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Subject : Low Impact Development Stormwater Guidance Manual Stakeholder Comments – ERO 019-4971 January 2022 Draft

The Municipal Engineers Association (MEA) is an association of public sector Professional Engineers in the full-time employment of Ontario municipalities performing the various functions that comprise the field of municipal engineering. Members of MEA are in a unique position to comment on the January 2020 draft of the Low Impact Development Stormwater Guidance Manual as the individuals typically responsible for planning, overall design acceptance, operations and monitoring of storm water management facilities.

MEA through its MECP-MEA Liaison Committee had the privilege of reviewing earlier drafts of this document with you directly. As described previously, MEA has had the benefit of our members participating with both the MECP-MEA Liaison Committee and the Low Impact Development Stormwater Guidance Manual stakeholder review group organized by MECP. We have worked closely with MEA members regarding the proposed LID guidelines and we last forwarded comments on the May 2020 draft in our letter of June 4, 2020. Earlier, our MEA/MOECC Liaison Committee had also compiled comments on the 2017 draft. The following is an update on the status of key comments, numbered below and requests to address outstanding items:

Comments from June 4, 2020 Letter (1, 2)

1) Voluntary guidance vs. minimum design standards for approval

In our June 4, 2020 letter MEA shared its appreciation of MECP noting that the LID would be a preferred, but also voluntary, tool for managing stormwater as opposed to a mandatory policy. While in earlier discussions with the MEA/MOECC Liaison Committee you had described the main focus as “minimum LID volume control criteria” (per January 12, 2017 meeting minutes), the Manager, Water Standards Section clarified in a 2020 letter to members of the stakeholder review group that “The most notable changes relate to language that makes clear that this is voluntary technical guidance – not policy or requirement”.

Our review of the 2022 draft indicates a lack of clarity, however, that the criteria are voluntary. The Preface states that the manual “will be used as a baseline reference document in the review of stormwater management applications for approval under Section 53 of the Ontario Water Resources Act”, implying a requirement for approval, similar to the 2003 Stormwater Management Planning and Design Manual that is also cited in the Preface and that is applied as a minimum standard across the province. MECP’s ECA Template for Stormwater (January 21, 2022 draft) also points to a return to the 2017 position that the LID Manual represents a ‘minimum standard’. Clauses 4.1.1 e), 5.2.1 d) and 6.1.1

c) all require that additions, modifications, replacements, alterations and extensions of systems "Satisfies the Design Criteria or any municipal criteria that have been established that exceed the minimum requirements set out in the Design Criteria". These clauses reference the 90th percentile storm introduced in the LID Manual criteria as criteria for Water Balance and Water Quality (see Appendix A – Stormwater Management Criteria in the ECA template).

MEA requests that language in the LID Manual clearly reflect the Manager, Water Standards Section 2020 correspondence that the manual is "technical guidance – not policy or requirement" and that the 90th percentile storm does not represent a minimum standard for approval under the OWRA.

2a) Technical constraints for right-of-ways

The Association remains concerned with LID a mandatory requirement due to constraining conditions such as the variability of soil conditions across Ontario and in particular an area's potential inability to achieve practical levels of infiltration due to the presence of shallow impermeable bedrock, karst conditions and/or high ground water levels. While Section "3.2.5 Flexible Treatment Options for Sites With Restrictions" notes shallow bedrock and karst as a constraint for infiltration LIDs, the constraint does not ease the volume control requirement as alternative approaches to managing volume (i.e., "re-use and evapotranspiration practices"). Such approaches are infeasible for many settings where the LID Manual would apply such as right-of-ways.

MEA requests that constraints such as shallow bedrock, karst and high groundwater conditions be recognized as constraints that preclude the application of volume controls until such time as MECP demonstrates, through comprehensive cost-benefit analysis, that alternatives approaches (e.g., re-use, evapotranspiration) are practical and cost-effective for settings such as right-of-ways and retrofits.

Appended Comments from June 4, 2020 Letter (3, 4)

Our feedback on the 2020 draft we included supported comments prepared by the City of London. As described previously, these comments highlighted "significant concerns and/or limitations we foresee municipalities will confront in the implementation of the LID Manual". The status of these comments are reviewed below in the context of the 2022 draft.

3) Water Balance - Better guidance on water balance assumptions and range of values should be included.

This comment has not been addressed. We had requested that "the manual needs to provide a simplistic approach to water balance" that can be applied to small sites, such as by updating Table 3.1 from the 2003 Stormwater Management Planning and Design Manual. While A5.1.1 Class A: Water Balance Frameworks notes that "calculations can be done using a spreadsheet", Table 5.1 - Example Model Selection Rationale Checklist recommends complex Class B, C and D hydrologic and groundwater models for many common settings (e.g., "Seasonal Depth to Water Table < 4 m", "Fine Grained (Silt, Clays, Silt/Clay Tills, and Organics) at Surface") that excludes simple, cost-effective, industry-standard Class A analysis methods that rely on spreadsheets. As noted in 2020, the capacity and knowledge limitations of municipal staff and the consulting community for advanced modelling should be considered. Currently, the recommended analysis methods appear more reflective of advanced modelling capabilities of some LID Manual co-authors than of the majority of stormwater practitioners.

MEA requests that Section 5.0 LID Modelling Approaches be reviewed and updated to identify practical and cost-effective analysis approaches applicable to a wider range of settings (e.g., high seasonal water table and fine-grained soils).

MEA also requests that modelling requirements related to monitoring and calibration be reviewed and relaxed to reflect our previous comment that such monitoring "to calibrate the runoff and groundwater storage components of the water balance assessment isn't reasonable for most development sites".

4a) Climate Change - Overall framework for mitigation and adaptation strategies needs to be provided

This comment is not addressed. We noted previously that "Municipalities and CAs will be challenged to implement any of the climate change guidance as there is no over-arching framework from senior government". We also noted noted that previous IDF curve updates have not shown an increase in intensity, which complicates the advancement of such frameworks considering regional conditions. This is supported by the National Research Council's 2021 "National Guidelines on Undertaking a Comprehensive Analysis of Benefits, Costs and Uncertainties of Storm Drainage and Flood Control Infrastructure in a Changing Climate" that summarizes IDF trends at long-term climate stations in southern Ontario. While no overarching framework is available with general considerations, the LID Manual proposes advanced, research-level analysis of climate change temperature effects on algae growth and mosquito breeding (see Section 6.8.2.2), topics that we considering to be low risk.

MEA suggests that Section 6 Climate Change would be more-appropriately integrated into separate higher-level guidance on watershed planning, including clear direction on how to address climate change adaptation and mitigation in a comprehensive framework over regional and local scales. Ideally, local design requirements would be guided by regional studies that follow the Provincial approach, as opposed to requiring assessments for small sites, and/or low-risk settings, as proposed in the LID Manual. Analysis should be commensurate with risks (environmental, economic, social/safety) and consider aspects such as infrastructure service life, consistent with risk-based strategies developed by other agencies and industry organizations.

MEA requests that, as a minimum, Section 6.3 Climate Change in Ontario be reviewed and updated to i) include current information on IDF trends in regions across Ontario, ii) identify plausible emissions scenarios that should be applied in simple temperature-based IDF scaling for small, low-risk sites (i.e., review "business as usual emission scenario (RCP8.5 of AR5)" considering PCIC and others indicate that scenario is unlikely and that would result in unnecessary over-design in most cases), and iii) provide interim guidance on focused settings where Section "6.8 Four (4) Step Climate Change Adaptation Processes for Stormwater Management" is required, or should be considered.

4b) Climate Change - Needs for greater emphasis on conveyance for major storm events

This comment has not been fully addressed. Previous we noted that "stormwater management plans and designs there needs to be greater emphasis on conveyance of overland flows and major storm events in consideration of safe outlets during infrequent, short duration storm events". Section "2.2 Planning for Stormwater in a Watershed Context" acknowledges the importance of a well-designed major system to "reduce the risk to life and property damage" during flood events. Table 4.1 - Benefits

of Low Impact Development indicates that LID or Green Infrastructure is More Effective to meet the objective of "Reduce flooding risk" than Conventional Storm Sewer system. The CSA W210:2019 standard indicates that "Source controls designed for water quality control might have limited flood control effectiveness" in the context of overland flooding, and does not identify source controls as a physical intervention to address riverine flooding.

MEA requests that Table 4.1 be updated to reflect the importance of overland/major flow systems for meeting flood reduction objectives and for meeting the paramount goals of protecting life and property. Also, a footnote should be added to caution that LID or Green Infrastructure effectiveness for overland flood reduction depends on the capacity provided, and that effectiveness to address riverine flooding, especially where governed by large events, is limited.

4c) Climate Change – Regulatory floodlines and design safety factors

This comment has not been addressed. A noted previously, MNRF's 2002 *Technical Guide, River & Stream Systems: Flooding Hazard Limit* Section 4.6 states "Stormwater management facilities may not be used to provide any reduction in flood flows" and Section 4.1.1 states "Stormwater management facilities should not be relied upon in the establishment of flood hazard limits". Accordingly, design safety factors are considered for flood management by excluding existing quantity controls from Regulatory Floodline models. In addition, for SWM facilities integrate freeboard to address design and operational uncertainties, including effects of climate change. This later approach is consistent with *Federal hydrologic and hydraulic procedures for floodplain delineation* (NRCan, 2019) that states "Freeboard may be used as a qualitative method for accounting for climate change uncertainty". As noted previously, building climate change upon existing conservative measures may result in exaggerated regulatory floodlines in urban settings.

Section "2.4 Stormwater Approvals and Permissions" does not identify the role of MNRF, now MNDMNRF, in regulation of natural hazards, including roles that are not delegated to Conservation Authorities, i.e., Lakes and Rivers Improvement Act authorizations.

MEA requests, similar to comment 2a), that clear guidance on integrating climate change effects in stormwater design and natural hazard management be developed, including design considerations related to SWM facilities and regulatory floodline delineation, and well as bridge and culvert design. The guidance should consider risks, and not exaggerate regulatory floodlines in urban settings.

MEA also requests that the manual be reviewed with respect to the role of distributed storage in LIDs in mitigating regulatory flood hazards, in contrast with mitigating local quantity control needs, to be consistent with the MNRF 2002 Technical Guide that precludes reduction in flood flows when assessing life and property risk. In addition, any permitting requirements of MNDMNRF should be identified in Section 2.4.

MEA/MOECC Liaison Group June 19, 2017 Report (5, 6, 7)

In our MEA/MOECC Liaison Group's report to the MEA Board June 19, 2017, the following comments were made on an early draft of the manual. The status of these comments are reviewed below in the context of the 2022 draft.

5a) Cost – Capital and Operating

that the proposed LID requirements will require an expansion of the current level of service in retrofit areas, and that additional costs will result in either higher taxes, user fees, or an increased infrastructure funding gap. Analysis by members who have compiled LID project costs over the past 5 years suggest that the cost of ongoing municipal capital linear assets maintenance and replacement programs for the proposed volume controls are unaffordable. While "Appendix 4 – LID Economics" has been expanded slightly, analysis of cost impacts remains a fundamental gap.

Appendix 4 states that "Generally, LID BMPs have lower long-term life cycle costs, perform better and provide additional community benefits as compared conventional stormwater infrastructure. LID BMPs generally have a lower initial cost (see Table A4.1) with operation and maintenance costs typically separated by the extent and type of vegetation incorporated into the design". However, costs provided have not been normalized by drainage area served nor annualized to allow for a proper comparison of LID and conventional infrastructure cost (i.e., annual LID costs for a small area are incorrectly compared to infrequent conventional pond costs over large areas). When normalized and annualized, the cost example provided shows the opposite of what is described in the manual, i.e., that conventional infrastructure is more cost-effective.

The current draft of the manual is selective in citing favourable cost assessments that have limited cost impacts may be unique to isolated localized settings, e.g., with favourable soil conditions and design volumes less than the 90th percentile storm target. Less favourable cost impacts identified in other completed projects across the province have not been acknowledged. Cited favourable cost examples in Table A4.1 include estate residential subdivisions (e.g., Auburn Hills, WI) that are not typical of development in Ontario that meets required density targets, and are therefore not applicable. Our members have cited capital cost increases for road reconstruction projects of 30% (City of Ottawa) to 39% (City of Markham) to apply LID Manual criteria.

MEA requests that cost comparisons in Appendix 4 be reviewed and that the need for additional funding to meet the higher level of service provided by LIDs be clearly identified.

Capital and operating costs vary according to design capacity provided. This is clearly shown in the National Research Council's 2021 "National Guidelines on Undertaking a Comprehensive Analysis of Benefits, Costs and Uncertainties of Storm Drainage and Flood Control Infrastructure in a Changing Climate" that compiles and presents project costs for a range of LID types, showing cost increasing as a function of drainage area served and design volume provided. MECP has not undertaken a critical review of the cost-effectiveness of the proposed 90th percentile storm volume target to assess if it is reasonable.

The American Society of Civil Engineers' has published McMaster University's review of the LID Manual volume target in a paper entitled "Seeking More Cost-Efficient Design Criteria for Infiltration Trenches" in the *Journal of Sustainable Water in the Built Environment* (2021). It stated:

"Results indicate that the current 90th-percentile storm criterion is probably too high and not cost efficient. An evidence-based methodology for selecting more appropriate design criteria is proposed. Using this methodology, it was found that the economically more efficient design criterion for Ontario averages about 20–22 mm for different design cases. Significant savings can be realized if a lower design criterion is implemented."

Ongoing research also indicates that the 90th percentile storm target also results in overdesign of bioretention LIDs, providing limited marginal benefits at high incremental costs. The limited opportunities for meeting that high target in areas of urban intensification, intended to meet the Province's direction on development densities, should be assessed.

MEA requests that the MECP undertake a comprehensive review of cost-effectiveness of proposed volume targets, and the technical feasibility of these in Ontario's urban intensification areas (i.e., in contrast to estate residential subdivision settings cited in the draft manual). In the meantime, the ASCE publication should be cited in the LID Manual so that practitioners can be aware of cost-effectiveness considerations when developing feasibility and prioritization studies or conducting cost benefit analysis.

Commented [MR1]: Vaughan feedback

Municipalities may have facilities within a right of way which is under the jurisdiction of the upper tier government. Under these circumstances, for example in cases of cycling facilities etc., the proponents will have limited opportunities or it will be cost-prohibitive to enhance the storm system and the road right-of-way appurtenances which fall under the jurisdiction of others.

Commented [MR2]: Vaughan feedback

MEA requests that 3.2.5 Flexible Treatment Options for Sites with Restrictions identify capital cost as a constraint in right-of-ways constrained by utilities/appurtenances and having multi-jurisdictional management issues.

5b) Costs – Monitoring

In our June 19, 2017 report we noted that monitoring LIDs on an individual project basis is expensive and time consuming. We support implementation of watershed, subwatershed, and catchment level monitoring identified in Section 10.2. We believe this will better reflect the health of watercourses over the long-term.

MEA requests that MECP review cost implications of monitoring as proposed and identify an alternative receiver-based approach that better reflects cumulative impacts of developments and controls, as opposed to focusing narrowly on individual infrastructure components.

6) Constraints – Infiltration impacts

In our June 19, 2017 report we noted that LID infrastructure should not have to be implemented where there is already an existing sanitary sewer I and I (inflow and groundwater infiltration) problem. We noted that "Impacts of such recharge in partially separated wastewater servicing areas include increased extraneous flow stresses, surcharge potential, and sewer back-up risk, as well as migration of 'fines' in conjunction with pipe infiltration contributing to settling and structural failure of existing sewers". This is a long-standing concern in the industry and was identified in 1992 through consultation on the Stormwater Quality Best Management Practices Guidelines Workshop Summary. It stated that "Concerns related to adopting these site techniques as standards include: surcharging of sanitary sewers by short circuiting of infiltrated water". The LID Manual Section "3.2.5 Flexible Treatment Options for Sites with Restrictions" only partially recognizes I and I as a constraint by indicating that LIDs should be assessed for effectiveness through technical studies. That requirement is considered unreasonable as LID measures are not considered as I and I management measures in Ontario.

MEA requests that the long-standing constraint of extraneous flows be fully acknowledged, and that similar to Comment 2) above this condition preclude the application of volume controls until such time as MECP demonstrates, through comprehensive cost-benefit analysis, that alternatives approaches (e.g., re-use, evapotranspiration) are practical and cost-effective for settings such as right-of-ways and retrofits.

7) Private property LID – Implementation / Legal Considerations

Section "8.6 Operations and Maintenance for Municipal and Private Systems" promotes shared responsibility of operation and maintenance of private works by municipalities. This direction is also reinforced in the stormwater ECA template (i.e., Section 5.2.8) that requires legal instruments or binding agreements for private works in a treatment train, and that the municipality "ensures on-going operation and maintenance of the Privately Owned Stormwater Works". Our June 19, 2017 report stated that "for various legal reasons, it is not appropriate for municipalities to maintain LIDs on private property". As a minimum, in-depth consultation with municipal legal and by-laws groups, and public consultation with the development industry and property managers, would be required to develop such a program, and to identify funding requirements for necessary compliance monitoring, reporting and enforcement, to then be approved by municipal councils. If this is found to be feasible, a significant transition period would be required for implementation, especially given historical on-site works that have been implemented outside of such a framework.

MEA requests that MECP initiate a comprehensive review, including pilot studies as required, to evaluate various frameworks for the implementation of private LID operation and maintenance, including the option for a province-led program that would offer a more consistent and cost-effective approach than a multitude of individual municipal-led program.

Closure

MEA continues to appreciate the fact that MECP had maintained an industry wide stakeholder group throughout the development of the guideline. It remains our opinion that this method of developing a guideline document results in a greater chance of practical acceptance than a process limited solely to the regulatory body. Notwithstanding your extensive and acknowledged efforts in maintaining the roundtable approach, given the complexity of the LID Manual and the proposed paradigm shift in stormwater design, several key concerns remain unaddressed, as described above.

The advancement of water balance management goals promoted in the LID Manual is worthwhile in many settings, e.g., as required in Source Protection Plans under the *Clean Water Act to manage* identified water quantity stresses. However local needs and municipal priorities vary from community to community, and may focus on other goals such as on flood management to protect life and property. Municipalities should therefore be supported in advancing locally-established water management priorities that may not require water balance management to the extent promoted in the manual.

Currently municipalities will face significant challenges to meeting the LID policy objectives in the January 2022 draft. This reinforces the need to recognize the voluntary nature of the guidelines, and the constraints to implementation noted above. While the LID Manual allows for detailed site-specific studies to set local criteria, such new multi-disciplinary efforts are considered time-consuming, impractical and unnecessary for small, low-risk, constrained sites. As the January 21, 2022 draft for the

CLI ECA template would require LID criteria for water quality and water balance to be met for sites as small as 0.1 hectares, these studies would also be cost-prohibitive, increasing soft costs dramatically for small, local works.

We would be pleased to discuss the above concerns and requests offered to help address them at your convenience.