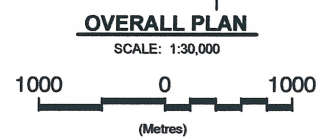
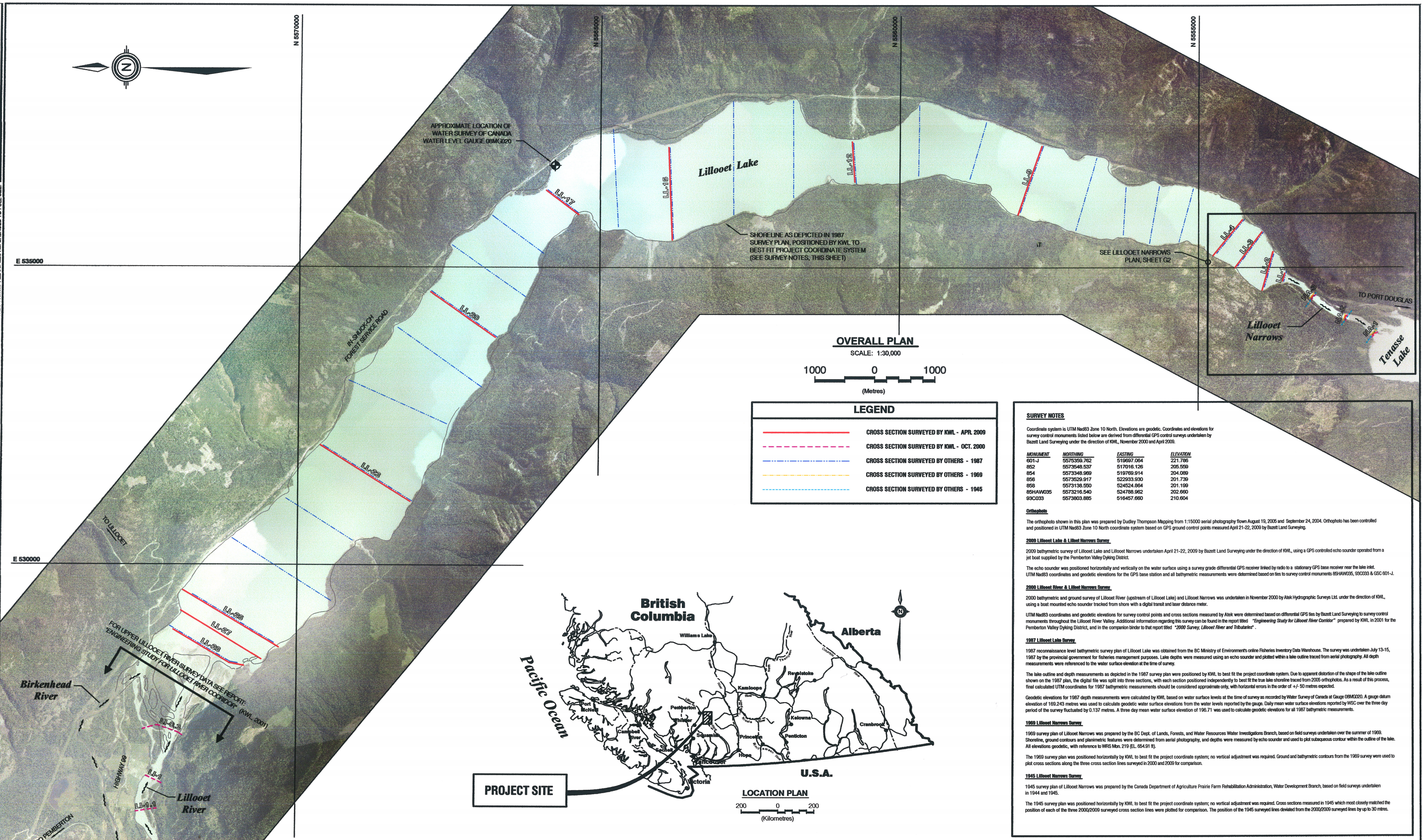


C:\0700-0769\713-0371\00-Drawings\713037G1.dwg October 13, 2009 AT FULL SIZE THIS BAR MEASURES 100mm. ALL SCALES REFERENCED TO FULL SIZE.



LEGEND

	CROSS SECTION SURVEYED BY KWL - APR. 2009
	CROSS SECTION SURVEYED BY KWL - OCT. 2009
	CROSS SECTION SURVEYED BY OTHERS - 1967
	CROSS SECTION SURVEYED BY OTHERS - 1969
	CROSS SECTION SURVEYED BY OTHERS - 1945

SURVEY NOTES

Coordinate system is UTM Nad83 Zone 10 North. Elevations are geoidic. Coordinates and elevations for survey control monuments listed below are derived from differential GPS control surveys undertaken by Bazett Land Surveying under the direction of KWL, November 2000 and April 2009.

MONUMENT	NORTHING	EASTING	ELEVATION
601-J	519697.004	519697.004	221.796
852	5573548.537	517016.126	205.559
854	5573348.969	519769.914	204.089
856	5573529.917	522933.930	201.739
858	5573136.550	524524.864	201.159
85HA-W035	5573216.540	524786.952	202.660
93C033	5573803.885	516457.660	210.604

Orthophoto
The orthophoto shown in this plan was prepared by Dudley Thompson Mapping from 1:15000 aerial photography flown August 10, 2005 and September 24, 2004. Orthophoto has been controlled and positioned in UTM Nad83 Zone 10 North coordinate system based on GPS ground control points measured April 21-22, 2009 by Bazett Land Surveying.

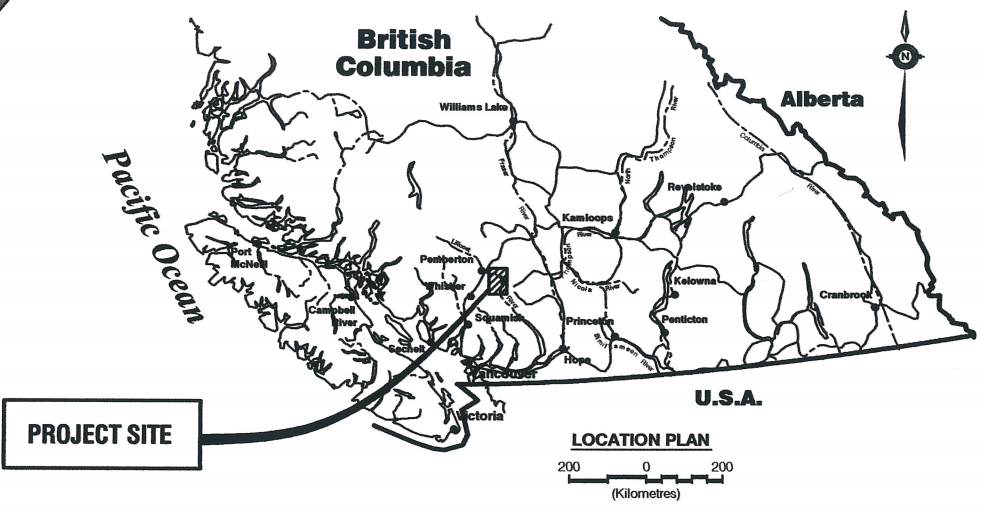
2009 Lillooet Lake & Lillooet Narrows Survey
2009 bathymetric survey of Lillooet Lake and Lillooet Narrows undertaken April 21-22, 2009 by Bazett Land Surveying under the direction of KWL, using a GPS controlled echo sounder operated from a jet boat supplied by the Pemberton Valley Dyking District.
The echo sounder was positioned horizontally and vertically on the water surface using a survey grade differential GPS receiver linked by radio to a stationary GPS base receiver near the lake inlet. UTM Nad83 coordinates and geoidic elevations for the GPS base station and all bathymetric measurements were determined based on ties to survey control monuments 85HA-W035, 93C033 & GSC 601-J.

2000 Lillooet River & Lillooet Narrows Survey
2000 bathymetric and ground survey of Lillooet River (upstream of Lillooet Lake) and Lillooet Narrows was undertaken in November 2000 by Atak Hydrographic Surveys Ltd. under the direction of KWL, using a boat mounted echo sounder tracked from shore with a digital transit and laser distance meter.
UTM Nad83 coordinates and geoidic elevations for survey control points and cross sections measured by Atak were determined based on differential GPS ties by Bazett Land Surveying to survey control monuments throughout the Lillooet River Valley. Additional information regarding this survey can be found in the report titled "Engineering Study for Lillooet River Corridor" prepared by KWL in 2001 for the Pemberton Valley Dyking District, and in the companion binder to that report titled "2000 Survey, Lillooet River and Tributaries".

1967 Lillooet Lake Survey
1967 reconnaissance level bathymetric survey plan of Lillooet Lake was obtained from the BC Ministry of Environment's online Fisheries Inventory Data Warehouse. The survey was undertaken July 13-15, 1967 by the provincial government for fisheries management purposes. Lake depths were measured using an echo sounder and plotted within a lake outline traced from aerial photography. All depth measurements were referenced to the water surface elevation at the time of survey.
The lake outline and depth measurements as depicted in the 1967 survey plan were positioned by KWL to best fit the project coordinate system. Due to apparent distortion of the shape of the lake outline shown on the 1967 plan, the digital file was split into three sections, with each section positioned independently to best fit the true lake shoreline traced from 2005 orthophoto. As a result of this process, final calculated UTM coordinates for 1967 bathymetric measurements should be considered approximate only, with horizontal errors in the order of +/- 50 metres expected.
Geoidic elevations for 1967 depth measurements were calculated by KWL based on water surface levels at the time of survey as recorded by Water Survey of Canada at Gauge 09MG020. A gauge datum elevation of 169.243 metres was used to calculate geoidic water surface elevations from the water levels reported by the gauge. Daily mean water surface elevations reported by WSC over the three day period of the survey fluctuated by 0.137 metres. A three day mean water surface elevation of 196.71 was used to calculate geoidic elevations for all 1967 bathymetric measurements.

1969 Lillooet Narrows Survey
1969 survey plan of Lillooet Narrows was prepared by the BC Dept. of Lands, Forests, and Water Resources Water Investigations Branch, based on field surveys undertaken over the summer of 1969. Shoreline, ground contours and planimetric features were determined from aerial photography, and depths were measured by echo sounder and used to plot subsequent contour within the outline of the lake. All elevations geoidic, with reference to WRS Mon. 219 (E.L. 654.91 ft).
The 1969 survey plan was positioned horizontally by KWL to best fit the project coordinate system; no vertical adjustment was required. Ground and bathymetric contours from the 1969 survey were used to plot cross sections along the three cross section lines surveyed in 2000 and 2009 for comparison.

1945 Lillooet Narrows Survey
1945 survey plan of Lillooet Narrows was prepared by the Canada Department of Agriculture Prairie Farm Rehabilitation Administration, Water Development Branch, based on field surveys undertaken in 1944 and 1945.
The 1945 survey plan was positioned horizontally by KWL to best fit the project coordinate system; no vertical adjustment was required. Cross sections measured in 1945 which most closely matched the position of each of the three 2000/2009 surveyed cross section lines were plotted for comparison. The position of the 1945 surveyed lines deviated from the 2000/2009 surveyed lines by up to 30 metres.



Issued for	Issue	Date	Issued By	Rev. No.	Date	Designed	Drawn	Checked	Description of Revision	Rev. No.	Date	Designed	Drawn	Checked	Description of Revision
Reference				0	OCT.13/09		TWC								
Approvals															
Tender															
Permits															
Construction															
Record Drawings															

kw KERR WOOD LEIDAL
associates limited
CONSULTING ENGINEERS

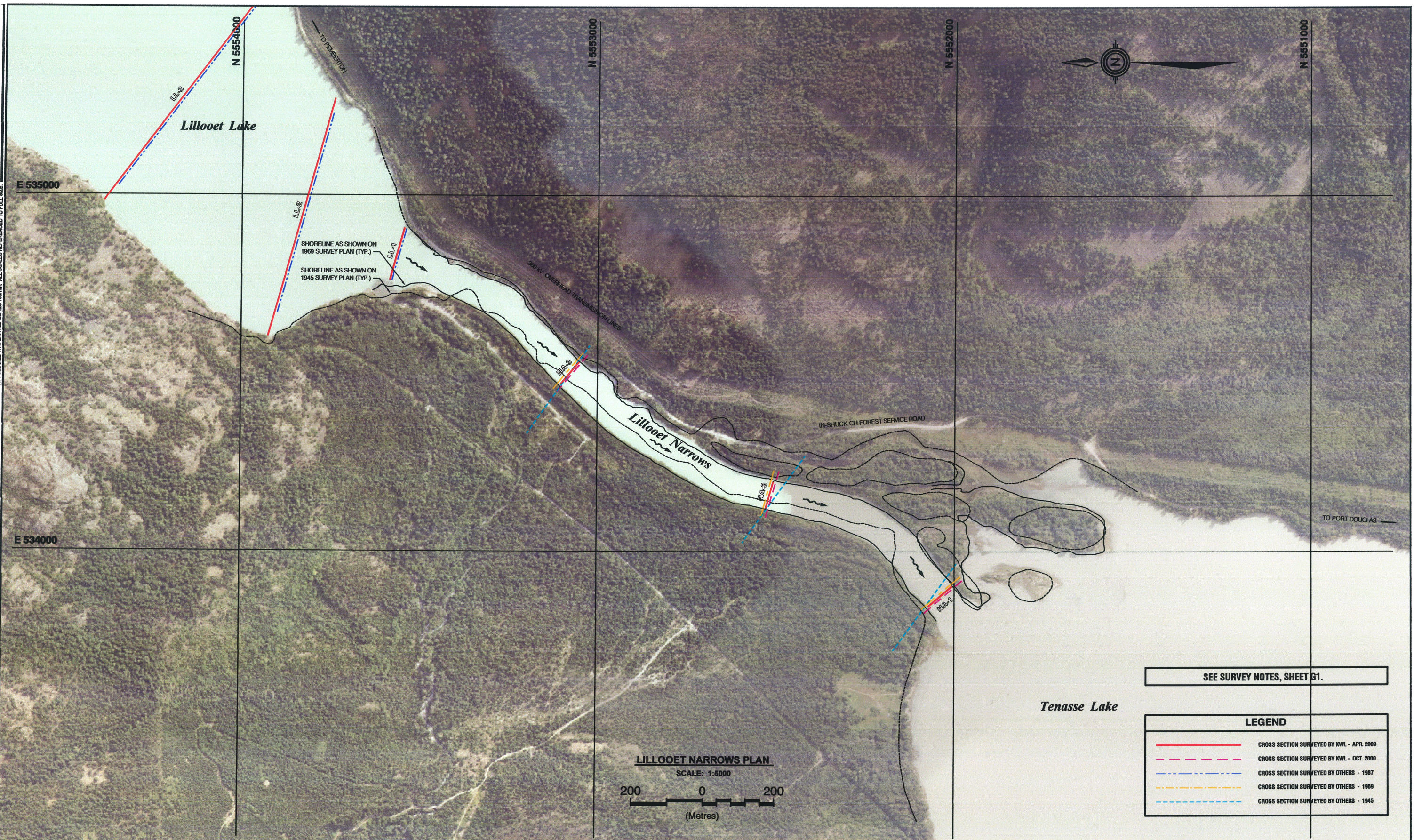
PEMBERTON VALLEY DYKING DISTRICT
2009 LILLOOET LAKE SURVEY AND
COMPILATION OF HISTORIC SURVEY DATA
OVERALL PLAN AND SURVEY NOTES

KWL Project No. 713.037 Scale 1:30,000 **G1**
Sheet 1 of 12 Rev. No. 0
Client: PEMBERTON VALLEY DYKING DISTRICT

AT FULL SIZE THIS BAR MEASURES 100mm. ALL SCALES REFERENCED TO FULL SIZE.

October 13, 2009

C:\0700-0786\713-0371500-Drawings\71303706.dwg



LILLOOET NARROWS PLAN
SCALE: 1:5000
200 0 200
(Metres)

SEE SURVEY NOTES, SHEET G1.

LEGEND	
	CROSS SECTION SURVEYED BY KWL - APR. 2009
	CROSS SECTION SURVEYED BY KWL - OCT. 2000
	CROSS SECTION SURVEYED BY OTHERS - 1987
	CROSS SECTION SURVEYED BY OTHERS - 1969
	CROSS SECTION SURVEYED BY OTHERS - 1945

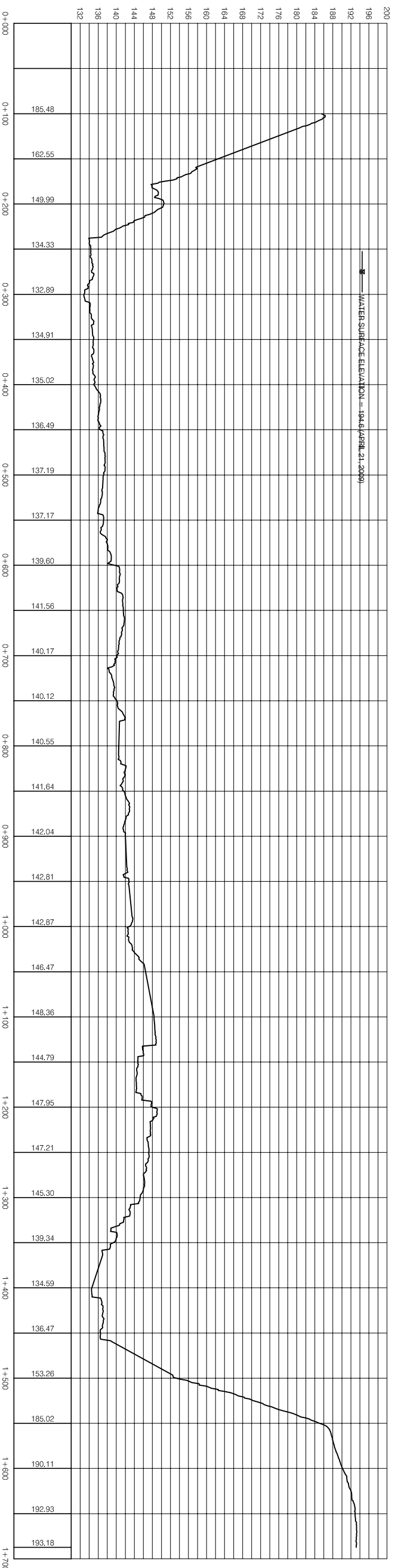
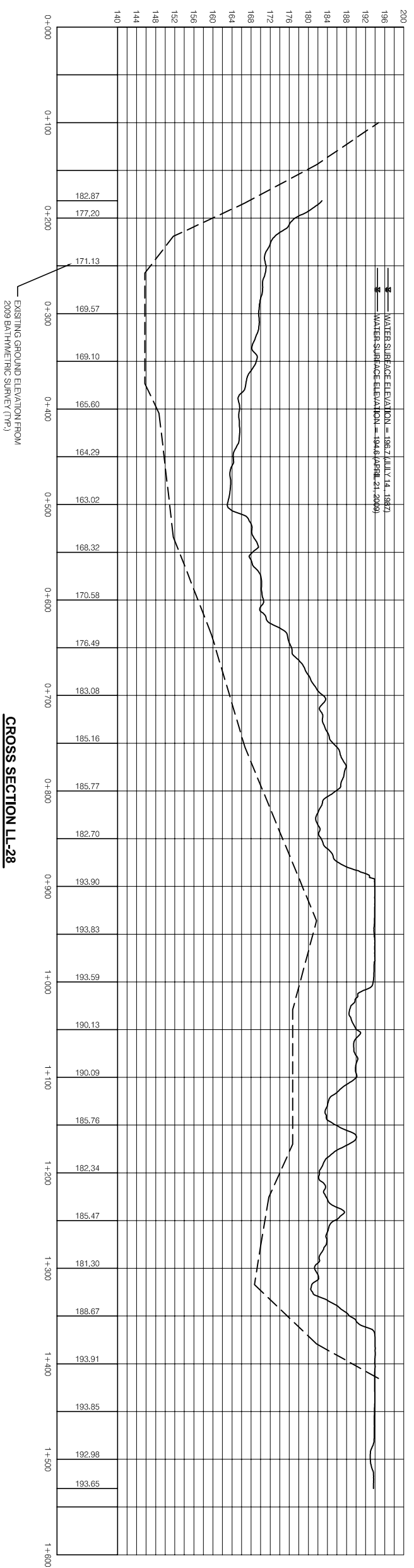
Issued for	Issue	Date	Issued By	Rev. No.	Date	Designed	Drawn	Checked	Description of Revision	Rev. No.	Date	Designed	Drawn	Checked	Description of Revision
Reference				0	OCT.13.09		TWC								
Approvals															
Tender															
Permits															
Construction															
Record Drawings															

kwl KERR WOOD LEIDAL
associates limited
CONSULTING ENGINEERS

PEMBERTON VALLEY DYKING DISTRICT
2009 LILLOOET LAKE SURVEY AND
COMPILATION OF HISTORIC SURVEY DATA
LILLOOET NARROWS PLAN

KWL Project No. 713.037 Scale 1:5000
Sheet 2 of 12 Rev. No. 0 **G2**
Drawing Number

Client: PEMBERTON VALLEY DYKING DISTRICT



NOTE: 1987 CROSS SECTIONS ARE APPROXIMATE AND SHOWN FOR REFERENCE ONLY. POSITION OF CROSS SECTION LINES SURVEYED IN 1987 MAY DEVIATE BY UP TO 80 m FROM CROSS SECTION LINES SURVEYED IN 2009. RELATIVE ACCURACY OF 1987 DEPTH MEASUREMENTS IS UNKNOWN. SEE SURVEY NOTES, SHEET 61 FOR ADDITIONAL DETAILS.

LEGEND

—	EXISTING GROUND FROM 2009 SURVEY
- - -	APPROX. EX. GROUND FROM 1987 SURVEY

ISSUED INFORMATION			
Issued for	Issue	Date	Issued By
Reference Approvals			
Tender			
Permits			
Construction			
Record Drawings			

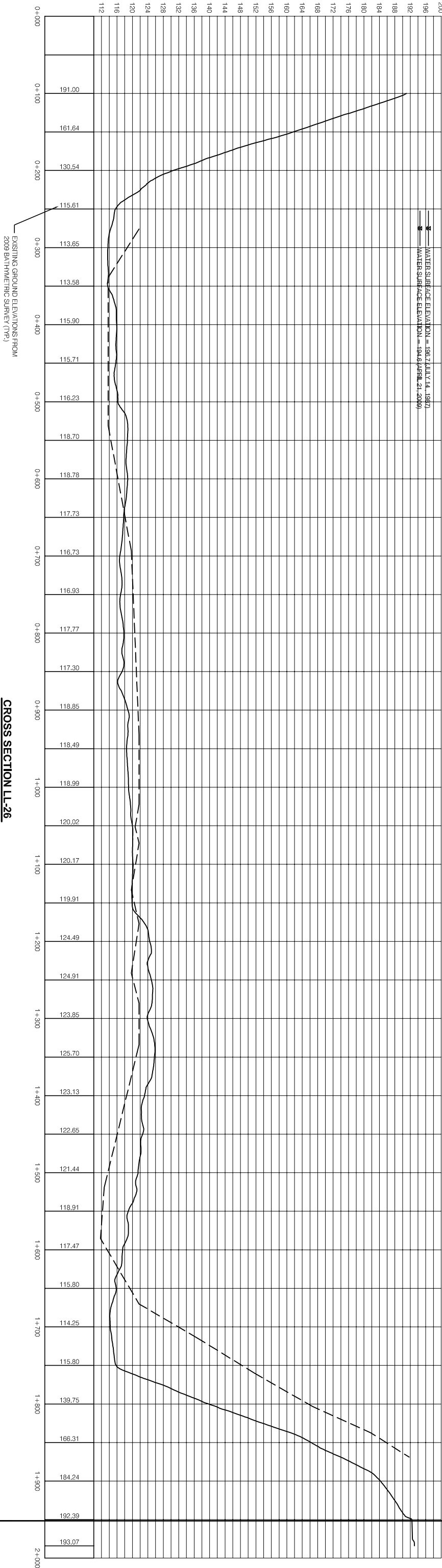
REVISION INFORMATION			
Rev. No.	Date	Designed	Drawn
0	OCT 13/09		TWC

Rev. No.	Date	Designed	Drawn	Checked	Description of Revision

<p>PEMBERTON VALLEY DYKING DISTRICT 2009 LILLOOET LAKE SURVEY AND COMPILATION OF HISTORIC SURVEY DATA CROSS SECTIONS LL-28 & LL-27</p>		<p>KWL Project No. 713037 Sheet 3 of 12 Scale H:1:2500 V:1:500 Rev. No. 0</p>	<p>G3 Drawing Number</p>
---	--	---	-------------------------------------

<p>KWL KERRWOOD LEIDAL CONSULTING ENGINEERS <i>associates limited</i></p>		<p>Client: PEMBERTON VALLEY DYKING DISTRICT</p>
--	--	---

ISSUED INFORMATION			
Issued for	Issue	Date	Issued By
Reference			
Approvals			
Tender			
Permits			
Construction			
Record Drawings			
REVISION INFORMATION			
Rev. No.	Date	Designed	Drawn
0	OCT. 13/09		TWC
Description of Revision			
Rev. No.	Date	Designed	Drawn
Description of Revision			



NOTE: 1987 CROSS SECTIONS ARE APPROXIMATE AND SHOWN FOR REFERENCE ONLY. POSITION OF CROSS SECTION LINES SURVEYED IN 1987 MAY DEVIATE BY UP TO 80 m FROM CROSS SECTION LINES SURVEYED IN 2009. RELATIVE ACCURACY OF 1987 DEPTH MEASUREMENTS IS UNKNOWN. SEE SURVEY NOTES, SHEET 61 FOR ADDITIONAL DETAILS.

LEGEND	
—————	EXISTING GROUND FROM 2009 SURVEY
- - - - -	APPROX. EX. GROUND FROM 1987 SURVEY



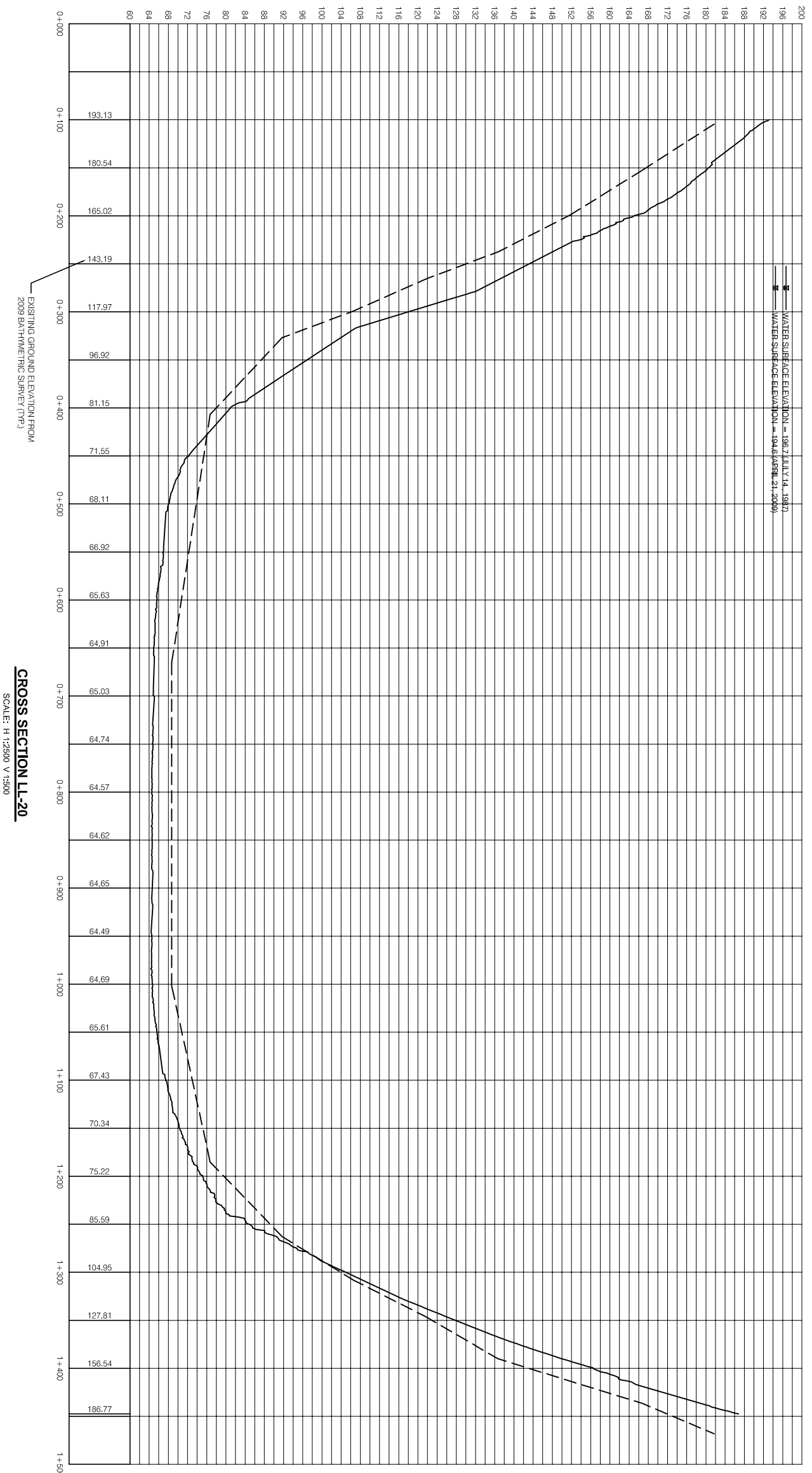
PEMBERTON VALLEY DYKING DISTRICT
2009 LILLOET LAKE SURVEY AND
COMPILATION OF HISTORIC SURVEY DATA
CROSS SECTION LL-26

KWL Project No. 713.037 Scale H 1:2500, V 1:500
Sheet 4 of 12 Rev. No. 0 Drawing Number **G4**
Client: PEMBERTON VALLEY DYKING DISTRICT

ISSUED INFORMATION			
Issued for	Issue	Date	Issued By
Reference Approvals			
Tender			
Permits			
Construction			
Record Drawings			

REVISION INFORMATION			
Rev. No.	Date	Designed	Drawn
0	OCT 13/09	TWC	

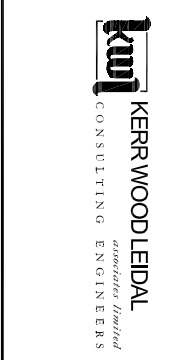
Rev. No.	Date	Designed	Drawn	Checked	Description of Revision



CROSS SECTION LL-20
SCALE: H 1:2500 V 1:500

NOTE: 1987 CROSS SECTIONS ARE APPROXIMATE AND SHOWN FOR REFERENCE ONLY. POSITION OF CROSS SECTION LINES SURVEYED IN 1987 MAY DEVIATE BY UP TO 80 m FROM CROSS SECTION LINES SURVEYED IN 2009. RELATIVE ACCURACY OF 1987 DEPTH MEASUREMENTS IS UNKNOWN. SEE SURVEY NOTES SHEET 61 FOR ADDITIONAL DETAILS.

LEGEND	
	EXISTING GROUND FROM 2009 SURVEY
	APPROX. EX. GROUND FROM 1987 SURVEY



PEMBERTON VALLEY DYKING DISTRICT
2009 LILLOOET LAKE SURVEY AND
COMPILATION OF HISTORIC SURVEY DATA
CROSS SECTION LL-20

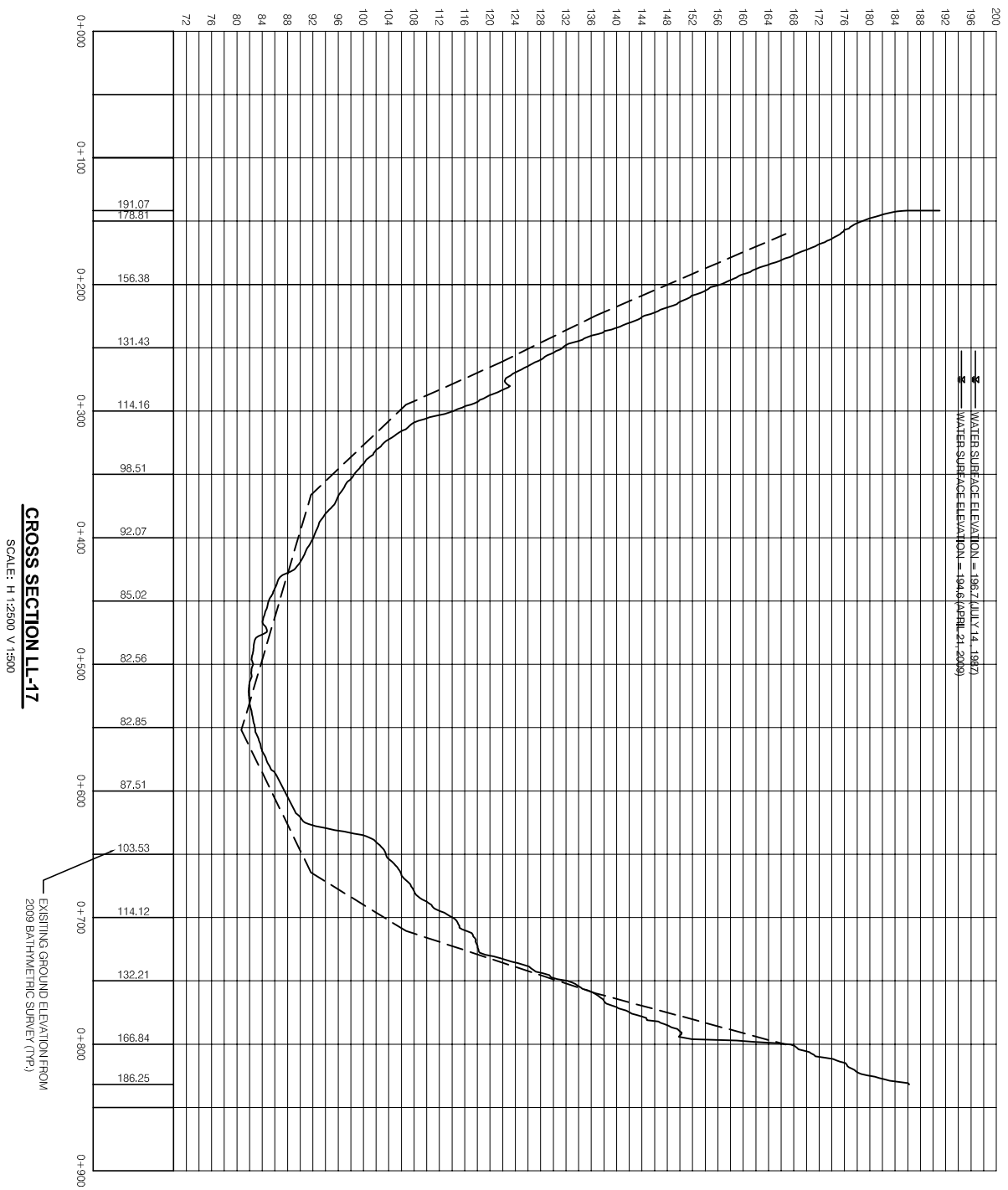
KVL Project No. 713037
Sheet 6 of 12
Scale H 1:2500, V 1:500
Rev. No. 0
Drawing Number **G6**

Client: PEMBERTON VALLEY DYKING DISTRICT

ISSUED INFORMATION			
Issued for	Issue	Date	Issued By
Reference			
Approvals			
Tender			
Permits			
Construction			
Record Drawings			

REVISION INFORMATION			
Rev. No.	Date	Designed	Drawn
0	OCT 13/09		TWC

Description of Revision	Rev. No.	Date	Designed	Drawn	Checked



NOTE: 1987 CROSS SECTIONS ARE APPROXIMATE AND SHOWN FOR REFERENCE ONLY. POSITION OF CROSS SECTION LINES SURVEYED IN 1987 MAY DEVIATE BY UP TO 80 m FROM CROSS SECTION LINES SURVEYED IN 2009. RELATIVE ACCURACY OF 1987 DEPTH MEASUREMENTS IS UNKNOWN. SEE SURVEY NOTES, SHEET G1 FOR ADDITIONAL DETAILS.

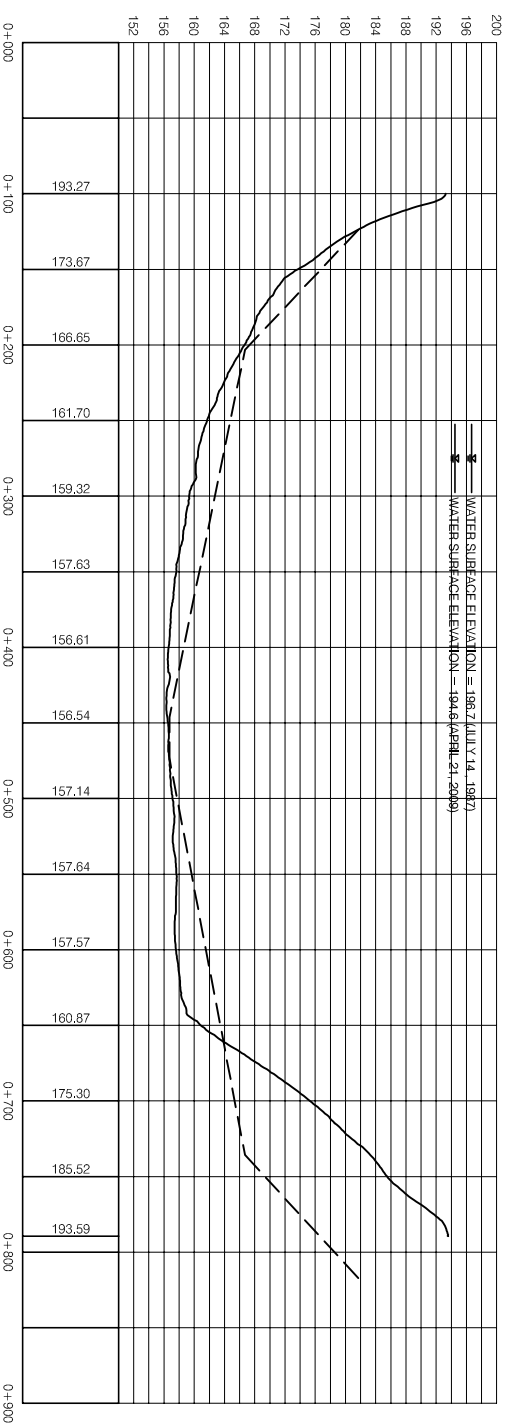
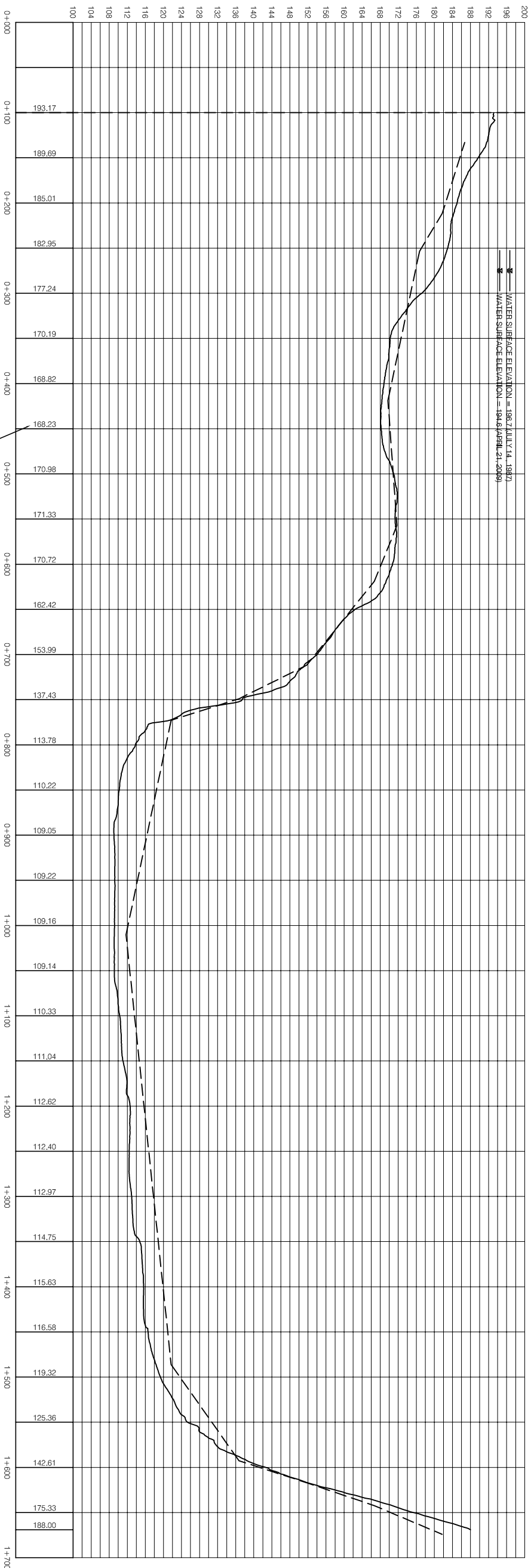
LEGEND	
	EXISTING GROUND FROM 2009 SURVEY
	APPROX. EX. GROUND FROM 1987 SURVEY

KWL KERRWOOD LEIDAL
CONSULTING ENGINEERS

PEMBERTON VALLEY DYKING DISTRICT
2009 LILLOOET LAKE SURVEY AND
COMPILATION OF HISTORIC SURVEY DATA
CROSS SECTION LL-17

Project No. 713037
Sheet 7 of 12
Scale H 1:2500, V 1:500
Rev. No. 0
Drawing Number **G7**

Client: PEMBERTON VALLEY DYKING DISTRICT



NOTE: 1987 CROSS SECTIONS ARE APPROXIMATE AND SHOWN FOR REFERENCE ONLY. POSITION OF CROSS SECTION LINES SURVEYED IN 1987 MAY DEVIATE BY UP TO 80 m FROM CROSS SECTION LINES SURVEYED IN 2009. RELATIVE ACCURACY OF 1987 DEPTH MEASUREMENTS IS UNKNOWN. SEE SURVEY NOTES SHEET G1 FOR ADDITIONAL DETAILS.

LEGEND

	EXISTING GROUND FROM 2009 SURVEY
	APPROX. EX. GROUND FROM 1987 SURVEY

ISSUED INFORMATION			
Issued for	Issue	Date	Issued By
Reference			
Approvals			
Tender			
Permits			
Construction			
Record Drawings			

REVISION INFORMATION			
Rev. No.	Date	Designed	Drawn
0	OCT 13/09		TWC

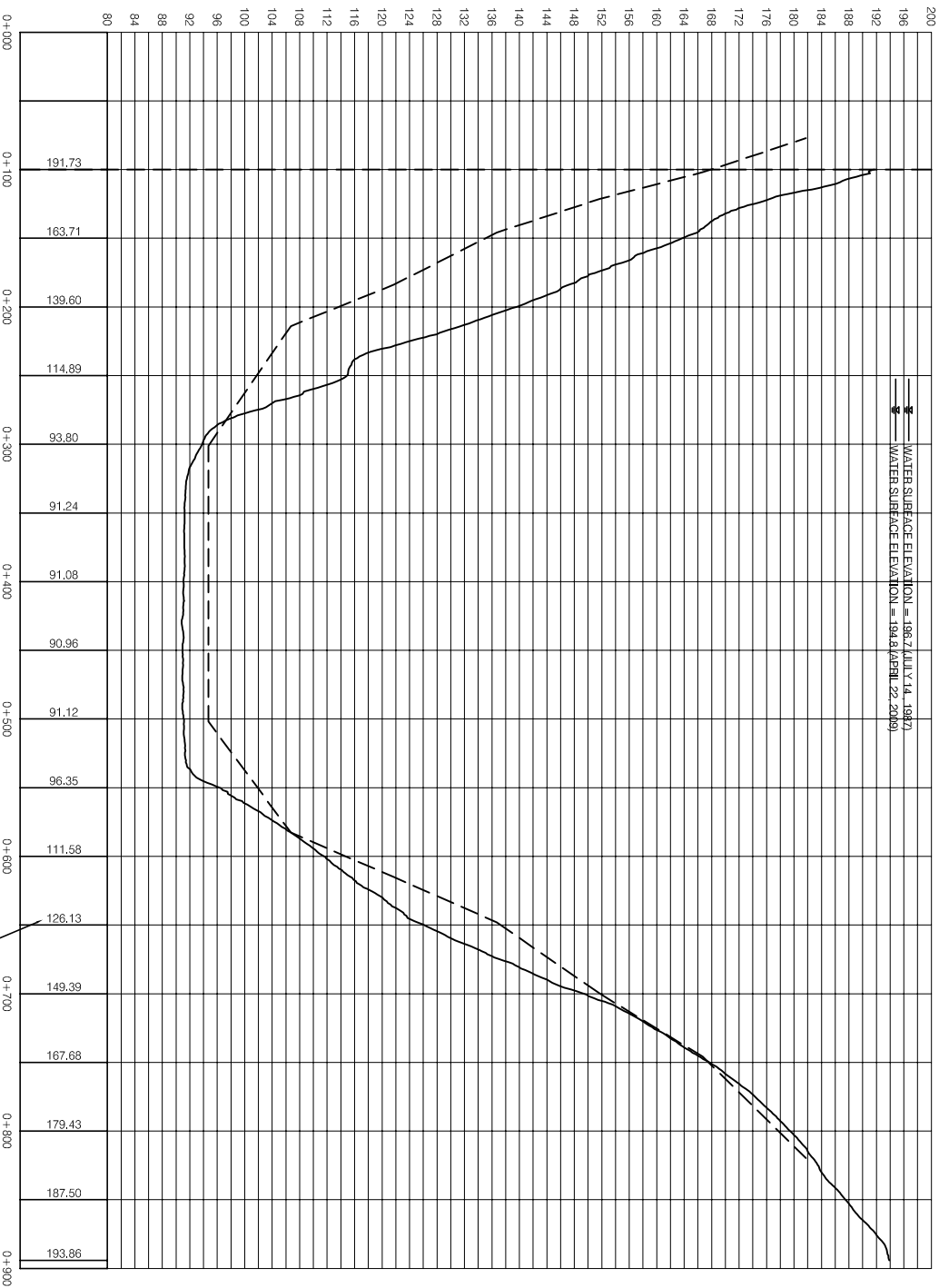
KWL KERRWOOD LEIDAL
CONSULTING ENGINEERS

PEMBERTON VALLEY DYKING DISTRICT
LILLOOET LAKE OUTLET ANALYSIS
APRIL 2009 LILLOOET LAKE BATHYMETRIC SURVEY
CROSS SECTION LL-15 & LL-12

Client: PEMBERTON VALLEY DYKING DISTRICT

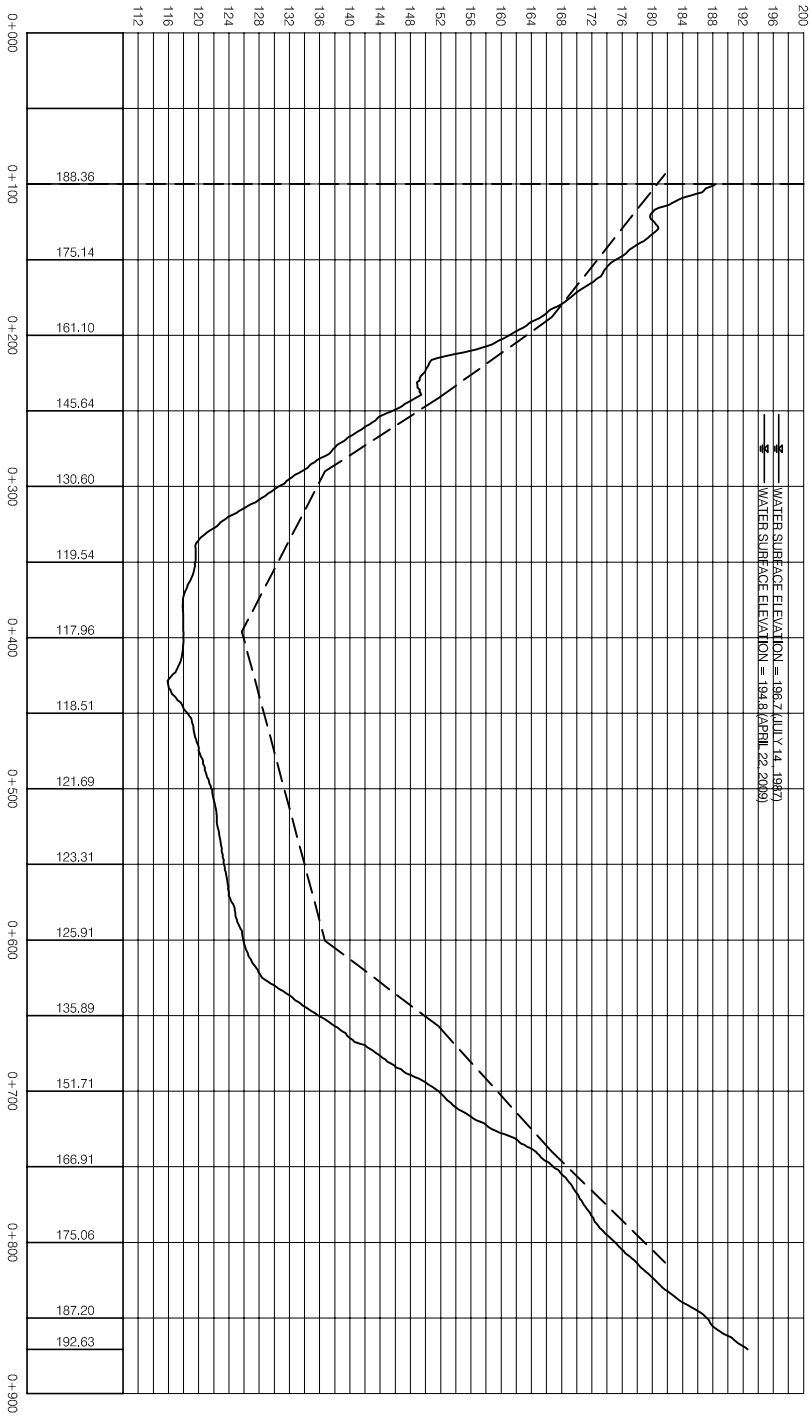
G8

KWL Project No. 713.037
Sheet 8 of 12
Scale H: 1:2500, V: 1:500
Rev. No. 0
Drawing Number



CROSS SECTION LL-4
SCALE: H 1:2500 V 1:500

EXISTING GROUND ELEVATION FROM 2009 BATHYMETRIC SURVEY (TP)



CROSS SECTION LL-3
SCALE: H 1:2500 V 1:500

NOTE: 1987 CROSS SECTIONS ARE APPROXIMATE AND SHOWN FOR REFERENCE ONLY. POSITION OF CROSS SECTION LINES SURVEYED IN 1987 MAY DEVIATE BY UP TO 80 m FROM CROSS SECTION LINES SURVEYED IN 2009. RELATIVE ACCURACY OF 1987 DEPTH MEASUREMENTS IS UNKNOWN. SEE SURVEY NOTES SHEET G1 FOR ADDITIONAL DETAILS.

LEGEND	
	EXISTING GROUND FROM 2009 SURVEY
	APPROX. EX. GROUND FROM 1987 SURVEY

ISSUED INFORMATION			
Issued for	Issue	Date	Issued By
Reference			
Approvals			
Tender			
Permits			
Construction			
Record Drawings			

REVISION INFORMATION			
Rev. No.	Date	Designed	Drawn
0	OCT 13/09		TWC

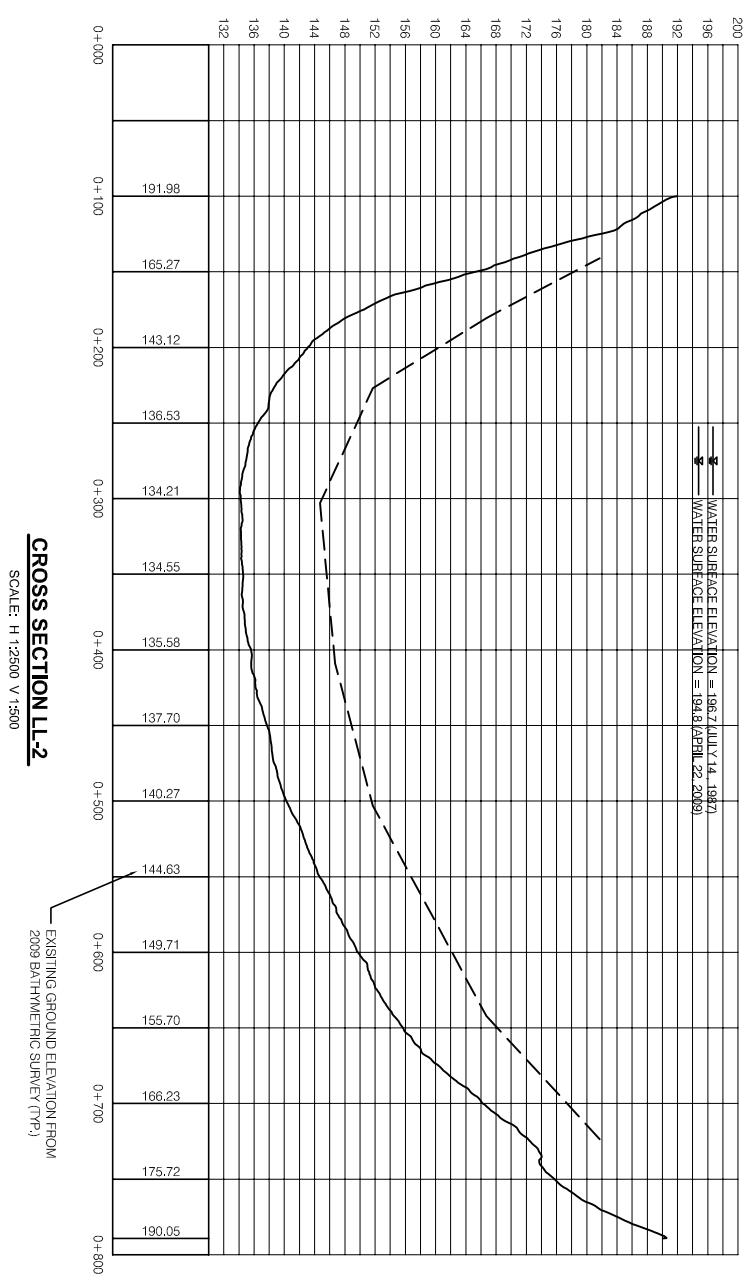
Rev. No.	Date	Designed	Drawn	Checked	Description of Revision

Seal

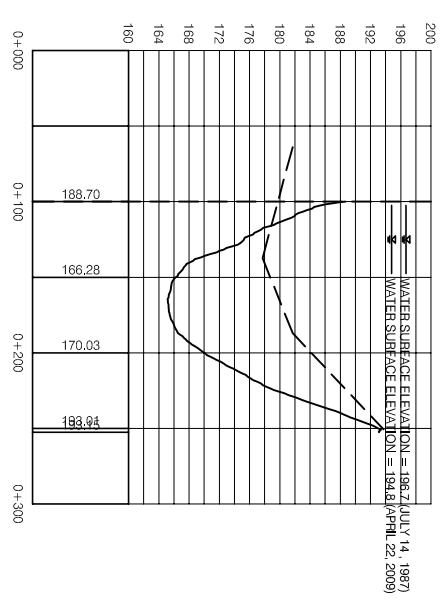
KERRWOOD LEIDAL
CONSULTING ENGINEERS

PEMBERTON VALLEY DYKING DISTRICT
LILLOOET LAKE SURVEY AND
COMPILATION OF HISTORIC SURVEY DATA
CROSS SECTION LL-4 & LL-3

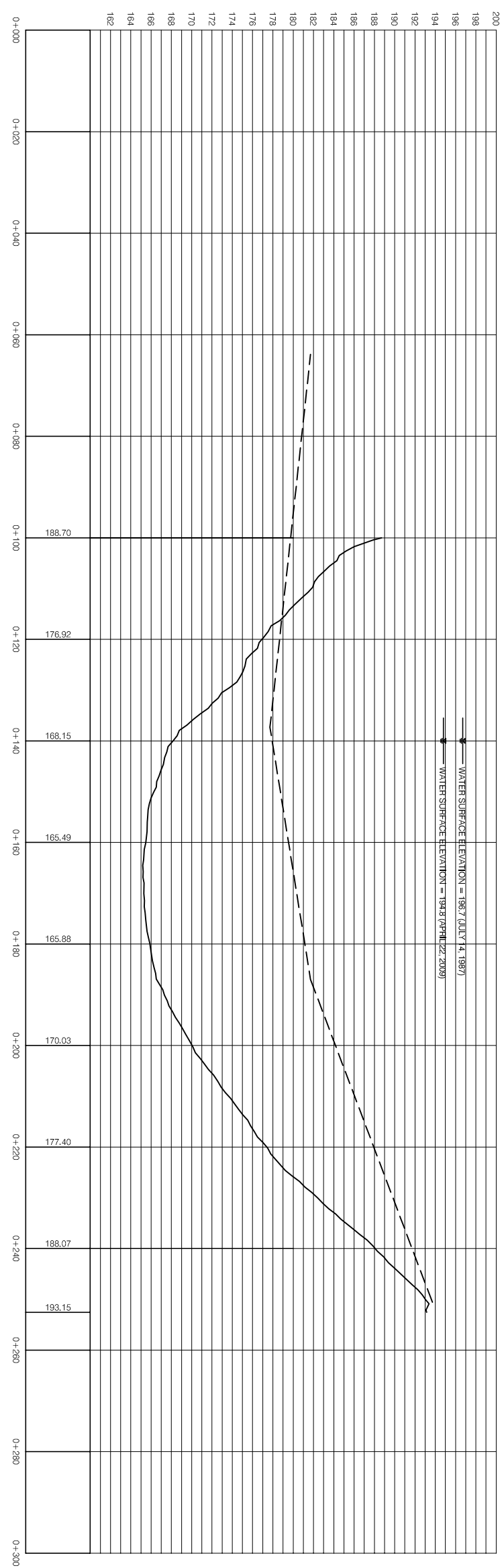
KVIL Project No. 713037
Sheet 10 of 12
Scale H 1:2500, V 1:500
Rev. No. 0
Drawing Number **G10**
Client: PEMBERTON VALLEY DYKING DISTRICT



CROSS SECTION LL-2
SCALE: H 1:2500 V 1:500



CROSS SECTION LL-1
SCALE: H 1:2500 V 1:500



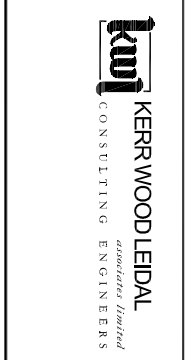
CROSS SECTION LL-1
SCALE: H 1:500 V 1:250

NOTE: 1997 CROSS SECTIONS ARE APPROXIMATE AND SHOWN FOR REFERENCE ONLY. POSITION OF CROSS SECTION LINES SURVEYED IN 1997 MAY DEVIATE BY UP TO 60 m FROM CROSS SECTION LINES SURVEYED IN 2009. RELATIVE ACCURACY OF 1997 DEPTH MEASUREMENTS IS UNKNOWN. SEE SURVEY NOTES, SHEET G1 FOR ADDITIONAL DETAILS.

LEGEND

	EXISTING GROUND FROM 2009 SURVEY
	APPROX. EX. GROUND FROM 1997 SURVEY

ISSUED INFORMATION				REVISION INFORMATION			
Issued for	Issue	Date	Issued By	Rev. No.	Date	Designed	Drawn
Reference				0	OCT 13/09		TWC
Approvals							
Tender							
Permits							
Construction							
Record Drawings							



PEMBERTON VALLEY DYKING DISTRICT
2009 LILLOOET LAKE SURVEY AND
COMPILATION OF HISTORIC SURVEY DATA
CROSS SECTION LL-2 & LL-1

KWL Project No. 713.037 Scale AS NOTED
 Sheet 11 of 12 Rev. No. 0
 Client: PEMBERTON VALLEY DYKING DISTRICT

G11
 Drawing Number

