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A Sky Full of Stars: Should *Viasat, Inc. v. FCC* Change the Agency's Treatment of Satellites as a Categorical Exclusion Under the National Environmental Policy Act?

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I. INTRODUCTION

The global, interpersonal connection through the internet and telecommunications is increasingly at the forefront of critical infrastructure development. According to a joint report by the United Nations Children's Fund (UNICEF) and the International Telecommunications Union (ITU), two-thirds of the world's school-aged children do not have internet access in their homes.[1] People in rural and underserved communities are significantly affected by the lack of internet connectivity.[2] The Federal Communications Commission (FCC) established the Rural Digital Opportunity Fund to bridge the digital divide and deliver high-speed broadband to rural communities to solve this problem.[3] One of the most innovative technologies rising to meet this need is satellite constellation systems. These blanket systems of small satellites encompass the Earth in layers, most commonly in low Earth orbit (LEO). These constellation systems provide the ability to reach rural communities that are otherwise difficult to reach through traditional land-based internet services.

SpaceX has emerged as a premier provider of this technology through its Starlink constellation satellite system. SpaceX has developed partner technologies of renewable and reusable rocketry systems that can deliver the large batches of the satellites necessary for its constellation into orbit. Due to Starlink's technological advances, the Rural Digital Opportunity Fund awarded $885.5 million to SpaceX to help provide internet service to rural, underserved areas of the United

1. *See* UNICEF, *Two thirds of the world's school-age children have no internet access at home, new UNICEF-ITU report says* (Dec. 1, 2020), https://www.unicef.org/rosa/press-releases/two-thirds-worlds-school-age-children-have-no-internet-access-home-new-unicef-itu [https://perma.cc/9PK8-BNS6] (stating that number equates to 1.3 billion school age children defined between the ages of three to seventeen years old).

2. Access to high-speed internet provides communities with resources such as educational access programming, modern communication, and business needs for economic production and manufacturing. *See, e.g.*, *Broadband*, U.S. DEP'T OF AGR., https://www.usda.gov/broadband [https://perma.cc/FQJ8-JZ4A] (USDA is partnering with the FCC to deploy precision agriculture and recognizes the needs of rural communities).

3. *See generally Auction 904: Rural Digital Opportunity Fund*, FED. COMMC'NS COMM'N. (Oct. 29, 2020–Nov. 25, 2020), https://www.fcc.gov/auction/904 [https://perma.cc/U9QQ-FMLL] [hereinafter *Auction 904*].

States.[4] Although these constellations provide unique benefits to underserved communities,[5] they require a blanketing of satellites to function. For Starlink, SpaceX has been granted approval from the FCC to launch 12,000 satellites and has filed paperwork with the ITU for the frequency and orbital allocations of 30,000 more.[6] Starlink's 30,000 proposed satellites ellipses the current 5,963 total number of active payloads orbiting at the end of 2021 based on the European Space Agency's (ESA) Annual Space Environment Report.[7] This means SpaceX alone plans to increase the total number of active space objects in orbit by a factor of five. With this complete overhaul of space objects, concerns have been raised by competitors and environmental groups about the effects this influx of satellites may have on the space environment.

Viasat, a Starlink competitor and multibillion-dollar provider of satellite services to rural areas, attempted to challenge this influx of Starlink satellites by demanding stricter environmental oversight through the FCC's licensing process.[8] Specifically, Viasat argued these satellite systems pose environmental harm to the orbital environment that, in turn, will directly harm Viasat's operations. Viasat has challenged multiple orders granted by the FCC that allowed Starlink satellites to operate.[9] Viasat brought suit asking for an injunction and, subsequently, an appeal when the injunction was denied on the most recent FCC order allowing Starlink to decrease the orbit for a subset of the original satellites.[10] The FCC asserted that Viasat has no injury-in-fact to assert the claim; the satellites are covered in a categorical exclusion through National Environmental Policy Act

4. *See* Michael Sheetz, *SpaceX's Starlink wins nearly $900 million in FCC subsidies to bring internet to rural areas*, CNN (Dec. 7, 2020), https://www.cnbc.com/2020/12/07/spacex-starlink-wins-nearly-900-million-in-fcc-subsidies-auction.html [https://perma.cc/V8FR-DVRV].
5. *See Connecting the Unconnected*, STARLINK, https://www.starlink.com/connecting-the-unconnected [https://perma.cc/W2VJ-PNFG] ("Starlink is designed to deliver high-speed, broadband internet, even to places where access has been unreliable, too expensive, or completely unavailable.").
6. Adam Mann et. al., *SpaceX Starlink internet: Costs, collision risks and how it works*, SPACE.COM (Nov. 23, 2022), https://www.space.com/spacex-starlink-satellites.html [https://perma.cc/5FT2-N874].
7. ESA SPACE DEBRIS OFF., ESA'S ANNUAL SPACE ENVIRONMENT REPORT 1, 52 (Apr. 22,2022) https://www.sdo.esoc.esa.int/environment_report/Space_Environment_Report_latest.pdf [https://perma.cc/YHR3-NYGB] [hereinafter SPACE ENVIRONMENT REPORT].
8. Final Brief of Appellants Viasat, Inc. and the Balance Group (filed Oct. 26, 2021) (Nos. 21-1123, -1125, -1128), 2021 WL 4990961 [hereinafter Viasat Reply Brief].
9. *See, e.g.*, Final Brief for Appellee/Respondent Federal Communications Commission and Respondent the United States of America at 17–23, (filed Oct. 26, 2021) (No. 21-1123 (and consolidated cases 21-1125, 21-1127, 21-1128)), 2021 WL 4990964 [hereinafter FCC Reply Brief].
10. FCC Reply Brief, *supra* note 9.

(NEPA), an act created to ensure Federal Agencies considered the environmental repercussions of their actions, and therefore no further review is necessary; and constellations do not harm the environment enough to warrant additional review.[11]

This Article reviews the history of *Viasat, Inc. v. FCC*.[12] Ultimately, Viasat lost the appeal due to a lack of standing. However, this Article will focus on why the FCC should consider adopting a NEPA review for satellites into its regulatory scheme because both Viasat and the FCC still concede that satellites "may" pose a significant effect on the environment. Thus, to avoid future litigation from a party with standing, the FCC should expand its satellite orbital debris mitigation guidelines to include a preemptive NEPA review.

Part II of this Article introduces some of the environmental concerns that arise with the advent of satellite technologies, the regulations surrounding commercial satellite regulations, including the licensing scheme, influencing treaties and legislation, and an outline of the National Environmental Policy Act (NEPA) as it applies to the Federal Communications Act (FCA). Part II also includes an overview and analysis of the arguments contributing to *Viasat, Inc. v. FCC*. Part III presents an analysis of the environmental harms pertinent to FCC licensing. Part IV presents recommendations and an analysis of how the FCC could proactively incorporate environmental review into its regulatory scheme to prevent future litigation. Part V concludes that the FCC should incorporate a NEPA review process into the orbital debris mitigation guidelines, as this process would preempt future litigation and address the risks of this growing technology while not posing an undue regulatory burden on operators.

II. BACKGROUND

A. Environmental Concerns with Satellite Technologies

With the exponential advent of satellites on the horizon, there are concerns about the potential impacts on the global and orbital environments. Environmental effects are at the heart of the litigation at the focus of this Article, as Viasat is suing the FCC for environmental harm. This section gives a brief overview of the possible issues that may be present with increased satellite constellation presence, not just from Starlink exclusive activity.

11. FCC Reply Brief, *supra* note 9.

12. Viasat, Inc. v. FCC, 47 F.4th 769 (D.C. Cir. 2022).

Article IX of the Outer Space Treaty compels States[13] to act in space with "due regard" for the activities of others.[14] The Treaty further directs States to conduct exploration of space and Celestial Bodies in a manner that "avoid[s] their harmful contamination."[15] Scholars have noted the lack of definition surrounding the phrase "harmful contamination,"[16] however, there are diverse anthropogenic effects that have been posited in space, such as space debris and light pollution.

Perhaps the most discussed environmental hazard associated with constellation satellites is space debris. At the end of 2021, there were 24,062 defunct space objects orbiting Earth.[17] Space debris can include anything from fragments of spacecraft, space trash, ejected instruments, and, most notably to this Article, defunct satellites.[18] Space debris presents a risk to all space activities. The risk from space debris comes from the object's velocity; even the tiniest object traveling in orbit can have catastrophic impact velocities on operational spacecraft.[19]

Associated with space debris is the collision risk of satellites with other space objects, which generates and perpetuates the existing debris. Traditional geostationary satellites must be removed from orbit within twenty-five years of their end-of-life.[20] In contrast, the LEO satellites are in a smaller, lower orbit with a lifetime of about five to seven years.[21] The deployment of the constellations will take years, and the replacement cycles must take place every seven years.[22] This makes controlled deorbits a safety challenge. With additional challenges, "current estimates are that there will be a collision in orbit between once in five years and once in ten years, depending on which model (i.e., ESA or NASA) is used."[23] The FCC has recognized the in-

13. In this Article, "State" or "States" is referring to a country, adopting the legal term utilized in the treaty language and international.
14. Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies art. IX, *entered into force* Oct. 10, 1967, 18 U.S.T. 2410, 610 U.N.T.S. 205 [hereinafter Outer Space Treaty].
15. *Id*.
16. Robert C. Bird, *Procedural Challenges to Environmental Regulation of Space Debris*, 40 AM. BUS. L.J. 635, 655 (2003).
17. *See* SPACE ENVIRONMENT REPORT, *supra* note 7, at 52.
18. Lotta Viikari, *The Environmental Element in Space Law*, *in* STUDIES IN SPACE LAW, 31 FRANS G. VON DER DUNK ED., (2008).
19. *See* Viikari, *supra* note 18, at 37 (stating specific velocities are "0.1-0.8km/s in Geostationary Orbit ("GEO"); 6-14 km/s in LEO.").
20. Joseph N. Pelton & Scott Madry, *Introduction to the Small Satellite Revolution and its Many Implications, in* HANDBOOK OF SMALL SATELLITES, 3 30 (Joseph N. Pelton ed., 2020).
21. *Id.*
22. *Id.*
23. *Id.*

creased risk of collision for LEO satellites, enacting a targeted and updated orbital debris mitigation guideline in September 2022, requiring operators deorbit satellites in this orbit within five years.[24] These considerations are important because any collision has the risk of creating cataclysmic space debris that can stay in orbit and create harmful interference with other space objects. The sheer number of satellites cycled into orbit with these new constellation systems creates increased collision and debris risks.[25] This collision risk can create exponential impacts resulting in self-contained growth in the number of objects in an orbit where the only possible solution may be remediation rather than mitigation measures.[26]

Another concern is the risk this space debris can pose to humans during reentry. If the debris is not fully demisable during reentry, there is a possibility that debris can injure people, property, or the environment.[27] A notable incident involved a nuclear-powered satellite in 1978. An unprogrammed reentry of the Soviet Cosmos 954 satellite occurred in a decaying orbit over the northern region of Canada.[28] The crash spread radioactive waste over a large area and required a comprehensive clean-up effort.[29] Fortunately, the area was uninhabited.[30] However, this incident showed the inherent risk of uncontrolled reentry from defunct satellites.

Further, deorbiting satellites reentering the atmosphere could cause harmful interference by positing a variety of chemicals into the upper atmosphere. It has been suggested that the effect of megacon-

24. *Space Innovation: Mitigation of Orbital Debris in the New Space Age*, IB Docket No. 22-271; 18-313, Second Report and Order, FCC 22-74 para. 10 (2022).

25. Chris Johnson, *The Legal Status of MegaLEO Constellations and Concerns About Appropriation of Lawrge Swaths of Earth Orbit, in* HANDBOOK OF SMALL SATELLITES, 1337, 1353 (Joseph N. Pelton ed., 2020). (asserting "[t]he failure rate of these comparatively cheap satellites should give pause, because if 5% of a constellation of 100 satellites fails, it is guaranteed new pieces of debris will intentionally be introduced into the fragile space domain. Article IX of the Outer Space Treaty, *supra* note 14, warns of harmful contamination of the space environment and requires States to take appropriate measures to prevent this harmful contamination. A responsible government could not, in all seriousness, permit the intentional release of such amounts of space debris, especially in the already fraught orbits that many megaconstellations are headed towards.").

26. NASA Orbital Debris Program Office, *Debris Remidiation*, NASA, https://orbitaldebris.jsc.nasa.gov/remediation/ [https://perma.cc/4LP3-PJSD] (last visited Mar. 28, 2023) (a 2005 study conducted by ODPO using the LEGEND model projected that "even if no future launches occurred, collisions between existing satellites would increase the 10-cm and larger debris population faster than atmospheric drag would remove objects")

27. *See* Viikari, *supra* note 18, at 48.

28. *Id.*

29. *Id.*

30. *Id.*

stellations could damage the ozone layer.[31] The effects would be due to the burning of the toxic chemicals coming from the increasing number of satellites concurring with the constellation's reentry.[32]

Last, there is increasing concern about the effects the constellation satellite systems will have on the night sky. In February 2022, the International Astronomical Union (IAU) launched a new center to oppose the effect that megaconstellations pose on the night sky.[33] The center describes the potential threat as "worse than urban night pollution."[34] The effects are felt by astronomers in multiple ways. One aspect is the effect on radio interference for large telescopes looking for distant planets that rely on large areas of non-interference, which is encumbered by the constellations.[35] Further, there is interference in large-scale night sky observations. The organizations sponsoring the center are currently developing the world's largest radio astronomy array, and their observations will be compromised by the satellite interference of the constellation satellite operations.[36] Connie Walker, a scientist at the NOIRLab, states that, "by the end of the decade, more than 5,000 satellites will be above the horizon at any given time."[37] These satellites would be detectable by even the smallest telescopes.[38] Connie Walker, on behalf of The Dark & Quiet Skies Satellite Constellation Observatories Working Group, proposed that future regulatory requirements could consider quantitative impact assessments of satellite brightness in context of the operational profile, cumulative radio emissions, and strategies to avoid radio quiet zones.[39]

The United States has a critical opportunity to set a positive precedent as a leader in the international space sector by mitigating environmental factors to be responsible space stewards. The UN Outer Space Treaty, directing all nations' activities in space, states in Article

31. Rojoef Manuel, *Megaconstellation Satellites Reentering Puts a Hole in Ozone Layer, Increases Atmosphere Pollution, and Uncontrolled Geoengineering*, THE SCI. TIMES (June 8, 2021), https://www.sciencetimes.com/articles/31594/20210608/megaconstellation-satellites-reentering-puts-hole-ozone-layer-increases-atmosphere-pollution.htm#:~:text=megaconstellation%20satellites%20that%20reenter%20Earth's,%2C%20including%20Starlink%2C%20will%20increase [https://perma.cc/8K7N-LGWP].
32. *Id.*
33. Tereza Pultarova, *International Astronomical Union launches new center to fight satellite megaconstellation threat*, SPACE.COM (Feb. 7, 2022), https://www.space.com/iau-center-protect-astronomy-megaconstellation-threat [https://perma.cc/MP7U-2S25].
34. *Id.*
35. *Id.*
36. *Id.*
37. *Id.*
38. *Id.*
39. Connie Walker, NOIRLab Scientist, *The Scientific and Technical Subcommittee Symposium on Dark Skies: Next Steps in Implementing Mitigations for Satellite Constellation Impact on Optical/Infrared Astronomy* (Feb. 15, 2022).

I that "the exploration and use of outer space . . . shall be carried out for the benefit and interests of all countries . . . and for the province of all mankind."[40] Mitigating possible environmental harms in outer space is a benefit for the space environment and aligns with the Outer Space Treaty's requirements to allow for the free exploration of space and keeping space a province for all mankind.

B. Overview of the Commercial Satellite Regulatory System

1. Regulatory Agencies Involved in U.S. Commercial Satellite Licensing

Regulatory agencies are responsible for licensing and regulating commercial satellite activities in the United States.[41] These responsibilities are split between multiple governing bodies with differing jurisdiction over the launch, reentry, and licensing of satellites.[42] Although U.S. regulatory agencies govern commercial satellite activities, there are international agreements and International Governmental Organizations (IGO's) that instruct the licensing and regulatory scheme adopted in the United States. The most relevant international agreements include the UN Outer Space Treaty, adopted in 1967, which governs the activities of all nations in space, including commercial activities.[43] The Outer Space Treaty is unique as it is one of the singular international treaties to require State responsibility for the actions of its commercial actors.[44] The Treaty is also unique because its scope is interpreted to apply to all actors who participate in space—even States which have not ratified the agreement. Subsequent United Nations treaties stemming from the Outer Space Treaty include the Liability Convention, adopted in 1971,[45] and the Registration Convention, adopted in 1976, which are both applicable to commercial satellite operations.[46] These treaties subsequently guide United States space legislation to ensure compliance with international laws.

Other international law influential to the United States' national space legislation includes the International Telecommunications Union (ITU). The ITU is an IGO that grants frequency and orbital slots to States for space objects. Most recently, a body of international

40. Outer Space Treaty, *supra* note 14, at art. I.
41. Matthew Schaefer, *The Contours of Permisonless Innovation in the Outer Space Domain*, U. PA. J. INT'L L. 103, 117–18 (2018).
42. *Id.*
43. *Id.*
44. Outer Space Treaty, *supra* note 14, at art. VI.
45. Convention on International Liability for Damage Caused by Space Objects, *entered into force* Mar. 29, 1972, 24 U.S.T. 2389, 861 U.N.T.S. 187.
46. Convention on Registration of Objects Launched into Outer Space, *entered into force*, Sept. 15, 1976, 28 U.S.T. 695, 1023 U.N.T.S. 15.

"soft law" has developed and influenced space legislation globally. Produced by the United Nations Committee on the Peaceful Uses of Outer Space (UNCOPUOS), guidelines were published through the work of the national space agencies and scientists that studied various mitigating efforts States could take to limit the effects of space debris.[47] Since its publication, many States, including the United States, have adopted the Space Debris Mitigation Guidelines as a minimum threshold for their licensing schemes.[48]

As discussed above, in the United States, multiple agencies participate in commercial satellite operations licensing and regulation. Those agencies include the Federal Aviation Administration (FAA), the National Oceanic and Atmospheric Administration (NOAA), and, at issue for this Article, the Federal Communications Commission (FCC). The FAA oversees the launch and reentry of any vehicle that leaves the atmosphere and is engrained in the satellite regulation process.[49] However, the FAA does not administer the licenses of the actual satellites. The FAA currently conducts NEPA reviews for most of its actions. The FAA requires most launches to conduct an Environmental Assessment (EA), and, if the need arises, the agency will require the company to conduct an Environmental Impact Statement (EIS). NOAA is involved in remote sensing satellite systems' regulatory and licensing process.[50] Currently, a NEPA review is not conducted in its regulatory process, and no challenge has been brought on the matter.

2. How the National Environmental Policy Act Review Incorporates into Federal Communication Act Framework for Satellites

At issue for this Article is the licensing regime for commercial satellite systems, which are conducted under the FCC. Congress grants the FCC authority to issue satellite licenses and regulate commercial

47. United Nations Office for Outer Space Affairs, *Space Debris Mitigation Guidelines of the Committee on the Peaceful Uses of Outer Space*, UNITED NATIONS (2010).

48. United Nations Office for Outer Space Affairs, *Compendium of space debris mitigation standards adopted by States and international organizations*, UNITED NATIONS (last updated, Japan, Feb. 18, 2022), https://www.unoosa.org/oosa/en/ourwork/topics/space-debris/compendium.html [https://perma.cc/U7XJ-S5L8]. Arguably all the major space faring powers aside from China have adopted the mitigation standards since its publication in 2010 including the European Space Agency, United States, Russia, Japan, and Canada.

49. *Vehicle Operator Licenses & Permits*, FED. AVIATION ADMIN., https://www.faa.gov/space/licenses/operator_licenses_permits/ [https://perma.cc/N426-VDYJ].

50. *About the Licensing of Private Remote Sensing Space Systems*, NOAA, https://www.nesdis.noaa.gov/commercial-space/regulatory-affairs/licensing [https://perma.cc/W4ZY-JRDL].

satellites.[51] The NEPA was an attempt to ensure federal agencies were evaluating the environmental impacts of its actions.[52] NEPA's declaration of purpose was to encourage "enjoyable harmony between man and his environment . . . [and] prevent or eliminate damage to the environment."[53] However, the Act allows an agency to specify which regulatory activities it considers to be categorically excluded from an environmental review under NEPA.[54] Categorically excluded actions are deemed to "individually and cumulatively to have no significant effect on the quality of the human environment and are categorically excluded from environmental processing."[55] The FCC indeed runs with that freedom and considers all of its actions categorically excluded except for three actions requiring an environmental review.[56] These three actions are (1) communications facilities in specific ground-based locations, (2) communications using high-intensity lighting near residential areas, and (3) communications facilities that would expose humans to radio-frequency radiation above the FCC's safety standards.[57] Satellites are not covered by any of the three categories requiring review and are thus categorically excluded.

Applicants applying for a "space station [satellite] or space-station constellation must comprise a comprehensive proposal" on FCC Form 312.[58] During this process, the word "environment" is not mentioned once, and applicants are not asked specific questions about the effects on the environment.[59] However, applicants are held to technical specifications and given a questionnaire as a requirement of the application.[60] These orbital debris questions include space situational awareness information, registration requirements, booster and deorbit information, accuracy and orbital tolerances.[61]

Although the FCC currently applies a categorical exclusion process for commercial satellite systems, a brief overview of how the NEPA review process works is pertinent to understanding the levels of review possible. NEPA requires agencies to prepare either an EA or EIS before taking "major [f]ederal action[ ] significantly affecting the quality of the human environment."[62] The statement details environmen-

51. Ramon J. Ryan, *The Fault in Our Stars: Challenging the FCC's Treatment of Commercial Satellites as Categorically Excluded from Review Under the National Environmental Policy Act*, 22 VAND. J. ENT. & TECH. L. 923, 930 (2020).
52. *Id.* at 927.
53. 42 U.S.C. § 4321.
54. Ryan, *supra* note 51, at 930.
55. 47 C.F.R. § 1.1306(a).
56. Ryan, *supra* note 51, at 930–31.
57. *Id.*
58. 47 C.F.R. § 25.114 (a)(1).
59. *Id.*
60. *Id* § 25.114 (14).
61. *Id.*
62. 42 U.S.C. § 4332(2)(C).

tal impacts, the significance, and possible alternatives to the action.[63] Agency approval of a project conducted by private parties, whether by "permit or other regulatory decision," may qualify under major federal action.[64]

The Council on Environmental Quality, initiated by the NEPA mandate, created four NEPA review categories a federal action can fall under for NEPA review.[65] The first category for federal action is a categorical exclusion.[66] These are actions that an agency concludes "normally do not have a significant effect" on the environment.[67] However, if an agency determines that a categorical exclusion covers a proposed action that has "extraordinary circumstances" presenting "significant effect[s]," then the agency shall prepare an EA or EIS if they cannot lessen the impacts to avoid the effects.[68]

The second category, and the first that begins a NEPA review process, is an action that requires the preparation of an EA. This category is for actions that are "not likely to have significant effects or the . . . effects [are] unknown and [are] therefore appropriate for an environmental assessment."[69] As noted, even actions where it may not be likely or the effects are unknown to the agency, NEPA generally deems that action to be at an appropriate level for a NEPA review. This category requires the applicant to involve state, tribal, and local governments, and relevant agencies describe the purpose for the action, environmental impacts, and alternatives, and include a list of agencies and persons consulted.[70] Under the FCC statutory structure, specific types of actions are required to produce an EA.[71] Outside of those specific actions, any other projects under FCC jurisdiction are deemed to be categorically excluded and do not have to produce an EA.[72] Historically, the actions under sections 1.1307(a) and (b) have only involved environmental effects at the earth's surface. Therefore, space stations or satellites have not traditionally triggered a production of EA's under FCC statutory framework and have been categorically excluded.[73] If an applicant alleges a categorically excluded action will have a "significant environmental effect" under FCC's statutory framework, they submit a petition to the Bureau "setting forth in detail the reasons justifying or circumstances necessitating environmen-

63. *Id.*
64. 40 C.F.R. § 1508.1(q)(3)(iv) (2021).
65. *See id.* §§ 1501.4(a), 1501.3(a)(2), 1501.6(a), 1502.4.
66. *Id.* § 1501.4(a).
67. *Id.*
68. *Id.* § 1501(b)(1)–(2).
69. *Id.* § 1501.3(a)(2).
70. *Id.* § 1501.5(c)(e).
71. 47 C.F.R. § 1.1307(a)–(b).
72. *Id.* § 1.1306(a)–(b).
73. *Id.* § 1.1306.

tal consideration in the decision-making process."[74] If the Bureau reviews the petition and determines "the action may have a significant environmental impact," then "the Bureau will require the applicant to prepare an EA . . . which will serve as the basis for the determination to proceed with or terminate environmental processing."[75]

The third category is a Finding of No Significant Impact (FNSI).[76] This finding is a product of performing an EA and determining that an EIS is not required based on that result because the proposed action will not have a significant effect.[77] Finally, the fourth category is an EIS, itself.[78] If a proposed action is deemed "likely to have significant effects," an EIS will be prepared, which involves a multi-stage reporting process involving public comment.[79]

C. Overview of *Viasat, Inc. v. FCC* and Viasat's Challenge to the Categorical Exclusion of Satellites

Viasat, Inc. v. FCC was a case of first impression which challenged the categorical exclusion of conducting a NEPA review of commercial satellites.[80] Viasat was the interested party in this suit.[81] Viasat claimed that the FCC's actions to allow SpaceX to operate without a NEPA review caused it direct environmental harm.[82]

It is essential to assess the order of SpaceX's operations in relation to Viasat's suit to understand the arguments in Viasat's challenge. In 2016, SpaceX filed an application for an Authorization Order with the FCC to provide non-geostationary orbit (NSGO) or LEO services for a constellation system of 4,425 satellites from approximately 1,110 to 1,325 kilometers.[83] The FCC granted the initial license because it aligned with the agency's public interest goals of providing high-speed, reliable, and affordable internet to underserved areas.[84]

SpaceX then filed a supplemental application to request additional GHz bands for the constellation to allow greater communication and bandwidth access. At the time, Viasat filed a petition to deny this request, while other operators filed comments with concerns about SpaceX's orbital debris mitigation plans.[85] After reviewing the request, FCC approved the application citing it would serve the public

74. *Id.* § 1.1307(c).
75. *Id.*
76. 40 C.F.R. § 1501.6.
77. *Id.*
78. *Id.* § 1502.4.
79. *Id.*
80. Viasat, Inc. v. FCC, 47 F.4th 769 (D.C. Cir. 2022).
81. *Id.*
82. *Id.* at 779–80.
83. *See* FCC Reply Brief, *supra* note 9, at 17–23.
84. *Id.*
85. *Id.* at 18.

interest, subject to requirements. The requirements included: (1) receiving a "qualified favorable" rating from ITU prior to initiation of service, (2) a further assessment as to the reliability of spacecraft and deorbiting systems, and (3) approval on an updated description of SpaceX's orbital debris mitigation plan and guarantees that the company would comply with any future mitigation plans in the future.[86]

Subsequently, SpaceX filed its First Modification Order to move the first batch of 1,584 satellites from 1,150 kilometers to a lower orbit of 550 kilometers.[87] Again, this order was granted on the grounds of public interest.[88] Comments and petitions were submitted citing concerns about granting SpaceX a waiver for the "qualified waiver" requirement from the ITU.[89] However, this requirement was waived subject to the requirement that SpaceX would have to adjust to comply with ITU regulations if they were given an unfavorable finding.[90] Regarding orbital debris mitigation, the FCC found SpaceX's orbital debris mitigation plan "sufficient." The FCC found sufficiency within the orbital debris guidelines because Space X applied a propulsion-based collision avoidance system, the possible failure rate for collisions was within the boundaries of risk, and the satellites included demisable component parts[91] upon reentry.[92]

In April 2020, SpaceX filed another modification which was granted in an FCC Order (the Order).[93] SpaceX applied to modify the orbit of another 2,824 satellites to a lower orbit between 540–570 kilometers and to make other operational changes.[94] The FCC analyzed the application "in light of Bureau level precedent for determining whether the application [was] in the 'public interest,' [and] consider[ed] whether the proposed modification present[ed] any signifi-

86. *Id.* at 18–19.
87. *Id.* at 19.
88. *Id.*
89. *Id.* at 19–20.
90. *Id.* at 20.
91. *Updates: SpaceX's Approach to Space Sustainability and Safety*, SPACEX (Feb. 22, 2022), https://www.spacex.com/updates/ [https://perma.cc/H6QA-8V92].

> Starlink satellites are designed to demise as they reenter the Earth's atmosphere, meaning they pose no risk to people or property on the ground. Design for demise required the investment of significant engineering resources and often required adding cost and even mass to our satellites, such as our decision to use aluminum rather than composite overwrap pressure vessels for the fuel tank for our propulsion system. SpaceX has safely deorbited over 200 satellites utilizing this approach.

Id.
92. *See* FCC Reply Brief, *supra* note 9, at 21–22.
93. Space Exploration Holdings, LLC Request for Modification of the Authorization for the SpaceX NGSO Satellite System, 36 FCC Rcd. 7995 (2021), *available at*: https://www.fcc.gov/document/fcc-grants-spacexs-satellite-broadband-modification-application [https://perma.cc/WA3S-GW3C].
94. *See* FCC Reply Brief, *supra* note 9, at 22.

cant interference problems and [was] otherwise consistent with Commission polices."[95]

The appeal against the Order brought by Viasat had multiple challenges against SpaceX for its Starlink constellation satellite system. Viasat's challenge and arguments and the FCC's rebuttal arguments are presented below, followed by a holistic analysis on the merits. The Balance Group joined Viasat as an appellant,[96] but because the court discounts them as not meeting group standing requirements,[97] its standing is not considered in this Article. The FCC was joined by SpaceX as an Intervenor.[98]

Viasat's case was ultimately dismissed on appeal due to lack Article III standing in *Viasat, Inc. v. FCC*. However, this Article posits that future petitioners with standing will likely be able to raise similar substantive issues argued during the reply process that led to the request for appeal. This Article focuses on the arguments made by the Petitioners, the FCC, and SpaceX to make recommendations to prevent future litigation. The D.C. Circuit held that Viasat lost on standing. The court noted Viasat was chiefly attempting to make environmental claims using economic harm, stating collision risks and orbital crowding could increase its operating costs. The court stated that these harms are not covered under NEPA and do not personally affect Viasat in the way Viasat described the problem.[99]

1. Viasat's Challenge and Argument

The Petitioners brought two challenges to the Order—the first challenge regarded frequency complaints,[100] and the second challenge regarded the lack of NEPA review of the SpaceX Starlink satellite system. Viasat argued that under the FCC framework, a NEPA EA is required if an activity "may have a significant environmental impact."[101] Viasat argued that the Order allowing the modification of the 2,824 satellites into a lower orbit with an unlimited number of replacements when the satellites reach their five-year end-of-life design creates an event that will quickly have a significant environmental impact.[102] Thus, because the FCC failed to conduct an EA "and to explain its decision adequately, the Order was arbitrary, capricious, and an abuse of discretion."[103]

95. *Id.* at 22–23.
96. Viasat, Inc. v. FCC, 47 F.4th 769, 774 (D.C. Cir. 2022).
97. *Id.*
98. *Id.* at 773.
99. *Viasat*, 47 F.4th 769 at 774.
100. The interference issues raised in the complaint are not at issue in this Article and therefore will not be addressed.
101. *See* Viasat Reply Brief, *supra* note 8, at 1 (emphasis omitted).
102. *Id.*
103. *Id.* at 5.

Viasat claimed that FCC's failure to conduct an EA was arbitrary and capricious because the Starlink satellites "may" impact the environment in at least three ways. The first potential impact is that the launch and reentry of the satellites will harm the atmosphere by introducing dangerous chemicals and creating dangerous reentry debris.[104] The second is that the satellites will create light pollution that affects astronomy and alters the night sky.[105] Third, Starlink would potentially increase the amount of orbital pollution in space.[106] Viasat argued that each of these environmental harms requires an independent review under the applicable "may" standard.[107]

Perhaps even more notably than the specifics of the environmental challenges raised were the arguments behind the challenges. Viasat stated the FCC failed to utilize well-considered decision-making required under *WildEarth Guardians v. Bernhardt*.[108] Viasat makes this argument due to the FCC's lack of consideration that thousands of Starlink satellites at least *may* create the *potential* for a significant environmental impact, which would warrant a review under the agency's standards.[109] Viasat stated that the FCC largely ignored Appellants' arguments and, instead, decided the satellites did not even have the potential for an environmental impact.[110]

Viasat's argument rested mainly around the precedent of the D.C. Circuit Court of Appeals in the case of *American Bird Conservancy, Inc. v. FCC*. The petitioners in *American Bird* claimed the FCC failed to analyze the past, present, and reasonably foreseeable tower impacts on birds. Therefore, by failing to do so, the rules and procedures for approving new towers failed to comport with NEPA standards.[111] The court agreed with the petitioners. The FCC, in this case, stipulated that "[section] 1.1307(c) applies to the petition . . . and that the regulation requires an EA when an action "may" have a significant environmental effect."[112] The court highlighted the Order to explain that the "demand for definitive evidence of significant effects—noting Petitioners' failure to make a 'scientific showing that the population of any specific bird species has decreased as a result of collisions'—plainly contravenes the 'may' standard."[113] The court also emphasized the goal of NEPA is to predict environmental effects before they occur, but a precondition requiring certainty of those effects would jeopardize

104. *Id.* at 13–14.
105. *Id.* at 14.
106. *Id.*
107. *Id.* at 13.
108. 502 F. Supp. 3d 237 (D.D.C. 2020).
109. *See* Viasat Reply Brief, *supra* note 8, at 12.
110. *Id.*
111. Am. Bird Conservancy, Inc. v. FCC, 516 F.3d 1027, 1033 (D.C. Cir. 2008).
112. *Id.*
113. *Am. Bird*, 516 F.3d at 1033 (internal citation omitted).

NEPA's purpose that agencies consider those impacts before it is too late.[114] The emphasis on conflicting studies and data points or divergent views does not forestall NEPA's mandate and confirms, rather than refutes, the tower's possible environmental effects.[115] Therefore, the court held there was no real dispute that the towers "may" have significant impact, which meets the threshold requirement for the conduct of an EA.[116]

Viasat contended the FCC is attempting to make the same exclusions rejected in *American Bird Conservancy*. There, the FCC gave two reasons not to undertake an environmental review: the lack of specific evidence and lack of consensus among scientists as to the environmental effects of the towers.[117] The court rejected both arguments, "explaining that 'they demonstrate an apparent misunderstanding of the nature of the obligation imposed by' NEPA."[118] Therefore, Viasat argued the FCC is making the same mistake, allowing uncertainty in possible outcomes, to be the reason not to require further review.[119]

Viasat also argued it had the standing to make this environmental claim based on injury-in-fact suffered by the environmental effects.[120] Viasat stated that without the ability to access and utilize space safely, it has an injury-in-fact in the suit.[121] Viasat reiterated that Starlink's unprecedented deployment in LEO was the most critical concern in the space environment risking a "tragedy of the commons" scenario.[122] Therefore, in this area, the increased risk of harm is "substantial, and the harm itself would be severe, meaning that even relatively modest increments in risk should qualify as injury-in-fact."[123] Viasat also noted that, even if the risk of future collision is not considered a harm, there is no question the orbital environment will become exponentially more crowded than it is presently.[124] This will affect Viasat by limiting launch windows and limiting orbital slots and frequencies.[125] Thus, Viasat will have to expend time and resources to

114. *Id.*
115. *Id.*
116. *Id.*
117. *See* Viasat Reply Brief, *supra* note 8, at 23–24.
118. *See id.* at 24 (quoting *Am. Bird*, 516 F.3d at 1033).
119. *See id.* at 24–25.
120. *See id.* at 49–50.
121. *Id.* at 52 (stating "Viasat's interests in the safe and efficient use of a shared natural resource thus closely align with NEPA's goal of ensuring adequate consideration of "the profound impact of man's activity on the interrelations of all components of the natural environment." 42 U.S.C. § 4331(a)).
122. *Id.* at 2.
123. *Id.* at 20.
124. *See id.* at 21.
125. *Id.*

adjust to Starlink operations resulting in injury-in-fact because regulatory restrictions are being lifted on their competitors.[126]

Notably in the present case, the Court's holding did not include any reference to *American Bird Conservancy* or section 1.1307(c).[127] There was no discussion even in dicta of the "may" standard and what extent an environmental effect may have on the environment to require a NEPA review in this situation.

2. FCC's Rebuttal to the Challenge

The FCC's rebuttal to Viasat's challenge makes multiple arguments against Viasat's claim. However, the pertinent rebuttals revolve around the FCC's public interest mandate, Viasat's lack of Article III standing, and the fact that none of the environmental issues rise to the level needed for review. The FCC's first rebuttal argument is that approving SpaceX's applications for the satellite constellation and subsequent modification orders is in the public interest and supports the agency's mandate. The FCC stated that it has broad authority to allow for license approval if the "action will promote the public interest, convenience, and necessity."[128] The FCC determined that SpaceX's Order to modify the satellite constellation met this public interest requirement by "improving broadband access in underserved areas and reducing the potential to generate orbital debris."[129]

In determining whether a license or modification serves the public interest, the FCC evaluates whether the action would cause harmful interference.[130] FCC rules define harmful interference as "interference which endangers the functioning of a radionavigation device or of other safety services or seriously degrades, obstructs, or repeatedly interrupts a radiocommunication service operating in accordance with" the Radio Regulations of the ITU.[131]

The last public interest argument the FCC makes is that in 2004, the FCC adopted "comprehensive rules on orbital debris [p]ursuant to its authority to determine whether the public interest would be served by the authorization of satellite communications systems under 47 U.S.C. section 307(a)."[132] The FCC understood the danger of orbital debris and collision risk, and the importance of satellites being safely decommissioned at the end of their life.[133] Therefore, the agency has

126. *Id.* at 21–22.
127. Viasat, Inc. v. FCC, 47 F.4th 769 (D.C. Cir. 2022).
128. *See* FCC Reply Brief, *supra* note 9, at 6–7 (quoting 47 U.S.C. § 316(a)(1)).
129. *Id.* at 34.
130. *Id.*
131. *Id.* at 8 (internal quotation marks omitted) (quoting 47 C.F.R. § 2.1(c) (2021)).
132. *Id.* at 16 (internal quotation marks omitted).
133. *Id.*

discretion under the *Chevron* doctrine to create rules aligned with its mission when the delegating authority is ambiguous.[134] The FCC created rules that required operators to disclose strategies to mitigate orbital debris risk, potential collision information, plans to dispose of their satellites at their end of life, and the potential human casualty risk.[135] These rules were updated most recently in 2021 and are now titled "Special Provisions for Satellite Systems."[136] These rules require the operators of proposed experimental satellite facilities to submit descriptions of the design and operational strategies the satellite system will utilize to mitigate orbital debris, but the operators can begin operation prior to a grant of authorization.[137]

Next, the FCC argues Viasat has not made a sufficient argument to prove Article III standing. The FCC reasons Viasat's claim must be within NEPA's "zone of interest."[138] Viasat has the burden to establish that it is substantially probable an Agency action "disregarded a procedural requirement created a demonstrable risk, or caused a demonstrable increase in an existing risk, of injury to the particularized interests of the plaintiff."[139] Even if Viasat proves environmental harm from the satellites, Viasat suffers from multiple limiting factors. The first is that Viasat's claim was limited in scope to only the modification of lowering a specific quantity of satellites. This limits the environmental effect that can be addressed under the Order on appeal. Viasat attempted to say that the FCC should consider the effects of every SpaceX satellite, past or pending.[140] However, the FCC rejected this argument.[141] The FCC explained that "consistent with section 1.1307(c), it would consider the potential effects of the particular action at issue—the proposed authorization of the satellites covered by the instant modification request."[142] Further, Viasat only has one satellite in operation in conjunction with SpaceX's operational orbit, limiting any direct harm claim through collision orbital debris Viasat attempts to make. Also, Viasat has a strong economic interest in this case, and reduced competition does not fall within the zone of interest for NEPA to win them Article III standing.[143] FCC's argument about standing was ultimately upheld by the court on appeal.

134. Chevron U.S.A., Inc. v. Nat. Res. Def. Council, Inc., 467 U.S. 837 (1984).
135. *See* FCC Reply Brief, *supra* note 9, at 16–17.
136. 47 C.F.R. § 5.64 (2021).
137. *Id.*
138. *See* FCC Reply Brief, *supra* note 9, at 66–67 (quoting Match-E-Be-Nash-She-Wish Band of Pottawatomi Indians v. Patchak, 567 U.S. 209, 224 (2012)).
139. *See id.* at 66 (quoting Sierra Club v. FERC, 827 F.3d 59, 65 (D.C. Cir. 2016)).
140. *See id.* at 27 (citing ¶ 78 (JA)).
141. *Id.*
142. *Id.* at 27–28 (citing 47 C.F.R. § 1.1307(c)). Viasat does not challenge this conclusion.
143. *See id.* at 68.

The FCC's last argument was to counter the environmental claims Viasat made to necessitate an environmental review. To begin, the FCC based its environmental argument on the fact that the Agency did not need to address the environmental concerns, "but out of an abundance of caution, the Commission assumed that NEPA may apply and consider[ed] the concerns raised in the record before [it]."[144] However, the FCC argued it was not clear whether all issues raised by Viasat were within the scope of NEPA and the review presented novel questions as to NEPA's scope.[145] Notably, the FCC referred to SpaceX's argument questioning the scope of NEPA's jurisdiction extending to space.[146] The FCC relayed that NEPA only applied to the "human environment."[147] The FCC addressed Viasat's claims on launch and reentry emissions, astronomy and the night sky, and orbital debris. Although the FCC found limited effects in each category, the FCC argued there was no real dispute as to the effects of emissions,[148] it was not arbitrary and capricious to rely on the agency's orbital debris mitigation standards,[149] and that the effects on the night sky would not be significant (even though future monitoring would be required) because SpaceX was involved in mitigation efforts.[150]

3. Viasat's Standing Issue

It is not surprising that Viasat lost its appeal based on standing because, not only is Viasat a competitor of SpaceX, but also many of its environmental arguments were underpinned with economic grievances. The FCC argued in its reply brief that Viasat could not meet the standing requirement because it attempted to achieve Article III standing based on an economic grievance.[151] Economic grievances alone do not fall within the zone of interest protected by NEPA.[152] However, although standing was lost in this case, it can serve as both a guide and a warning to future petitioners. If a future competitor wishes to challenge SpaceX using NEPA, it is likely they will lose unless they can present a strong showing of harm outside of economic grievances. If a future non-competitor wishes to challenge the FCC on NEPA review, some bounds for possible NEPA challenges have also been set.

144. *Id.* at 26.
145. *Id.* at n.5.
146. *Id.* at 27.
147. *Id.* at 26.
148. *Id.* at 81–82.
149. *Id.* at 85.
150. *Id.* at 91–92.
151. *Id.* at 68.
152. *Id.* at 69–70.

Nothing in the regulatory definition of "effects" requires the FCC to consider potential competitive effects on a company when assessing a categorically reviewed action.[153] Instead, the regulations state that "[e]conomic . . . effects by themselves do not require preparation of an environmental impact statement."[154] If Viasat was able to show there were increased operating costs associated with environmental harms, then it is possible the environmental costs could fall within NEPA's scope. However, Viasat already operates a satellite in an orbital environment with space debris present, and the FCC contends that Viasat could not identify any costs attributable to SpaceX's satellites increasing their cost of operating in that sphere.[155] Further, Viasat severely limited the scope of its argument. The FCC noted that the court could not "presume the missing fact" that the SpaceX satellites will impose additional costs on Viasat.[156] Viasat's argument was limited to only the satellites in the modification order, and because of this, Viasat ran into quantity issues in proving harm to their operations. Viasat was not able to prove that increased risk of environmental harm threatens the company's particular interests in this case, only that it may impact the environment in general.[157]

The standing issues show that if a party were to bring this challenge before the FCC again, it would need to prove direct environmental harm from the satellite constellations based on the satellites' effect on the environment. If a company's sole purpose in filing the injunction was economic, it likely would not present much of a challenge to the FCC's regulations. However, if an organization with direct environmental harm raised the same challenge, it would likely pass the Article III standing requirement. Therefore, evaluation of the environmental harms raised in this case is significant.

III. ANALYSIS

In the present case, Viasat presented unique environmental concerns that could be resurfaced by a party directly affected by those actions in the future.[158] Both the FCC and Viasat addressed the merits of the environmental harms in this case.[159] Both parties conceded

153. *See id.* at 69.
154. *Id.* (citing 40 C.F.R § 1502.16(b)).
155. *See id.* at 69–70.
156. *Id.*
157. *Id.* at 71–72.
158. Viasat lost due to Article III standing on the case at issue in this Article. If a petitioner with a true environmental harm, such as a petitioner arguing Starlink satellites's light pollution were interfering with radio astronomy, there may be the potential for further litigation.
159. *See* Viasat Reply Brief, *supra* note 8, at 3 (claiming there is no real dispute that Starlink satellites may have an environmental impact); *see also* FCC Reply Brief, *supra* note 9, at 30 (although minimizing the effects of Starlink on radio astron-

that environmental harms "may" exist, but the issue was the standard of review on those harms and whether the level of environmental harm was enough to override the Administrative Procedure Act (APA).[160] Under the APA, "the Court must uphold an agency's decision unless it is "arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with law."[161] The FCC argued this applied to its decision to have satellites be categorically excluded from an environmental review.

The following is an analysis based on the reply briefs before the court on how and why the FCC should consider applying an environmental review to satellite operations to prevent future litigation proactively. The first argument for environmental review is that the FCC was not correctly interpreting the standard under 47 C.F.R. § 1.1307(c) as the courts have upheld the statute. The second is that based on the holding of *United Keetoowah Band of Cherokee Indians in Oklahoma v. FCC*; the agency is entitled to deference to its reasonable interpretations of ambiguous interpretations of its provisions, but not the provisions of other agencies.[162] Third, satellite constellations are new technologies, the scope of which has not been considered and is what NEPA was created to address. Fourth, the biosphere and jurisdiction of LEO are squarely under the FCC's jurisdiction based on the Outer Space Treaty and how the courts have interpreted the extraterritoriality of NEPA.

This section will be addressed with the understanding that Viasat's appeal was limited in scope to only the modification of the 2,824 satellites to a lower orbit. Although that contributed to its lack of standing, this section will analyze environmental considerations based on the entire Starlink constellation and similar constellation systems. This analysis is intended to guide future challenges the FCC might face regarding the categorical exclusion of satellites.

A. NEPA Standard of Review under 47 C.F.R. § 1.1307(c)

First, the FCC and Viasat took different interpretations of the standard in 47 C.F.R. § 1.1307(c) that states, "if an interested person alleges that a particular action, otherwise categorically excluded, will have a significant environmental effect" they shall submit a petition setting forth the reasons "necessitating environmental consideration

omy, the FCC noted it took steps to "monitor those activities," emphasizing the impact the satellites were having on astronomy).

160. In both briefs, parties acknowledge impacts of Starlink satellites even if the FCC arguments are paired with the 'robust record' of Space X's work on the matter.

161. 5 U.S.C. § 706(2)(A).

162. United Keetoowah Band of Cherokee Indians in Okla. v. FCC., 933 F.3d 728 (D.C. Cir. 2019).

in the decision making process."[163] Then, if the FCC determines the action "may have significant environmental impact, the Bureau will require the applicant to prepare an EA."[164]

Interestingly, if the petitioner's standard shows that the action "will" have a significant environmental effect, then the burden shifts to the agency to determine only if the action "may" have an environmental effect.[165] Neither the caselaw nor the parties in the Order addressed this differential in the standards. Moreover, in *American Bird Conservancy*, both the petitioner and the FCC conceded to only the "may" standard and did not address the "will" standard.[166] Further, the court in *American Bird Conservancy* held that petitioners only needed to show an environmental effect "may" be significant in order to require the agency to conduct an EA under its rules.[167] Because "may" has been adopted in the circuit at issue, this seems to be the common law interpretation of the ambiguity in the statute. Due to this if a future petitioner meets standing and can show any tendency that a satellite constellation's environmental impact will meet the "may" standard, the court would likely rule in the petitioner's favor.

B. FCC Deference Pertaining to NEPA

Second, an examination is necessary regarding the deference given to the FCC regarding their NEPA review. In the 2019 D.C. Appeals Court case *United Keetoowah Band of Cherokee Indians in Oklahoma v. FCC*, the court addressed the issue of the court's deference to agency decision making.[168] Agency orders are set aside only if they are arbitrary, capricious, an abuse of discretion, or unlawful.[169] That was true in this case when the FCC turned against its precedent for wireless infrastructure. With the advent of 5G and the internet of things, more infrastructure became necessary. The type of infrastructure changed from large to small cell towers.[170] The FCC decided that these small towers did not require any environmental review, declining even to list them under a categorical exclusion.[171]

163. 47 C.F.R. § 1.1307(c).
164. *Id.*
165. *Id.* ("If an interested person alleges that a particular action, otherwise categorically excluded, *will* have a significant environmental effect, the person shall electronically submit to the Bureau responsible for processing . . . If the Bureau determines that the action *may* have a significant environmental impact, the Bureau will require the applicant to prepare an EA." (emphasis added)).
166. Am. Bird Conservancy, Inc. v. FCC, 516 F.3d 1027, 1033 (D.C. Cir. 2008).
167. *Id.*
168. United Keetoowah Band of Cherokee Indians in Okla. V. FCC, 933 F.3d 728, 738 (D.C. Cir. 2019).
169. 5 U.S.C. § 706(2)(A).
170. *United Keetoowah*, 933 F.3d at 738–39.
171. *Id.* at 738–42.

Generally, agency decisions are required to be reasoned. The result of their actions must be within the scope of their lawful authority. The process in which they reach the result must be logical and rational.[172] Agency action is arbitrary and capricious when they "entirely failed to consider an important aspect of the problem or offered an explanation for its decision that runs counter to the evidence before the agency or is so implausible that it could not be ascribed to a difference in view or the product of agency expertise."[173] The FCC is entitled to deference of ambiguous provisions of its own Communications Act.[174] However, the court held that no deference is owed to the FCC's interpretation of NEPA, which the Council on Environmental Quality primarily administers.[175] In the case of *United Keetoowah*, the court held that the action of deregulating the small cell towers was arbitrary and capricious because its public interest analysis "did not meet the standard of reasoned decisionmaking."[176] The court did not allow the FCC to remove the small cells from their approval authority. This is because the FCC failed to consider the scale and effect of the towers,[177] the potential for streamlining the review process rather than eliminating the review,[178] and the impact of the effect of the towers on the petitioners (no matter how rare).[179]

This case is analogous to the FCC's current interpretation of satellites under a categorical exclusion. Although they have not deregulated satellite licensing from their regulatory scheme, the FCC has chosen to continue to exclude satellites from NEPA review. As *United Keetoowah* held, the agency's choice of interpretation as to NEPA is not given deference. Like *United Keetoowah*, the FCC has not fully considered the scale and effects of the tens of thousands of satellites, including their replacements, the potential to streamline the review process by approving constellation satellite systems collectively, or the full impact of the satellites. Therefore, it is likely that a court would rule in favor of a petitioner's motion to require the FCC to perform an EA for satellite licensing.

C. New Technologies and NEPA Considerations

Third, the FCC's licensing of satellite constellations is a brand-new venture into novel technologies. NEPA is not intended to be a barrier

172. *Id.* at 738.
173. *Id.* (quoting Motor Vehicle Mfrs. Ass'n of U.S., Inc. v. St. Farm Mut. Auto. Ins. Co., 463 U.S. 29, 43 (1983)).
174. Chevron U.S.A., Inc. v. Nat. Res. Def. Council, Inc., 467 U.S. 837, 843 (1984).
175. *United Keetoowah*, 933 F.3d at 738.
176. *Id.* at 745.
177. *Id.* at 740.
178. *Id.* at 744.
179. *Id.* at 735–43.

to innovation but rather a partner to innovation. This idea was outlined in *Scientists' Institute For Public Information, Inc. v. Atomic Energy Commission*. The Atomic Energy Commission used nuclear fission to produce energy in power plants by creating artificially produced nuclear fuel.[180] At the time, this was a brand-new technology. The issue was not whether to issue an impact statement for individual facilities which had already taken place at the individual level but "whether at some point in time the Commission must issue a statement for the research and development program as a whole."[181] The agency conceded that "concerned citizens have the right to know what the broader future implications may be of the cumulative impact of a number of such facilities, rather than looking at each facility microscopically."[182]

The agency then created a comprehensive environmental survey as a substitute for a NEPA review. The agency argued that a NEPA review would "require the Commission to look into the crystal ball and would be meaningless in terms of content."[183] The court held that NEPA was designed not for individual programs but rather for developing a new program that contemplates subsequent actions.[184] The benefit of a NEPA review is that it can contemplate exhaustive effects and alternatives that would not be practicable in a singular case-by-case analysis. When Congress enacted NEPA, it understood that development and implementation of "new technologies were a major cause of environmental degradation."[185]

The court stated that NEPA's objective of controlling the impact of technology on the environment is not served unless it is applied to programs developing the new technologies affecting the environment.[186] Therefore, "to wait until a technology attains the stage of complete commercial feasibility before considering the possible adverse environmental effects . . . will undoubtedly frustrate meaningful consideration and balancing of environmental costs against economic and other benefits."[187] The court held that due to these factors, NEPA impact statements are required for major federal research programs "aimed at the development of new technologies which, when applied,

180. Scientists' Inst. for Pub. Info., Inc. v. Atomic Energy Comm'n., 481 F.2d 1079, 1083 (D.C. Cir. 1973).

181. *Id.* at 1085.

182. *Id.* at 1086 (quoting *National Environmental Policy Act: Joint Hearings on Operation before S. Comm. on Public Works and S. Comm. on Interior and Insular Affairs*, 92d Cong., 2d Sess. 97, 98–99 (1972) (statement of Dr. James R. Schlesinger, Chairman, Atomic Energy Comm'n.)).

183. *Id.* at 1086.

184. *Id.* at 1089–90.

185. *Id.* at 1089.

186. *Id.*

187. *Id.*

will significantly affect the quality of the human environment."[188] The court continued by stating that the Agency cannot shirk its responsibility for conducting a NEPA review for this type of project "by labeling any and all discussion of future environmental effects as crystal ball inquiry."[189] The statute is designed to involve some degree of forecasting and predicting potential impacts and effects that cannot be known.[190] The development of the review is to use the rule of reason and to conduct a review to the fullest extent possible.[191]

The logic for nuclear energy is like satellite internet and constellation systems. Nuclear energy production depends on long lead times, high investment, and limited research dollars to determine what technology will ultimately prevail.[192] This is analogous to the space environment. The decisions that are made now are the decisions that will be available decades from now. Although all satellite technology does not stem from a major federal research program,[193] the connections are similar to nuclear. Satellite technology is also a budding new technology that requires large investment and lead times.[194] SpaceX's Starlink program, however, is partially funded by the aforementioned Rural Development Opportunity Fund grant in an effort to rapidly expand access to the technology.[195] Thus, the FCC should consider conducting a NEPA review due to the constellation satellites' experimental and innovative technological nature. Although Starlink is currently the dominant player in the constellation market, it will not be the only player forever. Starlink can set the precedent for future constellation satellites asking for licensing from the FCC. Further, in the *Atomic Energy Commission* case, the Commission attempted to shirk a NEPA review by stating they had already conducted an environmental survey of the general nuclear research. The FCC already requires licensees to produce an Orbital Debris Mitiga-

188. *Id.* at 1091.

189. *Id.* at 1092 (internal quotation marks omitted).

190. *Id.*

191. *Id.*

192. Scientists' Inst. For Pub. Info., Inc. v. Atomic Energy Comm'n, 481 F.2d 1079, 1090 (D.C. Cir. 1973).

193. Although grants like the Rural Development Opportunity Fund exists, not all satellite technology have been partially funded through grant programs. *See Leo-Track*, LEOLABS, https://interactive.satellitetoday.com/via/july-2021/the-10-hottest-satellite-companies-in-2021/ [https://perma.cc/P79B-9S2Z] (private satellite startup providing ground-based space situational awareness for satellite operators of all sizes).

194. Rob Bland, et. al, *A different space race: Raising capital and accelerating growth*, MCKINSEY & CO. (Nov. 16, 2022), https://www.mckinsey.com/industries/aerospace-and-defense/our-insights/a-different-space-race-raising-capital-and-accelerating-growth-in-space [https://perma.cc/L3G8-WKVU].

195. *See generally Auction 904*, *supra* note 3.

tion review, and this could be expanded to be inclusive of NEPA requirements.

D. NEPA and Jurisdictional Considerations

Fourth, the FCC should consider a NEPA review of constellation satellites because outer space should be considered within the jurisdiction of the FCC, and NEPA has been held to extend extraterritorially. The jurisdiction of satellites needs to be assessed within the existing legal framework. Although SpaceX and the FCC contended in the FCC Rebuttal that the scope of NEPA only extended to the "human environment,"[196] and NEPA's statute references the "biosphere,"[197] legal framework supports extending NEPA review to space. Although the NEPA statute mentions the biosphere specifically, the Congressional Declaration of Purpose also states the goal of NEPA is to "promote efforts which will prevent or eliminate damage to the environment."[198] The environment arguably includes the space environment, and as humans reach further into space and the stars, they create their own self-contained biospheres in LEO while living and working on space stations or conducting orbital operations.

Notably, the controlling precedent in space law is the Outer Space Treaty.[199] The Outer Space treaty has been ratified by 112 countries as of February 2022.[200] Under the Outer Space Treaty, Article 6, states:

> Parties to the Treaty shall bear international responsibility for national activities in outer space . . . whether such activities are carried on by governmental agencies or by non-governmental entities, and for assuring that national activities are carried out in conformity with the provisions set forth in the present Treaty. The activities of non-governmental entities in outer space, including the Moon and other celestial bodies, shall require authorization and continuing supervision.[201]

The importance of this provision is that States are responsible for the actions of their commercial actors in space under the Outer Space Treaty. Further, from a jurisdictional standpoint, under the Outer Space Treaty, Article 8, when a State registers a space object, it "shall retain jurisdiction and control over such object, and over any personnel thereof, while in outer space."[202] Based on those Articles of the Outer Space Treaty, jurisdiction and responsibility follow satellites

196. *See* FCC Reply Brief, *supra* note 9, at 26–27.
197. 42 U.S.C. § 4321.
198. *Id.*
199. Outer Space Treaty, *supra* note 14, at art. VI.
200. Office for Disarmament Affairs, *Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space*, UNITED NATIONS (Feb. 4, 2022), https://treaties.unoda.org/t/outer_space [https://perma.cc/7GCV-P9JD] (Oman became the 112th party to the Outer Space Treaty in February 2022).
201. *Id.*
202. *Id.* at art. VIII.

and the control of satellites into orbit. Therefore, NEPA should be extended based on that interpretation of the legal framework.

Further, NEPA has been extended extraterritorially to similar situations. In *Environment Defense Fund, Inc. v. Massey*, the court held that:

> [The] presumption against the extraterritorial application of statutes described . . . does not apply where the conduct regulated by the statute occurs primarily, if not exclusively, in the United States, and the alleged extraterritorial effect of the statute will be felt in Antarctica—a continent without a sovereign, and an area over which the United States has a great measure of legislative control.[203]

In this case, the question was whether the parties failed to prepare an EIS under section 102(2)(C) of NEPA, which was remanded to the district court for determination.[204] The reason that the presumption against extraterritoriality was not applied in this case is that the United States retains legislative control over its activities in Antarctica,[205] and there is no foreign policy or territorial interference against extending NEPA.[206] Additionally, the regulation of the activity began with conduct occurring in the United States and ended with the extension of the action in the sovereignless region of Antarctica.[207]

The court stated that Antarctica is considered to be a "global commons" and frequently analogized to outer space, which led the Court to hold the presumption against exterritoriality should not apply to Antarctic cases.[208] The United States has an even more robust control of its activities in space than in Antarctica under this principle, as it retains jurisdiction and control of its space objects and citizens under the Outer Space Treaty, Article 8.[209] Therefore, under the Outer Space Treaty's requirement of responsibility and extension of jurisdiction, as well as precedent supporting extraterritoriality of NEPA to areas of "global commons," a NEPA review should be extended to space activities.

IV. RECOMMENDATIONS

Based on the analysis surrounding the environmental concerns that the parties discussed on appeal , it would be beneficial for the FCC to consider adopting an EA into its licensing process. If a new party with direct environmental harm decided to challenge the FCC on a broader scale due to the categorical exclusion, the Court would

203. Env't Def. Fund, Inc. v. Massey, 986 F.2d 528, 529 (D.C. Cir. 1993).
204. *Id.*
205. *Id.*
206. *Id.* at 536–37.
207. *Id.* at 535–36 (discussing the plain meaning of NEPA and determining Congress avoided the "use of restrictive terminology").
208. *Id.* at 534; *see also* Beattie v. United States, 756 F.2d 91 (D.C. Cir.1984)).
209. Outer Space Treaty, *supra* note 14, at art. VIII.

likely have the grounds to grant the motion to remand. Therefore, it would be beneficial for the FCC to be proactive and incorporate the review process into its procedures. There are several ways that this could be done.

The FCC already requires license applicants to complete Orbital Debris Mitigation measures to submit a license. Although this is a significant step in mitigating the potential environmental harm, as the FCC was able to show, this measure alone does not address all the environmental issues such as light pollution, chemical emissions, all space traffic management concerns, and others. If that were to expand and be submitted as part of an EA, that would be a suitable option. An EA would not significantly burden the commercial actors applying for a license as they are already compiling information for the orbital debris mitigation compliance. An EA would be additional information for the operators to ensure their constellations systems addressed all aspects that the FCC considered necessary for an EA. Further, this would not take much effort for the FCC to change the Orbital Debris Mitigation Guidelines and expand them to encompass additional environmental review categories. This change is like the *Atomic Energy Commission* case where the agency developed a separate environmental survey but stopped short of developing it to the point where it could be submitted for NEPA.

Continuing off of guidance from *Atomic Energy Commission*, the FCC could also look to conduct an EA for constellation satellites as new technology.[210] Although it may have to work with commercial partners to conduct this EA, it could provide an alternative to providing an EA for each satellite constellation. A technology-based EA would vastly limit the negative administrative impact this would have on limiting innovation or becoming a barrier to entry. However, it should be noted that in *Atomic Energy Commission*, the technology was considered so new and innovative, EAs were already conducted for individual construction sites, and the Commission was newly required to conduct one for the nuclear activity broadly.[211] However, if that is inapplicable in the current situation, it would be advisable for the FCC to license similarly to how the FCC licensed in *United Keetoowah*. In that case, the FCC conducted NEPA reviews based on the projects and not on the individual small cell towers because of the sheer number of towers that are needed for wireless connectivity of 5G.[212] This is like constellation satellites, where only one NEPA review may become necessary for the entire projected constellation.

210. Scientists' Inst. for Pub. Info., Inc. v. Atomic Energy Comm'n., 481 F.2d 1079, 1092 (D.C. Cir. 1973).

211. *Id.* at 1085–86.

212. United Keetoowah Band of Cherokee Indians in Okla. v. FCC, 933 F.3d 728, 739–44 (D.C. Cir. 2019).

Overall, the FCC should incorporate the EA into the existing framework to limit the burdens on the commercial operators as well as the regulatory burden on the agency.

Notably, an addition of an environmental review into the regulatory process will not cause an undue burden on the operators who are already completing orbital debris reviews, it would increase efficiency of the FCC by preventing future litigation on the environmental impact of satellite's effects, and it would promote the United States as being stewards of the space environment by acting with "due regard"[213] for the activities of all.

V. CONCLUSION

Although Viasat lost its appeal due to Article III standing requirements, this Article posits that it would be beneficial for the FCC to consider incorporating the NEPA EA review process into their constellation satellite system licensing process. Conducting an EA would not cause a regulatory burden on the commercial actors, as they are already conducting orbital debris mitigation requirement compliance. A NEPA review process would allow the FCC to begin an EA for this new technology and to conform with the spirit and mandate of the Outer Space Treaty to keep LEO orbit a province of all humankind for generations to come.

213. Outer Space Treaty, *supra* note 14, at art. IX.