



Via eMail
16 pages (plus attached plans)
From: paulc@talismanenviro.com

Memo

William R. Bennett Bridge Project

SNC FILE NO: 30EP-MR

March 9, 2008

TO: Bruce Runciman, Habitat Management Biologist, DFO
Phil Epp, Regional Hydrologist, MoE

CC: Tom Tasaka, Project Director, WRB Bridge Group
Gill Hardy, Project Manager, WRB Bridge Group
Wayne Saunders, Construction Manager, WRB Bridge Group
Bruce Miller, Roadways Manager, Emil Anderson Construction
Jay Sutton, Province's Field Representative, Westmar
John Millar, Coast River
Angela Buckingham, Environmental Manager, MoT

FROM: Paul Christie, Environmental Monitor

RE: Review Of Habitat Compensation Requirements, Reclamation Planning and Implementation Progress Report

INTRODUCTION

This memo provides a progress report on the status of the reclamation planning and implementation program for the William R. Bennett Bridge (WRBB) Project in accordance with the requirements of the DFO Amended Authorization of May 16, 2006 (attached).

Table 1 summarizes the WRBB Project habitat restoration/reclamation requirements as presented in the DFO Amended Authorization of May 16, 2006.

Table 1 - DFO Authorization Summary

Restoration/Compensation	Area (m ²)	
	Authorized Areas	Simplified Areas
West End		
Causeway Restoration/Riparian Habitat Creation above HWL	5,625	6,275
Willow Bench/Riparian Habitat Creation above HWL	650	
Causeway Restoration/Marsh Bench Habitat Creation below HWL	3,075	5,225
Granular Beach below HWL (adjacent to Willow Bench)	2,150	
sub-totals	11,500	11,500
East End		
Causeway Restoration to Maintained Habitat above HWL	6,675	6,675
sub-totals	6,675	6,675
Other		
Marsh Planting/Marsh Creation below HWL	2,525	2,525
\$150,000 payment for Mission Creek restoration projects		
sub-totals	2,525	2,525
TOTAL	20,700	20,700

EAST CAUSEWAY

DFO Requirements

The DFO Amended Authorization requires restoration of 6,675 m² of the “old” East Causeway on the southeast side of the new highway along Mill Creek to Maintained Habitat above HWL. The restoration of this area to parkland “is expected to be mimic planting density of the adjacent parkland”.

Restoration Plan

The attached plans (Site 360 Landscape Architecture, Sheets L1-L4) show the Overall Landscape Plan and the detailed Planting Plans for the East Approach that were

developed in close consultation with the City of Kelowna (CoK).

The Maintained Habitat area on the southeast side between the highway and the right bank of Mill Creek above the HWL will total 7,355 m², excluding the pathway. This habitat is coincident with the area shown as "Restoration of Causeway to Parkscape Habitat above HWL (approx. 6,675 sq. m)" shown on Figure 5-3 (attached, Aug. 22, 2001, Coast River) on which the DFO Amended Authorization was based.

The "Native shrub beds" and the open areas shown on the landscape plans between the footpath and Mill Creek will be hydro-seeded to the Interior Dryland seed mix when grading is completed this spring, followed by in-fill with native shrub planting this fall. The existing willow trees that are growing along Mill Creek will be preserved. The native shrub planting plan will be developed after the grading and hydro-seeding has been completed. The WRBB Group will work closely with the CoK in developing the native shrub plan and will review it with DFO prior to planting.

Timing

The reclamation work along the East Causeway started in the fall of 2007 with removal of portions of the old causeway, followed by some site grading and topsoil placement. Removal of the remaining portions of the old roadway and bridge abutment, site grading, topsoil placement and planting will be carried out in the spring and fall of 2008.

WEST CAUSEWAY

North Side West Causeway

DFO Requirements

The DFO Amended Authorization requires the creation of 650 m² of Willow Bench/Riparian Habitat above HWL on the north side of the West Causeway and the construction of 2,150 m² of a Granular Beach below HWL (preferably adjacent to the willow bench).

Restoration Plan

The attached plan, West Causeway Restoration Grading and Vegetation Plan (Westmar Drawing No. 1458-194A, Oct. 25/07), shows the proposed locations of the Linear Planting Bench along the north shore and the adjacent Granular Beach, as well as representative cross-sections of the grading and planting plan. The attached plan, WRB Bridge Project Habitat Compensation (Dec. 4, 2007, Rev. 0) shows the location of the Linear Planting Bench along the north shore and the adjacent Granular Beach habitat that was constructed in the fall of 2007 (also see Photos 1 and 2, attached).

The Linear Planting Bench will be about 5 m wide, comprising a narrow, level shoulder behind the Campbell Road exit ramp barrier, a steep, upper slope, a planting bench, and a rip-rapped lower slope extending into high water. The planting bench will be about 2 m wide and excavated just above the HWL, back-sloping gently to the highway side. Topsoil, 15-30 cm deep, will be placed over the upper slope and bench. The topsoil will be lightly compressed into the coarser underlying, fill material. The upper slope and bench will be hydro-seeded to a custom Interior Dryland seed mix in a tackifier/mulch binder that has been developed for use at the site by Interior Reforestation Co. Ltd. (see Appendix 1, attached).

To date, about 675 m² of the Linear Planting Bench and 875 m² of the Granular Beach have been completed. At project completion, the Linear Planting Ledge along the north shore of the West Causeway will be in excess of 1,275 m² (~255 m by 5 m), 625 m² above the DFO requirement of 650 m². The Granular Beach will be extended along the entire Linear Planting Bench and the north shore of the West Causeway, to meet the 2,150 m² DFO requirement.

Native willows will be planted along the bench at approximately 3 m spacing. The willows will be approximately 1 m tall at the time of planting, in at least 2 gallon pots or the equivalent burlap wrapped root ball. WRBB is currently obtaining quotes from two interior nurseries that produce native willow stock known to do well in the interior in riparian settings. The area will not be permanently irrigated, although periodic watering may be carried out by portable pump or the watering truck until the plants are established.

Timing

About 675 m² of the linear planting ledge was constructed and hydro-seeded in the fall of 2007. The willows will be planted on this section in the spring of 2008. The remaining linear planting ledge and Granular Beach areas will be constructed in the spring and fall of 2008 with the last section being constructed and planted when the temporary dock and staging area is no longer required.

South Side West Causeway

DFO Requirements

The DFO Amended Authorization requires the creation of 5,625 m² of Causeway Restoration/Riparian Habitat Creation above HWL and the creation of 3,075 m² of Causeway Restoration/Marsh Bench Habitat Creation below HWL on the south side of the West Causeway.

Restoration Plan

The attached plan, West Causeway Restoration Grading and Vegetation Plan (Westmar Drawing No. 1458-194A) shows the proposed location of the Riparian Habitat above HWL and the Marsh Bench Habitat Creation below HWL on the south side of the West Causeway, as well as a representative cross-section of the grading and planting plan. In accordance with the attached plan, the extent of the upland and lowland areas will closely match the DFO requirements.

The primary objective of the reclamation plan for the south side of the West Causeway is the creation of an upland and lowland (wetland) complex that will provide diverse habitat in the riparian zone of the lake. A series of upland terraces and mounds will be created with intermittent lowland benches near mean water level (341.92 m asl).

The following sections provide a brief description of the proposed construction methods and planting plans for the creation of the upland terraces and intermittent wetland benches.

Upland Terraces

Following removal of the concrete curbs and asphalt from the “old” causeway, as well as removal of any other material that will not be conducive to use in the reclaimed habitats, the highway fill will be re-graded to the approximate configuration shown in the above referenced plan. The upland terraces will lie at about 343 m asl and the upland mounds at about 345 m asl. As the existing fill is coarse textured and rocky, about 15 - 30 cm of topsoil will be spread over the upland areas, including the slopes that extend to the lowland benches. The topsoil will be graded and lightly compacted to help prevent erosion.

The upland areas and slopes will be seeded to the custom Interior Dryland seed mix in either the spring or fall when growing conditions are conducive to germination in the absence of irrigation. The upland areas will then be planted in either the spring or the fall, to a mixture of native shrubs including wild rose, elderberry, Saskatoon, snow berry and mahonia, with native willow along the margins of the wetland and lake shore. Shrubs will be planted at an average spacing of 1.5 m, requiring a total of about 2,500 shrubs. The area will not be permanently irrigated but temporary watering will be carried out following planting, if required. The topsoil and planting specifications for shrubs are presented on the West Causeway Restoration Grading and Vegetation Plan.

Lowland Benches

The lowland benches will lie at about 342 m asl (mean water level is 341.92 m asl). The benches will be capped with about 15 cm of clean, fine to medium sand and a rock (small rip-rap) berm will be constructed along the edge of the bench at the shoreline to

prevent erosion. These wetland benches will be planted to cattail, hard stem bulrush, rushes (*Juncus* spp.) and native sedges in the spring. The cattail and hard stem bulrush plants will be salvaged from nearby wild stocks and the sedges will be purchased from local nursery suppliers. The planting density will be about 1 plant per square meter, requiring about 3,075 plants in total.

The new storm water system for the West Causeway will be routed through 2 oil/grit separators located at the lower end of the causeway, terminating in the southerly wetland bench that will be created as part of the compensation habitat along the south shore. The wetland bench will serve as a bio-filtration pond before the storm run-off enters the lake.

Timing

The reclamation work on the south side of the West Causeway will begin in August or September of 2008, with hydro-seeding anticipated in late September 2008 and shrub planting in the spring of 2009.

MARSH CREATION

DFO Requirements

The DFO Amended Authorization requires the creation of 2,525 m² of Causeway Restoration/Marsh Bench Habitat Creation below HWL, at a site to be determined. In 2005, Coast River salvaged hard-stem bulrush rhizomes from the north side bay and stored them in sacking along the south side beach. Over time, the sacks deteriorated and the plant material was spread over the south side shoal area, where hard-stem bulrush appears to be re-establishing.

Hard-stem bulrush colonies grow in water less than 1 m deep, in a variety of substrate conditions. Based on observations of emergent stems over the past two years at the site, the hard-stem bulrush community in the littoral zones of the north bay and along the south shoal, show significant expansion and contraction on a seasonal basis. The north bay is subject to significant wave action from northerly winds and it is not uncommon to find rhizomes along the beach.

Based on observations while driving from the Graving Dock to Penticton along Okanagan Lake, it is apparent that the species is adaptable and opportunistic, growing in most of the shallow bays and shoals wherever water depth, substrate and other conditions are suitable. As the littoral zone on the north side of the West Causeway shifts further to the north due to changing shoreline processes from causeway filling, it is expected that the hard-stem bulrush zone will shift further out as well.

Planting experiments on hard-stem bulrush have shown that “*careful examination failed to reveal any important differences in the amount of development between seeded and un-seeded areas, and it was thought that the seeding operation had made little if any contribution to the establishment of these stands.*” (S. W. Harris, et. al., Appendix 2).

It is therefore proposed that no additional planting of hard stem bull rush will be carried out, but the existing communities along the north and south shores of the Causeway will be monitored and their extent recorded over the 5 year vegetation monitoring program following project completion, to ensure that they remain healthy and expand in size.

HABITAT RESTORATION SUMMARY

Table 2 provides a summary of the projected habitat restoration related to the WRBB Project, in relation to the DFO Authorization requirements.

PONTOON AND PIER DEMOLITION AND DISPOSAL PLAN

Overview

The old bridge consists of 12 floating, concrete pontoons and 2 concrete piers, including:

- 10 pontoons - 60 m long, 15 m wide and between 4.5 and 9 m tall (not counting parapets);
- 2 pontoons - 15 m long, 15 m wide and about 12 m tall; and
- 2 piers – 27 m long, 12 m wide (one pier is 15 m high and the other is 26 m high).

The total footprint of the old pontoons and piers is 10,098 m².

DFO Requirements

The DFO Authorization for the WRB Bridge Project provides for up to 4,050 m² footprint to be sunk in a deep water location on Okanagan Lake. DFO has indicated that if MoT and the WRB Bridge Group propose to sink more than the currently authorized footprint, compensation will be required to offset the additional impacts. The agreed upon ratio of compensation was set at 1 to 10 (1m² of compensation for 10m² of additional pontoon footprint).

As it has now been decided that all the old pontoons and the two piers will be sunk, an additional 6,048 m² footprint on the lake bottom will be created. This will require an additional 605 m² of habitat compensation, as summarized in the table above.

Table 2 - DFO Authorization & Reclamation Progress Summary Table

Restoration/ Compensation	Area (m ²)			
	Authorized Areas	Simplified Areas	Compensation Completed to date	Remaining to be completed
West End				
Causeway Restoration/Riparian Habitat Creation above HWL	5,625	6,275	0	5,625
Willow Bench/Riparian Habitat Creation above HWL	650		675	580 ¹
Causeway Restoration/Marsh Bench Habitat Creation below HWL	3,075	5,225	0	3,075
Granular Beach below HWL (adjacent to Willow Bench)	2,150		850	1,300
sub-totals	11,500	11,500	1,525	10,581
East End				
Causeway Restoration to Maintained Habitat above HWL	6,675	6,675	0	6,675
sub-totals	6,675	6,675	0	6,675
Other				
Marsh Planting/Marsh Creation below HWL	2,525	2,525	-	- ²
\$150,000 payment for Mission Creek restoration projects				
sub-totals	2,525	2,525	0	0
TOTALS	20,700	20,700	1,525	17,255

1. The additional 580 m² is to meet the habitat compensation requirement of 605 m² if all the old pontoons and 2 old piers are to be sunk in deep water (refer to discussion).
2. In 2005, hard-stem bulrush was harvested on the north side of the West Causeway and transplanted to the south side.

Preparatory Work prior to Disconnecting pontoons

There are a total of 11 connecting joints between the 12 pontoons. Every 2nd pontoon joint will be disconnected for a total of 5 joints, resulting in 6 sections consisting of 2 original pontoons. It may be necessary to remove a 6th joint, which would result in two individual pontoon sections. Each pontoon section will be removed and temporarily moored away from the bridge prior to removing the next section.

The following provides a brief description of the proposed cleanup procedures:

1. Individually undo and remove all connecting bolts that appear to be corroded and then clean and replace them. This will expedite the actual disconnection process during which the new bridge will have detached south anchors.
2. The hydraulic systems that tension the anchor cables will be removed prior to disposal. All accessible materials from the pontoons and piers that cannot be put in the lake will be removed. This includes the asphalt and exposed exterior steel such as handrails, light standards and electrical cables.
3. All other loose materials, including demolition debris will be removed from the pontoons and piers. This will include sweeping, followed by vacuuming of all surfaces with visible debris.
4. The hydraulic systems that tension the anchor cables will be removed prior to disposal.
5. All areas where hydrocarbon staining is observed, particularly in the anchor galleries where the hydraulic systems are located, will be power washed using a suitable detergent. The washate will be wet-vacuumed for disposal off site at an approved facility.
6. Interior attached steel such as elevated deck, catwalks and ladders and cable galleries will remain attached to the pontoons.
7. Representative sampling of demolition materials may be required to facilitate disposal. Sampling and laboratory analysis will be at the discretion of the Environmental Monitor.
8. The Environmental Monitor will inspect the pontoons and piers during and following cleanup. The pontoons and piers will not be prepared for final sinking until the Environmental Monitor is satisfied that they are clean.

Disconnecting pontoons

1. Install high strength rods and hydraulic jacks at the top corners of the joint being disconnected.
2. Release tension and disconnect either the single or both south anchors to the pontoon segments being disconnected.
3. Remove the connecting bolts in sequence and plug the bolt holes to seal the pontoon end compartment. Water ballast may be required to maintain a closed seal between the two pontoons at the disconnecting joint.
4. The Environmental Monitor will test ballast water for pH and clarity prior to pumping out to the lake. Remedial treatment (pH alteration) will be carried out as necessary.
5. Release the jacks and pump out the ballast water to break the seal between the two pontoons.
6. Tow the disconnected pontoon away from the old bridge and secure it to the temporary tie up piles.
7. Replace the anchor cable upper pennant on the south anchor and attach the anchor cable to the new bridge pontoon. Tension the anchor cable as required.

Preparatory Work for Sinking the pontoons

1. At the tie up location, prepare the towing and mooring points to allow the pontoons to be safely towed and secured at the sinking location.
2. Prepare the pontoon section for introduction of water to initiate sinking.
3. Finalize the removal of accessible pontoon materials that remain from demolition and disconnection activities.

Sinking the pontoons

The preferred location for the pontoon sinking is approximately 5 km (3 nautical miles) to the north of the bridge location off Traders Cove in the approximate middle of the lake. This is the closest location with a water depth of 152 m (500 feet) or greater and allows for a short tow from the bridge site. This location would also have significantly less potential for adverse weather conditions during the sinking operation than would the south side of the bridge. Due to the depth of water and mooring requirements for this operation, the north side presents substantially less risk from wind and weather related problems. This location will also allow the relocation of the derrick and pontoon

to the secure Graving Dock in a relatively short time frame, in an emergency event.

An alternative location for the old pontoon sinking is approximately 6.5 km (4 nautical miles) south of the bridge location in the middle of the lake off of Green Bay which is the nearest southerly location of greater than 152 m depth. This is a less preferable location due to the longer distance for towing and more importantly the greater chance of adverse wind and weather related risk.

The final pontoon sinking procedure will entail the following steps:

1. Once the sinking location is confirmed, 2 large temporary sea anchors and buoys will be placed at this location with a spacing to allow for the mooring of the pontoon sections while completing preparations and until the actual time of sinking. A GPS will be used to confirm locations.
2. Once each pontoon section is secured, the derrick will be brought alongside to facilitate final preparations for sinking.
3. The sinking will be initiated by the controlled introduction of water to override final buoyancy.

After sinking of the pontoon sections, sonar sounding or a similar method will be used to verify the final resting location of the sections on the lake bottom. The final resting location of the pontoons will again be established with a GPS.

Preparatory Work for Removing and Preparing the Piers

When the steel structures have been removed from the piers they will be prepared for removal by taking off all other miscellaneous materials leaving only the ballasted concrete structures. The deep west pier will then be removed by saddling it between barges placed on either side for vertical support and removing ballast water until the pier floats free of the piled foundation structure. Bumpers will be in place between the pier and the new bridge during this operation to avoid damage to the bridge. Once the pier is floating free it will be towed to the south disposal location for sinking using the same procedures employed for the pontoon sinking.

The shorter east pier will be removed in much the same way, however the added backfill around the east side of the pier will first need to be removed to allow it float free once the ballast has been removed.

All ballast water will be tested before removal and the pier compartments and exterior will be inspected for cleanliness before being sunk at the disposal location.

Sinking Piers

The piers are too high (deep) to take under the bridge to the pontoon sinking site and the proposed location for the pier sinking is approximately 6.5 km (4 nautical miles) south of the bridge in the middle of the lake near Green Bay, which is the nearest southerly location of greater than 152 m depth.

GRAVING DOCK

The primary objective of the Graving Dock reclamation plan is the restoration of the site to the equivalent of pre-project conditions, or better, from an ecological perspective. The WRBB will work with the site owners, Tolko Industries Ltd., to prepare a reclamation plan that will ensure that these objectives are met. The exceptions to the removal of most improvements at the site and the re-grading to pre-project conditions are likely to be the retention of the main access road, reconfiguration of access to the public boat launch and some or all of the permanent fencing, and some of the electrical services.

The following provides a brief description of the steps that will be required in reclaiming the Graving Dock site. A more detailed plan will be prepared at a later date.

Removal of Infrastructure and Site Cleanup

1. remove all equipment and supplies;
2. remove all trailers and ancillary works such as concrete pads or foundations, water and sewage holding tanks;
3. remove above and below ground electrical, hot water heating, and other services (Tolko may want to retain some electrical services);
4. remove all Graving Dock works, including gates and sheetpiles;
5. review deep burial of piles and Graving Dock slab with Tolko and resource agencies and remove any portion of the slab that might be exposed along the lake bottom;
6. remove the Graving Dock dewatering system, including the rip-rap and manhole outlet structure;
7. remove all concrete pads from storage and construction areas;
8. remove all litter from the site;
9. remove all metal from working areas of the site, including use of magnets to pick up small pieces of ferrous metals;
10. audit site and cleanup any contaminated soils where fuel/oil spots occur, particularly around fuel storage and form oil storage sites.

Site Re-grading

1. fill Graving Dock with original material stored in the Waste Dump and re-grade entire area, including the north and south fingers;

2. tie in north and south finger areas to the beach areas configuring the beach berm to the pre-project grade to the extent practical;
3. re-grade waste dump, ensuring that the clean sandy material is spread over the entire surface;
4. re-grade the working areas of the site where trailers and storage areas were established, contouring to the natural grade to the extent practical.

Planting Plan

The disturbed native habitat within the Graving Dock site totals 3,702 m². All disturbed areas within the Graving Dock site will be planted to native species, at a similar density to the pre-project conditions. One issue that will have to be addressed that is not directly related to the WRBB Project is the number of ponderosa pine trees that have died or are dying as a result of the western pine beetle. It is apparent that most, if not all, of the ponderosa pines on the site will die as the result of the infestation that has drastically increased in severity since the WRBB Project took over the site.

All disturbed and re-graded areas will be seeded with the custom Interior Dryland seed mix in either the spring or fall. Detailed planting plans for trees and shrubs will be developed in consultation with Tolko and the resource agencies. The following sections provide brief descriptions of the proposed planting prescriptions for each area of the site.

Upper Parking Lots

The upper parking lot, trailer sites, and Waste Dump, were developed in the Upland vegetation zone which in addition to a largely native grass cover, contained ponderosa pine, red maple, Saskatoon berry, red osier dogwood, Oregon grape and wild rose. Following hydro-seeding, these species will be replanted in areas that are to be reclaimed to natural habitat at a similar density to that which existed pre-project disturbance.

Disturbed (Cleared) Areas

The majority of the lower site was previously cleared and disturbed by logging and sort yard operations. This area will be re-seeded to the custom Interior Dryland seed mix in either the spring or fall. Shrubs and trees will not be planted in this area.

Riparian Areas

The riparian zone (along the beach) will be planted to wild rose, wax berry, Oregon grape, Saskatoon berry, and red osier dogwood, all species that currently occur within the site.

Timing

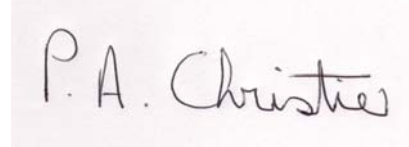
The demobilization and reclamation of the Graving Dock will not be carried out until the removal and disposal of the old pontoons is complete. Removal of some of the equipment and the materials used in the construction of the pontoons will begin following completion of the last pontoon (expected by the end of February 2008). Some reclamation procedures, such as limited site grading and planting of areas peripheral to the Graving Dock could be undertaken in the fall of 2008, with the removal and reclamation of the graving dock facility likely to occur in 2009.

MONITORING REQUIREMENTS

DFO Requirements

The DFO Amended Authorization presents detailed requirements for the implementation of the Habitat Compensation and Reclamation Plan.

Should you have any questions regarding the habitat restoration and reclamation program please call me at (250) 542-1567.



Paul A. Christie, P.Ag., R.P.Bio.
Talisman Land Resource Consultants Inc.

Attachments:

- Photos 1 & 2
- Appendix 1 - Custom Interior Dryland seed mix
- DFO Amended Authorization, May 16, 2006

Plans:

- Figure 5-3, Okanagan Lake Bridge, Habitat Balance Issues, Positive Impacts (Coast River Environmental Services, August 22, 2001)
- Bennett Bridge, Landscape Plans, Sheets L1-L4 (Site 360 Landscape Architecture, March 07/08)
- WRB Bridge Project Habitat Compensation (Westmar, Dec. 4, 2007, Rev. 0)
- West Causeway Restoration Grading & Vegetation Plan (Westmar, Oct. 25/07, Drawing No. 1458-194A)



Photo 1: The south-westerly portion of the linear planting bench along the Campbell Road Interchange was constructed and hydro-seeded in the fall of 2007. It will be planted to native willows in the spring of 2008 (photo Nov. 14 '07).



Photo 2: The portion of the Granular Beach habitat requirement adjacent to the linear planting bench was completed in the fall of 2007. It will be extended along the remainder of the linear planting bench to be constructed in 2008 (photo Dec. 5, '07).

Appendix 1 - Custom Interior Dryland Seed Mix

mulch - ecofibreplus - 2400 kg/ha

fertilizer - 26-13-13, 50% pcu

seed - 35 kg/ha

annual rye - 15 kg/ha

Native seed mix by weight / species

Bluebunchwheatgrass	40%/16%
Rough Fescue	25%/21%
Idaho Fescue	15%/18%
Perennial ryegrass	10%/7%
Sandberg Bluegrass	5%/13%
Junegrass	4%/18%
Canada Bluegrass	1%/7%