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PROJECT IMPLEMENTATION PROCEDURES MANUAL

Water & Wastewater Divisions

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Revision History

Revision	Description	Date
1.0	Initial Release	Nov 2021
1.1	Region Finalizing Draft Revised (R1.0) PIPM Manual	April 2022
1.2	Region Finalized Draft of PIPM (R1.0) – PIPM Manual	Nov 2022
1.3	Appendix Folders finalized and revisions to appendix folders updated.	Sept 2023
1.4	Finalize Rev 1.4 version of PIPM with Updated Appendix List and Appendices. Appendix Form updates completed.	Nov 2023
1.5	Fixed formatting error in section 10.4.4 (10.4.5 was removed), Fixed formatting error in 10.4.5.3 (10.4.6.3 was deleted). Section 16.9 (Operations Manual) updated with additional requirements. Section 8.1 updated with additional requirements. Updated section 16.1 for Vendors to perform Contractor evaluations in accordance with procedure F35-27.	Jan 2024
1.6	Additional requirement added to 16.11 to include all pipe materials and Additional asset data requirements added.	Feb 2024

Revision	Description	Date

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1. List of Acronyms and Abbreviations

ANSI	American National Standards Institute
AODA	Accessibility for Ontarians with Disabilities Act
BAS	Building Automation System
CAD	Computer Aided Design
CCDC	Canadian Construction Documents Committee
CH	Conservation Halton
CO	Change Order
CVCA	Credit Valley Conservation Authority
DFO	Department of Fisheries and Oceans
DSS	Designated Substances Survey
EA	Environmental Assessment
ESA	Electrical Safety Authority
EOI	Expression of Interest
EASR	Environmental Activity and Sector Registry
ESR	Environmental Study Report
ESC	Engineering Scope Change
FAT	Factory Acceptance Test
GBR	Geotechnical Baseline Report
GDR	Geotechnical Data Report
HAZOP	Hazard and Operability Review
HMI	Human Machine Interface
HMS	Hazardous Material Survey
HVAC	Heating, Ventilation and Cooling
IFC	Issued for Construction
IFT	Issued for Tender
IO	Infrastructure Ontario
ISA	Instrument Society of America
JHSC	Joint Health and Safety Committee
JIS	Joint Industrial Standards
MCC	Motor Control Centre
MEA	Municipal Engineers Association
MNR	Ministry of Natural Resources

MECP	Ministry of the Environment, Conservation and Parks
MOL	Ministry of Labour
MTO	Ontario Ministry of Transportation
NEC	Niagara Escarpment Commission
OHS	Occupational Health and Safety
OHSA	Occupational Health and Safety Act
PI	Point of Intersection
PIC	Public Information Centre
P&ID	Process and Instrumentation Drawing
PAIDS	Process Automation and Instrumentation Design Standards
PCN	Process Control Narrative
PDF	Portable Document Format
PDR	Preliminary Design Report
PFD	Process Flow Diagram
PIPM	Project Implementation Procedures Manual
PLC	Programmable Logic Controller
PM	Project Manager
PO	Purchase Order
PSHSR	Pre-Start Health and Safety Review
PTTW	Permit to Take Water
QA	Quality Assurance
QC	Quality Control
RFP	Request for Proposal
RFQ	Request for Quotation
RFT	Request for Tender
RPU	Remote Programmable Unit
SAT	Site Acceptance Testing
SCADA	Supervisory Control and Data Acquisition
SWIFT	Structured What-if Technique
TRCA	Toronto Region Conservation Authority
TSSA	Technical Standards and Safety Association
TTM	Time-Task Matrix
WAN	Wide Area Network
VC	Vendor Contract

VE	Value Engineering
WHMIS	Workplace Hazardous Material Information System
W/WW	Water/Wastewater

2. General Requirements

2.1. Introduction

The Regional Municipality of Peel ("Peel") developed the Project Implementation Procedures Manual ("PIPM") for use by both Consulting Engineering firms and internal Peel staff involved in the implementation of water and wastewater projects. PIPM includes requirements for facility infrastructure, such as water and wastewater treatment plants, reservoirs and pumping stations, as well as linear infrastructure, such as watermains and sanitary sewers. The procedures outlined in PIPM include project phases from the Class Environmental Assessment (EA) stage to pre-design and detailed design through to construction, start-up and commissioning.

PIPM is intended for use on both internally- and externally resourced projects. The procedures stipulated in this manual are mandatory and must be complied with, unless exemption has been obtained in writing from the Project Manager of the applicable Water/Wastewater Engineering Group managing the project or as modified by the project's Request for Proposal ("RFP") or other scoping documents.

PIPM will be updated by Peel as required. The most recent version is available online at https://www.peelregion.ca/public-works/design-standards/.

In all cases, the most recent version of PIPM shall apply. The Project Lead utilizing PIPM shall ensure the most recent version is being used to define procedures and requirements.

PIPM uses the term "Project Lead" to identify the individual, entity or agency that is overall responsible for project delivery. The Project Lead can be either an external Vendor or internal Peel staff.

Deliverables sections are included in each section of this manual. These table are included to assist users of this manual but are not intended to be complete lists of all requirements and deliverables included in this manual. All users are responsible for all requirements and deliverables included in this manual regardless of their inclusion in the deliverable's tables.

Where conflicts exist in this manual or between this manual and requirements from other Regional or referenced standards, regulations or statues users of this document shall assume

the more stringent of the requirements apply unless otherwise clarified by the Regional Project Manager or Sponsor for the project.

2.2. Other References and Peel Standards

This PIPM document compliments a series of Region of Peel Design Standards and Guidelines. The Project Lead shall ensure that they are familiar with the requirements of the applicable standards and shall review the Standards and Guidelines prior to completing the work included under the project. Peel's standards are available online at https://www.peelregion.ca/public-works/design-standards/.

The requirements below shall not relieve the Project Lead of their responsibility to adhere to applicable legislation, other industry standards, requirements, and specifications. Peel staff completing internal projects should carefully review all relevant standards, guidelines, codes, regulations, and statutes, as well as any non-standard requirements.

When producing an RFP or other procurement document for the procurement of services by outside Vendors, Peel staff responsible for producing the procurement document should review the applicable standards and guidelines and ensure the procurement document includes:

- Copies of or references to any standards or guidelines not published on the Region of Peel website
- Clearly explained planned deviations from published Standard or Guideline requirements including clarification of the expectation regarding the delivery of the service in question
- A defined scope of work, where a service is to be supplied that is not covered by other Peel Standards or Guidelines

Similar considerations should be given for internal projects when developing the scope of the project and should be clearly defined before starting work on the project in question. Details should as a minimum be included in project charters and project scope documents developed by the Peel Lead for the project.

The Project Lead shall obtain the most current versions of Peel's Standards or Guidelines from Peel's website as noted above. The Project Lead shall confirm with Peel's Project Manager that the version being used is the most current. It is the responsibility of the Project Lead delivering the project to ensure compliance with Peel Standards or Guidelines.

Where the requirements of other standards or guidelines contradict the requirements contained in the procurement document, the Project Lead shall advise Peel and if directed by

Peel, shall develop a memorandum documenting the deviation and providing a recommendation to Peel. If warranted, an engineering services scope change shall be submitted by the Project Lead. Refer to **Appendix 1 – Request for Design Standard Deviation**.

2.3. Access to Region's Infrastructure Data (ePAL)

The Project Lead will be provided access to the Region's infrastructure data (water, wastewater, stormwater, transportation) via the secure External Peel Asset Locator (ePAL), a custom app for external partner access. The app, built on ESRI GIS software, will provide access to Peel's GIS and Asset records as well as document records associated with as-built, IFCs, sewersheds and CCTV reports from Peel's Microsoft Sharepoint site. The Project Lead will be required to register a valid email with the Region of Peel in order to be provided access to the secured app and associated information.

All User's of EPAL shall note that the information provided is to be used for general coordination and information only. It is the responsibility of all User's to interpret the information reflected in ePAL at their own risk and to review and utilize appropriate methods to confirm the physical location of all assets as needed. Use of any records without appropriate consideration of accuracy of the information provided shall be at the risk of the User and in no manner is Peel responsible in the event information included in ePAL is not spatially accurate.

Please see terms and conditions included with ePAL and refer to specific conditions in other agreements and documents (Consulting Agreements, Data Disclaimers etc.) for additional information on the reliance of the information provided for in ePAL.

The Region's External Peel Asset Locator (ePAL) can be accessed at:

https://externalpal.peelregion.ca/ePal/epal.aspx

2.4. Applicability of PIPM

The procedures set out in PIPM cover engineering and/or other professional services that are to be provided by the Project Lead. These procedures must be complied with, subject to any other terms and conditions or information included in the applicable procurement document or project charter/scope document. Submission of proposals by the Project Lead or preparation of Project Scope and Project Charter documents by internal staff shall mean that they have read, understood and accepted the conditions and procedures as stipulated in this most recent version of PIPM. The Project Lead is solely responsible for conducting their own independent research, due diligence and investigations, and for seeking any clarifications or other advice

necessary for the preparation of their response to procurement documents (such as RFPs, RFQs, RFTs and EOIs).

The Project Lead is required to determine the full extent of the scope of work of the project to ensure that their proposals include the required staffing and time to execute the project and to meet Peel's requirements and stated expectations.

Where PIPM requirements are revised and result in a change in scope on the project after the project begins, the Project Lead shall notify the appropriate Peel staff member leading the project of the change in scope in writing, including any impacts or costs. Peel staff leading the project shall confirm how the Project Lead shall proceed upon submission of the change in scope notification in writing. In all cases, documentation of the change in scope must be finalized before proceeding and should be filed for record purposes. For Vendors this revision should be consolidated as an Engineering Scope Change. For internal projects, as a minimum, written documentation of the change in scope, approved by Project Sponsors and Project Owners, must be completed.

2.5. Procurement Methods

2.5.1. Requests for Proposal, Requests for Tender, Expressions of Interest or Other Procurement Models

The project's scope of work for work to be carried out by external vendors will be defined in a Request for Proposal (RFP), Request for Tender (RFT), Request for Expressions of Interest (EOI), Request for Quotation (RFQ) or other procurement approach as defined in Peel's Procurement By-law (F35-06). In all cases, the requirements of the procurement document(s) shall include the details of the assignment for the soliciting of services by outside vendors.

The Project Lead is responsible for clarifying discrepancies during the appropriate stage of the procurement process. Where discrepancies are not identified or not clarified during the appropriate stage of the procurement process and should a dispute regarding project scope or requirements occur, the interpretation of the requirements of the original procurement document shall be at the sole discretion of the Region of Peel.

2.5.2. Vendor Rosters

Peel uses pre-qualified vendor rosters for various projects. Where a vendor roster is utilized to secure the services of a consultant or an external vendor, the requirements of the original roster procurement document, as well as subsequent requirements of the scope package

provided with the specific roster assignment apply in all cases. The PIPM manual current at the time the scope document is provided to the pre-qualified Vendor shall be the Version considered applicable to the assignment. Vendors in all cases shall ensure any pricing provided takes this into account when providing quotes for work.

2.6. Agreement for Professional Consulting Services

The Project Lead shall enter into a Professional Consulting Agreement for the provision of engineering or other professional services for projects not being delivered by internal Peel staff. The Region of Peel utilizes a standard Engineering Agreement. The most recent version of the Engineering Agreement will be included in the procurement documents.

The Project Lead shall be responsible for providing Peel with bonding and insurance certificates on Peel's standard forms upon execution of the Agreement in accordance with the requirements of the specific procurement process being followed. In all cases, the Region of Peel retains sole discretion to modify the terms and conditions contained in Peel's Standard Agreement. In such cases, the scoping or procurement document will clearly identify such modifications. In most cases, Vendor requests for deviations from the requirements set in the Region's Standard Agreements will not be considered, unless revisions to the clauses contained in the Agreement are formally modified by Peel during the procurement process. The same applies for bonding and insurance forms including proof of insurance or proof of bonding.

Peel staff preparing procurement documents for the securing of Consulting or other external Vendor services should ensure the most recent version of Peel's Standard Engineering Agreement template is included in the procurement documentation provided. Should services included in the scope of work fall outside the scope of standard Engineering/Consulting Services, a review of the specific requirements and corresponding modifications to the Agreement to be executed must be conducted.

2.7. Project Deliverables and Standardized Software

2.7.1. Project Software

The Project Lead shall prepare documents using the following software:

- Microsoft Word – The latest version shall be used for all reports, operation manuals and other such documents.
- Microsoft Excel – The latest version shall be used for spreadsheets and data analysis.

- Microsoft Project – The latest version, or as defined by the procurement document, shall be used for project scheduling.
- Portable Document Format (.pdf) – Unlocked PDFs shall be supplied so that non-proprietary software can be used to view or modify the files as required. In all cases, the Project Lead shall supply documents to Peel in their native format (word/excel/project etc.), in addition to the PDF files, when requested by Peel.
- Specialized Software – Many types of existing specialized software exist for different facets of work that may be covered under the Project Lead's assignment. In all cases, the Project Lead shall review the specifics of the software being utilized with Peel in advance, to ensure specialized software being proposed for use is acceptable to Peel. In all cases, the Project Lead shall utilize software platforms and versions consistent with Peel Standards and Guidelines, procurement document specifics or as discussed and agreed to by Peel. Whenever Peel does not own the specific software or software versions and the use of the software cannot be avoided, the Project Lead shall work with Peel to provide the reports or outputs in a format that can be easily used by Peel.
- CAD Software – The Project Lead shall use the required CAD software to produce engineering drawings according to the Region of Peel's latest CAD standards. In all cases no deviations from this requirement shall be allowed unless exemption has been obtained in writing from the Manager of the applicable Water/Wastewater Engineering Group managing the project or as modified by the project charter/scope document or applicable procurement document. All CAD work completed shall be supplied to Peel in both its native file format or in portable document format, as requested by Peel. Graphics, Field Survey Information, Legal Surveys, plan and profile drawings for Sewers and Watermains, discipline drawings, detail drawings, standard drawings and "As-Built" Drawings must comply with Region's CAD standards as applicable to the work being completed.

The Project Lead shall provide hard copies of deliverables, as required by the Peel Project Lead or as indicated in the applicable procurement document. Region Staff preparing procurement documentation for Consulting or other external Vendor services should include, in the procurement documentation, specific requirements for software platforms and versions, if not already covered under other Peel Standards or Guidelines.

2.7.2. Formatting of Documents and Style Guidelines

Graphics and styling of all documents produced on behalf of Peel shall be as per Peel's applicable graphics standards. Where no standard exists, the Project Lead should review final

formatting specifics with Peel staff to ensure the formatting and style of the deliverable meets Peel's requirements.

All documents, presentation materials and all other deliverables produced shall be provided in accordance with the requirements of the Accessibility for Ontarians with Disabilities Act (AODA). Additional information on Peel's policies and procedures related to the AODA can be found at the web links noted below.

- https://www.peelregion.ca/accessibility/
- https://www.peelregion.ca/corpserv/makingway/acs-training.htm#:~:text=Under%20the%20Integrated%20Accessibility%20Standards%20Regulation%20(IASR)%20of,the%20IASR%20and%20the%20Ontario%20Human%20Rights%20Code

The Project Lead shall prepare all reports and specifications using 12-point Calibri font and according to Peel's most current samples and layout provided by Peel's Procurement department. Whenever hard copies are requested, memoranda and reports shall be printed on standard 8½x11 paper, double sided. Graphics may be printed on 11x17 sheets when appropriate. Full sized drawings or plans may be required from time to time and the Project Lead shall ensure Peel staff requesting full sized plans receive the requested full-sized drawings or plans accordingly.

Draft memoranda and reports shall include the word "DRAFT" screened diagonally across every page as a watermark and cover pages should clearly indicate the document provided is in draft format.

A final copy of every report or deliverable defined in the scope of work shall be provided to Peel in all cases. The finalized version of the report or deliverable shall be updated to show the accurate date of the finalized report or deliverable and shall contain a revision table. All final reports and memos shall be clearly discernible as the final version of the document and must include the necessary signatures and, where required, professional stamps or seals in accordance with Professional Engineers Ontario (PEO) requirements and applicable regulations. All professional stamping and sealing of work shall be completed by an Engineer licensed to practice in the Province of Ontario and shall be provided in accordance with the most current applicable laws, statues and regulations as defined by the Province of Ontario and/or the Professional Engineers of Ontario (PEO).

The Project Lead shall refer to Peel's most current formatting standard for technical specifications.

2.7.3. Drawing Management

The Project Lead shall refer to Peel's latest CAD standards for specific requirements.

Revision blocks shall be included on all drawings and sketches and shall accurately identify revisions including specifics of the revision completed regardless of whether the drawing provided is preliminary or final. Revision blocks shall include both the date and a description of the drawing (e.g. 50% Design, Issued for Permits and Approvals, Issued for Tender, etc.). Revision block formatting and style shall be as per the applicable CAD standards relevant to the project.

For all preliminary engineering drawings issued for review, the Project Lead shall stamp all drawings clearly with the following caption "PRELIMINARY – ISSUED FOR DISCUSSION AND REVIEW PURPOSES ONLY" and update the revision block indicating what stage of design corresponding to that submission.

For drawings issued for a tender, the Project Lead's Design and Supervising Engineer(s) shall seal all drawings.

Upon award of the construction contract, the Project Lead shall prepare "ISSUED FOR CONSTRUCTION" drawings and specifications reflecting any changes during the tender process. Specifications and drawings, issued for execution of contract as well as for construction, shall include all addenda issued during tender call.

The Project Lead is responsible for submitting all produced CAD drawings to Peel for review and assignment of Peel record drawing numbers prior to tendering. Peel's CAD team will review drawings in their native format for compliance with the relevant Peel CAD standards and will assign a Peel drawing number to each drawing contained in the set of drawings provided. This applies to all drawings contained in procurement documents (RFP, RFT, RFQ, EOI, etc.) and must be completed before procurement of services based on the drawings and sketches produced by the Project Lead begins. Under no circumstances is the Project Lead to update any drawings to the "Issued for Tender" stage until Peel drawing number is assigned and the drawings have been checked and verified by Peel CAD staff for compliance with Peel standards. Upon assignment of applicable Peel drawing numbers and correction of any noted deficiencies, the Project Lead shall submit to Peel the drawing files in their native file format, in .pdf format and shall provide hard copies as stipulated in this document, in the procurement document or in any other Region standards relevant to the Vendor's scope of work.

Requirements for the preparation of "As-Built" drawings are outlined in Section 16.11 – As-Built Drawings and Documentation.

2.7.4. Identification of Deliverables

All correspondence and deliverables to Peel shall be identified by Peel's project number, document number and the title of the project.

3. Project Management and Quality Control

3.1. Project Scope, Cost and Schedule Control

3.1.1. General

The Project Lead is expected and required to practice effective project cost and schedule control throughout the duration of the project. This includes monitoring and controlling project costs, scope, resources and schedule during the Class EA/planning, preliminary design, detailed design, tendering, construction and commissioning and all other stages for the scope defined in the scoping or procurement document.

The Project Lead is to proactively manage the project schedule and to inform Peel's Project Manager/Project Sponsor in a timely manner of any potential changes in the project schedule that may impact the critical path of the baseline project schedule. If the project is deemed to be in risk of schedule slippage, the Project Lead must identify what actions and/or resources will be required to bring the project back on schedule.

The Project Lead is to inform Peel's Project Manager in a timely manner of any potential changes in engineering fees or construction cost, together with all supporting documents, so that action may be taken to mitigate impact on the project's approved budget. Considerations for extra costs or scope changes identified after the fact are not acceptable and budget overages are the sole responsibility of the Project Lead. Project Leads shall in all cases familiarize themselves with the Region's policies and processes on budget and Purchase Order/Vendor Contract management and shall proactively manage budget and Purchase Order/Vendor Contract increases or decreases in accordance with Regional policies and processes.

The Project Lead will be responsible to coordinate all Consultant and Region staff and sub-consultants/sub-contractors on the project. In addition, the Project Lead shall be responsible for the coordination of all Agency supplied services (e.g., operations, maintenance, property services) as required for the project. This includes but is not limited to making arrangements related to the delivery of the project, reporting to various parties on the status of the Work, or scheduling of Agency supplied services.

3.1.2. Project Management Plan

The Project Lead shall develop a Project Management Plan with Peel's Project Manager at project initiation and if required, submit updates, resulting from any approved changes in the scope of work.

The Project Lead's and Peel's Project Managers shall review the Project Management Plan monthly to ensure that the scheduled milestones, budget, and deliverables have been achieved as planned. If the progress of the work fails to meet the planned schedule, the Project Lead must advise Peel what action or actions are proposed to achieve the approved schedule.

As a minimum, the Project Management Plan shall include the following elements:

1. Project Description
2. Detailed Scope of Work
3. Staff assigned to the Project
4. List of Milestone and Completion date(s)
5. List of Deliverables
6. Organization structure and responsibilities of each key member
7. Project Schedule procedures
8. Budget control procedure
9. Quality Control
10. Quality Assurance
11. Reporting and Communication Procedures
12. Design and Drafting standards

3.1.3. Budget Upset Limit

Engineering assignments generally have a Budget Upset Limit, which must be adhered to by the Project Lead. Unless Peel has modified the scope of work, the Budget Upset Limit cannot be exceeded. In all cases, timely notification by the Project Lead of any impending overrun of the engineering fees or capital cost is mandatory. Claims for additional engineering fees after the fact may not be approved. Availability and approval of budget increases, including Purchase Order/Vendor Contract increases, is at the discretion of the Region's Project Manager/Project Sponsor and requires approval of the Region's Procurement Division. All parties shall note that justification and approval of budget increases are required in order to access additional budget and/or unapproved amounts under Purchase Orders/Vendor Contracts.

In every case, prior written authorization of the approved change in scope of the work must be obtained from Peel's Project Manager prior to the Project Lead commencing with the work. See Section 3.1.9 – Engineering Services Scope Change.

The procurement document will define the type of contract (e.g. time and materials, fixed fee, unit price, milestone/percent completion) and billing approach for the project.

3.1.4. Project Schedule

The Project Lead shall provide a baseline project schedule as per the requirements contained here or with these requirements as a minimum and as modified in the procurement document. For internal projects, the Region Project Lead shall provide a schedule in a format suitable for the work being undertaken and in a format acceptable to the Project Sponsor/Project Owner. This schedule shall:

- Be in Gantt chart format
- Be baselined
- Be submitted to Peel/Project Sponsor in both PDF and MS Project/native file format
- Identify the critical path
- Illustrate task relationships linking tasks with at least one predecessor and one successor, excluding the first and final task, which will have only successors or predecessors, respectively
- Outline deliverables, milestones and define major work activities to be performed by each engineering discipline involved
- Reflect Region review times and tasks completed by Peel
- Identify tasks completed by others

At Peel's discretion, the Baseline schedule can be updated under the following conditions:

- When a Change Order/ESC has been submitted with a revised schedule and this change has been approved by Peel
- If Peel decides the original baseline has become unachievable and tracking it no longer provides useful information.

During the execution of the project, the schedule shall be updated to reflect task progress (shown as percent complete) relative to the baseline schedule.

Schedule management and updating shall be as per the requirements contained in Section 3.1.7 – Monthly Progress and Schedule Reporting.

3.1.5. Communications and Public Relations Plan

The Project Lead shall work with the Agency to develop and execute a comprehensive communication strategy targeted to proactively keep residents, businesses, the community and Regional Councillors informed of the project. This plan shall include the development of objectives, key messages, target audiences and a range of communications tactics to ensure effective communication for the duration of the project, from the design phase through to construction completion. The requirements contained herein are considered the minimum and Project Leads should consult their procurement document or project charter/scope document in case of additional or revised requirements

The Vendor will work in consultation with the Agency's Marketing and Communications division on all aspects of the communications strategy.

The Vendor shall allow for quarterly stakeholder meetings with Councillors and/or residents/businesses and/or senior management from the City and/or Agency.

Attendance at stakeholder meetings and/or presentations by relevant and representative Vendor staff is mandatory. The Vendor shall anticipate a minimum of 10 meetings related to stakeholder issues.

In addition to monthly meetings anticipate a minimum of two (2) public information centres (PICs) during the detailed design and/or construction process. PICs shall be attended by Agency and key Vendor team members. Included in this assignment will be the preparation of all PIC materials, boards, and presentation materials.

Key Communication Components:

- Client briefing meeting with the Agency's Project Management team and the Agency's Marketing and Communications' divisional staff.
- Development of a Stakeholder Register in relation to each life cycle of the project. The stakeholder register shall include the following:
    - Level of engagement as per Project Management Body of Knowledge (PMBOK);
    - Communications tactics for each stakeholder in relation to each life cycle of the project; and
    - Timing and frequency of communication per stakeholder group.
- Management, facilitation and implementation of agreed-upon communication tactics;

- Co-ordination of production and dissemination of agreed-upon creative and collateral pieces in collaboration with the Agency's Marketing and Communications division;
- The Agency will assume responsibility for all production and dissemination costs;
- Management of political issues notices to residents, Councillors, and businesses; and
- At the point of substantial completion, the Vendor and Agency shall have a half day lessons learned workshop regarding the project's communications strategy and a report will be produced highlighting what was successful and areas for improvement.

3.1.6. Risk Register

The Project Lead shall develop and submit a risk register at project initiation. The risk register shall identify risks to the project inclusive of financial, scheduling, design, health & safety, construction, compliance and include mitigation measures. The risk register shall be updated regularly and as a minimum after every major project design milestone (30%/Preliminary design if part of assignment and included in procurement document, 50% 90% and 100%. including when 100% drawings and specifications are converted to issued for tender packages to reflect any revisions that may have occurred between 100% and IFT). Refer to **Appendix 2** for a Risk Register template.

3.1.7. Monthly Progress and Schedule Reporting

With every invoice, the Project Lead shall submit Monthly Status Reports on the progress and status of the project. Invoices will not be processed until the associated Monthly Status Report has been received for the month. The following information shall be provided as a minimum:

1. Progress of project achieved to date
2. Work completed for the month and to date versus planned progress as noted in the approved workplan and baseline schedule
3. Work planned to be completed for the following month or period
4. Gantt chart showing actual progress vs. baseline schedule
5. Outstanding Action Items either internal or external to Peel
6. Requests for Information
7. Project alerts of critical issues which may delay the project
8. Status of Application for Approvals
9. Status of third-party activities such as field investigations.
10. Expenditure of engineering fees and Earned Value for the month and to date
11. Graph of planned vs. actual expenditure (earned value) of engineering fees

12. Triannual cashflow estimate for engineering fees
13. Permits and Approvals Log

If the project is behind schedule, the Project Lead shall provide information to Peel's Project Manager/Project Sponsor on the reason(s) for the delay(s) and on the course of action the Project Lead will take to bring the project back on schedule. Where the Project Lead is unable to recover the original schedule, revise the baseline schedule only upon approval of Peel's Project Manager. **Appendix 3 - Engineering Status Report** is an Engineering Status Report outline, which should be used to incorporate the above requirements.

3.1.8. Submission of Invoices

Project Lead invoices shall be submitted complete with the Summary and Earned Value Sheets (refer to **Appendix 4 - Invoice Summary Sheet** and **Appendix 5 – Earned Value Sheet**) as well as all other requirements outlined in 3.1.7 – Monthly Progress and Schedule Reporting. On the invoice, the Project Lead shall include the title of project, the project number, the Region Project number, the Purchase Order number (P.O.) and the name of the responsible Region Project Manager.

Proof of expenses should be submitted along with the Vendor invoices and when specifically requested, external Vendors shall supply backup and justification of expenses, consumables and disbursements to the satisfaction of the Region's staff responsible for approving the invoice. Disbursements shall not be paid based on a percentage fixed fee unless agreed to and approved by the Region Project Manager.

Invoices submitted without the above information will be returned unprocessed.

If, in Peel Project Manager's opinion, the engineering fee invoiced is inconsistent with the work performed, payment may be reduced by the amount in dispute until the dispute has been resolved. The Project Lead acknowledges that Peel's Project Manager is the sole judge of the actual work performed versus the fees invoiced.

When explicitly provided for in the procurement document, the Project Lead is to inform Peel's Project Manager of proposed changes in the hourly charge out rate of employees who are working on the project. External Vendors shall take note that most procurements do not allow for escalations or increases in hourly rates and this shall only be considered when the applicable procurement document includes this or where exceptional circumstances arise. Where not included in the procurement document the decision to allow increases or escalations in hourly rates shall be at the sole discretion of the Region's Project

Manager/Project Sponsor. Increases or escalations of hourly rates shall not result in automatic budget, Purchase Order or Vendor Contract increases. External Vendors are expected to manage increases within the framework of the Purchase Order or Vendor Contract amounts previously approved.

The Project Lead shall provide the Region's Project Manager with monthly budget updates to be submitted with their invoicing. These updates must include as a minimum the following information:

1. Percentage of budget used for each item compared to the original budget amount for each item (i.e. breakdown as a minimum shall include each individual item included in the fee scheduled included in the procurement document);
2. Amount invoiced for the period covered by the invoice;
3. Previous amounts invoiced;
4. Total amount invoiced to date for each budget item;
5. Estimated total for completion of each budget item. Where the final estimate is expected to exceed the budget amount for the item the Vendor shall include with the invoice a written explanation on how the Vendor plans on addressing the budget shortfall;
6. Cash flow update comparing the original cash flow estimate to incurred costs to date;
7. Summary of Engineering scope changes authorized to date; and
8. Summary of anticipated Engineering scope changes and an estimated value for the anticipated change.

3.1.9. Engineering Services Scope Change

The Project Lead shall obtain approval in writing from the Project Manager prior to commencing work on any contemplated or proposed change in scope of work. For each change in scope, the Project Lead shall complete and submit an Engineering Services Scope Change Form to Peel's Project Manager for approval using the template included in **Appendix 6 – Engineering Services Scope Change Request**. Confirmation of the approved increase in fees and/or schedule must in all cases be supported by the approved Engineering Services Scope Change Form.

External Vendor shall provide breakdowns of the submitted costs to the satisfaction of the Regional Project Manager or Project Sponsor. Breakdown requested can include request for Time-Task Matrices (TTM), quotes or estimates from suppliers, subconsultants or subcontractors and any other information as required by the Regional Project Manager or other Regional Staff.

3.1.10. Changes to Project Team

If the Project Lead proposes to substitute their Project Manager, key project staff, specific staff listed in organizational charts or sub-consultant/sub-contractor/material suppliers identified in proposals or other responses to procurement document requests, the Project Lead shall submit a written request along with the resume(s) of the proposed replacement staff. Additional justification of the proposed change in staff may be requested and when requested, Vendors shall provide the requested details the Regional Staff approving the proposed change. Until the Regional Lead for the project is satisfied with the Vendors reasoning and justification and have received the required information to substantiate the requested change in staffing, Vendors shall not invoice the Region for work completed by the proposed staff member.

Under no circumstances shall the Region consider increases in rates or fees charged based on the proposed Vendor change and any impact to Vendors or their subconsultant/ subcontractor/ material suppliers shall be the complete responsibility of the prime external vendor for the assignment.

Peel reserves the right at their own discretion to reject the proposed substitution if the proposed employee is deemed unsuitable for the position.

Any schedule or engineering cost impacts resulting from the approved change will be the responsibility of the Project Lead. The Project Lead is completely responsible for any additional efforts required to bring the project back on its baseline schedule progress necessitated by the proposed change to the project team.

3.1.11. Meeting Minutes and Action Log

The Project Lead is to attend and chair all project meetings and distribute meeting agendas five (5) working days in advance and meeting minutes five (5) working days after the meeting. The Project Lead is to follow-up on all action items and to advise Peel's Project Manager on action items which may require his/her involvement for resolution.

The Project Lead shall maintain an Action Log documenting all open and closed actions on the project and identifying the persons responsible and resolution dates. A sample action log is included in **Appendix 7 – Action Log.**

Meeting minutes shall contain the necessary details to document discussions, progress, issues and action items. In addition, they should include a list of all attending parties and personal and include general contact information for the attending parties and personal. All items recorded shall be given tracking numbers and should include relevant task completion schedule

information (due date) for the item being recorded as well as enough background information to ensure that other meeting minute readers can accurately ascertain the issue at hand as well as how it is being resolved and any follow up items or impacts of the issue being recorded.

3.1.12. Project Management Coordination

The Project Lead's and Region's Project Managers shall meet at least monthly to review the progress of the project including the following as a minimum:

1. Project objective and scope for the period
2. Project Lead's staff assigned to the project
3. Work progressed to date and any anticipated roadblocks and proposed options/solutions
4. Engineering budget and any anticipated deviations
5. Any instructions from Peel that will result in scope change
6. Public participation and preparation of advertisements, public information handouts, etc.

Peel's Project Manager shall be the main point of contact for all communications and deliverables unless otherwise specified. Project Leads shall be responsible for coordination and communication of all work, outside parties, internal Peel teams or staff and all other stakeholders. Project Leads are responsible for coordinating and scheduling of all calls, meetings, workshops and any and all other discussions required to complete the project.

3.1.13. Deliverables

	Description	Submission
1.	**Gantt Chart Schedule:** Baselined at project initiation and updated monthly.	Electronic
2.	**Risk Register:** Developed at project initiation and updated at each project milestone.	Electronic
3.	**Monthly Progress Reports and Invoicing**	Electronic
4.	**Meeting Agendas, Minutes and Action Log**	Electronic
5.	**Project Management Plan**	Electronic

3.2. Quality Assurance and Quality Control

3.2.1. General

The Project Lead shall institute Quality Assurance (QA) and Quality Control (QC) programs as part of the project. The constructed works, as designed by the Project Lead, must meet the

project intent specified in the corresponding RFP or applicable procurement or scoping document. The Project Lead is fully responsible for the QA/QC of all their services, including those of their Subconsultants, Subcontractors and Material Suppliers, and must take appropriate actions and corrective measures to meet the quality requirements of the project.

3.2.2. Quality Assurance and Quality Control

The goal of the Quality Assurance and Control (QA/QC) program is to ensure the entire scope is delivered in accordance with good engineering practice, in accordance with applicable codes, legislations, regulations, guidelines and standards and per Peel's procedures, policies, practices and quality requirements defined in this PIPM or otherwise specified.

All engineering deliverables, including but not limited to drawings and reports, must be sealed by a Professional Engineer licensed to practice in the Province of Ontario and fully qualified in the relevant specialty area. The drawings and reports shall also bear the signature or stamp of the independent checker of the work.

The results of all independent QA/QC checks completed shall be recorded in a traceable manner for auditing and the list of all items as well as how they were addressed and who was responsible shall be recorded and made available to the Region Lead for the project when requested. Where multiple reviews are completed an updated version of the list shall be kept and provided to the Region Lead when requested or required.

The Project Lead is accountable for the submission and correctness for all services in the assignment including the work performed by subconsultants.

The Project Lead shall designate a QA/QC Team for the project, with appropriate qualifications and including staff that are not directly involved in the day-to-day project delivery operations and who shall ensure that the work has been performed in accordance with:

1. Good engineering practice
2. Constructability
3. Practical equipment layout – operation/maintenance, ergonomic design
4. Compliance with relevant codes, design standards, etc.
5. Region's design standards
6. Other statutes and regulations and/or codes that may be applicable.

The Project Lead shall submit QA/QC Reports, signed by the QA/QC team, based on the information from the QA/QC checklist at specified milestones of the project. Unless otherwise noted in the scoping document, the QA/QC Team will meet with Peel and the Project Lead's

Design Team to review the QA/QC Reports upon completion of the draft Project File (for Schedule B Class EA projects), draft Environmental Study Report (for Schedule C Class EA projects), draft Preliminary Designs and Preliminary Design Reports, Technical Memorandums, and at 50%, 90% and 100% design milestones during Detailed Design process. Separate logs shall be kept and maintained for drawings and specifications for each major design milestone. When resubmission of any item a previous QA/QC report was provided for occurs, Project Lead's shall ensure an updated QA/QC list indicating how all previous comments were addressed or resolved is included in the resubmission. This way documentation indicating all past issues raised have been resolved unless resolution is time dependant and still ongoing, is submitted with each subsequent revision of the document or drawings being reviewed. Where ongoing actions are still be undertaken to resolve a past issue a thorough and complete update with estimated timelines should be included.

When IFT documents are being prepared a complete list must be submitted including all past issues from 30%/50%/90% and 100% design milestones. Separate lists or a consolidated list of drawing and specifications comments from each milestone shall be provided along with the IFT documents.

The Project Lead is solely responsible for coordination and follow up with the originator of any comments provided to ensure the resolution of the issues is completed to the satisfaction of the party originating the comment.

Following the QA/QC Report meetings, the Project Lead shall advise Peel of the actions to be taken to correct non-conformance issues.

Every project is to maintain an updated General Project Comment Log to track all comments and decisions from Peel, regulatory agencies, stakeholders, and/or Project Lead throughout the project. The Comment Log is to be included with each Design milestone submission, excluding technical memos. Comments in the Comments Log form are to be tracked sequentially clearly identifying the document and section within the document being referenced, the comment originator, date, response, responder and date of response. See **Appendix 8 - Deliverable Comment & Response Log** for a sample Comment Log.

Where QA/QC or review comments are provided by Regional staff these comments are to be listed and included in the appropriate QA/QC reports provided for the submission in question and shall be added to the QA/QC reports by the Project Lead.

3.2.3. Deliverables

	Description	Submission
1.	**QA/QC Report – Class EA:** On Completion of Draft Project File Report/Environmental Study Report for Class EA projects. Report to include a review of objectives as outlined in the scoping document, completed Comment Log and completed QA/QC checklist for EA projects.	Electronic
2.	**QA/QC Report – Preliminary Design:** On Completion of Draft Preliminary Design Report. Report to include review of Comment Log and draft QA/QC checklist to be used for detailed design.	Electronic
3.	**QA/QC Report – 50% Detailed Design:** On Completion of 50% Detailed Design. Report to include review of Specifications, QA/QC checklist and Comment Log.	Electronic
4.	**QA/QC Report– 90% Detailed Design:** On Completion of 90% Detailed Design. Report to include completed QA/QC checklist, Comment Log and constructability and Risk Assessment.	Electronic
5.	**QA/QC Report– 100% (Final) Design:** On Completion of 100% Detailed Design. Report to include completed QA/QC checklist and Comment Log.	Electronic
6.	**QA/QC Report– IFT Package:** On Completion of the IFT documents for any project. Report to include completed QA/QC checklist and Comment Log.	Electronic

4. Occupational Health and Safety

4.1. General

The Project Lead is responsible for meeting all applicable obligations under the *Occupational Health and Safety Act (OHSA)* and any Peel-specific health and safety requirements. These obligations include but are not limited to providing a safe workplace; providing an inclusive workplace free of harassment of any kind, providing appropriate training and personal protective equipment, providing information and educating their workers on workplace hazards; and ensuring competent persons and workers are assigned for all tasks when required. This does not alleviate the designated Constructor, as defined by OHSA in Ontario, of any or all of their responsibilities but is included to ensure Project Leads take a lead role in establishing the proper Occupational Health and Safety culture for the project they are delivering. These responsibilities apply to all employees, Subconsultants, Subcontractors, Material Suppliers or other personnel providing services to the Project Lead under the terms and scope of the project.

The Project Lead shall institute a Project Specific Health and Safety (H&S) program(s)/ Plan(s) as necessary, to cover all aspects of the project H&S risks.

Furthermore, Health and Safety is a critical criterion for the success of any project and the Project Lead shall incorporate health and safety considerations in the planning, design and construction administration phases of all projects.

A Hazard and Operability Review (HAZOP) or Structured What-if Technique (SWIFT) Review and a Pre-Start Health and Safety Review are required for all design and construction administration projects related to water and wastewater treatment facilities, potable water and sewage pumping stations, reservoirs or any other facility work in Peel. The Project Lead's proposal shall provide details of their methodology and approach to complete the HAZOP/SWIFT and HAZMAT/DSS review programs. Furthermore, the Project Lead shall document how the infrastructure has been designed to be safe, reliable, and easy to operate, maintain, retrofit and/or replace.

A Designated Substances Survey (DSS) and Hazardous Material Survey (HMS) is required depending on the work being completed. Project Leads shall refer to all applicable OHSA (Ontario/Canada (if applicable)) legislation and where project scope does not include the requirement for a DSS /HMS and one is identified to be required, the Project Lead shall immediately inform the Regional Project Manager or Sponsor in writing and shall ensure the work is completed as required by the relevant OHS legislation.

4.2. Region's Project Health and Safety Consultant

Peel's PM may retain an independent, external, third-party consultant from an Occupational Health and Safety (OHS) Consultant Roster to conduct health and safety Inspections and/or audits of the Project including all Linear, Facility or other projects. The OHS consultant will serve as a subject matter expert for project specific OHS requirements, will review the Project Lead's Project OHS Program / Plan, and to provide advice to Peel's PM regarding OHS aspects of the project, and related legislative compliance requirements.

Peel's Project Manager/Project Lead will have the third-party OHS consultant identify a list of project specific documents and records that are to be handed over to the Operations teams, including but not limited to those documents that are required by legislation (e.g. Inspection Health and Safety Reviews, Reports, Licenses).

4.3. Designated Substances Survey/Hazardous Materials Survey

If the proposed works involve the expansion/renovation/alteration of any existing water/wastewater infrastructure or asset a designated substances survey shall be provided for in accordance with OHS regulations. A inspection and testing program designed and executed to meet the full requirements of OHS legislation is required in all cases. Linear projects should focus on areas where in the past or as identified by project staff or risks included in the risk register designated substances are a concern. A couple of examples is asbestos in some specific historically used pipes (transite pipe), insulation/insulation wrapping and asbestos that may be present in some asphalt. This is not intended to be a complete list of where Designated Substances may be present in the Region's Linear systems, but is intended to provide clarification on how DSS/HMS should be considered and where required included on Linear Projects.

Exposure to Designated Substances is to be controlled according to the requirements outlined in *Ontario Regulation 490/09 – Designated Substances, Ontario Regulation 213/91 – Construction Projects*, *Ontario Regulation 278 – Designated Substances Asbestos*, and the *OHSA R.S.O. 1990 and other applicable Ontario and Canadian OHS Legislation*.

A Designated Substances Survey (DSS) shall be completed to determine if any Designated Substances are present at a project site prior to construction or demolition activities and a report shall be prepared to outline findings and recommendations. This report shall be included as part of tendering information for any tendered project or to prospective Consultants (and Subconsultants) to ensure appropriate control measures can be implemented to protect workers during renovations and/or operations and maintenance. Appropriate considerations and specification requirements shall be included in all capital contract documents to address DSS/HMS completed and whatever substances are identified.

Designated Substances under the regulation include acrylonitrile, arsenic, asbestos, benzene, coke oven emissions, ethylene oxide, isocyanates, lead, mercury, silica and vinyl chloride. This list is intended as a sample for ease of review. Project Leads should consult with applicable OHS legislation to ensure any designated substances, as identified by the current OHS legislation, are included in the DSS/HMS.

A Designated Substance Survey/Hazardous Materials Survey shall be provided, identifying designated substances as well as any other hazardous materials, including mould, PCBs, Ozone-

Depleting Substances (ODS), Radon, radioactive materials and Urea Formaldehyde Foam Insulation.

Each water and wastewater facility may already have a previously completed facility wide Asbestos Survey. The Project Lead is responsible for developing a project specific DSS/HMS. The DSS shall be conducted during the Preliminary Design Phase or 50% Detailed Design Phase where one has not been completed during preliminary design to ensure any design limitations or constraints are identified prior to completion of the 100% Detailed Design work and production of IFT contract documents. All Project Leads are responsible for ensuring the DSS/HMS completed is applicable based on the final scope of work for capital projects. Where required additional or follow up testing may be required the Project Lead is responsible for ensuring the DSS/HMS provided with all contract documents is complete and thorough. Responsibility for completion of the DSS should not be passed onto Capital Vendors due to the potential for significant revisions in scope, as well as cost and time impact, should Designated Substances be determined after the procurement phase of any capital work is completed. The DSS report shall be updated as required, if warranted by any changes made during the detailed design, and the up-to-date DSS report shall be included in the tender documents.

4.4. Hazard and Operability Review

The Project Lead shall complete a Hazard and Operability (HAZOP) Review or Structured What-If Technique (SWIFT) Review at specified stages of the project. A HAZOP Review is a systematic, critical examination of the individual equipment and components of the process and engineering design to identify failure modes and the potential impact on the infrastructure operation and/or the environment. A SWIFT review is a structured approach to brainstorming, using guiding words, to assess the safety of a method or process. Both HAZOP and SWIFT Reviews are applicable to the assessment of water and wastewater infrastructure, depending on the level of detail and associated hazards of the design.

The Project Lead shall facilitate HAZOP/SWIFT workshops at the following stages of the project:

1. Commencement of Preliminary Design
2. Commencement of 90% Detailed Design
3. Completion of 100% Detailed Design and Prior to Production of IFT Documents

HAZOP/SWIFT reports completed after each workshop are to be included as part of the Preliminary Design Report and its subsequent updates at the end of the Detailed Design phases.

The HAZOP/SWIFT reports shall identify potential hazards associated with the infrastructure and its operation (e.g., hydraulic overload, process by-pass, high/low nutrients load, equipment hazards, equipment failures, odour hazards, health and safety, etc.) and recommendations to be incorporated into the design. Region operations staff should participate in the workshops and their comments shall be included and addressed in the HAZOP/SWIFT Reports.

4.5. **Pre-Start Health and Safety Review**

The Pre-Start Health and Safety Review (PSHSR) process is required both during design (preliminary) and construction (final). Final PSHSRs must be conducted and sealed by a Professional Engineer licenced to practice in the Province of Ontario.

The Project Lead shall develop a report or Clearance Letter that demonstrates compliance with the *Regulation for Industrial Establishments (R.R.O. 1990, Reg. 851)* for all machines and processes installed or modified as part of the project. This report or Clearance Letter should also demonstrate how the Regulation 851 requirements are included or addressed in the technical specifications for the construction.

Prior to commissioning and hand over to operations, a second and final stand-alone PHSR report or Clearance Letter is required. The Project Lead is permitted to transfer various tasks to the Constructor, however the Design Engineer, or a representative of the Design Engineer shall provide the report and clearance letter for the design phase of the project. The PSHSR shall be completed prior to submission of the 100% design package (drawings and specifications) and a summary document indicting and confirming all issues noted at the 100% phase of design were suitably addressed shall be submitted along with the IFT contract documents. The Project Lead has overall ownership and responsibility for delivering the final report to Peel.

A copy of the PSHSR is to be provided to Peel's Joint Health and Safety Committee (JHSC) before the equipment being assessed is used. If any of the recommended measures specified in the PSHSR are not implemented, a written notice is to be provided to the JHSC detailing what alternate measures have been taken. Additionally, provide copy to operations for their records and posting near the equipment.

In the event of any disputes associated with the PSHSR, Peel's JHSC shall make a determination on how the issue noted needs to be resolved. Applicable Peel Operations staff or their designates should be consulted at all times while PSHSR are being completed and when issues are being reviewed , if required, by the Region's JHSC.

4.6. Deliverables

	Description	Submission Requirements	Responsible
1.	Project Lead's Project Specific OHS Program or Plan	Electronic	Project Lead
2.	List of Project Specific Documents and Records that are to be handed over to Operations	Electronic	Region's Project Health and Safety Consultant
3.	Documents and Records identified by Region's Health and Safety Consultant to be submitted to Operations	Electronic	Region's Project Manager
4.	Designated Substances and Hazardous Material Survey – Preliminary Design, Draft and Final	Electronic	Project Lead
5.	HAZOP/SWIFT Review (Preliminary Design), Draft and Final Reports	Electronic	Project Lead
6.	HAZOP/SWIFT Review (90% Detailed Design), Draft and Final Reports	Electronic	Project Lead
7.	PSHSR – 90% Detailed Design Report, Draft	Electronic	Project Lead
8.	PSHSR – 100% Detailed Design Report, Final	Electronic	Project Lead
9.	Designated Substances and Hazardous Material Survey – Detailed Design, Draft and Final	Electronic	Project Lead
10.	PSHSR – Final Report	Electronic	Project Lead

5. Permits and Approvals

5.1. General

The Project Lead shall comply with all applicable Codes and Regulations. The approvals from Municipal, Provincial and Federal Ministries, regulatory bodies, other utilities or any other Department or Agency responsible for issuing permits may be required for the implementation of the project. Project Lead should also note that there may be permitting and approvals required by internal Peel departments as well. Internal Peel approvals or permits should be included and considered along with external permits and approvals. All requirements of this section shall apply equally to both internal and external permitting and approvals. It is the

responsibility of the Project Lead to determine the approvals required for the execution of the project and to allow appropriate time in their workplan to secure them. Permits and approvals shall be obtained prior to tendering the project unless otherwise agreed to with Peel.

Peel will identify any known permits and approvals requirements in the scoping document. The Project Lead shall confirm approval requirements.

Where Peel is required to execute application form(s) in support of the permits and approvals, the Project Lead shall complete the form(s) and forward to Peel for review and execution. The executed application form(s) will be transmitted back to the Project Lead for submittal to the approval/permitting agency and a notice of submission confirmation shall be provided to Peel.

5.1.1. Permits and Approvals Management

The Project Lead shall be responsible for administering and managing the planning, preparation, tracking, securing and amendment of permits and approvals throughout the duration of the project. This includes, but is not limited to:

- Designating a Permits and Approvals Lead as a part of the Project Lead's team
- Confirming the required permits and approvals for the project
- Liaising with Agencies, Ministries, Authorities and other governing bodies to secure permits and approvals
- Tracking all review comments and responses made by Peel staff, Agencies, Ministries, Authorities, and other governing bodies

It is the responsibility of the Project Lead to allow sufficient time in the project schedule to secure the required permits and approvals. Permits and approvals tend to be on project schedules' critical path and typically have long lead times, so it is essential that the Project Lead address the scheduling and sequencing of pre-requisite tasks for securing permits and approvals.

Where a project has been exempted from a particular permit or approval, that is the permit or approval has been deemed "not required", the rationale for this decision shall be documented in the Permit and Approval Tracking sheet, along with the necessary correspondence from the Authority.

Within each permit and approval application, the Project Lead shall identify all the necessary mitigation measures, contingencies, emergency response plans and testing and monitoring plans that are to be incorporated during design, construction and post-construction to fully address the Authorities' comments and requirements. Where agreements must be executed

between Peel and the approving Authorities, the Project Lead shall advise Peel in writing, in a timely manner, so that all such agreements can be reviewed and executed by Peel to avoid impacts on the project schedule.

See **Appendix 9 – Approvals Log** for a sample approvals log.

5.1.2. Permits and Approvals Activities

The application process and requirements are permit or approval specific. However, there are activities that are common to any permit or approval.

The common permits and approvals activities that the Project Lead shall conduct in each of the project phases include:

- Planning (Environmental Assessment)
- Design
- Construction and Commissioning
- Post-Commissioning

The process outlined below may apply for permits and approvals that are not specifically referred to within this document and/or may be future legislated requirements.

Note that where the process for obtaining a permit or approval does not fall within the typical project workflow phases, (e.g., the permit is needed to support field work for a study assignment, or a need arises in construction due to unforeseen circumstances) the following generic steps for permits and approvals may be followed, irrespective of the project phase:

1. Identify the need for the permit or approval based on an analysis of baseline data and impact assessment
2. Consult the approving Authority
3. Apply for the permit or approval by preparing all the necessary documentation, including but not limited to any studies, drawing sets or reports required to support the permit or approval application
4. Address the Authority's comments, as applicable
5. Secure the permit or approval
6. Adopt a monitoring/reporting program
7. Comply with the permit or approval conditions
8. Renew/amend the permit (if applicable)
9. Close/revoke the permit (once it is no longer needed)

The Project Lead is expected to be knowledgeable regarding the governing regulations and requirements for obtaining permits and approvals specific to the project scope of work. During the planning phase of the project, including the Environmental Assessment stage, the Project Lead shall ascertain the required permits and approvals. This shall involve conducting a pre-screening of the project for all potential permit and approval requirements, conducting site visits and populating the Permit and Approval Tracking Sheet. Where required to support field work, the Project Lead may be required to secure specific permits during the project planning phase.

If changes are made to the design during the tender process that have implications for permit or approval validity (e.g., changes to Approval Authority stamped and approved drawings), the Project Lead shall be responsible for consulting with the Authority and coordinating amendments or reissuance of the permit or approval.

The Project Lead shall liaise with the Authorities, obtain and complete the required application forms, as well as prepare all required supporting documentation. All applications shall be submitted to Peel for review and all Region comments shall be addressed prior to the submission process.

The Project Lead shall obtain authorized signatures on each permit or approval application submission from Peel staff as necessary.

As changes are proposed during construction, such as substituted materials or equipment that differs from the system description in the permit, the Project Lead shall prepare and submit the necessary documentation, permit or approval amendment application, and receive approval from the Authority for the changes prior to the changes being completed in the field. Any changes are subject to prior approval by Peel.

All permits required for physical construction should be obtained/secured prior to tendering. Project Leads should obtain the approval of the Peel Project Manager or Project Sponsor to proceed with tendering without the necessary permits and approvals in place.

Project Leads shall not defer or transfer responsibility for permitting and approvals to other Vendors or through contract documents to Constructors unless specifically approved in writing by the Project Manager of the applicable Water/Wastewater Engineering Group

5.2. **Approvals – Federal**

The Project Lead shall comply with all relevant statutory regulations and requirements and where required, and shall apply for all relevant approvals, permits or certificates from, but not limited to, the following Federal Departments or agencies:

- Fisheries and Oceans (DFO)
- Canadian Coast Guard
- Canadian Gas Association
- Indigenous and Northern Affairs Canada
- Environment and Climate Change Canada

All fees associated with the application/approval will be borne by Peel.

The Project Lead shall deliver to Peel a status report of all the applications for approvals required for the project. The status report shall be submitted monthly with invoice. Where there are outstanding approvals, the Project Lead shall indicate the time frame, as when these approvals are expected to be in place.

5.3. **Approvals – Provincial**

The Project Lead shall comply with all relevant statutes, regulations and shall apply for all relevant approvals, permits or certificates including those but not limited to the following:

- Ministry of the Environment, Conservation and Parks (MECP) (Effluent criteria, Environmental Compliance Approval, Limited Operational Flexibility, Air and Noise Environmental Compliance Approval, Permit to Take Water, Drinking Water Works Permit, Environmental Activity and Sector Registry (EASR), O. Reg. 406/19 On-Site and Excess Soil Management)
- Ministry of Natural Resources and Forestry (MNRF)
- Ontario Ministry of Transportation (MTO) – Land Use and Encroachment Permits
- Technical Standards and Safety Authority (TSSA)
- Digester Gas Code CAN/CGA-B105-M93
- Ontario Gas Utilization Code, Ontario Regulation 244
- Ontario Regulation NPC 300, Environmental Noise
- Ontario Regulation 524/98, Environmental – Air
- Railway Companies
- Electrical Safety Authority (ESA)
- Ontario Electrical Safety Code, Ontario Regulation 164/99

- Utilities such as Hydro One Networks, Alectra, Enbridge Consumers Gas, Bell Telephone, etc.
- Ministry of Tourism, Culture and Sport
- Boiler and Pressure Vessels Act, Ontario Regulation 220/01
- Installation Code for Fuel Oil Burning Equipment CAN/CSA-B139
- Natural Gas and Propane Installation Code, B149.1
- On-Site and Excess Soil, Ontario Regulation 406/19
- Infrastructure Ontario (IO)
- Transit Agencies – Go, Metrolinx, MiWay, Brampton Transit (ZUM), Transhelp

All fees associated with the application/approval will be borne by Peel.

The Project Lead shall deliver to Peel a status report of all the applications for approvals required for the project. The status report shall be submitted monthly with invoice. Where there are outstanding approvals, the Project Lead shall indicate the time frame, as when these approvals are expected to be in place.

5.4. **Approvals – Peel**

Application for Peel approvals/permits shall be co-ordinated with Peel's Project Manager. As applicable, obtain the following:

- Road Occupancy/Road Cut Permit
- Source Water Protection Clearance
- Hydrant/Backflow Permit

All fees associated with the application/approval will be borne by Peel.

The Project Lead shall deliver to Peel a status report of all the applications for approvals required for the project. The status report shall be submitted monthly with invoice. Where there are outstanding approvals, the Project Lead shall indicate the time frame, as when these approvals are expected to be in place.

5.5. **Approvals – Area Municipalities**

The Project Lead shall liaise and comply with all requirements of the Area Municipality and shall seek and apply for the following permits and or approvals:

- Site Plan Approval (and all associated permits and forms)
- Building Permit

- Demolition Permit
- Road Occupancy Permit
- Traffic Management Permit
- Public Utility Coordinating Committee (PUCC)
- Permit for Installation/Relocation of Public Utilities Permit to Discharge to Sewers (Sewer Use Bylaw)
- Permit to Discharge to Storm Water System
- Heritage Planning, Culture Division
- Zoning Review
- Municipal Consent
- Recreation and Parks
- Fire Route application

Approvals/permits for municipalities generally consist of an administrative fee, to be paid by the Project Lead and reimbursed by Peel, and a final application fee that is calculated based on such factors as area of work and complexity. These fees are to be paid by Peel but may be done so by the Project Lead on Peel's behalf.

All fees associated with the application/approval will be borne by Peel.

The Project Lead shall deliver to Peel a status report of all the applications for approvals required for the project. The status report shall be submitted monthly with invoice. Where there are outstanding approvals, the Project Lead shall indicate the time frame, as when these approvals are expected to be in place.

5.6. **Approvals – Conservation Authorities**

The Project Lead shall liaise with the local area conservations authorities to comply with regulations and requirements of the Conservation Authority. The Project Lead shall seek and apply for the permits and or approvals from the following Conservation Authorities where applicable:

- Source Protection Authorities (under Clean Water Act)
- Credit Valley Conservation Authority (CVCA)
- Toronto Region Conservation Authority (TRCA)
- Niagara Escarpment Commission (NEC)
- Nottawasaga Valley Conservation Authority (NVCA)
- Conservation Halton (CH)

All fees associated with the application/approval will be borne by Peel.

The Project Lead shall deliver to Peel a status report of all the applications for approvals required for the project. The status report shall be submitted monthly with invoice. Where there are outstanding approvals, the Project Lead shall indicate the time frame, as when these approvals are expected to be in place.

5.7. **Approvals - Other**

The Project Lead is responsible to ensure that the facilities and works as designed by them comply with Statutes and Regulations, Codes, Standards and Guidelines. These Statutes and Regulations, Codes, Standards and Guidelines are intended to set the minimum acceptable standard and shall not relieve them of their responsibilities to comply with the requirements of Peel.

The Project Lead are responsible to ensure that they have fully understood the requirements of the project as detailed in the Request for Proposal, as they will be required to fulfil the specified scope of work.

Compliance with other authorities/entities that may be required for the project includes:

1. Occupational Health and Safety Act (OHSA)
2. Local Distribution Company (LDC) – New/Upgrade Service Application
3. Preliminary Consultation Application for utility parallel generation applications
4. Connection Impact Assessment (CIA), for utility parallel generation applications
5. Local Hydro Utility (Brampton, Caledon, Mississauga)
6. Greater Toronto Airports Authority (GTAA)
7. Peel Fibre (PSN)
8. Private Property Owners

All fees associated with the application/approval will be borne by Peel.

The Project Lead shall deliver to Peel a status report of all the applications for approvals required for the project. The status report shall be submitted monthly with invoice. Where there are outstanding approvals, the Project Lead shall indicate the time frame, as when these approvals are expected to be in place.

5.8. **Deliverables**

	Description	Submission Requirements
1.	Permits and Approvals Tracking Log (to be submitted monthly)	Electronic
2.	Federal Approvals Applications & Supporting Documents	Electronic
3.	Provincial Approvals Applications & Supporting Documents	Electronic
4.	Peel Approvals Applications & Supporting Documents	Electronic
5.	Municipal Approvals Applications & Supporting Documents	Electronic
6.	Conservation Authority Approvals Applications & Supporting Documents	Electronic

6. **Cost Estimating**

The Project Lead is responsible for developing cost estimates at each project phase and design milestone, from the planning phase through to design, pre- and post-tendering. In some cases, Peel may request that a specialised subconsultant complete cost estimation for the project, in which case, this will be specified in the procurement document. Project Leads preparing procurement documents should ensure they consider this when preparing the procurement document in question.

In all cases estimates should be prepared by staff with expertise and experience estimating similar scopes of work to those included in the Project Lead's scope.

In all cases information used to prepare estimates should reflect local conditions and factors effecting the costs being estimated. Use of information from other geographic areas within Canada or outside of Canada should be adjusted to reflect localized conditions and factors.

When requested Project Leads shall provide to the Regional Project Lead detailed information used for the purpose of estimating included actuals values and amounts used to prepare the estimate, backup used to calculate elements included in the estimates and any other details used in the production of the estimates provided.

Should the project scope include estimating being completed by a specialist subconsultant or subcontractor a plan outlining the approach and details being used to complete the estimate shall be provided to the Region's Project Manager or Project Sponsor. Where lump sum amounts are used to complete estimates and when requested by the Regional Project Manager

or Project Sponsor, the party responsible for the production of the estimate shall provide necessary breakdowns and justification of the lump sum amount included.

6.1. Capital Cost Estimating

The Project Lead or subconsultant is responsible for utilizing industry best practices, tools, manuals, guidelines and standards for the development of capital cost estimates, such as those developed by the Canadian Construction Association (CCA) and the Association for the Advancement of Cost Engineering (AACE). These guidelines outline the level of accuracy or Class that may be achieved for cost estimating at various stages of a project, from the planning to the preliminary design and pre-tender stages. The following table summarizes the cost estimating Classes for the various project stages.

Table 6-1: Cost estimation Classes and Accuracy for Project phases

Class	Project Phase	Description	Accuracy Range
Class E	Planning	Based on master planning	± 30% to 50%
Class D	EA/Conceptual Design	Based on conceptual level design of the project	± 20% to 30%
Class C	Preliminary Design	Based on preliminary design drawings	± 15% to 20%
Class B	50% Detailed Design	Based on working design drawings and specifications	± 10% to 15%
Class A	90% - 100% Detailed Design	Based on near tender ready drawings and specifications	± 5% to 10%

Pre-tender estimates shall be prepared to achieve accuracy within ±10% and are to consider current market unit rates for each trade of the construction works and are to consider as required, unionized work costing, availability, current material costs as well as any current or expected global or local material shortages. The estimates are to be formatted in a divisional detailed breakdown for CCDC or Lump Sum style contracts and shall be formatted in the same format as the pricing form for unit price based contracts. Where the contract style includes both divisional and unit prices (CCDC 4) the specific approach should be reviewed and agreed to

with the Regional Project Lead for the project. Unless under exceptional circumstances, unit price contract estimates should be prepared based on the proposed pricing form. Where lump sum amounts are indicated in unit price contracts the Regional Project Lead should ensure the estimate considers all elements of the work included under the lump sum item and high level estimates for these items should only be used for Class C, D and E estimates.

The estimates shall include assumptions/breakdowns for contractor overhead, profit, bonding, insurance and contingency cost allowances. The Project Lead shall include all quantity take-off and unit price worksheets with the cost estimates.

The Project Lead shall review with Peel's Project Manager cost estimate items and work with Peel's PM to accommodate the requirements of the project to the available budget. Following the issuance of all required addenda for the tender, the Project Lead shall supply a revised and updated Final Cost Estimate two (2) weeks prior to the tender closing.

6.2. Operation and Maintenance Cost Estimates

In addition to capital cost estimating, the Project Lead shall identify the cost of operating the upgraded, new facility and/or linear asset. This includes details on:

- Operating staff requirements
- Maintenance requirements
- The need for spare parts
- Chemical costs
- Energy cost and any offsets due to the use of energy efficient equipment

Prior to completing Operation and Maintenance Cost Estimates project staff preparing them should review the approach and details and with the Regional Project Lead and Operations staff responsible for the operation and maintenance of the assets in question or on whose behalf the work is being completed for. Consideration of Operational teams' approach to procuring the spare parts, chemicals, other elements of the operations and maintenance estimate should be taken into account and any specific information related to these elements included in the operation and maintenance cost estimate.

6.3. Life Cycle Cost Estimates

The Project Lead shall utilize the capital and operations and maintenance cost estimates to complete life cycle costing analysis to support in the evaluation of design alternatives. Life cycle costs shall be projected to at least include the estimated service life of the longest life asset and

if appropriate to include multiple replacement cycles. When required by Peel, the analysis shall be presented in terms of a net present value using an agreed upon discount rate. Alternatively, costs shall be expressed in present year dollars.

Prior to providing any life cycle costs estimate the party responsible for preparing the estimate shall provide an outline on their approach and details and review this with the Regional Project Lead. Adjustments in approach to ensure the life cycle costing considered necessary inputs and meets the Region's requirements shall be made to the satisfaction of the Regional Project Manger or Project Sponsor responsible for the work being completed.

7. Capital Phasing, Sequencing, and Implementation Plan

The Project Lead shall develop a Capital Phasing, Sequencing and Implementation Plan (CPIP) for the project from the preliminary design phase and updated throughout the detailed design. A Final check on preparation for any IFT documents is also required. This Plan is to address the following:

- Construction tendering strategy
- Infrastructure isolation/shutdown requirements
- Consider and include planning for other projects' construction sequencing
- Coordination efforts between design/management teams working on other projects that may impact the project
- Construction phasing for the project

The plan shall include contingency plans to address unknown and unforeseen constraints that may impact the project.

The CPIP shall be updated for each of the detailed design milestones, as required. The updated phasing plans should consider available budget in the project and recommend a proposed capital construction and/or implementation program. Updated capital cost estimates, earned value tracking, and cashflow projections shall be included in the CPIP.

7.1. Budgetary Constraints and Mitigation Measures

The CPIP shall review budgetary constrains for each portion of the project. The Project Lead shall be required to develop a master cost worksheet for the entire project to document changes to the project which require additional budget approval. The worksheet shall be included in the CPIP submissions and maintained to track major changes to the project to

facilitate reporting to senior representatives, Council and other project stakeholders. The document will also be utilized to develop Council reports for requesting additional funds for the project during each year's budget cycle.

This portion of the CPIP may also be utilized to develop cost allocations for each component of the project so that an update to future development charges can be levied based on cost associated with each item. Cost allocation will also be utilized to determine the portions of the project which are allocated to other stakeholders.

The CPIP shall also be utilized to develop budget for logical future upgrade/expansion requirements, opportunities and constraints, including an estimate of net present value for future budgeting purposes, and recommend alternatives for review by Peel.

7.2. Timing-Related Constraints and Mitigation Measures

The CPIP shall include approaches and strategies for dealing with project constraints such as the following:

- external stakeholders including municipal, provincial, federal, conservation authorities, transit agencies and utilities, amongst others
- environmental mitigation issues from local conservation authorities, MECP, DFO, MNR, amongst others
- other projects in the same area or that may impact/are impacted in the project area
- political issues
- traffic and transportation management
- local businesses and residents
- planned or special events
- property acquisition and occupancy restrictions for easements
- property acquisition matters and/or delays
- Region capital related issues, shutdowns, isolations and unplanned emergencies

The CPIP shall be prepared and utilized to plan construction which respects the known and unknown constraints placed upon the project and includes a contingency plan to address unknown and unforeseen constraints.

CPIP's should include consideration of market conditions and inflation. Applicable factors should be provided where escalation or inflationary pressures can impact the financial planning associated with the CPIP.

8. Asset Management

8.1. General

The Project Lead shall prepare and submit a Draft Asset Management Data Sheet, completed as much as possible, in spreadsheet format for each project and submit it with the 100% detailed design submission (Appendix 10 should be used for multidisciplinary projects and Appendix 28A should be used for linear projects). This should be updated, if required, when the IFT documents are provided. The list should include every piece of equipment associated with the upgrades and as required by the form being used (including process mechanical, building mechanical, electrical, instrumentation, structural, and safety). The information provided for each asset included shall be consistent with Peel's Asset Management Data Collection Protocol and the appropriate Asset Hierarchy Standard (Linear or Vertical). The Asset Management Data Sheet shall also identify existing equipment that would be removed during the project. This is to ensure removed assets are clearly identified and tracked accordingly by the Agency's Asset teams. The Draft Asset Management Data Sheet shall be included in the Tender Package and a digital copy provided to the successful Contractor. Contract documents must include the detailed requirements for Contractors to complete if responsibility for the production of this is transferred to other parties by the Project Lead. Draft lists prepared should be reviewed by Peel project staff assigned to the project as well as with the Water/Wastewater Asset Management group and the Operations team ultimately responsible for operating and maintaining the asset in question. For projects where the Ontario Clean Water Agency (or other Operational Party hired by the Region to operate and maintain assets) Vendors shall assume two versions of the asset data forms (Peel's and the Operating Agency) may be required.

During the construction phase, the Contractor shall be responsible for updating the forms after receiving the final shop drawings for each piece of equipment and after each piece of equipment is commissioned. The project lead is responsible for checking the all the information supplied by the Vendor is accurate and complete. Where the information is not accurate or complete, the Project Lead is responsible for re-submissions of the completed Asset Management Data Sheet as may be required to ensure all associated information is recorded prior to equipment being taken over by Peel and is accurate. The required number of submissions by the Contractor during the Construction phase, shall be identified in the contract documents. Prior to substantial performance being issued, the Contractor is required to submit the completed Final Asset Management Data Sheet(s) (Appendix 10 and 28A), which has been reviewed and accepted by the Project Lead.

The asset management data sheets is included in **Appendix 10 – Asset Management Data Sheet and Appendix 28A – Pipe Data Asset Form** However, for each project Peel will provide the latest spreadsheet template for all assignments with the procurement document or after project award depending on the specifics of the project in question. Where an operating authority (OCWA or other) is present this will be clarified in the procurement document and samples provided similar to the Peel forms with the procurement document or after project award.

For Linear projects the Project Lead shall submit the completed Appendix 28A form(s) along with the digital as-built CADD drawings. The Peel CADD team will review the submissions for completeness and accuracy along with the digital drawings but is not responsible for the accuracy of the information contained within the forms. Peel CADD team shall forward the completed form and drawings onto the Public Works Infrastructure Records Team.

Where IFC drawings are produced the Project Lead shall forward an updated version of the IFC drawings and Appendix 10 or 28A, as applicable, at this time as well.

8.2. Deliverables

	Task	Submission Requirements
1.	Draft Asset Management Data Sheet (100% detailed design submissions updated if required when IFT documents are provided)	Electronic
2.	Final Asset Management Data Sheet (prior to Substantial Performance, at Contract Completion, end of Warranty Period)	Electronic

9. Environmental Assessment

9.1. General

Peel's water and wastewater projects fall under the requirements of the *Environmental Assessment Act (EA Act)*. The Project Lead shall follow the Municipal Class Environmental Assessment (Class EA) process, described by the Municipal Engineers Association (MEA) in the latest version of the *Class Environmental Assessment Document*.

Under the Municipal Class EA process, Peel's water and wastewater projects generally fall under Schedules A, A+, B or C, as defined in the MEA document. The Project Lead shall be familiar with the requirements for each of the Schedules and shall ensure the project is implemented in compliance with the Class EA requirements.

The Class EA process is comprised of five phases:

i) Phase 1 – Identify the problem or opportunity
ii) Phase 2 – Identify alternative solutions to address the problem or opportunity
iii) Phase 3 – Examine alternative design concepts for the preferred solution
iv) Phase 4 – Document the project in an Environmental Study Report
v) Phase 5 – Implementation of the preferred solution and design concept

The figure below provides an overview of the key features of the Class EA process.

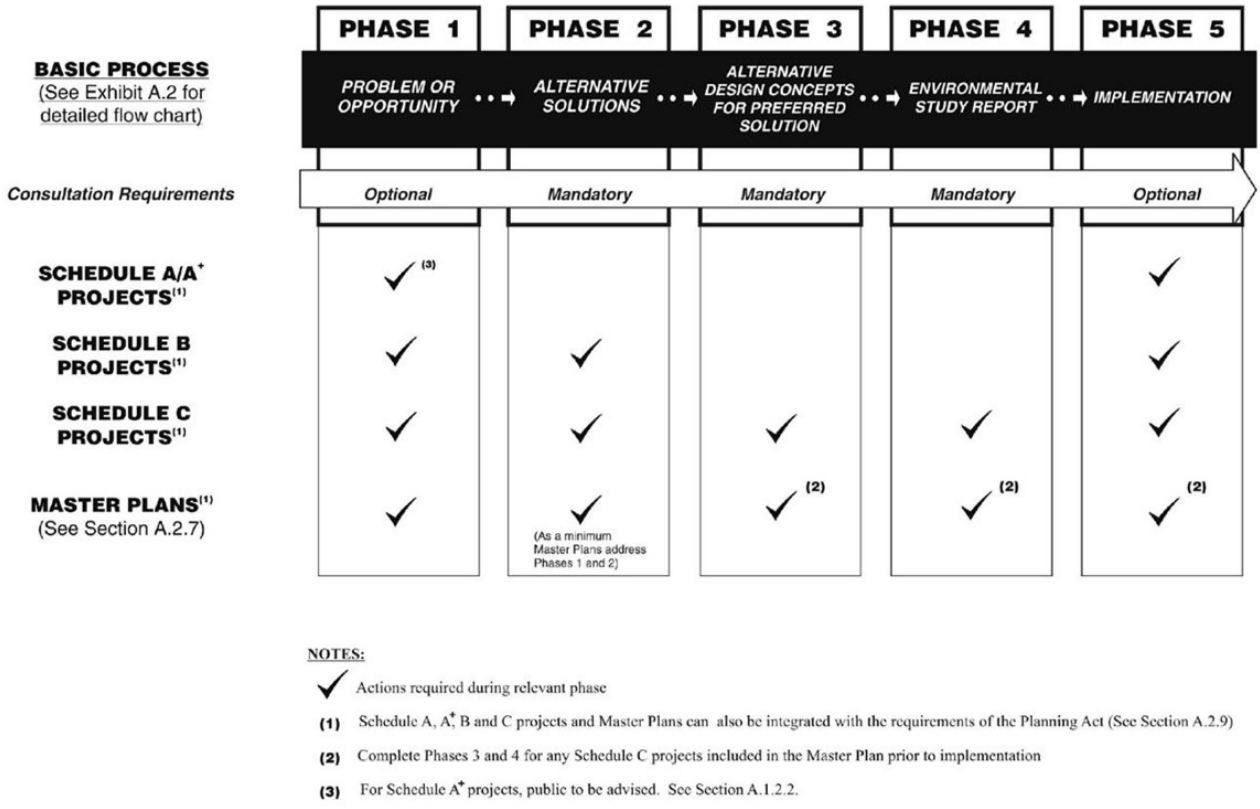

Figure 9-1: Phases of the Municipal Class EA Process (taken from Exhibit A-1 of *MEA Class EA Document*)

Master Plans completed following the Class EA process generally address Phases 1 and 2. The implementation of the individual projects identified in the Master Plan will follow the requirements of Schedule A, A+, B or C projects, with recognition that Phases 1, 2, 3 and 4 for specific projects may be completed as part of a Master Plan. The various phases shall be revisited to ensure that the EA requirements have been satisfied for the individual project.

The scoping document will outline the specific requirements to be followed for each EA project. Where there is disagreement between the PIPM and the scoping document requirements, the scoping document takes precedence.

9.2. Communication and Consultation Requirements

As a minimum, the Environmental Assessment process guidelines as required by the MECP shall be met during the Public Consultation component of the Class EA. Peel is responsible for all decisions on the nature, format, style and messaging of communication materials, forums and scheduling. Peel is also responsible for determining any communication or public consultation beyond the minimum MECP and MEA guidelines.

The Project Lead shall undertake the following, at a minimum, during the public consultation process:

- Development of a Communication and Consultation Plan
- Indigenous and First Nations Consultation
- Notice of Commencement
- Municipal/Stakeholder Consultation
- Public Information Centre(s) and Notices
- Maintain direct mailing/email lists of stakeholders and interested parties
- Distribution of Presentation Materials and Class EA documentation
- Notice of Completion

The style and format of all communication media should be targeted to non-technical audiences. Peel's communications associate will act as advisor for all communications materials at Peel Project Manager's discretion.

All communication materials and documents prepared as part of the Class EA process shall meet the requirements of the *Accessibility for Ontarians with Disabilities Act* (AODA).

The following sections provide additional detail on the requirements for each of the above noted consultation components.

9.2.1. Communication Plan

The communication plan, which the Project Lead shall submit to Peel for approval at the commencement of the study, shall include at least the following items:

- Discussion on the approach to consulting with appropriate regulatory agencies, utilities, interested and affected parties, and document issues and mitigation measures (e.g.,

Conservation Authorities, Ministry of Transportation (MTO), MECP, Ministry of Natural Resources (MNR), area municipalities, utilities, etc.)

- Approach to present the study findings at all public meetings
- Details of a comprehensive public consultation program, including at least one Public Information Centre (PIC) for Schedule B Class EA projects and at least two PICs for Schedule C Class EA projects
- Approach to meeting AODA requirements
- Approach for public notification for Schedule A+ Class EA projects
- Approach to addressing public comments and inquiries regarding the study
- Approach to addressing agency and stakeholders' comments and questions related to the study
- Recommendations on additional consultation to be carried during the implementation of the project

Consideration should be given to in-person or virtual engagement and communication approaches to reach the largest possible audience. The use of social media and other means is encouraged. The virtual engagement approach shall be elaborated in the Communication Plan.

9.2.2. Indigenous and First Nations Consultation

Consultation with First Nations and other Indigenous communities is mandatory for infrastructure projects that may impact their traditional territory and the resources upon which their cultures and livelihoods depend. The Project Lead shall determine, in consultation with the MECP, the appropriate Indigenous and First Nations Communities to be included in the project mailing list. Indigenous and First Nation communities will be invited to participate in the project and will be consulted according to their interest and desired level of involvement. A detailed record of any communication or consultation with Indigenous and First Nations communities shall be maintained by the Project Lead for inclusion in the Project File Report (Schedule B projects) or Environmental Study Report (Schedule C projects).

9.2.3. Notice of Commencement

The purpose of this notice is to inform the public and stakeholders of the Problem/Opportunity and to invite comments and participation in the study. This notice is a mandatory point of contact in the Class EA process and shall be published at the end of Phase 1. The Notice of Commencement shall include the following:

- Name and address of the municipality

- A brief description of the project that outlines the problem or opportunity and the need for a solution
- Reference to the project following the relevant Municipal Class Environmental Assessment Schedule and the process being followed
- Details of when and where information is available to the public (e.g., ESR, Project File Report)
- Details on how the public can provide input (per the Communication Plan)
- Contact information for Peel's representative to whom comments should be directed
- A disclaimer pertaining Freedom of Information and Protection of Privacy (FIPPA)
- Date of publication
- Map of study area

Refer to **Appendix 11** for a sample Notice.

Peel will be responsible for posting the Notice of Commencement in the newspaper (minimum 2 published notices appearing in separate issues of the same newspaper) and for hosting a project website to include the Notice and other project documents. The Project Lead shall be responsible for the distribution to all impacted property owners, individuals and/or agencies that have previously inquired about the study. The Notice shall also be sent to the MECP's Environmental Approvals Branch.

9.2.4. Stakeholder Meetings

The Project Lead shall arrange and facilitate stakeholder meetings as specified in the procurement document to provide a forum for stakeholders to express concerns, discuss critical issues, challenges and opportunities, constraints and project impacts. As a minimum, meetings should be held with the local area municipality(ies), utilities, and the conservation authority(ies) with jurisdiction in the study area.

9.2.5. Public Information Centres (PICs)

PICs have been common consultation tools for Class EA projects. While there is no requirement to conduct PICs in the MEA Class EA document, should they be deemed an effective consultation tool for the project, the Project Lead shall prepare at a minimum the following for each PIC:

- PICs shall be advertised in newspapers, specific locations, websites, and/or direct mail as deemed required, relaying the details and technical information about the project.

Advertisement for the PIC shall be arranged with Peel's Project Manager. The Project Lead shall prepare the advertisement using Peel's template provided in Appendix 11.

- The forum/locations and timing of the PIC(s) shall be at the discretion of Peel and will be arranged based on study area demographics (including locations, time of year and quantity, as prescribed in the scoping document).
- Presentation boards and/or audiovisual materials shall be prepared to effectively communicate the study approach, alternatives considered, environmental impacts and evaluation approach. Materials should be targeted to a non-technical audience and highlight stakeholder/public impacts. Materials shall be provided to Peel in draft at least two weeks prior to the PIC.
- Additional 'take away' materials with more detailed information shall be prepared and provided at the PICs by the Project Lead, as required in the scoping document.
- Consultant logos shall be kept to a minimum size and Peel logos more prominent
- The Project Lead shall record and document attendance and public comments at the PICs.

9.2.5.1. PIC Phase 2 Content (Schedule B and C projects)

The Project Lead shall hold a public meeting during Phase 2 of the Class EA to solicit public input on the following:

- The purpose of the study
- The study area
- Issues and concerns within the study area
- Approach and criteria to evaluate alternative solutions
- Alternative solutions being evaluated
- Preliminary preferred alternative
- The next steps in the study process

9.2.5.2. PIC Phase 3 Content (Schedule C projects)

The Project Lead shall hold a second public meeting during Phase 3 to solicit public input on the following:

- Alternative design concepts for the preferred alternative identified in Phase 2
- Approach and criteria to evaluate alternative design concepts of the preferred alternative
- Preliminary preferred design concept
- Potential impacts and mitigation measures for project implementation

- The next steps in the study process

9.2.6. Maintenance of Direct Mail/Email Stakeholder/Interested Party List

Working with Peel, ensure that all interested parties/stakeholders are included on distribution lists. Certify that all mailing lists are updated regularly, and immediate changes are made when mail is returned unsent or undeliverable. The notices/communication to properties affected/in vicinity of the infrastructure proposed shall be directed to the owner/current occupant of the property. Notices to Region and area municipal staff shall be through email and/or inter-office mail and will be coordinated by Peel.

9.2.7. Notice of Completion

The purpose of this notice is to inform the public and stakeholders that the relevant phases of the Class EA process have been fulfilled and to invite comments on the Class EA documentation and findings of the study. The Notice of Completion shall be issued at the end of Phase 2 or 4 (for Schedule B or C projects, respectively) of the Municipal Class EA process.

This notice shall be advertised in newspapers, specific locations, websites and direct mail, as required.

The Notice of Completion shall include the following (Refer to **Appendix 11A** for a sample Notice of Completion):

- A brief description of the study
- Description of the preferred solution
- Information on where/how to access the Project File Report (for Schedule B projects) or Environmental Study Report (Schedule C projects) for review
- Details on how the public/stakeholders can provide input (per the Communication Plan)
- Contact information for Peel's representative to whom comments should be directed
- Deadline for receipt of comments (end of review period)
- The approach to request a Part II Order request
- A disclaimer pertaining Freedom of Information and Protection of Privacy (FIPPA)
- Date of first publication.

Peel will be responsible for posting the Notice of Completion as appropriate and for hosting a project website to include the Notice and other project documents. The Project Lead shall be responsible for the distribution to all impacted property owners, individuals and/or agencies

that have previously inquired about the study. The Notice shall also be sent to the MECP's Environmental Approvals Branch.

9.3. Class EA Process

The Project Lead shall comply with the requirements of the Class EA document for the project-specific Schedule classification. Although the Schedule status is generally pre-determined by Peel as part of a Master Planning process, the Project Lead shall be required to confirm the Schedule classification at the beginning of the Class EA process for the specific project.

9.3.1. Schedule A and A+ Projects

Schedule A and A+ projects are deemed to have minimal environmental impact and are considered pre-approved, subject to the Class EA requirements applicable to Schedule A and A+ projects. Public consultation is optional for these projects. *Appendix 1 – Project Schedules* of the Class EA document includes a list of typical project descriptions corresponding to Schedule A and A+ projects.

For Schedule A and A+ projects, the Project Lead will complete Phase 1 of the Class EA process, as specified in the scoping document. The Project Lead shall prepare a memorandum to Peel confirming the classification of the project as a Schedule A or A+ project.

For Schedule A+ projects, the public shall be advised prior to project implementation. The approach to notify the public shall be determined by the Project Lead, in consultation with Peel. When proceeding with a Schedule A and A+ project, a determination may be made by the Project Lead or Peel that the project should be elevated to a Schedule B because of requirements to mitigate community, approval agency or stakeholder concerns. In this case, Peel will authorize, if appropriate, an increase in the engineering fee upset limit to allow for the change in scope of work.

9.3.2. Schedule B Projects

Schedule B projects have the potential for some adverse impacts that require mitigation. *Appendix 1 – Project Schedules* of the Class EA document includes a list of typical project descriptions corresponding to Schedule B projects.

For Schedule B projects, the Project Lead will complete Phases 1 and 2 of the Class EA process, as specified in the scoping document. At the beginning of Phase 1, the Project Lead shall prepare a memorandum to Peel confirming the classification of the project as a Schedule B project. The Project Lead shall define the study area, describe the problem/opportunity the

Class EA seeks to address, and conduct an evaluation of alternative solutions to the problem based on their impact/merits with respect to the natural, social, technical and economic environments. The Project Lead shall provide sufficient information and data to assess the impacts/merits of the alternatives. The evaluation process typically involves the development of a long list of alternatives which is screened to develop a short-list of alternatives. The evaluation of short-listed alternatives shall include careful consideration of the constructability, approval requirements, implementation/construction schedule and life cycle costs for each alternative. Alternatives shall be developed to a sufficient level of detail to adequately assess their merits, environmental impacts, constructability and life cycle costs. Refer to Section 7.1.1 for requirements for project cost estimates.

The Project Lead shall review the evaluation approach and criteria, as well as the findings of the evaluation of alternatives with Peel. The Project Lead shall solicit feedback from Peel and all interested parties and select a preliminary preferred alternative.

At the conclusion of Phase 2, the Project Lead shall prepare a Project File Report and a Notice of Completion and make the Project File Report available to the public for the mandatory 30-day review period. Peel may, in special circumstances, opt to increase the review period at their discretion if significant interest/feedback is received during the project. At the end of the review period and if no concerns are raised, the study is considered complete and the project may proceed to implementation.

In summary, for Schedule B projects, the Project Lead shall, at a minimum:

- Complete Phases 1 and 2 of the Class EA process
- Prepare and distribute all project notices (Study Commencement, PICs and Study Completion)
- Complete a Project File Report and distribute to interested parties and stakeholders. Make the Project File Report available for public review.
- Document and respond to all public, agency and stakeholder comments and inquiries and include them as part of the Project File Report

9.3.3. Schedule C Projects

Schedule C projects are those that are expected to have greater degree of environmental impact and will require mitigation measures. These projects are subject to the full Class EA planning process. Phases 1 through 4 of *Appendix 1 – Project Schedules* of the Class EA document includes a list of typical project descriptions corresponding to Schedule C projects.

The Project Lead shall define the study area, describe the problem/opportunity the Class EA seeks to address, and conduct an evaluation of alternative solutions to the problem based on their impact/merits with respect to the natural, social, technical and economic environments. The Project Lead shall provide sufficient information and data to assess the impacts/merits of the alternatives. The evaluation process typically involves the development of a long list of alternatives which is screened to develop a short-list of alternatives. The evaluation of short-listed alternatives shall include careful consideration of the constructability, approval requirements, implementation/construction schedule and life cycle costs for each alternative. Alternatives shall be developed to a sufficient level of detail to adequately assess their merits, environmental impacts, constructability and life cycle costs. Refer to Section 7.1.1 for requirements for project cost estimates.

The Project Lead shall review the evaluation approach and criteria, as well as the findings of the evaluation of alternatives with Peel. The Project Lead shall solicit feedback from all interested parties and select a preliminary preferred alternative. A PIC may be held at this time, to present the results of Phase 1 and 2 of the Class EA process and to describe the approach to undertake Phases 3 and 4. Based on feedback received from the public and/or stakeholders and agencies, the preferred alternative solution will be confirmed.

Following the selection of the preferred solution, the Project Lead shall develop alternative design concepts to implement the preferred solution and evaluate the alternative design concepts based on their merits and impacts on the natural, social, technical and economic environments. Design concepts shall be developed to a sufficient level of detail to adequately assess their merits, environmental impacts, constructability and life cycle costs. Refer to Section 7.1.1 for requirements for project cost estimates.

At the conclusion of Phase 4, the Project Lead shall prepare an Environmental Study Report (ESR) and a Notice of Completion. The Project Lead shall make the ESR available to the public for the mandatory 30-day review period. Peel may, in special circumstances, opt to increase the review period at their discretion if significant interest/feedback is received during the project. At the end of the review period if no concerns are raised, the study is considered complete and the project may proceed to implementation.

In summary, for Schedule C projects, the Project Lead shall, at a minimum:

- Complete Phases 1 through 4 of the Class EA process
- Prepare and distribute all project notices (Study Commencement, PICs and Study Completion)

- Complete an ESR and distribute to interested parties and stakeholders. Make it available for public review
- Document and respond to all public, agency and stakeholder comments and inquiries and include as part of the ESR

9.4. Reporting

One of the key principles of successful planning under the *EA Act* is to provide clear and complete documentation of the planning process followed, to allow for the traceability of decision making with respect to the project.

For all Class EA projects, at the end of each Phase of the Municipal Class EA Process, a "Phase Interim" report is to be submitted. The Interim reports are to outline the progress made to date, a summary of the data collected and any input or comments received. The "Phase Interim" reports must be in a form suitable for reproduction, in whole or in part by Peel, for use in a public forum and consistent with the format of the Project File Report (for Schedule B projects) or the Environmental Study Report (for Schedule C projects).

All documents available to the public must meet the requirements of the *Accessibility for Ontarians with Disabilities Act* (AODA). All Class EA documents and reports must be compliant with the AODA.

9.4.1. Project File Report (Schedule B)

Formal planning of Schedule B projects ends at the conclusion of Phase 2 of the Class EA process. At this point, the planning process shall be documented in a Project File Report and a Notice of Completion shall be issued. Following the Notice of Completion, the public is allowed a minimum of 30 calendar days to review and comment on the Project File Report. The Project File Report appendices shall contain all correspondence, copies of notices, letters and bulletins related to the public/stakeholder consultation process; "Phase Interim" reports explaining the Project Lead's rationale and approach to the various stages of the project; and copies of all supporting reports prepared by the Project Lead and others.

The Project File Report must be organized chronologically and contain at minimum the following information:

- An executive summary documenting key activities and the principal decisions / conclusions
- Background to the project and earlier studies

- An outline of the Class EA process and how the process implemented for this project
- The problem or opportunity to justify the need for the project
- Description/inventory of the environment (including but not limited to the natural, social, built, technical and economic environment)
- The alternative solutions considered and the evaluation process followed to select the preferred solution
- Follow-up conditions and commitments, including but not limited to any monitoring necessary, consolidated into a stand-alone document for the design / construction phase of the project
- Public/agency consultation recommendations and/or commitments during project implementation
- Approval agency requirements for implementation of the project
- The public consultation/communication program employed and how concerns raised have been addressed

9.4.2. Environmental Study Report (Schedule C)

Formal planning of Schedule C projects ends at the conclusion of Phase 4 of the Class EA process. At this point, the planning process shall be documented in an Environmental Study Report and a Notice of Completion shall be issued. Following the Notice of Completion, the public is allowed a minimum of 30 calendar days to review and comment on the Environmental Study Report. The Environmental Study Report shall contain full documentation of the Class EA process for Schedule C projects including, but not limited to:

- A description of the problem or opportunity and other background information
- The rationales employed in the selecting the preferred solution to the problem and the preferred design concept
- A description of the environmental consideration and impacts
- The mitigating measure that will be taken to avoid of minimize environmental effects
- A description of the consultation process and an explanation of how concerns raised have been addressed
- Public/agency consultation recommendations and/or commitments during project implementation
- Approval agency requirements for implementation of the project

- A description of the monitoring program which will be carried out during construction and operation and how the results will be communicated to the public and review Agencies

9.5. Other EA Requirements

The Project Lead shall follow the procedures, as detailed in the MEA Class Environmental Assessment document for Schedules A, A+, B or C, regardless of whether these have been specifically enunciated in the scoping document or in this PIPM. In addition, the Project Lead shall evaluate the complexities and needs of the project and ensure that the work plan meets the requirements of the Class EA process.

For projects affecting Crown lands or Provincial Infrastructure, the requirements of the specific Provincial Class EA process shall be met in addition to those set in the Municipal Class EA document.

The Project Lead shall also be familiar with the requirements of the *Canadian Environmental Assessment Act (CEAA)* so that if applicable, the project may be implemented in compliance with the Act. The Act and its Regulations set out the responsibilities and procedures for carrying out environmental assessments for projects which involve Federal Government decision making. The Project Lead should refer to the CEAA website to verify whether the Act applies to the project in question.

To effectively evaluate the natural, social, technical and economic environments through the Class EA process, supporting studies are typically required. Specific requirements will be as stipulated in the scoping document. Requirements for some commonly required supporting studies are described in the subsequent sections.

9.5.1. Baseline Natural Features Assessment

Existing natural features need to be considered in the evaluation of the long and short list of alternatives in the Environmental Assessment process.

The following sub-sections below outline the necessary content and deliverables that shall be submitted as a part of the Baseline Natural Features Assessment.

9.5.2. Long List of Alternatives

A desktop evaluation for the entire Study Area will be completed through searches of available databases, including but not limited to:

- Region of Peel
- Local Conservation Authorities
- Ministry of Natural Resources
- Niagara Escarpment Commission Plan
- Parkway Belt West Plan
- Oak Ridges Moraine York, Peel, Durham, Toronto and the Conservation Authorities Moraine Coalition (YPDT – CAMC) Groundwater Program
- City of Mississauga, City of Brampton, Town of Caledon

This information will be used to evaluate the long list of alternative solutions to the problem and generate a Baseline Natural Environment Assessment Report and maps of the study area showing significant natural features.

9.5.3. Short List of Alternatives

Desktop surveys, complemented by windshield surveys, will be required for the short list of alternatives, including a detailed review of databases. Site photos and a detailed description of short-listed alternative sites/routes, including watercourse crossings, will be provided by the Project Lead in a Technical Memo.

9.5.4. Preliminary Preferred Solution

The Project Lead shall complete applicable detailed field surveys and investigations for the preferred solution. These investigations may include, but are not limited to:

- Geomorphological assessment
- Fish spawning surveys
- Benthic invertebrate surveys
- Vegetation surveys
- Amphibian surveys

The Project Lead shall provide a technical memo that includes, but is not limited to:

- The results of field investigations
- Possible construction constraints
- Potential mitigation requirements
- Recommendations for additional field investigations.

9.5.5. Cultural Heritage and Archaeological Assessments

As part of the Environmental Assessment process, it may be necessary to conduct an inventory of Cultural Heritage Properties and Archaeological sites/potential for potentially impacted areas. The following briefly illustrates minimum criteria required by Peel when conducting site assessments for Cultural and Archaeological Heritage:

- Completing Form 0478E – Criteria for Evaluating Archaeological Potential from Ministry of Tourism and Culture (or equivalent)
- Stage One (desktop) Study for the entire Study Area
- Stage Two Analysis for shortlisted routes and/or sites (pending results of Stage One)
- Stage Three Analysis for preferred route and/or site (pending results of Stage One and Stage Two analysis; considered provisional)
- Stage Four Analysis for preferred route and/or site (pending results of Stage Three analysis; considered provisional)

If the Stage One Assessment illustrates the potential for archaeological sites on the preliminary preferred route and/or site, then a Stage Two (field) assessment and, in some cases, a Stage Three (further site evaluation) or Stage Four (full-scale site excavation) level of assessments would be required. Stage Two, Three and Stage Four Archaeological Assessments shall be priced as provisional items.

Provincial heritage properties include three types of cultural heritage resources: built heritage resources, cultural heritage landscapes and archaeological sites.

- “Built heritage resources” means one or more significant buildings (including fixtures or equipment located in or forming part of a building), structures, earthworks, monuments, installations or remains that have cultural heritage value.
- “Cultural heritage landscape” means a defined geographical area that human activity has modified and that has cultural heritage value. Such an area involves one or more groupings of individual heritage features, such as structures, spaces, archaeological sites, and natural elements, which together form a significant type of heritage form distinct from that of its constituent elements or parts. Heritage conservation districts designated under the Ontario Heritage Act, villages, parks, gardens, battlefields, main streets and neighbourhoods, cemeteries, trails and industrial complexes of cultural heritage value are some examples.
- “Archaeological site” means any property that contains an artifact or any other physical evidence of past human use or activity that is of cultural heritage value or interest.

At a minimum, Peel expects that the following legislation and policies will be applied when conducting Cultural Heritage and Archaeological Assessments:

- Provincial Policy Statement (2005)
- Criteria for Determining Cultural Heritage Value or Interest (Ontario Regulation 9/06) as amended
- Criteria for Determining Cultural Heritage Value or Interest of Provincial Significance (Ontario Regulation 10/06) as amended
- Ministry of Heritage, Sport, Tourism and Culture Industries: Standards and Guidelines for Conservation of Provincial Heritage Properties (April 28th, 2010)
- Ministry of Heritage, Sport, Tourism and Culture Industries: Standards and Guidelines for Consultant Archaeologists (2011)
- Municipal Databases for inventory of Cultural Heritage/Archaeological Sites (i.e. City of Mississauga, City of Brampton, Town of Caledon)
- Official Plans (Mississauga, Brampton, Caledon)

A Stage One (background) Archaeological Assessment Report will be prepared for Ministry of Municipal Affairs and Housing (MAH) review and inclusion in the Project File Report (Schedule B Project) or Environmental Study Report (Schedule C project) document.

A Cultural Heritage Report will also be prepared for the Ministry of Tourism, Culture and Sport (MTCS) review and inclusion in the Project File Report or Environmental Study Report document.

9.5.6. Addenda to Class EA

The Project Lead may be required to prepare an Addendum to the Project File/Environmental Study Report due to changes to environmental conditions, study assumptions and/or requirements affecting the problem statement or the preferred solution after the Notice of Completion for the Class EA has been issued.

An Addendum will also be required due to a lapse of time greater than 10 years between the completion of the Class EA and commencement of construction.

As part of the preparation of the Addendum, the Project Lead's scope shall, at a minimum, include:

- Development and distribution of a Notice of Filing of Addendum
- Preparation of an Addendum Report. The Addendum Report is to be submitted along with the original Project File/ESR to the MECP and shall be made available to key

stakeholders and agencies as well as those who were notified in the preparation of the original Project File/ESR. The Addendum Report shall describe the reasons for the changes to the project, describe the environmental implications of the change, and the necessary mitigation measures.

The Notice of Filing of Addendum shall include the following:

- A brief description of the study
- Changes necessitating the Addendum
- A statement indicating that only items changed through the Addendum are open for review
- Information on where/how to access the Addendum Report and the corresponding Project File Report (for Schedule B projects) or Environmental Study Report (Schedule C projects) for review
- Details on how the public/stakeholders can provide input
- Contact information for Peel's representative to whom comments should be directed
- Deadline for receipt of comments (end of review period)
- The approach to request a Part II Order request
- A disclaimer pertaining Freedom of Information and Protection of Privacy (FIPPA)
- Date of first publication

This notice shall be advertised in local newspapers, specific locations, websites and direct mail, as required. Peel will be responsible for posting the Notice of Filing of Addendum in a local newspaper (minimum 2 published notices appearing in separate issues of the same newspaper) and for hosting a project website to include the Notice and other project documents. The Project Lead shall be responsible for the distribution to all impacted property owners, individuals and/or agencies that have previously inquired about the study. The Notice shall also be sent to the MECP's Environmental Approvals Branch.

9.6. Deliverables

The specific deliverables and number of copies required of each deliverable for each Class EA project will be stipulated in the scoping document. Typical deliverables for Class EA projects are summarized in the table below, and indication is given as to what Schedule of Class EA will require these deliverables.

	Description	Schedule A/A+	Schedule B	Schedule C
	Consultation Documents			
1.	Communication Plan (including Indigenous and First Nations Consultation)		✓	✓
2.	Notice of Study Commencement		✓	✓
3.	Notice of PIC and PIC Materials		✓	✓
4.	Notice of Completion		✓	✓
5.	Notice of Project Implementation	✓		
	EA Reporting			
1.	Phase 1 Interim Report	✓	✓	✓
2.	Phase 2 Interim Report		✓	✓
3.	Phase 3 Interim Report			✓
4.	Project File Report		✓	
5.	Environmental Study Report			✓
	Supporting Studies			
1.	Baseline Natural Features Assessment Report		✓	✓
2.	Stage One Archaeological Assessment Report		✓	✓
3.	Stage Two Archaeological Assessment Report (pending results of Stage One)		✓	✓
4.	Cultural Heritage Report		✓	✓

10. Preliminary Design Engineering and Report

10.1. General

The intent of the preliminary design is to confirm the design basis, refine the design concept and set the foundations for detailed design. If a conceptual design or any other prior work has been completed (such as a Class Environmental Assessment), the Project Lead shall thoroughly review this work as part of the background review for the project. The resulting deliverable of the preliminary design phase is a Preliminary Design Report (PDR) including drawing packages, sketches, reports and appendices as required.

The Project Lead shall conduct project site visits and consult with operations staff to become familiar with the operational requirements and procedures and any process requirements or limitations that will impact the design of the proposed expansion or upgrade works.

In designing the project, the Project Lead shall comply with all applicable statutes and regulations, design standards, guidelines and codes. Failure to comply with these requirements shall be corrected by the Project Lead at no additional cost to Peel. Furthermore, the Project Lead shall document how the infrastructure has been designed to be safe, reliable, and easy to operate, maintain, retrofit and/or replace.

Preliminary Design scopes of work will be included in either the procurement document for external projects and/or the project charter/scope document for internal projects. See section 10.5 for additional details specific to Preliminary Design Work.

10.2. Design Guidelines and Standards

The Project Lead shall comply with relevant industry and local area municipality design standards, guidelines and best practices for the design of the project and shall meet the requirements of relevant codes and regulations in addition to Peel's Design Guidelines. The Project Lead shall identify all design guidelines, codes, standards and regulations applicable to the design and provide a list in the design report(s). It is the responsibility of the Project Lead to ensure the standards used for any design or other work are the applicable standard at the time the work is being completed. Where design or re-work is required based on the identification of an incorrect, outdated or unapplicable standard, all additional work/re-work shall be completed at no extra cost to the Region.

Where standards are updated and revised during project delivery, the Project Lead shall familiarize themselves with updates or revisions and provide a written summary of what has changed and how those changes impact the work being delivered. If necessary, the Project Lead shall identify costs and schedule impacts of these changes and where required changes in scope should be formalized through Engineering Scope Changes in writing.

Project Lead's are solely responsible for checking and ensuring, immediately prior to delivery of final deliverables for any project or scope, that the guidelines, codes and standards used are applicable and still relevant at the time the deliverable is finalized.

Work shall primarily be based on Region of Peel design guidelines and standards. Project Leads shall be responsible for identifying when other regulatory, industry, Utility Owner or local area Municipality standards require deviation from Peel standards and propose resolutions taking

into account the Region's standard requirements and the conflicting requirement identified by the Project Lead. Permission to Deviations from Peel standards when required based on regulatory/code requirements should be identified and recorded using the Request for Design Standard Deviation form included in this manual.

10.2.1. Region Design Guidelines

Region of Peel Design Guidelines that may be relevant to the project include but are not limited to the following:

- Project Design and Technical Specifications Manual
- Project Management Methodology For Water and Wastewater Capital Projects
- Region of Peel W/WW Style Guidelines and Templates – Reports
- Water Shutdown and Service Interruption Requirements (Specifications and Processes)
- Linear Shutdown and Bypass Requirements (Specifications and Processes)
- Wastewater Pumping Station Shutdown and Bypass Requirements (Specifications and Processes)
- Water and Wastewater Linear Asset Testing, Commissioning and Acceptance Manual
- LRT Standards – Watermain, Storm Sewer and Sanitary Sewer Design Criteria Addendum for Infrastructure within the LRT Corridor
- Trunk Sewer and Rehabilitation Decision Framework
- Realtime Control Guidelines and Standards
- Sanitary Sewer Rehabilitation Guidelines and Standards
- Region of Peel CCTV Inspection Guidelines
- Watermain Rehabilitation Guidelines and Standards
- Low Pressure Forcemains Guideline
- Sewage Pumping Station Design Standard
- Water Linear Design Criteria'
- Wastewater Linear Design Criteria
- Bulk Water Stations Design Standard
- Process Automation and Instrumentation Design Standards – SCADA (PAIDs)
- Water Pumping Station Design Standards
- South Peel Reservoir Design Guidelines
- Wastewater Treatment Plant Standards
- Subdivision Process
- Site Plan Process

- Wet Weather CCTV Guideline
- Sanitary Smoke Testing Guideline
- Downspout Survey Guideline
- Downspout Disconnection Guideline
- How to Report Monitoring Analysis
- Flow Monitor Standards and Guidelines
- Water and Wastewater Criticality Assessment Guideline
- Vertical Water and Wastewater Inspection and Condition Assessment Guideline
- Linear Water and Wastewater Inspection and Condition Assessment Guideline
- Water and Wastewater Functional Asset Hierarchy Guideline
- TOR for Hydrogeological Investigations to Apply to Class EA's, Capital Construction Projects and PTTW/ESAR
- Guide to Considering Sourcewater Protection in Municipal Class Environmental Assessments in the Region of Peel
- Standards, Conventions and Checks for Using Peel Region's Hydraulic Wastewater Model
- ESRI Field Data Collection
- Function Service Report
- Guideline for Well Efficiency Tests for Municipal Supply Wells
- TOR for Water Resources Investigations for Development Applications
- Standard Drawings (1-X-X, 2-X-X, 3-X-X and Appendix D for Sewage Station Design Standards
- Excess Soil Guidelines
- Transit Project Assessment Process (TPAP)
- Guidelines for Hydrogeologic Assessment and Reporting Requirements
- Public Works – Design, Specifications and Procedures Manual, Vertical CAD Standards including Draft 3D Standards
- Public Works – Design, Specifications and Procedures Manual, Linear Infrastructure CAD Submission Requirements Capital Works
- Environmental Assessment Process
- Supplementary General Conditions – CCDC2 and CCDC 4
- Indigenous Consultation Guideline
- Permit to Take Water Guideline
- Geotechnical Guidelines

- ESA and Record of Site Condition Guidelines
- Public Works, Design, Specifications & Procedures Manual, Linear Infrastructure, Peel Roads and Traffic
- Public Works Stormwater Design Criteria and Procedural Manual
- Public Works, Watermain, Storm Sewer and Sanitary Sewer Design Criteria Addendum, Linear Infrastructure within Proximity of an Electrified Light Rail Transit (LRT) System
- Public Works, Design, Specifications & Procedures Manual, Linear Infrastructure, Peel Roads and Traffic

10.2.2. Guidelines, Standards, Codes, Statutes and Regulations

The following list of guidelines, standards, codes, statues and regulations are provided as a guide only and is not to be considered an exhaustive list:

- American Society of Civil Engineers (ASCE) Standard 38-22 “Standard Guideline for the Collection and Depiction of Existing Subsurface Utility Data”
- American Concrete Institute (ACI)
- Ontario Electrical Safety Code (OESC)
- Ontario Provincial Standard Specifications (OPSS)
- Canadian Standards Association (CSA)
- Canadian General Standard Board (CGSB)
- CSA Certificate Standards and Electrical Bulletins
- CSA Code Z462 latest edition – Workplace Electrical Safety
- Occupational Safety and Health Act (OSHA)
- Ontario Building Code
- Ontario Traffic Manual Book 7 – Temporary Conditions
- Environmental Protection Act
- Ontario Water Resources Act
- Safe Drinking Water Act
- Clean Water Act
- Navigable Water Act
- NFPA 820 Standard for Fire Protection in Wastewater Treatment and Collection Facilities
- American Society of Mechanical Engineers (ASME) standards and specifications
- American Society for Testing and Materials (ASTM) standards and specifications
  American Water Works Association (AWWA)
- American National Standards Institute (ANSI) standards and specifications

10.3. Engineering Reports from Peel

Peel will provide the Project Lead with a copy of all pertinent reports that are applicable to the projects. This typically could include:

- Development Reports related to the project
- Engineering reports related to the project, such as previous preliminary design and or Detailed Design reports, “As-Constructed” drawings, condition assessments, Operations and Maintenance Manual, etc.
- MEA Class Environmental Study Report or Project File
- Geotechnical and hydrogeological reports
- Designated Substances Surveys
- Utility Servicing Report or Connection Agreements for Power Supply
- Other reports as applicable

Project Leads shall be responsible for review of all information provided by the Region as part of the scoping package or procurement document. Project Leads shall take a proactive roll in identification of other records and information that may be valuable to the project being delivered. At the start of the project and during project delivery Project Lead’s are responsible for providing requests for information for this information when required. Requests for information should make clear what information is being sought and what its intended use is. Project Leads shall independently review and ensure the information being requested is not available to them and should ensure that they are not requesting information that may be available through other Region records or databases available to Project Leads. Project Leads should ensure the Regional Project Manager or Sponsor is aware of any risks associated with the lack of the records being sought. Risk registers should be updated with this information, as it becomes available, and in all cases lack of records and the risks associated should be adequately addressed during design and/or provisions included in capital contracts to address the risks associated with the missing records.

The Project Lead shall note that changes may have been made to the infrastructure over time that may not have been captured in record documents. Prior to commencement of the preliminary design, the Project Lead shall review the existing background information, as well as actual onsite conditions to confirm if changes or omissions in the area of the work being completed deviates from record conditions. The Project Lead shall record their findings and advise Peel’s Project Manager/Sponsor of any significant changes or omissions identified.

Failure to identify onsite conditions that are a result of local conditions not matching records is the complete responsibility of the Project Lead. Any re-work required to be completed due to failure to identify onsite conditions that have changed when compared to records is the responsibility of the Project Lead and external Vendors shall note no additional costs will be considered for re-work if required. This includes the completion of additional physical investigations, surveys and any other re-work required. Condition changes that arise during design shall be identified by the Project Lead as soon as they become aware of the change in conditions. Applicable scope change documentation should be completed to ensure the change is identified, acknowledged and any revisions in approach or scope required to manage the unexpected change in conditions resolved as quickly as possible.

10.4. Supporting Investigations and Data Collection

The Project Lead shall identify, coordinate, prepare terms of reference and ensure proactive management of all necessary field investigations, including coordination with internal and external parties and issues resolution. This shall also include, once the investigations are underway, active Vendor Project Management including minutes and notetaking and invoice reviews if required, on behalf of the Region. Peel Project Managers/Sponsors for external projects shall coordinate, with their Project Vendors support, the procurement and subsequent award of investigation assignments under the work being completed. The Vendor retained by the Region shall be responsible for technical and procurement document preparation. The Vendor shall be responsible for administrative and technical support from the Peel Project Lead as required and requested. This support includes preparation and development of the investigation's technical scope of work as well as procurement document preparation (RFP's, RFQ's or RFT's).

Project Leads shall be responsible for review and incorporation of any information arising out of field investigations completed and are responsible for ensuring the investigations meet the project's needs. The Project Lead shall be responsible for indicating to the Regional Project Manager/Sponsor any investigations or data collection required not identified by the original scoping document or procurement document. An explanation as to the benefits of the additional investigation work/data collection and the risks associated with not completing the additional work shall be provided along with a quote to add the additional investigations to the base scope included in the original procurement document. Changes in scope should be formalized through Engineering Scope Changes as required. shall be provided to the Regional Project Manager or Sponsor by the Project Lead.

Field investigations associated with preliminary/detailed design, or any other assignment as outlined in the procurement document or project scope document will for the most part be completed through separate agreements and procurement processes unless specifically noted within the procurement document/scope document associated with the project. In many cases the Region has existing rosters or procurement processes in place to engage experienced and qualified Vendors to perform the required investigations. Where the Region does not have existing roster or procurement processes to engage Specialist Vendors to perform the required services, an RFP, RFT or RFQ will need to be used to secure the necessary services. It should be noted that field investigations referenced here do not include routine (including confined space entry when required) confirmation of field conditions, review and confirmation of background information or day to day regular engineering-based tasks required to complete the detailed design, preliminary design, study, analysis or other assignment as detailed in the procurement document associated with the project.

Project Leads preparing RFP's, RFT's, RFQ's etc. for external project assignments need to pay special attention to the specific requirements of their projects and should ensure the procurement document being prepared includes the necessary details for Vendors to have a complete and clear understanding of what investigations need to be completed outside of their base scope and how the services to complete the investigations are to be secured. Detailed lists of what investigations needs to be included and what procurement method will be required to secure the services to complete the required investigations should be included in all documents. Included in this assessment needs to be how the services will be paid for under the assignment. Clear indication within the procurement document prepared to secure external Vendor support is required if the investigation work is to be included in the base assignment fees for the external Vendor. Inclusion of separate items in the procurement document Pricing Form, including where required allowances, is encouraged to ensure separate unit pricing of the investigations is included. In addition, this provides clear indication to external Vendors which investigations are to be included in their base scope fees and which will be paid for out of allowances or contingency amounts. Where use of existing rosters is intended costs will be paid directly to the Vendors by the Region. Failure to include a complete list of investigations to be completed inside base fees and outside of the base fees can result in confusion and challenges in project scoping and project budgets. For internal projects the Project Lead shall consider the same when producing the project charter and when the project budgets are being assessed and confirmed to ensure suitable project funds are available to pay for the investigations.

The Project Lead is to carry specialist firms or subconsultants (Geotechnical, Hydrogeological, Environmental, etc.) as required to successfully deliver all design services and design support services related to their project as per the procurement document scope, unless the scoping document or applicable procurement document specifies that these are to be retained through a separate procurement process or through an existing roster.

The Project Lead will not be permitted to transfer the responsibility for preliminary or detailed design in any way to third party vendors through the procurement process associated with completion of investigations unless specifically agreed to in writing by the Region's Project Manager/Sponsor.

For investigations to be completed outside of the Vendors base fees, the Project Lead shall be responsible for costs and services related to field investigation procurement, procurement document production/development, administration, analysis and recommendations on award. Fees for all these activities shall be included in the Vendor's base fees. The Project Lead shall prepare procurement documents according to Peel's requirements and templates and shall clearly define the scope and Region's expectations to ensure a qualified team with the necessary capabilities, knowledge and resources is retained. The procurement documents shall include if applicable supplementary requirements such as traffic management and control, permit/approval application, utility location, supervisory requirements, laboratory testing services, ongoing monitoring/maintenance, and restoration of areas to original or better conditions. The Project Lead shall structure the procurement document prepared to include unit prices and allowances for provisional scope items and shall recommend an appropriate contingency amount for field changes or impromptu services rendered. The Project Lead shall note that the procurement documents must be submitted to and approved by Peel's Procurement Department. The Project Lead's schedule shall allow for three (3) weeks for Peel's Procurement Review.

Following award of the investigation work the External Vender is also primarily responsible for project management, coordination, issue resolution, meeting and workshop logistics and minute taking. Costs associated with these activities shall be incorporated in the Project Lead's base fees.

10.4.1. Topographic Survey

When required in the scoping document, the Project Lead shall undertake a full topographic site survey of the proposed alignment/site, proposed limits of construction, existing facilities and study area in support of the detailed design. All surveys and base plans are to be completed

in accordance with Peel's current Public Works applicable CAD Standards and Guidelines. Peel staff preparing procurement documents for external Vendor support should clearly indicate within the procurement document being prepared which CAD standard shall be utilized for the project. The Project Lead shall be responsible for all surveys required to complete the design and shall not rely solely on existing surveys or data.

The Project Lead shall provide the following minimum surveying scope:

- Surveys must be integrated into the existing horizontal and vertical control network and must be geographically referenced to the Ontario Coordinate System UTM NAD83 ORG or as superseded by requirements included in the applicable CAD standard.
- Vertical elevations should be reported relative to the Geodetic Survey of Canada (GSC_ datum, 1978 Southern Ontario adjustment) or as superseded by requirements included in the applicable CAD standard. All elevations are Geodetic.
- The survey must be checked and documented to a minimum of three (3) known integrated control monuments in the perimeter of the survey area. Where geographically separate areas are included in an assignment, separate control points located with the contract limits for the individual contracts shall be checked and provided as project level survey controls.
- Provide project level controls including control point and benchmark information in accordance with Peel's coordinate and adjustment standards based on the completed survey work. Project control information from the surveys completed shall be provided as part of all capital contracts to ensure capital work completed uses the same coordinate systems established by the Vendor as part of their design work.
- Total Station or GPS surveys are acceptable. GPS may only be used if the equipment is survey grade and capable of 1-2cm horizontal accuracy and +\-5-9mm vertical accuracy. GPS survey must not be used for precise elevations if required.
- Use of Aerial Surveys or Drone surveys shall not be considered acceptable unless specifically allowed by the procurement document or unless written authorization by the Regional Project Manager/Sponsor is provided. Should Aerial or Drone surveys be completed accuracy on par with traditional survey methods shall be provided.
- Where deviations in record information (as-builts, hydraulic or other Region owned models etc.) and new survey data are encountered, the Project Lead shall send to the Project Manager/Sponsor written details of the deviations and the new data. In addition, all survey details including horizontal and vertical control data used and checked as part of the survey completed shall be provided. Risks associated with the

deviations are to be discussed and Project Leads shall ensure the Regional Project Manager/Sponsor is aware of all deviations. Failure to identify and resolve discrepancies related to surveys is the sole responsibility of the Project Lead including costs where applicable.

Horizonal Standard is:

- Projection space – 6 degree – Universal Transverse Mercator (UTM)
- Zone-17 – North
- Central Meridian – 81 degrees west
- Geodetic Datum: North American Datum – 1983 Adjustment (NAD 83 ORG)

10.4.2. Legal Surveys

Where identified in the scoping document, the Project Lead shall undertake, or prepare a TOR for a third-party vendor to undertake, legal surveys as necessary for property acquisition or easements. Legal surveys are to be completed by a Professional Land Surveyor registered with the Association of Ontario Land Surveyors.

Project Leads shall coordinate all requirements with the Region's Real Estate Staff assigned to the project. Project Leads shall be responsible for preparing background information, sketches and drawings to support the production of the necessary legal surveys. These sketches should include details such as dimensioning, area calculations and any other information requested by the Region's Real Estate Staff for the support and coordination of property acquisition. Costs associated with the production of these sketches, background information or drawings shall be considered part of the Project Lead's fees and no separate payment for this shall be provided.

Peel staff preparing procurement documents should clearly identify within the procurement document prepared both what the scope of work for the project is related to the need for actual Legal Surveys and R-Plan production and are reminded to include appropriate unit pricing or allowances within the pricing form associated with the procurement document in question.

Where requirements for the production of R-Plans is included in a Vendors scope all aspects of the development, submission and filing of the R-Plan shall be included in costs supplied by the Vendor.

10.4.3. Subsurface Utility Evaluation

When specified in the scoping document, the Project Lead shall undertake or prepare a TOR for subsurface utility engineering (SUE) investigations as required for the project scope. The Project Lead shall be responsible for the collection of all utility data in accordance with the (ASCE) Standard 38-22 “Standard Guideline for Investigating and Documenting Existing Utilities”.

SUE investigations may be included as a field investigation to be paid for out of applicable allowances when indicated by the procurement document for the project being completed. Peel Project Leads preparing procurement documents should clearly indicate whether the SUE investigation is to be completed as part of the Vendor’s base fee’s, separate from the Vendor’s contract work or through an allowance or other separate pay item on the pricing form. Where included and where not specifically indicated to be paid for out of an allowance or unit cost Vendors shall include costs to perform the necessary SUE work as part of their base fees.

Unless otherwise noted any SUE work completed as part of preliminary design work shall be completed to Quality Level B as per ASCE 38-22.

For detailed design assignments Quality level B as per ASCE 38-22, shall be completed for the project area.

Any utilities located within 1m of any new planned assets or anticipated temporary work locations (shafts, trench limits etc.) shall be located to Quality Level A as per ASCE 38-22. Following receipt of the initial SUE investigation work completed to quality level B the Project Lead shall carefully review the draft Composite Utility Plan provided and shall provide to the Regional Project Manager/Sponsor a marked-up plan showing where Quality Level A work is proposed to be completed. Agreement from the Regional Project Manager/Sponsor on the location and quantity of Level A SUE work required should be agreed to.

Upon completion of any Quality Level A work the Composite Utility Plan should be reviewed in detail updated as required with new or revised information and finalized. Copies of the Composite Utility Plans should be provided in both raw CAD format (.dgn) and .pdf as separate stand-alone records. All drawings to be completed to Peel Public Works CAD standards. Project Leads are responsible for updating preliminary drawings, plan and profile drawings, yard piping plans, utility plans, site plans and any other impacted drawings or reports with the data obtained from the SUE work completed.

Draft and finalized composite utility plans shall be provided as well as embedded in a utility report as per ASCE 38-22 summarizing all findings. A utility report shall be provided with each investigation and where Level A work is completed individual utility data record sheets with

information collected through the Level A exploratory work shall be included on the utility data record sheet. Final versions of drawings and the utility report shall be signed and sealed by an Engineer licensed to practice in the Province of Ontario.

Regional Project Leads preparing procurement documents should include in all cases provisional items covering costs associated with Quality Level A work as per ASCE 38-22. Quality Level A work required should not be carried under base fee scope as the quantity and specifics of the amount of test pits is difficult to predict until the completion of an SUE investigation to Quality Level B is completed. Where Quality Level A work is included as base scope or as a lump sum special attention to baseline quantities and details must be included in the procurement document prepared.

10.4.4. Pre-Condition Assessment and Surveys

Where identified in the scoping document, the Project Lead shall undertake, or prepare a TOR for a third-party vendor to undertake, Pre-Condition Surveys/Assessment. Surveys shall be completed by a specialist firm and are intended to be used in the defence of construction-related damage claims.

Surveys shall include coordination with property owners for permission to enter private property, exterior and interior inspections, photographs and written documentation of all observations.

Peel staff preparing procurement documents shall clearly indicate the scope of work required for this and should include appropriate pay items if the work is to be considered base scope. Where the TOR approach is selected the Project Lead should ensure a suitable allowance to pay for this work is included in the pricing form attached to the procurement document being prepared. Geostructural Assessment

Where identified in the scoping document, the Project Lead shall undertake, or prepare a TOR for a third-party vendor to undertake, a Geo-structural Assessment. The assessment shall include all existing structures (buildings, bridges, culverts, retaining walls, signage and all other features of interest) potentially impacted by the project. Where structures are to be crossed or potentially impacted (within the zone of influence of the planned works), the Project Lead shall review the existing structure's condition and construction methodology to ensure their design addresses protection of the existing structure.

Geostructural review and assessment report should be submitted at the 90% Detailed Design milestone. Should anticipated means and methods or other changes in design occur after the

assessments are completed review of the work previously completed should be undertaken to ensure its relevance. Project Leads shall confirm they have reviewed these assessments and provide this confirmation to the Peel Project Manager/Sponsor before the submission of any Issued for Tender documents. Geostructural Assessments shall include at a minimum:

- Assessment of each structure for age, condition, risk and vulnerability to damage during construction
- Assessment and prediction of potential impacts such as settlement and movement based on the original design and construction of the asset being assessed as well as the predicted or prescribed means and methods of construction of the works being designed
- Recommended procedures for protection during construction
- Recommendations for structure replacement and/or rehabilitation
- Where required, incorporate into the detailed design the requirement to protect the structures during construction.

Peel staff preparing procurement documents shall clearly indicate the scope of work required for this and should include appropriate pay items if the work is to be considered base scope. Where the TOR approach is selected the Project Lead should ensure a suitable allowance to pay for this work is included in the pricing form attached to the procurement document being prepared.

10.4.5. Geotechnical and Hydrogeological Investigations

10.4.5.1. General

Where identified in the scoping document, the Project Lead shall undertake, or prepare a TOR for a specialized third-party vendor to undertake geotechnical, hydrogeological and associated investigations to assist in the Preliminary Design, Detailed Design or study being completed.

The Project Lead shall be responsible to review and approve final reports prepared by a third party, to be used in the preliminary and detailed design of the project.

Peel staff preparing procurement documents shall clearly indicate the scope of work required for these elements and should include appropriate pay items if the work is to be considered base scope. Where the TOR approach is selected the Project Lead should ensure a suitable allowance to pay for this work is included in the pricing form attached to the procurement document being prepared.

10.4.5.2. Geotechnical Investigation

Geotechnical investigations and reports shall be suitable for design and construction purposes. Projects involving tunnelling may require more extensive investigations.

The investigation will include at a minimum, the following:

- Geotechnical services including boreholes and test pits as required, satisfying the design requirements and geotechnical interpretation and analysis based on the data gathered as part of the investigative services.
- Soil sampling, including but not limited to:
    - Soil corrosivity
    - Grain size analysis
    - Chemical analysis for all boreholes
    - Environmental soil samples in accordance with current regulations
- Investigation summary requirements (as applicable to scope of work):
    - Soil classifications
    - Depths of overburden
    - Type and hardness of bedrock (if applicable)
    - Static groundwater elevations (4 per year)
    - Bearing capacity of soils
    - Slake (durability) testing
    - Packer testing
    - Seismic testing
    - Cerchar testing
    - Uniaxial compressive testing
    - Triaxial shear testing
    - Recommendations for soil parameters used in design of retrained joints
    - Recommendation of pipe bedding requirements
    - Recommendations for trench excavations and backfill materials
    - Detailed recommendations for all trenchless crossings
    - Detailed recommendations for settlement and vibration monitoring suitable to any internal or external stakeholders that may be impacted by the proposed works
    - Recommendations for driveway, roadway and parking lot pavement design and granular sub-base

- Ground settlement calculations
- Recommendations for typical shoring designs
- All restoration works as part of the investigative services
- Recommendations for excess soil management

Work completed shall be summarized in a Geotechnical Data Report and Geotechnical Memorandum(s) of Design. Finalized versions of all reports and memorandums shall be signed and sealed by Engineers Licenced to Practice in the Province of Ontario.

Where GBR's are being utilized on a project, special care and concern to coordinate the information contained in all geotechnical reports and memorandums including the GBR do not conflict or contradict with one another must occur. Coordination between documents and the information provided should be coordinated within the reports as per the recommendations contained in the ASCE Geotechnical Baseline Reports for Construction Guidelines.

Hydrogeological Investigation

Hydrogeological investigations and reports shall be suitable for design and construction purposes. Projects involving tunnelling may require more extensive investigations.

The Project Lead shall be responsible to review and approve final reports prepared by a third party, to be used in the preliminary and detailed design of the project.

Peel staff preparing procurement documents shall clearly indicate the scope of work required for these elements and should include appropriate pay items if the work is to be considered base scope. Where the TOR approach is selected the Project Lead should ensure a suitable allowance to pay for this work is included in the pricing form attached to the procurement document being prepared.

The investigation will include at a minimum, the following:

- Hydrogeological services including monitoring wells and piezometers as required, satisfying the design requirements and hydrogeological interpretation and analysis based on the data gathered as part of the investigative services.
- Groundwater sampling and analysis, including but not limited to:
  - Chemical analysis
  - Slug testing
  - Groundwater level monitoring (12 months from well installation)
- Investigation summary requirements (as applicable to scope of work):
  - Assessment of anticipated dewatering rates

- Recommendation of dewatering techniques
- Recommendations for groundwater treatment and discharge
- Dewatering water quality monitoring and mitigation plan
- All required information and reporting to support a Permit to Take Water (PTTW) or Environmental Activity and Sector Registry (EASR) application, as applicable

The Project Lead shall be responsible for ensuring that all monitoring wells and other field installations are removed at the end of the construction phase either by the third-party specialist firm that installed them or the Contractor.

Work completed shall be summarized in a Hydrogeological Report. Hydrogeological Reports should not be amalgamated with Geotechnical reports or memorandums unless approved in writing by the Region's Project Manager/Sponsor. Finalized versions of all reports and shall be signed and sealed by an Engineer or Professional Geoscientist Licenced to Practice in the Province of Ontario.

Where GBR's are being utilized on a project, special care and concern to coordinate the information contained in the Hydrogeological reports including the GBR do not conflict or contradict with one another must occur. Coordination between documents and the information provided should be coordinated within the reports as per the recommendations contained in the ASCE Geotechnical Baseline Reports for Construction Guidelines.

10.4.5.3. Geotechnical Baseline Reports (GBR)

Where identified in the scoping document, the Project Lead shall prepare, or prepare a TOR for a third-party vendor to prepare a Geotechnical Baseline Reports(GBR) in accordance with the recommended practices as outlined in the American Society of Civil Engineers (ASCE) Suggested Guideline Document "Geotechnical Baseline Reports for Construction", most recent version).

A draft GBR shall be included with the 90% submission. Following production of the draft GBR the Project Lead shall arrange a workshop with the Peel Project Manager/Sponsor, the Project Lead, the Geotechnical and Hydrogeological Vendors and any other specialists required to review the GBR in detail. The GBR author shall review each baseline provided with all attendees and shall provide as part of the review backup data and the risk assessment associated for associated baseline. The intent of the workshop is for all parties to review the necessary details and background information associated with each baseline and for the Peel Project Manager/Sponsor to have a clear understanding of the risk profile of each baseline.

Following completion of the workshop, the GBR shall be finalized and a final copy of the project GBR shall be provided with the 100% Design Package.

The Project Lead shall be responsible to review and approve the final report prepared by the Third-party Vendor.

Peel staff preparing procurement documents shall clearly indicate the scope of work required for these elements and should include appropriate pay items if the work is to be considered base scope. Where the TOR approach is selected the Project Lead should ensure a suitable allowance to pay for this work is included in the pricing form attached to the procurement document being prepared.

10.4.6. Environmental Site Assessment (ESA)

Where identified in the scoping document, the Project Lead shall undertake, or prepare a TOR for a third-party vendor to undertake, Environmental Site Assessment(s). All Environmental Site Assessment(s) shall be completed according the following requirements:

- Phase I or Route ESAs shall be completed in general accordance with CSA Z768-01
- Phase II or Route ESAs shall be completed in general accordance with CSA Z769-00
- ESAs completed for the Agency must be completed so as to ensure a “full reliance” on recommendations of the report
- All ESA work will be completed in accordance with O. Reg. 153/04 (as amended by O. Reg. 511/09, and any other future amendments)

The Project Lead shall be responsible for ensuring that all monitoring wells and other field installations are removed at the end of the construction phase either by the third-party specialist firm that installed them or the Contractor. Timings of removals should be tied to the installations need during construction. Where possible all installations should be removed prior to construction where not required.

All Environmental Site Assessment work and reporting should be completed by the 50% Design milestone to ensure important details are not realized during later stages of design, when rework may be required and schedule slippage may occur.

Draft versions of reports should be submitted for review by the Project Lead and the Region Project Manager/Sponsor. Finalized reports shall be submitted to the Project Lead and Region Project Manager/Sponsor. Work completed shall be summarized in stand alone reports. Finalized versions of all reports shall be signed and sealed by an Engineer or Professional Geoscientist (as applicable) Licenced to Practice in the Province of Ontario.

Peel staff preparing procurement documents shall clearly indicate the scope of work required for these elements and should include appropriate pay items if the work is to be considered

base scope. Where the TOR approach is selected the Project Lead should ensure a suitable allowance to pay for this work is included in the pricing form attached to the procurement document being prepared.

10.4.7. Tree Inventory and Arborist Report

The Project Lead shall be required to carry and utilize the services of an experienced Arborist or Landscape Professional to perform tree inventories and tree surveys as well as associated assessments and recommendations. The Landscape professional responsible for signing and sealing reports and drawings associated with this scope of work are required to be good standing as one of the following:

.1 ISA Certified Arborist;

.2 ISA Board Certified Master Arborist;

.3 Ontario Qualified Arborist;

.4 Registered Professional Forester; and

.5 Registered consulting arborist with the American Society of Consulting Arborists.

Project Leads shall be responsible for the production of the documents outlined below as per City of Mississauga Standards and Bylaw requirements. Works completed in other areas of Peel outside of Mississauga shall produce the noted reports to Mississauga standards unless otherwise indicated by the scoping document or procurement document. Special care and attention shall be given and considered when working within property owned and regulated by conservation authorities to ensure the deliverables outlined below not only meet City requirements but also conservation authority requirements.

Deliverables required under this scope of work are:

- Arborist Tree Preservation and Protection Report
- Tree Inventory Document
- Tree Preservation and Protection Plans

In addition, the Project Lead shall prepare detailed design engineering landscaping and streetscaping plans along the proposed infrastructure routes to support detailed design and construction. Areas requiring these plans may include but are not limited to construction compounds, shaft locations, staging and laydown areas, open-cut sections and any areas where existing landscaping/streetscaping/topography will be affected by the project.

10.4.8. Electrical Servicing

The Project Lead shall contact the power utility to establish if any new servicing requirements and connection agreements are needed for the site/project. The Project Lead shall also coordinate any servicing applications or amendments to existing agreements as related to electric power distribution. The Project Lead's scope for utility servicing investigations shall include the following:

Greenfield Projects:

- Coordination with the utility on behalf of Peel to establish the electrical utility servicing requirements
- Completion of the utility application documentation for a new service, and provide the necessary information
- Meeting with the utility representatives at the site, as required to confirm the scope of the new service
- Identification of utility costs associated with the new service
- Identification of scope that is associated with the Contractor for the project
- Arrangement of regular meetings with the utility for projects with substations owned by Peel

Retrofit Projects

- Contacting the utility to upgrade the existing electrical service, as required, if the retrofit scope loads exceed the current service rating
- Identification of utility Costs associated with the upgrade service
- Identification of Scope that is associated with the Contractor for the project

Emergency Power Parallel Generation

- Submission of a customer impact assessment (CIA) application for emergency generators used in Region Standard Parallel Generation applications
- Development and submission of a System Impact Assessment (SIA) for large parallel generation applications

10.5. Preliminary Design

10.5.1. General Preliminary Design Report Requirements

The Project Lead shall prepare a Preliminary Design Report (PDR) in accordance with the requirements as specified in the sections below. The PDR, when completed and signed-off by all parties will be the basis on which the Project Lead shall prepare the detailed design. Sign-off must be obtained from Peel prior to the Project Lead proceeding to detailed design. General requirements for the PDR include the following:

- Submission of a report outline to Peel for approval prior to developing the report.
- Signing and stamping of the final PDR by a Professional Engineer licensed in Ontario.
- Refer to Section 1 (General Requirements), Section 2 (Project Management and Quality Control), Section 3 (Health and Safety), Section 4 (Permits and Approvals) for other project requirements related to the preliminary design phase.

Generally speaking, the Region considers Preliminary Designs to be a 30% Design Milestone.

10.5.2. Preliminary Design Report for Linear Infrastructure

For linear infrastructure projects, as a minimum, the PDR shall include the following:

- Background information
- Project scope
- Design criteria and preliminary design calculations
- Basic design data as required by permits and approvals
- Any deviations from Peel's standards (refer to Appendix 1 for the Deviation Request Form)
- Plan and Profile Drawings including:
    - Preliminary horizontal and vertical alignments
    - Locations of proposed maintenance holes and connections
    - Locations of proposed hydrants, valves, valve chambers and interconnections
    - List of valves and equipment
    - Locations of drop structures
    - Trenchless construction methods and shaft locations, if applicable
    - Property requirements (temporary and permanent easements)
    - Interconnections with facilities
    - Access routes and staging plans

- Basic Structural design of chambers
- Any electrical and I&C/SCADA design considerations
- Impacts on existing utilities and identification of required utility relocations
- Constructability
- Site surveys, condition assessments, geotechnical investigations, and other specialized studies delineating all site issues and construction requirements including designated substances survey as required
- Hydraulic modelling and transient analysis results as required by the project.
- Stormwater management, erosion and control requirements
- Preliminary Traffic Management Plan during construction, identify need for and probable duration of closures/lane modifications
- Cost Estimates
- Construction Schedules
- Capital Phasing and Implementation Plan as well as required budgetary approvals schedule

10.5.3. Preliminary Design Report for Facilities

For facility projects, as a minimum, the PDR shall include the following:

- Background information
- Project scope
- Basis of design
- Any deviations from Peel's standards
- Hydraulic analysis and considerations for the design
- Plans and sections of the proposed/upgraded facility and equipment
- Site surveys, condition assessments, geotechnical investigations, and other specialized studies delineating all site issues and construction requirements including designated substances survey as required
- Stormwater management, erosion and control requirements
- Detailed process design and sizing calculations for all works
- Recommendations on pre-selection or pre-purchase of process equipment, where applicable
- Draft process control narrative (PCN) and operating philosophy
- Automation and Control system requirements for proposed facility including integration with existing SCADA system

- Equipment list
- Description of heating, ventilation and air conditioning systems
- Description of electrical systems
- Implementation strategy and scheduling of construction works to minimize impact on the operation of the existing facility including details on critical shutdowns and tie-ins, including bypass requirements (see Appendix 29)
- Details of all major process isolations required for the project including for electrical, process, and any other systems requiring facility shutdowns
- Approval requirements per Section 5.
- Cost estimates of the proposed construction works including all engineering costs, permits, etc.
- Operation and maintenance cost estimates of the infrastructure including detailed breakdown of estimates
- An O&M Skills/Competency Gap Analysis outlining operations staff competency and licensing requirements to operate the infrastructure
- Anticipated noise and odour pollution sources together with distances from the points of emission to the property lines and the nearest private residence
- As a minimum, the following drawings are required to be submitted with the PDR:
    - Site base mapping and layout plans
    - Layout of all process and non-process facilities
    - Site grading and landscaping
    - Architectural elevations and floor plans
    - Layouts of all buildings and structures
    - Building sections
    - Hydraulic profiles
    - Process flow diagrams
    - Major piping layouts
    - Preliminary plumbing, HVAC, mechanical, plan and roof drainage layouts
    - Single Line Diagrams
    - Electrical room and site layouts
    - Process and Instrumentation diagrams
    - SCADA architecture drawings

Refer to Peel's PAIDS for details on I&C and SCADA design requirements.

- Capital Phasing and Implementation Plan as well as required budgetary approvals schedule

10.5.3.1. Process Design

The following process design elements shall be covered in the PDR:

- Hydraulic profile and identify all major units operating liquid levels. All assumptions used in the calculations of the hydraulic profile must be included.
- Equipment list and data sheet including design sizing calculations, production information, etc.
- Process flow worksheets showing design sizing calculations for piping, control valves, tankages, process air requirements, etc.
- Preliminary process plans and sections showing equipment layout and considering access, clearance and equipment support for installation, removal and operation and maintenance for each piece of equipment and process unit.
- Recommendations on pre-selection or pre-purchase of process equipment, where applicable.
- A schedule of area classifications and hazardous and confined area/spaces for each area of the facility.

10.5.3.2. Civil Design

The Project Lead shall complete the civil design incorporating information from all surveys, as-built and record drawings, and field investigations and confirming the design basis for all civil/linear infrastructure. Civil plan(s) shall be developed including site grading, erosion and sedimentation control and stormwater management, yard piping, road layout and traffic circulation plan, fire routes, and parking requirements. The Project Lead shall identify infrastructure tie-ins including sanitary and storm sewers, forcemains, potable watermains, gas and electrical. The civil plan(s) shall also identify potential utility conflicts. Plan and profile drawings are to be provided illustrating crossings of existing infrastructure.

10.5.3.3. Structural Design

The structural design is to be developed to accommodate the process, mechanical and/or electrical/I&C design infrastructure requirements for the project. The structural design shall incorporate the findings and recommendations of the geotechnical and hydrogeological investigations with respect to foundation design. The recommended types of structural materials to be used in the design shall be identified in the PDR.

10.5.3.4. Architectural Design

The architectural design is to establish architectural building footprints for the project and identify landscaping requirements. A building code compliance check is required at this stage to identify design requirements including materials, fire and life safety systems, access/egress and area classifications. The architectural design at the preliminary designs stage includes the development of layouts and elevations for major buildings including building forms, materials and colours. Building accessibility requirements are to be reviewed and verified.

Details of all internal and external architectural finishes including special finishes, e.g., water proofing, are to be provided.

Major landscaping features are to the identified in the design.

10.5.3.5. Electrical Design

The Project Lead shall provide the following details for the proposed electrical system:

- Any new servicing requirements and connection agreements for the site/project.
- Subject to the size and servicing requirements of the site, the need for additional electrical studies to support the design of the primary distribution system including ground resistivity, ground potential rise, and ground grid analyses.
- An electrical site plan identifying the electrical power supply source and connection details to the facility. This includes details on the location of transformers, standby power (if required) and switchgear, the site power distribution routing and whether these are through conduits, trays or duct banks.
- Complete motor list including description of equipment, power requirement, phases, cycle, type, location and direction of rotation. Include all electrical power supply and equipment power demand requirement calculations performed in the preparation of the PDR
- Assessment of the frequency and the time of power outages from local power supply system to determine if emergency standby power should be provided. If required, determine capacity and installation cost. In all cases, compare diesel to natural gas-powered standby generators and recommend accordingly with respect to project requirements such as noise, exhaust air emissions, etc.
- Single-line diagram(s) showing proposed electrical power supply to all equipment.
- Single-line Motor Control Centre (MCC) drawing(s) incorporating all motors integrated with the various MCC’s, including elevations showing arrangements of each unit. Determine appropriate provisions for future loads.

- Preliminary list of 120 V loads and corresponding lighting panels
- Detailed lighting schedule(s) including areas with multiple lighting levels and control systems. Include description of emergency and exit lighting equipment and locations
- Detailed description of fire alarm system, supervised monitoring, and remote status integration with the SCADA system

10.5.3.6. Instrumentation and Controls & SCADA Systems Design

The instrumentation and controls (I&C) design shall define instrumentation and I/O requirements for the design in addition to network and communications system strategies. The PDR shall include a preliminary process control strategy and preliminary process control narratives for each process unit. A preliminary submission of the process control narrative is to be submitted for review prior to submission of the draft PDR.
Process & Instrumentation flow diagrams (P&ID) showing schematic depiction of equipment, piping, valves, instrumentation etc. shall be developed. The P&IDs shall include all ancillary systems such as process air, etc.

All aspects of the I&C and SCADA design shall be compliant with Peel's PAIDS.

10.5.3.7. Heating and Ventilation Design

The Project Lead shall include details on the proposed heating, ventilation and air conditioning system. As a minimum, the following are required in the PDR:

- Room schedule, seasonal temperature objectives, minimum ventilation requirements, heat dispersion ventilation requirements, pressurization (negative or positive) and special classifications
- Fan schedule, including equipment listing of all units, throughput capacity, static pressure and electrical motor sizing
- Control schematics for each fan
- Duct and louvre schedule to be completed for each area including calculations of duct and ventilation equipment sizing
- Capacity, type, location and performance parameters for odour reduction treatment systems (if applicable)
- Description and sizing of the heating system. For hot water heating systems, include boiler sizing, re-circulation and booster pump capacities, unit heaters, etc.
- Provide details for the Building Automation System (BAS) including its integration to the SCADA system, if required for the project.

10.5.3.8. Ancillary Systems Design

The following ancillary systems are to be included as part of the PDR:

- Facility potable water requirements, frequency of use, flows, pressure and temperature. Provide a schematic flow diagram of facility potable water supply system. Wherever possible water conservation must be practised.
- Facility service (non-potable) water requirements, frequency of use, flows, pressure and temperature. Provide a schematic flow diagram of facility water supply system. Wherever possible the use of service water over potable water must be considered.
- Details of fire protection system, including areas with fire doors, fire dampers, sprinklers system, fire hose cabinets, etc.
- Details of the security system, paging system and other communication systems.

10.6. Preliminary Design Permits and Approvals Review

The Project Lead is to determine the approvals required for the project and coordinate the approval application process. The permits and approvals identified shall be summarized in a Permits and Approvals Tracking Log along with associated details, contact persons and a summary of next steps for each permit or approval required. Tracking log should summarize status of discussions and any pre-approvals or details applicable for when the actual permitting or approval process is completed. It should also clearly indicate contact details for the entity at the permitting or approval agency the pre-consultation occurred with. Is it essential to provide as appendices to the log, copies of any final or summary correspondence between the Peel Project Lead and the permitting or approval Agency. This is required to avoid unnecessary delays or issues once the permits or approvals are sought to be obtained during detailed design IFT packager preparation.

Pre-consultation is required with regulatory agencies. The Project Lead is to identify the schedule for obtaining all required approvals. Refer to **Section 5** for further details and a general list of regulatory agencies. See Appendix 9 for sample Approval Log.

On completion of the PDR, the Peel Project Lead should consider commencing pre-consultation with all applicable regulatory and other approval agencies as soon as possible and as required.

10.7. Impacts of Construction

10.7.1. Linear Infrastructure

The Project Lead shall identify the impact of construction works on the operation of existing infrastructure and develop mitigation measures, specifically as it relates to:

- Shutdown requirements of watermains including identification of critical users and communication protocols to affected users
- Temporary watermain requirements
- Bypass pumping requirements for sewers (see Appendix 29B)
- Impacts of Contractor's failure to complete work within the approved shutdown period and mitigation plans
- Traffic and pedestrian management requirements during construction including the need and duration of probable closures, identification of any impacted transit/bus and cycling and/or active transportation routes
- Regulatory agency notification requirements

10.7.2. Facility Infrastructure

The Project Lead shall identify the impact of construction works on the operation of the facility and develop mitigation measures, specifically as related to:

- Critical shutdown requirements of various facility treatment process
- Impacts on process operation and operation modifications required to ensure regulatory performance requirements are met during the shutdown(s)
- Impact of Contractor's failure to complete work within the approved shutdown period and mitigation plans
- Traffic and pedestrian management requirements during construction including the need and duration of probably closures, identification of any impacted transit/bus and cycling and/or active transportation routes
- Regulatory agency notification requirements

10.8. Acceptance of Preliminary Design Report

On completion of the review of the final PDR, Peel will sign-off on the PDR document. At that time, the design will be frozen, and no further changes may be made to the design without the express approval of Peel's Project Manager. Peel assumes no responsibility or liability for any

changes or modifications to the design made by the Project Lead without prior approval by Peel.

10.9. Deliverables

	Description	Submission Requirements
1.	Technical Memoranda – Draft and Final (as required in the scoping document)	Electronic
2.	Request for Tender Documents for all third party subconsultants as required in scoping document (Geotechnical, Hydrogeological, etc.) – Draft and Final	Electronic
3.	Reports from third party subconsultants as required in scoping document (Geotechnical, Hydrogeological, etc.) – Draft and Final	Electronic
4.	Preliminary Design Report – Draft and Final	Electronic
5.	HAZOP/SWIFT Report – Draft and Final	Electronic
6.	Capital Phasing, Sequencing and Implementation Plan – Draft and Final	Electronic

11. Detailed Design

11.1. General

Detailed design includes the production of the detailed contract documents, drawings and specifications used for the tender and construction of the infrastructure project.

The Project Lead shall conduct project site visits and become familiar with the operational requirements and procedures and any process requirements or limitations that will impact the design of the proposed expansion or upgrade works.

The Project Lead shall prepare detailed design documents (including drawings, specifications, cost estimates and other relevant documents) for the works in accordance with the approved PDR. Detailed design submissions to Peel for review shall be submitted typically at the 50%, 90% and 100% level of design. The Project Lead shall comply with Peel's latest Linear Infrastructure and Vertical CAD Standards (as applicable for the project) for drawing production.

11.2. Detailed Design Milestones

11.2.1. Linear infrastructure

This section defines general requirements for the detailed design of linear infrastructure projects. The design shall also conform to standard engineering practices, industry standards, guidelines, codes and regulations.

11.2.1.1. 50% Detailed Design

The following generally outlines the level of detail requirements for 50% detailed design. This design milestone deliverable generally consists of detailed design drawings, specifications, updated capital and engineering cost and cash flow estimates, and an updated risk register for the design. Additional requirements include but are not limited to the following:

- Plan and Profile Drawings:
    - Refined vertical and horizontal alignments
    - Minimum clearances at utility crossings
    - Minimum ground cover
    - Separation distances from existing features as well as protection measures for limited separation scenarios where additional space is unavailable
    - Existing infrastructure including existing valves, chambers and/or maintenance holes
    - Service connection details
    - Draft trenchless/tunneling drawings and details
    - Locations of proposed maintenance holes, drop structures, connections, sizing and details
    - Locations of proposed hydrants, valves, valve chambers, interconnections, sizing and details
    - Vent locations and details
- Demolition/removals plans
- Valve chamber tables showing invert elevations and finished grade elevations
- Updated list of valves and equipment
- Trenchless construction methods and shaft locations, if applicable
- Property requirements (temporary and permanent easements) and submission of Property Impact Plans per Region's CAD standards
- Interconnections with facilities
- Access routes and staging plans

- Structural design of chambers and other structures
- Electrical and I&C/SCADA design details
- Draft Commissioning, Bypass and Connection Sequencing Plans (see Appendix 29A & Appendix 29B)
- Water surveys of buildings that may be affected by the project during shutdowns including where required by the scoping document formal BICP (Business and Institutional Consultation Process) or similar communication protocols
- Updated sewer design sheets
- Updated drainage area plans
- Dewatering requirements
- Draft traffic management and staging plans
- Roadway design and restoration details according to applicable Local Area Municipality and Region Standards
- Draft tree preservation plans
- Draft restoration landscape and planting plans
- Property impact plans and/or property acquisition plans
- Utility relocation requirements and details
- Hydraulic and stormwater modelling
- Constructability reviews

11.2.1.2. 90% Detailed Design

The following generally outlines the required level of detail for the 90% detailed design submission, specifications, updated capital cost and cash flow estimates, and an updated risk register for the design. Additional requirements may include but are not limited to the following:

- Draft Commissioning, Bypass and Connection Sequencing Plans (**For Bypass specifics see** Appendix 29A & Appendix 29B)
- Final sewer design sheets
- Final drainage area plans
- Final traffic management and staging plans
- Final tree preservation plans
- Standard detail drawings

- Soil management plan – prepared by a Qualified Person (QP). The Project Lead is to advise whether soil must be managed in accordance with MECP document "Management of Excess Soil – A Guide for Best Management Practices."
- Construction Testing Requirements technical memorandum – to identify specialized materials and equipment tests required during construction. The Project Lead shall review with Peel staff to determine which tests will be completed internally by Peel – via pre-existing blanket contracts, which are to be included in the construction tender, and which will be done by procuring specialized testing services.
- Plan and Profile Drawings including:
    - Finalized vertical and horizontal alignments
    - Restraint lengths identified on linear infrastructure
    - Identify Safety platforms where required in maintenance holes and chambers
    - Removals and relocations
    - Restoration limits and details
- Survey control points and point of intersection (PI) tables

11.2.1.3. 100% Detailed Design

The final design package is to address all Region comments and prepare the final tender documents to be signed and stamped.

11.2.2. Facility Infrastructure

This section defines general requirements for the detailed design of facility infrastructure projects. The design shall also conform to standard engineering practices, industry standards, guidelines, codes and regulations.

11.2.2.1. 50% Detailed Design

The level of detail for 50% detailed design is generally outlined but is not limited to the requirements outlined in **Table 11-1** below. This design milestone deliverable generally consists of detailed design drawings, specifications, updated capital cost and cash flow estimates, as well as an updated risk register for the design.

Table 11-1: 50% Detailed Design Requirements – Facility Infrastructure

Discipline	50% Detailed Design
Process	Hydraulic profile PFDs Equipment List

Discipline	50% Detailed Design
	Equipment and general layout drawings showing major piping Updated Process Control Narratives Area Classification for each room/area Details for preselected equipment, if applicable Draft specifications
Civil	Site plan Plan and profile of yard piping/utilities Grading plan Draft landscape plan Draft specifications
Structural	Foundation plans and sections Floor and framing plans Draft specifications
Architectural	Building sections and elevations Wall sections and stair designs Architectural materials selection Draft specifications
Building Mechanical/HVAC	Mechanical equipment layout plans Preliminary plumbing plans Preliminary roof and drainage layouts Building Automation System (BAS) design in accordance with PAIDS Draft specifications
Electrical	Single Line Diagrams MCC elevations Load list Electrical site plan Electrical equipment layout plans LDC servicing Power and lighting plans Draft specifications
Instrumentation & Controls	P&IDs Panel layout plans Control loop drawings Communications architecture Draft specifications Tagging List Other requirements defined in PAIDS

11.2.2.2. 90% Detailed Design

The following table outlines the level of detail required for 90% detailed design by discipline. This design milestone deliverable generally consists of detailed design drawings, specifications, updated capital cost and cash flow estimates, and an updated risk register for the design.

Table 11-2: 90% Detailed Design Requirements – Facility Infrastructure

Discipline	90% Detailed Design
Process	Updates to 50% drawings and specifications Detailed equipment plan/sections and detailed piping Standard details Process Control Narratives
Civil	Updates to 50% drawings and specifications Standard details
Structural	Updates to 50% plan and section drawings, standard notes, standard details
Architectural	Updates to 50% drawings and specifications Final schedules
Building Mechanical/HVAC	Updates to 50% drawings and specifications BAS design in accordance with Region's PAIDS standards
Electrical	Updates to 50% drawings and specifications Equipment layouts and control schematics Cable schedule Lighting design Arc Flash Hazard Assessment Report Short Circuit Protection Coordination Study (As Required)
Instrumentation & Controls	Updates to 50% drawings and specifications Local and area control panel drawings and RPU panel drawings SCADA hardware and software requirements Any other requirements defined in PAIDS.

Additional requirements for the 90% submission include:

- Draft Form of Tender
- Draft SCADA Operations Manual
- Soil management plan – prepared by a Qualified Person (QP). The Project Lead is to advise whether soil must be managed in accordance with MECP document "Management of Excess Soil – A Guide for Best Management Practices."
- Construction Testing Requirements technical memorandum – to identify specialized materials and equipment tests required during construction. The Project Lead shall

review with Peel staff to determine which tests will be completed internally by Peel – via pre-existing blanket contracts, which are to be included in the construction tender, and which will be done by procuring specialized testing services

- Updated project register
- Updated construction cost and cash flow estimates

11.2.2.3. 100% Detailed Design

The final design package is to incorporate all Region comments and prepare the final tender documents to be signed and stamped by a professional engineer licensed in Ontario. Construction contract documents shall incorporate Peel's latest front-end documents.

11.2.2.4. Design Report

On completion of the detailed design, the Project Lead shall update the PDR as a Design Report and include the following calculations where applicable:

- Process/mechanical calculations for all components of the facility
- Hydraulics calculations
- Structural design
- Foundation design
- Electrical/Utility power supply
- Short circuit analysis
- Arc flash hazard analysis
- Heating, ventilation and air conditioning system

In addition to the calculations above the following should be included in the Design Report:

- Modifications to the PDR and the reasoning for the deviation from the PDR
- Additional or updated studies, investigations, reports, modelling and any other project specific work included as part of the Detailed Design Scope
- Drawings and sketches as necessary to reflect the final design details and approach.

The intent of the Design Report is to be a consolidated summary and details of the final detailed design package and is an important record document for asset management purposes and for future replacement, remediation or expansion of the assets included in the Detailed Design Assignment.

Design report shall be completed to Peel branding standards, shall include appendices to ensure copies of all report and studies are included in the design report and shall be signed and sealed by an Engineer Licenced to Practice in the Province of Ontario.

Peel staff preparing procurement documents shall clearly indicate the scope of work required for this element and should include appropriate pay items if the work is to be considered base scope.

11.3. Update Permits and Approvals Tracking Log

The Project Lead shall obtain all required approvals, permits and agreements for the project prior to tendering and will not be permitted to transfer responsibility for any of the approvals to the General Contractors, Suppliers or other third parties.

The Project Lead shall maintain and update the Permits and Approvals tracking log produced under the predesign work where possible. Where no Permits and Approvals log was produced the Project Lead shall create and maintain a log of all required approvals, permits or agreements at each design milestone and complete submissions in a timely manner such that the required approvals are in place prior to tendering. The Project Lead shall undertake a detailed review of the requirements to secure all approvals. Where required based on design expectations, the Project Lead shall also suitably note requirements for application for minor variances or other processed where designs deviate from the requirements of the regulatory body.

Refer to **Section 5** of this manual for further details. See Appendix 9 for sample Approval Log.

11.4. Tender Documents

Following Peel's review and approval of the 100% detailed design, finalize the tender documents including drawings and specifications incorporating Peel's comments as Issued for Tender (IFT) documents. Peel will provide the Project Lead with the latest tender documentation template that the Project Lead will be required to customize for the project.

The tender documents will be reviewed by Peel's PM and forwarded onto the procurement team for final review. After the final review by Peel, the Project Lead shall revise and submit the final tender documents.

One (1) electronic version of the tender drawings and specifications must be forwarded to Peel prior to the Tender issuance, one (1) in the original Microsoft Word version (specifications) and

in the CAD software (drawings) format, and one (1) version of both documents in Portable Document Format (PDF).

11.5. Operation Manual

The Project Lead shall prepare the facility or linear infrastructure Operation Manual as specified in the *Public Works Project Design and Technical Specifications Manual*, *Section 19 – Facility Operation Manual* and submit the first draft of the Manual at 90% Detailed Design. On completion of the Manual, the Project Lead shall submit the draft to Peel's Project Manager for review.

11.6. Acceptance of Detailed Design

Upon review of each detailed design milestone, Peel will provide sign-off after review comments have been addressed. At that time, the design as illustrated in the design drawings and specifications will be frozen, and no changes may be made to the design concepts without the express approval of Peel's Project Manager. After this time, Peel assumes no responsibility or liability for any changes or modifications to the design made by the Project Lead without prior approval by Peel.

11.7. Deliverables

Item	Description	Submission Requirements
1.	Drawings, Technical Specifications, cost estimate at 50% Design	Electronic and 3 hard copies
2.	Property Impact Plans at 50% design	Electronic
3.	Drawings, Technical Specifications, cost estimate at 90% Detailed Design	Electronic and 3 hard copies
4	Drawings, Specifications, cost estimate and Bid Document and updated predesign report (Formalized as a Design Report) at 100% Design	Electronic and 3 hard copies
5.	Tender Documents (front-end/bid forms, drawings, specifications)	Electronic
6.	Draft Commissioning, Bypass and Construction Sequencing Plans	Electronic
7.	Draft Operations Manual at 90% Design	Electronic
8.	HAZOP/SWIFT Report at 90% Design	Electronic

Item	Description	Submission Requirements
9.	Equipment Tagging List	Electronic
10.	Draft Asset Management Data Sheet (with 90% and 100% detailed design submission)	Electronic

12. Project Value Engineering

12.1. General

Value Engineering (VE) is an organized and systematic technique for analysing projects with the aim to improve functions and quality, while reducing cost. It follows a proven, structured, systematic review process that identifies unnecessary and/or inefficient functions and then identifies alternative ways to perform and/or improve the required functions at a lower life cycle cost while delivering the needed value. In essence, the purpose of VE analysis is to obtain the best project at the least cost without sacrificing quality or reliability.

Peel may retain an independent VE Consultant to lead the Value Engineering exercise.

The scoping document will state if VE is required for the project and will identify:

- Project milestones at which the Value Engineering team shall complete their review
- Number of value engineering workshops
- Anticipated timelines required for the Value Engineering Process (required for design consultants to develop their overall project schedule during the procurement stage)

Peel has full discretion in selecting and assigning a VE Consultant for the project. Peel's objective is to select a VE Team that has relevant experience on similar projects, and can provide an unbiased assessment regarding potential opportunities, lifecycle cost savings, optimization, risk mitigation, constructability and design simplification. The VE Consultant shall include subject matter experts in the relevant areas of design and construction pertaining to the project in questions. Furthermore, VE Team shall include individuals with expertise in hydro, gas and telecommunications utility coordination if applicable to the project.

12.2. Scope of Work

The VE process shall generally follow the phases identified below. Descriptions of the Project Lead and VE Consultant roles and responsibilities summarized in **Section 12.3.**

1. **VE Consultant Project Review**

   During this phase, information is provided from the Project Lead through Peel's Project Manager to the VE Consultant. The purpose of this phase is for the VE Consultant to become familiar with the project through their review of the background documentation and completion of visit(s) to the project site. The VE Consultant shall be responsible for making their own independent assessment and evaluation of the existing and proposed infrastructure associated with the project.

2. **Workshops**

   The number and proposed objectives for each workshop will be defined in the scoping document. The VE Consultant shall be responsible for defining the agenda for each workshop with support from Peel's Project Manager. The VE Consultant shall also be responsible for developing workshop materials. The workshops shall be structured to ensure that the Peel's overall goals for the Value Engineering assignment are met. These goals generally include developing recommendations and deliverables which are:

   - Consistent with Peel's overall vision and schedule
   - Comprehensive to address multiple bottom-line criteria including:
     - Environmental, regulatory and compliance requirements
     - Social, economic, public health and community impact
     - Long term servicing, management and capacity considerations
   - Implementable from a phasing, constructability, operability, maintenance and financial perspective
   - Innovative, technically viable and cost effective

   Peel's Project Manager and Staff from Engineering and Operations will attend workshops to ensure that appropriate inputs to the project are provided.

3. **VE Draft Report**

   After the last workshop the VE Consultant shall prepare a VE Process Draft Report. The Report contents shall be tailored to meet the project needs and items covered during the VE process. In general, the report shall cover the following items:

   - Documentation of the VE process
   - Description of the current design and proposed alternatives
   - Rank proposed alternatives in order of merit
   - List of alternatives that the VE Consultant recommends be included as part the project
   - Life cycle cost comparison of proposed alternatives

- Descriptive evaluation of the advantages and disadvantages of the proposed alternatives
- Sketches of the proposed alternatives, if appropriate
- Technical information on proposed process/operation alternatives
- Review of the Project Lead's Cost Estimate
- Value Engineering calculation worksheets
- Assessment of constructability and risk mitigation
- Planning/approval implications if any deviations from the preferred EA solution/solutions approved by agencies are recommended
- Assessment of constructability and sequencing of the proposed works and impact on operation of the existing infrastructure and action(s) that can be taken to mitigate the impact
- Risk assessment of the contract documents
- Description of recommended changes to the drawings and specifications that would reduce both Peel's and the Contractor's risk and result in the lowest project implementation cost

4. **VE Recommendations and Implementation Meeting**

   The Project Lead shall develop a technical memorandum indicating whether alternatives proposed by the VE Consultant should be accepted, accepted as modified or rejected. For alternatives the Project Lead recommends be accepted, the Project Lead shall provide a workplan impact assessment (including schedule and budget impacts) to Peel's PM for consideration.

   The VE Consultant shall provide feedback on the Project Lead's final recommendations. Peel, VE Consultant, and Project Lead shall meet to discuss the VE Consultant's feedback on the recommendations.

5. **VE Process Final Report**

   After the VE Recommendations and Implementation Meeting, the Project Lead shall issue a final list of recommended works to be included in the design and the VE Consultant shall finalize the VE Process Final Report accordingly.

12.3. Roles and Responsibilities During Value Engineering

The following table summarizes the general responsibilities of the Project Lead and VE Consultant during the VE process. Through all VE phases, the Project Lead is expected to provide information in a timely manner to support the VE process.

Summary of Project Lead and VE Consultant Responsibilities

VE Process Phase	Project Lead	VE Consultant
1. VE Consultant Project Review	• Provide a letter addressed to Peel's Project Manager listing important project information to be reviewed by the VE Consultant (i.e., drawings, cost estimates). The letter shall identify any key issues or unique challenges associated with the project. • Support Peel's Project Manager in collecting project files for review, as required (including related Environmental Assessment and design documents).	• Review background information provided by Peel and demonstrate understanding of all relevant codes/design standards/guidelines. • Region Project Manager will arrange for the VE Consultant to complete a review of the project site, and to meet with relevant Peel staff to understand the operation/maintenance of the existing infrastructure.
2. Workshop(s) (as per requirements stated in procurement document)	• Unless modified by the requirements of the scoping document, the Project Lead's Project Manager and applicable design lead(s) shall attend the workshops on a full-time basis. • In advance of the workshop, review the agenda with Peel's Project Manager to confirm the appropriate design leads that will be in attendance. • Prepare and deliver a kick-off presentation summarizing the project at the start of the first workshop.	• Prepare the agenda for all workshop(s) with support of Peel's Project Manager. • Present key project issues as identified by the VE consultant and facilitate a discussion of potential opportunities. • At the end of each workshop, provide a verbal summary of the discussion and key decisions/issues identified. • Take detailed meeting notes and distributing them for review to all workshop attendees.
3. VE Draft Report	• Review the draft VE Report and prepare a technical memorandum providing an	• After the last VE workshop provide a draft VE Report.

VE Process Phase	Project Lead	VE Consultant
	opinion on whether alternative(s) proposed should be accepted, accepted as modified or rejected. • For alternatives the Project Lead recommends be accepted, provide a workplan impact assessment (including schedule and budget) to Peel's PM.	
4.VE Recommendations and Implementation Meeting	• Review with Peel and VE consultant the proposed changes to the scope of work. • Take detailed meeting minutes and distribute them for review.	• Review the technical memorandum prepared by the Project Lead regarding items to be accepted, accepted as modified or rejected.
5. VE Process Final Report	• Review with Region and finalize the change in scope of engineering services.	• Submit Final VE Process Report

12.4. Deliverables

	VE Process Phase	Deliverable	Responsibility
1.	VE Consultant Project Review	Letter summarizing important information to be reviewed by the VE Consultant and identification of key project issues.	Project Lead
2.	Workshops	Workshop Agenda (for each workshop)	VE Consultant
3.	Workshops	Project Summary Presentation (Start of 1st workshop)	Project Lead
4.	Workshops	Presentation and workshop materials (for each workshop)	VE Consultant
5.	Workshops	Workshop Minutes	VE Consultant
6.	VE Process Draft Report	Draft Report	VE Consultant
7.	VE Process Draft Report	Technical memorandum summarizing VE alternatives to be accepted, accepted as modified or rejected.	Project Lead
8.	VE Process Draft Report	Value Engineering Workplan Impact Assessment	Project Lead

	VE Process Phase	Deliverable	Responsibility
9.	VE Recommendations and Implementation Meeting	Meeting Minutes	Project Lead
10	VE Process Final Report	VE Process Final Report	VE Consultant
11	VE Process Final Report	Request for Engineering Scope Change	Project Lead

13. Pre-Selection or Pre-Purchase of Equipment

13.1. General

The purpose of pre-selection or pre-purchasing of equipment is to obtain equipment in a timely manner and incorporate it into the tendered Contract to be carried by the General Contractor. It also enables the Project Lead to make suitable provisions for the specific equipment in the design.

In some cases, the need for pre-selection or pre-purchase of equipment will be established within the project scoping document and will be included in the Project Lead's scope of work. Otherwise, the Project Lead shall assess the need or benefit for pre-selection or pre-purchase of equipment for the project and advise Peel's Project Manager accordingly. The Region of Peel Procurement By-law (F35-06) and the Corporate Procurement Policy and Procedures Manual govern the purchase of all goods and services. More specifically, *Purchasing Policy No. F35-23 Pre-selection or Pre-purchase of Equipment* outlines the procedures that regional staff and the Project Lead must follow in pre-selecting or pre-purchasing equipment and *Purchasing Policy No. F35-09 Request for Tender* outlines the procedures that Peel staff and Consultants must follow in preparing, issuing and receiving tender documents, and evaluating and awarding tenders for Peel. The Project Lead must be familiar with these policies.

13.2. Bid Document

Peel's Procurement department will provide Peel's latest pre-selection or pre-purchase front-end template through Peel's Project Manager. The Project Lead is required to draft the bid document and customize to the project, providing input on information required from bidders, and technical and financial evaluation criteria. Peel must review and approve the evaluation criteria and scoring rationale prior to finalizing the document. Some examples of technical evaluation criteria include compliance with technical design criteria and requirements, bidder

experience and qualifications (including references), proposed staff, location and availability of spare parts and/or service representation. Where appropriate, the financial evaluation shall include life-cycle costs, operation and maintenance costs, and/or capital cost.

All specific spare parts or special maintenance tools required must be determined and specified in the pre-selection or pre-purchase bid documents.

In outlining pre-purchasing requirements, the Project Lead shall consider impacts to the project related to duties, tariffs, bonding, insurance, scheduling, and storage of equipment.

The Project Lead shall meet with Peel's Project Manager and Peel Procurement staff to review the draft pre-selection documents and submit an electronic version of the final draft of bid documents to Peel's Project Manager for review and final editing.

13.3. Advertisement

Upon completion and approval of the Pre-Selection document, Peel's Project Manager will coordinate with Peel's Purchasing staff to upload the documents to Peel's *Bids and Tenders* platform.

13.4. Assistance during Bid Process

The Project Lead shall respond to bidders' questions via addenda to be issued during the bid period. All addenda shall be provided directly to Peel's Project Manager for review and further distribution to purchasing staff.

13.5. Evaluation of Submitted Bids

The Project Lead shall support Peel in evaluating the bids received. Final technical scoring shall be completed in collaboration with Peel purchasing staff using a pre-established scoring system. Upon completion of final technical scoring, the compliant financial proposals will be unsealed, and final financial scoring can also be completed. The Project Lead shall submit a bid analysis report and recommendation to Peel's Project Manager in accordance with the schedule established by the Project Manager (with the Project Lead) or no later than ten consecutive working days after bid closing.

13.6. Incorporation of Pre-Purchased or Pre-Selected Equipment

The Project Lead shall include the following requirements in the bid documents:

- A copy of the Novation Agreement and specifications of the pre-selected equipment
- General Contractor responsibilities for the assumption of new equipment
- General Contractor responsibilities for the co-ordination with supplier(s) and sub-trades
- Payment schedule to supplier(s) for pre-purchased equipment

13.7. Deliverables

	Tasks	Submission Requirements
1.	Draft Pre-Selection or Pre-Purchase Bid Documents	Electronic
2.	Final Pre-Selection or Pre-Purchase Bid Documents, including any technical appendices or drawings not included in bid document.	Electronic

14. Contractor Pre-Qualification

14.1. General

The purpose of the Contractor pre-qualification is to pre-select and invite only those General Contractors, and, if applicable, the Electrical, Mechanical, and/or Specialty Sub-Contractors that have the necessary experience, qualifications and resources to undertake the construction of the project specific infrastructure.

The Region of Peel Procurement By-law (F35-06) and the Corporate Procurement Policy and Procedures Manual govern the purchase of all goods and services. More specifically, *Procurement Policy No. F35-22 Pre-Qualification* outlines the procedures that Peel staff and the Project Lead must follow in the Contractor pre-qualification process. The Project Lead shall familiarize themselves with this policy.

Peel may opt to use industry standard approaches for pre-qualification of Contractors, such as the one defined in the Canadian Construction Documents Committee CCDC 11 Contractor's Qualification Statement.

The Project Lead shall support Peel with the selected pre-qualification approach.

Peel uses their web-based *Bids and Tenders* platform for all types of project bidding. The Project Lead is to support Peel with their policies and procedures for the procurement process.

14.2. Advertisement

Upon completion and approval of the Pre-Qualification document, Peel's Project Manager will coordinate with Peel's Purchasing staff to upload the documents to Peel's *Bids and Tenders* platform.

14.3. Pre-Qualification Document

Peel's Procurement department will provide Peel's latest pre-qualification front-end template through Peel's Project Manager. The Project Lead is required to draft the pre-qualification document and customize to the project, providing input on information required from contractors, and technical and financial evaluation criteria. Peel must review and approve the evaluation criteria and scoring rationale prior to finalizing the document. Some examples of technical evaluation criteria include compliance with technical design criteria and requirements, contractor experience and qualifications (including references), proposed staff and available resources.

The Project Lead shall meet with Peel's Project Manager and Peel Procurement staff to review the draft pre-qualification documents and submit an electronic version of the final draft of bid documents to Peel's Project Manager for review and final editing.

14.4. Assistance during Pre-Qualification Process

The Project Lead shall answer bidders' questions during the bid period and issue addenda as required. All addenda to be provided directly to Peel's Project Manager for review and distribution to purchasing staff.

14.5. Reference Checks

The Project Lead shall conduct reference checks with references provided by the Contractor in their Pre-Qualification response. The Project Lead shall inquire on the Contractor's performance on the referenced project(s), concerning such items as project performance, communication, claims management, change orders, schedule management, co-ordination, documentation submittals, response time, quality of work, and warranty work, as well as comfort level with the Contractor on a repeat project.

14.6. Evaluation of Contractors

Peel's Pre-qualification Committee shall score each Contractor using a prepared scoring system set up specifically for the project according to the Prequalification Guidelines. In some cases,

the Project Lead may be involved in the scoring, however, this will be determined on a project-specific basis and shall be agreed to between Peel's Project Manager and the Project Lead prior to the release of the pre-qualification documents.

14.7. Pre-Qualification Evaluation and Recommendation Report

On completion of the Pre-Qualification process, the Project Lead shall support Peel in preparing a report covering all the above points and recommend the General, and, if applicable the Electrical, Mechanical, and/or Specialty Subcontractors to be invited to submit bids for the project.

Where requested by the Peel Project Manager the Project Lead shall provide written feedback and comments to the Peel Project Manager/Sponsor and to the Region's Procurement Staff for the purpose of debriefing Vendors who do not successfully pre-qualify.

14.8. Deliverables

	Task	Submission Requirement
1.	Contractor Pre-Qualification Document	Electronic
2.	Project Lead's Reference Check Summary	Electronic
3.	Pre-Qualification Evaluation and Recommendation	Electronic

15. Tendering

15.1. General

The Region of Peel Procurement By-law (F35-06) and the Corporate Procurement Policy and Procedures Manual govern the purchase of all goods and services. Specifically, *Procurement Policy No. F35-09 Request for Tender* outlines the procedures that regional staff and the Project Lead must follow in preparing, issuing, and receiving tender documents, and evaluating and awarding tenders for Peel. The Project Lead must familiarize themselves with this policy.

Peel uses their web-based *Bids and Tenders* platform for all types of project bidding. The Project Lead is to support Peel with their policies and procedures for the procurement process.

15.2. Advertisement

Upon completion and approval of the Tender documents, Peel's Project Manager will coordinate with Peel's Purchasing staff to upload the documents to Peel's *Bids and Tenders* platform.

15.3. Assistance during Tendering Period

The Project Lead shall answer bidders' questions during the bid period and issue addenda as required. All addenda to be provided directly to Peel's Project Manager for review and distribution to purchasing staff.

All addenda shall be prepared and submitted to Peel's Project Manager by the Project Lead in Peel's standard template. Peel's Project Manager will review the addendum and forward it to Peel's procurement staff for review and issuance.

15.4. Pre-Bid Meeting

The Project Lead shall work with Peel's Project Manager to determine the need for a pre-bid meeting. This is done during the final stages of the tender document preparation. The Project Lead shall attend the pre-bid meeting, if applicable, and present the tender's scope of work and clarify any questions raised at the meeting. In accordance with the provisions of the bid document, attendance at the Pre-bid Site Meeting may or may not be mandatory. If the pre-bid meeting is mandatory, failure by the Contractor to attend and sign-in at the meeting will result in their tender submission being rejected.

The Project Lead shall record attendance and all questions and answers during the meeting and provide Peel's Project Manager with the minutes of the meeting, together with questions and answers to provide a basis for the issuance of an addendum if required.

15.5. Tender Opening

Submitted tender pricing is automatically posted on Peel's *Bids and Tenders* platform at noon on the bid closing date.

Bids are downloaded by Peel's Procurement staff and reviewed to ensure that bid submissions are compliant with the requirements of the tender. The compliant bids are then provided to Peel's Project Manager to provide to the Project Lead to complete a bid evaluation. Information on the *Bids and Tenders* platform related to award of project shall be updated by Peel.

15.6. Evaluation of Tenders

The Project Lead shall evaluate the tenders received and submit a report and recommendation to Peel's PM in accordance with the agreed-upon schedule or no later than 10 working days after the close of tender. The evaluation shall include an analysis of the compliant bids and comparison to the Project Lead's pre-bid cost estimate as well as recommendation for award.

The tender analysis is to include an enhanced bid review of the lowest and second lowest compliant bids received. The enhanced bid review to use the strategy noted below:

- Identify which sections of the tender the bid is in the upper or lower 5% of all bids received
- Identify sections of the bid that are significantly higher or lower than the average bids or the engineers estimate.
- Identify specific items where the bid is the lowest or highest bid receive for that item
- Identify specific items where the bid is significantly higher or lower than the average bid received
- Identify specific items where the bid is significantly higher or lower than the Project Lead's estimate
- For specific items identified during the enhanced review, compare unit rates vs estimated quantity, and provide a review of potential item quantity overruns or underruns
- Identify specific items where the bid may be significantly under bid
- Where items are significantly underbid or overbid provide a caution statement to the Contract Administration team for possible increased scrutiny or awareness during the administration of the contract
- Provide a tender review report for use by Peel and the Contract Administration team

16. Contract Administration

16.1. General

Contract Administration and Inspection services shall be provided in accordance with the Association of Professional Engineers of Ontario (PEO) "Guideline for Professional Engineering Providing Services to Municipalities, 1986, Phases 4 and 5" and in accordance with the Municipal Engineers Association/Consulting Engineers of Ontario (MEA/CEO) Client Vendor

Agreement for Municipal Works as stipulated in Schedule “D” except where modified or altered by this Document or the associated project procurement document.

Where conflicts exist between these standard documents and Agency’s requirements included in this document or project specific procurement documents, the requirements of this Document shall take precedence over the requirements of the PEO orMEA/CEO guidelines or agreement terms.

The Project Lead’s Resident Engineers and/or Inspectors will provide a review of the work carried out by the General Contractor and its agents during all phases of construction. The performance of the General Contractor is not the Project Lead’s responsibility nor are their review services rendered for the General Contractor’s benefit, as the General Contractor is fully responsible for discharging his obligations under the terms and conditions of the contract. Notwithstanding that obligation, it is still the Project Lead’s responsibility to verify that the General Contractor discharges his obligations faithfully under the terms and conditions of the construction contract and executes the work as designed.

The General Contractor is responsible for the quality of their work, but it is the Project Lead’s responsibility to verify through their Quality Assurance and Quality Control during the construction phase that the work is executed in accordance with the contract documents.

Contract Administration leads (Internal or Vendor supplied) are responsible for ensuring Contractor Performance is evaluated and recorded in accordance with the Agency’s Procurement procedures (F35-27). Vendors are responsible for ensuring that interim evaluations are provided on a monthly basis (or as agreed to by the Regional Project Lead). All Project Leads shall ensure a final evaluation for Contractors is completed in accordance with Procurement procedure F35-27 and submitted for record purposes.

16.2. Construction Team Building

Construction of water and wastewater infrastructure in Peel involves many stakeholders including Peel, Consultants, Operators and the General Contractor. Trust and collaboration between stakeholders are important to successfully navigate project challenges. To achieve this, a Team Building process may be undertaken during or after the pre-construction meeting incorporating Peel, the Project Lead and the General Contractor. Team Building is a process through which participants meet as equals, test assumptions, manage expectations, gain mutual understanding of roles and responsibilities, buy-in to common goals, identify, examine and prioritize potential challenges and jointly develop an effective dispute resolution mechanism and evaluation system within the critical stakeholders team for the project as a

whole. By having an early Construction Team Building meeting, all the critical stakeholders can voice their perspectives and objectives and seek to align goals for fast, cost-effective and cooperative project delivery.

To ensure the success of the Construction Team Building process, the Project Lead shall include the Project Director, Project Manager/Contract Administrator, Resident Engineer and Inspector in the Contract Team Building session. The General Contractor will be required to include the Company's Project Director, Project Manager, Site Superintendent(s) and the Electrical and Mechanical Sub-Contractor's Project Manager. Team Building/Partnering sessions shall be conducted as a minimum semi-annually but as often as monthly as needed.

16.3. Project Lead's Team Roles and Responsibilities

16.3.1. Project Manager/Contract Administrator and Head Office Staff

It is not the intent of this Manual to apportion work between the Project Lead's Project Manager/Contract Administrator and Head Office Staff and that of the Resident Engineering / Inspection staff. However, in general, it is normally expected that the Project Lead's Project Manager/Contract Administrator and Head Office Staff will perform the following functions:

1. The Project Lead shall ensure the project schedule is submitted by the Contractor in accordance with the terms and conditions of the contract specifications.
2. Reviewing the baseline construction schedule proposed by the General Contractor and comment on the procedures and sequence of work.
3. Schedule analysis shall be conducted on the Contractor's bi-weekly/monthly schedule submission with a summary report provided Monthly to both the Agency Project Manager and the Contractor. Review, monitor, and notify the Agency Project Manager of any issues regarding the Contractor's construction schedule.
4. Consulting with Operations Staff to review contingency plans developed during detailed design to mitigate potential operation impacts on Peel infrastructure due to construction. Coordinate with the General Contractor's construction schedule to mitigate these impacts.
5. Reviewing shop drawings submitted for general compliance with the design requirements. The Project Lead shall review all shop drawings in a timely manner and in accordance with the Contract. The Project Lead shall coordinate the review of shop drawings by Peel as required. All submission review comments shall be reviewed with the Peel Project Manager prior to being returned to the Contractor when requested.

6. The Project Lead shall prepare for the pre-construction meeting a submission log listing all required contractual submissions. This submission log is to be used by all parties to ensure all requirements of the contract are being adequately addressed. The submission log is to be updated and reviewed at each project meeting.
7. The Project Lead shall assess, review, summarize and make recommendations concerning all pre-condition survey information collected by the Contractor's sub-consultant.
8. The Project Lead shall verify that all construction means and methods meet the requirements of the Contract. Should the Project Lead determine that works being completed do not meet contractual requirements, immediately notify the Region, and upon discussing this with the Region, issue a site instruction to the Contractor accordingly.
9. The Project Lead shall track all Contractor related submissions and ensure timely responses are provided to ensure the Contractor is not delayed in their performance of the Work. Individual tracking forms (RFI, RFQ, CCO, CO, shop drawing log, etc.) shall be maintained by the Vendor for the duration of the project and shall be updated for all progress meetings. The Vendor shall also update and forward a current change order log with each progress payment application and individual change order forwarded for execution by the Peel Project Manager.
10. The Project Lead shall complete additional forms as required or mandated by the PIPM, PDTSM or other requirements of applicable Peel Standards as well as other requirements relevant to the project specifics including permit and approval conditions.
11. Responding to Requests for Information from the General Contractor in a timely manner. Refer to **Appendix 16** for a sample RFI Log.
12. Issuing Requests for Quotation (RFQ) for contemplated changes to the project and tracking all RFQs. See **Appendix 17** and **Appendix 18**.
13. Issuing Site Instruction(s) to the General Contractor for any non-compliance issues related to the Contract Documents, or issues related to the means and methods and safety of the work, and tracking such Site Instruction(s) in a log. See Appendix 39 and 40.
14. Advising on alternative methods, equipment and materials proposed by the General Contractor as permitted by the terms and conditions of the contract. Under no circumstances will alternatives be considered without the General Contractor advising the amount of credit and/or schedule benefits first and acceptance of all associated engineering review costs. The Project Lead shall issue a Request for Change Order to Peel for the cost to review of alternatives proposed by Contractors. Refer to **Appendix 19** and

Appendix 20 for the Value Engineering Change Proposal Request template and Contract Change Order template, respectively.

15. The Project Lead shall and track all Value Engineering Proposals, RFQs and approved Change Orders.
16. Under no circumstances where the price for a Change in the Work cannot be agreed to before the Change in the Work commences, the Project Lead in consultation with Peel's Project Manager shall issue a Change Directive to authorize the General Contractor to proceed with the Change in the Work and track such costs on a Time and Material basis. Change Directive(s) shall be issued using the form included in Appendix 38 and tracked using the Change Directive Log included in Appendix 39.
17. Advising on the validity of cost and schedule impacts for additions or deletions to the contract and issue change orders upon the approval of Peel's Project Manager.
18. The Project Lead shall provide comprehensive services relating to the measurement and recommendations for payment of all contract items.
19. The Project Lead shall, at a minimum, perform the following

    - Verification of all quantity reports to support payment.
    - Review & verify any Work performed on time and material basis.
    - Review and provide recommendations on the suitability of any Contractor submitted quotes.
    - Review and evaluate any Contractor requests for extension of time and provide recommendations to the Region based on "critical path method" (CPM) analysis.
    - Produce change orders including all back-up information. Arrange for change orders to be signed by all applicable parties and distribute copies to all parties as required.
    - Reviewing all proposed change orders with Peel's Project Manager prior to issuing them to the General Contractor and tracking all approved change orders. Refer to **Appendix 21 – Contract Change Order Log.** Under no circumstance shall the Project Lead agree to additional compensation or costs without specific written approval from Peel's Project Manager.
    - Review all claims, notice of intent to claim, disputes and questions relating to Contractor performance, quality of the Contractor's work and interpretation of the Contract Documents. Provide options for resolution for the Region's Project Manager representative as required and implement preferred options. Prepare and process change orders as per bullet above based on preferred option.

20. Reviewing and processing General Contractor's requisitions for payment and issue payment certificates to Peel in accordance with, and within the timelines specified by, the Construction Act and the terms of the contract between the Owner and the General Contractor.
21. Evaluate whether the General Contractor achieves Substantial Performance using the Substantial Performance Evaluation Form in Appendix 25A and provide a recommendation to Peel's Project Manager accordingly. Should the General Contractor be deemed to have achieved Substantial Performance, the Project Lead shall issue the Substantial Performance Certificate in accordance with Construction Act (see Appendix 25), including Cover Letter and Form of Release in Appendix 25B, and other requirements specified in this Manual.
22. Maintain a change order log to be submitted with all payment certification applications. The change order log shall include:

    - Executed change orders;
    - Prepared change orders that have not been executed at the time the log is prepared; and
    - Any items which the CA/inspector is aware that the Contractor considers being outside of the original scope and is planning on providing a quote/making a claim for. Included with these items is an estimated value from the CA to ensure all additional costs are represented by the change order log.

23. Maintain a cash allowance log to be submitted with all payment certification applications.
24. Prepare and submit final estimates as requested and produce a complete set of "As-Built" drawings as per the Region's standards. Marked up copies shall be kept onsite and reviewed monthly with the Peel Project Manager as requested.
25. Upon achievement of Substantial Performance as outlined in the Contract and the Construction Act, the Project Lead will issue the Substantial Performance Certificate (see Appendix 25) for commencement of the Lien Period and the Warranty Period.
26. Where the General Contractor fails to remedy the deficiencies or incomplete works in accordance with the stipulated deadlines, the Project Lead shall issue appropriate notice or notices of default to the General Contractor.
27. The Project Lead shall issue a Substantial Performance Certificate for commencement of the Lien Period and the Warranty Period.
28. Ensure that the General Contractor submits all the required "final" shop drawings.

29. Provide a recommendation to Peel's Project Manager on whether the General Contractor has achieved completion based on the requirements of the Construction Act. Issue the Certificate of Completion, including associated Cover Letter and Release Form. Refer to **Appendix 27 & Appendix 27A.**
30. Arrange for necessary inspections with Region Staff and the General Contractor and assemble deficiency lists at substantial completion and completion. Review and close out deficiencies as needed and update deficiency lists after deficiencies have been rectified. Thereafter, the Master Deficiency List (see **Appendix 24**) shall be updated as required until the end of the warranty period and thereafter as required.
31. The Project Lead shall assist Peel's Project Manager to retain the services of another Contractor to have the deficiencies corrected in case the General Contractor fails to address the deficiencies in a timely manner. The effort involved in managing the rectification works shall be covered under an engineering scope change and the rectification works shall be deducted from the Contractor's budget.
32. Produce a complete set of "As-Built" drawings as per the Agency's standards. "As-Built" drawings to be delivered to the Agency no later than 60 days after "Substantial Completion" of the proposed Works.

16.3.2. Resident Engineer/Site Inspector

Requirements for the amount of Resident Engineers/Site Inspectors and their level of service (time onsite) during the construction phase will be specified in the scoping document. However, in general, the responsibilities of the Project Lead's Resident Engineer(s) and/or Inspector(s) include the following:

1. Advising the General Contractor on the interpretation of the drawings and specifications and issue supplementary details and instructions during the construction period as required clarifying the design intent. The Resident Engineer/Site Inspector shall act as the liaison between the Project Lead's design team and the General Contractor.
2. Providing reference lines and elevations to the General Contractor and checking the line and grade as work progresses. Document these checks in daily reports including photos and videos daily.
3. Advising Peel's Project Manager if the General Contractor is deemed to not be executing the works in accordance with the contract documents, drawings and specifications or if the General Contractor's work does not satisfy the intent of the design. The Project Lead shall issue field instructions or stop work orders in respect to the deficiencies with prior approval from Peel.

4. Arranging for all necessary field testing, inspections or verification by specialist consulting or inspection firms to determine that work and materials conform with intent of design requirements, including contract requirements, Peel standards, applicable codes, regulations, and permit conditions. All material testing and specific environmental and other inspection and monitoring reports are to be reviewed by the Project Lead. All specialist reporting to be filed by Project Lead and provided to Peel at end the end of the project.
5. Carry out site inspection to verify that the construction works and installation of equipment are in accordance with the contract documents.
6. Surveying to include layout of project control points, measuring and verification of the construction methods as required by the contract documents.
7. Ensuring that all reports for all field testing, calibration reports, air balancing reports, all manufacturers' start-up reports, electrical co-ordination study reports, etc. are incorporated in the Operation & Maintenance Manual(s) prior to the start up of the infrastructure.
8. Investigating, reporting and advising on unforeseen circumstances identified during construction, such as differing underground soil conditions, obstructions and any claims from the General Contractor in a timely manner so that appropriate actions may be taken to mitigate damages or claims by the General Contractor.
9. Maintaining a daily and weekly site report. The Project Lead shall maintain adequate data and records in the site reports related to the daily status and progress of the construction work. Refer to **Appendix 22 – Daily Site Inspection Report Facilities** & **Appendix 22A Daily Site Inspection Report Linear** as well as **Appendix 23 – Weekly Site Inspection Report and Quantity Summary.**
10. Reviewing General Contractor requests for payment as to progress, quantities of work completed, and materials delivered to the site and advising on their accuracy. Ensure site records are maintained of critical equipment and material delivery dates and conditions of delivered critical equipment and materials for record purposes.
11. Reviewing the General Contractor's request for final payment and its compliance with the Construction Act.
12. Initiating and maintaining a Master Deficiency List (see **Appendix 24**) as soon as there is work completed that has deficiencies and documenting incomplete work. The Project Lead shall advise the Contractor of the deficiencies and discuss during regular progress meetings.

13. After the Contractor issues a request for the Certificate of Substantial Performance, carrying out an inspection of the infrastructure with the General Contractor, the Operations Supervisor, and Region's Project Manager and/or designates. The Project Lead shall update the Master Deficiency List, including incomplete work. The Project Lead shall assign holdback values to the deficient and incomplete work on the Master Deficiency List.
14. The Master Deficiency List shall be updated on a weekly basis after issuing Substantial Performance until all deficiencies have been addressed. The Project Lead shall stipulate a deadline for the General Contractor to rectify deficiencies.
15. One month prior to the end of the Warranty Period, arrange for inspection with the General Contractor, the relevant Operations Supervisor and Peel's PM and issue the updated Master Deficiency List, including incomplete work. One week from the expiry of the warranty period, the Project Lead will carry out a final inspection.
16. Ensure that the General Contractor does not negatively affect the operation of existing infrastructure during the construction works. Refer to **Section 16.7**.
17. Verify that the General Contractor carries out his work in compliance with the approved Health & Safety Plan for the project. Issue written notification to the General Contractor on all instances whenever it is determined that the General Contractor has breached safety procedures and notify the Ministry of Labour when required.
18. Prepare an inventory list of special tools, spare parts and equipment specified to be supplied by the General Contractor for Operations' use, two months after award of contract to the General Contractor. Issue inventory list to General Contractor, Operations Supervisor and Peel's Project Manager. Refer to **Appendix 26 – Inventory of Spare Parts and Tools**.
19. Accept spare parts on behalf of Region and issue same to the Operations Supervisor. Ensure that the Operations Supervisor or Designate signs for all equipment using the Inventory List form.
20. Ensure that the General Contractor prepares and submits the Operation & Maintenance Manual prior to commissioning of the infrastructure.
21. Review and discuss weekly with Peel's Project Manager the progress of the construction works and advise/update Peel's Project Manager, noting any contractual problems, schedules or claims, health & safety issues and public complaints and strategy for resolving these issues.
22. Coordinate contract training requirements with Peel, Operations, and the General Contractor.

23. Provide effective communication through field memos or discussions with Peel's Project Manager and the Operations Supervisor to ensure that the General Contractor's and the Operations Supervisor's requirements are properly co-ordinated. Any actions resulting from the discussion with Peel's Project Manager and the Operations Supervisor shall be confirmed in writing by a site instruction.
24. Maintain a redline set of drawings. The redline drawings shall be updated weekly. Verify against the General Contractor's As-Built drawing submission.
25. Ensure that the General Contractor submits As-Built drawings and schematics before their request for Substantial Performance.
26. Attend project meetings as deemed necessary for proper coordination of work by the General Contractor, the Sub-Contractors, Suppliers or testing firms. Site meetings will be conducted every two weeks and whenever the progress of work is deemed to be unacceptable, hold site meetings every week. Record and produce meeting minutes and distribute drafts for review and final versions for all parties records.
27. The Vendor shall ensure that all traffic control is completed inaccordance with all applicable codes, approvals, regulations, permit conditions, contract drawings and good practices. Thefollowing is a summary of traffic management and public information services to be provided by the Vendor:

    - The Vendor shall ensure that all traffic management and public information services included in the Contract Documents, or required by law, are complied with.
    - Assess the Contractor's traffic control plan, prior to start-up of construction to ensure that all Contract requirements are complied with. Provide review comments to Contractor in writing.
    - During construction, monitor the traffic control measures to ensure they are consistent with the traffic control plan and that they provide satisfactory levels of safety for workers and motorists.
    - Assess the effectiveness of the traffic control measures through monitoring of the traffic control. Notify the Contractor of any deficiencies and provide a copy of the Contractor's traffic control signing diary to the Agency as requested.
    - Perform traffic control/lane closure notifications, coordinating traffic management and public
    - Where requested by the Agency, notify the local media and the Agency of any potential delays caused by construction activities.

- Provide a record of traffic accidents, public notification and complaints that occur in the Work zone.
- Coordinate with the Agency's Project Manager any reporting and recording of accidents/incidents with the Agency's risk management staff to ensure accurate and effective records of any incidents are recorded.

28. Pipe installation records including as per Agency standards.Installation records shall track all pipe joint installation including UTM coordinates of all joints, confirmation of mechanical restraint installed and testing where applicable, confirmation of joint grouting records.
29. Record Documents shall be maintained throughout construction ofthe Contract and then delivered to the Agency upon completion of the project (See **16.16** Deliverables)
30. Include all warranty and contact information for equipment and service contact information. Include all preventative maintenance procedures required during the life of thecoating systems including inspection requirements.

16.3.3. Tunnel Inspection and Monitoring Requirements

The Project Lead is to closely monitor any tunnelling operations as applicable. As a minimum the Project Lead will be required to ensure that the following items are completed regarding any tunnels being constructed on their assignments:

- Ensure all permits (MOE, DFO, MTO, PTTW, Conservation Authority) required to construct the tunnel are in place and valid for the proposed construction timelines. Where required obtain extensions to existing permits well in advance of the expiration date. The Vendor is to ensure that all Work associated with tunnelling is conducted in strict accordance to all permit conditions. Of special note relating to tunnels is the variety of monitoring that may be associated with tunnels, for example:
  - Settlement monitoring
  - Vibration monitoring
  - Dewatering discharge monitoring
  - Convergence monitoring
  - Shoring monitoring
  - Well monitoring

- The Project Lead is to ensure that at all times all monitoring required by permit requirements and the specifications is being completed in accordance with the terms and conditions of the Contract.
- The Project Lead is expected to keep detailed notes of all tunnelling activities due to the higher than normal risk associated with tunnels.
- The Project Lead is expected to observe the actual tunnelling Work at a minimum of three times daily, once in the morning, once at midday and once at the end of the day. This is to ensure that the Project Lead is well aware of any issues onsite, downtime due to maintenance or breakdowns, change in ground conditions and to ensure that the Contractor is maintaining good Work practices related to the tunnelling at all times.
- The Vendor is to ensure that the Contractor is performing the necessary line and grade checks at the frequency and using the methodology established as part of the contract specifications.
- The Vendor is expected to fill out and distribute to all parties on a daily basis a tunnel log. As a minimum the following will need to be included with the tunnel log:
    - Date
    - Weather
    - Production
    - Amount of spoil removed per tunnel support section
    - Nature and type of material being removed
    - Amount of down time due to boulders, obstructions
    - Amount of down time due to maintenance or breakdowns
    - Nature of maintenance and breakdowns
    - Number of interventions
    - Jacking pressures/force being used for each push
    - Type, nature and material being used as a lubricant(bentonite)
    - Was any sort of ground conditioning or soilstabilization completed
    - Line and grade check results
- Where a GBR is being utilized on projects the Project Lead is to take special care to ensure that all measurement and record requirements relating to the GBR in terms of measurable quantities are being completed so compensation can be fairly determined
- The Project Lead is to establish a regular inspection of ground conditions by the geologist or geotechnical engineer associated with the design of the tunnel. Where claims are made, frequency of inspections will need to increase to ensure suitable

records concerning the ground conditions are obtained to deal with any potential Contractor claims.

16.3.4. Environmental Permit Monitoring Requirements

The Project Lead shall ensure that all work completed by the Contractor adheres to applicable environmental codes, regulations, and permit conditions. As such, it is the Project Lead's responsibility to adequately review the terms and conditions of all environmental permits attained for the Project, and to ensure adherence to these terms and conditions during construction.

Upon discovery of a code, regulatory and/or permit violation, the Project Lead shall immediately notify the Region in writing of the violation. In addition, such violations may require that the Project Lead issue an instruction directing the Contractor to take appropriate corrective measures. Under such circumstances, the Project Lead shall confirm and report the results of the corrective measures taken on-site to the Region.

The following subsections detail the minimum responsibilities of Project Lead with respect to the various environmental permits and/or regulatory codes that may be required and/or applicable to a Project.

16.3.4.1. Environmental Activity Sector Registry (EASR) and/or Permit-To-Take-Water (PTTW)

The Project Lead shall ensure all Environmental Activity Sector Registry (EASR) and/or Permit-To-Take-Water (PTTW) monitoring conditions are adhered to and that required samples are being taken as applicable. The Project Lead shall record daily dewatering discharge rates at all discharge locations. The Project Lead shall, in conjunction with the Contractor, ensure daily measurements for flow rate and daily volumes are collected and recorded for yearly reporting to the MECP. The Project Lead shall provide a record of daily water taking to the Region no later than the 15th of January of each year, in Microsoft Excel format. The Project Lead shall also provide monthly summary spreadsheets to the Region's Project Manager during the course of construction. The daily summary sheet shall include the following information: location including approximate northing easting of dewatering location, daily water taking rates and volumes, and any other additional requirements of the EASR and/or PTTW.

16.3.4.2. Conservation Regulatory Agencies (TRCA and/or CVCA)

The Project Lead shall ensure compliance with the permitting requirements of the Toronto Regional Conservation Authority and/or the Credit Valley Conservation Authority as applicable.

The Project Lead shall also ensure that the Contractor does not undertake construction activities which require erosion sediment control measure to be first in place (i.e. stripping sod and topsoil).

The Project Lead shall be responsible to review all erosion and sediment control measures on a daily basis and shall keep a separate log of these inspections. Included in the log as a minimum is the following information: date, weather, precipitation, permit status numbers; and details where deficiencies are noted including details on how and when the deficiency was addressed.

Where revisions are required to the sediment and erosion control plans approved the conservation agency, the Project Lead shall be required to make these revisions on the sediment erosion control plans and resubmit to the conservation authority for approval.

16.3.4.3. MECP Spill Response

The Project Lead shall be responsible for coordinating with Peel Environmental Controls Section, the Ontario Spills Action Centre, conservation authorities, public health and other stakeholders as required and advise of the spill and action taken in the event of a spill as applicable. The Project Lead shall also be required to coordinate any and all remediate action required by the Contractor. Upon reporting the spill to the Spills Action Centre (SAC), the Project Lead shall provide the Region with the reference number assigned to the spill.

The Project Lead shall accurately document all information required by SAC, including but not limited to the following, the volume of the spill, the cause of the spill, the location of the spill, remedial action taken for the spill, any watercourse impacted by the spill (as applicable), sampling undertaken as a result of the spill and any other information that may be required by SAC. The Project Lead will issue a report to the Region containing such information.

16.3.4.4. Sewer Use By-Law

The Project Lead shall be responsible to ensure that all water discharged during construction follows the Provincial Water Quality Objectives (PWQO) and Peel's Wastewater Bylaw. The Project Lead may also be required to coordinate sampling of the discharged water against the chemical parameters set out in the Provincial Water Quality Objectives (PWQO) and/or Peels' Wastewater By-law to ensure that discharged water meets these chemical limits. Where this is not the case, the Project Lead will provide recommendations in terms of treating the discharged water (i.e. through carbon filters, sediment tanks, etc.) and direct the Contractor accordingly upon consultation with the Region.

16.3.5. Independent Testing Coordination and Reporting

The Project Lead shall be responsible to coordinate and manage the services of a qualified material testing firms retained through the Agency's Roster agreement process to undertake material testing and environmental services during construction or coordinate with the Region's internal material testing department.

The Project Lead shall be responsible for the following:

- Coordination for specialist inspections and testing if required by the specifics of the project, including but not limited to, granular, asphalt, concrete, welding, coatings, foundations, pile and caisson, vibration monitoring, shoring monitoring, structural monitoring, convergence monitoring, etc.
- Development of specific work plans for the materials testing and specialty inspections and monitoring prior to the commencement of construction to the Region for review and comment. The work plan should include details on the types of testing and inspections, including frequency of inspections. The expected level of effort anticipated for services during construction shall be clearly described in the Project Lead's work plans.
- Submission of results of all correlation findings between quality control and quality assurance results, and pay factor calculations
- Prepare and submit monthly summaries, identifying acceptability of all materials, course of action for any borderline materials or rejected materials.
- If requested, provide lot, monthly and year end summaries of all samples of material.
- Distribution of all documents, reports and test results to applicable stakeholder.
- Provide test results within four business days of taking of the sample or performing the inspection in question. Physical testing of aggregates shall be evaluated and the test results available within 15 days of the taking of the sample.

16.3.6. Investigations and Studies During Construction

The Project Lead shall coordinate and review all studies completed by the Contractor's specialized subcontractor(s), including arc flash and short circuit studies, power and harmonic studies and any other studies that may be required to be performed by the Contractor during construction. The Project Lead shall review all studies to ensure that applicable regulatory codes and the Region's standards are met. The Project Lead is also responsible for providing corrective approaches when needed where the studies may reveal a deficiency with the works

completed. All test results must be stamped by a Professional Engineer licensed to practice in the province of Ontario.

16.3.7. On-Site and Excess Soil Management during Construction

The Project Lead shall oversee all the soil management activities by the Contractor during construction as applicable. All activities related to soil management at the Project site shall be overseen by the Project Lead to ensure compliance with the Excess Soil Regulation. The Project Lead shall verify that the Contractor complies with all the requirements of O.Reg. 406/19, as amended, and the requirements of the contract.

With the assistance of the Qualified Person hired for the Project, the Project Lead shall ensure that all Contractor submittals are adequate in accordance with the Requirements of O.Reg 406/19, as amended. The submittals reviewed shall include, but are not limited to, the following:

- Excess Soil Implementation Plan;
- Identification of each Reuse Site and/or Receiving Site at which the Excess Soils will be deposited, including the location of each site;
- Excess Soil Destination Assessment Report (ESDAR) for each of the identified Reuse Site(s) and/or Receiving Site(s);
- Completed registration on the Resource Productivity and Recovery Authority (RPRA or successor organization) portal (the “Registry”);
- A written consent from the owner or operator of the Reuse Site and/or Receiving Site at which the Excess Soil will be deposited
- Results of any additional sampling and testing which may be required by the owner or operator of the Reuse and/or Receiving Site;
- A copy of the Environmental Compliance Approval(s) for the Reuse and/or Receiving Site(s); and
- A Quality Control Plan.

The Project Lead shall also conduct compliance checks and audits during construction to confirm the Contractor is implementing the Excess Soil Management Implementation Plan, as set out in the contract. The Excess Soil Management Implementation Plan provides detailed information on the temporary stockpiling, handling and transport of Excess Soil.

16.3.8. Property Requirements

The Project Lead shall familiarize themself with all conditions of the property agreements and shall monitor the physical work to ensure that all agreement conditions are adhered to by the Contractor. The Project Lead shall add all individual property agreements to the permit tracking form to ensure expiration dates of property agreements are tracked and where required extensions are obtained. The Region's Real Estate staff shall perform actual negotiations with individual property owners. The Project Lead will be expected to provide support to Region's Real Estate staff and assist in agreement extensions if requested during construction.

16.3.9. Traffic Control

The Project Lead shall ensure that all traffic control on the Project is completed in accordance with Ontario Traffic Manual Book 7 latest edition, including all applicable codes, approvals, regulations, permit conditions, contract documents, and contract drawings.

The Project Lead shall review the Contractor's Traffic Control Plan, prior to the start of construction, to ensure that all Book 7 and contractual requirements are complied with prior to the Contractor's submission for the road occupancy permit. Once the Project Lead is satisfied with the submission, the Contractor shall submit for the road occupancy permit.

During construction, the Project Lead shall monitor traffic control measures to ensure consistency with the traffic control plans. The Project Lead shall ensure that traffic control measures provide satisfactory levels of safety for workers, pedestrians and motorists. The Project Lead shall immediately notify the Contractor of any deficiencies related to the traffic control provided on site that may create a health and safety hazard and shall instruct the Contractor to correct such deficiencies.

The Project Lead shall coordinate with the Region's Project Manager, any reporting and recording of accidents/incidents with the Region's Risk Management staff to ensure accurate and effective records of any incidents are recorded.

16.3.10. Public Relations/Public Liaison

The Project Lead shall, during the work, act as the Region's representative onsite and all interactions shall be conducted in a manner which reflects the Region's values and goals. The Project Lead is expected to establish and maintain appropriate relationships with adjacent

property owners, other Agency representatives, local politicians, local police and emergency services, community groups, residents, business owners.

The Project Lead is to direct all media requests concerning the project to the Region's Project Manager or Public Relations Associate. All issues and complaints shall immediately be identified to the Region's Project Manager as they arise in writing. The Project Lead shall maintain a complaint tracking form throughout the life of the project. As a minimum the tracking form must contain the following information:

- Date of complaint;
- Location of issue;
- Description of issue;
- Person initiating the complaint;
- Contact information for the complaint originator;
- Description on how the issue was resolved; and
- Date the issue was resolved and confirmation that the resolution was discussed with the originator of the complaint.

All issues are to be separately tracked. The Project Lead shall review the updated list at all site meetings to ensure no issues go unresolved.

The Project Lead shall be responsible for delivering pre-construction, construction and post-construction notices related to the project, including comment cards to effected parties, including all residents and businesses within the project area. In addition, the Vendor shall be responsible for coordinating any water shutdowns and ensuring all parties are notified in the event of a planned or emergency shutdown.

16.3.10.1. Water Interruption Survey/Shutdown Notice Management

The Project Lead shall conduct a Water Interruption Survey of all impacted residents to ensure there are no special needs or restrictions that need to be considered prior to planning any shutdowns or interruptions to service as applicable. This requirement applies to all residential dwellings and businesses that may be impacted. The intent is to ensure, where possible, specific concerns are incorporated into the planning of any outages wherever possible. Night, weekend, and off-hour opportunities are to be identified and coordinated, if preferable, for all works which may impact property owners or users.

Prior to the approval of any shutdown, the Vendor shall be responsible for the completion of a Project Request For Shutdown (RFS) for the shutdown. The RFS shall include all necessary details including valve isolations, contingency plans, temporary services, special procedures and

monitoring plans. The Vendor shall work with the Region's Operator, the Region's Project Manager and other parties, as deemed necessary, to complete a proper and complete plan prior to seeking approval and sign off for the form

16.3.10.2. Lane Closure Notifications

The Project Lead shall be responsible to provide lane closure notifications to all affected residents, businesses and other stakeholders as required by the Region's Project Manager. The Project Lead shall coordinate traffic management and public communications with other roadway work in the vicinity as applicable.

16.4. Project Controls

16.4.1. Pre-Construction Photos

The Project Lead shall be responsible for taking pre-construction photos of all features within all project limits. This includes, but is not limited to, all surface features, environmental features, structures including bridges and buildings, and underground features (e.g. maintenance holes, valve chambers, hydro vaults, pull pits). All pre-construction photos should be taken at a time when snow or other obstructions do not cover the features in each photo. Where this is not possible the Project Lead shall, as soon as conditions allow, take another set of pre-construction photos once snow or other obstructions are clear.

Photos should be taken a maximum of every 10m when highlighting surface features. For photos showing structures and other underground features, sufficient pictures should be taken to adequately ascertain the condition of all aspects of the structure/underground feature at a later date. (i.e. cleanliness, cover condition, condition of the underground feature itself, photos of anything inside the underground feature of interest).

Where degraded conditions are noted, extensive photographs should be taken to adequately display the extent of current degradation. Scale features should be utilized (i.e. rulers) where possible. Structure cracking should be noted and notes taken for each photograph to properly describe preconstruction conditions.

The Project Lead is to provide copies of all pre-construction photos in an acceptable format to the Region's Project Manager prior to construction beginning. The Project Lead shall also submit a spreadsheet listing the date of picture, location of picture; and description of picture/highlights of any points of note.

Should the pre-construction photos show existing conditions that are considered contentious (asphalt cracking/condition, sidewalk and curb damage), the Project Lead will be responsible for coordinating an onsite meeting with the owner of the feature in question and the Region to ensure pre-existing conditions are noted and agreed to by all parties.

16.4.2. Pre-Construction Meeting

16.4.2.1. Attendees

After award of the contract to the successful General Contractor, the Project Lead shall arrange for the Pre-Construction Meeting to be held within ten working days. Attendees at the meeting shall include as a minimum:

- Region's Project Manager
- Region's Compliance Representative
- Operations Supervisor and Operator
- Project Lead's Project Manager/Contract Administrator
- Project Lead's Resident Engineer and/or Region's Inspector and Foreperson
- General Contractor's Project Manager
- General Contractor's Site Supervisor
- Major Sub-Contractors

16.4.2.2. Agenda

The Pre-Construction Meeting Agenda shall include the following:

- Review of Contract Document Status (Insurance, Bonds) and execution of Contract Document
- Official Commencement Date
- Required Completion Date
- Contact information for correspondence to the Project Lead and Region
- Status of Approvals
- Notification to Concerned Agencies/Stakeholders
- Construction Schedule
- Site Supervisory Staff and Emergency Contact Information
- Designated Peel Region Operations Contact
- Materials Testing and Specialist Inspections
- Document and Records keeping approach
- List of Equipment Suppliers and Sub-Contractors

- Timing for purchase orders to Pre-selected Equipment Suppliers (if required)
- Names of major Equipment Suppliers and Sub-Contractors
- Major and long-lead equipment to be ordered.
- Project Signboard
- Temporary Buildings (Site Offices) – submit Site Plan showing proposed location for review prior to moving on site
- Submittals and RFIs
- Work Procedures
    - Safety – Occupational Health and Safety Act, Contractor designated as the Constructor
    - Site Security
    - On-site parking
    - Environmental issues - silt fences, sediment control, trees protection
    - Site Fencing
    - Traffic Control/Haul Routes
    - Co-operation with other Contractors
    - Surplus Material Disposal, attention required to satisfy O Reg 406/19
    - Shutdowns and Switchovers
    - Disinfection
    - Training
    - Testing & Commissioning
- Approaches to Site Instructions and Work Changes
- Public relations and procedure on recording and handling complaints
- Pre-construction surveys
- Approach to managing progress payment requests
    - General Contractor’s electronic copy of request for progress payment breakdown to be submitted monthly
    - Payment Certificate to be issued by the Project Lead to Peel
    - Date of submission to Peel
    - Payment date and time with respect to the Construction Act
    - Cash flow submission requirements
- Team Building Workshop
- Constructability Workshop

- Site Meetings
- Other Business

16.4.3. Construction Meetings

Construction Progress Meetings will be held bi-weekly throughout construction and into the warranty period as necessary and are to be chaired by the Project Lead. The Pre-Construction Meeting Minutes will form the basis of the first Construction Progress Meeting with the Project Lead updating information and actions as necessary. Should progress not be satisfactory, Peel may request Progress Meetings be held weekly until progress is again deemed satisfactory.

16.4.4. Meeting Minutes

The Project Lead shall issue the Meeting Minutes within five business days of each meeting. The minutes will have an “Action By” column to be completed for each item and carried forward to future agendas when outstanding. Where there is no action required, the entry shall reflect that the item is for information only.

16.4.5. Schedule

The Project Lead shall review the Contractor’s proposed Preliminary Construction Schedule for conformance to the contract documents. The Project Lead will comment on the procedures and sequence of work and will consult with the Operations Supervisor and Region’s PM to identify and resolve any conflicts with possible schedule impacts.

Once it is determined that the General Contractor’s construction schedule adheres to contract requirements, it will become the baseline schedule.

The General Contractor shall submit updated schedules in accordance with the contract documents and the Project Lead is responsible for monitoring and reporting on the General Contractor’s schedule submissions.

In addition to the project schedule, the General Contractor shall submit a rolling schedule on a weekly basis showing construction work completed in the last week and construction work to be carried out for the next two-week period.

When the rolling schedules are out of sequence and falling behind the baseline construction schedule, the Project Lead shall request that the General Contractor update the project schedule to recover slippage.

The Vendor will assist the Agency with all aspects of the critical path schedule. Special emphasis will be placed on the development of the comprehensive schedule early on at project commencement as well as maintenance and accurate, realistic updating on a monthly basis at a minimum throughout the life of the project.

16.4.6. Monthly Construction Report

The Project Lead shall submit a monthly construction cost control report to Peel's Project Manager including the following:

- Value of Contract amount
- Payments to Contractor to-date
- Approved Change Orders issued to-date
- Value of Contract plus all Change Orders approved to date.
- Include or identify any potential additional costs for work that is outside the contract, which may be required to complete the construction works.
- Description of work performed to-date and advise on progress to-date versus baseline schedule submitted by Contractor.
- Recommend any action to be taken by Peel to mitigate cost overruns for the project.

16.4.7. Occupational Health and Safety (OHS)

The Project Lead is responsible for ensuring all applicable OHS obligations are implemented by the General Contractor and their sub-contractors. These obligations include but are not limited to providing a safe workplace; providing appropriate training and personal protective equipment, providing information and educating their workers on workplace hazards; and appointing a competent supervisor. These responsibilities apply to all employees, Subconsultants, or other personnel providing services to the Project Lead and the General Contractor under the terms and scope of the project.

General Contractors providing services to Peel shall institute a Project Specific Health and Safety (H&S) program(s)/ Plan(s) as necessary, to cover all aspects of the project H&S risks.

Although the General Contractor is responsible to meet the requirements of the Occupational Health and Safety Act (OHSA), the Project Lead shall perform continuous monitoring of activities for compliance with OHSA. The Project Lead shall notify Peel of any health and safety incidents or infractions.

When applicable, the Project Lead shall assist Peel in coordinating works among different general contractors near the construction site limits to ensure compliance with OHSA, and specifically to ensure that Peel is not deemed to be the “Constructor.”

Should a situation arise during construction that the Project Lead considers unsafe or damaging to the environment, the Project Lead shall issue a Stop Work Order. The Project Lead’s Resident Engineer and/or Inspectors must be knowledgeable and capable to identify site-specific health and safety issues relevant to the project scope.

Peel and the Ministry of Labour also have the authority to issue a Stop Work Order. The Project Lead shall always cooperate with a Ministry of Labour inspector and shall immediately notify Peel Project Manager of any Ministry of Labour visit and orders.

The Project Lead shall participate in any audits conducted by Peel’s Safety Specialist and shall verify that the General Contractor has addressed any deficiencies noted by the specialist in health and safety related activities applicable to the project (i.e.confined space entry, tunnel rescue, fall arrest, first aid & CPR, WHMIS, asbestos awareness, trenching and shoring safety training documentation, and any other appropriate certificate required to perform inspection Work). Prior to initiating any Work onsite, the Project Lead must submit a letter on a company letterhead, identifying that all personnel engaged in the assignment have had appropriate health and safety training. The letter must be signed by personnel who have the authority to bind the corporation.

The Project Lead will be responsible for providing all safety equipment for the protection of their staff, including gas detection, safety retrieval devices, and any ancillary equipment for confined space entries (CSEs) required for inspection purposes. Certification in CSE is a pre-requisite.

16.4.8. Change Management and Cost Control during Construction

The Project Lead is fully responsible for cost control of the project with respect to engineering consulting fees and Peel’s contractual obligations to the Contractor and is required to provide timely reports to Peel of the impending overrun of consulting engineering fees or its contractual obligations to the Contractor.

The Project Lead shall manage a Request for Quotation (RFQ) log that will track all quotations requested to the General Contractor, the date they were received, their values, and their status with regards to a Change Order.

Any changes to the contract must be made by the issuance of Change Order(s) to the General Contractor. This includes:

- Changes to the contract when there is a change to the project scope resulting in a change to the contract value i.e., increase/decrease of the Contract cost. Changes to the contract when there is no change to the contract value (e.g., substitution requests)
- Approval to use Provisional Items, Miscellaneous Items or Cash Allowances defined under the Contract.

Change orders will be issued for additional work that deviates from the intent or requirement of the contract only when approved by Peel's Project Manager. Peel accepts no responsibility for any change orders that are issued by the Project Lead without the approval of Peel's Project Manager. The Project Lead will issue Change Orders using the template provided in **Appendix 20.**

The Project Lead shall maintain a Change Order log and track all approved Change Order costs and the remaining contingency/provisional funds available as provided under the contract. The Project Lead shall provide bi-weekly updates to Peel's Project Manager via email. Logs should be reviewed in each progress meeting. Refer to **Appendix 21.**

16.4.9. Tri-Annual Cash Flow Estimations

Provide tri-annual cash flow estimations for the construction period to the Region one month prior to the Region's triennial reporting cycles. The cash flow estimations will be based upon the Contractors' schedule of Works and shall include:

- Expected cash flow projections on a tri-annual basis for the duration of the construction phase;
- Monthly totals for the pending four (4) month reporting cycle;
- Totals for each four (4) month cycle to the point of project completion including the maintenance cycle;
- Inclusion of the statutory lien hold back issuance;
- Inclusion of the maintenance holdback retaining period of payments and ultimate release;
- Prediction and collaborations with the Contractor for any substantial material pre-payments;
- Include within the monthly summary report a justification section for any deviations of the predicted cash flows greater than 10% of the total estimate for each month.

16.5. Quality Assurance and Quality Control

A Quality Assurance and Quality Control (QA/QC) program is to be implemented by the Project Lead during the construction phase including the planned and systematic actions to verify that the works are constructed in accordance with applicable codes, guidelines, standards and as specified by the contract.

The QA/QC program shall include:

1. Checking of all layouts to verify conformance with design drawings.
2. Review of all construction work and installation of equipment.
3. Progress monitoring and record keeping of the construction work, noting unusual or unforeseen events that may have delayed the progress of work.
4. Review of shop drawings to verify that contractual requirements are met for materials and equipment.
5. Issuing of clarification drawings to meet intent of contract requirements.
6. Inspection of work by technical specialists to verify work complies with contractual requirement and codes, regulations, etc.
7. Arranging for external specialist testing firms to verify work that is beyond the expertise of the Project Lead.
8. Performing check-out/verification of all equipment, process and/or mechanical, instrumentation & control and SCADA systems.
9. Verifying that the Contractor performs all instrumentation calibration as specified.
10. Inspecting and ensuring that the Contractor executes the work in an efficient and competent manner.
11. Recording as-built information noting changes relative to the Issued for Construction (IFC) drawings. The Project Lead shall review the General Contractor's redline drawings monthly for completeness and accuracy. The Project Lead shall consolidate the reviewed final as-built documentation from the General Contractor with the Project Lead's records and issue As-Built Drawings to Peel for review and acceptance.
12. For linear infrastructure projects involving concrete pressure pipe, the Project Lead shall collect and record all as-constructed information, including GPS coordinates and horizontal and vertical (x,y,z) locations of all pipe joints, closures, fittings, tees, bends, bevels, and specials and record these using Peel's standard form included in Appendix 28.
13. For linear infrastructure projects involving any pipe materials other than concrete pressure pipe, the Project Lead shall collect and record all as-construction information,

including GPS coordinates and horizontal and vertical (x,y,z) locations for a minimum of every 3 pipe joints or 20m whichever is less, including any bends, couplings, fittings, tees, saddles and any joints in which mechanical restrainers are installed. Refer to Appendix 28A for Peel's standard form for recording such as-constructed information.

14. The Project Lead shall ensure complete production of "As-Built" drawings to Agency standards.
15. Verifying that the Contractor adheres to the Occupational Health and Safety Act, and all applicable Regulations for Construction Projects.
16. Ensuring that all spills are contained and cleaned up by the Contractor immediately when found. The Project Lead shall contact the Peel Environmental Controls Section, the Ontario Spills Action Centre and other stakeholders as required and advise of the spill and action taken, if any, to contain and mitigate its impact on the environment.
17. Ensuring that the Contractor institutes environmental protection measures prior to commencing any construction works on the site as specified in the contract.
18. Ensuring that all regulatory agencies have been notified of completed work and that the required inspections have been carried out.
19. Verifying and ensuring that the Contractor observes and complies with all Environmental Protection Statutes and Regulations during the construction of the facility.

16.6. Review Shop Drawings

The Project Lead's review of shop drawing submissions is vital to quality control and to ensure adherence to the technical specifications. The Project Lead must have a systematic and efficient approach to processing, reviewing and transmitting shop drawings to avoid delay claims by the General Contractor in association with shop drawing reviews.

The General Contractor shall be responsible for preparing and submitting a shop drawing list prior to the Pre-Construction Meeting. The Project Lead shall review the list with the General Contractor to identify any long lead equipment or deliveries that could impact the construction schedule.

The General Contractor shall certify that shop drawings conform to contract documents by affixing their review stamp to the drawings. The Project Lead shall not review any shop drawings that have not been reviewed by the General Contractor and certified by them to conform to the contract documents. Drawings received from the General Contractor without the review stamp and Compliance Statement will be returned to the General Contractor. Refer to **Appendix 14- Submittal Review Form**.

Peel will review submittals as required, and the Project Lead shall produce one consolidated set of review comments for the General Contractor. Comments on shop drawings shall be returned to the General Contractor no more than ten business days after receipt of the shop drawing.

If more than one resubmittal is required or if a submittal is complex or critical to the schedule, a meeting with the General Contractor and supplier should be scheduled to resolve all comments.

The Project Lead shall maintain a Shop Drawing Submittal Log during the construction of the Project. The Project Lead shall prepare the Submittal Log, including all required contractual submission for the pre-construction meeting. This submission log is to be used by all parties to ensure all requirements of the Contract are being adequately addressed. The submission log is to be reviewed at each Construction Progress Meeting and distributed with the Meeting Minutes. See **Appendix 15.** The Project Lead shall use the submittal log as a reference to ensure that shop drawings are being reviewed within the stipulated contractual timelines. Should the Region incur additional costs from the Consultant not meeting contractual timelines for shop drawing review, the Region reserves the right to recover these costs from the Consultant as appropriate.

The Project Lead shall review all shop drawings, working drawings, methodology statements submitted by the Contractor and shall ensure compliance with the contract requirements.

Where deviations with the specifications are noted the Project Lead shall advise the Region Project Manager of the deviations and ensure the Region has no objections prior to approving the submission in question. Written approval for the deviation will be provided by the Region's Project Manager. The Project Lead shall respond to all submissions in accordance with the timelines provided in the Contract Documents. Under no circumstances shall the Project Lead approve shop drawing submissions without a comprehensive review of all calculations, sizes, dimensions, or references. Any reference to supplemental materials shall be reviewed by the Project Lead and any sub-consultants prior to approval of the shop drawings.

Where the Contract or Region's standards (PAIDS, Compliance Forms, Design Standards, Testing and Commissioning Standard) require submission to other departments the Project Lead shall ensure the appropriate submissions and coordination is completed in accordance with these standards. Deviations are only allowed with the written consent of the Region's Project Manager to any ofthese requirements.

16.7. Requests for Shutdown, Assistance or Bypass

The overall purpose for the Request for Shutdown (RFSD) process is to consider operational and physical issues to mitigate risks. The General Contractor is required to submit a Request for Shutdown for instances when assistance is required from Operations staff or when disruption to operation or access occurs.

A project-specific, detailed step-by-step shutdown process shall be developed by the Project Lead (in coordination with Peel) and the requirements shall be integrated into the contact documents for the project.

In general, the General Contractor shall prepare and submit Requests for Shutdown that include an adequate level of detail to clearly demonstrate requirements for assistance, impacts to operations or access, and contingency plans for the proposed work. Refer to **Appendix 29 – Water Request for Shutdown.** Requests are to be submitted a minimum of 20 working days in advance of the proposed request date to give ample time for the Project Lead, Region and Operations review. Each request shall be reviewed by the Project Lead, including a QC check by the relevant discipline lead(s), for conformance to the contract requirements. If acceptable, the Project Lead shall sign the request and distribute to Peel Project Manager and Operations Supervisor, unless otherwise noted by Peel Project Manager during project planning and execution. Region and Operations Compliance staff shall be included on the review of shutdown requests, commissioning and disinfection plans, etc.

The Operations Supervisor will issue final approval of any Request for Shutdown.

The Project Lead shall be responsible to coordinate with the General Contractor should they require assistance in the development of Requests for Shutdown. Complex shutdowns may require coordination meetings and/or site walkthroughs with all parties.

16.8. Supervisory Control and Data Acquisition Programming

16.8.1. Region's PAIDS Design Manual

Peel developed the Process Automation and Instrumentation Design Standards (PAIDS) Manual which forms the basis for the development, and implementation of Region of Peel control systems, communications, instrumentation, automation, and software for process applications. The Project Lead are required to conform with PAIDS for the design of water and wastewater

infrastructure for Peel. PAIDS defines the requirement for the following categories of process automation and instrumentation systems:

- Design and Process Tagging Conventions
- SCADA (graphical user interface software development, and related reporting)
- Controller (Automation System Hardware/Software)
- Information Technology (Communications requirements)
- Instrumentation & Control Design
- Processes (application specific process definitions and locations)
- Implementation (requirements for field verification, testing, commissioning, and training)

16.8.2. PLC and SCADA Programming by Project Lead

Development, testing and implementation of software applications, including automation logic and SCADA/HMI, shall be the responsibility of the Project Lead unless stated otherwise in the scoping document. The Project Lead shall reference PAIDS for specific requirements related to SCADA, controllers, and IT for the development and deployment of SCADA software applications. Specifically, implementation requirements for the PLC and HMI software development can be found in Peel's *PAIDS Design Manual*, including *Section G – Implementation*. The following is a general overview of the Project Lead's SCADA integration tasks for a project requiring integration services:

1. Programming of automation controller logic for the operation of the site/process area(s) based on the approved process control narratives (PCN) developed as part of the project. The Project Lead shall confirm with Peel the most up-to-date version of the PCN to be used for the programming.
2. Coordination with Peel of Peel SCADA group to facilitate configuration of network devices, including Industrial PC's, switches, routers, servers, and modems as required to integrate new/retrofit SCADA application.
3. Development or modification of the HMI applications including integrating into existing master applications as required.
4. Design of the required local communications network infrastructure or modification of existing to facilitate connection of SCADA HMI components and automation controllers to the Peel Process SCADA LAN.

5. Coordination and design of the necessary infrastructure to accommodate the installation of the Peel WAN access for existing facilities that require SCADA communications access or to service new facilities equipped with automation.

The Project Lead shall be an approved PAIDS SCADA system integrator by Peel or must retain an approved integrator for the development and implementation of all software applications. The integrator shall demonstrate competency and certified, as required, by the respective Human Machine Interface (HMI) platform vendor in accordance with PAIDS.

The Project Lead shall develop all applications in accordance with PAIDS, whether the work involves automation control logic development and/or modifications to existing programs, HMI application development and/or modifications to an existing HMI application is required. The Project Lead shall be responsible for software modifications, including but not limited to alarming, historian, and reporting, related to the integration of the new or modified SCADA HMI applications.

It is the Project Lead's responsibility to familiarize themselves with Peel's PAIDS Design Manual and associated requirements for facility networks and/or distribution or collection systems wide area networks.

16.8.3. PLC and SCADA Programming by Contractor/Vendor

Where PLC and HMI programming is the responsibility of the Contractor or the equipment package vendor, the SCADA integrator shall ensure that the software applications are developed in accordance with PAIDS. Requirements for Vendor developed software application are defined in PAIDS *Section G – Implementation*.

16.8.4. PLC and SCADA Programming by Region SCADA Staff

Where the PLC and HMI programming is the responsibility of Peel's SCADA staff, the Project Lead shall coordinate with the Contractor to provide support to Peel for the pre-SAT and software SAT activities. The Project Lead shall provide Peel's SCADA representatives with the required contract documentation to complete the development of the software application, including design drawings, specifications, equipment shop drawings and process narratives. The Project Lead shall ensure that all automation, instrumentation, and communications systems have been verified by the contractor in advance of software SAT.

16.9. Operations Manual

The Project Lead shall submit the draft Operation Manual for Operations staff as per the requirements of the contract documents. The final version of the Operations Manual shall be completed prior to training and commissioning and copies provided to the Operations Supervisor prior to the Region assuming operation of the assets being constructed.

Where construction work is being performed on existing infrastructure, the Project Lead will work with Peel to obtain the current Operations Manual(s) impacted by the work and follow the relevant Operations procedures for preserving the Operations Manual(s) for the duration of the construction.

For the South Peel System, the Project Lead will work with Peel to obtain the current Operations Manual(s) from the Operations document management software solution and use the “reserve” function to lock files from being edited. In addition, a note will be added to each reserved Operations Manual in the document management solution identifying the date, project, and the name of individual reserving the document(s). Any revisions required to the reserved Operations Manual(s) during construction work by other internal or external parties must obtain permission from the individual who has reserved the document(s), so they can be unreserved. Once revisions are made by the internal or external parties, the Operations Manual(s) can be re-reserved following the process identified above. Once the construction work has been completed, the final version of the Operations Manual(s) will be provided to Peel and PCN(s) will be unreserved.

16.10. Asset Tagging

Asset tagging shall be completed in accordance with Peel’s requirements. This includes linear and facility infrastructure and in the case of facilities also includes OCWA tagging requirements.

All I&C equipment shall be tagged in accordance with the requirements of Peel’s PAIDS Design Manual. The tag numbers noted on Process and Instrumentation Drawings (P&ID) shall be used for the identification of the equipment in the field. The General Contractor will be required to tag all equipment based on the approved list of equipment tag numbers and the requirements as set out in the contract documents.

16.11. As-Built Drawings and Documentation

The Project Lead shall prepare and submit Draft As-Built Drawings to the Region no later than 60 days after Substantial Performance. The Project Lead shall review and transfer all redline information from the General Contractor and from the Project Lead’s records onto the As-Built

Drawings. The Project Lead shall remove all references to proposed works except for future proposed works (by others) and any drawings for temporary construction facilities that do not provide as-built information. A copy of the redlines are to be provided to Peel at Substantial Performance and prior to finalizing the As-Built Drawings. Should there be any changes made during the warranty period that need to be reflected on the As-Built Drawings, the Project Lead shall re-issue any drawings as necessary.

The Project Lead shall verify all critical vertical and horizontal portions of the work. Prior to the work beginning, the Project Lead shall review with the Region their proposed approach to verifying line and grade and agree to the method of data collection related to the projects included under this assignment.

As a minimum, independent verification of line and grade must occur for the following items:

- Storm and sanitary sewer invert(s) at each maintenance hole
- Maintenance hole and chamber northing and easting coordinates including top of frame elevation.
- Service tee and sanitary lateral data (at mainline and at property line) for each property / lot
- at mainline and at property line)
- Watermains:
    - Line and grade verification and record horizontal and vertical (x,y,z) as-recorded data at all Point of Intersection (P.I.) points;
    - Line and grade verification and record horizontal and vertical (x,y,z) as-recorded data at a minimum of 20m intervals between horizontal and vertical P.I. Points. This requirement applies to all pipe materials and sizes. Concrete Pressure Pipe as-recorded data and checks shall be completed as per the specific requirements below.
    - Line and grade verification and record horizontal and vertical (x,y,z) as-recorded data at all future tie-in locations;
    - Line and grade verification and record horizontal and vertical (x,y,z) as-recorded data at all hydrant lead, service tap locations;
    - Vendors are to note that for all Concrete Pressure Pipe installations Vendors shall be required to record horizontal and vertical (x,y,z) as-recorded data for all pipe joints, closures, fittings, bends, bevels, tees; and
    - Vendors shall include information in an independent Horizontal/Vertical Alignment Drawing.

- All Other underground utilities, including but not limited to:
  - Hydro Duct Banks;
  - Sanitary Forcemains;
  - Water Service locations; and
  - Communication and Instrumentation conduits.
- Structures:
  - Line and grade for all foundation corners;
  - Line and grade for all critical elements of the structure in question for example top of pier elevations, top of deck elevations, bearing surfaces; and
  - Location and grades for all piles, caissons, rock anchors, shoring systems.
- Roads:
  - Verify elevation of all critical layers of the pavement structure for example, top of subgrade, top of granular sub-base, top of granular base, top of all asphalt layers.

All installed software for all components of the project's SCADA System shall be submitted as As-Built Documentation, including HMI and PLC software.

As-Builts are to be provided in accordance with all Peel standards (i.e., applicable design standards and CAD standards).

16.12. Post Construction Photos

Following completion of construction and restoration work, the Project Lead will complete a set of Post-Construction photos for record purposes. Photos will be taken during a time when snow or other weather impacts will not obscure any features being highlighted. Photos are to be taken and logged in accordance with the requirements for Pre-Construction Photos as outlined in this document.

16.13. Final Regulatory Agencies Approvals

Depending on the project, inspection of the constructed infrastructure may be required by some or all of the following regulatory agencies prior to operation and/or occupancy:

- Technical Standards and Safety Authority
- Building Occupancy Permit
- Fire Department Approval for occupancy
- Ontario/Local Hydro Inspection / Electrical Safety Authority
- Ministry of Consumer and Corporate Affairs

The Project Lead shall verify that the Contractor has provided a copy of all approvals in each set of the Operation & Maintenance Manual.

It is the Project Lead's responsibility to arrange for and conduct final inspections, as required, with representatives from regulatory agencies and/or local area municipalities.

The Project Lead shall confirm that all required inspections by regulatory agencies have been performed prior to issuance of the Substantial Performance Certificate. Peel shall notify all internal stakeholders of the project completion.

16.14. Contract Completion

The Project Lead shall advise Peel's Project Manager on the retaining and release of holdbacks pursuant to the provisions of the Construction Act and pursuant to the Contract between Peel and the General Contractor, and to administer all warranty provisions, including any applicable warranty holdbacks, in accordance with the contract between Peel and the General Contractor.

16.14.1. Vendor Document, Record Control and Reporting

While notes and record documents shall be maintained throughout all phases of the project, from the pre-tendering process to the issuance of the Completion Certificate, the Project Lead shall, no later than one month following the issuing of the Completion Certification, provide the following documents in their entirety to the Region for record purposes:

- Copies of all site diaries/site notes related to the project;
- Copies of all general and specialist inspection/ monitoring reports associated with the project;
- Copies of all Contract Administration paperwork, specifically copies of all RFI's, RFQ's, CCO's, CO's, Site Instructions, shop drawing logs;
- Copies of all test reports related to the project;
- Photos to be included for all phases of the project including pre-construction, progress, restoration and maintenance pictures; and
- Summaries of the following information as applicable:
    - Record of Contractor-submitted certificates of conformance as required by the Contract Documents;
    - Originals of any warranties required by the Contract Documents in the name of the Agency;
    - Soils and granular material quality records;
    - Concrete, concrete aggregates and structures quality records;

- All pertinent quality control records;
- Hot mix, hot mix aggregates and bituminous materials records;
- Grading records;
- Drilling records;
- Blasting records (if applicable);
- Specialty work quality records;
- New product quality records;
- Environmental quality assurance records;
- Miscellaneous items quality records;
- Monitoring/auditing records of the Contractor's quality control plan;
- Summaries of all allowances and record of any payment from allowance items
- Company environmental compliance records complying with environmental statutes and regulations;
- Traffic accident and any incident records including police reports where applicable;
- Records documenting how property related commitments and construction concerns have been addressed;
- "As-recorded" drawings illustrating constructed deviations from the original drawings; and
- Other documents pertinent to the Project as may be required by the Region

Vendors shall submit all this data in electronic format to the Region.

16.15. Warranty Period

16.15.1. Final Inspection

One month prior to the expiration of the Warranty Period, the Project Lead shall assemble a team to inspect the infrastructure constructed/modified to determine if there are any outstanding deficiencies where remedial work is still outstanding or has been performed unsatisfactorily which must be rectified.

The inspection shall be carried out jointly with the Contractor, the Operation and Maintenance Supervisory staff together with Peel's Project Manager.

The inspection shall include all infrastructure systems and components.

The Project Lead shall update the master deficiency list of all the noted deficiencies and provide a copy to all parties. The Project Lead shall notify the Contractor of the required completion

date for the performance of the remedial work, which shall not be later than the end of the Warranty period.

16.15.2. Maintenance and Warranty Items

The Project Lead shall be responsible for investigating all warranty and maintenance claims from Region personnel. The Project Lead shall review the specifics of the issues raised by the Region and shall review all pertinent information.

The Project Lead will be responsible for creating and maintaining a maintenance item tracking form which shall include the following information as a minimum:

- Maintenance/Warranty issue;
- Date issue was raised;
- Description of issue and location of the issue;
- Date Contractor was notified; and
- Date issue was resolved by the Contractor.

The Project Lead shall proactively deal with the Contractor in question to address the issue in question. Where the Contractor refuses or does not deal with the maintenance/warranty issue in a timely manner, the Project Lead shall assist the Region in resolving the issue by other means and shall ensure the appropriate financial holdback is retained from the warranty holdback to cover the Region's costs related to this matter.

16.15.3. Release of Warranty Holdback

At the end of the Warranty period, if the Contractor has completed the rectification of all the deficiencies satisfactorily, the Project Lead shall prepare and submit a final payment certificate for the release of the Warranty Holdback to Peel's Project Manager.

If at the end of the warranty period there are deficiencies still outstanding, the Project Lead shall advise Peel's Project Manager and Peel may choose to retain a third party to complete the remedial work. In this case, the Contractor shall be advised that they are in default of the contractual requirements as per General Conditions of the contract and that Peel is proceeding with the remedial work of the outstanding deficiencies independently. When the remedial work has been completed, the cost of the remedial work including all associated engineering fees will be deducted from the Warranty Holdback. The Project Lead shall prepare and submit a

payment certificate to Peel's Project Manager for the release of the outstanding balance of the Warranty Holdback monies.

16.16. Deliverables

	Construction Phase	Submission
1.	"Issued for Construction" (IFC) Drawings and Specifications incorporating all Addenda	Electronic
2.	Construction photographs at all key stages of the works and suitably filed and titled	Electronic
	Daily and weekly construction reports	Electronic
3.	Review and approval of progress payment certificates monthly to final completion	Electronic
5.	Spare parts requirements	Electronic
6.	Meeting agendas, minutes, progress reports, RFIs, shop drawings, requests for quotations, change orders, etc.	Electronic

	Prior To Commissioning	Submission
1.	Final Asset Management Data Sheet	Electronic
2.	Final Operations Manual	Electronic
3.	Pre-Start Health and Safety Review	Electronic

	At Substantial Performance	Submission
6.	As-Built Drawings (within 60 days of Substantial Performance)	Electronic
7.	HMI and PLC software (if part of Project Lead's scope)	Electronic
8.	Master Deficiency list	Electronic
9.	All approvals and permits	Electronic
10.	Final Facility SCADA and PLC Manual	Electronic
11.	Final Process Control Narrative	Electronic
12.	Updated Final Coordination Study of Protective Devices	Electronic
13.	Certificate of Substantial Performance	Electronic
14.	Payment Certificate for Lien Holdback Release	Electronic
15.	Updated Asset Management Data Sheet	Electronic

	Contract Completion	Submission
1.	Total Completion Certificate	Electronic
2.	Updated Deficiency List	Electronic
3.	Updated Asset Management Data Sheet	Electronic

	Prior To End of Warranty Period	Submission
1.	Final inspection and re-issue Deficiency List	Electronic
3.	Payment Certificate for release of Warranty Holdback.	Electronic
4.	Contract Release Certificate	Electronic

17. Training

17.1. Training of Operations Staff by General Contractor/Supplier(s)

17.1.1. Contractor/Supplier(s) to Schedule and Organize Training

The General Contractor shall notify Peel a minimum of fifteen (15) working days ahead of the intended training. The training shall be conducted to provide training to all operators and shifts as required by Peel.

The Project Lead shall include the above requirements in the tender specifications and shall coordinate all Regional Staff attendance as required.

17.1.2. Training on the Operation and Maintenance of Equipment

The Contractor shall arrange with the manufacturer and/or supplier to train Peel staff on the proper operation and maintenance of the equipment or system.

The training shall be conducted by qualified, experienced, factory-trained representatives of the various equipment manufacturers at the site of the equipment. Training shall include instructions on the proper operation of the equipment, including normal preventive maintenance and repairs, and troubleshooting.

The training sessions are intended to complement and cover instructions that are found in the Equipment O&M Manual.

Draft training materials shall be submitted three weeks prior to the delivery of the training.

The Project Lead shall include all the above requirements in the tender specifications and shall coordinate all Regional Staff attendance as required.

17.2. Training by the Project Lead

17.2.1. Training on Project Lead's Operations Manual

When the construction works have been completed, the Project Lead shall revise the draft Operations Manual and submit the final version of the Operation Manual to Peel's Project Manager.

The Project Lead shall allocate for adequate time in their proposal for the training of Peel Operations staff on the operation of the facility. Training will be required for up to five separate groups of Operations staff and shall be conducted in the nearest facility's meeting room. The Project Lead shall provide all classroom material, visual aids, handouts, etc. for the training session.

As a minimum, the training shall include the following:

- Operation of the facility or linear asset after upgrade
- Description and function of newly constructed process
- Treatment process and performance criteria
- Identification of critical process "bottlenecks"
- Possible process upsets/failure modes and mitigation measures including those identified during HAZOP workshops
- Sampling and monitoring
- Safety procedures
- Handling of alarms
- On-line operation of the facility and SCADA System
- Using the Manual
- Procedures for Region Operations staff to update the Manual

17.3. Deliverables

	Task	Submission Requirement
1.	Operations Manual - Draft	1 hard copy & electronic
2.	Operations Manual - Final	4 hard copies & electronic

18. Commissioning

18.1. General

Commissioning refers to the process of getting systems/linear works to operate reliably and efficiently as intended so the infrastructure can be handover safely to Peel. Commissioning includes all activities covering the end of construction/installation to the time the infrastructure is placed into service and turned over to Peel.

Thus, commissioning generally involves planning, installation verification, site acceptance testing (SAT), and performance testing.

The Project Lead is required to implement quality assurance and quality control procedures for the verification of all equipment, systems, process sub-system processes and/or linear works to ensure they perform as intended. This section outlines procedures that shall be implemented by the General Contractor with the participation, coordination and oversight of the Project Lead and Region Staff.

18.2. Contractor's Commissioning Plan

The General Contractor is required to produce a detailed plan to document the installation verification, testing, start-up, performance testing and initial operation of equipment and systems installed under the Contract. The plan is intended to outline the commissioning process to achieve the operation of equipment, systems and/or linear works for their intended purpose. The document shall be reviewed and approved by the Project Lead in advance of implementation. The General Contractor's Commissioning Plan shall be submitted for review/approval within the specified period, from the date of the contract is awarded. The Plan shall include details on the commissioning tasks, timelines, resources, and procedures. All facilities, systems, components, and equipment installed by the General Contractor shall be included in the commissioning plan. The Plan shall include supporting documentation for verification tests performed in advance of start-up including but not limited to, vendor verification reports, check lists, inspections by authorities having jurisdiction, Factory Acceptance Tests, and Site Acceptance Tests. The supporting reference documentation is intended to demonstrate the respective equipment, systems, components have undergone quality assessment, and ready to for functional operation as defined in the plan.

The following is a general outline for the Commissioning Plan, intended to be customized by the General Contractor to suit the contract specific scope of work:

- Overview - Provide a description of the scope of work associated with the project as it relates to commissioning activities. Identify the equipment, and systems that are to be verified tested by the General Contractor, including building services
- Resources and Roles – Provide detailed information on the resources required to achieve the commissioning works and define the roles of the participants. Include resources requirements related to the General Contractor, sub-contractors, suppliers, Peel staff, operations staff and associated utilities.
- Sequencing - Define the proposed sequence, to accommodate verification of all equipment and systems specific to the project scope of work. Identify the required testing and associated resources. Develop sequencing such that testing is performed consecutively.
- Operations – Define coordination with operations for new or existing installations, to ensure continuity of new/existing systems, during the commissioning phase including but not limited to, linear works, process equipment, process systems, building services, electrical distribution, life safety system, emergency systems, instrumentation, automation, controls, and network communications systems.
- Schedule – Define a schedule for the respective start-up and commissioning activities including duration of events, task predecessors, in accordance with sequencing requirements. Coordinate and harmonize the schedule with the main construction scheduled.
- Procedure – Define testing required for the individual equipment, systems specific to the project scope of work. Define the following requirements for each equipment, system: Factory Acceptance Testing plans/procedures, installation verification requirements, Site Acceptance Testing plans/procedures, mechanical equipment pre-start inspections, electrical equipment pre-energization inspections, authority having jurisdiction inspections, Consultant / Region inspections and request for shutdown submissions.
- Applicable Legislative and Regulatory Requirements – Define requirements as per permits and approvals for project and as defined in the technical specifications.

18.3. Infrastructure Verification

The General Contractor is required to notify the Project Lead and Region of the proposed equipment/linear works verification, with advanced notice in accordance with terms and conditions of the contract. The Project Lead and/or Region will review requests for verification

of systems to establish a suitable date/time for the attendance of Project Lead and Region Staff including Operations.

The Project Lead will arrange for Operations Supervisory Staff to be present to witness and confirm correct operation.

The General Contractor shall arrange for the appropriate Sub-Contractor(s) and Supplier(s) required to perform the verification.

Prior to each verification test, the Contractor shall confirm that the manufacturer and/or supplier have inspected equipment installed by the General Contractor in accordance with the specifications and requirements of the Contract. The manufacturer/supplier is required to provide documentation certifying that the equipment has been installed correctly, is free of deficiencies, and ready to be placed in service.

The Project Lead shall ensure the General Contractor completes verification forms for each system and/or sub-system after each verification test. The General Contractor is required to provide a copy of the completed verification forms to the Project Lead, to the Operations Supervisory Staff and Peel's Project Manager.

The General Contractor will be required to repeat the verification testing process for any failed result until the mechanical/electrical/process system has passed. The Project Lead shall follow up with the General Contractor to ensure that the required remedial work has been successfully performed and to schedule verification testing. Verification testing shall only be scheduled upon confirmation that remedial work has been completed by the General Contractor. The Contractor and Project Lead shall provide timely notice to Operations Supervisory Staff and Peel's Project Manager to attend the follow-up verification process. On completion, the General Contractor shall issue the required verification forms confirming the successfully completion of the test.

18.3.1. Mechanical/Process System Verification

The Project Lead, with assistance from the General Contractor, shall prepare and provide Peel's Project Manager with a listing of all mechanical/process systems (including rotating equipment) to be tested/verified by the Contractor. The Project Lead shall provide an electronic submission of a draft list to Peel's Project Manager for review and approval. Once approved, the Project Lead shall electronically distribute the approved list to the General Contractor, Operations Supervisory Staff and Region's Project Manager. The General Contractor is required to include the equipment listed in the Commissioning Plan.

See Appendix 31 – Process Mechanical Equipment Installation Start-Up Checklist, Appendix 32 – Alignment Data Record, Appendix 33 – Valve Installation Checklist

18.3.2. Instrumentation and Control System Verification

The Project Lead, with assistance from the General Contractor, shall prepare and provide Peel's Project Manager with a listing of all instrumentation, automation and communication systems and equipment to be tested/verified by the Contractor.

18.3.2.1. Instrumentation Verification

The Project Lead shall ensure that the Contractor/Sub-Contractors/Suppliers have installed and verified all instrumentation as specified. The Contractor/Sub-Contractors/Suppliers shall demonstrate the proper calibration of each field instrument or devices to verify that they perform in accordance with the intended process application, and as specified in the contract.

The General Contractor shall complete an Instrumentation Installation Checklist and an Instrumentation Calibration Form for each instrument or field device on completion of installation and calibration test. The General Contractor to provide supplementary data sheets for verification digital data provided though HART communications protocol for smart instruments. The General Contractor will ensure all parties sign the checklists/forms at the conclusion of each test and shall provide a copy to the Project Lead, who will distribute to the Operations Supervisory Staff and Peel's Project Manager.

Testing that requires verification of Smart Instruments, equipped with HART communications protocol, is to be conducted once the respective host automation system, instrument control panel (ICP), is in service and capable of verifying the digital data.

For the calibration of each field device, the Contractor will arrange for appropriate the electrical, mechanical, instrumentation and control system Sub-Contractors to be present. The Project Lead shall witness the instrument verification and will arrange for the Operations Supervisor and Region SCADA staff to be present for the instrument calibration tests.

18.3.3. HVAC Verification

18.3.3.1. Air Balancing of HVAC System

The Project Lead shall direct the General Contractor to perform air balancing of the HVAC system in accordance with the project contract documents and specifications. Balancing is to be performed once the installation of the new HVAC equipment is completed, operational and free from any deficiencies. The HVAC system to be balance tested shall be in operation for a

minimum of seven consecutive days prior to air balancing. The Contractor shall balance the HVAC system until it meets the specified operating requirements. When the air balancing has been completed, the Contractor shall submit the specified Air Balance Report for review in accordance with shop drawing procedures.

Where the HVAC system is equipped with a Building Automation System (BAS), the General Contractor shall provide a SAT plan for testing/verification. The SAT plan is intended to demonstrate the integrity and correct operation of the HVAC automation application, including but not limited to field wiring verification of control loops, I/O verification, status monitoring, modes of operation, field devices, zone control, alarms and interlocks. The BAS system shall be tested and verified in accordance with the contract documents and specifications. Where the HVAC system is automation is provided by the SCADA System, the Project Lead shall confirm that the software SAT for the respective HVAC application is successfully completed prior to the Air Balancing.

18.3.3.2. Demonstration of HVAC Compliance with Contract Requirements

The General Contractor is required to verify the correct operation and integrity of the HVAC applications, in advance of demonstration/testing with the Project Lead, Region and Operations Supervisory Staff. The General Contractor will coordinate with the Mechanical Sub-Contractor, BAS integrators and other sub-contractors as required, and with the Project Lead for demonstration of the HVAC system operation on a zone-by-zone basis. The General Contractor is required to demonstrate that the system operation is consistent with the contract drawings, specifications, and equipment shop drawing control sequence. The General Contractor will be required to repeat the testing of the HVAC system operation if all functions cannot be verified during the initial testing.

The General Contractor is required to demonstrate the proper function of control and status monitoring interfaces between the HVAC automation and Plant Process SCADA automation in accordance with the contract design documents. The Project Lead and General Contractor shall coordinate HVAC system testing with the verification of the process SCADA automation system, including the following, if applicable:

- Hardwired I/O signals between the BAS and Plant SCADA automation
- Digital data based on communications links between the BAS and Plant SCADA automation

Integration and digital data from the HVAC automation system to the Plant SCADA shall be implemented in accordance with PAIDS. Where digital data exchange between the Plant SCADA

and HVAC automation is required, the HVAC automation system shall be equipped with approved communications protocols in accordance with PAIDS.

Testing and verification of the HVAC building automation system is to be performed with the approved HVAC automation system vendor retained by the General Contractor. The General Contractor shall obtain sign-off from the Project Lead, Region and Operations staff confirming that HVAC system operation was successfully completed. The General Contractor to submit the completed HVAC Verification Forms for distribution to all parties that attended the witness testing.

See **Appendix 34 – HVAC Checkout Verification Form**

18.3.3.3. External HVAC Specialist

For complex HVAC systems, Peel may retain the services of an external HVAC specialist for QA/QC and to confirm that the HVAC system is installed and functioning in compliance with the contract specifications. The Project Lead shall direct the external HVAC specialist to verify the installation and operation of the HVAC system including Air Balancing performance. The Contractor is required to provide the necessary resources and support from the mechanical installer and equipment vendors to aid in the external HVAC specialist performance verification. Peel will not accept the Air Balancing Report if the results of the independent testing firm's result deviates more than ±5% from the Contractor's results.

Where the HVAC system installed by the General Contractor or Mechanical Sub-Contractor does not perform as specified, the Project Lead shall document the deficiencies in the Master Deficiency List. The General Contractor shall be directed to repeat verification testing to demonstrate that the deficiencies have been corrected. Additional testing is to be witnessed by external HVAC specialist.

18.3.4. Electrical Verification

The General Contractor is required to coordinate the pre-commissioning testing of electrical distribution equipment, with the respective equipment vendors in advance of functional witness testing with the Project Lead, Region and Operations staff. The Project Lead is required to ensure the General Contractor submits documentation to verify that the following items have been addressed prior to functional witness testing of the electrical distribution equipment:

- Electrical Safety Authority "Power On" Inspection certificate, confirming that the General Contractor is permitted to energize the electrical distribution equipment

- Equipment vendor pre-energization and post energization inspection report
- Power conductor insulation testing
- Local Distribution Company (LDC) authorization to energize power
- Short Circuit Protection Coordination Study, implementation and field verification of protection settings (when required in the contract specification)
- Application of electrical hazard warning labels on the respective distribution equipment (when required in the contract specification)

18.3.5. Linear Works Verification

Commissioning and testing of linear works are to be performed in accordance with the Contract specifications, applicable Region standards, and regulations as related to water retaining structures and process piping or sewers. For drinking water infrastructure, the Project Lead shall confirm compliance with MECP Drinking Water Systems Regulation (Ontario Regulation 170/03) and provide verification documentation regarding work to be completed prior to commissioning. The Project Lead shall enforce applicable industry standards, with the contractor, to prepare drinking water infrastructure for service including but not limited to AWWA C651-14 Standard for Disinfecting Water Mains, AWWA C652-11 Disinfection of Water-Storage Facilities. The General Contractor shall implement procedures defined in the regulations and standards to verify the integrity of drinking water infrastructure including process pipe charging, flushing / de-chlorination, disinfection, swabbing, and hydrostatic pressure testing.

Refer to **Appendix 28 – Pipe Delivery and Inspection Form** and **Appendix 37 – Pressure Test Forms**.

18.4. Site Acceptance Testing

The Contractor and/or Sub-Contractor shall demonstrate the proper operation of the individual system in a sequential manner. For example, demonstration of chemical systems will require sequential operation of individual chemical applications (e.g., alum, chlorine, fluoride), including associated controls, instrumentation, SCADA interface, media storage, mechanical piping, such that each system has been proven fit for its intended purpose prior to proceeding to the system.

Electrical distribution systems and equipment shall be verified by the respective equipment vendor and authority having jurisdiction (i.e., Electrical Safety Authority). The General Contractor shall confirm that ESA has provided authorization to energize the respective power

distribution and electrical equipment. The General Contractor shall provide supporting documentation to the Project Lead and ESA, to demonstrate the integrity of the insulation power distribution insulation, facility grounding and electrical overcurrent protection.

Automation, SCADA HMI, instrumentation, and communications systems shall be verified and tested in accordance with PAIDS. Testing/verification shall be performed in accordance with the approved SAT plan. The General Contractor is required to provide documentation to verify the integrity of Automation, SCADA HMI, instrumentation, and communications systems in advance of proceeding with testing associated with the SAT plan.

18.4.1. Electrical Equipment

The Project Lead shall coordinate witness testing of electrical distribution and motor controller equipment, once pre/post energization vendor testing is completed, and the verification documentation has been submitted. Witness testing of electrical distribution equipment is to be completed by the General Contractor, in the presence of the Project Lead, Region and Operations staff in advance of commissioning of process equipment. The General Contractor shall retain qualified equipment technicians and licenced electricians to perform verification testing of the electrical distribution systems. The Contractor is required to confirm that related equipment Factory Acceptance Testing (FAT) has been successfully completed in advance of scheduling Site Acceptance Testing (SAT). The General Contractor is required to demonstrate the integrity, and functionality of the electrical distribution during site acceptance witness testing including the following:

- Functional operation of main distribution equipment breakers, switches, and interrupters
- Demonstration of Mechanical or Electrical Safety Interlocks between power sources
- Digital Power Metering Applications
- Solid State or Microprocessor Based Protection Systems
- Motor Controller / Starter applications
- Normal/Emergency Power Distribution Operation (where facilities are equipped with emergency generation)

Appendix 35 - Electrical Equipment Installation Checklist
Appendix 36 - Variable Speed Drives Installation Start-up Checklist

18.4.1.1. Emergency Generation

The General Contractor is required to perform site acceptance testing of emergency generation systems in accordance with the contract specifications. The Project Lead shall witness the generation system SAT and ensure that General Contractor provides a completed SAT report documenting testing results. The emergency generation system SAT report shall be included with the respective O&M documentation. Prior to the SAT the General Contractor shall submit pre-start-up inspection documentation, in accordance with the code that governs the generator appliance based on the fuel type. The General Contractor shall provide the following documentation in advance of SAT as required, based on the application fuel type:

- An OBT1 comprehensive report indicating that the generation system fuel oil (diesel) appliance and related auxiliary systems, including fuel system combustion exhaust system and combustion air systems, comply with applicable codes and standards and are free of deficiencies.
- Written confirmation from the local gas utility that the natural gas generation appliance is approved for operation.

Where the emergency generation system is equipped with a Region Standard Utility Paralleling system, the Project Lead and General Contractor shall ensure that the following items are completed:

- Confirm compliance with Customer Impact Assessment (CIA) application requirements
- Perform SAT for the Utility Paralleling Switchgear associated with the generation system, and provide a completed SAT Plan in accordance with PAIDS
- Confirm that electrical protection system associated with Utility Paralleling have been demonstrated to the Utility. The General Contractor shall provide a protection relays implementation test report to confirm verification of protection coordination study settings in accordance with the contract specifications
- The Project Lead shall coordinate with Peel to ensure that a Customer Connection agreement is ratified with the respective Utility as required, to allow the operation of the generation system

18.4.2. SCADA Systems

18.4.2.1. SCADA System Testing Procedure when Programming is by Project Lead

Where the Project Lead is responsible for SCADA programming, the Project Lead shall prepare and issue to the Contractor and Operations Supervisory Staff a complete detailed testing procedure for the SCADA system. The Project Lead shall develop a software Site Acceptance Test plan, in accordance with PAIDS. The SAT Plan is to be submitted to Peel's SCADA representative for review approval, in advance software installation.

Software Factory Acceptance Test procedure/plan shall be developed and submitted to Peel's Project Manager four weeks in advance of the scheduled FAT date. When approved, the Project Lead shall provide the final testing procedure to the Contractor and to Operations Supervisory Staff. Software testing implementation is contingent on the successful completion of Instrumentation Calibration, and Control Loop Check-Out by the General Contractor, including verification of automation system hardware and communications infrastructure in accordance with PAIDS *Section G – Implementation*.

After Region acceptance and approval of the software FAT demonstration at the Project Lead's offices, the Project Lead shall install the automation logic and SCADA HMI software applications on site. The Project Lead shall perform a software SAT to demonstrate the operation process automation logic, status monitoring, control, alarming and HMI visualization application, in accordance with PAIDS. The Project Lead shall coordinate with General Contractor so the necessary sub-contractors are present during the SAT and shall coordinate the participation/attendance of Operations Staff and Region's Project Manager. The Project Lead shall test / demonstrate the software control, status monitoring, modes, alarming, in accordance with the software SAT plan. The successful SAT demonstration of the automation system logic and SCADA HMI application functionality shall include reporting, process historian, alarming in accordance with PAIDS.

The General Contractor shall confirm that all safety interlocks are in place and that field devices/equipment have been verified to be free of deficiencies and deemed ready for their intended operation.

The Project Lead shall provide a completed and signed copy of the software SAT form(s), to Peel's SCADA representative, Operations Supervisory Staff and Peel's Project Manager once testing is completed. The Project Lead shall perform additional software testing, as required, if the SAT is unsuccessful. The Project Lead shall document the outstanding items to be verified

during follow up a SAT. The Project Lead shall issue the completed SAT plan document/form at the completion of the follow-up testing. On successful completion of the SAT, Operations Supervisory Staff shall sign-off that correct operation of the process automation and HMI visualization application were witnessed. The Project Lead shall ensure that all parties sign-off that the system is performing as specified in the in the scoping document and Pre-design Report. After successful completion of the SAT, the Project Lead shall provide electronic submissions of the relevant software files, to Peel SCADA representative and Project Manager in accordance with PAIDS.

The Project Lead shall conduct verification testing of the Automation (PLC) logic and HMI application, to ensure compliance with PAIDS, and the approved process control narrative, in advance of Factory Acceptance Testing (FAT). Once internal testing is completed, Peel will attend the FAT at the Project Lead's office. The FAT is to be conducted in accordance with the approved FAT plan, as indicated in PAIDS. The Project Lead shall rectify works that are not in compliance with PAIDS.

Upon the successful completion of the software FAT and/or confirmation that deficiencies identified during the FAT have been addressed, Peel will provide authorization to proceed to software Site Acceptance Testing (SAT) and commissioning. The Project Lead shall install and verify the new software on site, including deployment of the new/updated SCADA HMI application, in advance of the SAT. The Project Lead shall coordinate and obtain approval for the field installation/deployment of all software with Peel's SCADA representatives.

Automation logic and SCADA HMI software developed by the Project Lead for the project shall become the property of Peel.

18.4.2.2. SCADA System Testing Procedure when Programming is by the General Contractor

When the General Contractor or equipment vendor are responsible for the development of automation system logic and HMI application, the General Contractor and/or equipment vendor shall provide a software FAT/SAT plan in accordance with PAIDS *Section G – Implementation*. The SAT plan shall be reviewed and approved by the Project Lead, Peel's Project Manager, and Region's SCADA representative. The Project Lead shall coordinate with the General Contractor and Region SCADA staff to schedule FAT/SAT testing.

18.4.2.3. SCADA System Testing Procedure when Programming is by Region's SCADA Staff

When Peel's SCADA staff are responsible for the development of automation system logic and HMI application, the required software SAT and FAT plans are to be developed by Peel staff. The SAT plan shall be distributed to the Project Lead, General Contractor, Region's Project Manager and operations staff for review. The Project Lead shall attend the FAT conducted by Peel's SCADA Staff. The Project Lead shall coordinate with the Contractor and Region SCADA staff to schedule SAT testing. The SAT plan will be implemented by Peel's SCADA Staff. The Project Lead shall monitor the process to ensure the requirements outlined in the previous section are followed accordingly.

18.5. Performance Testing

Performance testing shall start either on a Monday or Tuesday, unless otherwise pre-approved by Peel's Project Manager, and will require the system to operate as intended for a minimum period of 14 continuous consecutive days without failure under normal operating conditions. If a system fails to perform as specified during this period, the commissioning will be suspended, and the Contractor/Supplier will be required to take appropriate action to remedy the situation. On completion of the remedial work, the Contractor/Supplier shall re-start the performance test for another 14 continuous consecutive days. This procedure will be repeated until the system has been proven to operate in the manner as required under the terms and conditions of the contract.

The Project Lead shall include all the above requirements in the tender specifications.

18.6. Deliverables

At the completion of the commissioning process, all reports related to the start-up and commissioning reports shall form the basis of the documentation required for verification and inclusion in the project manuals. Reports and documentation are to be produced by the General Contractor in accordance with the contract documents, and as indicated in relevant Peel Standards. A summary of the required verification documentation is to be produced by the General Contractor in advance of training and commissioning activities such that they are included in the initial draft of the Equipment Operations and Maintenance (O&M) Manual. The General Contractor is required to produce a draft Equipment O&M manual complete with the necessary commissioning documentation section headings, ready to be populated with the specific information, forms, results, reports, and as-built information that are produced during

start-up and commissioning phase. The Project Lead shall review the draft Equipment O&M manual and submit it for review and approval to Peel's Project Manager prior to permitting the General Contractor to proceed with training and/or commissioning.

The Project Lead shall ensure that the O&M Manual is finalized for all equipment, instrumentation, and control systems. The Project Lead shall ensure the standard modes of operations in all alternative station operational configurations is provided within the O&M Manual. The O&M Manual is to contain suppliers' submissions and shop drawings for all equipment installed and operational as required, including all warranty and contact information for equipment and service contact information.

Commissioning Plans are to be developed by the Contractor with assistance and approval of the Project Lead. Commissioning Plans are to be reviewed by Peel's Project Manager, and other relevant staff including Operations and Compliance (as required). The Project Lead shall coordinate a workshop with Region and Operations staff to review the Contractor's Commissioning Plans, to be scheduled with 4 weeks of advanced notice to allow for the participation of all required staff.

The Project Lead shall monitor and document in the Master Deficiency List (see **Appendix 24**) any issues identified during commissioning that require corrective action by the General Contractor. Correction of commissioning deficiencies shall be verified by the Project Lead and acknowledged by Peel and/or to allow sign off, documenting the deficiency correction.

19. Infrastructure Handover to Peel

19.1. General

Acceptance and assumption of the infrastructure by Peel will be made after performance testing and substantial performance.

The formal handing over of the facility or asset to Peel by the Contractor shall coincide with the date of the issuance of the Certificate of Substantial Performance after all deficiencies have been remedied by the Contractor.

On that date, the Project Lead will convene a meeting with the Contractor, Operations and Maintenance Supervisory Staff and Peel's Project Manager. If the Contractor has performed as required by the Contract, the Certificate of Substantial Performance will be issued and the facility or asset shall be turned over to Peel's Operations Supervisory Staff.

20. Consultant Performance Evaluation

The Project Lead (in projects delivered by a Consultant) shall be subject to Peel*'s Procedure F35-39*. The evaluation will provide a summary of the Consultant's performance during the project. The information collected through the evaluation will be used to provide feedback to consultants for performance improvements and/or acknowledge Satisfactory or Exceptional performance. The evaluation will be used to determine the Consultant's eligibility or ineligibility to bid on future Region of Peel projects.

The complete Procedure and Vendor Performance Evaluation Form can be found on Peel's website at Procurement - Region of Peel (https://www.peelregion.ca/procurement/#perf).

This Procedure and all related information may be amended from time to time and the most current version will apply. This Procedure and all related information may be amended from time to time and the most current version will apply.

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Appendix 1: Request for Design Standard Deviation

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Appendix 2: Risk Register

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Appendix 3: Engineering Status Report

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Appendix 4: Invoice Summary Sheet

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Appendix 5: Earned Value Sheet

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Appendix 6: Engineering Scope Change Request

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Appendix 7: Action Log

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Appendix 8: Deliverable Comment & Response Tracking Log

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Appendix 9: Approvals Log

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Appendix 10: Asset Management Data Sheet

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Appendix 11: Environmental Assessment Public Notification Template, Notice of Study Commencement

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Appendix 12: Letter of Award

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Appendix 13: Notice to Commence

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Appendix 14: Submittal Review Form

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Appendix 15: Submittal Log

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Appendix 16: RFI Log

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Appendix 17: RFQ Form

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Appendix 18: RFQ Log

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Appendix 19: Value Engineering Change Proposal Request

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Appendix 20: Contract Change Order Form

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Appendix 21: Contract Change Order Log

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Appendix 22: Daily Site Inspection Report - Facilities

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Appendix 22A: Daily Site inspection Report – Linear

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Appendix 23: Weekly Site inspection Report and Quality Summary

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Appendix 24: Master Deficiency List

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Appendix 25: Certificate of Substantial Performance

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Appendix 25A: Substantial Performance Evaluation Form

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Appendix 25B: Substantial Performance Cover Letter Sample

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Appendix 26: Inventory of Spare Parts and Tools

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Appendix 27: Completion Certificate

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Appendix 28: Pipe Delivery and Inspection Form

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28A

Appendix 28A: Pipe Data Asset Form

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Appendix 29: Water Request for Shutdown

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29A

Appendix 29A: Wastewater Shutdown & Bypass

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29B

Appendix 29B: Wastewater – Diversion or Bypass Trunk or Sub – Trunk

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Appendix 30: Equipment Tags

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Appendix 31: Process Mechanical Equipment Installation Start-up Checklist

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Appendix 32: Alignment Data Record

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Appendix 33: Valve Installation Checklist

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Appendix 34: HVAC Checkout Verification Form

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Appendix 35: Electrical Equipment Installation Checklist

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Appendix 36: Variable Speed Drives Installation Start-up Checklist

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Appendix 37: Pressure Test Forms

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Appendix 38: Change Directive Form

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Appendix 39: Change Directive Logs

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Appendix 40: Site Instruction Form

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Appendix 41: Site Instruction Log

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Appendix 42: Blank

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Appendix 43: Wastewater Treatment - Shutdown Permit to Work

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