2019

Fiduciary and Conflict of Interest Review of the New York State Common Retirement Fund

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Executive Summary

Subsequent to a competitive Request for Proposal ("RFP") process undertaken by the Comptroller of the State of New York (the "Comptroller"), as Trustee of the New York State Common Retirement Fund (the "CRF" or the "Fund"), Duff & Phelps, LLC ("Duff & Phelps" or "D&P" or "we") was selected to conduct the triennial Fiduciary and Conflict of Interest Review (the "Review") of the CRF as required by regulations of the New York State Department of Financial Services ("DFS").

DFS regulations require the Fund to undergo a fiduciary and conflict of interest review every three years by a qualified unaffiliated person; this is the third such review, the first being conducted in 2013 and the second in 2016. Each Review has focused on an examination of key aspects of the investment-related operations of the Fund; however, the Reviews are not meant to analyze individual investments, nor are they meant to review the administrative operations of the Fund. We were charged with completing the following tasks:

Task 1: Review of Investments; Compliance with CRF Investment Policies and Procedures and Department of Financial Services Regulations

We reviewed documents for all investment transactions requiring the Comptroller's approval that closed during the Review Period (March 31, 2015 through March 31, 2018). In all there were 118 such transactions during the period.

Based on our review of the transaction files, all were executed in accordance with the statutes, regulations and CRF policies and procedures in place at the time of closings. A detailed checklist showing all closings during the Review Period, along with relevant requirements, is found later in this report. We also found that the Fund has made great strides in improving the standardization and organization of the individual transaction files.

Task 2: Review Implementation of Actions Identified in the Internal Report[1] (the "Comptroller's Report")

We familiarized ourselves with the Comptroller's Report (full contents will be discussed later in this document), reviewed and analyzed the CRF's implementation of the recommendations, and evaluated the progress made on each of the recommendations.

In reviewing the recommendations in the Comptroller's Report, we found them to be thoughtful and relevant to the operations of the Fund. We found the staff of the Division of Pension Investments and Cash Management (respectively, the "CRF Staff" and "PICM") to be receptive

[1] Link to "Actions Taken by State Comptroller Thomas P. DiNapoli to Enhance the Common Retirement Fund's Policies and Procedures Following an Internal Review: **https://www.osc.state.ny.us/reports/internal-pension-fund-investigation-and-actions.pdf**

and open to improvement, and all of the recommendations have been implemented or diligently pursued by the CRF as far as reasonably possible.

Task 3: Assess Compliance with Fiduciary Principles

In reference to the matters examined in Task 1 and Task 2, we evaluated whether the CRF remains in compliance with the fiduciary principles set out in the DFS regulations to which the Fund is subject.

Based on the extensive documentation we reviewed and the interviews we conducted, we believe the CRF remains in compliance with the stated fiduciary principles. We found that the Comptroller and CRF Staff hold themselves to the highest ethical, professional and conflict of interest standards and work for the sole benefit of the members and beneficiaries of the Fund. From the Comptroller down through the organization, CRF Staff were knowledgeable, professional and dedicated to their roles and we did not discover any unethical behavior or misconduct. In our experience, the CRF under the leadership of Comptroller DiNapoli is constantly striving to be a leader amongst its peers for transparency of management and operations.

The Fund has a strong governance framework with sound internal controls and is managed efficiently and effectively.

Task 4: Identify Recommendations for Improvement

Based upon our interviews with the CRF Staff and review of documentation in reference to Tasks 1 and 2, we identified areas where there was room for improvement in the investment related policies, procedures and practices to bring them in line with industry best practices.

Overall, we found the Fund to be operating to a high standard, engaging with participants in the financial markets and their peers in order to identify prevailing and best practices for consideration by the Fund. While we were not specifically tasked with following up on recommendations from prior fiduciary and conflict of interest reviews, where recommendations from those reviews coincided with areas of focus for this review, we evaluated progress in implementation. In light of that, we have found the Fund has made great strides in implementing past recommendations and improving its operations.

In consideration of the above, we do highlight recommendations that we believe will help the CRF become best-in-class among other large state pension plans. We have tried to be cognizant of the challenges in obtaining new resources and as such, have attempted to focus our recommendations on improving efficiency where possible.

As noted in the past fiduciary and conflict of interest reviews, Human Capital (“HC”) and Information Technology (”IT”) still present the biggest challenges for the Fund, but we wanted to specifically highlight the progress that has been made on staffing and resource allocation to PICM. The CRF has recently received mandate approval for an increase in headcount, an increase in compensation for various levels of Investment Staff and a widening of the compensation bands for CRF Staff. This final point allows for a greater career progression for employees.

Achieving this improvement represents a significant accomplishment and years of hard work on the part of the management of PICM to close the compensation gap with its peer public pension funds, bringing PICM compensation closer to the median of other public fund peers. It required close cooperation with PICM's internal partner, Human Resources & Administration, and the support of CRF and OSC leadership, as well as the cooperation of the Legislature, the Governor and the external executive state agencies that control PICM compensation and staffing levels.

This staffing and compensation plan should allow for better retention of current staff and increase the level of new talent they will be able to recruit in the future. Retention and optimization of key staff is of utmost importance to any organization. Public pensions have traditionally lagged, in some cases significantly, the overall investment industry in compensation, which puts public pension plans at risk of losing seasoned staff to higher paying private sector positions. Loss of institutional knowledge due to turnover can have a devastating impact on an organization.

All investment organizations are inherently operating in high risk environments. Those that have appropriate staffing levels and fully utilize technology to increase efficiency and minimize risk will be more able to move beyond the status quo and to think strategically about what issues they may face in different market environments or what the enterprise could do to operate more efficiently.

Below we provide a summary of our recommendations. A detailed discussion of these recommendations can be found further on in this report, in the section entitled *Task 4: Identify Recommendations for Improvement*. While we recognize that significant progress has been made by the Fund in the area of staffing during the Review Period, we note that several of our recommendations would require additional staff resources. We recommend the following:

Recommendation 1: Information Technology

Enhanced PICM IT Staff and Authority. The services provided enterprise wide by the OSC Division of the Chief Information Officer ("CIO") are a positive for PICM in the core functional IT and support areas; however, PICM has unique business needs and highly time sensitive and market sensitive processes. Therefore, we recommend:

- Differentiated PICM IT solutions to address investment needs;
- Additional IT staff resources within PICM to implement technology solutions that address PICM-specific needs, and
- A broader scope of authority to PICM IT Staff from the CIO to implement those investment technology solutions.

Additional PICM IT Staff with the functionality recommended above may also require additional resources within the CIO to coordinate with and provide support to PICM IT Staff.

Automation. We recommend that the Fund more fully automate day-to day mechanical tasks, using solutions such as Straight-Through-Processing ("STP"), where the manual aspects of trading and processing securities are minimized or completely removed. Implementing STP processes would reduce the risk of errors and allow Investment Staff to focus on their core duties.

In conjunction with augmented STP solutions, the CRF should consider implementing an Investment Book of Record (IBOR) to provide consolidated reporting across asset classes.

IT Project Management. As is the standard at peers of the CRF, we recommend that PICM IT Staff remain in the Operations group and that they be responsible for the procurement, deployment, maintenance and optimization of PICM-specific systems. Due to their greater understanding of the investment business, efficiencies can be gained by leaving management of technology and technology vendors to PICM IT Staff. As noted above, this will require a broader scope of authority for PICM IT Staff and additional IT staff resources in PICM and may require the same in CIO.

PICM Technology Needs for Travel. Based on the amount of domestic and international travel that is necessary for PICM investment officers to diligence and monitor investments, we recommend that an independent a cloud-based collaboration solution be deployed to increase the efficiency of CRF Staff. The benefit of this automated sharing functionality would not be limited to employees in travel status and would be accessible from any internet connected device. As a result, it could aid in creating further institutional knowledge across the Fund and benefit the staff by allowing for note taking/sharing, secured document access and secure messaging with colleagues and partners. This solution could be further secured for domestic and internal travel by integrating the solution with dual or multi-factor authentication functionality.

Cyber Training. While some CRF Staff receive ad hoc cyber training when they plan to travel, we recommend that the entire PICM organization be regularly trained so that they are reminded and cognizant of the increasing threat from cyber criminals. In addition, we recommend a greater frequency of phishing tests by the CIO (i.e., from annual to quarterly) and risk-based and remedial training when necessary.

Recommendation 2: Compliance

Staffing. We recommend the addition of at least one compliance staff member for the near term. We would also recommend adding a Deputy Director of Compliance, organizationally much like the deputies that have been added in the asset classes and other program areas across PICM. This position could be filled from within or an external hire. Moreover, locating the Deputy in the New York City office, where approximately half of the investment team is located, would enhance compliance supervision of the investment team that are located there and lessen the travel burden of the current Compliance team members, who are all located in Albany.

Electronic Communication review. We recommend routine targeted compliance review of the electronic communications of employees, particularly Investment Staff. Although OSC currently has the ability to collect email and some other forms of electronic communications, to date OSC has only done so in cases of a specific concern or after a problem has occurred. A more proactive and preventative approach, one that is consistent with industry best practices, would aid in the oversight and governance of the Fund and higher risk CRF Staff.

Compliance Training. In addition to the annual training that is currently provided to all PICM Staff concerning certain high risk areas (i.e., travel, gifts and entertainment, personal account trading policies, misuse of material nonpublic information and insider trading prevention), we recommend further ad hoc training on high risk areas such as manager fiduciary duties (as was provided at the 2019 PICM Staff training), the OSC whistleblower policy (which allows for complaints to be made outside of PICM by contacting the OSC Inspector General), and, specialized cyber and information security training.

Recommendation 3: Fund Management

Transaction Files. In conjunction with our overarching recommendations, particularly improvements in IT infrastructure, we recommend more standardized and automated transaction file keeping systems be utilized. This will enhance recordkeeping, allow for better user access and better preserve institutional memory.

Staff Onboarding and Training. Although the current onboarding process is thorough in content, we recommend that all training take place in person when possible instead of by video conference. In-person attendance typically increases mental retention of the material and can also serve to build comradery.

Role of Investment Consultants. We suggest that, to the extent feasible, the CRF separate the core functions of its investment consultants from other functions, such as providing IT systems and support, and either bring those non-core functions in-house or engage an independent consultant to perform non-core services. We also recommend that all consultants be subject to periodic performance reviews during the term of their contracts with evaluation against specific delineated benchmarks appropriate to the asset class. Those criteria may include, for example, quality of deals or managers brought forth, quality and level of returns generated against risk to the Fund and quality and transparency of manager due diligence. Finally, there are some investment-related services performed by consultants that should be reviewed periodically to determine if the time has come where, with modest additional resources, staff could replicate some or all of the services at substantial cost savings to the Fund.

Risk Management. To allow for improved management of data provided by the Fund's custodian and outside data providers, we recommend an increase in the allocation of technology resources to the Chief Investment Risk Officer ("CIRO"); this could tie in with our recommendation of having PICM-specific technology experts.

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Overview of the Common Retirement Fund

The New York State and Local Retirement System ("NYSLRS" or the "System") administers service retirement, disability retirement and death benefits for members employed by the State and local governments and other participating employers. The System comprises the New York State and Local Employees' Retirement System ("ERS") and The New York State and Local Police and Fire Retirement System ("PFRS"). The assets of the System are held and invested in a trust fund, the CRF, for the exclusive benefit of the members, retirees and beneficiaries of the System. The Comptroller is the Administrative Head of the System and the sole Trustee of the CRF.

As the sole Trustee, the Comptroller determines policy and manages the investment operations of the CRF with support from the Deputy Comptroller for the Division of Pension Investment and Cash Management (a role also known as the Chief Investment Officer ("CIO")), Counsel to the Comptroller and the First Deputy Comptroller and their professional staffs, as well as outside counsel, consultants, managers and the external investment advisory committees to the CRF. The assets of the CRF are managed on a day-to-day basis by PICM, which is a Division within the OSC.

The CRF was established in 1967 by Article 9 of the New York Retirement and Social Security Law ("RSSL") and is subject to the RSSL and to the regulations of and oversight by the New York State DFS. The New York State Constitution (Art V, §7) provides that membership in a state pension or retirement system is a contractual relationship and protects the benefits of membership from being diminished or impaired.

The CRF consistently remains among the best funded of United States public pension plans: as of the close of the fiscal year 2019, 96.27% for ERS and 95.09% for PFRS.[2] In their most recent report on pension funding gaps among US states, Pew Charitable Trusts ranked the Fund fourth out of the 50 states[3].

PICM managed CRF assets of $210.5 billion on behalf of over 1.1 million members, retirees and beneficiaries as of the close of the 2019 fiscal year, making it the third largest state plan in the United States. For perspective on the size of the Fund, the entire NYS budget for the same fiscal year totaled $165.3 billion in revenues and $163.2 billion in expenses. The entire OSC has a staff of over 2,700 people, while PICM has approximately 87, inclusive of dedicated support functions, as of the preparation of this report.

Although the CRF, as a public pension plan, is not subject to regulations of the Federal Employee Retirement Income Security Act of 1974 ("ERISA"), the "CRF voluntarily looks for guidance to ERISA and the United States Department of Labor interpretations"…"where relevant and

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[2] Letter of Transmittal, NYLSRS 2019 Comprehensive Annual Financial Report: **https://www.osc.state.ny.us/retire/word_and_pdf_documents/publications/cafr/cafr_19.pdf**

[3] June 2019, Pew Charitable Trust Survey: **https://www.pewtrusts.org/en/research-and-analysis/issue-briefs/2019/06/the-state-pension-funding-gap-2017**

appropriate" and the Comptroller has put in place policies and procedures so that "Fund investments are made with the care that a prudent person serving in a like capacity and familiar with such matters would use in the conduct of an enterprise of like character and with the aims – the "prudence" and "exclusive benefit" fiduciary standards of investment"[4].

General Investment Objectives

- Provide the means, together with employee and employer contributions, to pay benefits, when due, to the System's members, retirees and beneficiaries;
- Seek to optimize long-term risk-adjusted returns, consistent with liquidity and diversification parameters that are prudent under existing circumstances;
- Invest according to an asset allocation that provides for the diversification of assets;
- Invest assets efficiently, bearing in mind the impact of management and transaction costs on the return of the assets; and
- Exercise all investor responsibilities on behalf of CRF, including the voting of proxies, in the best long-term interest of the CRF and in accordance with the applicable statutes and voting guidelines of the CRF.

Asset Allocation Plan

The CRF has developed an Asset Allocation Plan (the "AAP") which establishes the investment objectives of the Fund to be the "best risk-adjusted returns needed to achieve and maintain fully funded status[5]." It is not economical, feasible, nor desirable for a fund the size of the CRF to routinely adjust its investment strategy. Accordingly, this plan emphasizes asset allocation and is updated every five years with annual tactical adjustments as necessary. There are seven primary asset classes in which the Fund invests:

- Private Equity – Designed to generate long-term returns that exceed those of public equities;
- Fixed Income – Designed to provide a consistent source of funds to help address the cash flow needs of the Fund. Additionally, provides downside protection against the volatility of the overall portfolio's equity-oriented strategies while achieving efficiency in the risk/return profile for fixed income;
- Global Equities – Designed to provide the largest source of returns in the Fund's portfolio over the long-term, through diversified, global exposure;

[4] NYSLRS 2019 Comprehensive Annual Financial Report, page 53: https://www.osc.state.ny.us/retire/word_and_pdf_documents/publications/cafr/cafr_19.pdf
[5] https://www.osc.state.ny.us/pension/investment-philosophy.pdf

- Absolute Return Strategies – Designed to provide diversified superior risk-adjusted returns with a low correlation to other asset classes;

- Opportunistic Investments – Designed to add alpha (excess return) to the Fund's overall return with relatively low correlation to other asset classes;

- Real Assets – Designed to add alpha to the Fund's overall portfolio return and offer inflation participation opportunities while maintaining a low correlation to traditional asset classes over time; and

- Real Estate – Designed to provide a steady stream of income through less risky core investments, and capture excess returns through riskier, core-plus/value-add and opportunistic investments.

During the course of our review, the Fund was undergoing a review of the AAP with new asset allocations to be implemented and published in 2020, but for the Review Period covered by this report, the allocation was as follows:

Asset Class	Target
Domestic equity	36%
International equity	14%
Private equity	10%
Real estate	10%
Absolute return strategies	2%
Opportunistic funds	3%
Real assets	3%
Bonds and mortgages	17%
Cash	1%
Inflation-indexed bonds	4%
Total	**100%**

Scope of the Review

DFS regulations require the Fund to undergo a fiduciary and conflict of interest review every three years by a qualified unaffiliated person. As noted earlier, this is the third such review, the first being conducted in 2013 and the second in 2016. D&P, as an independent, unaffiliated entity was selected through a competitive procurement process. We were charged with completing the following tasks:

Task 1: Review of Investments

Evaluate compliance with CRF investment policies and procedures, and compliance with DFS regulations, for every transaction requiring Comptroller approval that closed during the covered period; the three-year period ending March 31, 2018.

Task 2: Review of the Internal Actions

Review the extent to which the CRF has implemented certain policies and procedures outlined in the April 5, 2017 report entitled "Actions Taken by State Comptroller Thomas P. DiNapoli to Enhance the Common Retirement Fund's Policies and Procedures Following an Internal Review" (the "Internal Report"). The Comptroller ordered the Internal Review be undertaken in light of allegations of wrongdoing on the part of a rogue former employee.

Task 3: Fiduciary Principles

Based on the above matters examined in the course of this fiduciary and conflict of interest review, evaluate whether the CRF continues to be in compliance with the fiduciary principles set out in the DFS Regulations:

- The Fund operates under a strong governance framework with a rigorous system of internal controls;
- The Fund maintains a high level of operational transparency;
- The Comptroller adheres to and manages the Fund with the highest ethical, professional and conflict of interest standards;
- The Comptroller acts for the sole benefit of the retirement system's members and beneficiaries; and
- The Fund is managed in the most efficient and effective manner possible.

Task 4: Recommendations

Recommend improvement opportunities, if any, identified in the course of this review, to the CRF's investment-related policies, procedures and practices to bring them in line with prevailing and/or best practices.

The Duff & Phelps Process

Duff & Phelps is a New York City headquartered global advisor that provides a broad range of services to a diverse clientele spanning public and private entities. We have collectively reviewed hundreds of investment managers and thousands of employees at all types of securities investment firms. The project team chosen for the engagement with CRF was drawn from our Compliance and Regulatory Consulting ("CRC") practice and encompasses professionals with operational, investment, legal, regulatory, compliance and accounting expertise. We also employed the services of a partner from a law firm, Roberts & Holland, LLP, to provide expertise on ERISA related matters. Full team biographies can be found in Appendix 2.

In approaching our mandate for the CRF, we viewed each of the Tasks not as distinct, stand-alone projects, but as integral parts of a whole, each contributing to successful investments for the beneficiaries of the Fund. As such, the individual Tasks will build on each other. We leveraged our extensive experience performing annual compliance reviews, annual trainings, operational due diligence and mock regulatory exams in conducting this Review. While the Fund is not subject to oversight by the United States Securities and Exchange Commission (the "SEC"), best practices and fiduciary duties are near universal across investment organizations of all types.

We began our process as we would with all engagements, gathering documentation to gain an understanding of the details of the CRF and PICM, beginning with publicly available information such as the annual Comprehensive Annual Financial Report ("CAFR") and prior Conflict of Interest and Fiduciary Review reports. An Opening Conference was held in Albany, NY where members of the D&P team met relevant CRF Staff and we discussed the process, submitted an initial document request and scheduled interviews.

Interviews were conducted with over 30 individuals, including among others:

- New York State Comptroller,
- CIO and Deputy Comptroller,
- Chief of Staff to the Comptroller,
- Interim Deputy CIO,
- Counsel to the State Comptroller,
- General Counsel to the CRF
- Chief Information Officer of OSC,
- Director of Operations,
- Deputy Director of Operations,
- Special Counsel for Ethics,
- Director of Compliance,
- Investment Advisory Committee Chair,
- Real Estate Advisory Committee Chair,
- Chief Risk Officer,
- Director of Internal Audit,
- Asset Class and Program Directors,
- Investment Officers,
- Compliance Officer,

- Human Resources leadership, and
- Broker Services Consultant.

The purpose of the interviews varied but they were generally used to gain insights into the policies, processes and procedures of the Fund; what risks the Fund is facing; what is done well and where there is room for improvement. Interviews were primarily conducted at OSC offices in Albany and New York City while a few took place via conference call.

After speaking with all interviewees, we determined that they understood the importance of their fiduciary duties to the beneficiaries of the Fund. Interviewees were both candid and forthcoming with information and were interested in how they could improve the organization.

A Project Plan Review Session was held in Albany to review the status of the project to date and discuss preliminary findings. Present at the meeting were senior members of the OSC, PICM and D&P teams.

Weekly conference calls were conducted between key members of the teams. D&P shared our progress on the Review, posed questions regarding matters that needed clarification and submitted supplemental document requests.

An Interim Briefing was conducted at the OSC office in New York City with senior members of the PICM, OSC and D&P teams discussing the recommendations that are presented in this report.

Task 1: Review of Investments; Compliance with CRF Investment Policies and Procedures and DFS Regulations

We reviewed documentation for all investment transactions requiring the Comptroller's approval[6] that closed during the Review Period to determine whether the transaction documents:

- Demonstrate the CRF's compliance with its investment policies and procedures; and
- Include representations from investment managers on the use of placement agents, disclosure of conflicts of interest, access to records as required by the DFS Regulations, acknowledgement of the restrictions on gifts and entertainment, the inclusion of an ESG assessment and other key terms as identified by the CRF.

We were not expected nor required to test any of the underlying investments nor the evaluation process of prospective investments and thus we did not test nor opine on any investments. While there were no new internal investment mandates closed during the Review Period, we discuss the operations and controls of current internally managed mandates elsewhere in this report.

During the course of the Review Period, there were 118 transactions that required the Comptroller's approval. These were broken down as follows:

Asset Class	New Mandates
Global Equity	7
Fixed Income	5
Private Equity	58
Real Estate	23
Absolute Return Strategy	0
Opportunistic	14
Real Asset	11
Total:	**118**

The Review Process

For each mandate, we tested for completeness and accuracy of the transaction files versus the required documentation as indicated below:

- Investment Consultant Recommendation;
- Investment Officer Analysis and Recommendation to Chief Investment Officer;

[6] For the avoidance of doubt, when referring to "investment transactions" in this report, we are speaking in a larger sense of investment mandates and manager allocations; the Comptroller does not approve investments in individual companies or individual trades.

- Chief Investment Officer Recommendation to the Comptroller;
- Comptroller Approval;
- Placement Agent Disclosure Letter;
- Internal Investment Committee or Real Estate Advisory Committee Review as appropriate;
- Fully executed transaction agreements;
- Background Checks Completed or Waived;
- Internal ESG Assessment Checklist;
- Acknowledgement of the restrictions on Gifts and Entertainment;
- Legal Review, internal and external, as appropriate;
- Acknowledgement of Political Contribution Limitations;
- Conflicts of Interest Disclosures;
- FEAA Boycotts Disclosures;
- MacBride Fair Employment Disclosure; and
- Department of Financial Services Access to Records.

The folders for the 118 transactions contained over 2000 individual files that were reviewed by the D&P team for completeness and accuracy versus the required documentation.

Findings

The full transaction log and checklist are presented in Appendix 1, however we found in all instances that the appropriate, required documentation was present in each transaction folder and the transactions were closed consistent with the CRF's policies and procedures, DFS Regulations and the Comptroller's duty as the sole Trustee.

We note that in the 2016 report, a recommendation was made to standardize the format of the Staff Recommendation to the Comptroller and we can report that this recommendation was implemented with a standard format apparent in files closed after the 2016 Review. In addition, the "chain" of recommendations from the investment officer to the CIO to the Comptroller have been consolidated for signatures.

In conjunction with our overarching recommendations, in particular concerning improvements to information technology infrastructure, we are noting that the CRF utilizes a very manual file organization system that proved cumbersome in use. To enhance recordkeeping and bolster institutional memory a more standardized and automated file keeping system should be utilized.

The Comptroller is fulfilling his mandate to transparency by disclosing publicly extensive information on assets, managers and consultants annually in the Retirement System's Comprehensive Annual Financial Report:

https://www.osc.state.ny.us/retire/about_us/financial_statements_index.php

and each closed transaction in a monthly publication available on the OSC website:

https://www.osc.state.ny.us/pension/disclosure.htm.

Task 2: Review Implementation of Actions Identified in the Internal Report

We reviewed the CRF's implementation of the actions identified in the Internal Report[7] and determined whether each action had been completed, is a work in process, is under consideration or has not yet been undertaken. This portion of the review required D&P to familiarize ourselves with not only the Internal Report, but also the underlying incident that precipitated the Report[8], wrongdoing by a former rogue PICM employee.

Documentation related to the implementation of the actions set out in the Internal Report were made available to D&P by CRF Staff. D&P was not tasked with, nor did we evaluate the conduct of the underlying internal investigation.

For all items, we found the Fund to have implemented the recommendations in the report or pursued them to the extent feasible. D&P has noted progress made after the covered period and prior to the completion of the Review.

Item 1: Enhanced Pre-Employment Vetting Procedures for all Investment Professionals

While acknowledging that even the strictest controls can be evaded, the Comptroller outlined additional enhancements to further bolster the existing vetting process for hiring all investment professionals at the CRF. D&P reviewed each of the Comptroller's enhancements that were directed as follows:

- The requirement that all candidates, prior to being interviewed, must complete an application for employment listing all former employers, the name of the candidate's former supervisors, and the supervisors' contact information;
- All candidates must provide at least three professional references, one of whom must have been the candidate's most recent employer;
- Reference checks must be performed by appropriate CRF Investment Staff, as assigned by the Chief Investment Officer. This function may not be delegated to an outside entity; and
- All former employers for whom the candidate has performed work relevant to the position for which the candidate is being considered during the past 10 years must be contacted.

[7] https://www.osc.state.ny.us/reports/internal-pension-fund-investigation-and-actions.pdf
[8] https://www.justice.gov/usao-sdny/pr/former-director-fixed-income-and-head-portfolio-strategy-new-york-state-common-0

Evaluation

Following the events that warranted the review of the CRF's hiring practices, the entire process of vetting, interviewing and qualifying candidates was moved under internal control of the CRF and is overseen by the Director of Operations in coordination with Human Resources ("HR").

The CRF has worked to identify and remedy potential weaknesses and to further develop the hiring process by building out the content and detail of job specifications, the advertising of positions, the vetting of candidates, and the interviewing process. Key to these internal controls are enhanced processes, documentation requirements and approvals by multiple CRF Staff throughout the process.

The development of a detailed job specification involves close coordination of all stake holders that included asset class representatives, the Director of Operations, the Interim Deputy CIO and the CIO.

The application process at the CRF is detailed and in-depth. Application screening for completeness and vetting of eligible candidates is overseen by the Director of Operations, with multiple CRF Staff reviewing as well. Candidates are required to be interviewed by the relevant Asset Class Director and Investment Officers from the group at a minimum. In addition, other staff members including the Director of Operations, Legal and other Asset Class Directors may be asked to participate. Finally, the CIO interviews all candidates before extending an offer.

Once an offer is extended by CRF and accepted by a candidate, the process of employment, reference and background checks is initiated. The checks are extensive and documented to include multi-level reviews of the candidate's vital information.

The enhancements relevant to pre-employment vetting as directed by the Comptroller's Report were integrated as enhanced procedural controls to prevent any candidate from being able to misrepresent their experience, to ensure the legitimacy of the candidates' references and ensure the highest qualification standards. Internal policies and procedures require all relevant documentation be retained in each staff member's employment file.

Additionally, the CRF has changed recruiting firms since the events, engaging with a recruitment consultant that has extensive experience in the public pension space. The recruitment consultant, in coordination with the CRF, is the initial point of contact and provides initial screening of potential investment officers.

Findings

D&P determined that the CRF has been successful in strengthening and centralizing the overall hiring process and implementing extensive measures to enhance procedures. Effective policies are in place to implement and document the procedures required to obtain completed applications, reference checks, and relevant employment verifications. We interviewed relevant staff such as the Director of Operations, HR Staff and a recent new hire. During the interviews it was apparent that CRF Staff are aware of the hiring policies and there was a high degree of satisfaction with the overall hiring process.

The CRF has integrated the hiring of a new recruitment consultant into its process and the change has been successful on multiple levels. D&P reviewed the recruitment Consultant Agreement which extensively details the services that the recruitment consultant is obligated to deliver to the CRF. At a management level, the assignment of a Relationship Manager at the recruitment consultant and background checks on all consultant employees on the account, has added additional safeguards and controls in the new hire process. The consultant's experience in the public pension space has also resulted in a larger pool of qualified candidates which is important due to certain restrictions the CRF faces such as compensation.

Although the added layer of vetting and larger pool of candidates provided by the consultant has continued to enhance the hiring process, the CRF maintains control over the process, checking references and performing background and prior employment checks in-house.

To verify that staff maintains the appropriate documentation in hiring employees, D&P reviewed sample employment files on-site at the CRF's Albany offices. All sample files included the required completed applications, reference checks, and relevant employment checks as well as any additional relevant notes. D&P confirmed that HR conducts extensive background checks. Reference checks were also conducted in-house and appropriately documented. There is also a phone script, which was reviewed by D&P, for all reference checks to ensure accuracy and consistency.

To further review the hiring process, D&P interviewed a recent investment officer hire to the CRF. The recent hire found the overall process to be in-depth and efficient. It included an extensive questionnaire and interviews with the recruitment consultant prior to any contact with the CRF Staff. The recent hire confirmed that the required procedures were followed during the process and noted that their references were impressed with the level of detail required and extent of the reference checks performed.

Item 2: Fresh Review of all Brokers and Ongoing Monitoring Process

To review the continuous selection of executing brokers that are authorized to execute trades for the internally managed mandates for the CRF, fixed income and domestic equities, we reviewed:

- The process that an executing broker undertakes to be added to the CRF-approved list of brokers;
- The evaluation process conducted by the external consultant and internally at the CRF;
- The monitoring of brokers on an on-going basis by the external consultant in conjunction with the CRF;

- Required reporting of material changes and significant events to the CRF review committee which will formulate a recommendation to the CIO;

- Whether CRF transactions are executed through approved brokers unless expressly authorized by the CIO; and

- The planned re-application process for all brokers at least once every five years[9].

CRF-Approved List of Brokers and the Broker Evaluation Process

The CRF has established a Broker-Dealer Selection Policy that sets out approval criteria and the evaluation process for new executing brokers and for ongoing monitoring of approved brokers.

To assist with the broker search, the CRF has entered into an agreement with a third-party brokerage search consultant (the "Broker Consultant") to assist with the annual questionnaire and the broker selection process. The CRF has put in place a process that all incoming questions regarding new brokers are to be directed to the Broker Consultant.

In keeping with the Comptroller's emphasis on transparency, an executive summary of the broker selection process is published on the OSC website[10]. On an annual basis, brokers seeking to be added to the list are required to complete the appropriate questionnaire(s) by stated deadlines.

As part of the initial and ongoing due diligence process, brokers must certify that they are familiar with the CRF's compliance policies, particularly the restrictions on accepting gifts and hospitality, the requirement for brokers to provide training to its employees on those restrictions, and the need to monitor the broker's employees' compliance with the restrictions. In addition to those topics, the annual questionnaires inquire about the following key topics:

- Regulatory issues;

- Civil, criminal or other legal issues;

- Fines and other penalties;

- Internal compliance controls;

- Conflicts checks;

- DFS required access to books and records;

- Changes in firm strategy, structure or key personnel;

[9] As of the date of this report, the five-year anniversary had not yet passed, so while we discussed the reapplication process with the Staff, there was no process to review.
[10] https://www.osc.state.ny.us/pension/questionnaire.htm

- Political contributions; and
- Gift Restrictions;

An approved broker must also notify the Fund's Director of Compliance, the Special Counsel for Ethics and the CRF Inspector General if it becomes aware of violations of the above or other restrictions.

Findings

D&P reviewed the CRF's Broker Selection Policy that sets out the selection criteria and process for the recruitment of brokers to be selected for the Approved List of Brokers. D&P found the Broker Selection Policy to be complete and appropriately implemented in practice by CRF Staff.

The Broker Consultant was engaged through a competitive RFP process, with the Staff evaluating several firms before choosing the current provider.

Although the CRF Staff works closely with the Broker Consultant throughout the brokerage selection process, the CRF maintains overall oversight and control of decision making. For example, the CRF developed and maintains the broker questionnaire that is then relayed to the Broker Consultant for distribution to current and potential brokers. A separate questionnaire was developed for brokers seeking to serve the global equity portfolio and brokers seeking to serve the fixed income portfolio. Responses were evaluated by the respective teams and separate lists of approved brokers were ultimately approved by the CIO

The questionnaires cover areas that brokers must meet for minimum qualifications as set forth in the Broker Policy. Responses to those questionnaires were evaluated in three phases. The first phase was an assessment of the overall financial viability of the firm. Firms that met or exceeded the minimum threshold in Phase 1 continued on to Phase 2 and were scored in four categories. A targeted number of brokers that received the highest scores then progressed to Phase 3, which consisted of reference checks, background checks and due diligence visits.

The CRF established two Broker Selection Committees to review proposed broker counterparties for global equity and fixed income, respectively, before approval by the CIO, all pending final due diligence by the Director of Compliance. D&P found that the Broker Selection Committees were comprised of representatives from the appropriate internal stakeholders and followed all required evaluation processes, due diligence and implementation requirements.

The CRF website provides clear guidance to brokers on the basic requirements for approval and directs brokers to contact the Broker Consultant, who has a standardized process to provide information to brokers seeking selection. The Broker Consultant is responsible for initially vetting the broker questionnaires and providing the CRF with qualified candidates to be considered for addition to the Approved List of Brokers.

Brokers that have been through the approval process are not required to reapply each year, which reduces the number of counterparties to be evaluated annually. However, they must reapply at least once every five years. Brokers are required to update the CRF of any material changes to their business.

The CRF has found that in addition to conducting a background check on the brokerage firm, its requirement that any person at an approved broker who is assigned to cover the CRF's account must consent to a background check is an effective method to ensure that the firms and the individual brokers covering the CRF understand the CRF expects a high standard of compliance with its counterparty requirements. D&P believes this is a good example where the CRF is proactive in identifying risks and implementing policies to mitigate those risks. The requirements of a background check on both the firm and the covering brokers and a written agreement recognizing gifts restrictions are leading practices in the industry.

In interviews, CRF Staff conveyed to D&P that the Broker Consultant's initial broker selection screening removes a significant administrative burden out of the process and allows the Committee to effectively evaluate the brokers in an organized, efficient manner. Additionally, the process ensures that brokers are aware of the policies, procedures and potential penalties of non-compliance with the detailed terms set forth for broker approval.

Ongoing Monitoring of Brokers and Reporting of Material Changes

Through their daily investment activities, Investment Officers with trading responsibilities are in continuous, direct communication with their executing brokers and are also speaking with peers in the industry. The Director of Fixed Income receives detailed weekly and monthly reports that assist him in monitoring the distribution of transactions across approved counterparties; while the Public Equity team prepares and distributes, within PICM, monthly commission reports to enable the Fund to monitor aggregate commissions paid.

The Broker Consultant continuously monitors brokers through industry contacts, FINRA BrokerCheck[11], SEC Focus Reports[12] and other public filings and will notify CRF of any significant events or changes that it determines would be material in relation to the broker's ability to provide services. FINRA BrokerCheck is a database maintained by all FINRA registered brokers (all client facing personnel at broker dealers are subject to a licensing requirement) and notes any regulatory issues on individual brokers or firms. SEC Focus Reports are annual financial reporting produced by all SEC registered broker dealers. Focus Reports contain general operating and financial conditions, identifying information and the firm's annual audit results.

The Director of Compliance typically meets with each approved broker's Compliance Officer prior to the broker's addition to the CRF's Approved Broker List. D&P was advised that these meetings are typically held in coordination with the Broker Consultant. In addition, the Director of Compliance and his Staff issue annual questionnaires to brokers that require them to attest to the ongoing adequacy of their business to provide services that comply with CRF's standards.

[11] **https://brokercheck.finra.org/** ; FINRA is an independent non-governmental regulator for all securities firms doing business with the public in the United States. BrokerCheck is an online tool that reports individual brokers employment history, regulatory actions, investment-related licensing information, arbitration and complaints.

[12] Focus Report: SEC Form X-17A-5, Financial and Operational Combined Uniform Single Report (FOCUS).

Brokers are required to provide periodic reports as requested by CRF and are required to advise the CRF of any material changes to their business that would reasonably be expected to impact the broker's ability to provide execution services for the CRF. Per the Policy, any material changes to a broker's business are required to be provided to the Broker Selection Committee for review. In turn, the Broker Selection Committee can subsequently recommend appropriate action to the CIO for a final decision.

The CRF Investment Staff is in continuous contact with their approved brokers and has a robust internal process for monitoring their performance. Issues are raised with the Broker Consultant for transmittal to individual brokers.

Approved brokers are required to fully reapply for approval at least once every five years, a process involving full questionnaires, on-site reviews and background checks of key personnel.

Findings

D&P found that the CRF has implemented several methods to monitor brokers an on-going basis. There are multiple "touch points" with the brokers that allow for continuous monitoring.

In interviews, all CRF Staff were aware of the on-going process of monitoring brokers and the channels of communication for reporting on relationships. D&P reviewed documents that provided an example of a trader notifying all Investment Staff of the effective date when a broker was being bought by a competitor. The CRF notified Investment Staff to cease trading pending the formal review process of the successor entity.

CRF's Investment Staff are proactive in managing each brokerage relationship and raising concerns as appropriate. Review of internal communications showed detailed ongoing evaluations of brokers and subsequent measures to provide feedback or other consequences to the given brokerage counterparty.

The Director of Compliance plays a key role in the monitoring of brokerage counterparties through background checks and communications with brokers to ensure relationships are current. The Director of Compliance oversees the annual questionnaires that are issued to each approved broker and will also run background checks on any changes in coverage. Relevant updates to CRF Staff are provided on a timely basis, as evidenced by communications reviewed by D&P.

Although approved brokers are required to reapply for approval once every five years, the CRF has initiated a more frequent application process to allow those brokers not on the approved list to apply for consideration. This is intended to keep the process "evergreen" so that the changing needs of the CRF can be met and is also a best practice in the industry.

The Broker Consultant appears to be proactive in monitoring the brokers and providing feedback to CRF. The Broker Consultant described their engagement with brokers through calls and in-person meetings while also monitoring other potential sources of information such as industry websites. In addition, our review of documents indicates that the Broker Consultant is diligent in communicating notification to brokers as directed by the CRF Staff.

CRF Transactions only Through Approved Brokers

Per CRF policy, transactions are only allowed to be executed with brokers on the approved list. However, exceptions may be made on a transaction basis with the prior approval of the CIO and with notice sent to the Director of Compliance.

The Director of Compliance emails the Approved List of Brokers periodically to CRF Staff and issues updates as necessary if brokers are placed on a "watch list", suspended, removed from the list or there is a coverage change.

Periodically, the Director of Compliance requires all authorized investment officers to certify that they have received the Approved Coverage List, have only traded with executing brokers on the list and have only placed trades through persons identified as approved on the list.

Findings

D&P was advised by the Director of Compliance that he maintains the list of approved brokerage counterparties on an automated third-party portfolio management system ("PMS") and order management system ("OMS") that contains pre- and post-trade compliance controls. The Investment Staff confirmed the functioning of these controls noting that only approved brokers appear in the OMS. We also reviewed attestations from the Investment Staff to the Director of Compliance stating that they had only conducted business with approved counterparties.

In compliance with the Broker Policy, we noted one such counterparty exception. We reviewed the documentation of this transaction, which included a request from the Investment Staff and an approval from the CIO with a notification to the Director of Compliance and note the prescribed process for an exception was followed.

Item 3: Restoration and Tightening of the Controls Eliminated by the Rogue Employee

In response to the internal investigation ordered by the Comptroller following allegations of wrongdoing by a rogue PICM employee, the Comptroller directed the CIO and PICM to take certain steps to reinstate and enhance certain trading controls. These controls involved:

- Reinstitution of appropriate trade reports, both weekly and monthly, containing pertinent information – including broker names that are reviewed by either the CIO or Interim Deputy CIO;

- Institution of volume reports to readily reveal trade volume per broker, which are shared with the CIO, Interim Deputy CIO, Director of Operations and Director of Compliance;

- Regular review by the Interim Deputy CIO and the Director of Compliance of all trading volume reports for any spikes or anomalies, which should prompt immediate inquiry or justification for such spikes or anomalies;

- Annual review of all broker usage data by the CIO and Interim Deputy CIO and a written explanation for any significant changes in broker traffic; and

- Continued publication of all broker usage data in the System's Comprehensive Annual Financial Report.

Each of these controls represent basic management oversight of the investment process and similar controls should be standard practice in any asset management institution. The elimination or manipulation of these safeguards by the rogue employee allowed him to direct brokerage to unapproved and/or favored brokers. In examining the reinstatement of these controls, we interviewed numerous investment and support staff and reviewed management reporting.

Findings

We reviewed over 100 files in relation to the review and approval of CRF trades that had been executed via the internal mandate and interviewed Investment Officers, the Director of Fixed Income, Director of Global Equity, Interim Deputy CIO and CIO. Overall, we found that the process is following the spirit and letter of the policies and procedures put in place. Particular findings were:

- Samples of trade blotters on a daily, weekly and monthly basis were provided and reviewed for evidence of supervisory signoff. Of the sampled blotters, all were in compliance;

- Monthly volume and commission reports were reviewed and interviews with key CRF Staff confirmed that the reports were being reviewed. We would further highlight that the annual CAFR also contains all broker volume data for the preceding year;

- No such spikes in volume were noted during our Review Period and thus, no action was necessary to investigate;

- As noted, all volume data is published in the CAFR and the CIO is responsible for signing off on the veracity of this data before publication; and

- The CAFR is available on the OSC website[13].

The restoration and tightening of the internal controls appear complete and brings the CRF, with a few technology upgrades discussed in the Recommendations section of this report, up to market best practices.

[13] https://www.osc.state.ny.us/pension/cafr.htm

Item 4: Assertive Action to Promote Compliance with the NYS Ethics Laws by CRF Consultants, Advisors, Managers and Brokers.

New York State Ethics Law, specifically Public Officers Law § 73(5) states that: "No person shall, directly or indirectly, offer or make any such gift to a statewide elected official, or any state officer or employee, member of the legislature or legislative employee…" To ensure that all consultants, advisors, managers and brokers with whom the CRF does business comply with this law, the Comptroller directed the following:

- The party will expressly acknowledge the restrictions on offering, making or providing a gift to a state employee;
- The party will agree not to offer, make or provide any gift to an employee of the OSC;
- The party will agree to promptly report to the Director of Compliance, the IG and the OSC Special Counsel for Ethics any violations of these restrictions;
- Executing brokers are required to certify to the above provisions, commit to ongoing compliance and submit to background checks of impacted individuals; and
- The annual CRF Compliance Questionnaire for Consultants, Advisors and Managers has been amended to include a certification to the above.

Findings

In April 2017, the CRF began including in all contracts and agreements with consultants, advisors, managers and brokers (each a "Partner" and collectively the "Partners") language to expressly acknowledge the law on gift restrictions, and other compliance matters. Concurrently, the annual questionnaires that are sent by Compliance to the Partners were updated to include similar language.

During the course of our review of the transaction files, we noted that all appropriate documentation (subscription documents, side letters and limited partner agreements, amongst others) from April 2017 onwards included language stating (paraphrasing as the language can vary slightly in wording by agreement):

- The Partner acknowledges the provisions of §73(5) of the NYS Public Officers Law to which CRF Staff are subject;
- The Partner will not attempt to provide or offer any gifts or hospitality in violation of the above gift restriction; and
- The Partner will report any breaches of the restrictions to which they become aware.

We find the Comptroller's action above to be in keeping with his fiduciary duties as sole Trustee for the CRF and also represents best practices in oversight of the CRF's Partners.

Item 5: Mandatory Refresher Ethics and Compliance Training for all CRF Staff

The Comptroller has directed that all CRF Staff attend mandatory refresher training covering:

- Ethics – Gifts and travel statutory and regulatory requirements; with examples specific to PICM;
- Compliance – Personal trading and insider trading prevention; compliance disclosures; the new automated compliance management system; and
- Travel Requirements and Restrictions – responsibilities of the traveler, supervisor and Finance Office; OSC's travel card program.

Findings

D&P interviewed both the OSC Special Counsel for Ethics and the Director of Compliance for PICM and we queried how often and of what type of training CRF Staff receives.

New hires within PICM are required to participate in initial Ethics training within 90 days of hire. Further, all CRF Staff is subject to annual Ethics and Compliance Training, and due to the higher risk posed by the duties of the Investment Staff, they may be subject to ad hoc training throughout the year if deemed warranted by OSC management. We reviewed training presentations from both Ethics and Compliance and found the materials and content to be thorough and of a sufficient nature to impart the necessary knowledge to trainees.

It was clear during the course of our interviews that the Special Counsel for Ethics takes their job very seriously and is committed to maintaining a high level of ethical standards. We had an extensive discussion regarding restrictions on gifts and entertainment, travel restrictions and the policies and procedures in place to monitor adherence to those policies. Throughout our interviews with the Investment Staff, they all appeared aware and knowledgeable of these policies.

The Compliance Office within PICM also plays a key role in maintaining the integrity of the CRF. The training modules mentioned above include sections on compliance as well, focusing particularly on personal trading, insider trading and access to material non-public information. The Director of Compliance has also instituted a third-party compliance system to assist with the tracking of personal trading of the CRF Staff. We consider the use of this type of technology to be in keeping with market best practices.

Item 6: Affirmative Advocacy on Behalf of the CRF to Secure the Return of any Ill-Gotten Gains

Comptroller DiNapoli, to ensure that persons found to have engaged in wrongdoing, as alleged in the criminal and SEC civil complaint, has written:

- To the SEC asking that the disgorgement of any ill-gotten gains secured be returned to the CRF; and

- To the Acting United States Attorney, asking that restitution to the Fund be included in any potential disposition of the criminal prosecution.

Findings

Comptroller DiNapoli, through his outreach to the SEC and the Acting United States Attorney, took the necessary steps to ensure that if any of the defendants in the case illegally profited, the prosecuting authorities would be aware of the request by the CRF for compensation. Further, the Comptroller has directed the Counsel for the Comptroller to remain in contact with the prosecution to determine if any restitution for the Fund is available or forthcoming.

Item 7: Diligent Efforts to Determine if the CRF Suffered any Losses

The internal review of the alleged activities determined that whether the CRF suffered a loss as a result of the activities, and what the scope of such loss might be are not readily calculable. However, a process is laid out in the Comptroller's Report to attempt to ascertain such loss:

- Provision of all fixed income data to a third party for execution comparison to contemporaneous trades;
- If a pattern is found or suspected, a forensic advisory service is to be engaged to further review the data; and
- If potential losses are identified, Counsel is to determine if such losses may be recoverable.

Findings

The Fund engaged a third-party vendor to review all fixed income data for the relevant period for comparison with contemporaneous market trades. That analysis did not produce a definitive determination of whether there were any losses associated with the activities, in large part due to a lack of access by the CRF and its vendor to the records of counterparties of suspect trades. The number of potential trades in question, combined with the difficulty in obtaining all necessary trading records for comparison, makes this task a near-impossibility. Notably, neither the United States Attorney's Office nor the SEC, who have access to substantially more trade information than the Fund have established any loss to the Fund to support restitution. Based on this, we feel that the Comptroller is following his fiduciary duties as Sole Trustee for the Fund in continuing to work with law enforcement and regulators to discern whether there were any losses incurred as a result of the activities of the rogue employee and, if so, to obtain recompense to the Fund for those losses.

Task 3: Assess Compliance with Fiduciary Principles

As we undertook Tasks 1 and 2, we were charged with determining whether the policies, procedures, and processes are in place to ensure that the conduct of the investment-related operations of the Fund continue to be consistent with the Fiduciary principles set forth in the DFS Regulations, specifically:

- The Fund operates under a strong governance framework with a rigorous system of internal controls;
- The Fund maintains a high level of operational transparency;
- The Comptroller adheres to and manages the Fund with the highest ethical, professional and conflict of interest standards;
- The Comptroller acts for the sole benefit of the CRF's members and beneficiaries; and
- The Fund is managed in the most efficient and effective manner possible.

Governance Framework

The Comptroller, as the sole Trustee of the CRF and in his role as the Administrative Head of the System, is responsible for the investment of all the Fund's assets and as such is bound by the prudent investing standards. Additionally, he must abide by the exclusive benefit provisions of the New York State Retirement and Social Security Law ("RSSL") and specific regulations of the DFS. As a government plan, the System is not subject to ERISA; however, as a matter of policy the CRF looks for guidance to ERISA and the U.S. Department of Labor interpretations where relevant.

The Comptroller is permitted to invest the CRF's assets in specific types of investments laid out in several sections of the RSSL, most notably §177, and §235 of the State Banking Law. These statutes also contain limitations on the amount and quality of investments the CRF may hold in certain asset categories. These investments fall under the so-called "legal list". In addition, up to 25% of the CRF's assets may be invested in investments not covered by the legal list. These are the so-called "basket bill" investments. International equities over the legal list maximum percentage, private equity, hedge funds and opportunistic investments are included in this category. In making basket bill investments the Comptroller is subject to the specific prudent investor and exclusive benefit provisions of the RSSL and such investments are to benefit the overall economic health of the State to the extent possible. Monitoring of basket bill investments is handled by the Director of Compliance with assistance and reporting provided by the CRF's custodian.

The Comptroller has established a well-defined governance process to effectively execute on the duties outlined above. He adopts investment policies, including the Asset Allocation Plan for the Fund, with the advice of the CIO, Investment Staff, investment consultants, internal and external legal counsel, and the external Investment Advisory Committee ("IAC") and Real Estate Advisory Committee ("REAC"). The consolidation of the investment related policies governing the CRF into a comprehensive manual was completed in 2019 and will be updated as necessary and recirculated annually. CRF Staff are required to confirm the receipt and review of these policies on an annual basis.

Members of the external advisory committees serve at the discretion of the Comptroller. In addition to the IAC and REAC, the Comptroller has appointed the following committees: The Actuarial Advisory Committee, The Advisory Council for the Retirement Systems and the Advisory Audit Committee. The Advisory Audit Committee reviews the annual internal and external audit processes related to the Retirement System and the CRF and reviews the CAFR.

Day-to-day operations of PICM and the management of Investment Staff and Operations Staff are delegated by the Comptroller to the CIO. Under the direction of the CIO and the Interim Deputy CIO, the various asset class heads exercise fiduciary responsibilities in managing investments either directly, or indirectly through external investment managers. Given the size and complexity of the CRF portfolio, the Comptroller engages the services of the external advisors and investment consultants to assist in various investment related functions of the Fund, including asset allocation studies, investment strategy development, manager selection, performance reviews and broker due diligence.

The primary role of the investment consultants is the review of potential investments by the CRF. Additionally, they assist CRF Staff with ongoing monitoring of existing investments, including the measurement of manager performance and other metrics related to external investment mandates. A recommendation by the appropriate asset class consultant is one of the requirements for approval of any new investment by the Comptroller. Each consultant functions under a written contract that defines its duties and responsibilities. Additionally, they must agree to act as a fiduciary for the Fund. In the procurement process, Staff selects consultants based on a variety of factors including experience and specific knowledge of pertinent investments and strategies.

Upon taking office, by way of an Executive Order (“EO”), the Comptroller created the OSC Office of Inspector General (“IG”) and as a commitment to continued rigorous governance, reaffirmed the EO in December 2017. The IG serves several functions within the OSC: to receive and investigate complaints, corruption, fraud or conflicts of interest within the OSC; conduct internal investigations; supervise internal audit; operate a whistleblower hotline; and perform any other duties necessary or appropriate.

Findings

The Comptroller has a clear mandate to the CIO and her Staff to conduct rigorous, extensive due diligence around every investment the CRF makes. This mandate is reflected in detailed policies and procedures and various levels of oversight, including his own active engagement in the process. The Comptroller attends the annual Advisory Council meeting and the vast majority of IAC, REAC, Advisory Audit Committee and Actuarial Advisory Committee meetings, generally in person and occasionally by phone. Staff and outside consultants perform the actual work of identifying and evaluating potential investment managers in order better to ensure the integrity of the process is maintained. We found the segregation of duties to be clearly defined and supervisory functions performed as prescribed in the Policies and Procedures Manual. Each member of the Staff had a strong sense of what their roles and responsibilities were, who they reported to, and how the investment approval process functions. They also understood the roles of other professional at all levels of the organization.

The System and the CRF are thoroughly audited at various times over a multiple-year period by internal and external entities, including an annual audit of the System by a CPA firm, an examination at least once every five years by the New York State DFS, a triennial fiduciary and conflict of interest review by a qualified unaffiliated entity, a triennial audit of internal controls by an independent third-party and ongoing risk-based audits by the OSC Office of Internal Audit. An Advisory Audit Committee meets three times each year to review and discuss upcoming audits and any issues identified in completed audits. This near-constant review of the policies and procedures of the CRF and the books and records of the System gives us comfort that any issues or concerns can be identified and resolved quickly and effectively.

Through our conversations with the CRF Staff and especially with the Comptroller himself, we came away with the understanding that the performance of the Fund and maintaining its viability for the beneficiaries, is paramount.

Transparency of Operations

NYSLRS publishes the Comprehensive Annual Financial Report which provides a full review of the System's administrative, financial, actuarial and statistical information for the preceding fiscal year. The System has received the Certificate of Achievement for Excellence in Financial Reporting from the Government Finance Officers Association ("GFOA") for its CAFR for the last 15 years. The CAFR presents a detailed view of the Administrative Organization of the System, including an employee organizational chart, a list of the Advisory committees and an Overview of the System. The audited basic financial statements are presented along with required supplementary and other information. The Investment Section includes an overview of the CRF, Fund performance, and management fee and performance fee information. Finally, the actuarial and statistical analyses are shown at the end of the report. The System also publishes a detailed Asset Listing that accompanies the CAFR.

The System provides a detailed accounting of policies and procedures on its website, including the monthly disclosure of every new investment transaction and quarterly Fund performance. The In-State Private Equity Investment Program and Corporate Governance policies are defined and explained on the website. The CRF's commitment to hiring minority and women-owned investment managers ("MWBE") and its Emerging Manager Program is outlined on the website. Moreover, the reports of all the Fund's prior conflict of interest and fiduciary reviews are also maintained on its website.

During our review, Duff & Phelps met with over 30 members[14] of PICM and OSC, for a minimum of one hour each. During these interviews, we discussed the person's background and experience, their day-to-day responsibilities, the recruitment and vetting process for more recent

[14] For a full listing of interviews, please refer to section "The Duff & Phelps Process" of this Report.

hires, their interaction with internal and external constituents and any suggestions they might have for how operations could be executed more effectively.

As part of our document review process, we went through several categories of material, from broker data, the CAFR, compliance, ethics, PICM's policies and procedures, strategic plans, staffing updates, templates and guidelines, and importantly, transaction files for 118 investments approved by the Comptroller during the Review Period. Any supplemental document requests by D&P were provided expeditiously by the CRF.

Findings

We found every member of the CRF Staff to be forthcoming and truthful during our conversations. No topics were considered "off limits", including the actions that led to the Internal Report, and employees spoke freely about all aspects of their daily roles. When speaking with newer hires, we were able to determine that the hiring procedures enacted in response to the Internal Report are being followed, down to the types of questions that are asked of professional references and the multiple points of contact with the candidate and his/her potential team at the CRF.

The published documents, including the CAFR and monthly reports on the OSC website, are comprehensive and exacting in detail. Fund expenses are laid out in detail, including fees paid to external consultants, advisors and managers. Broker commissions and volume are also disclosed. Finally, the CAFR includes a Fund-level private equity fee, expense and carried interest analysis, all of which are exceptional relative to industry standards of transparency.

The CRF was also an early adopter of the Institutional Limited Partners Association ("ILPA") fee reporting template for general partners[15] and has required its use for all new private equity commitments since its introduction in January 2016. The template promotes transparency by providing a standardized form for General Partners to report management fees, expenses and carried interest.

The Fund is demonstrating a high level of operational transparency and in many cases appears to be in the vanguard of industry standards in this area.

Ethical Standards

The Comptroller's *Executive Order on Certain Ethics Principles* governs all OSC officers and employees. The CRF Staff is also covered by the Code of Ethics for State Officers and Employees (the "Code") which is laid out in the Public Officers Law. Mandatory ethics training is provided to all OSC employees, while CRF Staff also receive additional ethics training customized specifically for the Division. There are also policies and procedures in place intended to prevent insider trading and the misuse of material non-public information. Compliance monitors personal account trading by PICM Staff, utilizing an external software application.

[15] https://ilpa.org/

A Code of Ethics also applies to members of the Advisory Council and Advisory Committees to the CRF, and each year IAC and REAC members file a statement of financial disclosure with the PICM Compliance Office.

The standard of ethics for the CRF extends to its relationship with all Partners. All investment managers are legally banned from using the services of placement agents and are required to certify in writing that they have not used the services of a placement agent, registered lobbyist or other third-party intermediary to assist in obtaining an investment by the CRF prior to the investment being approved by the CRF. Managers, consultants and advisors must also certify in writing that none of their employees have made an impermissible contribution to the State Comptroller or to a candidate for State Comptroller in the previous two years. In addition, all managers, consultants and advisors must annually disclose to the Fund in writing any conflict of interest they may have which could reasonably be expected to impair the ability of said firm to render unbiased and objective advice. These certifications are part of the CRF's Annual Compliance Questionnaire required to be filled out by managers, consultants and investment managers.

Findings

Duff & Phelps conducted a full audit of the transaction files for every investment approved by the Comptroller during the Review Period. One set of key parameters we examined was the inclusion of particular manager certifications to the above discussed ethical standards. In all cases we found the agreements to show the inclusion of and adherence to the stringent ethical standards set forth by the Comptroller.

The Ethics Office within the OSC is composed of the Special Counsel for Ethics, staff lawyers and administrative personnel. The Ethics Office was cognizant of the heightened potential for ethical concerns posed by the CRF operations and while the office handles ethics for the whole OSC which has over 2,700 employees, covering the responsibilities of PICM with less than 100 employees consumes approximately one half of the unit's time. We feel this is an appropriate approach considering the significant risks posed by managing the CRF.

The Compliance team for the CRF is currently comprised of just two people, with a third to be hired in the near term. They are responsible for, among other things:

- Monitoring adherence to the CRF's investment-related Policies and Procedures;
- Monitoring adherence to the statutory and policy mandates for trading by both internal staff and external managers;
- Monitoring personal trading activities of employees pursuant to the "Insider Trading Policies";
- Administering an Annual Compliance Questionnaire to be completed by all external managers and consultants who are fiduciaries of the CRF;

- Reviewing the results of broker questionnaires to be completed at least annually by firms that are on the list of approved broker-dealers;

- Facilitating the PICM risk assessment process to create an inventory of potential risks to the Division, and recommending new policies and/or systems to address any internal control weaknesses;

- Reviewing background checks conducted by vendors on managers, consultants, brokers and members of certain advisory committees pursuant to the "Background Investigations Policy";

- Periodically providing compliance training for Staff and distributing appropriate compliance materials to Staff;

- Obtaining and reviewing Annual Financial Disclosures from members of IAC and REAC; and

- Completing filings required under section 13 of the Securities and Exchange Act of 1934.

In addition to these responsibilities, the Director of Compliance is also charged with at least annually facilitating a review of the written policies and procedures of the CRF to assist in determining the following:

- Adequacy;

- Effectiveness;

- Accuracy;

- Appropriateness for current activities;

- Current regulatory requirements;

- Any prior policy issues or exceptions; and

- Any changes or updates that may otherwise be desired or deemed appropriate.

As detailed further in the recommendations section, while we believe all of the above responsibilities are appropriate and necessary, we believe the Compliance Staff needs additional resources to adequately cover these current responsibilities and also allow for advance planning and strategic thinking. We would recommend additional resources for the Compliance team to allow enhanced oversight of CRF Investment Staff and review of outside partners, as the areas Compliance is responsible for testing and monitoring are high-risk areas for the Fund. For the avoidance of doubt, we do not believe there are current lapses in the Ethical or Compliance functions, however certain resources are stretched extremely thin, allowing for potential risks to emerge. Please see our recommendations under *Task 4* for further detail.

Through our review process, we found that the Comptroller and the CRF Staff manage the Fund to the highest level of ethical standards.

Comptroller Acts for the Sole Benefit of the CRF's Members and Beneficiaries

Comptroller DiNapoli, as the sole Trustee of the CRF, has a tremendous fiduciary responsibility to the members and beneficiaries. He is responsible for overseeing the strategic direction of the Fund and maintaining its highly regarded and nearly fully funded status. He is responsible for implementing an asset allocation with an appropriate balance of risk and return and has put in place investment policies and practices designed to ensure that investments are made for the exclusive benefit of the participants and beneficiaries of the System. Fund investments must be made with the care that a "prudent person" would use in the conduct of an enterprise with similar characteristics and aims as the CRF.

To assist with this endeavor, the Comptroller seeks the input of multiple internal and external advisors to determine the allocation of assets and the appropriate investment choices for the Fund. In addition to the employees of PICM, led by the CIO, the Fund relies on advice from outside advisors, consultants and legal counsel, as well as independent external advisory committees to recommend all investment decisions that the Comptroller approves for the portfolio.

In his role as the sole Trustee, in accordance with DFS regulation 136-2.3 (h), the Comptroller (and all of his delegees, including Staff) may not:

- Deal in the assets of the retirement system or the fund for his own account;

- Act in any capacity in any transaction involving the System or the Fund on behalf of a party whose interests are averse to the retirement system or the Fund;

- Receive any consideration from any party other than the OSC, the System or the Fund in connection with a transaction involving the System or the Fund; nor

- Own or maintain any indicia of ownership or personal interest in any assets of the System or the Fund other than an interest in the System as a member or beneficiary.

Findings

The Comptroller, through the implementation of several meaningful reforms over the last several years, has strengthened the process to ensure that the Fund's assets are managed for the exclusive benefit of its beneficiaries. As previously discussed, he has sought to eliminate any real or perceived conflicts of interests on the part of external managers, advisors and consultants. Each of these groups must attest, in writing, that they have acted and will continue to act free from conflicts such as the use of third-party placement agents or other financial relationships that may compromise their judgement.

Any investment opportunity that comes up for approval must be thoroughly vetted by both internal staff and the appropriate asset class investment consultant. The Comptroller delegates to Staff the sourcing, analyzing and monitoring, in conjunction with consultants, of investments and relies on them to present a comprehensive evaluation of the manager for his approval. He also relies on input from independent advisory committees with deep experience in their respective asset classes in the decision-making process.

Duff & Phelps spent a significant amount of time examining the external manager approval process. We went through transaction files for 118 new investment transactions that were approved by the Comptroller during the Review Period and interviewed many members of the Investment, Operations and Legal Staff regarding this process. There are multiple steps involved in selecting a manager or investment for the portfolio, along with a requisite number of documents that are included in the final investment committee package. We believe this comprehensive framework provides for a robust manager review and selection process by the CRF, given the constraints on the team discussed elsewhere in the Report.

These measures, along with our observations of high ethical standards among Staff and no findings of inappropriate behavior lead us to conclude that the Comptroller is fulfilling his duty to act for the sole benefit of CRF's members and beneficiaries.

Efficient and Effective Management of the Fund

The CRF is the third largest public pension fund in the United States, managing approximately $210 billion. The Fund's asset composition is governed by the Asset Allocation Plan ("AAP") that is formulated every five years in conjunction with an asset/liability study. This plan is developed by the CIO, Investment Staff and outside consultants, with the IAC and the Comptroller ultimately approving the plan based on their input. The plan is reviewed annually by the IAC.

The CRF's general investment objectives include the following:

- Provide the means, together with employee and employer contributions, to pay benefits, when due, to the System's members, retirees and beneficiaries;
- Optimize the long-term, risk-adjusted returns, consistent with liquidity and diversification parameters that are prudent under existing circumstances;
- Invest according to the AAP;
- Invest assets efficiently, bearing in mind the impact of management and transaction costs on the overall return; and
- Exercise all investor responsibilities, including the voting of proxies, in the best long-term interests of the CRF.

The AAP is intended to serve as a general guideline, allowing for the flexibility needed to respond to changes in various markets and economies globally. The CRF publishes the Asset Allocation in the annual CAFR.

Within asset classes that tend to be more efficient, such as domestic equities, the Fund will utilize passive investing tools such as internally managed index funds to capture market returns with lower fees relative to active strategies. In domestic equities, the active/passive mix is approximately 15%/85%, while in non-US equities the split is approximately 50%/50%. Domestic managers are benchmarked to the Russell Top 200, Russell Midcap 800 and Russell Small Cap 2000. The Fund utilizes multiple benchmarks within the Global Equity portfolio based on market capitalization and geography. Non-US managers are benchmarked to the MSCI EAFE, MSCI ACWI ex US IMI and Emerging Market Indices, while global managers are tracked against the MSCI ACWI Index. Core Fixed Income is actively managed on a total-return basis against a broad market index, the Bloomberg Barclays Aggregate Bond Index. However, while Core Fixed Income is an actively managed strategy, the Fund tends not to engage in short-term directional trading, focusing instead on tactically adjusting sector allocation relative to the benchmark. Core Fixed Income acts as a source of stable income and is a provider of liquidity for the Fund as a whole. Non-core Fixed Income accounts for approximately 10-15% of this asset class; investments in this sub-sector demand greater returns for the increase in risk and reduced liquidity.

Findings

Staffing and IT

The Fund has made meaningful strides in the last several years to optimize the management of the portfolio, in terms of both staffing and IT. Each asset class now has a dedicated Operations Staff person to handle back office functions and a Deputy Director to handle some of the day-to-day managerial functions delegated by the Asset Class Directors, allowing the Directors additional time to dedicate to investment-related issues. This also provides continuity should there be staff turnover at these senior levels. The Operations team added a Deputy Director as well, who has a background in technology from his prior position with one of the System's peers.

D&P was also tasked with examining developments that took place after the Review Period closed and we would be remiss if we did not highlight the departure of the prior CIO and the promotion of the Deputy CIO to CIO. The new CIO has eight years of experience at PICM. Her tenure includes over three years as Deputy CIO, a position to which she was promoted after a national search. The new CIO was subject to the standard new hire vetting procedure prior to the promotion. In addition to the new CIO's substantive qualifications, the CRF stands to reap the intangible benefits of the continuity of management that the promotion presents. The role of Deputy CIO is being filled on an interim basis by the individual who is also the Director of Opportunistic and Alternative Return Strategies. A national search is currently underway to fill the Deputy CIO position on a permanent basis.

We view the addition of Deputy Directors in each asset class, as well as Operations, as a significant improvement in both business continuity and personnel development, we commend the Fund for taking this forward-thinking step.

The CRF, however, has lagged behind some of its peers in the utilization of IT to streamline investment functions. In some cases, it is simply a matter of having separate software systems interact more seamlessly to reduce inefficiencies and time spent on non-investment related matters. We detail our recommendations in this regard further in Task 4.

Environmental, Social and Governance

Comptroller DiNapoli and the Fund have long emphasized environmental, social and governance ("ESG") issues. The CRF has been a leader in the institutional investor community with respect to sustainability efforts since the beginning of Comptroller DiNapoli's tenure with the creation of the Green Strategic Investment Program in 2008-2009. The Fund continued to make significant strides during the reporting period by incorporating ESG analysis more formally into all aspects of its investment process and expanding its ESG reporting during the Review Period. In fact, as of 2018, Asset Owners Disclosure Project ranks the Fund 3rd among the world's 500 largest investment funds and first in the U.S. among public funds in managing climate-related investment risk[16].

Beginning in July 2015, the Fund's management and asset class heads undertook a six-month process to evaluate their core investment philosophy. An articulated ESG investment philosophy emerged from that work, resulting in:

- The establishment of an ESG investment philosophy to guide the integration of ESG factors into the investment process[17];
- The development of a method to assess the materiality of ESG factors for each investment; and
- The creation of an ESG Risk Assessment to evaluate the ESG policies and performance of the Fund's external managers.

CRF policies were amended to reflect this and provide, in part, that the "CRF considers environmental, social and governance factors in its investment process because they can influence both risk and return. ESG issues impact the sustainability, value and performance of CRF's investments." However, the policies also recognize that the "relevance of particular ESG issues may differ and vary in degree across companies, sectors, regions, asset classes and over time." Therefore, investment recommendations in all asset classes are required to include information on and consideration of the manager's ESG policies and practices, focusing on the risks and standards relevant to the investment under consideration. ESG considerations are also integrated in the Fund's proxy voting guidelines and in public advocacy efforts with entities such as the SEC and the United Nations.

Other notable ESG initiatives undertaken during the Review Period include the creation of a Risk-Aware Low Emission Equity Index with an initial investment of $2 billion, and an additional $2 billion investment in 2018. This innovative index reduces investments in companies with the highest carbon emissions and increases investments in companies with lower emissions while maintaining a minimum tracking error to its underlying index.

In the 2016 – 2017 fiscal year, the Fund updated the guidelines for its Sustainable Investment Program ("SIP"), defining sustainable investing for the Fund and enumerating criteria, including best-in-class managers and strategies that identify macro trends or themes, such as Climate and

[16] https://aodproject.net/changing-climate/
[17] https://www.osc.state.ny.us/reports/esg-report-mar2017.pdf

Environment, Human Rights & Social Inclusion and Economic Development. All SIP investments are held to the same investment criteria as all of the Fund's other investments.

The Fund published its first ESG Report in March of 2017. Additionally, the Fund publishes annually a comprehensive report outlining the Fund's major Corporate Governance initiatives and achievements for the prior fiscal year, the Corporate Governance Stewardship Report[18].

In 2018, the Comptroller, on behalf of the Fund, joined over 315 organizations in expressing support for the Task Force on Climate-related Financial Disclosures ("TCFD"), which has developed recommendations for voluntary climate-related financial disclosures. In 2018, for the first time, the Fund implemented TCFD's recommendations to report on its climate change initiatives in the System's CAFR.

In March 2018, Comptroller DiNapoli announced his work with the New York State Governor to appoint and convene the Decarbonization Advisory Panel[19], a distinguished group of six experts, to develop recommendations for the CRF's climate-related work over the next decade. This group of investment, financial, environmental, energy and legal experts worked for nearly a year to deliver recommendations to the Comptroller that focused on climate-change-related investment opportunities and risk mitigation. The Panel's primary recommendation was for the Fund to align its entire portfolio with a two degree or lower future as called for in the Paris Agreement. The Panel suggested that this would be accomplished by ramping up investment in sustainable assets and climate solutions, establishing minimum standards to evaluate transition readiness, prioritizing engagement with companies and assessing investments.

In response, the Comptroller directed staff to build on the Fund's existing work by formulating a Climate Action Plan[20] to put the CRF on the path to achieving a sustainable portfolio. The Climate Action Plan delineates the CRF's next level of climate related assessment, investment, engagement and advocacy work. The Fund has recently completed minimum transition readiness standards for thermal coal mining companies and is currently engaging with them to assess their transition readiness as provided for in its Climate Action Plan[21].

The Fund has grown its commitment to sustainable investments, expanding its SIP to include Climate Solutions. In accordance with the Climate Action Plan, the Fund recently created the position of Director of Sustainable Investments and Climate Solutions to support the implementation of the Plan and hired its first Director[22]. This Director is a senior investment professional who will report directly to the CIO and oversee the outstanding commitment to the SIP.

Emerging Manager Program

CRF has a longstanding commitment to recognizing the principles of diversity and inclusion in all aspects of its business operations. Its Emerging Manager and MBWE program offers opportunities to newer, smaller and diverse investment management firms to help grow the CRF.

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[18] https://www.osc.state.ny.us/reports/esg-report-jan-2019.pdf
[19] https://www.osc.state.ny.us/press/releases/mar18/030618.htm
[20] https://www.osc.state.ny.us/pension/climate-action-plan-2019.pdf
[21] https://www.osc.state.ny.us/press/releases/jan20/012920.htm
[22] https://www.osc.state.ny.us/press/releases/jan20/010920.htm

The program has steadily grown over the years, not just in size but also scope and now operates across all asset classes. It has one of the largest programs among public plans. The Fund hosts a widely attended Emerging Manager and MWBE Conference annually; its last conference had over 700 attendees. During the fiscal year ended 3/31/19, its total MWBE investments and commitments grew substantially, from over $16 billion to approximately $21 billion[23].

During the Review Period, the Fund conducted a survey in the emerging manager community and as a result, adopted a universal emerging manager definition and provided clarity on business life-cycle stage definitions to assist in consistent screening, monitoring and progression of potential candidates for inclusion in the program. Each year, the Fund seeks to graduate emerging managers to be mature direct investments by the Fund, and while more than 20 emerging managers have already graduated from the program, this clarity should aid in that endeavor. The Fund also identified common attributes of successful emerging managers. This guidance is on the Fund's website[24] and this transparency is expected to facilitate the Fund's ability to educate diverse market participants about its needs and expectations. This would further the Fund's goal of increasing its pool of fresh talent and investment opportunities to help the Fund continue to earn strong returns.

Based on our review, we conclude that the Fund has policies, procedures and practices in place to ensure that the investment-related operations of the Fund continue to be consistent with managing the Fund efficiently, effectively and as a leader amongst its peers.

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[23] https://www.osc.state.ny.us/pension/mwbe-report-2018-2019.pdf
[24] https://www.osc.state.ny.us/pension/emerging/index.htm

Task 4: Identify Recommendations for Improvement

D&P was tasked with evaluating how the CRF could enhance the investment-related policies, procedures and practices that were considered in scope for this review to bring them in line with best practices. We are not providing advice on any specific investments.

Throughout this report, we have highlighted recommendations or areas for improvement, which we detail in the section to follow. Broadly speaking we have organized our recommendations into three categories: Information Technology, Compliance and overall Fund Management.

Recommendation 1: Information Technology

PICM currently operates with a very lean, dedicated Information Technology ("IT") staff considering the amount of assets managed by the Fund and the risk that entails. Like the other divisions and bureaus within OSC, PICM's technology needs are met primarily by OSC's Division of the Chief Information Officer ("CIO").[25] Under an enterprise wide IT model at OSC, CIO offers a catalog of services available to the entirety of OSC, an agency of over 2,700 employees with a broad mandate primarily focused outside of PICM, including maintaining the State's accounting system and administering the State's payroll; paying pension benefits to over one million retirees and beneficiaries; reviewing State contracts and auditing State agencies and public benefit corporations; reporting on State finances; and managing and issuing State debt, among other things. CIO has a service level agreement ("SLA") with PICM that sets a framework for the information technology services available to all divisions of OSC. It lays out specific terms and minimum service levels to be provided and includes core infrastructure items such as hardware management, network support and a helpdesk. There is a further addendum that outlines a shared resource or project manager to coordinate between the CIO and PICM. The addendum uses the IT service options available to all of OSC as a basis for any supplemental services to be provided to PICM.

Neither the SLA nor the addendum specifically covers technology support for portfolio management, investment processing, trade processing, or commitments around limiting market impacts resulting from technology. While the CRF has multiple software solutions in place allowing for both real-time market transactions and the passing of those transactions to the custodian, these products are separate and not necessarily able to be easily integrated and therefore lack the core efficiencies for effective operational processing. It also warrants commenting that the solutions are supported by the product vendors, not through CIO.

Within PICM, the Deputy Director of Operations (the "DDO"), among other responsibilities, supervises technology resources and the deployment of those resources for the division. The DDO was a recent hire (August 2018) and had significant IT experience in prior roles, including, notably, in the investment division of another public pension plan. Currently, PICM is limited in its ability to leverage the benefit of this prior experience to relevant cases within CRF due to restrictions on what technology tasks CIO allows individual divisions within OSC to perform. As

[25] To avoid confusion, CIO in sections regarding information technology refers to the Division of the Chief Information Officer. Instances where the Chief Investment Officer and Chief Information Officer overlap will refer to the Chief Information Officer explicitly

this position develops, it is anticipated that technology will become a primary responsibility, assuming CIO allows PICM to expand on its technology footprint internally. As of the close of our review, an additional PICM IT professional was hired (November 2019) (such hire, and any other subsequent PICM IT hire, together with the DDO, "PICM IT Staff"). It is clear to us that PICM management is committed to implementing technology solutions, but additional staff resources within PICM are required as well as increased CIO coordination with and support of such PICM IT Staff.

As of March 31, 2019, PICM managed $210 billion for the Fund; yet, even with the DDO and the subsequent IT-focused hire, PICM lacks the necessary authority to deploy investment related IT solutions and two individuals is insufficient relative to the Fund size. Pension industry leaders such as the California Public Employees Retirement System ("CalPERS") and the Teacher Retirement System of Texas ("TRS") have entire technology divisions within Investment Operations to support those operations and coordinate with wider enterprise IT. CalPERS has at least six technology divisions including an operations and technology division embedded within the Investment Office and an Enterprise Operations and Technology group that supports the entirety of just CalPERS[26]. TRS, which has for comparison $158 billion in assets as of August 31, 2019 has an entire division, headed by a Chief Information Officer, within the larger Operations division[27]. We recognize, however, that structurally, the Fund is very different from the state plans mentioned; those plans are independent entities that do not sit within a broader state-wide agency. This fundamental difference will have implications for how the Fund navigates implementing these recommendations.

An enterprise wide IT model has many efficiencies, particularly for the delivery of services that all or several of the component business divisions require. However, PICM's unique business needs and highly time sensitive and market sensitive processes require the resources of additional PICM IT Staff. We believe the IT Staff resources currently allocated within PICM are not reflective of the risk posed by managing $210 billion on behalf of the over one million beneficiaries. While we view the services provided by CIO as a positive for PICM in the core functional IT and Information Security support areas, we also see a need for differentiated PICM IT solutions to address specific investment needs. Additional dedicated PICM IT Staff would be able to spearhead technology initiatives and effectively utilize deployed software in those PICM specific areas.

However, it is just as important that PICM IT Staff have sufficient resources, access and functional authority to implement investment technology solutions that address PICM's needs, bearing in mind that those technology solutions may differ from the broader OSC needs, or the services or solutions that CIO supports. A broader delegation of authority from CIO on these needs would not only benefit both PICM and the wider OSC technology effort, but also the non-PICM specific areas that have central roles in supporting the PICM processing such as Accounting. We recognize that additional PICM IT Staff with the functionality as proposed may require additional CIO resources to support the coordination with PICM IT that will be required.

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[26] https://www.calpers.ca.gov/docs/calpers-organization-chart.pdf
[27] https://www.trs.texas.gov/TRS%20Documents/cafr_2019.pdf

Automation

During the course of our interviews, we discovered several processes performed by the Investment Officers managing the Fund, particularly for internally managed strategies, that in our experience are typically accomplished through automation. The automation of day-to-day and mechanical tasks has been a staple of investment management firms for decades. Straight-Through-Processing ("STP") is a widely used solution, varying in function by securities type, whereby the manual aspects of trading and processing a security are minimized or completely removed.

A typical example of this in the industry would be an investment officer placing a securities order through an electronic execution system. Once executed, the trade automatically flows directly back to the trader and into the portfolio management system without any further human intervention. Before STP, there was manual intervention at each of those steps, increasing the risk for error. STP is currently in place for portions of the investment process but should be implemented for the entire trade lifecycle.

Automation brings with it a multitude of benefits, first and foremost a reduction in risk by reducing the number of "hands" involved in a process. Secondly, Investment Staff are able to focus more of their time on managing the Fund and generating positive returns for the beneficiaries. This process has already begun, with increased attention from the recently hired DDO, but additional resources are still needed. Much of the automation necessary to achieve greater STP usage can be accomplished by augmenting and enabling internal Technology Staff with the necessary business and technical knowledge to understand the current processing environment and ability to analyze the delta between systems currently implemented and additional solutions required to extend capabilities to achieve operational efficiency.

The Fund should also consider implementing an Investment Book of Record (IBOR) to provide reporting across asset classes. This would be in conjunction with the augmented STP processing models mentioned above. As market conditions become more volatile, it becomes increasingly important to minimize disruptions in collaboration, communication, and processing in the decision-making process.

IT Project Management

Investment Officers by definition are, and should be, focused on managing their individual asset classes and should not be involved in all of the technicalities of the systems they use to manage those assets, nor on how the capabilities of those systems might be leveraged across asset classes. Efficiencies can be gained by leaving the management of technology vendors to a PICM IT team, which would allow investment officers to focus on the task of investing and monitoring the assets of the CRF instead of managing software.

In our experience, there are typically several layers of technology personnel supporting investment teams. There is a support area that is very familiar with the needs of the business, with a keen understanding of how the particular assets behave and how the investment officers can best be served by the technology, hardware and software in place. This group acts as the “subject matter experts” and coordinates with broader, enterprise support areas to enact the coding necessary to achieve what the business needs. The subject matter experts will also typically be involved in the procurement process and the ongoing support of the deployed software.

The involvement of PICM IT Staff in the procurement, deployment, maintenance and optimization of systems can bring expertise in how discrete systems can work together (potentially improving the quality of systems being deployed), knowledge of what new or developing technologies might exist that could improve existing processes, and an overall sense of the PICM IT enterprise risk. This process is currently managed within the Operations group, which is where it should reside, but for optimal functioning, as previously recommended, the team should have a broader scope of authority from CIO and the number of PICM IT Staff should be increased. As noted previously, this may also require an increase in staff resources on the CIO side of the equation.

A relatively small investment in expanding the IT team within PICM could generate efficiencies and returns far outweighing the costs. In our discussions with several different asset class heads, Investment Officers and Operations Staff, multiple different investment management, risk management and portfolio monitoring systems were discussed. The tools and the structure necessary to manage the implementation of all these diverse systems and to leverage specific services provided across asset classes is currently lacking. Importantly, as we previously highlighted, as additional qualified IT Staff are added to PICM, it is imperative that those resources are granted sufficient permissions and access to implement investment technology solutions. While collaboration with CIO to achieve desired results is critical, the investment experience leveraged from these resources is key to achieving the efficiencies to sound technology implementations.

PICM Technology Needs for Travel

As mentioned, the Office of the CIO provides technology support for the entire OSC, including technology support for employees who travel on official business. OSC employees regularly travel within New Yok State and, to a lesser extent, outside the State. PICM presents a unique support need due to the significant level of inter-state and international travel necessary to diligence and monitor investments. Through the course of our interviews, we received significant feedback regarding the challenges in utilizing provided hardware and software solutions while traveling. We feel compelled to stress the importance of being able to work efficiently while traveling with consistent access to email, documentation and other necessary systems.

To increase the efficiency of CRF Staff that travel, an independent cloud-based collaboration solution accessible from any internet connected device would be particularly useful. As it currently stands, while traveling, due to the technology challenges, investment officers have to take notes offline and then input them upon their return to share with their team. They have reduced or, in some cases, no access to documentation, and rely on all collaboration to occur after the fact, upon return to the office. There are several products available that would enable the taking, tracking and sharing of content and research amongst the entire CRF team significantly easier while traveling. Content can be shared among investment officers, support staff and Compliance. The benefit of this automated sharing functionality would not be limited to travel status and can also aid in creating further institutional knowledge across the entire Fund. This solution could be further secured for domestic and international travel purposes by integrating the solution with dual or multi-factor authentication functionality.

Technology in general is making the world smaller. The workforce is becoming more global than ever. Due to extensive travel requirements, PICM is a global workforce where processing and decision making needs to continue in a mobile capacity. PICM needs to focus on building an agile workforce that can be effective while traveling outside the continental United States while minimizing cyber risk

Cyber Training

CRF Staff are subject to the standard OSC provided cyber training, which provides a solid educational base; however, the increased travel and investment responsibilities CRF pose particular cybersecurity risks and require specialized training. While some CRF Staff receive ad-hoc cyber training when they plan to travel, we feel it would benefit the entire PICM organization to be aware of the increased threat from cyber criminals. The SEC has made it a priority in recent years to highlight the threat posed to investment organizations, both reputational and monetary in nature.

In addition to travel security threats, a common security breach is with individual users clicking on malicious emails, phishing, spear-phishing attacks or malware attacks. Criminals have greatly increased the sophistication and targeting of these attacks and therefore continual training is a best practice. This would allow CRF Staff to be regularly reminded and cognizant of the threat. The CIO conducts annual phishing tests, but we would recommend a higher frequency (quarterly), and risk-based testing with remedial training when necessary.

Recommendation 2: Compliance

Due to the nature of their work, PICM employees have always been subject to compliance and ethics regulations that are enhanced beyond those of a typical OSC employee.

Compliance as a stand-alone function predated the Review Period. However, it is relatively new at the System, with the current Director being only the second Director of Compliance. The current compliance infrastructure of the CRF consists of a Director of Compliance supported by a Compliance Staff member and a proposed new hire.

As a public plan, the Fund is not subject to regulation by the SEC: however, we do see some areas of SEC regulation and industry best practices that, with adoption, can assist in preserving the reputation and high ethical standing of the Fund. Without exception, we found CRF Staff to be cognizant of and dutiful to their ethical and compliance responsibilities, which provides a solid foundation for all compliance and ethics programs. Our compliance recommendations take that into account and, therefore, are not remedial but are aimed to be forward looking, keeping the CRF at the vanguard of public pension funds.

The compliance department plays a key role and shoulders significant responsibility in any investment organization. As we noted earlier in this report, the primary purpose of the Compliance Program at the CRF is to monitor compliance by PICM Staff and external managers with applicable statutes, policies and procedures, conflicts of interest and other ethical standards governing the CRF. In addition, as part of their enterprise wide duties, the OSC Special Counsel for Ethics provides oversight of conflicts of interest and ethics issues with respect to CRF Staff. We believe a key, forward looking part of that Compliance role is the review of the adequacy of the policies and procedures currently in place and updating those procedures to reflect the changing risks posed to the Fund. Optimizing the time and resources of the Compliance Staff will allow them to think strategically about new risks the Fund might be facing.

Staffing

While compliance at the CRF is the responsibility of all CRF Staff, the Director of Compliance for PICM is currently assisted by one other staff member. There is also a mandate to hire an additional compliance staff member to assist with the current duties. Additionally, and as noted before, compliance and ethics are separate functions, with the Special Counsel for Ethics having OSC–wide responsibilities.

We highly recommend the addition of at least one other compliance staff member for the near term. While we found the Compliance team to be knowledgeable and dedicated, the sheer volume of daily tasks that they must complete, including by the Director of Compliance, does not allow appropriate time and resources for strategic thinking and a thorough analysis of potential risks. A typical Director of Compliance role will involve some day-to-day responsibilities to keep a finger on the pulse of the organization, but in a business as large as the CRF, spread between two locations in Albany and New York City, the Director of Compliance should be spending more time interacting with the team, other divisions and peers, thinking about identifying compliance issues and how to mitigate risks.

One approach to this situation, and one we would recommend, would be to add a Deputy Director of Compliance, much like deputies have been added across the organization within PICM. This position could be either filled from within involving intensive training by the Director of Compliance and then a mentoring program, or an external hire with compliance experience. Currently the entire Compliance team is based out of Albany, whereas approximately half of PICM is located in New York City. Locating a Deputy Director of Compliance within the New York City office would enhance compliance supervision of the team there and allow easier monitoring of locally based Partners, as well as lessen the travel burden of the current Compliance team members.

Electronic Communication Review

A mainstay of SEC regulated investment firms is the compliance review of all electronic communications by employees. There are multiple reasons why SEC regulated firms conduct these reviews and, we believe there are several benefits which would aid in the oversight and governance of the Fund and the higher risk CRF Staff.

A traditional view of this type of review is solely to find insider trading violations, but this is just one potential benefit. Asset management industry experience has shown that it can be used to:

- Uncover reputational issues. If a member of the CRF is having inappropriate conversations or disparaging the Fund/organization to others;

- Monitor new hires to ensure they are complying with policies and procedures - this was raised as a point of concern during our conversation with the Ethics Officer;

- Spot check for compliance with travel, gifts and entertainment issues. A high priority for the Ethics Staff and a standard review point;

- Aid in the creation of a culture of compliance where staff are aware that they are subject to review; and

- Enable Compliance to get ahead of any potential concerns before they become larger issues.

It was noted to D&P that OSC has the ability to collect email and some other forms of electronic communication, but to date has only done so in cases of a specific concern or on a "postmortem" basis. As noted, we recommend a proactive and preventative approach.

Compliance Training

All OSC Staff are currently subject to annual Ethics training concerning the prime risk areas: travel, gifts and entertainment, personal account trading policies, misuse of material non-public information and insider trading prevention. We would recommend further ad hoc compliance training on high risk areas, such as:

- Manager fiduciary duties. While all CRF Staff we spoke with were knowledgeable on the topic and dedicated to the Fund, and targeted training on this topic was provided in the most recent annual PICM Staff training in 2019, given the recent increase in Investment Staff hiring, targeted training should be continued in the future;

- Whistleblower Policies. While the CRF has a well-established whistleblower policy enshrined with the Office of the Inspector General, a reminder of this policy and with whom to speak if CRF Staff have concerns could preclude future issues. During our discussions with some CRF Staff, it appeared they were unsure if there was a person outside of PICM to whom they can go with concerns; and

- Cyber and Information Security. Due to their higher profile, business travel and dealings with the investment world, CRF Staff are exposed to different risks than the typical OSC Staff, which should necessitate specialized cybersecurity and information security training.

Recommendation 3: Fund Management

Transaction Files

In conjunction with our overarching recommendations, in particular concerning improvements to information technology infrastructure, we are noting that the CRF utilizes a very manual file organization system that proved cumbersome in use. To enhance recordkeeping, increase consistency across files, allow for better user access and bolster institutional memory, a more standardized and automated file keeping system should be utilized.

We acknowledge that individual transaction files come from a disparate group of authors within PICM including legal documents from many different firms and that there will be more initial work required to bring these into a consistent format, but there will be a great value add down the road when it is necessary to review a particular transaction folder.

Staff Onboarding & Training

The 2016 Report recommended formal PICM specific onboarding be undertaken to highlight the particular duties and responsibilities of CRF Staff. Currently, new hires undergo several steps of onboarding, including general OSC training, PICM-specific ethics training, PICM-specific compliance training, as well as asset class-specific training.

The current onboarding process appears to be thorough in content, but we would make a recommendation that all training takes place in person when possible instead of via video conference. We appreciate that different classes of employees may be present for Division-wide training, and it may even be advantageous for all new hires to attend such onboarding. However, in-person attendance typically increases mental retention and can also serve to build comradery amongst new hires at different layers of the organization.

Role of Investment Consultants

The Fund employs the services of consulting firms to assist each asset class, as well as a consultant to assist with executing broker review. The Fund also engages a general consultant to assist with overall portfolio strategy. The CRF's investment policies require that an investment consultant evaluation be included with each investment recommended for approval by the Comptroller. There is a policy in place to limit opportunities for firms to serve as a consultant and a manager for the CRF at the same time. Further, consultants are typically selected in a competitive procurement process undertaken approximately every five years. They are also subject to annual questionnaires attesting to compliance with various conflict of interest and gifts & entertainment provisions as noted earlier in this report.

We would highlight that the CRF has recently begun instituting a consultant "pool" for many of the asset classes to assure they have access to a broader range of market and investment expertise and to assist when the lead consultant has a conflict on a potential investment.

We observed that some asset classes are heavily dependent on their respective investment consultants to provide services that are in addition to the investment consultants' "core" role of assisting in sourcing and evaluating deals and portfolio monitoring. For example, investment consultants may provide proprietary portfolio management tools and platforms to facilitate PICM's access to CRF portfolio metrics. We suggest that, to the extent feasible, the CRF separate the core functions of the investment consultants from other functions, such as providing portfolio management/tracking systems and support, and either bring those non-core functions in-house or engage an independent consultant to perform the non-core functions. This should reduce the potential risk of unnecessarily concentrating responsibility in relatively few consultants and also provide for continuity in the non-core functions where CRF opts to engage different investment consultants.

Investment Staff interact with their respective asset class consultants constantly and the CRF has the ability to sever a relationship at any time, with or without cause. Accordingly, there is ample opportunity to provide feedback to the consultants and clear authority to end the engagement. Nevertheless, D&P recommends that all consultants be subject to periodic formal performance reviews during the term of their contracts with evaluation against specific delineated benchmarks appropriate to the asset class. Those criteria may include, for example, quality of deals or managers brought forth, quality and level of returns generated versus risk to the Fund and quality and transparency of manager due diligence.

As noted above, CRF policies and procedures require independent external consultant evaluation of transactions. However, there are some investment-related services performed by consultants that should also be reviewed periodically to determine whether the time has come where staff can replicate some or all of the consulting services in-house. For example, consultant services such as executing broker oversight were necessary to build out a new broker selection process. However, as that process was implemented and matured, it relied heavily on guidance, input and feedback from CRF Investment Staff. This would illustrate a situation where PICM possesses the knowledge to conduct that sort of diligence, and therefore with modest additional resources could bring that functionality in-house at a substantial cost savings to the Fund.

Risk Management

Risk Appetite Statement of the CRF:

The CRF is dedicated to providing a secure pension for generations of NYSLRS members, retirees and beneficiaries. In pursuit of this mission, the CRF is committed to the highest standards of ethics and prudent investment management. In their decision making, the Trustee and staff of the CRF may take prudent investment risks when compensated by higher expected returns in order to generate stronger long-term performance. Regardless of potential returns, the CRF endeavors to avoid the risk of a loss of asset value that could compromise the economic viability of the current plan structure or call into question the integrity and responsibility of the CRF or its staff. Therefore, the CRF diligently seeks to identify and avoid such risk. [28]

The CRF has an investment risk team, Pension Risk Management ("PRM"), that provides an investment risk framework for the Fund. PRM is headed by the Chief Investment Risk Officer ("CIRO") and is assisted by several staff members and is advised by the Risk Committee ("RC").

[28] Risk Appetite approved by the Comptroller in 2018 and reflected in NYLSRS 2019 Comprehensive Annual Report.

The RC, chaired by the CIRO, includes members from PICM, the System, Internal Audit, the Office of the Inspector General, the office of the Chief Information Officer and the Division of Legal Services.

In fiscal year 2018-19, the CIRO's reporting lines were changed. CIRO reports directly to the Executive Deputy Comptroller for Retirement Services ("EDCRS"), with an administrative reporting line to the CIO to provide coordination of the investment and risk functions; this ensures that the CIRO has an independent reporting line and the ability to escalate issues outside of the investment function. The CIRO has authority over PRM and has responsibilities including, but not limited to, advising the CIO, the EDCRS and the Comptroller on risk issues and making formal recommendations to the CIO, the EDCRS and the Comptroller on investment risk and investment-related risk issues.

The roles of the PRM team, the CIRO and the Risk Committee are both wide ranging and detailed. All enterprise risks that may impact investment activities of the CRF are within the Committee's purview. These risks include, but are not limited to, market and credit risk, operational risk as it may relate to the investment process, as well as relevant aspects of liquidity risk, reputational risk, asset/liability risk, cyber risk and governance risk as they may pertain to CRF investment programs.

Currently the CIRO relies heavily on reporting from the Fund Custodian and from a third-party risk data provider. The data provided by this firm can be incredibly in-depth, but in our experience, typically requires a significant amount of analytics built in-house to be relevant to the end user. There is currently a project in place to improve the management reporting function of this data, but as with all technology projects, staff resources are an issue. We would recommend an increase in the allocation of technology resources to the CIRO that would tie in with our earlier recommendation of having PICM-specific technology experts.

As we noted earlier in the recommendations, giving supervisory staff the opportunity to think strategically regarding risks posed to the Fund is extremely important to maintaining both the performance and reputation of the CRF.

Further, as budget and appetite permit, we would recommend the addition of dedicated PRM staff to work with individual asset classes, tying in with our earlier recommendation of greater independence from and oversight of outside consultants.

Appendix 1: Closed Transaction Summary

	Date	Consultant Rec[29]	Staff Rec[30]	Comptroller Signoff[31]	IIC or REAC[32]	Subscription Documents	Background Check[33]	ESG Risk Assessment	Gift Restriction Acknowledgement[34]	Placement Agent[35]	Legal Review	Political Contribution Limits[36]	Conflicts of Interest	FEAA Boycotts[37]	MacBride Fair Employment[38]	DFS Access[39]
Fixed Income																
Neuberger Berman	Sep-15	✓	✓	✓	✓	✓	✓	NA[40]	NA	✓	✓	✓	✓	✓	✓	✓
Semper	Jan-16	✓	✓	✓	✓	✓	✓	NA	NA	✓	✓	✓	✓	✓	✓	✓
Smith Graham	May-16	✓	✓	✓	✓	✓	✓	NA	NA	✓	✓	✓	✓	✓	✓	✓
New Century	Oct-16	✓	✓	✓	✓	✓	✓	NA	NA	✓	✓	✓	✓	✓	✓	✓
Double Line	Jun-17	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Global Equity																
Morgan Stanley	Apr-15	✓	✓	✓	✓	✓	✓	NA	NA	✓	✓	✓	✓	✓	✓	✓
Russell HEDI	Jun-15	✓	✓	✓	✓	✓	✓	NA	NA	✓	✓	✓	✓	✓	✓	✓
Wellington	Jun-15	✓	✓	✓	✓	✓	✓	NA	NA	✓	✓	✓	✓	✓	✓	✓
GSAM Low Emission 2016	Oct-15	✓	✓	✓	✓	✓	✓	NA	NA	✓	✓	✓	✓	✓	✓	✓
GSAM Low Emission 2018	Feb-17	✓	✓	✓	✓	✓	✓	NA	NA	✓	✓	✓	✓	✓	✓	✓
Channing	Oct-17	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
GQG	Dec-17	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Opportunistic																
Landmark Hudson I	May-14	✓	✓	✓	✓	✓	✓	NA	NA	✓	✓	✓	✓	✓	✓	✓
ADV Opps I	Jun-15	✓	✓	✓	✓	✓	✓	NA	NA	✓	✓	✓	✓	✓	✓	✓
Clearlake Opps	Jul-15	✓	✓	✓	✓	✓	✓	NA	NA	✓	✓	✓	✓	✓	✓	✓

[29] Investment Consultant recommendation is necessary for all closed transactions.
[30] Investment Staff recommendation to the Comptroller.
[31] Comptroller signoff of a particular transaction.
[32] Internal Investment Committee or Real Estate Advisory Committee
[33] Background checks completed or waived as applicable.
[34] Acknowledgement of compliance with the provisions of Section 73, sub (5) of the New York Public Officers Law.
[35] Acknowledgment of the restriction on the use of placement agents.
[36] Representation that the GP or investment manager that it is in compliance with Rules 206(4)-5 and 204-2(a)18 of the US Investment Advisers Act of 1940.
[37] Representation that the GP or the Partnership is in compliance with the Federal Export Administration Act of 1979 (as amended).
[38] Representation that the GP or investment manager is subject to Section 423-a of the NYS RSSL.
[39] The GP and investment manager agree to grant access to the NYS Department of Financial Services for the purposes of examining the books and records of the manager in connection with the investments by the Fund.
[40] NA – Not Applicable indicates the transaction closed before the policy was in force.

Stellex	Oct-15	✓	✓	✓	✓	✓	✓	NA	NA	✓	✓	✓	✓	✓	✓	✓
Blackstone Tact Opps Core	Nov-15	✓	✓	✓	✓	✓	✓	NA	NA	✓	✓	✓	✓	✓	✓	✓
Blackstone Tact Opps II	Nov-15	✓	✓	✓	✓	✓	✓	NA	NA	✓	✓	✓	✓	✓	✓	✓
Landmark Real Estate VIII	Jan-16	✓	✓	✓	✓	✓	✓	NA	NA	✓	✓	✓	✓	✓	✓	✓
Oak Hill Strategic II	May-16	✓	✓	✓	✓	✓	✓	NA	NA	✓	✓	✓	✓	✓	✓	✓
Brightwood IV	Sep-16	✓	✓	✓	✓	✓	✓	NA	NA	✓	✓	✓	✓	✓	✓	✓
GSO Cap Opps III	Oct-16	✓	✓	✓	✓	✓	✓	NA	NA	✓	✓	✓	✓	✓	✓	✓
Landmark Eq XVI	Dec-16	✓	✓	✓	✓	✓	✓	NA	NA	✓	✓	✓	✓	✓	✓	✓
TSSP ADJ Opps 3.0	Dec-16	✓	✓	✓	✓	✓	✓	NA	NA	✓	✓	✓	✓	✓	✓	✓
NB Loan Advisors	Jul-17	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Strategic Value SS IV	Feb-18	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Private Equity																
Blackstone Capital VII	Mar-15	✓	✓	✓	✓	✓	✓	NA	NA	✓	✓	✓	✓	✓	✓	✓
CVC Growth	Mar-15	✓	✓	✓	✓	✓	✓	NA	NA	✓	✓	✓	✓	✓	✓	✓
CVC Coinvest	Mar-15	✓	✓	✓	✓	✓	✓	NA	NA	✓	✓	✓	✓	✓	✓	✓
KSL Capital IV	Apr-15	✓	✓	✓	✓	✓	✓	NA	NA	✓	✓	✓	✓	✓	✓	✓
NB Co-Invest	Apr-15	✓	✓	✓	✓	✓	✓	NA	NA	✓	✓	✓	✓	✓	✓	✓
Acon Equity IV	Jul-15	✓	✓	✓	✓	✓	✓	NA	NA	✓	✓	✓	✓	✓	✓	✓
Bridgepoint Eur V	Jul-15	✓	✓	✓	✓	✓	✓	NA	NA	✓	✓	✓	✓	✓	✓	✓
Wigmore St Coinvest	Jul-15	✓	✓	✓	✓	✓	✓	NA	NA	✓	✓	✓	✓	✓	✓	✓
Brookfield Capital IV	Jul-15	✓	✓	✓	✓	✓	✓	NA	NA	✓	✓	✓	✓	✓	✓	✓
Clearlake Opps	Jul-15	✓	✓	✓	✓	✓	✓	NA	NA	✓	✓	✓	✓	✓	✓	✓
Contour Opp Fund	Jul-15	✓	✓	✓	✓	✓	✓	NA	NA	✓	✓	✓	✓	✓	✓	✓
Dyal Cap III-NB	Jul-15	✓	✓	✓	✓	✓	✓	NA	NA	✓	✓	✓	✓	✓	✓	✓
Dyal Third Ave Co-Invest	Jul-15	✓	✓	✓	✓	✓	✓	NA	NA	✓	✓	✓	✓	✓	✓	✓
EQT VII	Jul-15	✓	✓	✓	✓	✓	✓	NA	NA	✓	✓	✓	✓	✓	✓	✓
RRJ Capital III	Jul-15	✓	✓	✓	✓	✓	✓	NA	NA	✓	✓	✓	✓	✓	✓	✓
Apollo Nat Res II	Aug-15	✓	✓	✓	✓	✓	✓	NA	NA	✓	✓	✓	✓	✓	✓	✓
Tribeca Ventures II	Nov-15	✓	✓	✓	✓	✓	✓	NA	NA	✓	✓	✓	✓	✓	✓	✓
57 Stars 2016	Jan-16	✓	✓	✓	✓	✓	✓	NA	NA	✓	✓	✓	✓	✓	✓	✓
TA XII	Jan-16	✓	✓	✓	✓	✓	✓	NA	NA	✓	✓	✓	✓	✓	✓	✓
FIMI Opp 6	Feb-16	✓	✓	✓	✓	✓	✓	NA	NA	✓	✓	✓	✓	✓	✓	✓
TA Sub Debt IV	Feb-16	✓	✓	✓	✓	✓	✓	NA	NA	✓	✓	✓	✓	✓	✓	✓
Vista Credit Opps II	Feb-16	✓	✓	✓	✓	✓	✓	NA	NA	✓	✓	✓	✓	✓	✓	✓
Hony Capital VIII	Mar-16	✓	✓	✓	✓	✓	✓	NA	NA	✓	✓	✓	✓	✓	✓	✓
KKR Americas XII	Mar-16	✓	✓	✓	✓	✓	✓	NA	NA	✓	✓	✓	✓	✓	✓	✓
NY Credit Co-Invest II	Mar-16	✓	✓	✓	✓	✓	✓	NA	NA	✓	✓	✓	✓	✓	✓	✓
Oaktree Opps Xb	Mar-16	✓	✓	✓	✓	✓	✓	NA	NA	✓	✓	✓	✓	✓	✓	✓
Vista Equity VI	Mar-16	✓	✓	✓	✓	✓	✓	NA	NA	✓	✓	✓	✓	✓	✓	✓
Warburg Pincus XII	Mar-16	✓	✓	✓	✓	✓	✓	NA	NA	✓	✓	✓	✓	✓	✓	✓

Ares COF V	Apr-16	✓	✓	✓	✓	✓	✓	NA	NA	✓	✓	✓	✓	✓	✓	✓
Hudson River Co-Invest III	Apr-16	✓	✓	✓	✓	✓	✓	NA	NA	✓	✓	✓	✓	✓	✓	✓
Thoma Bravo XII	Apr-16	✓	✓	✓	✓	✓	✓	NA	NA	✓	✓	✓	✓	✓	✓	✓
Searchlight II	May-16	✓	✓	✓	✓	✓	✓	NA	NA	✓	✓	✓	✓	✓	✓	✓
Snow Phipps III	May-16	✓	✓	✓	✓	✓	✓	NA	NA	✓	✓	✓	✓	✓	✓	✓
Vista Found Fund III	May-16	✓	✓	✓	✓	✓	✓	NA	NA	✓	✓	✓	✓	✓	✓	✓
Green Equity VII	Jun-16	✓	✓	✓	✓	✓	✓	NA	NA	✓	✓	✓	✓	✓	✓	✓
IK VIII	Jul-16	✓	✓	✓	✓	✓	✓	NA	NA	✓	✓	✓	✓	✓	✓	✓
Cinven VI	Aug-16	✓	✓	✓	✓	✓	✓	NA	NA	✓	✓	✓	✓	✓	✓	✓
Blackstone Core Eq	Sep-16	✓	✓	✓	✓	✓	✓	NA	NA	✓	✓	✓	✓	✓	✓	✓
KKR Asia III	Mar-17	✓	✓	✓	✓	✓	✓	✓	NA	✓	✓	✓	✓	✓	✓	✓
GSO Cap Sol III-Co Invest	Apr-17	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
GSO Cap Solutions III	Apr-17	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
NY Co-Asia II	Apr-17	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Palladium Equity V	Apr-17	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
CVC Capital VII	May-17	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
The Rise Fund (TPG)	May-17	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Apollo Inv Fund IX	Jun-17	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
ICV IV	Jul-17	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
57 Starts 2017	Aug-17	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Insight Venture X	Oct-17	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
M2 NY Pioneer Fund II[41]	Oct-17	✓	✓	✓	✓	✓	✓	NA	NA	✓	✓	NA	NA	NA	NA	X
HL-NYSCRF Israel Fund	Nov-17	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Affinity Asia Fund V	Dec-17	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
TPG Growth IV	Dec-17	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Vista Opportunistic Credit Fund	Dec-17	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Warburg Pincus Fin Sector Fund	Dec-17	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Clearlake V	Jan-18	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Tribeca Growth Fund	Jan-18	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
EQT VIII	Feb-18	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Real Assets																
KKR Infrastructure II	Apr-15	✓	✓	✓	✓	✓	✓	NA	NA	✓	✓	✓	✓	✓	✓	✓
TIAA-CREF Global AG II	Jul-15	✓	✓	✓	✓	✓	✓	NA	NA	✓	✓	✓	✓	✓	✓	✓
North Haven Infrastruct II	Feb-16	✓	✓	✓	✓	✓	✓	NA	NA	✓	✓	✓	✓	✓	✓	✓
Kayne Anderson Energy	Jun-16	✓	✓	✓	✓	✓	✓	NA	NA	✓	✓	✓	✓	✓	✓	✓
Brookfield Infrastructure Fund III	Jul-16	✓	✓	✓	✓	✓	✓	NA	NA	✓	✓	✓	✓	✓	✓	✓
Pantheon	Jan-17	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

[41] M2 NY Pioneer Fund II represents a follow-on commitment to an earlier investment.

IFM Global	Apr-17	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
SASOF IV	May-17	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Meridian Infra NA III	Oct-17	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Stonepeak III	Oct-17	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
KKR Global Infra III	Mar-18	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Real Estate																
Ares European RPEP II	Mar-15	✓	✓	✓	✓	✓	✓	NA	NA	✓	✓	✓	✓	✓	✓	✓
Simpson Housing	May-15	✓	✓	✓	✓	✓	✓	NA	NA	✓	✓	✓	✓	✓	✓	✓
Westbrook IX Coinvest	May-15	✓	✓	✓	✓	✓	✓	NA	NA	✓	✓	✓	✓	✓	✓	✓
Westbrook X	May-15	✓	✓	✓	✓	✓	✓	NA	NA	✓	✓	✓	✓	✓	✓	✓
Westbrook X Coinvest	May-15	✓	✓	✓	✓	✓	✓	NA	NA	✓	✓	✓	✓	✓	✓	✓
Blackstone Property Partners	Jun-15	✓	✓	✓	✓	✓	✓	NA	NA	✓	✓	✓	✓	✓	✓	✓
Niam Nordic VI	Jun-15	✓	✓	✓	✓	✓	✓	NA	NA	✓	✓	✓	✓	✓	✓	✓
Jamestown Premier	Dec-15	✓	✓	✓	✓	✓	✓	NA	NA	✓	✓	✓	✓	✓	✓	✓
MetLife Office JV	Dec-15	✓	✓	✓	✓	✓	✓	NA	NA	✓	✓	✓	✓	✓	✓	✓
Brookfield Strategic	Jan-16	✓	✓	✓	✓	✓	✓	NA	NA	✓	✓	✓	✓	✓	✓	✓
JP Morgan Strategic 2016	Feb-16	✓	✓	✓	✓	✓	✓	NA	NA	✓	✓	✓	✓	✓	✓	✓
Pramerica Real Estate	Jun-16	✓	✓	✓	✓	✓	✓	NA	NA	✓	✓	✓	✓	✓	✓	✓
Blackstone Real Estate Debt	Aug-16	✓	✓	✓	✓	✓	✓	NA	NA	✓	✓	✓	✓	✓	✓	✓
CPC Revolver	Sep-16	✓	✓	✓	✓	✓	✓	NA	NA	✓	✓	✓	✓	✓	✓	✓
UBS Trumbell	Sep-16	✓	✓	✓	✓	✓	✓	NA	NA	✓	✓	✓	✓	✓	✓	✓
MetLife Core Plus II	Oct-16	✓	✓	✓	✓	✓	✓	NA	NA	✓	✓	✓	✓	✓	✓	✓
Asana Select	Mar-17	✓	✓	✓	✓	✓	✓	✓	NA	✓	✓	✓	✓	✓	✓	✓
Avanath Housing III	Mar-17	✓	✓	✓	✓	✓	✓	✓	NA	✓	✓	✓	✓	✓	✓	✓
GreenOak	Mar-17	✓	✓	✓	✓	✓	✓	✓	NA	✓	✓	✓	✓	✓	✓	✓
Mesa West	Apr-17	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Prologis	Jul-17	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Blackstone Asia II	Aug-17	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Landmark VII-A	Nov-17	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Appendix 2: Team Biographies

Chris Lombardy - Managing Director, Compliance and Regulatory Consulting

Chris is a Managing Director and Head of U.S. Compliance Consulting at Duff & Phelps. He joined Duff & Phelps in January 2015 from Kinetic Partners as a result of Duff & Phelps' acquisition of Kinetic.

Chris has extensive experience within the investment advisory industry as a lawyer, chief compliance officer, and consultant. Mr. Lombardy works closely with investment advisory and broker dealer clients on numerous matters such formation and structuring, establishing compliance and operations infrastructure, selecting appropriate service providers, identifying and addressing risks and conflicts, performing operational due diligence reviews and preparing for and dealing with regulatory examinations, and performing mock regulatory examinations.

Chris is frequently asked to lecture on panels on matters specific to investment adviser regulations, developing a robust compliance infrastructure, industry best practices, preparing for regulatory examinations and due diligence reviews, investment advisers and directors & officers insurance.

Chris earned his B.S. in International Finance and Master of Business Administration in Finance from American University, Kogod College of Business and his Juris Doctorate from St. Thomas University School of Law.

Jason Beckett - Project Director, Compliance and Regulatory Consulting

Jason is a Director in the Compliance and Regulatory Consulting practice in New York. Within this role, he has worked with a wide array of allocators, pension funds, investment managers, hedge funds and private equity funds in providing investment-operation reviews, operational due diligence, regulatory preparedness exams and annual compliance reviews. He has over twenty years of investment industry experience within hedge funds and broker dealers.

Prior to joining Duff & Phelps, Jason was the Head of Treasury at a $2.5 billion fixed income hedge fund that specialized in sovereign relative value and macro trading. He was responsible for securities finance, treasury and liquidity controls, short term investments and counterparty risk management. Jason started as the Head of US Operations, where he helped launch and grow the business. He was instrumental in the creation of operational procedures such as trade flows, position and PNL reconciliations and the negotiation of Prime Broker agreements, ISDA's and GMRA's, as well as the day to day operational aspects of the fund.

Jason began his career as an Operations Vice President at Greenwich Capital Markets where he managed a team providing middle and back office support for the US Treasury primary dealership, distressed debt team and investment grade corporate trading desk. He was a member of the New Products Committee as well as point person in his group for internal, external and regulatory audits.

He graduated from Ithaca College with a Bachelor of Science in Finance and is a CAIA Level 2 candidate.

Peter Wilson – Managing Director

Peter is an attorney and Managing Director at Duff & Phelps in the Compliance and Regulatory Consulting practice. He specializes in counseling a variety of investment advisers, including those managing hedge funds, private equity and real estate funds.

With over 15 years of legal and regulatory experience, Peter has worked extensively with private fund managers. His expertise includes designing compliance programs, implementing industry best practices, conducting mock regulatory examinations, supporting regulatory filings and performing operational due diligence. Peter also has significant experience guiding advisers through regulatory examinations and corresponding with federal and state securities regulators.

Peter held numerous senior level management positions within the asset management industry. Prior to joining Duff & Phelps, he served as Chief Compliance Officer and legal counsel for several SEC-registered entities, including an investment adviser to a global multi-billion dollar fund-of-hedge funds and a number of mutual funds. Peter also served as Chief Compliance Officer at a CFTC registered swap execution facility where he oversaw firm-wide compliance management and strategy, designed operational systems and implemented robust controls to promote sound governance of the trading platform.

Peter began his legal career in the U.S. Army JAG Corps, where he held numerous positions including prosecutor and criminal defense trial attorney. He is admitted to practice law in New York, Connecticut and before the U.S. District Court for the Southern District of New York.

Mark McGrath - Director, Compliance and Regulatory Consulting

Mark is a Director in the Compliance and Regulatory Consulting practice at Duff & Phelps, specializing in operational and investment due diligence of alternative investment managers. He has over 15 years of experience as both an allocator of capital and investment manager research and due diligence. Mark has experience investing in and doing deep analysis of multiple alternative investment sub-strategies, including long/short equity, global macro, credit, multi-strategy, special situations, distressed debt, private equity and venture capital. He has worked in the capital markets for the entirety of his career.

Prior to Duff & Phelps, Mark was the Director of Research for Alternative Investments at a multi-billion dollar private bank. He was responsible for sourcing, evaluating and monitoring the alternative investment managers on the firm's approved manager platform. He served on the firm's Investment Committee and Wealth Management Committee and helped set strategic capital market expectations for client portfolios across the firm.

Previously, he was a Vice President in the Private Equity Group at a large multi-family office. In addition to managing client portfolios as a Family Investment Officer, Mark was part of a team that managed a series of private equity fund and direct private investment commingled vehicles for the firm's ultra-affluent clients. Mark also spent several years in Investor Relations consulting and worked at several investment firms as an analyst.

He received an MBA in Finance from Emory University and a Bachelor of Arts in Political Science from Miami University (OH).

Alexandra McCabe - Director, Compliance and Regulatory Consulting

Alexandra McCabe is a Director in the U.S. Compliance Consulting practice at Duff & Phelps, based in New York. She has over 20 years of financial markets experience in regulatory compliance, trade compliance and surveillance across multiple businesses and asset classes. Alexandra has worked for institutional asset managers and hedge funds, as well as sell side institutions gaining expertise in equity capital markets and sales trading.

Alexandra joined Duff & Phelps from a top tier U.S. Investment Bank, where she was a vice president in independent risk management responsible for responding to regulatory inquires, surveillance review and development of market surveillance scenarios. Alexandra has extensive international experience trading live in global markets on site in three major investment centers: New York, London and Hong Kong. Prior to her role at the Investment Bank, Alexandra was Head of Trading at a hedge fund where she worked live hours executing trade flow for funds that included long/short strategies. Prior to the hedge fund, Alexandra held the position of Industry Expert in the Asset Management Unit in the Enforcement Division of the Securities and Exchange Commission supporting enforcement attorneys and working with the Office of Compliance Inspections and Examinations on presence examinations.

Alexandra received her B.S. in marketing from the University of Rhode Island and graduated from the Senior Executive Program at Columbia University.

Matt Haney - Director, Compliance and Regulatory Consulting

Matt is part of the Compliance and Regulatory Consulting practice in New York. He works closely with a number of advisers to hedge funds and private equity funds in formation and structuring, drafting compliance manuals, analyzing fees and expenses, supporting accounting and operations functions, performing operational due diligence reviews and conducting mock regulatory examinations.

Matt has assisted clients over the years with regulatory examinations involving the U.S. Securities and Exchange Commission (SEC), Commodity and Futures Trading Commission (CFTC), National Futures Association (NFA) and FINRA. Additionally, he has led a number of operational and accounting reviews for hedge fund and private equity clients, which have focused on areas such as fee and expense allocation, cash controls, valuation, trade operations and back office technology.

Previously, Matt worked in hedge fund administration and accounting, most recently as an Assistant Vice President with Citi Fund Services in the firm's Bermuda and Dublin offices. Before Citi, he served in fund accounting roles at BISYS, Morgan Stanley and SEI.

He holds an MBA from Temple University and a BS in Accounting from La Salle University. Matt is a Certified Public Accountant.

Allen J. Erreich – Partner at Roberts & Holland LLP

Employee Benefits; Executive Compensation

Allen J. Erreich concentrates on employee benefits and executive compensation matters. He is involved in the design and implementation of all types of qualified retirement and welfare benefit plans. He counsels clients on all aspects of plan administration, compliance and fiduciary matters and advises private investment funds on issues relating to the structuring of underlying investments to comply with applicable ERISA requirements. He has participated in negotiating employee benefits issues in mergers, acquisitions and other corporate restructurings. He has also advised clients on tax issues related to equity-based compensation plans and deferred compensation arrangements.

He received a B.A. from Rabbinical College of Long Island and his J.D. from Columbia University, where he was a Stone scholar and an editor of the Law Review.

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