ROBERTS BANK TERMINAL 2 WORKING GROUP

Meeting #4
June 17th, 2014
Afternoon Session

(NO TE: contains preliminary information subject to revision)
HUMAN HEALTH PROPOSED VALUED COMPONENT

Presenters:

• Erin Bishop, Socio-Economic Project Manager, Hemmera
• Doug Bright, Health Risk Assessment Specialist, Hemmera
• Marla Orenstein, Health Impact Assessment Specialist, Habitat Health Impact Consulting Corp.

Purpose:

• Overview of the human health proposed VC and feedback on VC selection
• Summary of the human health assessment approach
Assessment of human health includes:

- **Human health risks** related to:
  - Changes to *air and noise emissions*, from ship, road and rail traffic within the Project area
  - Potential *shellfish contamination*
  - **Human health effects** related to stress and annoyance, employment, and food security.

**Key interests and issues raised:**

<table>
<thead>
<tr>
<th>Local Gov't, the public and stakeholders</th>
<th>Aboriginal Groups</th>
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<tbody>
<tr>
<td>• Health as related to air quality, noise and vibration, quality of life, and community well-being</td>
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HUMAN HEALTH PROPOSED VC - COMPONENT LINKAGES

- Air Quality IC
- Noise and Vibration IC
- Population Demographics IC
- Marine Invertebrates VC
- Marine Fish VC
- Coastal Birds VC
- Labour Market VC
- Outdoor Recreation VC
- Visual Resources VC
- Physical and Cultural Heritage VC
HEALTH EFFECTS ASSESSMENT TOOLS

- Human Health Risk Assessment (HHRA)
- Health Impact Assessment (HIA)
Human Health Risk Assessment (HHRA)

- Predicts risk of potential health effects quantitatively, based on:
  - What toxicants and stressors people may be exposed to;
  - How much exposure they’re likely to experience; and
  - Whether exposure estimates may exceed threshold levels for potential adverse health effects.
• **Health Impact Assessment (HIA)**
  - Predicts potential health effects qualitatively
  - Addresses social, economic and environmental influences on health
QUESTIONS?
RBT2 HUMAN HEALTH RISK ASSESSMENT (HHRA)

Presenter:
• Doug Bright, Health Risk Assessment Specialist, Hemmera

Purpose:
• Summary of Human Health Risk Assessment (HHRA) rationale, methodology, and scope
Appropriate analytical tool for assessing influence of changes in environmental quality (including acoustic environment) on those health conditions for which people routinely seek medical interventions

Focussed on identifying risk management needs by defining key contributors and exposure pathways

Explicitly deals with uncertainty and intentionally errs on the side of caution
HUMAN HEALTH RISK ASSESSMENT - METHODOLOGY

1. Problem Definition: What are the issues that need to be evaluated?

2. Exposure Assessment: How much are individuals and groups exposed to?

3. Development of Exposure Thresholds: How much can individuals and groups safely withstand?
4. Risk Characterization
   How high are exposures likely to be in comparison with known thresholds of effects?

5. Uncertainty Analysis: How certain are we about the information we are using to characterize risks?

6. Risk Management Recommendations
HHRA Scope Includes

- Air Quality
- Noise
- Shellfish Consumption
The scope of the HHRA was informed by:

- Issues raised through consultation with public and Aboriginal groups
- Input from scoping activities with Tsawwassen First Nation
- Issues identified through a noise and vibration social survey
- Input through an Air Quality Scoping Study
- Input from federal and provincial regulatory bodies
HUMAN HEALTH RISK ASSESSMENT - PROPOSED ASSESSMENT AREAS

- **LAA**: Area where air quality, noise, and sediment quality changes are assessed.
- **RAA**: Residences within Tsawwassen First Nations lands and Delta.

Rationale:
- Established at a sufficient distance from the emissions and noise sources that people and communities beyond the LAA and RAA boundaries could not be subjected to project-related incremental exposure.
Baseline Health Status

- Community and regional health studies:
  - populations in the local assessment area, B.C., Canada, Washington State

- Data obtained from:
  - Fraser Health Authority, British Columbia Ministry of Health, Statistics Canada, Health Canada and Washington State Department of Health

- Health indicators potentially affected by air quality:
  - Cancer (all forms), lung cancer, asthma, chronic obstructive pulmonary disease (COPD, including chronic bronchitis and emphysema), hypertension, cardiovascular disease (including ischemic heart disease and congestive heart failure), and respiratory systems disease (general).
Project Emissions: Diesel exhaust and other traffic-related sources

Local Airshed: Gaseous air pollutants Particulate Matter (fine, coarse)

Chemical Deposition: Sediments Soil -> Animals Plants -> Animals

Indirect Human Exposure: Ingestion (soil, plants, animals) Dermal Contact (soil)

Direct Human Exposure: Inhalation
• Extensive engagement on air quality study scope

• Stakeholders/Regulatory Agency Representatives
  • Port Metro Vancouver
  • Metro Vancouver
  • Environment Canada
  • Tsawwassen First Nation
  • Corporation of Delta
  • B.C. Ministry of Environment

• Purpose of the Air Quality Scoping Study:
  • To determine which air quality elements need to be included in the RBT2 air quality assessment
  • Discuss spatial and temporal boundaries
  • Identify and review data sources and the methods (models) that will be used to complete the assessment
Receptor Types:
• Tsawwassen First Nation
• Farmers
• Healthcare Facility
  • Delta Hospital
• Residents
  • Canada – Ladner, Boundary Bay, Tsawwassen
  • U.S. (Point Roberts)
• Recreationists
  • Beach Grove, Boundary Bay GVRD Park, Reifel Bird Sanctuary, English Bluff Beach, South Arm Marsh
• Tsawwassen Ferry Terminal
HHRA SCOPE – NOISE AND VIBRATION

Changes in noise from the port during construction and operation → Noise transmission through the air → HUMAN RECEPTORS

Nearby communities/residences

Indoor/ outdoor

Stress and hypertension

Sleep disturbance

Other

Marine areas
Noise related issues included in HHRA Scope

- Audible noise
- Transient and impulsive noise
- Low frequency noise
- Ground vibration
Noise Effects Criteria

World Health Organization, Health Canada, U.S. Federal Inter-agency Committee on Noise (FICON)

- Maximum increase in %Highly Annoyed of 6.5% (Schulz curve).
- Impulsive, tonal characteristics of source noise accounted for by adjustments to %HA calculations.
- Nighttime sound level (Ln) of 30 dBA (indoor) or 45 dBA (outdoor) as a threshold for sleep disturbance.
- In schools and preschools, target for mitigation is a daytime sound level (Ld) of 35 dBA (indoor) or 50 dBA (outdoor) during class time.
Coal dust in sediments from historical release

Sediment re-suspension during construction

Uptake by crabs, cockles, clams, mussels

HUMANS
    Shellfish consumption
    Dungeness crabs, Cockles and clams

Ship, train, vehicle emission: deposits on tide flat
• Focal species
  - Cockles
  - Little-neck clams
  - *Macoma* clams
  - Oysters
  - Mussels
  - Dungeness crabs

• Collected at Roberts Bank and Reference Site (Boundary Bay or Sturgeon Bank)

• Edible tissues analyzed for contaminants of potential concern
QUESTIONS?
**Presenter:**

- Marla Orenstein, Health Impact Assessment Specialist, Habitat Health Impact Consulting Corp.

**Purpose:**

- Summary of a Health Impact Assessment (HIA) rationale, scope and methodology
HEALTH IMPACT ASSESSMENT - RATIONALE

• Port Metro Vancouver’s interpretation of “human health” in the EIS Guidelines

• Addresses community expectations

• Good business practice

• Informs mitigation of potential adverse effects
HEALTH IMPACT ASSESSMENT - SCOPE

• Scope of the RBT2 HIA was informed by:
  • Meetings with Health Canada, Fraser Regional Health Authority, First Nations Health Authority
  • Meetings with Tsawwassen First Nation
  • Input from community consultation meetings
  • Information from Aboriginal groups
  • HIAs of similar projects
## Issues included in the HIA

- Economic-related health effects
- Food security
- Stress and annoyance
- Marine, road and rail safety
- Health equity
HEALTH IMPACT ASSESSMENT - SCOPE

• Potential employment related effects:
  • Direct, indirect and induced employment and income provision
  • Effects on health outcomes
  • Positive and negative health effects
  • Vulnerable sub-populations
• Potential Food Security Effects:
  • Income-related effects on food security
  • Changes in availability, access, acceptability, and sharing of traditional food
  • Effects on adjacent agricultural production
HEALTH IMPACT ASSESSMENT - SCOPE

• Potential stress and annoyance effects:
  • Stress and annoyance related to:
    • Noise
    • Light
    • Visual environment
    • Cultural or heritage resources
    • Other project-related changes
HEALTH IMPACT ASSESSMENT - SCOPE

• Potential safety related effects
  • Injuries related to marine, road, and rail traffic within PMV jurisdiction
HEALTH EQUITY

- Differences in health that are distributed unequally across population groups and are deemed avoidable and unfair.

- Not a health topic per se, but a **lens** through which to view the effects of the project on all health-related areas.

- Vulnerable populations
HEALTH IMPACT ASSESSMENT – PROPOSED ASSESSMENT AREAS

- **LAA**: Tsawwassen First Nation, Musqueam Indian Band, and the Delta area.
- **RAA**: Metro Vancouver and areas currently used for traditional purposes by other Aboriginal groups, where subsistence activities may be affected.

**Rationale:**

- **LAA**: areas that have the greatest potential to experience potential changes in community health and wellbeing indicators.
- **RAA**: area where effects of the proposed Project may overlap with the effects of other current and proposed projects.
### HEALTH IMPACT ASSESSMENT - SCOPE

**Issues included in the HIA**
- Economic-related health effects
- Food security
- Stress and annoyance
- Marine, road and rail safety
- Health equity

**Issues included in other sections**
- Exposure to environmental contaminants
- Visual aesthetics
- Noise
- Recreational opportunities
- Health care services
HEALTH IMPACT ASSESSMENT - METHODOLOGY

Existing Conditions

Changes from the Project

Recommendations

PRELIMINARY INFORMATION SUBJECT TO REVISION

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HEALTH IMPACT ASSESSMENT - METHODOLOGY

Existing Conditions

1. Describe existing conditions
2. Identify vulnerable sub-populations
HEALTH IMPACT ASSESSMENT - METHODOLOGY

**Existing Conditions**
1. Describe existing conditions
2. Identify vulnerable sub-populations

**Changes from the Project**
3. Develop a logic framework
4. Seek out evidence
5. Characterize the effect
HEALTH IMPACT ASSESSMENT - METHODOLOGY

1. Describe existing conditions
2. Identify vulnerable sub-populations
3. Develop a logic framework
4. Seek out evidence
5. Characterise the effect
6. Develop recommendations for mitigation and enhancement

Existing Conditions

Changes from the Project

Mitigation
QUESTIONS?
PROPOSED ROBERTS BANK ECOSYSTEM VALUED COMPONENT

Presenter:
- Derek Nishimura, Senior Biologist - Ecosystem Productivity, Hemmera

Objective:
- Overview of the proposed Roberts Bank Ecosystem VC and feedback on VC selection
- Summary of the Roberts Bank Ecosystem assessment approach
OVERVIEW OF THE PROPOSED ROBERTS BANK ECOSYSTEM VC

Purpose:

• Basis of selection
• Component linkages
• Assessment area
ROBERTS BANK ECOSYSTEM PROPOSED VC - BASIS FOR SELECTION

Ecological basis

Provides spawning, rearing, feeding, refuge and migratory habitat for wide variety of fish and birds

Stabilizes sediment
- buffers against wave erosion
- important in nutrient cycling
- carbon sink

Key interests and issues raised:

The public and stakeholders
- Health of marine ecosystem
- Changes to species populations and distribution, and habitat

Aboriginal groups
- Health of marine ecosystem
- Access to land and resources currently used for traditional purposes
- Changes in the ability of Aboriginal groups to use for traditional purposes
ROBERTS BANK ECOSYSTEM PROPOSED VC - COMPONENT LINKAGES

- Coastal Geomorphology IC
- Sediment Characteristics IC
- Marine Water Quality IC
- Marine Vegetation and Biofilm VC
- Marine Invertebrates VC
- Marine Fish VC
- Marine Mammals VC
- Coastal Birds VC

Roberts Bank Ecosystem VC

Ongoing Productivity of CRA Fisheries VC

Marine Commercial Use VC
Outdoor Recreation VC
Human Health VC
• Roberts Bank, from the north side of the B.C. Ferries causeway to Canoe Passage and from high water mark to -100 m depth CD.

Rationale:
• Area where project-related effects are expected to occur.
• Area of highest productivity for other marine VCs (vegetation and biofilm, invertebrates, fish and birds).
• The Fraser River Estuary, from Boundary Bay to Sturgeon Bank from the high water mark to -100 m CD

Rationale:
• Provides ecological context.
• Contains similar habitats to those of the LAA.
Purpose:

• Summary of Roberts Bank Ecosystem assessment approach, rationale, scope, and methodology
• Ecosystem based model that measures ongoing productivity of the ecosystem based on:
  • Change in biomass (tonnes/km²)
  • Change in productivity (tonnes/km²/year)

• Ecosystem based model informs:

Effects Assessments for
- Biophysical VCs and focal species
- Roberts Bank Ecosystem Proposed VC
- Ongoing productivity of CRA Fisheries Proposed VC

Mitigation Strategy
- Estimate net change in productivity of study area (pre vs post-construction)
ASSESSMENT APPROACH - RATIONALE

- Avoids challenges of focusing assessment on small number of species
- Complements VC / species focused approach
- DFO Science Advisory Secretariat:
  - For major projects, advice is to use:
    - an ecosystem approach; and
    - A productivity-based approach that evaluates impacts
# ASSESSMENT APPROACH - RATIONALE

**Productive Capacity Technical Advisory Group (TAG):**

<table>
<thead>
<tr>
<th>Name</th>
<th>Affiliation</th>
<th>Expertise</th>
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<tbody>
<tr>
<td>Juergen Baumann</td>
<td>Baumann Environmental Services (former PMV)</td>
<td>Roberts Bank Ecology</td>
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<tr>
<td>Dr. Sean Boyd</td>
<td>Environment Canada (CWS)</td>
<td>Avian Ecology &amp; Habitat</td>
</tr>
<tr>
<td>Dr. Steve Macdonald</td>
<td>Fisheries and Oceans Canada</td>
<td>Aquatic Habitat Biology</td>
</tr>
<tr>
<td>Brian Naito</td>
<td>Fisheries and Oceans Canada</td>
<td>Fish Ecology &amp; Habitat</td>
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<tr>
<td>Dr. Terri Sutherland</td>
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<tr>
<td>Patrice LeBlanc</td>
<td>SENES (former DFO)</td>
<td>Habitat Policy &amp; Practice</td>
</tr>
<tr>
<td>Dr. Carson Keever</td>
<td>Hemmera</td>
<td>PC Methodologies</td>
</tr>
<tr>
<td>Scott Northrup</td>
<td>Hemmera</td>
<td>Habitat Biology</td>
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Productive Capacity (PC) TAG Objectives

- Provide technical direction in order to:
  1. Identify Focal Species
     - i.e. species that are ecologically linked to many components of the ecosystem
  2. Ongoing Productivity Assessment Method

**ASSESSMENT APPROACH - RATIONALE**
ASSESSMENT APPROACH - METHODOLOGY

• **PC TAG Outcome #1:** 25 Focal Species Identified

• **PC TAG Outcome #2:** Identified Ongoing Productivity Assessment Method

  • Reached consensus on using an ecosystem approach to assessing Ongoing Productivity (including birds & fish)
  • Selected ecosystem based model as the preferred assessment method to assessing changes in Ongoing Productivity at Roberts Bank
  • Acknowledged that Port Metro Vancouver approach is in-line with evolving regulatory framework
METHODOLOGY: ECOSYSTEM BASED MODEL

- BIOMASS
- CONSUMPTION, PRODUCTION RATES
- DIET
METHODOLOGY: ECOSYSTEM BASED MODEL

Food Web Example

Image Courtesy of: Speak Up For Blue
METHODOLOGY: ECOSYSTEM BASED MODEL

Roberts Bank environmental conditions

Salinity
Depth
Velocity
Wave height

Environmental preferences of each species

FOOD WEB

BIOMASS
CONSUMPTION, PRODUCTION RATES
DIET
METHODOLOGY: ECOSYSTEM BASED MODEL

- BIOMASS
- CONSUMPTION, PRODUCTION RATES
- DIET

FOOD WEB

Roberts Bank environmental conditions

- Salinity
- Depth
- Velocity
- Wave height

Environmental preferences of each species

FOOD WEB OVER TIME AND SPACE

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METHODOLOGY: ECOSYSTEM BASED MODEL

**BIOMASS**

**CONSUMPTION, PRODUCTION RATES**

**DIET**

**FOOD WEB**

Roberts Bank environmental conditions:
- Salinity
- Depth
- Velocity
- Wave height

Environmental preferences of each species

**FOOD WEB OVER TIME AND SPACE**

**PRODUCTIVITY AT ROBERTS BANK**
(MEASURED IN TONNES PER KILOMETRE SQUARED OR T/KM²)

- WITH ROBERTS BANK TERMINAL 2
- WITHOUT ROBERTS BANK TERMINAL 2
• Integrates Physical ICs and Biophysical VCs to understand the multiple linkages in the ecosystem
• Informs Socio-ec VCs
• Summarises changes to the ecosystem for all Biophysical VCs
• Estimates productivity changes pre- and post-construction
• One of the tools in assessing potential changes to the ecosystem
QUESTIONS?
WRAP-UP AND NEXT STEPS

Facilitator: Malcolm Smith, Hemmera
FOLLOW UP FROM WG#4

- **Distribution of WG Information:**
  - The draft meeting record will be distributed for input prior to finalization
  - Copies of the presentations will be distributed after the meeting
  - A summary report that will be shared with working group members for input prior to posting on the CEAA registry website
FOLLOW UP FROM WG #4

• Feedback on WG #4
  • Today’s Q&A
  • Via hardcopy feedback form (provided)
  • Via Email: container.improvement@portmetrovancouver.com
  • Or to Malcolm Smith via Email: msmith@hemmera.com
    • Please include “Follow Up To WG # 4” in the subject line of your emails
CONSULTATION WITH ABORIGINAL GROUPS

• Meeting with Aboriginal groups on Proposed Valued Components scheduled for July 3, 2014.

• July meeting with Aboriginal groups concludes the first phase of the Working Group Process.
• **Summer 2014**
  - Regulatory – Issues specific engagement
  - Aboriginal groups – Ongoing Aboriginal Consultation
  - Local Government – Technical Liaison Committees & Elected Round Table
  - As-and-when needed follow up with WG

• **Fall 2014**
  - Ongoing Aboriginal Consultation
  - Consultation with the Public & Aboriginal groups on Mitigation

• **Early 2015 - Post-EIS Submission**
  - Overview of EIS Submission
THANK YOU