Introduction
This methodology describes Morningstar’s approach to issuing letter-grade ratings for commercial mortgage-backed securities (CMBS) at issuance. Any determination to issue letter-grade ratings is in Morningstar’s sole discretion in accordance with Morningstar’s policies and procedures on a case by case basis and Morningstar may, at any time, decline or refuse to rate a transaction for any number of reasons, including, without limitation, the failure or refusal of the arranger or other third parties to provide information to Morningstar.

Morningstar Definitions of Letter-Grade Credit Ratings
The definitions of Morningstar’s letter-grade credit ratings, a surveillance general description, application of changes to Morningstar methodology, access to rating opinions and conflicts are set forth at https://ratingagency.morningstar.com in Morningstar’s “Definitions and Descriptions of Letter-Grade Credit Ratings, Rating Outlooks and Surveillance”, which is incorporated herein by reference and integral to evaluating any ratings described herein.

Morningstar Rating Methodology
Morningstar’s ratings approach typically consists of a: (1) quantitative and qualitative analysis of a sampling of the underlying commercial real estate loans, the properties backing the loans and the security payment structure; and (2) a legal review of (i) the offering documents, the related servicing agreement and trust agreement (if separate), loan sale agreement(s) (including any loan and property representations and warranties and exceptions), true sale opinion or similar opinion, and any related hedge documents at the securitization level, and (ii) loan documents and/or loan summaries, special purpose entity operating agreement(s), nonconsolidation opinion(s), intercreditor and/or co-lender agreements with respect to all or certain loans enumerated in the related presale report for the transaction.

Overview of Quantitative and Qualitative Analysis
Morningstar employs a bottom-up quantitative analysis approach typically beginning with an analysis of a sample of the loans collateralizing the CMBS issuance. Then, NCF reduction assumptions are applied to the originator’s underwritten NCF for the remaining loans in the portfolio. As part of this review, limited-scope site visits are typically performed on a sample of the portfolio. This analysis ultimately determines the credit quality of each loan as measured by the debt service coverage ratio (DSCR) and loan-to-value (LTV) metrics.

The results of the analysis of the loans, loan terms and corresponding property characteristics, are then input into Morningstar’s proprietary new issuance CMBS subordination model described at https://ratingagency.morningstar.com (the “CMBS Subordination Model”) to determine the required credit support levels at each rating category. The CMBS Subordination Model is a critical component of Morningstar’s credit rating process and applies a combination of property cash flow, property value and lending environment stresses to each loan to determine the expected loss for each loan under defined economic conditions and aggregates the losses across the entire portfolio. This model also makes quantitative adjustments for portfolio-level concentration risks factors such as loan size, property type and geography.
Ultimately, the CMBS Subordination Model provides the Morningstar-derived subordination level attachment points and estimates of losses for each particular rating category. Morningstar does not generally permit “material differences” between the final credit rating(s) issued by Morningstar and the corresponding credit rating, or subordination level attachment point, implied by this quantitative model. A “material difference” is generally a difference of, or equivalent to, one or more letter-grade rating categories. A difference of a plus or minus within a letter-grade rating category is typically not considered a “material difference” for such purposes. An analysis of whether a difference is material and the resulting impact, if any, to final credit ratings, is considered by a majority committee vote as described below.

Morningstar posts a “white paper” summary of the CMBS Subordination Model at https://ratingagency.morningstar.com. This white paper further describes the quantitative metrics used in the application of the model.

**Morningstar Rating Methodology for Interest-Only Certificates**

Interest-only (I/O) certificates do not have a certificate principal balance and are not entitled to receive distributions of principal. Instead, most I/O certificates have a notional balance that is equal to one of the transaction’s principal-balance certificates (or the sum of two or more principal-balance certificates), and, as the name implies, holders of I/O certificates are entitled to receive only distributions of interest based on the then-outstanding notional balance of the I/O certificate (as well as certain yield maintenance premiums).

MCR’s rating for an I/O certificate at the time of issuance generally is based on the I/O certificate’s payment priority within the transaction’s cash waterfall, without regard to the rating of the principal-balance certificate on which the notional balance of the I/O certificate is based. The rating on the I/O certificate generally is the same as the rating assigned to the principal-balance certificate that shares the same order of payment per the transaction’s priority of payments. In the event payment to the I/O certificate is prior to payment to all principal-balance certificates, MCR’s rating for the I/O certificate generally is the same as the rating for the senior-most principal-balance certificate.

The following examples illustrate the methodology:

**Scenario 1:** The notional balance of a hypothetical I/O certificate, class X-B, is based on the sum of the principal-balance certificates, Class A and Class B. MCR assigns ratings of ‘AAA’ and ‘AA’ to these certificates, respectively. Per the transaction’s priority of payments, the Class X-B certificate receives its interest distribution prior to or pari-passu with the Class A certificates. MCR will assign a rating of ‘AAA’ to the class X-B certificate.

**Scenario 2:** The notional balance of a hypothetical I/O certificate, class X-B, is based on the sum of the principal-balance certificates, Class A and Class B. In this scenario, MCR assigns ratings of ‘A’ and ‘BBB’ to these certificates, respectively. Per the transaction’s priority of payments, the Class X-B certificate receives its interest distribution prior to or pari-passu with the Class A certificates. MCR will assign a rating of ‘A’ to the class X-B certificate.

**Scenario 3:** The notional balance of a hypothetical I/O certificate, class X-B, is based on the Class A principal-balance certificate to which MCR assigns a rating of ‘AAA’. Per the transaction’s
priority of payments, the Class X-B certificate receives its interest distribution after payments to the Class A Certificates and pari-passu with the Class B certificate, to which MCR assigns a rating of ‘AA’. MCR will assign a rating of ‘AA’ to the class X-B certificate.

In each of the above scenarios, MCR’s assigned rating to the class X-B certificate is based on the certificate’s priority in the transaction’s cash waterfall, not the rating of the principal-balance certificate(s) to which class X-B’s notional balance is tied.

Post-securitization, MCR will continue to rate an I/O certificate ‘AAA’ even if no other principal-balance certificates that MCR rates are rated ‘AAA’, provided that a) MCR’s initial rating on the I/O certificate was ‘AAA’; b) the I/O certificate has the highest priority in the transaction’s cash waterfall; and c) the I/O certificate is not in default. Likewise, for I/O certificates initially rated below ‘AAA’, we will continue to maintain the ratings based on their relative priority in the cash waterfall and current payment status.

The notional balance of an I/O certificate on which interest is calculated may be reduced by realized losses and/or principal prepayments to the related principal-balance certificate, whether such prepayments are voluntary or involuntary. MCR’s ratings do not address the timing or magnitude of reductions of such notional balances, but only the contractual obligation to pay interest in a timely manner based on the notional balance, as so reduced, from time to time.

**Legal Analysis**

Morningstar’s legal analysis includes a review of documents enumerated above to identify qualitative risks that might impact the expected cash flow received on the loans and/or the flow of such funds to the security holders. When warranted, quantitative adjustments are made to the loan level analysis and/or the CMBS Subordination Model to address the qualitative risks identified by the legal review.

**Morningstar Information Sources**

At issuance, Morningstar generally expects to receive certain information in order to rate a new issuance transaction. This information may include for some or all assets: asset summaries, historical financial reports, third-party reports (such as appraisals, environmental reports, and engineering reports), rent rolls, lease extracts, insurance information, and loan-level and securitization-level transaction documentation (such as the servicing agreement, loan purchase agreement, loan documents, subordinate debt documents and legal opinions). In addition, Morningstar may initiate site visits to certain properties to assess certain characteristics of the properties. Morningstar may also utilize the services of third-party data vendors for certain information such as economic forecasts, property-performance information, real estate news, and/or market-level economic statistics. The scope and extent of Morningstar’s review of the information received and/or collateral is typically enumerated in the respective presale report for the transaction or otherwise indicated. In addition, transaction documents generally require delivery of various reports and information to Morningstar post issuance in order for Morningstar to perform surveillance on the ratings.

Unless required under Morningstar’s policies and procedures, Morningstar does not independently verify or perform due diligence on the information described herein. Morningstar does not perform an audit or verification of commercial real estate or other underlying assets, or
any publicly-available information or any non-public information provided by arrangers, issuers, servicers, trustees, data vendors and other third-party sources of information, including any website posted information. Morningstar ratings may be changed, suspended or withdrawn as a result of changes in, or unavailability of, information or other circumstances.

**Morningstar Rating Process and Rating Committee**

When rating a new CMBS issue, a Morningstar analyst serves as the primary contact person for the arranger for that deal (the "Deal Lead"). Loans reviewed for a particular transaction are assigned to a team of analysts to assess the credit risk of such loans in accordance with Morningstar’s policies and procedures.

Each loan analysis performed by the analyst is reviewed by the Deal Lead or a senior CMBS analyst (typically Vice President or higher), and/or reviewed in a loan review meeting to arrive at estimations of the sustainable net cash flow and sustainable value. After approval of the loan analysis, these estimations are input into the CMBS Subordination Model.

Morningstar typically does not analyze every loan in the portfolio. For those loans not analyzed, Morningstar applies a stress assumption to the loan originator’s underwritten net cash flow to arrive at an estimation of the sustainable net cash flow. These estimations are input into the CMBS Subordination Model.

The Deal Lead or a designee presents a summary of the CMBS deal, the model inputs, model stresses, and model results to a ratings committee. The rating committee typically considers (i) risks and analysis related to larger loans, riskier loans and portfolio-level risks, and (ii) other factors material to Morningstar’s rating analysis in accordance with Morningstar’s policies and procedures. On a case by case basis, the committee may require adjustments to Morningstar’s collateral analysis or subordination model stresses before the model results are finalized and approved by the committee.

In the event any issues arise related to the ratings prior to issuance, including any decisions to suspend or withdraw a rating and/or whether to apply changes in Morningstar methodology to a particular transaction, such issues are generally considered through the committee approach described above.

**Surveillance of the New-Issue Ratings**

A description of the monitoring and surveillance process is described at [https://ratingagency.morningstar.com](https://ratingagency.morningstar.com) in Exhibit 2 of its Form NRSRO and Morningstar’s “CMBS Surveillance Rating Opinions”.