



360 Portage Avenue (22) · Winnipeg Manitoba Canada · R3C 0G8  
Telephone / N° de téléphone: (204) 360-3257 · Fax / N° de télécopieur: (204) 360-6147 · [baczarnecki@hydro.mb.ca](mailto:baczarnecki@hydro.mb.ca)

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May 23, 2023

THE PUBLIC UTILITIES BOARD OF MANITOBA  
400-330 Portage Avenue  
Winnipeg, Manitoba  
R3C 0C4

ATTENTION: Dr. D. Christle, Board Secretary and Executive Director

Dear Dr. Christle:

**RE: MANITOBA HYDRO'S 2023/24 & 2024/25 GENERAL RATE APPLICATION – MANITOBA HYDRO'S ASSET MANAGEMENT PANEL QUALIFICATIONS**

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Please find enclosed the Witness Qualifications for Manitoba Hydro's Asset Management Panel with respect to the 2023/24 & 2024/25 General Rate Application, to be marked as exhibits in this proceeding.

The Asset Management Panel for this Application consists of the following witnesses:

- Hal Turner, *Vice-President, Asset Planning & Delivery – CV provided in the letter dated Tuesday, May 16, 2023*
- Alastair Fogg, *Corporate Controller*
- Cyril Patterson, *Director, Distribution Operations & Maintenance Rural*
- James Pawluk, *Director, Asset Management*
- Tanis Brako, *Director, Sales/Marketing & Product Development*
- Krista Halayko, *Manager, Asset Management Strategy & Planning Department*
- Sarah Vine, *Director of Asset Management, AMCL*

Should you have any questions with respect to the foregoing, please do not hesitate to contact the writer at 204-360-3257.

Yours truly,  
**MANITOBA HYDRO LEGAL SERVICES**

Per:

A handwritten signature in blue ink, appearing to read 'Brent Czarnecki', written over a horizontal line.

**Brent Czarnecki**  
Senior Counsel

**PROFESSIONAL EDUCATION:**

Masters of Business Administration (MBA), University of Manitoba, 2015  
Bachelor of Science in Mechanical Engineering, University of Manitoba, 2007

**PROFESSIONAL AFFILIATIONS:**

Chartered Professional Accountant (CPA, CMA), CPA Manitoba  
Professional Engineer (P. Eng.), Engineers Geoscientists Manitoba

**EMPLOYMENT HISTORY:**

January 2022 – Present	Corporate Controller, Corporate Controller Division, Manitoba Hydro
2020 – December 2021	Director, Enterprise Risk Management Division, Manitoba Hydro
2014 –2020	Manager, Converter Stations Commercial & Controls Department, Manitoba Hydro
2012 –2014	Commercial Engineer, Converter Stations Department, Manitoba Hydro
2011 – 2012	Risk Management Engineer, Project Services Department, Manitoba Hydro
2009 – 2011	Cost & Schedule Engineer, Project Services Department, Manitoba Hydro
2009 –2009	Engineer-in-Training, Customer Engineering Services Department, Manitoba Hydro
2005 –2009	Design & Project Management, CML Northern Blower

**PROFESSIONAL EDUCATION:**

Certified in Management (C.I.M.), Canadian Institute of Management  
Certificate in Applied Management, Utilities Specialization, University of Manitoba  
Certificate in Management & Administration, University of Manitoba  
Powerline Journeyman, Manitoba Hydro

**PROFESSIONAL AFFILIATIONS:**

Canadian Institute of Management & Administration

**EMPLOYMENT HISTORY:**

August 2016 – Present	Director, Distribution Operations & Maintenance Rural Division, Manitoba Hydro
2010 – July 2016	Department Manager, Parkland, Customer Service & Operations
2009 – 2010	Neepawa Customer Service Center Supervisor, Parkland, Customer Service & Operations
2008 – 2009	Operations Coordinator, Westman, Customer Service & Operations
2007 – 2008	District Operator, Hamiota, Westman, Customer Service & Operations
2000 – 2007	Assistant District Operator, Shoal Lake, Parkland, Customer Service & Operations
1998 – 2000	Field Safety Officer, Transmission and Distribution
1996 – 1998	Line Trades Training Coordinator, Western Region
October 1988 – 1996	Powerline Journeyman, various departments, Manitoba Hydro

**PROFESSIONAL EDUCATION:**

B.Sc. Mechanical Engineering, 1991, University of Manitoba

**PROFESSIONAL AFFILIATIONS:**

Member, Engineer Geoscientists Manitoba (EGM)

Certificate in Asset Management, 2019, Institute of Asset Management

Certificate in Management Program, 2003, Continuing Education, University of Manitoba

Certified LEED Professional, 2006

**EMPLOYMENT HISTORY:**

January 2022 – Present	Director, Asset Management Division, Manitoba Hydro
2020 – January 2022	Department Manager, Generation Project Management Department, Manitoba Hydro
2019 –2020	Department Manager, Generation Design Department, Manitoba Hydro
2015 –2019	Section Head, Generation Project Management Department, Manitoba Hydro
2014 –2015	Team Lead, Generation Project Management Department, Manitoba Hydro
2011 –2014	Area Project Manager, Real Property Branch, Public Works and Services Canada
2007 –2011	Project Manager, Real Property Branch, Public Works and Services Canada
March 2003 –2007	Project Administrator, Westwood Mechanical

**PROFESSIONAL EDUCATION:**

Master of Business Administration, Asper School of Business - University of Manitoba, 2019  
Bachelor of Science in Mechanical Engineering, University of Manitoba, 2003

**PROFESSIONAL AFFILIATIONS:**

Member of the Association of Professional Engineers and Geoscientists of Manitoba as a registered Professional Engineer

**EMPLOYMENT HISTORY:**

2023 - Present	Director, Energy Service Advice & Product Development, Manitoba Hydro
2021 – 2023	Director, Sales/Marketing & Product Development, Manitoba Hydro
2019 – 2021	Manager, Customer Energy Services Department, Manitoba Hydro
2016 – 2019	Manager, Gas Apparatus Maintenance & Control Department, Manitoba Hydro
2012 – 2016	Gas Station Engineer Section Head, Manitoba Hydro
2006 – 2012	Gas Planning and Design Engineer Supervisor, Manitoba Hydro
2004 – 2006	Applications Engineer, Price Industries
2003 – 2004	Specials Design Supervisor, Price Industries

**PROFESSIONAL EDUCATION:**

Certificate in Asset Management, Institute of Asset Management, 2018  
Master of Science, Civil Engineering (Geotechnical), University of Manitoba, 1998  
Bachelor of Science, Civil Engineering, University of Manitoba, 1995

**PROFESSIONAL AFFILIATIONS:**

Member, Engineers Geoscientists Manitoba  
Representative for Manitoba Hydro, Asset Management Interest Group - Centre for Energy  
Advancement through Technological Innovation (CEATI)  
Institute of Asset Management, North America, Board Member - Women in Asset Management

**EMPLOYMENT HISTORY:**

March 2021 – Present	Manager, Asset Management Strategy & Planning Department, Manitoba Hydro
2017 – 2021	Asset Management Strategy and Improvement Section Head, Generation Asset Strategy and Performance Department, Manitoba Hydro
2016 – 2017	Generation Asset Management Reliability Section Head, Generation Asset Management Department, Manitoba Hydro
2008 – 2016	Dam Safety Section Head, Civil Engineering Department, Manitoba Hydro
2007 – 2008	Dam Safety Studies Engineer, Civil Engineering Department, Manitoba Hydro
2001 – 2008	Supervising Geotechnical Engineer, Civil Engineering Department, Manitoba Hydro
1998 – 2001	Geotechnical Engineer, Civil Engineering Department, Manitoba Hydro
1995 – 1998	Engineer-in-training (multiple rotations), Manitoba Hydro

# CURRICULUM VITAE

## SARAH VINE MBA, M.Eng, C.Eng, C.WEM, AMP, FIAM



### CAPABILITY SUMMARY

Sarah Vine is the Director of Asset Management for AMCL Canada. She is a Chartered engineer and asset management professional with nearly 30-years industry experience in asset management in utilities, transportation, defence and civil infrastructure across the UK, US and UAE.

Sarah is a Fellow of the Institute of Asset Management and has been an Asset Management Assessor for over 15 years. Over her career, Sarah has been involved with various facets of asset management, including developing industry sector specific asset management maturity models, and regulatory assessment models.

In addition to her extensive experience leading maturity assessments and improvement plans, Sarah is a leader in developing industry standards for those practices; she contributed to the update of IAM's Asset Management – An Anatomy, a foundational document in asset management and is currently contributing to the IAM's Subject Specific Guidance document on Competence and Leadership.

Sarah relocated from the UK to Canada in 2018 and is based in our Calgary office.

### QUALIFICATIONS

- MBA, Master in Business Administration
- MEng, Master of Engineering
- AMP IAM Registered Asset Management Professional
- CAMA, WPIAM Certified Asset Management Assessor
- Institute of Asset Management Diploma

### AFFILIATIONS

- UK C.WEM Chartered Water and Environmental Manager
- Member, Chartered Institute of Water & Environment, 2000
- FIAM Fellow of the Institute of Asset Management
- UK CEng Chartered Engineer
- MICE Member of the Institute of Civil Engineers

### KEY SKILLS

- Strategic Asset Management
- Asset Management Capability Establishment
- Investment Optimization
- Risk Based Investment Planning
- ISO 55000 Assessments and Certification
- Business Process Optimization
- Corporate Risk Management
- Diagnostic analysis of systems and processes for data

### KEY EXPERIENCE

Prior to becoming a consultant, Sarah spent 12 years at Wessex Water, in the UK, the first water utility to achieve PAS55 certification. Sarah was responsible for corporate risk management, contract risk management, including undertaking a pricing and scope validation of the £480m, 500 project, rate case application prior to submission.

Sarah then spent three years seconded into Southern Water as their Head of Asset Management to establish their Asset Management capability and improve their asset performance.

Sarah has held long term roles (6+ years) as a Technical Assessor of long-term business plans for rate applications, leading teams undertaking assurance of forecasts and audit of data and performance metrics on behalf of regulators in the UK and UAE. This included preparing and signing off the formal "Statement of Reasonableness" of asset strategies and plans for power and water production/ generation/ transmission and distribution along with the projected impact on levels of service and cost of service.

She was one of the first group to appear on the IAM Register of Professionals launched in 2020 and is a regular panel interviewer for new applicants wanting to be awarded the designation Registered Asset Management Professional.

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**Turner & Townsend Canada Inc (AMCL), Canada**  
**Dates of Employment 12th February to Present**  
**Position: Director of Asset Management**

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**National Grid Generation, GFMAM 39-Subjects Assessment, NY, USA**

ISO 55001 mock audit ahead of formal recertification audit. Included providing detailed feedback following each stage of the assessment, with additional coaching and practice sessions to prepare the client team for questions and challenges they may be presented with during the formal audit.

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**New York Power Authority; Pre-Certification Audit, NY, USA**

ISO 55001 mock audit ahead of formal recertification audit. Included providing detailed feedback following each stage of the assessment, with additional coaching and practice sessions to prepare the client team for questions and challenges they may be presented with during the formal audit.

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**Manitoba Hydro; Maturity Assessment, MB, Canada**

IAM Endorsed Lead Assessor on the assessment of Hydro's current asset management capabilities against the GFMAM 39-Subjects and providing recommendations on areas to improve to achieve their strategic asset management plan objectives. Developed and delivered a bespoke advanced training program to enable them in progressing improvements.

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**Toronto Hydro; Maturity Assessment, ON, Canada**

IAM Endorsed Lead Assessor on the assessment of THESL's current asset management capabilities against the ISO 55001 requirements. Lead development of a road map outlining the shortfalls and providing recommendations on filling those gaps to achieve ISO 55001 accreditation within a specified time frame. Delivered a bespoke advanced training program covering Information Systems, Processes and Procedures, Organizational Culture and Strategy & Planning.

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**BC Hydro; Maturity Assessment, ON, Canada**

Lead Assessor on the assessment of BC Hydro's asset management system against the requirements of ISO 55001. Made recommendations to address some near-term challenges and developing a suitable Asset Management System Manual.

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**ENMAX; Training, Advisory, AB, Canada**

Leading and delivering the Asset Management Framework which covers a wide range of areas, including ISO 55000 Alignment, Training, Risk Management and Decision Support Tools. Other broad areas of work include Planning and Development, Operational and Optimization activities, and support for ENMAX's existing Enterprise Systems.

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**ATCO Natural Gas; Development of Value Framework, AB, Canada**

Leading and delivering Value Framework Development for ATCO Natural Gas Division. This framework will help ATCO streamline their future investment planning process and asset management decision-making. AMCL have delivered a Value Framework design based on industry best practices and are currently establishing Value Themes and Measures of Value.

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**Columbia Power; Maturity Assessment, Training, Advisory, BC, Canada**

Undertook a GFMAM 39 Subjects maturity assessment of the Columbia Power Corporation to determine how to strengthen their asset management program in a cost-effective way and to ensure that they are on track to meet their objectives.

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**Metrolinx; Asset Management Subject Matter Expert, ON, Canada**

Supporting Fleet and Engineering Asset Management team in developing their Asset Management Plan. In parallel, providing local direction and support to their asset management capability development programme following a reorganisation of the business. This includes identifying the processes and procedures required, developing role profiles, undertaking training needs analysis and coaching staff in new ways of working.

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**Region of Niagara; Training, Advisory, ON, Canada**

Developed and delivered a tailored training program based on the IAM Certificate training material and tailored with assignments and workshops designed to tackle existing challenges being faced by the organization.

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**SNC Lavalin, Canada****Dates of Employment 3<sup>rd</sup> July 2018 to 2<sup>nd</sup> July 2019****Position on Leaving: Director of Asset Management Services**

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**BC Hydro; Strategic Asset Management Plan & Asset Management Plan, BC, Canada**

Developed the Strategic Asset Management Plan (SAMP) covering the John Hart Power Plant to provide the overall long-term strategic direction for the management of plant. Set asset management objectives for the overall plant aligned with BC Hydro requirements and InPower's business objectives and demonstrating how the service performance requirements and hand-back requirements will be achieved.

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**ProTrans BC; Maturity Assessment and Lifecycle Forecast of LRT, BC, Canada**

Undertook a maturity assessment of the Canada Line Rapid Transit (Canada Line) operations and maintenance activities being delivered by ProTrans BC under a 35-year concession agreement. The LRT was originally procured as a DBFOM project by SNC-Lavalin. Undertook a detailed review of the operations, maintenance and lifecycle cost forecast to the end of the 35-year concession to validate planning scenarios and assumptions used and make an assessment of out-turn confidence

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**Atkins, UK****Dates of Employment: 1 August 2007 to 2 July 2018****Position on Leaving: Associate Director**

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**Abu Dhabi Water and Electricity Company (ADWEC), Future Capacity Planning, UAE****Technical Assessor on behalf of the Regulatory and Supervisory Bureau (RSB).**

Provided independent technical assurance of ADWEC's population and industry growth forecast for Abu Dhabi and the surrounding region and confirming the predicted capacity demand for power and water production for the next 5 years.

Assessed the validity of the planning scenarios used to predict the optimum dispatch of existing co-generation and Reverse Osmosis (RO) plant to achieve lowest whole life cost given the planned completion of nuclear and solar power plants and additional RO capacity for water production. Presented findings to the industry regulator (RSB); and provided a detailed technical report of findings and statement of reasonableness ensuring compliance.

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**Babcock Marine and Technology, Nuclear Submarine Maintenance Facility, UK**

Sarah was the Subject Matter Expert, leading asset sustainment strategy and business transformation programmes. Developed a Target Asset Management Framework in line with the requirements of ISO 55000 and tailored to the specific operating conditions of a nuclear submarine refit facility and provided support and guidance in development of the Asset Management Policy and Strategy.

Also, in parallel with the existing transformation programme, lead additional work for the production and delivery of Asset Class Sustainment Strategies for 14 identified critical assets, the objective being to fast-track asset management capability development within the dockyard.

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**Portsmouth Water Limited, Asset Management Improvement, UK**

Engaged to provide an asset management maturity assessment and develop a capability improvement program. As Asset Management Subject Matter Expert (SME), developed a Decision Support Tool (DST) to allow the client to prioritize individual investment needs based on Cost Benefit Assessment and to optimize the portfolio using Multi Criteria Decision Analysis (MCDA) to deliver the greatest total value across seven financial and non-financial customer outcomes.

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### **Irish Water; Asset Strategy, Investment Planning and Delivery, Ireland**

Sarah was appointed by IBM as their SME in Asset Strategy, Investment Planning and Capital Delivery for the establishment of the Irish Water business. Responsible for the business process design, co-ordinating the business process design with the systems design and overseeing systems interface design between Oracle, Maximo and Primavera (P6 and PCM) required for defining and managing delivery of the Irish Water Capital Programme. Also responsible for defining staff skills and competency requirements for the new Asset Management and Capital Delivery Team, delivering 65 role profiles with responsibilities, hand-offs between teams, and training needs analysis. Delivery included documented procedures, process maps, training materials, training delivery and knowledge transfer.

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### **Northern Ireland Water, Asset Management; Subject Matter Expert, Northern Ireland**

Developed Asset Management Capability Assessment Framework for the economic regulator and provided recommendations on improving the systems and controls essential to the data-to-investment decisions process. Also included assistance to NI Water on OpEx special factors analysis as part of the review of the PC15 Business Plan for the Utility Regulator plans for a benchmarking exercise.

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### **Thames Water; Asset Planning, UK**

As Project Director Sarah was responsible for development and roll-out of asset planning processes and documented procedures required to develop the 2015-2020 Asset Management Plan for Thames Water. Thames Water needed to demonstrate an auditable link between the current and predicted performance of the asset base, current and predicted service risk through solution definition and pricing. Also Responsible for overseeing the delivery of a suite Asset Standards for over 400 asset types, ranging from wastewater inlet screens to clean water chlorination systems.

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### **Severn Trent Water; PAS 55 Assessment, UK**

Technical Lead for an extensive review of the clean water asset management activities within the company by following an asset management framework that brought together the requirements of PAS55, The Capital Maintenance Planning Common Framework (CMPCF) and the Asset Management Planning Assessment Process (AMPAP). The framework split the company into 9 key business areas, which were further divided into 75 work areas to enable a targeted assessment to be undertaken and a business improvement plan to be delivered.

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### **Moalajah FZC, PAS 55 & ISO 55000 Assessment, UAE**

Lead Assessor for wastewater operating company asset management system maturity assessment in Ajman, UAE. The assignment included recommendation of which standard was the most appropriate to apply given the nature of the concession contract. Both PAS 55 gap analysis and ISO 55000 assessments, followed by development of a prioritized business improvement and plan know-how transfer.

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### **Bristol Water, Review of Risk Prioritization Process, UK**

Bristol Water required an external technical audit of their Risk Process and accompanying documentation from the perspective of its suitability as a procedure to capture, monitor, and manage risks. Assessed the risk register against the primary use of developing the company's investment plans; and assessed the documentation, processes, and spreadsheet tool against ISO 31000:2009 – Risk Management.

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### **Thames Water; Operational Efficiency, UK**

Brought in as Program Director responsible for developing and delivering the Operations & Process Optimisation programme as part of the wider CHP strategy. Undertook the OPEX assessments, focused on ensuring that any performance limitations of the main treatment works were highlighted and rectified to protect the new CHP engine investment. Implemented a structured and repeatable review process to identify and evaluate potential efficiencies in Consumption, Production & Performance. The objective being to return a site to, or better than, its operational performance efficiency baseline and reduce operational costs.

Also led the initiative for realising TotEx and OpEx benefits delivered by the supply chain and ensuring there was a suitable commercial mechanism built into the contracts. For the stakeholders to come to agreement, they all needed a clear understanding of complex concepts such as TotEx, OpEx, base lining/trending, unit cost of service, benefits measurement and tracking, CBA, NPV and whole life costing.

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## **Southern Water, Head of Asset Management, UK**

Responsible for overseeing the implementation of a Portfolio Management solution and supporting processes based on MS Office Portfolio Server to manage the prioritization and programming of investment projects for Southern Waters in capital maintenance program and managing development of the area asset plan, with rolling 1-year and 5-year asset investment program based on a list of interventions, prioritized using both financial and non-financial benefits. Developed a methodology for identifying worst performing processes to trigger reviews of maintenance plans and the effectiveness of interventions. Leading a team of specialists in developing a system to collate and analyse corporate data systems to determine asset performance. Undertook a performance risk assessment of 98 water supply sites developing a methodology for defining, prioritizing and procuring remedial works. Provided advice on changes to asset standards and operating practices.

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## **Wessex Water, United Kingdom**

**Dates of Employment: August 1995 to July 2007**

**Position on Leaving: Audit and Risk Manager**

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### **Audit and Risk Manager**

Undertook a corporate risk assessment for Wessex Water, covering economic and people issues, legal and ethical impact of risk and public perception, credit rating and H&S issues. Developed a management strategy to reduce likelihood of risks within company control, response plans for external risk and a proactive approach to managing sources of risk. This had greater returns on management investment rather than reactive emergency planning, Carried out successful independent pricing/scope check of Board's £480m, 500 project AMP4 Business Plan in only four months, with 10-strong team, prior to Ofwat submission.

Established internal whistle-blowing policy and processes and undertaking probity audits.

Provided and presented quarterly Corporate Governance reports and risk management plans to the Non-Executive Board.

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**AMP3 Program Manager** Responsible for completion of 254 water and waste treatment schemes totalling £18m. Managed a team of 15 highly skilled problem-solving program managers and resident engineers. Reduced outstanding contracts down to eight difficult ones, including a major claim, whilst ensuring tight management of the initial £18m budget to meet all completions and claims.

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### **Contract Risk Manager**

Developed and maintained a risk analysis methodology and provided risk management services for £170m construction program of AMP3 projects, recruited Risk Management team and trained contractors, designers, Qs, project managers and operational staff. Ensured consistent, auditable approach to project risks. Authorized scope and target price on negotiated contracts and managed change control processes.

Designed and managed development of Contract & Risk Management database to monitor 1,800 AMP3 Contracts providing high-level management information and visibility for contract risk.

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### **Construction Manager**

Assigned to £46m wastewater treatment projects, including design and construction of Weston-Super-Mare's Sewage Treatment Works. Managed and coordinated 37 different contractors on site and 300 variation orders plus claims work. Managed operational emergency works on two major sewer tunnel collapses and flooding of a major treatment works

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## ASSET MANAGEMENT MATURITY ASSESSMENT EXPERIENCE

Client	Role	Sector	Year	Description	Location
National Grid Generation	Lead Assessor	Power Generation	2023	Maturity Assessment against 39 Subjects; Gap Analysis	USA
New York Power Authority	Lead Assessor	Power Generation, Transmission	2022	Pre-certification Assessment against ISO 55001	USA
Manitoba Hydro	Lead Assessor	Power Generation, Transmission, & Distribution	2022	Maturity Assessment against 39 Subjects; Gap Analysis	Canada
Columbia Power	Lead Assessor	Power Generation	2020	Maturity Assessment against 39 Subjects; Gap Analysis; Roadmap	Canada
Toronto Hydro	Lead Assessor	Power Distribution	2020	Maturity Assessment against ISO 55001 Roadmap to ISO Certification	Canada
Abu Dhabi Water and Electricity Company	Lead Assessor	Water; Power, Generation, Transmission & Distribution	2013 to 2018	Technical Assessor on behalf of the Regulatory and Supervisory Bureau (RSB)	United Arab Emirates
ProTrans BC	Lead Assessor	Transit	2018	Maturity Assessment integrated with IAM Framework; Lifecycle Forecast of Light Rail Transit	Canada
Metropolitan Atlanta Rapid Transit Authority (MARTA)	Assessment Assurance	Transit	2017	ISO 55000 Certification in line with the requirements of the IAM Endorsed Assessor programme	USA
Moalajah FZC	Lead Assessor	Water & Wastewater	2017	Pre-certification Assessment against ISO 55001 integrated with IAM Framework; Gap Analysis; Roadmap;	United Arab Emirates
Babcock Nuclear Submarine Maintenance Facility	Lead Assessor	Nuclear	2017	Developed a Target Asset Management Framework in line with the requirements of ISO 55000; Gap Analysis;	UK
Bristol Water	Lead Assessor	Water & Wastewater	2016	ISO 31000 Audit of risk prioritization process	UK
Northern Ireland Water	Lead Assessor	Water & Wastewater	2015	Developed Regulatory Assessment Model; Gap Analysis; Roadmap	Ireland
Moalajah FZC	Lead Assessor	Water & Wastewater	2012	PAS 55 Maturity Assessment	UAE
Severn Trent Water	Assessor	Water & Wastewater	2012-2016	PAS 55 Maturity Assessment; Gap Analysis; Improvement Plan on behalf of OFWAT	UK