



Process Overview

HYDRAULIC NETWORK ANALYSIS (HNA)

JUNE 2025



Process Overview: Hydraulic Network Analysis (HNA)

The following is a list of revisions for the Process Overview: Hydraulic Network Analysis (HNA):

| Section | Description (Change) | Date |
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1.0 INTRODUCTION

The Hydraulic Network Analysis (HNA) process is a planning tool which supports water system planning through the review of proposed development in greenfield growth areas. The process determines the size and alignment of water infrastructure to support customer servicing and fire protection. The HNA process is not suitable for the analysis of existing infrastructure or to assess private water infrastructure. The hydraulic model used by EPCOR to assess the water network is only suitable to size new EPCOR owned (public) water infrastructure.

In the City of Edmonton, development follows the Land Development Application (LDA) process. The scope of the Hydraulic Network Analysis shifts depending on the level of detail available in the proposed planning document(s) and can be grouped by the below two technical report types:

1. Water Planning Report (WPR): Used to assess long range planning of the water network associated with Area Structure Plans (ASP) and Neighbourhood Structure Plans (NSP)
2. Water Servicing Report (WSR): Used to assess active planning of the water network associated with Subdivision Applications and Engineering Drawing Reviews.

Further details and requirements of the above reports can be found in the [Design Guidelines: Sanitary Flow Generation for Neighbourhood Design Reports \(NDR\), Water Consumption and Fire Flow for Hydraulic Network Analysis \(HNA\)](#) (termed “Design Guidelines”). Other than what is shown in the Design Guidelines, the engineering consultant may determine the appropriate level of detail to submit for review. All technical documents must be submitted to BoundaryConditions@epcor.com for review.

Engineering consultants are provided with parameters at in-service (termed “existing”) water main connections upon request. These parameters are called “Boundary Conditions” and typically include the Hydraulic Grade Line (HGL) at different scenarios determined by the engineering consultant based on the Design Guidelines.

EPCOR has incorporated an alternative option for hydraulic analysis termed “Reverse Boundary Conditions”. This option includes the engineering consultant proposing a water network and including the HGL required for the water network to meet the requirements in the Design Guidelines. When EPCOR reviews the technical document, the HGL is reviewed against EPCOR’s hydraulic model and comments are provided back to the consultant. This provides an opportunity to move forward with analysis without waiting for EPCOR to provide boundary conditions and gives the engineering consultant more opportunity to explore options for the proposed development.

2.0 PROCESS OVERVIEW

The steps for the HNA process are largely the same, but timelines and expectations for the steps vary depending on the LDA application type. Guidance for each LDA step is noted below:

Area Structure Plans (ASP)

EPCOR requires a finalized technical report, termed a Water Planning Report (WPR), that is authenticated and validated by an engineering professional *prior to support* of an Area Structure Plan circulation. The technical report must be submitted to boundaryconditions@epcor.com for review and the final version of the reviewed report is to be included in the ASP circulation.

Neighbourhood Structure Plans (NSP)

EPCOR requires a finalized technical report, termed a Water Planning Report (WPR), that is authenticated and validated by an engineering professional *prior to support* of a Neighbourhood Structure Plan circulation. The technical report must be submitted to boundaryconditions@epcor.com for review and the final version of the reviewed report is to be included in the NSP circulation.

Rezoning

EPCOR does not require a technical report to review or support Rezoning applications. It is expected the proposed zoning of lands in greenfield areas aligns with the NSP and the technical report that supports the NSP. If the zoning does not align, it is expected the technical report supporting the NSP will be updated as necessary.

Subdivision

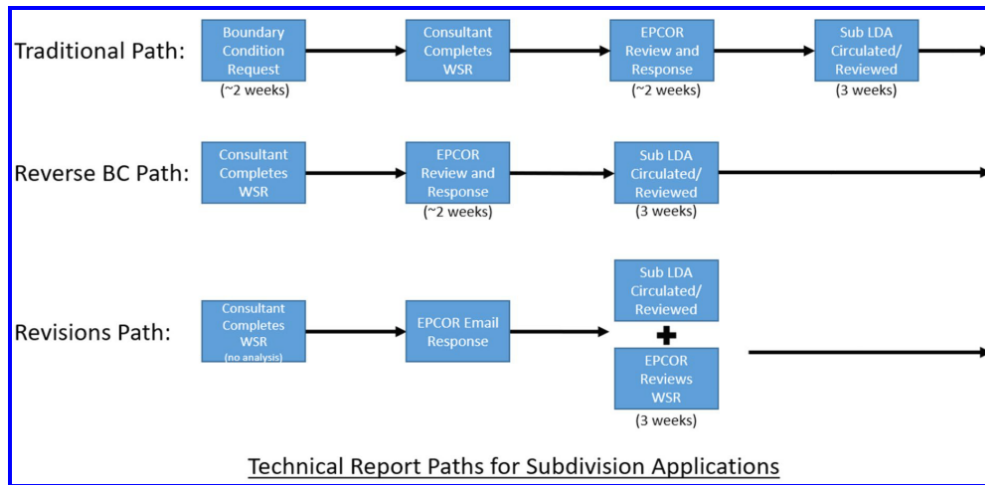
EPCOR requires a finalized technical report, termed a Water Servicing Report (WSR), that is authenticated and validated by an engineering professional *prior to file acceptance by Subdivision Planning (circulation)* of a Subdivision application. The technical report must be submitted to boundaryconditions@epcor.com for review and the final version of the reviewed report, along with EPCOR's response letter, must be included in the application for subdivision for the application to be circulated for review.

The HNA process can follow three paths to create the technical documents to support planning circulations:

1. Traditional Path: this path involves the engineering consultant engaging EPCOR, through boundaryconditions@epcor.com to request the expected HGL at the connection points of the proposed development under different scenarios determined by the engineering consultant. Once the HGL is provided by EPCOR, the engineering consultant analyzes the proposed network and submits the technical report to boundaryconditions@epcor.com for review. EPCOR reviews the report and provides a formal letter response.
2. Reverse Boundary Conditions (BC) path: this path involves the engineering consultant analyzing a proposed water network and identifying the required HGL that will support the network under different scenarios determined by the engineering consultant. The technical report is created and submitted to boundaryconditions@epcor.com for review. EPCOR verifies if the HGL proposed in the technical report is achievable by the existing water network and provides a formal letter response back to the engineering consultant.
3. Revisions Path: this path is used when there are planning revisions to the water network, but the engineering consultant has determined additional hydraulic analysis is not required. In this case the engineering consultant submits a technical letter to boundaryconditions@epcor.com identifying the water network which aligns with the planning revisions. The letter must state the water network meets all the requirements of the Design Guidelines and Volume 4 of the City of Edmonton Design and Construction Standards. EPCOR responds, through email, that the letter satisfies the requirements for LDA circulation and reviews the technical letter through the circulation. No formal response letter is provided for the letter. This path is not suitable for development areas where hydraulic analysis has not been already conducted or if there have

been significant enough changes the original hydraulic analysis no longer applies.

Below is a visual representation of the different paths for a LDA subdivision circulation:



3.0 LEARNINGS

Starting in 2024, EPCOR has worked with a cross-functional team of industry engineering consulting representatives to discuss and improve the HNA process. Along with the process clarifications identified above, the below are learnings, comments and suggestions to help streamline the development process.

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| Report Contents | Specific Site Pressure Inquiries | <ul style="list-style-type: none"> For pressure inquiries, please reach out to flowtestrequest@epcor.ca to see if there is an existing hydrant flow test within the area or to request a new hydrant flow test. |
| General Information to Include/Pipe Network Expectations | Digital Files | <ul style="list-style-type: none"> Digital files are to be provided with any WPR for analysis of ASP and NSP level planning. The following must be provided in .shp file, or equivalent format, in NAD83 3TM 114 GRID format: <ul style="list-style-type: none"> Pipe name Pipe internal diameter Pipe roughness/Hazen-Williams coefficient Pipe from node/to node Pipe length Node name, elevation, demand Node X and Y coordinates |
| | Phasing/Pipe Network | <ul style="list-style-type: none"> The WSR contains a Phasing/Staging Plan for subdivision if applicable. If phasing changes, an updated report or technical memorandum may be required. All submitted reports must clearly show existing (constructed and commissioned) connection points and identify any additional infrastructure (offsite) that needs to be constructed to support the proposed development. The WSR clearly shows all infrastructure that is planned to be constructed with the subdivision including stubs for adjacent developments. Lot layout shows that all sites have street frontage for servicing. |

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| | Non-Standard Cross Sections | If water mains are proposed to be installed in alley in the proposed subdivision, EWS would ask the consultant to submit road cross-sections with their technical report, to create a smoother process and avoid issues through tight LDA response timelines. |
| Analysis | ADD, MDD, PHD Analysis, Pressure Criteria | <ul style="list-style-type: none"> EWS suggests the consultant include all pressure criteria (ADD, MDD and PHD) in each submission. If system pressures are above 550 kPa a Standards Exemption letter, accepted by EPCOR, will be required prior to circulation of first submission engineering drawings. If system pressure is below 280 kPa in ADD or MDD scenarios, a mitigation strategy must be determined prior to proceeding with development planning. |
| | MDD + Fire Flows (FF) L/s | <ul style="list-style-type: none"> The MDD+FF simulations are analyzed on the worst-case node, chosen using engineering judgement. In general, this will be the node with the lowest available fire flow. The worst-case node may also be chosen based on its: <ul style="list-style-type: none"> Location on a dead end main Location on a small diameter pipe Distance from transmission mains, or Highest elevation If the required fire flow based on zoning cannot be reasonably achieved with interim infrastructure, the technical report must include written confirmation from Edmonton Fire Rescue Services (EFRS) Fire Engineer confirming this is acceptable before EPCOR can review the report. |
| | Fire Protection and Zoning | <ul style="list-style-type: none"> If zoning is not as listed in the guidelines a memorandum letter or confirmation email from EFRS is required to show equivalency. A copy of this letter must be included with the HNA. Fire flow analysis in cul-de-sacs will artificially increase the required HGL. To avoid this, place fire flows where hydrants would reasonably be located rather at the endpoint of the cul-de-sac. Fire protection requirements: (e.g. for lots adjacent to arterials if distribution mains are not required for servicing) Fire protection needs to be addressed on all sides of a lot adjacent to a road. |
| | Pipe Velocity | <ul style="list-style-type: none"> EPCOR requires submitted technical reports to assess velocity based on AWWA C900 Table 4 - Allowable Maximum occasional surge pressure capacity and allowable sudden changes in water velocity for pipe operating at 73oF at working pressure expressed as percent of nominal pressure class (PC). |