WATERFORD

RF EMISSIONS COMPLIANCE REPORT

Prepared for:

Crown Castle
1505 Westlake Avenue N., Suite 800
Seattle, WA 98109

Site:

SESEA00401B (880329) - 1
3150 S MERIDIAN
Puyallup, WA 98373
47.1621, -122.294

November 15, 2021

This site will be in compliance with

FCC Regulations and MPE Limits:

Crown Castle Is 0.887% of General Population (GP) Limit
(0.177% of Occupational (Occ) Limit)

Analysis completed using Waterford's NIERTool© software

Only clients and client representatives are authorized to provide input data through the Waterford web portal. In securing that authorization, clients and client representatives warrant the accuracy of all input data. Waterford Consultants, LLC attests to the accuracy of the engineering calculations. Waterford also attests that the results of those engineering calculations are correctly summarized in this report.

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RF EMISSIONS COMPLIANCE STATEMENT

Site:
SESEA00401B (880329) - 1
3150 S MERIDIAN
Puyallup, WA 98373

Compliance Statement

Subject site COMPLIES with Radiofrequency Radiation Exposure Limits of 47 C.F.R. §§ 1.1307(b)(3) and 1.1310.

Ground Level Site Summary

Predicted cumulative RF power density at ground level as a percentage of the FCC General Population limits. This result is the sum of the maximum ground level MPE for each RF emitter by band of operation. Sites below 100% are in full compliance.

Source	Predicted Power Density, % of Limit (GP)
Dish Wireless 600 MHz	0.144 %
Dish Wireless 700 MHz	0.146 %
Dish Wireless 2007 MHz	0.333 %
Dish Wireless 2100 MHz	0.264 %
Sum of Listed Sources	**0.887%**

Technical Framerwork: Basis for Compliance Statement

The compliance framework is derived from the Federal Communications Commission (FCC) Rules and Regulations for preventing human exposure in excess of the applicable Maximum Permissible Exposure ("MPE") limits listed in Table 1 of 47 C.F.R. § 1.1310. Calculations using input data provided to Waterford by client or client's representative numerically confirm the subject site can operate at a 100% duty cycle without exceeding the FCC MPE limits in areas of uncontrolled access.

At this site, the radio frequency (RF) power density resulting from each transmitter at any location may be expressed as a percentage of the frequency-specific limits and added to determine if 100% of the exposure limit has been exceeded. The FCC Rules define two tiers of permissible exposure differentiated by the situation in which the exposure takes place and/or the status of the individuals who are subject to exposure. General Population / Uncontrolled exposure limits apply to those situations in which persons may not be aware of the presence of electromagnetic energy, where exposure is not employment related, or where persons cannot exercise control over their exposure. Occupational / Controlled exposure limits apply to situations in which persons are exposed as a consequence of their employment, have been made fully aware of the potential for exposure, and can exercise control over their exposure. Based on the criteria for these classifications, continuous exposure to RF power density levels below the FCC General Population limits is not hazardous. The FCC General Population limits are 5 times more restrictive than the Occupational limits..

Frequency (MHz)	Limits for General Population/ Uncontrolled Exposure		Limits for Occupational/ Controlled Exposure	
	Power Density (mW/cm^2)	Averaging Time (minutes)	Power Density (mW/cm^2)	Averaging Time (minutes)
30-300	0.2	30	1	6
300-1500	f/1500	30	f/300	6
1500-100,000	1.0	30	5.0	6

In situations where the predicted MPE exceeds the General Population threshold in an accessible area because of emissions from multiple transmitters, FCC licensees that contribute greater than 5% of the aggregate MPE share responsibility for mitigation.

For any location where radiofrequency (RF) power densities exceed 100% MPE of the General Population limits, access controls with appropriate RF alerting signage must be available to be visible upon approach from any direction to provide notification of potential conditions within these areas. Subject to other site security requirements, occupational personnel should be trained in RF safety and equipped with personal protective equipment (e.g. RF personal monitor) designed for safe work in the vicinity of RF emitters. Waterford Consultants, LLC recommends that any work activity in these designated areas or in front of any transmitting antennas be coordinated with the wireless operators.

Predictive Modeling

Based on the computational guidelines set forth in FCC Office of Engineering and Technology, Bulletin 65 ("OET65"), Waterford Consultants, LLC has developed software to predict the overall MPE possible at any particular location given the spatial orientation and operating parameters of multiple RF sources. These theoretical results represent worst-case predictions as emitters are assumed to be operating at 100% duty cycle.

The tabular analysis in this report calculates the spatial peak power density produced at ground level from each RF emitter. The far field power density in milliWatts per square centimeter is expressed as $S_{ff} = 33.4$ x ERP / R2 where ERP is the Effective Radiated Power along a specific azimuth in Watts and R is the distance from the antenna radiation center in meters. The antenna manufacturer's horizontal and vertical radiation patterns have been considered in determining the ERP in any direction. This computation is based on the maximum ERP and includes a 1.6-fold increase in field strength due to ground reflection. The result provides a conservative estimate of spatially averaged power density at ground level and may be higher than predicted MPE in the graphical plots described below.

As the limits are frequency dependent, the contribution of any RF source at a specific location may be expressed as a percentage of the FCC General Population MPE limits at the associated operating frequency. The percentage contributions from all RF sources are added to determine the overall exposure level. If this result is less than 100%, the predicted cumulative exposure level is below the General Population limits set forth in the FCC Rules. The cumulative MPE depicted on the summary page is the summation of maximum MPE values for each emitter regardless of antenna orientation.

A graphical plot of calculated spatially averaged RF power density, based on the Cylindrical Model as described in OET65, predicts spatially averaged MPE conditions at areas in near proximity to the antenna. In the vertical display, predicted MPE is depicted at the center of the 6 ft vertical zone that a person could occupy.

Qualifications of Waterford

With more than 100 team-years of experience, Waterford Consultants, LLC [Waterford] provides technical consulting services to clients in the radio communications and antenna locating industry. Waterford retains professional engineers who are placed in responsible charge of the processes for analysis.

Waterford is familiar with 47 C.F.R. § § 1.1307(b)(3) and 1.1310 along with the general Rules, Regulations and policies of the FCC. Waterford work processes incorporate all specifications of FCC Office of Engineering and Technology, Bulletin 65 ("OET65"), from the website: www.fcc.gov/oet/rfsafety and follow criteria detailed in 47 CFR § 1.1310 "Radiofrequency radiation exposure Limits".

Within the technical and regulatory framework detailed above, Waterford developed tools according to recognized and generally accepted good engineering practices. Permissible exposure limits are band specific, and the Waterford computerized modeling tools correctly calculate permissible exposure based on the band(s) specified in the input data. Only clients and client representatives are authorized to provide input data through the Waterford web portal. In securing that authorization, clients and client representatives attest to the accuracy of all input data.
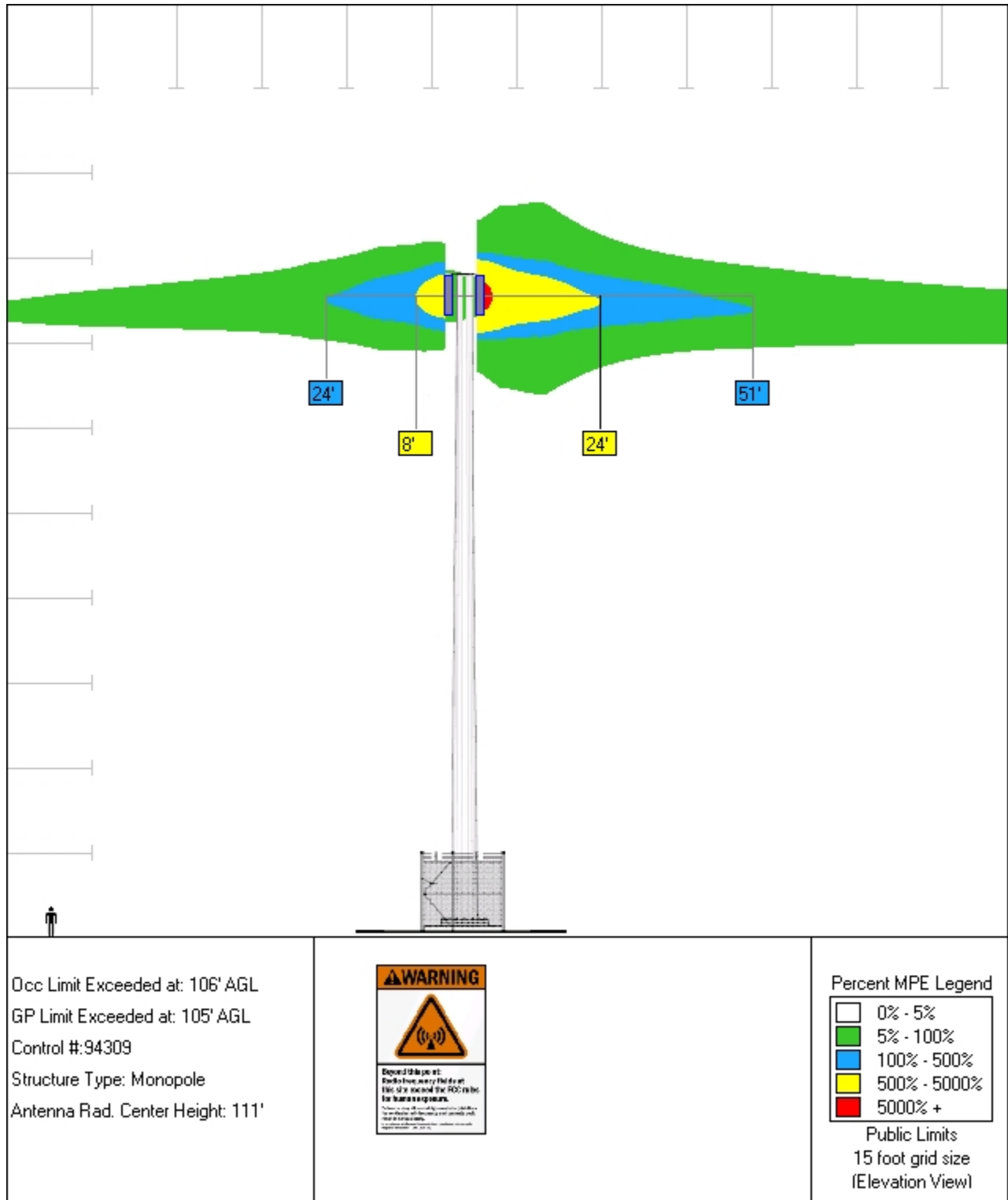
Waterford Consultants, LLC attests to the accuracy of the engineering calculations computed by those modeling tools. Furthermore, Waterford attests that the results of those engineering calculations are correctly summarized in this report.
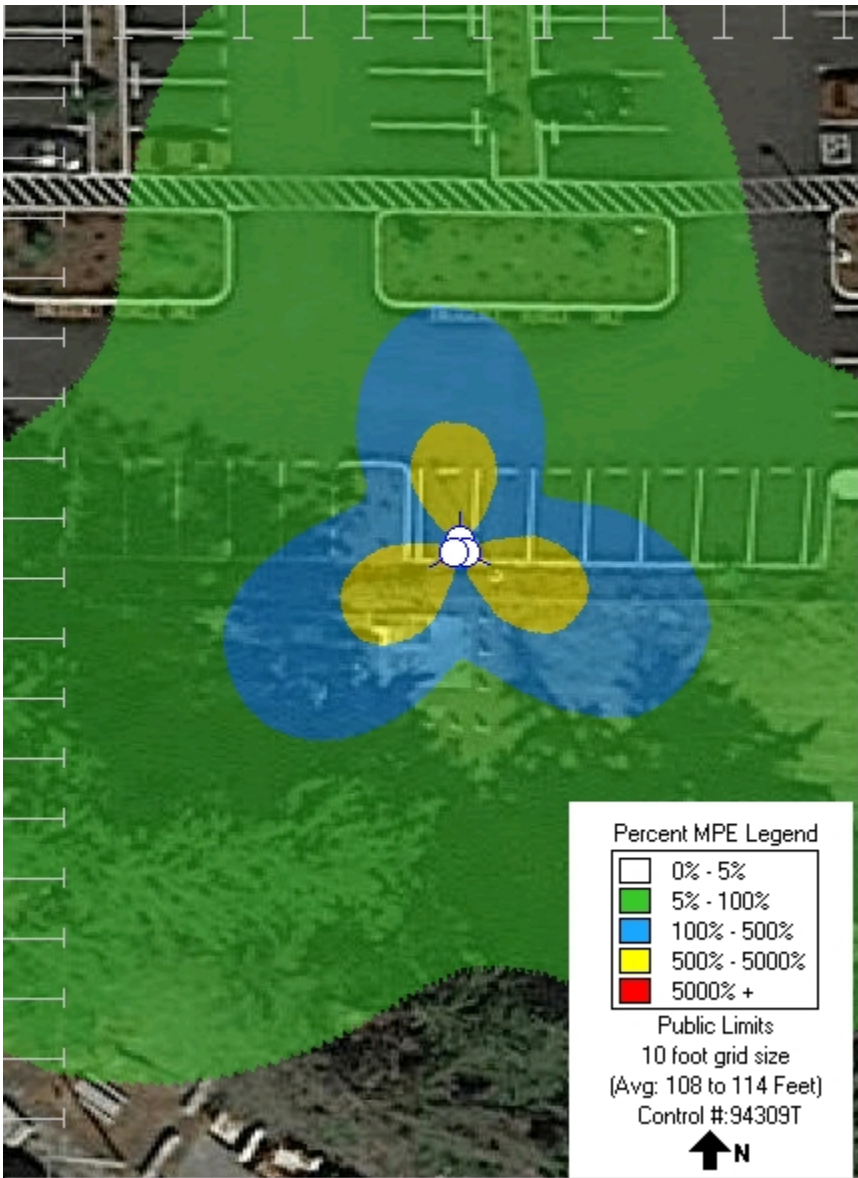
Antenna Inventory

#	Operator	Make	Model	Freq (MHz)	Az (deg)	Tilt (deg)	HorBW (deg)	Ant (ft)	TPO (w)	Paths	Loss (db)	Ant Gain	Radiated Power (W)	RC AGL (ft)
1	Dish Wireless	JMA	MX08FRO665-21 02DT 600	600	0	0	62	6	30	4	0	11.35dBd	1637.500 ERP	111
2	Dish Wireless	JMA	MX08FRO665-21 02DT 600	600	120	0	62	6	30	4	0	11.35dBd	1637.500 ERP	111
3	Dish Wireless	JMA	MX08FRO665-21 02DT 600	600	240	0	62	6	30	4	0	11.35dBd	1637.500 ERP	111
4	Dish Wireless	JMA	MX08FRO665-21 02DT 700	700	0	0	52	6	40	4	0	12.05dBd	2565.190 ERP	111
5	Dish Wireless	JMA	MX08FRO665-21 02DT 700	700	120	0	52	6	40	4	0	12.05dBd	2565.190 ERP	111
6	Dish Wireless	JMA	MX08FRO665-21 02DT 700	700	240	0	52	6	40	4	0	12.05dBd	2565.190 ERP	111
7	Dish Wireless	JMA	MX08FRO665-21 03DT 2007	2007	0	0	66	6	40	4	0	16.15dBd	10817.330 EIRP	111
8	Dish Wireless	JMA	MX08FRO665-21 02DT 2007	2007	120	0	62	6	40	4	0	15.75dBd	9865.520 EIRP	111
9	Dish Wireless	JMA	MX08FRO665-21 02DT 2007	2007	240	0	62	6	40	4	0	15.75dBd	9865.520 EIRP	111
10	Dish Wireless	JMA	MX08FRO665-21 03DT 2100	2100	0	0	65	6	40	4	0	16.75dBd	12419.950 EIRP	111
11	Dish Wireless	JMA	MX08FRO665-21 02DT 2100	2100	120	0	65	6	40	4	0	16.75dBd	12419.950 EIRP	111
12	Dish Wireless	JMA	MX08FRO665-21 02DT 2100	2100	240	0	65	6	40	4	0	16.75dBd	12419.950 EIRP	111

ELEVATION DETAIL

[Predicted MPE depicted at the center of the 6 ft vertical zone that a person could occupy

24'
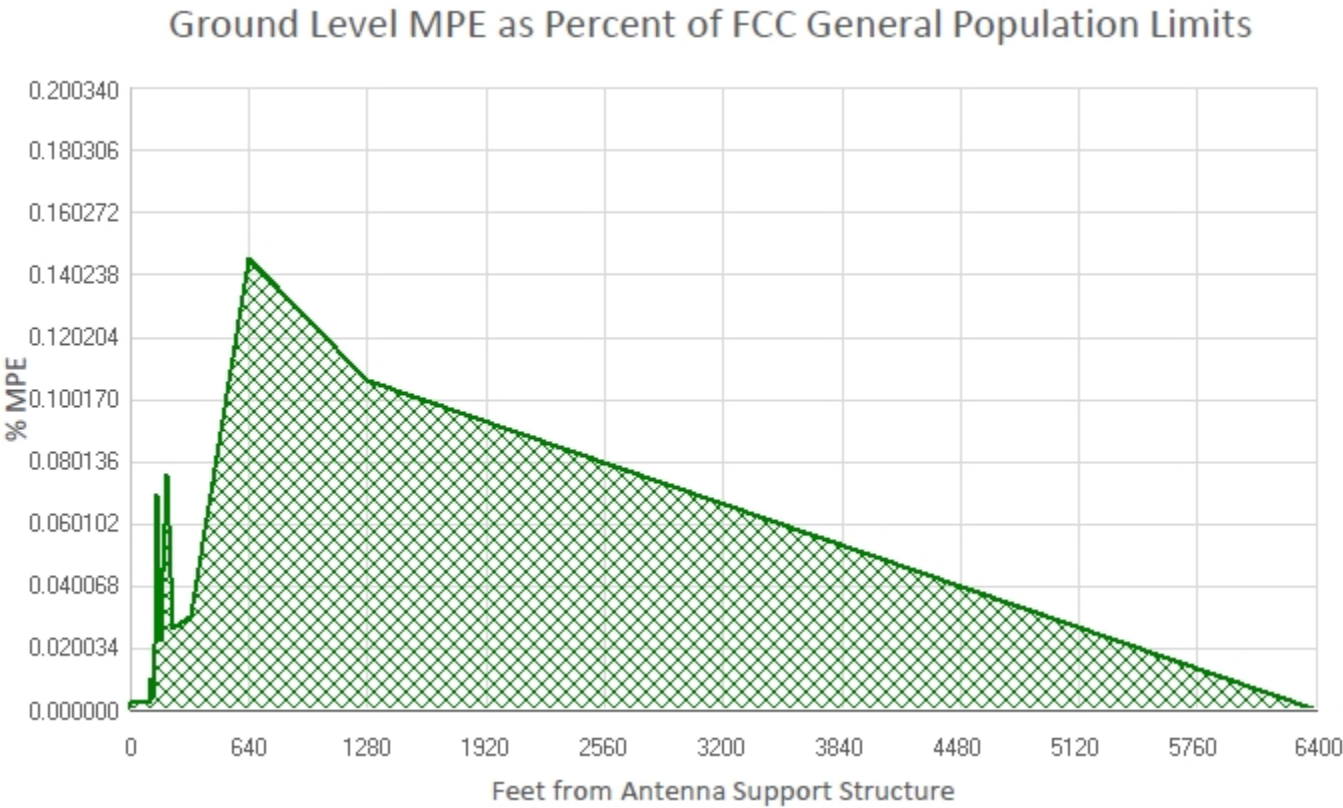
8'

24'

51'

Occ Limit Exceeded at: 106' AGL

GP Limit Exceeded at: 105' AGL

Control #:94309

Structure Type: Monopole

Antenna Rad. Center Height: 111'

⚠ WARNING

Beyond this point:
Radio frequency fields at
this site exceed the FCC rules
for human exposure.

Percent MPE Legend

☐ 0% - 5%
🟩 5% - 100%
🟦 100% - 500%
🟨 500% - 5000%
🟥 5000% +

Public Limits
15 foot grid size
(Elevation View)

Percent MPE Legend

☐	0% - 5%
🟩	5% - 100%
🟦	100% - 500%
🟨	500% - 5000%
🟥	5000% +

Public Limits
10 foot grid size
(Avg: 108 to 114 Feet)
Control #:94309T

↑ N

GROUND LEVEL MPE BY RF EMITTER

The maximum ground level MPE along the azimuth of orientation for each RF emitter by band of operation is listed below. The computational approach is described in the Predictive Modeling section. The maximum MPE by operator and band is contributive to the cumulative ground level MPE summary table presented above.

Dish Wireless
SESEA00401B (880329) - 1
JMA - MX08FRO665-21 02DT 700 0° Sector

Maximum Exposure Limit - 700 MHz

Limit (GP): 466.000 µW/cm^2

ERP		Height		Downtilt	
(Watts)	2565.190	(feet)	111.000	(Degrees)	0

Ground Level MPE as Percent of FCC General Population Limits

Maximum power density at ground level:	0.683 µW/cm^2
Highest percentage of Maximum Exposure Limit:	0.146 %

Dish Wireless
SESEA00401B (880329) - 1
JMA - MX08FRO665-21 03DT 2100 0° Sector

Maximum Exposure Limit - 2100 MHz

Limit (GP): 1000.000 µW/cm^2

EiRP		Height		Downtilt	
(Watts)	12419.950	(feet)	111.000	(Degrees)	0

Ground Level MPE as Percent of FCC General Population Limits
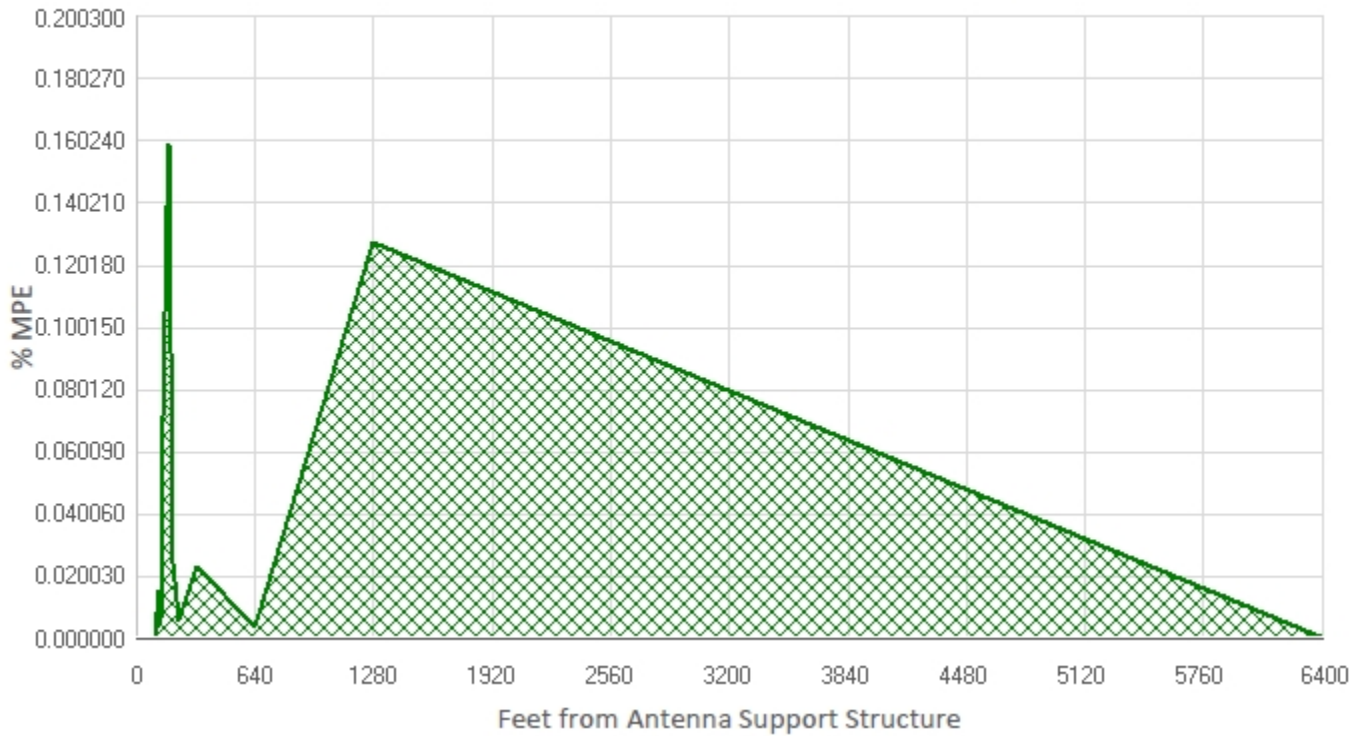
Maximum power density at ground level: 1.593 µW/cm^2
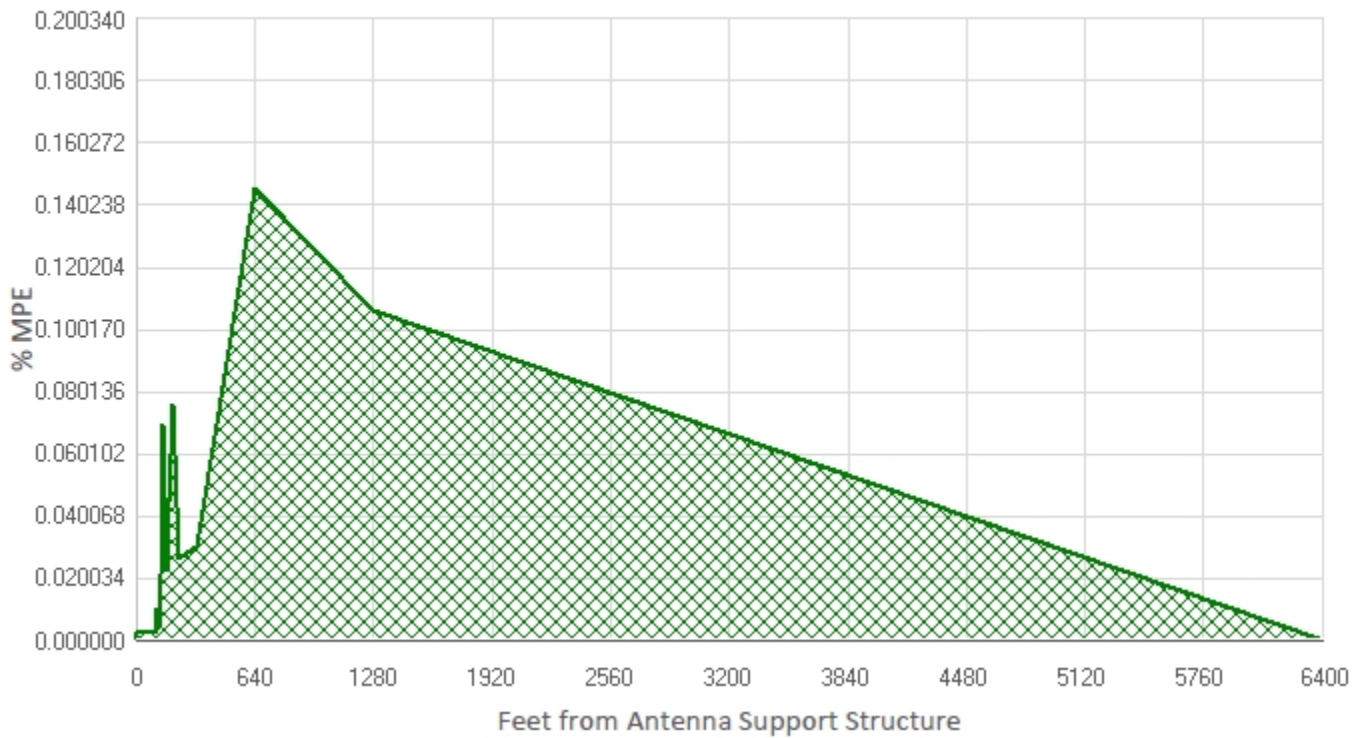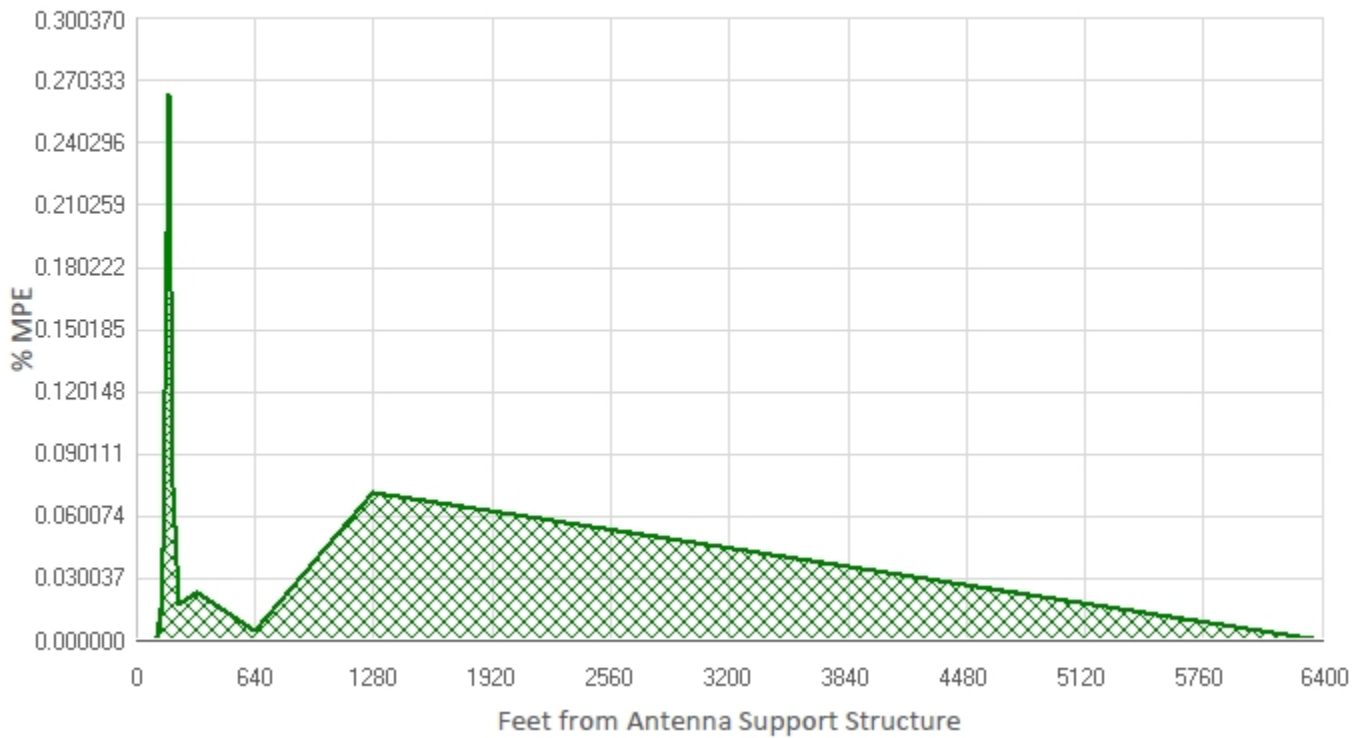
Highest percentage of Maximum Exposure Limit: 0.159 %
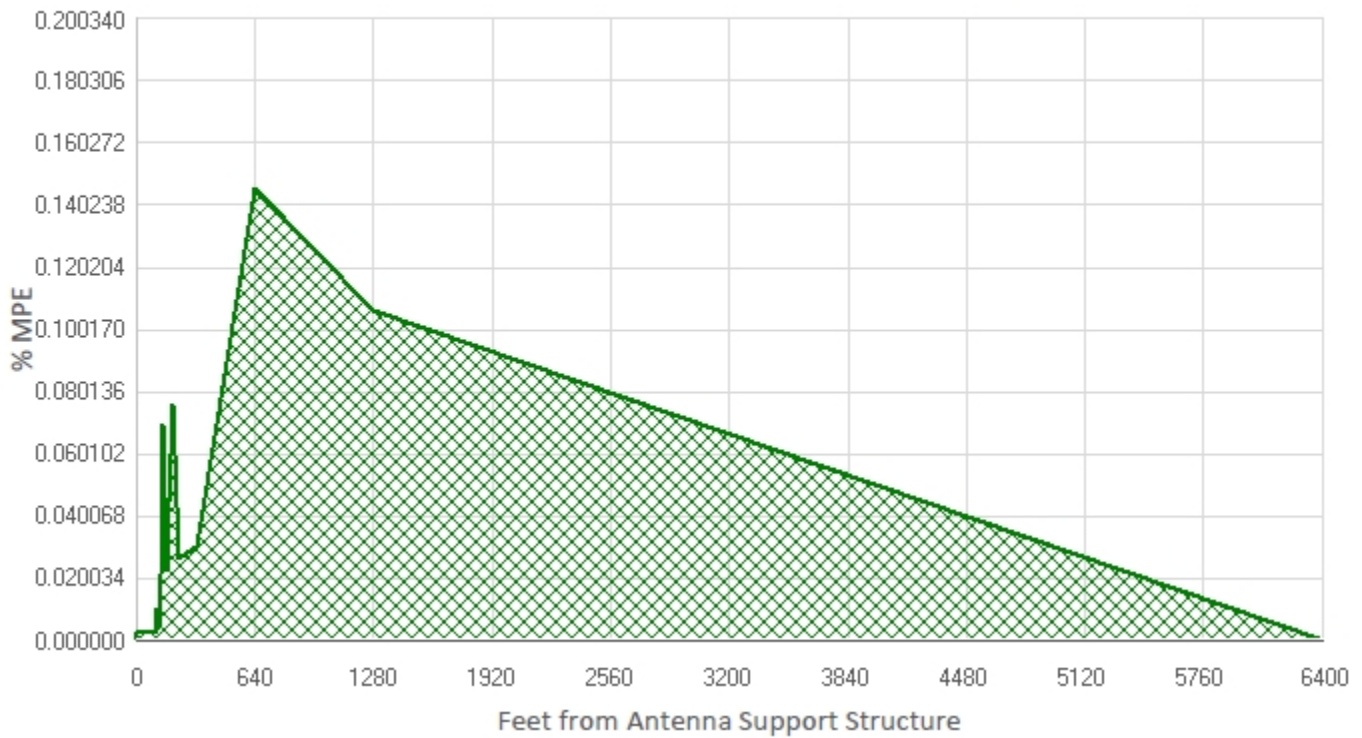
Dish Wireless
SESEA00401B (880329) - 1
JMA - MX08FRO665-21 02DT 700 120° Sector

Maximum Exposure Limit - 700 MHz

Limit (GP):   466.000 µW/cm^2

ERP		Height		Downtilt	
(Watts)	2565.190	(feet)	111.000	(Degrees)	0

Ground Level MPE as Percent of FCC General Population Limits

Maximum power density at ground level: 0.683 µW/cm^2

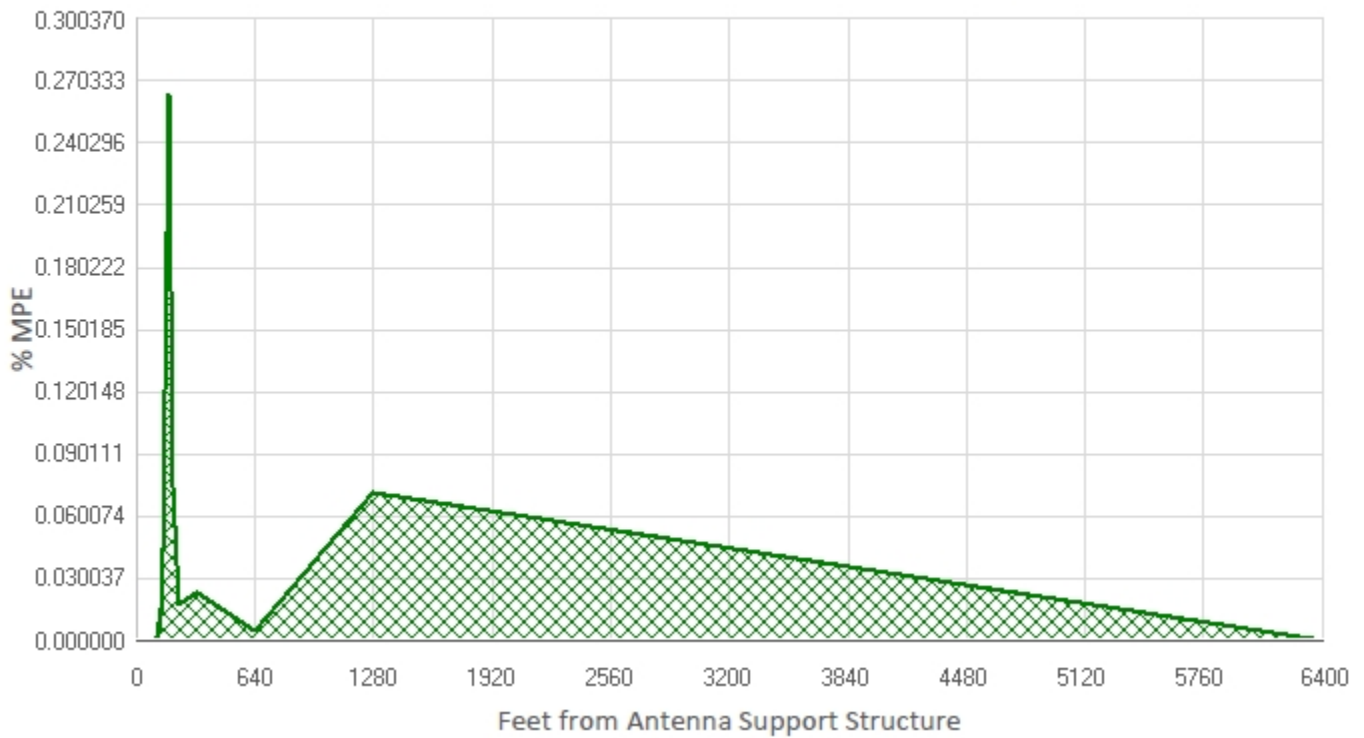**Highest percentage of Maximum Exposure Limit:**   0.146 %

Dish Wireless
SESEA00401B (880329) - 1
JMA - MX08FRO665-21 02DT 2100 120° Sector

Maximum Exposure Limit - 2100 MHz

Limit (GP): 1000.000 µW/cm^2

EiRP		Height		Downtilt	
(Watts)	12419.950	(feet)	111.000	(Degrees)	0

Ground Level MPE as Percent of FCC General Population Limits

Maximum power density at ground level:	2.644 µW/cm^2
Highest percentage of Maximum Exposure Limit:	0.264 %

Dish Wireless
SESEA00401B (880329) - 1
JMA - MX08FRO665-21 02DT 700 240° Sector

Maximum Exposure Limit - 700 MHz

Limit (GP):   466.000 µW/cm^2

ERP		**Height**		**Downtilt**	
(Watts)	2565.190	(feet)	111.000	(Degrees)	0

Ground Level MPE as Percent of FCC General Population Limits

Maximum power density at ground level: 0.683 µW/cm^2

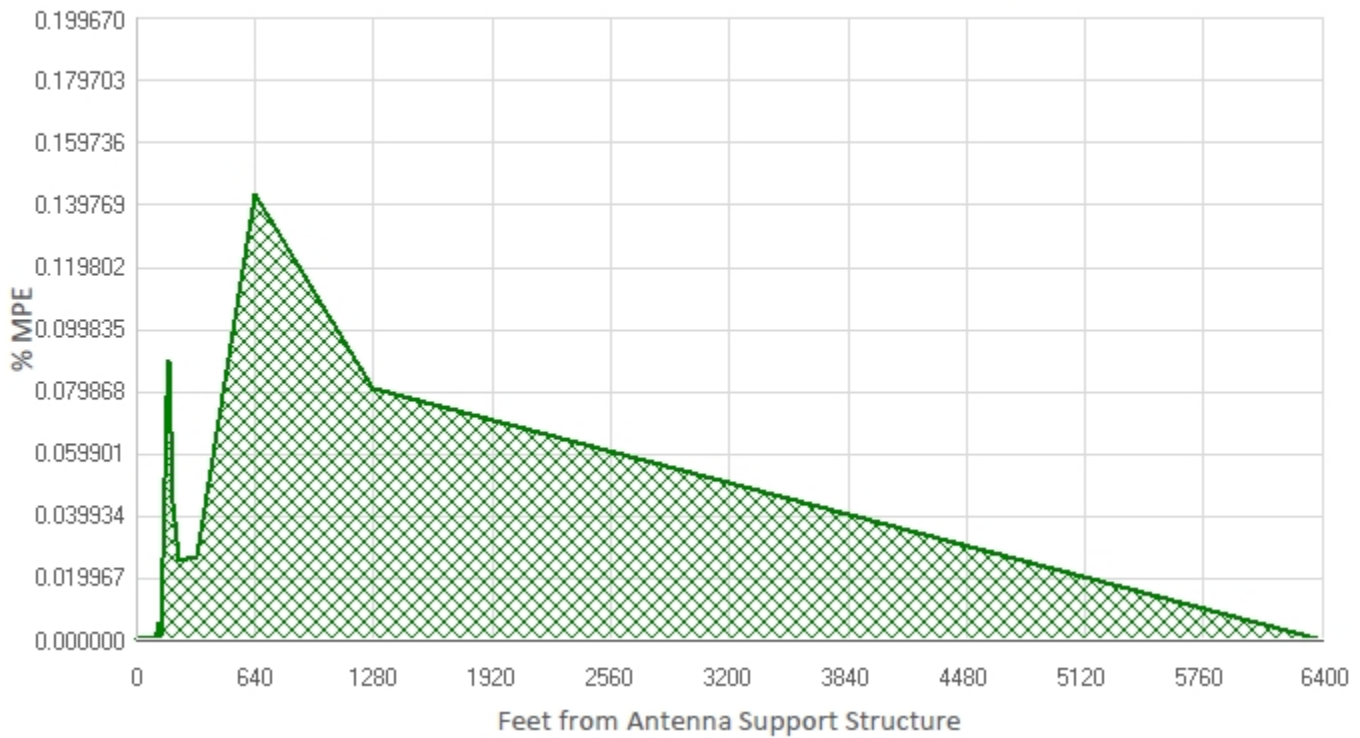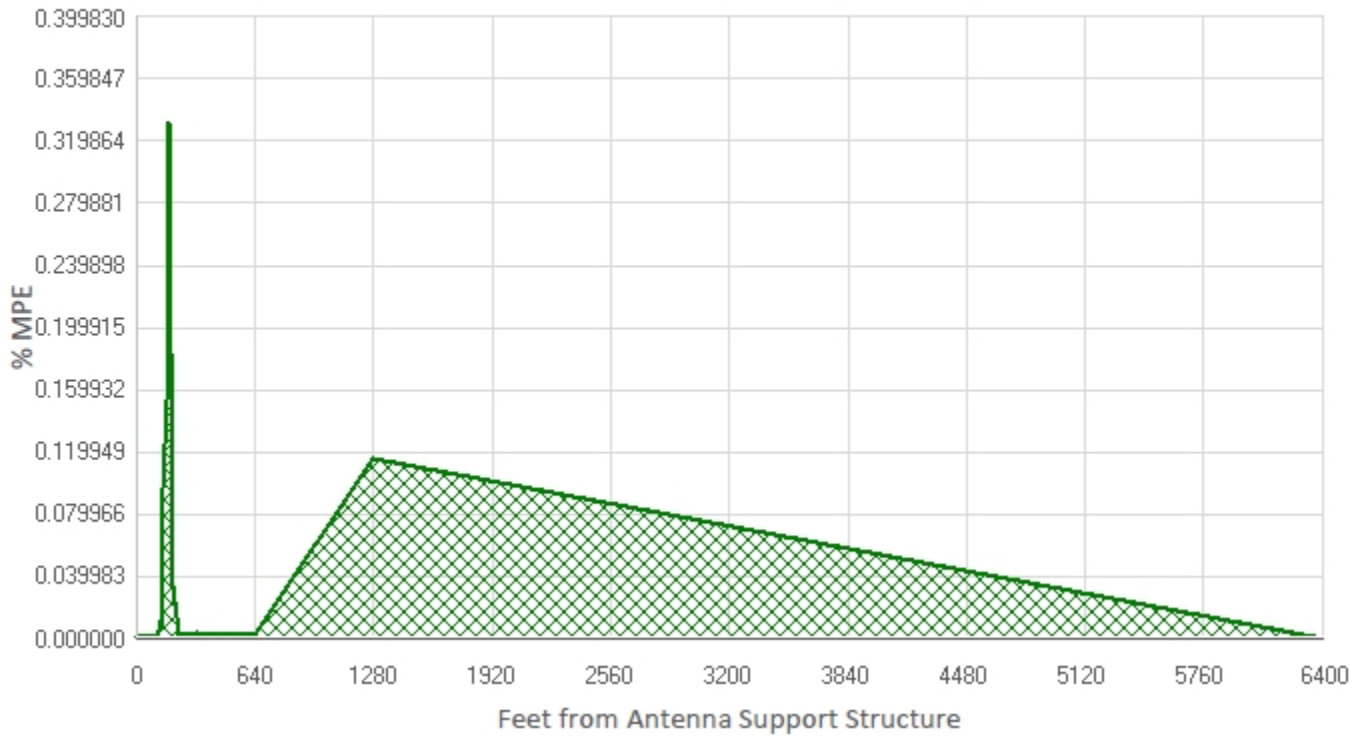**Highest percentage of Maximum Exposure Limit:**   0.146 %

Dish Wireless
SESEA00401B (880329) - 1
JMA - MX08FRO665-21 02DT 2100 240° Sector

Maximum Exposure Limit - 2100 MHz

Limit (GP): 1000.000 µW/cm^2

EiRP		Height		Downtilt	
(Watts)	12419.950	(feet)	111.000	(Degrees)	0

Ground Level MPE as Percent of FCC General Population Limits

Y-axis: % MPE (0.000000 to 0.300370)
X-axis: Feet from Antenna Support Structure (0 to 6400)

Maximum power density at ground level: 2.644 µW/cm^2

Highest percentage of Maximum Exposure Limit: 0.264 %

Maximum Exposure Limit - 600 MHz

Limit (GP): 400.000 µW/cm^2

ERP		Height		Downtilt	
(Watts)	1637.500	(feet)	111.000	(Degrees)	0

Ground Level MPE as Percent of FCC General Population Limits

Maximum power density at ground level:	0.575 µW/cm^2
Highest percentage of Maximum Exposure Limit:	0.144 %

Dish Wireless
SESEA00401B (880329) - 1
JMA - MX08FRO665-21 03DT 2007 0° Sector

Maximum Exposure Limit - 2007 MHz

Limit (GP): 1000.000 µW/cm^2

EiRP		**Height**		**Downtilt**	
(Watts)	10817.330	(feet)	111.000	(Degrees)	0

Ground Level MPE as Percent of FCC General Population Limits

Maximum power density at ground level: 3.328 µW/cm^2

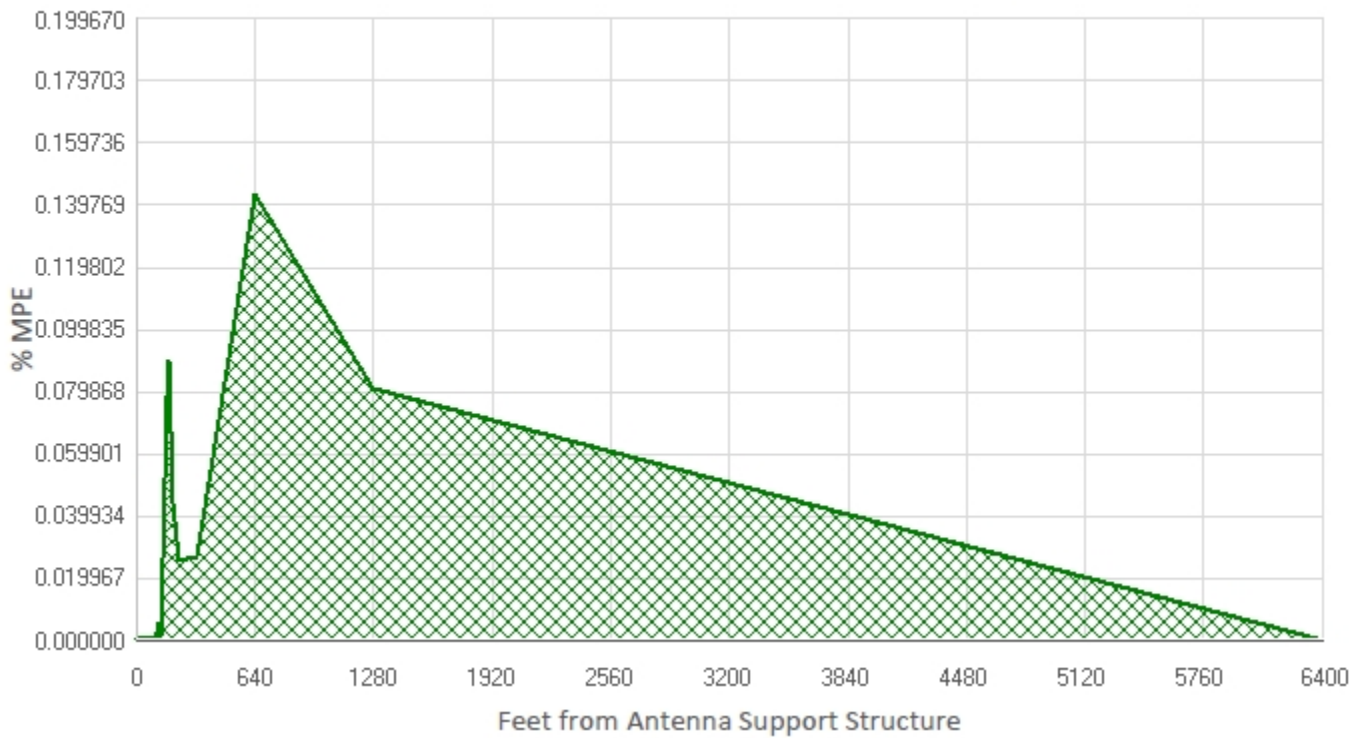**Highest percentage of Maximum Exposure Limit:** 0.333 %

Dish Wireless
SESEA00401B (880329) - 1
JMA - MX08FRO665-21 02DT 600 120° Sector

Maximum Exposure Limit - 600 MHz

Limit (GP): 400.000 µW/cm^2

ERP		Height		Downtilt	
(Watts)	1637.500	(feet)	111.000	(Degrees)	0

Ground Level MPE as Percent of FCC General Population Limits

Maximum power density at ground level: 0.575 µW/cm^2
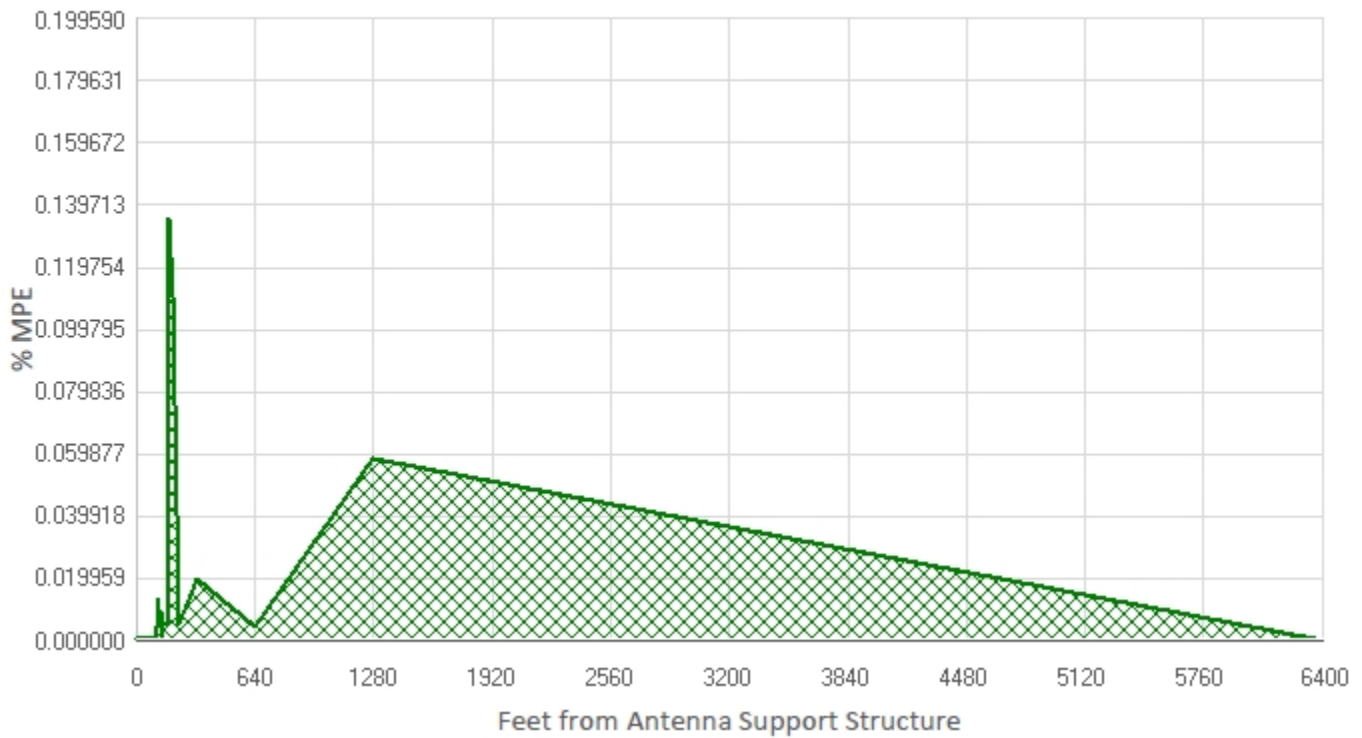
Highest percentage of Maximum Exposure Limit: 0.144 %

Maximum Exposure Limit - 2007 MHz

Limit (GP):   1000.000 µW/cm^2

EiRP		Height		Downtilt	
(Watts)	9865.520	(feet)	111.000	(Degrees)	0

Ground Level MPE as Percent of FCC General Population Limits

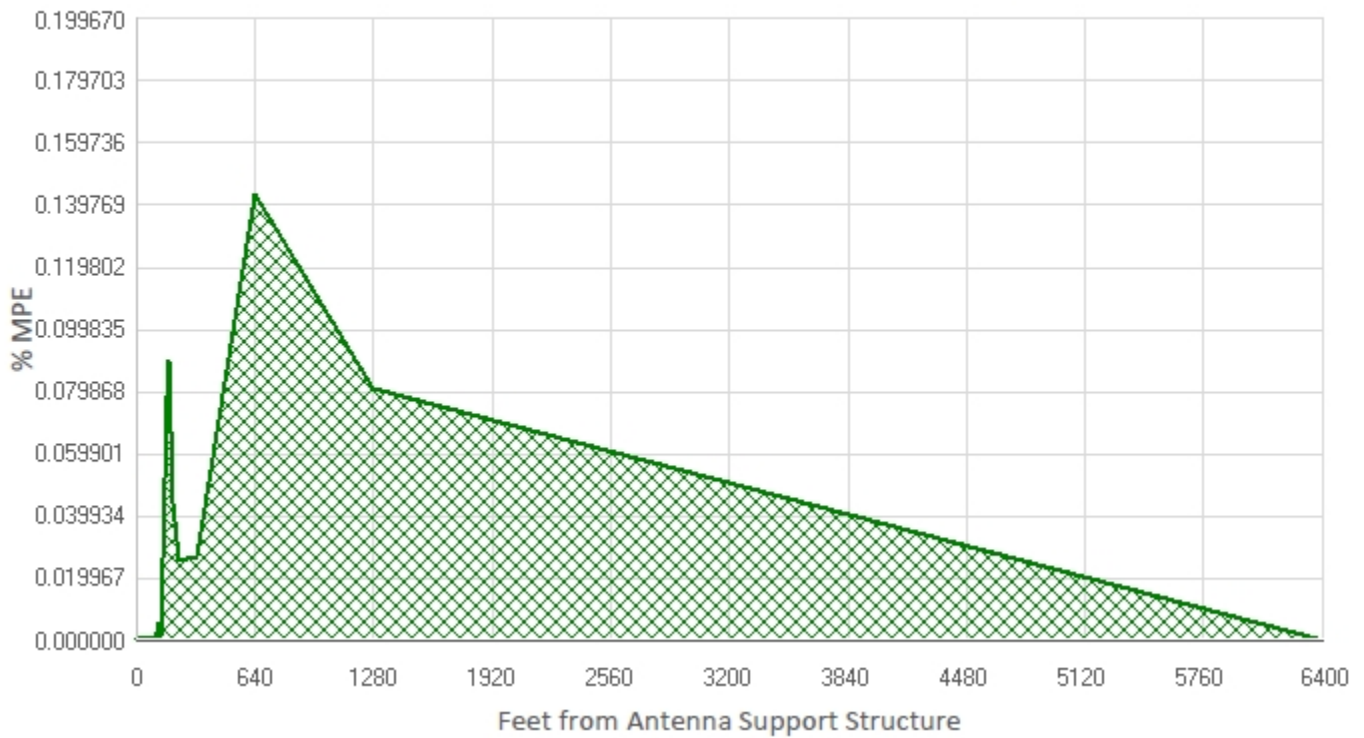| Maximum power density at ground level:	1.356 µW/cm^2
Highest percentage of Maximum Exposure Limit:	0.136 %

Dish Wireless
SESEA00401B (880329) - 1
JMA - MX08FRO665-21 02DT 600 240° Sector

Maximum Exposure Limit - 600 MHz

Limit (GP): 400.000 µW/cm^2

ERP		Height		Downtilt	
(Watts)	1637.500	(feet)	111.000	(Degrees)	0

Ground Level MPE as Percent of FCC General Population Limits

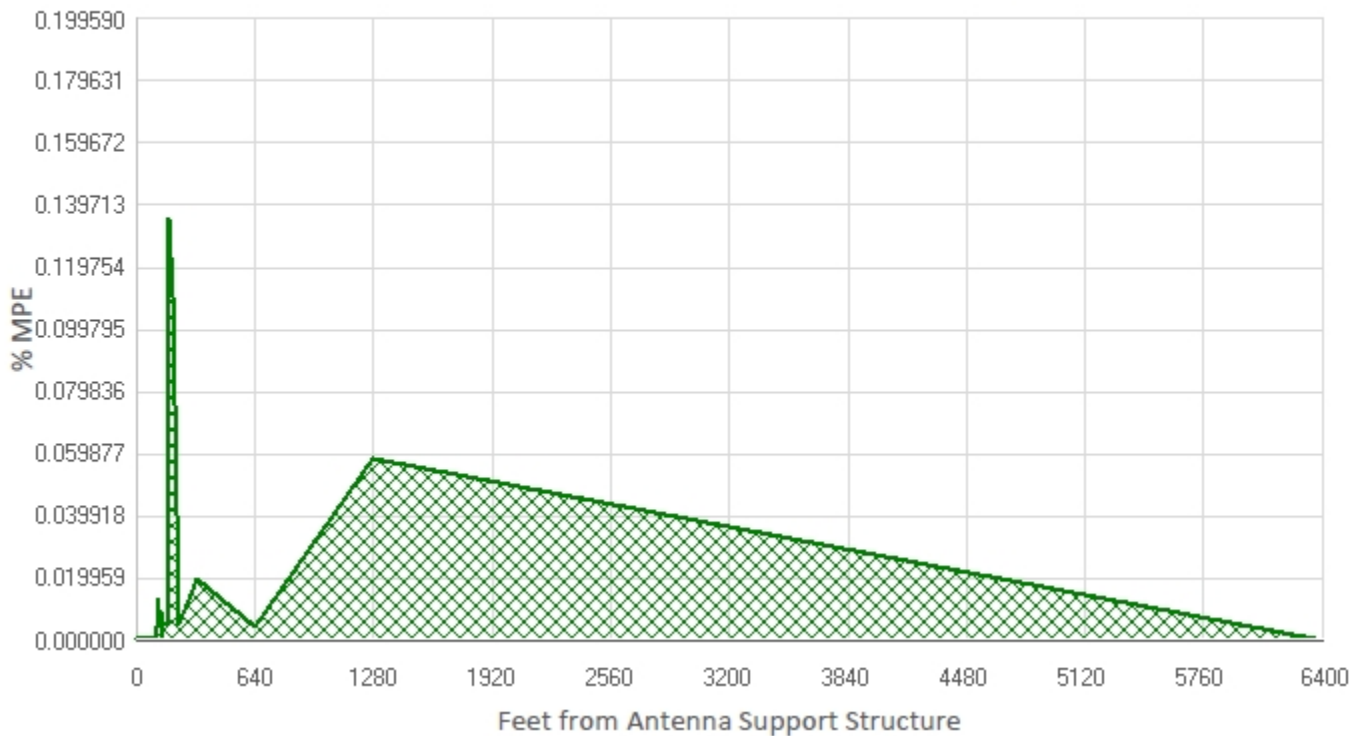|	
Maximum power density at ground level:	0.575 µW/cm^2
Highest percentage of Maximum Exposure Limit:	0.144 %

Dish Wireless
SESEA00401B (880329) - 1
JMA - MX08FRO665-21 02DT 2007 240° Sector

Maximum Exposure Limit - 2007 MHz

Limit (GP):   1000.000 µW/cm^2

EiRP		**Height**		**Downtilt**	
(Watts)	9865.520	(feet)	111.000	(Degrees)	0

Ground Level MPE as Percent of FCC General Population Limits

Maximum power density at ground level:	1.356 µW/cm^2
Highest percentage of Maximum Exposure Limit:	0.136 %