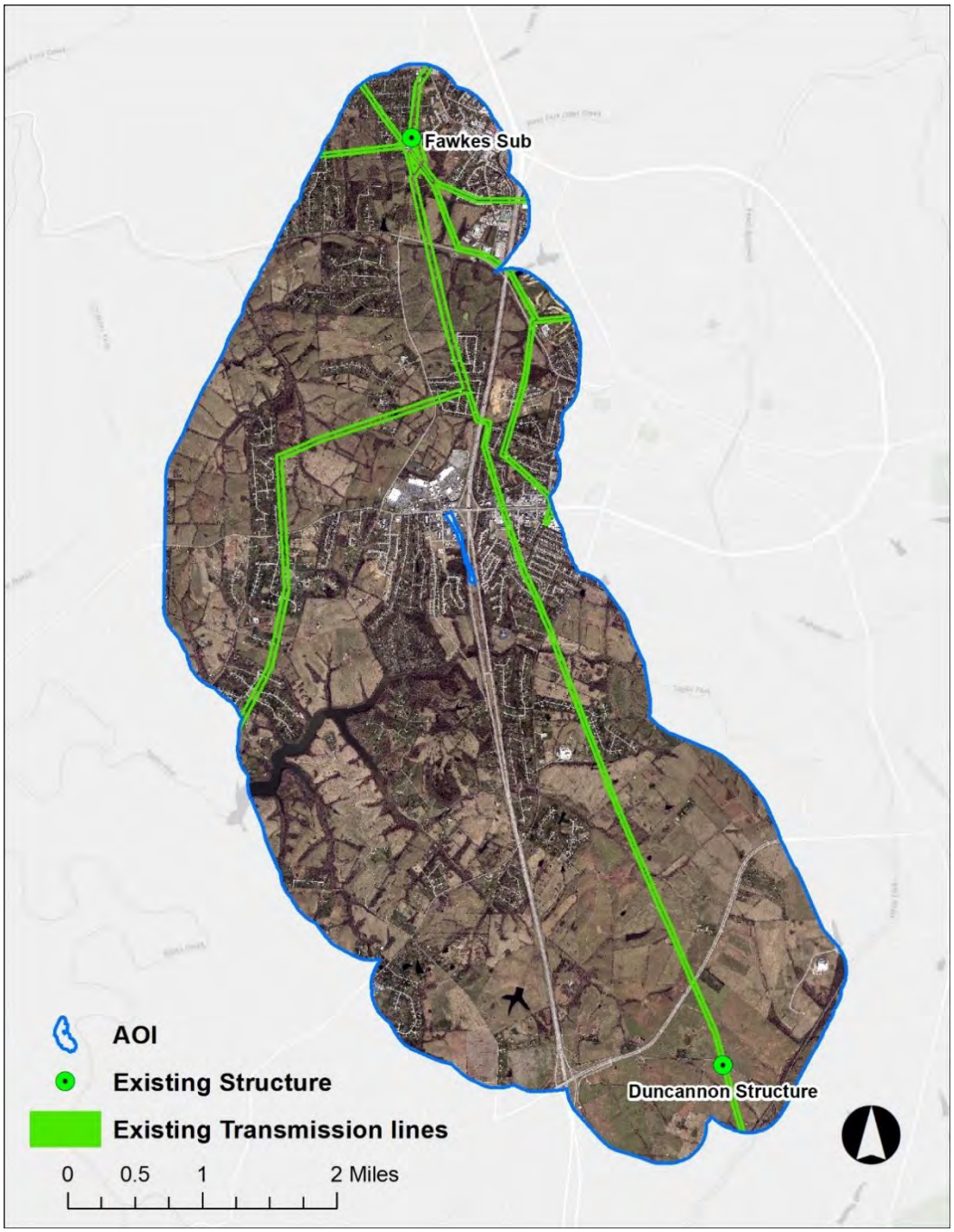


Figure 13: Parallel Existing Transmission Lines

The EPRI Model distinguishes between “good” and “bad” rebuild opportunities present in existing transmission lines. “Bad” rebuild opportunities represent transmission line easements with existing infrastructure that have been determined to be unsuitable to rebuild as a double-circuited transmission line. It could be feasible in some circumstances to rebuild an existing transmission line (Good) and use the existing easement, while purchasing only a minimal amount of additional ROW. For this project EKPC determined that All EKPC lines would be desirable to rebuild (Good). The existing utility ROWs that were not owned by EKPC (Bad transmission lines) to re-build are owned and operated by LGE&KU.

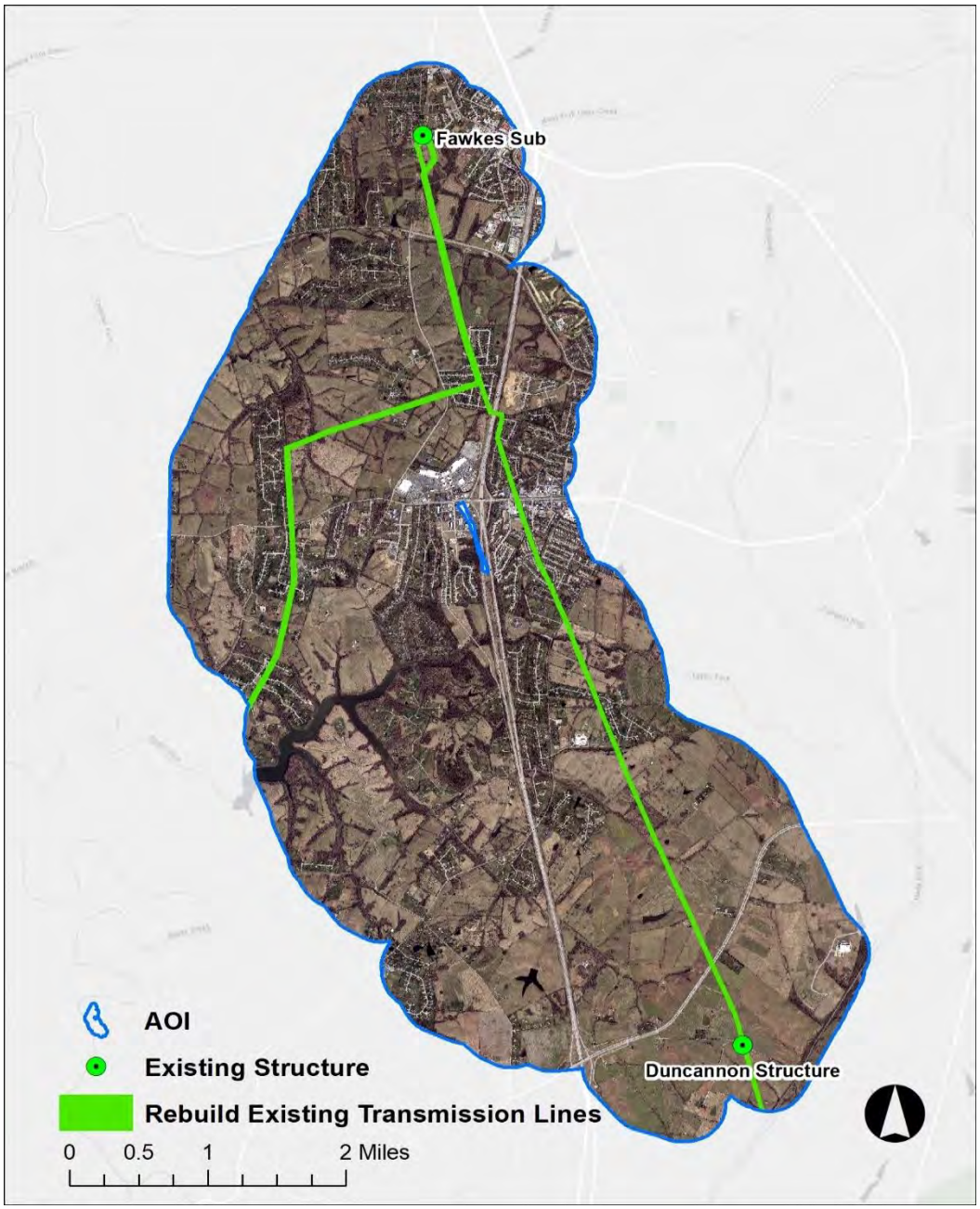


Figure 14: Rebuild (Good) Existing Transmission Lines

Paralleling interstates (50' buffer outside of ROW) are given a moderate suitability in the Engineering Environment. Within the project, I-75 runs north to south separating the start and stop locations, meaning a crossing is inevitable. This area is of moderate suitability as it is easy to access, generally has shoulders for safety, and limits new impacts to humans and the natural environment.

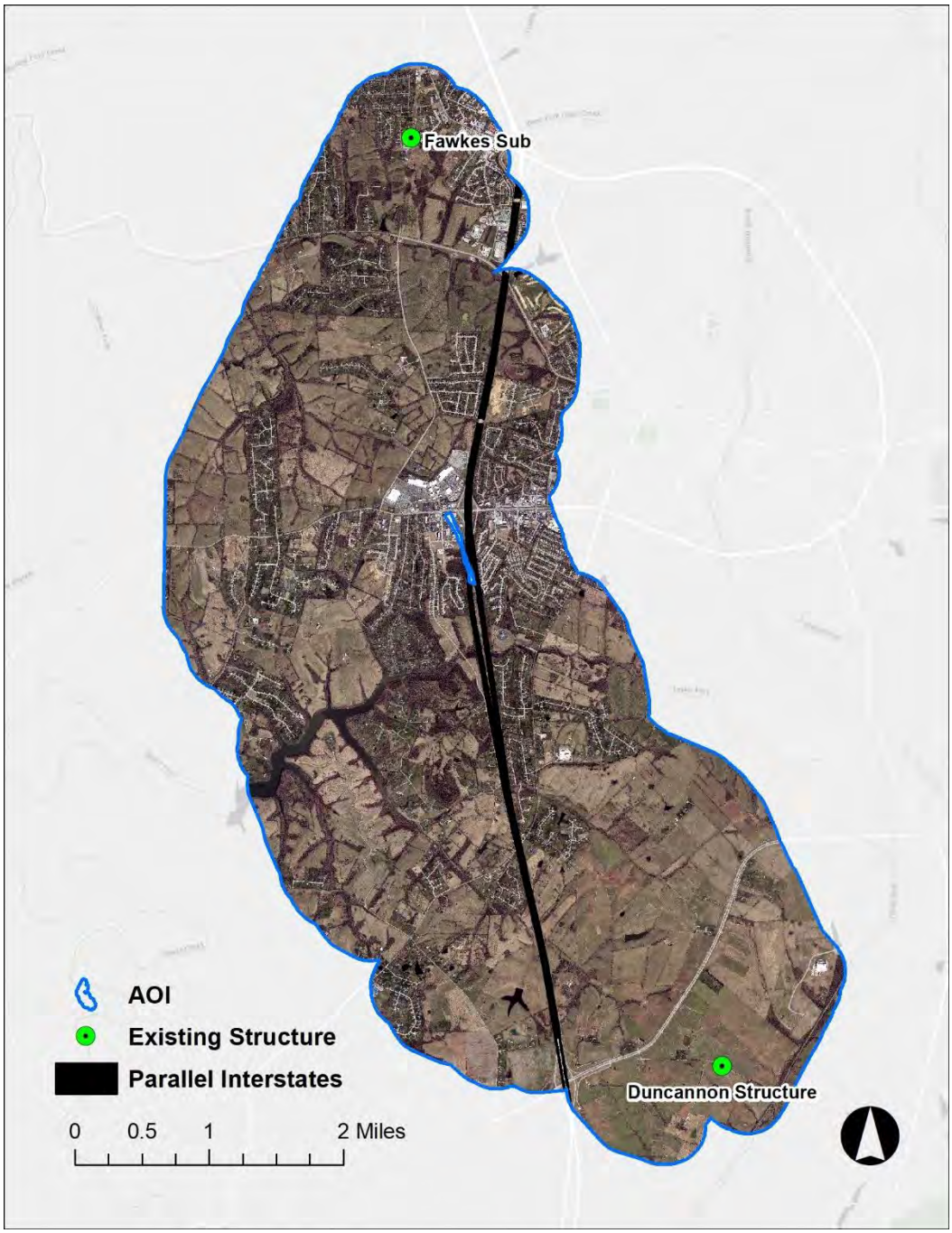


Figure 15: Parallel Interstates

Moderate Suitability: Parallel Road Right-of-Ways

Paralleling road ROW (50' buffer outside road ROW) are given a moderate suitability in the Engineering Environment. Within the study area, there were many roads that provided paralleling opportunities. Roads that were residential in nature and did not provide any connectivity were not considered. Figure 16 displays the suitable road ROW paralleling opportunities found within the study area. The road right-of-way data used in this analysis was created from US Census TIGER lines.

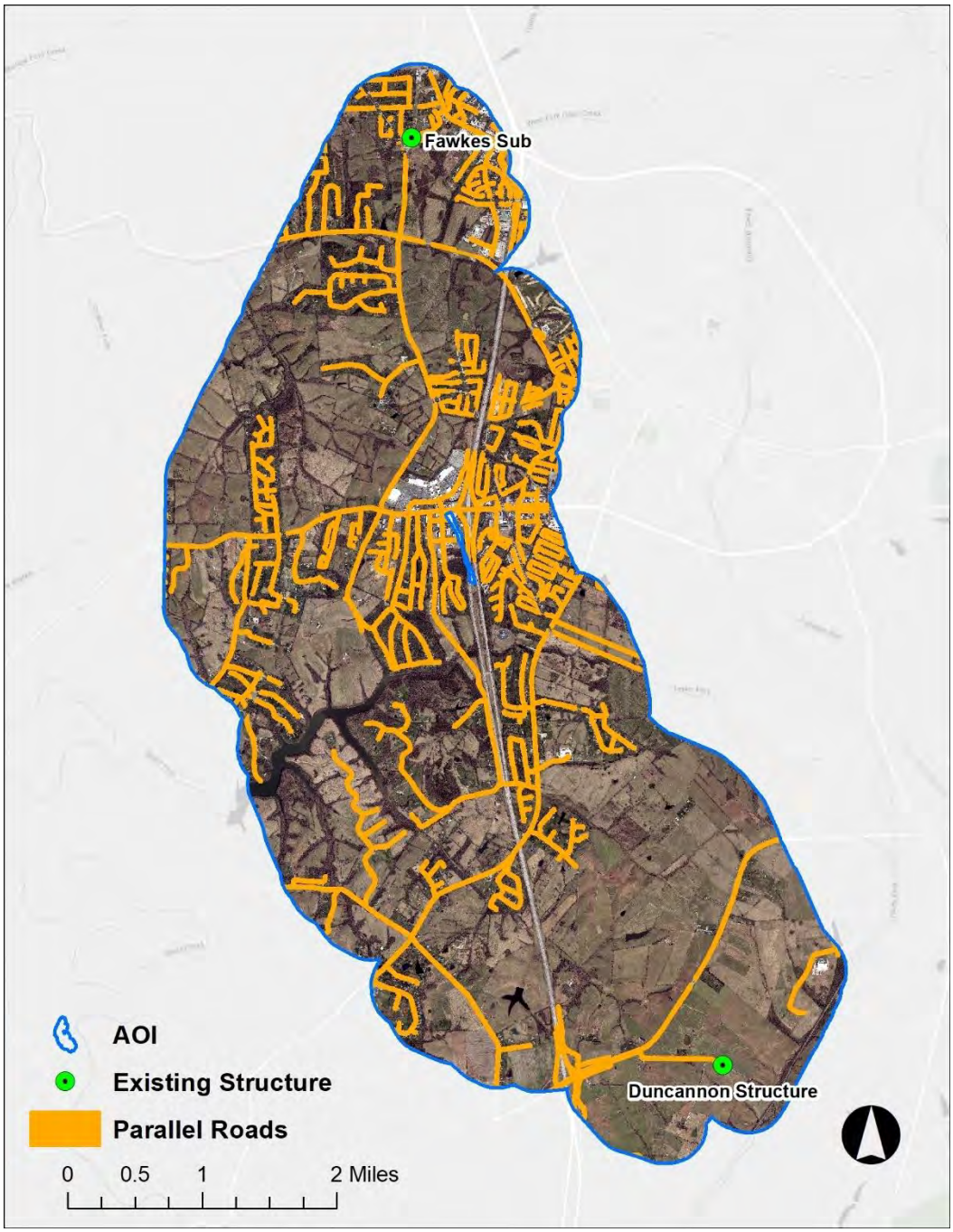


Figure 16: Parallel Road Right-of-Ways

Moderate Suitability: Parallel Pipelines

The EPRI Model looks to co-locate electric and gas utility locations by applying a paralleling buffer to existing pipeline features. Like other parallel features, this a 50’ buffer outside pipeline rows. Upon examining the National Pipeline Mapping System, there are numerous natural gas transmission pipelines within the northern extent of the AOI (owned by Kinder Morgan). These figures were georeferenced and digitized, with final QC via aerial and spherical imagery.

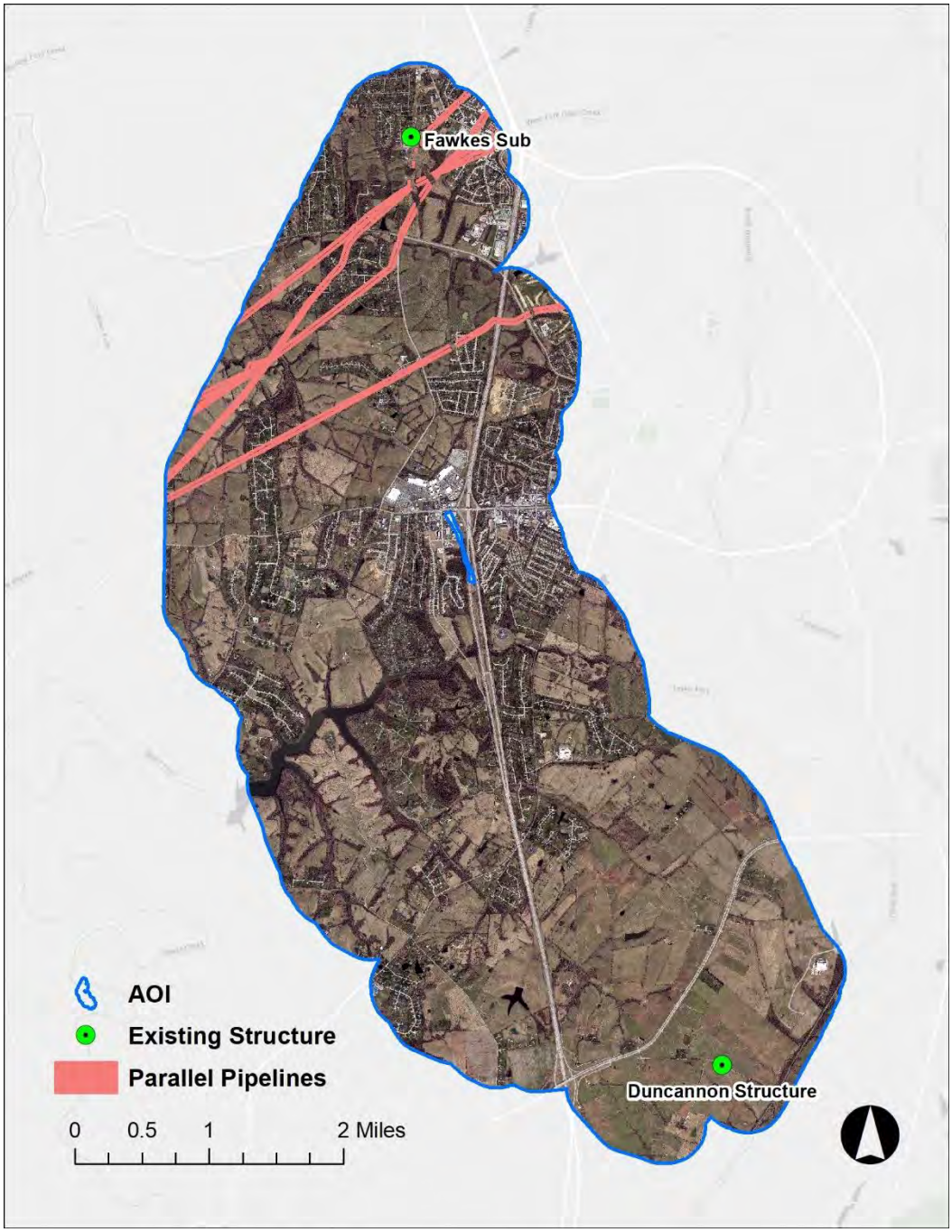


Figure 17: Parallel Pipelines

Moderate Suitability: Future DOT

Upcoming Department of Transportation projects are moderately suitable within the EPRI model. Within this project, there is one ROW and widening project along KY HWY 52, as seen in the figure below. Data was referenced from the Kentucky Department of Transportation and transcribed into existing road features.

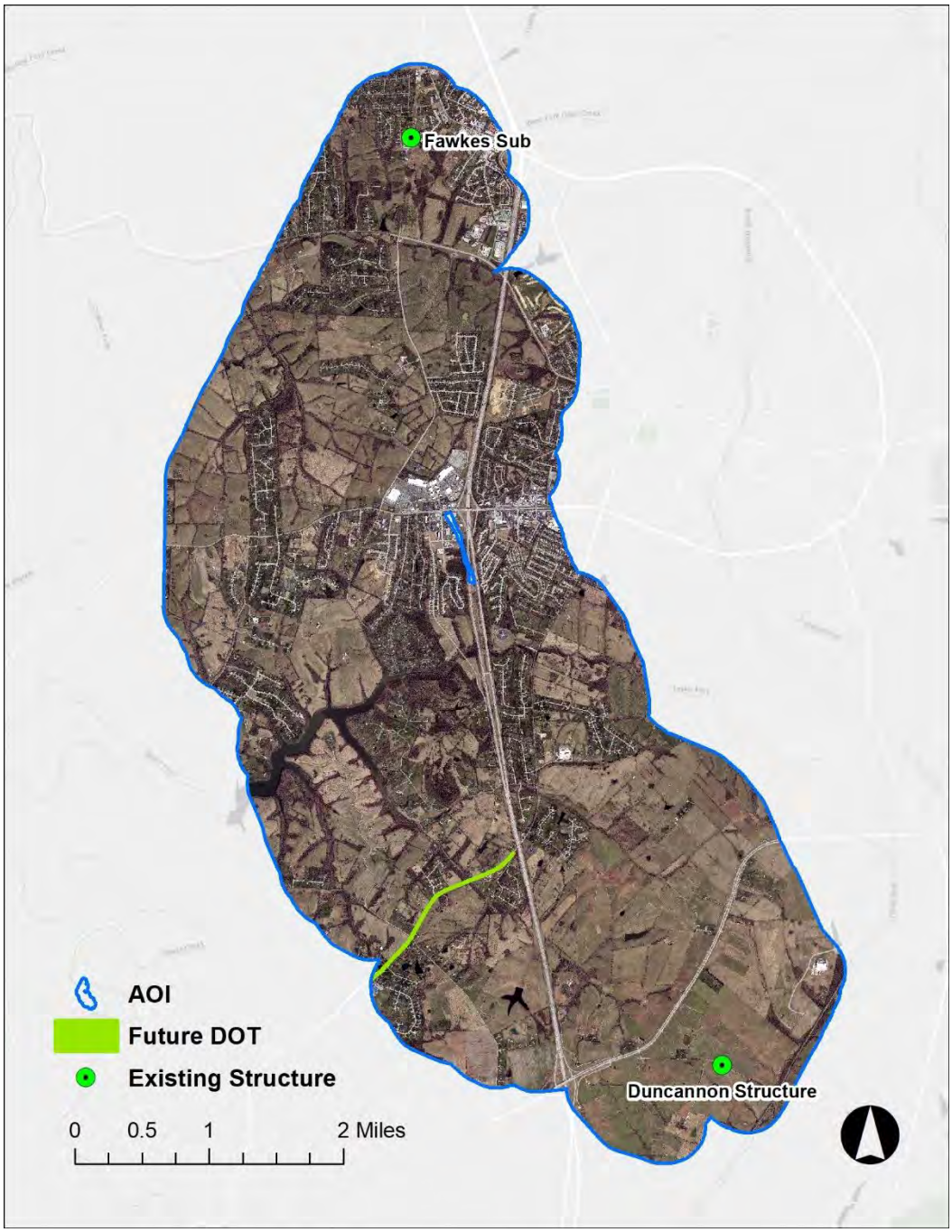


Figure 18: Future DOT

Moderate Suitability: Parallel Railway ROW

The EPRI Model looks to co-locate electric and railway utility locations by applying a paralleling buffer to existing rail features. This 50' buffer was created by aerial photo interpretation and cross referencing of US Census Transportation files. The rail line in the AOI is owned by CSX.

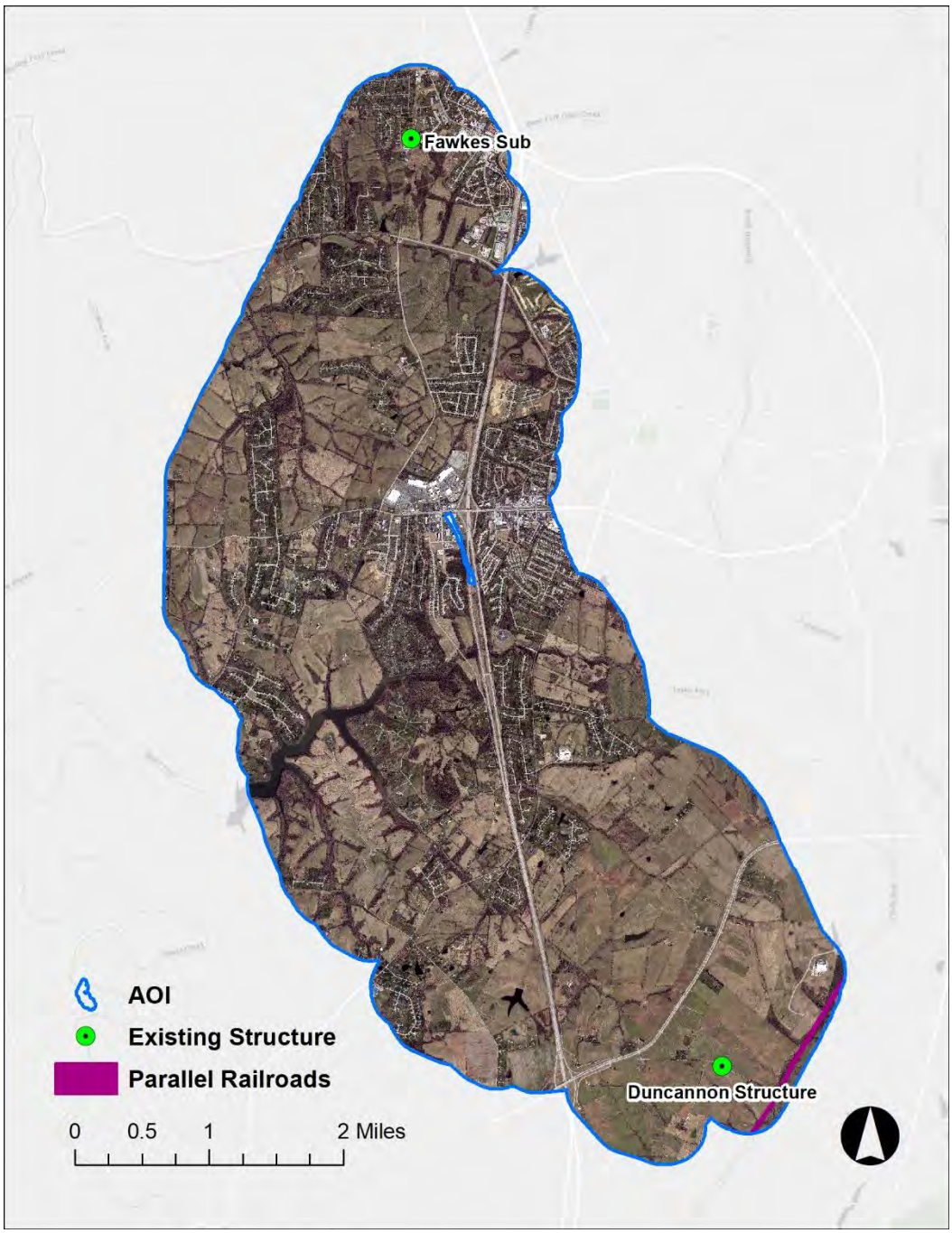


Figure 19: Parallel Railway ROW

Lower Suitability: Road Right-of-Ways

Road ROWs are given a lower suitability in the Engineering Environment. The ROW feature is the area inside of the parallel roads feature and is derived from the same dataset (US Census Tiger Lines). Though it is often necessary to cross over existing road ROWs, the centerline of the transmission line should not travel directly down the center of an existing roadway. Figure 20 highlights existing road right of ways.

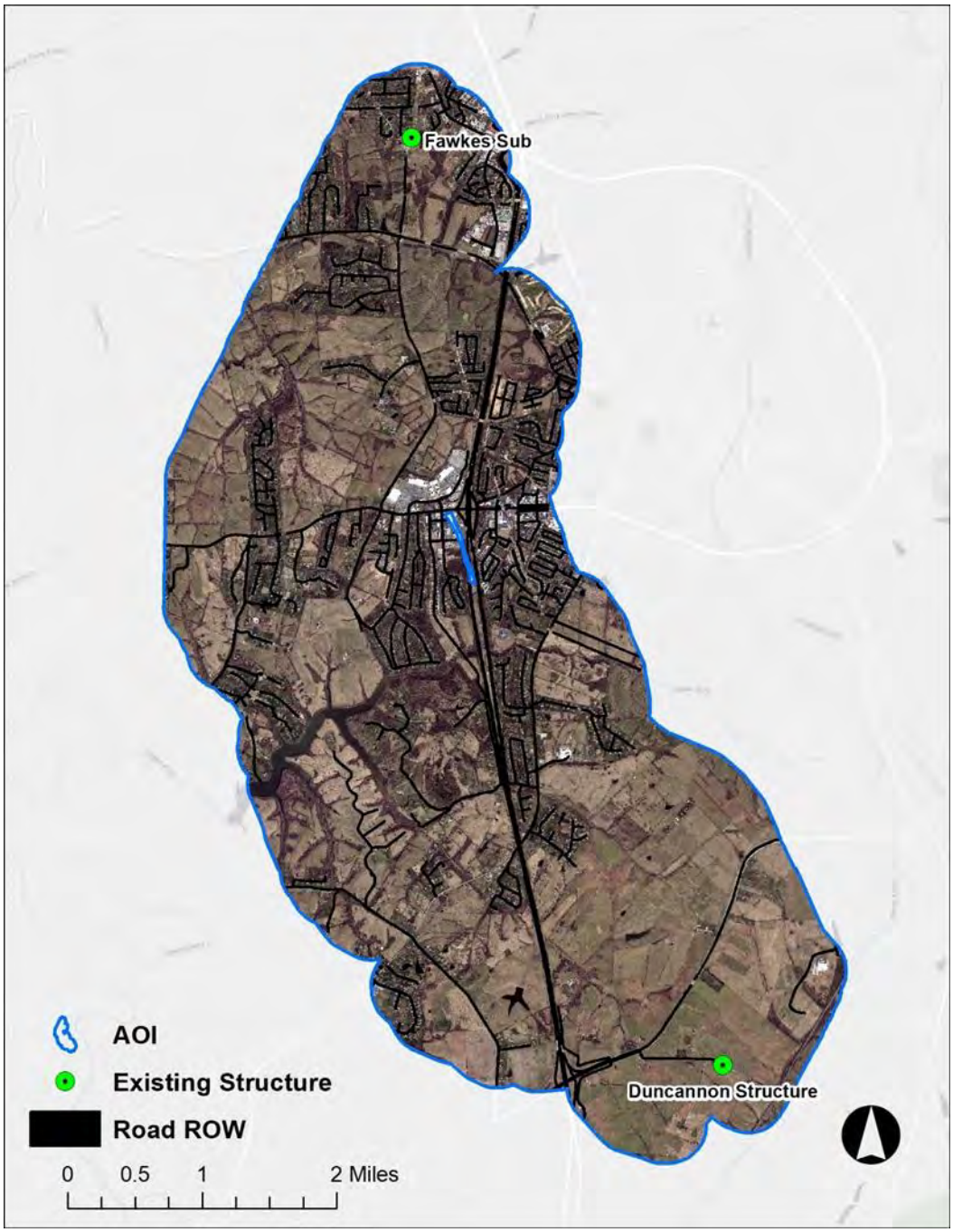


Figure 20: Road Right-of-Ways

Low Suitability: Rebuild Existing Transmission Lines

The EPRI Model distinguishes between “good” and “bad” rebuild opportunities present in existing transmission lines. “Bad” rebuild opportunities represent transmission line easements with existing infrastructure that have been determined to be unsuitable to rebuild as a double-circuited transmission line. It could be feasible in some circumstances to rebuild an existing transmission line (Good) and use the existing easement, while purchasing only a minimal amount of additional ROW. For this project EKPC determined that All EKPC lines would be desirable to rebuild (Good). The existing utility ROWs that were not owned by EKPC (Bad transmission lines) to re-build are owned and operated by LGE&KU.

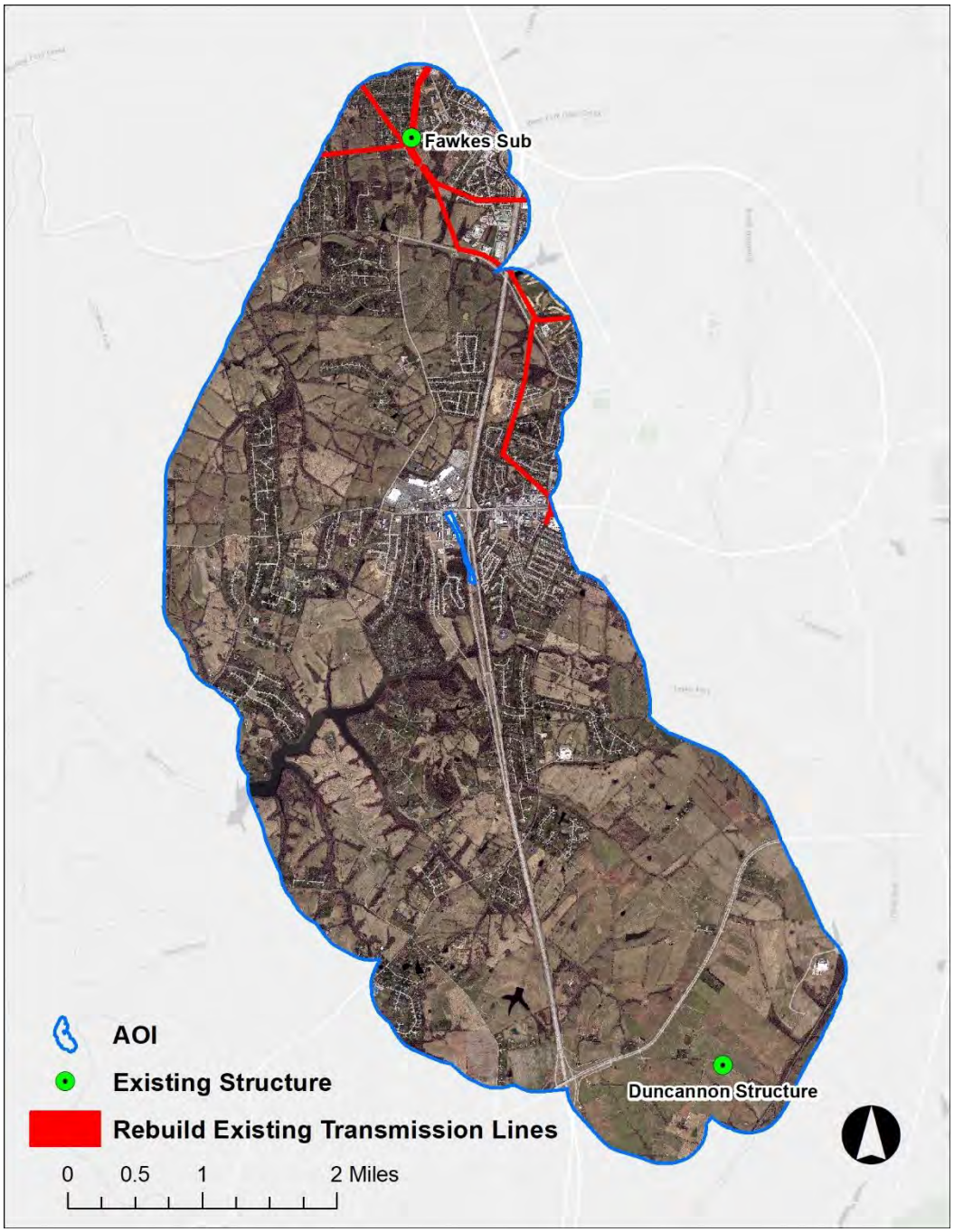


Figure 21: Rebuild (Bad) Existing Transmission Lines

Slope

The slope of the terrain can play a significant role in routing and constructing a transmission line. Using Digital Elevation Model (DEM) data for the commonwealth of Kentucky, percent slope is extracted and used in the model. Figure 22 details the locations and percentages of the slopes found within the study area. The steepest and least desirable areas in the project are found along the riparian zones, specifically around Wilgreen Lake. Slope percent breakdowns are set by the KY EPRI model at 0-15%, 15-30%, 30-40% and >40%.

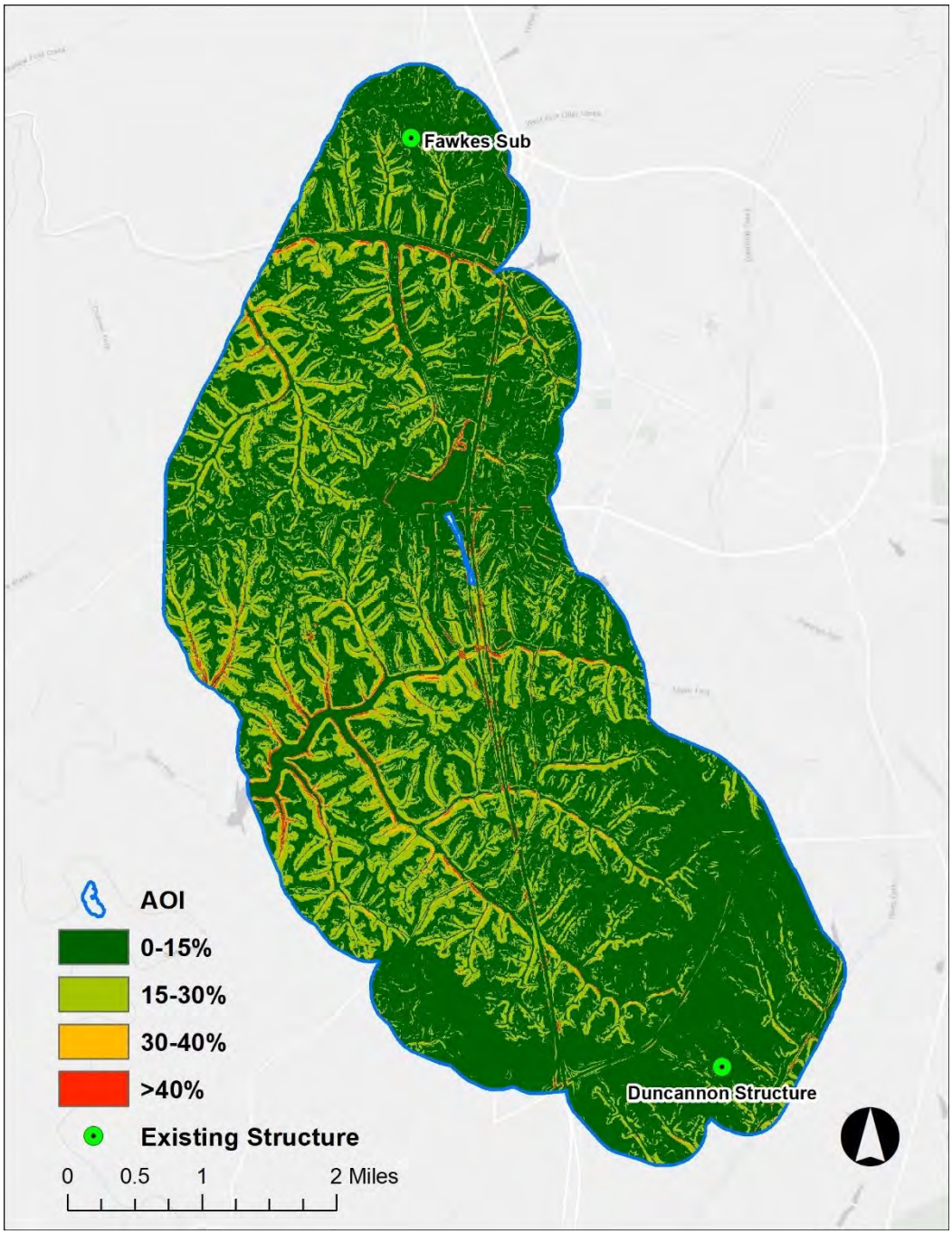


Figure 22: Slope

Avoidance Areas

Buildings, mines, quarries, airports, military facilities, and non-spannable water bodies are designated as areas of least preference in the Engineering Environment of the siting model. Within the study area, only buildings were found to be present.

Buildings

Buildings are designated as areas of least preference within the Engineering Environment. NV5 Geospatial used basemap imagery to extract the footprints of buildings. The most prominent buildings within the AOI were residential, accounting for ~75% of the structure types in the AOI.

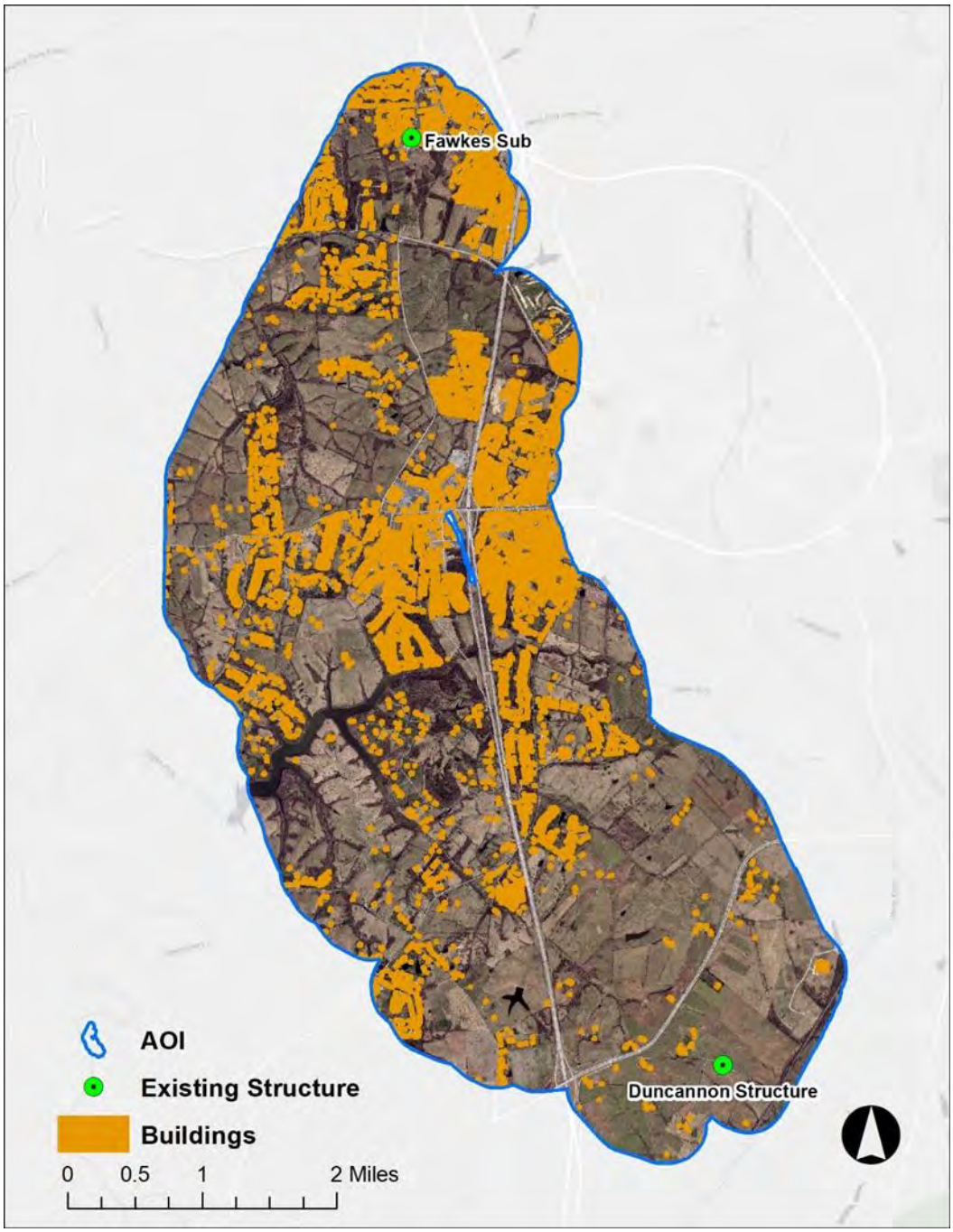


Figure 23: Avoidance Areas; Buildings

Figure 24: Building within the AOI (NV5 Field Photo)

PART VI: NATURAL ENVIRONMENT

Table 4 is the Natural Environment sub-model of the Kentucky tailored EPRI siting model. The sub-model incorporates those features whose presence or absence should be considered from the perspective of protecting the natural environment when constructing a transmission line.

Natural Environment	
Floodplain	**4.6%**
Background	1
100 Year Floodplain	9
Streams/Wetlands	**29.2%**
Background	1
Streams < 5cfs+ Regulatory Buffer	6.2
Rivers/Streams > 5cfs+ Regulatory Buffer	7.1
Wetlands + 30' Buffer	8.7
Outstanding State Resource Waters	9
Public Lands	**17.7%**
Background	1
WMA - Not State Owned	5.1
USFS (proclamation area)	6.2
Other Conservation Land	7.8
USFS (actually owned)	9
State Owned Conservation Land	9
Land Cover	**19.8%**
Developed Land	1
Agriculture	4.6
Forests	9
Wildlife Habitat	**28.7%**
Background	1
Species of Concern Habitat	9
AVOIDANCE AREAS	
EPA Superfund Sites	
State and National Parks	
USFS Wilderness Area	
Wild/Scenic Rivers	
Wildlife Refuge	
State Nature Preserves	
Designated Critical Habitat	

Table 4: Natural Environment Layers and Weights (Model Values)

Natural Environment Data Layer Weights (Project-Adjusted Values)

Not all features are present within every study area. Each model and sub-model must be adjusted based on the contents of the study area for a particular project. When a feature or layer is absent, the weights are adjusted accordingly and evenly across the remaining features or layers. The Natural Environment data layers and their relative weights for the Fawkes Duncannon project are summarized in Table 5 below. Items highlighted in gray are not present in the study area unless otherwise discussed below.

Natural Environment	
Floodplain	**5.6%**
Background	1
100 Year Floodplain	9
Streams/Wetlands	**35.5%**
Background	1
Streams < 5cfs+ Regulatory Buffer	6.4
Rivers/Streams > 5cfs+ Regulatory Buffer	7.3
Wetlands + 30' Buffer	9
Outstanding State Resource Waters	-
Public Lands	**-**
Background	-
WMA - Not State Owned	-
USFS (proclamation area)	-
Other Conservation Land	-
USFS (actually owned)	-
State Owned Conservation Land	-
Land Cover	**24.1%**
Developed Land	1
Agriculture	4.6
Forests	9
Wildlife Habitat	**34.9%**
Background	1
Species of Concern Habitat	9
AVOIDANCE AREAS	
EPA Superfund Sites	
State and National Parks	
USFS Wilderness Area	
Wild/Scenic Rivers	
Wildlife Refuge	
State Nature Preserves	
Designated Critical Habitat	

Table 5: Natural Environment Adjusted Data Layers and Weights

Natural Perspective Features

100 Year Floodplain- Federal Emergency Management Agency (FEMA) designated Federal 100-year floodplain. Approximately 410 acres of floodplain exist within the project study area, which is about 3% of the study area.

Streams/Rivers cf/s+ Regulatory Buffer – USGS National Map geospatial products delineate flowline features that have quantified cubic feet per second within their home watershed. These features were parsed out for the two features within the Natural Environment.

Wetlands + 30ft' Buffer – USFW inventory dataset of wetland features within project area.

Outstanding State Resource Waters – There are no listings of State Resource Waters within the AOI

WMA – Not State Owned – There are no Wildlife Management Areas that are not owned by the state within the AOI.

Other Conservation Land – There are no other conservation lands within the AOI.

USFS (proclamation area) – UFSF lands that are set aside and reserves from public domain by executive order or proclamation. None exist within the AOI.

USFS (actually owned) – USFS lands that are owned by the agency. None exist within the AOI.

State Owned Conservation Land – No State Conservation Lands exist within the AOI.

Land Use – Developed Land, Agriculture, Forest, are all present within the AOI.

Species of Concern Habitat – Northern Long Eared Bat summer habitat exists within the AOI, and described in detail in Figure 30.

Avoidances

State & National Parks – Analysis of the tax parcel information obtained from the Madison County PVA and national records finds no areas that are federal or state owned parks within the AOI.

EPA Superfund Site – The EPA lists no current superfund sites in the study area.

USFS Wilderness Area – No Wilderness areas exist within the AOI.

Wild / Scenic Rivers – The National Wild & Scenic Rivers System lists no wild / scenic rivers within the AOI.

State Nature Preserves – Data from the Kentucky State Nature Preserve Commission indicates that there are no state nature preserves in the study area.

Wildlife Refuge – The Kentucky State Nature Preserve lists no wildlife refuges in the study area.

Floodplain

Low Suitability: 100 Year Floodplain

The Natural Environment places a low desirability to build transmission within floodplains. The model utilizes the FEMA 100 Year Flood via the National Flood Hazard Map.

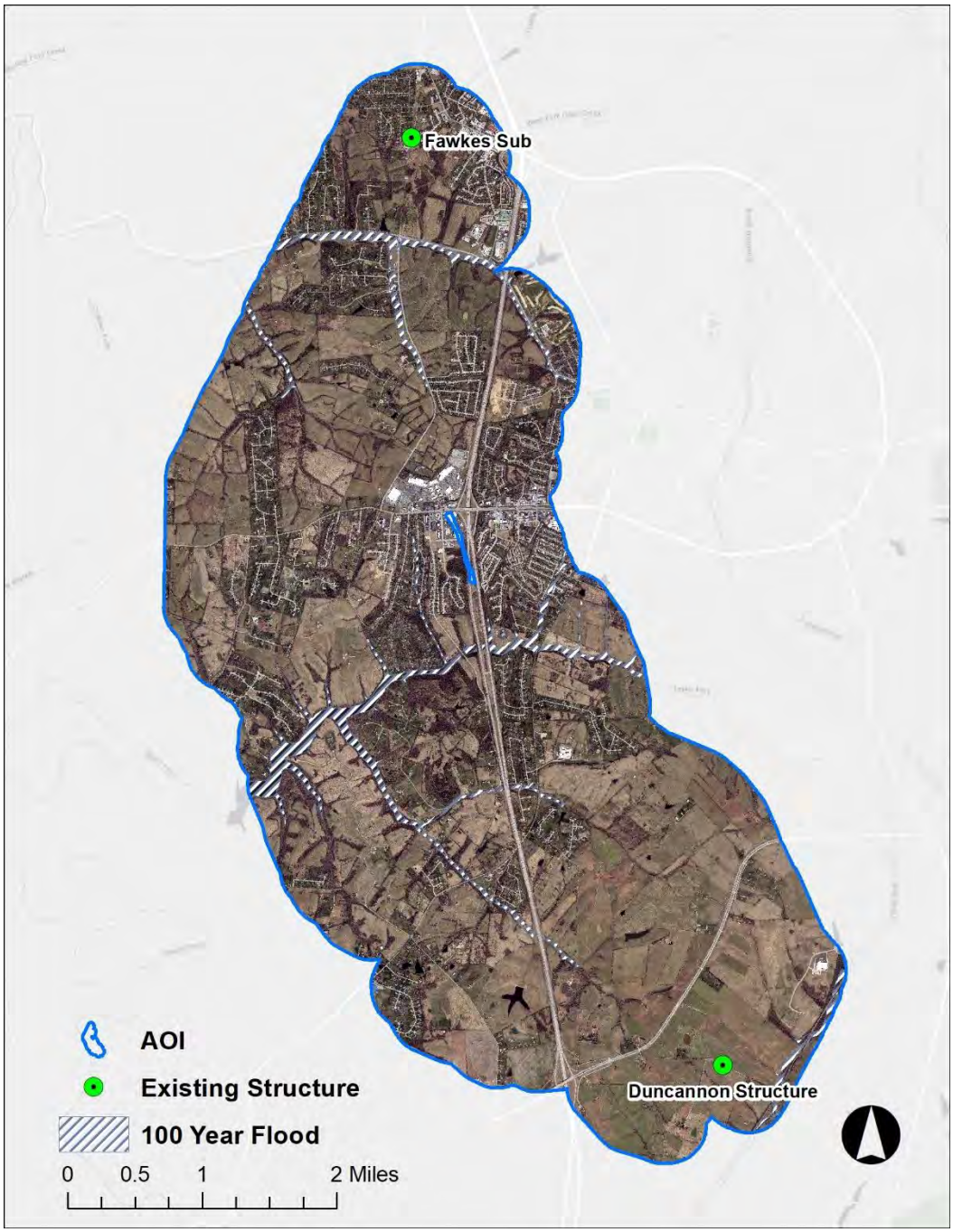


Figure 25: 100 Year Floodplain

Streams & Wetlands

Moderate to Low Suitability: Streams & Rivers

There are two categories for streams & rivers: those with a flow greater than five cubic feet per second (cf/s) and those whose flow is less than five cf/s. It is moderately suitable to cross a stream with a flow that is less than five cf/s and low suitability to crossing a stream with a flow greater than five cf/s. Figure 26 illustrates these river features.

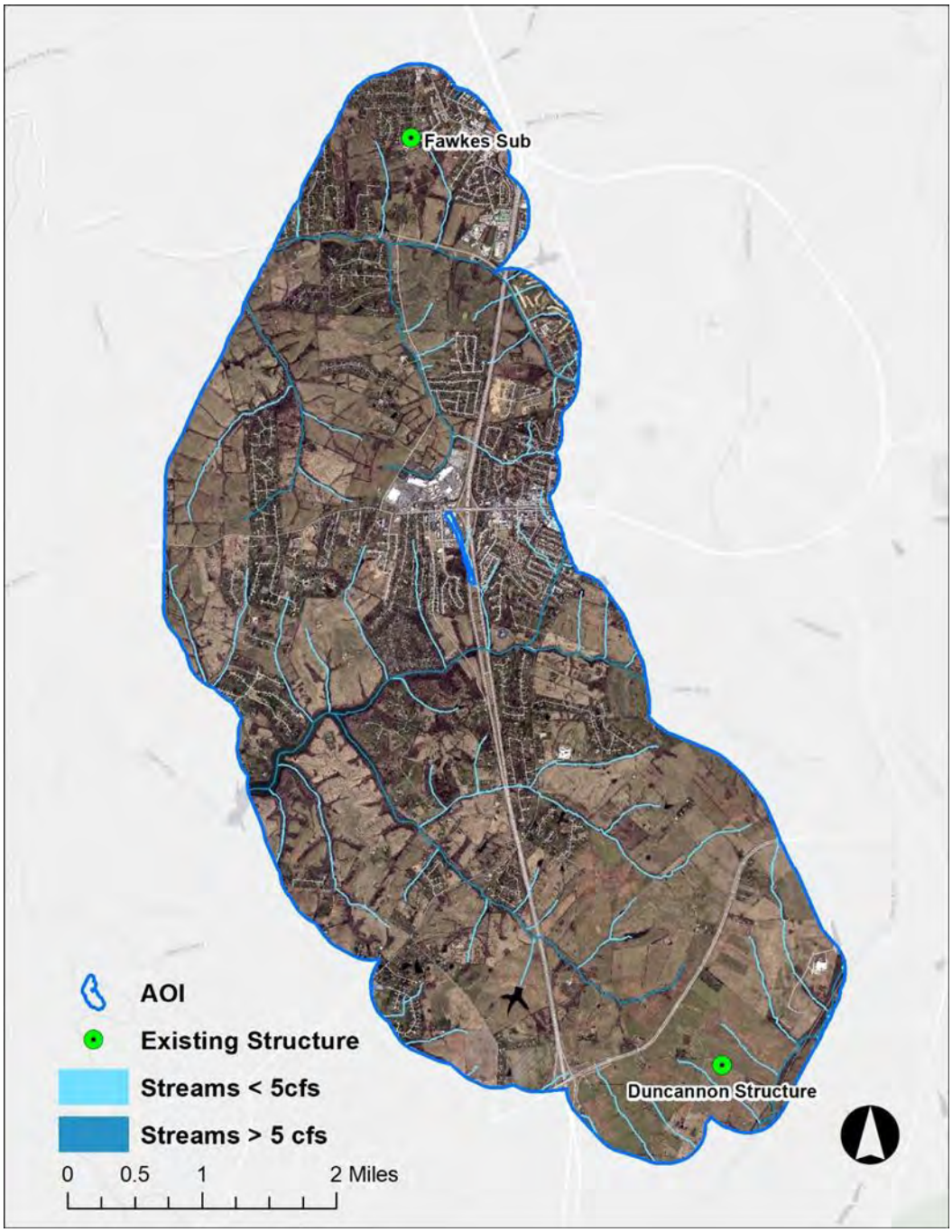


Figure 26: Streams and Rivers

Low Suitability: Wetlands

Wetlands have a low suitability value for locating transmission lines in the Natural Environment perspective.

Per the EPRI KY methodology, only true wetlands as attributed as such within the dataset are used for this input. Lakes, ponds, and riverine areas are disregarded. The source of the wetland information is the U.S. Fish and Wildlife Service's National Wetland Inventory data and is shown in Figure 27.

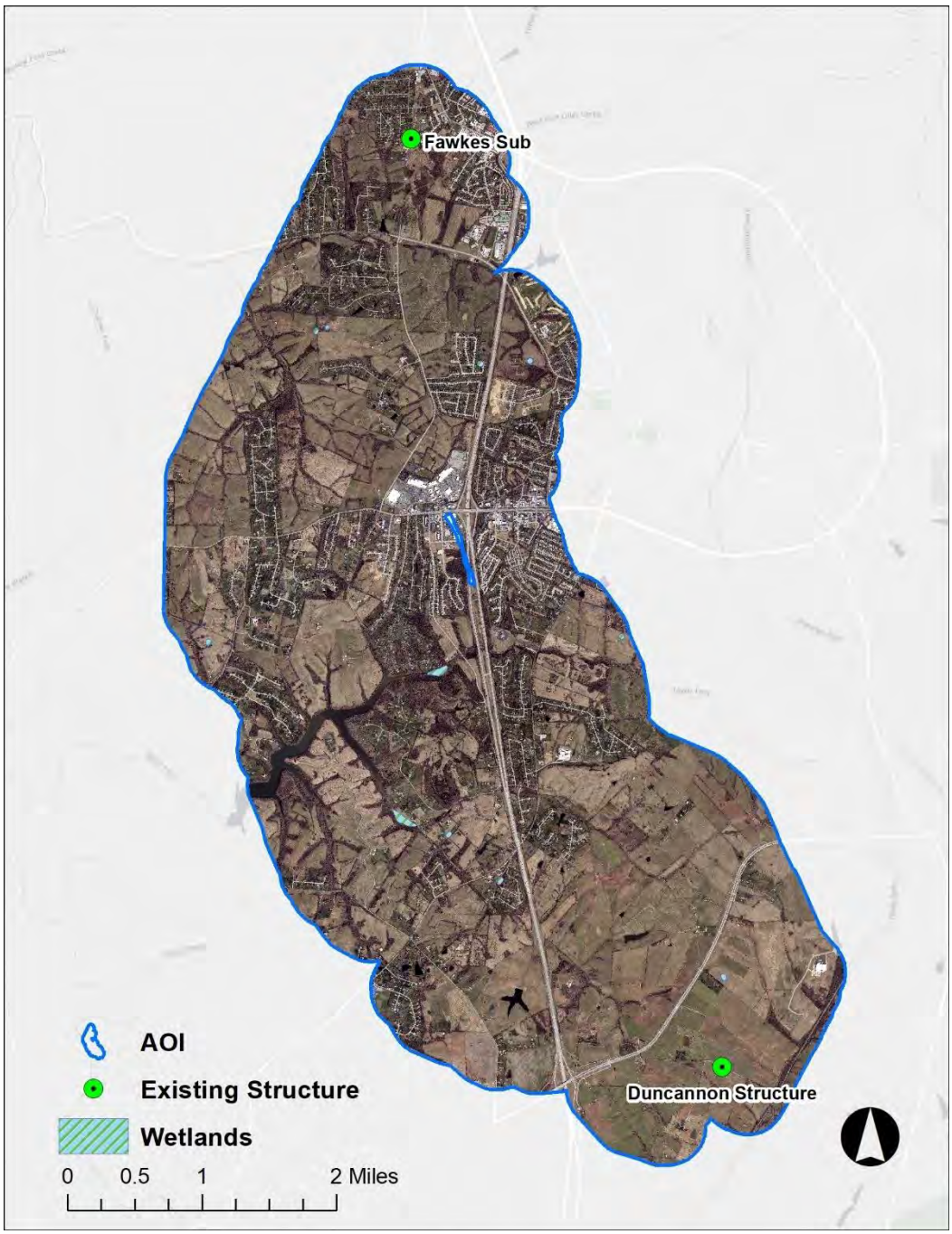


Figure 27: Wetlands

Lowest Suitability: Outstanding State Resource Waters

Outstanding State Resource Waters (OSRW) are areas of least suitability. OSRW waters have been designated by the Kentucky Environmental and Public Protection Cabinet as requiring pollution management, and include certain unique waters of the Commonwealth. Upon detailed review, there are no Outstanding State Resource Waters within the AOI.

Public Lands

There were no Public Lands located within the study area.

Figure 28: Open Land (NV5 Field Photo)

Land Cover

In the Natural Environment, the sub-model finds developed land most suitable for transmission lines. Open and agricultural lands have moderate suitability for the construction of transmission lines. Naturally forested lands and hydrological features have the lowest suitability with respect to the Natural Environment. This layer was created by NV5 Geospatial through aerial photo interpretation of the most recent NAIP imagery as seen in Figure 29.

Land Cover	Model Value	Suitability
Developed Land	1	High
Agriculture	4.6	Moderate
Forests	9	Low

Table 6: Land Cover Suitability

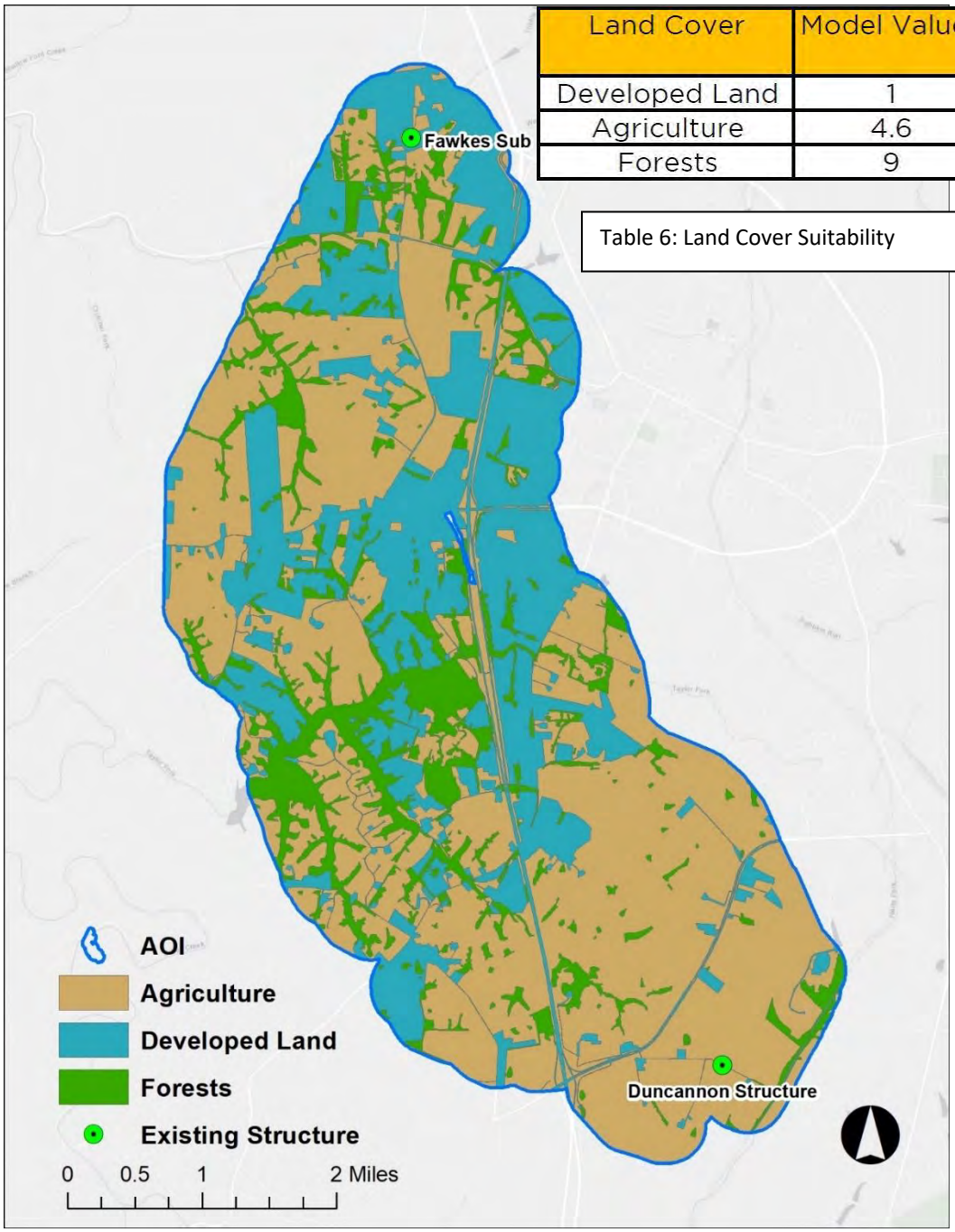


Figure 29: Land Cover

Wildlife Habitat

Lowest Suitability: Species of Concern Habitat

Although the AOI is within known summer habitat for the Northern Long Eared Bat (Myotis septentrionalis), the AOI will not be within 0.25 mile of a known hibernacula or 150 feet of a known occupied maternity tree, so the project will qualify for reliance on the USFWS's programmatic biological opinion for the Final 4(d) Rule. This rule concludes there is not a significant effect due to the interfering features not being near a cave or maternity tree. To ensure the forested habitat was accounted for this bat habitat, EPKC and NV5G determined all forested features within the known habitat are least desirable for transmission location as seen in figure 30.

This layer was created by NV5G based on USFWS data and EKPC consultation.

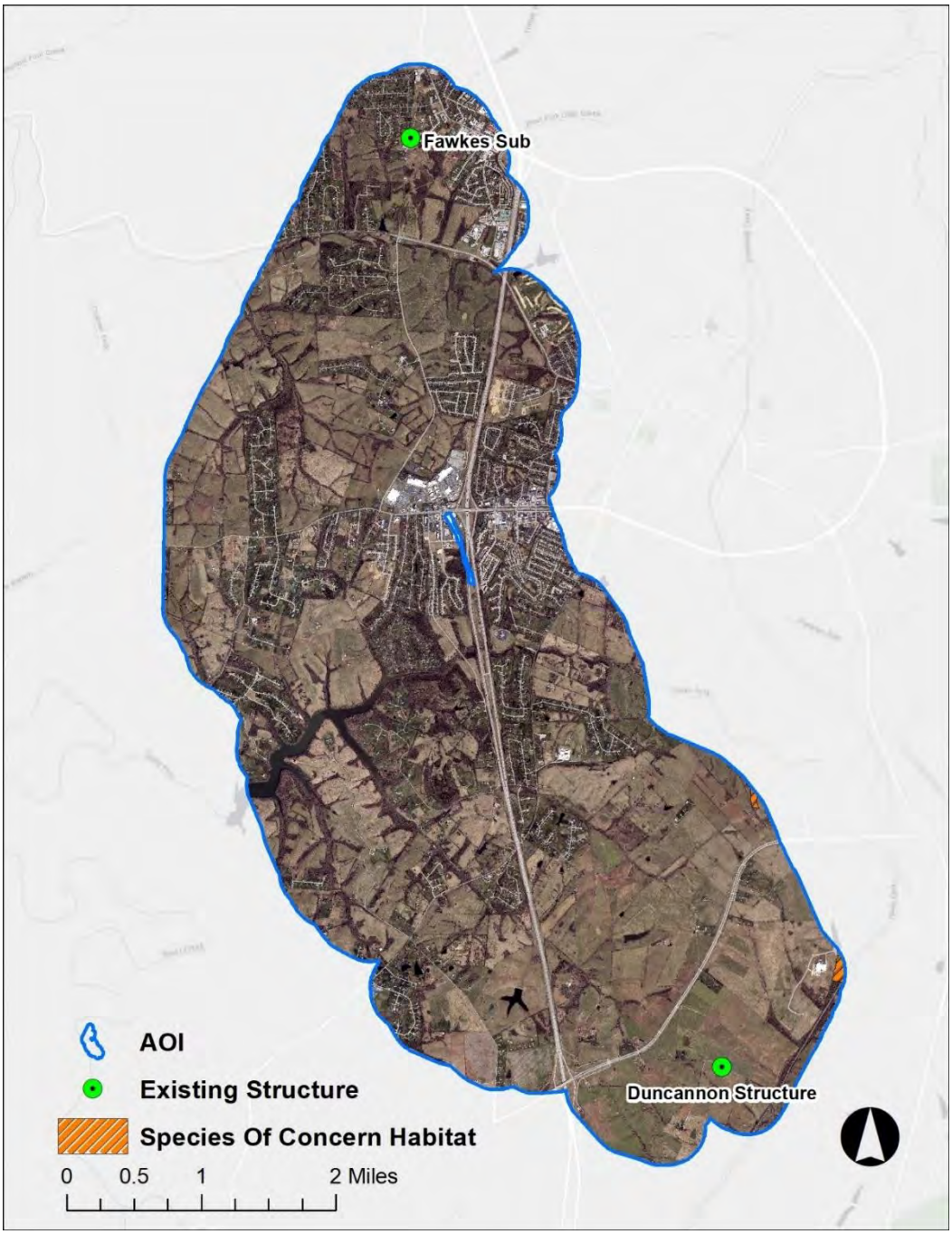


Figure 30: Species of Concern Habitat

PART VII: BUILT ENVIRONMENT

Table 7 is the Built Environment sub-model of the Kentucky tailored EPRI Siting Model. The sub-model incorporates those features whose presence or absence should be considered from the perspective of preserving human development and activities, including view shed, when constructing a transmission line.

Built Environment			
Proximity to Buildings	**16.8%**	**Proximity to Eligible Historic and Archeological Sites**	**31.0%**
Background	1	Background	1
900-1200'	3.4	900-1200'	4.6
600-900'	5.7	600-900'	7.9
300-600'	8	0-300'	8.6
0-300'	9	300-600'	9
Building Density	**8.4%**	***AVOIDANCE AREAS***	
0 - 0.05 Buildings/Acre	1	Listed Archaeology Sites & Dist.	
0.05 - 0.2 Buildings/Acre	3	Listed NRHP Districts and Buildings	
0.2 - 1 Buildings/Acre	5.6	City and County Parks	
1 - 4 Buildings/Acre	8.5	Day Care Parcels	
> 4 Buildings/Acre	9	Cemetery Parcels	
Proposed Development	**3.9%**	School Parcels	
Background	1	Church Parcels	
Proposed Development	9		
Spannable Lakes and Ponds	**4.0%**		
Background	1		
Spannable Lakes and Ponds	9		
Land Use	**35.9%**		
Commercial/Industrial	1		
Agriculture (crops)	3.5		
Agriculture (other livestock)	4.6		
Silviculture	6		
Other (forest)	6.7		
Equine Agri - Tourism	8		
Residential	9		

Table 7: Built Environment Data Layers and Weights

Built Environment Data Layer Weights (Project-Adjusted Values)

Not all features are present within every study area. Each model and sub-model must be adjusted based on the contents of the study area for a particular project. When a feature or layer is absent (greyed out), the weights are adjusted evenly across the remaining features or layers. The Built Environment data layers and their relative weights for the Fawkes Duncannon project are summarized in Table 8.

Built Environment			
Proximity to Buildings	**16.8%**	**Proximity to Eligible Historic and Archeological Sites**	**31.0%**
Background	1	Background	1
900-1200'	3.4	900-1200'	4.6
600-900'	5.7	600-900'	7.9
300-600'	8	0-300'	8.6
0-300'	9	300-600'	9
Building Density	**8.4%**	***AVOIDANCE AREAS***	
0 - 0.05 Buildings/Acre	1	Listed Archaeology Sites & Dist	
0.05 - 0.2 Buildings/Acre	3	Listed NRHP Districts and Buildings	
0.2 - 1 Buildings/Acre	5.6	City and County Parks	
1 - 4 Buildings/Acre	8.5	Day Care Parcels	
> 4 Buildings/Acre	9	Cemetery Parcels	
Proposed Development	**3.9%**	School Parcels	
Background	1	Church Parcels	
Proposed Development	9		
Spannable Lakes and Ponds	**4.0%**		
Background	1		
Spannable Lakes and Ponds	9		
Land Use	**35.9%**		
Commercial/Industrial	1		
Agriculture (crops)	3.5		
Agriculture (other livestock)	4.6		
Silviculture	-		
Other (forest)	6.7		
Equine Agri - Tourism	-		
Residential	9		

Table 8: Built Environment Adjusted Data Layers and Weights

Built Perspective Features

Proximity to Buildings- Building footprints are delineated from aerial photography with progressive 300' buffers applied to them to create the proximity feature. See Figure 32 for further details.

Building Density – Each building is given a centroid point and point densities are created with the EPRI contained area for calculated areas. See Figure 33 for further details.

Proposed Developments- Data from Madison County PVA revealed two proposed developments within the AOI. See figure 34 for further details.

Spannable Lakes and Ponds–Lakes and ponds that a 400' span could not cross were not found within the AOI. See figure 35 for further details.

Land Use–Within the Built Perspective there are seven categories of land classification. Within this project five of them were found within the AOI and are detailed in Figure 36.

Proximity To Eligible Historic and Archaeological Sites- Utilizing University of Kentucky and national data sources, one eligible archaeological site was found within the AOI. See figure 37 for further details.

Avoidances

Listed Archaeology Sites and Districts–The UK Department of Archaeology has no listed sites or districts within the AOI.

Listed National Register of Districts and Buildings– US National Register of Historic Places shows features within the AOI.

City and County Parks- Madison County PVA lists parks within the AOI.

Day Care Parcels- Madison County PVA lists day care parcels within the AOI.

Cemetery Parcels- Madison County PVA does not list any cemetery parcels within the AOI.

School Parcels- Madison County PVA lists day care parcels within the AOI.

Church Parcels- Madison County PVA lists day care parcels within the AOI.

Figure 31: Built Avoidances within the Project AOI (NV5 Field Survey)

Proximity to Buildings

In the Built Environment, it is more suitable to locate a transmission line away from buildings. The model has five categories to rank the proximity to buildings layer for suitability at 300 ft increments. The background category constitutes all areas that are farther than 1,200 ft from any building. This data was derived and complied by NV5 from analysis of aerial photography. It is displayed in Figure 32. Building proximity was determined by buffering half the distance to the ROW (50ft) from building footprints, and then applying the 300 ft incremental buffer zones.

Proximity to Buildings	Model Value	Suitability
Background	1	High
900-1200′	3.4	Moderate
600-900′	5.7	Moderate
300-600′	8	Low
0-300′	9	Low

Table 9: Building Proximity Suitability

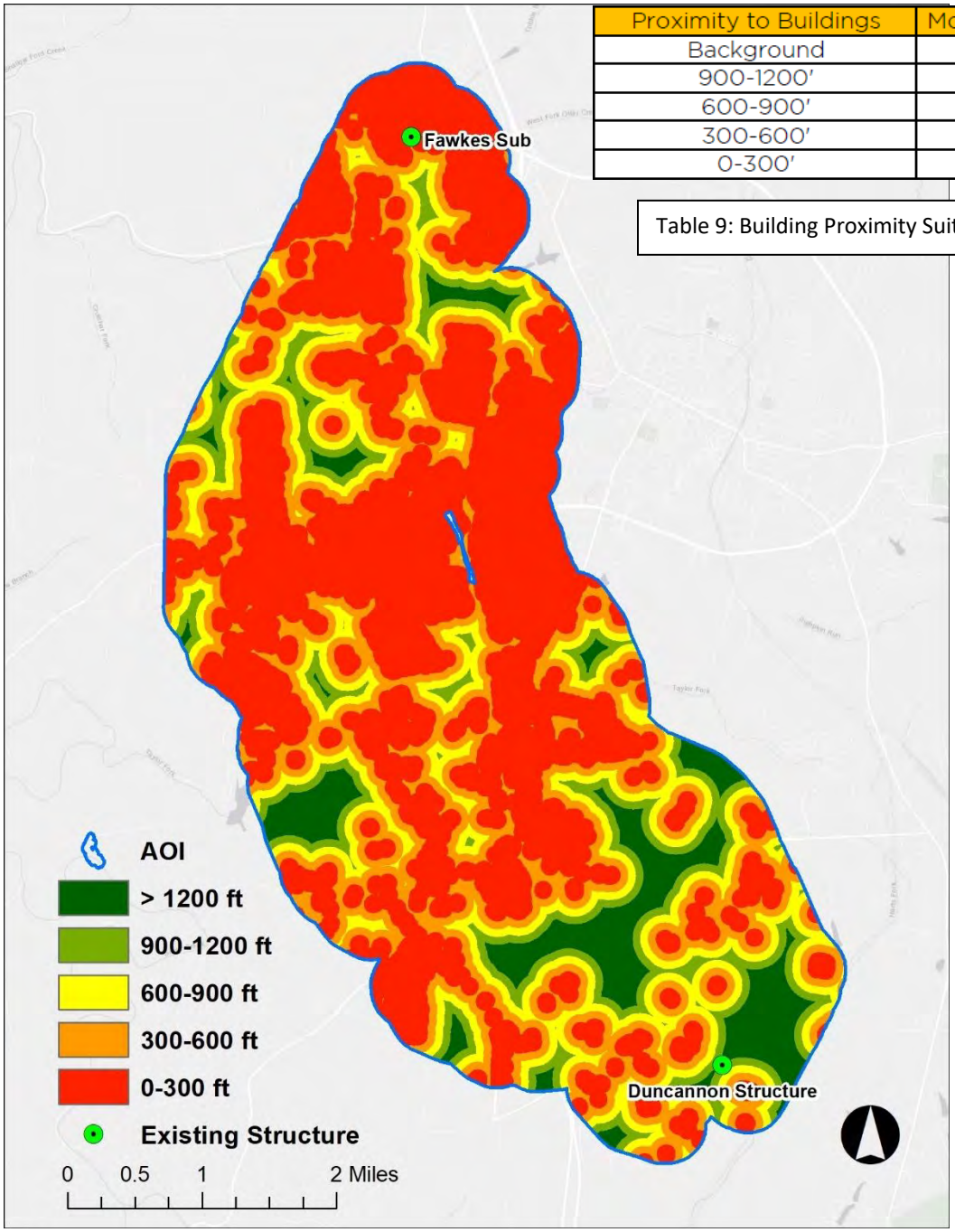


Figure 32: Proximity to Buildings

Building Density

Areas of lower building density are considered more suitable to locate a transmission line within the Built Environment. The density metric is broken down into five classifications which can be viewed in table below. Building centroid information was derived by NV5 Geospatial from analysis of the same building centroids and footprints as the building proximity layer.

Building Density	Model Value	Suitability
0 - 0.05 Buildings/Acre	1	High
0.05 - 0.2 Buildings/Acre	3	Moderate
0.2 - 1 Buildings/Acre	5.6	Moderate
1 - 4 Buildings/Acre	8.5	Low
4 Buildings/Acre	9	Low

Table 10: Building Density Suitability

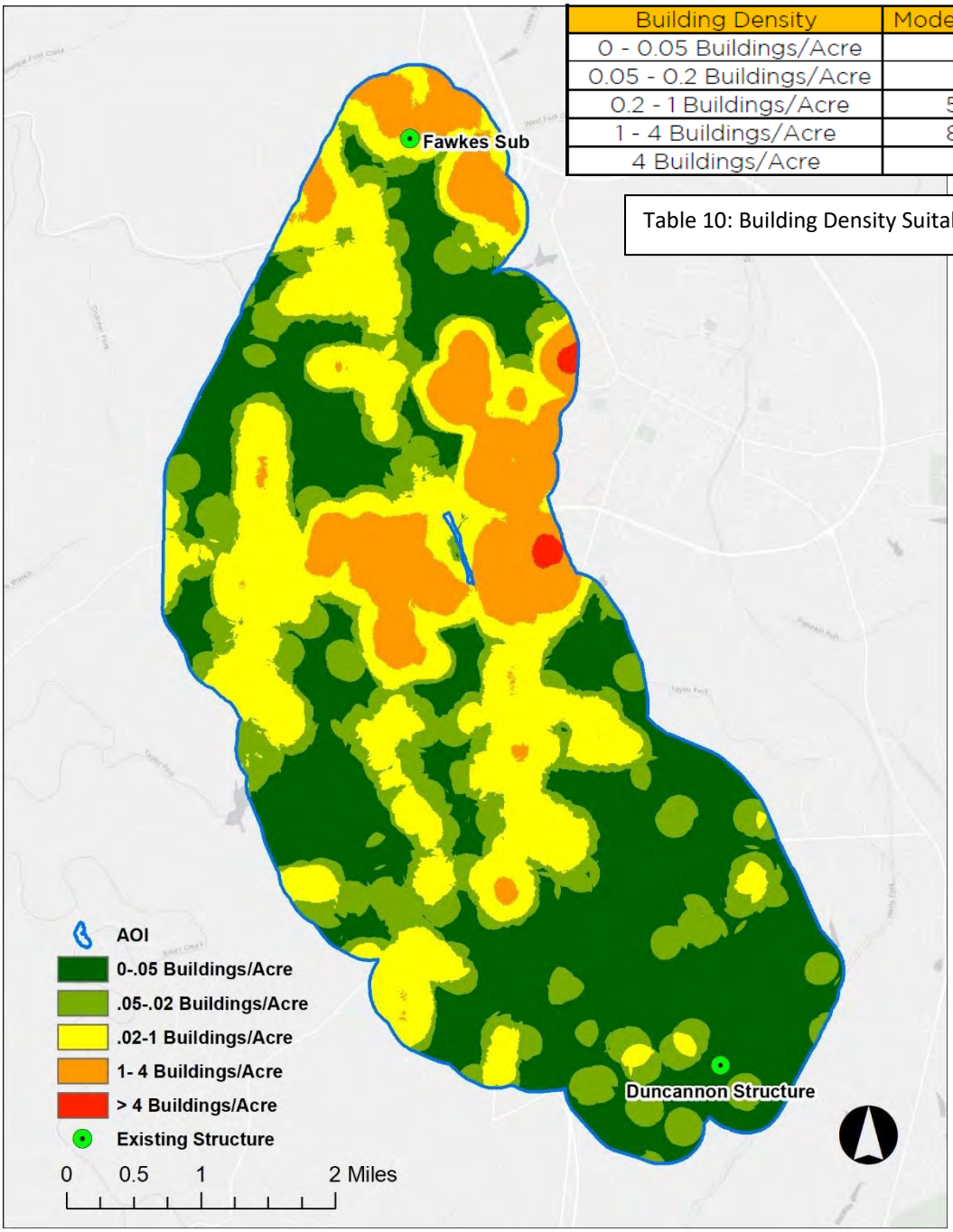


Figure 33: Building Density

Low Suitability: Proposed Development

Within the EPRI model, areas for proposed development are found to be low suitability for building a new transmission line. For the Fawkes Duncannon project, two proposed developments are within the AOI; one for a multi-use commercial/residential development called The Farms west of I-75, and an attached dwelling development east of the interstate. Development and parcel data was downloaded from the Madison County PVA and City of Richmond Planning and Development sites.

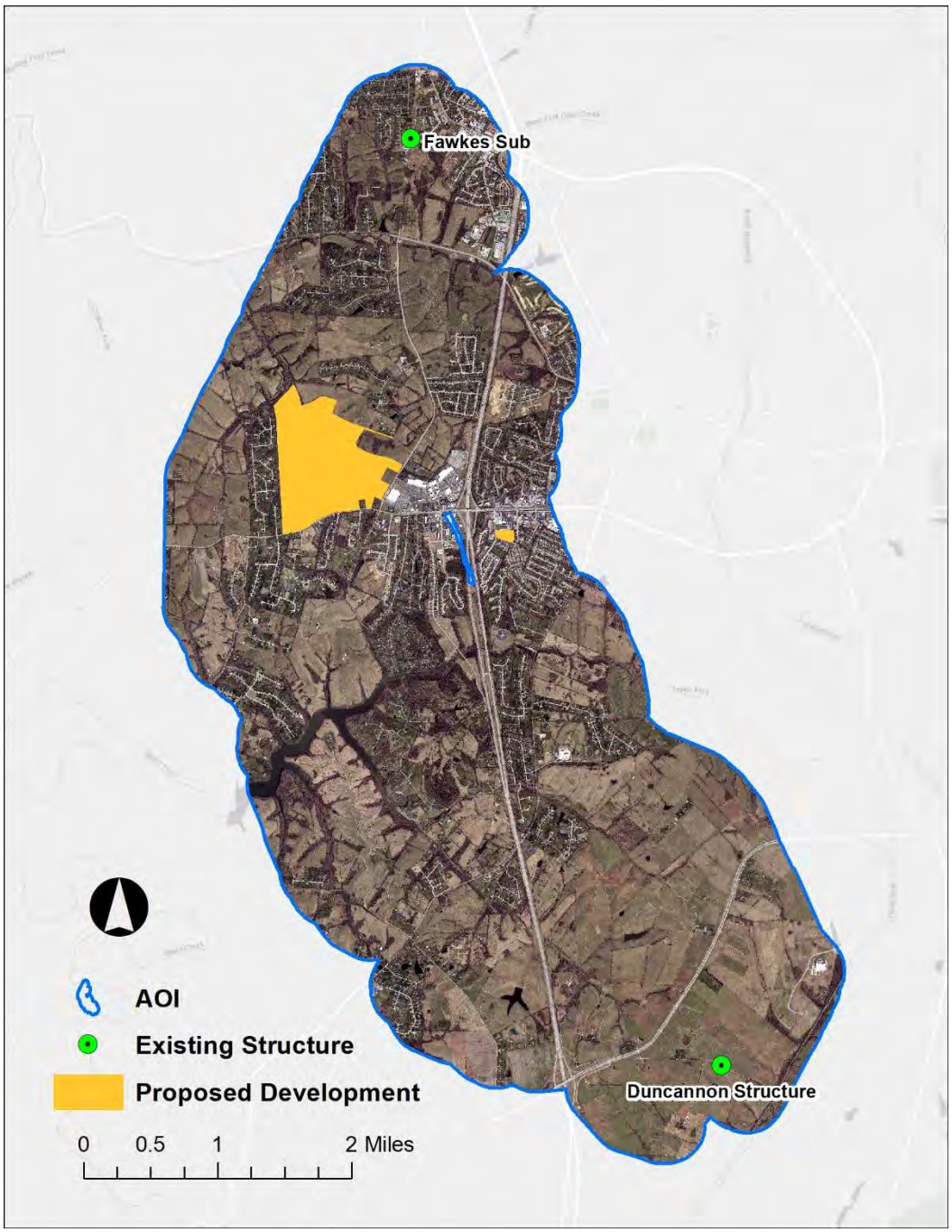


Figure 34: Proposed Development

Waterbodies

Low Suitability: Spannable Lakes and Ponds

Open waters, such as lakes, ponds, and rivers, are designated as less suitable for locating transmission lines. Several small, isolated water bodies exist in the study area. These areas are small enough to allow the construction of a transmission line, however, they still present challenges to the routing process. Figure 35 depicts the location of water bodies distributed within the study area.

The hydrologic features were extracted from aerial photography interpretation and supplemented by the NHD of water bodies in the study area.

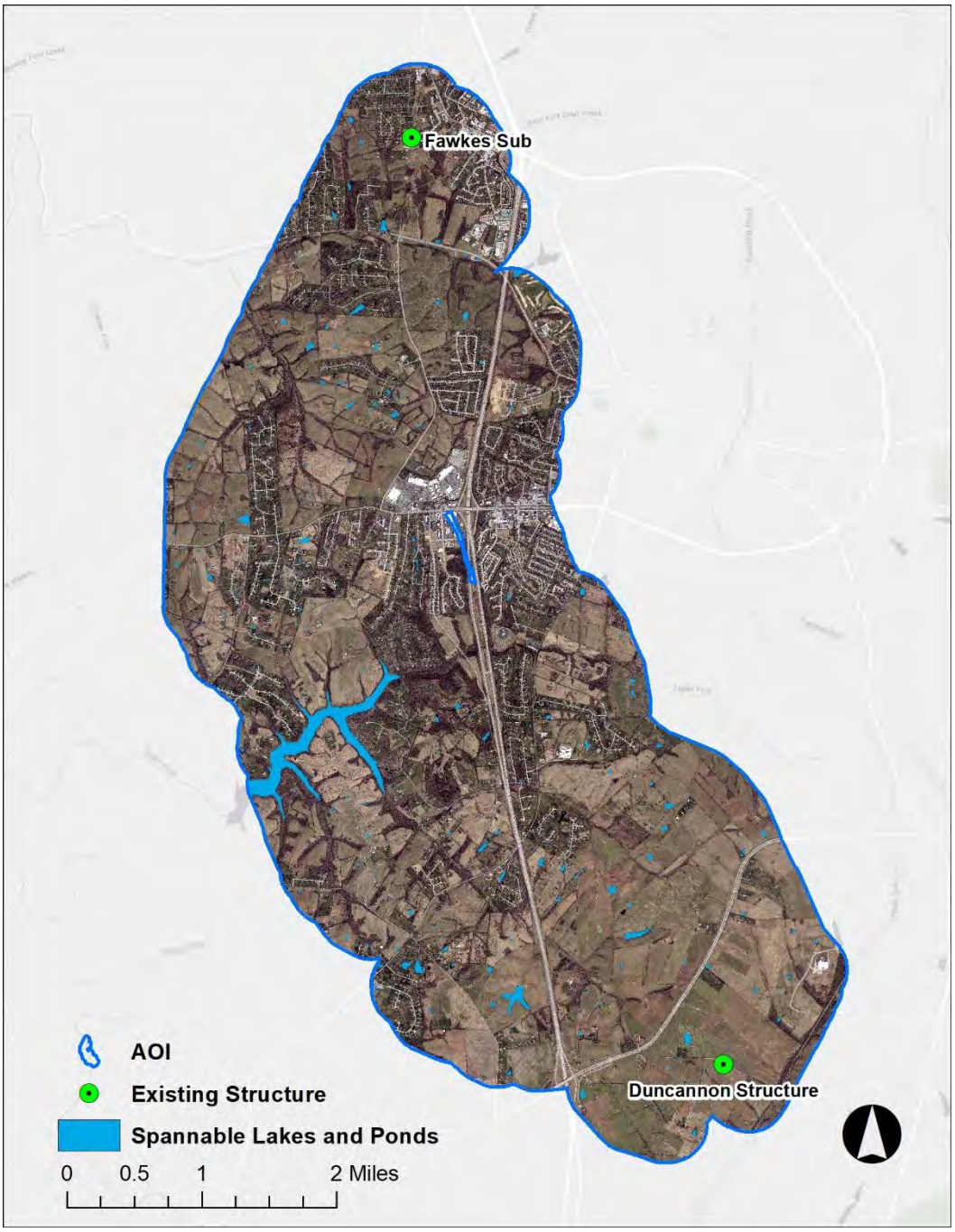


Figure 35: Spannable Lakes and Ponds

Land Use

Land use within the build environment considers commercial or industrial land to be the most suitable for locating transmission lines. Figure 36 shows the existing land use patterns within the study area. Table 11 shows the land use classifications considered by the model. Silviculture and equine agri-tourism classifications were not present in the project AOI. The land use data was extracted using aerial imagery by NG5 Geospatial and cross-referenced with Madison County PVA parcel data.

Land Use	Model Value	Suitability
Commercial/Industrial	1	High
Agriculture (crops)	3.5	Moderate
Agriculture (livestock)	4.6	Moderate
Other (forest/river)	6.7	Low
Residential	9	Low

Table 11: Land Use Suitability

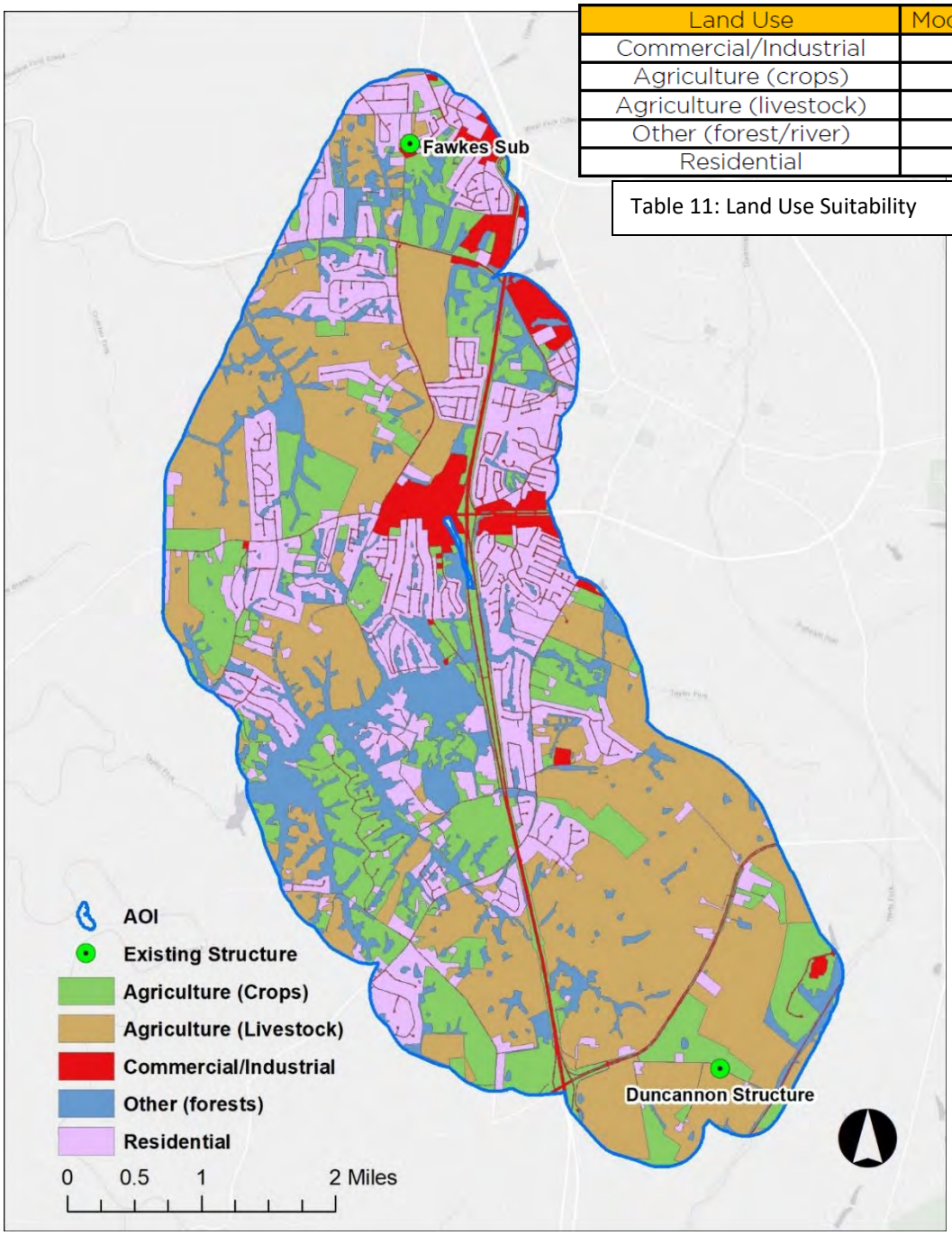


Figure 36: Land Use

Proximity to Eligible Historic and Archaeological Sites

There is one eligible archaeological site within the AOI; it is an earth mound located in the SE section of the AOI. Data was purchased from the UK Archaeological department. Only eligible sites are considered for this input, and details of site specifics and exact location are restricted to qualified archaeologists. The site is displayed below in Figure 37, which looks at proximity buffers at 300' increments for suitability.

Proximity to Eligible Historic and Archaeological Sites	Model Value	Suitability
Background	1	High
900-1200'	4.6	Moderate
600-900'	7.9	Low
0-300'	8.6	Low
300-600'	9	Low

Table 12: Archeological Proximity

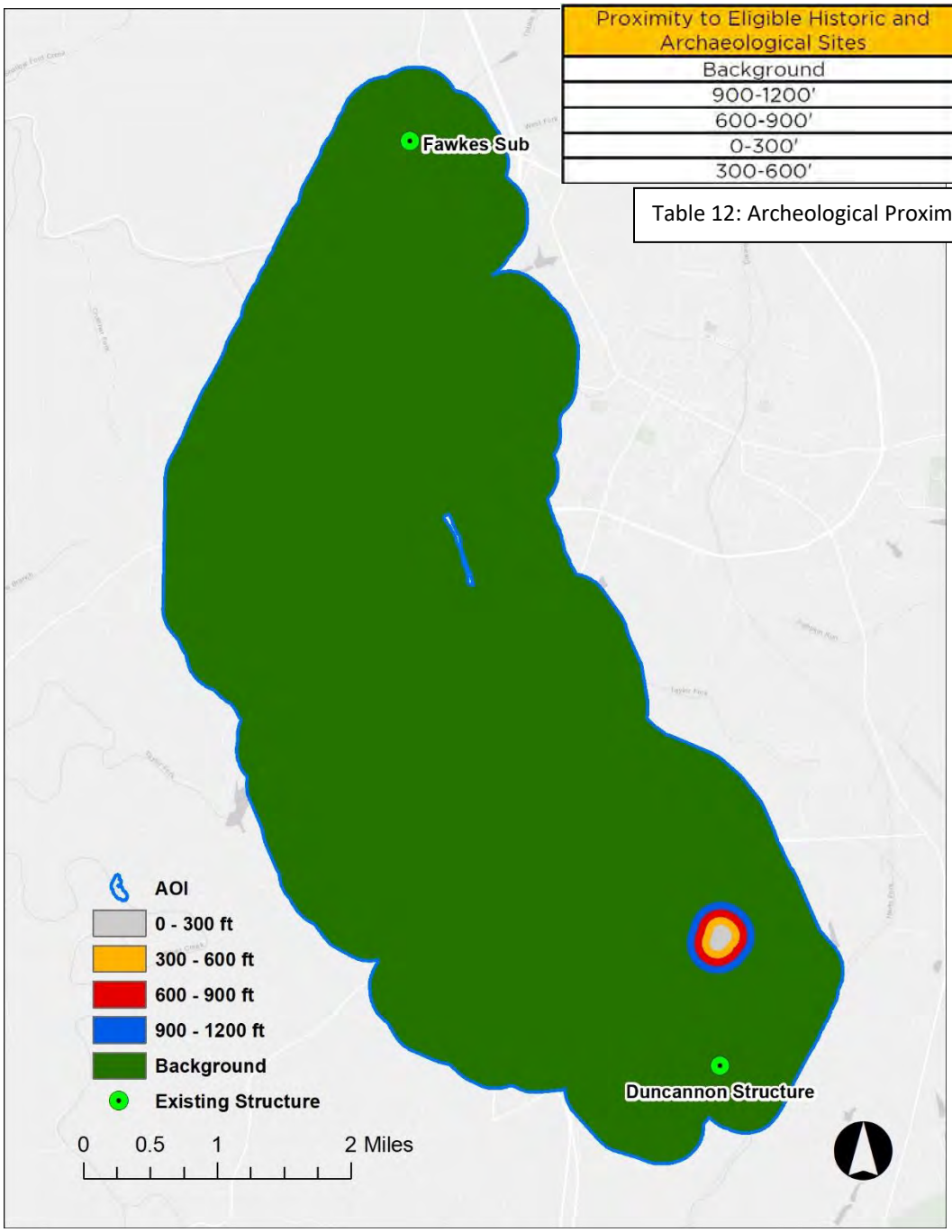


Figure 37: Proximity to Eligible Historic and Archaeological Sites

Avoidance Areas

Listed Archaeology Sites & Districts- After reviewing UK, State, and National data sources no features were found within the AOI.

Listed NRHP Districts and Buildings- there were historical buildings found within the AOI.

City and County Parks- One park was found within the AOI.

Day Care Parcels- Seven day-care parcels were found within the AOI.

Cemetery Parcels - In the project study area no cemeteries were found.

School Parcels- Elementary, Montessori, charter, and university parcels were found within the AOI.

Church Parcels- 40 religious parcels were found within the AOI.

All these features can be seen in Figure 39 on the next page.

Figure 38: New modern residential structure within the AOI (NV5 Field Survey)

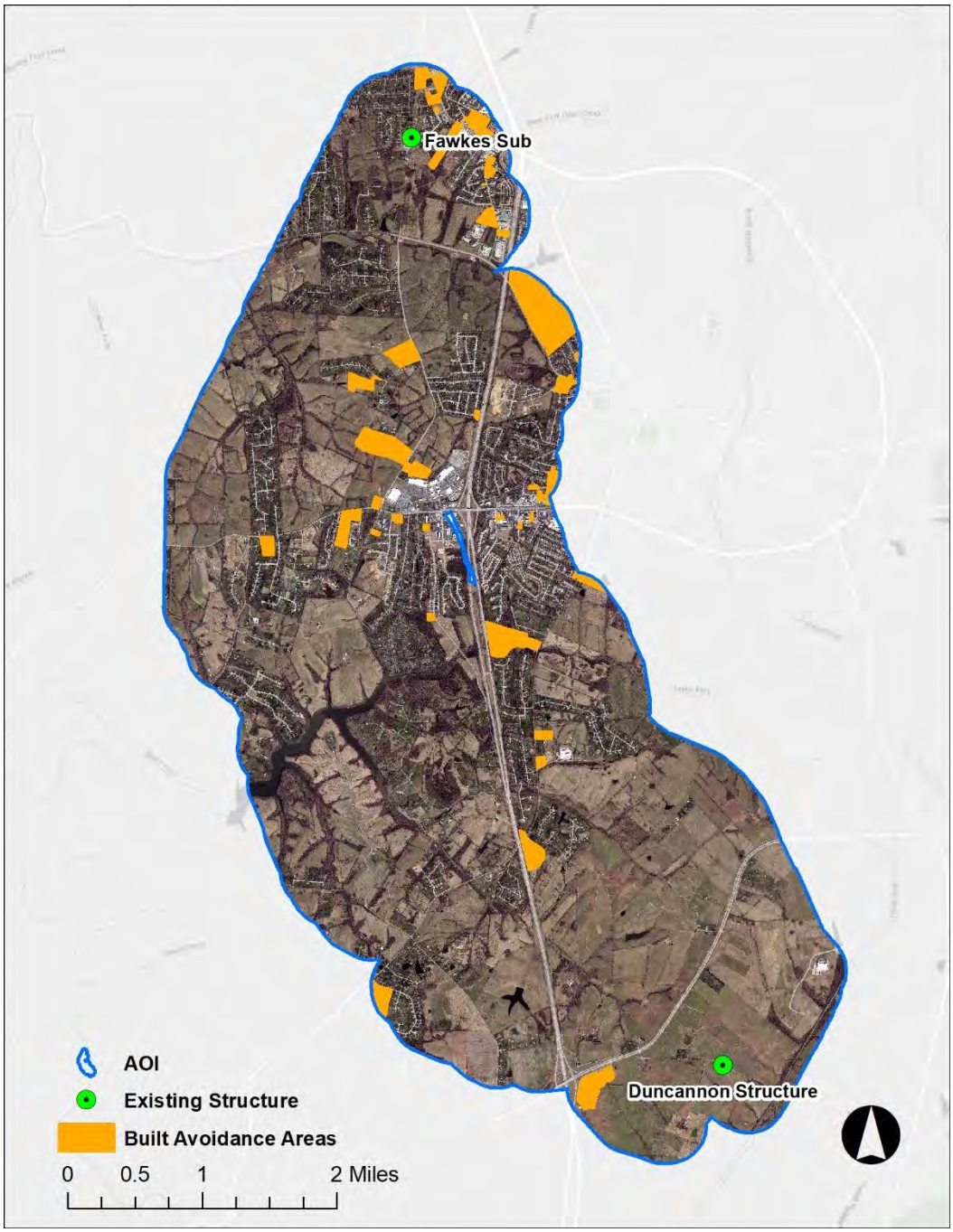


Figure 39: Built Avoidance Areas

PART VIII: SUITABILITY SURFACES

Once all inputs for the environments were researched and created, values and weights were redistributed for each feature and perspective. The normalizing of missing values follows a min-max routine that is part of the standard EPRI methodology. For example, within the Engineering perspective, Scenic Highways ROWs are the least desirable location (score of 9) of Linear Infrastructure to build a transmission line. Since there are no Scenic Highways within the Fawkes Duncannon study area, that value of 9 is re-assigned to the next least desirable feature (Rebuild Existing Transmission lines Bad), and every other feature's score is increased proportionally.

In the case where every feature within a category is not present, such as Public Lands within the Natural Perspective, the percent weight of that category is re-assigned to the other categories. See pages 29 and 30 regarding Tables 4 and 5 for specific reallocation of weighted percentages withing this example.

The next step in the analysis is to take all the avoidance features and create an avoidance area that is removed from the suitability mapping. This is done to limit the prospective corridors from being created over features that have been identified within the model. However, if there is a legacy transmission line that was constructed before avoidance features were created or before the siting model was utilized, or there is an existing ROW, extra calibrations must be done to address this. For the Fawkes Duncannon Project, both of those conditions were met (line construction in 1950's, and existing ROW easement). EKPC elected to maintain the standard avoidance area methodology for corridor creation and sought to address a calibrated model within route scoring. For more detail regarding the calibration the EPRI model for rebuild opportunities and avoidance areas, see the route scoring section.

Once model weights and avoidance features have been completed, the next step in the methodology is to create Suitability Surfaces by combining the three sub-model inputs (Engineering, Natural, and Built) described in the preceding sections. Each Suitability Surface represents a weighted combination of the three sub-models. This means that for the Engineering Suitability, its features are weighted 5x the amount of the Built and Natural perspectives. By utilizing this approach, each perspective has a higher weight, but is still slightly influenced by the other features within other perspectives. There is finally a Simple Suitability Surface that is the equal distribution of weight from each perspective, to create four total surfaces.

The Suitability Surfaces are shown in Figure 40 through Figure 43. The optimal path algorithm was then applied to each surface to develop the four Alternate Corridors with the top ten percent extracted and displayed in Figures 45 through 49.

Engineering Suitability Surface: The data layers from the Engineering Environment are given five times (72%) the emphasis of the Built (14%) and Natural (14%) groups, as shown in Figure 40.

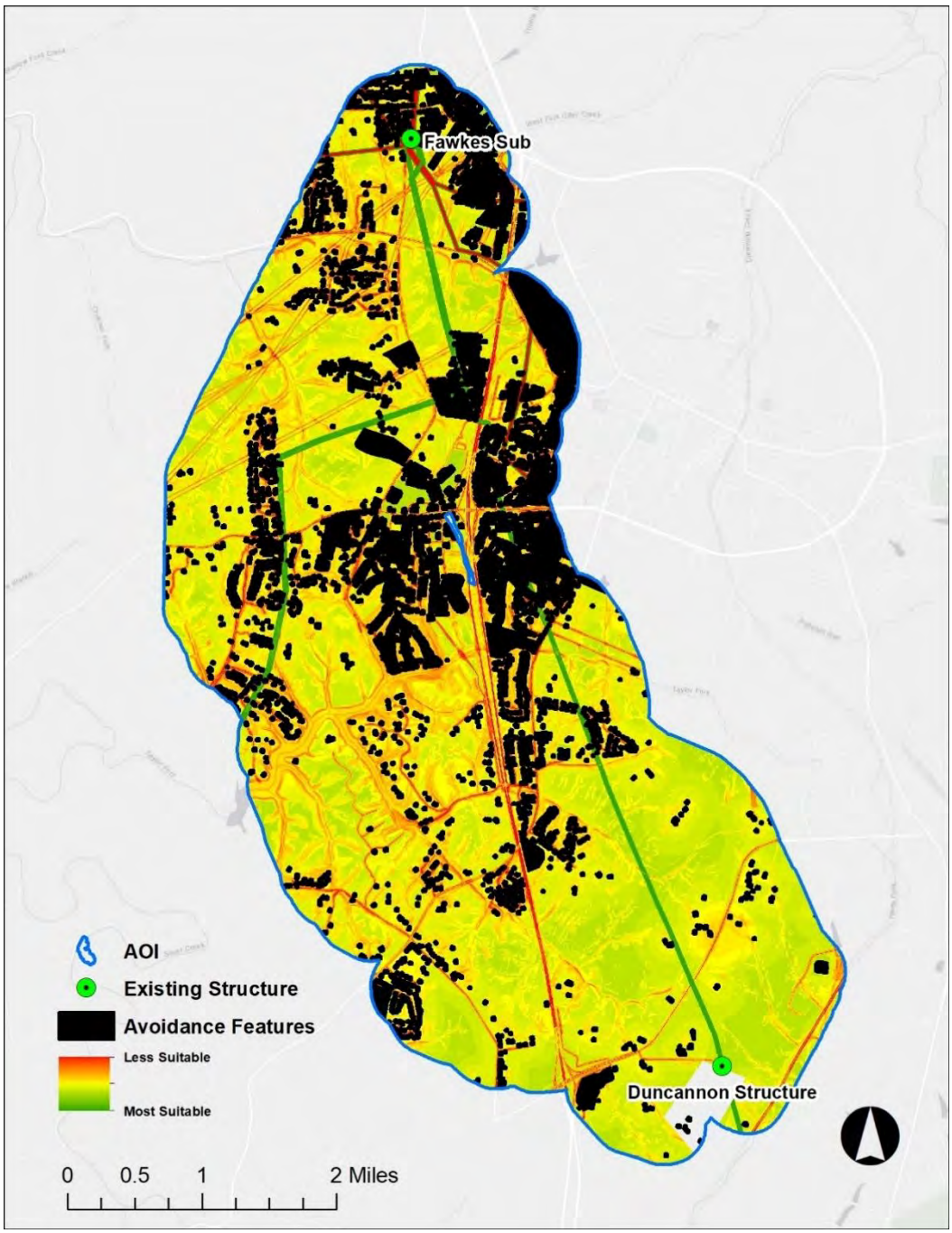


Figure 40: Engineering Suitability Surface

Natural Suitability Surface: The data layers from the Natural Environment are given five times (72%) the emphasis of the Engineering (14%) and Built (14%) groups, as shown in Figure 41.

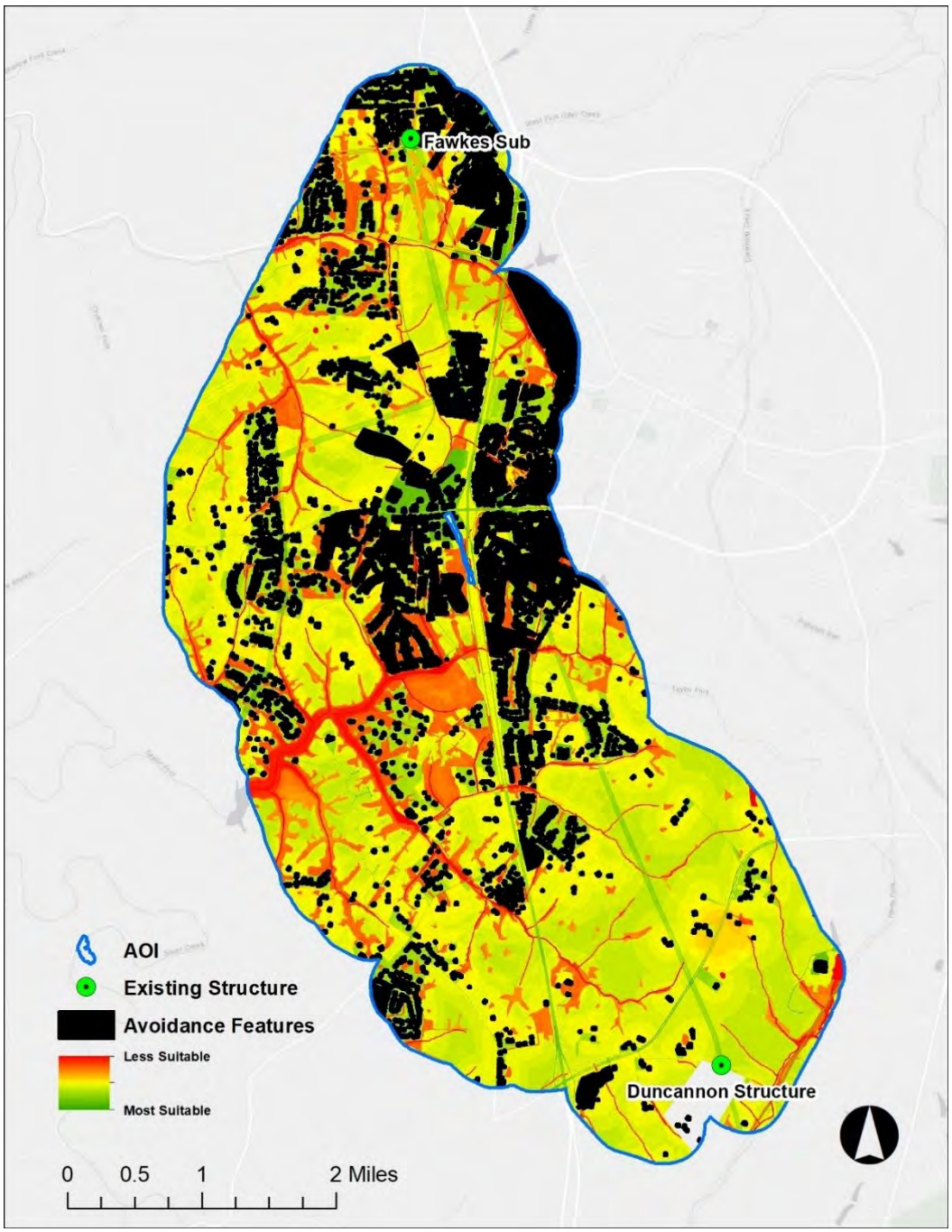


Figure 41: Natural Suitability Surface

Built Suitability Surface: The data layers from the Built Environment are given five times (72%) the emphasis of the Engineering (14%) and Natural (14%) groups, as shown in Figure 42.

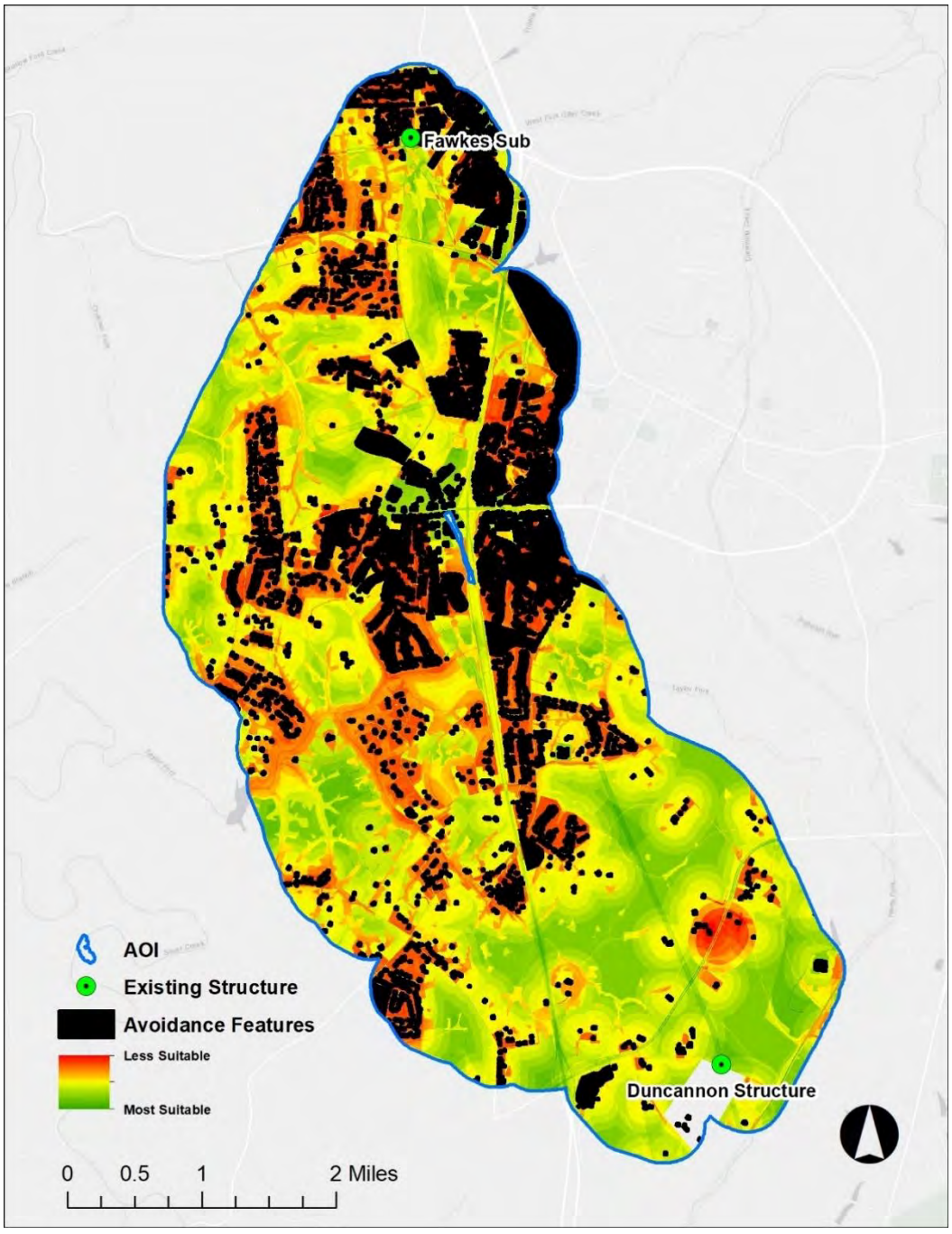


Figure 42: Built Suitability Surface

Simple Suitability Surface: The data layers from all the perspectives are given equal weights to create the Simple Suitability Surface. The breakdown of the weights are Natural (33.3%), Engineering (33.3%) and Built (33.3%) as shown in Figure 43.

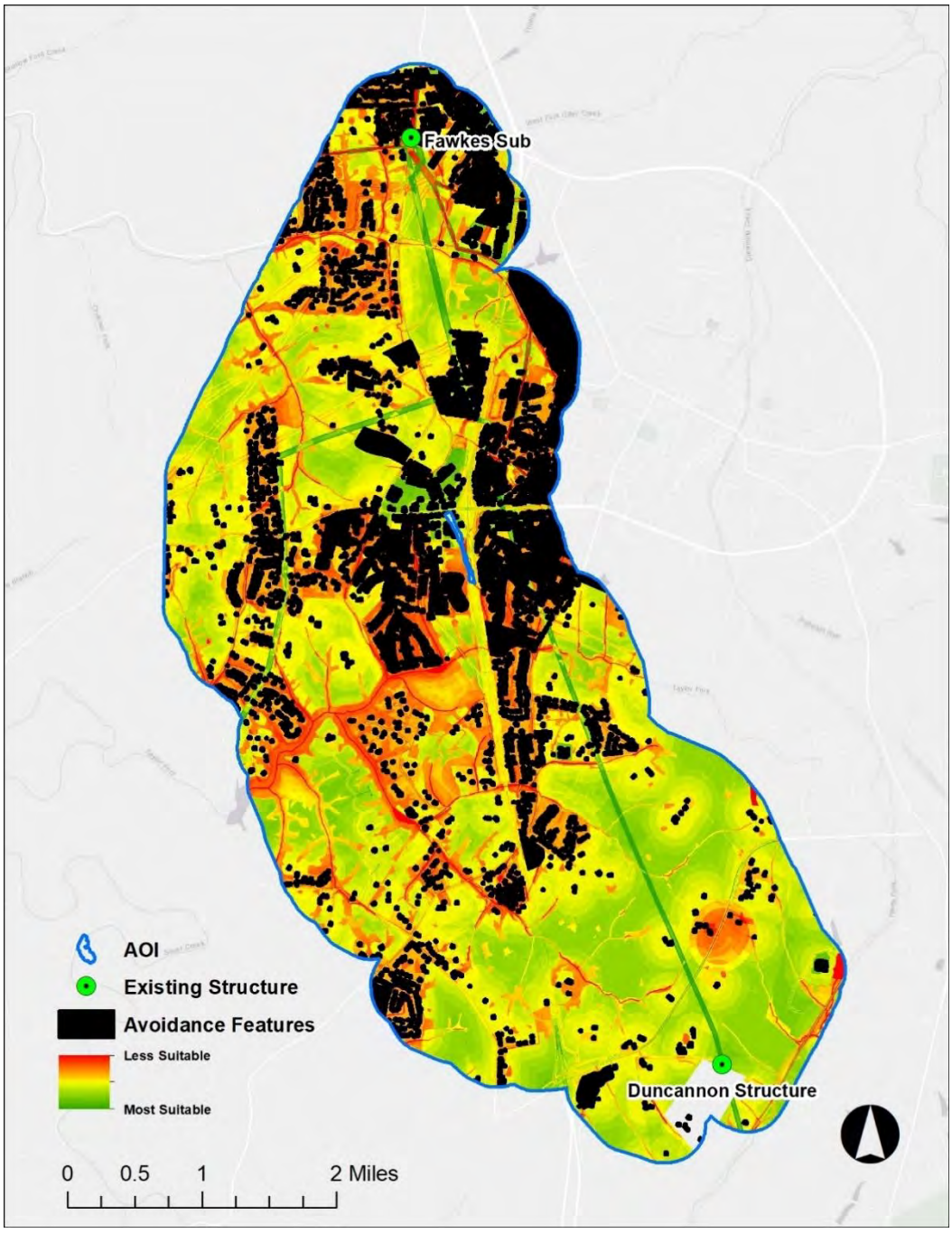
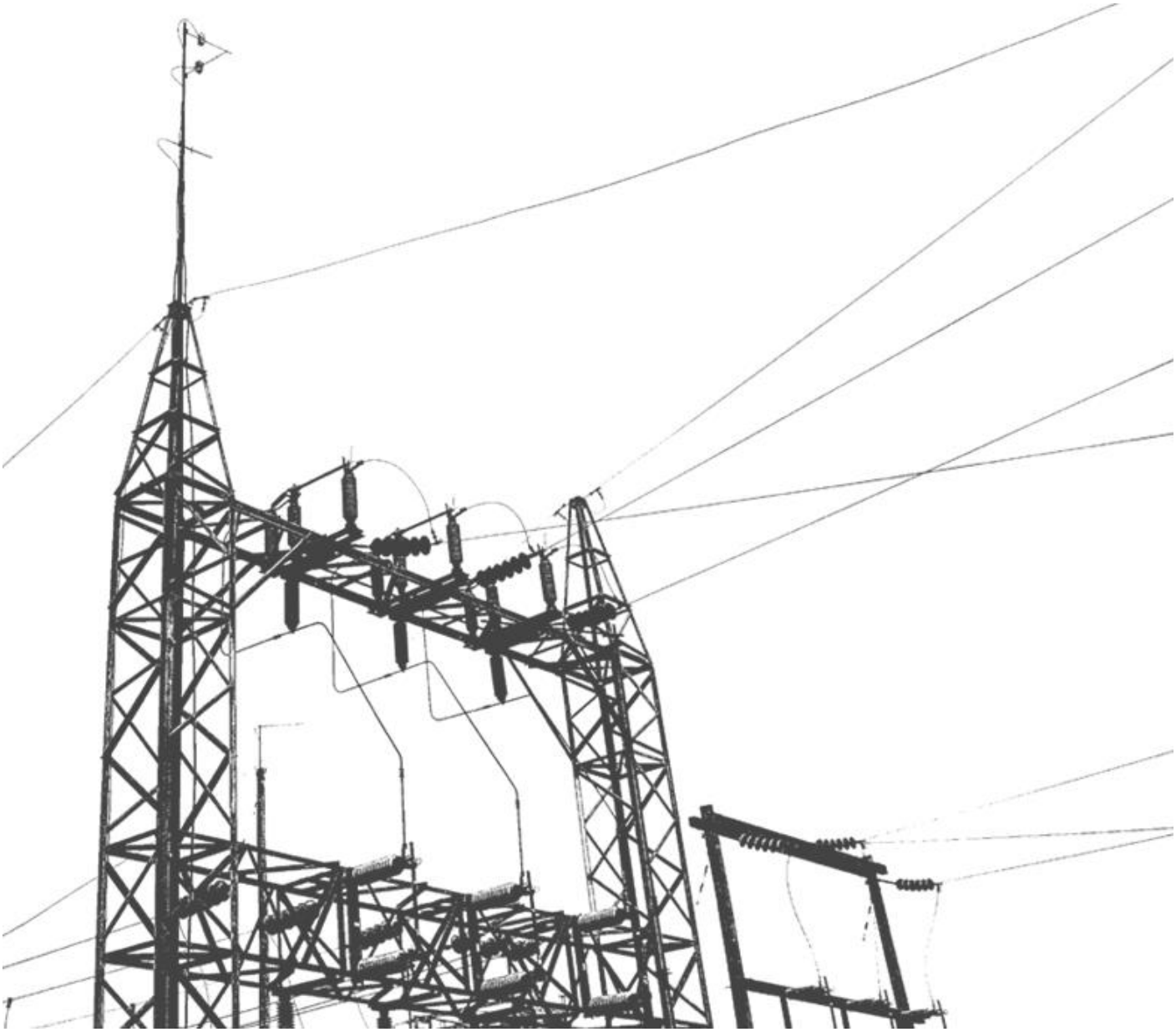


Figure 43: Simple Suitability Surface

PART IX: ALTERNATE CORRIDOR GENERATION

Each Suitability Surface was used in the next phase of the analysis. This phase is called Alternate Corridor Analysis, and involves the creation of "least cost paths." An algorithm is used to find the cost of every possible path (corridor) between the two end points. A corridor is any continuous string of grid cells, 15 by 15 feet in size, connecting the end point and start point. The cost is the accrual of values of those cumulative grid cells, and the value of each cell varies depending on the features that the cell represents by virtue of their weighted suitability environment. Lower summed values indicate relatively suitable corridors, whereas higher summed values indicate relatively unsuitable corridors. The Alternate Corridor for each perspective (Engineering, Built, Natural, and Simple Average) is the total area representing the top ten percent (lowest values) of all potential corridors. The top ten percent was chosen for this specific project due to the narrow confines of buildable space along the I-75 corridor and adjacent neighborhoods. Because of the recent residential growth in the area and new construction, there is limited realistic space to build a right of way within the grid cells of the top five percent alternate corridors. Therefore, EKPC elected to utilize the top ten percent as opposed to the top five (which is more common in greenfield projects).



Engineering Environment Alternate Corridor

The Engineering Corridor of the siting model is heavily weighted toward co-location and with good rebuild opportunities for existing transmission lines. NV5 received and confirmed the existence of all transmission lines within the study area. Starting from the Duncannon Structure, this corridor seeks out the existing 69kV line for paralleling and rebuilding opportunities, while avoiding the heavily pocketed residential areas that have been developed since the line was erected. Because of this, the corridor seeks out developed and commercial land around I-75 and then heads north, to re-connect with the 69 kV line once residential buildings are not in the suitability surface.

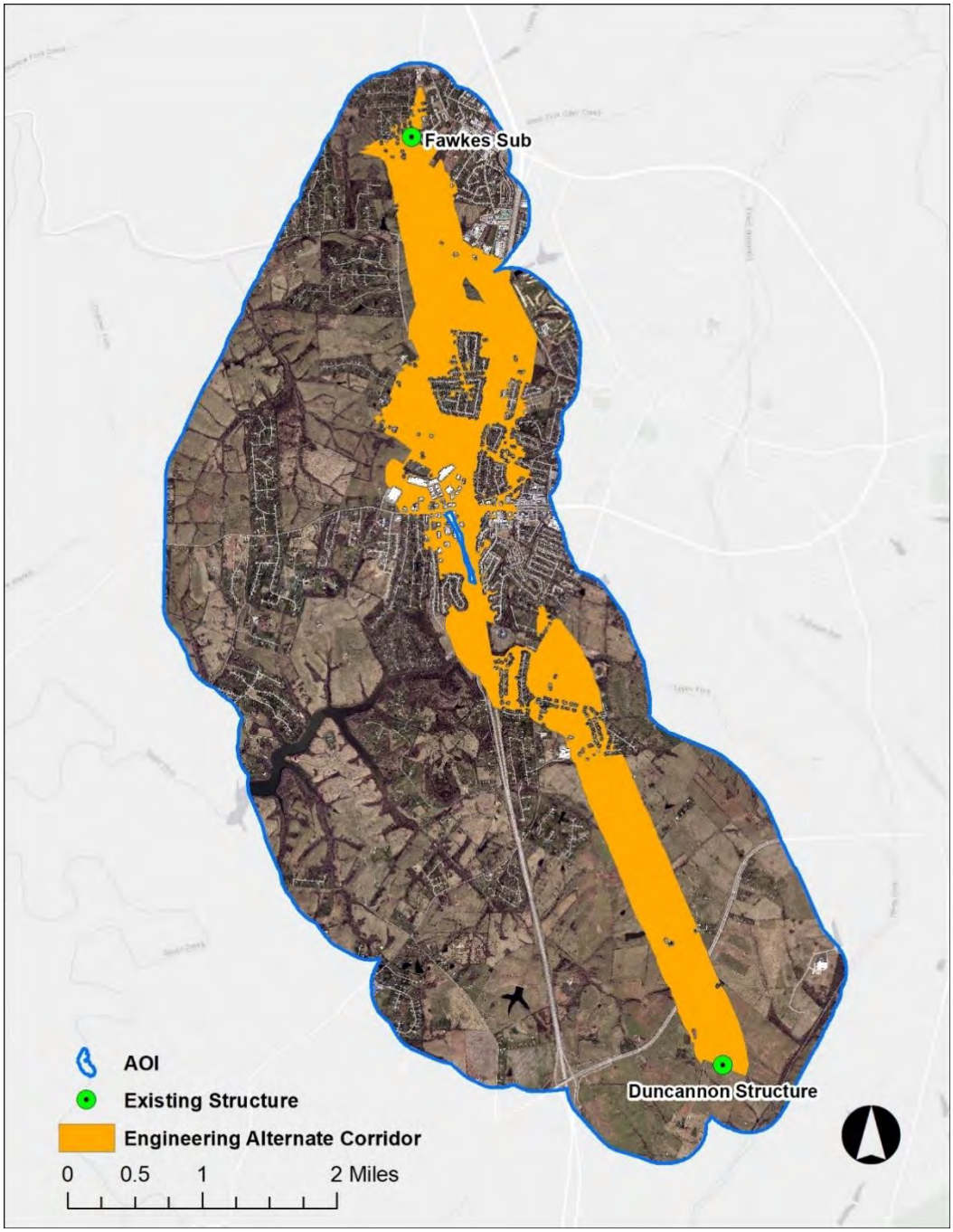


Figure 44: Engineering Environment Alternate Corridor

Natural Environment Alternate Corridor

The Natural Corridor of the model seeks to protect the natural environment, favoring developed land classification over wetlands, streams, rivers, FEMA floodplain areas, or protected species. The Natural Corridor avoids the species of concern, while also looking to minimize stream crossings, forested land, and seeking out developed land. Starting from the Duncannon Structure, it has a cross-country path until it hits the existing buildings and avoidance parcels, at which point it crosses I-75 and heads north by northwest to the Fawkes Substation.

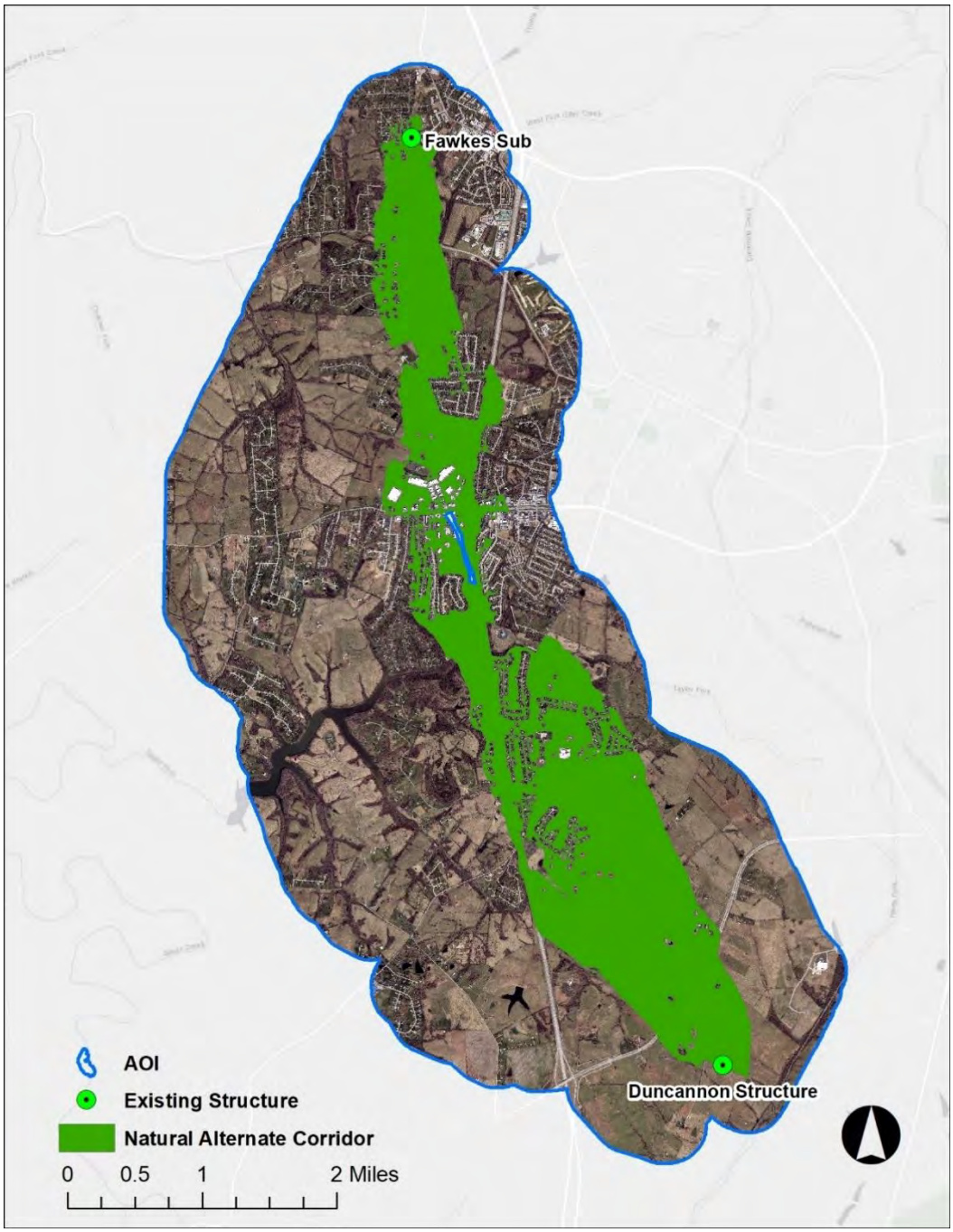


Figure 45: Natural Environment Alternate Corridor

Built Environment Alternate Corridor

The Built Corridor seeks out developed land use that isn't near existing structures, that isn't close to densely populated areas of the study area and is as far as possible from historic and archaeological sites as possible. Starting from the Duncannon Structure, the Built Corridor avoids the densely populated neighborhoods and proximity to structures, seeking out the I-75 path heading north before pulling towards commercial/industrial land use and then open spaces around the Fawkes Substation.

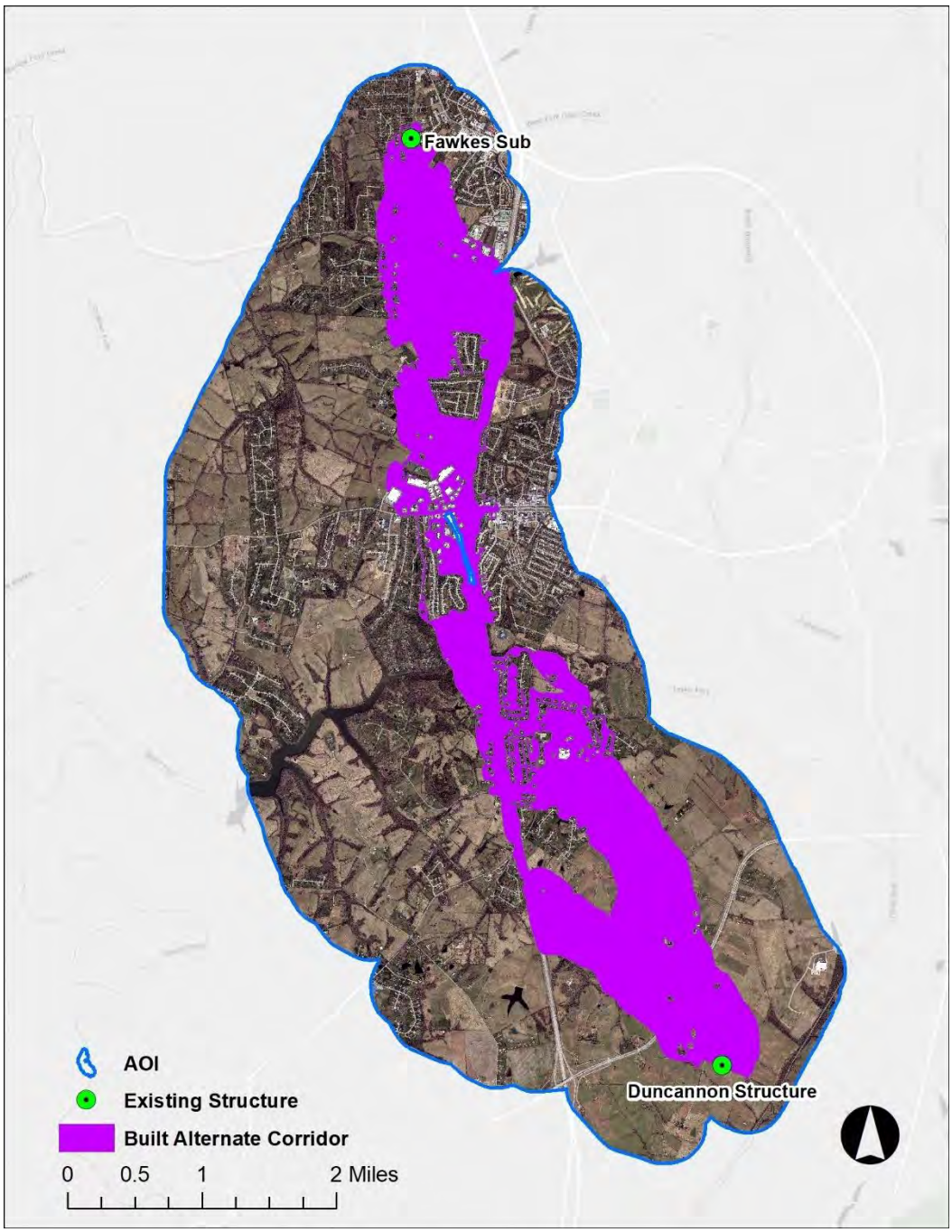


Figure 46: Built Environment Alternate Corridor

Simple Average Alternate Corridor

The Simple Average Corridor will resemble elements of the previous perspectives' corridors, since each features contributes to the corridor equally, The greatest variation between the simple and the other corridors has to do with how the algorithm looks to optimize the balance between avoiding natural features (streams, floodplain, wetlands, species of concern), avoiding built features (developed land), and utilizing existing electrical infrastructure (parallel and rebuild of transmission lines).

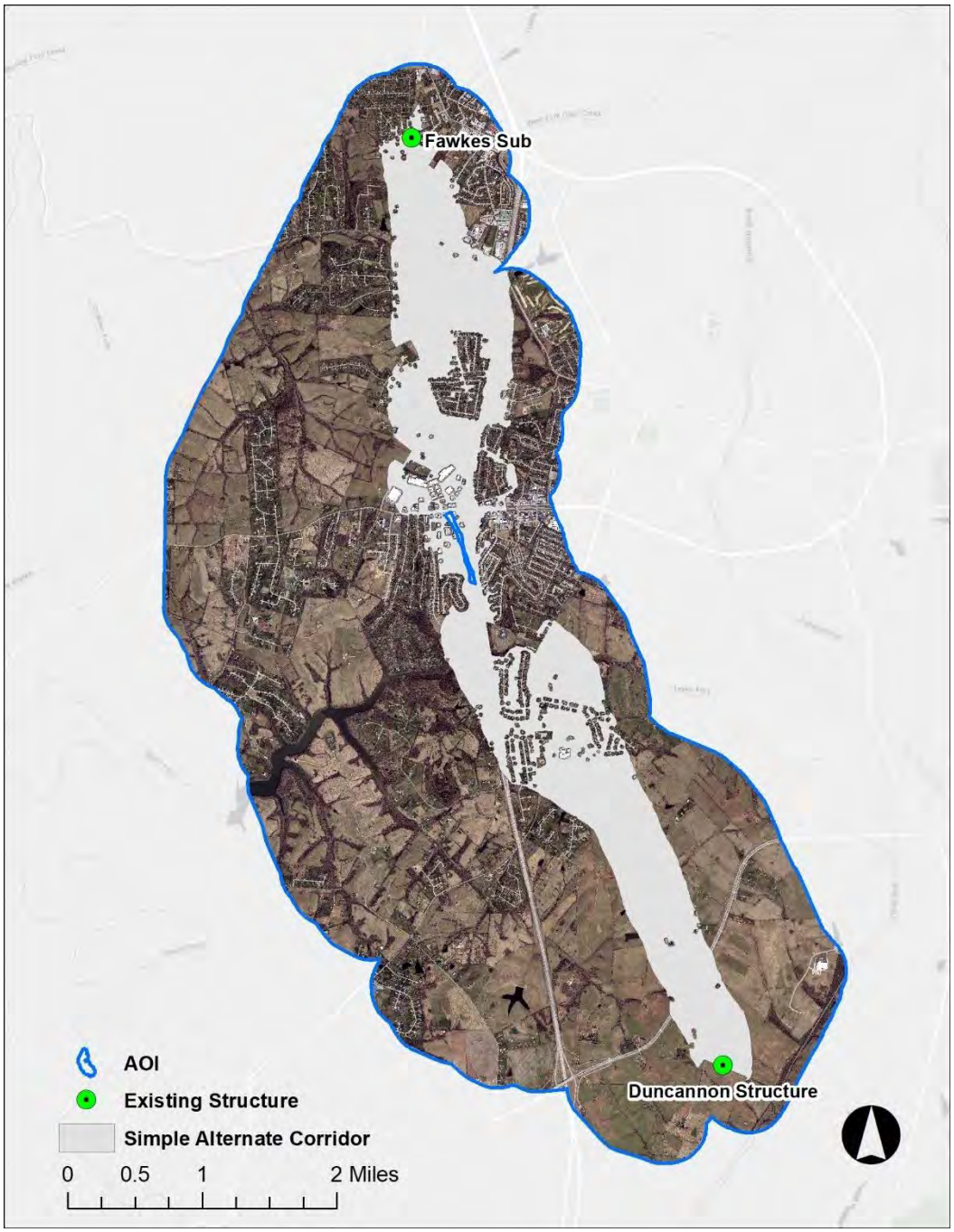


Figure 47: Simple Average Alternate Corridor

When comparing corridors, it is useful to the siting team to compare corridors with each other to ensure the model accurately captures each perspective's features. Ideal locations for Engineering perspective are parallel opportunities for existing transmission lines and low angle sloped terrain. Ideal locations from the Natural perspective avoid floodplain and wetlands and prefer developed land. Ideal locations from the Built perspective avoid existing human impacts and seek developed areas. The four corridors are shown below in Figure 48.

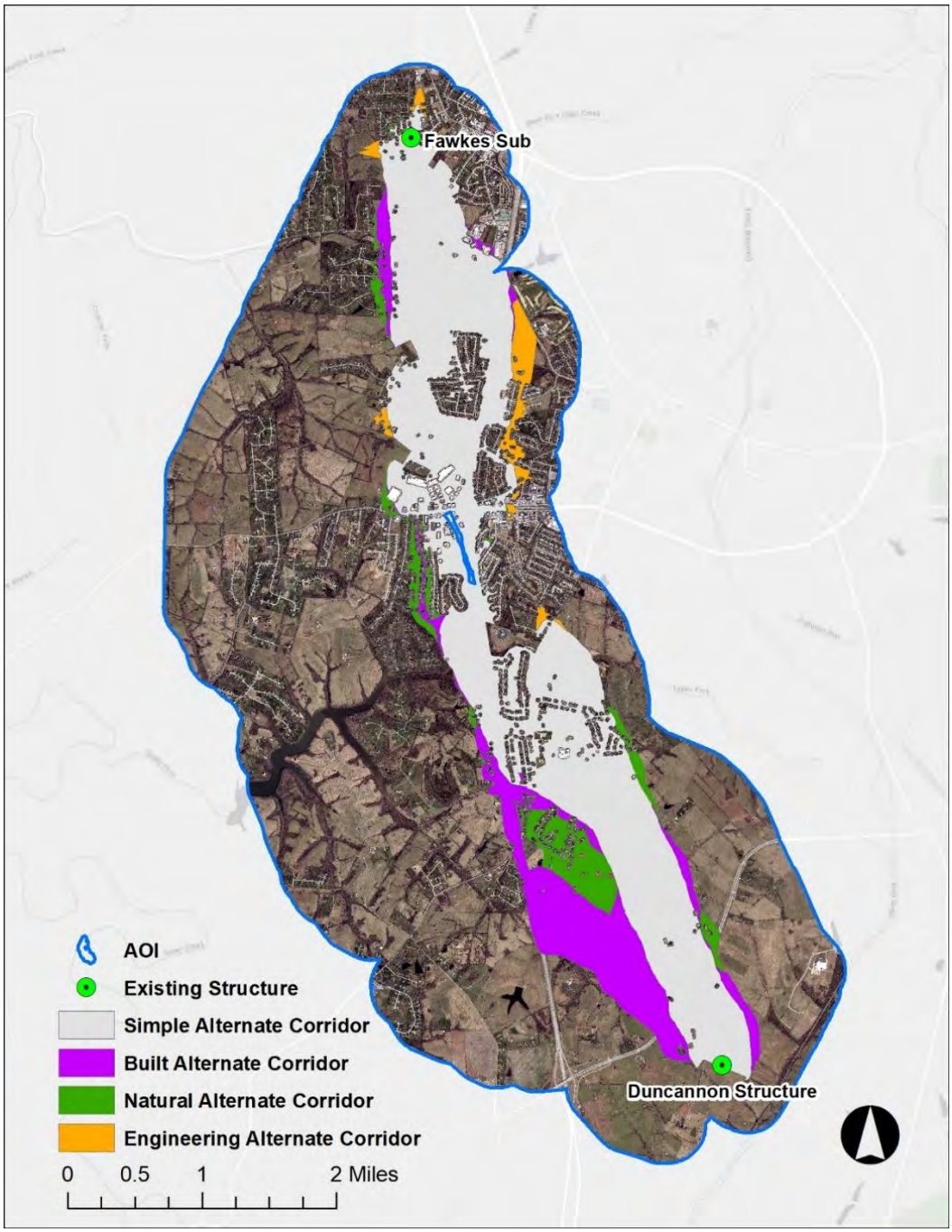


Figure 48: Alternate Corridors

Composite of Alternate Corridors

A composite of all four Alternate Corridors is shown in Figure 49. The Composite Corridor is simply the combination of all four Alternate Corridors. The area that is represented by the Composite Corridor serves as the main area for route creation, with the best practice in siting to chart a route within the Composite Corridor. To ensure all pertinent data is captured in the field and given the potential real-world constraints of the Composite Corridor, there is a 1,500 ft buffer area which is added to the Composite Corridor to create the Phase 2 AOI. Whereas the Phase I study area was examined almost exclusively by aerial photography, the features in the Phase 2 were reviewed by NV5 staff members sent into the field to verify the data. This buffer captures all possible features if there are routes that extend beyond the composite corridor. The Phase 2 AOI is below in Figure 49.

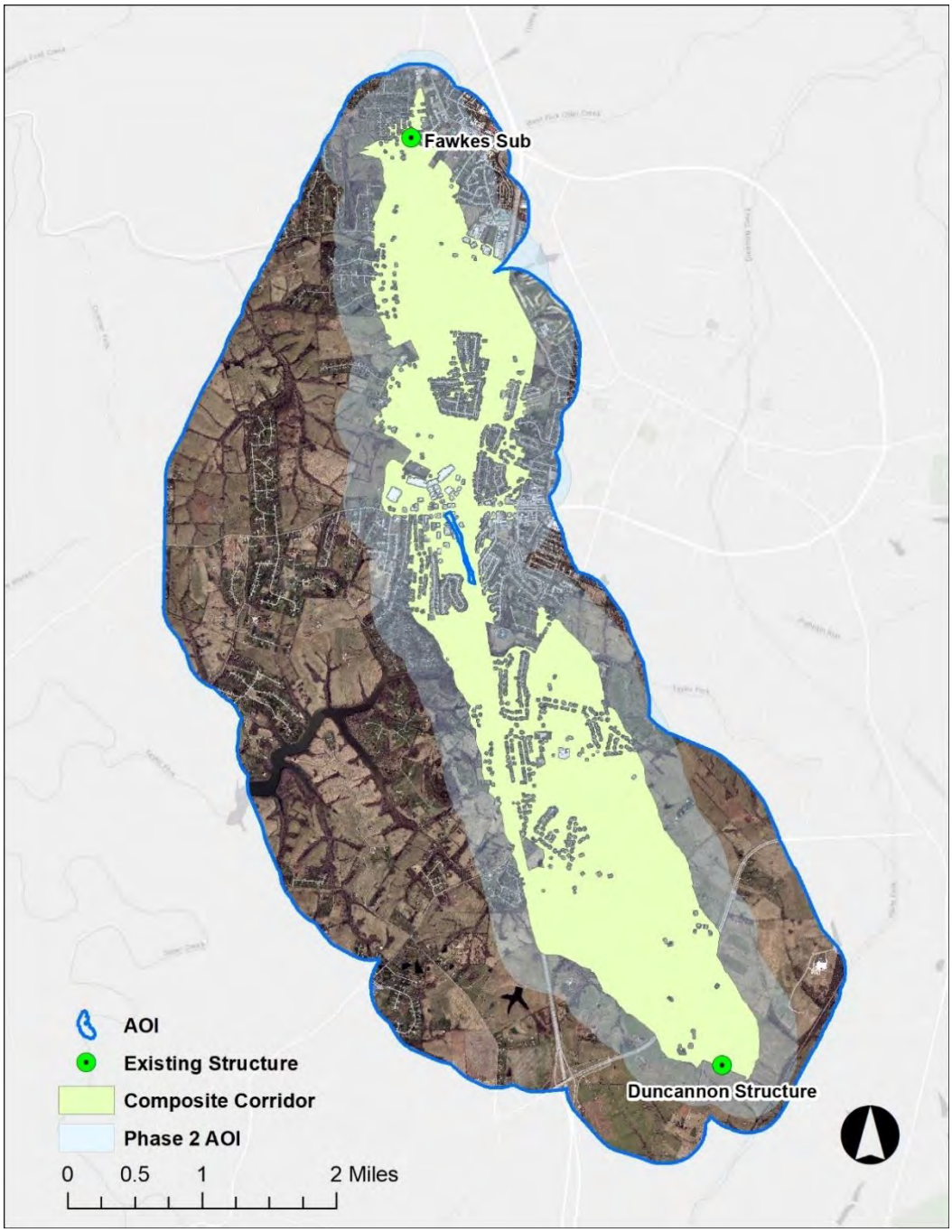


Figure 49: Composite Corridors

PART X: ALTERNATE ROUTES

Alternate Route Inputs

After reviewing and analyzing the Alternate & Composite Corridors, the EKPC project team developed possible centerline routes that were located within the corridors. Within the context of this study, these potential centerline routes are referred to as Alternate Routes. Each individual route is then scored using the EPRI KY Scoring Methodology. Once routes are scored, perspective weights are applied for final route scores. Like the Alternate Corridors, each perspective is given five times the weight of the other two perspective, with a final simple equal weight applied as well. These routes followed the EPRI standards for all being unique, and not back tracking in direction between towers while connecting substation to substation. These 10 routes are displayed below in Figure 50.

Although the project team attempts to create routes within the corridors, for this project EKPC also wanted to score the 138 kV line that extends well beyond the Phase 2 AOI. After discussing with EKPC, NV5 did a second field survey to accurately capture all features that would be along the 138kV line.

80% of the variation between the routes occurred in a small sub area located in the central part of the AOI (red box on Figure 50 and detailed in Figure 51). These inset routes had a few permutations around Barnes Mill Rd, utilizing a parking lot between Barnes Mill Rd and Hwy 876 for new construction, new construction along Martin Drive, and a new southern crossing of I-75. Routes 3 and 4 were both west of I-75, including far more new construction, but no permutations.

The inputs to complete route scoring fall into two categories, EKPC provided or NV5 provided.

EKPC provided:

- Centerline route geometry
- Proposed ROW width
- Substation locations
- Project costs of construction and clearing
- Route 3 and Route 4 Cost Adders

NV5 provided

- Buildings
- Proposed developments
- Schools, Day-cares, Churches, Cemeteries, Parks
- NRHP listed or eligible structures
- Forested area
- Stream crossings
- Wetlands
- Floodplains
- Line length
- Location of other utilities in the proximity
- Parcel data
- Hi angle (>30 degree) structure location
- Standard construction costs
- Scoring Matrix

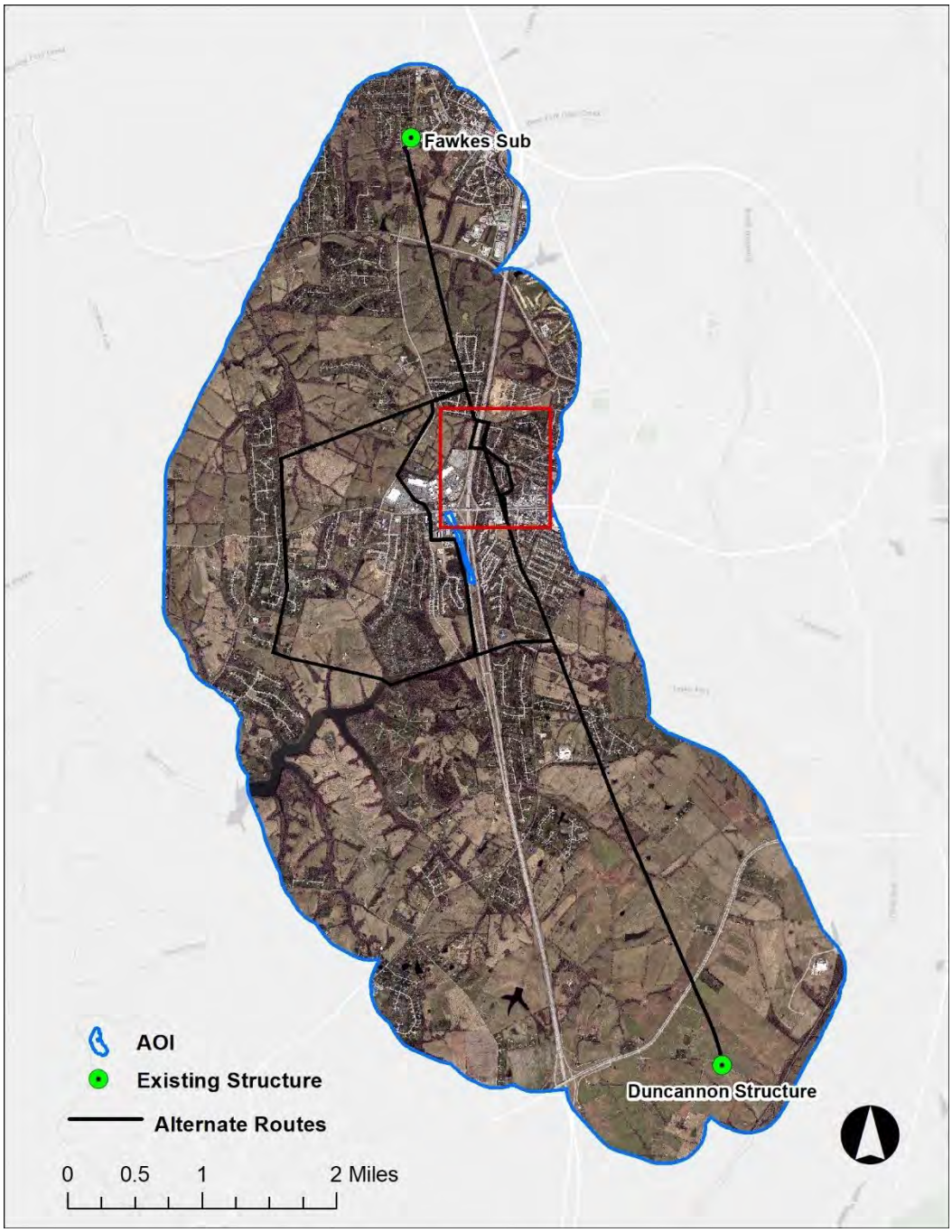


Figure 50: Alternate Routes

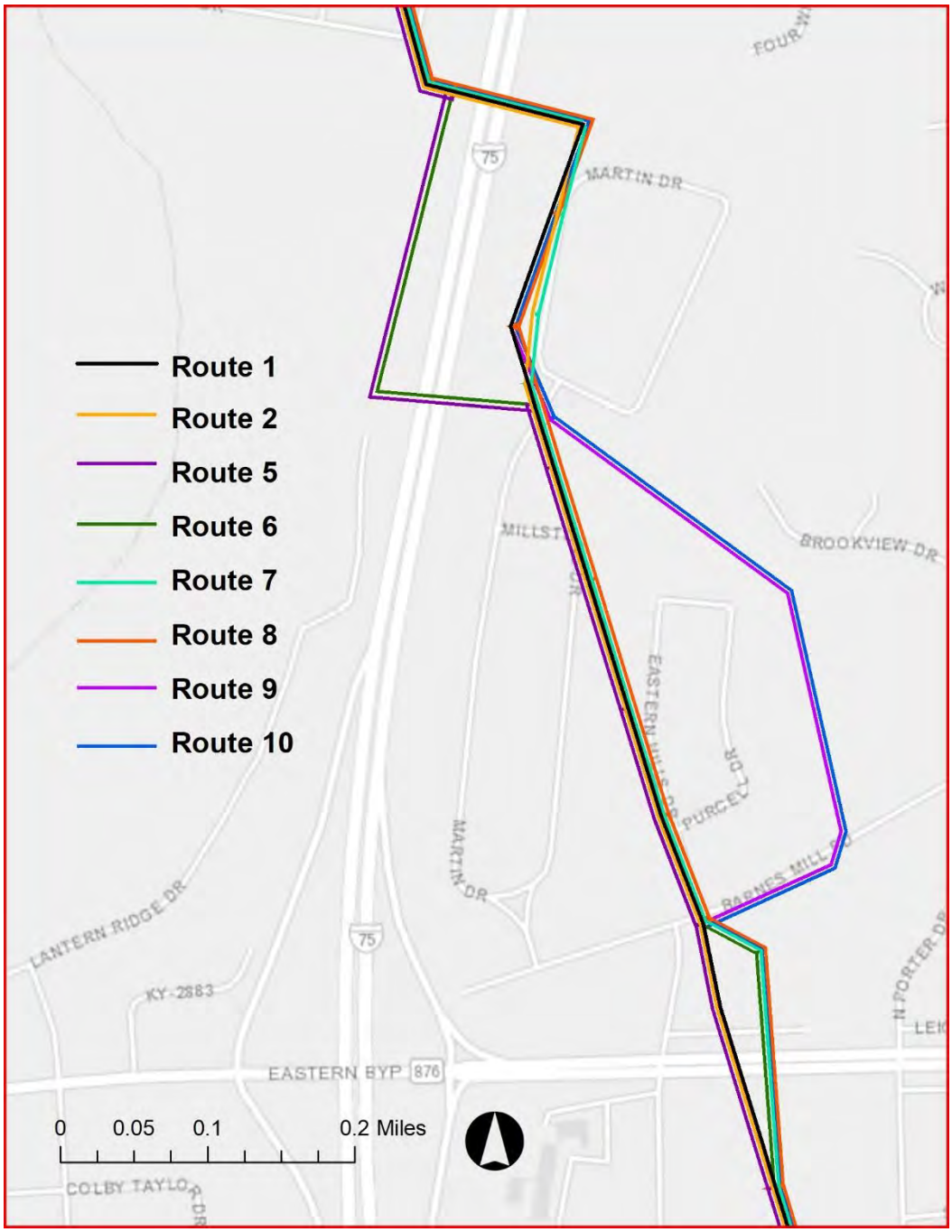


Figure 51: Alternate Corridors Inset

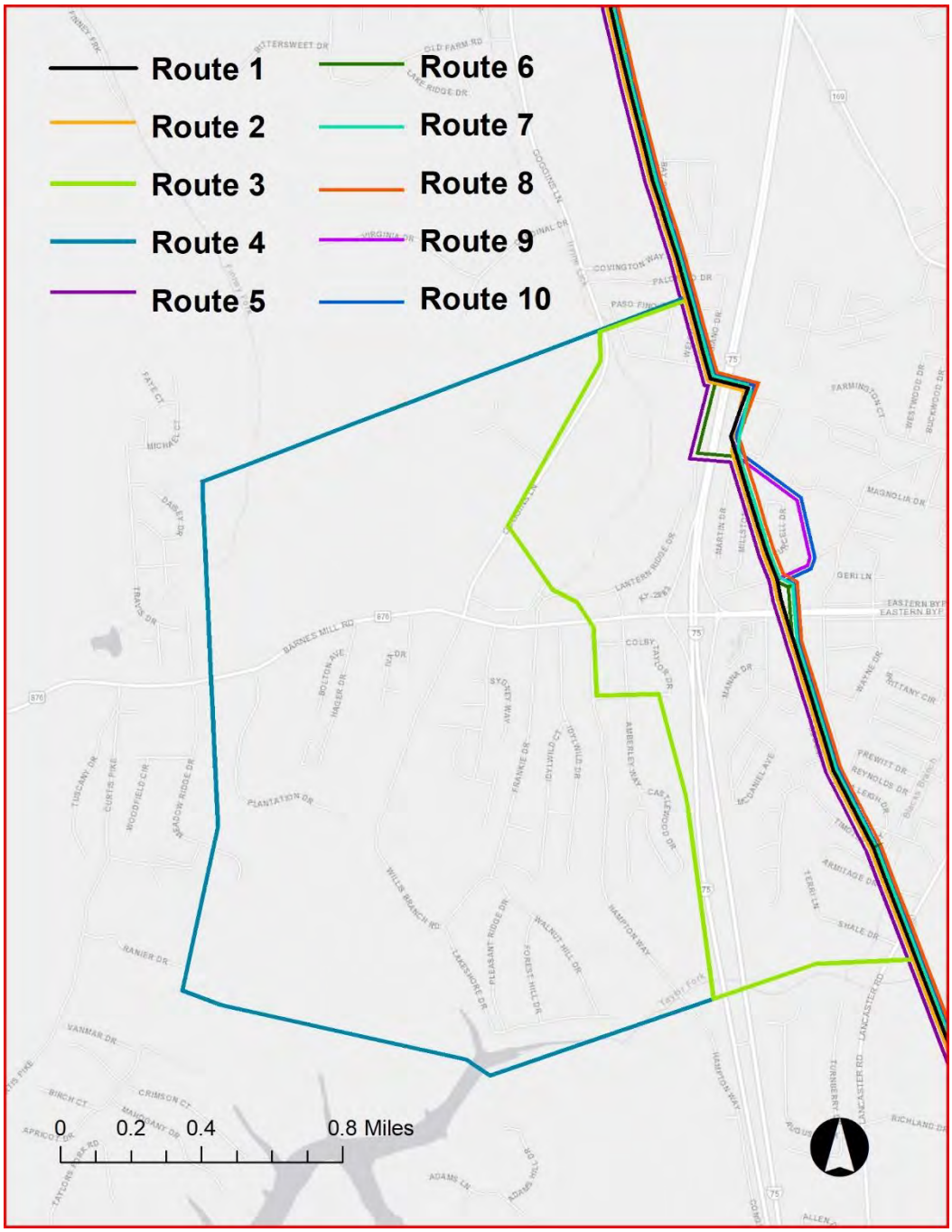


Figure 52: Alternate Corridors Inset

Alternate Route Evaluation

Statistics were collected for the ten Alternate Routes and divided into three categories that are like the Alternate Corridor perspectives of the Built, Natural, and Engineering layers. The statistics were then normalized and assigned weights based on standardized EPRI weights. Also like the Alternate Corridor model, features or layers not found within the project study area were removed from consideration, and their weight distributed proportionally among the remaining feature layers. The raw statistics for the ten routes are shown below in Table 13. Grayed out cells represent features that are listed in the standard model but not present within the project AOI. These raw statistic features for this project were:

Built

- Count of relocated residences within proposed 100' corridors
- Count of residences within 300' of proposed 100' corridors
- Count of proposed developments intersecting proposed 100' corridors
- Count of commercial buildings within 300' of proposed 100' corridors
- Count of undesirable parcels (schools, day-cares, churches, cemeteries, parks) that intersect with the proposed 100' corridors

Natural

- GIS calculated acres of forested land cover that intersect within the proposed 100' corridors
- Count of stream/river crossings within the proposed 100' corridors
- GIS calculated acres of wetland land cover that intersect within the proposed 100' corridors
- GIS calculated acres of floodplain land cover that intersect within the proposed 100' corridors

Engineering

- Length of route centerline in miles
- Length of route centerline that is aligned with good rebuild opportunities in miles
- Percentage of route centerline that is aligned with good rebuild opportunities
- Length of route centerline that is within parallel road opportunities in miles
- Number of parcels that intersect within the proposed 100' corridors
- Total Project Cost

The Total Project Cost layer is meant to provide an approximate value for the construction of the project. The generalized cost calculations were assessed by combining several cost related factors. Construction cost and clearing cost were per unit metrics provided by EKPC. The figure of $1,600,000 construction cost per mile was given to account for the construction of new and rebuild transmission lines that also covers costs for typical structures. The figure of $6,000 per acre of wooded land was given to account for clearing. Land costs are those costs associated with acquiring easement / property for the transmission line. EKPC evaluated easement cost in the per mile construction cost. Additionally, non self-supporting structures were included in the construction cost per mile. Of note for this project, no existing structures will be utilized for this computation. Finally, EKPC designated where every self-supporting deadend structure would be for all angles (regardless of the angle size) within the project, as well as their cost. The cost of self-supporting angles over 30° had a value of $320,000 and self-supporting structures under 30° had a value of $220,000.

The final input to costs the team made were for very specific route costs for the two routes that require new construction to the west of I-75 (Route 3 and Route 4). These costs adders had specific construction requirements that EKPC pre-determined and were then summed with the standard construction and angle costs. These cost adders were $9,719,960 for Route 3 and $9,434,000 for Route 4.

The sum of all these values, as they apply to each route, constitutes the "Total Project Cost" component of this phase of the route selection process.

Tables 13 and 14 illustrate the Alternate Route data inputs for Engineering Environment, Natural Environment, Built Environment, and Simple Average evaluations.

In addition to the standard route scoring, EKPC wanted to calibrate another set of scores based on the existing easements they have for the 69 kV and 138kV lines. The purpose of this second scoring exercise was to calibrate the model to address the 100% rebuild in regard to existing easements. EKPC and NV5 agreed on a methodology in which only features that would be affected by new ROW geometry be counted. This second set of scores is called the Calibrated Scores. The calibrated scoring objectively quantifies the net new impacts to Built and Natural features. The features that would have net new affects are highlighted in yellow in Table 14.

DATA	Raw Stats for Routes									
	Rte 1	Rte 2	Rte 3	Rte 4	Rte 5	Rte 6	Rte 7	Rte 8	Rte 9	Rte 10
Built										
Relocated Residences (within 100' Corridor)	53	46	5	8	43	43	46	53	35	35
Proximity to Residences (300' buffer)	343	343	164	194	314	315	344	344	326	326
Proposed Developments	1	1	1	1	1	1	1	1	1	1
Proximity to Commercial Buildings (300')	27	27	24	2	27	28	28	28	27	28
Proximity to Industrial Buildings (300')	0	0	0	0	0	0	0	0	0	0
School, DayCare, Church, Cemetary, Park Parcels (#)	1	1	2	2	1	1	1	1	1	1
NRHP Listed/Eligible Strucs /Districts (1500' from edge c	0	0	0	0	0	0	0	0	0	0
Natural										
Natural Forests (Acres)	5.54	5.54	13.73	19.50	5.60	5.60	5.54	5.54	7.40	7.40
Stream/River Crossings	9	9	12	19	11	11	9	9	9	9
Wetland Areas (Acres)	0.0	0.0	0.0	1.85	0.0	0.0	0.0	0.0	0.0	0.0
Floodplain Areas (Acres)	2.14	2.14	5.80	8.77	2.14	2.14	2.14	2.14	2.14	2.14
Engineering										
Length (Miles)	7.35	7.35	5.28	5.28	7.38	7.39	7.36	7.37	7.48	7.49
Miles of Rebuild with Existing Utility*	7.35	7.16	5.29	8.20	7.06	6.87	6.98	7.17	6.92	6.74
% Rebuild with Existing Utility*	100%	97%	63%	79%	96%	93%	95%	97%	93%	90%
% Co-location w/ Existing T/L or other major utilities	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Miles of Co-location with Roads*	0.17	0.32	1.39	0.00	0.37	0.37	0.32	0.17	0.27	0.42
Number of Parcels	196	201	139	141	181	180	200	195	186	184
Construction Cost	$ 11,760,000.00	$ 11,760,000.00	$ 8,448,000.00	$ 8,448,000.00	$ 11,808,000.00	$ 11,824,000.00	$ 11,776,000.00	$ 11,792,000.00	$ 11,968,000.00	$ 11,984,000.00
Land - Easements Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Clearing	$ 33,240.00	$ 33,240.00	$ 82,380.00	$ 117,000.00	$ 33,600.00	$ 33,600.00	$ 33,240.00	$ 33,240.00	$ 44,400.00	$ 44,400.00
Structure Costs	$ 960,000.00	$ 960,000.00	$ 320,000.00	$ 320,000.00	$ 1,280,000.00	$ 1,920,000.00	$ 1,600,000.00	$ 1,600,000.00	$ 1,280,000.00	$ 1,600,000.00
Cost "adder"			$9,719,960	$9,434,000						
Total Project Costs	$ 14,513,240.00	$ 14,733,240.00	$ 19,010,340.00	$ 18,759,000.00	$ 14,881,600.00	$ 15,757,600.00	$ 15,389,240.00	$ 15,185,240.00	$ 15,712,400.00	$ 16,268,400.00

Table 13 RAW Route Data Statistics - Standard

DATA	Raw Stats for Routes									
	Rte 1	Rte 2	Rte 3	Rte 4	Rte 5	Rte 6	Rte 7	Rte 8	Rte 9	Rte 10
Built										
NEW Relocated Residences (within 100' Corrido	0	0	1	1	0	0	0	0	0	0
NEW Proximity to Residences (300' buffer)	0	0	33	11	0	1	1	1	26	26
Proposed Developments	1	1	1	1	1	1	1	1	1	1
NEW Proximity to Commercial Buildings (300')	0	0	24	2	0	2	2	2	0	2
Proximity to Industrial Buildings (300')	0	0	0	0	0	0	0	0	0	0
NEW School, DayCare, Church, Cemetery, Part	0	0	2	1	0	0	0	0	0	0
NRHP Listed/Eligible Strucs /Districts (1500' fro	0	0	0	0	0	0	0	0	0	0
Natural										
NEW Natural Forests (Acres)	0.00	0.00	8.66	9.61	0.06	0.06	0.00	0.00	2.00	2.00
NEW Stream/River Crossings	0	0	4	6	2	2	0	0	0	0
Wetland Areas (Acres)	0.0	0.0	0.0	1.85	0.0	0.0	0.0	0.0	0.0	0.0
NEW Floodplain Areas (Acres)	0.00	0.00	3.66	6.63	0.00	0.00	0.00	0.00	0.00	0.00
Engineering										
Length (Miles)	7.35	7.35	5.28	5.28	7.38	7.39	7.36	7.37	7.48	7.49
Miles of Rebuild with Existing Utility*	7.35	7.16	5.29	8.20	7.06	6.87	6.98	7.17	6.92	6.74
% Rebuild with Existing Utility*	100%	97%	63%	79%	96%	93%	95%	97%	93%	90%
% Co-location w/ Existing T/L or other major util	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Miles of Co-location with Roads*	0.17	0.32	1.39	0.00	0.37	0.37	0.32	0.17	0.27	0.42
Number of Parcels	196	201	139	141	181	180	200	195	186	184
Construction Cost	$ 11,760,000.00	$ 11,760,000.00	$ 8,448,000.00	$ 8,448,000.00	$ 11,808,000.00	$ 11,824,000.00	$ 11,776,000.00	$ 11,792,000.00	$ 11,968,000.00	$ 11,984,000.00
Land - Easements Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Clearing	$ -	$ -	$ 51,960.00	$ 57,660.00	$ 360.00	$ 360.00	$ -	$ -	$ 12,000.00	$ 12,000.00
Structure Costs	$ 960,000.00	$ 960,000.00	$ 320,000.00	$ 320,000.00	$ 1,280,000.00	$ 1,920,000.00	$ 1,600,000.00	$ 1,600,000.00	$ 1,280,000.00	$ 1,600,000.00
Cost "adder"			$9,719,960	$9,434,000						
Total Project Costs	$ 14,480,000.00	$ 14,700,000.00	$ 18,979,920.00	$ 18,699,660.00	$ 14,848,360.00	$ 15,724,360.00	$ 15,356,000.00	$ 15,152,000.00	$ 15,680,000.00	$ 16,236,000.00

Table 14 RAW Route Data Statistics – Calibrated Scores

Tables 15 and 16 show the standard route scoring weights and then the project specific weights with values redistributed

	Weights
Built	
Feature	
Relocated Residences (within 100' Corridor)	54.0%
Weighted	
Proximity to Residences (300')	15.9%
Weighted	
Proposed Developments	3.8%
Weighted	
Proximity to Commercial Buildings (300')	2.6%
Weighted	
Proximity to Industrial Buildings (300')	1.5%
Weighted	
School, DayCare, Church, Cemetery, Park Parcels (#)	7.7%
Weighted	
NRHP Listed/Eligible Strucs./Districts (1500' from edge of R/W)	14.5%
Weighted	
TOTAL	100.0%
WEIGHTED TOTAL	
Natural	
Natural Forests (Acres)	42.6%
Weighted	
Stream/River Crossings	12.0%
Weighted	
Wetland Areas (Acres)	41.9%
Weighted	
Floodplain Areas (Acres)	3.5%
Weighted	
TOTAL	100.0%
WEIGHTED TOTAL	
Engineering	
% Rebuild with Existing Utility*	33.3%
Weighted	
% Co-location w/ Existing T/L or other major utilities*	52.7%
Weighted	
Total Project Costs	14.0%
Weighted	
TOTAL	100.0%
WEIGHTED TOTAL	
SUM OF WEIGHTED TOTALS	
RANK	

TABLE 15: Alternate Route Criteria & Weights (Model Values)

	Weights
Built	
Feature	
Relocated Residences (within 100' Corridor)	64.3%
Weighted	
Proximity to Residences (300')	18.9%
Weighted	
Proposed Developments	4.5%
Weighted	
Proximity to Commercial Buildings (300')	3.1%
Weighted	
Proximity to Industrial Buildings (300')	0.0%
Weighted	
School, DayCare, Church, Cemetery, Park Parcels (#)	9.2%
Weighted	
NRHP Listed/Eligible Strucs./Districts (1500' from edge of	0.0%
Weighted	
TOTAL	100.0%
WEIGHTED TOTAL	
Natural	
Natural Forests (Acres)	42.6%
Weighted	
Stream/River Crossings	12.0%
Weighted	
Wetland Areas (Acres)	41.9%
Weighted	
Floodplain Areas (Acres)	3.5%
Weighted	
TOTAL	100.0%
WEIGHTED TOTAL	
Engineering	
% Rebuild with Existing Utility*	70.4%
Weighted	
% Co-location w/ Existing T/L or other major utilities*	0.0%
Weighted	
Total Project Costs	29.6%
Weighted	
TOTAL	100.0%
WEIGHTED TOTAL	
SUM OF WEIGHTED TOTALS	
RANK	

Table 16: Alternate Route Criteria and Weights (Project Values)

Raw Statistics and Normalized Statistics

The next step of the analysis is to normalize the raw statistics of the routes. Table 17 shows an example of the routes raw and normalized statistics for the Alternate Routes. The statistics were normalized (light blue cells), on a scale from zero to one, to provide a method of comparison between each of the layers' different units. The values associated with Miles of Co-location were inverted since a higher value in this category is seen as desirable. Table 18 has the normalized statistics for the Calibrated Scores calibration.

DATA	Numbers Normalized									
FOR ALL ROUTES	Rte 1	Rte 2	Rte 3	Rte 4	Rte 5	Rte 6	Rte 7	Rte 8	Rte 9	Rte 10
Built										
Feature	**Unit**	**Unit**	**Unit**	**Unit**	**Unit**	**Unit**	**Unit**	**Unit**	**Unit**	**Unit**
Relocated Residences (within 100' Corridor)	53.00	46.00	5.00	8.00	43.00	43.00	46.00	53.00	35.00	35.00
Normalized	1.00	0.85	0.00	0.06	0.79	0.79	0.85	1.00	0.63	0.63
Proximity to Residences (300')	343.00	343.00	164.00	194.00	314.00	315.00	344.00	344.00	326.00	326.00
Normalized	0.99	0.99	0.00	0.17	0.83	0.84	1.00	1.00	0.90	0.90
Proposed Developments	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Normalized	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Proximity to Commercial Buildings (300')	27.00	27.00	24.00	2.00	27.00	28.00	28.00	28.00	27.00	28.00
Normalized	0.96	0.96	0.85	0.00	0.96	1.00	1.00	1.00	0.96	1.00
Proximity to Industrial Buildings (300')	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Normalized	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
School, DayCare, Church, Cemetery, Park Parcels (#)	1.00	1.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Normalized	0.00	0.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00
NRHP Listed/Eligible Strucs./Districts (1500' from edge	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Normalized	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Natural										
Natural Forests (Acres)	5.54	5.54	13.73	19.50	5.60	5.60	5.54	5.54	7.40	7.40
Normalized	0.00	0.00	0.59	1.00	0.00	0.00	0.00	0.00	0.13	0.13
Stream/River Crossings	9.00	9.00	12.00	19.00	11.00	11.00	9.00	9.00	9.00	9.00
Normalized	0.00	0.00	0.30	1.00	0.20	0.20	0.00	0.00	0.00	0.00
Wetland Areas (Acres)	0.00	0.00	0.00	1.85	0.00	0.00	0.00	0.00	0.00	0.00
Normalized	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00
Floodplain Areas (Acres)	2.14	2.14	5.80	8.77	2.14	2.14	2.14	2.14	2.14	2.14
Normalized	0.00	0.00	0.55	1.00	0.00	0.00	0.00	0.00	0.00	0.00
Engineering										
Length (Miles)	7.35	7.35	8.40	10.38	7.38	7.39	7.36	7.37	7.48	7.49
Normalized	0.00	0.00	0.35	1.00	0.01	0.01	0.00	0.01	0.04	0.05
% Rebuild with Existing Utility*	100%	97%	63%	79%	96%	93%	95%	97%	93%	90%
Normalized	1.00	0.93	0.00	0.43	0.88	0.81	0.86	0.93	0.80	0.73
Inverted	0.00	0.07	1.00	0.57	0.12	0.19	0.14	0.07	0.20	0.27
% Co-location w/ Existing T/L or other major utilities*	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Normalized	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Inverted	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Miles of Co-location with Roads*	0.17	0.32	1.39	0.00	0.37	0.37	0.32	0.17	0.27	0.42
Normalized	0.12	0.23	1.00	0.00	0.27	0.27	0.23	0.12	0.19	0.30
Inverted	0.88	0.77	0.00	1.00	0.73	0.73	0.77	0.88	0.81	0.70
Number of Parcels	196.00	201.00	139.00	141.00	181.00	180.00	200.00	195.00	186.00	184.00
Normalized	0.92	1.00	0.00	0.03	0.68	0.66	0.98	0.90	0.76	0.73
Total Project Costs	$14,513,240	$14,733,240	$19,010,340	$18,759,000	$14,881,600	$15,757,600	$15,389,240	$15,185,240	$15,712,400	$16,268,400
Normalized	0.00	0.05	1.00	0.94	0.08	0.28	0.19	0.15	0.27	0.39
SUM of Weighted Totals	5.75	5.70	6.63	9.77	5.41	5.71	5.95	6.01	5.70	5.79
RANK	**5**	**3**	**9**	**10**	**1**	**4**	**7**	**8**	**2**	**6**

Table 17: Raw Statistics and Normalized Statistics - Standard

DATA	Numbers Normalized									
FOR ALL ROUTES	Rte 1	Rte 2	Rte 3	Rte 4	Rte 5	Rte 6	Rte 7	Rte 8	Rte 9	Rte 10
Built										
Feature	**Unit**	**Unit**	**Unit**	**Unit**	**Unit**	**Unit**	**Unit**	**Unit**	**Unit**	**Unit**
Relocated Residences (within 100' Corridor)	0.00	0.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00
Normalized	0.00	0.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00
Proximity to Residences (300')	0.00	0.00	33.00	11.00	0.00	1.00	1.00	1.00	26.00	26.00
Normalized	0.00	0.00	1.00	0.33	0.00	0.03	0.03	0.03	0.79	0.79
Proposed Developments	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Normalized	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Proximity to Commercial Buildings (300')	0.00	0.00	24.00	2.00	0.00	2.00	2.00	2.00	0.00	2.00
Normalized	0.00	0.00	1.00	0.08	0.00	0.08	0.08	0.08	0.00	0.08
Proximity to Industrial Buildings (300')	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Normalized	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
School, DayCare, Church, Cemetery, Park Parcels (#)	0.00	0.00	2.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00
Normalized	0.00	0.00	1.00	0.50	0.00	0.00	0.00	0.00	0.00	0.00
NRHP Listed/Eligible Strucs./Districts (1500' from edge	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Normalized	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Natural										
Natural Forests (Acres)	0.00	0.00	8.66	9.61	0.06	0.06	0.00	0.00	2.00	2.00
Normalized	0.00	0.00	0.90	1.00	0.01	0.01	0.00	0.00	0.21	0.21
Stream/River Crossings	0.00	0.00	4.00	6.00	2.00	2.00	0.00	0.00	0.00	0.00
Normalized	0.00	0.00	0.67	1.00	0.33	0.33	0.00	0.00	0.00	0.00
Wetland Areas (Acres)	0.00	0.00	0.00	1.85	0.00	0.00	0.00	0.00	0.00	0.00
Normalized	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00
Floodplain Areas (Acres)	0.00	0.00	3.66	6.63	0.00	0.00	0.00	0.00	0.00	0.00
Normalized	0.00	0.00	0.55	1.00	0.00	0.00	0.00	0.00	0.00	0.00
Engineering										
Length (Miles)	7.35	7.35	8.40	10.38	7.38	7.39	7.36	7.37	7.48	7.49
Normalized	0.00	0.00	0.35	1.00	0.01	0.01	0.00	0.01	0.04	0.05
% Rebuild with Existing Utility*	100%	97%	63%	79%	96%	93%	95%	97%	93%	90%
Normalized	1.00	0.93	0.00	0.43	0.88	0.81	0.86	0.93	0.80	0.73
Inverted	0.00	0.07	1.00	0.57	0.12	0.19	0.14	0.07	0.20	0.27
% Co-location w/ Existing T/L or other major utilities*	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Normalized	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Inverted	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Miles of Co-location with Roads*	0.17	0.32	1.39	0.00	0.37	0.37	0.32	0.17	0.27	0.42
Normalized	0.12	0.23	1.00	0.00	0.27	0.27	0.23	0.12	0.19	0.30
Inverted	0.88	0.77	0.00	1.00	0.73	0.73	0.77	0.88	0.81	0.70
Number of Parcels	196.00	201.00	139.00	141.00	181.00	180.00	200.00	195.00	186.00	184.00
Normalized	0.92	1.00	0.00	0.03	0.68	0.66	0.98	0.90	0.76	0.73
Total Project Costs	$14,480,000	$14,700,000	$18,979,920	$18,699,660	$14,848,360	$15,724,360	$15,356,000	$15,152,000	$15,680,000	$16,236,000
Normalized	0.00	0.05	1.00	0.94	0.08	0.28	0.19	0.15	0.27	0.39
SUM of Weighted Totals	2.80	2.89	9.47	10.45	2.96	3.33	3.20	3.12	4.07	4.21
RANK	**1**	**2**	**9**	**10**	**3**	**6**	**5**	**4**	**7**	**8**

Table 18: Raw Statistics and Normalized Statistics – Calibrated Scores

Like the Alternate Corridors, each perspective has a five times emphasis. The Simple Average perspective has an equal amount of weight assigned to each perspective (33.3%). Each of the routes is ranked according to its values with respect to the individual environment being emphasized.

Emphasis on Engineering Environment

Engineering Emphasis	Weights										
		1	2	10	9	3	7	5	4	6	8
		Rte 1	Rte 2	Rte 3	Rte 4	Rte 5	Rte 6	Rte 7	Rte 8	Rte 9	Rte 10
Built	14%										
Feature		Unit	Unit	Unit	Unit	Unit	Unit	Unit	Unit	Unit	Unit
Relocated Residences (within 100' Corridor)	64.3%	1.00	0.85	0.00	0.06	0.79	0.79	0.85	1.00	0.63	0.63
Weighted		0.64	0.55	0.00	0.04	0.51	0.51	0.55	0.64	0.40	0.40
Proximity to Residences (300')	18.9%	0.99	0.99	0.00	0.17	0.83	0.84	1.00	1.00	0.90	0.90
Weighted		0.19	0.19	0.00	0.03	0.16	0.16	0.19	0.19	0.17	0.17
Proposed Developments	4.5%	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Weighted		0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Proximity to Commercial Buildings (300')	3.1%	0.96	0.96	0.85	0.00	0.96	1.00	1.00	1.00	0.96	1.00
Weighted		0.03	0.03	0.03	0.00	0.03	0.03	0.03	0.03	0.03	0.03
Proximity to Industrial Buildings (300')	0.0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
School, DayCare, Church, Cemetery, Park Parcels (#)	9.2%	0.00	0.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.09	0.09	0.00	0.00	0.00	0.00	0.00	0.00
NRHP Listed/Eligible Strucs./Districts (1500' from edge of R/W)	0.0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	100.0%	0.91	0.81	0.16	0.21	0.74	0.74	0.81	0.91	0.65	0.65
WEIGHTED TOTAL		0.127	0.114	0.023	0.029	0.104	0.104	0.114	0.127	0.091	0.091
Natural	14%										
Natural Forests (Acres)	42.6%	0.00	0.00	0.59	1.00	0.00	0.00	0.00	0.00	0.13	0.13
Weighted		0.00	0.00	0.25	0.43	0.00	0.00	0.00	0.00	0.06	0.06
Stream/River Crossings	12.0%	0.00	0.00	0.30	1.00	0.20	0.20	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.04	0.12	0.02	0.02	0.00	0.00	0.00	0.00
Wetland Areas (Acres)	41.9%	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.00	0.42	0.00	0.00	0.00	0.00	0.00	0.00
Floodplain Areas (Acres)	3.5%	0.00	0.00	0.55	1.00	0.00	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.02	0.04	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	100.0%	0.00	0.00	0.31	1.00	0.03	0.03	0.00	0.00	0.06	0.06
WEIGHTED TOTAL		0.000	0.000	0.043	0.140	0.004	0.004	0.000	0.000	0.008	0.008
Engineering	72%										
% Rebuild with Existing Utility*	70.4%	0.00	0.07	1.00	0.57	0.12	0.19	0.14	0.07	0.20	0.27
Weighted		0.00	0.05	0.70	0.40	0.08	0.13	0.10	0.05	0.14	0.19
% Co-location w/ Existing T/L or other major utilities*	0.0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Project Costs	29.6%	0.00	0.05	1.00	0.94	0.08	0.28	0.19	0.15	0.27	0.39
Weighted		0.00	0.01	0.30	0.28	0.02	0.08	0.06	0.04	0.08	0.12
TOTAL	100.0%	0.00	0.06	1.00	0.68	0.11	0.22	0.16	0.10	0.22	0.31
WEIGHTED TOTAL		0.000	0.046	0.720	0.489	0.077	0.155	0.112	0.069	0.159	0.220
SUM OF WEIGHTED TOTALS		0.127	0.159	0.786	0.658	0.184	0.263	0.226	0.196	0.258	0.319
RANK		1	2	10	9	3	7	5	4	6	8
* Inverted for calculations	Lowest Number is Best										

Table 19: Alternate Route Evaluation Matrix Emphasis on Engineering Environment – Standard

Engineering Emphasis	Weights										
RANK		1	2	10	9	4	6	5	3	7	8
		Rte 1	Rte 2	Rte 3	Rte 4	Rte 5	Rte 6	Rte 7	Rte 8	Rte 9	Rte 10
Built	14%										
Feature		Unit	Unit	Unit	Unit	Unit	Unit	Unit	Unit	Unit	Unit
Relocated Residences (within 100' Corridor)	64.3%	0.00	0.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.64	0.64	0.00	0.00	0.00	0.00	0.00	0.00
Proximity to Residences (300')	18.9%	0.00	0.00	1.00	0.33	0.00	0.03	0.03	0.03	0.79	0.79
Weighted		0.00	0.00	0.19	0.06	0.00	0.01	0.01	0.01	0.15	0.15
Proposed Developments	4.5%	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Weighted		0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Proximity to Commercial Buildings (300')	3.1%	0.00	0.00	1.00	0.08	0.00	0.08	0.08	0.08	0.00	0.08
Weighted		0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Proximity to Industrial Buildings (300')	0.0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
School, DayCare, Church, Cemetery, Park Parcels (#)	9.2%	0.00	0.00	1.00	0.50	0.00	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.09	0.05	0.00	0.00	0.00	0.00	0.00	0.00
NRHP Listed/Eligible Strucs./Districts (1500' from edge of R/W)	0.0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	100.0%	0.05	0.05	1.00	0.80	0.05	0.05	0.05	0.05	0.19	0.20
WEIGHTED TOTAL		0.006	0.006	0.140	0.112	0.006	0.007	0.007	0.007	0.027	0.028
Natural	14%										
Natural Forests (Acres)	42.6%	0.00	0.00	0.90	1.00	0.01	0.01	0.00	0.00	0.21	0.21
Weighted		0.00	0.00	0.38	0.43	0.00	0.00	0.00	0.00	0.09	0.09
Stream/River Crossings	12.0%	0.00	0.00	0.67	1.00	0.33	0.33	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.08	0.12	0.04	0.04	0.00	0.00	0.00	0.00
Wetland Areas (Acres)	41.9%	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.00	0.42	0.00	0.00	0.00	0.00	0.00	0.00
Floodplain Areas (Acres)	3.5%	0.00	0.00	0.55	1.00	0.00	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.02	0.04	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	100.0%	0.00	0.00	0.48	1.00	0.04	0.04	0.00	0.00	0.09	0.09
WEIGHTED TOTAL		0.000	0.000	0.068	0.140	0.006	0.006	0.000	0.000	0.012	0.012
Engineering	72%										
% Rebuild with Existing Utility*	70.4%	0.00	0.07	1.00	0.57	0.12	0.19	0.14	0.07	0.20	0.27
Weighted		0.00	0.05	0.70	0.40	0.08	0.13	0.10	0.05	0.14	0.19
% Co-location w/ Existing T/L or other major utilities*	0.0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Project Costs	29.6%	0.00	0.05	1.00	0.94	0.08	0.28	0.19	0.15	0.27	0.39
Weighted		0.00	0.01	0.30	0.28	0.02	0.08	0.06	0.04	0.08	0.12
TOTAL	100.0%	0.00	0.06	1.00	0.68	0.11	0.22	0.16	0.10	0.22	0.31
WEIGHTED TOTAL		0.000	0.046	0.720	0.487	0.077	0.155	0.112	0.069	0.159	0.220
SUM OF WEIGHTED TOTALS		0.006	0.052	0.928	0.739	0.089	0.169	0.120	0.076	0.199	0.260
RANK		1	2	10	9	4	6	5	3	7	8

Table 20: Alternate Route Evaluation Matrix Emphasis on Engineering Environment – Calibrated Scores

Emphasis on Natural Environment

Natural Emphasis	Weights										
		2	1	9	10	4	6	3	5	7	8
		Rte 1	Rte 2	Rte 3	Rte 4	Rte 5	Rte 6	Rte 7	Rte 8	Rte 9	Rte 10
Built	14%										
Feature		Unit	Unit	Unit	Unit	Unit	Unit	Unit	Unit	Unit	Unit
Relocated Residences (within 100' Corridor)	64.3%	1.00	0.85	0.00	0.06	0.79	0.79	0.85	1.00	0.63	0.63
Weighted		0.64	0.55	0.00	0.04	0.51	0.51	0.55	0.64	0.40	0.40
Proximity to Residences (300')	18.9%	0.99	0.99	0.00	0.17	0.83	0.84	1.00	1.00	0.90	0.90
Weighted		0.19	0.19	0.00	0.03	0.16	0.16	0.19	0.19	0.17	0.17
Proposed Developments	4.5%	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Weighted		0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Proximity to Commercial Buildings (300')	3.1%	0.96	0.96	0.85	0.00	0.96	1.00	1.00	1.00	0.96	1.00
Weighted		0.03	0.03	0.03	0.00	0.03	0.03	0.03	0.03	0.03	0.03
Proximity to Industrial Buildings (300')	0.0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
School, DayCare, Church, Cemetery, Park Parcels (#)	9.2%	0.00	0.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.09	0.09	0.00	0.00	0.00	0.00	0.00	0.00
NRHP Listed/Eligible Strucs./Districts (1500' from edge of R/W)	0.0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	100.0%	0.91	0.81	0.16	0.21	0.74	0.74	0.81	0.91	0.65	0.65
WEIGHTED TOTAL		0.127	0.114	0.023	0.029	0.104	0.104	0.114	0.127	0.091	0.091
Natural	72%										
Natural Forests (Acres)	42.6%	0.00	0.00	0.59	1.00	0.00	0.00	0.00	0.00	0.13	0.13
Weighted		0.00	0.00	0.25	0.43	0.00	0.00	0.00	0.00	0.06	0.06
Stream/River Crossings	12.0%	0.00	0.00	0.30	1.00	0.20	0.20	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.04	0.12	0.02	0.02	0.00	0.00	0.00	0.00
Wetland Areas (Acres)	41.9%	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.00	0.42	0.00	0.00	0.00	0.00	0.00	0.00
Floodplain Areas (Acres)	3.5%	0.00	0.00	0.55	1.00	0.00	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.02	0.04	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	100.0%	0.00	0.00	0.31	1.00	0.03	0.03	0.00	0.00	0.06	0.06
WEIGHTED TOTAL		0.000	0.000	0.220	0.720	0.019	0.019	0.000	0.000	0.041	0.041
Engineering	14%										
% Rebuild with Existing Utility*	70.4%	0.00	0.07	1.00	0.57	0.12	0.19	0.14	0.07	0.20	0.27
Weighted		0.00	0.05	0.70	0.40	0.08	0.13	0.10	0.05	0.14	0.19
% Co-location w/ Existing T/L or other major utilities*	0.0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Project Costs	29.6%	0.00	0.05	1.00	0.94	0.08	0.28	0.19	0.15	0.27	0.39
Weighted		0.00	0.01	0.30	0.28	0.02	0.08	0.06	0.04	0.08	0.12
TOTAL	100.0%	0.00	0.06	1.00	0.68	0.11	0.22	0.16	0.10	0.22	0.31
WEIGHTED TOTAL		0.000	0.009	0.140	0.095	0.015	0.030	0.022	0.013	0.031	0.043
SUM OF WEIGHTED TOTALS		0.127	0.123	0.383	0.844	0.137	0.153	0.136	0.141	0.162	0.174
RANK		2	1	9	10	4	6	3	5	7	8
* Inverted for calculations	Lowest Number is Best										

Table 21 Alternate Route Evaluation Emphasis on Natural Environment – Standard

Natural Emphasis	Weights										
RANK		1	2	9	10	5	6	4	3	7	8
		Rte 1	Rte 2	Rte 3	Rte 4	Rte 5	Rte 6	Rte 7	Rte 8	Rte 9	Rte 10
Built	14%										
Feature		Unit	Unit	Unit	Unit	Unit	Unit	Unit	Unit	Unit	Unit
Relocated Residences (within 100' Corridor)	64.3%	0.00	0.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.64	0.64	0.00	0.00	0.00	0.00	0.00	0.00
Proximity to Residences (300')	18.9%	0.00	0.00	1.00	0.33	0.00	0.03	0.03	0.03	0.79	0.79
Weighted		0.00	0.00	0.19	0.06	0.00	0.01	0.01	0.01	0.15	0.15
Proposed Developments	4.5%	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Weighted		0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Proximity to Commercial Buildings (300')	3.1%	0.00	0.00	1.00	0.08	0.00	0.08	0.08	0.08	0.00	0.08
Weighted		0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Proximity to Industrial Buildings (300')	0.0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
School, DayCare, Church, Cemetery, Park Parcels (#)	9.2%	0.00	0.00	1.00	0.50	0.00	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.09	0.05	0.00	0.00	0.00	0.00	0.00	0.00
NRHP Listed/Eligible Strucs./Districts (1500' from edge of R/W)	0.0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	100.0%	0.05	0.05	1.00	0.80	0.05	0.05	0.05	0.05	0.19	0.20
WEIGHTED TOTAL		0.006	0.006	0.140	0.112	0.006	0.007	0.007	0.007	0.027	0.028
Natural	72%										
Natural Forests (Acres)	42.6%	0.00	0.00	0.90	1.00	0.01	0.01	0.00	0.00	0.21	0.21
Weighted		0.00	0.00	0.38	0.43	0.00	0.00	0.00	0.00	0.09	0.09
Stream/River Crossings	12.0%	0.00	0.00	0.67	1.00	0.33	0.33	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.08	0.12	0.04	0.04	0.00	0.00	0.00	0.00
Wetland Areas (Acres)	41.9%	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.00	0.42	0.00	0.00	0.00	0.00	0.00	0.00
Floodplain Areas (Acres)	3.5%	0.00	0.00	0.55	1.00	0.00	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.02	0.04	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	100.0%	0.00	0.00	0.48	1.00	0.04	0.04	0.00	0.00	0.09	0.09
WEIGHTED TOTAL		0.000	0.000	0.348	0.720	0.031	0.031	0.000	0.000	0.064	0.064
Engineering	14%										
% Rebuild with Existing Utility*	70.4%	0.00	0.07	1.00	0.57	0.12	0.19	0.14	0.07	0.20	0.27
Weighted		0.00	0.05	0.70	0.40	0.08	0.13	0.10	0.05	0.14	0.19
% Co-location w/ Existing T/L or other major utilities*	0.0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Project Costs	29.6%	0.00	0.05	1.00	0.94	0.08	0.28	0.19	0.15	0.27	0.39
Weighted		0.00	0.01	0.30	0.28	0.02	0.08	0.06	0.04	0.08	0.12
TOTAL	100.0%	0.00	0.06	1.00	0.68	0.11	0.22	0.16	0.10	0.22	0.31
WEIGHTED TOTAL		0.000	0.009	0.140	0.095	0.015	0.030	0.022	0.013	0.031	0.043
SUM OF WEIGHTED TOTALS		0.006	0.015	0.628	0.927	0.052	0.068	0.029	0.021	0.122	0.134
RANK		1	2	9	10	5	6	4	3	7	8

Table 22 Alternate Route Evaluation Emphasis on Natural Environment – Calibrated Scores

Emphasis on Built Environment

Built Emphasis	Weights										
		9	7	1	2	5	6	8	10	3	4
		Rte 1	Rte 2	Rte 3	Rte 4	Rte 5	Rte 6	Rte 7	Rte 8	Rte 9	Rte 10
Built	72%										
Feature		Unit	Unit	Unit	Unit	Unit	Unit	Unit	Unit	Unit	Unit
Relocated Residences (within 100' Corridor)	64.3%	1.00	0.85	0.00	0.06	0.79	0.79	0.85	1.00	0.63	0.63
Weighted		0.64	0.55	0.00	0.04	0.51	0.51	0.55	0.64	0.40	0.40
Proximity to Residences (300')	18.9%	0.99	0.99	0.00	0.17	0.83	0.84	1.00	1.00	0.90	0.90
Weighted		0.19	0.19	0.00	0.03	0.16	0.16	0.19	0.19	0.17	0.17
Proposed Developments	4.5%	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Weighted		0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Proximity to Commercial Buildings (300')	3.1%	0.96	0.96	0.85	0.00	0.96	1.00	1.00	1.00	0.96	1.00
Weighted		0.03	0.03	0.03	0.00	0.03	0.03	0.03	0.03	0.03	0.03
Proximity to Industrial Buildings (300')	0.0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
School, DayCare, Church, Cemetery, Park Parcels (#)	9.2%	0.00	0.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.09	0.09	0.00	0.00	0.00	0.00	0.00	0.00
NRHP Listed/Eligible Strucs./Districts (1500' from edge of	0.0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	100.0%	0.91	0.81	0.16	0.21	0.74	0.74	0.81	0.91	0.65	0.65
WEIGHTED TOTAL		0.652	0.585	0.118	0.150	0.534	0.535	0.586	0.654	0.466	0.467
Natural	14%										
Natural Forests (Acres)	42.6%	0.00	0.00	0.59	1.00	0.00	0.00	0.00	0.00	0.13	0.13
Weighted		0.00	0.00	0.25	0.43	0.00	0.00	0.00	0.00	0.06	0.06
Stream/River Crossings	12.0%	0.00	0.00	0.30	1.00	0.20	0.20	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.04	0.12	0.02	0.02	0.00	0.00	0.00	0.00
Wetland Areas (Acres)	41.9%	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.00	0.42	0.00	0.00	0.00	0.00	0.00	0.00
Floodplain Areas (Acres)	3.5%	0.00	0.00	0.55	1.00	0.00	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.02	0.04	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	100.0%	0.00	0.00	0.31	1.00	0.03	0.03	0.00	0.00	0.06	0.06
WEIGHTED TOTAL		0.000	0.000	0.043	0.140	0.004	0.004	0.000	0.000	0.008	0.008
Engineering	14%										
% Rebuild with Existing Utility*	70.4%	0.00	0.07	1.00	0.57	0.12	0.19	0.14	0.07	0.20	0.27
Weighted		0.00	0.05	0.70	0.40	0.08	0.02	0.10	0.05	0.14	0.19
% Co-location w/ Existing T/L or other major utilities*	0.0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Project Costs	29.6%	0.00	0.05	1.00	0.94	0.08	0.28	0.19	0.15	0.27	0.39
Weighted		0.00	0.01	0.30	0.28	0.02	0.08	0.06	0.04	0.08	0.12
TOTAL	100.0%	0.00	0.06	1.00	0.68	0.11	0.10	0.16	0.10	0.22	0.31
WEIGHTED TOTAL		0.000	0.009	0.140	0.095	0.015	0.015	0.022	0.013	0.031	0.043
SUM OF WEIGHTED TOTALS		0.652	0.594	0.300	0.385	0.552	0.554	0.608	0.667	0.505	0.517
RANK		9	7	1	2	5	6	8	10	3	4
* Inverted for calculations	Lowest Number is Best										

Table 23 Alternate Route Evaluation Matrix Emphasis on Built Environment - Standard

Built Emphasis	Weights										
RANK		1	2	10	9	4	5	6	3	7	8
		Rte 1	Rte 2	Rte 3	Rte 4	Rte 5	Rte 6	Rte 7	Rte 8	Rte 9	Rte 10
Built	72%										
Feature		Unit	Unit	Unit	Unit	Unit	Unit	Unit	Unit	Unit	Unit
Relocated Residences (within 100' Corridor)	64.3%	0.00	0.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.64	0.64	0.00	0.00	0.00	0.00	0.00	0.00
Proximity to Residences (300')	18.9%	0.00	0.00	1.00	0.33	0.00	0.03	0.03	0.03	0.79	0.79
Weighted		0.00	0.00	0.19	0.06	0.00	0.01	0.01	0.01	0.15	0.15
Proposed Developments	4.5%	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Weighted		0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Proximity to Commercial Buildings (300')	3.1%	0.00	0.00	1.00	0.08	0.00	0.08	0.08	0.08	0.00	0.08
Weighted		0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Proximity to Industrial Buildings (300')	0.0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
School, DayCare, Church, Cemetery, Park Parcels (#)	9.2%	0.00	0.00	1.00	0.50	0.00	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.09	0.05	0.00	0.00	0.00	0.00	0.00	0.00
NRHP Listed/Eligible Strucs./Districts (1500' from edge of	0.0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	100.0%	0.05	0.05	1.00	0.80	0.05	0.05	0.05	0.05	0.19	0.20
WEIGHTED TOTAL		0.032	0.032	0.720	0.576	0.032	0.038	0.038	0.038	0.140	0.141
Natural	14%										
Natural Forests (Acres)	42.6%	0.00	0.00	0.90	1.00	0.01	0.01	0.00	0.00	0.21	0.21
Weighted		0.00	0.00	0.38	0.43	0.00	0.00	0.00	0.00	0.09	0.09
Stream/River Crossings	12.0%	0.00	0.00	0.67	1.00	0.33	0.33	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.08	0.12	0.04	0.04	0.00	0.00	0.00	0.00
Wetland Areas (Acres)	41.9%	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.00	0.42	0.00	0.00	0.00	0.00	0.00	0.00
Floodplain Areas (Acres)	3.5%	0.00	0.00	0.55	1.00	0.00	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.02	0.04	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	100.0%	0.00	0.00	0.48	1.00	0.04	0.04	0.00	0.00	0.09	0.09
WEIGHTED TOTAL		0.000	0.000	0.068	0.140	0.006	0.006	0.000	0.000	0.012	0.012
Engineering	14%										
% Rebuild with Existing Utility*	70.4%	0.00	0.07	1.00	0.57	0.12	0.19	0.14	0.07	0.20	0.27
Weighted		0.00	0.05	0.70	0.40	0.08	0.02	0.10	0.05	0.14	0.19
% Co-location w/ Existing T/L or other major utilities*	0.0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Project Costs	29.6%	0.00	0.05	1.00	0.94	0.08	0.28	0.19	0.15	0.27	0.39
Weighted		0.00	0.01	0.30	0.28	0.02	0.08	0.06	0.04	0.08	0.12
TOTAL	100.0%	0.00	0.06	1.00	0.68	0.11	0.10	0.16	0.10	0.22	0.31
WEIGHTED TOTAL		0.000	0.009	0.140	0.095	0.015	0.015	0.022	0.013	0.031	0.043
SUM OF WEIGHTED TOTALS		0.032	0.041	0.928	0.810	0.053	0.059	0.060	0.052	0.183	0.197
RANK		1	2	10	9	4	5	6	3	7	8

Table 24 Alternate Route Evaluation Matrix Emphasis on Built Environment – Calibrated Scores

Equal Consideration of Categories (Simple Average)

Simple Emphasis	Weights										
		3	2	9	10	1	6	5	7	4	8
		Rte 1	Rte 2	Rte 3	Rte 4	Rte 5	Rte 6	Rte 7	Rte 8	Rte 9	Rte 10
Built	33%										
Feature		Unit	Unit	Unit	Unit	Unit	Unit	Unit	Unit	Unit	Unit
Relocated Residences (within 100' Corridor)	64.3%	1.00	0.85	0.00	0.06	0.79	0.79	0.85	1.00	0.63	0.63
Weighted		0.64	0.55	0.00	0.04	0.51	0.51	0.55	0.64	0.40	0.40
Proximity to Residences (300')	18.9%	0.99	0.99	0.00	0.17	0.83	0.84	1.00	1.00	0.90	0.90
Weighted		0.19	0.19	0.00	0.03	0.16	0.16	0.19	0.19	0.17	0.17
Proposed Developments	4.5%	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Weighted		0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Proximity to Commercial Buildings (300')	3.1%	0.96	0.96	0.85	0.00	0.96	1.00	1.00	1.00	0.96	1.00
Weighted		0.03	0.03	0.03	0.00	0.03	0.03	0.03	0.03	0.03	0.03
Proximity to Industrial Buildings (300')	0.0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
School, DayCare, Church, Cemetery, Park Parcels (#)	9.2%	0.00	0.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.09	0.09	0.00	0.00	0.00	0.00	0.00	0.00
NRHP Listed/Eligible Strucs./Districts (1500' from edge of R/W)	0.0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	100.0%	0.91	0.81	0.16	0.21	0.74	0.74	0.81	0.91	0.65	0.65
WEIGHTED TOTAL		0.302	0.270	0.054	0.069	0.247	0.248	0.271	0.302	0.215	0.216
Natural	33%										
Natural Forests (Acres)	42.6%	0.00	0.00	0.59	1.00	0.00	0.00	0.00	0.00	0.13	0.13
Weighted		0.00	0.00	0.25	0.43	0.00	0.00	0.00	0.00	0.06	0.06
Stream/River Crossings	12.0%	0.00	0.00	0.30	1.00	0.20	0.20	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.04	0.12	0.02	0.02	0.00	0.00	0.00	0.00
Wetland Areas (Acres)	41.9%	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.00	0.42	0.00	0.00	0.00	0.00	0.00	0.00
Floodplain Areas (Acres)	3.5%	0.00	0.00	0.55	1.00	0.00	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.02	0.04	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	100.0%	0.00	0.00	0.31	1.00	0.03	0.03	0.00	0.00	0.06	0.06
WEIGHTED TOTAL		0.000	0.000	0.102	0.333	0.009	0.009	0.000	0.000	0.019	0.019
Engineering	33%										
% Rebuild with Existing Utility*	70.4%	0.00	0.07	1.00	0.57	0.12	0.19	0.14	0.07	0.20	0.27
Weighted		0.00	0.05	0.70	0.40	0.08	0.13	0.10	0.05	0.14	0.19
% Co-location w/ Existing T/L or other major utilities*	0.0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Project Costs	29.6%	0.00	0.05	1.00	0.94	0.08	0.28	0.19	0.15	0.27	0.39
Weighted		0.00	0.01	0.30	0.28	0.02	0.08	0.06	0.04	0.08	0.12
TOTAL	100.0%	0.00	0.06	1.00	0.68	0.11	0.22	0.16	0.10	0.22	0.31
WEIGHTED TOTAL		0.000	0.021	0.333	0.226	0.036	0.072	0.052	0.032	0.074	0.102
SUM OF WEIGHTED TOTALS		0.302	0.292	0.489	0.629	0.291	0.328	0.323	0.334	0.308	0.337
RANK		3	2	9	10	1	6	5	7	4	8
* Inverted for calculations	Lowest Number is Best										

Table 25 Alternate Route Evaluation Matrix Emphasis on Equal Weights – Standard

Simple Emphasis	Weights										
RANK		1	2	10	9	4	6	5	3	7	8
		Rte 1	Rte 2	Rte 3	Rte 4	Rte 5	Rte 6	Rte 7	Rte 8	Rte 9	Rte 10
Built	33%										
Feature		Unit	Unit	Unit	Unit	Unit	Unit	Unit	Unit	Unit	Unit
Relocated Residences (within 100' Corridor)	64.3%	0.00	0.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.64	0.64	0.00	0.00	0.00	0.00	0.00	0.00
Proximity to Residences (300')	18.9%	0.00	0.00	1.00	0.33	0.00	0.03	0.03	0.03	0.79	0.79
Weighted		0.00	0.00	0.19	0.06	0.00	0.01	0.01	0.01	0.15	0.15
Proposed Developments	4.5%	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Weighted		0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Proximity to Commercial Buildings (300')	3.1%	0.00	0.00	1.00	0.08	0.00	0.08	0.08	0.08	0.00	0.08
Weighted		0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Proximity to Industrial Buildings (300')	0.0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
School, DayCare, Church, Cemetery, Park Parcels (#)	9.2%	0.00	0.00	1.00	0.50	0.00	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.09	0.05	0.00	0.00	0.00	0.00	0.00	0.00
NRHP Listed/Eligible Strucs./Districts (1500' from edge of R/W)	0.0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	100.0%	0.05	0.05	1.00	0.80	0.05	0.05	0.05	0.05	0.19	0.20
WEIGHTED TOTAL		0.015	0.015	0.333	0.266	0.015	0.018	0.018	0.018	0.065	0.065
Natural	33%										
Natural Forests (Acres)	42.6%	0.00	0.00	0.90	1.00	0.01	0.01	0.00	0.00	0.21	0.21
Weighted		0.00	0.00	0.38	0.43	0.00	0.00	0.00	0.00	0.09	0.09
Stream/River Crossings	12.0%	0.00	0.00	0.67	1.00	0.33	0.33	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.08	0.12	0.04	0.04	0.00	0.00	0.00	0.00
Wetland Areas (Acres)	41.9%	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.00	0.42	0.00	0.00	0.00	0.00	0.00	0.00
Floodplain Areas (Acres)	3.5%	0.00	0.00	0.55	1.00	0.00	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.02	0.04	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	100.0%	0.00	0.00	0.48	1.00	0.04	0.04	0.00	0.00	0.09	0.09
WEIGHTED TOTAL		0.000	0.000	0.161	0.333	0.014	0.014	0.000	0.000	0.030	0.030
Engineering	33%										
% Rebuild with Existing Utility*	70.4%	0.00	0.07	1.00	0.57	0.12	0.19	0.14	0.07	0.20	0.27
Weighted		0.00	0.05	0.70	0.40	0.08	0.13	0.10	0.05	0.14	0.19
% Co-location w/ Existing T/L or other major utilities*	0.0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Project Costs	29.6%	0.00	0.05	1.00	0.94	0.08	0.28	0.19	0.15	0.27	0.39
Weighted		0.00	0.01	0.30	0.28	0.02	0.08	0.06	0.04	0.08	0.12
TOTAL	100.0%	0.00	0.06	1.00	0.68	0.11	0.22	0.16	0.10	0.22	0.31
WEIGHTED TOTAL		0.000	0.021	0.333	0.225	0.036	0.072	0.052	0.032	0.074	0.102
SUM OF WEIGHTED TOTALS		0.015	0.036	0.827	0.825	0.065	0.104	0.070	0.050	0.168	0.197
RANK		1	2	10	9	4	6	5	3	7	8

Table 26 Alternate Route Evaluation Matrix Emphasis on Equal Weights – Calibrated Scores

Overall Scores & Ranks of Each Route

	Rte 1	Rte 2	Rte 3	Rte 4	Rte 5	Rte 6	Rte 7	Rte 8	Rte 9	Rte 10
Built	0.652	0.594	0.300	0.385	0.552	0.554	0.608	0.667	0.505	0.517
Engineering	0.127	0.159	0.786	0.658	0.184	0.263	0.226	0.196	0.258	0.319
Natural	0.127	0.123	0.383	0.844	0.137	0.153	0.136	0.141	0.162	0.174
Simple	0.302	0.292	0.489	0.629	0.291	0.328	0.323	0.334	0.308	0.337
	Rte 1	Rte 2	Rte 3	Rte 4	Rte 5	Rte 6	Rte 7	Rte 8	Rte 9	Rte 10
Built	9	7	1	2	5	6	8	10	3	4
Engineering	1	2	10	9	3	7	5	4	6	8
Natural	2	1	9	10	4	6	3	5	7	8
Simple	3	2	9	10	1	6	5	7	4	8

Table 27 Overall Scores and Ranks of Routes - Standard

	Rte 1	Rte 2	Rte 3	Rte 4	Rte 5	Rte 6	Rte 7	Rte 8	Rte 9	Rte 10
Built	0.032	0.041	0.928	0.810	0.053	0.059	0.060	0.052	0.183	0.197
Engineering	0.006	0.052	0.928	0.739	0.089	0.169	0.120	0.076	0.199	0.260
Natural	0.006	0.015	0.628	0.927	0.052	0.068	0.029	0.021	0.122	0.134
Simple	0.015	0.036	0.827	0.825	0.065	0.104	0.070	0.050	0.168	0.197
	Rte 1	Rte 2	Rte 3	Rte 4	Rte 5	Rte 6	Rte 7	Rte 8	Rte 9	Rte 10
Built	1	2	10	9	4	5	6	3	7	8
Engineering	1	2	10	9	4	6	5	3	7	8
Natural	1	2	9	10	5	6	4	3	7	8
Simple	1	2	10	9	4	6	5	3	7	8

Table 28 Overall Scores and Ranks of Routes – Calibrated Scores

Cost drivers per each perspective:

Engineering

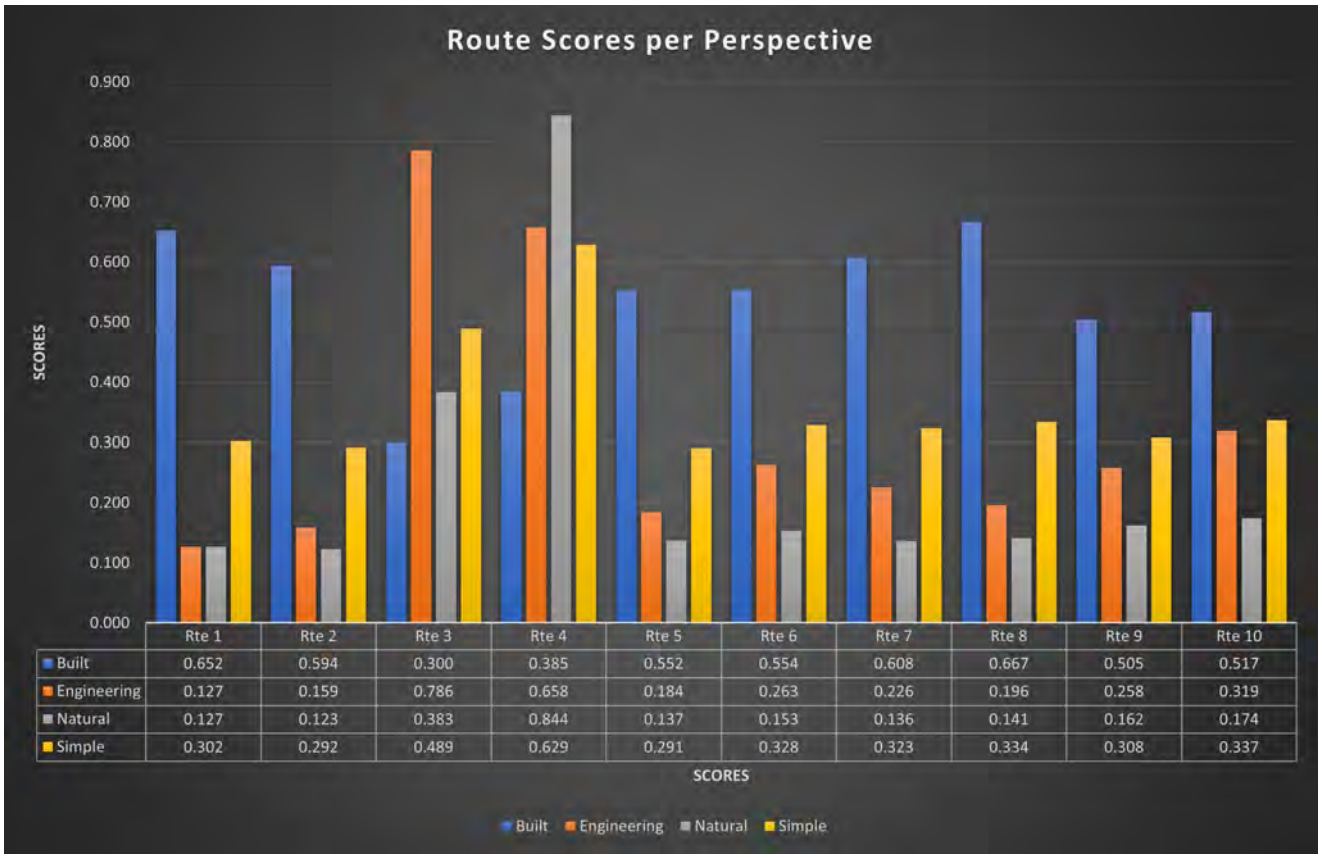
70.4%- Rebuild with Existing Transmission Line
29.6%- Cost

Built

64.3%- Relocated Residences
18.9%- Proximity to Residences
4.5%- Proposed Developments
3.1%- Proximity to Commercial
9.2%- Avoidance Parcels

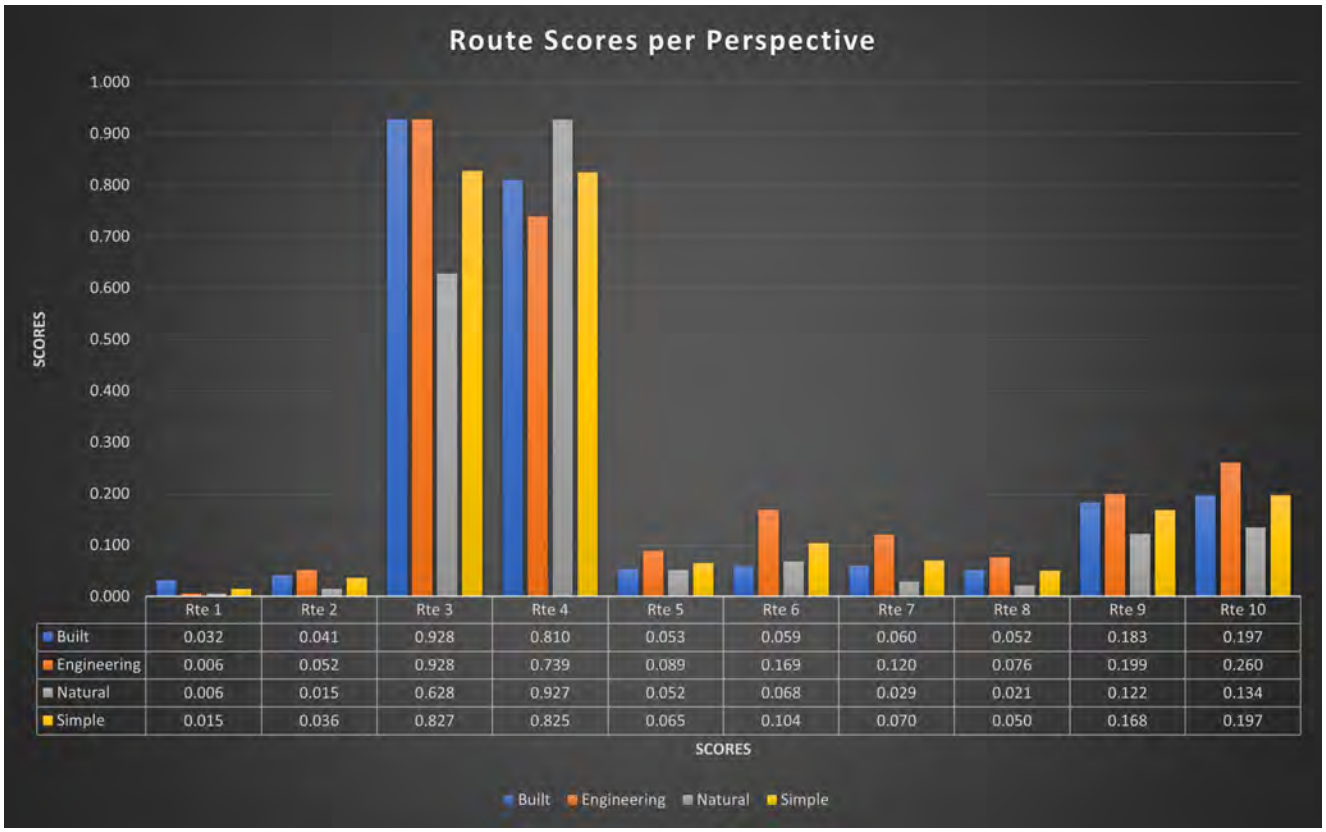
Natural

42.6%- Natural Forested Acres
12%- Stream/River Crossings
41.9%- Wetland Acres
3.5%- Floodplain Acres



	Rte 1	Rte 2	Rte 3	Rte 4	Rte 5	Rte 6	Rte 7	Rte 8	Rte 9	Rte 10
Built	0.652	0.594	0.300	0.385	0.552	0.554	0.608	0.667	0.505	0.517
Engineering	0.127	0.159	0.786	0.658	0.184	0.263	0.226	0.196	0.258	0.319
Natural	0.127	0.123	0.383	0.844	0.137	0.153	0.136	0.141	0.162	0.174
Simple	0.302	0.292	0.489	0.629	0.291	0.328	0.323	0.334	0.308	0.337

Figure 53: Route Comparison - Standard



	Rte 1	Rte 2	Rte 3	Rte 4	Rte 5	Rte 6	Rte 7	Rte 8	Rte 9	Rte 10
Built	0.032	0.041	0.928	0.810	0.053	0.059	0.060	0.052	0.183	0.197
Engineering	0.006	0.052	0.928	0.739	0.089	0.169	0.120	0.076	0.199	0.260
Natural	0.006	0.015	0.628	0.927	0.052	0.068	0.029	0.021	0.122	0.134
Simple	0.015	0.036	0.827	0.825	0.065	0.104	0.070	0.050	0.168	0.197

Figure 54: Route Comparison – Calibrated Scores

Expert Judgement

For some projects, the utility may utilize expert judgment to capture factors that are not present in the model. The EKPC Siting Team determined prior to the execution of expert judgment that the calibrated model would be utilized for route selection and expert judgment. The calibrated model was able to address the limitations of the Standard Model to evaluate and score an existing easement. The EKPC Siting team developed expert judgment criteria and weighting that evaluated project factors or impacts that are specific to the area and the project and are unable or not well-suited to be captured in the standardized model. Criteria was developed by EKPC for expert judgment prior NV5 providing route scoring results.

Upon receipt of the alternative route scoring results for both the standard and calibrated methodology, the EKPC siting team reviewed all route scoring and ranking. Based on the methodology, the top three routes in the alternative route scoring are to be taken to expert judgement.

Based on the calibrated model, the top scoring routes were Routes 1, 2 and 8. In further review of the top three scored routes in the calibrated model, EKPC noted that Route 1 ranked the best in simple average, built, engineering and natural perspectives. Routes 2 and 8 were minor deviations to Route 1, the 69 kV rebuilt opportunity.

In both the standard methodology and the calibrated methodology Alternative route scoring, Routes 3 and 4, which where the routes with the most deviation from the existing rebuild, ranked 9th and 10th out of 10 routes. EKPC felt that this outlined that deviation from the existing 69 kV route lead to additional impact to the community.

Based on review of the data provided, the EKPC siting team determined the they would calibrate scoring the routes in expert judgement and utilize the calibrated model results with the selection of Route 1 as the preferred route.
See appendices on page 80 for EKPC provided memos outlining how expert judgement was used by EKPC for the Fawkes - Duncannon 138 kV line.

Route Selection

The result of this review concludes the selection of the Preferred Route. It is important to note that the GIS representation of the routes considered in these analyses may not exactly match the constructed line. Small adjustments may be made in the exact geographical location of the routes during the physical construction, as a result of real-world engineering and building activities.

As a conclusion to the project, EKPC has selected to move forward with Route 1 for the Fawkes Duncannon 138 kV Transmission Line.

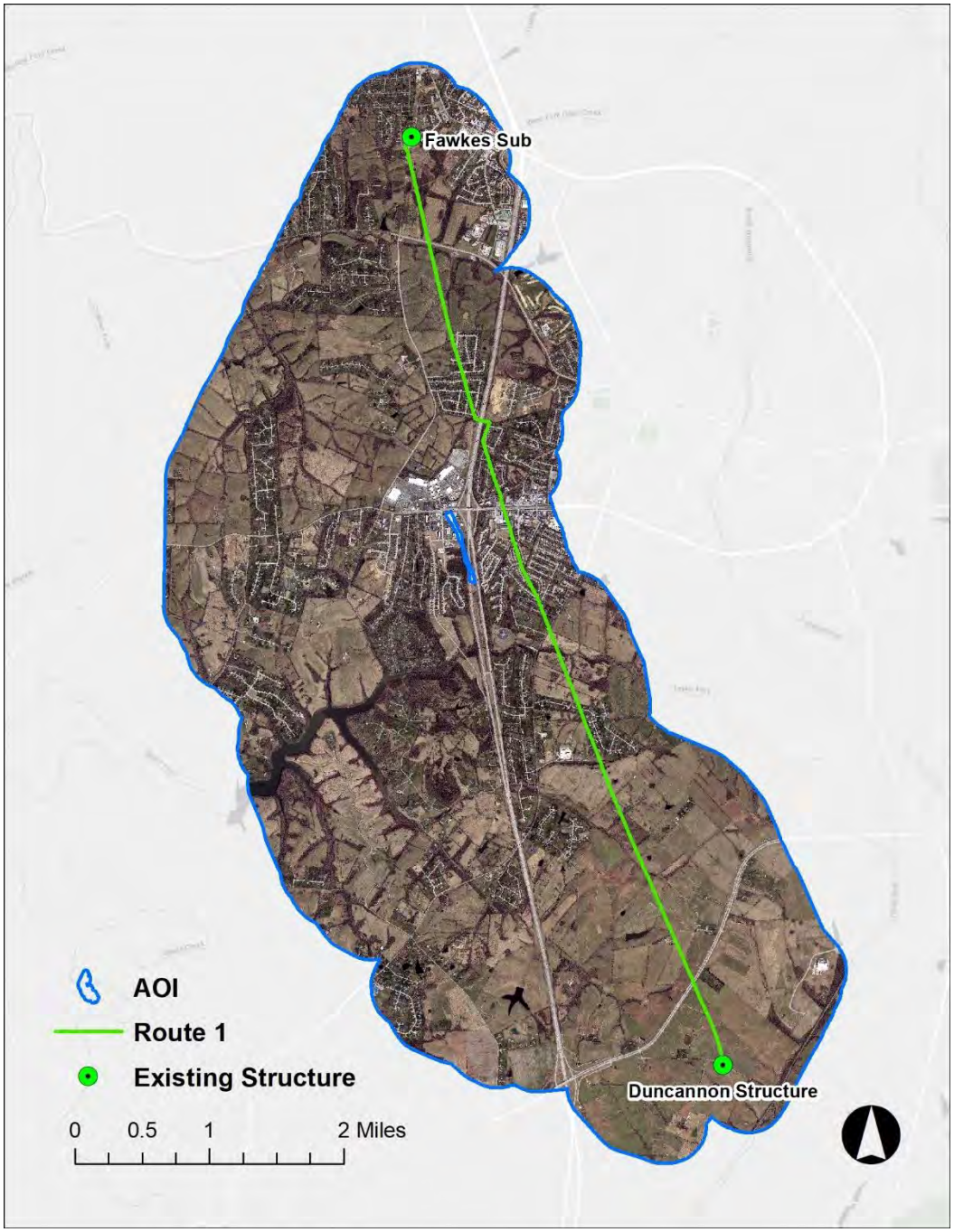


Figure 55: Alternate Route 1

PART XI: APPENDIX

Memorandum to File

To: File
From: Laura LeMaster
Date: August 2, 2022

Re: Fawkes – Duncannon Routing Study and EKPC expert judgement criteria

EKPC held a meeting on August 1, 2022 to discuss the expert judgement portion of the Routing Study. The entire route siting team was in attendance at the meeting, the attendees list is included at the end of this memorandum.

Prior to attendance at the meeting, Laura LeMaster requested that individuals develop their own set of expert judgement categories, weighting and description of categories including how each would be evaluated. The intent of expert judgement is to evaluate project factors or impacts that are specific to the area and the project in question and are unable or not well-suited to be captured in a standardized model.

Each team member proposed their developed criteria, discussed the reasoning behind categories and definitions, and the thought process behind the development. The team then discussed all team proposed criteria, to assist the team in development of a final proposed criteria. Discussions included how to account for impacts of tree clearing, including how to account for this due to the existing ROW for two of the route alternatives; how to account for any business impacts due to the location of the proposed routes through more congested areas; what factors would heavily influence the ability to meet to required deadline for operations; and many additional items.

Once the four preliminary categories were determined (see listing below), each member of the team provided recommended weighting for each category. All weights were listed on a board to see how each member of the team weighted each category in comparison. From this, the team was able to see a pattern of weighting. The team discussed each category specifically and came to a determination on the team selected weighting.

Based upon this process, the criteria, definitions and weighting were determined as follows:

Indirect Community Impacts – 15%

The siting team defined Indirect community impacts as disruption to those not directly crossed by the centerline. These impacts will be short-term during the duration of the construction, with the exception of visual impacts. These impacts include: construction traffic, local business disruption, tree clearing in the community, and visual impacts from the line on the area.

Direct Community Impacts – 40%

Direct community impacts is defined as disruption to those directly impacted and crossed by the centerline. These impacts can be both short and long-term to those impacted. Factors evaluated as direct impacts will be: new right of way purchases, tree clearing, and construction disturbance (construction occurring on the homeowners property including potential material staging, temporary access requirements onto the property, etc.). To assist in the evaluation of this category, the following quantifiable statistics can be evaluated.

a. Currently impacted vs newly impacted acres of right of way.

b. Acres of Tree clearing – Tree clearing for easement acres already impacted ROW vs. tree clearing for new impacted ROW.

Schedule – 35%

In the Schedule category, the siting team will evaluate the potential for impacts to the project schedule due to factors associated with the alternative routes. Due to the project's operationally required completion date, the project schedule is critically important. Schedule impacts that could impact completion date are right of way acquisition and operational impacts/limitation.

Constructability – 10%

The siting team defines constructability as the ability to execute the construction of the line. Impacts to the ability to construct include access for construction from existing roadways and the potential for underground utility conflicts that could impact the ability to execute the selected route of cause redesigns impacting schedule and cost.

While evaluating and discussing the criteria, there were a couple of discussion topics that the project team needed to be clarified for both the development of the expert judgment criteria and scoring.

- The existing 69-kV from Fawkes- Duncannon Lane is required to be rebuilt and reconductored with larger cable (795kcmil) due to operational restrictions and as outlined by EKPC Transmission Planning.
- The Routing Study being executed for this project is solely for the placement of the new 138-kV line from Fawkes – Duncannon Lane; the 69-kV line will be rebuilt in place regardless of the final selected preferred route, or any project approvals for the 138-kV.
- The existing 69-kV line from Fawkes-Duncannon must be rebuilt by winter 2024, as thermal overloads are forecasted on this line. The rebuild of this 69-kV was selected by EKPC as the solution to the thermal overload.
- Consistent with the application of the Kentucky Siting Model, the expert judgement of this line will be limited to the approximately 2 miles where the proposed 138 kV line is routed through a congested area, and a significant study area was submitted to NV5 for evaluation and scoring. Scoring will not take into account the approximately 5.5 miles of the line where the proposed route remains on the existing 69-kV centerline in territory that is not significantly developed.
- See previous memorandums regarding the use of the 69kV centerline for the proposed route outside of the congested area. EKPC understands this consideration to be in line with the Kentucky Public Service Commission's previous preference for co-location of transmission facilities where it is prudent and reasonable to do so.
- When the expert judgment process is undertaken, the team will rank the top 3 routes in each category using the following scoring: 1 – low impact, 2 – medium impact, 3 – high impact. The route with the lowest overall weighted score would be the preferred route.
- Regarding environmental, the divergence of the routes submitted to NV5 were reasonably similar to one another from an environmental standpoint, therefore this was not specifically scored in expert judgement, as it was included in the route scoring.
- It was noted that all routes submitted to NV5 require a crossing of the interstate, therefore this was not factored into the expert judgment evaluation.

Attendees at the meeting as listed below:
Laura LeMaster
Mary Jane Warner
Rob Young
Lucas Spencer
Ronnie Terrill
Trenton Sparks
Nick Adams
Josh Young
Bill Sharp
Shaun Vance

Memorandum to File

To: File
From: Laura LeMaster
Date: August 12, 2022

Re: Fawkes – Duncannon Routing Study and EKPC expert judgement criteria

EKPC held a meeting on August 1, 2022 and finalized the categories and weighting of the expert judgement model that EKPC would utilize for the Fawkes to Duncannon Lane Transmission project. See the August 2, 2022 Memorandum regarding the development of that criteria. The expert judgement criteria selected is shown below:

Indirect Community Impacts – 15%

The siting team defined Indirect community impacts as disruption to those not directly crossed by the centerline. These impacts will be short term during the duration of the construction, with the exception of visual. These impacts include, construction traffic, local business disruption, tree clearing in the community, and visual impacts from the line on the area.

Direct Community Impacts – 40%

Direct community impacts is defined as disruption to those directly impacted and crossed by the centerline. These impacts can be both short and long term to those impacted. Evaluated as part of direct impacts will be new right of way purchase, tree clearing, and construction disturbance. To assist in the evaluation of this category, the following quantifiable statistics can be evaluated.

a. Previously impacted vs newly impacted acres of right of way.
b. Acres of Tree clearing – Tree clearing for easement acres already impacted ROW vs. tree clearing for new impacted ROW.

Schedule – 35%

The siting team defines Schedule as the potential impacts to the project schedule due to factors associated with the alternative routes. Due to the projects operationally required completion date, the project schedule is critically important. Schedule impacts that could impact completion date are right of way acquisition and operational impacts/limitation.

Constructability – 10%

The siting team defines constructability as the ability to execute the construction of the line. Impacts to the ability to construct include access for construction from existing roadways and the potential for underground utility conflicts that could impact the ability to execute the selected route of cause redesigns impacting schedule and cost.

As discussed in the August 2 Memo, the siting team determined that the direct community impact, meaning newly impacted homes and tree clearing was extremely important to evaluate, and weighted this the most impactful in the expert judgement. The model did not take into account that the 69 kV line will be rebuilt on the same schedule regardless of the determination of the 138 kV route determined by the routing study. The model was unable to quantify the difference between newly impacted parcels versus those already impacted by the 69 kV rebuild. Due to these factors, EKPC's siting team weighted direct community impacts heavily.

The model creates small exclusion zones around each residential structure for purposes of developing alternate corridors. These exclusion zones around the 69 kV line effectively prevented consideration of the existing 69 kV right of way from further evaluation. The EKPC siting team felt that not evaluating an existing right of way and centerline on a transmission line that was an already scheduled project was unreasonable and would limit the reliability of the routing study. EKPC had included the existing 69 kV ROW as a potential route for NV5 scoring.

In a phone call with NV5 (Quantum Spatial) on August 5th (included Laura LeMaster and Lucas Spencer from EKPC), NV5 discussed with EKPC that the model had limitations in the regards to its ability to evaluate and score an existing easement. Due to this limitation, NV5 made EKPC aware that the model could determine the newly impacted properties in comparison to already impacted properties (meaning those parcels that already have the 69 kV easement and will have a rebuild occurring on this line regardless of the location of the 138 kV line's siting). EKPC determined that if the model could

quantitatively the newly impact properties, this would be preferred to a more qualitative evaluation in Expert Judgement. From previous meetings, EKPC had heavily weighted the impacts of currently versus newly impacted in the Expert Judgement criteria. EKPC requested that NV5 evaluate each route based on the standardized methodology scoring as well as with project-calibrated specific accommodations made for comparison of net new impacts and be prepared to provide scoring and evaluation for both data sets. The siting team felt that the calibrated scoring which included the "net new impact" evaluation by NV5 was a quantitative way to analyze direct impacts as opposed to the qualitative method that would be utilized for Expert Judgement. EKPC had not reviewed any scoring to date at the time the decision was made to add the project-calibrated analysis.

On August 8th, the EKPC Siting Team met with NV5 via Teams. The scoring was quickly reviewed. In this meeting, EKPC requested that the calibrated scoring NV5 evaluated also account for the impact to forested areas due to the existing 138 and 69 kV easements and the requirement for danger tree clearing for the 69 kV rebuild specifically. NV5 was going to review the calibrated methodology scoring.

On August 10th, the EKPC siting team met internally to discuss the implications of the calibrated scoring data set on the previously discussed Expert Judgement criteria. At this time, NV5 had not yet provided EKPC with any route scoring results. The determination in this meeting with the siting team was that the calibrated model should be utilized due to its ability to specifically address the limitations of the Siting Model and form the basis for the selection of the top three routes to review in Expert Judgement phase. The siting team also determined that the Expert Judgement criteria would be updated based on the calibrated model accounting for the net new impacts, which were the largest impact on the original weighting of the Direct Community Impacts.

In the August 10th meeting, it was determined that each member of the siting team would review the expert judgement criteria previously developed and determine each member's recommended individual changes to the criteria, definitions and weighting, if any, and a follow-up meeting would be scheduled to reevaluate and finalize the criteria. This meeting was set up for August 12th. EKPC during these meetings and reevaluation of the criteria, NV5 had retained all the scoring for all standardized and calibrated routes in order to preserve objectivity and transparency with regard to the development and finalization of the Expert Judgment criteria.

The Siting Team met again on August 12th to discuss each team member's individual updates to the Expert Judgement Category and weighting criteria to develop final Expert Judgement Categories and Weighting. The following items were discussed and taken into account by the siting team in development of the final criteria:

- Due to the quantitative inclusion of the newly impacted right of way and tree clearing into the calibrated scoring model, the quantitative analysis in the Direct community impact category did was not applicable, however, direct community impact remained a highly important category due to the construction disturbance and impacts of the physical appearance of the line, along with other factors
- The siting team felt that the schedule and direct community impacts remained the most critical categories for the expert judgement
- The siting team felt that the calibration of the model did not impact the constructability and indirect community impact portion of the expert judgement model.

Based on these stances, the final Expert Judgement model to be implemented by the siting team is shown below:

Indirect Community Impacts – 15%

The siting team defined Indirect community impacts as disruption to those not directly crossed by the centerline. These impacts will be short term during the duration of the construction, with the exception of visual. These impacts include, construction traffic, local business disruption, tree clearing in the community, and visual impacts from the line on the area.

Direct Community Impacts – 35%

Direct community impacts is defined as disruption to those directly impacted and crossed by the centerline. These impacts can be both short and long term to those directly crossed by the line. Evaluated as part of direct impacts will be new right of way purchase, tree clearing, and construction disturbance, Impact due to physical appearance of the line and structures, etc.

Schedule– 40%

The siting team defines Schedule as the potential impacts to the project schedule due to factors associated with the alternative routes. Due to the projects operationally required completion date, the project schedule is critically important. Schedule impacts that could impact completion date are right of way acquisition and operational impacts/limitation.

Constructability – 10%

The siting team defines constructability as the ability to execute the construction of the line. Impacts to the ability to construct include access for construction from existing roadways and the potential for underground utility conflicts that could impact the ability to execute the selected route of cause redesigns impacting schedule and cost.

Attendees at the meeting as listed below:
Laura LeMaster
Mary Jane Warner
Rob Young
Lucas Spencer
Ronnie Terrill
Trenton Sparks
Nick Adams
Josh Young
Shaun Vance

Memorandum to File

To: File
From: Laura LeMaster
Date: August 16, 2022

Re: Fawkes – Duncannon Routing Study and EKPC expert judgement scoring

Based on the Kentucky Siting Model's (Siting Model) Calibrated Methodology, Routes 1, 2, and 8 were the lowest three scoring routes in the Simple Average, meaning the best ranked routes. Route 1 is identical to the route of the complete rebuild of the existing 69 kV transmission line, while Routes 2 and 8 are minor route deviations from the existing ROW, showing centerline adjustments.

The siting team reviewed all the scoring methodology and ranking, provided by NV5. The team noted that, in the Calibrated Methodology, Route 1 ranked the best in the simple average as well as the build, engineering, and natural perspectives. Due to the significant similarities of the top three routes (Route 1, 2 and 8), the Siting team concluded there were very minimal differences in regards to the expert judgement categories and criteria developed. Furthermore, the team concluded the most impactful differences between the three best routes was that in both Routes 2 and 8, an additional pole is required to achieve the deviation from Route 1, which would be an additional direct impact to a local property owner.

The deviations in Routes 2 and 8 are in fact so minor from Route 1, EKPC decided to move forward with Route 1 and utilize these minor deviations in Routes 2 and 8 if in detailed design and open house discussions it is determined that Routes 2 or 8 are beneficial to the current property owners impacted, without negatively impacting any new property owners, or as required due to located underground utilities determined through the final design process.

Furthermore, in both the Standard Methodology and Calibrated Methodology, Routes 3 and 4 (which are the routes primarily through the commercial area and along the 138 kV Fawkes – West Berea circuit) scored 9th and 10th out of 10 routes. Based on this, the EKPC siting team concluded that utilizing the corridor associated with the rebuild of the existing 69 kV line is the optimal route for siting the 138 kV transmission line based upon analysis undertaken in accordance with the Kentucky Siting Model and the exercise of EKPC's expert judgment process.

Attendees at the meeting as listed below: (*via Teams)
Laura LeMaster
Mary Jane Warner
Rob Young
Lucas Spencer
Ronnie Terrill
Trenton Sparks
Nick Adams*

PART XI: REFERENCES

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Wilgreen Lake, Madison County KY.
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