MEMORANDUM

To: **Hudson Highlands Fjord Trail**
From: **Great Ecology (Carolyn Matthews, Chase Mathey)**
Date: **December 21, 2023**
Project: **Hudson Highlands Fjord Trail - Breakneck Connector**
Subject: **Tree Survey and Assessment**

Introduction

Great Ecology performed a tree survey and assessment east of Highway 9D within the Limit of Work (LOW) and/or within approximately 40 feet of the highway, as depicted on the received *Site Protections & Removals Plan* ("Removals Plan") prepared by Langan Engineer and Environmental Services, Inc. dated October 26, 2023, in Fishkill, New York ("Site"). This letter includes the methods and results of the survey and assessment, which was completed on December 13, 2023. In summary, a Condition Assessment and Risk Assessment was performed on 53 trees. This included 39 trees identified for removal, as shown on the Removals Plan, as well as an additional 14 trees within the LOW that were not identified on the Removals Plan. There were an additional 30 trees depicted on the Removals Plan within the LOW; however, these had been removed since the original tree survey was conducted, so these trees were not assessed.

Methodology

On December 13, 2023, Great Ecology surveyed and assessed the trees proposed for removal at the Site. The assessments were conducted by an International Society of Arboriculture (ISA) Certified Arborist holding the ISA Tree Risk Assessment Qualification. Only trees with a diameter at breast height (DBH) of six inches or greater were surveyed. Based on the Removals Plan, approximately 69 trees are within the LOW. Additional unmapped trees within the LOW were also included in the assessment. For each assessed tree, the following attributes were recorded: Tree ID Number, Location, Species, DBH, Nativity, and Tree Condition. A Risk Rating was also assigned to trees within proximity to potential targets such as the road, parking areas, footpaths, or pedestrians.

A Condition Assessment was performed to assess the health and condition of the trees. This assessment was performed following the framework outlined by the "Guide for Plant Appraisal" prepared by the Council of Tree and Landscape Appraisers. The assessment is completed via a visual inspection and requires hand tools (e.g., The assessment is completed via a visual inspection and the use of hand tools (e.g., binoculars and sounding mallet) to assess several tree components. Tree components are broken down into the roots, trunk, scaffold branches, small branches/twigs, and foliage/buds. Each component is evaluated on its health and structure to determine the overall soundness of the tree. Each component is combined to yield an overall tree condition rating of "Dead", "Poor, "Fair", or "Good".

A Risk Assessment was performed in accordance with the Level 2 tree risk assessment methodology outlined in the "Tree Risk Assessment Manual" prepared by the ISA. Risk assessment considers the whole tree or the identification of a component of a tree that has the potential for failure due to observed defects. The tree, or tree component, is assessed for the likelihood of failure, the likelihood of impacting a target (i.e., structures, people, and/or other resources that may be impacted by the failure of a tree component), and the consequence of striking the identified target. The tree is assigned a qualitative risk rating of "Low", "Moderate", "High", or "Extreme". The assessment is conducted via a 360-degree visual inspection from the ground and via the use of a sounding mallet and binoculars.

Results

Fifty-three trees at the Site were assessed, including 39 of the trees are identified for removal, as shown on the Removals Plan, as well as an additional 14 trees within the LOW that were not depicted on the Removals Plan. There were an additional 30 trees shown for removal on the Removals Plan; however, they were removed prior to the survey effort and therefore they were not assessed but their location was noted.

Of the 53 assessed trees, 31 trees (58.5 percent) are native species, and 22 trees (41.5 percent) are invasive species. The invasive trees include black locust (*Robinia pseudoacacia*), tree of heaven (*Ailanthus altissima*), and Norway maple (*Acer platanoides*)—all of which are rated Tier 4 species by the Lower Hudson Partnership for Regional Invasive Species Management (LH PRISM 2023d), a designation for invasive species that are widespread with high to very high impacts. Black locust can fix nitrogen which alters the nutrient soil composition making the soil less amenable to some native plant species, and it also successfully reproduces vegetatively allowing it to spread quickly and displace other native plant species (LH PRISM 2023c). Tree of heaven is a known host species for the invasive insect, spotted lanternfly (*Lycorma delicatula*) and creates allelopathic chemicals that inhibit the growth of other plant species (LH PRISM 2023b). Norway maple displaces shade-tolerant native tree species such as sugar maple (*Acer saccharum*) and with its dense canopy shade, is known to greatly reduce the native understory plant biodiversity (LH PRISM 2023a).

A total of 39 trees (73.6 percent) of the surveyed trees were assessed as having a "Poor" or "Dead" condition and 12 trees (22.6 percent) were in "Fair" condition. Defects that were commonly observed leading to lower condition assessment ratings included basal and/or trunk decay, deadwood and/or decay in the crown, and poor structure due to a one-sided crown, suppression from vines, or the forest canopy. These are defects that are unlikely to improve without intervention and will continue to adversely affect the condition rating of the tree over time. When combined, the total number of native trees with a "Poor" or lower condition rating or invasive trees of any condition rating, is 42 trees, or 79.2% of the assessed trees.

Approximately half the trees (28 trees or 52.8 percent) were rated with a risk rating of "Low". Eleven trees (20.8 percent) were rated as "Moderate" risk, and five trees (9.4 percent) were rated as "High" risk. The "Moderate" and "High" risk trees were assessed as having the potential to fail

(tree or part of tree), impact a target, and cause significant damage if the target is struck. The observed targets for this assessment included the road, parking areas, vehicles, footpaths, and pedestrians. Surveyed trees that are located beyond striking distance from these potential targets were not assessed for risk.

A summary of the condition and risk assessments can be found in TABLE 1. A comprehensive table and map of the tree survey and assessment results for individual trees can be found in the **Appendix A**.

Table 1. Summary of Tree Condition and Risk Assessment Results

		All	Native	Invasive
	Total Assessed Tress	53 (100%)	31 (58.5%)	22 (41.5%)
Condition	Dead	5 (9.4%)	3 (5.7%)	2 (3.8%)
	Poor	34 (64.2%)	17 (32.1%)	17 (32.1%)
	Fair	12 (22.6%)	9 (17.0%)	3 (5.7%)
	Good	2 (3.8%)	2 (3.8%)	0 (0.0%)
Risk	High	5 (9.4%)	1 (1.9%)	4 (7.5%)
	Moderate	11 (20.8%)	6 (11.3%)	5 (9.4%)
	Low	28 (52.8%)	17 (32.1%)	11 (20.8%)
	Risk Not Assessed	9 (17.0%)	7 (13.3%)	2 (3.8%)

Planting Plan Review

Great Ecology reviewed the proposed planting plan as shown on the *Canopy Planting Schedule* and *Canopy Plan* ("Planting Plan") sheets prepared by SCAPE Landscape Architecture DPC, dated October 26, 2023. The proposed Planting Plan is not only appropriate to restore a wholly native plant community but will also help to create more early successional forest, dense shrub, and grassland habitat. Grassland habitat in this region is uncommon and experiencing a declining trend in the area. Habitat loss is one of the main threats to the New England cottontail (*Sylvilagus transitionalis*), which is a Species of Special Concern in the State of New York. New England cottontail is known to occur within the vicinity and its preferred habitat is native early successional forest and dense native shrubs, which provide forage and protection from predators. (NYSDEC 2017). The understory of the site largely consists of invasive species such as common mugwort (*Artemisia vulgaris*), multiflora rose (*Rosa multiflora*), and wineberry (*Rubus phoenicolasius*), which displace native species. The Planting Plan includes several initiatives to remove and replace the

invasive understory with an all-native assemblage of species that will better serve native wildlife. Initiatives include creating more open wildflower meadows that will provide habitat for pollinators and planting native flowers that are known to be excellent pollinator species, particularly, wild bergamot (*Monarda fistulosa*), hairy bushclover (*Lespedeza hirta*), hairy beardtongue (*Penstemon hirsutus*), red columbine (*Aquilegia canadensis*), and common milkweed (*Asclepias syriaca*). Red columbine and wild bergamot are particularly well suited for hummingbirds. The monarch butterfly (*Danaus plexippus*) is currently listed as a "Candidate" species on the federal Endangered Species list and milkweeds are critical for their reproduction cycle (USFWS 2023). In addition to common milkweed, which is included in the Planting Plan, we recommend incorporating orange milkweed (*Asclepias tuberosa*) which will not only increase the native biodiversity of the restoration but will also increase the habitat utilization potential for monarch butterfly, as orange milkweed has a later blooming window than common milkweed.

Conclusions & Recommendations

Great Ecology performed a Tree Survey and Assessment at the Site for the 69 trees identified for removal on the Removals Plan as well as 14 additional trees not on the Removals Plan, but within the LOW. Fifty-three trees were assessed, and of these, 42 (79.2 percent) were invasive species and/or had a condition rating of "Poor" or "Dead." Invasive trees are recommended for control and removal due to the adverse impacts they have on the greater ecosystem. While they provide some ecosystem services such as carbon sequestration and stormwater mitigation, they have a significantly reduced capacity to provide wildlife habitat opportunities, specifically for insects and birds. Further, as the trees are invasive, they outcompete native trees in the area for resources and will dominate a stand over time. Tree of heaven is also a host to the invasive spotted lanternfly, many of which were found on the trees during the survey. The trees in "Poor" condition have defects that are unlikely to improve without intervention and will continue to adversely affect the condition rating of the tree over time. Further, of the 42 trees, five of them were assessed to have a risk rating of "High". These trees have the potential to strike cars or pedestrians and would cause significant or severe damage in the event of tree failure and as such, are recommended for removal. Great Ecology recommends that the removed trees are replaced with native trees, shrubs, and groundcover species, as proposed in the Planting Plan. We have provided additional recommendations that will further enhance the ecosystem services provided by the replanted edge habitat along the highway in the long term.

Assumptions

Data provided by Great Ecology on the assessed trees are based on observations made at the time of inspection and consider only known targets and visible/detectable conditions of the tree and site. This is consistent with a Level 2 assessment per ANSI A300 (Part 9) standards and the ISA Best Management Practices (Tree Risk Assessment). This level of assessment is consistent with client solicitation. Great Ecology is not responsible for the discovery or identification of hidden or otherwise non-observable hazards. Observations do not include individual testing or analysis and do not include aerial or sub-soil inspection. Any reference to timeframe is not a guarantee for tree stability. Records may not remain accurate after inspection due to variable deterioration of the inventoried material. Extreme weather or unforeseeable events may cause tree failure. Great

Ecology provides no warranty with respect to the fitness of the tree for any use or purpose whatsoever.

References

Council of Tree and Landscape Appraisers. 2000. The Guide for Plant Appraisal, 9th ed. 34-35 pp.

International Society of Arboriculture. 2017. Tree Risk Assessment Manual, 2nd ed. 20 pp. and appendices.

[LH PRISM] Lower Hudson Partnership for Regional Invasive Species Management. 2023a. Acer platanoides. Available at: https://www.lhprism.org/species/acer-platanoides.

[LH PRISM] Lower Hudson Partnership for Regional Invasive Species Management. 2023b. Ailanthus altissima. Available at: https://www.lhprism.org/species/ailanthus-altissima.

[LH PRISM] Lower Hudson Partnership for Regional Invasive Species Management. 2023c. Robinia pseudoacacia. Available at: https://www.lhprism.org/document/species-categorization-priorities.

[LH PRISM] Lower Hudson Partnership for Regional Invasive Species Management. 2023d. Species Categorization List LH PRISM. Available at: https://www.lhprism.org/document/species-categorization-priorities.

[NYSDEC New York State Department of Environmental Conservation. n.d. Tree Diameter Measurement. Available at: https://extapps.dec.ny.gov/docs/lands_forests_pdf/dbhguidelines.pdf.

[NYSDEC] New York State Department of Environmental Conservation. 2017. Species Assessment for New England Cottontail. Available at: https://extapps.dec.ny.gov/docs/wildlife_pdf/sgcnnengcottontail.pdf.

[USFWS] United States Fish and Wildlife Service. 2023. Species Profile for Monarch Butterfly (*Danaus plexippus*). Available at: https://ecos.fws.gov/ecp/species/9743.

Appendix A:
Tree Survey and Assessment
Results and Map Figures

Attachment A. Breakneck Connector Tree Survey and Assessment Data

ID	Species	DBH (in)	Nativity	Condition	Condition Notes	Risk Rating
R01	black locust (*Robinia pseudoacacia*)	16	Invasive	Poor	Large Dead Wood (3"+) Trunk Decay Vines	Moderate
R02	Tree Removed	-	-	-	-	-
R03	Tree Removed	-	-	-	-	-
R04	Tree Removed	-	-	-	-	-
R05	Tree Removed	-	-	-	-	-
R06	Tree Removed	-	-	-	-	-
R07	Tree Removed	-	-	-	-	-
R08	Tree Removed	-	-	-	-	-
R09	sugar maple (*Acer saccharum*)	12	Native	Fair	One-Sided Crown	Low
R10	Tree Removed	-	-	-	-	-
R11	sugar maple (*Acer saccharum*)	7	Native	Fair	One-Sided Crown Small Dead Wood (1-2") Vines	Low
R12	Tree Removed	-	-	-	-	-
R13	basswood (*Tilia americana*)	19*	Native	Poor	Trunk Decay Included Bark	Moderate
R14	Tree Removed	-	-	-	-	-
R15	Tree Removed	-	-	-	-	-
R16	tree of heaven (*Ailanthus altissima*)	17	Invasive	Poor	Small Dead Wood (1-2") Suppressed Vines	Low
R17	black cherry (*Prunus serotina*)	7*	Native	Dead	-	Risk Not Assessed
R18	black cherry (*Prunus serotina*)	10*	Native	Dead	-	Risk Not Assessed
R19	pignut hickory (*Carya glabra*)	11	Native	Fair	One-Sided Crown Vines	Low
R20	tree of heaven (*Ailanthus altissima*)	10	Invasive	Poor	One-Sided Crown Included Bark Vines	Risk Not Assessed
R21	green ash (*Fraxinus pensylvanica*)	10*	Native	Dead	-	High
R22	hickory (*Carya* sp.)	8	Native	Poor	Suppressed Vines	Low
R23	pignut hickory (*Carya glabra*)	7	Native	Poor	One-Sided Crown Trunk Decay Vines	Low

* Denotes multi-stem tree. DBH calculated using NYSDEC multi-stem DBH "Method 1" (NYSDEC n.d.)

ID	Species	DBH (in)	Nativity	Condition	Condition Notes	Risk Rating
R24	pignut hickory (*Carya glabra*)	12	Native	Poor	Large Dead Wood (3"+) Vines	Low
R25	black locust (*Robinia pseudoacacia*)	11	Invasive	Poor	Vines	Low
R26	Tree Removed	-	-	-	-	-
R27	Tree Removed	-	-	-	-	-
R28	Tree Removed	-	-	-	-	-
R29	Tree Removed	-	-	-	-	-
R30	Tree Removed	-	-	-	-	-
R31	black locust (*Robinia pseudoacacia*)	8	Invasive	Fair	One-Sided Crown Vines	Low
R32	black locust (*Robinia pseudoacacia*)	9	Invasive	Poor	Suppressed Vines	Low
R33	black locust (*Robinia pseudoacacia*)	9	Invasive	Poor	One-Sided Crown Trunk Decay Suppressed Vines	Moderate
R34	sugar maple (*Acer saccharum*)	7	Native	Poor	Suppressed Vines	Risk Not Assessed
R35	black cherry (*Prunus serotina*)	7*	Native	Poor	Suppressed Vines Serious Decline	Risk Not Assessed
R36	Tree Removed	-	-	-	-	-
R37	Tree Removed	-	-	-	-	-
R38	Tree Removed	-	-	-	-	-
R39	Tree Removed	-	-	-	-	-
R40	American elm (*Ulmus americana)*	8	Native	Poor	Suppressed Vines	Risk Not Assessed
R41	northern red oak (*Quercus rubra*)	24	Native	Fair	Large Dead Wood (3"+) Small Dead Wood (1-2") Basal Decay Vines	Moderate
R42	Tree Removed	-	-	-	-	-
R43	American hophornbeam (*Ostrya virginiana*)	6	Native	Poor	Vines	Risk Not Assessed
R44	Tree Removed	-	-	-	-	-
R45	Tree Removed	-	-	-	-	-
R46	Tree Removed	-	-	-	-	-
R47	northern red oak (*Quercus rubra*)	15	Native	Fair	Small Dead Wood (1-2") Vines	Low
R48	northern red oak (*Quercus rubra*)	18	Native	Poor	Basal Decay Vines	Moderate

* Denotes multi-stem tree. DBH calculated using NYSDEC multi-stem DBH "Method 1" (NYSDEC n.d.)

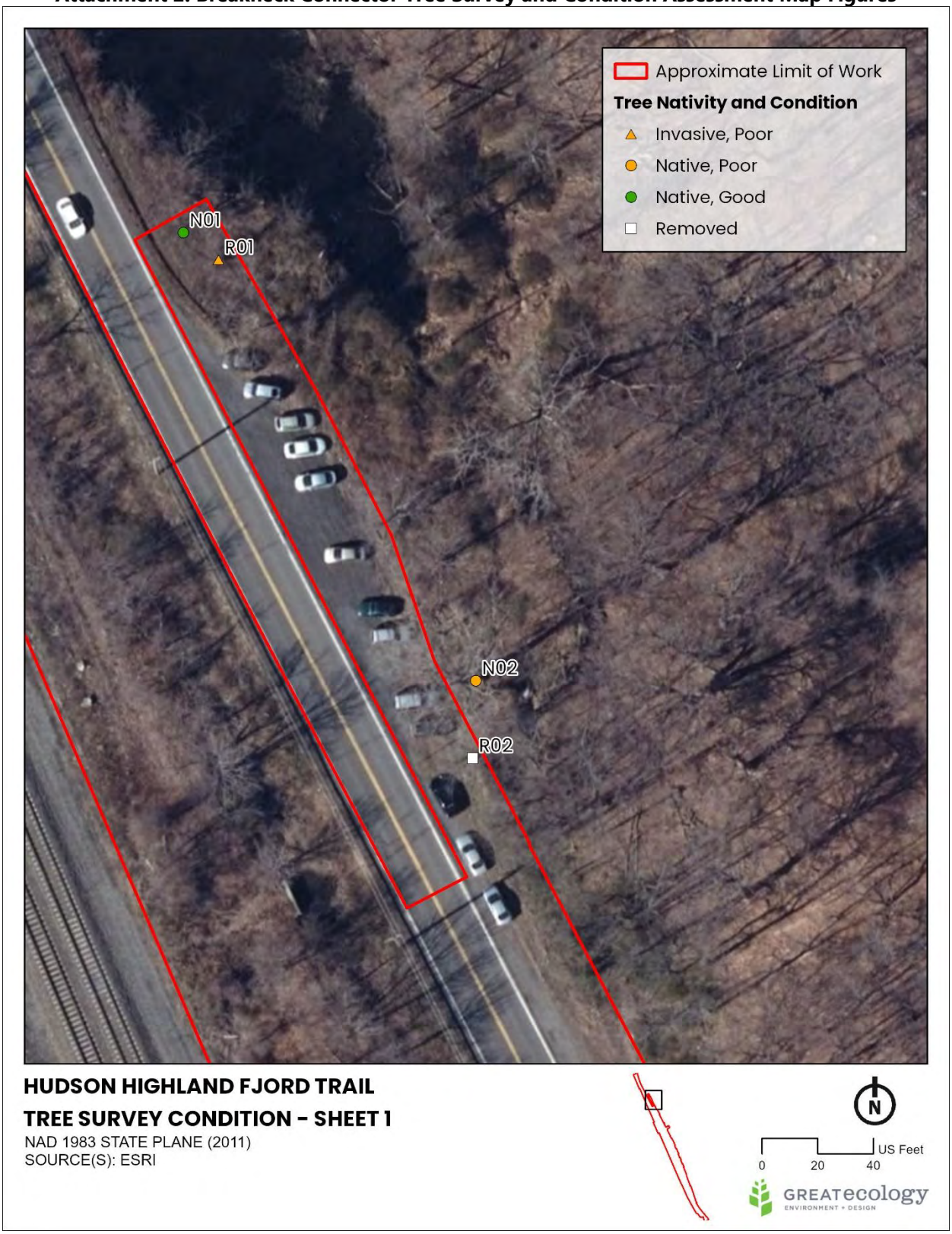
ID	Species	DBH (in)	Nativity	Condition	Condition Notes	Risk Rating
R49	red maple (*Acer rubrum*)	19	Native	Poor	Trunk Decay Included Bark	Moderate
R50	sweet birch (*Betula lenta*)	14	Native	Poor	Basal Decay Broken Limbs Vines	Low
R51	Tree Removed	-	-	-	-	-
R52	Tree Removed	-	-	-	-	-
R53	sugar maple (*Acer saccharum*)	19	Native	Good		Low
R54	Tree Removed	-	-	-	-	-
R55	Tree Removed	-	-	-	-	-
R56	northern red oak (*Quercus rubra*)	26	Native	Fair	Small Dead Wood (1-2") Branch Decay Included Bark Vines	Low
R57	northern red oak (*Quercus rubra*)	17	Native	Fair	One-Sided Crown	Low
R58	northern red oak (*Quercus rubra*)	14	Native	Fair	One-Sided Crown Small Dead Wood (1-2")	Low
R59	northern red oak (*Quercus rubra*)	15	Native	Fair	Full Crown Trunk Decay	Low
R60	black locust (*Robinia pseudoacacia*)	18	Invasive	Dead	-	Risk Not Assessed
R61	Tree Removed	-	-	-	-	-
R62	Tree Removed	-	-	-	-	-
R63	northern red oak (*Quercus rubra*)	21	Native	Poor	Large Dead Wood (3"+) Basal Decay Branch Decay Broken Limbs Vines	Moderate
R64	tree of heaven (*Ailanthus altissima*)	12	Invasive	Dead	-	Moderate
R65	tree of heaven (*Ailanthus altissima*)	17	Invasive	Poor	Large Dead Wood (3"+) Trunk Decay Broken Limbs	Moderate
R66	tree of heaven (*Ailanthus altissima*)	13	Invasive	Poor	Vines	Low
R67	tree of heaven (*Ailanthus altissima*)	12	Invasive	Poor	Trunk Decay	Low
R68	tree of heaven (*Ailanthus altissima*)	9	Invasive	Poor	Small Dead Wood (1-2") Basal Decay	Low

* Denotes multi-stem tree. DBH calculated using NYSDEC multi-stem DBH "Method 1" (NYSDEC n.d.)

ID	Species	DBH (in)	Nativity	Condition	Condition Notes	Risk Rating
R69	tree of heaven (*Ailanthus altissima*)	11	Invasive	Poor	Small Dead Wood (1-2") Basal Decay Serious Decline	High
N01	pignut hickory (*Carya glabra*)	13	Native	Good	Small Dead Wood (1-2") Vines	Low
N02	eastern cottonwood (*Populus occidentalis*)	43	Native	Poor	Small Dead Wood (1-2") Basal Decay Vines	Moderate
N03	black cherry (*Prunus serotina*)	7*	Native	Poor	Small Dead Wood (1-2") Suppressed Vines	Low
N04	American elm (*Ulmus americana)*	7*	Native	Poor	One-Sided Crown Vines	Low
N05	sugar maple (*Acer saccharum*)	9	Native	Poor	One-Sided Crown Vines	Low
N06	black locust (*Robinia pseudoacacia*)	17	Invasive	Poor	Large Dead Wood (3"+) Trunk Decay Basal Decay Serious Decline	High
N07	tree of heaven (*Ailanthus altissima*)	7	Invasive	Fair	One-Sided Crown Vines	Low
N08	black locust (*Robinia pseudoacacia*)	6	Invasive	Poor	Trunk Decay Suppressed Vines Excessive Lean	High
N09	American elm (*Ulmus americana)*	7	Native	Poor	Large Dead Wood (3"+) Trunk Decay Suppressed Vines	Risk Not Assessed
N10	Norway maple (*Acer platanoides*)	4*	Invasive	Poor	Excessive Lean	Low
N11	tree of heaven (*Ailanthus altissima*)	13*	Invasive	Poor	Basal Decay	High
N12	Norway maple (*Acer platanoides*)	14	Invasive	Fair		Low
N13	black locust (*Robinia pseudoacacia*)	8	Invasive	Poor	Small Dead Wood (1-2") Serious Decline	Moderate
N14	Norway maple (*Acer platanoides*)	30	Invasive	Poor	Basal Decay Broken Limbs Included Bark	Low

* Denotes multi-stem tree. DBH calculated using NYSDEC multi-stem DBH "Method 1" (NYSDEC n.d.)

Attachment 2. Breakneck Connector Tree Survey and Condition Assessment Map Figures



Approximate Limit of Work
Tree Nativity and Condition
Invasive, Poor
Native, Poor
Native, Fair
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HUDSON HIGHLAND FJORD TRAIL
TREE SURVEY CONDITION - SHEET 2
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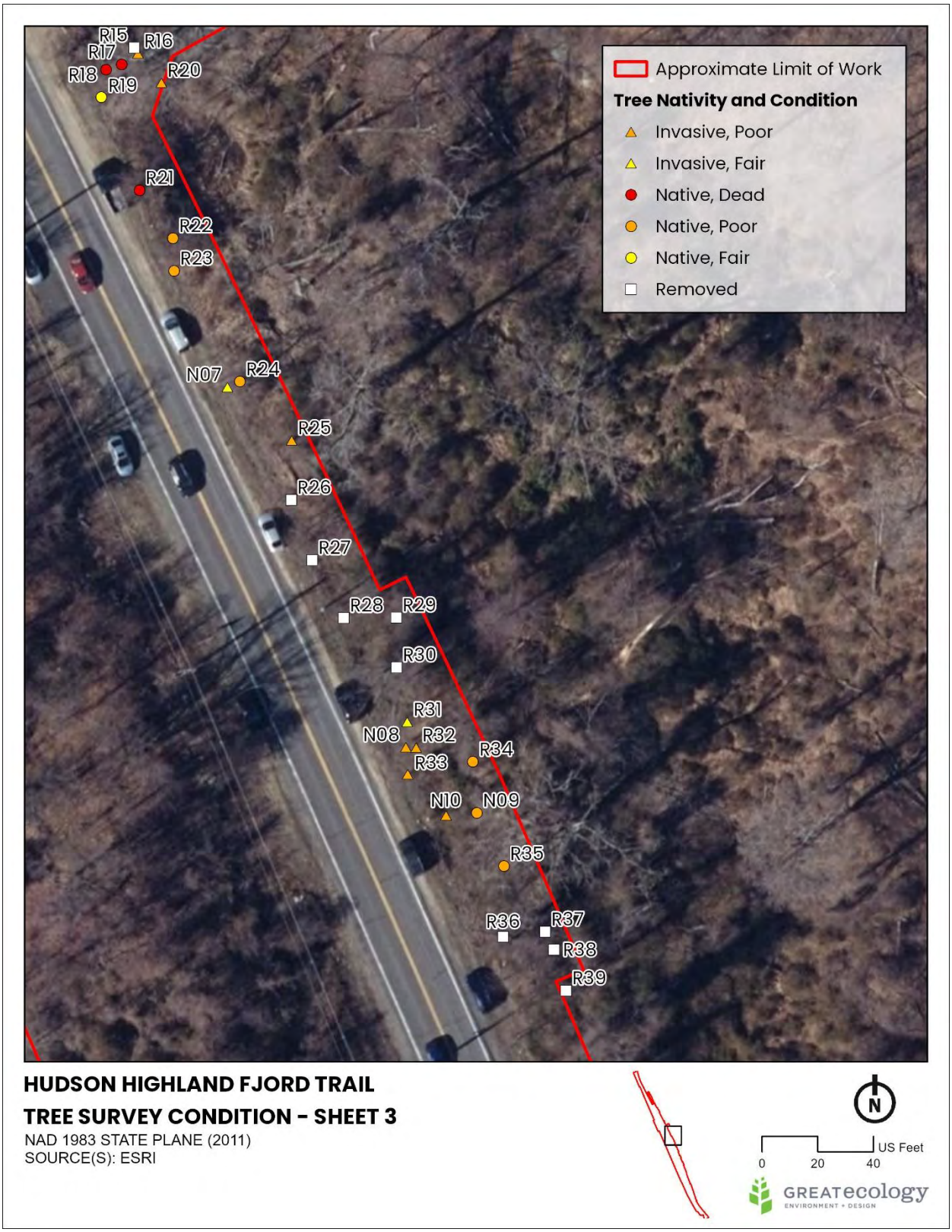
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Approximate Limit of Work
Tree Nativity and Condition
Invasive, Poor
Invasive, Fair
Native, Dead
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HUDSON HIGHLAND FJORD TRAIL
TREE SURVEY CONDITION - SHEET 3
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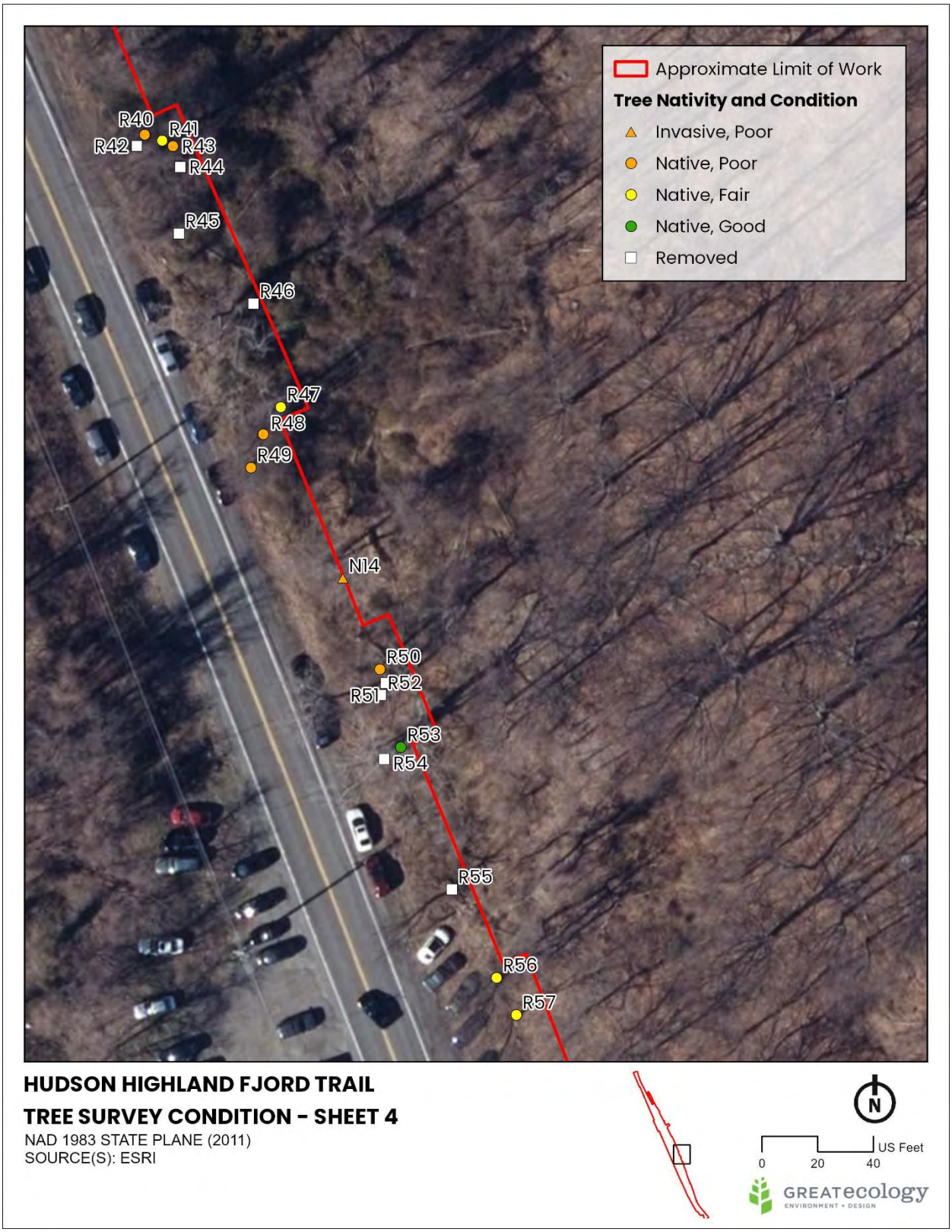
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Native, Poor
Native, Fair
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HUDSON HIGHLAND FJORD TRAIL
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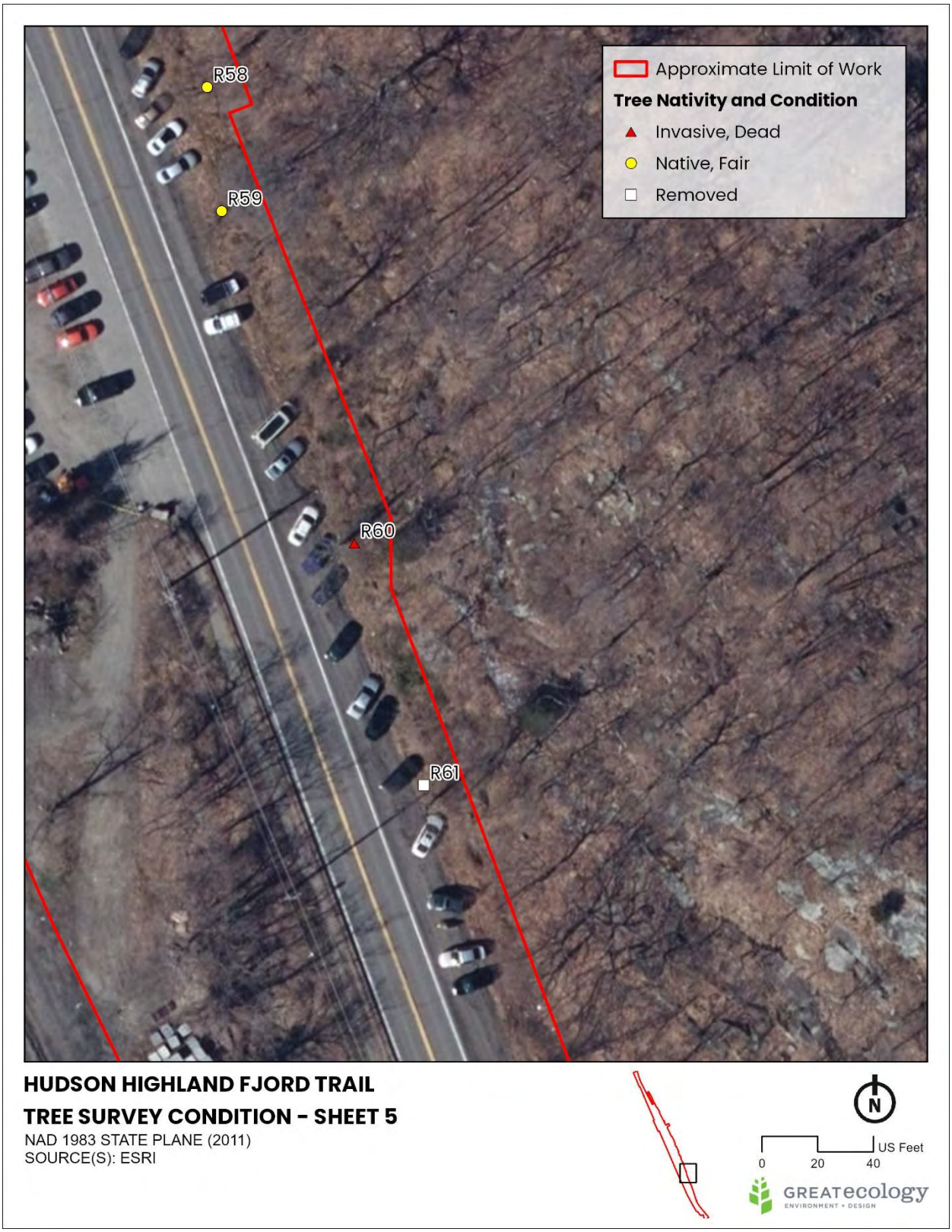
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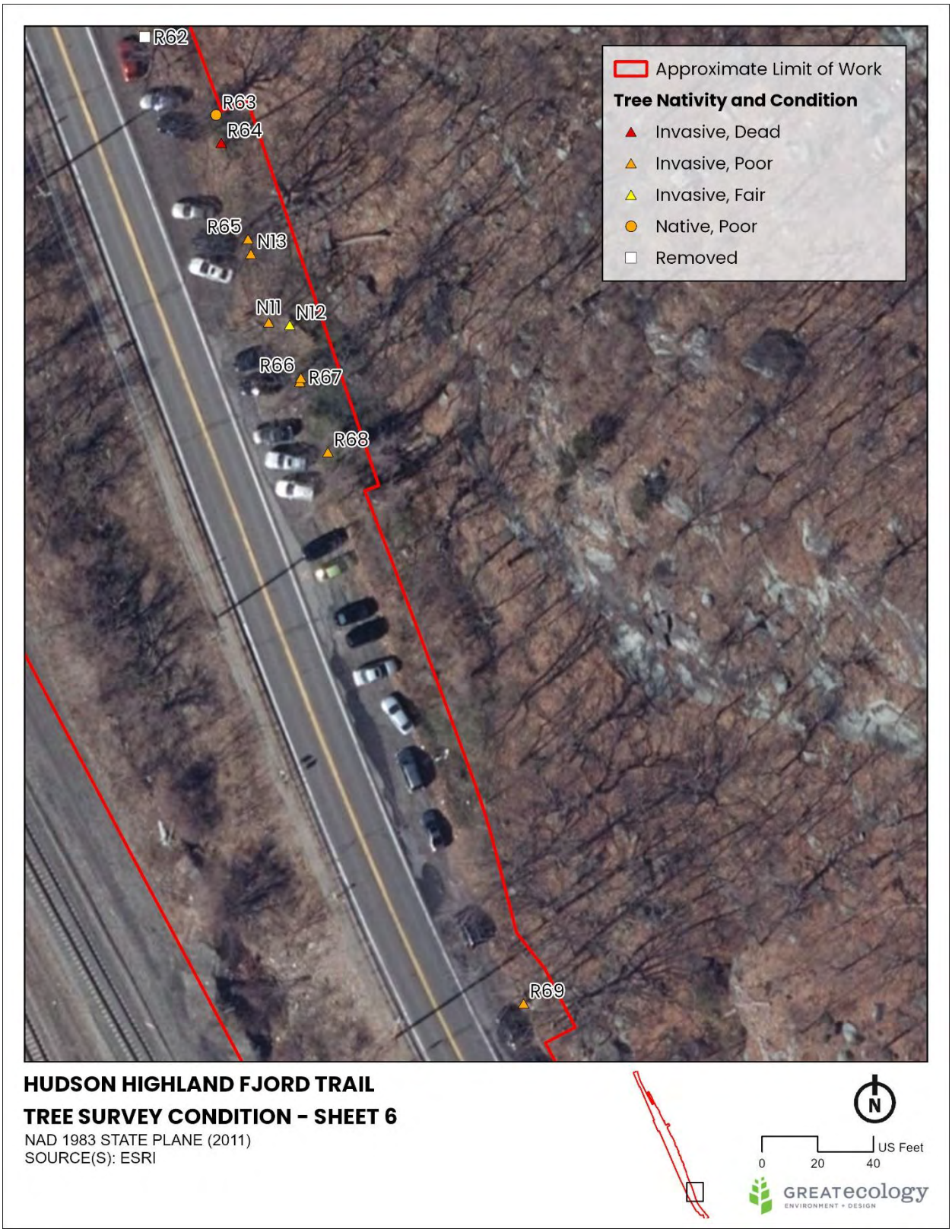
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Approximate Limit of Work
Tree Nativity and Condition
Invasive, Dead
Invasive, Poor
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HUDSON HIGHLAND FJORD TRAIL
TREE SURVEY CONDITION - SHEET 6
NAD 1983 STATE PLANE (2011)
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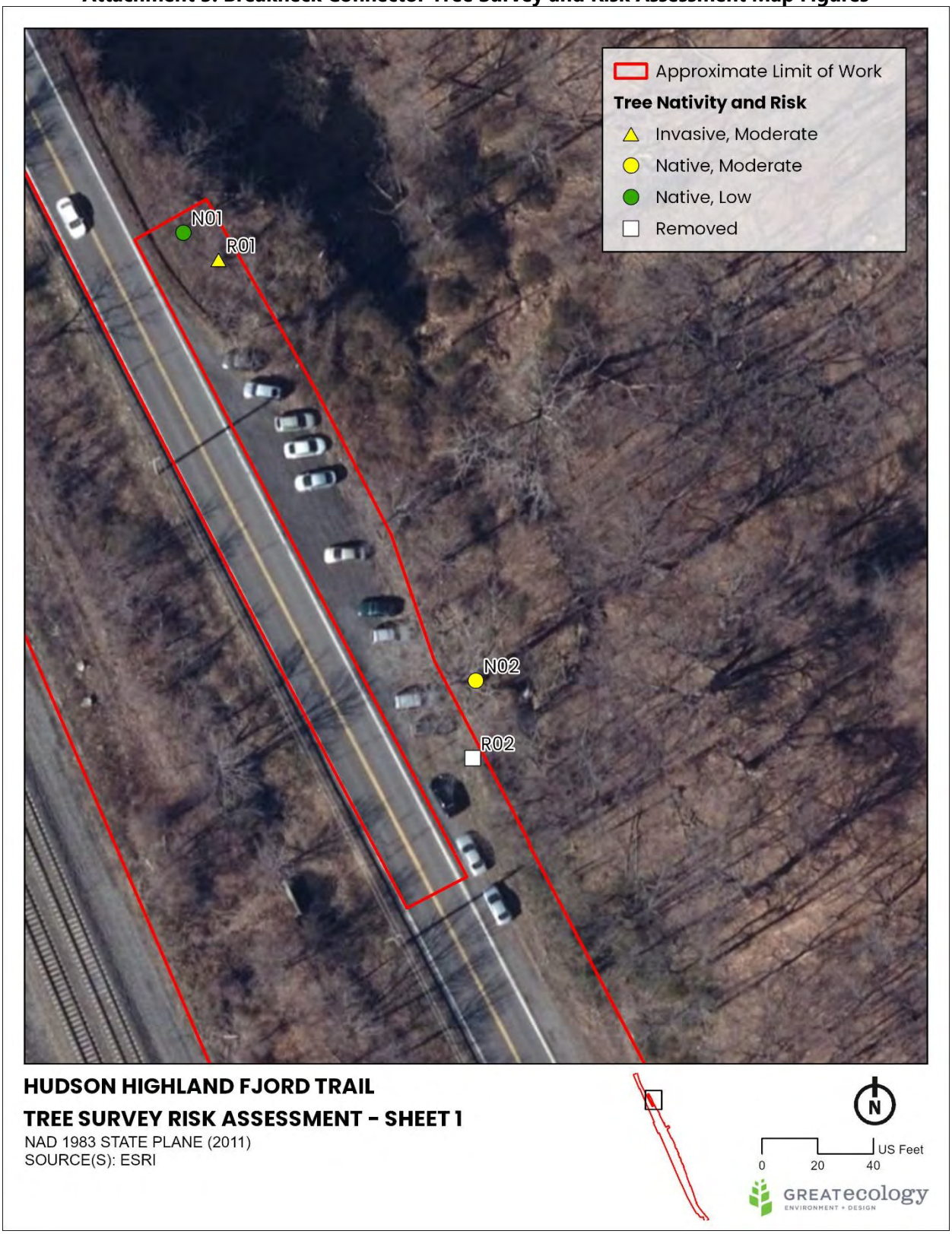
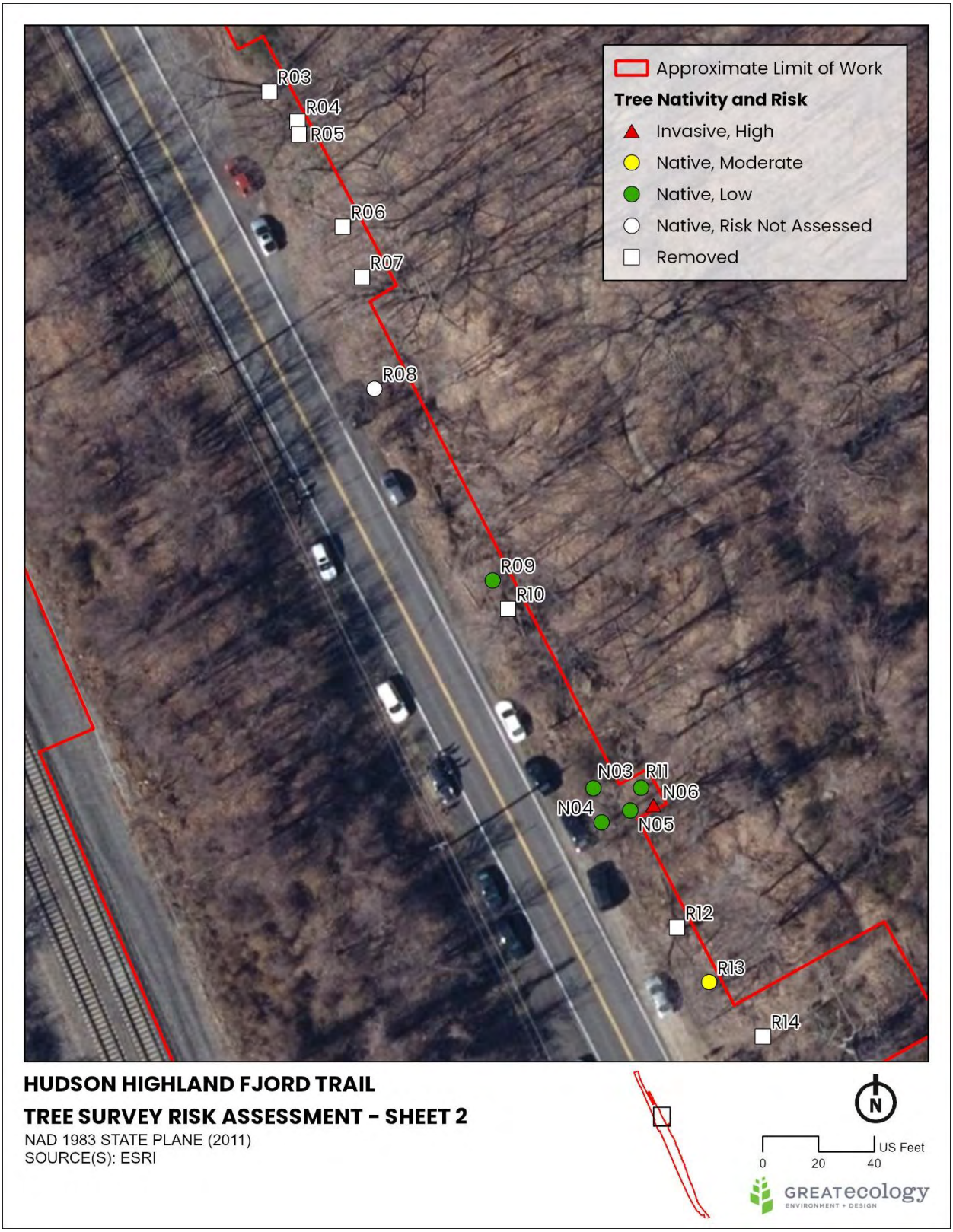
Attachment 3. Breakneck Connector Tree Survey and Risk Assessment Map Figures




Approximate Limit of Work
Tree Nativity and Risk
Invasive, High
Native, Moderate
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HUDSON HIGHLAND FJORD TRAIL
TREE SURVEY RISK ASSESSMENT - SHEET 2
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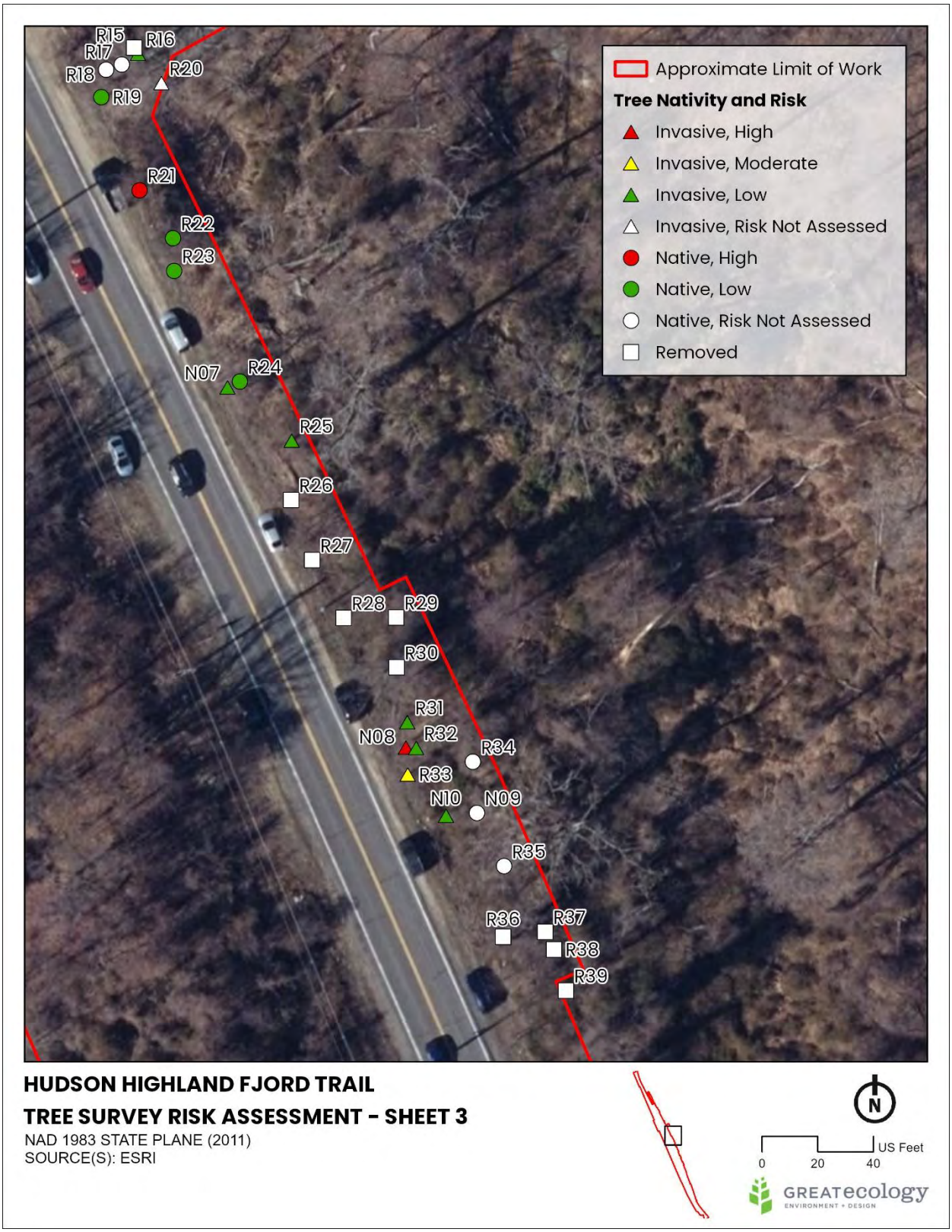
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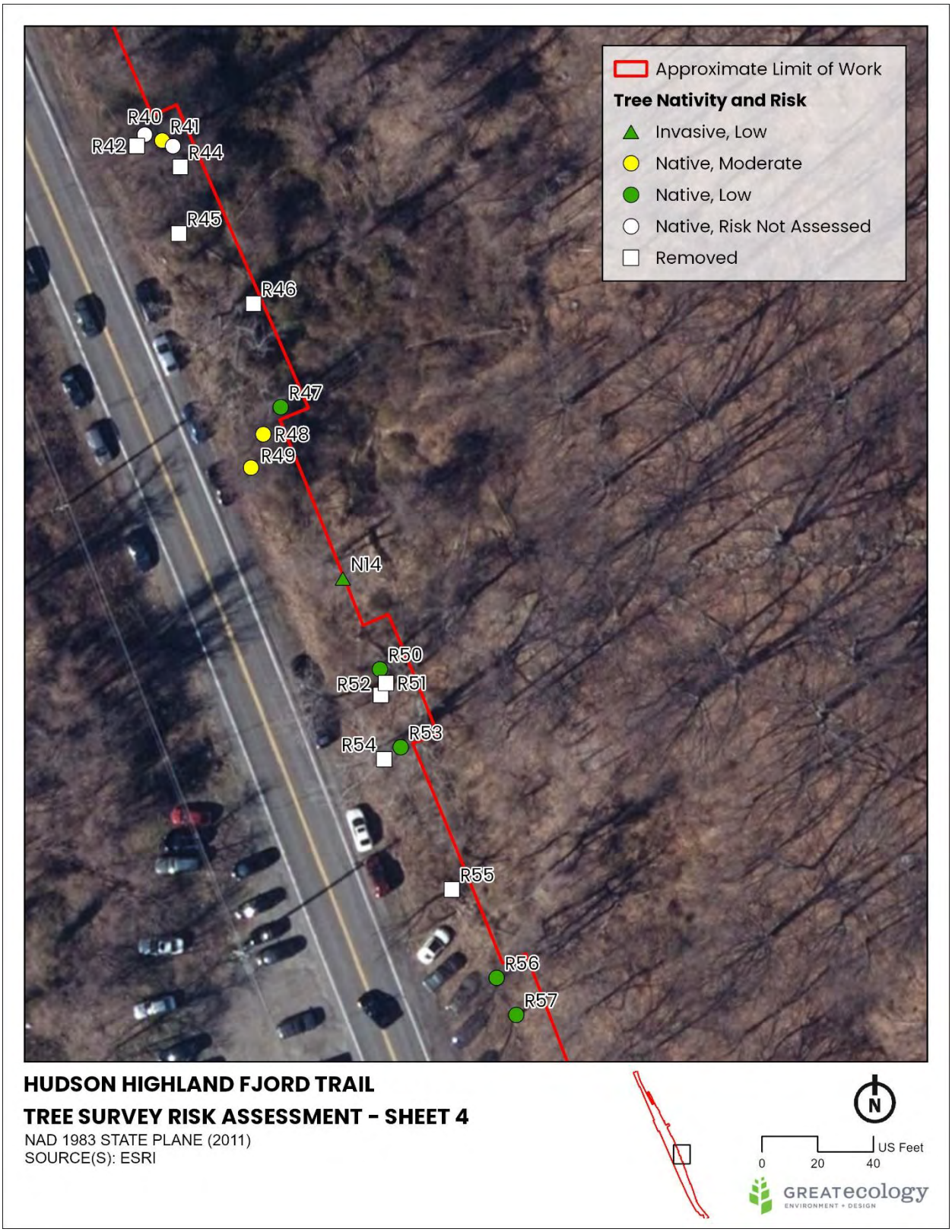
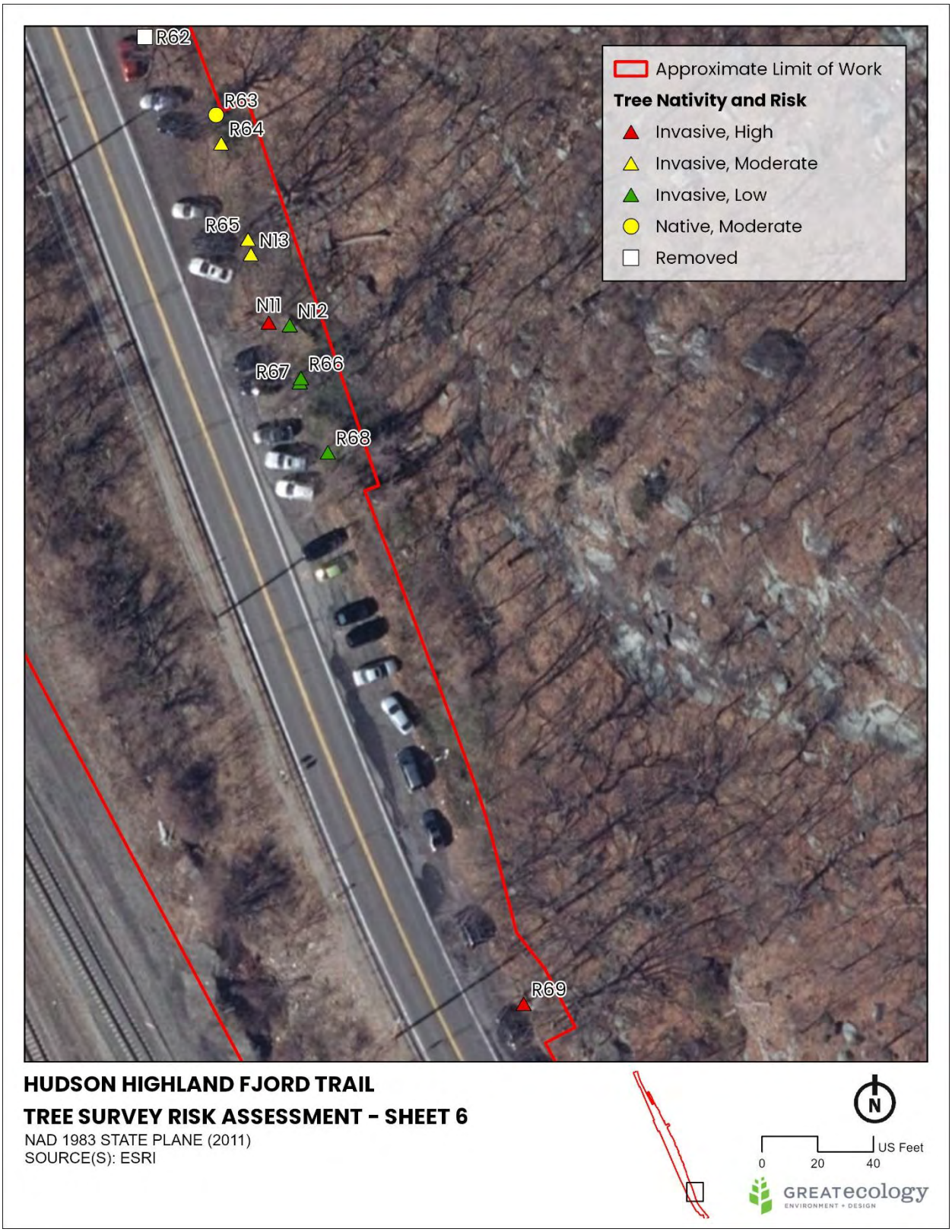
Approximate Limit of Work
Tree Nativity and Risk
Invasive, High
Invasive, Moderate
Invasive, Low
Invasive, Risk Not Assessed
Native, High
Native, Low
Native, Risk Not Assessed
Removed
HUDSON HIGHLAND FJORD TRAIL
TREE SURVEY RISK ASSESSMENT - SHEET 3
NAD 1983 STATE PLANE (2011)
SOURCE(S): ESRI
N
US Feet
0
20
40
GREATecology
ENVIRONMENT + DESIGN


Approximate Limit of Work
Tree Nativity and Risk
Invasive, Low
Native, Moderate
Native, Low
Native, Risk Not Assessed
Removed
R40
R41
R42
R44
R45
R46
R47
R48
R49
N14
R50
R52
R51
R54
R53
R55
R56
R57
HUDSON HIGHLAND FJORD TRAIL
TREE SURVEY RISK ASSESSMENT - SHEET 4
NAD 1983 STATE PLANE (2011)
SOURCE(S): ESRI
N
US Feet
0
20
40
GREATecology
ENVIRONMENT + DESIGN

Approximate Limit of Work
Tree Nativity and Risk
Invasive, Risk Not Assessed
Native, Low
Removed
R58
R59
R60
R61
HUDSON HIGHLAND FJORD TRAIL
TREE SURVEY RISK ASSESSMENT - SHEET 5
NAD 1983 STATE PLANE (2011)
SOURCE(S): ESRI
N
US Feet
0
20
40
GREATecology
ENVIRONMENT + DESIGN


R62
R63
R64
R65
N13
N11
N12
R67
R66
R68
R69
Approximate Limit of Work
Tree Nativity and Risk
Invasive, High
Invasive, Moderate
Invasive, Low
Native, Moderate
Removed
HUDSON HIGHLAND FJORD TRAIL
TREE SURVEY RISK ASSESSMENT - SHEET 6
NAD 1983 STATE PLANE (2011)
SOURCE(S): ESRI
N
US Feet
0
20
40
GREATecology
ENVIRONMENT + DESIGN