Massachusetts Bay Transportaion Authority
Senior Sales Tax Bonds

Issuer: Massachusetts Bay Transportation Authority		
Assigned	**Rating**	**Outlook**
Senior Sales Tax Bonds, 2023 Series A, Subseries A-1	AAA	Stable
Senior Sales Tax Bonds, 2023 Series A, Subseries A-2 (Sustainability Bonds)	AAA	Stable
Senior Sales Tax Bonds (Parity Fixed Rate Bonds)	AAA	Stable

Methodology:

U.S. Special Tax Revenue Bond Rating Methodology

ESG Global Rating Methodology

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Rating Summary: The long-term rating reflects: the priority of payment of Massachusetts Bay Transportation Authority (the "Authority" or "MBTA") Senior Sales Tax Bonds from Pledged Revenues, including dedicated gross sales tax receipts; the historic strength and resilience of the underlying pledged revenue base; the Authority's practice of structuring annual debt service requirements below the inflation-adjusted dedicated sales tax "Base Revenue Amount" or "BRA" which exceeds pro forma maximum annual debt service (MADS) and insulates bondholders from volatility in actual sales tax collections; the strong pro forma coverage of 4.24x MADS from FY 2022 Pledged Revenues; and, a conservative, two-part additional bonds test (ABT) that includes a requirement for prior year sales tax receipts to cover pro forma Senior Sales Tax MADS by at least 2.0x.

The currently offered Senior Sales Tax Bonds, 2023 Series A (the "Bonds") will fund $510 million in new capital projects and repay $108 million in commercial paper program borrowing. KBRA's long-term rating applies to the Bonds and outstanding fixed rate parity Senior Sales Tax Bonds. As of January 1, 2023, approximately $2.2 billion of Senior Sales Tax Bonds were outstanding.

The MBTA is a political subdivision of the Commonwealth of Massachusetts ("Commonwealth") created in 1964 to finance and operate a mass transportation system across the greater Boston area. It operates pursuant to Chapter 161A and Section 35T of Chapter 10 of Massachusetts General Laws (collectively, the "Enabling Act") and serves a territory encompassing 4.8 million people (~70% of the Commonwealth's population). The MBTA operates: (i) 38 miles of "heavy" rail routes across 52 stations; (ii) 26 miles of "light" rail routes across 70 stations; (iii) more than 1,000 buses across 1,513 miles of routes; (iv) a commuter rail network comprised of 90 locomotives, 420 coaches, and 141 stations; and, (v) a broad range of other services including commuter boats, paratransit, and express buses.

The Senior Sales Tax Revenue Bonds are secured primarily by a pledge of: (i) the greater of the gross receipts of a 1% Commonwealth-wide general sales tax plus $160 million annually (the "Dedicated Sales Tax Revenue Amount", or "DSTRA"), and the statutory inflation-adjusted BRA[1] (the "Pledged Sales Tax") and (ii) a lien and charge on certain funds and accounts created under the Sales Tax Bond Trust Agreement (the "Agreement"), including the Senior Sales Tax Bond Debt Service Fund, Debt Service Reserve Fund and the Authority-held Deficiency and Maintenance Funds. In addition, (iii) Assessment revenues remaining after the satisfaction of obligations under the Assessment Bond Trust Agreement ("Residual Assessments") are available to cure shortfalls in the Senior Sales Tax Bond Debt Service Fund. Assessment revenues are generated from proceeds of assessments levied upon 176 municipalities in the MBTA service area.

Pledged Sales Tax revenues, which comprised 92.5% of total Pledged Revenues in FY 2022, are administered and collected by the Commonwealth Department of Revenue (DOR) and credited upon receipt, without appropriation, to the MBTA State and Local Contribution Fund (the "MBTA State and Local Contribution Fund"). Amounts deposited to the MBTA State and Local Contribution Fund are immediately available upon request of the MBTA General Manager and must be applied to Sales Tax Revenue Bond debt service before becoming available for any other purpose. Assessments are also administered and collected by DOR and credited to the MBTA State and Local Contribution Fund, without appropriation. Residual Assessments, which comprised 7.5% of Pledged Revenues in FY 2022, are available, as needed, to pay debt service on Senior Sales Tax Revenue Bonds.

[1] The $160 million and any shortfall between the DSTRA and the BRA are funded from otherwise unpledged portions of the Commonwealth's general sales tax. Of the Commonwealth's total 6.25% general sales tax, proceeds of 4.25% are not pledged to other purposes.

The Commonwealth's economic base, throughout which the pledged taxes and assessments are levied, is characterized by favorable sociodemographic characteristics including a large and growing population (7.0 million people) and per capita income at 129% the national average in 2021. Its economy is broad, demonstrably resilient, and diverse. Massachusetts is home to 17 Fortune 500 companies as of 2021, reflecting its status as a major center of commerce. It is the most populous State in New England and home to the majority of the Boston-Cambridge-Newton, MA-NH metropolitan statistical area (Boston Metro), which is the 11th most populous urbanized area in the Nation.

Pledged Revenues in FY 2022 of $1.46 billion provided strong coverage of pro forma FY 2023 MADS at 4.24x. KBRA notes further that the guaranteed BRA Pledged Sales Tax floor of $1.16 billion in FY 2024 alone provides 3.38x pro forma coverage of Senior Lien Sales Tax Bond MADS. Pledged Revenues were comprised of $1.35 billion in Pledged Sales Tax revenues and $109.6 million in Residual Assessment revenues. Pledged Revenues increased at a strong 3.4% compound annual growth rate (CAGR) between FY 2001 and FY 2022, significantly faster than the 2.5% consumer price index for all urban areas in the Nation and have experienced a low level of volatility since FY 2001, declining in just one of 21 years, contracting 0.2% in FY 2004. The gross lien nature of the Pledged Sales Tax, as well as the availability of Residual Assessment receipts before becoming available for operations, substantially insulates Sales Tax bondholders from MBTA operations. We note nevertheless that MBTA relied on farebox revenues to support about 37% of operating expenditures in the five years preceding the COVID-19 pandemic and that the reduced ridership environment is expected to pressure operating finances in the years ahead.

The recovery in ridership has been slow with system ridership in December 2022 37.9% below the December 2019 same month pre-pandemic level. MBTA was allocated a total of $1.99 billion in pandemic-related federal assistance including $827 million in Coronavirus Aid, Relief, and Economic Security Act (CARES) funds, $301 million in Coronavirus Response and Relief Supplemental Appropriations Act of 2021 (CRRSAA) funds, and $860 million in American Rescue Plan Act (ARPA) funds. All such funds have been received and are expected to be used to stabilize operations through FY 2024 as ridership recovery continues.

The Authority's capital plan for FY 2024 through FY 2028 totals $9.77 billion of which $2.95 billion is projected to be debt funded with sales tax bonds. Management notes however that actual spending generally falls well short of budgeted levels due to the inherent complexities of developing major capital projects. Even if some or all CIP borrowing were to be funded with Senior Sales Tax Bonds, KBRA anticipates that leverage will remain moderate, constrained by the 2.00x additional bonds test and the need to fund a substantial portion of operations from the pledged revenues.

The Stable Outlook reflects KBRA's expectation that pledged revenues will continue to grow in line with the historic trend, with limited downside volatility reflecting the application of a guaranteed inflation-adjusted sales tax floor as well as the breadth, wealth, and growing economy of the underlying tax base. The Outlook also reflects the expectation that additional borrowing will be comfortably accommodated within the 2.00x addition bonds test and other existing financing programs.

Key Credit Considerations

The rating was assigned because of the following key credit considerations:

Credit Positives

- Gross lien sales tax pledge insulates bondholders from MBTA operations.
- Pledged Revenues provide strong coverage of Senior Sales Tax Bond MADS with residual amounts providing a substantial source of recurring financial support for capital and operating needs.
- Pledged Revenue volatility is limited by the "base revenue amount", an inflation-adjusted floor for Pledged Sales Tax receipts, which at $1.16 billion for FY 2024 provides coverage of 3.38x pro forma Senior Lien Sales Tax Bond MADS.
- Stable demographic trends and favorable socio-economic characteristics of tax base support growth and stability of pledged receipts.

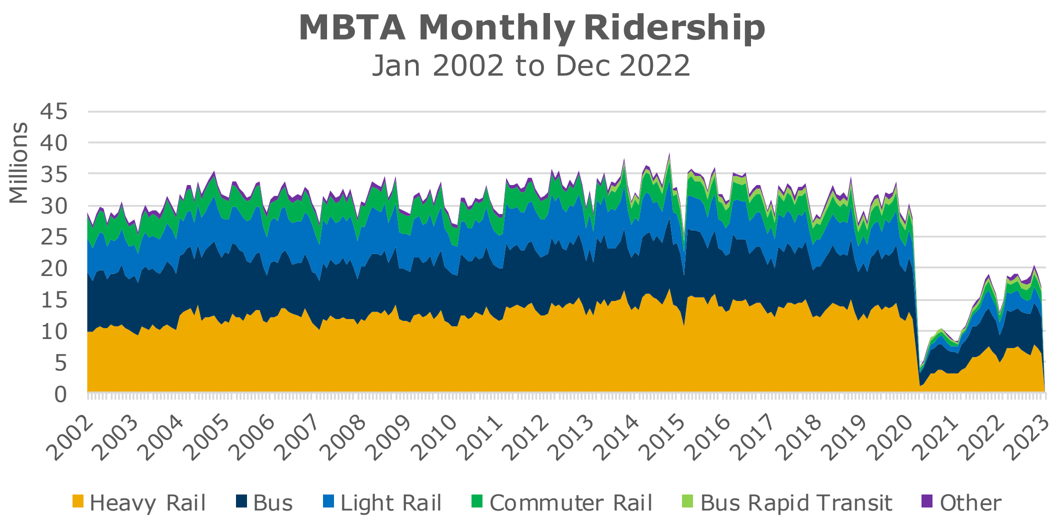
Credit Challenges

- Pledged Revenues have some sensitivity to economic cycles.

Rating Sensitivities

▪ Not applicable at AAA rating level.	+
▪ A significant decline in debt service coverage due to very large increases in sales tax bond leverage accompanied by significant and prolonged deterioration in the sales tax base.	-

Key Ratios	
Pledged Revenues, FY 2022	$1.458 billion
Growth FY 2001 to FY 2022	3.35% CAGR
CPI Growth FY 2001 to FY 2022	2.46% CAGR
Pro Forma MADS (FY 2023) Coverage from:	
FY 2022 Pledged Revenues	4.24x
FY 2024 Sales Tax BRA Floor Amount Only	3.38x



Source: Federal Transit Administration, National Transit Database Monthly Unlinked Passenger Ride Data

Rating Determinants (RD)	Senior Sales Tax Bonds
1. Legal Framework	AA+
2. Nature of Special Tax Revenues	AAA
3. Economic Base and Demographics	AAA
4. Revenue Analysis	AAA
5. Coverage and Bond Structure	AAA

RD 1: Legal Framework

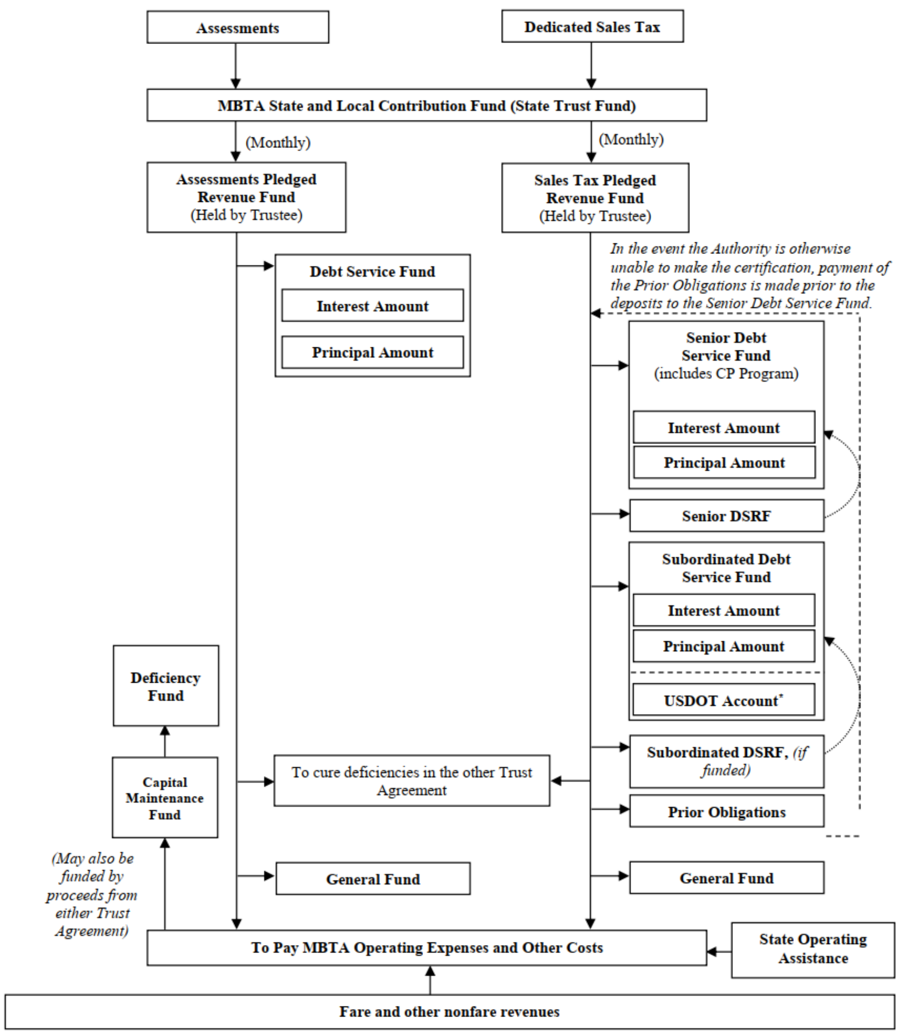
Sales Tax Bonds, including the Bonds, constitute special obligations of the Authority, secured by a pledge of certain revenues and other moneys received or derived under the Enabling Act. The Enabling Act provides the Authority with a stream of Dedicated Revenues consisting of a Dedicated Sales Tax and Assessments. Dedicated Revenues are credited upon receipt, without appropriation, to the State and Local Contribution Fund.

Defined Pledge

Under the Agreement, all Sales Tax Bonds are secured by and payable from a lien on Pledged Revenues. Pledged Revenues include (i) the Dedicated Sales Tax; (ii) payments received from certain providers of hedge agreements; and (iii) Sales Tax Alternate Revenues, if any. All Sales Tax Bonds are also secured by a lien and charge on certain funds and accounts created under the Agreement. However, Senior Sales Tax Bonds, including the Bonds, are only secured by the Senior Debt Service Fund and the Senior Debt Service Reserve Fund. Subordinated Sales Tax Obligations are secured by a separate debt service fund and reserve fund.

Figure 1

Flow of Funds



Source: MBTA

A description of Pledged Revenues and other funds and accounts pledged under the Agreement is provided below.

- *Dedicated Sales Tax ($1.349 billion in FY 2022)*
  Gross proceeds of a 1% statewide sales tax, plus $160 million annually (collectively, the DSTRA).

  Proceeds are pledged to Senior and Subordinated Sales Tax Bond Debt Service prior to the payment of Authority operating expenses, and are subject to a statutory floor known as the BRA ($1.1 billion in FY 2022). The BRA is adjusted annually by the percentage change in inflation (as measured by the Boston CPI for the prior year), subject to a floor of 0% and a ceiling of 3%.

  The 1% sales tax comprises a portion of the State's aggregate 6.25% sales tax, and excludes taxes collected at all restaurants as well as taxes collected at vendors that opened after FY 1997 within Boston's Convention Center District and vendors located in hotels in Cambridge and Boston outside of said District.

- *Additional Pledged Sources*
  Includes any Dedicated Payments, plus interest there on, allocated to Senior Sales Tax Bonds through supplemental resolution; the balance of the Authority held Deficiency Fund ($530 million as of January 1, 2023) and Capital Maintenance Fund ($43.7 million as of January 1, 2023); and, all funds and accounts established under the Agreement (other than the Bond Proceeds Fund while it is held and administered by the Authority and the Rebate Fund). As previously noted, Senior Sales Tax Bonds, including the Bonds, are secured by a Debt Service Fund and Debt Service Reserve Fund that are separate and apart from similar funds securing Subordinated Sales Tax Bonds.

  Under the Agreement, to the extent amounts on deposit in the Senior Debt Service Fund or Subordinated Debt Service Fund are insufficient to pay Senior Net Debt Service or Subordinated Net Debt Service, amounts remaining under the Assessment Bond Trust Agreement following the payment of debt service and funding of required accounts ("Residual Assessments") may be transferred to cure any shortfalls. Assessment proceeds are pledged first to the payment of obligations secured under the Assessment Bond Trust Agreement.

- *Residual Assessments ($109.6 million in FY 2022)*
  Net proceeds of certain Assessments levied under the Enabling Act upon 176 municipalities in the MBTA service area.

  The Assessments are derived from ad valorem taxes but are in practice deducted from Commonwealth allocations of local aid via an intercept program.[2] Gross Assessments are subject to annual adjustment (as measured by the Boston CPI for the prior year) up to a 2.5% cap, and subject to an absolute floor ("Assessment Floor Amount") of $136.0 million annually. In FY 2022, gross Assessments of $179.3 million less, $69.7 million in Assessment Bond MADS, provided Residual Assessment revenues of $109.6 million available for Senior Sales Tax Bond debt service.

Additional Protections

Non-Impairment Covenant
The Commonwealth has covenanted that the Dedicated Sales Tax shall not be diverted, and the rate of the tax shall not be reduced below the greater of the DSTRA or the BRA. Bond Counsel opines that this covenant is binding on future legislatures and that a petition to reduce the rate, if brought to a ballot measure and approved, would have no effect on the Dedicated Sales Tax. The Commonwealth also covenants that while any MBTA bonds secured by Dedicated Revenues are outstanding, Assessments shall not be reduced below $136.0 million per year.

Timing of Deposits

The Dedicated Sales Tax is generally deposited to the State and Local Contribution Fund no later than the last business day of each month, subject to a one-month lag. Assessments are deposited on or before the last day of the month, on the day credited.

Following a request of the General Manager, and upon Authority certification to the Commonwealth that debt service on Prior Obligations had been included in the Authority's budget, the Dedicated Sales Tax is deposited as soon as practicable to the Pledged Revenue Fund. KBRA notes that Prior Obligations, which have a Commonwealth Guaranty, were issued under the now closed General Transportation Bond lien. As of Jan. 1, 2023, only $99.5 million of Prior Obligations remained outstanding.

Debt Service Reserve Fund

As required by the Agreement, a debt reserve fund (DSRF) will be funded at closing with a portion of Bond proceeds.

[2] Among the 176 municipalities assessed in FY 2022, Boston had the lowest ratio of local aid subject to the intercept relative to total assessments at 136%.

The Minimum Senior Debt Service Reserve Requirement ("the Minimum Reserve Requirement"), funded for each series of Senior Sales Tax Bonds issued, is equal to one-half of the least of (i.) 10% of original net proceeds; (ii.) 125% of average annual debt service; and (iii.) maximum annual debt service. The Minimum Reserve Requirement for Subordinated Sales Tax Bonds is structured similarly.

KBRA notes the Authority has taken steps in conjunction with prior series of Senior Sales Tax Bonds to modernize provisions of the Agreement to provide flexibility in funding a DSRF. Most recently, in conjunction with the issuance of 2016 Series A, the Authority amended the definition of Minimum Reserve Requirement such that it could be met with a common reserve fund, calculated based on the aforementioned three prong test. The amended definition becomes effective if and when consent of a majority of bondholders is received.

The Authority is expected to make additional amendments to the Agreement upon issuance of the Bonds, including removal of the Minimum Senior and Subordinated Debt Service Reserve Requirements, and the ability to designate specific series of Senior and Subordinated Sales Tax Bonds for a DSRF through supplemental resolution. While these amendments would also require majority bondholder consent, the potential lack of a DSRF, in KBRA's view, is not dilutive to either the Senior or Subordinated Sales Tax Bond credits given the robust nature of Pledged Revenues.

Additional Bonds Test

Additional Sales Tax Bonds, issued either on a senior or subordinated basis, may be issued under a number of conditions. Upon receipt of a certificate of an Authorized Officer:

(i.) Setting forth (a) Senior Net Debt Service for all series of Sales Tax Bonds outstanding and to be issued; (b) Combined Net Debt Service (i.e., Senior Net Debt Service and Subordinated Net Debt Service) for all series of Sales Tax Bonds outstanding and to be issued; and (c) the aggregate estimated payments on Prior Obligations for the current year and future fiscal years;

(ii.) Stating that amounts on deposit in the Senior DSRF and Subordinated DSRF will at least be equal to each fund's respective Reserve Requirement;

(iii.) Demonstrating for the then current and each future fiscal year:

the sum of the Assessment Floor Amount[3] plus the Residual Sales Tax[4] divided by Net Debt Service on outstanding Assessment Bonds is ≥ 1.5(x); and

(iv.) Demonstrating that the Base Revenue Floor Amount[5] for each fiscal year the additional series of Sales Tax Bonds will be outstanding:

is ≥ the sum of Combined Net Debt Service and payments on Prior Obligations for each such fiscal year; *or*

(v.) Demonstrating that Historic DSTRA less the payments on Prior Obligations:

is ≥ 2.0(x) Senior Net Debt Service and ≥ 1.5(x) Combined Net Debt Service.

KBRA notes that the various components of the ABT test both the strength and resiliency of the Dedicated Sales Tax (iv., v.) and the Assessment cross-collateralization pledge (iii.). The dual nature of the ABT, in KBRA's view, provides sufficient protection against overleveraging of the Dedicated Sales Tax and other Pledged Revenues.

Similar to the proposed amendment to the DSRF, the Authority plans to make other Amendments to the Agreement including modifying the cross-collateralization portion of the ABT that measures Assessment Revenues, with a goal of achieving consistency between the Agreement and the recently amended Assessment Bond Trust Agreement. In addition, the Authority seeks flexibility to define new categories of deeply subordinated Sales Tax Debt, though MBTA has no immediate plans to make use of such liens. KBRA views the aforementioned proposed modifications as reasonable, especially given the Sales Tax Credit's consistently strong performance.

[3] Assessment Floor Amount equals the amount below which the assessment to cities and towns pursuant to the Enabling Act cannot be reduced. The Assessment Floor Amount is currently $136.0 million.
[4] Residual Sales Tax is equal to the greater of the Base Revenue Floor Amount and the Historic Dedicated Sales Tax Revenue Amount less the sum of (i.) estimate debt service on Prior Obligations; (ii.) Senior Net Debt Service; (iii.) Subordinated Net Debt Service; and (iv.) debt service on any indebtedness issued under the Agreement, secured by a pledge of or security interest in and payable from the Dedicated Sales Tax.
[5] Base Revenue Floor Amount equals the BRA most recently certified by the Commonwealth Comptroller.

Bankruptcy Assessment

KBRA has consulted outside counsel and the following represents our understanding of the material bankruptcy issues relevant to Authority and the Bonds.

To be a debtor under the municipal bankruptcy provisions of the U.S. Bankruptcy Code (Chapter 9), a local governmental entity must, among other things, qualify under the definition of "municipality" in the Bankruptcy Code, and must also be specifically authorized to file a bankruptcy petition by the State in which it is located. KBRA understands that the Authority is established as a political subdivision by Massachusetts state law. As such an entity, it meets the definition of a municipality under Chapter 9 of the U.S. Bankruptcy Code. As to authorization, Massachusetts state law does not currently permit municipalities in the State to file for protection under Chapter 9. However, the Commonwealth of Massachusetts could adopt in the future a law that would permit municipalities, such as the Authority, to file for bankruptcy relief.

Chapter 9 provides for post-petition recognition of (i) a security interest represented by a pledge of specific special tax revenues or of municipal enterprise revenues (referred to as a lien on "special revenues") and also (ii) a statutory lien on revenues pledged for municipal obligations. Such special revenues and statutory liens continue to apply to revenues acquired by a local government entity during a Chapter 9 case and will survive the conclusion of the Chapter 9 proceeding. However, other consensual pledges and liens arising by indenture, resolution or similar document, except to the extent they cover proceeds of collateral pledged prior to bankruptcy, are generally all cut off by Section 552 of the Bankruptcy Code as of the petition date.

KBRA believes, after consultation with outside counsel, that because (a) the funds pledged to pay the Bonds are not from a separate, dedicated source of revenues that meets one of the definitions of "special revenues" under Chapter 9, and (b) there is no statutory lien imposed on the funds pledged to pay the Bonds, the bondholders would likely be treated as having no lien on revenues arising after the filing of a Chapter 9 of the Authority in the event it were permitted to seek relief under Chapter 9.

RD 2: Nature of Special Tax Revenues

The Dedicated Revenues are strong in nature, deriving from a large geographic area and broad tax base.

Breadth of Tax Base

Dedicated Sales Tax

The Dedicated Sales Tax is broad in nature, comprising a portion of the State's general sales and use tax which is applicable to a wide range of essential goods and services generally including retail sales of tangible property, telecommunications, and use or consumption of the same properties. Notability excluded from the dedicated sales tax are restaurant and grocery, as well as most clothing purchases. The Commonwealth does not disclose data on taxable sales or collections by category.

Residual Assessments

The dedicated residual assessments are broad in nature, derived from ad valorem assessments levied on all taxable ad valorem properties in the municipalities so assessed.

Geographic Area of Tax Base

Dedicated Sales Tax

The Dedicated Sales Tax is levied across the entire Commonwealth of Massachusetts which covers a large geographic area and a population of 7.0 million people. The dedicated sales tax however excludes taxes collected at vendors that opened after FY 1997 within Boston's Convention Center District, as well as vendors located in hotels in Cambridge and Boston outside of said District.

Residual Assessments

Residual assessments are levied across a large geographic area, deriving from assessments levied on 176 cities and towns comprising the territorial area of the Authority which encompasses approximately 4.8 million people or about 69% of the Commonwealth's population.

RD 3: Economic Base and Demographics

The Commonwealth's economic base, throughout which the pledged taxes and assessments are levied, is characterized by favorable sociodemographic characteristics including a growing population and per capita income at 129% the National average. Its economy is broad, demonstrably resilient, and diverse. Massachusetts is home to 17 Fortune 500 companies as of 2021 reflecting its status as a major center of commerce. It is the most populous State in New England

and home to the majority of Boston-Cambridge-Newton, MA-NH metropolitan statistical area (Boston Metro), which is the 11th most populous urbanized area in the Nation.

Population

The Commonwealth's population growth trend is moderate. Population increased 6.3% between 2010 and 2021, faster than the New England region (4.3%), but slower than the Nation (7.3%).

Figure 2

Population	1990	2000	2010	2021	% Δ 2010 to 2021	CAGR 2010 to 2021
Massachusetts	6,022,639	6,361,104	6,569,537	6,984,723	6.3%	0.6%
New England	13,229,502	13,949,721	14,476,185	15,092,739	4.3%	0.4%
United States	249,622,814	282,162,411	309,378,433	331,893,745	7.3%	0.6%

Source: U.S. Census Burea, except for Special Assessment Area population which is the current population estimate included in the POS.

Per Capita Income and Poverty Level

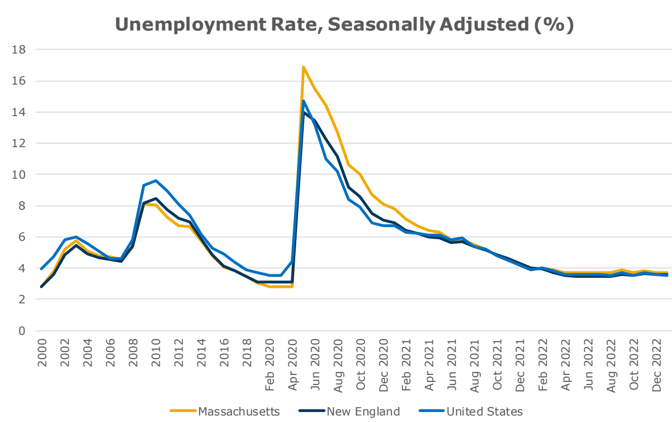
Commonwealth per capita income is strong at $48,617 in 2021, or 129% of the National level. The incidence of poverty at 10.4% in 2021 is below the U.S. level of 11.6%.

Employment

The Commonwealth unemployment level is low but remains somewhat higher than the 2019 pre-pandemic level. According to the U.S. Bureau of Labor Statistics, the total number of jobs remains 3.6% below the 2019 average level as of December 2022. Employment however grew faster than that of New England and the U.S. through the last economic cycle. As of December 2022, total employment is Massachusetts is 16.7% higher than that annualized trough recorded during the Global Financial Crisis versus New England and U.S. growth of 11.7% and 13.3%, respectively, over the same period.

The Commonwealth's unemployment rate continues to trend down from the early months of the pandemic but has historically been lower than the National level. The Commonwealth's seasonally adjusted unemployment rate was 3.7% in December 2022, slightly higher than the New England region at 3.6% and National average at 3.5%.

Figure 3



	Massachusett	New England	Untied States
Dec 2022	3.7	3.6	3.5
Nov 2022	3.7	3.6	3.6
Great Recession Annualized Peak	8.1	8.5	9.6
Point Δ Since Great Recession Annualized Peak	4.4	4.9	6.1

Source: U.S. Bureau of Labor Statistics

Figure 4

Total Employment (Seasonally Adjusted) (in thouands)	Massachusetts	Δ(%)	New England	Δ(%)	United States	Δ(%)
2000	3,247		7,138		136,901	
2001	3,258	0.4%	7,119	-0.3%	136,939	0.0%
2002	3,257	0.0%	7,125	0.1%	136,481	-0.3%
2003	3,223	-1.0%	7,099	-0.4%	137,729	0.9%
2004	3,226	0.1%	7,116	0.2%	139,240	1.1%
2005	3,223	-0.1%	7,164	0.7%	141,710	1.8%
2006	3,251	0.8%	7,259	1.3%	144,418	1.9%
2007	3,278	0.9%	7,312	0.7%	146,050	1.1%
2008	3,282	0.1%	7,296	-0.2%	145,373	-0.5%
2009	3,191	-2.8%	7,100	-2.7%	139,894	-3.8%
2010	3,198	0.2%	7,102	0.0%	139,077	-0.6%
2011	3,233	1.1%	7,153	0.7%	139,885	0.6%
2012	3,272	1.2%	7,193	0.5%	142,475	1.9%
2013	3,284	0.4%	7,206	0.2%	143,941	1.0%
2014	3,364	2.4%	7,347	2.0%	146,319	1.7%
2015	3,418	1.6%	7,439	1.2%	148,845	1.7%
2016	3,472	1.6%	7,532	1.3%	151,436	1.7%
2017	3,582	3.2%	7,725	2.6%	153,335	1.3%
2018	3,686	2.9%	7,859	1.7%	155,763	1.6%
2019	3,725	1.1%	7,932	0.9%	157,534	1.1%
2020	3,398	-8.8%	7,320	-7.7%	147,813	-6.2%
2021	3,536	4.1%	7,524	2.8%	152,586	3.2%
2022	3,603	1.9%	7,744	2.9%	152,586	0.0%
December 2022	3,590	-0.4%	7,708	-0.5%	158,297	3.7%
Δ Great Recession Trough to 2019	16.7%		11.7%		13.3%	
Δ 2019 Avg (Pre-COVID) to Dec 2022	-3.6%		-2.4%		-3.1%	

Source: U.S. Bureau of Labor Statistics

RD 4: Revenue Analysis

Dedicated Revenues in FY 2022 totaled $1.458 million including $1,348.9 million in Pledged Sales Tax receipts (92.5%) and an estimated[6] $109.6 million in estimated Residual Assessment Revenues (7.5%). Pledged Revenues increased at a strong 3.4% compound annual growth rate (CAGR) between FY 2001 and FY 2022 and have experienced a low level of volatility since 2001, declining in just one of 21 years, contracting 0.2% in FY 2004.

[6] Similar to presentation in the POS, estimated Residual Assessments are calculated by subtracting forward Assessment Bond MADS of $69.7 million from total Assessment Receipts.

Trend in Annual Receipts

Dedicated Sales Tax

Dedicated Sales Tax receipts increased at a 3.4% compound annual growth rate (CAGR) between FY 2001 and FY 2022, significantly faster than the 2.5% consumer price index for all urban areas in the Nation (CPI). As previously discussed, the BRA floor is adjusted annually by the percentage change in inflation (as measured by the Boston CPI for the prior year), subject to a floor of 0% and a ceiling of 3%, protecting the BRA floor from moderate levels of inflation. Receipts were based on the BRA floor level each year between FY 2002 to FY 2017 because the BRA exceeded the DSTRA. Receipts in each subsequent year were based on the DSTRA which exceeded the BRA floor in each subsequent year. For planning purposes, MBTA management assumes that Dedicated Sales Tax receipts will increase at a 2.8% CAGR through FY 2056, a conservative assumption relative to the historic growth trend.

Residual Assessments

Total Assessment Receipts increased at a 1.0% CAGR between FY 2001 and FY 2022, a rate of growth somewhat lower than the CPI CAGR at 2.5%. Gross Assessments since FY 2006 have been subject to annual adjustment (as measured by the Boston CPI for the prior year) up to a 2.5% cap, protecting total Assessment receipts from moderate levels of inflation. Assessments are additionally subject to an absolute floor of $136 million annually. Historic Residual Assessment revenues are estimated below by subtracting forward Assessment Bond MADS ($69.7 million) from total Assessment Receipts in all prior years. Based on this methodology, estimated historic Residual Assessment receipts have increased in each year since FY 2006. For planning purposes, MBTA management assumes that gross Assessment Revenues will increase 1.5% annually in each of the next five years and 2.0% annual thereafter, a conservative set of assumptions relative to the historic growth trend.

Figure 5

Historic Dedicated Revenues
FYE June 30 (dollars in millions)

FYE	Dedicated Sales Tax							Residual Assessments					Total Dedicated Revenues	
	Base Revenue Amount (BRA)	Δ YoY	Dedicated Sales Tax Revenue Amount (DSTRA)	Δ YoY	Excess (Deficiency) of DSTRA Over (Under) BRA	Pledged Sales Tax Available for DS	Δ YoY	Assessment Receipts[2]	Δ YoY	Assessment Bond MADS[3]	Estimated Residual Assessment Revenues Available for Senior Sales Tax Bond DS[3]	Δ YoY	Pledged Revenues Available for Senior Sales Tax Bond DS	Δ YoY
	a		b		b - a	Greater of a and b = **c**		d		e	d - e = **f**		c + f = **g**	
2001	$ 645.0		$ 654.6	5.3%	$ 9.6	$ 654.6		$ 144.6		$ 69.7	$ 74.9		$ 729.5	
2002	664.4	3.0%	638.8	-2.4%	(25.6)	664.4	1.5%	142.9	-1.2%	69.7	73.2	-2.3%	737.5	1.1%
2003	684.3	3.0%	639.2	0.1%	(45.1)	684.3	3.0%	141.2	-1.2%	69.7	71.5	-2.3%	755.7	2.5%
2004	684.3	0.0%	642.2	0.5%	(42.1)	684.3	0.0%	139.4	-1.2%	69.7	69.7	-2.4%	754.0	-0.2%
2005	704.8	3.0%	666.2	3.7%	(38.6)	704.8	3.0%	137.7	-1.2%	69.7	68.0	-2.5%	772.8	2.5%
2006	712.6	1.1%	684.0	2.7%	(28.5)	712.6	1.1%	136.0	-1.2%	69.7	66.3	-2.5%	778.9	0.8%
2007	734.0	3.0%	691.8	1.1%	(42.2)	734.0	3.0%	139.4	2.5%	69.7	69.7	5.1%	803.7	3.2%
2008	756.0	3.0%	690.8	-0.1%	(65.2)	756.0	3.0%	142.9	2.5%	69.7	73.2	5.0%	829.2	3.2%
2009	767.1	1.5%	647.8	-6.2%	(119.2)	767.1	1.5%	146.5	2.5%	69.7	76.8	4.9%	843.8	1.8%
2010	767.1	0.0%	637.1	-1.7%	(130.0)	767.1	0.0%	150.1	2.5%	69.7	80.4	4.8%	847.5	0.4%
2011	767.1	0.0%	654.6	2.8%	(112.4)	767.1	0.0%	150.1	0.0%	69.7	80.4	0.0%	847.5	0.0%
2012	779.1	1.6%	670.5	2.4%	(108.6)	779.1	1.6%	152.1	1.3%	69.7	82.4	2.4%	861.5	1.7%
2013	786.9	1.0%	682.0	1.7%	(104.8)	786.9	1.0%	155.9	2.5%	69.7	86.2	4.6%	873.1	1.3%
2014	799.3	1.6%	727.5	6.7%	(71.8)	799.3	1.6%	157.1	0.8%	69.7	87.4	1.4%	886.7	1.6%
2015	970.6	(1) 21.4%	924.1	(1) 27.0%	(46.5)	970.6	(1) 21.4%	160.1	1.9%	69.7	90.4	3.4%	1,061.1	19.7%
2016	986.3	1.6%	958.5	3.7%	(27.8)	986.3	1.6%	162.9	1.7%	69.7	93.2	3.0%	1,079.4	1.7%
2017	992.2	0.6%	976.8	1.9%	(15.4)	992.2	0.6%	164.0	0.7%	69.7	94.3	1.2%	1,086.5	0.7%
2018	1,006.8	1.5%	1,007.9	3.2%	1.1	1,007.9	1.6%	166.5	1.5%	69.7	96.8	2.6%	1,104.7	1.7%
2019	1,032.1	2.5%	1,053.2	4.5%	21.1	1,053.2	4.5%	170.1	2.2%	69.7	100.4	3.8%	1,153.6	4.4%
2020	1,063.0	3.0%	1,077.3	2.3%	14.3	1,077.3	2.3%	174.4	2.5%	69.7	104.7	4.2%	1,182.0	2.5%
2021	1,083.3	1.9%	1,261.4	17.1%	178.1	1,261.4	17.1%	177.9	2.0%	69.7	108.2	3.3%	1,369.6	15.9%
2022	1,095.6	1.1%	1,348.9	6.9%	253.3	1,348.9	6.9%	179.3	0.8%	69.7	109.6	1.3%	1,458.5	6.5%
2023	1,128.5	3.0%	n.a.	n.a.	n.a.	n.a.	n.a.	183.8	2.5%	69.7	114.1	4.1%	n.a.	n.a.
2024	1,162.3	3.0%	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.

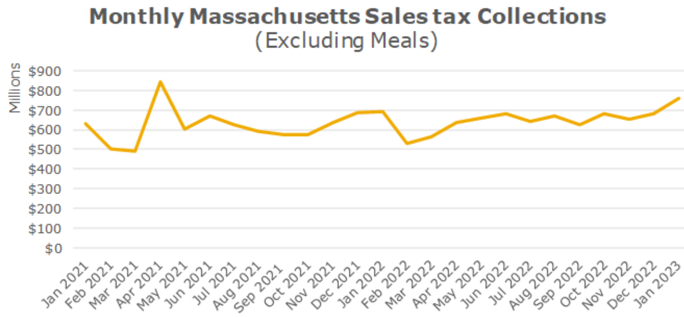
Source: MBTA

(1) The Enabling Act was amended on October 31, 2014 to increase the annual BRA and the DSTRA amount by $160 million, replacing the annual appropriation the MBTA received from FY 2010 to FY 2014.
(2) Subject to floor of $136.027 million.
(3) Historic Residual Assessment reveneus are estimated based by subtracting forward Assessment Bond MADS from total Assessment Receipts in all prior years.

Trend in Monthly Sales Receipts

Pledged Sales Tax receipts are subject to a moderate level of month-to-month volatility due to factors including seasonality.

Figure 6



Source: MBTA

Absence of Concentration in Taxable Base

The Pledged Sales Tax is levied across a wide range of retail transactions throughout the Commonwealth. This taxable base is broad and diverse with no concerning industry or company level concentrations.

Pledged Residual Assessment revenues are derived form ad valorem taxes levied upon 176 local governments in and around the MBTA service area. In FY 2022, the City of Boston accounted for the largest portion of the total annual assessment at 52.5%, followed by City of Cambridge at 6.0%, and the City of Newtown at 3.4% reflecting significant municipality level concentration.

RD 5: Coverage and Bond Structure

Dedicated Revenues provide strong coverage of pro forma sales tax revenue bond debt service requirements. The level of outstanding indebtedness reflects moderate leverage. Debt is structured in a conservative manner with debt service requirements declining annually. The Authority's capital plan calls for substantial additional borrowing projected to result in escalating debt service requirements going forward, but KBRA anticipates that leverage will remain moderate given the conservative additional bonds test as well as the Authority's reliance on sales taxes to support operations.

Outstanding Debt

MBTA has $5.2 billion in debt outstanding, of which $4.54 billion is secured by sales taxes.

Figure 7

MBTA Pro Forma Debt (dollars in millions)	
Sales Tax Bonds:	
Senior Bonds[1]	$ 2,840
Commerical Paper Notes[2]	-
Subordinated Bonds	1,352
Line of Credit[3]	-
US DOT RRIF Loan[4],[5]	351
Total Sales Tax Obligations	4,543
Assessment Bonds	558
General Transportation System (GTS) Bonds	99
Total Debt	**5,201**

Source: POS

(1) Includes $618.265 million in currently offered bonds.
(2) Facility is authorized for borrowing of up to $400 million. Approximately $58 million is drawn as of March 2, 2023, but will be refunded with proceeds of the currently offered bonds. Priority of payment is at parity with Senior Sales Tax Bonds.
(3) Facility is authorized for borrowing of up to $50 million but has no drawn balance. Facility terminates May 4, 2023. Priority of payment is at parity with Subodinated Sales Tax Bonds.
(4) Amount drawn as of January 1, 2023. Loans provide for the drawdown of up to $851.15
(5) Payable on a subordinate basis to Subordinated Sales Tax Bonds, unless there is a default on the USDOT Loan, in which case, paid on a parity basis with Senior Sales Tax Bonds.

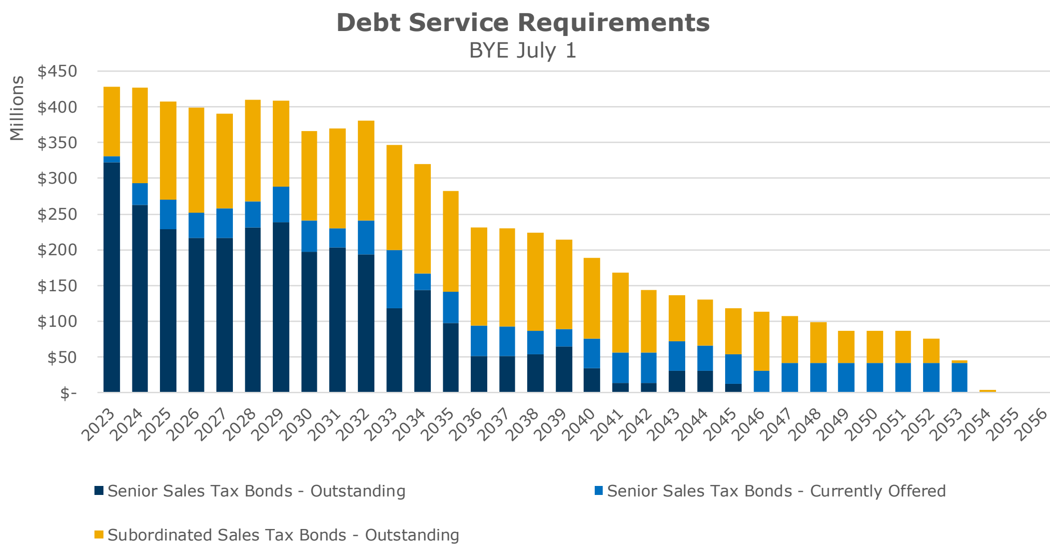
Approximately 96.0% of pro forma sales tax debt is fixed rate. A remaining 1.5% is synthetically fixed with 2.4% consisting of unhedged variable rate debt.

Debt Service Requirements

Pro forma Senior Sales Tax Bond debt service reaches a peak of $330.4 million in FY 2023, and generally descends thereafter (Figure 8 light and dark blue). Debt service inclusive of Subordinated Sales Tax Bonds is also descending.

Additional borrowing in support of the Authority's 4-year $9.77 billion Capital Improvement Program ("CIP") is expected in an amount of up to $2.95 billion. If all projects and borrowing contemplated in the CIP and the Authority's long-term capital planning projections are implemented, Authority debt service requirements would increase gradually, though substantially through the Authority's planning horizon. Management notes however that actual spending generally falls well short of the budgeted levels due to the inherent complexities of developing major capital projects. Nonetheless, debt capacity projections used by the Authority indicate that approximately $590 million in total Senior and/or Subordinated Sales Tax Bonds could be issued each year through FY 2056, with combined lien MADS coverage remaining at or above 2.60x each year. Such projections are based on a conservative assumption of 2.8% annual increases in sales tax receipts, which KBRA views favorably.

Figure 8



Source: MBTA

Historic Coverage

Pledged revenues provide ample MADS coverage of pro forma Senior Sales Tax Bond MADS, inclusive of the currently offered bonds.

Figure 9

Historic Revenues Available for Senior Sales Tax Revenue Bond Debt Service and MADS Coverage
FYE June 30 (dollars in millions)

FYE	MBTA Sales Tax Receipts	Base Revenue Amount	Sales Tax Available for Senior Sales Tax Bond DS	Assessment Receipts	Assessment Bond MADS	Residual Assessment Revenues Available for Senior Sales Tax Bond DS	Pledged Revenues Available for Senior Sales Tax Bond DS	Pro Forma MADS for Senior Sales Tax Bonds	Coverage Ratio for Senior Sales Tax Bonds
	a	b	Greater of a and b = **c**	d	e	d - e = **f**	c + f = **g**	h	h / g
2018	$1,007.9	$1,006.8	$ 1,007.9	$ 166.5	$ 69.7	$ 96.8	$ 1,104.7	$ 343.6	**3.21x**
2019	1,053.2	1,032.1	1,053.2	170.1	69.7	100.4	1,153.6	343.6	**3.36x**
2020	1,077.3	1,063.0	1,077.3	174.4	69.7	104.7	1,182.0	343.6	**3.44x**
2021	1,261.4	1,083.3	1,261.4	177.9	69.7	108.2	1,369.6	343.6	**3.99x**
2022	1,348.9	1,095.6	1,348.9	179.3	69.7	109.6	1,458.5	343.6	**4.24x**

Source: MBTA

Maximum Annual Debt Service Coverage is Ample

Pro forma Senior Sales Tax Revenue Bond debt service achieves MADS of $330.4 million in FY 2023, upon which pledged FY 2022 receipts provides ample coverage of 4.24x.

Stress Analysis

As the Authority is highly reliant on pledged revenues for operations as well as debt service, and the Indenture stipulates an additional bond test for Senior Lien Sales Tax Bonds based on trailing annual Dedicated Revenues equivalent to 2.00x pro forma MADS, KBRA's stress analysis focuses on declines to the 2.00x MADS coverage level rather than the 1.00x coverage breakeven threshold. KBRA determined that Pledged Receipts would need to decline by 52.9% before reaching the 2.00x MADS coverage level. This decline is far larger than the largest decline recorded in pledged receipts since FY 2001, which was a 0.2% decline in FY 2004. Furthermore, a decline of this magnitude is not plausible given that guaranteed Pledged Revenue amount based on the FY 2022 BRA alone is only 24.2% below actual FY 2022 Dedicated Revenues.

ESG Management

KBRA typically analyzes Environmental, Social, and Governance (ESG) factors through the lens of how issuers plan for and manage relevant ESG risks and opportunities. More information on KBRA's approach to ESG risk management in public finance ratings can be found here. Over the medium-term, public finance issuers will likely need to prioritize ESG risk management and disclosure with the likelihood of expansions in ESG-related regulation and rising investor focus on ESG issues.

KBRA analyzes many sector- and issuer- specific ESG issues but our analysis is often anchored around three core topics: climate change with particular focus on greenhouse gas emissions, stakeholder preferences, and cybersecurity. Under environmental, as the effects of climate change evolve and become more severe, issuers are increasingly facing an emerging array of challenges and potential opportunities that can affect financial assets, operations, and capital planning. Under social, the effects of stakeholder preferences on ESG issues can affect the demand for an issuer's product and services, the strength of its global reputation and branding, its relationship with employees, consumers, regulators, and lawmakers, and, importantly, its cost of and access to capital. Under governance, as issuers continue to become more reliant on technology, cybersecurity planning and information management are necessary for most issuers regardless of size and industry.

Environmental Factors

The Authority entered into renewable energy contracts commencing January 1, 2021 that transitioned the system to 100% renewable electric energy use, resulting in a significant reduction in the MBTA's carbon footprint. Previously, approximately 36% of the MBTA's carbon emissions came from electric usage.

MBTA is in the process of completing climate vulnerability assessments for the entire rapid transit system, key bus and commuter rail facilities, and other locations. MBTA has also developed a set of standards to assess climate change impacts and ensure that resilience is bult into each capital project from the earliest stages of design. The standards require the use of vulnerability assessment scores, climate resiliency scores, design standards addressing flood protection and stormwater management, and the mandatory consideration of climate related risks.

The Authority has designated the Subseries A-1 Bonds as Sustainability Bonds reflecting the use of such proceeds for purposes that may include projects with environmental benefits supporting the transition to low-carbon, climate resilient, and sustainable community as well as social benefits.

Social Factors

Social benefits priorities under the Authority's MBTA Sustainability Bond framework may include access to essential services and affordable infrastructure, critical health and safety improvements, and socioeconomic advancement.

In 2015, the MBTA was awarded Gold Level Recognition as part of the America Public Transportation Association's Sustainability Commitment Pledge which sets stands for social responsibility as well as environmental preservation, economic viability of the system, and overall quality of life for commuters.

Governance Factors

The Enabling Act requires that MBTA's Board of Director's be comprised by members of a varying backgrounds and consist of:

i. the Secretary of Transportation of the Commonwealth, who serves ex officio;
ii. one person appointed by the MBTA advisory board who shall have municipal government experience in the service area constituting the Authority and experience in transportation operations, transportation planning, housing policy, urban planning or public or private finance;
iii. one person appointed by the Governor who shall have experience in safety;
iv. one person appointed by the Governor who shall have experience in transportation operations;
v. one person appointed by the Governor who shall have experience in public or private finance;
vi. one person appointed by the Governor who shall be a rider as defined in the Enabling Act and a resident of an environmental justice population; and,
vii. one selected appointed by the Governor from a list of three persons recommended by the president of the Massachusetts State Labor Council, AFL-CIO.

Additionally, not less than two of the appointed members shall also be members of the board of directors of the Massachusetts Department of Transportation.