

**Before the
Federal Communications Commission
Washington, DC 20554**

In the Matter of	)	
	)	
Pixxel Space Technologies, Inc.	)	File No. _____
	)	
Application for Authority to Launch and	)	
Operate a Non-Geostationary Satellite	)	
Orbit System in the Earth-Exploration	)	
Satellite Service	)	

APPLICATION

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APPLICATION

Pixxel Space Technologies, Inc. (“Pixxel”) requests authority to launch and operate Honeybee-00, a single earth-imaging satellite in low-Earth (“LEO”), non-geostationary (“NGSO”) orbit, pursuant to the conventional Part 25 space station licensing process of the Federal Communications Commission (“FCC” or “Commission”).¹ A completed Form 312, Schedule S, Technical Annex, orbital debris assessment report (“ODAR”), ground station exhibit, and ownership information exhibit are included with this application. ITU documentation for the satellite will be provided to the Commission under separate cover.

I. BACKGROUND AND SYSTEM DESCRIPTION

Pixxel is an experienced hyperspectral, satellite-imaging company headquartered in El Segundo, California. The company has previously successfully launched and operated multiple

¹ See 47 C.F.R. § 25.114. Pixxel previously filed an application for the Honeybee-00 satellite under the Commission’s streamlined licensing rules governing small satellites. See Application, ICFS File No. SAT-LOA-20241007-00214 (filed October 7, 2024). The application is principally the same, except it is filed under the Commission’s conventional Part 25 rules. Additionally, Pixxel has changed the propellant from Krypton to Xenon, updated the G/T and EIRP calculations, changed the CONOPS to remove the post-mission disposal maneuver, revised the launch date, and updated the associated NASA DAS results.

HSI satellites, including the Anand, Shakuntala, D2 and Firefly satellites.² Through multiple funding rounds, Pixxel has secured over \$95M in capital for the development and launch of Pixxel's next-generation Hyperspectral Imaging (HSI) satellites, including the Short-Wave Infrared (SWIR) HSI demonstrator system, named Honeybee-00.

Pixxel's current constellation of satellites is designed to provide global coverage and collect HSI data in hundreds of wavelengths that will allow the platforms to detect problems often missed by other satellites. The Honeybee-00 satellite will extend and augment this capability by increasing the resolution and the number of spectral bands available, allowing for more detailed imaging. In addition, Honeybee-00 represents the first U.S.-built Pixxel satellite, enhancing Pixxel's capabilities to perform prospective services for the U.S. government defense and intelligence community.

Through the growth and utilization of its satellite constellation, including the Honeybee-00 satellite, Pixxel intends to enhance several industries by providing more frequent, consistent, and higher quality imagery to identify, monitor, localize, and resolve issues that arise in every sector globally.³ Examples of industry utilization include the transformation of the agriculture sector by using HSI data to detect and/or monitor pest infections and crop diseases, an increase and sustainment of forest health (through mapping forest biodiversity and deforestation), and poisonous chemicals seeping into the air and waterways.

For the reasons identified above, Pixxel submits that grant of this application is in the public interest and requests FCC action in time to allow Pixxel to launch Honeybee-00 by October 2025, the commencement of the scheduled launch window.

² See ELS File Nos. 0886-EX-CN-2019, 0201-EX-CM-2020, and 0325-EX-CR-2023 (authorizing the Anand demonstration satellite).

³ See *Pixxel Space: Vision*, Pixxel, <https://www.pixxel.space/vision> (last visited Feb. 7, 2025).

A. Space Segment

As discussed in the Technical Annex,⁴ Honeybee-00 will use S-band frequencies (2025-2110 MHz) for imaging control and TT&C uplinks, X-band frequencies (8025-8400 MHz) for data downlinks, and S-band (2200-2290 MHz) frequencies for TT&C and backup data downlinks. In addition, Honeybee will use the 400.15-401 MHz band for beacons and backup TT&C downlinks and the 402-403 MHz band for backup image tasking and TT&C uplinks.⁵

B. Ground Segment

Pixxel will use the ground station networks identified in Exhibit D. The company may expand its future ground station network to include stations inside and/or outside the United States for the purposes of increasing opportunities for data transmissions. The company will coordinate all such ground stations with Federal spectrum managers in the relevant bands prior to operating any such stations and request authority for such communications subject to coordination with relevant Federal spectrum managers.⁶

II. FREQUENCY USE

A. S-Band/X-Band EESS

The S-band (2025-2110 MHz, 2200-2290 MHz) and X-band (8025-8400 MHz) frequency bands each have allocations for Earth Exploration-Satellite Service (“EESS”) use. Specifically, the 2025-2110 MHz (Earth-to-space) band is allocated internationally and in the

⁴ See Exhibit C.

⁵ This backup TT&C uplink is only used in the event of emergency in order to issue firecodes. Firecodes enable the spacecraft to be rebooted manually from the ground in the event of an anomaly, such as a failure of one or more subsystems that leads to non-nominal operations. Such use would cease once the issue is resolved and the spacecraft returns to nominal operations.

⁶ See, e.g., Stamp Grant, ICFS File No. SAT-LOA-20220921-00113 (granted November 6, 2023) (Licensee “shall provide the FCC with an updated list of coordinated non-Federal Earth stations within ten business days following any changes to this list.”).

U.S. for non-Federal EESS use, subject to conditions as may be applied on a case-by-case basis and the limitation that any use may not cause harmful interference to authorized Federal and non-Federal operations.⁷ Pixxel will use the 2025-2110 MHz band for TT&C and image tasking. The 2200-2290 MHz (space-to-Earth) band is allocated internationally for EESS and space operations and is allocated in the United States for Federal EESS and space operations.⁸ Pixxel will use this frequency band for TT&C and backup EESS payload downlinks and communicate only with non-U.S. ground stations.⁹ The 8025-8400 MHz (space-to-Earth) band is allocated internationally and in the U.S. for non-Federal EESS use on a primary basis.¹⁰ Pixxel will use the 8025-8400 MHz band for EESS payload downlinks. Because the Honeybee-00 satellite is an Earth imaging satellite, use of these frequency bands for image tasking, TT&C,¹¹ and data downlinks, as discussed above, is consistent with the international and domestic frequency allocations.

Spectrum sharing in the proposed EESS frequencies will be possible because the Honeybee-00 satellite and satellites in other similar systems transmit/receive only in short periods of time while visible to a receiving/transmitting earth station. For harmful interference to occur, satellites belonging to the different systems would have to be visible to the Earth station and transmitting or receiving using the same frequencies at the exact same time. In such an unlikely event, the resulting inline interference could be avoided by coordinating the satellite

⁷ See 47 C.F.R. § 2.106 n.US347. The 2025-2110 MHz (Earth-to-space) band is also allocated to space operations internationally. 47 C.F.R. § 2.106.

⁸ See 47 C.F.R. § 2.106.

⁹ To the extent necessary, Pixxel requests a waiver of the U.S. Table of Frequency Allocations to conduct operations on these frequencies. See *infra* Part IV.

¹⁰ The 8025-8400 MHz band is also subject to an electromagnetic compatibility analysis as may be applied on a case-by-case basis. 47 C.F.R. § 2.106 n.US258.

¹¹ To be clear, the X-Band frequencies will not be used for TT&C.

transmissions so that they do not occur simultaneously. Accordingly, there is no mutual exclusivity between the Honeybee-00 satellite and other EESS (or similar) systems using the same frequency bands.

Pixxel will also comply with technical requirements in Part 2 of the Commission's rules and applicable ITU rules and complete coordination with the Federal spectrum managers, as required.

B. UHF Uplink

Pixxel requests to use the 402.00-403.00 MHz bands for back-up EESS (image tasking) and TT&C uplinks, consistent with the EESS primary ITU frequency band allocation. In the United States, this band is allocated only for Federal use or non-Federal use with Federal satellites.¹² However, Pixxel intends to use this frequency only from Lomazzo, Italy. Accordingly, Pixxel submits that the proposed frequency use is consistent with the domestic and international Table of Frequency Allocations. Nonetheless, in an abundance of caution, Pixxel requests a waiver to use this frequency band.¹³ The proposed, limited backup image tasking and TT&C use will not exclude other operators from use of these bands.

C. UHF Downlink

Pixxel requests the use of 400.15-401.00 MHz bands for backup TT&C downlinks and for beacon purposes, consistent with the secondary space operations service allocation in this band.¹⁴ Pixxel will use these frequencies only for backup TT&C purposes in the event of off-nominal situations and during initial commissioning. Pixxel will comply with technical

¹² See 47 C.F.R. § 2.106 US384.

¹³ See *infra* Part IV.

¹⁴ See 47 C.F.R. § 2.106 nn.5.286 and US87; see also Stamp Grant, ICFS File No. SAT-LOA-20230414-00088 (granted January 19, 2024) (authorizing the use of the 400.15-401 MHz band for backup TT&C downlinks).

requirements in Part 2 of the Commission’s rules and applicable ITU rules and complete any necessary coordination with the Federal spectrum managers. Accordingly, such limited use will not exclude other operators from use of these bands.

Operations in the 400.15-401 MHz (space-to-Earth) frequency band shall not exceed the long-term interference criteria limits specified in Table 2 (Type C) of Recommendation ITU-R RS.1263.

Pixxel is aware that the FCC established an October 15, 2019, cut-off deadline for requests to operate, *inter alia*, in the 400.15-401 MHz band for the provision of mobile-satellite service.¹⁵ Pixxel’s proposed use of this band for space operations on a secondary basis is limited and not mutually exclusive with other operations on a long-term basis. Accordingly, the request to use these frequencies should not be treated as inconsistent with the 400.15-401 MHz processing round. Nonetheless, in an abundance of caution, Pixxel requests a waiver to use this frequency band.¹⁶

III. WAIVER REQUESTS

The Commission may waive any of its rules if there is “good cause” to do so.¹⁷ In general, waiver is appropriate if (1) special circumstances warrant a deviation from the general rule; and (2) such deviation would better serve the public interest than would strict adherence to the rule.¹⁸ Generally, the Commission will grant a waiver of its rules in a particular case if the relief requested would not undermine the policy objective of the rule in question and would

¹⁵ See *Cut-off Established for Additional NVNG MSS Applications or Petitions for Operations in the 399.9-400.05 MHz and 400.15-401 MHz Bands*, Public Notice, DA 19-779 (rel. Aug. 15, 2019).

¹⁶ See *infra* Part IV.

¹⁷ See 47 C.F.R. § 1.3; *Northeast Cellular Tel. Co. v. FCC*, 897 F.2d 1164 (D.C. Cir. 1990); *WAIT Radio v. FCC*, 418 F.2d 1153 (D.C. Cir. 1969).

¹⁸ See *Northeast Cellular*, 897 F.2d at 1166.

otherwise serve the public interest.¹⁹ Pixxel submits that good cause exists to waive the following rules.

A. U.S. Table of Frequency Allocations

1. UHF Uplink Frequency Allocation

As discussed above, Pixxel requests authority to use the 402.00-403.00 MHz bands for backup EESS (image tasking) and TT&C uplink, consistent with the EESS primary ITU frequency band allocation. In the United States, however, this band is allocated only for Federal use or non-Federal use with Federal satellites.²⁰ Accordingly, Pixxel requests a waiver to use this frequency band, to the extent necessary.

Here Pixxel will use these frequencies for back-up image tasking and TT&C purposes in the event of off-nominal situations²¹ primarily to issue fire codes. Additionally, this UHF uplink will only be used at the Lomazzo ground station. Pixxel will comply with technical requirements in Part 2 of the Commission's rules and applicable ITU rules and complete any necessary coordination with the Federal spectrum managers. For these reasons, Pixxel submits that waiver of the Table of Frequency Allocations would be appropriate.

2. 2200-2290 MHz Downlink

This band is allocated internationally for EESS and space operations and is allocated in the United States for Federal EESS and space operations.²² Accordingly, Pixxel requests a waiver to use this frequency band, to the extent necessary. Pixxel will transmit on these frequencies only to non-U.S. ground stations. Pixxel's proposed use is consistent with the

¹⁹ See *WAIT Radio*, 418 F.2d at 1157.

²⁰ See 47 CFR § 2.106 US384.

²¹ See *supra* note 11.

²² See 47 C.F.R. § 2.106.

domestic and international allocation²³ and prior FCC grants²⁴ and will be coordinated, ensuring that operations will not cause harmful interference.²⁵ Accordingly, Pixxel submits that a waiver of the U.S. Table of Frequency Allocations would be appropriate.

B. UHF Processing Round

With respect specifically to the UHF downlink band (400.15-401 MHz), Pixxel requests the use of 400.15-401.00 MHz bands for backup TT&C downlinks and for beacon purposes, consistent with the secondary space operations service allocation in this band, as discussed above.²⁶ Pixxel will use these frequencies only for backup TT&C purposes in the event of off-nominal situations and during initial commissioning. Accordingly, such limited use will not exclude other operators from use of these bands and should not trigger the need for an FCC processing round.

Pixxel is aware that the FCC established an October 15, 2019, cut-off deadline for requests to operate, *inter alia*, in the 400.15-401 MHz band for the provision of mobile-satellite service (“MSS”).²⁷ Pixxel’s proposed use of this band for space operations on a secondary basis for TT&C is limited and not mutually exclusive with MSS operations on a long-term basis. Accordingly, Pixxel’s request to use these frequencies should not be treated as inconsistent with the 400.15-401 MHz MSS processing round and should not trigger the need for a new FCC

²³ See *supra* Section II.B.

²⁴ See, e.g., Stamp Grant, Loft Orbital Solutions Inc., ICFS File No. SAT-LOA-20220606-00057 (granted Nov. 15, 2022) (“YAM-5 Grant”); Stamp Grant, Umbra Lab Inc., ICFS File No. SAT-LOA-20210616-00080 (granted Dec. 13, 2021).

²⁵ See *supra* Section II.B.

²⁶ See 47 C.F.R. § 2.106 nn.5.286 and US87; see also Stamp Grant, ICFS File No. SAT-LOA-20230414-00088 (granted January 19, 2024) (authorizing the use of the 400.15-401 MHz band for backup TT&C downlinks).

²⁷ See Cut-off Established for Additional NVNG MSS Applications or Petitions for Operations in the 399.9-400.05 MHz and 400.15-401 MHz Bands, Public Notice, DA 19-779 (rel. Aug. 15, 2019).

processing round.²⁸ Nonetheless, to the extent necessary, Pixxel requests waiver of any applicable processing round requirement (and/or associated cut-off deadline).

1. Modified Processing Round Rules

Pixxel requests waiver of Sections 25.156 and 25.157 of the Commission's rules, which stipulate the processing of "NGSO-like satellite systems" under a modified processing round framework.²⁹ Instead, Pixxel requests that this application be processed pursuant to the first-come, first-served procedure adopted for "GSO-like satellite systems" under Section 25.158 of the Commission's rules.³⁰ The Commission has previously waived the modified processing round requirement and allowed NGSO EESS systems to be processed on a first-come, first-served basis and should do so here.³¹

Spectrum sharing in the proposed EESS frequencies, S-band and X-band, will be possible because Honeybee-00 and satellites in other similar systems transmit/receive only in short periods of time while visible to a receiving/transmitting earth station. For harmful interference to occur, satellites belonging to the different systems would have to be visible to the earth station and transmitting or receiving using the same frequencies at the exact same time. In such an unlikely event, the resulting inline interference could be avoided by coordinating the satellite transmissions so that they do not occur simultaneously. Accordingly, there is no mutual exclusivity between the Honeybee-00 satellite and other NGSO EESS systems using the same

²⁸ See *supra* note 26.

²⁹ See 47 C.F.R. §§ 25.156, 25.157.

³⁰ See 47 C.F.R. § 25.158.

³¹ See Stamp Grant, Planet Labs, Inc., IBFS File No. SAT-LOA-20130626-00087 (granted Dec. 3, 2013); Stamp Grant, Skybox Imaging, Inc., IBFS File No. SAT-LOA-20120322-00058 (granted Sept. 9, 2012) ("Skybox Imaging Stamp Grant"); *Space Imaging, LLC*, Declaratory Order and Order and Authorization, 20 FCC Rcd 11964 ¶¶ 9-11 (2005) ("*Space Imaging Order*").

frequency band. Pixxel will also comply with technical requirements in Part 2 of the Commission's rules and applicable ITU rules and complete coordination with the Federal operators as required.³²

Because the purpose of the modified processing round is to preserve opportunities for competitive entry in frequency bands where licensing the first applicant to operate in the band would prevent subsequent applicants from using the spectrum, grant of the waiver would not undermine the rules.³³ Accordingly, waiving Sections 25.156 and 25.157 will not undermine the policy objectives of these rules, and the waiver request is justified here.

2. Default Service Rules

Pixxel requests a waiver of the default service rules under Section 25.217(b) of the Commission's rules.³⁴ The Commission has not adopted band-specific rules for the services Pixxel proposes to provide. Additionally, the Commission has previously granted a waiver of the default service rules to NGSO EESS and other similar applicants based on the fact that the operators are required to comply with technical requirements in Part 2 of the Commission's rules and applicable ITU rules.³⁵ In these cases, the Commission concluded that, because the cited requirements had been sufficient to prevent harmful interference, there was no need to impose

³² See *Space Imaging Order* ¶¶ 26-31; *DigitalGlobe, Inc., Order and Authorization*, 20 FCC Rcd 15696 ¶¶ 1, 15 (2005) ("*DigitalGlobe Order*"); see also Stamp Grant, Planet Labs Inc., IBFS File No. SAT-MOD-20170713-00103 (granted Jul. 18, 2019); Skybox Imaging Stamp Grant; Stamp Grant, Spire Global Inc., IBFS File No. SAT-LOA-20151123-00078 (granted in part Mar. 18, 2016) ("*Spire Stamp Grant*").

³³ See, e.g., *Space Imaging Order* ¶ 10.

³⁴ See 47 C.F.R. § 25.217(b); see also 47 C.F.R. §§ 25.156, 25.157.

³⁵ See *Space Imaging Order* ¶¶ 26-31 (2005); *DigitalGlobe Order* ¶¶ 1, 15; see also Stamp Grant, Planet Labs Inc., ICFS File No. SAT-MOD-20170713-00103 (granted Jul. 18, 2019); Stamp Grant, Planet Labs Inc., ICFS File No. SAT-MOD-20150802-00053 (granted Sept. 15, 2016); Stamp Grant, Planet Labs, Inc., ICFS File No. SAT-LOA-20130626-00087 (granted Dec. 3, 2013); Skybox Imaging Stamp Grant; Spire Stamp Grant.

additional technical requirements on operations in that band and, therefore, granted the waiver requests. These same reasons warrant waiver of the default service rules here.

3. Milestone and Bond Requirements

Pixxel requests waiver of the Commission's milestone and bond requirements for NGSO systems.³⁶ Pixxel has manifested the Honeybee-00 satellite for deployment in October 2025. Moreover, Pixxel does not seek mutually exclusive use of the spectrum used, as discussed above. Accordingly, there can be no concerns about speculation or spectrum warehousing, and there is no basis to impose the milestone or bond requirements. Given the approaching scheduled launch date of the satellite, Pixxel requests the Commission waive the bond and milestone requirements.³⁷ For these reasons, Pixxel submits that waiver of the milestone and bond requirements is justified.

IV. ITU COMPLIANCE

Pixxel has prepared the ITU Advance Publication Information submission for its proposed system and will provide this information to the Commission under separate cover. Similarly, submitted contemporaneously with this application is Pixxel's signed ITU cost-recovery letter.

³⁶ See 47 C.F.R. §§ 25.164, 25.165.

³⁷ See, e.g., Stamp Grant, Momentus Space, LLC, ICFS File Nos. SAT-LOA-20220504-00047 and SAT-AMD-20220729-00075, at Condition 15 (granted Nov. 15, 2022) (providing applicant a 90-day period to post a surety bond in light of impending launch); Stamp Grant, Loft Orbital Solutions, Inc., ICFS File No. SAT-LOA-20240517-00107, at Condition 14 (granted January 23, 2025) (allowing applicant a 90-day period to post a surety bond in light of impending launch). In the event the Commission denies this waiver request, Pixxel affirms that it will comply with the bond requirement.

V. CONCLUSION

For the reasons stated above, Pixxel submits that the public interest would be served by expeditious grant of the application.

Respectfully submitted,

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CERTIFICATION OF PERSON RESPONSIBLE FOR PREPARING ENGINEERING
INFORMATION

I hereby certify that I am the technically qualified person responsible for preparation of the engineering information contained in this application, that I am familiar with Part 25 of the Commission's rules, that I have either prepared or reviewed the engineering information submitted in this application and that it is complete and accurate to the best of my knowledge and belief.

/s/ James Bultitude

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