

CREDIT OPINION

6 August 2024

Update



Send Your Feedback

RATINGS

Ontario Teachers' Pension Plan Board

| | |
|-------------------------|-----------------------------|
| Domicile | Canada |
| Long Term CRR | Not Assigned |
| Long Term Issuer Rating | Aa1 |
| Type | LT Issuer Rating - Dom Curr |
| Outlook | Positive |

Please see the [ratings section](#) at the end of this report for more information. The ratings and outlook shown reflect information as of the publication date.

Contacts

Rabia Yusufzai, CFA +1.416.214.3853
Analyst
rabia.yusufzai@moodys.com

Waseema Bhura +1.212.553.9561
Lead Ratings Associate
waseema.bhura@moodys.com

Fadi Abdel Massih, +1.212.553.0441
CFA
Associate Managing Director
fadi.massih@moodys.com

Robert M. Callagy +1.212.553.4374
AMD - Financial Institutions
robert.callagy@moodys.com

Ontario Teachers' Pension Plan Board

Update to credit analysis

Summary

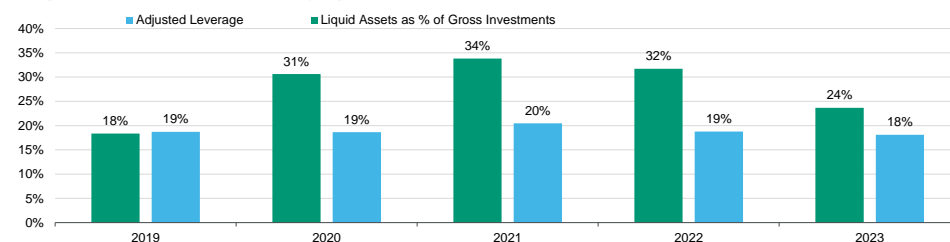
[Ontario Teachers' Pension Plan Board's](#) (OTPP) aa3 Baseline Credit Assessment (BCA) reflects its strong liquidity and predictability of future cash flows and a pension obligation that is over-funded after applying Moody's discount rate adjustments. On a Moody's adjusted basis, OTPP's funding ratio was 136% as of 31 December 2023. OTPP's credit profile also reflects a high proportion of high-risk assets (as defined in Moody's methodology) as well as growth in less-liquid and private market assets that help the fund meet its expected target return but reduce liquidity for creditors. Additionally, OTPP also has a moderate level of leverage and higher asset encumbrance and derivatives reliance compared to peers.

OTPP's co-sponsors are the [Province of Ontario](#) (Ontario, Aa3 positive) and the Ontario Teacher's Federation, which represents the four teacher associations in the province. As the province provides a salary to public teachers, for analytical purposes we view both sponsors as having the same creditworthiness as Ontario. OTPP's Aa1 long-term issuer rating is based on its aa3 BCA, and a high assumption of extraordinary support from its sponsor, Ontario. OTPP's Aa1 issuer rating benefits from an additional two notches of uplift from asset coverage because of a statutory framework that ranks OTPP's creditor obligations senior to the pension manager's pension obligations.

[Ontario Teachers' Finance Trust](#) (OTFT), a wholly-owned subsidiary of OTPP, has a backed senior unsecured rating of Aa1 and a backed commercial paper rating of Prime-1, reflecting the instrument-level guarantees provided by OTPP. OTFT adds a moderate degree of leverage by issuing commercial paper and term debt with the goal of diversifying funding sources and enhancing overall returns of the fund.

Exhibit 1

OTPP's adjusted leverage is moderate The pension fund maintains strong liquidity



Fiscal year ending 31 December 2023. Liquid assets represent cash, short-term investments, securities purchased under reverse repurchase agreements, Government of Canada bonds and Canada Treasury bills.

Source: Company financials and Moody's Ratings

Credit strengths

- » Creditors have an effective priority over pension obligations and benefit from strong asset coverage by high quality liquid assets
- » An over-funded pension obligation, on a Moody's adjusted basis, which afford the pension manager greater financial flexibility compared to underfunded plans
- » Flexible pension benefit obligation levers that share the risk of funding shortfalls with both contributors and retirees
- » High expectation of extraordinary support from the Province of Ontario
- » OTFT's issued instruments are unconditionally and irrevocably guaranteed by OTTP

Credit challenges

- » Increasing cash outflows due to increasing longevity and decreasing active-to-retired member ratio, adding liquidity pressures from growing benefit payments
- » Growing exposure to illiquid and private market assets helps the fund meet its expected target investment return, but reduces liquidity for creditors
- » Higher level of funding sources secured with liquid assets, such as repos and short-sold securities, relative to peers which indicates liquid asset encumbrance
- » Higher usage of derivatives relative to peers, which exposes the plan to greater liquidity, operational, and counterparty risk

Rating outlook

The positive outlook reflects the outlook of OTTP's sponsor and support provider, the [Province of Ontario](#) (Aa3 positive) as well as further strengthening of OTTP's funding profile.

Factors that could lead to an upgrade

- » The key driver of an upgrade of OTTP's long-term issuer rating would be an upgrade of the Province of Ontario, as its support provider
- » Adjusted leverage below 10% for a sustained period of time
- » OTFT's ratings could be upgraded following an upgrade of OTTP's ratings

Factors that could lead to a downgrade

A ratings downgrade is unlikely given the positive outlook. However, the outlook on OTTP and OTFT's ratings could return to stable following:

- » A return to stable outlook on the Province of Ontario
- » Adjusted leverage above 25% for a sustained period of time

This publication does not announce a credit rating action. For any credit ratings referenced in this publication, please see the issuer/deal page on <https://ratings.moody's.com> for the most updated credit rating action information and rating history.

Key indicators

Exhibit 2

| Ontario Teacher's Pension Plan Board | 2023 | 2022 | 2021 | 2020 | 2019 |
|--|---------|---------|---------|---------|---------|
| Gross Assets (CAD millions) | 310,203 | 316,320 | 321,549 | 278,945 | 263,887 |
| Net Assets (CAD millions) | 247,513 | 247,235 | 241,582 | 221,241 | 207,412 |
| Gross Investments (CAD millions) | 305,335 | 311,270 | 317,714 | 274,706 | 259,763 |
| Alternative Investments % Gross Investments | 11% | 10% | 7% | 7% | 7% |
| Fixed Income % Gross Investments | 30% | 32% | 33% | 39% | 37% |
| Public Equities % Gross Investments | 7% | 6% | 8% | 9% | 10% |
| Private Equity % Gross Investments | 22% | 22% | 19% | 17% | 15% |
| Real Estate % Gross Investments | 9% | 9% | 10% | 11% | 13% |
| Infrastructure % Gross Investments | 13% | 13% | 8% | 7% | 7% |
| Inflation Sensitive Assets % Gross Investments | 4% | 4% | 3% | 3% | 4% |
| Receivables % Gross Investments | 4% | 5% | 11% | 7% | 6% |
| Repurchase Agreements (CAD millions) | 23,795 | 26,316 | 25,529 | 14,185 | 19,821 |
| Derivative Notionals (CAD millions) | 735,090 | 566,319 | 729,770 | 550,649 | 576,053 |
| Accrued Pension Benefits (CAD millions) | 211,393 | 206,197 | 257,482 | 257,330 | 224,669 |
| Reported Funding Ratio | 117.1% | 119.9% | 93.8% | 86.0% | 92.3% |
| Adjusted Leverage | 18% | 19% | 20% | 19% | 19% |

Source: Moody's Ratings, company financials

Profile

OTPP was established by the Government of Ontario to manage the investments and administer the pension benefits of school teachers in the province. Its co-sponsors are Ontario and Ontario Teacher's Federation; the latter representing the four teacher associations in the province. As the province provides a salary to public teachers, for analytical purposes we view both sponsors as having the same creditworthiness as Ontario (Aa3 positive).

Detailed credit considerations

Funded Status - Excellent funding position with a conservative discount rate

Moody's considers the actuarial obligation of OTPP to be over-funded. As a pension fund, it has responsibility for the administration of benefits and in setting actuarial assumptions of the underlying obligation. At 31 December 2023, OTPP reported a funding surplus of 117% using a discount rate of 4.00%. We use the [FTSE Pension Discount Curve and Liability Index](#) as the standard discount rate to determine OTPP's pension benefit obligation to arrive at our adjusted funding ratio.

As of 31 December 2023, the discount rate under this Index was 4.83% compared to 5.02% as of 31 December 2022. On a Moody's adjusted basis, OTPP's funding ratio was 136% as of 31 December 2023, a slight deterioration from 137% as of 31 December 2022. We view the current higher-for-longer interest rate environment as favorable for OTPP's funding health.

OTPP has two funding levers that further support its strong funding profile; conditional inflation protection and contribution increases. Both these levers are key aspects of OTPP's Funding Management Policy. Conditional inflation protection benefits for credited service earned after 2009 are conditional on the plan's funded status. When the plan is in an underfunded position, on a going concern basis, the co-sponsors can reduce the level of inflation adjustments retirees receive. The pension obligation's long duration is driven by the long life expectancy of its predominantly female teacher membership. The fact that teachers live longer than average working Canadians, and low eligible retirement age of members, means that changes in expected benefit increases can produce large changes in the value of the benefit obligation. Over time, this lever will become more valuable as service credited after 2009 becomes a larger part of the obligation. Since January 1, 2018, contribution levels have been at the desired target level of 11% of pay per plan sponsor and 100% inflation protection levels have been provided on all benefits.

OTPP's has an initial funding ratio score of aaa to which we make no adjustments.

Liquidity - Benefits of liquid fixed income portfolio and stable cash flows offset by funding sources that encumber assets

As of 31 December 2023, OTPP had good coverage of liquid assets to cash obligations. The ratio of discounted liquid asset inflows to recognized obligation outflows was down from 260% at the end of 2022 to 224% at the end of 2023 but still at a strong level. The decline was due to lower holdings of level 1 fixed income securities, cash and investment receivables.

As well, plan members are legally obligated to become contributors to the plan; creating a very stable source of regular cash inflows. OTPP's active-to-retired plan members ratio has declined from 2.0 in the year 2000 to 1.2 in 2023. As the proportion of retired members rises, OTPP's benefit obligation will grow creating more liquidity pressure on the plan. In order to meet its net pension obligations, OTPP maintains sufficient income-based instruments in its investment portfolio that pay interest and dividends.

As a pension benefit obligation has an exceptionally long time horizon, we review its current cash flow pattern to determine coverage of creditor obligations. For 2023, OTPP's net cash outflow (benefit payments in excess of contributions) was approximately CAD4.3 billion. This outflow was more than offset by stable cash flows of CAD4.7 billion from interest and dividends as well as real estate operating income. In addition, further cash flow support was provided by CAD4.1 billion in realized gains.

OTPP uses relatively high levels of repo funding and short-sold securities compared to peers, resulting in above-average asset encumbrance and counterparty credit risk exposure. As at 31 December 2023, the proportion of gross assets funded by repos and short-sold securities was 7.6%, above the peer average of 6.2%. However, we note this proportion has fallen from 11.5% at the end of 2019.

OTPP has an initial liquidity score of aaa but we make a one-notch downward adjustment to aa1 to reflect that OTPP has higher levels of secured borrowings than its peers.

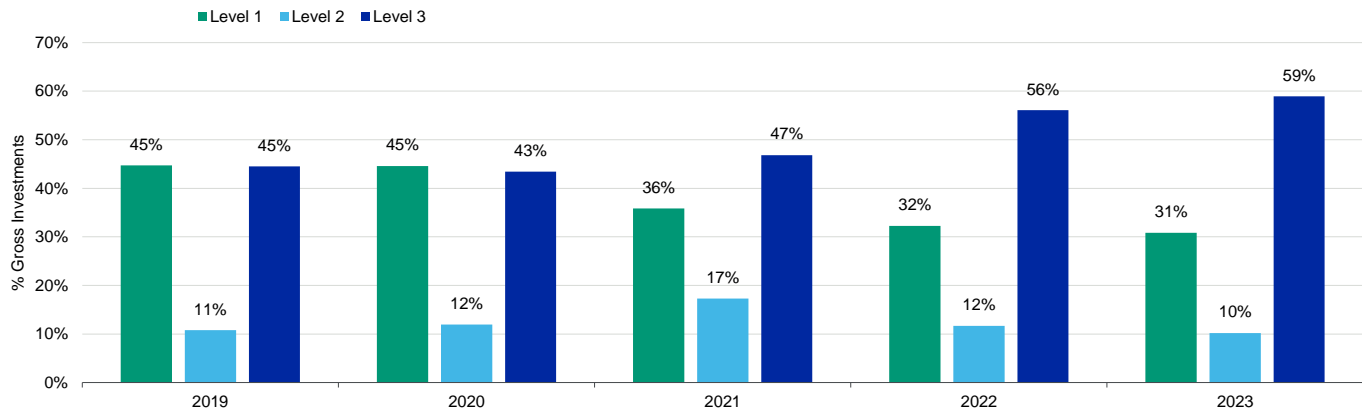
Asset Risk - High levels of less-liquid assets, although broadly diversified by geography and sector

OTPP's ratio of high risk assets to gross assets was 75% as of 31 December 2023 which was in line with its peers. These assets are largely invested outside Canada and are broadly diversified across several asset classes and sectors. Moody's definition of high risk assets broadly comprises all investments other than investment-grade bonds and mortgage loans, including below-investment-grade and unrated bonds/loans, common and preferred stock equities, alternative investments such as private equity and hedge fund holdings, real estate assets, and other investments that are not classified on a pension manager's balance sheet.

At 31 December 2023, OTPP's investment assets were comprised of 30% fixed income, 7% public equity, 22% private equity, 9% real estate, and 13% infrastructure. In recent years, OTPP's investment portfolio has shifted toward less-liquid Level 3 assets such as real estate, infrastructure and private equity (Exhibit 3). In 2023, OTPP's Level 3 assets increased to 59% of gross investments from 56% in 2022. While these asset classes align to the pension manager's mandate to invest over a longer time horizon and offer attractive returns from a liquidity premium, they also add incremental liquidity and operational risks to the fund.

Exhibit 3

OTPP's encumbered funding sources require higher levels of Level 1 assets, but Level 3 assets have grown in recent years
 Real estate, infrastructure and private equity align with OTPP's long time horizon



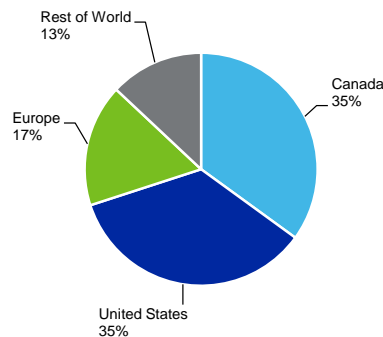
Data as of 31 December 2023

Source: Company Financials, Moody's Ratings

As of the same period, 65% of OTPP's investment portfolio was invested outside Canada (Exhibit 4) and is broadly diversified across several asset classes. The geographic diversification means that OTPP's cash flow generation in regions outside of Canada could be somewhat shielded from Canadian economic conditions that could affect its pension obligations and related contribution cash flows.

Exhibit 4

OTPP's investments are globally diversified



As of 31 December 2023

Source: Company financials and Moody's Ratings

OTPP's long investment horizon is a considerable advantage since it affords time to make portfolio shifts, particularly with less-liquid investments. For the year ended 31 December 2023, OTPP reported a 1.9% overall return on its investments primarily due to strong returns from public equities and credit which were offset by losses in infrastructure and real estate.

OTPP's initial asset risk score is ba2, to which we make a three-notch upward adjustment to reflect the benefits its diverse investment portfolio provides to its credit profile and serves to mitigate the incremental risks from a high level of less-liquid Level 3 assets. This results in an assigned score of baa2.

Financial Policy - Conservative financial policies and investment profile is natural hedge to creditor obligations

OTPP's financial policies are broadly conservative. It has good liquidity and risk management practices that mitigates the refinancing and counterparty risks associated with its modest portfolio leverage. OTPP hedges currency risks within certain portfolios and has natural currency hedges between its investments and funding. Over two-thirds of OTPP's investment portfolio is in USD or CAD which aligns with its creditor obligations, much of which is denominated in USD.

However, the pension manager employs greater use of derivatives and secured borrowing than its peers. OTPP uses derivatives for gaining exposures in their investment portfolio, carrying out absolute return strategies and for leverage and hedging purposes. The ratio of notional derivatives to gross assets was 2.4 times as of 31 December 2023 which was higher than the peer average of 1.0 times but in line with OTPP's long-term historical average of 2.0 times. While the derivatives usage is higher than peers, we view OTPP as having good liquidity and counterparty credit risk management policies. OTPP manages its exposure to credit and counterparty risk through internal credit risk assessment processes, by primarily dealing with investment-grade counterparties and has policies to limit the maximum exposure to any individual counterparty.

Moreover, as of 31 December 2023, the pension manager is over-funded with a Moody's adjusted funding ratio of 136%. During the low interest rate environment period of 2020-2021, the funding status had deteriorated at the margin to 97% as of 31 December 2020 but recovered to 101% as of 31 December 2021. Overall, we view the pension fund as having conservative financial policies and have assigned a "aa" financial policy score in line with the initial score.

Financial Profile

OTPP's scorecard-indicated Financial Profile Outcome is aa2 which incorporates a downward adjustment for Liquidity and an upward adjustment for Asset Quality. As OTPP's sponsor, Ontario's Aa3 long-term issuer rating is a constraint on OTPP's aa3 BCA as OTPP's BCA cannot be higher than Ontario's Aa3 rating. Therefore, the Scorecard-Indicated Outcome is aa3 and the BCA assigned to OTPP is aa3.

Support and structural considerations

High expectation of extraordinary support with a mandate as the exclusive pension manager of public school teachers in Ontario

Extraordinary support represents the probability that a government owner of a GRI would provide financial support, or other contractual protections, to a GRI to avoid a default on its debt obligations. The expectation of a continuation of ordinary support does not constitute extraordinary support and is instead considered in our assessment of the GRI's BCA.

As noted, OTPP has exclusive legal authority as the investment manager and provider of pension benefits for over 340,000 active and retired schoolteachers in Ontario as of 31 December 2023. The pension manager is a key element of the provincial government's employment system and an important contributor to the economy of Ontario. In our view, a default of OTPP would be politically embarrassing to the Province of Ontario and would have implications for the province's own ability to access debt markets. As such, we believe the Province of Ontario would provide extraordinary support, financial or otherwise, to OTPP if necessary.

Creditors have an effective priority over pension obligations and therefore benefit from good coverage of high-quality liquid assets

OTPP's governing legislation does not explicitly define the priority of its unsecured creditors relative to its pension obligation. However, Moody's believes these obligations rank ahead of payments because Schedule 1 to the Teachers' Pension Act places properly incurred liabilities to creditors ahead of accrued benefit entitlements of members, if the plan is wound up. As a result, OTPP's creditor and guarantee obligations rank senior to the amounts that become due to the pension plan beneficiaries and pari passu with other senior unsecured obligations.

As of 31 December 2023, OTPP had CAD310 billion in gross assets and CAD248 billion in net assets; which constitutes a loss absorbing cushion for the benefit of creditors. On a gross investment base of CAD305 billion, OTPP's investment portfolio is comprised of CAD12 billion of cash, money market instruments and reverse repos, CAD85 billion in investment grade fixed income securities and CAD21 billion in public equities. Its primary sources of leverage are repurchase agreements, securities sold short, term debt and commercial paper of CAD61 billion which is used to manage liquidity and augment investment return in a cost-effective manner while allowing it to retain economic exposure to government bonds. While this leverage strategy is higher than its peers, OTPP has an established track record of its use and has policies in place to mitigate liquidity and counterparty credit risks.

As at 31 December 2023, OTPP's leverage was 18% after adjusting for nettable repurchase agreements and derivatives that are not offset for accounting purposes. As noted previously, this results in two additional rating notches for the issuer and senior unsecured rating from the BCA.

ESG considerations

Ontario Teachers' Pension Plan Board's ESG credit impact score is CIS-2

Exhibit 5

ESG credit impact score

CIS-2



ESG considerations do not have a material impact on the current rating.

Source: Moody's Ratings

OTPP's ESG **CIS-2** score reflects the limited impact of impact of environmental, social and governance considerations on the current rating.

Exhibit 6

ESG issuer profile scores

ENVIRONMENTAL

E-3



SOCIAL

S-4



GOVERNANCE

G-2



Source: Moody's Ratings

Environmental

OTPP faces moderate exposure to environmental risk related to carbon-intensive investments in its portfolio, such as oil & gas, transportation and other utilities. As well, the fund's real estate and infrastructure portfolios are exposed to physical climate risk where assets could be damaged by extreme weather or rising sea levels. In addition, natural capital assets, such as agriculture, are used as hedge against inflation.

Social

OTPP faces high industry-wide exposure to social risks, primarily from changes in unemployment or immigration rates, which can impact contribution cash flows; however also from direct exposure to an aging population. OTPP also faces high industrywide risks related to cyber and personal data security, which raises the potential for a data leak of beneficiary information compared with pension managers that do not have such responsibility. These risks are mitigated by continued IT investments by the pension plan that are focused on threat prevention and detection.

Governance

OTPP faces low governance risks with governance practices that are in line with most standards within the Canadian financial services sector. This includes a defined risk appetite statement, risk and performance benchmarks and a professional board of directors and standing board control committees. OTPP has consistently maintained a high funding ratio due to a strong risk management function that stands out relative to its peers.

ESG Issuer Profile Scores and Credit Impact Scores for the rated entity/transaction are available on Moody's.com. In order to view the latest scores, please click [here](#) to go to the landing page for the entity/transaction on MDC and view the ESG Scores section.

Rating methodology and scorecard factors

Exhibit 7

Ontario Teachers' Pension Plan Board

2023

| | | Historical | | | Assigned | |
|--|----------------|----------------|---------------|----------------|-----------------------------|------------------|
| | Factor Weights | Historic Ratio | Initial Score | Assigned Score | Key driver #1 | Key driver #2 |
| Funding Ratio* | | | | | | |
| Net Assets / PBO | 40% | 136.0% | aaa | aaa | Benefit Flexibility | |
| Liquidity | | | | | | |
| Liquidity Inflows / Outflows | 20% | 224.0% | aaa | aa1 | Asset Encumbrance | |
| Asset Quality | | | | | | |
| High Risk Assets / Gross Assets | 20% | 75.0% | ba2 | baa2 | Asset Class Diversification | Operational Risk |
| Financial Policy | | | | | | |
| Financial Policy | 20% | aa | aa | aa | | |
| Financial Profile Outcome | 100% | | aa3 | aa2 | | |
| Qualitative Notching | | | | | | |
| Political Independence | | | | 0 | | |
| Corporate Behavior | | | | 0 | | |
| Scorecard-Indicated Outcome Before Constraint | | | | aa2 | | |
| Consideration of: | | | | | | |
| Sovereign Constraint (Y/N) | | | | Yes | | |
| Sovereign Rating | | | | Aaa | | |
| Sponsor Constraint (Y/N) | | | | Yes | | |
| Sponsor Rating | | | | Aa3 | | |
| Scorecard-Indicated Outcome | | | | aa3 | | |

Source: Moody's Ratings

Ratings

Exhibit 8

| Category | Moody's Rating |
|--|----------------|
| ONTARIO TEACHERS' PENSION PLAN BOARD | |
| Outlook | Positive |
| Baseline Credit Assessment | aa3 |
| Issuer Rating -Dom Curr | Aa1 |
| ONTARIO TEACHERS' FINANCE TRUST | |
| Outlook | Positive |
| Bkd Senior Unsecured | Aa1 |
| Bkd Commercial Paper | P-1 |
| ONTARIO TEACHERS' CADILLAC FAIRVIEW PROP TRT | |
| Outlook | Stable |
| Issuer Rating -Dom Curr | A1 |
| Senior Unsecured | A1 |

Source: Moody's Ratings

© 2024 Moody's Corporation, Moody's Investors Service, Inc., Moody's Analytics, Inc. and/or their licensors and affiliates (collectively, "MOODY'S"). All rights reserved.

CREDIT RATINGS ISSUED BY MOODY'S CREDIT RATINGS AFFILIATES ARE THEIR CURRENT OPINIONS OF THE RELATIVE FUTURE CREDIT RISK OF ENTITIES, CREDIT COMMITMENTS, OR DEBT OR DEBT-LIKE SECURITIES, AND MATERIALS, PRODUCTS, SERVICES AND INFORMATION PUBLISHED OR OTHERWISE MADE AVAILABLE BY MOODY'S (COLLECTIVELY, "MATERIALS") MAY INCLUDE SUCH CURRENT OPINIONS. MOODY'S DEFINES CREDIT RISK AS THE RISK THAT AN ENTITY MAY NOT MEET ITS CONTRACTUAL FINANCIAL OBLIGATIONS AS THEY COME DUE AND ANY ESTIMATED FINANCIAL LOSS IN THE EVENT OF DEFAULT OR IMPAIRMENT. SEE APPLICABLE MOODY'S RATING SYMBOLS AND DEFINITIONS PUBLICATION FOR INFORMATION ON THE TYPES OF CONTRACTUAL FINANCIAL OBLIGATIONS ADDRESSED BY MOODY'S CREDIT RATINGS. CREDIT RATINGS DO NOT ADDRESS ANY OTHER RISK, INCLUDING BUT NOT LIMITED TO: LIQUIDITY RISK, MARKET VALUE RISK, OR PRICE VOLATILITY. CREDIT RATINGS, NON-CREDIT ASSESSMENTS ("ASSESSMENTS"), AND OTHER OPINIONS INCLUDED IN MOODY'S MATERIALS ARE NOT STATEMENTS OF CURRENT OR HISTORICAL FACT. MOODY'S MATERIALS MAY ALSO INCLUDE QUANTITATIVE MODEL-BASED ESTIMATES OF CREDIT RISK AND RELATED OPINIONS OR COMMENTARY PUBLISHED BY MOODY'S ANALYTICS, INC. AND/OR ITS AFFILIATES. MOODY'S CREDIT RATINGS, ASSESSMENTS, OTHER OPINIONS AND MATERIALS DO NOT CONSTITUTE OR PROVIDE INVESTMENT OR FINANCIAL ADVICE, AND MOODY'S CREDIT RATINGS, ASSESSMENTS, OTHER OPINIONS AND MATERIALS ARE NOT AND DO NOT PROVIDE RECOMMENDATIONS TO PURCHASE, SELL, OR HOLD PARTICULAR SECURITIES. MOODY'S CREDIT RATINGS, ASSESSMENTS, OTHER OPINIONS AND MATERIALS DO NOT COMMENT ON THE SUITABILITY OF AN INVESTMENT FOR ANY PARTICULAR INVESTOR. MOODY'S ISSUES ITS CREDIT RATINGS, ASSESSMENTS AND OTHER OPINIONS AND PUBLISHES OR OTHERWISE MAKES AVAILABLE ITS MATERIALS WITH THE EXPECTATION AND UNDERSTANDING THAT EACH INVESTOR WILL, WITH DUE CARE, MAKE ITS OWN STUDY AND EVALUATION OF EACH SECURITY THAT IS UNDER CONSIDERATION FOR PURCHASE, HOLDING, OR SALE.

MOODY'S CREDIT RATINGS, ASSESSMENTS, OTHER OPINIONS, AND MATERIALS ARE NOT INTENDED FOR USE BY RETAIL INVESTORS AND IT WOULD BE RECKLESS AND INAPPROPRIATE FOR RETAIL INVESTORS TO USE MOODY'S CREDIT RATINGS, ASSESSMENTS, OTHER OPINIONS OR MATERIALS WHEN MAKING AN INVESTMENT DECISION. IF IN DOUBT YOU SHOULD CONTACT YOUR FINANCIAL OR OTHER PROFESSIONAL ADVISER.

ALL INFORMATION CONTAINED HEREIN IS PROTECTED BY LAW, INCLUDING BUT NOT LIMITED TO, COPYRIGHT LAW, AND NONE OF SUCH INFORMATION MAY BE COPIED OR OTHERWISE REPRODUCED, REPACKAGED, FURTHER TRANSMITTED, TRANSFERRED, DISSEMINATED, REDISTRIBUTED OR RESOLD, OR STORED FOR SUBSEQUENT USE FOR ANY SUCH PURPOSE, IN WHOLE OR IN PART, IN ANY FORM OR MANNER OR BY ANY MEANS WHATSOEVER, BY ANY PERSON WITHOUT MOODY'S PRIOR WRITTEN CONSENT. FOR CLARITY, NO INFORMATION CONTAINED HEREIN MAY BE USED TO DEVELOP, IMPROVE, TRAIN OR RETRAIN ANY SOFTWARE PROGRAM OR DATABASE, INCLUDING, BUT NOT LIMITED TO, FOR ANY ARTIFICIAL INTELLIGENCE, MACHINE LEARNING OR NATURAL LANGUAGE PROCESSING SOFTWARE, ALGORITHM, METHODOLOGY AND/OR MODEL.

MOODY'S CREDIT RATINGS, ASSESSMENTS, OTHER OPINIONS AND MATERIALS ARE NOT INTENDED FOR USE BY ANY PERSON AS A BENCHMARK AS THAT TERM IS DEFINED FOR REGULATORY PURPOSES AND MUST NOT BE USED IN ANY WAY THAT COULD RESULT IN THEM BEING CONSIDERED A BENCHMARK.

All information contained herein is obtained by MOODY'S from sources believed by it to be accurate and reliable. Because of the possibility of human or mechanical error as well as other factors, however, all information contained herein is provided "AS IS" without warranty of any kind. MOODY'S adopts all necessary measures so that the information it uses in assigning a credit rating is of sufficient quality and from sources MOODY'S considers to be reliable including, when appropriate, independent third-party sources. However, MOODY'S is not an auditor and cannot in every instance independently verify or validate information received in the credit rating process or in preparing its Materials.

To the extent permitted by law, MOODY'S and its directors, officers, employees, agents, representatives, licensors and suppliers disclaim liability to any person or entity for any indirect, special, consequential, or incidental losses or damages whatsoever arising from or in connection with the information contained herein or the use of or inability to use any such information, even if MOODY'S or any of its directors, officers, employees, agents, representatives, licensors or suppliers is advised in advance of the possibility of such losses or damages, including but not limited to: (a) any loss of present or prospective profits or (b) any loss or damage arising where the relevant financial instrument is not the subject of a particular credit rating assigned by MOODY'S.

To the extent permitted by law, MOODY'S and its directors, officers, employees, agents, representatives, licensors and suppliers disclaim liability for any direct or compensatory losses or damages caused to any person or entity, including but not limited to by any negligence (but excluding fraud, willful misconduct or any other type of liability that, for the avoidance of doubt, by law cannot be excluded) on the part of, or any contingency within or beyond the control of, MOODY'S or any of its directors, officers, employees, agents, representatives, licensors or suppliers, arising from or in connection with the information contained herein or the use of or inability to use any such information.

NO WARRANTY, EXPRESS OR IMPLIED, AS TO THE ACCURACY, TIMELINESS, COMPLETENESS, MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE OF ANY CREDIT RATING, ASSESSMENT, OTHER OPINION OR INFORMATION IS GIVEN OR MADE BY MOODY'S IN ANY FORM OR MANNER WHATSOEVER.

Moody's Investors Service, Inc., a wholly-owned credit rating agency subsidiary of Moody's Corporation ("MCO"), hereby discloses that most issuers of debt securities (including corporate and municipal bonds, debentures, notes and commercial paper) and preferred stock rated by Moody's Investors Service, Inc. have, prior to assignment of any credit rating, agreed to pay to Moody's Investors Service, Inc. for credit ratings opinions and services rendered by it. MCO and Moody's Investors Service also maintain policies and procedures to address the independence of Moody's Investors Service credit ratings and credit rating processes. Information regarding certain affiliations that may exist between directors of MCO and rated entities, and between entities who hold credit ratings from Moody's Investors Service, Inc. and have also publicly reported to the SEC an ownership interest in MCO of more than 5%, is posted annually at www.moody.com under the heading "Investor Relations — Corporate Governance — Charter Documents - Director and Shareholder Affiliation Policy."

Moody's SF Japan K.K., Moody's Local AR Agente de Calificación de Riesgo S.A., Moody's Local BR Agência de Classificação de Risco LTDA, Moody's Local MX S.A. de C.V., I.C.V., Moody's Local PE Clasificadora de Riesgo S.A., and Moody's Local PA Calificadora de Riesgo S.A. (collectively, the "Moody's Non-NRSRO CRAs") are all indirectly wholly-owned credit rating agency subsidiaries of MCO. None of the Moody's Non-NRSRO CRAs is a Nationally Recognized Statistical Rating Organization.

Additional terms for Australia only: Any publication into Australia of this document is pursuant to the Australian Financial Services License of MOODY'S affiliate, Moody's Investors Service Pty Limited ABN 61 003 399 657AFSL 336969 and/or Moody's Analytics Australia Pty Ltd ABN 94 105 136 972 AFSL 383569 (as applicable). This document is intended to be provided only to "wholesale clients" within the meaning of section 761G of the Corporations Act 2001. By continuing to access this document from within Australia, you represent to MOODY'S that you are, or are accessing the document as a representative of, a "wholesale client" and that neither you nor the entity you represent will directly or indirectly disseminate this document or its contents to "retail clients" within the meaning of section 761G of the Corporations Act 2001. MOODY'S credit rating is an opinion as to the creditworthiness of a debt obligation of the issuer, not on the equity securities of the issuer or any form of security that is available to retail investors.

Additional terms for India only: Moody's credit ratings, Assessments, other opinions and Materials are not intended to be and shall not be relied upon or used by any users located in India in relation to securities listed or proposed to be listed on Indian stock exchanges.

Additional terms with respect to Second Party Opinions (as defined in Moody's Investors Service Rating Symbols and Definitions): Please note that a Second Party Opinion ("SPO") is not a "credit rating". The issuance of SPOs is not a regulated activity in many jurisdictions, including Singapore. JAPAN: In Japan, development and provision of SPOs fall under the category of "Ancillary Businesses", not "Credit Rating Business", and are not subject to the regulations applicable to "Credit Rating Business" under the Financial Instruments and Exchange Act of Japan and its relevant regulation. PRC: Any SPO: (1) does not constitute a PRC Green Bond Assessment as defined under any relevant PRC laws or regulations; (2) cannot be included in any registration statement, offering circular, prospectus or any other documents submitted to the PRC regulatory authorities or otherwise used to satisfy any PRC regulatory disclosure requirement; and (3) cannot be used within the PRC for any regulatory purpose or for any other purpose which is not permitted under relevant PRC laws or regulations. For the purposes of this disclaimer, "PRC" refers to the mainland of the People's Republic of China, excluding Hong Kong, Macau and Taiwan.