MOODY'S
INVESTORS SERVICE

RATING METHODOLOGY

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TABLE OF CONTENTS

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Rating Methodology

Privately Financed Public Infrastructure (PFI/PPP/P3) Projects in Construction

This rating methodology replaces the *Construction Risk in Privately Financed Public Infrastructure (PFI/PPP/P3) Projects* methodology published in July 2019. We have reordered and have made editorial updates to various sections of the methodology. These updates do not change our methodological approach.

Scope

This methodology applies to privately financed public infrastructure (PFI/PPP/P3) projects in construction globally where the sponsoring government pays for the infrastructure asset either upon certain construction milestones being reached and/or through availability payments covering operating and maintenance costs, debt service and equity returns with such payment only being subject to availability and performance risk. The related methodology is the methodology applicable to operational privately financed public infrastructure (PFI/PPP/P3) projects.[1] At financial close, the lower of the two ratings (the rating during construction and the rating during the operating phase) applies.

This methodology may be applicable to any infrastructure project contracted by a government entity where the fundamental structure exhibits many of the same traits as a typical PFI/PPP/P3 project (for instance, a design-build-finance (DBF) project where the government makes milestone payments or a completion payment, where the risk allocation is similar to the one that is expected in a PFI/PPP/P3 project and where there are termination payments with such termination payment essentially only exposed to a cost-to-complete penalty).

This methodology does not apply to projects that deviate materially from an availability payment PFI/PPP/P3 project model even where there is a fixed-price date-certain construction contract involved, including projects that may exhibit some of the following characteristics: projects contracted by non-government entities; projects where the economic rationale can change significantly over time resulting in different behaviors by the Issuer's consortium; projects that are exposed to volume and/or price risk (for instance, such that in case of termination of the project agreement/concession during construction,

the termination payment or the sale price may reflect changes in post-construction revenue assumptions, not just cost-to-complete considerations); projects with no termination payments for force majeure and for convenience, so more exposed to a wider range of construction risks and economic rationale risk; projects fully exposed to the whole suite of construction risks, such as land acquisition, long lead time permits, and other risks.

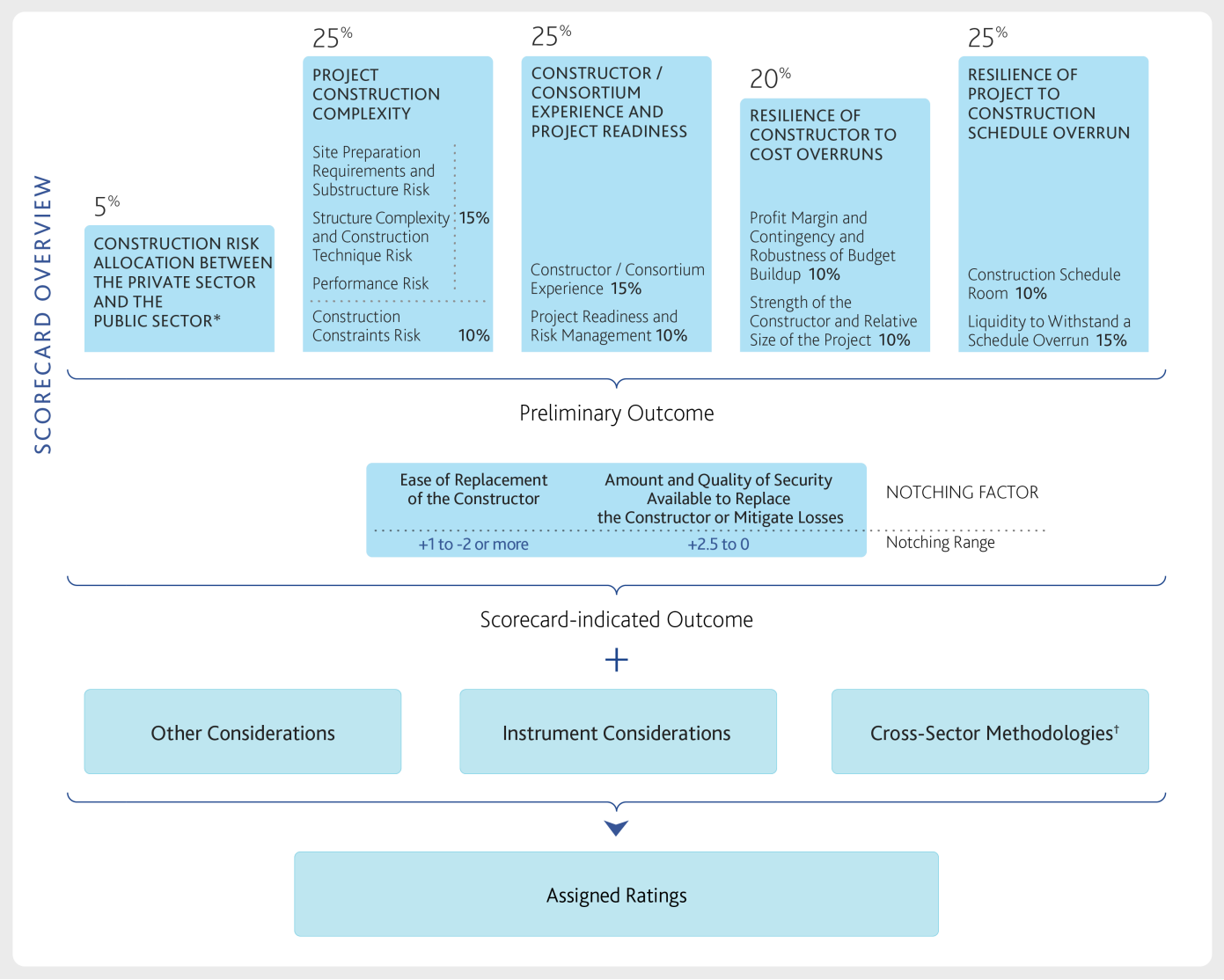
Rating approach

In this rating methodology, we explain our general approach to assessing credit risk of privately financed public infrastructure (PFI/PPP/P3) projects in construction globally, including the qualitative and quantitative factors that are likely to affect rating outcomes in this sector. We seek to incorporate all material credit considerations in ratings and to take the most forward-looking perspective that visibility into these risks and mitigants permits.

The following schematic illustrates our general framework for the analysis of privately financed public infrastructure (PFI/PPP/P3) projects in construction, which includes the use of a scorecard.[2] The scorecard-indicated outcome is not expected to match the actual rating for each company. For more information, see the "Other considerations" and "Limitations" sections.

Exhibit 1

Illustration of the framework for privately financed public infrastructure (PFI/PPP/P3) projects in construction



*This factor has no sub-factors.

†Some of the methodological considerations described in one or more cross-sector rating methodologies may be relevant to ratings in this sector. A link to a list of our sector and cross-sector methodologies can be found in the "Moody's related publications" section.

Source: Moody's Investors Service

Privately financed public infrastructure (PFI/PPP/P3) projects in construction scorecard

For general information about how we use the scorecard and for a discussion of scorecard mechanics, please see the "Using the scorecard to arrive at a scorecard-indicated outcome" section. The scorecard does not include or address every factor that a rating committee may consider in assigning ratings in this sector. Please see the "Other considerations" and "Limitations" sections.

Exhibit 2

Privately financed public infrastructure (PFI/PPP/P3) projects in construction scorecard

	Weight	Aa	A	Baa	Ba	B/Caa
Factor: Construction Risk Allocation Between the Private Sector and the Public Sector (5%)						
Construction Risk Allocation Between the Private Sector and the Public Sector	5%	The sponsoring government retains most of the construction risks through delay and compensation events; timely compensation; highly supportive contract terms and conditions.	The sponsoring government retains some material construction risks that are usually borne by the private sector with appropriate time relief and compensation; timely compensation; supportive contract terms and conditions.	The sponsoring government and private sector have a standard risk allocation; For the risks retained by the sponsoring government, appropriate levels of time relief and compensation; standard overall PFI/PPP/P3 terms and conditions.	The private sector retains more construction risks than in a standard allocation of risks and these risks can be material; or thresholds for time relief and compensation are high or the risk allocation is somewhat unclear; overall contract terms and conditions have some areas of concern.	The private sector retains most construction risks with the very little allocated to the sponsoring government; unusual terms and conditions of the Project Agreement that lead to material specific concerns.

Weight	Aa	A	Baa	Ba	B	Caa
Factor: Project Construction Complexity (Factor 2 — 25%)						
Site Preparation Requirements and Substructure Risk	Well-understood and simple geology; very limited site area; very limited scope and complexity of construction site preparation and very limited need to build substructures, all well within known and simple technologies.	Well-understood and primarily simple geology; limited site area; limited scope and complexity of construction site preparation; limited need for substructures, all within known and essentially simple technologies.	Well-understood and moderately complicated geology; manageable/standard site area; site preparation requirements that do not entail very lengthy processes or blasting or tunneling; normal substructures (but excluding material/ extensive deep foundations), all within standard technologies.	Well-understood and somewhat more complicated geology; fairly extensive site; some aspects of the project have complex or lengthy site preparation requirements such as some limited blasting, cut and cover tunnels or surcharge pre-loading requirements and some substructures may be complex but usually all within accepted techniques.	Complex geology; extensive site; complex, extensive, lengthy site preparation requirements that may require extensive blasting; complex/extensive substructures; some unusual or complex techniques required.	Unusual/difficult geology; very extensive site; the project is unique, few precedents with that combination and extent of site preparation risks and substructure risk; unique techniques or equipment required (such as a tunnel boring machine).
Structure Complexity and Construction Technique Risk	Very simple structure; highly repetitive; very well-tested and very simple design and construction techniques; material offsite work; several independent elements; very well-known and highly appropriate materials for the project.	Simple structure with a material level of repetitiveness; simple normal design and construction techniques; some offsite work possible on some elements of the project; some material ability to work independently on various aspects of the project; generally well known and appropriate materials.	Structure of standard complexity; well understood design and construction techniques although they could have a certain element of complexity; some repetitive elements within at least a material part of the project; may have a few complex elements for the more unique parts of the project (e.g. mechanical floor in a hospital) but well within industry norms and experience; project is mostly sequential and has limited offsite work; materials generally appropriate for the project.	Some complex structural elements; may require material testing to demonstrate that the asset can withstand a range of events (wind, etc.); minimal repetition; some complex or unusual design and construction techniques; project is essentially sequential with minor offsite work; may incorporate less well-tested materials in some parts of the project.	Several complex, unique elements of the structure; extensive testing to demonstrate that the asset can withstand a wide range of events (wind, etc.); complex and/or unusual design and construction techniques; project structure is highly sequential and is all essentially built on site; materials used may be unusual or untested for a material portion of the project.	Many complex, unique elements in the design, structure, techniques and materials that, singly or in combination, cause a very high degree of construction risk.

	Weight	Aa	A	Baa	Ba	B	Caa
Factor: Project Construction Complexity (Factor 2 — 25%)							
Performance Risk		Few very simple mechanical and electrical (M&E) systems, IT and equipment need to be installed - all well-proven technology; these components of the project are a small percentage of construction budget (typically less than 5%-10%); availability and performance standards to reach substantial completion are limited in scope and highly achievable; very short commissioning period (<2 months).	Simple M&E systems, IT and equipment need to be installed - all proven technology; these components of the project are a relatively small percentage of construction budget (typically 10%-20%); availability and performance standards to reach substantial completion are relatively limited in scope and can be easily achieved; short commissioning period (<3-4 months).	M&E systems, IT and equipment required are standard for the asset although they can have a certain degree of complexity - generally proven technology; these components represent a material percentage of the construction budget (20%-35%); availability and performance standards to reach substantial completion follow industry norms and may have some degree of stringency; moderate commissioning period of 4-6 months.	M&E systems, IT and equipment required are relatively extensive and complex - some elements may not be well proven; these components represent a large proportion of the construction budget (35%-55%); several strict standards with respect to performance and availability to reach substantial completion, some of which may be above industry norms; relatively lengthy commissioning period of 6-9 months.	M&E systems, IT and equipment required are extensive and complex - several elements may not be proven (i.e., custom-made); these components represent a very substantial portion of the construction budget (55%-75%); very high standards of performance and availability in most of the facility to reach substantial completion, several of which may be above industry norms or may be unusual; lengthy commissioning period of 9-12 months.	M&E systems, IT and equipment required are extensive and unique; mostly a custom order M&E, IT or equipment project; extremely high and unique performance and availability standards; extensive commissioning period (>1 year).
Construction Constraints Risk	10%	No material constraints beyond constraints generally applicable to the industry (e.g. vacations, weather, widely-known construction laws and regulations); no constraint that could impact the critical path.	A few manageable constraints, not expected to result in requirements for material work around; restrictions set at very workable levels, only impacts a limited period of the project construction; no material constraints that could impact the critical path.	A few manageable constraints with some well understood and relatively simple work around requirements; restrictions set at workable levels; constraints affect only a reasonably limited period of the project; limited impact on critical path.	Several constraints and restriction levels are such that material workaround is required but the workaround solutions have precedents and a reasonable degree of predictable results; if workaround cannot be implemented, it could have a material impact on the critical path; restrictions affect several phases of the project.	Many constraints or unusual constraints; restriction levels that are restraining or have limited precedents for workarounds; high risk of material impact on critical path if work cannot be done efficiently and in a timely basis as a result of all the constraints; restrictions are pervasive through the whole length of the project.	The project as a whole is subject to a multitude of constraints affecting most of the construction period; restrictions set at tight levels; highly unusual workaround solutions; impact on critial path could be extremely deleterious if work cannot proceed as a result of the constraints.

	Weight	Aa	A	Baa	Ba	B	Caa
Factor: Constructor/Consortium Experience and Project Readiness (25%)							
Constructor/ Consortium Experience	15%	Extensive successful track record in jurisdiction, with type and size of project, and with PFI/PPP/P3's; very robust oversight and project management; consortium members have excellent track record of working together.	Good track record in jurisdiction with type and size of project; and with PFI/PPP/P3's; robust oversight and project management; consortium members have good track record of working together.	Good track record in two out of the three areas (PFI/PPP/P3, project type/size, country); adequate oversight and project management; consortium members have limited but successful track record of working together.	Good track record in one out of the three areas (PFI/PPP/P3, project type/size, country) of experience; potentially weak project management and oversight; consortium members have limited track record of working together.	Limited track record in all 3 areas (PFI/PPP/P3, project type/size, country); weak project management and project oversight; consortium members have no track record of working together.	Questionable track record in all respects; inexperienced project management and/or ineffective project oversight; Note that in that case, a high degree of focus needs to be put on a constructor replacement scenario and/or a Project Agreement termination event.
Project Readiness and Risk Management	10%	Very conservative approach throughout; evidence of active and extensive risk reduction strategies employed throughout the project design and preparedness to mitigate the risks identified under factor 2;[1] high degree of confidence that such strategies will sufficiently mitigate the risks and will have predictable results; very limited risk exposure to material sub-contractors availability and credit risk through pre-identification, pre-clearance, material diversification and material security posted by such sub-contractors; well-established and solid supply chain management (SCM).	Evidence of active and material risk reduction strategies employed throughout the project design and preparedness for all of the major risks identified under factor 2; good degree of confidence that such strategies will help mitigate such risks; limited exposure related to material sub-contractors availability and credit risk through pre-identification, pre-clearance, good diversification and material security posted by the material sub-contractors; good SCM.	Normal, standard approach to bid/project and identified risks including close coordination with the facilities management provider during the design/construction period; partial mitigation of some risks or lower degree of comfort that the risk mitigation strategies will result in predictable outcomes; some larger identified critical sub-contractors but risk well mitigated through security; material percentage of the project may not have identified sub-contractors for smaller contracts but no concern with respect to availability of such sub-contractors at prices within budget; adequate SCM.	A few aspects of the project approach/bid approach are exposed to risks that cannot be entirely mitigated or for which the de-risking strategies may not have a high degree of outcome predictability; potential risk associated with one or more critical sub-contractors and there are some gaps in the security being posted; high percentage of project may not have identified subs but no concern with respect to the availability of such subs; generally adequate SCM.	Several large elements of the bid approach/project are representing additional risk that cannot be mitigated; large critical sub-contractor risk with such key sub-contractor not easily replaceable without lengthy delays; limited security taken from critical sub-contractors; concerns with respect to the availability of sub-contractors; weak SCM.	Very aggressive approach to risk throughout the project, bid and for the project approach; very little thought given to risk mitigation; high dependence on high risk key sub-contractors with no security being taken; high degree of concern with respect to the availability of sub-contractors; untested or very weak SCM.

	Weight	Aa	A	Baa	Ba	B	Caa
Factor: Resilience of Constructor to Cost Overruns (20%)							
Profit Margin and Contingency and Robustness of Budget Buildup	10%	Very strong profit margin and contingency characteristics given the type of project and industry conditions; highly disciplined budget buildup methods with independent reconciliation of quantities; conservative and specific escalation assumptions and/or hedging; AND in all cases stable industry conditions.	Strong profit margin and contingency characteristics given the type of project and industry conditions; disciplined budget buildup; robust escalation assumptions and/or hedging AND in all cases normal industry conditions.	Average profit margin and contingency characteristics given the type of project and industry conditions; adequate budget buildup; adequate escalation assumptions/ hedging; AND in all cases normal industry conditions.	Below-average profit margin and contingency characteristics given the type of project and industry conditions; somewhat weak budget buildup; general CPI escalation assumptions or minimal hedging; (or previous case but some concern re commodity/labor inflation).	Below-average profit margin and contingency characteristics given the type of project and industry conditions; weak budget buildup; somewhat aggressive assumptions with respect to cost escalation; OR material concerns with respect to commodity/labor inflation or labor/ commodity availability.	All other cases; including if there are strong concerns about overall industry construction conditions and constructors bidding at very thin margins, or at a loss, to win contracts.
Strength of the Constructor and Relative Size of the Project	10%	Large and well-diversified constructor (by geography and by business segment) with solid financials AND project annual spend represents less than 1% of the company's annual revenues.	Large and well-diversified constructor (by geography and business segment) with solid financials AND project annual spend represents less than 3% of the company's revenues.	Solid large national/ multi-regional constructor AND annual spend on the project is less than 3% of the company's annual turnover (or previous case but project annual spend represents 3-5% of company's annual revenues).	Solid regional constructor AND project annual spend is less than 3% of the company's annual turnover (or previous case but annual spend on project is 3-6% of annual revenues).	All other cases as long as constructor is financially healthy and project annual spend does not represent an undue amount of risk.	Material short-term or medium concern about the financial viability of the constructor and/or its willingness to support and complete troubled projects; Note that if the constructor is particularly weak financially or has a history of walking away from projects, a high degree of focus needs to be put on the analysis of the project resilience to a constructor replacement or Project Agreement termination.

	Weight	Aa	A	Baa	Ba	B	Caa
Factor: Resilience of Project to Construction Schedule Overrun (25%)							
Construction Schedule Room	10%	>15% schedule float; 18 months period between the target date for substantial completion and the long stop date and very conservative schedule buildup.	10%-15% schedule float; 12 (for simple projects) - 18 months (for complex projects) between the target date for substantial completion and the long stop date and conservative schedule buildup.	5%-10% schedule float, 12 months between the target date for substantial completion and the long stop date and appropriate schedule buildup; or higher float/longer period between the target date for substantial completion and the long stop date but schedule already incorporates some limited partial acceleration measures (e.g., night work, weekend work, double shift).	2%-5% schedule float, 6-12 months period between the target date for substantial completion and the long stop date and appropriate schedule buildup; or same as previous category but schedule already incorporates material acceleration measures for some aspects of the construction (e.g., night work, weekend work, double shift).	2%-5% schedule float, 6-12 months period between the target date for substantial completion and the long stop date but schedule already incorporates material acceleration measures for some aspects of the construction (e.g., night work, weekend work, double shift).	Weaker characteristics than B category.
Liquidity to Withstand a Schedule Overrun	15%	Liquidity sufficient to withstand at least a 30% schedule overrun, min 18 months; very robust delay analysis and no gaps identified.	Liquidity sufficient to withstand a 25%-30% schedule overrun, min 12 months; robust delay analysis and no material gap identified.	Liquidity sufficient to withstand a 20%-25% schedule overrun, min 9 months; standard delay analysis and limited gaps identified.	Liquidity sufficient to withstand a 15%-20% schedule overrun, min 6 months; somewhat limited delay analysis and some material gaps identified.	Liquidity sufficient to withstand a 6 months delay but less than 15% schedule overrun; limited delay analysis and several material gaps identified.	Weaker characteristics than B and/or other concerns re liquidity (e.g., quality).
Preliminary outcome							

Notching factor						
Ease of Replacement of Constructor						
	+1.0	+0.5	0	-0.5	-1.0	-2.0 or more
Ease of Replacement of Constructor	High degree of replacement ease either within DBJV or through availability of many suitable companies who could step-in in a timely manner; extensive and robust mitigants to avoid loss of sub-contractors; pricing of construction contract and of operating, maintenance and life cycle costs at high end of comparables with such comparables being recent and relevant.	Good degree of replacement ease either within DBJV or through availability of several suitable companies who could step-in in a timely manner; material mitigants to avoid loss of sub-contractors; pricing of construction contract and of operating, maintenance and life cycle costs well within comparables with such comparables being recent and relevant.	Moderate degree of replacement ease either within DBJV or through availability of a few suitable companies who could step-in in a timely manner; some mitigants to avoid loss of sub-contractors; pricing of construction contract and of operating, maintenance and life cycle costs mostly within recent relevant comparables.	Somewhat weak degree of replacement ease either through weak DBJV members, or very few suitable companies who could step-in in a timely manner; weak mitigants to avoid loss of sub-contractors; pricing of the construction contract and of operating, maintenance and life cycle costs at the lower end of comparables or comparables are somewhat old or not close.	Weak degree of ease of replacement; weak to non-existent mitigants for sub-contractor loss; pricing of construction contract and of operating, maintenance and life cycle costs somewhat below comparables or few comparables, or comparables are old.	It is not expected that the failed constructor would be replaced in a timely manner due to the project nature or market conditions or both; likely to be no relevant comps.
Amount and Quality of Security Available to Replace the Constructor or Mitigate Losses						
	+2.5	+2.0	+1.5	+1.0	+0.5	0
Amount and Quality of Security Available to Replace the Constructor or Mitigate Losses	High quality security (after application of haircuts - see note below) ≥ 25% of the construction price.	High quality security (after application of haircuts - see note below) ≥ 20% but less than 25% of the construction contract amount.	High quality security (after application of haircuts - see note below) is ≥ 15% but less than 20% of the construction contract amount.	High quality security (after application of haircuts - see note below) is ≥ 9% but less than 15% of the construction contract amount.	High quality security (after application of haircuts - see note below) is ≥ 5% but less than 9% of the construction contract amount.	Security (after application of haircuts - see note below) is less than 5% of the contract amount; or any other amount where there is weak security quality.
Scorecard-indicated outcome						

[1] For instance, if geological conditions are identified as a risk in factor 2 to score well in this sub-factor, the constructor would need to demonstrate that it has undertaken additional geological studies, and/or selected design choices that take into account the potential uncertainty with respect to geological conditions, and/or settled on a schedule that provides adequate buffer to spend more time on site preparation and excavation/piling so that ultimately, geological risk is materially reduced.
Note: Haircuts are applied in accordance with our assessment of the certainty of funding upon demand for such instruments in the relevant jurisdiction as well as their scope and features. We have observed considerable variation in the promptness and amount of funding not only among instrument types, but also among jurisdictions. The performance of instruments is a function of their term and conditions as well as the legal and judicial framework of the jurisdiction and prevalent commercial practices, including the frequency of claim disputes. In addition, our assessment may be based on the performance history of a particular support provider as well as its financial strength. Since none of these factors is static, our assessment of appropriate

haircuts evolve over time. As of the date of this methodology, general guidelines for typical instruments in jurisdictions where we have rate PFI/PPP/P3-Construction projects are as follows: Letters of credit from highly rated OECD banks and payable on demand upon presentation: no haircut; Australia performance bonds: 10% haircut; Australia adjudication bonds: 25% haircut; North America standard performance bond: 50% haircut; UK adjudication bond: 25% haircut.
Source: Moody's Investors Service

Sector overview

PFI/PPP/P3 structures are designed to shift to the private sector certain financing, design, construction and operating[3] [4] risks of public infrastructure projects, such as hospitals, courthouses, schools, jails, roads, public transit systems, bridges and power projects. Private sector consortia are engaged through a bidding process to design, build and operate (DBO) infrastructure projects under long-term Project Agreements from a sponsoring government or one of its agencies. Once the asset is built to the specifications required by the sponsoring government, the sponsoring government pays the private sector an availability payment that is sized to cover operating, maintenance, life cycle costs as well as debt service and equity returns. These availability payments are not subject to any material demand risk and are only adjusted for poor performance or availability.

PFI/PPP/P3 projects are distinguished from traditional government procurement arrangements by the fact that they feature fixed-price, date-certain construction contracts and a payment for that asset made upon certain milestones being met, or through availability payments over a long period of time (generally 25 years or more) instead of as work progresses.

A typical PFI/PPP/P3 issuer is a limited purpose entity established to construct and then operate a public infrastructure asset pursuant to a long-term Project Agreement with a sponsoring government or agency. The Issuer passes down substantially all the design and construction requirements under the Project Agreement to a constructor on a back-to-back basis under a fixed-price date-certain contract. Usually, the Issuer has no title to the infrastructure asset once the asset is built and its main asset is the long-term Project Agreement which is assigned, along with all major other contracts, to the Issuer's lenders.

PFI/PPP/P3 projects are usually financed with very high levels of debt (often 90% or higher), with the equity level sized to produce a target debt service coverage ratio falling within a very narrow band (typically 1.15x to 1.30x) once the asset is built and starts receiving revenues.

In most cases, the Project Agreement sets a target date for substantial completion with substantial completion triggering the start of the availability payments. To meet the definition of substantial completion, the asset has to be able to show that it was built according to the specifications in the Project Agreement (e.g. a 350 room hospital with 6 operating theatres) and that it can perform according to the specifications in that same agreement (e.g. reliable supply of water, power, heat, medical gases, back-up systems and air flow, all at the required levels of quantity and quality). The Project Agreement also typically sets a long stop date for the completion of the construction so that if the project is not completed by that date, it is an event of default under the Project Agreement that gives the right to the sponsoring government to terminate the Project Agreement.

The construction period budget is sized to cover construction costs, interest during construction,[5] Issuer SPV costs, reserve funding and miscellaneous costs such as insurance costs up to and including the target date for substantial completion.

Upon the termination of the Project Agreement before its scheduled maturity, the sponsoring government makes a termination payment, the calculation of which depends on the circumstances of the termination. Normally, senior debt is made whole in case of termination for the sponsoring government's default (subject to the sponsoring government credit risk), convenience and force majeure, but will likely suffer losses if the termination is caused by the Issuer's default.

The principal risks to the Issuer's debt-holders during construction of a PFI/PPP/P3 project include the following scenarios:

» the project is delayed beyond the original target date for substantial completion and the issuer runs out of liquidity to meet all its obligations before it is entitled to receive the availability payments.

» the project cannot be completed before the long stop date in the Project Agreement, leading to a potential right of the sponsoring government to terminate the Project Agreement and pay a termination amount that may not cover senior debt, since that calculation will typically reflect a cost to complete penalty (as well as other costs, including potential additional costs related to the operating period)

» the constructor[6] to which the construction obligations have been passed down needs to be replaced for a variety of reasons. These could include the constructor's inability to perform and deliver the asset in accordance with the required standards in the Project Agreement; its bankruptcy or insolvency, including as a result of losses incurred on the project being built; or its inability to complete the project by the constructor's long stop date. In all likelihood, such a replacement would entail a higher construction cost. If there are insufficient funds in the structure to cover these additional costs or if the failed constructor cannot be replaced, the Project Agreement may be terminated and the termination payment may be insufficient to reimburse the Issuer's debt.

Discussion of the scorecard factors

In this section, we explain our general approach for scoring each scorecard factor or sub-factor, and we describe why they are meaningful as credit indicators.

Factor: Construction Risk Allocation Between the Private Sector and the Public Sector (5% weight)

Why it matters

The allocation of construction risks between the private and public sectors provides important indications of the extent to which private-sector construction risks are reduced.

A PFI/PPP/P3 project starts with a negotiated allocation of the construction risks between the sponsoring government and the private sector. Very few PFI/PPP/P3's allocate all the construction risks to either party. The sponsoring government's agreement to retain or share some of the construction risks can take either of two forms: a delay event (that provides time relief to the private sector to complete the construction of the asset) or a compensation event (that compensates the private sector for costs arising from the incurrence of such risks). The most credit supportive risk allocations are those where the allocation of construction risks is clear; the allocation is generally standard for the jurisdiction and therefore well understood and tested; the sponsoring government retains the risks that cannot be easily controlled/priced by the private sector (such as land acquisition); and provides for schedule relief and timely compensation for those risks.

How we assess it for the scorecard

In assessing this factor, we consider whether construction risks are allocated to the private sector, the public sector or shared between them. Broadly speaking, the information in the following table outlines a typical risk allocation for a PFI/PPP/P3[7] project:

Exhibit 3

Typical construction risk allocation in a PFI/PPP/P3 project

Risks usually kept by the private sector	Risks usually kept by the public sector (either delay event or compensation event)	Shared risks or case-by-case allocation
All matters related to design, construction, getting appropriate resources, suppliers, materials and equipment; input price risk		
Weather		
Geotechnical conditions		
Protected/endangered species, habitat compensation		
Utilities relocation		Sometimes the risk sharing is as follows: utilities identified in the Project Agreement are private sector risk while undisclosed ones are public sector risk
	Land and right of way acquisition within an agreed upon area	
	Archeological/historical finds	
	Change orders requested by the sponsoring government	
	Force majeure	
	Asset replacement cost beyond insurance coverage	
Construction permits	Initial planning/regulatory/long lead time permits	
Specific company strikes	General construction industry strikes	
Disclosed/known contamination	Undisclosed/unknown contamination and /or contamination beyond an agreed upon level	
		Change in Law (post bid) can be either party's risk or a shared risk
		Blockade/protests could be either party's risk or a shared risk

Source: Moody's Investors Service

Any material deviation (positive or negative) from this broad risk allocation is assessed on its own merits in order to determine the potential impact on the project rating. For instance, in some projects, the private sector retains archeological risk. Given the general difficulty of locating archeological and historical artifacts before construction starts, such a shift of risk to the private sector could be negative unless the discovery of such artifacts is highly unlikely or we expect the impact on the construction program would be very limited (e.g., artificially created land, brownfield site or project with a small footprint). Conversely, in some cases, the sponsoring government agrees to retain or share geological risk or some other risks normally kept by the private sector. We consider the extent, materiality and timeliness of such risk sharing and whether it reduces private-sector risk.

In our overall assessment, we also considerthe project agreement's terms and conditions (e.g., dispute procedure or process for reviewing and signing off drawings).[8] While in major OECD jurisdictions the PFI/PPP/P3 contracts typically follow a similar overall framework, there can be some significant variations.

Factor: Project Construction Complexity (Factor 2 — 25% weight)

Why it matters

Project complexity represents the intrinsic construction risk of a project that can lead to delays and cost overruns. As complexity rises, so does the uncertainty as to the final cost and the schedule to complete the construction of the asset.

The PFI/PPP/P3 framework is used to procure assets with a wide range of construction complexity: from simple low-rise accommodation buildings to highly complex transportation projects. While the Issuer enters into a fixed-price date-certain contract with a constructor, construction complexity could result in schedule overruns or create operational or financial stress for the constructor could, in turn, lead to the necessity of replacing it at a higher cost if that constructor cannot perform or finish the project on time.

The factor comprises four sub-factors.

Site Preparation Requirements and Substructure Risk

Most infrastructure projects require at least some level of site preparation/substructure work before construction of the actual asset (be it a building, a road or a rail transit system) can commence. Since it is impossible to know with absolute certainty what lies below the surface of a site before a project starts, it is not unusual for projects to incur delays and unexpected costs as a result of unexpected geological or other site conditions. Actual conditions can cause excavation delays or a requirement for more surcharge pre-loading to achieve the required soil settlement qualities or additional deep foundations (e.g., piling), a need for more waterproofing of the site, or lengthier or more expensive utility relocation than anticipated. The resulting schedule delays and or cost overrun can be material. However, these issues typically occur at the beginning of the project construction, when the full project schedule and the entire cost contingency are usually available.

Structure Complexity and Construction Technique Risk

PFI/PPP/P3 projects also have a wide range of structure complexity. As structure design, construction techniques and complexity uniqueness increases, so does the risk of schedule and cost creep.

Performance Risk

Many infrastructure projects exhibit sizable mechanical, electric, IT, systems and equipment[9] work that involves lengthy installation, testing and commissioning in order to ensure that the asset meets all the minimum availability and performance requirements outlined in the project agreement. Often, once substantial completion has been reached, there are still transitioning and fine-tuning issues with respect to such equipment until a steady operating state is reached. With the increased complexity of the equipment and systems being used in infrastructure assets, risks to the schedule and to the construction cost can arise during commissioning if the equipment does not perform as expected and needs to be fine-tuned, repaired, replaced and re-tested until all the performance and availability requirements in the definition of substantial completion are achieved.

Construction Constraints Risk

Constraints in construction projects can vary widely and can introduce risks that lead to material cost overruns or schedule delays. Most are well known normal constraints and apply to all construction projects as a matter of course (e.g., respect of safety and labor laws) but others are project-specific. Some are imposed through the project agreement (e.g., keeping a minimum number of traffic lanes open while a road is being expanded or making it expensive to shut down lanes at certain times of the day; keeping a train station operating while the building is being modernized; maximum vibration or noise levels when construction takes place near a sensitive area; or consulting with or receiving the approval of various parties). Other constraints are a result of laws and regulations that are pertinent to the project (e.g., environmental regulations). A fourth set of constraints results from the site location such as a congested site, or a site requiring water works. For instance, constrained access could create a need to stage the phases of the project (e.g., build a portion of the project first or build temporary facilities first, or move the operations of the existing facilities to the new facilities, demolish the old facilities and then complete the project).

How we assess it for the scorecard

Scoring for this factor is based on four sub-factors: Site Preparation Requirements and Substructure Risk; Structure Complexity and Construction Technique Risk; Performance Risk; and Construction Constraints Risk.

The first three sub-factors have a total combined scorecard weight of 15%. We have not allocated distinct weights to the first three sub-factors to recognize that the PFI/PPP/P3 model may apply to a wide range of assets, some of which may not exhibit all the construction phases that we consider standard for a project.The scorecard weights of each of the first three sub-factors may vary based on the specifics of a project.

For instance, for a building project, the first three sub-factors —Site Preparation Requirements and Substructure Risk; Structure Complexity and Construction Technique Risk; and Performance Risk — typically would be allocated even weights given that a building generally requires at least some kind of site preparation and sub-structure, an envelope and mechanical and electrical components. For a computer system project, the Performance Risk sub-factor would typically be allocated the entire 15% weight. An accommodation refurbishment project may not have any site preparation requirement or substructure risk, in which case the 15% weight would be allocated to the Structure Complexity and Construction Technique Risk and the "Performance Risk" sub-factors.

The separation between substructure and structure is somewhat artificial. Sub-structure relates to everything that is needed to anchor the asset in the ground. Structure relates to anything above that. For an accommodation building, deep foundations such as piling would be assessed using the Site Preparation Requirements and Substructure Risk sub-factor and everything from the basement level upwards would be assessed using the Structure Complexity and Construction Technique Risk sub-factor. For a road in a tunnel, tunneling risk would be assessed using the Site Preparation Requirements and Substructure Risk sub-factor, whereas the road construction would be assessed using the Structure Complexity and Construction Technique Risk sub-factor.

In assessing the Project Construction Complexity factor for projects comprising various elements with widely different degrees of complexity (e.g., a project comprising a simple road and a large bridge or a complex interchange, or a project comprising a large hospital building and a separate simple administrative building), scoring of the Project Construction Complexity sub-factors would typically mostly reflect the complexity of the most difficult component as that component would probably be on the critical path and be more likely to result in schedule and cost overruns.

SITE PREPARATION REQUIREMENTS AND SUBSTRUCTURE RISK

In assessing this sub-factor, we consider the complexity of site preparation or sub-structure work needed before construction of the main asset structure can commence in the context of the construction site characteristics, such as its size and its geological complexity. The scope of activities assessed in this sub-factor depends on the type of project. With respect to the geological conditions, we assess the level of complexity of the site geology[10] and the level and quality of the information[11] available to assess that risk (acknowledging that in most, if not all, PFI/PPP/P3 projects there is a minimum of knowledge available from the sponsoring government's studies). Site size is also important as the more extensive the construction area the more difficult it is to understand the full geological risk of the site. With respect to site preparation, we assess the extent to which the following may be needed to prepare the site before construction commences: utilities relocation, removal and treatment of contaminated soils, blasting, excavating, tunneling, waterproofing, surcharge pre-loading, shoring or similar type of work. With respect to sub-structure risk, we assess the extent to which deep foundations such as piling may be required.

For example, an accommodation building construction in a remediated brownfield area with no excavation requirements (i.e., shallow foundation) may receive a higher score for this sub-factor. By contrast, a civil transport infrastructure project that includes many bridges with river piling, tunnels with complex geology requiring the use of different techniques and complex machinery (e.g., a tunnel boring machine) and relocation of many utilities would typically receive a lower score for this sub-factor.

STRUCTURE COMPLEXITY AND CONSTRUCTION TECHNIQUE RISK

In assessing this sub-factor, we consider the broad range of risks associated with the complexity of the asset structure, the construction techniques used, and the materials used.

We assess asset complexity based on whether the structure being built has many precedents or is unique (due to height, length, size, type, architecture or other characteristics), whether the construction is highly repetitive (e.g., an office tower with every single floor except the mechanical floor being built using the same floor plan) versus comprising mostly custom elements, each requiring a highly specific design. We assess construction techniques based on the extent to which design and construction techniques used are routine, specialized or unique (e.g., a new or seldom tested way of building a bridge); whether a material portion of the work can be done offsite and assembled onsite (e.g., prefabricated buildings) or whether everything needs to be done on site, and whether the project can be broken down into several independent elements that can be worked on in parallel (e.g., a school project with multiple sites and thus multiple construction teams, so that if one site is late and others are ahead, resources can be re-allocated to the delayed part of the project) or whether the project is sequential (greatly increasing the likelihood that a delay in any element may delay the entire project). We assess whether the required construction materials are widely available, well proven and normal for that type of project, or whether new materials may be used.

We also consider whether the project is a refurbishment or a new build. While refurbishment may be easier and thus may typically score higher than a new build since it is usually limited to upgrades or cosmetic work as opposed to rebuilding the whole structure, some risks can be hidden or not known until well after the construction work has commenced. For instance, it may not be feasible to determine the full extent of the deterioration of a bridge deck until the deck surface has been removed. Similarly, when refurbishing involves a large number of units (e.g., housing), the survey of pre-existing conditions is usually sampled-based, thus creating a risk that the sample may not be representative. Hence, the scoring of this sub-factor for refurbishment projects is based not only on the intrinsic complexity of the structure but also on the extent to which the full and exact asset condition can be assessed prior to the start of construction.

For example, projects where several low-rise schools need to be built on different sites and all use highly repetitive simple floor plans typical of the jurisdiction in which the school is being built, using standard techniques and materials, may receive a higher score for this sub-factor than a large bridge, since each bridge typically has its own specific design conducted by specialized firms, usually requiring specialized calculations and tests (e.g., for resistance to wind, vibrations, ship impact, scouring or earthquakes).

PERFORMANCE RISK

In assessing this sub-factor, we consider the extent, range and complexity of the asset's electric and mechanical systems, IT and equipment that need to be installed in the project. We also assess the sponsoring government's minimum performance and availability standards as set out in the project agreement that need to be met in order to reach substantial completion. Examples of these standards include parameters for air quality and air flow quantity, temperature, light intensity, noise insulation, safety, reliability and road geometry standards, such as slope and roughness. We also assess the length of the commissioning period required to ensure that the equipment is working at the expected level of performance as, generally, the length of the commissioning period is a good indicator of complexity.

For example, a simple road required to follow well-known industry standards (e.g., American Association of State Highway and Transportation Officials standards) and with normal lighting and other system requirements would typically receive a higher score for this sub-factor than a highly specialized research facility with very stringent requirements by the sponsoring government that are unique and specific (for instance, requirements relating to precise insulation of air flows, specialized security systems, or performance requirements that fall within extremely narrow bands.

CONSTRUCTION CONSTRAINTS RISK

In scoring this sub-factor, we assess the number and magnitude of the project-specific constraints, the ease with which they can be worked around and the potential impact on the critical path if certain important timing windows are missed (e.g., having to do all foundation work for a bridge in water and outside of the fish spawning season; or needing to complete a critical structure before winter sets in and disrupts supply lines and or construction operations).

For example, a military housing project being built in a rural area with no particular constraint related to access, endangered species, noise, dust, vibration limits and where construction can occur all year round with a normal work week would typically receive a higher score for this sub-factor. By contrast, an extensive road project crossing multiple municipalities in a very dense urban area where the

existing roads must remain open, where the contracting authority puts a number of limits on accessing certain portions of the highway (e.g., only at night) or where limits on vibration, dust, or noise levels are quite stringent or onerous to meet would typically receive a lower score for this sub-factor.

Factor: Constructor/Consortium Experience and Project Readiness (25% weight)

Why it matters

The experience of the constructor/consortium and its approach to the project are crucial determinants in the difference between a successful project and a problematic one. Consortium experience and project readiness represent the ability of the consortium to deal with the project complexity and thus minimize schedule delays and cost overruns.

This factor comprises two sub-factors:

Constructor / Consortium Experience

Since most construction projects tend to run into some difficulties at some point , whether the problems escalate into a failed project or whether the project can be put back on track depends in large part on the experience of the project parties. Significant aspects of this assessment include their experience with the specific type and size of project, with the jurisdiction where the project is located and with PFI/PPP/P3projects (since PFI/PPP/P3 construction projects need to be managed differently from traditionally procured assets).

Project Readiness and Risk Management

Since PFI/PPP/P3 projects involve a bidding situation between various consortia, each consortium attempts to find an acceptable balance between identifying and managing construction risks and minimizing bid costs (which are generally not recoverable for unsuccessful consortia). Hence, consortia exhibit different risk mitigation strategies for their bid depending on their risk tolerance, and other considerations.[12] Risk mitigation strategies at bid phase and pre-financial close may include increasing the percentage of the project design that is fully developed; building and testing mock-up rooms; carrying out additional geotechnical studies or other studies over those made available by the sponsoring government; getting pre-clearance by utilities, municipalities or other government entities regarding certain aspects of the project (e.g., use of a municipal park or other land as a staging area if the project is in a constrained space); identification of key sub-contractors that have quoted prices based on reviews of the available designs; pre-negotiation of major sub-contracts; and close coordination between the constructor and the operating and maintenance services provider in the design phase.

The management of construction sub-contractors and key suppliers by the constructor can also introduce risk. Very few constructors self-perform an entire project. They typically pass down some or most of their obligations to a range of sub-contractors and suppliers that may be substantially smaller and financially weaker than the constructor. Some of these sub-contractors or suppliers may be critical to the success of the project, such as suppliers of large and specialized equipment (e.g., rail cars, large mechanical and electrical equipment or pre-fabricated modules) and may not be easily replaceable in a timely fashion.

How we assess it for the scorecard

Scoring for this factor is based on two sub-factors: Constructor/Consortium Experience, and Project Readiness and Risk Management.

CONSTRUCTOR / CONSORTIUM EXPERIENCE

In scoring this sub-factor, we assess the constructor's[13] and, more broadly, the consortium's experience and track record in these three areas (jurisdiction, type and size of asset, PFI/PPP/P3[14]). This assessment may include consideration of the experience of the key constructor personnel leading the construction and of the project company/equity sponsor personnel overseeing the project. The equity sponsor's experience with PFI/PPP/P3 project oversight is crucial to ensure close monitoring during construction, requiring remediation plans from the constructor when delays occur, ensuring the constructor meets its obligations (including enforcing its rights against the constructor where appropriate) and helping to manage key relationships, including with the sponsoring government. We also assess whether the consortium members have a good track record of working together.

PROJECT READINESS AND RISK MANAGEMENT

In scoring this sub-factor, we assess the constructor's approach to and management of the obligations it has accepted and risks it has taken on. We also assess the constructor's approach to managing risks related to sub-contractors and suppliers and the robustness of its supply chain management (SCM): exposure to the performance of sub-contractors and suppliers that cannot be easily and quickly replaced; process for selection of sub-contractors and suppliers; experience and track record of major sub-contractors and key suppliers; quality control management; spreading of risks for large budget components; requirements for sub-contractors and suppliers to post security by way of letters of credit, performance bonds; constructor's sub-contract risk insurance.[15] A project where the majority of sub-contractors or suppliers need to post material security (or where material and reliable sub-contract risk insurance is in place) typically receives a higher score for this sub-factor than one where there is no such security.

Constructors with self-perform capabilities may score higher with respect to characteristics related to project readiness and budget-build up but these constructors may be more difficult to replace if they need to be terminated. Each situation is assessed on its own merits in order to determine what the net effect is on the project when a company with a high percentage of self-perform capabilities is involved in a project.

Factor: Resilience of Constructor to Cost Overruns (Before Termination of Contract) (20% weight)

Why it matters

Since it is not unusual for a construction project to incur a cost overrun beyond the base budget (thus forcing the constructor to access the budget contingency and, potentially, the constructor's profit margin), the resilience of the constructor to manage cost overruns is a key determinant of the success or failure of a PFI/PPP/P3 project. A resilient constructor generally has some ability to absorb that stress without defaulting on its obligation or becoming insolvent.

Profit Margin and Contingency and Robustness of Budget Buildup

The percentage profit margin and contingency already incorporated into the fixed price contract acts as a first level of cushion for the constructor to absorb some cost overruns. The robustness with which the construction budget is built can help deal with or limit certain cost overrun types. For instance, a construction budget with specific escalation indices for labor, concrete, steel and asphalt, and realistic assumptions as to the future evolution of these indices is more robust than one built with a general CPI index, especially when the construction industry conditions are volatile in the jurisdiction of the project. In addition, a construction budget built with a very disciplined reconciliation of quantities (e.g., separate teams) and based on quoted committed unit or fixed prices from suppliers is more robust than a budget based on loose estimates.

How we assess it for the scorecard

Scoring for this factor is based on two sub-factors: Profit Margin and Contingency and Robustness of Budget Buildup; and Strength of the Constructor and Relative Size of the Project.

PROFIT MARGIN AND CONTINGENCY AND ROBUSTNESS OF BUDGET BUILDUP

We use the profit and contingency margin, which is a percentage of the pre-profit and contingency construction budget.[16]

While profit margins and contingency levels can vary depending on the type of project, the risk allocation and the construction industry cycle, we typically expect a prudent constructor to incorporate a level of contingency and profit margin into its bid price appropriate for the level of risk it shoulders. Mid-single-digit profit and contingency percentages —or lower— are considered "below average" except in the most simple projects and stable conditions. Average contingency and profit margins may range from high-single-digit to low-mid-teen percentages, depending on project complexity; mid-to-high-teen percentages would normally pertain only to the most complex projects.

In scoring this sub-factor, we consider not only the profit margin and contingency range but also the quality and comprehensiveness of the information available to make that assessment.

STRENGTH OF THE CONSTRUCTOR AND RELATIVE SIZE OF THE PROJECT

When the credit quality of the constructor or its guarantor is relevant to our assessment of the resilience of the constructor to cost over-runs and the likelihood of project completion, we assess the constructor's credit strength and liquidity. However, in a typical PFI/PPP/P3 project, the credit quality of the constructor is not, in and of itself, a critical determinant of the credit quality of the project, because a financial failure of the constructor would be unlikely to seriously jeopardize the project in light of mitigants. These generally include sufficient time and budget to replace the constructor, as well as third-party support for the constructor's liquidated damage obligations. We find it analytically useful to make a credit assessment of the constructor,[17] which may occur without a need for the constructor to have a rating.

When the project has a high dependence on the constructor or on the damages provided by the constructor (especially if unsupported, or where support is viewed as uncertain in terms of quality or timeliness), a rating (which may be unpublished) could be required. A project typically has a high dependence on the contractor if there is a strong likelihood of the project not being able to repay its debt if the constructor were highly distressed.

In addition to assessing the credit strength of the constructor, we examine whether the size of the project is such that a cost overrun on that project could lead to stress for the constructor, as well as the constructor's track record of supporting and completing projects that have encountered material problems. We also evaluate the constructor's likely willingness to complete the project even if difficulties arise, which may include financial stress.

All else being equal, a large highly diversified constructor with strong profitability and liquidity has materially more scope to absorb losses on a problematic large project than a small local company that may be rendered insolvent by a single large loss. We note that while seasoned constructors can experience a problematic project, there are cases of constructors that have experienced recurring issues with projects, so although a single stressed project may not be problematic for the company's financial health, a series of them might stress the constructor's ability to complete the Issuer's project.

Factor: Resilience of Project to Construction Schedule Overrun (25% weight)

Why it matters

Schedule overruns beyond the target date for substantial completion are not unusual in PFI/PPP/P3 projects and thus an assessment and understanding of the resilience of a project to such an overrun is crucial. Construction period budgets at financial close, including budgeted interest during construction, are normally only designed to be sufficient to allow the project to attain the target date for substantial completion (albeit based on a conservative draw down of funds). As a result, any delay beyond that date could result in liquidity stress and default if there is insufficient liquidity available to the Issuer.

In this factor, we assess how the Issuer can deal with delays before the target date for substantial completion and assess the length of time the issuer can continue to meet its obligations, including debt service, once the initial target date for substantial completion has passed. The project's ability to withstand a schedule overrun primarily depends on two major considerations: (i) construction schedule room and distance to the long stop date; and (ii) the quality and amount of liquidity available to the issuer in order to meet scheduled or upcoming obligations if substantial completion occurs after the initial target date has passed.

How we assess it for the scorecard

CONSTRUCTION SCHEDULE ROOM

A crucial consideration for assessing schedule risk in a PFI/PPP/P3 project is the contractual length of time allowed between the target date for substantial completion and the long-stop date (the date by which the project construction must be completed in order to avoid a Project Agreement termination). We assess the degree to which the long-stop date gives a reasonable amount of time, in view of the complexity of the project, to complete construction (e.g., whether there are short-fuse hard deadlines, such as for new Olympic Games facilities or for existing asset retirement). Many PFI/PPP/P3 projects benefit from a one-year period between the target date for substantial completion and the long-stop date. However, some projects have to deal with materially less time while others benefit from substantially more. In addition, the resilience of the issuer to delay stress depends on how the schedule is built and what the buffers are; for instance, whether the construction schedule appropriately reflects vacations, the likelihood of weather delays or constraints around certain tasks (e.g., seasonal restrictions on water work; night-only work).

In addition, we assess whether the schedule is built on a regular work day/week or whether it already assumes night and weekend work, which may already preclude the possibility of increasing the numbers of work hours to recoup a delay. Another consideration is the reasonableness of assumed productivity rates. We also consider the construction schedule buffer up to the target date for substantial completion as most prudent constructors will incorporate at least some buffer. The schedule buffer is measured as the number of weeks identified in the construction schedule as being available to deal with a delay as a percentage of the total construction period, measured in weeks, from construction commencement to the target date for substantial completion (excluding the schedule buffer). The schedule buffer is assessed both in aggregate, by construction phase and with respect to the critical path.

LIQUIDITY TO WITHSTAND A SCHEDULE OVERRUN

The calls on the issuer's liquidity are potentially numerous during construction, even absent a constructor replacement scenario. Some of the main triggers for calls on the issuer's liquidity relate to:

» Having to meet scheduled obligations (debt service, insurance costs and other costs) post initial target date for substantial completion if substantial completion has not been achieved by that date. The reason for such delay could be either constructor borne risks or risks borne by the sponsoring government but the latter either has only granted a time relief or undertakes to pay compensation and that compensation is delayed (contractually or de facto).

» Having to pay for additional costs when such additional costs are borne by the issuer (e.g., changes in law) or are borne by the sponsoring government but must be paid by the issuer before they are received from the sponsoring government (or financed).

» Having to pay for debt service or any other costs in projects that rely on revenues during construction (availability payments or construction milestone payments) and these revenues are delayed due to construction delays.

In most PFI/PPP/P3 projects, the risks identified above are addressed through a number of mechanisms:

» Delay liquidated damages paid by the constructor and supported by highly rated and liquid instruments such as letters of credit. We note that the constructor may or may not agree to pay liquidated damages for sponsoring government borne risks.

» Reserves: We note that the debt service reserve fund may or may not be available at the initial target date for substantial completion.

» Constructor not being paid by issuer for additional construction costs until funds are received by the sponsoring government.

The contractual arrangements with respect to liquidity can vary widely from project to project and a robust analysis of potential liquidity calls and liquidity sources to withstand a schedule overrun is a critical aspect of the risk analysis of a PFI/PPP/P3 project. In that analysis, it is important to identify any liquidity timing gaps that could lead to potential stress for the issuer and thus a potential debt default before substantial completion can be achieved. For the liquidity sources, it is crucial to not only analyze the amount of the liquidity available, but also its quality and the timing and triggers for accessing such liquidity instrument. A project that has weak liquidity but is otherwise strong may not be able to achieve an investment grade rating unless there are other mitigating factors, such as a very reasonable schedule with a material buffer. That is because, in case of delay, there may be insufficient funds to service debt and thus the threat of a debt default is high.

Given the need to access highly reliable liquidity on short notice in case of delays, we count toward available liquidity only letters of credit issued by a highly rated bank, cash (e.g., a fully funded debt-service reserve fund (DSRF))[18] and other types of security where such type of security provides for timely payment and clearly supports the payment of liquidated damages and or financing costs and where it is issued by a highly rated counterparty. For all issuers of such letter of credit or other equivalent instrument, their rating is expected to be, at a minimum, in the A category for their instruments to be fully counted toward the liquidity of the project. In addition, we would expect that there will be triggers for draw downs if the rating of such issuer of letter of credit or similar instrument falls below a certain threshold and the issuer cannot be replaced.

In most PFI/PPP/P3 projects, the amount of liquidity is available for the whole period of the construction and is only released at substantial completion, once revenues start flowing. However, in some projects, the construction period has been structured in discrete and separate phases, with revenues starting to flow when each construction phase is completed. In those projects, liquidity may

be released in stages as each construction phase is completed with very little left for the last phase of construction. We view these structures with partial releases of liquidity/security during construction as being weaker than structures where all the liquidity and security is retained until substantial completion is achieved, because the scheduled release of liquidity may not match the actual de-risking profile of the project.[19] For these projects, the ability of the issuer to withstand a schedule overrun is measured at the end of each phase and assuming all subsequent phases are delayed by the same length of time, just prior to the next release of liquidity. The minimum schedule overrun that the issuer can withstand across every single phase without defaulting is used for scoring purposes.[20] For non-phased projects, the ability to withstand a schedule overrun is measured starting at the initial substantial completion target date.[21]

Some projects are structured with construction retention amounts that build over time and are not paid to the constructor until the project is completed. While these can be used as a potential source of liquidity, it is important to assess their value from a liquidity point of view, including the following aspects: whether these amounts are available to pay debt service and other obligations in case of delay or whether they are solely set aside for the future benefit of the constructor (i.e., solely an incentive for the constructor to complete on time); and how quickly the funds are expected to build up (the retention account has very limited value in the initial months of construction).

Any part of the liquid security used notionally in order to deal with a schedule overrun is not considered available in our assessment of the Amount and Quality of Security Available to Replace the Constructor or Mitigate Losses notching factor (see next section) to assess the resilience of the issuer to a constructor replacement scenario or a Project Agreement termination scenario.

Notching factors

The scorecard contains two notching factors: Ease of Replacement of the Constructor; and Amount and Quality of Security Available to Replace the Constructor or Mitigate Losses. Our assessment of the notching factors may result in upward or downward adjustments to the preliminary outcome that results from the five weighted factors. We apply these adjustments in half- or whole-notch increments, with up to 3.5 upward and 2 or more downward alpha-numeric notches from the preliminary scorecard-indicated outcome to arrive at the scorecard-indicated outcome.

In cases where we consider that the credit weakness or credit strength represented by a notching factor, or by these factors in aggregate, is greater than the scorecard range, we incorporate this view into the rating, which may be different from the scorecard-indicated outcome. For a discussion of scorecard mechanics, please see the "Using the scorecard to arrive at a scorecard-indicated outcome" section.

Ease of Replacement of the Constructor

Why it matters

In a worst-case scenario, the constructor fails to perform and deliver the asset or is so late that meeting the long stop date under the Project Agreement is going to be problematic.[22] The issuer then has to replace the constructor with a new constructor charged to complete the project before the Project Agreement can be terminated. In addition, irrespective of how the project is progressing, there could be a need to replace the constructor if it becomes insolvent or bankrupt. In all likelihood, such replacement will translate into additional costs for the issuer, such as the costs to re-tender and enter into a new construction contract as well as potentially needing to fix the work that was not done correctly.

How we assess it for the scorecard

We assess the ability of an issuer to withstand a constructor replacement at a higher cost or for lenders to reduce their losses in the case of a Project Agreement termination.

EASE OF REPLACEMENT OF CONSTRUCTOR

We assess the ease with which the issuer may be able to replace the constructor in a stress scenario, including the quality, availability and number of companies that have the experience and the financial strength to replace the failed constructor in a timely manner in view of the type, location, and size of the project. Projects where the construction is undertaken by a design and build joint venture (DBJV) typically receive higher scores for this sub-factor if the following conditions are met: each party to the DBJV is considered able to complete the project on its own if one of the DBJV parties becomes bankrupt or insolvent, and the project documents stipulate

that if a member of the DBJV fails to perform, the issuer has an opportunity to demonstrate that the project can be completed by the remaining DBJV parties, and if not, it has an opportunity to find a new partner to complete the project. While the DBJV construct does not mitigate the risk of constructor replacement if the entire DBJV must be replaced, it does help in mitigating the credit risk of any single member of the DBJV. i.e., the crystallization of a higher contract cost is not immediate or is reduced even if one DBJV member fails.

In addition, we assess the strength of other mechanisms available that can facilitate the replacement of a failed constructor such as whether there are labor and material bonds[23] available, or whether there are step-in rights available to the issuer so that key sub-contracts continue even when the constructor has been terminated. In assessing this notching factor, we also consider whether the construction and operating maintenance/life cycle budget has close and recent comparables and, if so, whether the pricing is within the comparable pricing or is materially different.

Exhibit 4

Notching factor: Ease of Replacement of Constructor

+1.0	+0.5	0	-0.5	-1.0	-2.0 or more
High degree of replacement ease either within DBJV or through availability of many suitable companies who could step in in a timely manner; extensive & robust mitigants to avoid loss of sub-contractors; pricing of construction contract and of operating, maintenance and life cycle costs at high end of comparables with such comparables being recent and relevant.	Good degree of replacement ease either within DBJV or through availability of several suitable companies who could step in in a timely manner; material mitigants to avoid loss of sub-contractors; pricing of construction contract and of operating, maintenance and life cycle costs well within comparables with such comparables being recent and relevant.	Moderate degree of replacement ease either within DBJV or through availability of a few suitable companies who could step in in a timely manner; some mitigants to avoid loss of sub-contractors; pricing of construction contract and of operating, maintenance and life cycle costs mostly within recent relevant comparables.	Somewhat weak degree of replacement ease either through weak DBJV members, or very few suitable companies who could step in in a timely manner; weak mitigants to avoid loss of sub-contractors; pricing of the construction contract and of operating, maintenance and life cycle costs at the lower end of comparables or comparables are somewhat old or not close.	Weak degree of ease of replacement; weak to non-existent mitigants for sub-contractor loss; pricing of construction contract and of operating, maintenance and life cycle costs somewhat below comparables or few comparables, or comparables are old.	It is not expected that the failed constructor would be replaced in a timely manner due to the project nature or market conditions or both; likely to be no relevant comps.

Source: Moody's Investors Service

Amount and Quality of Security Available to Replace the Constructor or Mitigate Losses

Why it matters

In many cases, the Issuer has obtained from its constructor specific security that can be used in such replacement scenarios, and the project construction can be completed before the Project Agreement is terminated. However, in an extreme scenario, it may not be possible to replace the constructor at a price that can be paid out of the issuer's available funds, and if none of the parties involved in the consortium is willing or able to provide additional funding, the Project Agreement may be terminated. In some cases, the project may be so specialized or so large that replacing the constructor is not feasible, causing a termination of the Project Agreement. When the Project Agreement is terminated, the sponsoring government generally pays a termination amount and, while calculation specifics can vary, the loss to the equity providers and to the lenders will reflect a project cost-to-complete calculation.[24]

How we assess it for the scorecard

We assess the amount and quality of security available to the Issuer and the lenders (*over and above* the liquidity available in the circumstances of a schedule overrun, as detailed in the Liquidity to Withstand a Schedule Overrun sub-factor) that would translate into *additional funding* available to replace a failed constructor or to complement a Project Agreement termination payment. This security may include letters of credit, adjudication bonds, performance bonds or contingent equity.

By quality of security, we mean not only the quality of the issuer of such instrument but also the predictability of the outcomes when such instrument is called upon. With respect to the quality of the security, the full notching up for the applicable range is available only when the issuer of the instrument is investment grade and has a rating at least equal to that of the issuer (long-term debt rating or Insurance Financial Strength Rating). By definition, when such instruments are called, there is an adverse situation and disputes,

claims and counterclaims and difficult relationships between the parties are likely, as well as potential insolvency or bankruptcy of certain parties. At that point there can be varying degrees of certainty around the ability of the beneficiaries to enforce their rights under such instruments and receive the full benefit of the instrument. For instance, the insolvency of a constructor in some jurisdictions is not per se a breach of a contract. This limits the usefulness of an instrument if it cannot be called upon at the time of the constructor insolvency, unless the instrument stipulates that constructor insolvency would allow for the instrument to be called upon.

Before applying the notching described in the table below, we apply a haircut to each instrument's face value to recognize the wide range of instrument quality, timeliness and predictability of outcome. For instruments where (i) the issuer is highly rated, (ii) the conditions for drawdowns are extensive and clear in the contract between the Issuer and the constructor; (iii) there are no conditions to payment on presentation and (iv) payment is timely, the haircut applied to the instrument for purposes of the notching is typically minimal or nil (for instance, a letter of credit). As these conditions get weaker, the haircut typically increases.

If the security is provided by a highly rated entity, the notching up for security can be higher than from the straight application of the notching guidance if the instrument is an on-demand instrument and the following criteria are met by the instrument issuer:

» High rating, generally in the Aaa/Aa category; may be a multi-lateral or similar type of organization

» Good track record of honoring its obligations without raising any defense or seeking to dispute the right to access the instrument when the beneficiary calls on the security

» Limited or no direct recourse to the construction company.

In a PFI/PPP/P3 environment, the constructor liability cap is expected to be between 30%-50% of the contract price. Scoring may be shaded down if that level of liability cap is particularly weak (less than 30%) or may be shaded up, if a material amount (as a general rule of thumb, over 10%) of unsecured liability cap (i.e., over and above what is secured) is provided by a solid investment grade entity. In the latter case, we would not in most cases assign more than one-half upward notch because, once there is termination of the contract with the constructor, there is heightened likelihood of delays and disputes.

Note that our ratings for PFI/PPP/P3 issuers assume that we will continue to receive information during construction that is sufficient to assess the parties whose financial strength is relevant to the Issuer's rating, which may include the constructor and its guarantor as well as other providers of liquidity and support. If there is a material decrease in the availability of important information or in the periodicity, freshness or quality thereof (e.g., withdrawal of a pertinent rating, material delays in receiving updated financial statements, or statements no longer being audited), the Issuer's rating may be negatively affected or may need to be withdrawn.

Exhibit 5

Notching factor: Amount and Quality of Security Available to Replace the Constructor or Mitigate Losses

+2.5	+2.0	+1.5	+1.0	+0.5	0
High quality security (after application of haircuts – see note below) ≥ 25% of the construction price.	High quality security (after application of haircuts – see note below) ≥ 20% but less than 25% of the construction contract amount.	High quality security (after application of haircuts – see note below) is ≥ 15% but less than 20% of the construction contract amount.	High quality security (after application of haircuts – see note below) is ≥ 9% but less than 15% of the construction contract amount.	High quality security (after application of haircuts – see note below) is ≥ 5% but less than 9% of the construction contract amount.	Security (after application of haircuts – see note below) is less than 5% of the contract amount; or any other amount where there is weak security quality.

Note: Haircuts are applied in accordance with our assessment of the certainty of funding upon demand for such instruments in the relevant jurisdiction as well as their scope and features. We have observed considerable variation in the promptness and amount of funding not only among instrument types, but also among jurisdictions. The performance of instruments is a function of their terms and conditions as well as the legal and judicial framework of the jurisdiction and prevalent commercial practices, including the frequency of claim disputes. In addition, our assessment may be based on the performance history of a particular support provider as well as its financial strength. Since none of these factors is static, our assessments of appropriate haircuts evolve over time. As of the date of this methodology, general guidelines for typical instruments in jurisdictions where we have rated PFI/PPP/P3-Construction projects are as follows: Letters of credit from highly rated OECD banks and payable on demand upon presentation: no haircut; Australia performance bonds: 10% haircut; Australia adjudication bonds: 25% haircut; North America standard performance bond: 50% haircut; UK adjudication bond: 25% haircut.
Source: Moody's Investors Service

Other considerations

Ratings may reflect consideration of additional factors that are not in the scorecard, usually because the factor's credit importance varies widely among the issuers in the sector or because the factor may be important only under certain circumstances or for a subset

of issuers. Such factors include financial controls and the quality of financial reporting; corporate legal structure; the quality and experience of management; assessments of corporate governance as well as environmental and social considerations; exposure to uncertain licensing regimes; and possible government interference in some countries. Regulatory, litigation, liquidity, technology and reputational risk as well as changes to consumer and business spending patterns, competitor strategies and macroeconomic trends also affect ratings.

Following are some examples of additional considerations that may be reflected in our ratings and that may cause ratings to be different from scorecard-indicated outcomes.

Key aspects of standardization in PFI/PPP/P3 projects

The scorecard is not designed to incorporate projects that deviate from the standard PFI/PPP/P3 project structure, so that actual ratings for such projects may vary widely from the scorecard-indicated outcome. Some of the key aspects of standardization in a PFI/PPP/P3 structure include:

» Equity funded upfront and, if not, equity commitment supported by a highly rated financial institution (non-recourse to the Issuer) with such commitment accelerated upon certain events, including an event of default under the debt documents

» Equity provided by way of common stock, partnership units or very deeply subordinated instruments that behave, for all intents and purposes, like common equity

» All the funding required to complete construction completion is arranged/raised/available at financial close and there is no material concern with respect to any possible conditions that could lead to the required funds becoming unavailable (e.g. draw stop triggers in the case of bank funding, weak banks; reliance on revenues during construction)

» Perfected security interests in the material contracts, the Issuer's accounts, and the shares of the Issuer

» Any hedging is with highly rated counterparties with replacement rights if the counterparty's rating dips below certain thresholds

» No distributions permitted until after substantial construction completion

» Structures to insulate the risk of the Issuer from that of its owner

» Lender step-in rights (e.g. to Project Agreement, construction contract)

» Substantially all design build obligations under the Project Agreement with the sponsoring government passed down to the constructor on a back-to-back basis under a fixed-price, date-certain contract, so that the Issuer only retains financing and management of the project

» Comprehensive construction insurance protection provided by creditworthy insurance companies and standard documentation so that the lenders' representative is named as additional insured, or mortgagee or loss payee as applicable

» Construction security is available through the construction period and only steps down post completion with an amount remaining sufficient to cover warranties and defects for an adequate period of time post completion

» No impediment for the Issuer to enforce its rights and obligations against the constructor (especially in case of common ownership)

» Rigorous independent verification of amounts to be paid to the constructor (including only paying for work done, testing for cost to complete, etc.) and no unusual frontloading of the payments to the constructor ahead of the work

» Monitoring of construction through monthly reports from the lenders' technical advisor (in addition to a comprehensive report available at the time of the bid and updated at the time of financial close)

» Financial model (reviewed and found to be satisfactory by the lenders' technical advisor or other advisor) showing all the sources and uses of funds during construction on a monthly basis with robust construction delay analysis

» Well-tested PFI/PPP/P3 framework. We note that the great majority of the PFI/PPP/P3's we have rated are located in a handful of jurisdictions, mostly OECD countries, with a well-established legal framework for such projects and, in many cases, highly standardized contracts. Should a project be located in a jurisdiction with a poorly tested PFI/PPP/P3 framework, where there is a lack of consensus on the PFI/PPP/P3 framework, and/or material concerns about the enforceability of contracts or about the government's level of experience with PFI/PPP/P3 projects or its possible interference, then such concerns are reflected in the rating analysis of the project. We note that the sovereign rating of a country may not necessarily be a good indicator of how supportive a specific government (whether sovereign or sub-sovereign) is of PFI/PPP/P3 projects and how predictable its behavior will be toward these entities.

Rating adjustments during construction

Under normal circumstances, the rating of a PFI/PPP/P3 project in construction is not expected to change during construction as the project gets closer to completion, even assuming the project is on time and budget. The principal exceptions are projects composed of highly repetitive phases and where revenues start as each phase is completed. If the first phases are completed on time and budget and the other aspects of the project remain as strong as at the time of the initial rating assignment, the diminution of risk may lead to an upward movement in the rating towards the operating phase rating before all the phases are completed (noting however, that in several cases of phased construction, the liquidity and security provided by the constructor is also reducing as each phase is completed, in which case an upgrade or change of outlook may not occur until all phases are completed). Conversely, while the initial rating considers the potential for delays and the adequacy of risk mitigants, ratings during the construction period may face downward pressure (or may vary widely from scorecard-indicated outcomes) for any number of reasons that may include but are not limited to: (i) the incurrence of material delays such that reaching substantial completion by the target date may be jeopardized thus requiring draw downs of available liquidity, translating into stress for the constructor and potentially the need to replace it; (ii) a weakening of the construction support provided by the constructor or a material weakening in the credit quality of the constructor; or (iii) construction performance issues. In each case, the assigned ratings reflect our assessment of the overall risk profile of the project, its current circumstances and how much resilience there is to any issue or combination of issues.

Credit quality of sponsoring government

During the construction period, the quality of the sponsoring government entity is relevant if the sponsoring government is scheduled to make construction progress or milestone payments, in which case, its rating is a rating constraint of the project.

Government contributions during construction

Government contributions during construction are in evidence in some PFI/PPP/P3 projects and have ranged from very low percentages of construction costs (5-10%) to well over 50%, or even close to 70% of construction costs in some cases.

While government contributions during construction may indicate a high level of support to the project from the sponsoring government, they may have a number of analytical implications that may be positive, neutral or negative.

» Liquidity implications: as indicated under the Liquidity to Withstand a Schedule Overrun sub-factor, we consider any potential delay in the payment of such government contribution if project construction is delayed (before and after original target date for substantial completion). For instance, if government contributions are paid when agreed-upon construction milestones are reached and they are scheduled to partially pay debt service during construction, a delay in the receipt of the scheduled government funding may result in a debt default well before the end of construction if not properly mitigated. Conversely, government contributions paid at fixed, agreed-upon dates or as a percentage of construction costs incurred during any given month may have less negative impact from a liquidity risk perspective.

» Termination payment implications: the terms and conditions applicable to the calculation of the termination payment in case of Issuer default in the Project Agreement greatly influence our view of whether government contributions are supportive, neutral or adverse for lenders. At a very high level, the termination payment calculated after a Project Agreement termination event incorporates a number of elements, the largest one generally being an estimate of the cost to complete the project over and above the original construction price. In a supportive scenario, the sponsoring government will absorb most if not all of the cost-to-complete penalty (i.e. senior lenders and equity are effectively "super" senior to the government funding); in a neutral scenario, the sponsoring government and the private sector will share the losses related to completing the project (i.e. the senior lenders and the government funding will effectively be pari passu); in an adverse scenario, the private sector funders will take all the losses related to the completion of the project before the sponsoring government takes any loss (in effect the government funding is "super" senior to senior lenders and equity). It is worth noting that in the great majority of cases the impact of the government contributions is expected to be adverse to lenders since, by nature, a PFI/PPP/P3 project's goal is to transfer construction risk to the private sector. The reason that government contributions tend to be negative in most PFI/PPP/P3 projects is that the asset risk of incurring a cost overrun is carried by a smaller private sector capital base, compared to a project without government contributions. While government contributions during construction (assuming they are made as scheduled) do not change the probability of the occurrence of a termination event for the project (and thus a debt default), they potentially increase the percentage of loss given default for private sector lenders.

The analysis of the impact of the government contributions on the Issuer's debt ratings incorporate the following elements:

» The terms and conditions of the termination payment provisions in the Project Agreement.

» The timing and nature of the government contributions (for instance government contributions paid at substantial completion as opposed to during construction can, for all intents and purposes, be treated as a first availability payment and are thus neutral).

» The Issuer's credit profile considering all factors other than government contributions. Since government contributions that are made as scheduled do not impact the probability of default even if they are super-senior to lenders, their impact on the risk of project lenders is strongly related to the Issuer's risk of project non-completion:

  › When the Issuer's credit profile is otherwise solidly investment grade and the risk of project non-completion is low, the impact of government contributions during construction is low.

  › When the Issuer's credit profile is otherwise deeply speculative grade and risk of project non-completion is high, the impact of government contributions is high.

  › When the Issuer's credit profile is changing (for instance due to more challenging construction conditions) and government contributions are part of the financing structure, our view of the project may change based both on the change in conditions itself and the impact of government contributions on project lenders, especially if the risk of project non-completion is increasing.

»The percentage of the government contributions in relation to the total project funding: where the impact of government contributions is viewed as material based on the above considerations, the higher the percentage of government contributions, the higher the potential impact on the Issuer's debt rating.

Application of the methodology to PFI/PPP/P3 that have no operating period (DBF)

This methodology applies to DBFs except that, in all likelihood, there will not be any long-term project equity interest independent of the constructor. As a result, the enforcement of all contractual obligations vis-a-vis the constructor will need to be taken by the debt funders and thus the experience and effectiveness of the funders group will be a key rating consideration. In addition, the DBF model carries a number of other specific risks factors:

» Ownership and insulation of the issuer from its constructor owner

» Structure of the debt in particular with respect to the term of the debt versus the target date for substantial completion

» Insulation of lenders from the government withholding final payments for holdbacks and/or deficiencies

» Government rating

Environmental, social and governance considerations

Environmental, social and governance (ESG) considerations may affect the ratings of privately financed public infrastructure (PFI/PPP/P3) projects in construction. For information about our approach to assessing ESG issues, please see our methodology that describes our general principles for assessing these risks.[25]

Among the areas of focus in corporate governance, for example, are audit committee financial expertise, the incentives created by executive compensation packages, related party transactions, interactions with outside auditors, and ownership structure.

Financial controls

We rely on the accuracy of audited financial statements to assign and monitor ratings in this sector. The quality of financial statements may be influenced by internal controls, including the proper tone at the top, centralized operations, and consistency in accounting policies and procedures. Auditors' reports on the effectiveness of internal controls, auditors' comments in financial reports and unusual restatements of financial statements or delays in regulatory filings may indicate weaknesses in internal controls.

Using the scorecard to arrive at a scorecard-indicated outcome

1. Measurement or estimation of factors in the scorecard

In the "Discussion of the scorecard factors" section, we explain our analytical approach for scoring each scorecard factor or sub-factor,[26] and we describe why they are meaningful as credit indicators.

The information used in assessing the sub-factors is generally found in or calculated from information in the project and financing documents, the financial model, the issuer's or sponsor's financial statements or regulatory filings, the design-build contract, the independent engineer review of the project construction risks, the independent insurance advisor report, the equity commitment and support documents, derived from other observations or estimated by Moody's analysts. We may also incorporate non-public information.

Our ratings are forward-looking and reflect our expectations for future financial and operating performance. However, historical results are helpful in understanding patterns and trends of a company's performance as well as for peer comparisons.

2. Mapping scorecard factors to a numeric score

After estimating or calculating each factor or sub-factor, each outcome is mapped to a broad Moody's rating category (Aaa, Aa, A, Baa, Ba, B, Caa or Ca, also called alpha categories) and to a numeric score. Because the construction of a project is intrinsically a risky activity, the scorecard criteria do not provide for Aaa factor scoring.

Qualitative factors are scored based on the description by broad rating category in the scorecard. The numeric value of each alpha score is based on the scale below.

Exhibit 6

Aaa	Aa	A	Baa	Ba	B	Caa	Ca
N/A	3	6	9	12	15	18	20

Source: Moody's Investors Service

3. Determining the overall scorecard-indicated outcome

The numeric score for each weighted sub-factor (or each factor, when the factor has no sub-factors) is multiplied by the weight for that sub-factor (or factor), with the results then summed to produce an aggregate numeric score before notching factors (the preliminary outcome). We then consider whether the preliminary outcome that results from the five weighted factors should be notched upward or downward[27] in order to arrive at an aggregate numeric score after notching factors (the scorecard-indicated outcome). In aggregate, the notching factors can result in a total of up to 3.5 upward notches or 2 or more downward notches from the preliminary outcome.

The aggregate numeric score before and after notching factors is then mapped back to an alphanumeric based on the ranges in the table below. For example, an issuer with an aggregate numeric score before notching factors of 11.7 would have a Ba2 preliminary

outcome, based on the ranges in the table below. If the combined notching factors totaled two upward notches, the aggregate numeric score after notching factors would be 9.7, which would map to a Baa3 preliminary outcome after notching.

Exhibit 7

Scorecard-indicated outcome

Scorecard-indicated outcome	Aggregate numeric score
Aaa	x < 1.5
Aa1	1.5 ≤ x < 2.5
Aa2	2.5 ≤ x < 3.5
Aa3	3.5 ≤ x < 4.5
A1	4.5 ≤ x < 5.5
A2	5.5 ≤ x < 6.5
A3	6.5 ≤ x < 7.5
Baa1	7.5 ≤ x < 8.5
Baa2	8.5 ≤ x < 9.5
Baa3	9.5 ≤ x < 10.5
Ba1	10.5 ≤ x < 11.5
Ba2	11.5 ≤ x < 12.5
Ba3	12.5 ≤ x < 13.5
B1	13.5 ≤ x < 14.5
B2	14.5 ≤ x < 15.5
B3	15.5 ≤ x < 16.5
Caa1	16.5 ≤ x < 17.5
Caa2	17.5 ≤ x < 18.5
Caa3	18.5 ≤ x < 19.5
Ca	x ≥ 19.5

Source: Moody's Investors Service

In general, the scorecard-indicated outcome is oriented to the senior secured rating. For issuers that benefit from rating uplift from parental support, government ownership or other institutional support, we consider the underlying credit strength or Baseline Credit Assessment for comparison to the scorecard-indicated outcome. For an explanation of the Baseline Credit Assessment, please refer to *Rating Symbols and Definitions* and to our cross-sector methodology for government-related issuers.[28]

Assigning issuer-level and instrument-level ratings

After considering the scorecard-indicated outcome, other considerations and relevant cross-sector methodologies, we typically assign a senior secured project finance instrument rating. For issuers that benefit from rating uplift from government ownership, we may assign a Baseline Credit Assessment.[29] We may also assign an issuer rating.

Key rating assumptions

For information about key rating assumptions that apply to methodologies generally, please see *Rating Symbols and Definitions*.[30]

Limitations

In the preceding sections, we have discussed the scorecard factors and many of the other considerations that may be important in assigning ratings. In this section, we discuss limitations that pertain to the scorecard and to the overall rating methodology.

Limitations of the scorecard

There are various reasons why scorecard-indicated outcomes may not map closely to actual ratings.

The scorecard in this rating methodology is a relatively simple reference tool that can be used in most cases to approximate credit profiles of companies in this sector and to explain, in summary form, many of the factors that are generally most important in assigning ratings to these companies. Credit loss and recovery considerations, which are typically more important as an issuer gets closer to

default, may not be fully captured in the scorecard. The scorecard is also limited by its upper and lower bounds, causing scorecard-indicated outcomes to be less likely to align with ratings for issuers at the upper and lower ends of the rating scale.

The weights for each factor and sub-factor in the scorecard represent an approximation of their importance for rating decisions across the sector, but the actual importance of a particular factor may vary substantially based on an individual company's circumstances.

Factors that are outside the scorecard, including those discussed above in the "Other considerations" section, may be important for ratings, and their relative importance may also vary from company to company. In addition, certain broad methodological considerations described in one or more cross-sector rating methodologies may be relevant to ratings in this sector.[31] Examples of such considerations include the following: how sovereign credit quality affects non-sovereign issuers, the assessment of credit support from other entities, the relative ranking of different classes of debt and hybrid securities, and the assignment of short-term ratings.

We may use the scorecard over various historical or forward-looking time periods. Furthermore, in our ratings we often incorporate directional views of risks and mitigants in a qualitative way.

General limitations of the methodology

This methodology document does not include an exhaustive description of all factors that we may consider in assigning ratings in this sector. Companies in the sector may face new risks or new combinations of risks, and they may develop new strategies to mitigate risk. We seek to incorporate all material credit considerations in ratings and to take the most forward-looking perspective that visibility into these risks and mitigants permits.

Ratings reflect our expectations for an issuer's future performance; however, as the forward horizon lengthens, uncertainty increases and the utility of precise estimates, as scorecard inputs or in other considerations, typically diminishes. Our forward-looking opinions are based on assumptions that may prove, in hindsight, to have been incorrect. Reasons for this could include unanticipated changes in any of the following: the macroeconomic environment, general financial market conditions, industry competition, disruptive technology, government policy, or regulatory and legal actions. In any case, predicting the future is subject to substantial uncertainty.

Moody's related publications

Credit ratings are primarily determined through the application of sector credit rating methodologies. Certain broad methodological considerations (described in one or more cross-sector rating methodologies) may also be relevant to the determination of credit ratings of issuers and instruments. A list of sector and cross-sector credit rating methodologies can be found here.

For data summarizing the historical robustness and predictive power of credit ratings, please click here.

For further information, please refer to *Rating Symbols and Definitions*, which is available here.

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Endnotes

1 See our methodology that describes our approach for rating operational privately financed public infrastructure (PFI/PPP/P3) projects. A link to a list of our sector and cross-sector methodologies can be found in the "Moody's related publications" section.

2 In our methodologies and research, the terms "scorecard" and "grid" are used interchangeably.

3 Operating requirements are normally limited to operating the asset itself; for instance, in a school PFI/PPP/P3 project, the private sector would likely be responsible for operating and maintaining the systems that provide power, water, heating; would likely clean and maintain the buildings; would likely replace and repair what needs to be replaced or repaired. However, the education responsibilities would likely be retained by the sponsoring government.

4 Some PFI/PPP/P3 projects do not have any operating period. See the "Other considerations" section.

5 Amortization of debt principal is typically scheduled to start shortly after the target date for substantial completion.

6 In this methodology, the term "constructor" refers to projects built by a single construction company and to those built by construction joint ventures that include two or more construction companies/equipment suppliers.

7 The information in this table represents a very high level risk allocation; actual documents are more nuanced; for instance, while contamination that is not disclosed in the project agreement is usually government risk, contamination caused by the private sector is usually private sector risk.

8 Our assessment of the performance requirements to be met by the asset is described in the Project Construction Complexity section.

9 The list of equipment is not exhaustive: boilers, chillers, generators, turbines, elevators, computers, cameras, alarm systems, security systems, tolling systems, electrical systems.

10 Complexity refers both to the suitability of the geological conditions for the project (e.g., a solid rock layer to anchor a building versus a very soft terrain that will require deep foundations) and to the uniformity of the geological conditions through the site (e.g., a uniform sandy site with a rock layer at a constant depth versus a highly complex combination of different soil types and depths through the site).

11 The lenders' technical advisor report typically provides an assessment of the quality of the geological information and its reliability, including a commentary on the quality and the extensiveness of the geological tests.

12 For instance, construction companies can go through cycles of disciplined approach to projects, then, if faced with a difficult environment or higher competition or the need to enter a new market, they may relax their discipline; it is important to understand where a constructor may stand in that cycle.

13 Constructor being the actual party to the construction contract and its guarantor if applicable.

14 Experience with PFI/PPP/P3 projects or, at a minimum, similar types of construction projects where the constructor undertakes to build a project on a fixed-price date-certain contract.

15 In North America, constructor's sub-contract risk insurance is typically purchased to insure the performance of sub-contractors as an alternative to requiring that sub-contractors provide their own bonding. When project-specific and with appropriate sub-limits, such insurance can help mitigate sub-contractor risk on the project.

16 Often the profit margin is called the "profit and overhead margin." It is distinct from the escalation allowance.

17 In this usage, "credit assessment" does not indicate a formal Input to Rating Services such as a Credit Estimate. Instead, it is more broadly an analytic judgment about the creditworthiness of the entity. Analysts may review and consider the constructor's size, market position, diversification, financials and order book; however, the quality and timeliness of information we receive on these factors can vary, and the assessment is not an input in the scorecard. As noted above, the credit quality of the constructor is not, in and of itself, a critical determinant of the credit quality of the PFI/PPP/P3 project.

18 A fully funded DSRF at financial close or a committed amount that will be available to fund the DSRF on the original target date for substantial completion.

19 De-risking of construction is not necessarily linear. For instance, many infrastructure projects incorporate material systems and equipment, the commissioning of which can expose the project to substantial delays in the last period of its schedule. In addition, some risks never disappear during construction. For instance, a weak contractor may be bankrupt toward the end of the construction period and may have to be replaced after incurring various delays.

20 For instance: a project has 3 phases; A, B and C; 50% of liquidity is released at completion of phase A and 25% at completion of phase B. One would test at the end of each phase how much of a schedule overrun can be incurred by the project without defaulting on its obligations: So one would test whether liquidity is sufficient to withstand a 3-6-9-12 months delay in Phase A (and phase B and phase C) with 100% of liquidity available; then a 3-6-9-12 month delay in Phase B and C once Phase A is completed and 50% of the liquidity has been released; then similar delays again in Phase C with the reduced liquidity after release of the liquidity when Phase B is completed. The minimum delay that can be sustained across all phases is the value used in the scoring of the sub-factor. So, in the preceding example if a delay of 9 months can be incurred across all phases prior to any release of security, then a delay of 6 months after the release of 50% of the liquidity and then 4 months after the release of 25% of the liquidity, the scoring would use the 4 months delay resilience.

21 Projects that have material government contributions are also tested through the construction period to determine how long the project -and thus the government contribution- can be delayed before the project runs out of liquidity to service debt and pay any other costs: in some projects, liquidated damages from the constructor are only triggered if the target date for substantial completion is not met, as opposed to being paid when interim milestones are missed.

22 Usually, the long stop date for the constructor is slightly shorter than under the Project Agreement, thus leaving some time for the constructor to be replaced and the project completed before a termination under the Project Agreement is triggered.

23 A Labor & Material bond in North America typically ensures that sub-contractors and suppliers continue to be paid when the constructor fails to pay thus making it easier to avoid a complete stop of the work on the project if a constructor defaults.

24 We note that in some cases, that calculation may include not only the cost to complete the construction of the project but also an increased cost of delivering the operating, maintenance and life cycle services, since the sponsoring government will most likely reassess these costs in a termination context.

25 A link to a list of our sector and cross-sector methodologies can be found in the "Moody's related publications" section.

26 When a factor comprises sub-factors, we score at the sub-factor level. Some factors do not have sub-factors, in which case we score at the factor level.

27 Numerically, a downward notch adds 1 to the score, and an upward notch subtracts 1 from the score.

28 A link to a list of our sector and cross-sector methodologies and a link to *Rating Symbols and Definitions* can be found in the "Moody's related publications" section

29 For an explanation of the Baseline Credit Assessment, please refer to *Rating Symbols and Definitions* and to our cross-sector methodology for government-related issuers. A link to a list of our sector and cross-sector methodologies and a link to *Rating Symbols and Definitions* can be found in the "Moody's related publications" section.

30 A link to *Rating Symbols and Definitions* can be found in the "Moody's related publications" section.

31 A link to a list of our sector and cross-sector methodologies can be found in the "Moody's related publications" section

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.moodys.com for the most updated credit rating action information and rating history.

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