

**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554**

In the Matter of

Northwood Space Corp.

Application for Baseline Earth Station
Authorization

Call Sign _____

File No. SES-LIC-20260426-01141

APPLICATION FOR BASELINE EARTH STATION AUTHORIZATION

Northwood Space Corp. (Northwood) seeks authority to operate a six-antenna fixed earth station in Bismarck, North Dakota, equipped for Earth-to-space transmissions in the 2025–2110 MHz band and space-to-Earth reception in the 2200–2290 MHz, 8025–8400 MHz, and 8450–8500 MHz bands. This Application establishes Northwood’s compliance with all applicable Commission rules, and grant of this Application and issuance of a “baseline license” will serve the public interest by expediting deployment of urgently needed ground infrastructure for low-Earth orbit satellite (LEO) operations. Grant of a baseline license in this case will allow Northwood to complete antenna construction, finalize service agreements with spacecraft operators, and, once Northwood designates a point of communication, promptly commence operations under the Commission’s streamlined modification procedures for baseline earth station licensees.¹

¹ See 47 C.F.R. § 25.115(a)(5)(i) (permitting earth station applications to “identify either the specific satellite(s) with which it plans to operate, or the eastern and western boundaries of the arc it plans to coordinate”); *id.* § 25.118(g) (establishing streamlined notification procedure for adding a point of communication to a baseline license); see also *Expediting Initial Processing of Satellite and Earth Station Applications*, Second Report and Order, 40 FCC Rcd 6443, 6444 ¶ 3 (2025) (“*Baseline License Order*”). Northwood acknowledges that it is required to modify this Application or grant to designate a point of communication before commencing operations. *Baseline License Order* at 6446–48 ¶¶ 7-10.

I. INTRODUCTION AND BACKGROUND

Founded in 2022, Northwood is a next-generation space infrastructure company focused on delivering high-performance, distributed satellite ground capacity for government and commercial missions. As the space economy continues to grow at an exponential pace, so too does the need for reliable ground infrastructure to support the tracking, telemetry, and command (TT&C) of spacecraft and to move space-based data quickly and securely back to earth. Northwood's novel antenna systems are manufactured at its 35,000-square-foot facility in Torrance, California, designed to communicate with multiple spacecraft simultaneously, and can be configured into different frequency and power combinations to rapidly scale connectivity and resilience for space.

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With this Application, Northwood seeks to deploy another North American earth station—a lightweight, cost-effective, mechanically steered parabolic antenna system. As described further below, Northwood's earth station will be equipped with six, 2.4-meter antennas and will communicate with non-geostationary orbit (NGSO) LEO satellites in S-band and X-band frequencies.

II. PUBLIC INTEREST BENEFITS

Northwood is developing an innovative, software-defined, global ground station network to support the exponential growth of the new space economy. Northwood's ground stations will support TT&C of multiple third-party satellite systems and help ensure reliable, low-latency

communications for critical spacecraft management functions. This service will, in turn, promote the Commission’s goals of furthering space safety and sustainability by offering the TT&C needed to support satellite maneuverability in orbit. Indeed, Northwood’s ground stations will support connectivity for a diverse range of satellite applications in the public interest, including navigation, remote sensing, scientific missions, weather forecasting, and satellite communications—to the benefit of Americans everywhere. And the uniquely lightweight footprint of Northwood’s ground stations mitigates the cost, risks, and delays associated with typical earth station construction processes, thus allowing for efficient deployments that can quickly expand access to Earth-to-space communications for emergencies and disaster relief.

Expeditious grant of this application will allow Northwood to deploy critical ground station infrastructure quickly and cost effectively.

III. ANTENNA LOCATION AND CHARACTERISTICS

The earth station site will be fixed and located in Bismarck at 46° 52’ 56.1” North, 100° 48’ 17.4” West (NAD83), with an altitude of 591 meters above mean sea level. The antennas will utilize TLE tracking via servo motor with 0.05-degree accuracy and will be enclosed by a radome.

Table 1, below, summarizes the antenna characteristics of the earth station.

Table 1. Antenna Characteristics

Model Number	NW24
Diameter	2.4m
Maximum EIRP	46 dBW
Gain	32.7 dBi
Beamwidth	4.26 degrees
Minimum Elevation Angle	5 degrees

Northwood’s earth station will operate well within the technical parameters of the Commission’s Part 25 rules. The antennas’ 32.7 dBi gain, 4.26-degree beamwidth, and high pointing accuracy ensure adequate gain-to-noise performance for Earth-to-space LEO TT&C

communications. Northwood requests authorization to operate up to all antennas at this site simultaneously with the characteristics in Table 1 on a per-antenna basis. Notwithstanding the EIRP and EIRP density limits specified in the station authorization, each earth station transmission shall be conducted at the lowest power level that will provide the required signal quality as indicated in the application and further amended by coordination agreements. Northwood can maintain the required carrier-to-noise levels across the full elevation range, including under conservative rain-fade assumptions applicable to Bismarck's climate. Northwood's operating parameters are fully compatible with the requested frequency bands and will not exceed the power, spectrum, or out-of-band emission limits applicable under Part 25.

IV. POINTS OF COMMUNICATION

Northwood's ground station network is designed to serve multiple spacecraft operators on a mission-by-mission basis, which makes the baseline license framework particularly well-suited to Northwood's operations. Consistent with the Commission's baseline license framework, Northwood does not identify a point of communication in this Application. Northwood will communicate with properly licensed NGSO satellites operating in compatible frequency bands. Once specific satellites are identified through commercial service agreements, Northwood will designate each point of communication through the streamlined prior-notification process established under section 25.118(g) of the Commission's rules prior to commencing operations with that spacecraft.²

² See 47 C.F.R. § 25.118(g); *Baseline License Order* at 6446 ¶ 8 (explaining that baseline licensees "who do not include a point of communication with their initial application" may "add a point of communication prior to communicating with any satellite, following the process we establish").

V. SPECTRUM USE AND SHARING

Northwood's S-band uplink operations will use narrowband TT&C carriers with emission designators consistent with standard telemetry and command waveforms. The specific modulation, coding, and duty-cycle parameters will depend on the mission profile of each supported spacecraft, but all emissions will remain within the authorized bandwidth and comply with the applicable spectrum and out-of-band emission limits in Part 25, and consistent with the Part 25 authority held by each supported spacecraft operator.³

Each antenna will support a single transmit beam that will operate at a maximum EIRP of 46 dBW, with the associated EIRP spectral density maintained within the limits applicable to the selected channel bandwidth and service configuration. Northwood will meet standard availability targets for LEO TT&C services and will adjust carrier bandwidths, coding rates, and modulation formats as required by mission partners while remaining fully compliant with the Commission's technical rules and the parameters authorized for this earth station.⁴

Northwood will adhere to all International Telecommunication Union (ITU) standards applicable to earth stations operating in the space operation, space research, and Earth exploration satellite services in the 2025–2110 MHz, 2200–2290 MHz, 8025–8400 MHz, and 8450–8500 MHz bands. These include the allocations and technical provisions set forth in ITU Radio Regulations Article 21, the relevant footnotes associated with these bands, and the reference antenna

³ 47 C.F.R. §§ 25.204 (earth station transmit power and OOB limits), 25.209 (earth station antenna gain performance standards); *see also* 47 C.F.R. § 25.271 (establishing rules for control of earth station facilities).

⁴ *See, e.g.*, 47 C.F.R. § 25.202(g) (prohibiting band-edge TT&C and requiring interior-band TT&C transmissions to avoid causing more interference or demanding more interference protection than ordinary traffic unless coordinated with nearby co-frequency satellites, and to use frequencies, polarization, and coding chosen to minimize interference into other networks).

performance standards in Recommendation ITU-R S.465-6.⁵ Because the station will communicate with NGSO satellites, Northwood will also comply with the applicable NGSO earth-station limits contained in Article 21 concerning off-axis emissions and protection of other space systems.⁶

Where the bands are allocated on a primary basis to Federal systems, Northwood’s receive-only operations will conform to the ITU allocation structure and the Commission’s domestic implementation of those allocations. When sharing spectrum domestically, Northwood will operate pursuant to the Commission’s rules, as discussed below.

A. Northwood Transmit Frequencies

The earth station will transmit to satellite systems using S-band spectrum with the technical operating parameters detailed in Table 2 below. These parameters define the station’s transmission characteristics, including power limits, modulation schemes, and operational constraints necessary to ensure compatibility with other spectrum users. The earth station will transmit to satellite systems in the frequencies listed in Table 2.

Table 2. Northwood System Transmit Operating Parameters

Parameter	S-band (2025–2110 MHz)
Max EIRP per carrier	46 dBW
Typical Bandwidth	10 kHz to 1.5 MHz
Typical EIRP density	+6 dBW/Hz to –15 dBW/Hz
Transmit power	20 W (13 dBW)
Power control range	0.5 dB steps
Polarization	RHCP/LHCP
Min. elevation	5°
Typical duty cycle	100%

⁵ See Int’l Telecomm. Union, Rec. ITU-R S.465-6, *Reference Radiation Pattern for Earth Station Antennas in the Fixed-Satellite Service for Use in Coordination and Interference Assessment in the Frequency Range from 2 to 31 GHz* (Jan. 2010).

⁶ See 47 C.F.R. § 25.204(a); *see also* International Telecommunication Union, *Radio Regulations: Articles*, Edition of 2024, Art. 21 at 21.8-21.12 (2024), *available at* <https://www.itu.int/pub/R-REG-RR-2024> (limiting FSS earth stations to a horizon EIRP mask of +40 to +55 dBW/4 kHz from 0°-5° elevation in the 2025–2210 MHz band, with no limit above 5° and up to a 10 dB exceedance permitted by agreement).

Table 3. Northwood System Transmit Frequencies

Transmit Frequencies (GHz)	Status ⁷
2025–2110 MHz	The band is allocated to Federal and non-Federal fixed and mobile services (BAS, CARS, LTTS) and to Federal space operation, Earth exploration-satellite, and space-research services. Federal fixed/mobile use is limited to military systems. Non-Federal operations are confined to space-launch telecommand on a secondary basis for “pre-launch testing and space launch operations” and must coordinate with BAS, CARS, LTTS, and NTIA. Non-Federal Earth-to-space and space-to-space transmissions may be authorized in the space research and Earth exploration-satellite services subject to such conditions as may be applied on a case-by-case basis.

The 2025–2110 MHz band is allocated on a primary basis in the United States to the fixed service and mobile service, with Federal and non-Federal uses, including Broadcast Auxiliary Service (BAS), Cable Television Relay Service (CARS), and federal aeronautical mobile operations.

Northwood’s earth station will comply with Part 25 and will follow the Commission’s frequency coordination framework, including identifying any active fixed service links or Federal operations that require protection in the vicinity of the site. Northwood has completed coordination with commercial fixed service links and attaches a coordination report, compliant with 47 C.F.R. § 25.203(c), as Exhibit A to this Application. Northwood’s transmissions will remain within the authorized bandwidth, adhere to the relevant out-of-band emission limits,⁸ and maintain off-axis EIRP density levels that are equal to or below the applicable limits in 47 C.F.R. § 25.218.⁹ These measures ensure that the earth station’s operations will be compatible with adjacent services and

⁷ See 47 C.F.R. § 2.106 (US347).

⁸ 47 C.F.R. § 25.202(f).

⁹ 47 C.F.R. § 25.218.

compliant with all satellite sharing criteria, including avoidance of harmful interference to both geostationary and non-geostationary satellite networks.

Northwood acknowledges that the 2025–2110 MHz band includes primary Federal allocations for space operations, Earth exploration-satellite, and space research services. To ensure compatibility with Federal operations, Northwood will confirm that each spacecraft point of communication has completed coordination with NTIA through the Interdepartment Radio Advisory Committee (IRAC) Frequency Assignment Subcommittee process. Northwood will also operate on a strict non-interference basis with respect to all Federal operations in this band. Northwood acknowledges and understands that non-Federal operations must accept any interference from Federal systems without recourse.

B. Northwood Receive Frequencies

The earth station’s receive system employs high-sensitivity S-band and X-band configurations optimized for LEO satellite telemetry reception. The station’s receive performance characteristics, including G/T ratios and system noise specifications, are detailed in Table 4. These parameters ensure reliable reception of spacecraft telemetry across varying elevation angles and atmospheric conditions typical of the Bismarck location.

Table 4. Northwood System Receive Operating Parameters

Parameter	S-band (2200–2290 MHz)	X-band (8025–8400 MHz)	X-band (8450–8500 MHz)
G/T	9 dB/K	23 dB/K	23 dB/K
System Noise Temp	240 K	125 K	125 K
Polarization	LHCP/RHCP	LHCP/RHCP	LHCP/RHCP
Min.-Max Bandwidth	100 kHz to 5 MHz	1 MHz to 375 MHz	1 MHz to 20 MHz
Min. Elevation	5°	5°	5°

The earth station will receive satellite downlink transmissions within the frequency bands and regulatory framework specified in Table 5. Northwood’s receive-only operations in these bands

inherently protect incumbent services from interference while accepting any received interference on a non-protection basis, consistent with the secondary status of non-Federal operations.

Table 5. Northwood System Receive Frequencies

Receive Frequencies (GHz)	Status¹⁰
2200–2290 MHz	This band is allocated to Federal uses, including the space operation service (space-to-Earth and space-to-space), the Earth exploration-satellite service (space-to-Earth and space-to-space), the space research service (space-to-Earth), and the fixed and mobile services on a line-of-sight basis, with aeronautical telemetry permitted but excluding flight testing of manned aircraft. Non-Federal operations are secondary to Federal use and governed by US96, which limits them to pre-launch testing and space-launch operations (unless authorized under US303) and requires NTIA coordination prior to each launch. US303 permits case-by-case authorization of non-Federal space research operations and Earth exploration-satellite transmissions to Tracking and Data Relay Satellite Systems in the 2285–2290 MHz band, provided they cause no harmful interference to Federal stations and maintain power flux-density between –144 to –154 dBW/m²/4 kHz under ITU Radio Regulation 21.16. US97 provides adjacent-band protection for the 2305–2320 MHz band, prohibiting space-to-Earth operations in 2305–2310 MHz and requiring WCS base stations within 145 km of Goldstone to coordinate with NASA.
8025–8400 MHz	The band is allocated to Federal Earth exploration-satellite service (space-to-Earth), the fixed-satellite service (Earth-to-space), and the fixed service on a primary basis, with Federal mobile-satellite service (Earth-to-space, no airborne transmissions) allocated on a secondary basis. The 8175–8215 MHz band is also allocated to Federal uses in the meteorological-satellite service (Earth-to-space). US258 allocates the band to non-Federal use for Earth exploration-satellite transmissions (space-to-Earth) on a primary basis, subject to case-by-case electromagnetic compatibility analysis.

¹⁰ See generally 47 C.F.R. § 2.106.

Receive Frequencies (GHz)	Status ¹⁰
8450–8500 MHz	The band is allocated to the space research service (space-to-Earth) on a primary basis for both Federal and non-Federal use, and to the fixed service for Federal uses. International footnote 5.465 limits SRS use of the adjacent 8400–8450 MHz band to deep space, making 8450–8500 MHz the designated band for near-Earth space research downlinks.

1. 2200–2290 MHz

The 2200–2290 MHz band is allocated on a primary basis to the space operation service (space-to-Earth) and is used by federal agencies for satellite TT&C downlinks and related space-research operations. Federal systems represent the dominant incumbents in this band, and non-Federal earth stations must operate on a non-interference basis and remain compatible with Federal use.¹¹ Northwood acknowledges that all non-Federal operations in this band are secondary to Federal operations and must not cause harmful interference to authorized Federal stations. Northwood’s receive-only operations inherently protect Federal systems from interference, and Northwood will accept any interference from Federal operations without requesting protection. As detailed below, Northwood requests a waiver of the U.S. Table of Frequency Allocations to the extent necessary to downlink critical telemetry data.

2. 8025–8400 MHz

The 8025–8400 MHz band (X-band) is allocated on a primary basis to Earth exploration-satellite service (space-to-Earth) for Federal use.¹² Footnote US258 permits non-Federal Earth exploration-satellite service transmissions (space-to-Earth) on a case-by-case basis, subject to a showing of electromagnetic compatibility with authorized Federal operations. The band is widely

¹¹ 47 C.F.R. § 2.106; *see also id.*, footnote US96.

¹² 47 C.F.R. § 2.106, footnote US258.

used for high-bandwidth spacecraft telemetry, remote-sensing data, and Earth-observation downlinks from Federal and commercial satellites. Northwood's receive-only operations will conform to the technical and sharing requirements applicable to this band, including operating in a manner that does not constrain or require protection from federal missions. Because the earth station will not transmit in this band, it will not contribute to interference, and its receiver characteristics will accommodate the normal power levels, bandwidths, and modulation types used in Federal and non-Federal EESS missions. Northwood's receive-only operations in the 8025–8400 MHz band will therefore be fully compatible with existing Federal uses and comply with all applicable Commission requirements.

3. 8450–8500 MHz

The 8450–8500 MHz band is allocated to the space research service (space-to-Earth) on a primary basis for both Federal and non-Federal use.¹³ International footnote 5.465 limits space research service use of the adjacent 8400–8450 MHz band to deep space operations, making 8450–8500 MHz the designated band for near-Earth space research downlinks.¹⁴

Northwood's receive-only operations in this band will be fully compatible with Federal and non-Federal space research operations. Because the earth station will not transmit in the 8450–8500 MHz band, it poses no risk of interference to other users. Northwood will operate in a manner that does not constrain Federal missions and will comply with all applicable Commission requirements.

¹³ 47 C.F.R. § 2.106.

¹⁴ ITU Radio Regulations, Art. 5, footnote 5.465 (“In the space research service, the use of the band 8400–8450 MHz is limited to deep space.”).

VI. ANTENNA PATTERN

No band-specific off-axis gain envelope applies to Northwood's requested S-band and X-band operations under Part 25. Northwood's 2.4-meter parabolic antennas are fully compliant with ITU-R Recommendation S.465-6, which specifies the reference earth-station radiation pattern for coordination and interference assessment in the frequency range from 2 to 30 GHz.¹⁵

VII. RADIATION HAZARD ANALYSIS

Exhibit B, the Radiation Hazard Analysis, confirms that Northwood complies with relevant Commission standards and demonstrates there is no risk of radiation exposure beyond the acceptable limits.¹⁶ To further protect the general public, Northwood will site the earth station either behind a fence or on private commercial property with limited access. Trained technicians responsible for operating the earth station will turn off and secure the transmitters before performing any maintenance work.

VIII. FAA NOTIFICATION

For an antenna structure of 6.1 meters or less in height above ground level, the Commission requires no Federal Aviation Administration (FAA) notification.¹⁷ Northwood's antenna structure for the earth station measures 6.1 meters or less in height above ground level and requires no FAA notification.¹⁸

¹⁵ ITU-R Rec. S.465-6.

¹⁶ See FCC OET Bulletin No. 65, *Evaluating Compliance with FCC Guidelines for Human Exposure to Radio Frequency Electromagnetic Fields* (Aug. 1997), <https://bit.ly/3SCjsBB>; 47 C.F.R. § 1.1310; Exhibit B.

¹⁷ See 47 C.F.R. § 17.2 (defining "antenna structure" as a structure that is constructed or used to transmit and/or receive radio energy or that supports antennas that transmit and/or receive radio energy and other appurtenances mounted thereon). See also *id.* §§ 17.7(e), 25.115(j).

¹⁸ The maximum overall height of the antenna structure is 3 meters. Northwood provided this value in Form 312, Schedule B, field E35 (Above Ground Level (meters)) pursuant to the form's instruction to provide "Maximum Antenna Height Above Ground Level (meters)" in this field. The height of the antenna structure from centerline is 2.4 meters.

IX. OTHER MATTERS

A. Waiver Requests

The Commission may waive any of its rules if there is “good cause” to do so.¹⁹ In general, waiver is appropriate if (i) special circumstances warrant a deviation from the general rule; and (ii) such deviation would better serve the public interest than would strict adherence to the rule.²⁰ 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 otherwise serve the public interest.²¹ Good cause exists to waive the following rules under the special circumstances presented in this Application.

To the extent necessary, Northwood requests waiver of 47 C.F.R. § 2.106 for use of the 2025-2110 MHz band. This band is allocated to Federal space research and other Federal uses on a co-primary basis with fixed and mobile commercial uses²² and may be allocated to non-Federal Earth-to-space transmission in the space research service subject to such 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 operations, as well as to non-Federal operations consistent with the Commission’s rules of general applicability as promulgated in Parts 26, 74, 78 and 101J.²³

Northwood will coordinate with Federal and non-Federal operators in this band to ensure its operations will not cause harmful interference, consistent with the Commission’s prior

¹⁹ See 47 C.F.R. § 1.3; *Northeast Cellular Tel. Co. v. FCC*, 897 F.2d 1164 (D.C. Cir. 1990) (“*Northeast Cellular*”); *WAIT Radio v. FCC*, 418 F.2d 1153 (D.C. Cir. 1969) (“*WAIT Radio*”).

²⁰ See *Northeast Cellular*, 897 F.2d at 1166.

²¹ See *WAIT Radio*, 418 F.2d at 1157.

²² See 47 C.F.R. § 2.106.

²³ See *id.*, n.US347.

authorization of TT&C uplinks in this band and as specified in Section V.A above.²⁴ The nature of Northwood's proposed TT&C uplinks also reflects an inherently compatible service with existing incumbent operations. Northwood's proprietary 2.4 meter Earth station antennas will be enabled with auto-track features that allow carefully timed and rapid adjustment of azimuth and elevation to avoid conjunction events with federal space missions operating in the band, and Northwood maintains the ability to mute transmissions altogether if necessary. With respect to non-federal incumbent operations, the broadcast and cable industry operations in the band involve largely point-to-point communications with high-gain, directional antennas aimed horizontally with modest uptilt or downtilt.²⁵ In contrast, Northwood's Earth station antennas will employ significant elevation to point at overhead spacecraft. Accordingly, it is unlikely that the disparate services will experience conjunction events. Moreover, and as discussed in Section V.A., Northwood will utilize the 2025-2110 MHz band solely for narrowband TT&C communications, which involve brief transmission times.

Accordingly, good cause exists for a waiver of the Table of Allocations to enable Northwood to conduct uplink operations in the 2025-2110 MHz band for discrete TT&C uplink operations only. Grant of the requested waiver, and deviation from the rule would not undermine the contemplated protections to authorized users of the band.

B. Preservation Considerations

Northwood's earth stations are designed to be lightweight and do not necessitate large concrete foundations or other constructions. In selecting the Bismarck location, Northwood is choosing land that is low maintenance and easy to operate with the site host. Deployment of the

²⁴ See generally Call Signs S3156, S3152, and S3087, among others.

²⁵ See 47 C.F.R. §§ 74.602(a), 78.18(a)(6), 101.803(b).

Northwood earth station at this site will not impact tribal, environmental, or historical preservation considerations.

X. CONCLUSION

Prompt grant of this baseline application will accelerate the deployment of Northwood's shared ground infrastructure and its ability to improve the security, resiliency, and reliability of space-based communications globally. Issuing a baseline license will allow Northwood to complete site construction while finalizing service agreements, and once a point of communication is designated, to begin operations without delay. Northwood's Bismarck facility will strengthen the resilience of America's space communications architecture by adding critically needed TT&C capacity. The Commission should act swiftly to authorize this vital addition to the nation's space infrastructure.

Respectfully submitted,

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