



ROYAL VANCOUVER YACHT CLUB

Coal Harbour Marina Expansion Project Master Plan



Prepared for: Royal Vancouver Yacht Club

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Disclaimer

This document represents a historical document utilized to confirm the feasibility of the proposed Coal Harbour Marina expansion. All measurements presented herewith are presented at a conceptual level of study, and do not reflect the port authority's accurate surveyed AutoCAD files. The recommended water lot lease expansion area presented herewith has been superseded by the information presented in the currently proposed Vancouver Fraser Port Authority's (port authority), Project and Environmental Review (PER 17-113) application currently under review. This is for historical context only.

Introduction

The Royal Vancouver Yacht Club (RVYC) proposes an expansion to the Coal Harbour Marina (CHM) located in Coal Harbour adjacent to Stanley Park (the "Project"). TyPlan Consulting (TyPlan) has been retained to ascertain the feasibility of such an expansion from a navigational and marine use perspective.

Background

As part of the planning process for this Project members of the RVYC met at the Coal Harbour Marina with Port Metro Vancouver Real Estate, Planning and Harbour Master staff to discuss the potential expansion of the CHM.¹ The PMV Harbour Master indicated that in order to pursue this Project, RVYC would be required to provide substantive background studies that verified the feasibility of the Project as well as confirming that stakeholder issues had been addressed. Specifically, the Harbour Master's office requested that reference be made to The World Association for Waterborne Transport Infrastructure (PIANC) report entitled: "Harbour Approach Channels – Design Guidelines" and the "Canada Waterways: National Manoeuvring Guidelines: Channel Design Parameters Waterways Development Marine Navigation Services, Canadian Coast Guard, Fisheries and Oceans Canada (CWNMGCDP) (revised 1999) be referenced where applicable in designing the navigational channel. It was concluded that in order for RVYC to pursue this Project the following be undertaken:

- A Marine Traffic Management Plan (as well as aeronautical impact assessment on float plane approaches);
- Marine Risk Assessment (Channel Design based on PIANC); and,
- Stakeholder consultation with local marinas and users had been undertaken.

This Master Plan document has been prepared to address the Harbour Master's concerns regarding the proposed Project.

¹ The meeting was held 04/28/09 at Coal Harbour Marina and those in attendance from the PMV included Yoss Leclerc Harbour Master (Captain), Tim Blair (Planning) and Whitney Gordon (Real Estate). Those in attendance from the RVYC included Captain Gordon Houston, Russ Fraser, Chris Barnett and Jack Wood.

Assessment

The Master Plan provides details on the following areas of study:

- Define the location of and the extent of the proposed water lot expansion,
- Provide a summary of the demand for expansion,
- Undertake an impact assessment of the project in relation to providing an assessment of:
 - Multiple Use Waterway Management; Best Management Practises,
 - Surrounding land use(s) and water lot lease tenure(s),
 - Marine Traffic Management Plan,
 - Navigational Channel Design Options and co- use considerations:
 - One-Way Channel Design (based on PIANC guidelines)
 - Two-Way Channel Design (based on PIANC guidelines)
 - PMV Navigational Channel Design examples (existing PMV channel widths)
 - Rowing Training Lane Requirements (based on FISA Regulations)²
 - Stakeholder consultations

Conclusions

The findings of the review confirm that expansion of the RVYC water lot is feasible and will not impact existing and future operations within the harbour from a navigational perspective. Furthermore, utilizing standard design guidelines for both navigation (PIANC) and rowing lanes for training purposes (FISA) both uses can be accommodated within a 62 m channel). The navigational channel consists of the following:

- 35 m two-way navigational channel for recreational vessels;
- Two 13.5 m rowing training lanes (27 m) accommodating both an inbound and outbound rowing lane; and,

From a navigational design perspective, the channel supports both the co-use and co-existence of the waterway for rowers and recreational vessels, incorporating a number of best management practises outlined in the Multiple Use Waterway Best Management Practices Guidebook.

Most importantly, the channel recommendations provided in this master plan protect in perpetuity the rowing training lanes, a key issue identified by the Vancouver Rowing Club (VRC).

² International Rowing Federation Regulations

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From a stakeholder consultation perspective, a number of stakeholders did not identify any significant issues or concerns regarding the project (except for Harbour Cruises with no explanation provided and the Vancouver Rowing Club), with the majority of stakeholders confirming they agreed with the proposed education and awareness program (see below) regarding improving relations with the rowing community. It is noted that the Vancouver Rowing Club was opposed to the project as they felt it would effectively eliminate their ability to continue to operate in the basin, although this report confirms that based on international rowing standards for training such activities can be accommodated. As the Project also avoids areas of environmental concern (avoidance of littoral areas) and no dredging is required the proposed project expansion does not pose concerns from an environmental and dredging perspective. It is understood that during detailed design all appropriate environmental issues will be studied in detail by RVYC.

Conceptual outlines of the recreational navigational channel, and the rowing training lanes, are presented on the following exhibit entitled: Coal Harbour Basin Master Plan and Traffic Scheme (CHBMPTS).

Recommendations

This report recommends that PMV and NWPP approve in principle the expansion of the water lot and provide documentation to the RVYC indicating so.

With such an approval in principle, RVYC will initiate a detailed marina design study that will address all of the engineering, environmental, aesthetic requirements of the expansion project. RVYC will work directly with both the PMV and Navigable Waters Protection Program (NWPP) in the detailed design process. It is noted that both PMV and NWPP will impose a number of terms and conditions as part of the ultimate approval for the project.

RVYC has as part of this study, recognized the historic and ongoing significance of the rowing in Coal Harbour and has, in addition to identifying designated rowing lanes for training, will facilitate a educational and awareness program to improve mariners understanding of the relationship between rowing and recreational use in Coal Harbour. Such an educational and awareness program will include:

- Working with both PMV and NWPP to verify and finalize the Coal Harbour Basin Master Plan and Traffic Scheme (CHBMPTS) and once verified and accepted by both parties;
- Advertise the CHBMPTS, three times in Pacific Yachting magazine to promote the scheme;
- Gazette the CHBMPTS in the Canadian Coast Guard (CCG) Notice to Mariners Publication;
- Post the CHBMPTS at all local Marinas;
- Post No Wake signs throughout the basin;
- Post speed limits throughout the basin;

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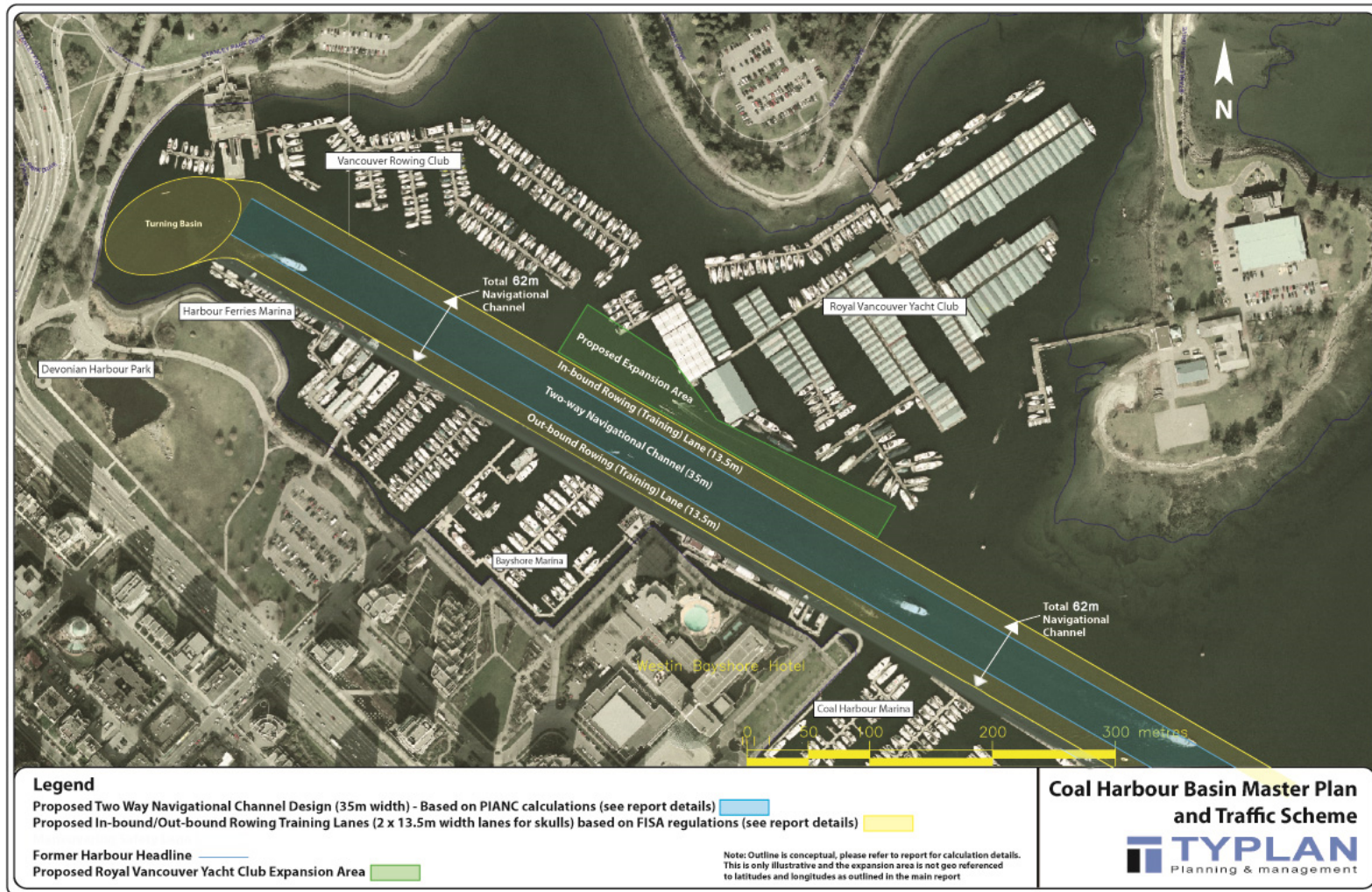
Executive Summary

- Work with VRC to ascertain whether buoying certain portions of the rowing lanes should be buoyed to improve directional awareness of both rowers and recreational users; and
- Undertake basin wide informational meetings with the various user groups to introduce the CHBMTS and highlight the significance of rowing schedules to limit marine conflicts.

Royal Vancouver Yacht Club: Coal Harbour Marina Expansion

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Executive Summary



1 Introduction

The Royal Vancouver Yacht Club (RVYC) proposes an expansion to the Coal Harbour Marina (CHM) located in Coal Harbour adjacent to Stanley Park (the “Project”).

As part of the planning process for this Project members of the RVYC met at the Coal Harbour Marina with Port Metro Vancouver Real Estate, Planning and Harbour Master staff to discuss the potential expansion of the CHM.³ Yoss Leclerc, Harbour Master PMV, indicated that in order to pursue this Project RVYC would be required to provide substantive background studies that verified the feasibility of the Project and confirming that stakeholder issues had been addressed.

While a navigational channel has not been designed by PMV in this portion of the harbour, increasing vessel traffic in the area is a concern of PMV. It was suggested that a vessel impact study and determination of the Project’s impact on navigation be undertaken. Specifically, the Harbour Master’s office requested that reference be made to The World Association for Waterborne Transport Infrastructure (PIANC) report entitled: “Harbour Approach Channels - Design Guidelines”. Also referenced was the “Canada Waterways: National Manoeuvring Guidelines: Channel Design Parameters Waterways Development Marine Navigation Services, Canadian Coast Guard, Fisheries and Oceans Canada (CWNMGCDP) (revised 1999).

It was concluded that in order for RVYC to pursue this Project the following issues be addressed:

- A Marine Traffic Management Plan (as well as aeronautical impacts on float plane approaches);
- Marine Risk Assessment (Channel Design based on PIANC); and,
- Communication with impacted stakeholders confirming issues have been addressed.

This Master Plan document has been prepared to address the Harbour Master’s concerns regarding the proposed Project.

³ The meeting was held April 28, 2009 at Coal Harbour Marina and those in attendance from the PMV included Yoss Leclerc Harbour Master (Captain), Tim Blair (Planning) and Whitney Gordon (Real Estate). Those in attendance from the RVYC included Captain Gordon Houston, Russ Fraser, Chris Barnett and Jack Wood.

1.1 Scope of this Review

The scope of this review consists of the following five phased work programs:

- **Section 1: Introduction;** providing an introduction and outlining the scope of this review.
- **Section 2: Location and Project Definition;** providing an outline of the location and the proposed water lot expansion.
- **Section 3: Demand;** providing a summary of the demand for expansion.
- **Section 4: Impact Analysis;** providing an assessment of:
 - Surrounding land use(s) and water lot lease tenure(s)
 - Marine Traffic Management Plan
 - Multiple Use Waterway Management Best Management Practises
 - Navigational Channel Design (Based on PIANC) for a:
 - One-way Channel Design
 - Two-way Channel Design
 - PMV Navigational Channel Design Widths
 - Rowing Channel Requirements
 - Stakeholder consultation(s)
- **Section 5: Conclusions and Recommendations;** providing a series of conclusions and recommendations of this study.

2 Project Location and Definition

The RVYC CHM is accessible via Stanley Park, and is located immediately west of Deadman's Island and east of the Vancouver Rowing Club (VRC). An orthophoto aerial photograph of the general location of the CHM is illustrated in Exhibit 1:

Exhibit 1: Royal Vancouver Yacht Club: Coal Harbour Marina Expansion Project; General Location



The CHM is on a water lot lease in the name of the RVYC and is identified as:

- Lease of water lot fronting district lot 185 Stanley Park, Vancouver Port Corporation Lease Plan No. 99-89-08 (based on the Port Metro Vancouver (PMV) documents).

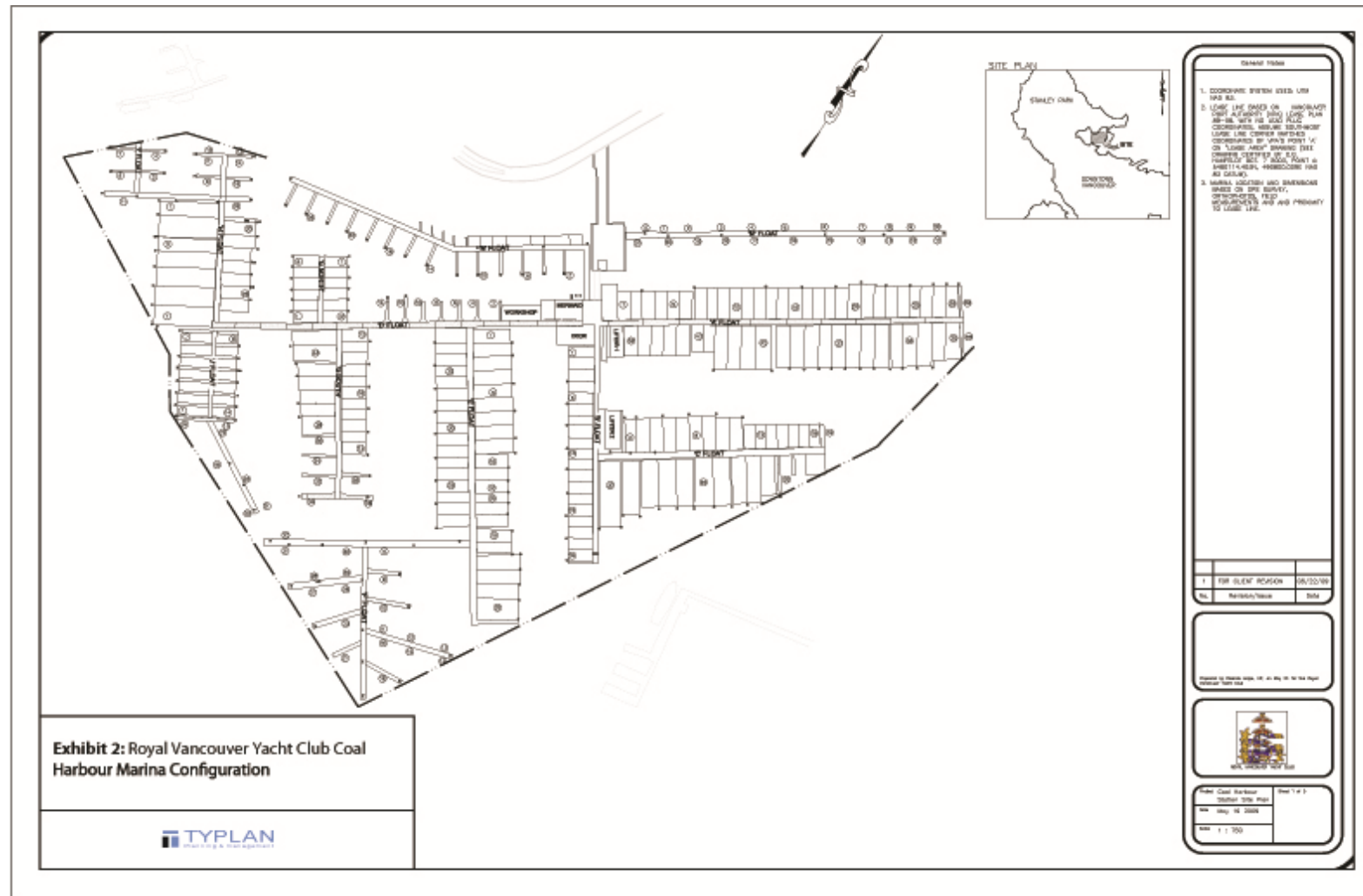
The existing configuration of the marina, identifying floats and related berths, is illustrated on Exhibit 2:

Royal Vancouver Yacht Club: Coal Harbour Marina Expansion

Master Plan

Preliminary Draft Report

Exhibit 2: Royal Vancouver Yacht Club - Existing Coal Harbour Marina Configuration



Royal Vancouver Yacht Club: Coal Harbour Marina Expansion

Master Plan

Preliminary Draft Report

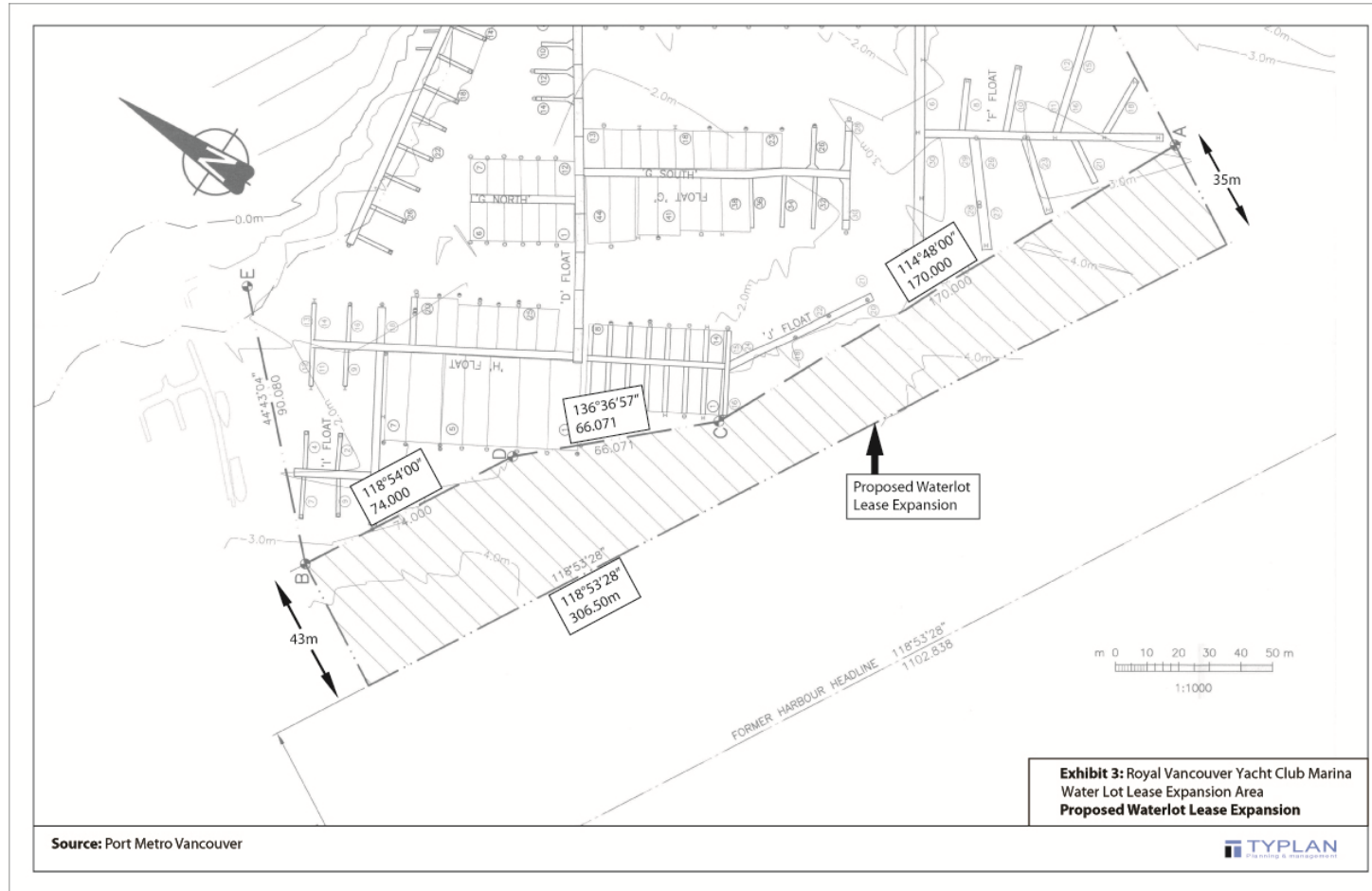
The existing marina consists of 320 berths and ancillary supporting facilities associated with the operation of the marina.

The proposed water lot lease area expansion area is presented on Exhibit 3. The expansion area is located at the southern boundary of the existing water lot lease area.

Exhibit 3 illustrates the length of the proposed expansion (306.5 m) and widths (of the proposed expansion area (43 m in the northwest and 35 m to the southeast- adjacent to the navigational channel) as well as the longitudinal azimuths of the proposed expansion project.

Royal Vancouver Yacht Club: Coal Harbour Marina Expansion Master Plan Preliminary Draft Report

Exhibit 3: Royal Vancouver Yacht Club: Coal Harbour Marina Water Lot Lease Expansion Area



Source: TyPlan

Royal Vancouver Yacht Club: Coal Harbour Marina Expansion

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Final Report

The Project has been in the planning stages for over three years and ongoing demand voiced by RVYC membership has resulted in this Projects development. A number of options for the proposed expansion were studied but were eliminated from consideration due to issues pertaining to:

- Environmental; and,
- Dredging.

The selected option (Exhibit 3) has been identified as the option that would minimize impacts to the environment (especially fish habitat), avoids the need for dredging and has minimal impact on ingress and egress to the marina.

RVYC has acknowledged that the marina is located within an area in which a number of recreational marinas reside and as part of the planning being undertaken for the Project (and based on advisement from the Harbour Master's office) has undertaken an assessment of the potential impacts of increased vessel transits on the navigational channel.⁴

In support of this application RVYC has initiated a series of consultations with surrounding water lot lease holders and other stakeholders to identify if any issues require resolution as part of the development of the Project and supporting Master Plan.

⁴ The navigational assessment was undertaken by Jack Wood; a marine engineer with over 40 years of professional experience in cooperation with TyPlan.

3 Demand for Marina Expansion

According to The Vancouver Sun article posted Saturday, July 3, 2010 regarding the availability of boat moorage in Greater Vancouver, there is an overall lack of supply related to moorage space for recreational users, especially within the Burrard Inlet, as no new moorage is being created to accommodate demand.

According to the article, the waitlists (demand) in various areas within the Burrard Inlet are as follows⁵ :

- False Creek area – a wait list of 325 boats exists;
- Coal Harbour has a 5-year wait list (demand not identified in the article);
- Mosquito Creek has a 3-year wait list (demand not identified in the article); and
- Sewells Marina in West Vancouver has a wait list of 5 to 8 years (demand not identified in the article).

Correspondingly in discussions with the RVYC Harbour Master for the Coal Harbour Marina, he indicates that as of August 2011 the Coal Harbour Marina waiting list (which has had a waiting list for over 15 years), has over 300 applicants for moorage.^{6,7}

Demand throughout the Burrard Inlet and specifically at Coal Harbour Marina has been identified and the provision of approximately 50 additional open berths (the lengths of the open berths is to be determined by RVYC as it is dependent on the size of the boats and the RVYC Steering Committee assessment of future demand.

Exhibit 4 presents a conceptual outline of one “potential” internal configuration of the berths being considered.⁸

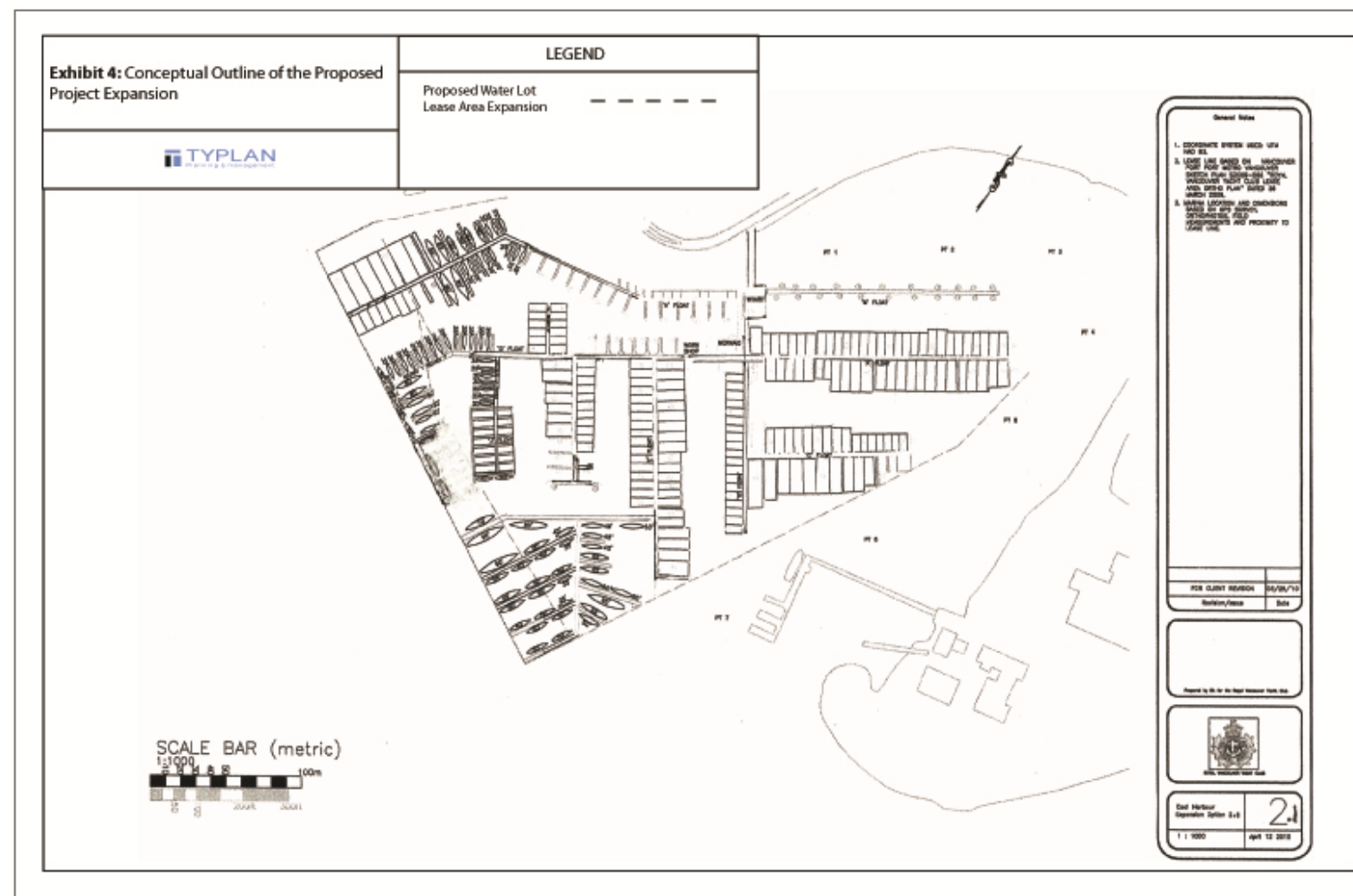
⁵ The Vancouver Sun business section Saturday, July 3, 2010 lee –young @Vancouver sun.com

⁶ Royal Vancouver Yacht Club Coal Harbour Waiting list August 2011.

⁷ For reasons of confidentiality the waiting list inclusive of names has not been included in this document.

⁸ The internal configuration is yet to be detailed (but will be submitted to PMV once construction drawings are prepared). This report notes that the expansion area remains consistent with Exhibit 3 of this report).

Exhibit 4: Conceptual Outline of the Proposed Project Expansion



4 Impact Analysis

This section provides an impact assessment of the proposed Project based on an assessment of:

- Multiple Use Waterway Management: Best Management Practises;
- Surrounding land uses/water lots;
- A marine traffic management plan;
- Channel design (designed for a one-way channel, a two-way channel, examples of PMV navigational channel classifications and the potential for accommodating rowing lanes for training purposes); and,
- Consultations with stakeholders.

In ascertaining whether any potential residual impacts would result from the Project, available information associated with waterway management, best management practises are presented and utilized as inputs into the plan. An overview of existing conditions is then presented identifying surrounding water/land lot/uses, as well as a summary of traffic patterns based on a survey undertaken by RVYC.

The best management practices, existing conditions and traffic volumes were inputs into channel design parameters. The channel design itself based on standardized and internationally accepted marine design guidelines and rowing standards.

The section is concluded with consultations with existing users within Coal Harbour summarizing concerns (or acceptance) regarding the proposed Project.

4.1 A Guide for Multiple Use Waterway Management

To facilitate and guide the development of a Master Plan for the Coal Harbour basin, *The Guide for Multiple Use Waterways Second Edition National Water Safety Congress* provides waterway planners and engineers a useful tool for multiple use waterway planning and management. The guidebook stresses the importance of comprehensive and systematic waterway research and analysis in preparing plans, and it presents basic waterway management planning approaches, techniques and tools for everyday use.⁹

The guide provides an introduction to waterway management outlining:

1. Trends and emerging issues;
2. Developing plans and solutions for multiple use waterways; and
3. Waterway Management Approaches, Tools, Processes and Techniques.

The book presents guiding principles to consider when preparing effective, balanced multiple use waterway management plans. While the book does not provide details regarding the actual design of the navigational channel (which is also undertaken as part of this Master Plan), it does provide principles associated with developing such plans.

This section provides a summary of the principles upon which an effective master plan should be prepared (this report evaluates those principles against our approach) and then summaries briefly trends and issues, solutions and tools and approaches to achieve effective waterway management.

Table 1 presents a summary of those guiding principles.

⁹ A Guide for Multiple Use Waterway Management, Second Edition, National Water Safety Congress Inc.; Aquatic Resources Trust Fund administered by the US Coast Guard.

Royal Vancouver Yacht Club: Coal Harbour Marina Expansion

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Table 1: Guiding Principles: Waterway Management Planning

Principle	Application to the Creation of the Coal Harbour Master Plan
Community support and understanding	RVYC and the consultant have contacted all users and leaseholders within the basin to discuss the Project, identify issues and solutions. Both Port Metro Vancouver and the Navigable Waters Protection Program (NWPP) of Transport Canada have also requested such consultations be undertaken. Responses are provided within the Master Plan.
Understand Waterway Activities and be Consistent with other Plans and strategies	An extensive assessment of users of the waterway and associated traffic volumes has been undertaken. A review of other Master Plans has also been undertaken to determine consistency in the preparation of this plan based on the author's experience.
Consider Guidelines Legislation, Regulations and Policy impacting the development of the Plan	In preparing this Master Plan the consultant has referenced the following documents: Guide for Multiple Use Waterway Management: National Water Safety Congress Inc. – Produced under a grant from the Aquatic Resources Trust Fund; Administered by the US Coast Guard. PIANC: The World Association for Waterborne Transport Infrastructure – Harbour Approach Channels - Design Guidelines (Final Report for the Joint Working Group PIANC and International Association of Ports and Harbors (IAPH), in cooperation with the International Maritime Pilots Association (IMPA) and the International Association of Lighthouse Authorities (LALA); Supplement to bulletin No. 95 (June 1997), and, The Fédération Internationale des Sociétés d'Avion/International Rowing Federation (FISA): Rules of Racing and Related Bylaws Canada Marine Act Navigable Waters Protection Program of Transport Canada as defined by staff Port Metro Vancouver requirements as defined by staff
Consider social, cultural and scientific inputs	Plan acknowledges that multiple use waterways can be developed provided that the Plan accommodates social and cultural concerns and satisfies technical design requirements.

Source: TyPlan adapted from "A Guide for Multiple Use Waterways Second Editions, National Water Safety Congress Inc.", US Coast Guard.

4.1.1 Trends and Emerging Issues

The guidebook identifies a number of trends creating pressure on waterways, these include:¹⁰

¹⁰ A guide for Multiple Use Waterway Management, Second Edition, National Water Safety Congress, US Coast Guard.

- Dramatic demographic and societal changes; population growth and the ever-increasing demand for accommodating a variety of water borne recreational activities;
- Increasing and intensive use of public waters (and the emergence of co use strategies);
- Evolution in watercraft combinations of activities and variations;
- The static surface acreage of the public waters and the booming development of commercial and recreational activities; and
- Varied attitudes and social perspectives about recreation – managing expectations of users who perceive their water way is their waterway and not for others.

The key underlying theme associated with emerging themes and trends is an ongoing and increasing pressure on waterways to consider a variety of user groups to accommodate multi uses in an area. Multi-use is becoming of critical importance in effective planning for recreational waterways.

4.1.2 Developing Plans and Solutions for Multi-Use Waterways

In developing Plans, the guidebook suggests that the process should:

- Include consultation with stakeholders and users of the waterway;
- Review as a longer term project (will demand continue and how to optimize the channel to protect it in perpetuity);
- Define the problems and trade-offs that must occur;
- Defend with a clear rationale, based on reasoned principled and scientific analysis the design; and
- Success is dependent upon balancing both societal (perception) and design standards (science) and that paying attention to both is critical.

Such processes have been incorporated into the development of the Master Plan.

4.1.3 Waterway Management Approaches, Tools, Processes and Techniques

In terms of waterway management approaches, tools, processes and techniques that can be utilized the guidebook highlights some techniques to be considered that could address issues and concerns of users. These include but not limited to:¹¹

- Information and Education
 - Providing users educational information to inform stakeholders of multi use issues
 - Localized navigational charts and aids
- Law Enforcement and boater Regulations
 - Stepped up rules and regulations, enforcement and patrol

¹¹ A guide for Multiple Use Waterway Management, Second Edition, National Water Safety Congress, US Coast Guard.

- Educations certification and licensing; and
- Water Use Activity controls and Traffic Management
 - Zoning:
 - Zoning for certain activities
 - Special events zoning
 - Anchorage/no anchorage zones
 - Pass through zones
 - Time of Day zoning
 - No wake zoning
 - No boat zones
 - Speed in proximity zones
 - Speed Limits
 - Noise regulations
 - Watercraft horsepower restrictions
 - Permits and permit systems
 - User fees
 - Rational watercraft patterns
 - Speed lanes
 - Commercial traffic lanes and no wake zoning
 - On-going communications with user groups

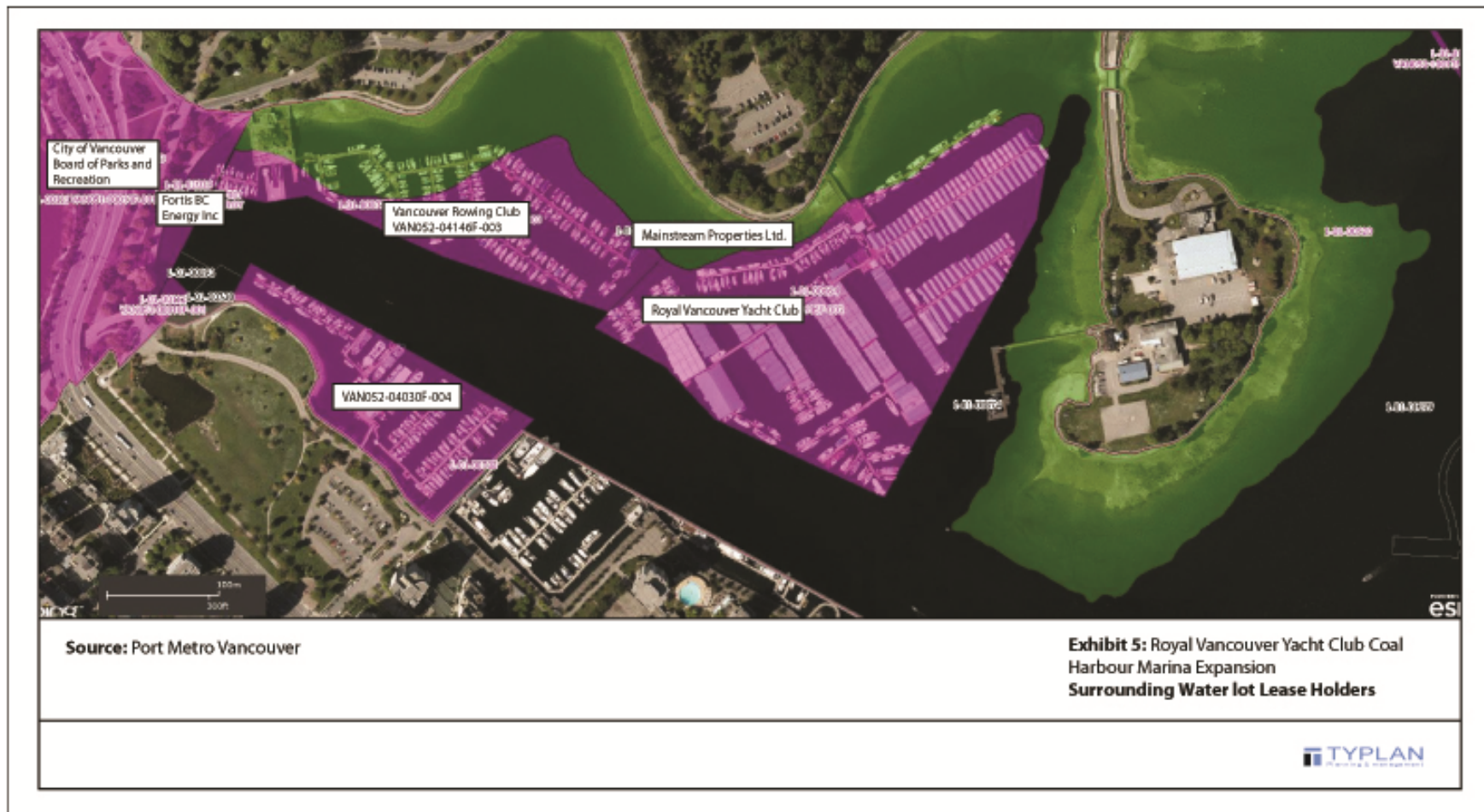
Such techniques can be utilized for improving safety and operations. The Master Plan for Coal Harbour incorporates a number of such tools and approaches in the navigational design options evaluated in this review.

4.2 Water Lot Leases

Water lot lease(s) adjacent to the CHM are illustrated in Exhibit 5.

Royal Vancouver Yacht Club: Coal Harbour Marina Expansion Master Plan Final Report

Exhibit 5: Surrounding Water Lot Lease Holders



Source: Port Metro Vancouver

Water lot lease holders in the vicinity of the existing and proposed Project include:

- Vancouver Rowing Club;
- Fortis Energy BC (a utility water lot lease);
- City of Vancouver Board of Parks and Recreation; and
- Harbour Cruises Marina area.

As evident from above, a number of marinas reside in the Coal Harbour Basin. A summary of the number of marinas and vessels has been compiled and presented below.

5 Channel Design Options

This section of the report provides a systematic analysis of inputs leading to the recommendations associated with the required channel design widths. This section provides the following:

- A marine traffic management assessment,
- A channel design for both:
 - a one-way channel; and,
 - a two-way channel (based on PIANC Harbour Approach Channels - Design Guidelines)
 - PMV current channel design examples
- Consideration of Rowing channel requirements based on International Rowing Federation (FISA) design requirements; and,
- Summary of consultations with users and identification of key concerns.

Based on the comprehensive and technical assessments undertaken as part of this review a recommended Master Plan (channel design width) is presented along with the required mitigation, forming the key recommendations of this report.

5.1 Marine Traffic Management Plan

5.1.1 Coal Harbour Basin Vessel Counts

In order to forecast whether the increase in number of transits resulting from the Project will impact navigation, the total number of berths/vessels within the Coal Harbour basin has been profiled.

Five marinas reside within the Coal Harbour basin. The marina names and the number of berths (vessels) are presented in the following table:

Table 2: Coal Harbour Basin: Total Number of Berths

Marina Name	Number of Berths
Bayshore West Marina	65
Coal Harbour Marina	249
Harbour Cruises Marina Area	106
Vancouver Rowing Club	256
Royal Vancouver Yacht Club	320
Coal Harbour Basin (total)	996

Sources:

- Bayshore West Marina Harbour Master
- Coal Harbour Marina Site Plan Marina Layout
- Harbour Cruises Marina Area Visual Count
- Vancouver Rowing Club Site Plan Marina Layout

There are approx. 1,000 vessels moored within the entire Coal Harbour Basin. RVYC's Coal Harbour Marina (CHM) currently accommodates 320 vessels, representing 32.1% of the current total within the basin. With the addition of 47 additional berths, RVYC would accommodate a total of 367 berths or 35.2% of the revised total. The addition of 47 berths in relation to the total basin only represents an increase of 4.5%.

5.1.2 Vessel Transit Volumes

In an attempt to identify the number of existing vessel transits occurring within the Coal Harbour RVYC undertook during the summer of 2009 a "Boat and Rower Count" from August 10, 2011 to September 16, 2011 (a five-week period) to assess the magnitude of current transits of vessels originating from either CHM, the Vancouver Rowing Club and the Harbour Cruises area. This period of time was identified as the peak period upon which transits would occur throughout the year as it represented the peak summer period of use. The counts were undertaken on a daily basis via taking panoramic pictures (which provided a view of the entire navigational channel) at 7:00 am, midday, 4:00 pm and 6:00 pm or 7:00 pm.

The busiest day for vessel transits throughout the 6-week period was August 23 (a Sunday) when 14 boats and 2 rowing shells were photographed. It is noted that the rowing shells generally had early morning periods (6:00 am to 7:00 am) and evening periods (6:00 pm to 7:00 pm) of transits, where in as many as 6 to 10 shells were photographed. The shells were generally viewed along the south side of the channel. It is noted the proposed water lot expansion is located along the north side of the channel.

It is noted if continuous viewing had been done on August 23 it is estimated that that a total of 70 boats may have transited the channel during the daylight hours.¹²

The remaining transits per day were significantly less than identified on August 23 and were evenly distributed throughout the 6-week period. As the time period upon which the transit data was taken assumed to be the busiest time of year (peak summer season) the volume of transits would be considered "light" with all other days being less so.

¹² As 14 boats were viewed over the period of the four time scenarios (assuming a total ½ hour is required to transit the channel) the findings would only account for 2 hours. Assuming a similar total existed for the remaining daylight hours (in 2 hours, 14 transits were evident; assuming 10 hours, 70 vessel transits are estimated).

The results were somewhat surprising as the numbers reveal a “light” density of transits via the navigational channel during the peak period of potential use (summer). However, the result can be somewhat accounted for as the majority of recreational users take extended summer vacations during the peak summer months. In these periods vessels for the most part remain outside of the Burrard Inlet (two to three weeks at a time).

In a recent study undertaken by Delcan/TyPlan for Transport Canada regarding the operational efficiency of the Second Narrows Bridge, in which local marinas were interviewed regarding recreational transits, a similar observation was noted by the marina operators as many of the sailboats would transit the second narrows only twice (outgoing and upon their return) during this peak period as they would be travelling to destinations such as Desolation Sound and the Gulf Islands on extended journeys.¹³

The rowing shells, as noted, seem to concentrate their practise sessions to early mornings and evening periods, when recreational boating occurs least, limiting conflicts between the user groups (e.g. wake created by recreational vessels impacting rowing).

Based on the vessel transit volumes identified in this report, the addition of 50 additional vessels and their transits would not have a significant impact on navigation.

Interviews with the RVYC Harbour Master suggest and confirm a relatively “light” number of transits within the basin based on his over 10 years of employment with RVYC.

5.2 Channel Design

According to PMV a navigational channel has yet to be established by the Port within this section of Coal Harbour. To ascertain the potential implications of such a proposed water lot expansion on navigation, determination of an appropriate navigational channel width is required.

Navigational design guidelines have been established to provide port engineers with appropriate models to ascertain navigational channel widths. Internationally and in Canada, they are:

1. The World Association for Waterborne Transport Infrastructure (PIANC) report entitled: *“Harbour Approach Channels - Design Guidelines”*; and,
2. The *“Canada Waterways: National Manoeuvring Guidelines: Channel Design Parameters Waterways Development Marine Navigation Services, Canadian coast Guard, Fisheries and Oceans Canada (CWNMGCDP) (revised 1999).*

¹³ Second Narrows Rail Bridge Clearance Detection System Feasibility Study (Delcan /TyPlan) 2011

Both provide guidance regarding channel design and a supporting input model upon which a navigational channel can be conceptually designed. Both references represent industry standards.

It is commonly accepted that the PIANC Guidelines represent the universally accepted guideline in the design of channels and it is our understanding that the PMV utilizes this methodology for their internal channel design studies.

For that reason, the inputs associated with the PIANC model were assessed and presented in context to this report.

Conversely, the Canada Waterways National Manoeuvring Guidelines while being useful as guidelines have been developed primarily for larger vessels such as tankers and bulk carriers and while referenced in context to this report they were not deemed applicable nor were they utilized as Coal Harbour caters specifically to recreational and tourist marine uses.¹⁴

The World Association for Waterborne Transport Infrastructure - Report on Approach Channels - Guide for Design Volumes 1 and 2

PIANC is a professional organization offering access to worldwide trends and challenges in port and waterway development and management. The design of an approach channel encompasses a number of disciplines including ship handling and maritime engineering in order to design waterways to a desired level of navigability and safety.

The “final report” of the Joint PIANC–IAPH Working Group 11-30 titled “Approach Channels – Preliminary Guidelines: 1995, was utilized in determination of the appropriate navigational channel width for Coal Harbour.

The overall design process is based on two specific stages:

1. **Stage 1:** Concept Design Study, based on initial physical and environmental data, the identification of a design ship or control vessel required to undertake detailed engineering and other requirements derived from commercial considerations and forecasts. Once physical data has been reviewed and the design ship or control vessel has been identified this leads to:
2. **Stage 2:** Detailed Design Study, involving development and validation of particular aspects of the navigational channel based on engineering modeling and verification.

Our assessment constitutes a Stage 1 Concept Design Study and consists of both a one-way channel design and a two-way channel design. Both design options are presented as follows:

¹⁴ As stated in the introduction to Canada Waterways: National Manoeuvring Guidelines: Channel Design Parameters Waterways Development Marine Navigation Services, Canadian Coast Guard, Fisheries and Oceans Canada (CWNMGCDP) (revised 1999).

5.2.1 One-Way Channel Design

Concept design generally considers the physical and environmental characteristics associated with the waterway in relation to the vessels that utilize that waterway. In addition, the PIANC approach to alignment, width and depth requirements are identified and aids to navigation and marine traffic and risk are discussed. Physical data and the identification of a control vessel are critical starting points in concept design.

The following factors are considered, and corresponding channel width addition factors are determined (and provided as part of this report) as inputs into the PIANC model in determination of an appropriate width for the navigational channel for Coal Harbour:

- Control vessel identification (inclusive of length, width and draft of vessel)
- Vessel speed
- Vessel manoeuvrability
- Vessel traffic density
- Traffic lane assessment
- Bank suction effect
- Bottom surface
- Cross current
- Wind Effects
- Channel depth
- Channel alignment

An assessment of each factor and was undertaken to identify inputs into the model and determination of channel width. It is noted for the purpose of this report that a one-way channel has been designed reflecting the “light” traffic density identified in the section entitled “Vessel Transit Volumes”, and a two-way channel for an increased frequency of transits.

The results are presented as follows:

5.2.1.1 Control Vessel

The required width of a channel is conveniently expressed as a multiple of the width of the beam of a ship with bend radii expressed as multiples of its length. The identification of a design ship or control vessel is critical and essential for detailed design. By definition the design ship or control vessel represents:

“The largest vessel capable of navigating the channel today and in the future considering the vessels vertical clearance, beam, length, weight capacity and frequency of transits, etc.”

TyPlan undertook a detailed site/field survey of Coal Harbour on September 4, 2011 which was augmented with conversations from representatives of RVYC to identify the largest vessel operating in the harbour.

Based on the above it was determined that Harbour Cruises and Events operate three of the larger vessels which regularly transit the waterway and therefore such vessels would represent the control vessel selected for channel design. The vessels operated by Harbour Cruises were confirmed to represent the largest vessels utilizing the channel according to Harbour Cruises Harbour Master.¹⁵

Harbour Cruises and Events operate three vessels, they are: MPV Constitution, MV Harbour Princess and the Britannia.¹⁶ Harbour Cruises operations are located within the Bayshore Marina at the foot of Denman Avenue. The vessel characteristics are outlined below:

Table 3: Coal Harbour Navigational Channel Control Vessel Identification

Harbour Cruises			
Vessel Name	Length (m)	Beam (m)	Draft
MPV Constitution	23.84	7.24	1.79 m
Harbour Princess	26.46	7.92	2.29m
MV Britannia	38.5	9.66	2.5 m

Source: Doug Newman Harbour Master Harbour Cruises and Events

5.2.1.2 Vessel Speed

The speed of vessel transits utilizing the channel is deemed to be slow ranging from 5 to 8 knots based on conversations with users. The majority of other vessels within Coal Harbour, being recreational vessels would also be restricted to and respect such speeds.

According to the PIANC Guidelines, in relation to vessel speeds the factor would be 0.0 according to Table 5.2 Additional widths for Straight Channel Sections.¹⁷

5.2.1.3 Vessel Manoeuvrability

The factor associated with vessel manoeuvrability is deemed to be “good” for the Coal Harbour navigational channel due to the nature of standard recreational vessel design which is designed with manoeuvrability in mind, as compared to commercial vessels such as tankers and barges that require tug assist in most cases. According to PIANC, vessel manoeuvrability is also impacted by other factors impacting navigation such as winds, cross currents and currents. As Coal Harbour is located within a “protected waterway” as defined by PIANC, it is not anticipated that vessel manoeuvrability is an issue.

¹⁵ According to Doug Newman, Harbour Master of Harbour Cruises.

¹⁶ Length and beam were confirmed by Doug Newman.

¹⁷ The World Association for Waterborne Transport Infrastructure: According to Table 5.2 Additional widths for Straight Channel.

According to Table 5.1 of the PIANC Guidelines, the basic manoeuvring (defined as W BM) is measured as a multiple of vessel beam (width) which is assumed for the purpose of this evaluation to be “Good” and therefore a factor of 1.3 times the beam of the control vessel is applied for additional channel width.

5.2.1.4 Traffic Density

Based on the marine traffic management plan prepared for this report (refer to Section 3) traffic is deemed as “Light”.

Correspondingly and according to PIANC Table 5.1 the Basic Manoeuvring Lane, a factor of 0.0 has been applied.

5.2.1.5 Traffic Lanes

Due to the nature of the navigational channel (assumed to be straight for the purpose of design) which predominantly caters to recreational users (non commercial vessels), has good visibility, good aids to navigation (refer to Exhibit 6) and traffic density is “light”, the provision of a “one-way channel” has been chosen as the design channel.

Exhibit 6: Nautical Chart of Coal Harbour



Source: CHS Nautical Chart.

5.2.1.6 Bank Suction Effect

As the navigational channel for Coal Harbour is sited in an area enclosed by banks but away from any natural banks within the harbour (due in part to existing marinas in the harbour on either side of the channel illustrated in Exhibit 6) there is only a slight potential for bank suction to impact navigation (most likely related to mooring of vessels within the designated marinas). A factor of 0.8 for additional beam width has been applied.

5.2.1.7 Bottom Surface

According to the Canadian Hydrographical Survey Nautical Chart (Exhibit 6) the bottom surface within Coal Harbour is identified as mud/sand.

A factor associated with “smooth and hard” (0.1) for additional beam width has been applied.

5.2.1.8 Cross Currents

Cross currents affect a ship's ability to maintain a course. Little, if any, cross current exists in this portion of Coal Harbour as it is a protected waterway and as such, a “negligible” cross current factor (less than 0.2 knots) has been applied.

Additionally, the prevailing longitudinal current (knots-tidal) is low, less than 1.5 and therefore a factor of 0.0 of the beam has been applied.

5.2.1.9 Navigation Aid/Pilotage

Navigational aids are important for mariners as they provide guidance to mariners. Usually visual (but increasingly electronic) they provide mariners information regarding navigation. As the channel is relatively well defined from a visual perspective and navigational aids are in place for the recreational user (refer to Exhibit 6) the existing channel has well established aids to navigation.

A factor of “good” (0.1) has been applied.

5.2.1.10 Cross Winds

Cross winds will affect the ship at all speeds, but will have greatest effect at low ship speeds as it will cause the ship to drift sideways or take up an angle of leeway, both of which increase the width required for manoeuvring.

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Cross winds do not affect the channel in Coal Harbour as it is located in protected waters and not impacted by the wind speed, direction, depth, draft and windage of the vessel. The wave height and length within the channel are rarely a concern to recreational users as the heights of the waves are less than 1m.¹⁸

A factor of 0.0 is applied.

5.2.1.11 Cargo Effect

No cargo vessels utilize the channel and as a result a ratio of 0.0 is applied.

5.2.1.12 Channel Depth

According to PIANC in the absence of other information the minimum values of the depth/draught ratio should be taken as 1.1 in sheltered waters.¹⁹

Based on the above parameters the Consultant has identified, defined, discussed and evaluated the ratings which have been applied to the PIANC model in the determination of an acceptable channel width.

Channel design is presented for a One-way channel (with the identified control vessel as the Britannia) is presented.

Table 4: Coal Harbour Horizontal Channel Design Recommendations

One-way Traffic (Britannia as the Control Vessel)			
Design Vessel	Vessel	Rating	Factor
Type	MV Britannia Tourist (Passenger) Ferry		
Length	38.5 m		
Beam	9.66	Basic Lane 1.3	
Draught	2.5 m		
Speed	5-8 knots	Slow	0.0
Vessel Width Parameters	9.66		
Vessel Manoeuvrability		Good	1.3
Traffic Density		Light	0.0
Traffic Lanes		One-way	.

¹⁸ Based on discussions with marine recreational users and RVYC members.

¹⁹ PIANC section 5.3.2.

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One-way Traffic (Britannia as the Control Vessel)			
Design Vessel	Vessel	Rating	Factor
Bank Suction Effect		Low/negligible	0.8
Bottom Surface (3.5mgt 1.5(2.5)		Smooth and Hard	0.1
Cross Current Effect		Negligible	0.0
Cross Wind Effect		Mild	0.0
Cargo Hazard		Low	0.0
Navigational Aid /Pilotage		Good	0.1
Depth Draft Effect			1.1
Total Factors			3.4
Recommended Horizontal Channel Width			32.8

Source: PIANC

Notes: Refer to main report for assessment details and rationalization of parameters chosen.

T - Draught

B - Beam

Based on the PIANC channel design methodology and assuming a one-way channel design approach the required channel width in Coal Harbour accommodating for a safety factor (2.2 m) is 35 m.

5.2.2 Two-way Channel Design

For the purpose of this review and at the request of the approving authorities (NWPP and PMV) it was requested that a two-way channel design also be prepared to address the potential safety concerns regarding separating outbound and inbound traffic.

Whereas in designing a one-way channel in which the largest vessel beam transiting the channel (e.g. control vessel) should be utilized in calculations, when preparing a two-way channel, a pair of large vessels should be selected. The control vessel selected is the Harbour Cruises vessel “Harbour Princess” with a length (L) of 26.46 m (27 m), beam (B) of 7.92 m and a draft of 2.29 m. The PIANC model run is presented in Table 5 below.

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Table 5: Coal Harbour Horizontal Channel Design Recommendations

Two-way Traffic Design (Control Vessel: Harbour Princess)			
Design Vessel	Vessel	Rating	Factor
Type Typical Recreational Charter Vessel		Manoeuvrability Good	
Length (L)	27 m		
Beam (B)	7.92		
Draught (D)	2.29 m	(Depth more than 1.5T) Low	0.0
Speed	5-8 knots	Slow	0.0
Vessel Width Parameters	7.92	B	0.0
Vessel Manoeuvrability		Good	1.3 (resulting in a 10.3 m traffic lane and 2 traffic lanes required therefore 20.6 m)
Traffic Density		Light	0.0
Traffic Lanes		Two	(1.3*B) 10.3 m
Bank Suction Effect		Low	0.58 x 2
Bottom Surface		Smooth and Soft (due the decreased draft of the vessel as compared to the control vessel draft for the one-way channel)	0.1 B
Cross Current Effect		Negligible (less than 0.2 knots)	0.0
Cross Wind Effect		Mild	0.0
Cargo Hazard		Low	0.0
Navigational Aid /Pilotage		Good	0.0 (reduced due to the reduced beam of both control vessels)
Depth Draft Effect		Less than 1.5T (shallower draft and therefore reduced to 0.0)	0.0

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Two-way Traffic Design (Control Vessel: Harbour Princess)			
Table 5.3 PIANC calls for an additional width between the lanes for passing	Control vessel beam	7.92	1 (therefore need 7.92 m)
Total Factors			3.6 B
Recommended Horizontal Channel Width			28.5 m

Source: PIANC

Notes: Refer to main report for assessment details and rationalization of parameters chosen.

In conclusion:

- Based on PIANC a one-way channel design for Coal Harbour requires a navigational channel width of 32.8 m plus 2.2 m allowance for safety = 35 m.
- Based on PIANC a two-way channel design for Coal Harbour requires a navigational channel width of 28.5 m + 6.5 m allowance for safety = 35 m.

For the purpose of the Master Plan a 62 m navigational channel is recommended which includes the 35 m navigational channel for recreational and tourist vessels, plus 2 x 13.5 m (27 m total) rowing training lanes.

5.3 PMV Navigational Channel Design Widths

PMV is responsible for the effective and efficient management of navigational channels and passages within its jurisdiction. The various navigation channels within the PMV have been divided into three official channel classifications. The officially designated channels have specific design parameters based on the types of vessels transiting the channels (identified as river reaches) as well as the goods being transported through each navigational channel (reach). The classifications are as follows:²⁰

- Deep Sea Channel** - means of navigating channel that is maintained to serve ocean going vessels;
- Domestic Channel** - means a navigational channel that is maintained predominantly to service the barge and towboat industry, commercial fishing vessels and recreational vessels; and,
- Local Channel** - means the portion of a waterway that is not either a deep-sea channel or a domestic channel but is utilized by a variety of smaller operators.

²⁰ Navigational Channel Design Fraser River Queens Reach Shipping Channel discussion paper Port Metro Vancouver.

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There are 37 designated channels or reaches within the PMV jurisdictional boundaries that have been designated as either deep sea, domestic or local channels. As identified in the context of this report the Coal Harbour does not have an identified nor designated channel.

However, a comparison of similar channels within the PMV's jurisdictional boundaries that exhibit similar characteristics, types of vessels and volume of transits can be benchmarked to ascertain whether our recommended channels widths based on the PIANC guidelines are reasonable.

Table 6: Channel Design Width Examples within PMV Jurisdictional Boundaries

Channel /Reach Classification	Description of Channel Use Characteristics	Width of Channel Reach
Ladner Reach	Predominantly recreational with some commercial fishing vessels. Marinas and float homes abut the channel and have direct access to the channels, very similar to Coal Harbour	45 m
Gunderson Slough	Predominantly commercial fishing vessels	45 m
North Arm	Major commercial and recreational corridor for coastal Commercial Operations. The North Arm provides access to the Strait of Georgia. Reach extensively utilized and has significant local traffic. Water lots supporting booming grounds and other marine related uses reside throughout the area.	60 m

Source: Navigational Channel Design Fraser River Queens Reach Domestic Shipping Channel, PMV Discussion Paper Discussions with PMV staff.

As illustrated, channels designated by PMV that most closely reflect the activities within Coal Harbour identify a navigational channel width of 45 m. It is however noted that according to PIANC only a 35 m wide navigational channel is required to accommodate two-way traffic.

5.4 Rowing Channel Design Requirements

This plan acknowledges that the Vancouver Rowing Club is valued and historic user of the waterway and accommodating its rowing members with a training facility should also be accommodated in the basin.

From a design perspective this plan cites the International Rowing Federation (FISA) Rules of Racing and related Bylaws.²¹ The FISA Rules of Racing outline all the rules and protocols associated with the sport to promote consistency. The Rules of Racing are highlighted to provide the study team insight into definitive design requirements associated with accommodating rowers within Coal Harbour for ongoing training facilities.

While it is acknowledged that FISA rules are specific to international and world events (which do not occur within Coal Harbour as it was acknowledged by VRC that training is the focus of their activities, see section 6.4 of this report) the overall widths of international courses are identified, qualified by requirements associated with training facilities.

Appendix 1: Bylaws to Rules 35 to 37 – Courses; outlines course requirements in accordance with all international standards related to rowing championships and world stage events. Under Appendix 1: Bylaw to rules 35-37-Courses: Section 2.1 Stretches of Water it states for courses that host international events:

*“A standard international course (for international and world regattas) shall be straight and shall not have less than 6 lanes.²² The minimum length of water necessary to contain the standard course is 2,150 m.²³ For a course for Masters the minimum length is 1,150 m²⁴ the standard international course should be at least 108 m wide **and the average width per rowing lane of 13.5 m.**”*

The FISA Rules of Racing also provide insight into the requirements for rowing training courses, as identified by Bylaw Rule 56, “Traffic Rules on the Course”, which states:²⁵

“The traffic rules for training shall identify at least one clear lane of water (13.5 m) as a neutral lane between crews travelling in opposite directions on the water. If it is not possible to provide the neutral lane, then the crews travelling in opposite directions must be separated by a “swimming lane” or equivalent, as a continuous physical barrier”²⁶

Therefore, as part of the Master Plan’s preparation the rowing channel design which considers two 13.5 m lanes (one for outbound and one inbound training lane, in order to support a rotational traffic pattern, as part of the channel design) in accordance with FISA requirements, has been identified.

As a benchmark to the standards outlined in the FISA regulations contact was made with the University of British Columbia (UBC) Rowing Club who operate out of the John Lecky facility on the Moray Channel in

²¹ FISA was founded on June 25, 1892 in response to the growing popularity of the sport of rowing, and the consequent need for uniformity of regulations over such matters as race lengths, boat composition, and weight classes)

²² Appendix 1 Bylaws to Rules 35 to 37 - Courses Section 2 Stretches of Water General (Section 2.1)

²³ Appendix 1 Bylaws to Rules 35 to 37 - Courses Section 2 Stretches of Water General (Section 2.2)

²⁴ Appendix 1 Bylaws to Rules 35 to 37- Courses Section 2 Stretches of Water General (Section 2.3)

²⁵ It must be emphasized that VRC is considered a rowing “training/learning facility” (by VRC mandate) and does not undertake organized events (i.e. status for international or world events) and therefore the Master Plan focus on the related training requirements outlined in the Rules of Racing (Rule 56).

²⁶ Rules of Racing and Related Bylaws – Bylaw to Rule 56 Traffic Rules on the Course

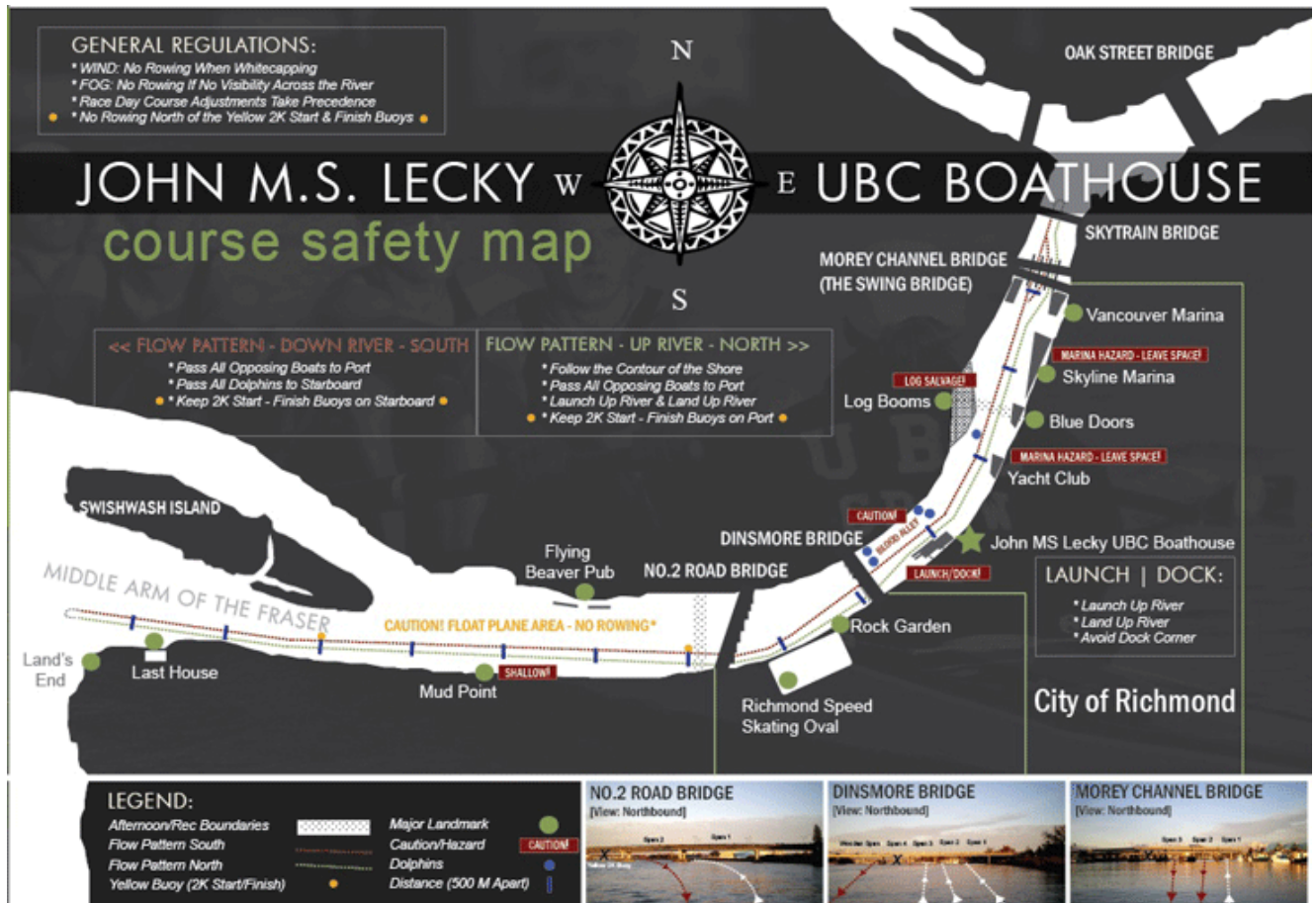
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Richmond. The location of the facility and the identified rowing lanes are outlined on the following exhibit (Exhibit 7).

Exhibit 7: John M.S. Lecky UBC Boat House Safety Map



In discussions with UBC rowing staff, it was confirmed that a 13.5 m width represents the standard width of a rowing lane and although the Moray Channel is also home to four yacht clubs, operating booming grounds requiring tug and tow operations, four bridges inclusive of an active swing span bridge, float plane landing areas and an active marine pub, the rowing facility still appears to work collaboratively with other marine stakeholders.

It is interesting to note that the UBC rowing facility was relocated from False Creek due to ongoing issues with vessel traffic as well as the rough water in the harbour.

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It is important to note that the UBC Rowing Clubs internal document entitled: *Safety Handbook for all Varsity, St. George and Community Programs* emphasizes the importance of weather restrictions, inclusive of:

There are no boats allowed on the water for any rowers or paddlers if any of the following is true:

- *Temperature of less than 5 degrees Celsius*
- *White caps are forming on the water*
- *Thunder or lightning are present*
- *Visibility is less than 1000 m*

While the Moray Channel is more secluded and exhibits better rowing conditions in terms of still water than Coal Harbour, the document further restricts use in stating that that:

“Only experienced rowers are permitted beyond the No. 2 Road Bridge (west) and they must be accompanied by a coach boat and follow the flow pattern carefully to ensure they remain out of the float plane territory.”

We note conditions to the west of the Dinsmore Bridge represent similar conditions within Coal Harbour in relation to the potential creation of whitecaps and conflicts with other users.²⁷

One of the most limiting aspects associated with rowing in the Coal Harbour are the generally less favourable weather conditions within the area and the existing number of recreational users in the basin. While rowing has and will continue to play a historic and ongoing use within Coal Harbour the harbour it does not exhibit physical and natural characteristics usually associated with rowing.

²⁷ It is important to note that one of the underlying rationales associated with the relocation of the UBC Rowing Club to the Moray channel from False Creek is due to similar conditions as those that exist within Coal Harbour.

6 Consultation with Stakeholders

This section of the review provides a summary of discussions undertaken with the local stakeholders currently operating some form of water- based activity within Coal Harbour.

6.1 Chevron Bulk Barge

The Chevron Legacy, a new and now the only marine fuel station for Vancouver Harbour, was completed and towed to Vancouver and was made operational in late January 2010. This station replaced the Chevron barge S.O.B.C. No. 5 which was moored to Coal Harbour since it was built in 1953.

The Chevron Legacy plays a critical role serving the marine community of the lower BC coast, accommodating both commercial and recreational users via the provision of fuel. The station has the following storage capacities:²⁸

- Marine diesel 339,197 gal;
- Gasoline 42,400 gal;
- Lube oils 20,896 gal in bulk tanks;
- 2,113 gal in drums; and
- The maximum fuel discharge rate is 13,209 gal per hour.

The facility supports as mentioned both commercial and recreational user fill ups. In consultation with the operators of the facility it was confirmed that the proposed expansion of the marina would not impact current operations and would not create issues to the operator, as both commercial and recreational users continue to be accommodated and supported at the station. It was noted it would improve the profitability of the operation and additional recreational users would be supported.²⁹

6.2 Nav Canada Air Traffic Control

Nav Canada; Air Traffic Control Centre, for Coal Harbour was contacted to identify the seaplane traffic patterns considering both float plane traffic landing areas and arrival and departure routes, in relation to navigation and any increase due to marine traffic.

It is acknowledged by Nav Canada that conflicts do not exist with current activity.

²⁸ Chevron Web Site entitled Chevron Legacy.

²⁹ Based on telephone conversation with Ross Johnston the operator at the facility (28/09/11) 604-681-7725

According to David Weston neither the expansion of the marina nor the increase in vessel transits would impact operations. The float plane traffic and the arrival/departure routes are discussed and outlined as follows.³⁰

Exhibit 8 Float Plane Traffic illustrates the main landing area utilized by the float planes. The Bayshore is a private facility with space for one aircraft. As illustrated on Exhibit 8 "The Ball" is an orange Scotsman buoy that is set by Harbour Air to delineate the southwest corner of the landing area. This serves as a runway threshold. Departing aircraft start their takeoff slide to the east of the buoy. Arriving aircraft should be off the step east of the buoy.

The ball is not treated as an official boundary and while flexibility does exist regarding Pilot decisions for reasons of safety, i.e., to stay away from debris, or boat traffic.

Pilots generally follow those identified "rules of thumb". The large blue area is called Area Alpha. Float aircraft operations are supposed to be contained to this area as much as possible.

It is noted that the new float plane facility at the Convention Centre is not identified on the exhibit.

³⁰ Unit Operation Specialist, Dave Weston 604-688-9254.

Exhibit 8: Float Plane Traffic Landing Area



Source: Dave Weston Unit Operation Specialist Vancouver Harbour Tower

Exhibit 9 outlines the Arrivals and Departures routes depending on wind direction depicting how the aircraft arrive and depart.

The red lines indicate what Pilots do in east winds. The green lines indicate what Pilots do in west winds. The black line is the approach when strong southeast winds are evident. Pilots will change up operations as needed to for reasons of safety and efficiency. As illustrated, the preference is to keep most of the operations on the south side of Area A to reduce taxi times.

Exhibit 9: Float Plane Approach and Take off Routes



Source: Dave Weston Unit Operation specialist

6.3 Vancouver Harbour Tower

As illustrated neither the expansion nor the relatively light increase in vessel transits impact float plane operations.

6.4 Vancouver Rowing Club

The Vancouver Rowing Club (VRC) provides a facility with direct access to Coal Harbour in which to row, train, and socialise. The club originally formed in 1886 as the Vancouver Boating Club, with the present clubhouse in Stanley Park officially opening September 9, 1911. The shell bay is equipped with over 25 rowing shells. A readily accessible rowing float enables users to launch directly onto Coal Harbour. As this dock space is dedicated for rowers which promote safe and easy launching into Coal Harbour.

VRC currently delivers programs which include:

- Novice: Mon/Wed: 6:00 pm - 7:30 pm, Sat: 12:00 pm – 2:00 pm
- Junior - Tue/Thu - 4:15 pm – 6:00 pm and Sat: 10:00 am – 12:00 pm
- Junior Novice - Mon/Fri - 4:15 pm – 6:00 pm and Sat: 10 am - 12 pm
- Recreational: Tue: 6:30 pm - 8:30 p.m. (May to August), Fri: 6:00 pm - 8 pm (April to October), Sun: 11:00 am - 1 pm (all year)

The Vancouver Sport Strategy for Rowing (VSSR) document outlines the importance of rowing in Vancouver's history, the current facilities and a 100-year plan. According to the plan the VRC operates learn-to-row programs (training only) for adults and youth as well as developmental programs for participants in those programs., inclusive of students from Magee Secondary School, Point Grey Secondary School, Lord Byng, Van Tech Secondary and York House School.

According to the VSSR the “keys” to success for rowing facilities include:

1. Direct access to water in a safe and protected environment;
2. Appropriate and secure equipment storage for sports equipment safety needs and materials;
3. Communal Use of socialization spaces inclusive of public spaces;
4. Sufficient space for education and administration; and
5. Accessible lockers, showers and changing rooms.

However, in downtown Vancouver, especially False Creek and Coal Harbour, due to competing land uses/ water lot uses and increasing activity some users have relocated to other facilities. For example, when the UBC Rowing Club had the opportunity to relocate to Richmond (Moray Channel) they did so.

According to the VSSR, sport capacity issues are evident and specifically in regard to Coal Harbour, as the report states:

“Coal Harbour is highly utilized by the rowing community already and operates a successful learn to row program but are restricted in terms of the number of users due to the small and shrinking navigable channel.”

While the results of this report confirm that a 35 m navigational channel is required based on the PIANC Guidelines and that in addition to accommodating two training lanes for rowing (13.5 m x 2 = 27 m), the total design requirements for the navigational channel would be 62 m post marina expansion.

However, the Vancouver Rowing Club remain opposed to the project and insist that an 81.5 m channel be maintained for their activities regardless, although the governing body of rowing standards and benchmarks presented herewith, indicate that at a minimum only a 13.5 m lane is required for training purposes.

6.5 Council of Marine Carriers

The Council of Marine Carriers (CMC) is an organization with a mandate to further the interests and to conserve the rights of coastal tug and tow operators and members to promote their general welfare. The Council's role is to formulate and advocate policies, legislation and regulations that are beneficial to their membership by working with the appropriate governmental and industrial agencies. The Council maintains links in both Canada, the United States as well as abroad. They also have close relations with similar organizations such as the Canadian Shipowner's Association, the BC Chamber of Shipping, the Chamber of Maritime Commerce, the Shipping Federation, WESTAC, the American Waterways Operators and the various Marine Exchanges across the US.

In discussions with the President of the CMC, Captain Phil Nelson on December 15, 2011 he did not indicate that he nor did his membership have any issues with the proposed expansion.

6.6 Bayshore West Marina

In a meeting held on December 8, 2011, attended by: Frank Armitage representing the Bayshore West Marina; Wally Eggleton, RVYC; Robbie Hausch, RVYC and Marcus D'Aubin, Harbour Master, RVYC the proposed expansion project was discussed.

Frank indicated that he did not see anything in the proposal that would cause concern but would run it by the management group to see if they have any questions.

He thought that some of our suggestions for working with the rowers (outlined in the conclusions and recommendations section of this report, see report section 7.2) were positive and Bayshore West Marina would support them. Such suggestions included, improved communication between VRC and other stakeholders regarding rowing, published schedules of rowing activity and the potential establishment of rowing lanes.

RVYC will continue to forward information to Bayshore West Marina as the project proceeds.

6.7 Coal Harbour Marina

In a meeting held on December 8, 2011, attended by Steven Varley; GM, Coal Harbour Marina, Wally Eggleton, RVYC; Robbie Hausch, RVYC and Marcus D'Aubin, RVYC Harbour Master the project was discussed.

Steven Varley (GM) did not see any negative impact on his operation associated with the proposed expansion. RVYC will follow up as the project proceeds with Coal Harbour Marina and provide drawings to show our proposed expansion in relation to the Coal Harbour Marina so he can review it with his board.

Steven agreed that improved communication with the VRC and rowing lane designation would be positive.

6.8 Vancouver Parks Board

On December 5, 2011, in a meeting attended by Mr. Ken Maguire, Vancouver Parks Board; Carmen Derricott, GM RVYC; Robbie Hausch, RVYC; Wally Eggleton, RVYC and Marcus D'Aubin, Harbour Master RVYC the proposed project was discussed. Ken had questions in regard to traffic and parking requirements but did not see any conflict with the Parks operation.

He asked for a drawing which shows the proposed expansion as it would impact the adjoining properties.

Ken was not concerned about what and where the channel would be as it was not in his jurisdiction.

6.9 HMCS Discovery

The proposed expansion project was discussed in a phone conversation with Lt. Cdr. Phil Horner, Commanding Officer, HMCS Discovery and John Long, RVYC. Preliminary discussions indicated that their operations would not be impacted; however, they requested a plan to verify that such was the case, which RVYC will provide.

6.10 Harbour Cruises

Numerous telephone attempts have been made to communicate in person with the owner of this operation. None of the attempts have been successful. However, we were able to contact Harm Malenstien; Maintenance Manager, who was provided a map illustrating the proposed expansion, to which he replied on behalf of the owner: "The owner has objections against the proposal", no further information nor clarification elaboration was provided.

7 Conclusions and Recommendations

7.1 Conclusions

The expansion of the CHM has been evaluated in relation to:

- Defining the location and the proposed water lot expansion
- Providing a summary of the demand for expansion
- Undertaking an impact assessment of the project in relation to providing an assessment of:
 - Multiple Use Waterway Management Best Management Practises
 - Surrounding land use(s) and water lot lease tenure(s)
 - Marine Traffic Management Plan
 - Navigational Channel Design Options and co- use considerations ()
 - One-way Channel Design (based on PIANC guidelines)
 - Two-way Channel Design (based on PIANC guidelines)
 - PMV Navigational Channel Design examples (existing PMV channel widths)
 - Rowing Training Lane Requirements (based on “FISA” Regulations)
 - Stakeholder consultations

The findings of the review confirm that expansion of the RVYC water lot is feasible and will not impact existing and future operations within the harbour from a navigational perspective. Furthermore, utilizing standard design guidelines for both commercial/recreational navigation (PIANC) and rowing lanes for training purposes (FISA) both uses can be accommodated within the 70 m channel, consisting of a:

- 35 m two-way navigational channel for recreational vessels;
- Two 13.5 m rowing training lanes (27 m) accommodating both and inbound and outbound rowing lane.

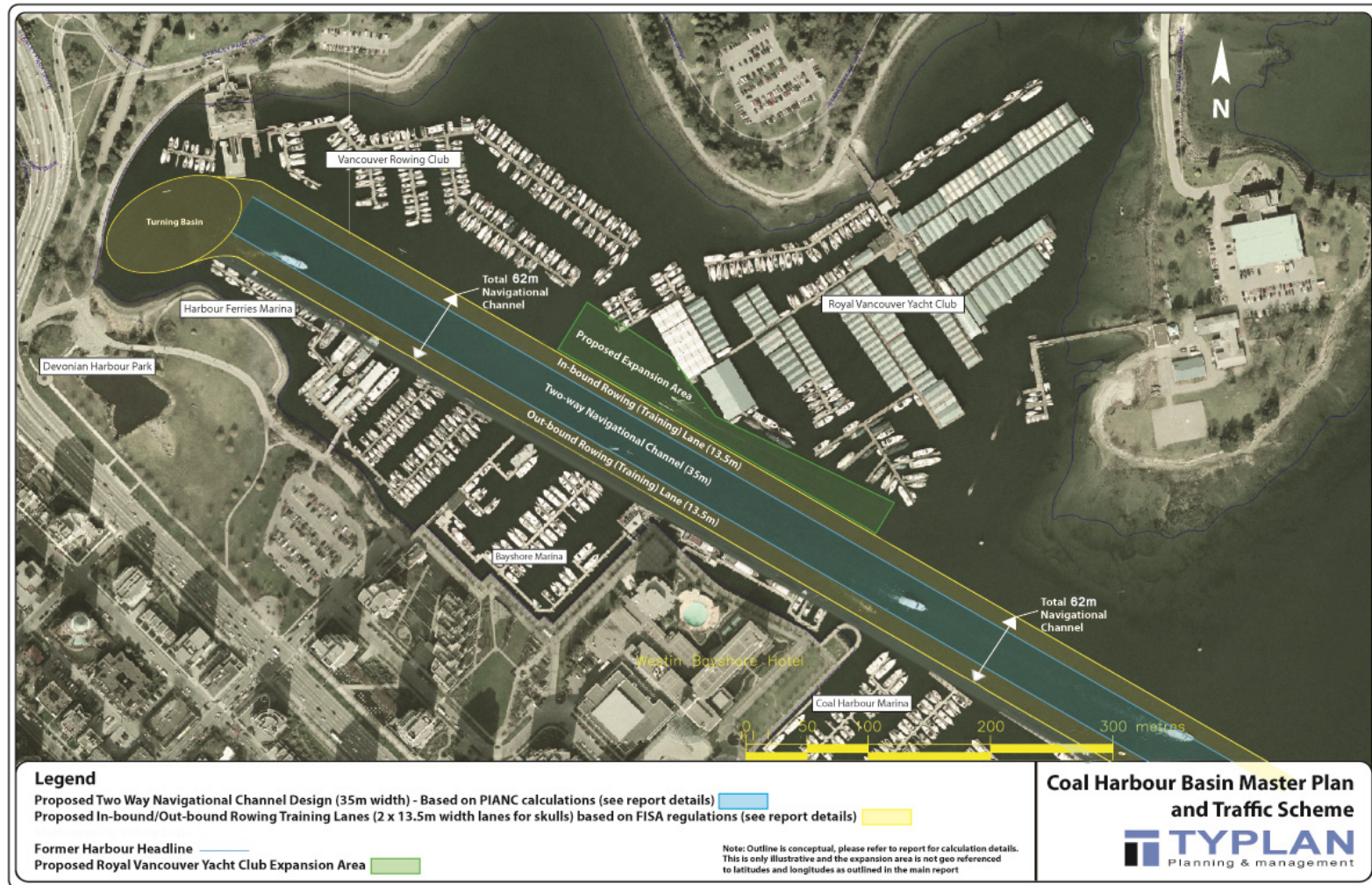
As the Project also avoids areas of environmental concern (avoidance of littoral areas) and no dredging is required the proposed project expansion does not pose concerns from an environmental and dredging perspective. From a navigational design perspective, the channel supports both the co-use and co-existence of the waterway for rowers and recreational vessels, also incorporating a number of best management practises outlined in the Multiple Use Waterway Best Management Practices Guidebook.

Most importantly, the channel recommendations protect in perpetuity the rowing training lanes, a key issue identified by the VRC. The expansion of the RVYC water lot is feasible and in general is supported by a number of users of the waterway interviewed.

Royal Vancouver Yacht Club: Coal Harbour Marina Expansion Master Plan Final Report

A conceptual outline of the recreational navigational channel, and rowing training lanes, is presented on the following exhibit entitled: “Coal Harbour Basin Master Plan and Traffic Scheme (CHBMPTS)”.

Royal Vancouver Yacht Club: Coal Harbour Marina Expansion Master Plan Final Report



7.2 Recommendations

This report recommends that PMV and NWPP approve in principle the expansion of the water lot and provide documentation to the RVYC confirming that the water lot expansion has been approved in principle.

With such an approval, RVYC will initiate a detailed design study that will address all of the engineering, environmental, aesthetic requirements of the expansion project. RVYC will work directly with both the PMV and NWPP in the detailed design process.

It is noted that both PMV and NWPP will require that a number of terms and conditions are imposed by the PMV and NWPP.

RVYC has as part of this study, recognized the historic and ongoing significance of the rowing in Coal Harbour and has, in addition to designated rowing lanes for training, will facilitate an educational and awareness program to improve mariners understanding of the relationship between rowing and recreational use in Coal Harbour. Such an educational and awareness program will include:

- Working with both PMV and NWPP to verify and finalize the Coal Harbour Basin Master Plan and Traffic Scheme and once verified and accepted by both parties;
- Advertise the CHBMPTS, three times in Pacific Yachting magazine to promote the scheme;
- Gazette the CHBMPTS in the Canadian Coast Guard (CCG) Notice to Mariners Publication;
- Post the CHBMPTS at all local Marinas;
- Post No Wake signs throughout the basin;
- Post speed limits throughout the basin;
- Work with VRC to ascertain whether buoying certain portions of the rowing lanes should be buoyed to improve directional awareness of both rowers and recreational users; and
- Undertake basin wide informational meetings with the various user groups to introduce the CHBMPTS and highlight the significance of rowing schedules to limit ongoing conflict.