Western Copper Corporation

Project Proposal

Carmacks Copper Project
Yukon Territory

Appendix G1

Waste Rock Storage Area
Evaluation and Detailed Design Report (1997)

WESTERN COPPER HOLDINGS LIMITED
CARMACKS COPPER PROJECT

WASTE ROCK STORAGE AREA
EVALUATION AND DETAILED DESIGN REPORT

June 30, 1997

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APPENDIX

A. Report on Detailed Design of Waste Rock Storage Area (Ref. No. 1785/2) dated May 30, 1997, by Knight Piesold Ltd. Consulting Engineers.

1. INTRODUCTION

Several options for waste rock dump location, configuration and foundation preparations have been considered in development of the plan for the Carmacks Copper Project.

These options include:

a) placing rock on the existing surface on the south side of the valley north of the open pit without any special foundation preparation;

b) stripping the area immediately north of the open pit of its vegetative cover, allowing thaw to begin and providing ditches to transport melt water with and without providing a contingency buffer area around the dump toe;

c) preserving the permafrost in the location immediately north of the open pit by placing an insulating layer of rock on the original ground in winter and later depositing lifts of rock waste on top of the frozen ground year round;

d) constructing of the dump on original ground with a stabilizing berm placed at the toe of the dump and keyed into thaw stable material;

e) constructing the dump across the valley bottom north of the pit using the opposite valley wall to help add stability to the dump;

f) locating the dump at higher elevation in the valley northwest of the pit and north of the heap leach pad;

g) locating the dump south of the pit on steep slopes free of permafrost;

h) removing potentially thaw unstable material in two locations north of the pit before placing rock in the dump.

2. EVALUATION OF OPTIONS

It is acknowledged that the area is in the zone of discontinuous permafrost and that thaw of soils below the waste dump is likely. It is further recognized that investigations in the area report significant ground ice locally. Thaw of this material is expected, thus the design concept selected must incorporate measures to deal with the resulting water and not allow it to increase pore pressure in foundation soils beneath the dump causing stability problems.

It is also acknowledged that the permafrost is warm and subject to degradation and may, in fact, already be degrading. Because of this, options aimed at preserving the permafrost have been investigated but not selected.

The alternative locations investigated were unfavorable from a haulage perspective, already reserved for other mine components, too steep or likely to have the same stability issues as the site selected. Options that would have resulted in placement of rock across the watercourse in the valley bottom north of the pit have not been pursued as this approach did not fit with Western Copper’s environmental approach.

The option selected for waste rock dump disposal is b) outlined above with a contingency buffer zone which allows further consideration of option d) if required at a later date.

Table 1 summarizes the evaluation of the options considered.

WESTERN COPPER HOLDINGS LTD.
CARMACKS COPPER PROJECT

TABLE 1
MINE WASTE ROCK STORAGE AREA ALTERNATIVES
EVALUATION MATRIX

Alternative	Area of Consideration				
	Economic Considerations	**Design, Engineering Construction and Operational Considerations**	**Environmental Considerations**	**Socioeconomic Considerations**	**Preferred Alternative**
Waste Rock Storage Area					
Option a	Immediately adjacent, haul distance very economical	Capacity limited, foundation problems, valley fill, possible stability concerns.	No fish habitat, Vegetation and wildlife capability moderate to low.	Not applicable	
Option b	Immediately adjacent, haul distance economical.	Adequate capacity, foundation concerns mitigated, permafrost stripping, side hill dump.	No fish habitat, Vegetation and wildlife capability moderate to low.	Not applicable	Preferred option being of adequate size, configuration and proximity of haul. Foundations conditions allow remediation. Absent of fisheries habitat. Vegetation and wildlife capability molderately low to low.
Option c	Immediately adjacent, haul distance relatively economical but costly ground preparation.	Adequate capacity, foundation concerns mitigated, side hill dump, winter construction of insulating layer, complicates sequencing.	No fish habitat, Vegetation and wildlife capability moderate to low.	Not applicable	
Option d	Immediately adjacent, haul distance relatively economical - extra costs for key.	Adequate capacity, foundation problems, side hill dump, construct keyed in stabilizing berm adds excavation.	No fish habitat, Vegetation and wildlife capability moderate to low.	Not applicable	Option allows further remediation with preferred option b
Option e	Moderately adjacent, haul distance not as econonmical. Requires end dump from high lifts.	Adequate capacity, foundation problems, cross valley fill, rock across stream, flow through drain could plug - likely slumps during construction due to lift height.	No fish habitat, Vegetation and wildlife capability moderate to low. Stream crossed - potential chemical issues.	Not applicable	
Option f	Moderately adjacent, haul distance not as econonmical	Adequate capacity, foundation problems, side hill dump.	No fish habitat, Vegetation and wildlife capability moderate to low. Convers small streams, possible chemical issues.	Not applicable	
Option g	Immediately adjacent, haul distance very economical.	Capacity limited, foundation better but steep slopes problems, valley fill.	No fish habitat, Vegetation and wildlife capability moderate to low.	Not applicable	
Option h	Immediately adjacent, haul distance relatively economical, but overall options highly uneconomic.	Adequate capacity, foundation problems, side hill dump, significant excavation of thaw unstable material	No fish habitat, Vegetation and wildlife capability moderate to low. stability of excavated soils	Not applicable	

3. THE SELECTED OPTION

The selected option is briefly summarized below and described in detail in Appendix A "Report on Detailed Design of Waste Rock Storage Area" (Ref. No. 1785/2) dated May 30, 1997 by Knight Piesold Ltd., Consulting Engineers. The appendix includes detailed design drawings consideration of foundation preparation, dump sequencing, contingencies for increased stability, water balance and water management, stability analysis, proposed monitoring, and an outline of reclamation proposed.

The 1996 geotechnical field investigation program undertaken by Knight Piesold Ltd. showed permafrost exists below the waste rock storage area in depth varying between 5 to 15 m (Knight Piesold 1784/1). The Knight Piesold Ltd. Design Report 1785/2 assumes that the foundation footprint will be stripped in advance of waste rock placement to permit it to thaw. Surface runoff diverted around the area and any seepage will be collected for treatment before discharge to the environment. At approximately year 3 of mine development, the extent of thaw and other geotechnical conditions below the dump will be re-evaluated to determine dump stability prior to placement of waste and the ultimate dump general arrangement revised as required. A buffer zone beyond the toe of the dump will always be maintained to permit thawing, to monitor dump performance during development, and to permit possible installation of foundation improvements and other design contingencies as necessary. Before final closure of the waste dump, Western Copper Holdings Ltd. would carry out a site investigation programme to confirm the stability of the waste rock. If the design criteria is not met, the buffer zone would provide sufficient clearance to excavate and construct a waste rock key trench to stabilize slopes, or to flatten slopes if necessary.

The reader is referred to Appendix A for details of the proposed design.

4. OTHER OPTIONS INVESTIGATED IN MORE DETAIL

Most of the options outlined above were rejected because they did not meet the economic or environmental objectives of Western Copper. Three of these other options were investigated in more detail and are elaborated below. These are options c), f) and h) in the above list. The reason that additional detail is provided on these options and not the others is that these concepts were suggested by government reviewers.

Option C

One of the original design concepts for the rock dump was to place waste on frozen ground similar to that proposed by Dr. C. Burn in his December 13, 1996 report to the RERC.

To do this the dump footprint to be covered during the summer months would be prepared in the winter by placing a pad of waste rock of 0.5 m thickness greater than the active layer. Topsoil and vegetation would not be stripped as it would act as an insulation layer and prevent penetration of the active layer into the underlying soil. Thermistors currently in place indicate that the active layer is 5 m thick on south facing slopes and 3 m thick on north facing slopes.

The placement of a pad of waste rock during the winter in two lifts of 2.5 m each as show in Figure 4 - 1 would maintain the permafrost during end dumping of 20 m lifts of waste in the summer. A buffer zone at the toe of the pad would have to be maintained as permafrost at the boundary of the pad will thaw, but the 5 m high lift should remain stable and, if not, the consequences of a slip would be insignificant.

Option F

The location of the dump higher in the valley had been suggested and a layout can be found in Figure 4 - 2. It is difficult to avoid water courses in this area and the design must still contend with potentially thaw unstable foundation materials. A geotechnical investigation was not carried out in this area. Since this option did not offer advantages beyond the selected one and added haulage costs, it was not selected.

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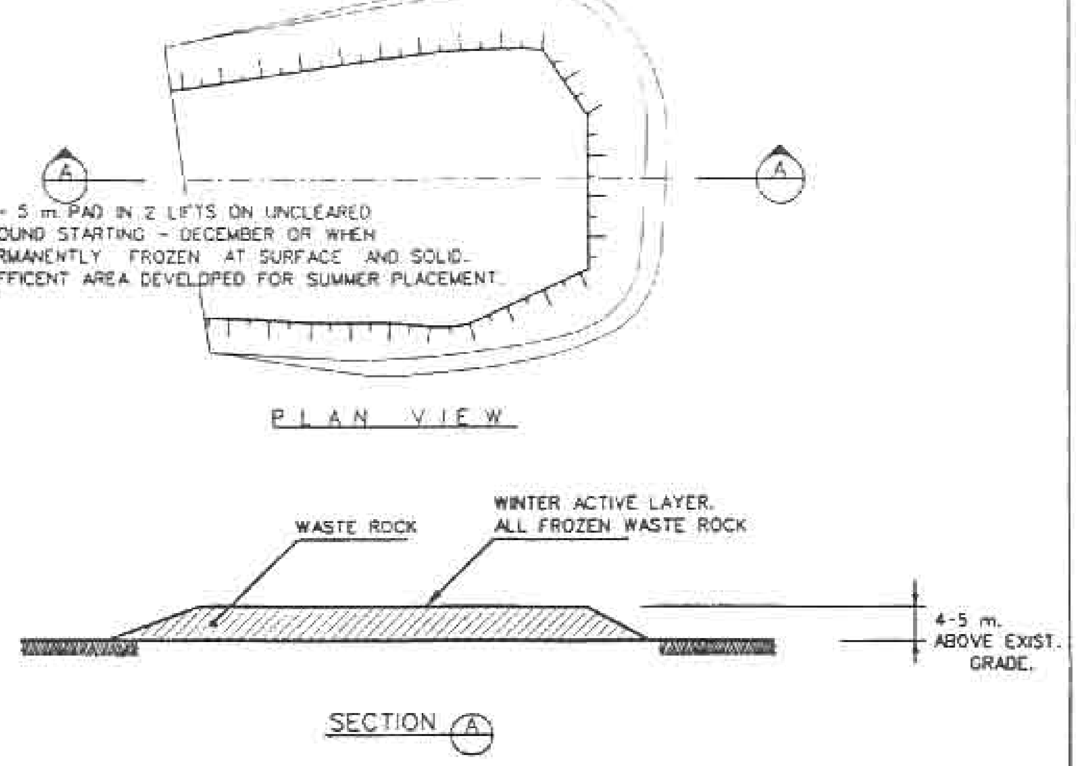
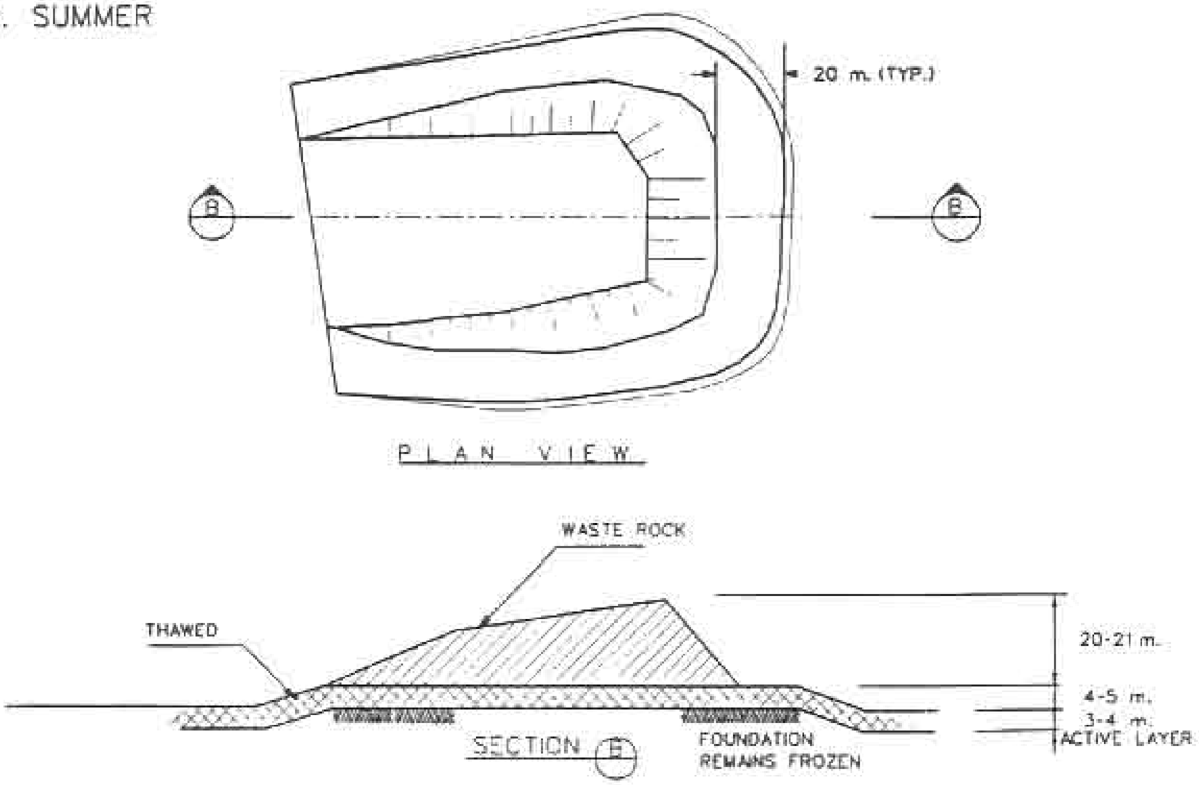
1 st. WINTER



1 st. SUMMER



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SCALE: N.T.S.	DATE	LOCATION: CARMACKS YUKON TERR.		CARMACKS COPPER PROJECT	EQUIP/UNIT/LOOP No.
DESIGNED:					
DRAWN: JMF	APR/97				
CHECKED:		THE ENGINEERING DATA ON THIS DRAWING IS SOLELY FOR THE PURPOSE AND PROJECT FOR WHICH THIS DRAWING IS ISSUED.		ALTERNATE WASTE ROCK PLACEMENT CONCEPT.	PROJECT No. 8555 / DIVISION No. 25
APPROVED:				FIGURE 4-1	DRAWING NUMBER 100-10-03 / REV A
A	ISSUED FOR COMMENTS		APR/97		
No.	REVISIONS		DATE / BY		

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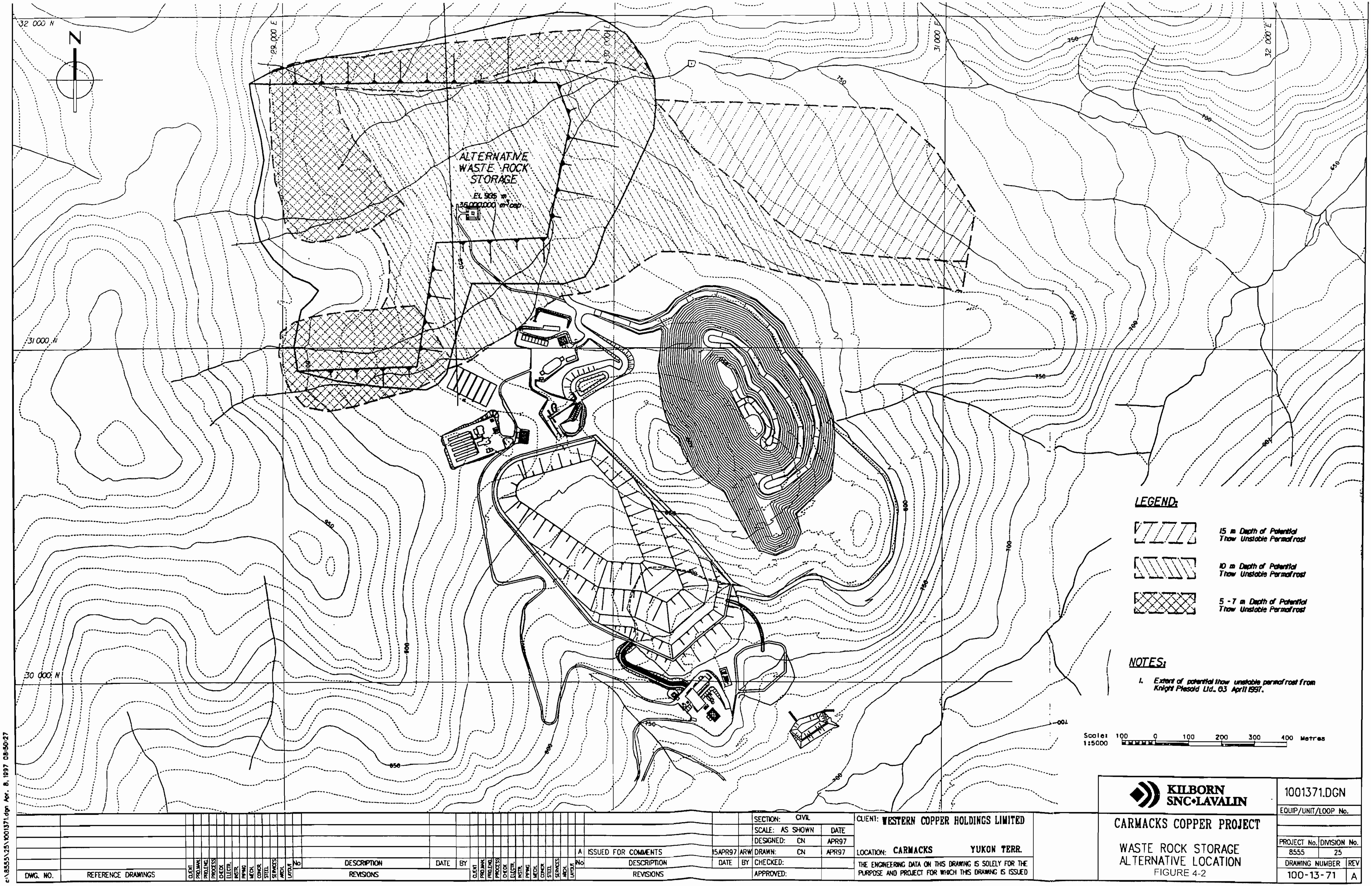

N
32 000 N
31 000 N
30 000 N
29 000 E
30 000 E
31 000 E
32 000 E
ALTERNATIVE WASTE ROCK STORAGE
EL 905 m
LEGEND:
15 m Depth of Potential Thaw Unstable Permafrost
10 m Depth of Potential Thaw Unstable Permafrost
5 - 7 m Depth of Potential Thaw Unstable Permafrost
NOTES:
1. Extent of potential thaw unstable permafrost from Knight Piesold Ltd., 03 April 1997.
Scale: 1:5000
100 0 100 200 300 400 Metres
KILBORN SNC•LAVALIN
1001371.DGN
EQUIP/UNIT/LOOP No.
CARMACKS COPPER PROJECT
WASTE ROCK STORAGE
ALTERNATIVE LOCATION
FIGURE 4-2
PROJECT No. 8555
DIVISION No. 25
DRAWING NUMBER 100-13-71
REV A
CLIENT: WESTERN COPPER HOLDINGS LIMITED
LOCATION: CARMACKS YUKON TERR.
THE ENGINEERING DATA ON THIS DRAWING IS SOLELY FOR THE PURPOSE AND PROJECT FOR WHICH THIS DRAWING IS ISSUED
SECTION: CIVIL
SCALE: AS SHOWN
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APPROVED:
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REFERENCE DRAWINGS

Option H

In this option, the thaw unstable soil beneath the Waste Rock Storage Area would be removed in the Waste Rock Storage Area before the waste rock is placed. This may somewhat improve the stability of the dump slopes, but raises the stability issue of storing the thawed soil that has been removed. The extent and depth of the material was based on Knight & Piesold geotechnical investigations and from actual borehole information gathered during the 1996 field program. Approximately 7,000,000 m^3 of thaw susceptible soil would have to be removed. Compare this to Waste Rock dump volume of 30,000,000 m^3. This is neither a minor excavation project nor a small spoils pile. The spoils pile would require special design measures to control site erosion and sediment release.

The thaw susceptible soil would have to be stockpiled into another location with some or all of the following being done to stabilize the location:

- removal of thaw susceptible soil from this location;
- ditching and/or filter fabric to aid surface drainage;
- construction of embankments to contain soil as it thaws.

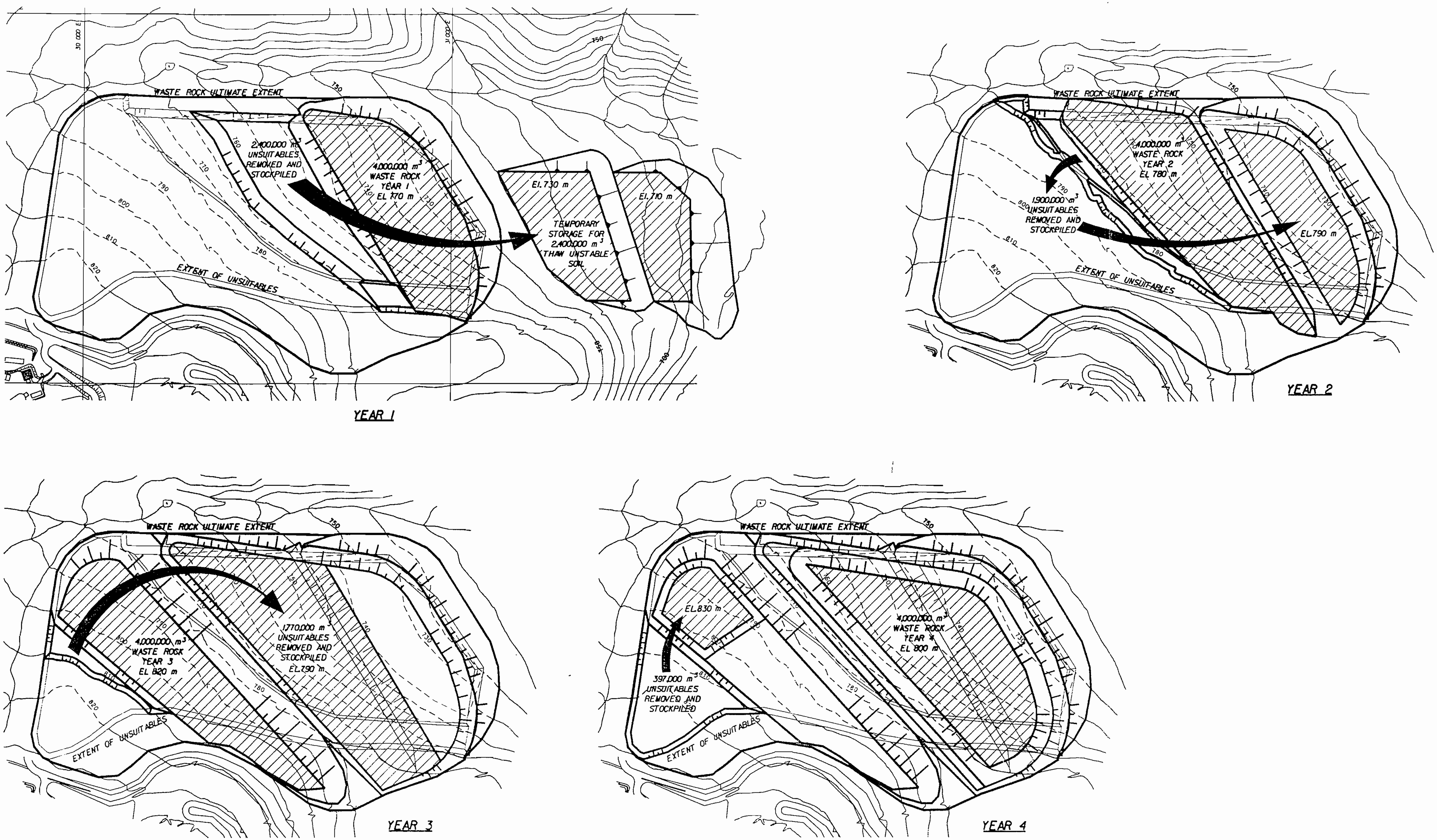
To minimize the rehandling of excavated foundation material and develop new stockpile areas to store it, Kilborn Engineering developed and costed the following preliminary concept to aid in the assessment of the waste rock dump option:

1. Remove thaw susceptible soil from a section of the proposed waste rock storage area and place it in a stockpile.

2. Fill the excavated area with waste rock so that future excavated thaw susceptible soil may be placed on top to permit it to thaw and to drain.

3. Continue with the development of the waste rock storage area by placing future waste on any excavated, drained material.

This sequence of dump construction is shown in Figure 4 - 3. The stability issues with this concept have not been analyzed. The on-going capital cost estimate for this concept, with the work spread out over 4 years, is on the order of $37 million. This option is very expensive,



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APPROVED:		

No	DESCRIPTION	DATE	BY
A	ISSUED FOR COMMENTS	15APR97	ARW

REVISIONS

DWG. NO. | REFERENCE DRAWINGS

KILBORN SNC•LAVALIN

1001370.DGN

EQUIP/UNIT/LOOP No.

CARMACKS COPPER PROJECT

WASTE ROCK STORAGE
PROPOSED LOCATION
FIGURE 4-3

PROJECT No.	DIVISION No.
8555	25

DRAWING NUMBER	REV
100-13-70	A

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offers limited additional stability, and is likely to add to rather than reduce environmental impact. For these reasons, this option was rejected and not assessed further

WESTERN COPPER HOLDINGS LIMITED

CARMACKS COPPER PROJECT

APPENDIX A

REPORT ON DETAILED DESIGN OF WASTE ROCK STORAGE AREA

(REF. NO 1785/2)

WESTERN COPPER HOLDINGS LIMITED
CARMACKS COPPER PROJECT

REPORT ON DETAILED DESIGN
OF WASTE ROCK STORAGE AREA
(REF. NO. 1785/2)

MAY 30, 1997

WESTERN COPPER HOLDINGS LIMITED
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REPORT ON DETAILED DESIGN
OF WASTE ROCK STORAGE AREA
(REF. NO. 1785/2)

WESTERN COPPER HOLDINGS LIMITED
CARMACKS COPPER PROJECT

REPORT ON DETAILED DESIGN
OF WASTE ROCK STORAGE AREA
(REF. NO. 1785/2)

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WESTERN COPPER HOLDINGS LIMITED
CARMACKS COPPER PROJECT

REPORT ON DETAILED DESIGN
OF WASTE ROCK STORAGE AREA
(REF. NO. 1785/2)

SECTION 1.0 - INTRODUCTION

1.1 PROJECT DESCRIPTION

The Carmacks Copper Project is an open pit copper mine and processing facility being developed by Western Copper Holdings Limited. It is located in the Yukon Territory, 38 km north west of the town of Carmacks. The project will comprise the operation of an open pit, crushing plant, acid heap leach and copper extraction facility, associated waste dumps, soil stockpiles, water storage facility, process water ponds, drainage ditches and sediment control ponds and miscellaneous structures to support mining operations.

The project general arrangement is shown on Drawing No. 1785.000.

1.2 SCOPE OF WORK

The scope of this report is to present a detailed level design the waste rock storage area, to support a Water License Application and address the concerns raised during the Initial Environmental Evaluation (IEE). The work presented in this report conforms with the guidelines presented in the British Columbia Mine Waste Rock Pile Research Committee publication, "Mined Rock and Overburden Piles, Investigation and Design Manual", May 1991.

1.3 REFERENCE DOCUMENTS

The following documents have been referred to, or are relevant to this report, and should be read in conjunction with this report:

- "Report on 1992 Surficial Geotechnical Investigations" Knight Piésold Ltd., May 1993, Ref. No. 1782/2.

- "Report on Preliminary Design", Knight Piésold Ltd., May 1, 1995, Ref. No. 1783/1.

- "Western Copper Holdings Ltd., Carmacks Copper Project Initial Environmental Evaluation Addendum No. 3, " Hallam Knight Piésold Ltd., October 1995.

- "Report on 1996 Geotechnical And Hydrogeological Investigations" Knight Piésold Ltd., June 1996, Ref. No. 1784/1.

- "QA/QC Program and Technical Specifications", Knight Piésold Ltd., June 1996.

- "Report on Updated Detailed Design Criteria", Knight Piésold Ltd., July 3, 1996, Ref. No. 1784/5.

SECTION 2.0 - DESIGN OBJECTIVES

The principal objectives for the design of the waste rock storage area (WRSA) are as follows:

- Provide a geotechnically stable and cost-effective configuration for staged waste rock storage with particular attention to permafrost and foundation conditions.
- Minimize potential impacts to the groundwater system and surface runoff flows during the life of the mine operation and in the long term by providing collection ditches and a sediment control pond.
- Develop the facility in stages to allow for ground thawing and drainage.
- Incorporate field observation and performance monitoring during the initial stages of waste rock placement to ensure on-going stability and performance of the waste rock storage area.
- Provide adequate contingencies to deal with localized instabilities which may arise from areas of potentially thaw unstable foundation.

SECTION 3.0 - DESIGN BASIS

The following assumptions were made for the final design of the WRSA.

- A design capacity of 60 million tonnes placed at 2.0 t/m^3.
- Annual waste rock production of approximately 7.5 million tonnes.
- Hauling and placing of mine waste rock occurs year round.
- Placement of waste material in maximum 25 metre lifts by end-dumping from the face of an advancing lift.
- Material waste comprised of coarse, durable granodiorite and biotite gneiss rock types.

The following design parameters have been used for the design of the sediment control pond for the WRSA.

- Provide storage for the 1 in 10 year 24 hour storm event.
- Provide a spillway that can safely pass the 1 in 200 year 24 hour storm event.

SECTION 4.0 - GENERAL ARRANGEMENT

The waste rock storage area is located immediately north of the open pit on a gentle, north-east facing slope. The general arrangement for the waste rock storage area and sediment control pond is shown on Drawing 1784.300. The WRSA covers an area of approximately 70 hectares and is designed to provide for permanent, secure storage and total confinement of the mine waste rock. This particular site was chosen as to minimize the haul distances from the pit and also to minimize any potential impact on existing surface drainage courses. The design includes surface drainage ditches to drain the footprint of the waste dump. Surface runoff and seepage from the WRSA will be collected in perimeter collection ditches located at the toe of the facility and transported via the WRSA outlet channel to the sediment control pond.

Design features of the waste rock storage area are shown on Drawings 1784.300 to 1784.307.

SECTION 5.0 - CONSTRUCTION METHODOLOGY AND SEQUENCING

The WRSA will be constructed in lifts with a maximum thickness of 25 metres. Lifts will generally be placed parallel to topography and will be advanced at the angle of repose of the material which may be as steep as 1H:1V. Staged development of the WRSA is shown on Drawing 1784.303 in plan and on Drawing 1784.302 in section. The finished slope of each lift will be graded to a 2H:1V. Benches approximately 7 metres wide will be established between successive lifts and will flatten the overall slope to 2.25H:1V.

A summary of the construction activities to be carried out for each stage of development is provided below:

Pre-Production:

- Clear and strip the entire waste rock storage area down to mineral soil.
- Stockpile stripped material at the designated areas north east of the facility.
- Construct surface drainage ditches, surface drainage collection ditch, perimeter collection ditch, and waste rock storage area outlet ditch.
- Construct sediment control pond and related structures.

Production:

- Place waste rock material by end-dumping from the face of the advancing lift.
- The surface elevation of the first lift is to be maintained at 840 m until a lift thickness of 25 m has been obtained.
- Continue advancement of first lift parallel to topography until the limits of the 100 metre wide contingency buffer zone are reached. This will take approximately 3 years at which time a geotechnical investigation program within the contingency buffer zone will be undertaken. The objective of this

program will be to confirm foundation conditions and update the stability assessment prior to year 4 waste rock placement. If foundation conditions are not as anticipated then remedial loading plans and contingency measures will be developed including stability berms and slope reduction.

- The surface elevation of the second lift is to be maintained at 840 m until a lift thickness of 25 m has been obtained then the lift is to be advanced parallel to topography.

- Level off the top of the waste dump at elevation 840 m using a maximum 25 metre thick lift followed by a 15 metre thick lift.

- Construct the final 30 metre thick lift to elevation 870 m.

SECTION 6.0 - WATER MANAGEMENT

6.1 GENERAL

Provisions are included in the design of the WRSA to control the surface inflows into the facility. This will be accomplished by constructing surface and collection drainage ditches that will collect and direct the surface runoff and near surface seepage water to the sediment control pond.

6.2 SURFACE DRAINAGE AND COLLECTION DITCHES

The location of the surface drainage and collection ditches are shown on plan Drawing 1784.300. Surface drainage ditches will be constructed to channel the surface runoff to the surface drainage collection ditch. It is anticipated that additional surface drainage ditches in the footprint of the WRSA may be required to enhance the drainage. These ditches will mainly be of use in the early stages of the WRSA development as the foundation thaws and excess water is released. Eventually these ditches will be covered by waste rock material. The perimeter collection ditch surrounding the WRSA has been designed to intercept all surface run off and near surface seepage from the WRSA and convey this to the WRSA outlet channel which ultimately drains into the sediment control pond. The perimeter collection ditch and the WRSA outlet channel will be riprap lined to prevent erosion and downcutting. The preliminary sizing of these ditches is based on conveying the peak runoff flow obtained from the 1 in 200 year 24 hour storm event. The peak design flows are estimated to be 1.25 m^3/s for the WRSA outlet channel and 0.65 m^3/s for the perimeter collection ditch. Peak flows were determined using both the Rational method as described in the MOE Manual of Operational Hydrology in B.C. and the SCS method as described in Water Resources Publications Technical Paper No. SCS-TP-149.

6.3 SEDIMENT CONTROL POND

The location and details on the design features of the sediment control pond are shown on Drawing 1784.305. The sediment control pond design includes a sloping riser for pumpback and will be protected from overtopping by a spillway designed to pass the 1 in 200 year, 24 hour storm event estimated with a peak flow of 1.25 m^3/s.

The sediment control pond has also been designed to store a volume of 65,000 m^3 which comprises the following:

- 1 in 10 year, 24 hour storm event: 10,000 m^3 .
- Dead storage: 10,000 m^3 .
- Surface runoff storage from the WRSA: 45,000 m^3 .

Pumping of stored water for use at the process plant site will be accomplished using the sloping riser.

SECTION 7.0 - WATER BALANCE

7.1 GENERAL

A linked annual water balance model was developed to estimate the monthly water sources to the sediment control pond. The water balance model accounts for runoff volumes derived from precipitation falling directly upon the waste rock storage area and associated runoff. For the snowmelt condition, a uniform depth of snow has been assumed to cover the entire area. The 20 year dry, average and 20 year wet annual precipitation conditions were modelled in the water balance to determine potential inflows and outflows on the facility. Detailed descriptions of the water balance modelling are presented in the following sections.

7.2 PARAMETERS AND ASSUMPTIONS

The precipitation assumptions used in the water balance model are presented in Table 1 and the design assumptions summarised in Table 2. The 9 year average year linked water balance is presented in Table 3.

Assumptions used in the analyses are outlined below:

- The sediment control pond will receive runoff and near surface seepage waters derived from direct precipitation on the WRSA. Water balance modelling has assumed a uniform depth of snow covers the entire site.

- Direct runoff coefficients for the cleared, unloaded catchment area and for the loaded waste rock area are estimated at 1.0 and 0.30 respectively. These numbers have been selected based on previous engineering experience with projects in the Yukon and differ from the runoff coefficients presented using the Rational method of estimating peak design flows.

- Some evaporation of water from the WRSA will occur. The evaporated water will consist of water retained from precipitation close to the active bench surface. Since a large free surface of water will not be present, a relatively small surface evaporation coefficient of 10 percent was applied to the mean monthly pond evaporation to calculate evaporation loss.

- A portion of the precipitation that infiltrates into the WRSA will be retained. It was considered that the maximum amount of water retained in the waste material would be approximately 5 percent by weight of the waste rock material.

7.3 RESULTS

The results of the water balance modelling for the WRSA are shown on Figure 1 for the end of years 1, 4, and 8. The modelling shows that the amount of runoff decreases as the size of the loaded portion of the WRSA increases. This is a direct result of the cleared, unloaded area having a higher runoff coefficient than the loaded area. The peak inflow volumes reporting to the sediment control pond occurs in the month of April with July generally being the second highest inflow month.

SECTION 8.0 - REVIEW OF THAW CONSOLIDATION ANALYSIS

Knight Piésold Ltd. have developed a one-dimensional finite difference computer model which predicts the magnitude of excess pore pressures with time in a thawing soil layer. This model incorporates an increased thaw depth with time and surcharge loading conditions.

Analyses have been performed to predict pore pressure conditions with time within the foundation materials beneath the waste rock storage facility and were presented in Addendum #3.

The assumptions incorporated in the ground thawing model were extremely conservative. A schematic diagram illustrating the main parameters and assumptions incorporated into the 1-D thaw model is given on Figure 2.

Estimates of pore water pressures were computed for a thawing layer beneath the initial 25 m lift of the waste rock storage facility. Surcharge loading from the overlying waste rock was applied at the start of ground thawing. This is a conservative worst case condition, with additional excess pore pressures due to surcharge loading being generated within each incremental thawing layer for the entire 6 months thawing period. Excess pore pressures gradually increase during the 6 month thawing period, corresponding to an increasing length of drainage path.

For a coefficient of consolidation of 200 m^2/year, pore pressures within the thawed layer were predicted to be minor with a corresponding maximum r_u value of less than 0.1 at the base of the thawed layer. Using a coefficient of consolidation of 20 m^2/year results in higher pore pressures maintained in the thawed layer, with a maximum r_u value of approximately 0.4 beneath the 25 m lift. Profiles of pore water pressure and corresponding r_u coefficients after 6 months are shown for both the above cases on Figure 3. Pore pressure conditions after 3 months are also shown for a coefficient of consolidation of 20 m^2/year. As thawing rates slow any excess pore pressures within the thawed foundation material tend to dissipate rapidly.

Thawing of foundation materials to a depth of 3 m may also occur for a short distance beyond the toe of the advancing lift due to ground disturbance and loss of surficial organics during foundation preparation. For these conditions where thawing occurs without any surcharge loading from overlying waste rock, maximum pore pressures equivalent to r_u coefficients of approximately 0.51 and 0.65 were computed for coefficients of consolidation of 200 m^2/year and 20 m^2/year respectively. An r_u value of 0.49 represents equilibrium hydrostatic conditions under these conditions. Hydrostatic conditions are achieved in both cases shortly after thawing is complete at a depth of 3 metres.

The thaw analyses have provided conservative worst case excess pore pressures and pore pressure dissipation rates which are used in the stability modelling. Actual pore pressures and pore pressure dissipation rates will be measured from the instrumentation installed in the foundation and will allow confirmation that the stability objectives are maintained. This information will be available when the dump is only 25 metres high and if conditions are not as anticipated then appropriate design modifications will be implemented.

SECTION 9.0 – STABILITY ANALYSES

Stability analyses were carried out for the preliminary design of the waste dump based on industry standard assumptions and parameters.

A reassessment of the stability of the waste dump was carried out incorporating material parameters obtained from laboratory testing of samples. The geometries and the material parameters used in the analyses are shown on Figure 4. An r_u value in the thawing foundation of 0.4 was used based on the thaw consolidation analysis presented above. As a result of review comments, a waste rock shear strength angle of friction of 37° was assigned. Typical strengths for rockfill as determined by large scale triaxial tests are shown on Figure 5.

The results of the stability analyses are shown on Figures 4.6 to 4.8 for the first lift and final configurations Sections 1 and 2, respectively. The calculated factors of safety are summarized as follows:

Stability Case	Factor of Safety	Minimum Required F.S.	Yield Acceleration
Static			
- Cross Section 1 & 2 (25 m lift)	1.42	1.3	N/A
- Cross Section 1 & 2 (25 m lift) Under Hydrostatic Conditions	1.83	1.3	N/A
- Cross Section 1 (Ultimate Configuration)	1.84	1.3	N/A
- Cross Section 2 (Ultimate Configuration)	1.75	1.3	N/A
Pseudostatic			
- Cross Section 1 (Ultimate Configuration)	1.38	1.0	0.13 g
- Cross Section 2 (Ultimate Configuration)	1.31	1.0	0.13 g
- Cross Section 1 (Ultimate Configuration)	1.0	N/A	0.28 g
- Cross Section 2 (Ultimate Configuration)	1.0	N/A	0.27 g

During an on site review of geological conditions with the review consultants, it was confirmed that there is significant variability in the foundation and notwithstanding that the location of the dump has been changed to avoid the poor foundation areas, it can be expected that some areas of thaw unstable foundation will be encountered. These may result in sloughing and toe instabilities at the advancing face of the dumps. The dump area is relatively flat and therefore the runout from these occurrences will be small. The potential for instability will reduce with time as thawing and consolidation will result in significant strength gains in the foundation material.

The contingency incorporated in the design to account for localized instabilities due to thaw unstable foundations is to construct a buffer area, 100 metres wide around the perimeter of the waste dump. The buffer will be stripped and drained during initial construction and allowed to thaw. The buffer will provide an area in which any runout from local instabilities will be contained during initial dump construction and will provide a thawed, drained foundation for the eventual construction of the final toe of the waste dump.

SECTION 10.0 - GEOTECHNICAL INSTRUMENTATION

Geotechnical instrumentation will be installed to monitor the performance of the waste dump and to confirm design assumptions and parameters used in the stability assessment.

Vibrating piezometers will be installed in the waste rock storage area foundation across two planes designated Planes A and B as shown on Drawing 1784.306. Typical sections and installation details are provided on Drawing 1784.307

Surface movement monuments will be installed at the locations shown on Drawing 1784.306 with a typical section shown on Drawing 1784.307. Periodic surveying of the location of these monuments will be required to monitor the deformations on the slope.

SECTION 11.0 - HYDROGEOLOGICAL IMPACT ASSESSMENT

The hydrogeological impact at the WRSA is not expected to be significant. Most of the precipitation onto the waste rock will runoff and be collected in drainage ditches along the toe of the pile. The amount of runoff which enters the pile will be insignificant and will flow in the near surface groundwater at the base of the pile for collection in the toe drains and ultimately into the sediment control pond for use as make-up water for leaching operations and for dust control on the roads.

The organic layer covering the WRSA will be removed during the initial development thereby initiating thawing of the permafrost. This will result in an increase in the hydraulic conductivity of the thawed soil and the generation of near surface groundwater which will flow downslope and be intercepted by drains along the toe of the dump. The water quality impact model presented in the IEE indicates that if 50% of the total effluent from the waste dump is collected and recycled then the impact on receiving waters is acceptable. The seepage losses into the groundwater will be an insignificant fraction of this amount and therefore seepage losses to North Williams Creek are not a concern.

SECTION 12.0 - RECLAMATION AND CLOSURE

Reclamation of the WRSA may be initiated during early stages of production as this will lower final reclamation costs, improve short term stability, and reduce surface erosion and sedimentation. The following are preliminary recommendations for on-going reclamation and final closure of the WRSA:

- Maintain sloped grading of bench surfaces to minimize surface water infiltration and erosion of downstream slopes.

- Maintain surface water collection ditches and the sediment control pond to control surface drainage during operations and reclamation.

- The operational slopes, consisting of benches and raises, will be maintained at 2.25H:1V and will not be regraded on closure. This approach removes the problems associated with the re-grading of long slopes and the corresponding erosion of drainage channels by runoff down long slopes.

- The final surface of the waste rock storage area will be integrated into the surrounding terrain by stockpiling final waste rock loads on the top surface to imitate a rolling landform.

- The surfaces of each bench and the top surface will be capped with overburden to a depth of approximately 0.3 m and revegetated with appropriate species of plant. Large boulders will be left in place to provide wildlife cover until vegetation is well established.

- Surface runoff collection ditches and the sediment control pond will remain operational until vegetation on the storage area has reached a self sustaining growth.

Reclamation will be carried out in conjunction with ongoing environmental monitoring to assure sediment control and water quality objectives are being met. When monitoring results have indicated that the waste rock storage area runoff and seepage are of suitable quality for direct release to the environment the surface runoff collection ditches will be decommissioned by backfilling with waste rock and the sediment control pond embankment will be breached.

SECTION 13.0 - REFERENCES

Coulson, C.H., 1991. Manual of Operational Hydrology in B.C. Hydrology Section, Water Management Branch, B.C. Ministry of Environment.

Craig, R.F., "Soil Mechanics", Chapman and Hall, 1992.

Johnston, G.H., "Permafrost Engineering Design and Construction", John Wiley and Sons, 1981.

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Ministry of Environment Manual of Operational Hydrology in B.C.

SLOPE/W, Version 3.0, 1991, A Slope Stability Program developed by GEO-SLOPE International, Calgary, Alberta.

Water Resources Publications Technical Paper No. SCS-TP-149.

TABLE 1

WESTERN COPPER HOLDINGS LIMITED
CARMACKS COPPER PROJECT

WASTE ROCK STORAGE AREA
PRECIPITATION DETAILS USED IN ANALYSIS

C:\ACG\Projects\WCH-01\Project Description\Reports to be Submitted - pdfs\WRSA\[t1.xls]Precip 2/23/2005 8:11

Description	Precipitation			
Precipitation Distribution:				
Mean annual precipitation (mm)	375			
20 year "Dry" annual precipitation (mm)	252			
20 year "Wet" annual precipitation (mm)	498			
"Max." annual precipitation (mm)	568			
"Min." annual precipitation (mm)	182			
Mean annual rainfall (mm)	233			
Mean annual snowfall (mm)	143			
Coefficient of variation	0.2			
Standard deviation (mm)	75			
Proportions of Actual Precipitation:				
Rainfall	0.62			
Snowfall	0.38			
	Rainfall (mm)	Proportion as Rainfall	Snowmelt (mm)	Proportion as Snowmelt
Jul	74.8	0.32	0.0	0.00
Aug	53.4	0.23	0.0	0.00
Sep	35.6	0.15	0.0	0.00
Oct	3.7	0.02	0.0	0.00
Nov	0.0	0.00	0.0	0.0
Dec	0.0	0.00	0.0	0.00
Jan	0.0	0.00	0.0	0.00
Feb	0.0	0.00	0.0	0.00
Mar	0.0	0.00	0.0	0.00
Apr	0.0	0.00	100.1	0.70
May	18.4	0.08	42.9	0.30
Jun	46.4	0.20	0.0	0.00
Total (mm)	232		143	

TABLE 2

WESTERN COPPER HOLDINGS LIMITED
CARMACKS COPPER PROJECT

WASTE ROCK STORAGE AREA
WATER BALANCE ANALYSIS DATA

C:\ACG\Projects\WCH-01\Project Description\Reports to be Submitted - pdfs\WRSA\[t1.xls]Assumptions 2/23/2005 8:14

Description		Precipitation
General Details:		
Annual Waste Rock production (tpy)		7500000
Months per year Waste Rock Placement		12
Bench Height (m)		25
Bulk Density of Waste Rock (t/m^3)		2.0
Initial Moisture in Waste		3%
Max. Mass of Water retained in WRSA		5%
Water content increase in Waste Rock		2.0%
Catchment Areas:		
Waste Rock Storage Area (ha)		64.75
Ditches, road, and sediment control pond		7.00
Sediment control Pond		1.70
Runoff and Evaporation Coefficients:		
Cleared, unloaded Area	Direct Runoff	100%
WRSA	Direct Runoff	30%
	Evaporation coeff.	10%
Sediment Control Pond	Direct Runoff	0%
	Evaporation Coeff.	100%
Ditches and perimeter road	Direct Runoff	100%
Seepage Loss Coefficients		
Unrecoverable Seepage		5%

TABLE 3

WESTERN COPPER HOLDINGS LIMITED
CARMACKS COPPER PROJECT

WASTE ROCK STORAGE AREA
MONTHLY WATER BALANCE - YEAR 1
AVERAGE PRECIPITATION CONDITIONS

Precipitation

Assumptions				**Catchments:**		**Area (ha.)**	**Runoff Coeff.**	**Rainfall, Evaporation and Seepage Criteria**			
Annual waste production	=	7.50E+06	tonnes	Cleared, unloaded area	=	64.75	100%	Total annual precipitation	=	375	mm
Placed density of waste rock	=	2	tonnes/m³	Loaded waste dump area (End yr. 1)	=	12.00	30%	Surface evaporation coefficient	=	10%	
Months per year waste placement	=	12	months	Ditches, perimeter road,				Mass of water retained in WRSA voids	=	5%	
Year of operation	=	1		and sediment control pond	=	7.00	100%	Maximum water content increase of rock	=	2%	
Initial moisture in waste	=	3%						Unrecoverable seepage loss	=	5%	

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DESCRIPTION	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Annual
Adjusted Precipitation Distribution													
Rainfall distribution (mm/month)	0	0	0	0	0	0	18	46	75	53	36	4	233.0
Snowmelt distribution (mm/month)	0	0	0	0	0	99	43	0	0	0	0	0	142.0
Mean monthly lake evaporation (mm/month)	0	0	0	0	0	0	93	108	99	71	33	0	404
Waste Rock Storage Area (WRSA) Growth													
Stored waste rock tonnage	625,000	1,250,000	1,875,000	2,500,000	3,125,000	3,750,000	4,375,000	5,000,000	5,625,000	6,250,000	6,875,000	7,500,000	7,500,000
Approximate stored waste rock volume	312,500	625,000	937,500	1,250,000	1,562,500	1,875,000	2,187,500	2,500,000	2,812,500	3,125,000	3,437,500	3,750,000	3,750,000
Plan area of loaded WRSA in ha.	1.00	2.00	3.00	4.00	5.00	6.00	7.00	8.00	9.00	10.00	11.00	12.00	12.00
Plan area of cleared, unloaded WRSA in ha.	63.75	62.75	61.75	60.75	59.75	58.75	57.75	56.75	55.75	54.75	53.75	52.75	52.75
Water Input Sources to the Loaded WRSA													
Initial moisture in placed waste rock	18,750	18,750	18,750	18,750	18,750	18,750	18,750	18,750	18,750	18,750	18,750	18,750	225,000
Total precipitation inflow	0	0	0	0	0	5,964	4,270	3,709	6,731	5,336	3,921	447	30,380
Water Losses from the Loaded WRSA													
Direct runoff	0	0	0	0	0	1,789	1,281	1,113	2,019	1,601	1,176	134	9,114
Evaporation loss	0	0	0	0	0	0	651	864	891	710	363	0	3,479
Loss due to water content increase of rockmass	0	0	0	0	0	3,966	2,221	1,646	3,630	2,874	2,263	297	16,897
Seepage flow	0	0	0	0	0	209	117	87	191	151	119	16	889
Unrecoverable seepage flow	0	0	0	0	0	10	6	4	10	8	6	1	44
input - losses	0	0	0	0	0	0	0	0	0	0	0	0	
Water Accumulation in the Waste Rock													
Total water input to waste rock	18,750	18,750	18,750	18,750	18,750	22,716	20,971	20,396	22,380	21,624	21,013	19,047	241,897
Total water accumulation	18,750	37,500	56,250	75,000	93,750	116,466	137,437	157,833	180,213	201,837	222,850	241,897	241,897
New moisture content	3.0%	3.0%	3.0%	3.0%	3.0%	3.1%	3.1%	3.2%	3.2%	3.2%	3.2%	3.2%	
Water Sources and Losses for Cleared, Unloaded Area													
Total precipitation inflow	0	0	0	0	0	58,398	35,232	26,313	41,697	29,213	19,161	1,967	211,980
Direct runoff to collection ditches	0	0	0	0	0	58,398	35,232	26,313	41,697	29,213	19,161	1,967	211,980
Evaporation loss	0	0	0	0	0	0	0	0	0	0	0	0	0
Seepage flow	0	0	0	0	0	0	0	0	0	0	0	0	0
Direct precipitation on ditches, road, and sediment control pond	0	0	0	0	0	6,958	4,270	3,246	5,236	3,735	2,495	261	26,201
Total runoff volume from unloaded area	0	0	0	0	0	65,356	39,502	29,559	46,933	32,948	21,657	2,227	238,181
Water Sources and Losses for Sediment Control Pond													
Direct runoff to sediment pond from WRSA	0	0	0	0	0	60,187	36,513	27,426	43,717	30,814	20,338	2,101	221,094
Direct runoff from ditches, roads, and sediment control pond	0	0	0	0	0	6,958	4,270	3,246	5,236	3,735	2,495	261	26,201
Total input to sediment pond	0	0	0	0	0	67,145	40,783	30,672	48,952	34,549	22,833	2,362	247,295
Sediment control pond evaporation loss	0	0	0	0	0	0	1,581	1,836	1,683	1,207	561	0	6,868
Net inflow to sediment control pond	0	0	0	0	0	67,145	39,202	28,836	47,269	33,342	22,272	2,362	240,427

TABLE 3 (cont'd)

WESTERN COPPER HOLDINGS LIMITED
CARMACKS COPPER PROJECT

WASTE ROCK STORAGE AREA
MONTHLY WATER BALANCE - YEAR 1
20 YEAR "DRY" ANNUAL PRECIPITATION CONDITIONS

Precipitation

Assumptions		
Annual waste production	=	7.50E+06 tonnes
Placed density of waste rock	=	2 tonnes/m³
Months per year waste placement	=	12 months
Year of operation	=	1
Initial moisture in waste	=	3%

Catchments:		**Area (ha.)**	**Runoff Coeff.**
Cleared, unloaded area	=	64.75	100%
Loaded waste dump area (End yr. 1)	=	12.00	30%
Ditches, perimeter road, and sediment control pond	=	7.00	100%

Rainfall, Evaporation and Seepage Criteria		
Total annual precipitation	=	252 mm
Surface evaporation coefficient	=	10%
Mass of water retained in WRSA voids	=	5%
Maximum water content increase of rock	=	2%
Unrecoverable seepage loss	=	5%

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DESCRIPTION	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Annual
Adjusted Precipitation Distribution													
Rainfall distribution (mm/month)	0	0	0	0	0	0	12	31	50	36	24	3	156.6
Snowmelt distribution (mm/month)	0	0	0	0	0	66.80	29	0	0	0	0	0	95
Mean monthly lake evaporation (mm/month)	0	0	0	0	0	0	93	108	99	71	33	0	404
Waste Rock Storage Area (WRSA) Growth													
Stored waste rock tonnage	625,000	1,250,000	1,875,000	2,500,000	3,125,000	3,750,000	4,375,000	5,000,000	5,625,000	6,250,000	6,875,000	7,500,000	7,500,000
Approximate stored waste rock volume	312,500	625,000	937,500	1,250,000	1,562,500	1,875,000	2,187,500	2,500,000	2,812,500	3,125,000	3,437,500	3,750,000	3,750,000
Plan area of loaded WRSA in ha.	1.00	2.00	3.00	4.00	5.00	6.00	7.00	8.00	9.00	10.00	11.00	12.00	12.00
Plan area of cleared, unloaded WRSA in ha.	63.75	62.75	61.75	60.75	59.75	58.75	57.75	56.75	55.75	54.75	53.75	52.75	52.75
Water Input Sources to the Loaded WRSA													
Initial moisture in placed waste rock	18,750	18,750	18,750	18,750	18,750	18,750	18,750	18,750	18,750	18,750	18,750	18,750	225,000
Total precipitation inflow	0	0	0	0	0	4,008	2,870	2,493	4,523	3,586	2,635	301	20,415
Water Losses from the Loaded WRSA													
Direct runoff	0	0	0	0	0	1,202	861	748	1,357	1,076	791	90	6,125
Evaporation loss	0	0	0	0	0	0	651	864	891	710	363	0	3,479
Loss due to water content increase of rockmass	0	0	0	0	0	2,665	1,290	837	2,162	1,710	1,408	200	10,271
Seepage flow	0	0	0	0	0	140	68	44	114	90	74	11	541
Unrecoverable seepage flow	0	0	0	0	0	7	3	2	6	4	4	1	27
input - losses	0	0	0	0	0	0	0	0	0	0	0	0	
Water Accumulation in the Waste Rock													
Total water input to waste rock	18,750	18,750	18,750	18,750	18,750	21,415	20,040	19,587	20,912	20,460	20,158	18,950	235,271
Total water accumulation	18,750	37,500	56,250	75,000	93,750	115,165	135,205	154,792	175,704	196,164	216,321	235,271	235,271
New moisture content	3.0%	3.0%	3.0%	3.0%	3.0%	3.1%	3.1%	3.1%	3.1%	3.1%	3.1%	3.1%	
Water Sources and Losses for Cleared, Unloaded Area													
Total precipitation inflow	0	0	0	0	0	39,243	23,676	17,683	28,020	19,631	12,876	1,322	142,451
Direct runoff to collection ditches	0	0	0	0	0	39,243	23,676	17,683	28,020	19,631	12,876	1,322	142,451
Evaporation loss	0	0	0	0	0	0	0	0	0	0	0	0	0
Seepage flow	0	0	0	0	0	0	0	0	0	0	0	0	0
Direct precipitation on ditches, road, and sediment control pond	0	0	0	0	0	4,676	2,870	2,181	3,518	2,510	1,677	175	17,607
Total runoff volume from unloaded area	0	0	0	0	0	43,919	26,545	19,864	31,539	22,141	14,553	1,497	160,058
Water Sources and Losses for Sediment Control Pond													
Direct runoff to sediment pond from WRSA	0	0	0	0	0	40,445	24,537	18,430	29,377	20,707	13,667	1,412	148,575
Direct runoff from ditches, roads, and sediment control pond	0	0	0	0	0	4,676	2,870	2,181	3,518	2,510	1,677	175	17,607
Total input to sediment pond	0	0	0	0	0	45,121	27,406	20,611	32,896	23,217	15,344	1,587	166,182
Sediment control pond evaporation loss	0	0	0	0	0	0	1,581	1,836	1,683	1,207	561	0	6,868
Net inflow to sediment control pond	0	0	0	0	0	45,121	25,825	18,775	31,213	22,010	14,783	1,587	159,314

TABLE 3 (cont'd)

WESTERN COPPER HOLDINGS LIMITED
CARMACKS COPPER PROJECT

WASTE ROCK STORAGE AREA
MONTHLY WATER BALANCE - YEAR 1
20 YEAR "WET" ANNUAL PRECIPITATION CONDITIONS

Precipitation

Assumptions

Annual waste production	=	7.50E+06	tonnes
Placed density of waste rock	=	2	tonnes/m³
Months per year waste placement	=	12	months
Year of operation	=	1	
Initial moisture in waste	=	3%	

Catchments:		**Area (ha.)**	**Runoff Coeff.**
Cleared, unloaded area	=	64.75	100%
Loaded waste dump area (End yr. 1)	=	12.00	30%
Ditches, perimeter road, and sediment control pond	=	7.00	100%

Rainfall, Evaporation and Seepage Criteria

Total annual precipitation	=	498	mm
Surface evaporation coefficient	=	10%	
Mass of water retained in WRSA voids	=	5%	
Maximum water content increase of rock	=	2%	
Unrecoverable seepage loss	=	5%	

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DESCRIPTION	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Annual
Adjusted Precipitation Distribution													
Rainfall distribution (mm/month)	0	0	0	0	0	0	24	62	99	71	47	5	309
Snowmelt distribution (mm/month)	0	0	0	0	0	132	57	0	0	0	0	0	189
Mean monthly lake evaporation (mm/month)	0	0	0	0	0	0	93	108	99	71	33	0	404
Waste Rock Storage Area (WRSA) Growth													
Stored waste rock tonnage	625,000	1,250,000	1,875,000	2,500,000	3,125,000	3,750,000	4,375,000	5,000,000	5,625,000	6,250,000	6,875,000	7,500,000	7,500,000
Approximate stored waste rock volume	312,500	625,000	937,500	1,250,000	1,562,500	1,875,000	2,187,500	2,500,000	2,812,500	3,125,000	3,437,500	3,750,000	3,750,000
Plan area of loaded WRSA in ha.	1.00	2.00	3.00	4.00	5.00	6.00	7.00	8.00	9.00	10.00	11.00	12.00	12.00
Plan area of cleared, unloaded WRSA in ha.	63.75	62.75	61.75	60.75	59.75	58.75	57.75	56.75	55.75	54.75	53.75	52.75	52.75
Water Input Sources to the Loaded WRSA													
Initial moisture in placed waste rock	18,750	18,750	18,750	18,750	18,750	18,750	18,750	18,750	18,750	18,750	18,750	18,750	225,000
Total precipitation inflow	0	0	0	0	0	7,920	5,671	4,926	8,939	7,086	5,208	594	40,344
Water Losses from the Loaded WRSA													
Direct runoff	0	0	0	0	0	2,376	1,701	1,478	2,682	2,126	1,562	178	12,103
Evaporation loss	0	0	0	0	0	0	651	864	891	710	363	0	3,479
Loss due to water content increase of rockmass	0	0	0	0	0	5,267	3,153	2,455	5,098	4,038	3,118	395	23,524
Seepage flow	0	0	0	0	0	277	166	129	268	213	164	21	1,238
Unrecoverable seepage flow	0	0	0	0	0	14	8	6	13	11	8	1	62
input - losses	0	0	0	0	0	0	0	0	0	0	0	0	
Water Accumulation in the Waste Rock													
Total water input to waste rock	18,750	18,750	18,750	18,750	18,750	24,017	21,903	21,205	23,848	22,788	21,868	19,145	248,524
Total water accumulation	18,750	37,500	56,250	75,000	93,750	117,767	139,670	160,875	184,723	207,511	229,379	248,524	248,524
New moisture content	3.0%	3.0%	3.0%	3.0%	3.0%	3.1%	3.2%	3.2%	3.3%	3.3%	3.3%	3.3%	
Water Sources and Losses for Cleared, Unloaded Area													
Total precipitation inflow	0	0	0	0	0	77,552	46,787	34,944	55,374	38,795	25,446	2,612	281,510
Direct runoff to collection ditches	0	0	0	0	0	77,552	46,787	34,944	55,374	38,795	25,446	2,612	281,510
Evaporation loss	0	0	0	0	0	0	0	0	0	0	0	0	0
Seepage flow	0	0	0	0	0	0	0	0	0	0	0	0	0
Direct precipitation on ditches, road, and sediment control pond	0	0	0	0	0	9,240	5,671	4,310	6,953	4,960	3,314	347	34,795
Total runoff volume from unloaded area	0	0	0	0	0	86,792	52,459	39,254	62,327	43,755	28,760	2,958	316,305
Water Sources and Losses for Sediment Control Pond													
Direct runoff to sediment pond from WRSA	0	0	0	0	0	79,928	48,489	36,422	58,056	40,921	27,009	2,790	293,613
Direct runoff from ditches, roads, and sediment control pond	0	0	0	0	0	9,240	5,671	4,310	6,953	4,960	3,314	347	34,795
Total input to sediment pond	0	0	0	0	0	89,168	54,160	40,732	65,008	45,881	30,322	3,136	328,408
Sediment control pond evaporation loss	0	0	0	0	0	0	1,581	1,836	1,683	1,207	561	0	6,868
Net inflow to sediment control pond	0	0	0	0	0	89,168	52,579	38,896	63,325	44,674	29,761	3,136	321,540

TABLE 3 (cont'd)

WESTERN COPPER HOLDINGS LIMITED
CARMACKS COPPER PROJECT

WASTE ROCK STORAGE AREA
MONTHLY WATER BALANCE - YEAR 2
AVERAGE PRECIPITATION CONDITIONS

Precipitation

Assumptions			
Annual waste production	=	7.50E+06	tonnes
Placed density of waste rock	=	2	tonnes/m³
Months per year waste placement	=	12	months
Year of operation	=	2	
Initial moisture in waste	=	3%	

Catchments:		**Area (ha.)**	**Runoff Coeff.**
Cleared, unloaded area (End yr. 2)	=	43.35	100%
Loaded waste dump area (End yr. 2)	=	21.40	30%
Loaded waste dump area (End yr. 1)		12.00	
Ditches, perimeter road, and sediment control pond	=	7.00	100%

Rainfall, Evaporation and Seepage Criteria			
Total annual precipitation	=	375	mm
Surface evaporation coefficient	=	10%	
Mass of water retained in WRSA voids	=	5%	
Maximum water content increase of rock	=	2%	
Unrecoverable seepage loss	=	5%	

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DESCRIPTION	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Annual
Adjusted Precipitation Distribution													
Rainfall distribution (mm/month)	0	0	0	0	0	0	18	46	75	53	36	4	233.0
Snowmelt distribution (mm/month)	0	0	0	0	0	99	43	0	0	0	0	0	142.0
Mean monthly lake evaporation (mm/month)	0	0	0	0	0	0	93	108	99	71	33	0	404
Waste Rock Storage Area (WRSA) Growth													
Stored waste rock tonnage	8,125,000	8,750,000	9,375,000	10,000,000	10,625,000	11,250,000	11,875,000	12,500,000	13,125,000	13,750,000	14,375,000	15,000,000	15,000,000
Approximate stored waste rock volume	4,062,500	4,375,000	4,687,500	5,000,000	5,312,500	5,625,000	5,937,500	6,250,000	6,562,500	6,875,000	7,187,500	7,500,000	7,500,000
Plan area of loaded WRSA in ha.	12.78	13.57	14.35	15.13	15.92	16.70	17.48	18.27	19.05	19.83	20.62	21.40	21.40
Plan area of cleared, unloaded WRSA in ha.	51.97	51.18	50.40	49.62	48.83	48.05	47.27	46.48	45.70	44.92	44.13	43.35	43.35
Water Input Sources to the Loaded WRSA													
Initial moisture in placed waste rock	18,750	18,750	18,750	18,750	18,750	18,750	18,750	18,750	18,750	18,750	18,750	18,750	225,000
Total precipitation inflow	0	0	0	0	0	16,600	10,666	8,470	14,248	10,582	7,350	798	68,714
Water Losses from the Loaded WRSA													
Direct runoff	0	0	0	0	0	4,980	3,200	2,541	4,274	3,175	2,205	239	20,614
Evaporation loss	0	0	0	0	0	0	1,626	1,973	1,886	1,408	680	0	7,573
Loss due to water content increase of rockmass	0	0	0	0	0	11,039	5,548	3,758	7,683	5,700	4,241	531	38,500
Seepage flow	0	0	0	0	0	581	292	198	404	300	223	28	2,026
Unrecoverable seepage flow	0	0	0	0	0	29	15	10	20	15	11	1	101
input - losses	0	0	0	0	0	0	0	0	0	0	0	0	
Water Accumulation in the Waste Rock													
Total water input to waste rock	18,750	18,750	18,750	18,750	18,750	29,789	24,298	22,508	26,433	24,450	22,991	19,281	263,500
Total water accumulation	260,647	279,397	298,147	316,897	335,647	365,436	389,735	412,243	438,676	463,126	486,117	505,397	505,397
New moisture content	3.2%	3.2%	3.2%	3.2%	3.2%	3.2%	3.3%	3.3%	3.3%	3.4%	3.4%	3.4%	
Water Sources and Losses for Cleared, Unloaded Area													
Total precipitation inflow	0	0	0	0	0	47,762	28,836	21,553	34,180	23,966	15,733	1,616	173,646
Direct runoff to collection ditches	0	0	0	0	0	47,762	28,836	21,553	34,180	23,966	15,733	1,616	173,646
Evaporation loss	0	0	0	0	0	0	0	0	0	0	0	0	0
Seepage flow	0	0	0	0	0	0	0	0	0	0	0	0	0
Direct precipitation on ditches, road, and sediment control pond	0	0	0	0	0	6,958	4,270	3,246	5,236	3,735	2,495	261	26,201
Total runoff volume from unloaded area	0	0	0	0	0	54,720	33,106	24,799	39,416	27,701	18,229	1,877	199,847
Water Sources and Losses for Sediment Control Pond													
Direct runoff to sediment pond from WRSA	0	0	0	0	0	52,742	32,036	24,094	38,455	27,141	17,938	1,855	194,260
Direct runoff from ditches, roads, and sediment control pond	0	0	0	0	0	6,958	4,270	3,246	5,236	3,735	2,495	261	26,201
Total input to sediment pond	0	0	0	0	0	59,700	36,306	27,340	43,690	30,876	20,433	2,116	220,461
Sediment control pond evaporation loss	0	0	0	0	0	0	1,581	1,836	1,683	1,207	561	0	6,868
Net inflow to sediment control pond	0	0	0	0	0	59,700	34,725	25,504	42,007	29,669	19,872	2,116	213,593

TABLE 3 (cont'd)

WESTERN COPPER HOLDINGS LIMITED
CARMACKS COPPER PROJECT

WASTE ROCK STORAGE AREA
MONTHLY WATER BALANCE - YEAR 3
AVERAGE PRECIPITATION CONDITIONS

		Precipitation	
Assumptions			
Annual waste production	=	7.50E+06	tonnes
Placed density of waste rock	=	2	tonnes/m³
Months per year waste placement	=	12	months
Year of operation	=	3	
Initial moisture in waste	=	3%	

Catchments:		**Area (ha.)**	**Runoff Coeff.**
Cleared, unloaded area (End yr. 3)	=	21.65	100%
Loaded waste dump area (End yr. 3)	=	43.10	30%
Loaded waste dump area (End yr. 2)		21.40	
Ditches, perimeter road, and sediment control pond	=	7.00	100%

Rainfall, Evaporation and Seepage Criteria			
Total annual precipitation	=	375	mm
Surface evaporation coefficient	=	10%	
Mass of water retained in WRSA voids	=	5%	
Maximum water content increase of rock	=	2%	
Unrecoverable seepage loss	=	5%	

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DESCRIPTION	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Annual
Adjusted Precipitation Distribution													
Rainfall distribution (mm/month)	0	0	0	0	0	0	18	46	75	53	36	4	233.0
Snowmelt distribution (mm/month)	0	0	0	0	0	99	43	0	0	0	0	0	142.0
Mean monthly lake evaporation (mm/month)	0	0	0	0	0	0	93	108	99	71	33	0	404
Waste Rock Storage Area (WRSA) Growth													
Stored waste rock tonnage	15,625,000	16,250,000	16,875,000	17,500,000	18,125,000	18,750,000	19,375,000	20,000,000	20,625,000	21,250,000	21,875,000	22,500,000	22,500,000
Approximate stored waste rock volume	7,812,500	8,125,000	8,437,500	8,750,000	9,062,500	9,375,000	9,687,500	10,000,000	10,312,500	10,625,000	10,937,500	11,250,000	11,250,000
Plan area of loaded WRSA in ha.	23.21	25.02	26.83	28.63	30.44	32.25	34.06	35.87	37.68	39.48	41.29	43.10	43.10
Plan area of cleared, unloaded WRSA in ha.	41.54	39.73	37.93	36.12	34.31	32.50	30.69	28.88	27.08	25.27	23.46	21.65	21.65
Water Input Sources to the Loaded WRSA													
Initial moisture in placed waste rock	18,750	18,750	18,750	18,750	18,750	18,750	18,750	18,750	18,750	18,750	18,750	18,750	225,000
Total precipitation inflow	0	0	0	0	0	32,057	20,778	16,630	28,178	21,067	14,720	1,607	135,037
Water Losses from the Loaded WRSA													
Direct runoff	0	0	0	0	0	9,617	6,233	4,989	8,453	6,320	4,416	482	40,511
Evaporation loss	0	0	0	0	0	0	3,167	3,874	3,730	2,803	1,363	0	14,937
Loss due to water content increase of rockmass	0	0	0	0	0	21,318	10,808	7,379	15,195	11,346	8,494	1,069	75,610
Seepage flow	0	0	0	0	0	1,122	569	388	800	597	447	56	3,979
Unrecoverable seepage flow	0	0	0	0	0	56	28	19	40	30	22	3	199
input - losses	0	0	0	0	0	0	0	0	0	0	0	0	
Water Accumulation in the Waste Rock													
Total water input to waste rock	18,750	18,750	18,750	18,750	18,750	40,068	29,558	26,129	33,945	30,096	27,244	19,819	300,610
Total water accumulation	524,147	542,897	561,647	580,397	599,147	639,215	668,773	694,902	728,848	758,944	786,189	806,007	806,007
New moisture content	3.4%	3.3%	3.3%	3.3%	3.3%	3.4%	3.5%	3.5%	3.5%	3.6%	3.6%	3.6%	
Water Sources and Losses for Cleared, Unloaded Area													
Total precipitation inflow	0	0	0	0	0	32,305	18,724	13,392	20,250	13,482	8,363	807	107,323
Direct runoff to collection ditches	0	0	0	0	0	32,305	18,724	13,392	20,250	13,482	8,363	807	107,323
Evaporation loss	0	0	0	0	0	0	0	0	0	0	0	0	0
Seepage flow	0	0	0	0	0	0	0	0	0	0	0	0	0
Direct precipitation on ditches, road, and sediment control pond	0	0	0	0	0	6,958	4,270	3,246	5,236	3,735	2,495	261	26,201
Total runoff volume from unloaded area	0	0	0	0	0	39,263	22,995	16,638	25,486	17,217	10,858	1,068	133,524
Water Sources and Losses for Sediment Control Pond													
Direct runoff to sediment pond from WRSA	0	0	0	0	0	41,922	24,957	18,381	28,704	19,802	12,779	1,289	147,834
Direct runoff from ditches, roads, and sediment control pond	0	0	0	0	0	6,958	4,270	3,246	5,236	3,735	2,495	261	26,201
Total input to sediment pond	0	0	0	0	0	48,880	29,228	21,627	33,939	23,537	15,274	1,550	174,035
Sediment control pond evaporation loss	0	0	0	0	0	0	1,581	1,836	1,683	1,207	561	0	6,868
Net inflow to sediment control pond	0	0	0	0	0	48,880	27,647	19,791	32,256	22,330	14,713	1,550	167,167

TABLE 3 (cont'd)

WESTERN COPPER HOLDINGS LIMITED
CARMACKS COPPER PROJECT

WASTE ROCK STORAGE AREA
MONTHLY WATER BALANCE - YEAR 4
AVERAGE PRECIPITATION CONDITIONS

Precipitation

Assumptions				**Catchments:**		**Area (ha.)**	**Runoff Coeff.**	**Rainfall, Evaporation and Seepage Criteria**			
Annual waste production	=	7.50E+06	tonnes	Cleared, unloaded area (End yr. 4)	=	0.00	100%	Total annual precipitation	=	375	mm
Placed density of waste rock	=	2	tonnes/m³	Loaded waste dump area (End yr. 4)	=	64.75	30%	Surface evaporation coefficient	=	10%	
Months per year waste placement	=	12	months	Loaded waste dump area (End yr. 3)		43.10		Mass of water retained in WRSA voids	=	5%	
Year of operation	=	4		Ditches, perimeter road,				Maximum water content increase of rock	=	2%	
Initial moisture in waste	=	3%		and sediment control pond	=	7.00	100%	Unrecoverable seepage loss	=	5%	

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DESCRIPTION	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Annual
Adjusted Precipitation Distribution													
Rainfall distribution (mm/month)	0	0	0	0	0	0	18	46	75	53	36	4	233.0
Snowmelt distribution (mm/month)	0	0	0	0	0	99	43	0	0	0	0	0	142.0
Mean monthly lake evaporation (mm/month)	0	0	0	0	0	0	93	108	99	71	33	0	404
Waste Rock Storage Area (WRSA) Growth													
Stored waste rock tonnage	23,125,000	23,750,000	24,375,000	25,000,000	25,625,000	26,250,000	26,875,000	27,500,000	28,125,000	28,750,000	29,375,000	30,000,000	30,000,000
Approximate stored waste rock volume	11,562,500	11,875,000	12,187,500	12,500,000	12,812,500	13,125,000	13,437,500	13,750,000	14,062,500	14,375,000	14,687,500	15,000,000	15,000,000
Plan area of loaded WRSA in ha.	44.90	46.71	48.51	50.32	52.12	53.93	55.73	57.53	59.34	61.14	62.95	64.75	64.75
Plan area of cleared, unloaded WRSA in ha.	19.85	18.04	16.24	14.43	12.63	10.83	9.02	7.22	5.41	3.61	1.80	0.00	0.00
Water Input Sources to the Loaded WRSA													
Initial moisture in placed waste rock	18,750	18,750	18,750	18,750	18,750	18,750	18,750	18,750	18,750	18,750	18,750	18,750	225,000
Total precipitation inflow	0	0	0	0	0	53,601	33,999	26,676	44,380	32,623	22,440	2,414	216,134
Water Losses from the Loaded WRSA													
Direct runoff	0	0	0	0	0	16,080	10,200	8,003	13,314	9,787	6,732	724	64,840
Evaporation loss	0	0	0	0	0	0	5,183	6,214	5,874	4,341	2,077	0	23,689
Loss due to water content increase of rockmass	0	0	0	0	0	35,645	17,685	11,837	23,932	17,571	12,949	1,605	121,224
Seepage flow	0	0	0	0	0	1,876	931	623	1,260	925	682	84	6,380
Unrecoverable seepage flow	0	0	0	0	0	94	47	31	63	46	34	4	319
input - losses	0	0	0	0	0	0	0	0	0	0	0	0	
Water Accumulation in the Waste Rock													
Total water input to waste rock	18,750	18,750	18,750	18,750	18,750	54,395	36,435	30,587	42,682	36,321	31,699	20,355	346,224
Total water accumulation	824,757	843,507	862,257	881,007	899,757	954,152	990,587	1,021,174	1,063,857	1,100,177	1,131,876	1,152,231	1,152,231
New moisture content	3.6%	3.6%	3.5%	3.5%	3.5%	3.6%	3.7%	3.7%	3.8%	3.8%	3.9%	3.8%	
Water Sources and Losses for Cleared, Unloaded Area													
Total precipitation inflow	0	0	0	0	0	10,760	5,503	3,346	4,048	1,925	643	0	26,226
Direct runoff to collection ditches	0	0	0	0	0	10,760	5,503	3,346	4,048	1,925	643	0	26,226
Evaporation loss	0	0	0	0	0	0	0	0	0	0	0	0	0
Seepage flow	0	0	0	0	0	0	0	0	0	0	0	0	0
Direct precipitation on ditches, road, and sediment control pond	0	0	0	0	0	6,958	4,270	3,246	5,236	3,735	2,495	261	26,201
Total runoff volume from unloaded area	0	0	0	0	0	17,718	9,774	6,592	9,284	5,660	3,139	261	52,427
Water Sources and Losses for Sediment Control Pond													
Direct runoff to sediment pond from WRSA	0	0	0	0	0	26,840	15,703	11,349	17,362	11,712	7,375	724	91,066
Direct runoff from ditches, roads, and sediment control pond	0	0	0	0	0	6,958	4,270	3,246	5,236	3,735	2,495	261	26,201
Total input to sediment pond	0	0	0	0	0	33,798	19,973	14,595	22,598	15,447	9,870	985	117,267
Sediment control pond evaporation loss	0	0	0	0	0	0	1,581	1,836	1,683	1,207	561	0	6,868
Net inflow to sediment control pond	0	0	0	0	0	33,798	18,392	12,759	20,915	14,240	9,309	985	110,399

TABLE 3 (cont'd)

WESTERN COPPER HOLDINGS LIMITED
CARMACKS COPPER PROJECT

WASTE ROCK STORAGE AREA
MONTHLY WATER BALANCE - YEAR 4
20 YEAR "DRY" ANNUAL PRECIPITATION CONDITIONS

Precipitation

Assumptions			
Annual waste production	=	7.50E+06	tonnes
Placed density of waste rock	=	2	tonnes/m³
Months per year waste placement	=	12	months
Year of operation	=	4	
Initial moisture in waste	=	3%	

Catchments:		**Area (ha.)**	**Runoff Coeff.**
Cleared, unloaded area (End yr. 4)	=	0.00	100%
Loaded waste dump area (End yr. 4)	=	64.75	30%
Loaded waste dump area (End yr. 3)		43.10	
Ditches, perimeter road, and sediment control pond	=	7.00	100%

Rainfall, Evaporation and Seepage Criteria			
Total annual precipitation	=	252	mm
Surface evaporation coefficient	=	10%	
Mass of water retained in WRSA voids	=	5%	
Maximum water content increase of rock	=	2%	
Unrecoverable seepage loss	=	5%	

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DESCRIPTION	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Annual
Adjusted Precipitation Distribution													
Rainfall distribution (mm/month)	0	0	0	0	0	0	12	31	50	36	24	3	157
Snowmelt distribution (mm/month)	0	0	0	0	0	67	29	0	0	0	0	0	95
Mean monthly lake evaporation (mm/month)	0	0	0	0	0	0	93	108	99	71	33	0	404
Waste Rock Storage Area (WRSA) Growth													
Stored waste rock tonnage	23,125,000	23,750,000	24,375,000	25,000,000	25,625,000	26,250,000	26,875,000	27,500,000	28,125,000	28,750,000	29,375,000	30,000,000	30,000,000
Approximate stored waste rock volume	11,562,500	11,875,000	12,187,500	12,500,000	12,812,500	13,125,000	13,437,500	13,750,000	14,062,500	14,375,000	14,687,500	15,000,000	15,000,000
Plan area of loaded WRSA in ha.	44.90	46.71	48.51	50.32	52.12	53.93	55.73	57.53	59.34	61.14	62.95	64.75	64.75
Plan area of cleared, unloaded WRSA in ha.	19.85	18.04	16.24	14.43	12.63	10.83	9.02	7.22	5.41	3.61	1.80	0.00	0.00
Water Input Sources to the Loaded WRSA													
Initial moisture in placed waste rock	18,750	18,750	18,750	18,750	18,750	18,750	18,750	18,750	18,750	18,750	18,750	18,750	225,000
Total precipitation inflow	0	0	0	0	0	36,020	22,847	17,927	29,824	21,923	15,079	1,622	145,242
Water Losses from the Loaded WRSA													
Direct runoff	0	0	0	0	0	10,806	6,854	5,378	8,947	6,577	4,524	487	43,573
Evaporation loss	0	0	0	0	0	0	5,183	6,214	5,874	4,341	2,077	0	23,689
Loss due to water content increase of rockmass	0	0	0	0	0	23,953	10,270	6,018	14,252	10,455	8,054	1,079	74,081
Seepage flow	0	0	0	0	0	1,261	541	317	750	550	424	57	3,899
Unrecoverable seepage flow	0	0	0	0	0	63	27	16	38	28	21	3	195
input - losses	0	0	0	0	0	0	0	0	0	0	0	0	
Water Accumulation in the Waste Rock													
Total water input to waste rock	18,750	18,750	18,750	18,750	18,750	42,703	29,020	24,768	33,002	29,205	26,804	19,829	299,081
Total water accumulation	824,757	843,507	862,257	881,007	899,757	942,460	971,480	996,248	1,029,250	1,058,455	1,085,259	1,105,088	1,105,088
New moisture content	3.6%	3.6%	3.5%	3.5%	3.5%	3.6%	3.6%	3.6%	3.7%	3.7%	3.7%	3.7%	
Water Sources and Losses for Cleared, Unloaded Area													
Total precipitation inflow	0	0	0	0	0	7,231	3,698	2,249	2,720	1,294	432	0	17,624
Direct runoff to collection ditches	0	0	0	0	0	7,231	3,698	2,249	2,720	1,294	432	0	17,624
Evaporation loss	0	0	0	0	0	0	0	0	0	0	0	0	0
Seepage flow	0	0	0	0	0	0	0	0	0	0	0	0	0
Direct precipitation on ditches, road, and sediment control pond	0	0	0	0	0	4,676	2,870	2,181	3,518	2,510	1,677	175	17,607
Total runoff volume from unloaded area	0	0	0	0	0	11,907	6,568	4,430	6,239	3,804	2,109	175	35,231
Water Sources and Losses for Sediment Control Pond													
Direct runoff to sediment pond from WRSA	0	0	0	0	0	18,037	10,552	7,627	11,667	7,871	4,956	487	61,197
Direct runoff from ditches, roads, and sediment control pond	0	0	0	0	0	4,676	2,870	2,181	3,518	2,510	1,677	175	17,607
Total input to sediment pond	0	0	0	0	0	22,713	13,422	9,808	15,186	10,381	6,633	662	78,804
Sediment control pond evaporation loss	0	0	0	0	0	0	1,581	1,836	1,683	1,207	561	0	6,868
Net inflow to sediment control pond	0	0	0	0	0	22,713	11,841	7,972	13,503	9,174	6,072	662	71,936

TABLE 3 (cont'd)

WESTERN COPPER HOLDINGS LIMITED
CARMACKS COPPER PROJECT

WASTE ROCK STORAGE AREA
MONTHLY WATER BALANCE - YEAR 4
20 YEAR "WET" ANNUAL PRECIPITATION CONDITIONS

Assumptions		Precipitation
Annual waste production	=	7.50E+06 tonnes
Placed density of waste rock	=	2 tonnes/m³
Months per year waste placement	=	12 months
Year of operation	=	4
Initial moisture in waste	=	3%

Catchments:		**Area (ha.)**	**Runoff Coeff.**
Cleared, unloaded area (End yr. 4)	=	0.00	100%
Loaded waste dump area (End yr. 4)	=	64.75	30%
Loaded waste dump area (End yr. 3)		43.10	
Ditches, perimeter road, and sediment control pond	=	7.00	100%

Rainfall, Evaporation and Seepage Criteria		
Total annual precipitation	=	498 mm
Surface evaporation coefficient	=	10%
Mass of water retained in WRSA voids	=	5%
Maximum water content increase of rock	=	2%
Unrecoverable seepage loss	=	5%

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DESCRIPTION	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Annual
Adjusted Precipitation Distribution													
Rainfall distribution (mm/month)	0	0	0	0	0	0	24	62	99	71	47	5	309
Snowmelt distribution (mm/month)	0	0	0	0	0	132	57	0	0	0	0	0	189
Mean monthly lake evaporation (mm/month)	0	0	0	0	0	0	93	108	99	71	33	0	404
Waste Rock Storage Area (WRSA) Growth													
Stored waste rock tonnage	23,125,000	23,750,000	24,375,000	25,000,000	25,625,000	26,250,000	26,875,000	27,500,000	28,125,000	28,750,000	29,375,000	30,000,000	30,000,000
Approximate stored waste rock volume	11,562,500	11,875,000	12,187,500	12,500,000	12,812,500	13,125,000	13,437,500	13,750,000	14,062,500	14,375,000	14,687,500	15,000,000	15,000,000
Plan area of loaded WRSA in ha.	44.90	46.71	48.51	50.32	52.12	53.93	55.73	57.53	59.34	61.14	62.95	64.75	64.75
Plan area of cleared, unloaded WRSA in ha.	19.85	18.04	16.24	14.43	12.63	10.83	9.02	7.22	5.41	3.61	1.80	0.00	0.00
Water Input Sources to the Loaded WRSA													
Initial moisture in placed waste rock	18,750	18,750	18,750	18,750	18,750	18,750	18,750	18,750	18,750	18,750	18,750	18,750	225,000
Total precipitation inflow	0	0	0	0	0	71,183	45,150	35,426	58,937	43,324	29,800	3,206	287,026
Water Losses from the Loaded WRSA													
Direct runoff	0	0	0	0	0	21,355	13,545	10,628	17,681	12,997	8,940	962	86,108
Evaporation loss	0	0	0	0	0	0	5,183	6,214	5,874	4,341	2,077	0	23,689
Loss due to water content increase of rockmass	0	0	0	0	0	47,337	25,101	17,656	33,612	24,686	17,843	2,132	168,367
Seepage flow	0	0	0	0	0	2,491	1,321	929	1,769	1,299	939	112	8,861
Unrecoverable seepage flow	0	0	0	0	0	125	66	46	88	65	47	6	443
input - losses	0	0	0	0	0	0	0	0	0	0	0	0	
Water Accumulation in the Waste Rock													
Total water input to waste rock	18,750	18,750	18,750	18,750	18,750	66,087	43,851	36,406	52,362	43,436	36,593	20,882	393,367
Total water accumulation	824,757	843,507	862,257	881,007	899,757	965,844	1,009,695	1,046,100	1,098,463	1,141,899	1,178,493	1,199,374	1,199,374
New moisture content	3.6%	3.6%	3.5%	3.5%	3.5%	3.7%	3.8%	3.8%	3.9%	4.0%	4.0%	4.0%	
Water Sources and Losses for Cleared, Unloaded Area													
Total precipitation inflow	0	0	0	0	0	14,289	7,308	4,444	5,376	2,557	854	0	34,828
Direct runoff to collection ditches	0	0	0	0	0	14,289	7,308	4,444	5,376	2,557	854	0	34,828
Evaporation loss	0	0	0	0	0	0	0	0	0	0	0	0	0
Seepage flow	0	0	0	0	0	0	0	0	0	0	0	0	0
Direct precipitation on ditches, road, and sediment control pond	0	0	0	0	0	9,240	5,671	4,310	6,953	4,960	3,314	347	34,795
Total runoff volume from unloaded area	0	0	0	0	0	23,530	12,980	8,754	12,329	7,517	4,168	347	69,623
Water Sources and Losses for Sediment Control Pond													
Direct runoff to sediment pond from WRSA	0	0	0	0	0	35,644	20,854	15,072	23,057	15,554	9,794	962	120,936
Direct runoff from ditches, roads, and sediment control pond	0	0	0	0	0	9,240	5,671	4,310	6,953	4,960	3,314	347	34,795
Total input to sediment pond	0	0	0	0	0	44,884	26,525	19,382	30,010	20,514	13,108	1,308	155,731
Sediment control pond evaporation loss	0	0	0	0	0	0	1,581	1,836	1,683	1,207	561	0	6,868
Net inflow to sediment control pond	0	0	0	0	0	44,884	24,944	17,546	28,327	19,307	12,547	1,308	148,863

TABLE 3 (cont'd)

WESTERN COPPER HOLDINGS LIMITED
CARMACKS COPPER PROJECT

WASTE ROCK STORAGE AREA
MONTHLY WATER BALANCE - YEAR 5
AVERAGE PRECIPITATION CONDITIONS

Assumptions		Precipitation		**Catchments:**		**Area (ha.)**	**Runoff Coeff.**	**Rainfall, Evaporation and Seepage Criteria**			
Annual waste production	=	7.50E+06	tonnes	Cleared, unloaded area (End yr. 5)	=	0.00	100%	Total annual precipitation	=	375	mm
Placed density of waste rock	=	2	tonnes/m³	Loaded waste dump area (End yr. 5)	=	64.75	30%	Surface evaporation coefficient	=	10%	
Months per year waste placement	=	12	months	Loaded waste dump area (End yr. 4)		64.75		Mass of water retained in WRSA voids	=	5%	
Year of operation	=	5		Ditches, perimeter road,				Maximum water content increase of rock	=	2%	
Initial moisture in waste	=	3%		and sediment control pond	=	7.00	100%	Unrecoverable seepage loss	=	5%	

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DESCRIPTION	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Annual
Adjusted Precipitation Distribution													
Rainfall distribution (mm/month)	0	0	0	0	0	0	18	46	75	53	36	4	233.0
Snowmelt distribution (mm/month)	0	0	0	0	0	99	43	0	0	0	0	0	142.0
Mean monthly lake evaporation (mm/month)	0	0	0	0	0	0	93	108	99	71	33	0	404
Waste Rock Storage Area (WRSA) Growth													
Stored waste rock tonnage	30,625,000	31,250,000	31,875,000	32,500,000	33,125,000	33,750,000	34,375,000	35,000,000	35,625,000	36,250,000	36,875,000	37,500,000	37,500,000
Approximate stored waste rock volume	15,312,500	15,625,000	15,937,500	16,250,000	16,562,500	16,875,000	17,187,500	17,500,000	17,812,500	18,125,000	18,437,500	18,750,000	18,750,000
Plan area of loaded WRSA in ha.	64.75	64.75	64.75	64.75	64.75	64.75	64.75	64.75	64.75	64.75	64.75	64.75	64.75
Plan area of cleared, unloaded WRSA in ha.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Water Input Sources to the Loaded WRSA													
Initial moisture in placed waste rock	18,750	18,750	18,750	18,750	18,750	18,750	18,750	18,750	18,750	18,750	18,750	18,750	225,000
Total precipitation inflow	0	0	0	0	0	64,362	39,502	30,023	48,428	34,549	23,083	2,414	242,360
Water Losses from the Loaded WRSA													
Direct runoff	0	0	0	0	0	19,308	11,851	9,007	14,529	10,365	6,925	724	72,708
Evaporation loss	0	0	0	0	0	0	6,022	6,993	6,410	4,597	2,137	0	26,159
Loss due to water content increase of rockmass	0	0	0	0	0	42,800	20,548	13,322	26,115	18,607	13,320	1,605	136,318
Seepage flow	0	0	0	0	0	2,253	1,081	701	1,374	979	701	84	7,175
Unrecoverable seepage flow	0	0	0	0	0	113	54	35	69	49	35	4	359
input - losses	0	0	0	0	0	0	0	0	0	0	0	0	
Water Accumulation in the Waste Rock													
Total water input to waste rock	18,750	18,750	18,750	18,750	18,750	61,550	39,298	32,072	44,865	37,357	32,070	20,355	361,318
Total water accumulation	1,170,981	1,189,731	1,208,481	1,227,231	1,245,981	1,307,532	1,346,830	1,378,902	1,423,767	1,461,124	1,493,194	1,513,550	1,513,550
New moisture content	3.8%	3.8%	3.8%	3.8%	3.8%	3.9%	3.9%	3.9%	4.0%	4.0%	4.0%	4.0%	
Water Sources and Losses for Cleared, Unloaded Area													
Total precipitation inflow	0	0	0	0	0	0	0	0	0	0	0	0	0
Direct runoff to collection ditches	0	0	0	0	0	0	0	0	0	0	0	0	0
Evaporation loss	0	0	0	0	0	0	0	0	0	0	0	0	0
Seepage flow	0	0	0	0	0	0	0	0	0	0	0	0	0
Direct precipitation on ditches, road, and sediment control pond	0	0	0	0	0	6,958	4,270	3,246	5,236	3,735	2,495	261	26,201
Total runoff volume from unloaded area	0	0	0	0	0	6,958	4,270	3,246	5,236	3,735	2,495	261	26,201
Water Sources and Losses for Sediment Control Pond													
Direct runoff to sediment pond from WRSA	0	0	0	0	0	19,308	11,851	9,007	14,529	10,365	6,925	724	72,708
Direct runoff from ditches, roads, and sediment control pond	0	0	0	0	0	6,958	4,270	3,246	5,236	3,735	2,495	261	26,201
Total input to sediment pond	0	0	0	0	0	26,266	16,121	12,252	19,764	14,100	9,420	985	98,909
Sediment control pond evaporation loss	0	0	0	0	0	0	1,581	1,836	1,683	1,207	561	0	6,868
Net inflow to sediment control pond	0	0	0	0	0	26,266	14,540	10,416	18,081	12,893	8,859	985	92,041

TABLE 3 (cont'd)

WESTERN COPPER HOLDINGS LIMITED
CARMACKS COPPER PROJECT

WASTE ROCK STORAGE AREA
MONTHLY WATER BALANCE - YEAR 6
AVERAGE PRECIPITATION CONDITIONS

Assumptions		Precipitation	
Annual waste production	=	7.50E+06	tonnes
Placed density of waste rock	=	2	tonnes/m³
Months per year waste placement	=	12	months
Year of operation	=	6	
Initial moisture in waste	=	3%	

Catchments:		**Area (ha.)**	**Runoff Coeff.**
Cleared, unloaded area (End yr. 6)	=	0.00	100%
Loaded waste dump area (End yr. 6)	=	64.75	30%
Loaded waste dump area (End yr. 5)		64.75	
Ditches, perimeter road, and sediment control pond	=	7.00	100%

Rainfall, Evaporation and Seepage Criteria			
Total annual precipitation	=	375	mm
Surface evaporation coefficient	=	10%	
Mass of water retained in WRSA voids	=	5%	
Maximum water content increase of rock	=	2%	
Unrecoverable seepage loss	=	5%	

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DESCRIPTION	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Annual
Adjusted Precipitation Distribution													
Rainfall distribution (mm/month)	0	0	0	0	0	0	18	46	75	53	36	4	233.0
Snowmelt distribution (mm/month)	0	0	0	0	0	99	43	0	0	0	0	0	142.0
Mean monthly lake evaporation (mm/month)	0	0	0	0	0	0	93	108	99	71	33	0	404
Waste Rock Storage Area (WRSA) Growth													
Stored waste rock tonnage	38,125,000	38,750,000	39,375,000	40,000,000	40,625,000	41,250,000	41,875,000	42,500,000	43,125,000	43,750,000	44,375,000	45,000,000	45,000,000
Approximate stored waste rock volume	19,062,500	19,375,000	19,687,500	20,000,000	20,312,500	20,625,000	20,937,500	21,250,000	21,562,500	21,875,000	22,187,500	22,500,000	22,500,000
Plan area of loaded WRSA in ha.	64.75	64.75	64.75	64.75	64.75	64.75	64.75	64.75	64.75	64.75	64.75	64.75	64.75
Plan area of cleared, unloaded WRSA in ha.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Water Input Sources to the Loaded WRSA													
Initial moisture in placed waste rock	18,750	18,750	18,750	18,750	18,750	18,750	18,750	18,750	18,750	18,750	18,750	18,750	225,000
Total precipitation inflow	0	0	0	0	0	64,362	39,502	30,023	48,428	34,549	23,083	2,414	242,360
Water Losses from the Loaded WRSA													
Direct runoff	0	0	0	0	0	19,308	11,851	9,007	14,529	10,365	6,925	724	72,708
Evaporation loss	0	0	0	0	0	0	6,022	6,993	6,410	4,597	2,137	0	26,159
Loss due to water content increase of rockmass	0	0	0	0	0	42,800	20,548	13,322	26,115	18,607	13,320	1,605	136,318
Seepage flow	0	0	0	0	0	2,253	1,081	701	1,374	979	701	84	7,175
Unrecoverable seepage flow	0	0	0	0	0	113	54	35	69	49	35	4	359
input - losses	0	0	0	0	0	0	0	0	0	0	0	0	
Water Accumulation in the Waste Rock													
Total water input to waste rock	18,750	18,750	18,750	18,750	18,750	61,550	39,298	32,072	44,865	37,357	32,070	20,355	361,318
Total water accumulation	1,532,300	1,551,050	1,569,800	1,588,550	1,607,300	1,668,850	1,708,148	1,740,220	1,785,085	1,822,443	1,854,513	1,874,868	1,874,868
New moisture content	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.1%	4.1%	4.1%	4.2%	4.2%	4.2%	
Water Sources and Losses for Cleared, Unloaded Area													
Total precipitation inflow	0	0	0	0	0	0	0	0	0	0	0	0	0
Direct runoff to collection ditches	0	0	0	0	0	0	0	0	0	0	0	0	0
Evaporation loss	0	0	0	0	0	0	0	0	0	0	0	0	0
Seepage flow	0	0	0	0	0	0	0	0	0	0	0	0	0
Direct precipitation on ditches, road, and sediment control pond	0	0	0	0	0	6,958	4,270	3,246	5,236	3,735	2,495	261	26,201
Total runoff volume from unloaded area	0	0	0	0	0	6,958	4,270	3,246	5,236	3,735	2,495	261	26,201
Water Sources and Losses for Sediment Control Pond													
Direct runoff to sediment pond from WRSA	0	0	0	0	0	19,308	11,851	9,007	14,529	10,365	6,925	724	72,708
Direct runoff from ditches, roads, and sediment control pond	0	0	0	0	0	6,958	4,270	3,246	5,236	3,735	2,495	261	26,201
Total input to sediment pond	0	0	0	0	0	26,266	16,121	12,252	19,764	14,100	9,420	985	98,909
Sediment control pond evaporation loss	0	0	0	0	0	0	1,581	1,836	1,683	1,207	561	0	6,868
Net inflow to sediment control pond	0	0	0	0	0	26,266	14,540	10,416	18,081	12,893	8,859	985	92,041

TABLE 3 (cont'd)

WESTERN COPPER HOLDINGS LIMITED
CARMACKS COPPER PROJECT

WASTE ROCK STORAGE AREA
MONTHLY WATER BALANCE - YEAR 7
AVERAGE PRECIPITATION CONDITIONS

Precipitation

Assumptions				Catchments:		Area (ha.)	Runoff Coeff.	Rainfall, Evaporation and Seepage Criteria			
Annual waste production	=	7.50E+06	tonnes	Cleared, unloaded area (End yr. 7)	=	0.00	100%	Total annual precipitation	=	375	mm
Placed density of waste rock	=	2	tonnes/m³	Loaded waste dump area (End yr. 7)	=	64.75	30%	Surface evaporation coefficient	=	10%	
Months per year waste placement	=	12	months	Loaded waste dump area (End yr. 6)		64.75		Mass of water retained in WRSA voids	=	5%	
Year of operation	=	7		Ditches, perimeter road,				Maximum water content increase of rock	=	2%	
Initial moisture in waste	=	3%		and sediment control pond	=	7.00	100%	Unrecoverable seepage loss	=	5%	

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DESCRIPTION	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Annual
Adjusted Precipitation Distribution													
Rainfall distribution (mm/month)	0	0	0	0	0	0	18	46	75	53	36	4	233.0
Snowmelt distribution (mm/month)	0	0	0	0	0	99	43	0	0	0	0	0	142.0
Mean monthly lake evaporation (mm/month)	0	0	0	0	0	0	93	108	99	71	33	0	404
Waste Rock Storage Area (WRSA) Growth													
Stored waste rock tonnage	45,625,000	46,250,000	46,875,000	47,500,000	48,125,000	48,750,000	49,375,000	50,000,000	50,625,000	51,250,000	51,875,000	52,500,000	52,500,000
Approximate stored waste rock volume	22,812,500	23,125,000	23,437,500	23,750,000	24,062,500	24,375,000	24,687,500	25,000,000	25,312,500	25,625,000	25,937,500	26,250,000	26,250,000
Plan area of loaded WRSA in ha.	64.75	64.75	64.75	64.75	64.75	64.75	64.75	64.75	64.75	64.75	64.75	64.75	64.75
Plan area of cleared, unloaded WRSA in ha.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Water Input Sources to the Loaded WRSA													
Initial moisture in placed waste rock	18,750	18,750	18,750	18,750	18,750	18,750	18,750	18,750	18,750	18,750	18,750	18,750	225,000
Total precipitation inflow	0	0	0	0	0	64,362	39,502	30,023	48,428	34,549	23,083	2,414	242,360
Water Losses from the Loaded WRSA													
Direct runoff	0	0	0	0	0	19,308	11,851	9,007	14,529	10,365	6,925	724	72,708
Evaporation loss	0	0	0	0	0	0	6,022	6,993	6,410	4,597	2,137	0	26,159
Loss due to water content increase of rockmass	0	0	0	0	0	42,800	20,548	13,322	26,115	18,607	13,320	1,605	136,318
Seepage flow	0	0	0	0	0	2,253	1,081	701	1,374	979	701	84	7,175
Unrecoverable seepage flow	0	0	0	0	0	113	54	35	69	49	35	4	359
input - losses	0	0	0	0	0	0	0	0	0	0	0	0	
Water Accumulation in the Waste Rock													
Total water input to waste rock	18,750	18,750	18,750	18,750	18,750	61,550	39,298	32,072	44,865	37,357	32,070	20,355	361,318
Total water accumulation	1,893,618	1,912,368	1,931,118	1,949,868	1,968,618	2,030,168	2,069,466	2,101,538	2,146,403	2,183,761	2,215,831	2,236,186	2,236,186
New moisture content	4.2%	4.1%	4.1%	4.1%	4.1%	4.2%	4.2%	4.2%	4.2%	4.3%	4.3%	4.3%	
Water Sources and Losses for Cleared, Unloaded Area													
Total precipitation inflow	0	0	0	0	0	0	0	0	0	0	0	0	0
Direct runoff to collection ditches	0	0	0	0	0	0	0	0	0	0	0	0	0
Evaporation loss	0	0	0	0	0	0	0	0	0	0	0	0	0
Seepage flow	0	0	0	0	0	0	0	0	0	0	0	0	0
Direct precipitation on ditches, road, and sediment control pond	0	0	0	0	0	6,958	4,270	3,246	5,236	3,735	2,495	261	26,201
Total runoff volume from unloaded area	0	0	0	0	0	6,958	4,270	3,246	5,236	3,735	2,495	261	26,201
Water Sources and Losses for Sediment Control Pond													
Direct runoff to sediment pond from WRSA	0	0	0	0	0	19,308	11,851	9,007	14,529	10,365	6,925	724	72,708
Direct runoff from ditches, roads, and sediment control pond	0	0	0	0	0	6,958	4,270	3,246	5,236	3,735	2,495	261	26,201
Total input to sediment pond	0	0	0	0	0	26,266	16,121	12,252	19,764	14,100	9,420	985	98,909
Sediment control pond evaporation loss	0	0	0	0	0	0	1,581	1,836	1,683	1,207	561	0	6,868
Net inflow to sediment control pond	0	0	0	0	0	26,266	14,540	10,416	18,081	12,893	8,859	985	92,041

TABLE 3 (cont'd)

WESTERN COPPER HOLDINGS LIMITED
CARMACKS COPPER PROJECT

WASTE ROCK STORAGE AREA
MONTHLY WATER BALANCE - YEAR 8
AVERAGE PRECIPITATION CONDITIONS

Precipitation

Assumptions				Catchments:		Area (ha.)	Runoff Coeff.	Rainfall, Evaporation and Seepage Criteria		
Annual waste production	=	7.50E+06	tonnes	Cleared, unloaded area (End yr. 8)	=	0.00	100%	Total annual precipitation	=	375 mm
Placed density of waste rock	=	2	tonnes/m³	Loaded waste dump area (End yr. 8)	=	64.75	30%	Surface evaporation coefficient	=	10%
Months per year waste placement	=	12	months	Loaded waste dump area (End yr. 7)		64.75		Mass of water retained in WRSA voids	=	5%
Year of operation	=	8		Ditches, perimeter road,				Maximum water content increase of rock	=	2%
Initial moisture in waste	=	3%		and sediment control pond	=	7.00	100%	Unrecoverable seepage loss	=	5%

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DESCRIPTION	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Annual
Adjusted Precipitation Distribution													
Rainfall distribution (mm/month)	0	0	0	0	0	0	18	46	75	53	36	4	233.0
Snowmelt distribution (mm/month)	0	0	0	0	0	99	43	0	0	0	0	0	142.0
Mean monthly lake evaporation (mm/month)	0	0	0	0	0	0	93	108	99	71	33	0	404
Waste Rock Storage Area (WRSA) Growth													
Stored waste rock tonnage	53,125,000	53,750,000	54,375,000	55,000,000	55,625,000	56,250,000	56,875,000	57,500,000	58,125,000	58,750,000	59,375,000	60,000,000	60,000,000
Approximate stored waste rock volume	26,562,500	26,875,000	27,187,500	27,500,000	27,812,500	28,125,000	28,437,500	28,750,000	29,062,500	29,375,000	29,687,500	30,000,000	30,000,000
Plan area of loaded WRSA in ha.	64.75	64.75	64.75	64.75	64.75	64.75	64.75	64.75	64.75	64.75	64.75	64.75	64.75
Plan area of cleared, unloaded WRSA in ha.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Water Input Sources to the Loaded WRSA													
Initial moisture in placed waste rock	18,750	18,750	18,750	18,750	18,750	18,750	18,750	18,750	18,750	18,750	18,750	18,750	225,000
Total precipitation inflow	0	0	0	0	0	64,362	39,502	30,023	48,428	34,549	23,083	2,414	242,360
Water Losses from the Loaded WRSA													
Direct runoff	0	0	0	0	0	19,308	11,851	9,007	14,529	10,365	6,925	724	72,708
Evaporation loss	0	0	0	0	0	0	6,022	6,993	6,410	4,597	2,137	0	26,159
Loss due to water content increase of rockmass	0	0	0	0	0	42,800	20,548	13,322	26,115	18,607	13,320	1,605	136,318
Seepage flow	0	0	0	0	0	2,253	1,081	701	1,374	979	701	84	7,175
Unrecoverable seepage flow	0	0	0	0	0	113	54	35	69	49	35	4	359
input - losses	0	0	0	0	0	0	0	0	0	0	0	0	
Water Accumulation in the Waste Rock													
Total water input to waste rock	18,750	18,750	18,750	18,750	18,750	61,550	39,298	32,072	44,865	37,357	32,070	20,355	361,318
Total water accumulation	2,254,936	2,273,686	2,292,436	2,311,186	2,329,936	2,391,487	2,430,785	2,462,856	2,507,722	2,545,079	2,577,149	2,597,504	2,597,504
New moisture content	4.2%	4.2%	4.2%	4.2%	4.2%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	
Water Sources and Losses for Cleared, Unloaded Area													
Total precipitation inflow	0	0	0	0	0	0	0	0	0	0	0	0	0
Direct runoff to collection ditches	0	0	0	0	0	0	0	0	0	0	0	0	0
Evaporation loss	0	0	0	0	0	0	0	0	0	0	0	0	0
Seepage flow	0	0	0	0	0	0	0	0	0	0	0	0	0
Direct precipitation on ditches, road, and sediment control pond	0	0	0	0	0	6,958	4,270	3,246	5,236	3,735	2,495	261	26,201
Total runoff volume from unloaded area	0	0	0	0	0	6,958	4,270	3,246	5,236	3,735	2,495	261	26,201
Water Sources and Losses for Sediment Control Pond													
Direct runoff to sediment pond from WRSA	0	0	0	0	0	19,308	11,851	9,007	14,529	10,365	6,925	724	72,708
Direct runoff from ditches, roads, and sediment control pond	0	0	0	0	0	6,958	4,270	3,246	5,236	3,735	2,495	261	26,201
Total input to sediment pond	0	0	0	0	0	26,266	16,121	12,252	19,764	14,100	9,420	985	98,909
Sediment control pond evaporation loss	0	0	0	0	0	0	1,581	1,836	1,683	1,207	561	0	6,868
Net inflow to sediment control pond	0	0	0	0	0	26,266	14,540	10,416	18,081	12,893	8,859	985	92,041

TABLE 3 (cont'd)

WESTERN COPPER HOLDINGS LIMITED
CARMACKS COPPER PROJECT

WASTE ROCK STORAGE AREA
MONTHLY WATER BALANCE - YEAR 8
20 YEAR "DRY" ANNUAL PRECIPITATION CONDITIONS

Precipitation

Assumptions			
Annual waste production	=	7.50E+06	tonnes
Placed density of waste rock	=	2	tonnes/m³
Months per year waste placement	=	12	months
Year of operation	=	8	
Initial moisture in waste	=	3%	

Catchments:		**Area (ha.)**	**Runoff Coeff.**
Cleared, unloaded area (End yr. 8)	=	0.00	100%
Loaded waste dump area (End yr. 8)	=	64.75	30%
Loaded waste dump area (End yr. 7)		64.75	
Ditches, perimeter road, and sediment control pond	=	7.00	100%

Rainfall, Evaporation and Seepage Criteria			
Total annual precipitation	=	252	mm
Surface evaporation coefficient	=	10%	
Mass of water retained in WRSA voids	=	5%	
Maximum water content increase of rock	=	2%	
Unrecoverable seepage loss	=	5%	

C:\ACG\Projects\WCH-01\Project Description\Reports to be Submitted - pdfs\WRSA\[t1.xls]Year 8 dry 2/23/2005 8:33

DESCRIPTION	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Annual
Adjusted Precipitation Distribution													
Rainfall distribution (mm/month)	0	0	0	0	0	0	12	31	50	36	24	3	157
Snowmelt distribution (mm/month)	0	0	0	0	0	67	29	0	0	0	0	0	95
Mean monthly lake evaporation (mm/month)	0	0	0	0	0	0	93	108	99	71	33	0	404
Waste Rock Storage Area (WRSA) Growth													
Stored waste rock tonnage	53,125,000	53,750,000	54,375,000	55,000,000	55,625,000	56,250,000	56,875,000	57,500,000	58,125,000	58,750,000	59,375,000	60,000,000	60,000,000
Approximate stored waste rock volume	26,562,500	26,875,000	27,187,500	27,500,000	27,812,500	28,125,000	28,437,500	28,750,000	29,062,500	29,375,000	29,687,500	30,000,000	30,000,000
Plan area of loaded WRSA in ha.	64.75	64.75	64.75	64.75	64.75	64.75	64.75	64.75	64.75	64.75	64.75	64.75	64.75
Plan area of cleared, unloaded WRSA in ha.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Water Input Sources to the Loaded WRSA													
Initial moisture in placed waste rock	18,750	18,750	18,750	18,750	18,750	18,750	18,750	18,750	18,750	18,750	18,750	18,750	225,000
Total precipitation inflow	0	0	0	0	0	43,251	26,545	20,175	32,544	23,217	15,512	1,622	162,866
Water Losses from the Loaded WRSA													
Direct runoff	0	0	0	0	0	12,975	7,964	6,053	9,763	6,965	4,653	487	48,860
Evaporation loss	0	0	0	0	0	0	6,022	6,993	6,410	4,597	2,137	0	26,159
Loss due to water content increase of rockmass	0	0	0	0	0	28,762	11,932	6,773	15,552	11,072	8,285	1,079	83,455
Seepage flow	0	0	0	0	0	1,514	628	356	819	583	436	57	4,392
Unrecoverable seepage flow	0	0	0	0	0	76	31	18	41	29	22	3	220
input - losses	0	0	0	0	0	0	0	0	0	0	0	0	
Water Accumulation in the Waste Rock													
Total water input to waste rock	18,750	18,750	18,750	18,750	18,750	47,512	30,682	25,523	34,302	29,822	27,035	19,829	308,455
Total water accumulation	2,254,936	2,273,686	2,292,436	2,311,186	2,329,936	2,377,448	2,408,130	2,433,653	2,467,955	2,497,777	2,524,812	2,544,641	2,544,641
New moisture content	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.3%	4.3%	4.2%	
Water Sources and Losses for Cleared, Unloaded Area													
Total precipitation inflow	0	0	0	0	0	0	0	0	0	0	0	0	0
Direct runoff to collection ditches	0	0	0	0	0	0	0	0	0	0	0	0	0
Evaporation loss	0	0	0	0	0	0	0	0	0	0	0	0	0
Seepage flow	0	0	0	0	0	0	0	0	0	0	0	0	0
Direct precipitation on ditches, road, and sediment control pond	0	0	0	0	0	4,676	2,870	2,181	3,518	2,510	1,677	175	17,607
Total runoff volume from unloaded area	0	0	0	0	0	4,676	2,870	2,181	3,518	2,510	1,677	175	17,607
Water Sources and Losses for Sediment Control Pond													
Direct runoff to sediment pond from WRSA	0	0	0	0	0	12,975	7,964	6,053	9,763	6,965	4,653	487	48,860
Direct runoff from ditches, roads, and sediment control pond	0	0	0	0	0	4,676	2,870	2,181	3,518	2,510	1,677	175	17,607
Total input to sediment pond	0	0	0	0	0	17,651	10,833	8,234	13,281	9,475	6,330	662	66,467
Sediment control pond evaporation loss	0	0	0	0	0	0	1,581	1,836	1,683	1,207	561	0	6,868
Net inflow to sediment control pond	0	0	0	0	0	17,651	9,252	6,398	11,598	8,268	5,769	662	59,599

TABLE 3 (cont'd)

WESTERN COPPER HOLDINGS LIMITED
CARMACKS COPPER PROJECT

WASTE ROCK STORAGE AREA
MONTHLY WATER BALANCE - YEAR 8
20 YEAR "WET" ANNUAL PRECIPITATION CONDITIONS

Precipitation

Assumptions			
Annual waste production	=	7.50E+06	tonnes
Placed density of waste rock	=	2	tonnes/m³
Months per year waste placement	=	12	months
Year of operation	=	8	
Initial moisture in waste	=	3%	

Catchments:		**Area (ha.)**	**Runoff Coeff.**
Cleared, unloaded area (End yr. 8)	=	0.00	100%
Loaded waste dump area (End yr. 8)	=	64.75	30%
Loaded waste dump area (End yr. 7)		64.75	
Ditches, perimeter road, and sediment control pond	=	7.00	100%

Rainfall, Evaporation and Seepage Criteria			
Total annual precipitation	=	498	mm
Surface evaporation coefficient	=	10%	
Mass of water retained in WRSA voids	=	5%	
Maximum water content increase of rock	=	2%	
Unrecoverable seepage loss	=	5%	

C:\ACG\Projects\WCH-01\Project Description\Reports to be Submitted - pdfs\WRSA\[t1.xls]Year 8 wet 2/23/2005 8:34

DESCRIPTION	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Annual
Adjusted Precipitation Distribution													
Rainfall distribution (mm/month)	0	0	0	0	0	0	24	62	99	71	47	5	309
Snowmelt distribution (mm/month)	0	0	0	0	0	132	57	0	0	0	0	0	189
Mean monthly lake evaporation (mm/month)	0	0	0	0	0	0	93	108	99	71	33	0	404
Waste Rock Storage Area (WRSA) Growth													
Stored waste rock tonnage	53,125,000	53,750,000	54,375,000	55,000,000	55,625,000	56,250,000	56,875,000	57,500,000	58,125,000	58,750,000	59,375,000	60,000,000	60,000,000
Approximate stored waste rock volume	26,562,500	26,875,000	27,187,500	27,500,000	27,812,500	28,125,000	28,437,500	28,750,000	29,062,500	29,375,000	29,687,500	30,000,000	30,000,000
Plan area of loaded WRSA in ha.	64.75	64.75	64.75	64.75	64.75	64.75	64.75	64.75	64.75	64.75	64.75	64.75	64.75
Plan area of cleared, unloaded WRSA in ha.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Water Input Sources to the Loaded WRSA													
Initial moisture in placed waste rock	18,750	18,750	18,750	18,750	18,750	18,750	18,750	18,750	18,750	18,750	18,750	18,750	225,000
Total precipitation inflow	0	0	0	0	0	85,472	52,459	39,870	64,313	45,881	30,654	3,206	321,854
Water Losses from the Loaded WRSA													
Direct runoff	0	0	0	0	0	25,642	15,738	11,961	19,294	13,764	9,196	962	96,556
Evaporation loss	0	0	0	0	0	0	6,022	6,993	6,410	4,597	2,137	0	26,159
Loss due to water content increase of rockmass	0	0	0	0	0	56,839	29,164	19,870	36,678	26,143	18,355	2,132	189,182
Seepage flow	0	0	0	0	0	2,992	1,535	1,046	1,930	1,376	966	112	9,957
Unrecoverable seepage flow	0	0	0	0	0	150	77	52	97	69	48	6	498
input - losses	0	0	0	0	0	0	0	0	0	0	0	0	
Water Accumulation in the Waste Rock													
Total water input to waste rock	18,750	18,750	18,750	18,750	18,750	75,589	47,914	38,620	55,428	44,893	37,105	20,882	414,182
Total water accumulation	2,254,936	2,273,686	2,292,436	2,311,186	2,329,936	2,405,525	2,453,439	2,492,060	2,547,488	2,592,381	2,629,486	2,650,368	2,650,368
New moisture content	4.2%	4.2%	4.2%	4.2%	4.2%	4.3%	4.3%	4.3%	4.4%	4.4%	4.4%	4.4%	
Water Sources and Losses for Cleared, Unloaded Area													
Total precipitation inflow	0	0	0	0	0	0	0	0	0	0	0	0	0
Direct runoff to collection ditches	0	0	0	0	0	0	0	0	0	0	0	0	0
Evaporation loss	0	0	0	0	0	0	0	0	0	0	0	0	0
Seepage flow	0	0	0	0	0	0	0	0	0	0	0	0	0
Direct precipitation on ditches, road, and sediment control pond	0	0	0	0	0	9,240	5,671	4,310	6,953	4,960	3,314	347	34,795
Total runoff volume from unloaded area	0	0	0	0	0	9,240	5,671	4,310	6,953	4,960	3,314	347	34,795
Water Sources and Losses for Sediment Control Pond													
Direct runoff to sediment pond from WRSA	0	0	0	0	0	25,642	15,738	11,961	19,294	13,764	9,196	962	96,556
Direct runoff from ditches, roads, and sediment control pond	0	0	0	0	0	9,240	5,671	4,310	6,953	4,960	3,314	347	34,795
Total input to sediment pond	0	0	0	0	0	34,882	21,409	16,271	26,247	18,724	12,510	1,308	131,351
Sediment control pond evaporation loss	0	0	0	0	0	0	1,581	1,836	1,683	1,207	561	0	6,868
Net inflow to sediment control pond	0	0	0	0	0	34,882	19,828	14,435	24,564	17,517	11,949	1,308	124,483

CAD FILE: 1784\DG\A28 Plot scale 1:1

WESTERN COPPER HOLDINGS LIMITED
CARMACKS COPPER PROJECT
WASTE ROCK STORAGE AREA
WATER BALANCE – END YEAR 1

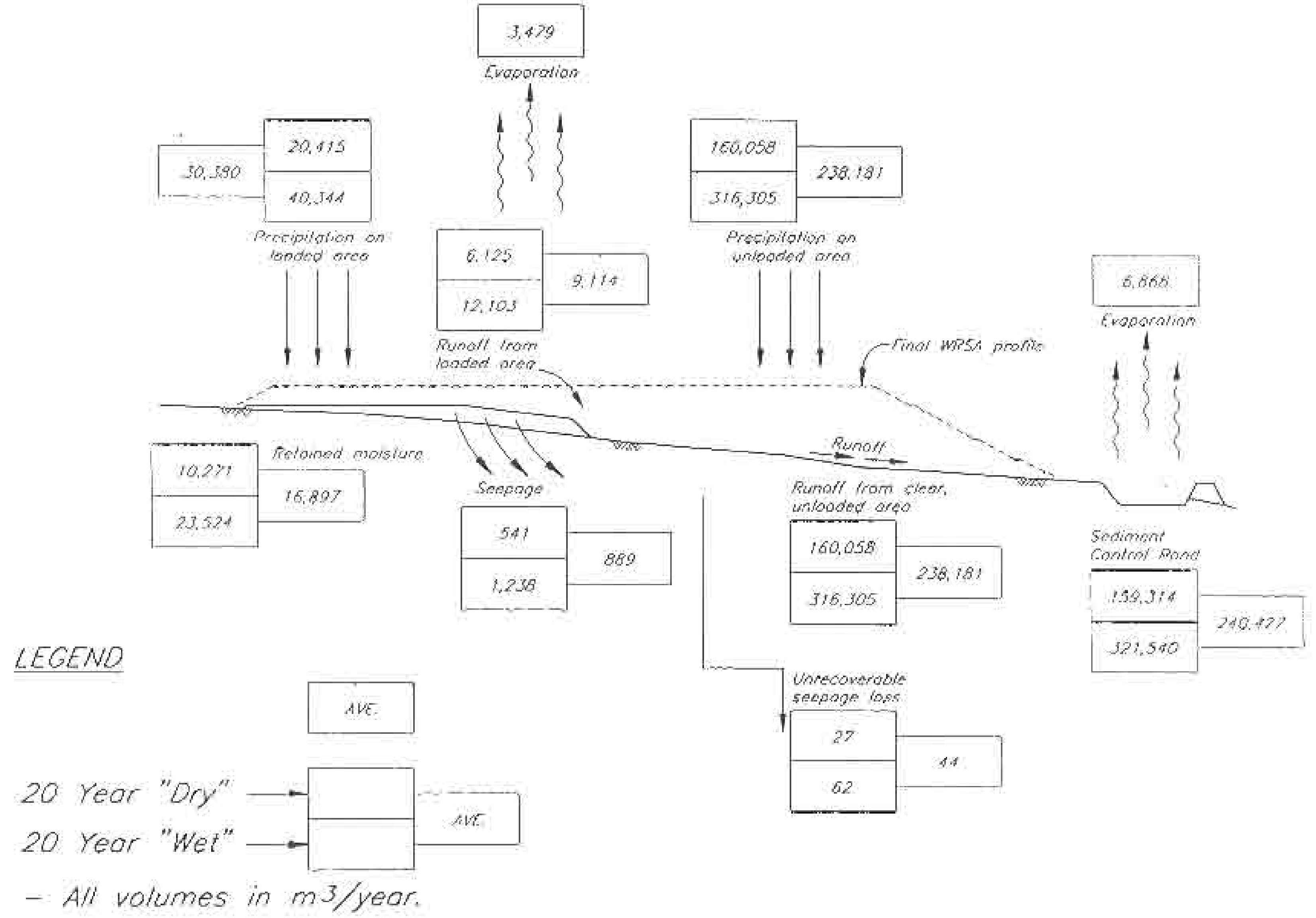

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FIGURE 1

1784-A28

CAD FILE: 1784\FIG\A29 Plot scale 1=1

WESTERN COPPER HOLDINGS LIMITED
CARMACKS COPPER PROJECT
WASTE ROCK STORAGE AREA
WATER BALANCE – END YEAR 4

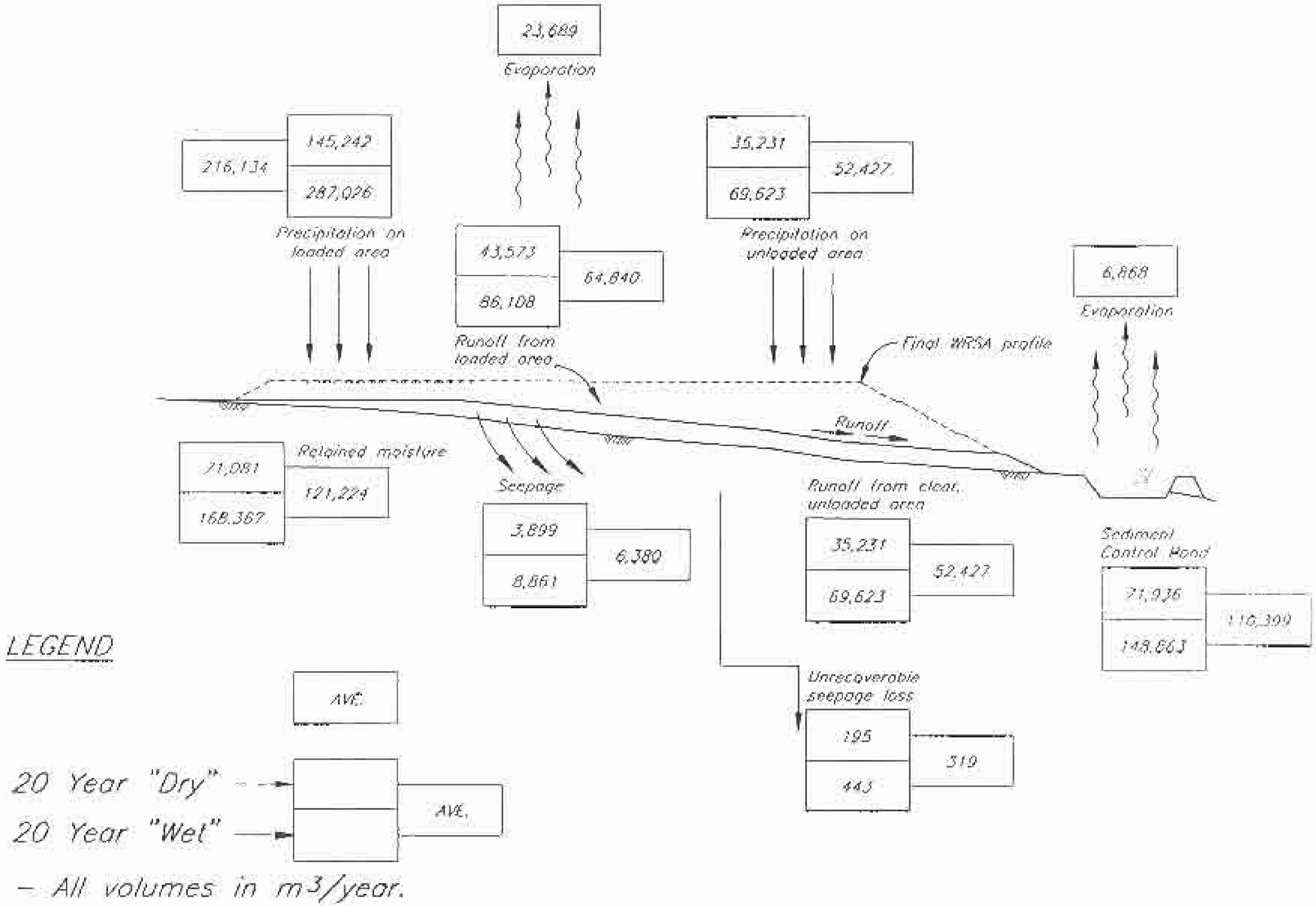

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FIGURE 1 (con't)

1784 A29

CAD FILE: \178A\FIG\A50 Plot scale 1=1

WESTERN COPPER HOLDINGS LIMITED
CARMACKS COPPER PROJECT
WASTE ROCK STORAGE AREA
WATER BALANCE – END YEAR 8

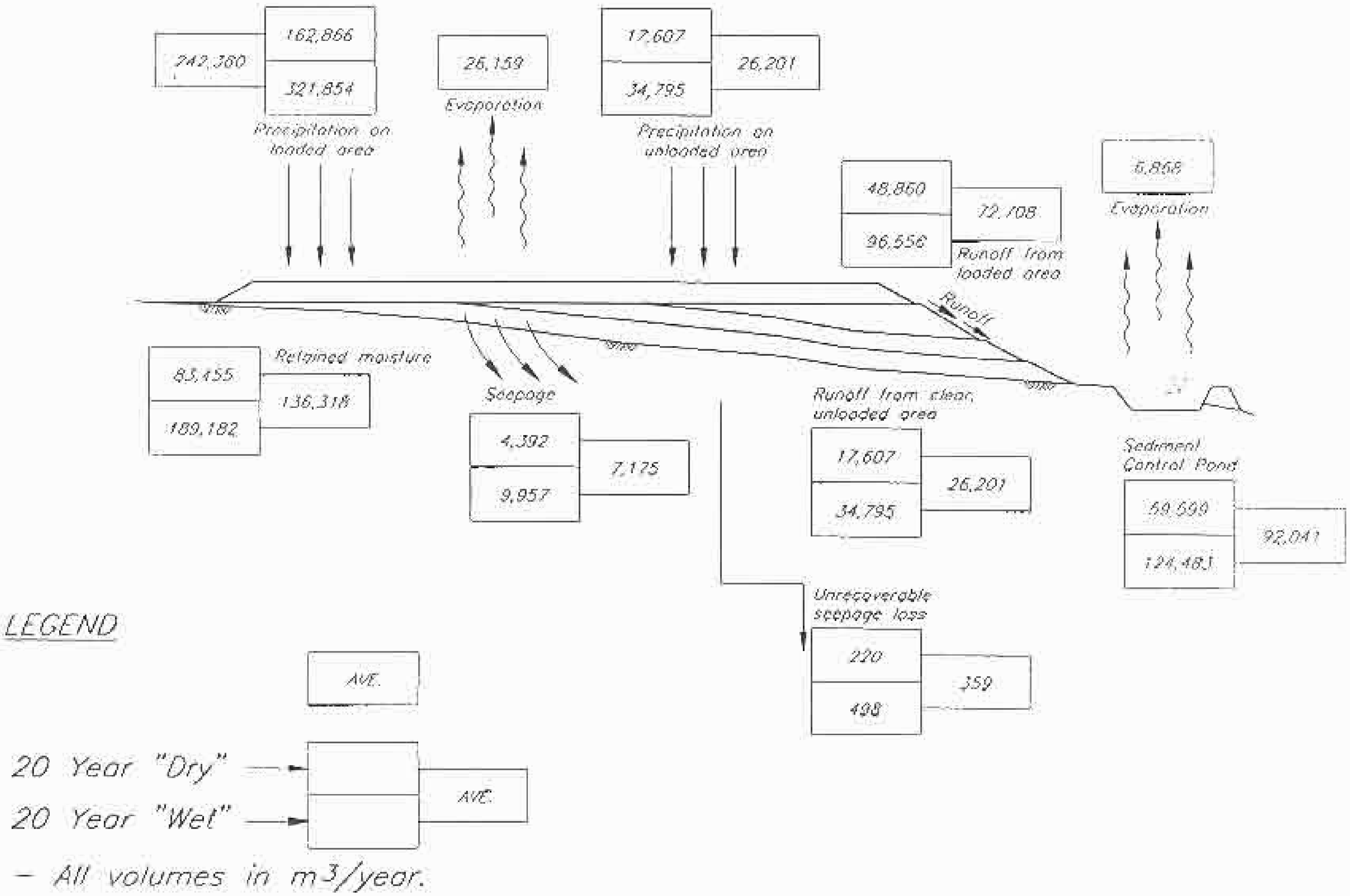

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FIGURE 1 (con't)

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CARMACKS COPPER PROJECT

WASTE ROCK STORAGE AREA

ONE-DIMENSIONAL THAW ANALYSES

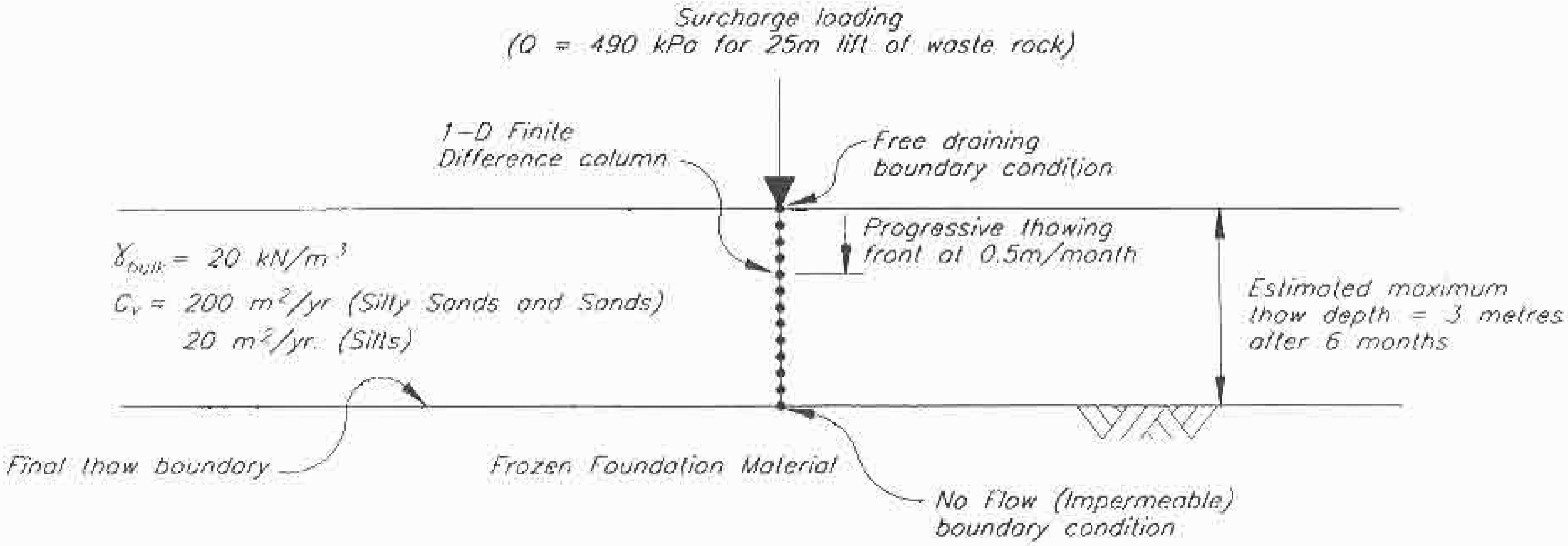

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FIGURE 2

WESTERN COPPER HOLDINGS LIMITED

CARMACKS COPPER PROJECT

WASTE ROCK STORAGE AREA
PORE PRESSURE AND r_u PROFILES – INITIAL 25m LIFT

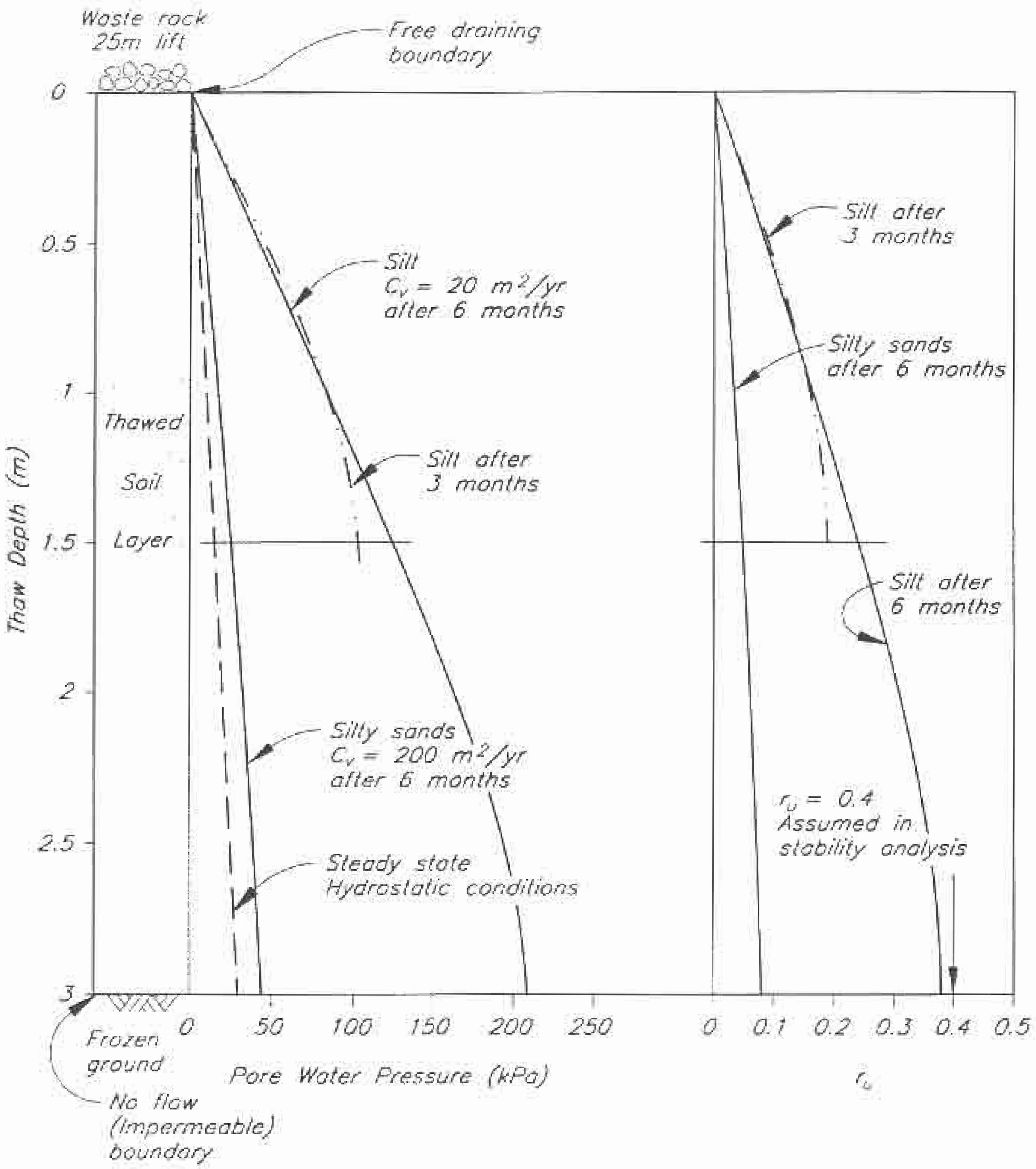

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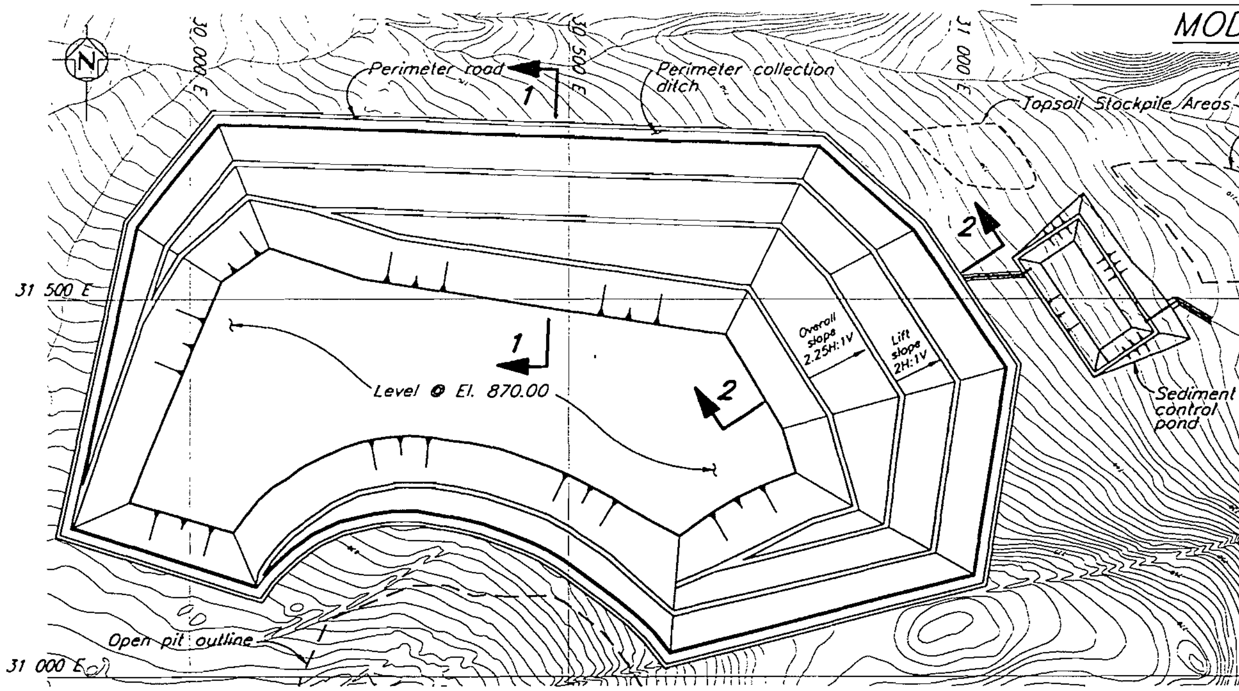
FIGURE 3

WESTERN COPPER HOLDINGS LIMITED
CARMACKS COPPER PROJECT
WASTE ROCK STORAGE AREA
STABILITY ANALYSIS GEOMETRY, SLOPE CONFIGURATION MODELS AND MODELLING PARAMETERS

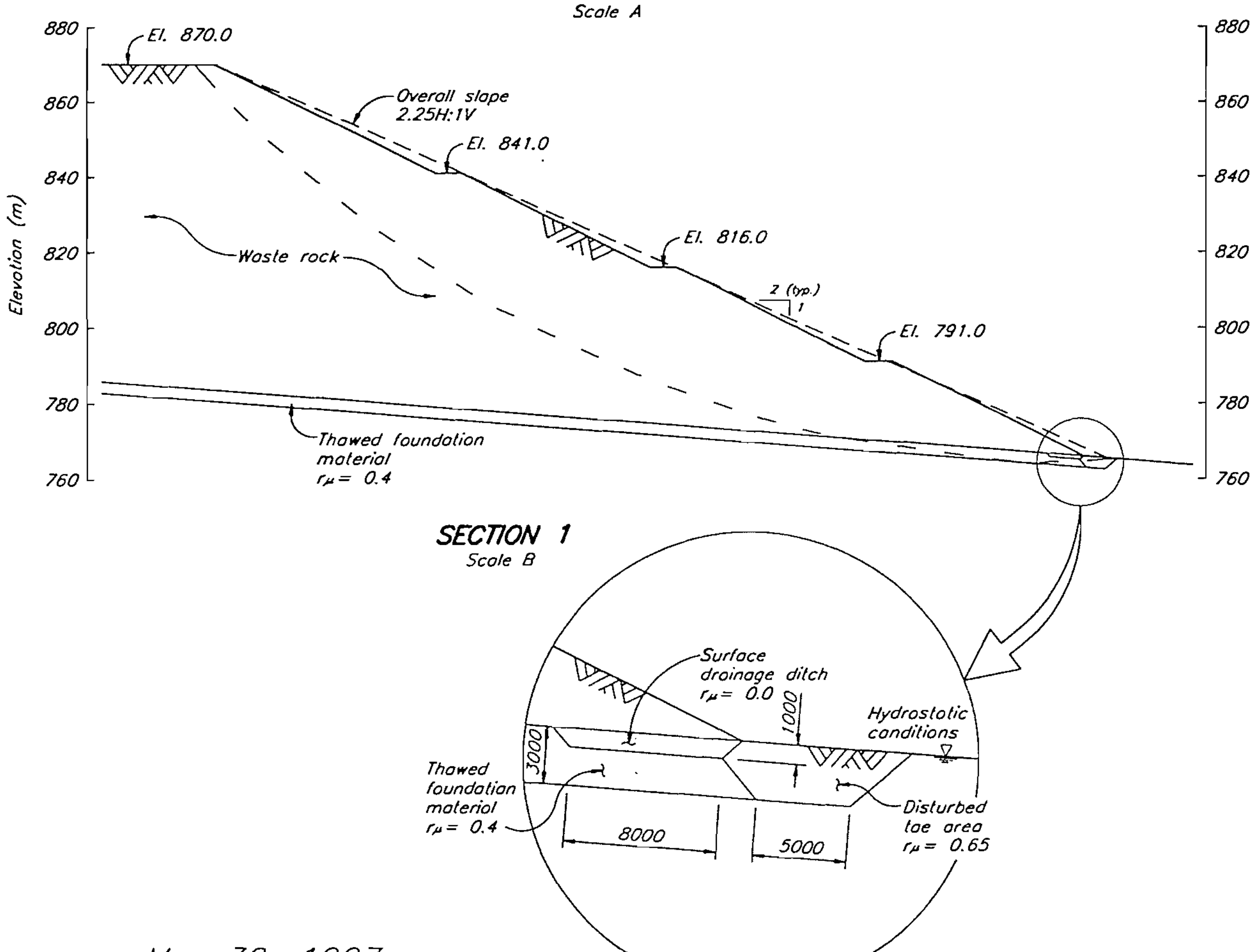


PLAN
Scale A

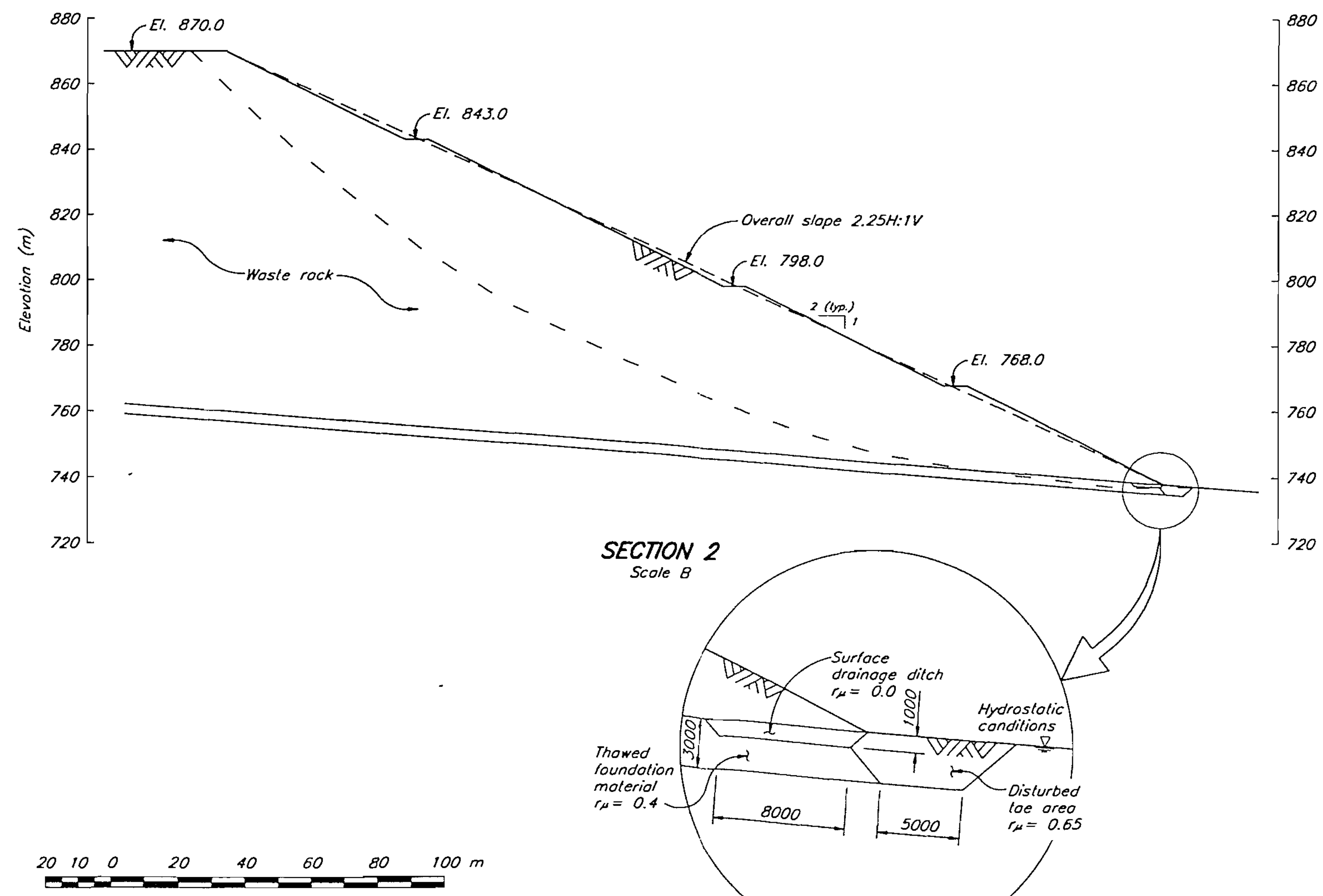
NOTES

1. All elevations are in metres, and dimensions are in millimetres, unless otherwise noted.
2. r_μ is the ratio of pore pressure to total stress. $r_\mu = \frac{U}{\gamma T}$

Material Parameters	
Waste Rock :	γ = 19.6 kN/m³ ϕ' = 37.0°
Foundation : Specimen TR96-12-1	γ = 20.0 kN/m³ ϕ' = 39.5° c' = 151.0 kN/m²
Modelled material strength	γ = 20.0 kN/m³ ϕ' = 39.5° c' = 0.0 kN/m²



SECTION 1
Scale B



SECTION 2
Scale B

B
20 10 0 20 40 60 80 100 m
A
100 0 100 200 300 400 500 m

CAD FILE: \1784\FIG\B4 1:10000 Plot 1=10 STD. 2

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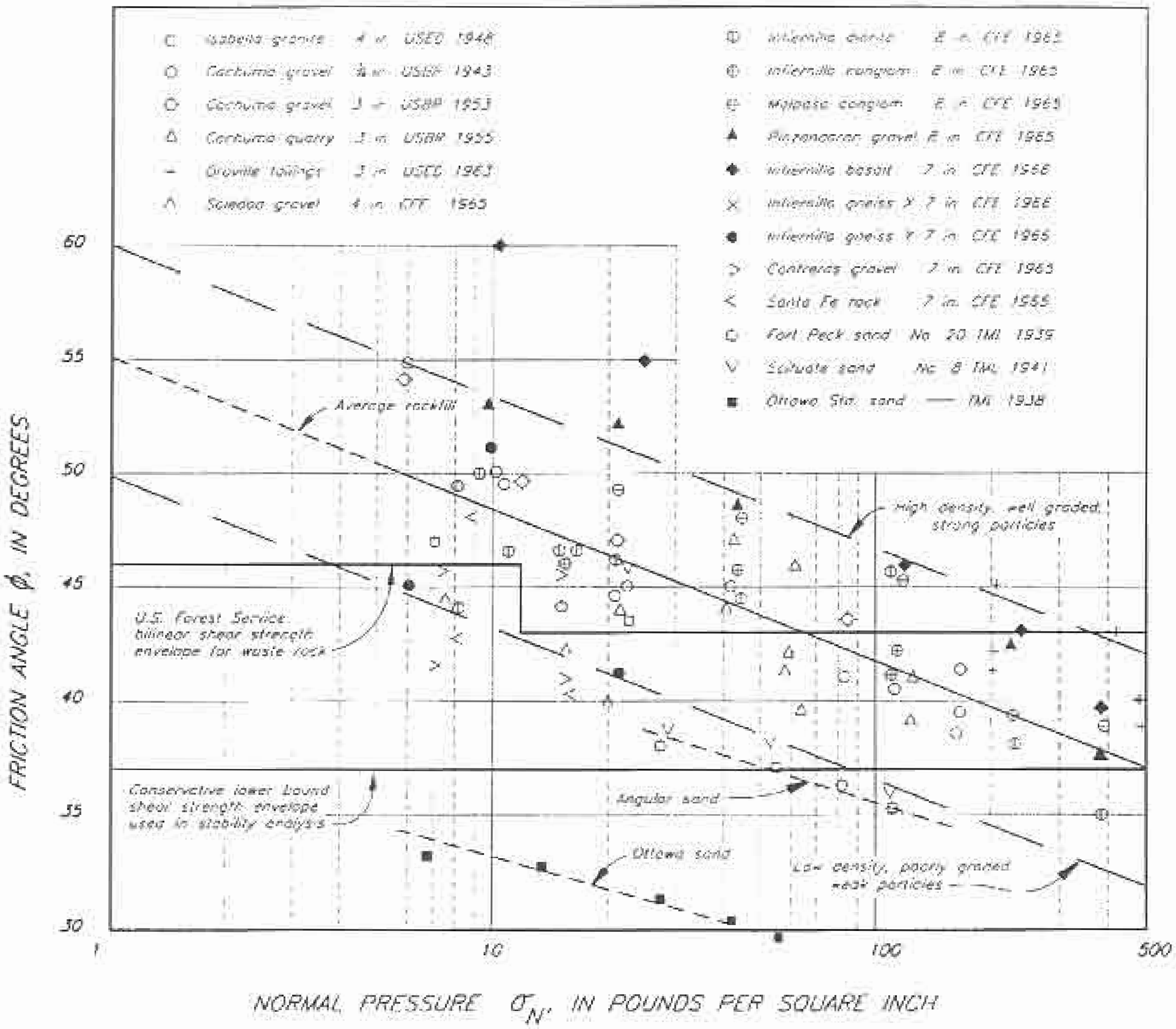
FIGURE 4

WESTERN COPPER HOLDINGS LIMITED
CARMACKS COPPER PROJECT
WASTE DUMP STABILITY ANALYSIS
SHEARING STRENGTH OF ROCKFILL FROM LARGE TRIAXIAL TESTS



Information taken from:

REVIEW OF SHEARING STRENGTH OF ROCKFILL
By Thomas M. Leps, F. ASCE
July, 1970

May 30, 1997

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FIGURE 5

WESTERN COPPER HOLDINGS LIMITED

CARMACKS COPPER PROJECT

WASTE ROCK STORAGE AREA

STABILITY ANALYSIS RESULTS
FOR INITIAL CONFIGURATION (25m LIFT)
SECTIONS 1 AND 2

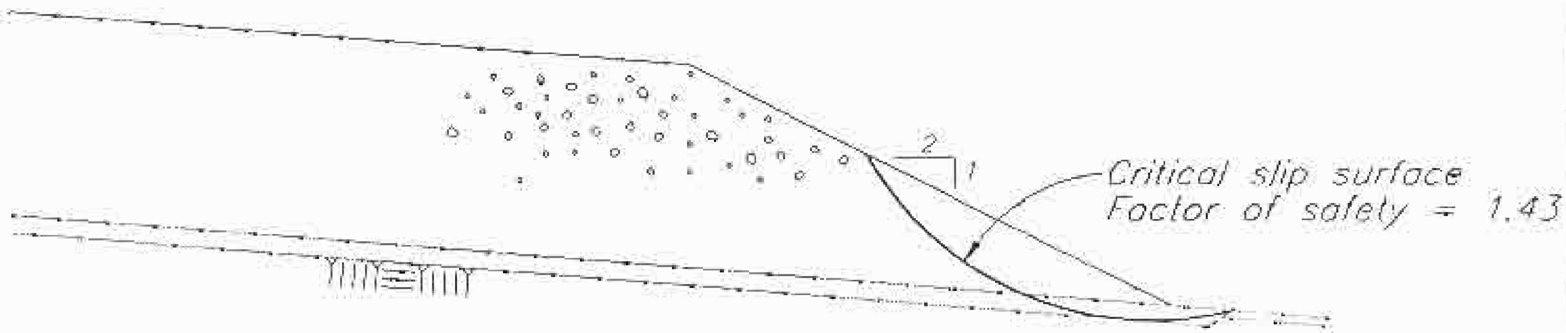

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FIGURE 6

CAD FILE \PROJECT\1784\FIG\A36 Plot scale 1:5

WESTERN COPPER HOLDINGS LIMITED
CARMACKS COPPER PROJECT
WASTE ROCK STORAGE AREA

STABILITY ANALYSIS RESULTS FOR ULTIMATE CONFIGURATION
SECTION 1

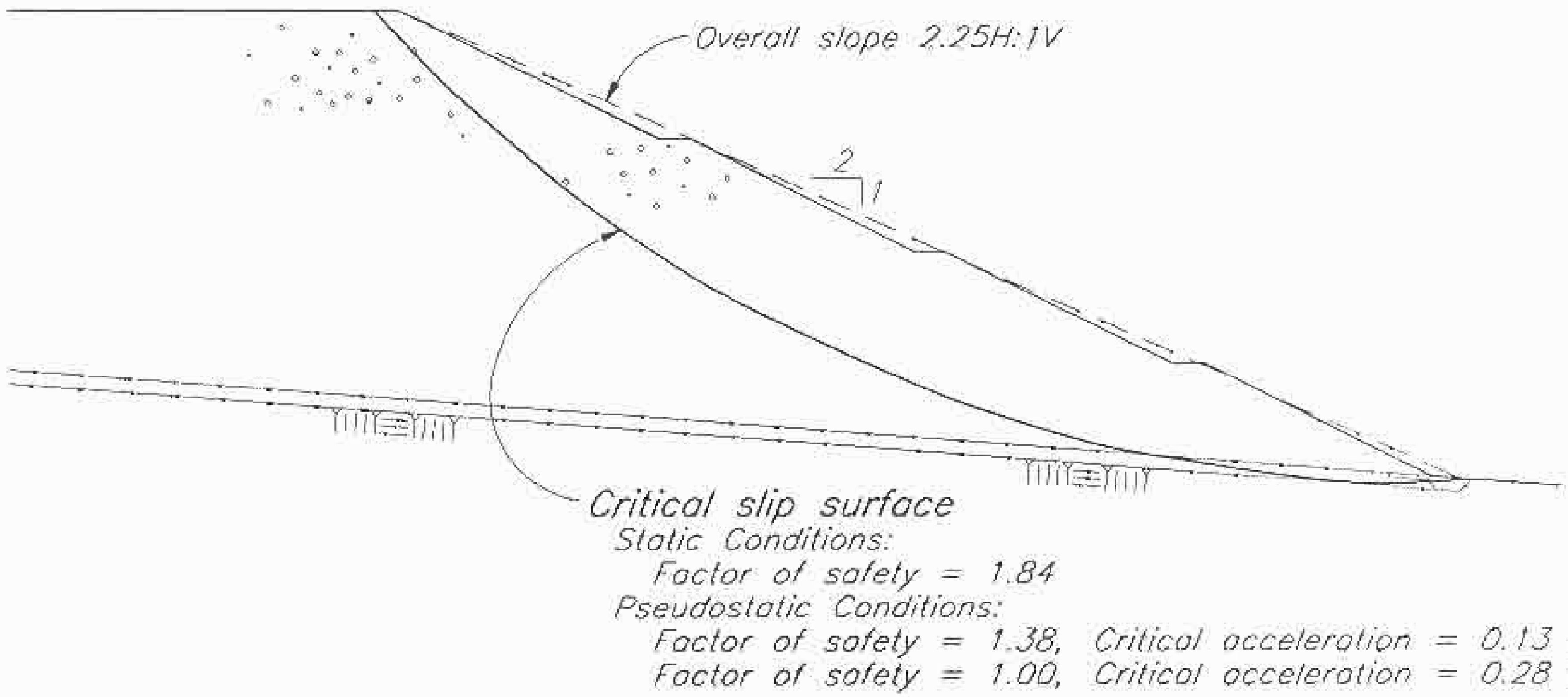

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FIGURE 7

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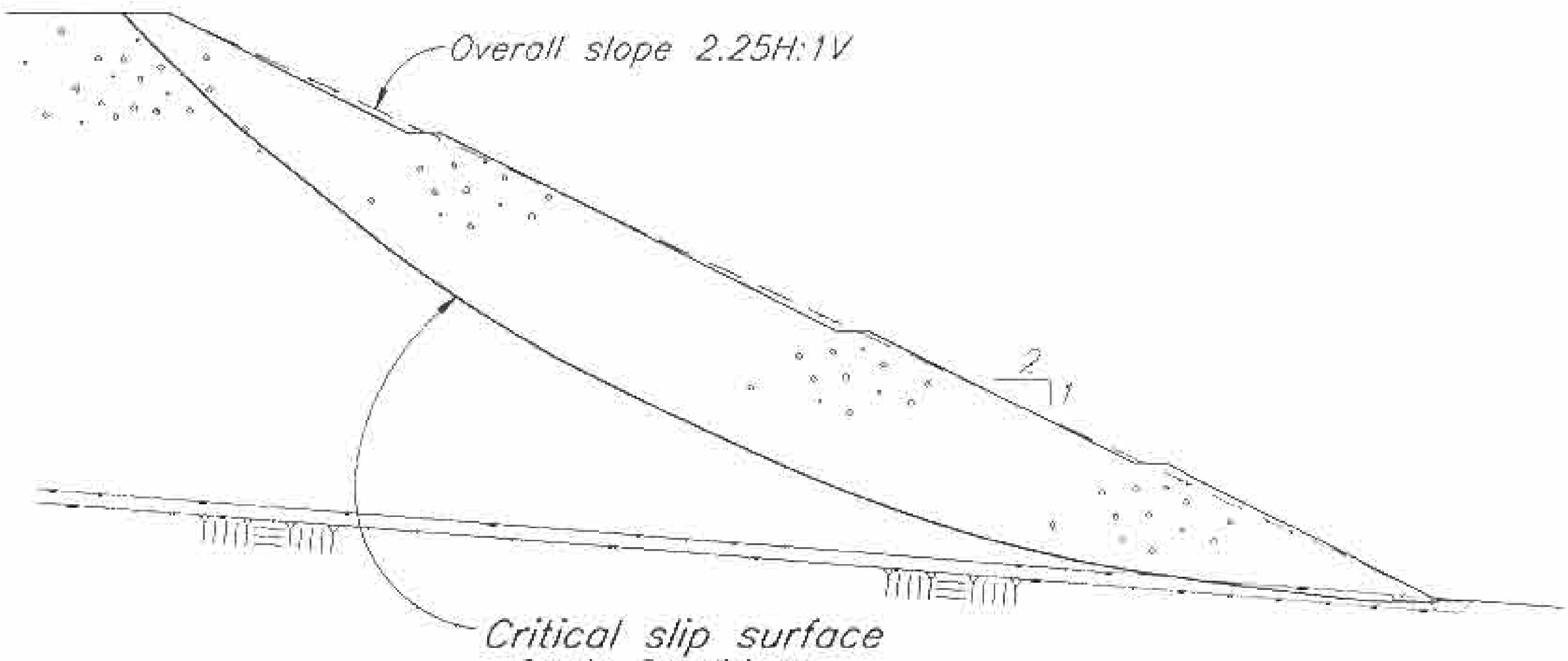
CARMACKS COPPER PROJECT

WASTE ROCK STORAGE AREA

STABILITY ANALYSIS RESULTS FOR ULTIMATE CONFIGURATION SECTION 2



Static Conditions:
Factor of safety = 1.75

Pseudostatic Conditions:
Factor of safety = 1.31, Critical acceleration = 0.13 g
Factor of safety = 1.00, Critical acceleration = 0.27 g

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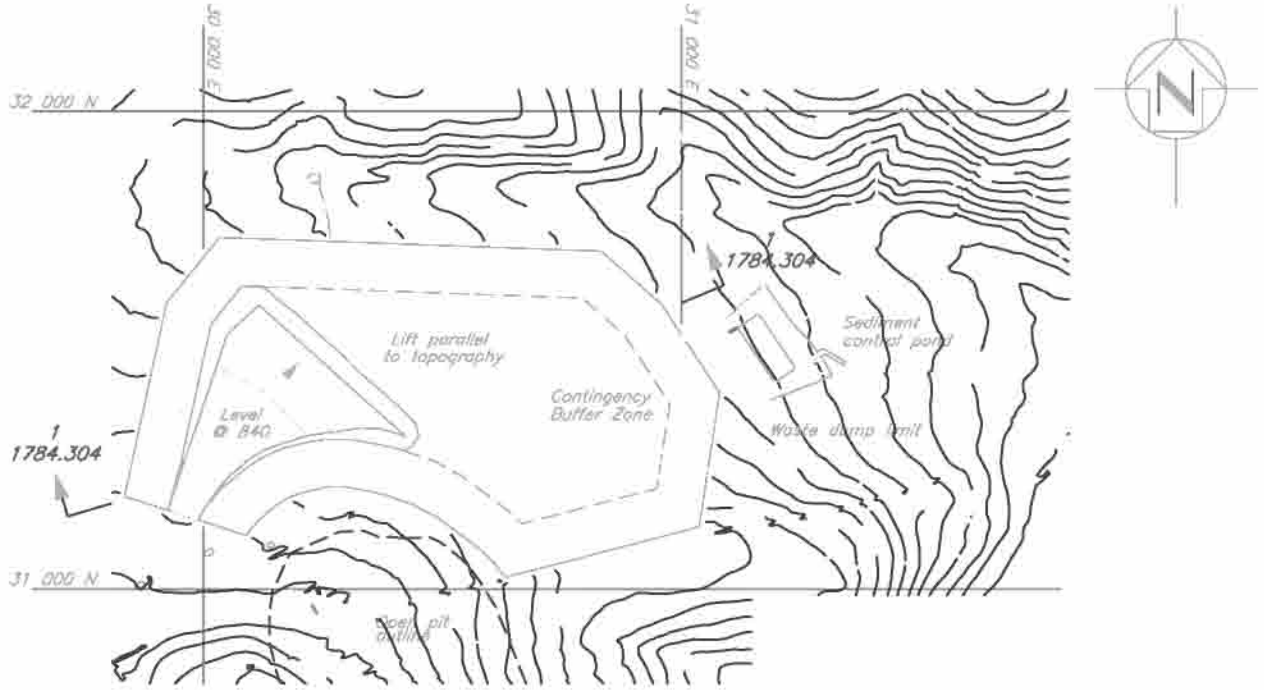
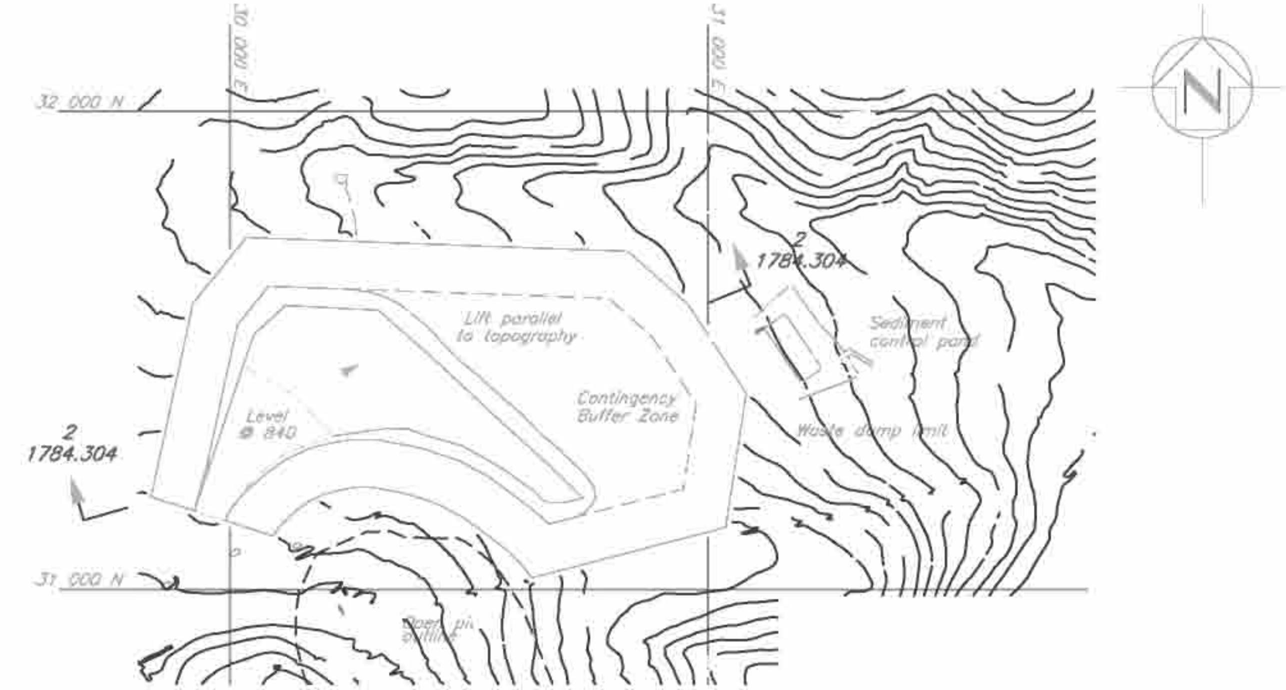
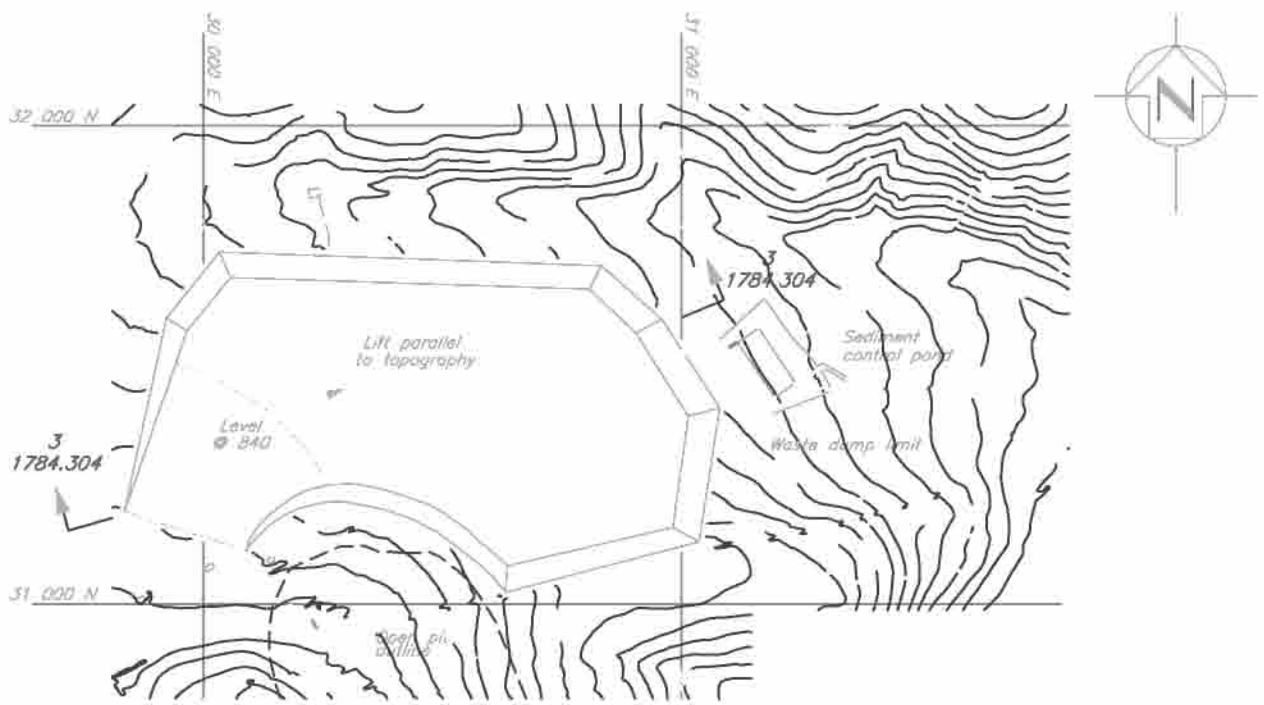
FIGURE 8



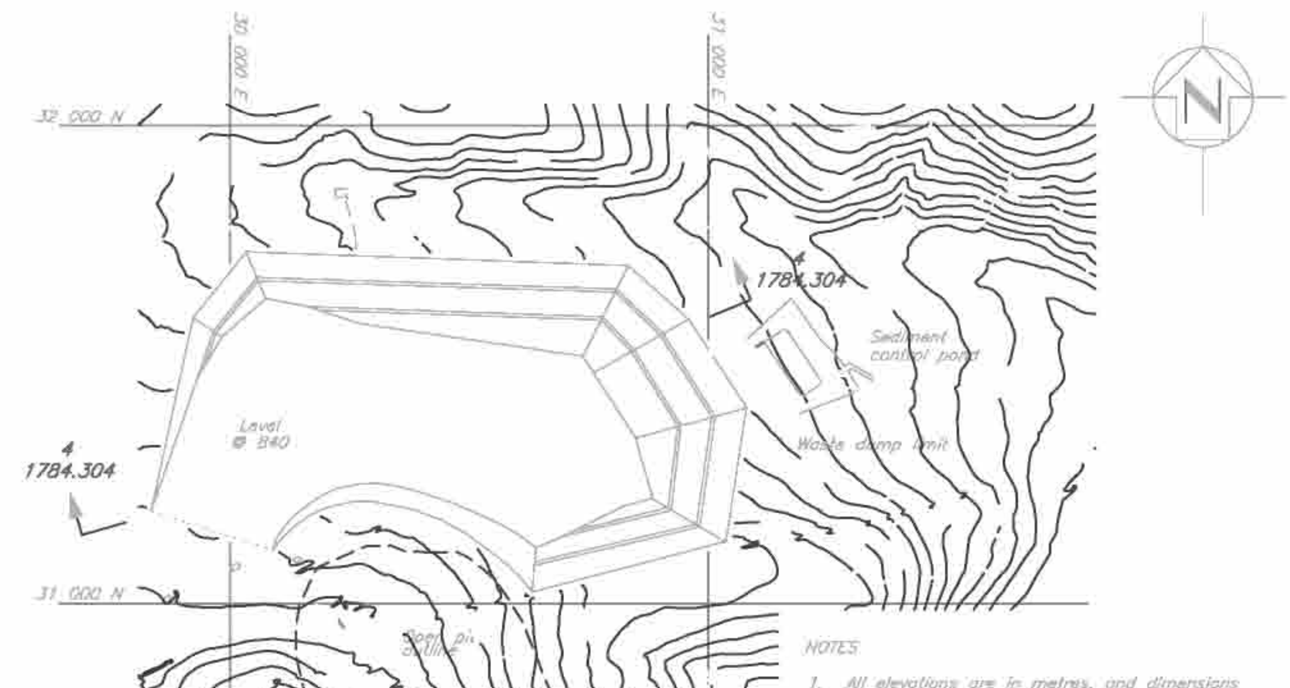
YEAR 1
15% OF 1ST LIFT COMPLETE



YEAR 2
30% OF 1ST LIFT COMPLETE



YEAR 4
1ST LIFT COMPLETE



YEAR 6
3RD LIFT COMPLETE

NOTES

1. All elevations are in metres, and dimensions are in millimetres, unless otherwise noted.
2. All drawings are to be read in conjunction with the Detailed Design Report, REF. NO. 1784/2.

Scale 200 100 0 200 400 600 800 1000 m

REFERENCE DRAWINGS		REVISIONS	REVISIONS
1784.304	WASTE ROCK STORAGE – SECTIONS AND DETAILS		0 JUNE 21/96 ISSUED FOR DESIGN REPORT

KNIGHT PIESOLD LIMITED
CONSULTING ENGINEERS – VANCOUVER, B.C.

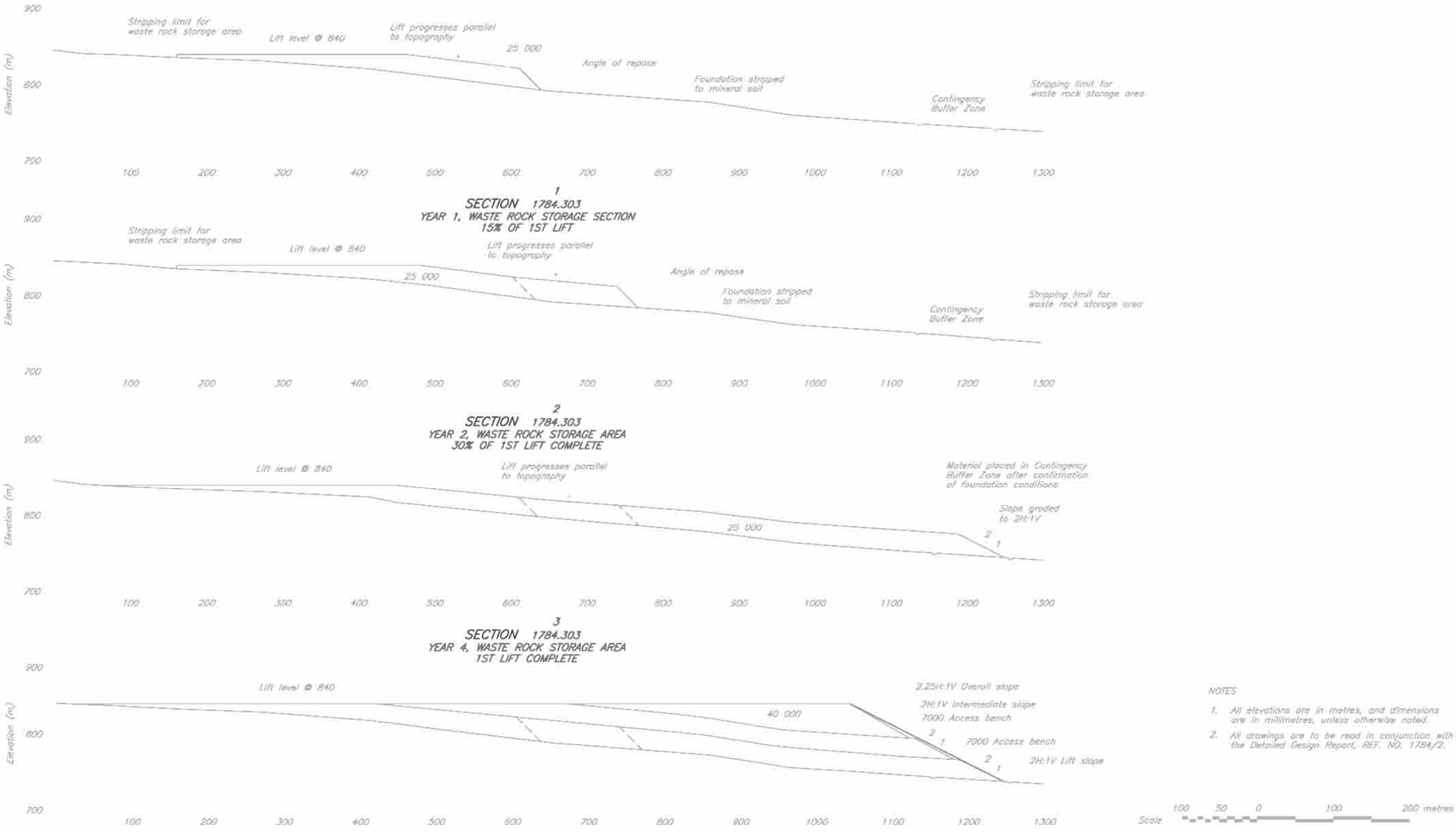
LG
AW
BSB

WESTERN COPPER HOLDINGS LIMITED

CARMACKS COPPER PROJECT

WASTE ROCK STORAGE AREA
LOADING PLAN

DATE JUNE 21, 1996 | SCALE AS SHOWN | DRG. NO. 1784.303 | REV. 0



4
SECTION 1784.303
YEAR 6, WASTE ROCK STORAGE AREA
3RD LIFT COMPLETE

KNIGHT PIESOLD LIMITED
CONSULTING ENGINEERS - VANCOUVER, B.C.

LG
AW
BSB

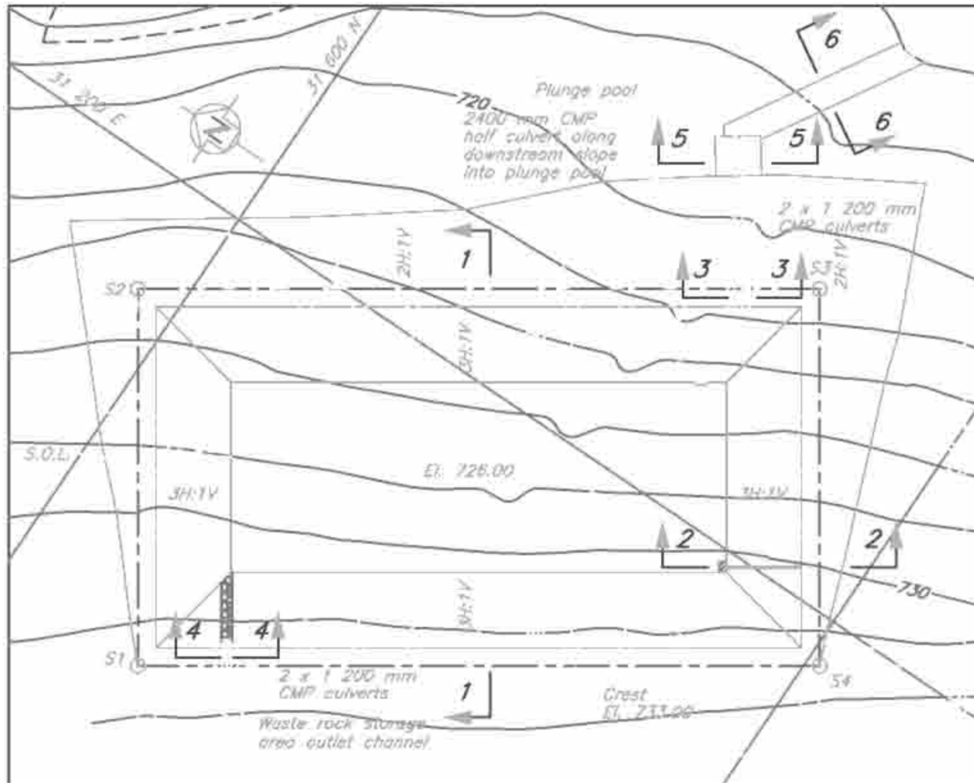
WESTERN COPPER HOLDINGS LIMITED

CARMACKS COPPER PROJECT

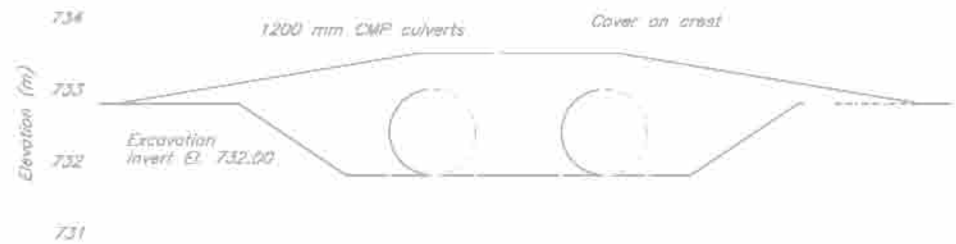
WASTE ROCK STORAGE AREA
LOADING SECTIONS

REFERENCE DRAWINGS	REVISIONS	REVISIONS
1784.303 WASTE ROCK STORAGE AREA - LOADING PLAN		0 JUNE 21/96 ISSUED FOR DESIGN REPORT

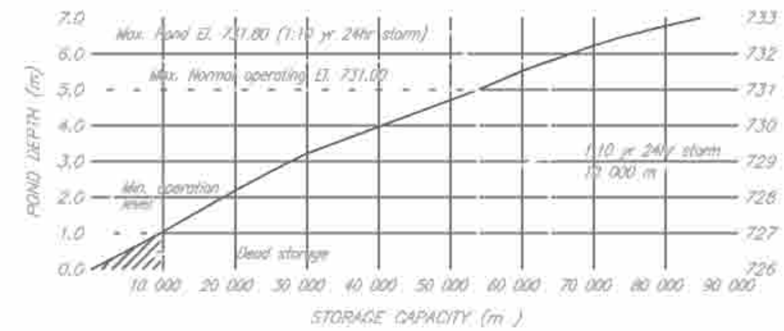
DATE JUNE 21, 1996 SCALE AS SHOWN DRG. NO. 1784.304 REV. 0



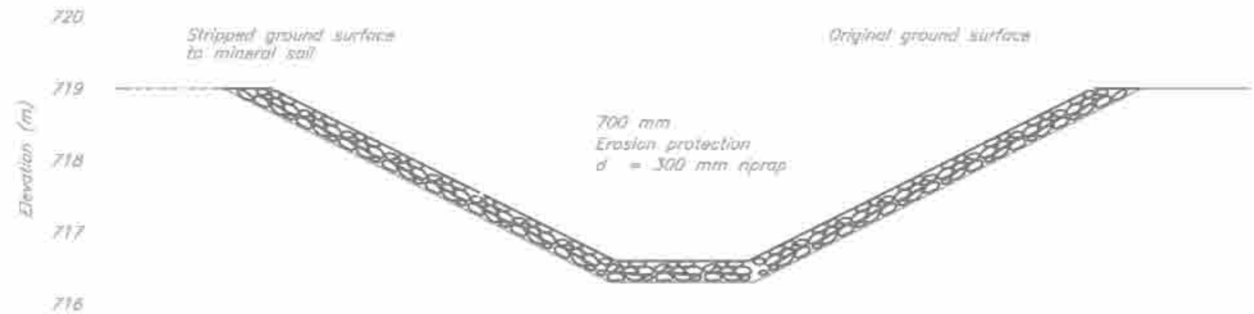
PLAN
Scale A



SECTION 3 AND 4
Scale D



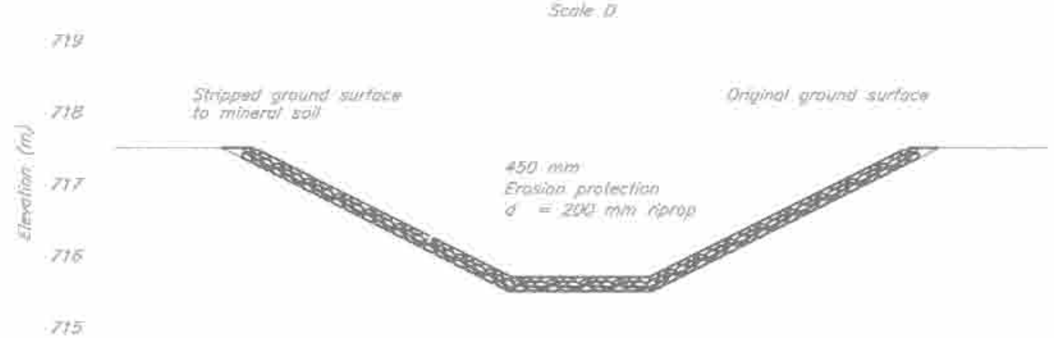
SEDIMENT CONTROL POND
DEPTH/CAPACITY RELATIONSHIP



SECTION 5
Scale D

SETTING OUT POINTS		
Waste Rock Storage		
Point No.	Northing	Easting
S1	315 53.658	310 81.287
S2	316 12.472	311 68.269
S3	314 55.077	312 74.695
S4	313 96.263	311 87.713

SECTION 1
Scale B



SECTION 6
Scale D

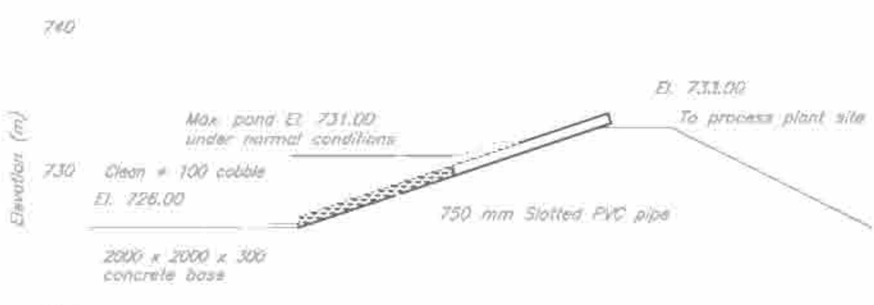
LEGEND

⊙ Setting Out Point

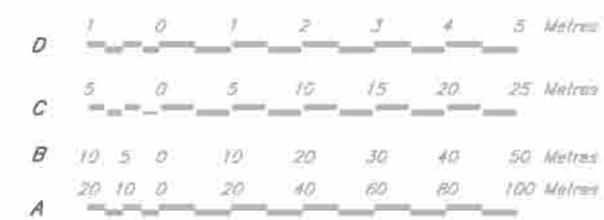
S.O.L. Setting Out Line

NOTES

1. All elevations are in metres, and dimensions are in millimetres, unless otherwise noted.
2. All drawings are to be read with the Detailed Design Report, REF. NO. 1784/2.



SECTION 2
Scale C



KNIGHT PIESOLD LIMITED
CONSULTING ENGINEERS – VANCOUVER, B.C.

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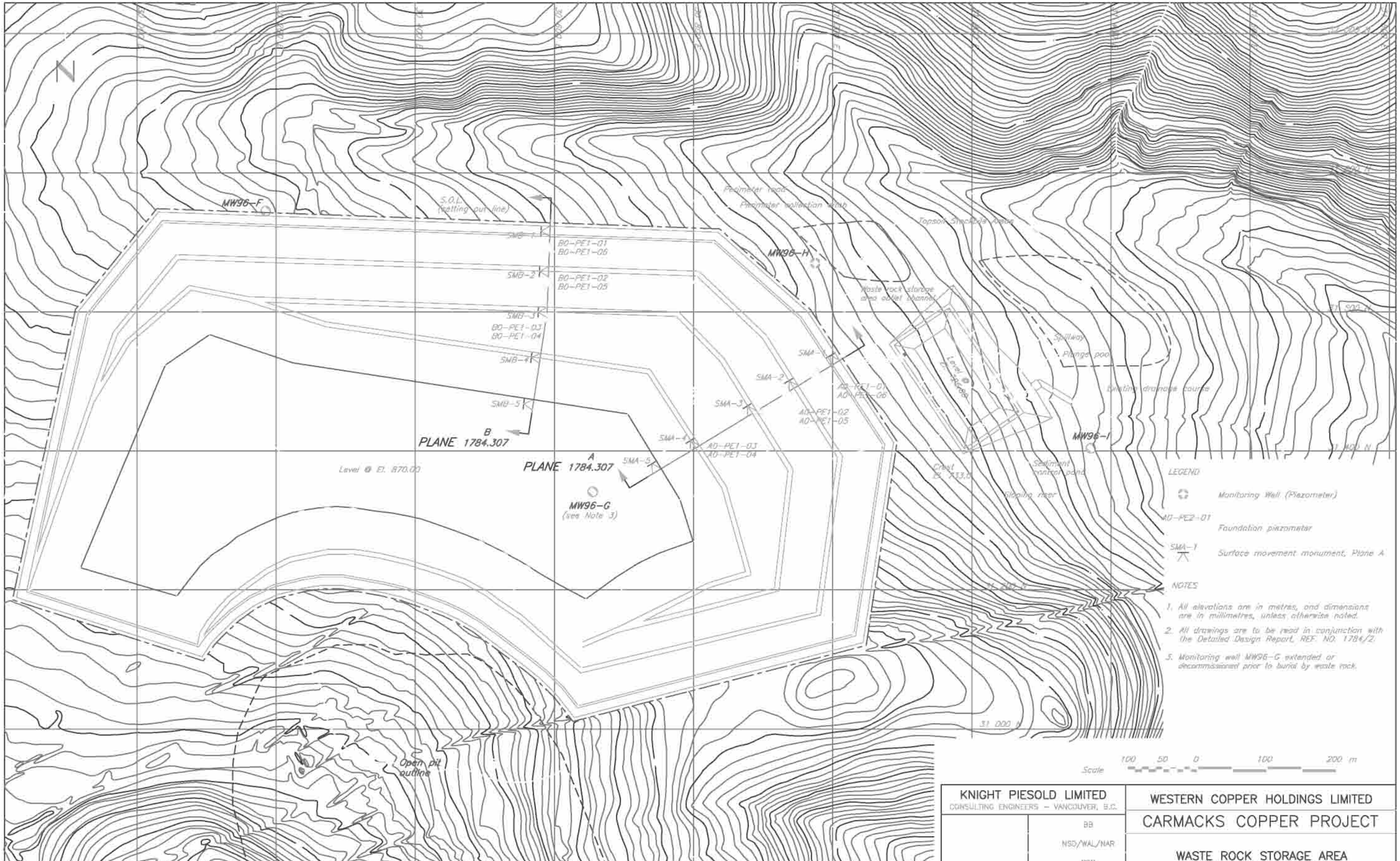
CARMACKS COPPER PROJECT

WASTE ROCK STORAGE AREA
SEDIMENT CONTROL POND
PLAN, SECTIONS AND DETAILS

REFERENCE DRAWINGS	REVISIONS	REVISIONS
		0 JUN 21/96 ISSUED FOR DESIGN REPORT

DATE JUNE 21, 1996 SCALE AS SHOWN DRG. NO. 1784.305 REV. 0



LEGEND

- Monitoring Well (Piezometer)
- AO-PE2-01 — Foundation piezometer
- SMA-1 — Surface movement monument, Plane A

NOTES

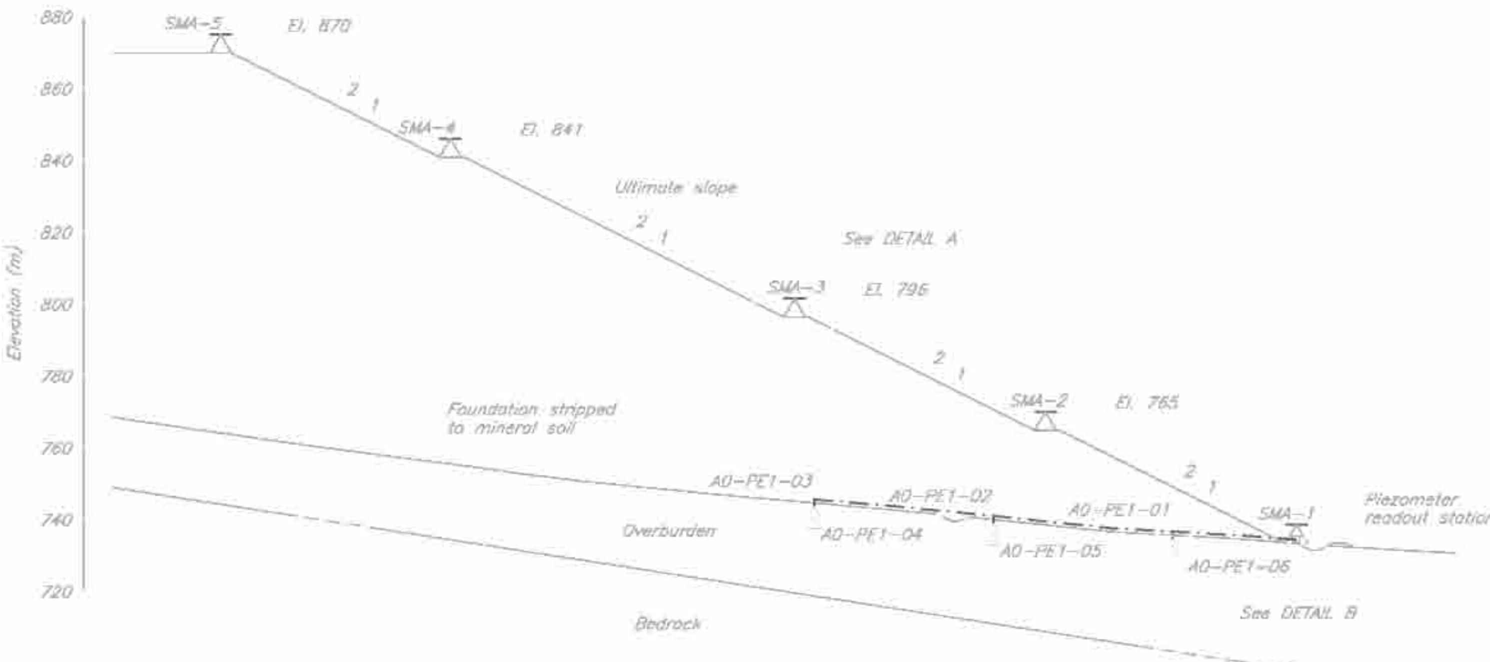
1. All elevations are in metres, and dimensions are in millimetres, unless otherwise noted.
2. All drawings are to be read in conjunction with the Detailed Design Report, REF. NO. 1784/2.
3. Monitoring well MW96-G extended or decommissioned prior to burial by waste rock.

Scale 100 50 0 100 200 m

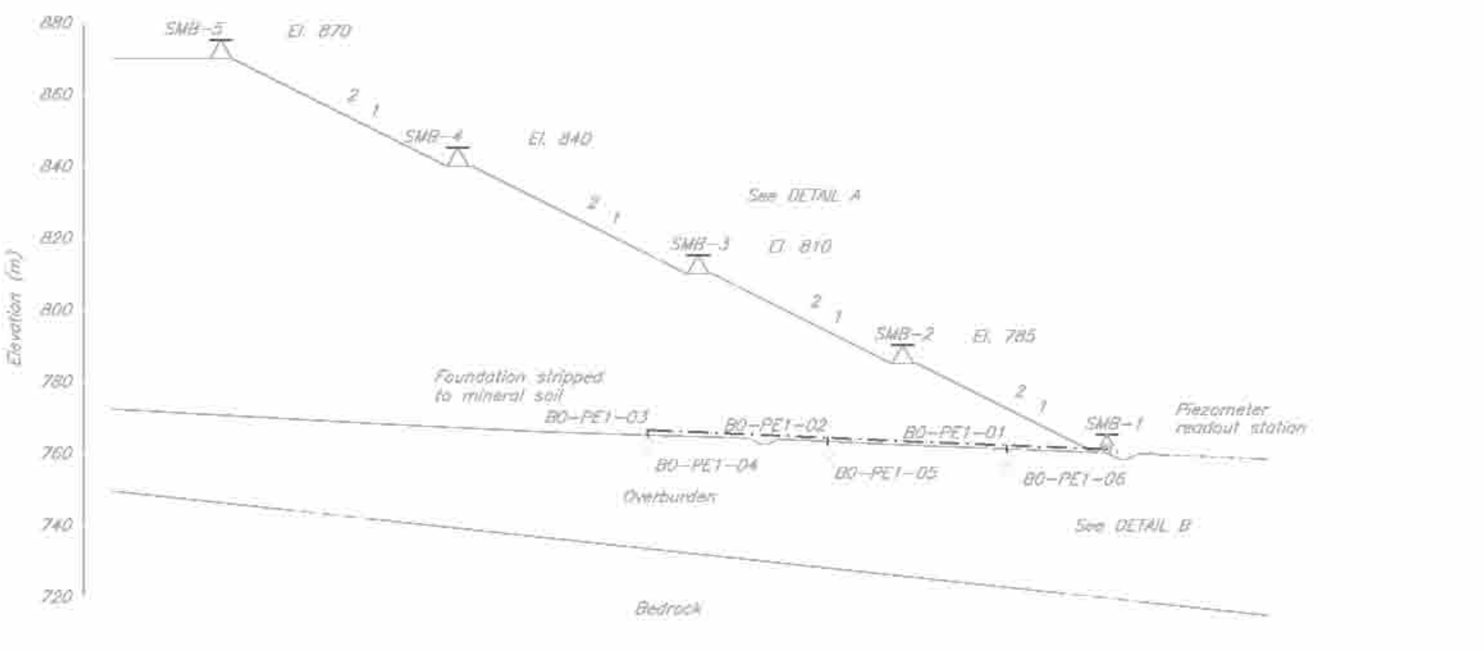
KNIGHT PIESOLD LIMITED CONSULTING ENGINEERS – VANCOUVER, B.C.	WESTERN COPPER HOLDINGS LIMITED
BB NSD/WAL/NAR BSB	CARMACKS COPPER PROJECT WASTE ROCK STORAGE AREA INTRUMENTATION PLAN

DATE JUNE 21, 1996 SCALE AS SHOWN DRG. NO. 1784.306 REV. 0

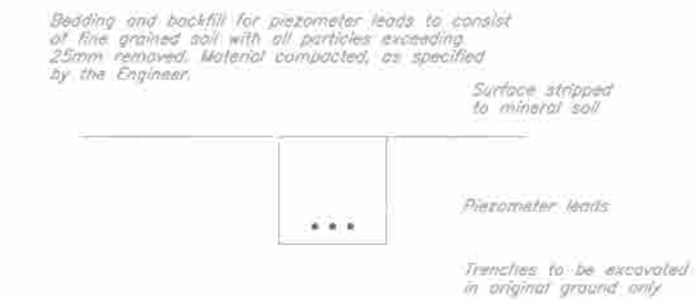
REFERENCE DRAWINGS	REVISIONS	REVISIONS
1784.307 WASTE ROCK STORAGE – INSTRUMENTATION SECTIONS AND DETAILS		0 JUN 21/96 ISSUED FOR DESIGN REPORT



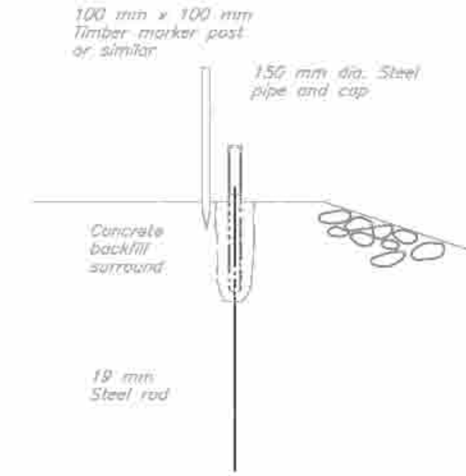
PLANE $\frac{A}{1784.306}$



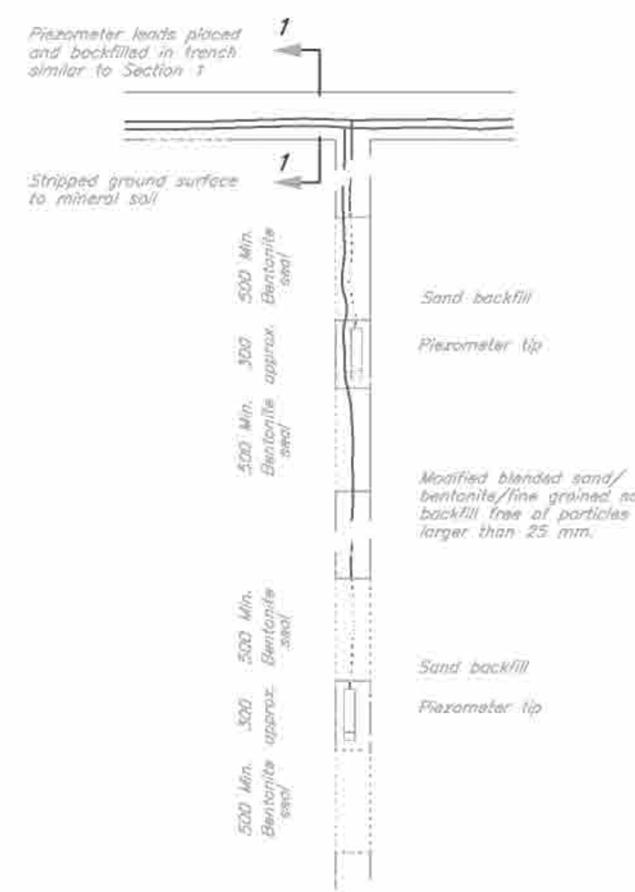
PLANE $\frac{B}{1784.306}$



SECTION 1
TYPICAL SECTION THROUGH PIEZOMETER LEAD TRENCH
NTS



DETAIL A
TYPICAL SURFACE MOVEMENT MONUMENT
NTS



DETAIL B
TYPICAL INSTALLATION OF PIEZOMETERS IN BOREHOLES
NTS

LEGEND

A0-PE1-01 — Instrumentation plane No. / Area (see below) / Number I.D. / Type of Instrumentation (PE–Piezometer electric; PE2 for 4500 S vibrating wire type piezometer)

A0-PE2-01 — Foundation piezometer

SMA-1 — Surface movement monument, Plane A

NOTES

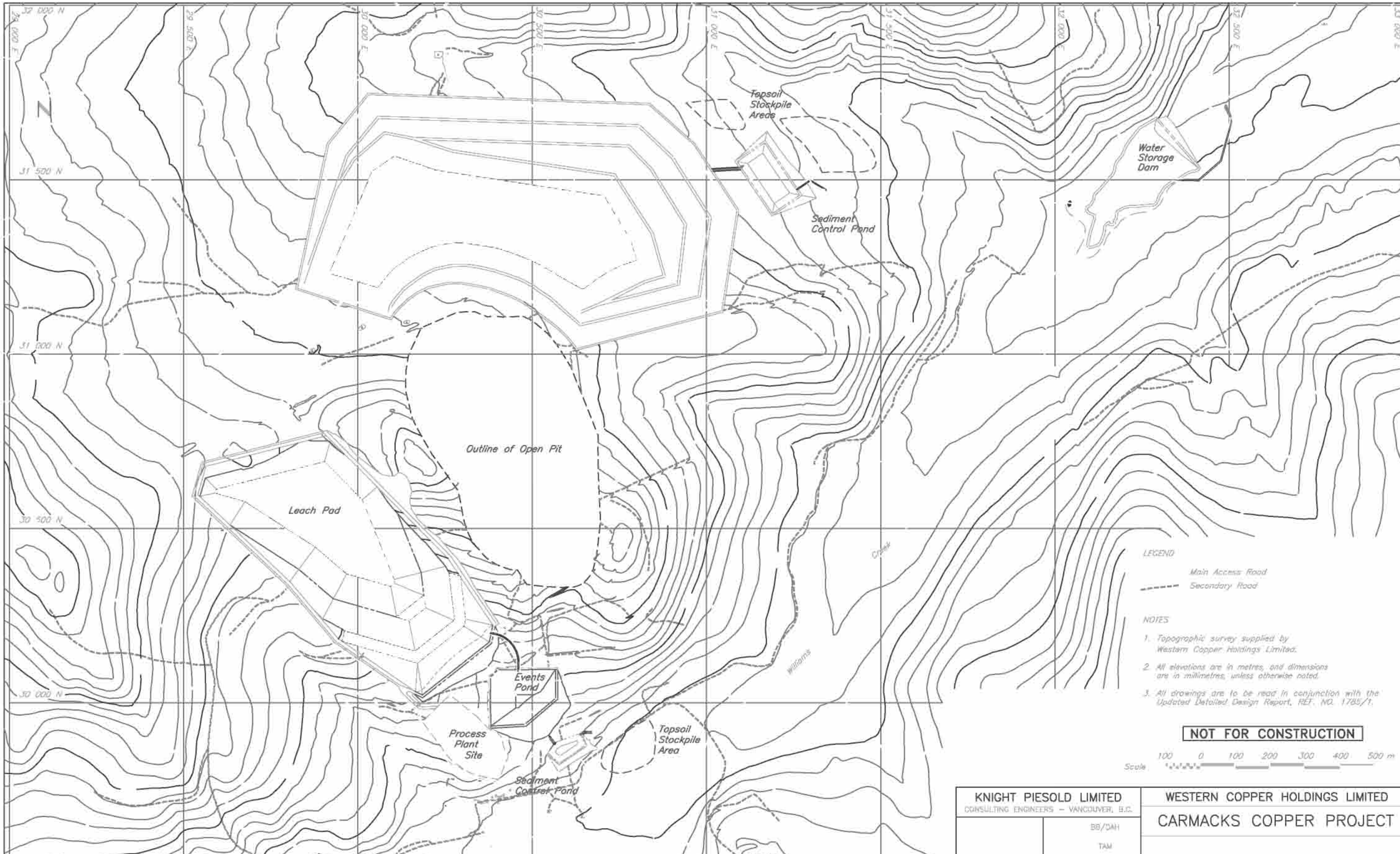
1. All elevations are in metres, and dimensions are in millimetres, unless otherwise noted.
2. The Technical Specification shall be read in conjunction with this Drawing.
3. Trenches to be excavated in compacted fill or in original ground only.
4. Bedding and backfill for piezometer leads trenches to comprise fine grained soil designated by the Engineer with all particles exceeding 25 mm removed.
5. Piezometers to be installed in Year 3 during investigation.
6. Surface movement monument installed as lifts are completed.
7. All drawings are to be read in conjunction with the Detailed Design Report, REF. NO. 1784/2.

Scale 20 10 0 20 40 60 80 100 Metres

KNIGHT PIESOLD LIMITED CONSULTING ENGINEERS – VANCOUVER, B.C.	WESTERN COPPER HOLDINGS LIMITED
BB NSD BSB	CARMACKS COPPER PROJECT WASTE ROCK STORAGE AREA INSTRUMENTATION SECTIONS AND DETAILS

REFERENCE DRAWINGS	REVISIONS	REVISIONS
1784.306 WASTE ROCK STORAGE – INSTRUMENTATION PLAN		0 JUN 21/96 ISSUED FOR DESIGN REPORT

DATE JUNE 21, 1996 SCALE AS SHOWN DRG. NO. 1784.307 REV. 0



KNIGHT PIESOLD LIMITED
CONSULTING ENGINEERS – VANCOUVER, B.C.

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WESTERN COPPER HOLDINGS LIMITED

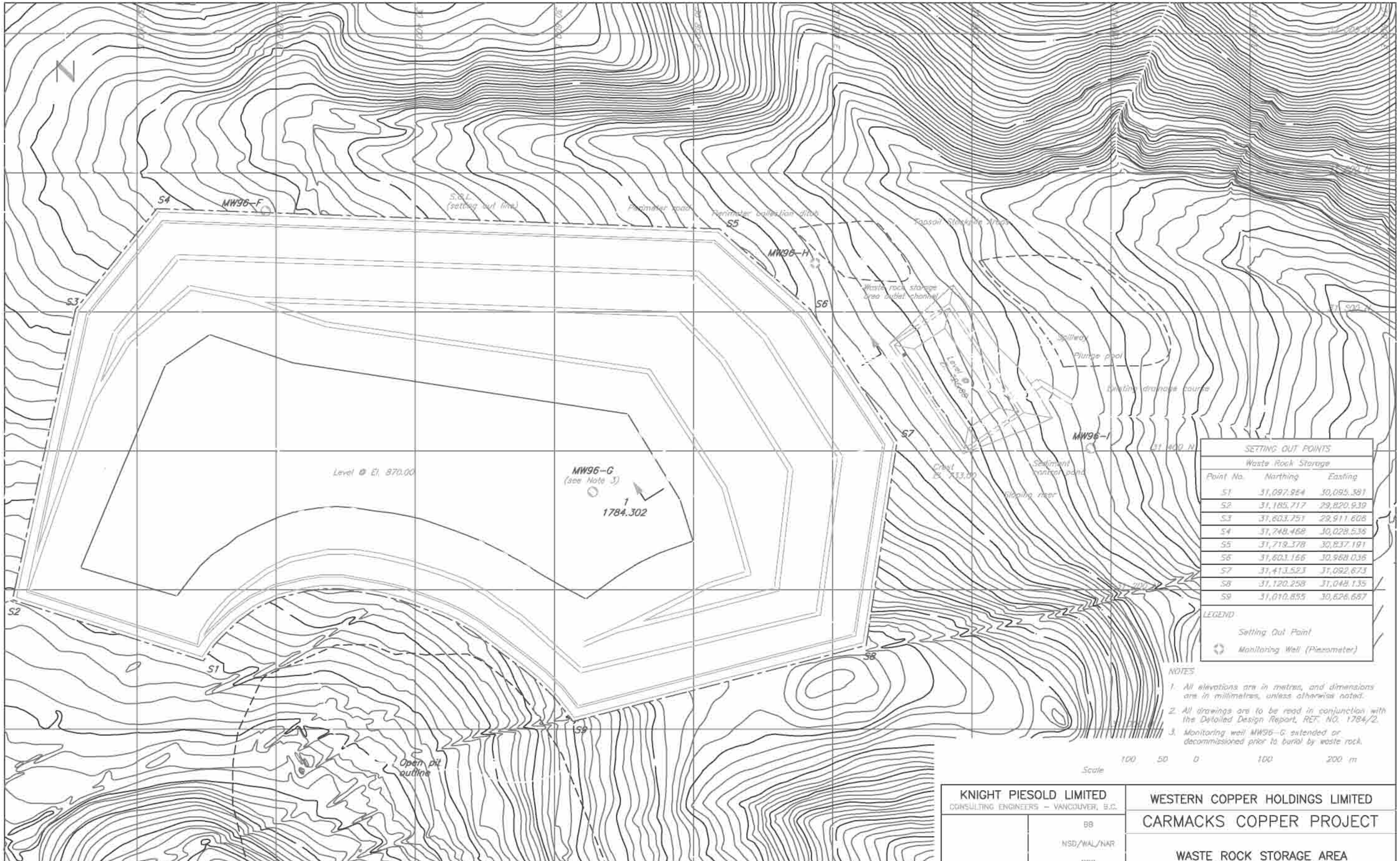
CARMACKS COPPER PROJECT

GENERAL ARRANGEMENT

0 FEB. 21/97 ISSUED FOR DESIGN REPORT

REFERENCE DRAWINGS | REVISIONS | REVISIONS

DATE FEB. 21, 1997 SCALE AS SHOWN DRG. NO. 1785.000 REV. 0



SETTING OUT POINTS		
Waste Rock Storage		
Point No.	Northing	Easting
S1	31,097.954	30,095.381
S2	31,185.717	29,820.939
S3	31,603.751	29,911.606
S4	31,748.468	30,028.536
S5	31,719.378	30,837.191
S6	31,603.166	30,968.036
S7	31,413.523	31,092.673
S8	31,120.258	31,048.135
S9	31,010.855	30,626.657

LEGEND

Setting Out Point

Monitoring Well (Piezometer)

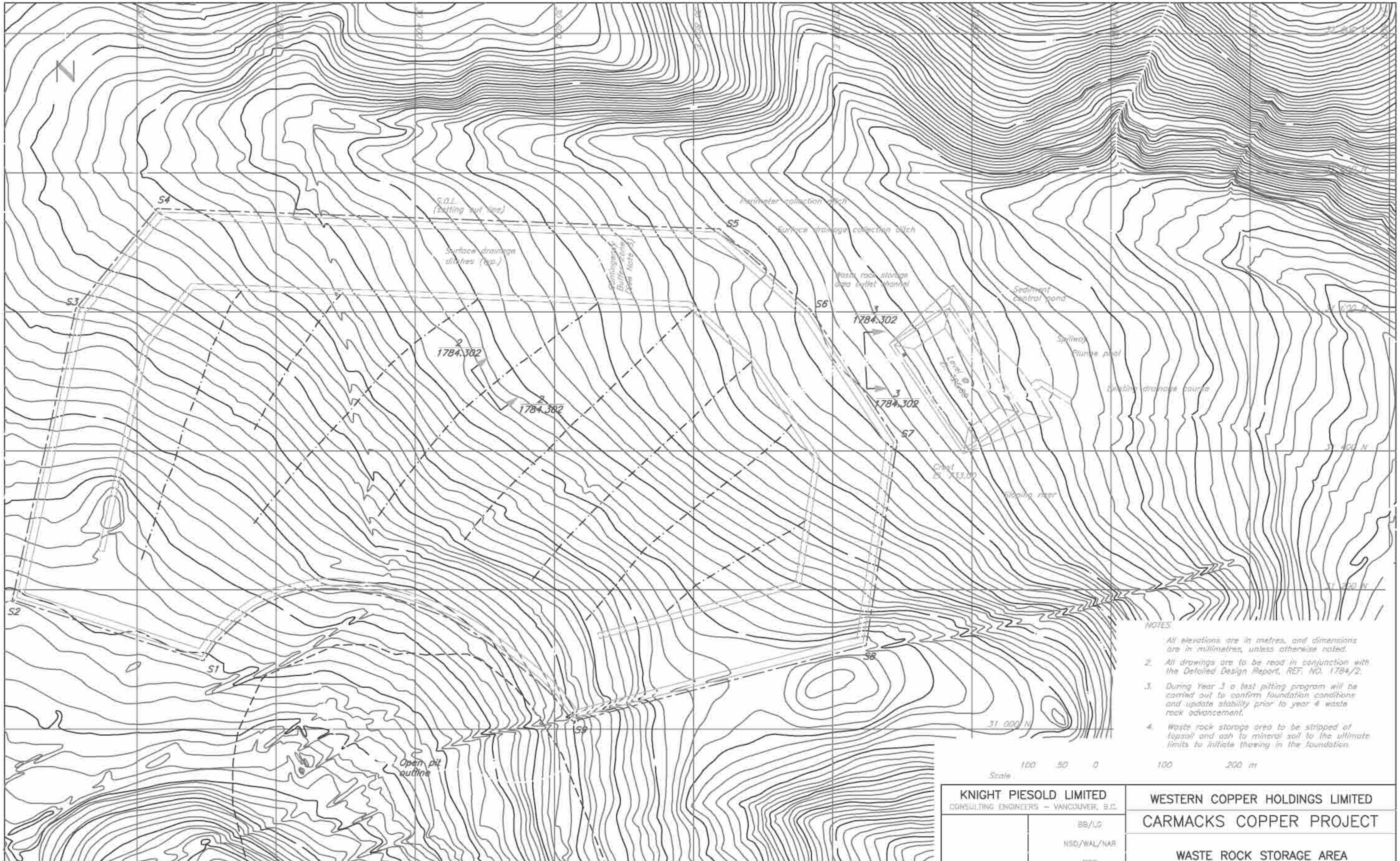
NOTES

1. All elevations are in metres, and dimensions are in millimetres, unless otherwise noted.
2. All drawings are to be read in conjunction with the Detailed Design Report, REF. NO. 1784/2.
3. Monitoring well MW96-G extended or decommissioned prior to burial by waste rock.

Scale 100 50 0 100 200 m

KNIGHT PIESOLD LIMITED CONSULTING ENGINEERS - VANCOUVER, B.C.	WESTERN COPPER HOLDINGS LIMITED
BB NSD/WAL/NAR BSB	CARMACKS COPPER PROJECT WASTE ROCK STORAGE AREA FINAL ARRANGEMENT
DATE JUNE 21, 1996	SCALE AS SHOWN DRG. NO. 1784.300 REV. 0

REFERENCE DRAWINGS	REVISIONS	REVISIONS
1784.302 WASTE ROCK STORAGE AREA - SECTION AND DETAILS		0 JUN 21/96 ISSUED FOR DESIGN REPORT



NOTES:

1. All elevations are in metres, and dimensions are in millimetres, unless otherwise noted.
2. All drawings are to be read in conjunction with the Detailed Design Report, REF. NO. 1784/2.
3. During Year 3 a test pitting program will be carried out to confirm foundation conditions and update stability prior to year 4 waste rock advancement.
4. Waste rock storage area to be stripped of topsoil and ash to mineral soil to the ultimate limits to initiate thawing in the foundation.

Scale 100 50 0 100 200 m

REFERENCE DRAWINGS	REVISIONS
1784.302 WASTE ROCK STORAGE – SECTIONS AND DETAILS	0 JUN 21/96 ISSUED FOR DESIGN REPORT

KNIGHT PIESOLD LIMITED
CONSULTING ENGINEERS – VANCOUVER, B.C.

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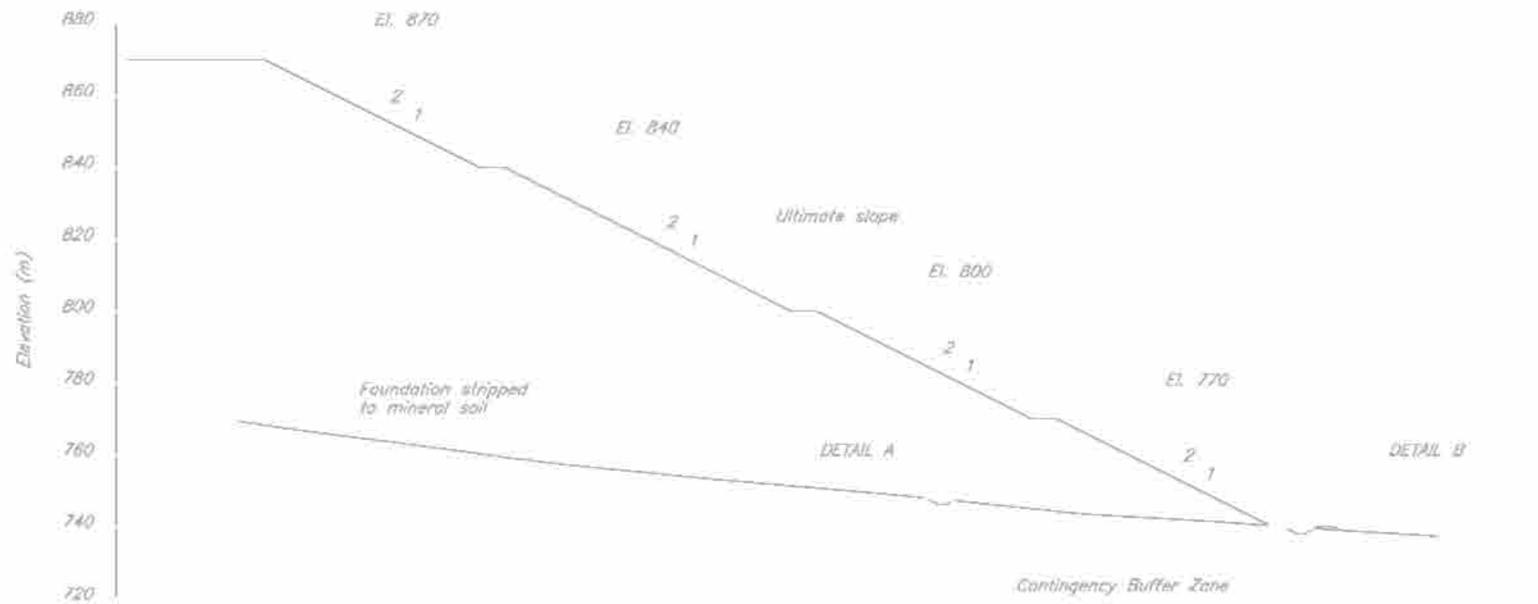
CARMACKS COPPER PROJECT

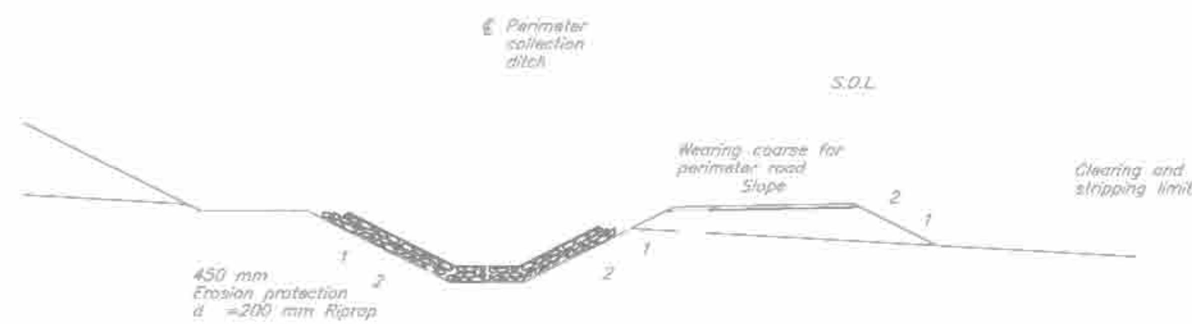
WASTE ROCK STORAGE AREA
FOUNDATION PREPARATION PLAN

DATE JUNE 21, 1996 SCALE AS SHOWN DRG. NO. 1784.301 REV. 0



SECTION 1 / 1784.300
Scale B

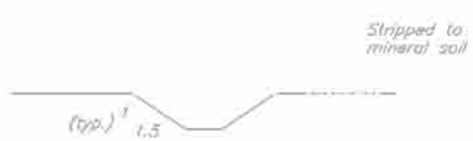
DETAIL A
Scale A



DETAIL B
Scale A

NOTES

1. All elevations are in metres, and dimensions are in millimetres, unless otherwise noted.
2. All drawings are to be read in conjunction with the Detailed Design Report, REF. NO. 1784/2.
3. S.O.L. – Setting out line.



SECTION 2 / 1784.301
TYPICAL SURFACE DRAINAGE DITCH
Scale A

SECTION 3 / 1784.301
WASTE ROCK STORAGE AREA OUTLET CHANNEL
Scale A

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LG AW/NSD BSB	CARMACKS COPPER PROJECT WASTE ROCK STORAGE AREA SECTIONS AND DETAILS
DATE JUNE 21, 1996	SCALE AS SHOWN DRG. NO. 1784.302 REV. 0

1784.301 WASTE ROCK STORAGE AREA – FOUNDATION PREPARATION PLAN
1784.300 WASTE ROCK STORAGE AREA – FINAL ARRANGEMENT

REFERENCE DRAWINGS

REVISIONS

0 JUN 21/96 ISSUED FOR DESIGN REPORT

REVISIONS