Waterfront Protection Coalition

April 9, 2024

Engineering Assessment of the Dock Management Plan (DMP)

Executive Summary

This document critically assesses the Dock Management Plan (DMP) implemented for British Columbia's coastal and lake regions, highlighting key engineering oversights that compromise both safety and environmental efficacy. Despite the DMP's intentions, its formulation has overlooked crucial engineering principles and site-specific ecological characteristics, notably in areas like Pender Harbour. This analysis aims to rectify misconceptions tied to the plan's limitations and proposes adjustments grounded in sound engineering and environmental science.

Engineering Concerns within the DMP

The DMP's constraints, specifically on float width and light transmission, demonstrate a misunderstanding of fundamental engineering and environmental dynamics:

- **Tidal range:** The proposed maximum width of dock structures is only suitable for fixed structures supported by piles but not for floating structures as required to accommodate the large tidal range of 5.0 meters predicted tide range in areas like Pender Harbour and up to 5.5 meters when pushed by southerly storm winds.

- **Float Width Limitation:** Restricting float width to 1.5 meters jeopardizes structural stability and safety, creating a potential hazard due to inadequate buoyancy and balance. Such a restriction disregards basic principles of engineering, resulting in designs that cannot safely withstand standard operational loads. 1.5 meters should be considered as a very minimum width for the main floats; and, depending on boat sizes, construction type, and all loading conditions, widths of 2 to 3 meters are more appropriate. Overall width restrictions should allow for exceptions based on intended use, number of vessels and their type.

- **Light Transmission Criteria:** The DMP's adoption of a 43% light transparency requirement, derived from studies aimed at saltwater marshes in Maryland, fails to account for British Columbia's predominantly rocky shorelines where such guidelines are irrelevant. Moreover, the necessity of flotation devices, which inherently block light, makes achieving this transparency threshold impractical and ill-suited to the deep-water contexts typical of the region, such as those

found in Pender Harbour. A reduction in floatation to offset light transparency concerns will serve to further reduce buoyancy and overall dock stability.

- **Wind, weather and current considerations** Although some of the swiya area is protected, the region is still subject to strong tidal currents, storm winds and snow loading. Conditions can vary greatly from site-to-site, given geographical differences. All structures such as piers, docks and boathouses must be designed for these conditions

- **Maximum length:** The DMP presently specifies a maximum length from the high-water mark of 60 meters. In some cases, the site may require up to half of this distance to reach the first point of sufficient water depth, given the additional requirement for anti-grounding design, and depending on the best arrangement the overall length could exceed 60 meters. Most of the swiya area docks and boathouses are not restrictive to through-traffic and have met the requirements of the Coast Guard and the Navigable Water Protection Act (NWPA). The DMP must accommodate designs that are suited to the specific site, number of berths, and construction conditions, not a "cookie cutter" **one-size-fits-all approach.**

Practical Construction Implications

- Floating structures will require substantial reduction in structural components to meet the 43% criteria.
- Billets and structure alone on a medium duty timber float will allow roughly ~37% light transmission before any decking is applied.
- Reducing the structure forces you to increase the coverage area of the billets to compensate, therefore further decreasing the available light penetration.
- Lighter duty floats will have lower survivability during weather events, therefore increasing potential hazard to the natural environment.
- Docks in deep water areas protected by high bank waterfront may see little to no light throughout the day regardless of transmissive materials used.
- A suitable retainment system should be selected (pilings, anchor blocks) based on topography and specific site conditions, such as weather conditions and storm tides.
- Consideration should be given to the desired number of berths and types of docked vessels typically present.

Comparative Analysis with Washington and Burrard Guidelines

Evaluating the DMP against the Burrard Inlet Dock Guidelines and the Washington Shoreline Programs reveals significant discrepancies and highlights the need for distinct criteria for new versus existing docks, clear grandfathering provisions, and adaptable design standards that reflect the diverse geographic and ecological contexts of British Columbia's coastlines. Furthermore, the DMP's **one-size-fits-all approach** neglects the fact that site-specific engineering expertise is required to design docks that are safe, functional, and environmentally compatible. Why does the DMP attempt to design the docks? Why not leave it up to the professionals building for the site?

- **Differentiating between new and existing dock standards**: the DMP lacks this distinction. This omission overlooks the practical and environmental implications of retrofitting existing structures under new, potentially incompatible standards. In Burrard Inlet, tailored criteria acknowledge the varied impacts and engineering challenges of modifying versus constructing docks, a nuance absent in the DMP.
- **Grandfathering Provisions:** The clarity and fairness of grandfathering provisions within the Burrard Inlet guidelines contrast sharply with the DMP's approach. By not adequately addressing the rights and expectations of current dock owners, the DMP potentially imposes undue burdens, undermining trust and cooperation essential for effective environmental stewardship.
- **Public Participation:** The Washington Shoreline Programs exemplify the benefits of robust public participation and clear grandfathering policies, offering a template for enhancing community engagement and ensuring policies are both practical and publicly supported. Such provisions are notably lacking over the decade the DMP has been implemented, weakening its foundation and the potential for a successful implementation.
- **Geographic and Ecological Variations:** Burrard Inlet's guidelines account for its specific geographic and ecological characteristics, offering predictable dock spacing and construction standards that may not be directly applicable to the more diverse terrains and ecosystems of the Sunshine Coast. The DMP's failure to adapt to these variations risks imposing standards that are either overly restrictive or insufficiently protective of local marine environments.
- **Engineering and Safety Concerns:** The restrictive size and design parameters proposed in the DMP, such as the 1.5-meter width limitation and the 43% light transmission criteria, do not align with practical engineering solutions or the safety needs of dock users. These constraints ignore essential stability considerations, such as the ASCE's recommended width-to-length ratios, which are vital for ensuring the structural integrity and usability of docks.

Recommendations for Revision

- **Site-Specific Design Flexibility:** Engineering and design guidelines for docks must be tailored to the unique characteristics of each location, ensuring safety and environmental compatibility, without resorting to a one-size-fits-all approach.
- **Design Considerations:** Dock size and design criteria should be based on site specific characteristics, and the number of docked vessels, rather than arbitrary area limitations.

Conclusion

The current and former iterations of the DMP have imposed unnecessary restrictions that overlook the nuanced engineering and environmental considerations essential for the safe and sustainable management of docks in British Columbia. By adopting a more informed and flexible approach, rooted in established engineering practices and ecological research, the DMP can more effectively balance the needs of dock owners with the preservation of British Columbia's unique marine ecosystems. The engineering requirements of the DMP should be substantiated by environmentally backed and peer-reviewed scientific study. Absent of robust evidence, proposed engineering constraints lack justification and necessity. Instead, recommendations to revisit and revise the plan should be prioritized to ensure that docks contribute positively to the coastal landscape, underpinned by a commitment to safety, environmental stewardship, and community engagement.

Source Documents

Burrard Inlet Dock Guidelines
https://www.portvancouver.com/wp-content/uploads/2020/06/Recreational-Dock-Guidelines-for-Burrard-Inlet.pdf?ref=waterfrontprotection.org

Washington Shoreline Program
https://apps.ecology.wa.gov/publications/SummaryPages/1106010.html?ref=waterfrontprotection.org

McElhanney - Review of Pender Harbour Dock Best Management Practices
https://comment.nrs.gov.bc.ca/api/public/document/6585f6dd0d24d60022e09df0/download?ref=waterfrontprotection.org

Accessibility Guidelines
https://vancouver.ca/files/cov/guidelines-universal-access-new-public-docks-false-creek.pdf?ref=waterfrontprotection.org

Kelty, R., & Bliven, S. (2003). *Environmental and Aesthetic Impacts of Small Docks and Piers: Workshop Report: Developing a Science-Based Decision Support Tool for Small Dock Management, Phase 1: Status of the Science* (NOAA Coastal Ocean Program Decision Analysis Series No. 22). NOAA Coastal Ocean Program. https://aquadocs.org/bitstream/handle/1834/20050/dockpier.pdf?sequence=1&isAllowed=y