

SEA-TO-SKY HIGHWAY IMPROVEMENT PROJECT ASSESSMENT REPORT

APPENDIX 1A

BIOPHYSICAL/TECHNICAL ISSUES TRACKING

List of Acronyms used in Appendix 1A

BCR	BC Rail
BMP	Best Management Practices
CEAA	Canadian Environmental Assessment Act
CEA Agency	Canadian Environmental Assessment Agency
CSD	Context Sensitive Design
CWS	Canadian Wildlife Services
DFO	Fisheries and Oceans Canada
EC	Environment Canada
EAO	Environmental Assessment Office
GVRD	Greater Vancouver Regional District
MEM	Ministry of Energy and Mines
MoT	Ministry of Transportation (Nelson Region)
MSRM	Ministry of Sustainable Resource Management
OCR	Owner's Commitments and Responsibilities – Sea to Sky Highway Improvement Project (MoT)
RESL	Robertson Environmental Services Ltd.
SLFN	Squamish and Lil'wat First Nations
SLRD	Squamish-Lillooet Regional District
TWFN	Tsleil-Waututh First Nation
WLAP	Ministry of Water, Land and Air Protection

COMMENT/ ISSUE	MINISTRY OF TRANSPORTATION RESPONSE	EA STATUS
1. PROJECT DESIGN		
Discuss the safety justifications for the reduced lane widths and median width for an 80km/h, high traffic volume, mountainous highway with significant truck and bus traffic volumes. Provide examples of successful application of Context Sensitive Design (CSD) standards in other North American jurisdictions. (MoT)	SCD Guidelines have been successfully applied on highway projects in the 5 pilot American states of Connecticut, Maryland, Kentucky, Minnesota and Washington. For the Highway 99 corridor, a safety analysis has been performed. This analysis indicates a reduction of about a third of the number of accidents as a result of the \$600 million pre-2010 program. The percentage of truck and bus traffic on this highway is less than 3% and is considered low.	Satisfactorily addressed for the purposes of the EA review
Slope stabilization measures (mesh, rock bolting, etc.) are not referenced in CSD criteria sheets but should be included in final design. (Ref: MoT Technical Bulletin GM02001). (MoT)	Technical Bulletin GM02001 was adopted as an aspect of CSD for the Sea to Sky corridor.	Satisfactorily addressed for the purposes of the EA review
Clarify reference to “improved passing opportunities” along Lions Bay to Furry Creek segment. Do the volumes of opposing traffic permit any use of passing opportunities, particularly during peak traffic periods when the passing pressures are the greatest? (MoT)	This section of the highway will remain as two lanes and work will generally be limited to alleviate condition at the more deficient locations. While the scope of work has not been detailed at this time, the intention is to increase the length or number of passing lanes where it is achievable.	No further detail required for the purposes of the EA review
The detailed design phase of this project should provide an access management strategy for the segment of highway from South Stawamus to Depot Road to help guide development adjacent to the highway. (MoT)	The current access strategy for this section of highway doesn't permit private access to the highway. All private businesses adjacent to the highway are currently accessed from municipal roads. This will be re-confirmed during the design process. The design of this section will commence in the very near future.	OCR - 8.1
What design criteria will be used for the ramps to and from the BCR line (minimum widths and maximum grades in particular)? (MoT)	The design criteria for the access ramps are based on road classification for Low Volume Roads. Total width for these single lane roads is 5.5m, including a 3.5m wide lane. Maximum grades allowable under this standard are 14%, however efforts were made to keep grades under 12%.	Satisfactorily addressed for the purposes of the EA review
Consider designing an intersection closer to 90° to the highway at Highway 99 and Valley Drive and Stawamus Forestry Road. Oblique angle intersections often have higher accident rates due to driver difficulty in checking for on-coming traffic. (MoT)	Design of intersections at as close to 90° as possible is always an objective, but not always achievable, particularly in the type of topography along the Highway 99. Valley Drive is currently signalized, but both of these intersections will be examined in more detail during detailed design.	Satisfactorily addressed for the purposes of the EA review
Has the proponent modeled the traffic patterns when BCR used as a single-lane-alternating detour and considered that slow moving trucks and that traffic cannot be stored in rockfall hazard zones? (MoT)	A traffic study was undertaken to identify the operational viability of this concept. The operation of the detours has limitations. The longer the length of the detour, the longer the traffic delay or the shorter the window of opportunity to operate the detour, given a maximum delay criteria. An average travel speed of 40 km per hour was used for the study. The presence of rockfall hazard areas was acknowledged in the study, but not modeled in detail since a significant program of slope stabilization will be undertaken prior to use of the corridor by vehicular traffic.	Satisfactorily addressed for the purposes of the EA review
Consider placement of tow trucks at key locations as an emergency operations procedure during the use of BCR as a detour. (MoT)	This has been considered and is included in the BCR Detour Concept Development Study. EAO Note: The MoT no longer plans to use the rail line as a detour during Project construction.	No longer applicable
Consider retaining the temporary industrial bridge spans for reuse by MoT during emergency situations upon completion of the project. (MoT)	The MoT District may be interested in maintaining temporary bridge spans for this use.	Information item only

COMMENT/ ISSUE	MINISTRY OF TRANSPORTATION RESPONSE	EA STATUS
1. PROJECT DESIGN		
Who will be responsible for maintenance of a highway segment being constructed – the highway construction contractor or the maintenance contractor? Will the BCR detours be included in this maintenance work? Often it is preferable that the maintenance responsibilities be transferred to the construction contractor. (MoT)	This will be dealt with consultatively with the MoT District during development of procurement documents. Responsibilities may change from contract to contract, depending on scope of work. If construction shuts down over the winter, arrangements can be coordinated between the project and District for maintenance during that time. Maintenance of BCR detours will be determined prior to the procurement process in consultation with the new operator.	Satisfactorily addressed for the purposes of the EA review
Bridges should be built to the 200 year Flood Construction Levels (DoS).	New Bridges required for the project will be designed to the 1 in 200 year flood levels (BTWG meeting – Dec 4, 2003)	Satisfactorily addressed for the purposes of the EA review
Introduce a green boulevard model in the Squamish section of the highway design to minimize habitat loss. (DoS)	EAO Note: Point of Information and matter for detailed design.	
2. GEOSCIENCES		
2.1 Metal Leaching and Acid Rock Drainage (ML/ARD)		
The possible need to stockpile surplus rock is mentioned on page 4, section 1.4. However, there is no outline of where these sites might be or if they were included in the EA. Would new sites be needed, requiring clearing and development, or would existing sites need expanding? (SLFN)	Identified stockpile sites are Westport Pit, Brunswick Pit and Callaghan Pit. All are existing Ministry gravel pit or aggregate processing and stockpile sites. The location of these pits is described in Vol. 1 Sec B page 29, and shown in the Volume 1 Map and Drawing Folio.	Satisfactorily addressed for the purposes of the EA review
In terms of Metal Leaching (ML) Potential, a statement is made on page 10, section 2.1 that "a more detailed risk assessment will be undertaken during detailed design in order to refine the nature and extent of the monitoring program." The monitoring program is offered as a mitigation measure. The First Nations consider this approach to be a deficiency in the EA. (SLFN)	The project will dispose of all PAG/ML materials either in designated ocean disposal sites at Watts Point and Point Grey or in the Britannia Mine. Monitoring will: <ul style="list-style-type: none"> • examine new rock cuts during construction to assure the Project that, should any zones presenting ARD/ML issues be exposed, appropriate measures would be taken; and • sample and test water quality in the vicinity of rock cuts known to present ARD/ML issues. 	Satisfactorily addressed for the purposes of the EA review OCR 2.4-2.6, 2.9
The potential for neutral leaching of Al and Cu from new rock cut faces during a "first-flush" event cannot be fully discounted, specifically if sensitive biological receptors reside within or immediately downstream of roadside ditches; several sensitive streams have been identified. (MEM)	The MoT recognizes that the potential for neutral leaching of aluminum and copper from new rock cut faces during a "first flush" event cannot be fully discounted. A water quality sampling and analysis program will be undertaken by the MoT. Water sampling and analysis will be conducted where there are rock cuts in PAG or ML rock material. The sampling of water runoff will be conducted in sensitive streams and highway ditches.	Satisfactorily addressed for the purposes of the EA review OCR 2.6

COMMENT/ ISSUE	MINISTRY OF TRANSPORTATION RESPONSE	EA STATUS
2.1 Metal Leaching and Acid Rock Drainage (ML/ARD)		
Concentrations in ditches under rock faces or “first flush” events could place contamination in streams. Aluminum and copper leachate levels in ditches below rock cut faces in PA Sections 2 & 3 already exceed Canadian Toxicity standards.(TWFN)	The project will be disposing of all PAG materials either in designated ocean disposal sites at Watts Point and Point Grey or in the Britannia Mine. Monitoring will be undertaken to: examine new rock cuts during construction to ensure that, should any zones presenting ARD issues be exposed, appropriate measures are undertaken; and sample and undertake water quality testing in the vicinity of rock cuts known to present ARD issues. MoT is committed to the management of project related water quality issues within the STS corridor. In that regard, the MoT has been engaged in extensive discussions with the MEM and EC in relation to the monitoring of PAG materials.	Satisfactorily addressed for the purposes of the EA review OCR 2.1, 2.4, 2.6, 2.9
Request a long-term PAG monitoring program along the relevant length of the project right-of-way and mitigation plans. (TWFN)	See above response. Also, a monitoring program is being completed to meet the MEM's requirements and to satisfy the related issues raised by EC.	Satisfactorily addressed for the purposes of the EA review OCR 1.2, 2.13, 2.14
PAG rock cut surfaces have the potential to leach significant metals at some point in the future. Where avoidance measures cannot be fully utilized, additional mitigative measures (such as drainage management) should be considered. Plans should include the monitoring and maintenance provisions for the mitigation of PAG rock cut surfaces. (MEM)	The MoT will retain a qualified consultant to monitor potential for acid generation and metals content through construction and recommend specific mitigative strategies to best address conditions as encountered.	Satisfactorily addressed for the purposes of the EA review OCR 2.9, 2.13
For the Gambier Group, if there is uncertainty regarding the PAG nature of the materials or the ability to segregate PAG from non-PAG materials during construction, MoT should apply PAG rock disposal strategies to all this rock. (MEM)	Studies are underway to determine the engineering properties of rock in proposed excavations along the length of the Sea to Sky corridor and the suitability for use in a variety of aggregate products. EAO Note: Studies now completed and results reviewed by MEM.	Satisfactorily addressed for the purposes of the EA review
Howe Sound is a sensitive aquatic feature and does not appear to have been included in this section. The construction and operation of the project could adversely impact water quality. The impacts to Howe Sound should also be assessed. (DFO)	Application Volume 1 Appendix 1D3 “Environmental Assessment of ARD/ML Effects from Bedrock Excavation, Reuse and Disposal” presents the results of the assessment of impact of metals leaching on the water quality of Howe Sound. MoT is committed to implementing measures to mitigate any effects on water quality associated with run-off from PAG/ML rock cuts and to monitor surface waters. EC believes the MoT predications appear thorough and conservative, plans for handling such units are feasible, and does not expect elevated metals concentrations in drainage from rock cuts to cause risks to the adjacent aquatic environment.	Satisfactorily addressed for the purposes of the EA review OCR 2.6

COMMENT/ ISSUE	MINISTRY OF TRANSPORTATION RESPONSE	EA STATUS
2.1 Metal Leaching and Acid Rock Drainage (ML/ARD)		
If segregation of Gambier PAG and non-PAG lithologies is planned, methods to operationally achieve this required. (MEM)	The MoT will be disposing of all PAG materials.	Satisfactorily addressed for the purposes of the EA review OCR 2.11, 2.12
If PAG materials are going to be used for asphalt applications the potential for ML/ARD from remaining exposed surfaces and over the longer-term still needs to be addressed by MoT. (MEM)	PAG materials are not being considered for use as asphalt aggregate.	Satisfactorily addressed for the purposes of the EA review OCR 2.11
MoT plans for Marine Disposal and Disposal at Britannia Minesite are tentative at this point and the ability to mitigate significant environmental effects from the excavated PAG materials hinges on access to these mitigation strategies. Additional written information should be provided to demonstrate that disposal options are viable (i.e. approval in principle with appropriate agencies, information requirements, restrictions) (MEM)	The letter dated October 21, 2003 to Linda Sullivan (CEAA) from Environment Canada (EC) noted that, with respect to metal leachate/acid rock drainage (ML/ARD), the MoT's "predictions are thorough and conservative and their plans for handling such units are feasible...". EC is the federal authority that regulates ocean disposal. The MoT has initiated a study of the feasibility and cost of using a conveyor system to move surplus rock to a proposed barge-loading site at Sunset Marina. This facility could be used for movement of PAG materials for barge disposal at Watts Point or Point Grey. The MoT has commenced discussions with respect to using the Britannia Mine for the disposal of PAG/ML rock, with specific thought to disposal of 7,000 m ³ from the zone of alteration south of Lonetree Creek.	Satisfactorily addressed for the purposes of the EA review MoT will use Britannia Site for PAG/ML rock disposal OCR 2.11, 2.15, 2.16
Environmental effects from ML/ARD could potentially be associated with initial handling, stockpiling of excavated materials, transportation of these materials and their use for bulk fill, shoreline fill, concrete, asphalt, granular road base or construction aggregates. Strategies required to mitigate water quality effects from re-use of non-PAG should include water management structures that consist of upstream diversion and downstream collection and appropriately sized settling ponds. (MEM)	If it is determined through this testing that these materials are PAG/ML, mitigative strategies will be developed. The MoT will continue ongoing liaison with the MEM as the testing proceeds.	Satisfactorily addressed for the purposes of the EA review OCR 2.3
Provide further assessment of greenstones near Daisy Lake. (MEM).	The MoT has requested further testing of the Greenstones. EAO Note: Testing Completed and Results Reviewed by MEM.	Satisfactorily Addressed OCR 2.1
Clarify plans for acid generating material at Lone Tree (is material suitable for marine disposal?) (MEM)	Enhanced static testing of the Gambier Group within Sections 2 and 3 has been completed. Results of kinetic tests will be available in February 2004. This program has identified four rock cuts within preliminary design sections 2 and 3 that have been characterized as potentially acid generating (PAG). The total volume of rock excavation based on preliminary design is 40,000 m ³ of which 7,000 m ³ is within the very distinct zone of alteration south of Lonetree Creek.	Satisfactorily addressed for the purposes of the EA review

COMMENT/ ISSUE	MINISTRY OF TRANSPORTATION RESPONSE	EA STATUS
2.1 Metal Leaching and Acid Rock Drainage (ML/ARD)		
Encapsulation has a long-term liability component and would require an engineered design as well as long-term monitoring and maintenance commitments to ensure effectiveness. (MEM)	If it is determined through testing that these materials are PAG/ML, mitigative strategies will be developed. The MoT will continue ongoing liaison with the Ministry of Energy and Mines (MEM) as testing proceeds.	Satisfactorily addressed for the purposes of the EA review OCR 2.17, 2.18
A slope stability assessment prepared on the basis of a Terrain Classification System mapping and assessment is required. (SLFN)	Terrain Classification System mapping may be suitable for general planning level studies but not for engineering risk assessment of rock slopes. All rock slopes along Highway 99 have been assessed and hazard prioritized by MoT and its engineering consultants using the Rockfall Hazard Rating System (FHWA OR-EG-90-01). On new rock cuts, engineering assessment is undertaken during construction by the geotechnical design engineer of record, and suitable stabilization measures applied as required. On existing rock slopes that will not be re-constructed, a consultant contract is being prepared for conducting a detailed engineering assessment and design of stabilization measures. Rock slope stabilization contracts will then be awarded to implement mitigation measures.	Satisfactorily addressed for the purposes of the EA review
2.2 Hazards		
Clarification is needed of the MoT's proposal to optimize "preliminary highway alignments to minimize rock excavation in areas where the potential exists for acid generating material" (page 2). Does this mean the highway could be relocated into areas requiring further assessment? (SLFN)	This statement refers to alignment adjustments within the existing highway corridor, generally from one side of the existing highway to the other side, for example, to avoid having to excavate into a high rock face or to avoid an environmentally sensitive area. It generally would not include significant shifts off the proposed alignment. The MoT has sufficient knowledge of corridor geology to determine impacts of such a shift.	Satisfactorily addressed for the purposes of the EA review
Section 5.3, page 42, presents a discussion of design requirements for structures related to earthquake activity. However, there is no mention of design details for fill slopes or engineered slopes. (SLFN)	Design requirements are presently being reviewed by MoT. Design will likely be based on a requirement that following a design earthquake, the highway will be useable by emergency vehicles and following maintenance, by the public.	Satisfactorily addressed for the purposes of the EA review
The submitted preliminary design drawings do not show any details of the proposed barrier walls at either the Disbrow, Sclufield or Kallahne creeks (Unnamed #1, #7 and #8 creeks could not be located on the design drawings. (MoT)	Kallahne, # 7 and #8 creeks are within Section 3, outside the project scope for the current phase of reconstruction of Highway 99. These creeks will be assessed when design for upgrading of Highway 99 to four lanes through this section is undertaken. Unnamed #1 is immediately south of Sclufield Creek and probability of occurrence of a debris flow is indicated as high in the Klohn Leonoff report, although there is no recorded history of an event. However, the design volume is low (6000m3) in comparison to creeks such as Harvey, Magnesia & Charles. No inexpensive mitigation option to improve catchment for Unnamed #1 – (\$350,000 to \$1.8 m.)	Satisfactorily addressed for the purposes of the EA review

COMMENT/ ISSUE	MINISTRY OF TRANSPORTATION RESPONSE	EA STATUS
2.2 Hazards		
MoT states that higher frequency debris torrent sites are located in the Hope area where “no mitigative measures” have been constructed. Mitigative measures include deflection berms and construction of chutes below bridges – a number of which have been constructed in the Hope area. (MoT)	There are mitigative measures –including deflection berms and chutes below bridges– near Hope. The intended reference was to the Patterson Creek area of Highway 1.	Satisfactorily addressed for the purposes of the EA review
Review sites identified by the 1983 Thurber report on a site by site basis for risk and decide mitigative measures based on the assessed risk. Low frequency debris torrent site may pose more risk for loss of life if there is a high density of residents located in the depositional area of the torrent. (MoT)	Further assessment was undertaken by Klohn Leonoff and presented in their 1991 report. Decisions for the current project were based on both the Thurber and Klohn Leonoff studies with additional assessment undertaken for the proponent on Disbrow Creek.	Satisfactorily addressed for the purposes of the EA review
Monitor debris torrent structure at Newman Creek to asses the long-term environmental effects of this and similar structures along the project route. (TWFN)	There are no plans to conduct any work at Newman Creek as part of the STS project. The debris flow mitigation structure at Newman Creek was constructed in the late 1980’s, largely for the protection of local residential areas.	Satisfactorily addressed for the purposes of the EA review
The discussion of the effects of the environment on Highway 99 should include discussion or listing of the very large rockfall events that have occurred along the corridor (i.e. events greater than 5000 m ³) similar to data presented for debris torrents. (MoT)	The Application did not discuss the very large rockfall events that have occurred along the corridor (i.e. events greater than 5000 m ³). The MoT agrees that the proposed highway improvements do not address these rockfall events that are difficult to predict let alone remediate.	Satisfactorily addressed for the purposes of the EA review
<i>Britannia Creek Flood Risk Assessment</i> by Golder Associates estimated the 200 year flood would inundate the highway and railway with debris deposited on Hwy 99 over a distance of about 400 m. This risk will not be reduced until Britannia Creek sediment is removed, or the stream channel is dyked and the Application does not include means to address this problem. (EC)	A flood mitigation study is underway for Britannia town site under direction of the SLRD with an independent consultant. The MoT will have access to the results of this study. On behalf of MoT, Intercad has undertaken an analysis of the Britannia Creek Bridge in their preliminary design report and commented on the hydraulic capacity of the existing structure and the proposed temporary up-stream bridge.	Satisfactorily addressed for the purposes of the EA review
Discuss the effects of logging the slopes above the highway creating new avalanche hazard zones and the review and permitting process in place by MoF. (MoT)	MoF requires avalanche hazard assessments on steep slopes on Crown land above the highway. Avalanche hazard assessments are not required on private land. There is no moratorium on logging above the highway. To the best of our knowledge, this situation exists throughout the province and it is outside the scope this Project.	Satisfactorily addressed for the purposes of the EA review
Discuss the hazard posed by the Cheekye River. Various papers by geotechnical and geologic experts have been written on the hazards of very large debris flows associated with the Cheekye River and associated fan. (MoT)	Cheekye River Bridge is not within the scope of the Project.	No further detail required for the purposes of the EA review
Recommend full review of the disaster management plan for the Garibaldi Civil Defense Zone (GCDZ) be carried out. . (TWFN)	The Rubble Creek Landslide Hazard Area (RCLHA – formerly the GCDZ) was created by Order in Council 1185 in 1980 and has been subject to several technical reviews since that time. Before reaching a decision on the preferred option, a Multiple Account Evaluation (MAE) comparative assessment was carried out on comparing options, considering capital costs, maintenance costs, highway user benefits, socio-community benefits, risks to highway users and environmental impacts. The results of the MAE supported the construction of improvements to this section of highway on the existing alignment, rather than relocate the highway outside of the RCLHA..	Satisfactorily addressed for the purposes of the EA review

COMMENT/ ISSUE	MINISTRY OF TRANSPORTATION RESPONSE	EA STATUS
2.2 Hazards		
Recommend a risk assessment be carried out similar to that undertaken for the Garibaldi Civil Defense Zone. . (MoT)	EAO Note: The MoT followed-up with the MoT representative on the working group after the BTWG and provided information already collected from previous studies. 04-12-03.	No further detail required for the purposes of the EA review
2.3 Contaminated Sites		
Section 4.3.2 contains limited information on vehicular accidents that resulted in significant spills. The provincial or federal spill reporting databases may provide further detail in this regard. (EC)	When preparing the Application, MoT consulted these records and did not find any information relevant to the Project.	No further detail required for the purposes of the EA review
The acceptability of placing clean fill over the existing soils at Britannia should be confirmed with WLAP well in advance of construction. Furthermore, a site specific plan for the area affected should be developed to ensure that future remediation efforts are not compromised. This may include an evaluation of the risks posed by construction over the existing contaminated soils. (EC)	The MoT met with MSRM staff and discussed the project plans through this area. The mitigation and remediation plan for the Britannia Beach site has yet to be finalized, however, MSRM indicated the highway improvements will not interfere with remediation efforts, the proposed water treatment plant, mine drainage control or the offshore effluent disposal projects. The MoT will request a letter from MSRM to this effect. In addition, the MoT has scheduled a meeting with the Britannia Mine Remediation Project to discuss remediation adjacent to the existing highway. Construction of the highway over any potentially, acid-drainage producing soils will improve the current situation by creating an anaerobic state with a sealed surface; the highway removes oxygen and surface seepage water which significantly reduces the potential for acid drainage or metal leaching processes to occur.	Satisfactorily addressed for the purposes of the EA review OCR 3.1-3.3
A site specific management plan for hydrocarbon contaminated soils uncovered during construction at Gonzales Creek Hydrocarbon Spill this site should be prepared and include mitigation methods for the containment and collection of any liquid phase hydrocarbons. (EC)	Should highway construction proceed within the area affected by this contaminated site, then coordination will occur between the design team (final design) and Levelton Engineering Ltd., who are managing the site for Scamp Industries and Hemmera Environmental, who are managing the site for Interfor (owners of the property on which the spill occurred) to ensure that remediation is done prior to construction.	Satisfactorily addressed for the purposes of the EA review OCR 3.4
A general plan should be prepared for the testing and management of suspect soils uncovered during construction. (EC)	The MoT has a plan for dealing with contaminated sites found during construction. Guidelines for this process are provided in the document entitled "Contaminated Sites – General Investigation Guidelines – 1998," produced by the Ministry of Transportation.	Satisfactorily addressed for the purposes of the EA review OCR 1.2, 3.6
Provincial Emergency Program and Environment Canada Records on accidents resulting in spills should be consulted. (DFO)	When preparing the Application, MoT consulted these records and did not find any information relevant to the Project.	No further detail required

COMMENT/ ISSUE	MINISTRY OF TRANSPORTATION RESPONSE	EA STATUS
3 WATER QUALITY		
Request MoT to avoid marine disposal of waste rock. (TWFN)	Two designated ocean disposal sites administered by EC, have been identified. Disposal of waste rock at these sites will fully comply with the EC permitting requirements.	Satisfactorily addressed OCR 2.15
MoT received WLAP's Region 2 Revised Instream Works Best Management Practices CD. MOT is required to implement those BMP's throughout the lengthy construction of this Hwy upgrade. (WLAP)	Guidelines and standards applied will include the Land Development Guidelines for the Protection of Aquatic Habitat, Interim Standards and Best Management Practices for Instream Works, Section 165 of the Standard Specifications for Highway Construction and any updated best management practices developed during the course of this project including WLAP's Region 2 Revised Instream Works Best Management Practices.	Satisfactorily addressed for the purposes of the EA review OCR 5.7
Vehicle generated pollutants accumulated on the road surface will be washed into the receiving environment, primarily during first flush. Without adequate treatment prior to discharge into the receiving environment, ongoing polluted stormwater run-off will remain a residual effect. (WLAP)	It is important to bear in mind that this change will not cause runoff water quality to exceed applicable criteria. A discussion of water quality impacts will be included in the cumulative effects assessment that is being prepared.	Satisfactorily addressed for the purposes of the EA review
If any runoff is directed towards municipal drainage systems the provincial storm water effluent quality standards should be met at the entry point. (DoS)	EAO Note: Permitting Issue	No further detail required for the purposes of the EA review
Recommend extension of Rainline north of Darrel Bay on the Sea-to-Sky and the use of magnesium chloride de-icing agent. (Electoral Area D)	The MoT cannot force maintenance contractors to use anti-icers. In contract documents the MoT specifies that contractors should use environmentally friendly processes. The trend among contractors is to use magnesium chloride because it is more economical. (BTWG Meeting 04-12-03)	No further detail required for the purposes of the EA review
The water supply for Pinecrest Estates is Retta Lake, situated immediately beside the highway on the west side. Protection of this water supply is of paramount importance when considering plans for highway improvements. (Electoral Area D)	The MoT Project Team is committed to ongoing consultation with the community post-certification to address their concerns about safety and water quality.	Satisfactorily addressed for the purposes of the EA review OCR 10.7, 10.8, 17.1
For Section 2.2 - Clarify whether phase 3 of the water quality monitoring program starts before phase 2, or whether phase 2 monitoring is intended to occur in the 90 days <i>preceding</i> the start of construction for a given section. (EC)	More detail provided in <i>Water Quality Monitoring Program Sea-to-Sky Highway Improvement Project</i> attachment to the MoT response of November 26, 2003.	Satisfactorily addressed for the purposes of the EA review OCR 10.1
Each construction section should be regularly monitored through preconstruction, construction and post-construction. For example during construction, water quality should be monitored weekly for oil and grease, TSS or turbidity, pH and conductivity. (EC).	More detail provided in <i>Water Quality Monitoring Program Sea-to-Sky Highway Improvement Project</i> attachment to the MoT response of November 26, 2003.	Satisfactorily addressed for the purposes of the EA review OCR 10.1

COMMENT/ ISSUE	MINISTRY OF TRANSPORTATION RESPONSE	EA STATUS
3. WATER QUALITY		
Consider monitoring discharge points downstream of the construction area in certain cases. (EC)	More detail provided in <i>Water Quality Monitoring Program Sea-to-Sky Highway Improvement Project</i> attachment to the MoT response of November 26, 2003.	Satisfactorily addressed for the purposes of the EA review OCR 10.1
Why are physical or biological and oil and grease and related monitoring parameters not listed in the monitoring program and where will they be included ? (EC)	See Water Quality Monitoring Program Sea-to-Sky Highway Improvement Project (November 26, 2003) for more detail. Oil and grease were not included as monitoring parameters because they are not considered to be an issue normally associated with highway construction or operation of a highway with the level of traffic found on the Sea-to-Sky Highway. (BTWG – 04-1203 - The MoT agreed to include oil and grease in the pattern of testing for phases 2, 3 and 4.)	Satisfactorily addressed for the purposes of the EA review OCR 10.1
Section 3 - This section is comprised of brief summaries of water quality impact sources (siltation, coliform increases, changes in flow, hydrocarbon spills, blasting, and new pavement) covering two pages. The report does not present the spatial extent, magnitude, or significance of potential water quality impacts. Without these sections, the First Nations consider the water quality section of the EA incomplete.(SLFN)	The spatial extent is defined as the area immediately upstream of construction and all areas downstream. The magnitude of potential impacts is discussed in terms of applicable water quality criteria. The objective of the project is to ensure that water quality criteria are not exceeded as a result of construction and operation of the project. The project is committed to a thorough water quality monitoring program by which to measure achievement of this objective.	Satisfactorily addressed for the purposes of the EA review OCR 10.1
The EA notes that over the length of the project, the amount of winter de-icers used will increase by 42% and abrasives by 31%. All of this increase will occur where additional lanes or lane widths are added. Despite this increase, the report concludes that dilution of the chemicals by heavy runoff will eliminate any impact on the aquatic environment. (SLFN)	EAO Note: The Working Group is satisfied with the MoT's proposed water quality monitoring program.	Satisfactorily addressed for the purposes of the EA review
The water quality report fails to examine the increased metals and hydrocarbons generated by increased traffic volumes on water quality. "First flush" effects of runoff on water quality are not discussed. No maps show the location and kinds of water resources and effects that could be expected. (SLFN)	At the time of Application submission, MoT forecasted that traffic volumes could be about 7.5% percent higher with the improved highway compared to the status quo. Since submission of the Application, a Transportation Demand Management study for inter-city travel in the Sea to Sky corridor (Sea to Sky TDM Study by TSi Consultants) indicates that coordinated implementation of TDM and supporting supply measures could offset a portion or all traffic volume increases related to the project. The water quality samples taken in 2002 were during the first freshet after an extended dry period. The MoT recognizes that sampling of first flush events capture the highest concentrations of runoff contaminants. The MoT is committed to a thorough water quality monitoring program that will include continued sampling of first flush events. Terrain maps and plans show all stream crossings and ponds/lakes along the proposed corridor and Volume 3 Section D Appendix C provides information on exactly where water quality sampling was conducted.	Satisfactorily addressed for the purposes of the EA review OCR 10.1, 10.11

COMMENT/ ISSUE	MINISTRY OF TRANSPORTATION RESPONSE	EA STATUS
3. WATER QUALITY		
Increased road salt and sediments are identified as potentially reaching Murrin Lake. The report concludes that mitigation would include non-draining barriers to direct runoff away from the lake (although the report fails to identify where this water would go). Neither the significance of this impact nor any residual impacts are identified. (SLFN)	Volume 1 – Map and Drawing Folio includes drawing no. 41DD-PD06-9307 and 9307A which illustrates how highway runoff will be collected and piped away from Browning Lake and shows the placement of non-draining roadside barrier. No adverse effects are identified because the drainage solution will provide permanent protection to Browning Lake water quality. This is an improvement over the existing conditions.	Satisfactorily addressed for the purposes of the EA review
Water quality sampling program section is vague with regard to what action would be taken if problems are detected during the sampling program. (SLFN)	The objective of the project is to ensure that water quality criteria are not exceeded as a result of construction and operation of the project. The project is committed to a thorough water quality monitoring program by which to measure achievement of this objective.	Satisfactorily addressed for the purposes of the EA review
Drainage systems should be designed to prevent increased flows from creating erosion problems downstream. (EC)	The “Manual of Control of Erosion and Shallow Slope Movement – 1997” is used as a reference for drainage design. Grass filter strips, biofiltration swales, lined channels, check dams, etc. are examples of control measures incorporated into highway drainage designs to slow flows and prevent erosion problems.	OCR 10.1-10.15 Satisfactorily addressed for the purposes of the EA review OCR 10.10, 10.12, 10.13, 10.15
The project relies on the biofiltration capacity of the proposed swales to reduce impacts to receiving streams. What maintenance is planned in terms of removing accumulated sediment and vegetation that may have reached its uptake capacity? How much of the highway alignment is expected to have space for swales or treatment ponds? (EC)	Ditches are inspected regularly by Ministry Area Managers and the privatized maintenance contractor and an annual ditching plan must be supplied by the contractor each year. All new ditch designs will incorporate swales, check dams, drop structures, lined channels, etc. Approximately 40% of the total highway ditch system will be improved to the new standards. Limited space for treatment ponds is available, so these will only be employed where warranted. Uptake capacity of vegetation is not an issue given the traffic volumes on the Sea-to-Sky Highway. Highway best management practices are designed to enhance the removal of solids and any associated sorbed pollutants through adsorption, filtration and settlement.	Satisfactorily addressed for the purposes of the EA review
Explain how water quality would be improved from the current situation and differentiate between zero impacts and water quality impacts that occur, but are still within environmental standards or guidelines. When standards or guidelines differ, the more conservative value should be used. (EC)	A reduction in suspended solids reaching streams will occur as a result of new ditch designs.. Water quality sampling on the STS Highway demonstrated that any current exceedances of the BC Water Quality Guidelines criteria for aquatic water standards are a reflection of the mineralogy of the rocks and not a product of highway run-off. MoT forecasted that traffic volumes could be about 7.5% percent higher with the improved highway compared to the status quo. It is reasonable to conclude that there will be environmental benefits as a result of the replacement of old infrastructure with new best practices.	Satisfactorily addressed for the purposes of the EA review

COMMENT/ ISSUE	MINISTRY OF TRANSPORTATION RESPONSE	EA STATUS
3. WATER QUALITY		
Section 7.0 of the EA Application describes a three phase water quality sampling program which does not match the four phase program discussed in Section 2.2. Clarify which is proposed. (EC).	More detail provided in <i>Water Quality Monitoring Program Sea-to-Sky Highway Improvement Project</i> attachment to the MoT response of November 26, 2003.	Satisfactorily addressed for the purposes of the EA review
Highway maintenance is part of the overall project impact and should be included in the water quality assessment. (EC)	More detail provided in <i>Water Quality Monitoring Program Sea-to-Sky Highway Improvement Project</i> attachment to the MoT response of November 26, 2003.	Satisfactorily addressed for the purposes of the EA review OCR 10.13
4. AIR QUALITY		
Pg 41, Figure 4-5 – Values for presented levels depend on what temperature and other conversion factors are used to convert ppb to micrograms per cubic metre. Some reference to the conversion factors could be added to highlight this fact. (WLAP)	Standard was derived using a reference temperature of 20 degrees Celsius to be applied to the 4 th highest measurement annually, averaged over three consecutive years. It is understood in the air quality assessment that this is the basis for which the Canada Wide Standards (CWS) should be converted.	Satisfactorily addressed for the purposes of the EA review
Pg 46, Section 4.2, Summary of Air Quality - Mention how often Whistler and Squamish exceed the maximum <i>desirable</i> ozone objectives. (100 g/m ³) is the value that the RMOW uses as a reference. The CWS statement is incorrect. The CWS is designed to be an attainment standard, not a management standard and cannot be exceeded for 'certain periods of the year'. O ₃ levels in Squamish were close to the CWS for the 97-99 period. (WLAP)	It is unclear which statement is being referred to regarding the CWS in Volume 2, Section C, pg. 46, Section 4.2. However, since the CWS is based on a 3 year average, 98 th percentile, it is understood that a measurement can be above 130 g/m ³ without being above at the 98 th percentile at the end of the measurement period. It is noted that the O ₃ levels in Squamish were 1 to 3 g/m ³ below the CWS for the 97-99 period (depending on the conversion technique used from ppb (see response to previous question).	Satisfactorily addressed for the purposes of the EA review
Pg 7, Section 2.3.3 Ammonia (NH ₃) - The role of ammonia in the formation of secondary particulates is not discussed. This may be important to lay the foundation for comments provided in Section 5.5. (WLAP)	It is recognized that ammonia plays a role in the formation of secondary particulate, as stated in Volume 2, Section C, Section 2.3.2 of the Application. NO ₂ causes a brown colour in the atmosphere at elevated concentrations and reacts in the atmosphere with ammonia to form fine particulate salts, which reduce visibility and increase PM _{2.5} concentrations.	Satisfactorily addressed for the purposes of the EA review
Gather baseline information on air quality and permanently monitor impacts to air quality. TDM measures are critical for mitigating impact of increased traffic volumes. (DoS)	MoT OCR 6.4	Satisfactorily addressed for the purposes of the EA review

COMMENT/ ISSUE	MINISTRY OF TRANSPORTATION RESPONSE	EA STATUS
4. AIR QUALITY		
Whistler is concerned about the degradation of air quality, and consequently public health and the resort experience of the Whistler Valley. The recent Community and Energy Plan, which includes an air quality management plan indicates that 48% of the total GHG emissions produced in the Whistler Valley are directly attributed to passenger vehicle transportation. (RMOW)	EAO Note: The MoT air quality expert subsequently met with the RMOW to explain how the air quality monitoring program was conducted.	Satisfactorily addressed for the purposes of the EA review
The report concludes that particulate pollutants emitted during construction would reach 92% of British Columbia air quality objectives. If the contribution of road dust from onroad vehicles is added, 24-hour PM ₁₀ concentrations could exceed the guideline. The report concludes, “therefore, it is important that pollution prevention and control measures are used to minimize potential dust or emissions of particulate matter” (page 86). (SLFN)	In consideration of a level of contribution from onroad vehicles, and in consideration that the Maximum predicted 24-hour concentration of PM ₁₀ is 92% of the objective, some mitigation and pollution prevention controls were deemed to be warranted. These measures were outlined in Vol 2, Sec C, Section 10 page 91.	Satisfactorily addressed for the purposes of the EA review OCR 6.1
The model results represent ambient air quality conditions (the air quality effects over a relatively large area). Could localized air quality effects (near to the right-of-way) exceed ambient emission level - e.g asphalt batch plants, or dust-generating activities (clearing, grubbing, grading, hauling)? (SLFN)	In general, the model results presented in the report, represent the maximum predicted worst-case impact for the applicable averaging period for each pollutant. The CALINE model was applied every 100m from Horseshoe Bay to Function Junction along the highway at distances ranging of 1m from roadside out to 1000m from roadside (page 22). Only the worst-case predictions were presented,. The model results (conservatively) represent “localized air quality effects” near the road itself. This is also illustrated in Vol 2, Sec C, Figures 8-2 through 8-10. The maximum predicted concentration occurs immediately next to the roadway (1m) at one location in the airshed (all other concentrations are predicted to be lower). No residences are situated at this location. For potential of a health effect to occur, a person would need to be alongside the road, for 24-hours at the exact same day that the worst-case concentration occurs.	Satisfactorily addressed for the purposes of the EA review
It is unclear how the authors conclude that automobile emissions from the operation of the highway could be considered a medium term impact. (SLFN)	The conclusions are based on the definitions that are used (page 87). The short-term is defined as extending one day or longer, but less than one year, and medium-term is defined as extending through the life of the project (i.e. through to 2025).	Satisfactorily addressed for the purposes of the EA review
The report authors conclude that the improved highway will have a “neutral to low impact” on air quality compared to the no-project alternative. This conclusion is not consistent with the tabular results contained in the air quality section. In these tables, moderate increases in emissions are noted for all pollutants, reflecting the increased traffic volumes anticipated to accompany the highway upgrade. (SLFN)	An additional statement is provided here for clarification: In follow up to the statement on page 91, mitigation and management measures were recommended (Vol 2, Sec C, Section 10) to arrive at a “low impact” rating. It is noted that with respect to the highway improvements when compared to the status quo, that a rating of “Low” is appropriate. It should be noted that air quality of criteria air contaminants (except ammonia) is expected to improve through 2025 with respect to the baseline.	Satisfactorily addressed for the purposes of the EA review

COMMENT/ ISSUE	MINISTRY OF TRANSPORTATION RESPONSE	EA STATUS
4. AIR QUALITY		
The report emphasizes, however, that the per vehicle emissions will decline substantially due to improvements in fuels and vehicle equipment over the study period. The report does not discuss how air quality would be affected if these assumed improvements in fuels and vehicles fail to occur. (SLFN)	The improvements as a result of fuels reformulations and vehicle control technologies are not “assumed” improvements. Only improvements that are already in place under legislation/regulation are considered in the modelling. As the vehicle fleet turns over in the future years, improvements will also result from use of new vehicle technologies.	Satisfactorily addressed for the purposes of the EA review
Pg 51, Section 5.3 – It would help to have a summary table to understand the relative magnitude of the construction emissions - a worst case and average case scenario (depending on how often equipment is used and construction activities occur) would help quantify the annual total. (WLAP)	Volume 2, Section C, Tables 5-7 and 5-8, pg. 52 and 53, show the total tonnes per year of fugitive dust and equipment as a result of the STS construction activities.	Satisfactorily addressed for the purposes of the EA review
Mitigation options need to be explored given the predicted increase in greenhouse gas emissions by 2025. MoT should provide a range and combination of TDM options for this highway that reduce the levels of greenhouse gases emitted as well as the amount of PM ₁₀ (and to a lesser extent, ammonia). (WLAP)	The MoT recognizes the importance of TDM along the STS corridor and is facilitating a TDM study for the corridor with the ultimate goal of improving the corridor’s air quality and extending the life of the planned highway improvements. The MoT anticipates that the TDM options identified will act to reduce the number of annual average daily trips on the highway and as a result, the projected impacts of air quality and GHGs would be reduced from the original assessment in the Application. The extent to which measures are effective will rely on the number of vehicles and the length a reduced trip. However, both of these measures would result in an air quality/GHG improvement.	Satisfactorily addressed for the purposes of the EA review
Further studies are required to assess air quality throughout the Howe Sound Airshed. VOCs and ammonia readings have not been taken anywhere in the airshed. (TWFN)	The air quality impact assessment addressed impacts to ambient air quality (Application V.2, Sec C); existing emission sources are characterized in Vol 2, Sec C, Sec 5.1; ambient air quality monitoring locations for a variety of pollutants was used to characterize the current air quality in the air shed (Vol 2, Sec C, Sec 4). The 98 percentile concentration from monitors was added to the maximum predicted modeled contribution from the highway. This represents a conservative approach to assessing contributions to cumulative air quality. Even when the ambient concentrations were added to the predicted emissions from the highway for the baseline and in future years (see Vol C, Sec C, Section 8.1, Table 8-1), the resulting concentrations remained below the applicable air quality objectives. No proposed or publicly disclosed future projects that require EAO approvals were discovered that are associated with direct emissions to atmosphere that could cumulate with the Project impacts. The associated traffic increase was included in the forecasts scenarios for 2010 and 2025, thus the potential impacts from foreseeable future projects were considered within the air quality assessment.	Satisfactorily addressed for the purposes of the EA review
Design a detailed ozone abatement program for Whistler area and implement this as a component of the highway project. (TWFN)	It is not anticipated that emissions from point and area sources within the airshed along the corridor will change significantly in the future years. Given that the ratio of NO _x to VOC emissions is also not expected to change, the emission decrease from vehicles would result in a slight reduction of ozone in the airshed.	Satisfactorily addressed for the purposes of the EA review
Assess the impacts of an expanded Sea to Sky Highway on metro Vancouver air quality. (TWFN)	This change is negligible when compared to the overall emissions in the Lower Fraser Valley, and other trans-boundary influences in the GVRD.	Satisfactorily addressed for the purposes of the EA review

COMMENT/ ISSUE	MINISTRY OF TRANSPORTATION RESPONSE	EA STATUS
4. AIR QUALITY		
Provide information on mitigation options to reduce increases in greenhouse gas emissions. Consider the relative benefits of TDM measures from an emissions (either GHG or CAC) standpoint. (WLAP)	There are no air quality objectives for greenhouse gases, as it is not a directly comparable issue to the health issues surrounding Criteria Air Contaminants (CACs).	Satisfactorily addressed for the purposes of the EA review
Recommend an Air Quality Monitoring and Mitigation plan to outline under what conditions monitoring should take place and what mitigative actions will take place should any ambient concentration thresholds be reached (e.g. if the rolling 24-hour PM ₁₀ concentration exceeds 50 g/m ³ , residents are warned and additional dust control measures will be put in place, burning activity or blasting activity will cease, etc.). (WLAP)	The MoT has committed to monitoring PM ₁₀ and PM _{2.5} . These commitments to monitoring and mitigation will be captured in the Environmental Management Plan by the MoT.	Satisfactorily addressed for the purposes of the EA review OCR 1.2, 6.1, 6.2
Provide a range and combination of TDM options that reduce levels of greenhouse gases emitted as well as the amount of PM ₁₀ (and to a lesser extent, ammonia). Consult with municipalities and other interested stakeholders to determine the most effective (from an economic and emissions reduction standpoint) and appropriate TDM strategies for this highway. (WLAP)	The MoT will look for an opportunity to bring the TDM issues to a larger forum such as the Howe Sound Community Forum. The MoT is not responsible to lead any future initiative but recognizes it has a role in future TDM initiatives and would participate in discussions when a larger inter-jurisdictional forum is organized. (SEWG – 12/02/04)	Satisfactorily addressed for the purposes of the EA review
If burning of land clearing debris is determined as the only viable solution for certain portions of the corridor, continuous PM monitoring should occur at nearby residences during the burn, and a response plan should be put in place if a concentration threshold is reached. Threshold response plan could be determined as part of an Air Quality Monitoring and Mitigation Action Plan. (WLAP)	At this time, no burning is planned near residences; however the MoT would take into account air quality management considerations should there be any vegetative disposal that could impact nearby residences. The MoT recognises that monitoring should take place on days where ambient levels could already be elevated.	Satisfactorily addressed for the purposes of the EA review OCR 6.3
Pg 19, Section 2.4.3.9, first paragraph – This paragraph states that there is a high level of uncertainty for quantifying the level of emission rates for short periods during construction activity. In other words, the construction activity peaks may not be captured by the modelling. (WLAP)	The modeling incorporates the annual emissions at the highest expected level of emissions (2007), and therefore captures a reasonable level of conservatism. The assumption that all equipment is operating in a 1km section of road (pg. 51) also adds conservatism to the assessment to capture peak concentrations.	Satisfactorily addressed for the purposes of the EA review
Pg 54, Section 5.5, first paragraph – Can MoT speculate as to the amount of secondary particulate formation that may result given increased ammonia? Findings from the GVRD suggest ammonia emissions are increasing in the region, may have significant impact on secondary particulate matter formation, visibility (from white haze) and human health. (WLAP)	As part of the Pacific 2001, ammonia measurements were made, but based on reviewed literature, very few published measurements of ammonia and their relationship to speciated particulate concentrations have been conducted in either the STS corridor or Greater Vancouver Regional District (GVRD) to date. As of October 30 th 2003, the measured data from Pacific 2001 was not yet publicly available. Thus, it is difficult to speculate as to the amount of secondary particulate that may result. It is important to note that ammonia alone is not solely responsible for the potential formation of secondary particulate. Its interaction with NO _x and SO _x also plays a key role, and these contaminants are expected to improve over the assessment period.	Satisfactorily addressed for the purposes of the EA review

COMMENT/ ISSUE	MINISTRY OF TRANSPORTATION RESPONSE	EA STATUS
4. AIR QUALITY		
Pg 57, Figure 5-1 VOCs in this graph aren't the pollutants of focal concern (PM would be much more relevant). (WLAP)	Although VOCs were shown for illustration purposes, the pattern is the same for the other CACs (except ammonia). GHGs are addressed separately in Volume 5, Section C, Section 6, and the project increase is presented in Table 6-1.	Satisfactorily addressed for the purposes of the EA review
Pg 58/59 - statements conflict with the definition of induced demand. Induced demand by definition only refers to new travel, and does not include diverted trips or mode shifting. (WLAP)	Based on the increased traffic demand in the STS corridor in future years, the predicted GHGs will increase within the corridor as a result. International forums have identified GHGs for reduction (e.g. Kyoto Protocol), and since GHGs do not have a direct environmental/health impact on the airshed, but are primarily a global concern, other mechanisms that have the capability to impact a larger scale (e.g. federal or global) are well suited to address this increase. The increase in GHGs is outlined in Table 6-1. It is recognized that based on the current emission factors, GHGs will increase with the increased amount of fuel consumed in the airshed.	Satisfactorily addressed for the purposes of the EA review
If the decision to build the tunnel is approved, and there are pedestrian, recreation or residential areas nearby, a continuous particulate matter monitor program should be installed. (WLAP)	The area for which the increased predicted concentration is to occur is situated directly at the north exit of the tunnel. This represents a very small area and does not intersect with a recreational or residential area. Regarding pedestrian access through the tunnel the extremely short-term nature of the activity, does not warrant installation of a continuous air quality monitor at this site.	Satisfactorily addressed for the purposes of the EA review
Pg 92, 1 st paragraph – Re: positive improvement for emissions - Exceptions are ammonia <i>and</i> greenhouse gases. (WLAP)	This statement was intended to refer specifically to air quality (CAC) parameters, and not to GHGs, which were dealt with in separate sections within the report. It is recognized that GHGs are predicted to increase within the STS airshed due to the increase in vehicle traffic in the corridor.	Satisfactorily addressed for the purposes of the EA review
4. WILDLIFE AND VEGETATION		
MoT should commit to complete any outstanding Tailed Frog and Tailed Frog habitat inventory and assessment (as discussed in the Recommendations section of the Application, and as per the Ascaphus Consulting report dated May 28, 2003) and to work with Ascaphus Consulting to complete specific stream crossing/Tailed Frog habitat management and impact mitigation on important Tailed Frog streams. (WLAP).	Ascaphus Consulting has completed the ranking of Tailed Frog streams along the corridor and the MoT will be discussing mitigation and management measures with Ascaphus Consulting. Any unmitigated impacts of culvert extensions on fish <u>and</u> amphibian habitats will be offset with the application of special measures. This will include special considerations for amphibians during the design of specific fish habitat compensation works, along with additional measures to address any amphibian habitat impacts that can not be offset in conjunction with fish habitat compensation (i.e. Tailed Frog habitats). 27-11-03	Satisfactorily addressed for the purposes of the EA review OCR 1.2, 5.12
Regionally rare and significant plants of the area were presented in the EA, but the plants listed by the First Nations do not appear to be included. (SLFN)	In the absence of further direction from the First Nations representative identifying what information should be included or referenced in the Application the MoT did not presume to describe specific elements of First Nations' interests and issues in advance of receiving the AIUS. RESL developed a spreadsheet containing a database of plant species documented during its vegetation surveys and forwarded this database via the appropriate channels to the Squamish and Lil'Wat Nations.	Satisfactorily addressed for the purposes of the EA review

COMMENT/ ISSUE	MINISTRY OF TRANSPORTATION RESPONSE	EA STATUS
5. WILDLIFE AND VEGETATION		
Wildlife and fish distribution and use of the project area varies seasonally. First Nations reviewers request that the impacts of the upgrade project on wildlife and fish be assessed on a seasonal basis. (SLFN)	Wildlife monitoring requirements associated with the project are currently under discussions with EC and MWLAP. Long term monitoring requirements will likely be specified within the Environmental Management Plan.	Satisfactorily addressed for the purposes of the EA review
Request long-term wildlife impact monitoring along the entire project route. (TWFN)	Wildlife monitoring requirements associated with the project are currently under discussions with EC and MWLAP. Long term monitoring requirements will likely be specified within the Environmental Management Plan.	Satisfactorily addressed for the purposes of the EA review OCR 1.2, 4.21
There is no discussion on the fate of the waste rock from the tunnel excavation. Will existing vegetated areas be cleared and grubbed for sorting and transporting rock? DFO	The MoT Westport pit has been designated as a stockpile and processing site for rock from tunnel excavation (See Volume 1 – Map and Drawing Portfolio Drawing no. 41DKPAHS- 0451). The contractor may, at their option, remove excavated rock and utilize it on or outside the project.	Satisfactorily addressed for the purposes of the EA review
6. BIRDS		
Recommend March 15 – July 31 general breeding bird period be avoided. Any required overlap with this period be addressed through the submission and review of nest survey data. (EC)	OCR 4.5, 4.19	Satisfactorily addressed for the purposes of the EA review
Will spotted owl surveys be conducted? (SLFN)	Spotted owl surveys in specific locations will be required. RESL is currently preparing plans to conduct these surveys, starting in early spring 2004. (EAO Note: The MoT advised the BTWG on April 20' 2004 that the surveys have been completed and the report is pending)	Satisfactorily addressed for the purposes of the EA review OCR 4.6
Coopers' hawk nests located near the right-of-way were not reported in the EA. Can the RESL personnel involved in the EA preparation investigate this issue?	The subject nests, observed in June 2003 were not occupied leading to speculation about which species might have used them. A field inspection, to be scheduled for late April 2004 should clarify what species is using these particular nests. The results will be reported via memo to the STS project team for appropriate dissemination.	Satisfactorily addressed for the purposes of the EA review
A Registered Professional Biologist (RP Bio.) should be specified as the wildlife professional responsible for monitoring trees with nesting potential for marbled murrelet. (SLFN)	MoT OCR 4.7	Satisfactorily addressed for the purposes of the EA review

COMMENT/ ISSUE	MINISTRY OF TRANSPORTATION RESPONSE	EA STATUS
7. FISH, FISH HABITAT AND AQUATIC RESOURCES		
Request long-term water quality monitoring process along the entire project route. (TWFN)	A water quality program has been developed in consultation with relevant federal and provincial agencies. Relevant components of this program will be included within the Environmental Management Plan. Once completed, MoT would be please to provide a copy to the TWFN.	Satisfactorily addressed for the purposes of the EA review OCR 1.2, 10.1
In the fisheries and aquatic habitats section, mention is made of showing "no disturbance" riparian areas on construction drawings. The First Nations would like to see these areas now, not after the project is approved. (SLFN)	It is not feasible to finalize these "no disturbance" details at this time. The riparian impact estimates in Tables 3-1 and 3-2 in Volume 2, Section B of the Application provide "worst case" estimates that are expected to be further reduced during detailed design planning. DFO authorizations for locations where impacts to fish habitat cannot be avoided will be required before construction works can begin at individual sites. Final details on "no disturbance" will be addressed during the permitting/approval stage.	Satisfactorily addressed for the purposes of the EA review
Wildlife and fish distribution and use of the project area varies seasonally. First Nations reviewers request that the impacts of the upgrade project on wildlife and fish be assessed on a seasonal basis. (SLFN)	All seasons were captured as part of the wildlife and fish assessments.	Satisfactorily addressed for the purposes of the EA review
Section 3.1.3 states that visual inspections were conducted to determine the arrival and overwintering of steelhead in selected watercourses during December 2002 and January 2003. What standards were used for these visual inspections? Did these inspections follow a standardized procedure with respect to reach length and time surveyed? (SLFN)	These were reconnaissance-level visual inspections, undertaken by fisheries biologists and technicians in conjunction with other field program tasks. The field work focused on the collection of information that was most critical to the Project.	Satisfactorily addressed for the purposes of the EA review
MoT must provide a reasonable amount of detail on fish habitat, (and habitat compensation) that will be authorized for alteration, disruption and destruction (HADD) under section 35.(2) of the <i>Fisheries Act</i> .	During the November 3, 2003 meeting, DFO clarified that there is no need for the MoT to provide additional fish habitat inventory information and that the MoT need focus on resolving the following crossing sites: Middle Creek, Mamquam Blind Channel, Mamquam River, Mashiter Spawning Channel, Meighan Creek and side channel, Thunderbird Creek, Newport Creek, Hop Ranch Creek and the unnamed tributary to the Brohm River.	Satisfactorily addressed for the purposes of the EA review OCR 5.16
How will changes to the upland hydrology effect the receiving waters of Howe Sound? (DFO)	Measures are implemented to avoid stream bank erosion, scour of channel beds and sedimentation processes that have the potential to affect downstream waters. Approximately 40% of the total highway ditch system will be improved to the new standards. In localized areas where erosion is a concern, mitigation methods such as rip rap or bio-engineered bank stabilization are used.	Satisfactorily addressed for the purposes of the EA review OCR 1.2, 5.4, 5.5, 10.3, 10.10, 10.13, 10.15

COMMENT/ ISSUE	MINISTRY OF TRANSPORTATION RESPONSE	EA STATUS
7.1 Stream Crossings		
The DFO hierarchy of preferred options is: relocation, redesign, mitigation; and last, habitat compensation. DFO will only authorize HADDs if given compelling technical rational why the first three other options are impossible or impractical. (DFO)	This DFO comment refers to the crossing sites identified in the DFO October 24, 2003 letter. In addition to these crossing sites, MoT has also prepared additional information related to the Horseshoe Bay Overhead structure at Larsen Creek and culvert works at Dryden Creek. The technical information package for the crossing sites identified in the DFO letter and these two additional sites is included as an attachment to this letter.	Satisfactorily addressed for the purposes of the EA review OCR 5.16
DFO requires clear span structures on all fish bearing streams and that clear span structures are preferred on non fish bearing streams. (DFO)	This DFO comment refers to the bridges that are currently proposed by the MoT as part of the project scope. Only 2 fish bearing water features associated with the project have proposed bridge works that are not clear span structures and would require instream piers. These 2 water features are the Mamquam Blind Channel and the Mamquam River, for which preliminary design plans propose piers within the wetted perimeter. There are no other non-clear span bridges proposed for modification or installation on fish bearing water features associated with the Project.	Satisfactorily addressed for the purposes of the EA review OCR 5.7
WLAP encourages MOT to pursue the new "alternative option" for replacement of the Horseshoe Bay overhead structure to minimize overall habitat impacts to Larsen Creek. (WLAP)	The MoT agrees that the alternate design option, as outlined in the October 10, 2003 letter from Coast River Environmental Services, represents an improvement over the original proposal.	Satisfactorily addressed for the purposes of the EA review
If MoT intends to pursue closed culvert installation and not open bottomed structures at Middle Creek, strong technical rational needs to be developed in order to support that proposal. (WLAP)	MoT commits to install an open bottom structure at this location, unless a technical rationale documenting why a closed bottom structure is more acceptable at this location is developed by the MoT and accepted by WLAP and DFO during the permitting/authorization phase.	Satisfactorily addressed for the purposes of the EA review OCR 5.14
WLAP supports an "on existing alignment" option at Thistle Creek. By using headwall structures, it may not be necessary to extend the existing culvert. (WLAP)	The "on existing alignment" is the preferred option. There may be no need to extend the existing culvert.	Satisfactorily addressed for the purposes of the EA review
Mashiter Complex: WLAP supports MOT commitment to lowering the two existing culverts under the Hwy in order to improve hydrological function. (WLAP)	There is only one existing culvert at the Mashiter Spawning Channel crossing location. The MoT commits to lower the invert of this culvert to improve the likelihood of success for any future restoration opportunities.	Satisfactorily addressed for the purposes of the EA review OCR 5.17
Two projects to consider as compensation measures are replacing the existing flood gates at Loggers Lane with new remote or tide activated gates and replacement of a culvert at Wilson Slough and Buckley Avenue. (DoS)	EAO Note: This is an information item.	OCR 5.16

COMMENT/ ISSUE	MINISTRY OF TRANSPORTATION RESPONSE	EA STATUS
7.1 Stream Crossings		
Baffles are prone to clogging with debris and sediment that can cause the culvert to fail or force water through it at higher velocities. Baffles can also disrupt the boundary layer, resulting in impaired juvenile fish passage. (DFO)	EAO Note: This is an information item. Detailed design issues will be addressed as part of the <i>Fisheries Act</i> authorization process	No further information required for the purposes of the EA review.
At Mamquam Blind Channel no rationale given why a temporary bridge must be installed. What other detour options have been explored that could avoid a HADD? (DFO)	A temporary traffic bypass is required in order to demolish the existing highway bridge and build a new bridge that straddles the alignment of the existing structure. This bypass, which will need to be located outside of the area proposed for construction of the new 4-lane bridge, will need to maintain 2 directions of traffic flow across the Mamquam Blind Channel at all times during construction.	Satisfactorily addressed for the purposes of the EA review
Centennial Way to Depot Road - the Application does not give any specific information on the culvert extension designs such as headwalls. (DFO)	Mitigation measures (e.g. headwalls and/or retaining walls) will be applied to the final design	OCR 5.15
Depot Road to Brohm Lake - The Application does not specify what kind of culvert extensions will be used in Tables 3-1 and 3-2. (DFO)	Although Table 3-1 in Volume 2, Section B indicates that culvert extensions may be required, efforts will be made at detailed design work to mitigate instream habitat impacts. Based on the outcome of design planning for the nearby Meighan Creek, Meighan Creek Side Channel, and Thunderbird Creek crossing locations (refer to design drawing No. 41DK-PAHS-9904), it is anticipated culvert extensions can be either avoided or minimized on Newport, Hop Ranch and Dryden Creeks through the installation of headwalls and/or retaining walls.	Satisfactorily addressed for the purposes of the EA review OCR 5.7
Cheakamus Canyon to North Garibaldi Civil Defense Zone Many of the wetland features were dry during sampling and should be assessed during the fall sampling period. (DFO)	EAO Note: This is an information item. Detailed design issues will be addressed as part of the <i>Fisheries Act</i> authorization process	
The Canadian Coast Guard Navigable Waters Protection Division would like to see plans for the Culliton Creek bridge since at the time it was built it was declared non navigable. (DFO)	EAO Note: Information Item.	
Prefer that the Mamquam Blind Channel bridge is rebuilt as a clear span bridge with no reduction in overhead clearances. (CCG)	MoT will consider this during detailed design of the structure. There are substantial design constraints to be considered and these are discussed in The Technical Information Package - Attachment to Letter from the MoT to DFO November 28, 2003.	Satisfactorily addressed for the purposes of the EA review

COMMENT/ ISSUE	MINISTRY OF TRANSPORTATION RESPONSE	EA STATUS
7.2 Tunnel Option		
<p>Bore tunnels, may raise significant issues or concerns in relations to fisheries issues because:</p> <ul style="list-style-type: none"> • there is the potential to expose pyretic bearing basaltic rock that could cause acid rock drainage; • the volume of slurry produced in the tunnel could be substantial if ground water is encountered; • the North Shore mountains are prone to intense fall storm events; • there appears to be limited area to construct sediment control structures. Until logistics are addressed in detailed plans by a qualified engineer, it's speculative whether they are feasible. (DFO) 	<p>The "South Portal – 1 km Tunnel Couplet" drawing in the Volume 1 –Map and Drawing Portfolio was prepared by McElhanney Consulting Services Ltd., and indicates there is sufficient space to manage water from the tunnel both during and following construction. Groundwater intercepted by the tunnel will be isolated and directed in a "clean" state and any construction/operations wastewater or spills will be addressed through the collection, treatment, and infiltration infrastructure identified on this drawing. Any construction works, including the handling of waste rock, will ensure that an adequate riparian buffer is maintained and that effective erosion and sediment control measures are applied. The tunnel alignment is entirely within granodiorites of the Coast Pluton, which have no visible sulphides. Analysis by Golder Associates show that rock in the vicinity of the tunnel has neutralization potential ratios (NP/AP) in the order of 12 to 31 and are definitely not acid generating.</p>	<p>Satisfactorily addressed for the purposes of the EA review</p> <p>OCR 5.8, 5.9</p>
<p>Preventing contaminates from spills or accidents in the operating tunnel from entering the creek has not been refined and the Application only gives an example of how maintaining water quality could be mitigated. DFO</p>	<p>Tunnel construction will be drill and blast rather than bored. Fines generated by drill and blast operations would be comparable to surface excavation of rock by drill and blast and much will remain within the tunnel. Expect that volumes of water entering the tunnel will be minor and waste water during construction can be managed.</p>	<p>Satisfactorily addressed for the purposes of the EA review</p> <p>OCR 5.9, 10.3</p>
8. ENVIRONMENTAL MANAGEMENT PLANS		
<p>MoT states that based on the outcome of the studies and risk assessment, water quality monitoring immediately prior to, during and after construction would be undertaken for all areas with sensitive streams to determine the need for mitigation. Water quality monitoring should be required regardless of the outcome of the risk assessment to resolve uncertainty with the predictions of "first-flush" water chemistry and confirm there will be no adverse environmental effects. If during the construction period significant data confirms no concern, the need for (or frequency of) on-going monitoring could be re-evaluated. (MEM)</p>	<p>The MoT has committed to developing an Environmental Management Plan prior to construction start-up, in accordance with or equivalent to the provisions of Section 165 of MoT's <i>Standard Specifications for Highway Construction (hereafter referred to as Section 165)</i>, to convey an understanding of the project's environmental constraints (including construction timing) and how the Project will be undertaken to avoid/mitigate negative impacts. The Environmental Management Plan(s) (EMP) will be submitted to the appropriate environmental agency for acceptance before work commences.</p> <p>OCR 1.2</p>	<p>Satisfactorily addressed for the purposes of the EA review</p>
<p>Information on mitigation techniques, environmental inspector's roles and responsibilities and instructions to highway construction contractors should be presented in the EA to demonstrate how environmental protection measures will be applied during all phases of the project (i.e. planning, construction, restoration and operation). (SLFN)</p>	<p>The MoT will retain an environmental monitor to work on-site during all phases of highway construction. The monitor will work with the Contractor to ensure the protection of the environment, that mitigation measures are appropriately implemented and to facilitate communication between the Contractor, environmental agencies, and MoT.</p> <p>OCR 1.6</p>	<p>Satisfactorily addressed for the purposes of the EA review</p>

COMMENT/ ISSUE	MINISTRY OF TRANSPORTATION RESPONSE	EA STATUS
9. ENVIRONMENTAL MANAGEMENT PLANS		
<p>Management plans or programs required:</p> <ul style="list-style-type: none"> • for various re-use/disposal areas, • for rock cuts near sensitive streams • for re-use/disposal areas, • to ensure that the ML/ARD predictive information, PAG management plans, mitigation measures and monitoring requirements are available and understood by all contractors during the design and construction phases; and • for ML/ARD construction monitoring. Include methods for on-going assessment of ML/ARD characteristics during construction and materials handling protocols. 	<p>A water quality sampling and analysis program will be undertaken by the MoT. Water sampling and analysis will be conducted where there are rock cuts in PAG or ML rock material. The sampling of water runoff will be conducted in sensitive streams and highway ditches. The MoT will retain a qualified consultant to monitor potential for acid generation and metals content through construction. The consultant will recommend specific mitigative strategies to best address conditions as encountered. Mitigation could include drainage management or shotcreting rock faces to prevent oxidation.</p>	<p>Satisfactorily addressed for the purposes of the EA review</p> <p>OCR 1,2, 2.4, 10.1</p>
<p>This project will take more than six years to complete and it is expected that the current DFO environmental standards and BMPs are adhered to. Also, the Environmental Protection Plan (EPP) should be updated annually. (DFO)</p>	<p>The MoT commits that any updated best management practices developed during the course of this project will be applied. The MoT considers the Environmental Management Plan to be a live document to be updated throughout the construction period as issues arise. OCR 5,7 for finalizing crossing structure designs</p>	<p>Satisfactorily addressed for the purposes of the EA review</p>
<p>Explain what training and equipment the highway maintenance contractors have to minimize the environmental impacts of a spill until proper authorities arrive. (EC).</p>	<p>The MoT will require that operational activities be carried out in accordance with, or using means equivalent to, applicable Ministry policies and procedures, including the MoT's <i>Emergency Response Plan</i> which outlines what actions maintenance contractors and Ministry Area Managers must take in the event of a hazardous spill. OCR 1.2 and 4.23</p>	<p>Satisfactorily addressed for the purposes of the EA review</p>
<p>In developing drainage systems and water quality management plan consider the following objectives:</p> <ul style="list-style-type: none"> • Avoid diverting water from one watershed to another ; • Manage development so storm water characteristics emulate the pre-development natural watershed; • Treat first flush events for water quality; e.g. swales, wetlands and other polishing treatments; • Limit effective impervious area; • Maximize forest cover, green spaces & vegetated areas. (EC) 	<p>See attachment: <i>Water Quality Monitoring Program Sea-to-Sky Highway Improvement Project</i> (November 26, 2003) for more detail.</p>	<p>Satisfactorily addressed for the purposes of the EA review</p>
<p>Include a water sampling program and planning to respond to fuel or other spills along the route of the project. (TWFN)</p>	<p>A water quality monitoring program will be developed for regulatory agency review and approval (WLAP, MEM and EC) and will be incorporated into the Environmental Management Plan. This documentation can be provided to the TWFN.</p>	<p>Satisfactorily addressed for the purposes of the EA review</p> <p>OCR 10.1</p>

COMMENT/ ISSUE	MINISTRY OF TRANSPORTATION RESPONSE	EA STATUS
8. ENVIRONMENTAL MANAGEMENT PLANS		
An Air Quality Monitoring and Mitigation Action Plan should be devised for the construction period that outlines when and where monitoring will be done and what mitigative actions will be taken if certain measurement thresholds are reached. This is particularly important for fine particulate matter emissions. (WLAP).	A number of air quality monitoring and mitigation items were identified in the Application (Volume 5, Section A – Summary, Section 1.2.5, pg 17). Finer details of the monitoring and mitigation will be in the Environmental Management Plan, once further details on contractors, construction timing, detailed designs and locations are established. The municipal by-laws and open burning regulations outline the details of permits required and guidelines to follow for safe reliable burning. Currently, the municipalities in the Lower STS corridor do not allow open burning within their by-laws.	Satisfactorily addressed for the purposes of the EA review OCR 1.2, 6.2, 6.3
The creation of an Air Quality Monitoring and Mitigation Action Plan prior to the construction, and implementation of this plan during construction, would ensure the health and safety of Sea-to-Sky corridor residents and workers. (WLAP)		Satisfactorily addressed for the purposes of the EA review OCR 6.2
Place air quality monitoring stations at several location along the corridor to gather better data for long-term review and base-line comparison purposes (TWFN)	Based on the air quality modeling which used conservative assumptions, the ambient air quality for all criteria air contaminants would remain below the applicable ambient objects. The MoT has committed to conducting additional air quality monitoring during the construction phase of the project. This data can be used to establish the contribution of the road to air quality in the immediate vicinity, particularly during construction when the highest concentrations are predicted. Existing regional stations can continue to be used to establish the long term concentrations and compliance within the airshed	Satisfactorily addressed for the purposes of the EA review OCR 6.2
Create a Vegetative Debris Disposal and Monitoring Plan, prior to construction. (WLAP)	The MoT will develop a Vegetation Debris Management Plan. OCR 1.2 and 6.	Satisfactorily addressed for the purposes of the EA review
Recommend creation of the Vegetative Debris Disposal Plan, as briefly outlined in this document, is also a positive step in reducing particulate matter emissions. It is recommended that the disposal plan and monitoring/mitigation plan be created prior to construction phase. Anticipated that the stakeholders will be the same for both planning exercises, and that they could theoretically do the work for both plans at the same time. (WLAP).	The MoT has committed to a Vegetative Debris Disposal Plan (Application - Volume 5, Section A – Summary, Section 1.2.5, pg. 17). This plan will be developed for the pertinent construction areas and encompassed in the Environmental Management Plan.	Satisfactorily addressed for the purposes of the EA review OCR 1.2, 6.2, 6.3
Will daily environmental inspection reports for work conducted on IR#24 be provided to the Squamish Nation? (SLFN)	Depending on the nature and scope of work being undertaken, bi-weekly monitoring reports would be a more standard reporting frequency for this type of undertaking. However, discussions are underway regarding the appointment of an individual to liaise between the MoT, highway contractors, and the Squamish Nation in relation to the work required through IR#24. More refined reporting responsibilities to the Squamish Nation could well form a component of this arrangement.	Satisfactorily addressed for the purposes of the EA review

COMMENT/ ISSUE	MINISTRY OF TRANSPORTATION RESPONSE	EA STATUS
8. ENVIRONMENTAL MANAGEMENT PLANS		
<p>More detail is required with regard to how the various stated goals will be attained. For instance, how will the Ministry ensure that the width of the cleared edge beside the highway will be minimized? How will designs be affected to reflect this change? How will equipment operators be informed of vegetation protection measures? What will happen if design and construction specifications are not met? (SLFN)</p>	<p>The construction contractors will be permitted to clear the minimum required to construct the highway improvements. This requirement will be clearly described in the contract documents. The contractors will be required to develop and submit environment management plans prior to starting construction work. These plans will include, among other measures, their methodology for ensuring all of their staff are knowledgeable of the requirements for minimizing vegetation removal. Generally the clearing limits are staked or flagged in the field to define the boundaries to the operators. The contractors will also be required to retain an on-site environmental monitor to ensure the environmental management plan is adhered to. The MoT will also undertake environmental quality audits to ensure compliance.</p>	<p>Satisfactorily addressed for the purposes of the EA review</p> <p>OCR 1.2, 1.6, 1.7</p>