



**RFP-03-24**  
**REQUEST FOR PROPOSALS**

**OYSTER RIVER AND COASTAL LANDS FLOODPLAIN MAPPING**

**ISSUE DATE**  
**APRIL 15, 2024**

**CLOSING DATE AND TIME**  
**12:00 NOON MAY 10, 2024**

**CLOSING LOCATION**  
Strathcona Regional District  
990 Cedar Street  
Campbell River, BC V9W 7Z8

**CONTACT PERSON**  
Meredith Starkey, Manager, Planning and Parks  
Tel: (250) 830-6700  
Fax: (250) 830-6710  
Email: Procurement@srd.ca

**TABLE OF CONTENTS**

**A. PROJECT SUMMARY 3**

**B. ADMINISTRATIVE REQUIREMENTS 3**

1.0 DEFINITIONS .....3

2.0 TERMS AND CONDITIONS .....4

3.0 EVALUATION .....4

4.0 ALTERNATIVE SOLUTIONS.....4

5.0 CHANGES TO PROPOSALS .....4

6.0 PROPONENT EXPENSES .....4

7.0 SUBCONTRACTORS AND PARTNERSHIPS .....4

8.0 CONFLICT OF INTEREST .....4

9.0 CURRENCY AND TAXES .....4

10.0 ACCEPTANCE OF PROPOSALS .....5

11.0 CANCELLATION OR DELAY OF RFP .....5

12.0 EXECUTION OF CONTRACT .....5

13.0 LIABILITY FOR ERRORS.....5

14.0 MODIFICATION OF TERMS .....5

15.0 FREEDOM OF INFORMATION.....6

16.0 USE OF DOCUMENT.....6

17.0 CONFIDENTIALITY OF INFORMATION .....6

**C. SUBMISSION REQUIREMENTS 6**

18.0 PROPOSAL SUBMISSION .....6

19.0 PROJECT MANAGER .....7

20.0 ENQUIRIES.....7

21.0 RFP ADDENDA.....7

22.0 DISCLAIMER .....8

23.0 EVALUATION CRITERIA .....8

**D. SPECIFICATIONS AND SCOPE OF WORK 8**

24.0 SCOPE OF WORK.....8

24.1 PRIMARY SCOPE - FLOODPLAIN MAPPING.....8

24.2 OPTIONAL, ADDITIONAL SCOPE - RIVERBANK INSPECTION..... 11

25.0 PERMITS AND CERTIFICATES .....12

26.0 PROJECT SCHEDULE .....12

27.0 CHANGE IN SCOPE .....12

**E. CONTRACT CONDITIONS 12**

28.0 COMPLIANCE WITH LAWS .....13

29.0 LAWS OF BRITISH COLUMBIA .....13

30.0 INDEMNITY .....13

31.0 INSURANCE .....13

32.0 REGISTRATION WITH WORKSAFE BC .....13

**F. PROPOSAL FORM 14**

**G. APPENDIX A – FLOOD HAZARD DPA 15**

**H. APPENDIX B - OPTIONAL, ADDITIONAL SCOPE: RIVERBANK INSPECTION 16**

## **A. PROJECT SUMMARY**

### Background

The Strathcona Regional District (SRD) has received funding through the UBCM Disaster Risk Reduction and Climate Adaptation grant to update the floodplain map for the Oyster River and coastal lands in Electoral Area D (Oyster Bay – Buttle Lake).

### Project Purpose

Recognizing that accurate and applicable information is essential to reducing flood risks, the purpose of this Request for Proposals (RFP) is to solicit submissions from qualified firms to develop new flood hazard modelling and mapping for the Oyster River and Coastal Lands Floodplain to support land use and emergency planning and infrastructure management. The current floodplain map for the Oyster River was prepared by the Province of BC in 1980. These maps are considered outdated because the hydrologic model used to create the map does not consider modern mapping criteria and technology, regional climate change and sea level rise on the floodplain, nor does it address the coastal lands north of the Oyster River.

### Optional Additional Scope:

Proponents may consider submitting a separate proposal for an optional, additional scope of work that is not currently funded. Full details provided in Appendix B of this RFP.

SRD Engineering Services is seeking a riverbank inspection of the Oyster River to identify areas that are experiencing or may be vulnerable to erosion related to current conditions and future impacts related to climate risks or sea level rise.

Riverbank stabilization efforts have been implemented on the north shore of the Oyster River, starting in the mid-1970s. Additional riprap has been installed in response to subsequent flooding events, as recently as 2010. A holistic assessment of the current condition of the northern riverbank and the resilience of the stabilization efforts is required, along with any recommended improvements, their priority ranking, recommended timelines, and class D estimates for each measure. These details are needed to establish budgets for the ongoing management of the riverbank protection service.

## **B. ADMINISTRATIVE REQUIREMENTS**

### **1.0 DEFINITIONS**

Throughout this Request for Proposals (RFP), the following definitions apply:

“Closing” means the closing date and time specified on the first page of this Request for Proposals.

“Contract” means the written agreement resulting from this Request for Proposals executed by the Strathcona Regional District and the contractor.

“Contractor” means the successful proponent to this Request for Proposals who enters into a written contract with the Regional District.

“Must”, “shall” or “mandatory” means a requirement that must be met in order for the proposal to receive consideration.

“Project” means that work to be completed in accordance with this Request for Proposals.

“Proponent” means an individual, company or partnership that submits, or intends to submit, a proposal in response to this Request for Proposals.

“Proposal” means a submission in response to this Request for Proposals.

“RFP” means this Request for Proposals.

“Should” or “desirable” means a requirement having a significant degree of importance to the objective of the Request for Proposals.

## **2.0 TERMS AND CONDITIONS**

The terms and conditions applicable to this RFP are contained within this document. Submission of a proposal in response to this RFP indicates acceptance of all terms and conditions contained herein or in any addenda issued by the Regional District.

## **3.0 EVALUATION**

Proposals will be evaluated by the Regional District based on the criteria identified herein. The intent of the Regional District is to enter into a contract with the proponent whose proposal represents the best value to the Regional District based on the Regional District’s evaluation of the proposals received.

## **4.0 ALTERNATIVE SOLUTIONS**

If alternative solutions are offered, the information should be submitted in the same format as a standard proposed response but must be clearly marked as an “Alternative Proposal”. If a proponent submits more than one proposal each must be separately and uniquely identified.

## **5.0 CHANGES TO PROPOSALS**

By written notice a proponent may, prior to closing, amend or withdraw its proposal. Upon closing all proposals become irrevocable and may not be amended or withdrawn prior to the deadline for acceptance except where the proponent and the Regional District have mutually agreed to a change for the purpose of entering into a contract.

## **6.0 PROPONENT EXPENSES**

Proponents are solely responsible for their own expenses in preparing and submitting their proposals. The Regional District will not be liable for any claims for costs or damages incurred by a proponent in preparing a proposal, loss of anticipated profit in connection with a final contract or any other matter whatsoever.

## **7.0 SUBCONTRACTORS AND PARTNERSHIPS**

If subcontractors are to be used they must be clearly identified in the proposal. Joint submissions in the form of a partnership or consortium are acceptable including a joint submission by proponents having no formal corporate links. However, each proposal must identify the legal entity which is to be responsible for the overall performance of the work which constitutes the project.

## **8.0 CONFLICT OF INTEREST**

Contracting or subcontracting with any firm or individual whose corporate or other interests could, in the Regional District’s opinion, give rise to a conflict of interest in connection with the services will not be permitted. This includes, but is not limited to, any firm or individual involved in the preparation of this RFP.

## **9.0 CURRENCY AND TAXES**

Prices must be quoted in Canadian dollars and exclusive of taxes which shall be shown separately on the Proposal Form. No adjustment of fees or pricing will be made due to international currency fluctuations and/or any import duties and any additional taxes as a result of the contractor sourcing any materials, components and/or labour from international sources.

**10.0 ACCEPTANCE OF PROPOSALS**

This RFP must not be construed as an agreement to purchase goods or services nor as an invitation to perform any service for the Regional District, except as specifically outlined herein. Proposals shall remain open for acceptance by the Regional District for at least 30 days after the RFP closing date. Proposals must state the latest date for acceptance at the time of submission.

The Regional District is not bound to accept the lowest priced proposal or any proposal. Proposals will be evaluated on the basis of stated criteria and the Regional District is under no obligation to request clarification or further information, whether written or oral, from any proponent prior to completion of the evaluation process.

The Regional District reserves the right to reject any and all proposals for any reason or to accept any proposal in whole or in part which the Regional District, in its sole unrestricted discretion, deems to represent the best value for the Regional District. Proponents acknowledge the Regional District’s rights under this clause and absolutely waive any right of action against the Regional District for failure to accept their proposals whether such right of action arises as a result of negligence, bad faith or for any other reason.

The Regional District reserves the right to enter into negotiations with one or more proponents with respect to the services to be provided, and expressly reserves the right through such negotiations to request changes, alterations, additions or deletions from the terms of any proposals received.

Formal acceptance of any proposal and the subsequent confirmation of project award must not be construed as authority for the proponent to proceed with the project as this will be dependent on the execution of a contract and the fulfillment of any conditions precedent imposed by any authority having jurisdiction over the work or service to be performed.

**11.0 CANCELLATION OR DELAY OF RFP**

The Regional District reserves the right to delay and/or cancel this RFP at any time and for any reason and will not be held responsible for any direct or indirect loss, damage, cost or expense incurred or suffered by any proponent as a result of such cancellation.

The acceptance of any Proposal and the subsequent execution of a contract may be subject to funding and approval by the Board of Directors of the Strathcona Regional District or any of its delegated authorities.

**12.0 EXECUTION OF CONTRACT**

After acceptance by the Regional District, the successful Proponent will be provided with written confirmation. A contract will be executed when all preconditions have been met. No proponent will acquire any legal or equitable rights or privileges with respect to this project until a contract has been entered into with the Regional District.

**13.0 LIABILITY FOR ERRORS**

The information contained within this RFP is not guaranteed or warranted to be accurate by the Regional District, nor is it necessarily comprehensive or exhaustive. Nothing in this RFP is intended to relieve proponents from conducting their own research and forming their own opinions and conclusions with respect to the matters addressed in this RFP.

**14.0 MODIFICATION OF TERMS**

The Regional District reserves the right, at its sole discretion, to modify the terms of this RFP at any time prior to the closing time. Such modifications will be communicated to all proponents through a formal addenda process.

**15.0 FREEDOM OF INFORMATION**

Proposals are subject to the provisions of the *Freedom of Information and Protection of Privacy Act* which provides that all information contained therein, with some exceptions, is subject to access by the public. Information that is considered to be confidential or proprietary in nature should be clearly noted as such by the proponent. The Regional District cannot guarantee that any information contained within a proposal will remain confidential if a request for access is made.

**16.0 USE OF DOCUMENT**

This document, nor any portion thereof, may not be used for any purpose other than the submission of proposals.

**17.0 CONFIDENTIALITY OF INFORMATION**

Information pertaining to the Regional District obtained by the Proponent as a result of participation in this RFP process, other than information that is generally available as part of the public record, is to be treated as confidential and must not be disclosed without prior written authorization from the Regional District.

**C. SUBMISSION REQUIREMENTS**

**18.0 PROPOSAL SUBMISSION**

Proposals shall be submitted in one of the following formats:

**Electronically** in PDF format, along with the signed and dated Proposal Form provided herein, to the secure RFP submission portal on the SRD’s website. The deadline for receipt of proposals is 12:00 noon Pacific time on May 10, 2024 at the following address:

<https://srd.ca/uploadsubmissions/>

Once submitted, proposals may not be viewed or changed. To make a correction, a clearly labelled corrected version shall be submitted to the portal and an email sent to [procurement@srd.ca](mailto:procurement@srd.ca) indicating which version is intended for consideration.

**In person delivery or by mail/courier** in duplicate complete with one digital copy in portable document format (.pdf file) on a USB device along with the signed and dated Proposal Form provided. The deadline for receipt of proposals is 12:00 noon Pacific time on May 10, 2024 at the following location:

Strathcona Regional District  
990 Cedar Street  
Campbell River, BC V9W 7Z8

Proposals must be submitted in a sealed package with the name and address of the proponent and the RFP title clearly marked on the outside.

SAMPLE LABEL

Name of Proponent Address of Proponent
<b>CONFIDENTIAL – DO NOT OPEN</b> RFP-03-24
STRATHCONA REGIONAL DISTRICT 990 Cedar Street Campbell River, BC V9W 7Z8

Late proposals will be disqualified.

Proposals that are conditional, illegible, obscure, contain arithmetical errors, erasures, alterations or irregularities of any kind may, at the discretion of the Regional District, be disqualified.

The person(s) authorized to sign on behalf of the proponent and to bind the proponent to statements made in response to this RFP **must execute** the Proposal Form. Unsigned proposals will be disqualified.

Proponents shall be solely responsible for the delivery of their proposals in the manner and time prescribed. All submissions must be delivered according to the instructions provided herein and the Regional District will accept no responsibility for documents delivered to any other location.

Proposals for the optional, additional scope of work shall be submitted as an appendix to a primary proposal, delivered to the SRD in accordance with the specifications noted above.

**19.0 PROJECT MANAGER**

Proponents are required to designate an individual who shall be the Designated Project Manager (“Project Manager”) for the project. The Project Manager shall be the contractor’s project/construction manager responsible for the delivery of all contracted services to the Regional District. The Project Manager, and not subordinate staff, shall at all times be directly responsible for the management of the project. The Project Manager shall attend all meetings of the project team during the term of the project. The Project Manager shall not be replaced without the prior written consent of the Regional District.

**20.0 ENQUIRIES**

All enquiries related to this RFP are to be directed, in writing or by email, to:

Strathcona Regional District  
990 Cedar Street, Campbell River, BC V9W 7Z8  
Phone: 250-830-6700  
Fax: 250-830-6710  
Email: [procurement@srd.ca](mailto:procurement@srd.ca)

Information obtained from any other source is not official and should not be relied upon.

**21.0 RFP ADDENDA**

Addenda to this RFP may be issued prior to closing in response to queries received or at the initiative of the Regional District. Such addenda will be in written form and will be made available on the BC Bid (<http://www.bcbid.gov.bc.ca>) and Strathcona Regional District

([www.srd.ca](http://www.srd.ca)) websites. Information contained within RFP addenda is considered an integral part of the RFP and should be considered by proponents when responding to this RFP.

Verbal communications will not be binding unless confirmed by written addenda.

The final day to submit inquiries is May 3, 2024.

**22.0 DISCLAIMER**

Each proponent is responsible to review and understand the terms and conditions of this RFP and the scope of the work described. The Regional District makes no representation or warranty as to the accuracy or completeness of the information contained in this RFP and proponents are solely responsible to ensure that they have obtained and considered all information necessary to understand the requirements of the RFP and to prepare and submit their proposals. The Regional District will not be held responsible for any loss, damage or expense incurred by a proponent as a result of any inaccuracy or lack of completeness associated with this RFP, or as a result of any misunderstanding or misinterpretation of the requirements of this RFP on the part of any proponent.

**23.0 EVALUATION CRITERIA**

The SRD will evaluate proposals based upon, but not limited to, the following criteria:

<b>Criteria</b>	<b>Points</b>
Best value to the Regional District (Max. \$150,000)	20
Methodology and approach	20
Project team and relevant expertise	20
Local specific experience (Oyster River surrounding regions)	5
Identify challenges, constraints and obstacles in the project and advise strategy to minimize	10
Reference samples and reference checks from similar projects	10
Proposal clarity and layout	10
Value added items such public education components (documents and/or presentations), evacuation route considerations and suggested mitigation measures.	5

If required, a short list of proponents may be established to be contacted by the Regional District. The purpose for contacting a proponent at this stage would be to gain a greater understanding of the proponent’s proposal as submitted. Depending on the nature of the questions to be answered an interview may also be arranged to facilitate a more in-depth understanding of the proposal.

**D. SPECIFICATIONS AND SCOPE OF WORK**

**24.0 SCOPE OF WORK**

**24.1 PRIMARY SCOPE - FLOODPLAIN MAPPING**

This project is to update floodplain mapping for the Oyster River and coastal lands in Electoral Area D. This update is necessary to better implement land use planning, emergency planning, and risk mitigation work in this area. Specifically, it will be used to further refine the Floodplain Hazard Development Permit Area within the Official Community Plan for Electoral Area D and contribute background information towards a future regional Climate Adaptation Plan.

The proposal must provide clear and concise information on the approach and methodology, demonstrating how it aligns with the Guidelines for Flood Mapping in BC (APEGBC, 2017) and

with reference to the Flood Hazard Area Land Use Management Guidelines (Province of BC, 2018). Based on this guidance, an updated hydraulic model(s) for both the coastal and riverine flood hazard areas will be developed. The study area is the extent of the Oyster River and coastal lands within the Electoral Area D Official Community Plan Map 5 – Floodplain Hazard Development Permit Area (Appendix A) including the coastline and Oyster River between Inland Highway 19 and the Georgia Strait.

This scope includes, but is not necessarily limited to, the following tasks:

- review existing materials and utilize existing data wherever possible, including but not limited to provincially captured LiDAR raw data (2018/ 2019);
- process provincially captured LiDAR raw data (2018/ 2019) such that it may be used;
- acquire new data as needed, such as riverine bathymetry and mapping;
- conduct hydrologic analysis, including climate change forecasting (such as a future precipitation and sea level rise projections) and subsequent hydraulic modelling of several design flood scenarios to calculate new Flood Construction Levels (FCLs), extents, hazards and risks (as applicable);
- conduct geospatial mapping activities to produce maps of forecasted design flood extents, hazards, risks and flood construction elevations (as applicable);
- prepare draft maps and project report(s), have reviewed by senior reviewers with expertise in area of study and submit draft documents to client for review;
- prepare a list of possible mitigation options for inclusion in the final project report; and
- prepare final project reports and share findings with applicable stakeholders.

*Deliverables:*

- a. Design brief to document the riverine investigation conducted to develop the modelling and mapping. The report should outline study specific factors leading to the choice of approach and models, identify data/ information gaps and provide recommendations for future mitigation works.
- b. An overview report designed to easily communicate the purpose of the project, basic approach and use of flood hazards maps to the general public.
- c. Digital mapping information and printable (.pdf format) riverine flood hazard maps that define the flood extent and FCLs.

In addition:

- Data must be shared back with Strathcona Regional District for incorporation into internal and public GIS systems.
- At minimum, expected GIS data deliverables and LiDAR derived products include:
  - 1m contours
  - Hillshade
  - Stream/Creek network
  - DEM
  - Induration zones/ floodplain limits
  - Bathymetry (if applicable)
  - River isolines
  - Flood risk/ hazard ratings
  - Any ortho imagery captured
  - Crown heights
  - DSM/DTM
  - Data must be delivered in a standard geospatial format, file geodatabase is preferred.

All spatial data acquired/produced with Community Emergency Preparedness funds must meet BC LiDAR standards and be provided to the Province of BC with free and clear access

and distribution rights, specifically a perpetual, royalty-free, non-exclusive, worldwide license to use, reproduce, modify and distribute, any and all of the spatial data products acquired/produced using Community Emergency Preparedness funding.

d. summary report of any stakeholder/ public process undertaken as a result of this project.

*Methodologies:*

The proponent will be expected to employ methodologies in the provision of the Service which comply with recommendations of the National Disaster Mitigation Program, and Emergency Management British Columbia.

Excerpt from Public Safety Canada (NDMP Guidelines):

Stream 2: Flood Mapping - The need to undertake a flood mapping project is informed by a risk assessment. If flooding was identified as a significant risk for a community, that community should consider undertaking a flood mapping activity to further assess how it would be specifically affected by a flooding event. A flood map identifies the geographical boundaries of a flooding event based on the type and likelihood (e.g. “1 in 100 years”, “1 in 300 years”, etc.), and this information is used to help identify the structures, people and assets that are within the flood zone that are most likely to be impacted by the defined flood event. Flood mapping information and data that is acquired from a flood mapping activity should then be used to update an area's existing risk assessment(s). With this information, a community can more accurately determine its vulnerability(ies) in relation to a flooding event, and the flooding risk to the community.

Proponents shall base their Proposal on furnishing everything including all permits, labour, engineering, materials, tools, equipment and all necessary supplies as well as incidentals required to complete the project in full compliance with the provisions and requirements of this RFP document. Any deviation from the requirements set out in this document must be fully disclosed in the proposal.

*Notes:*

- Any deliverables not identified in this RFP that the Contractor will also provide to the SRD should be listed in the proposal.
- It is the responsibility of the proponent to deal with access to any areas required to complete the work.

*References:*

Province of BC Flood Hazard Area Land Use Management Guidelines, last amended 2018

[https://www2.gov.bc.ca/assets/gov/environment/air-land-water/water/integrated-flood-hazard-mgmt/flood\\_hazard\\_area\\_land\\_use\\_guidelines\\_2017.pdf](https://www2.gov.bc.ca/assets/gov/environment/air-land-water/water/integrated-flood-hazard-mgmt/flood_hazard_area_land_use_guidelines_2017.pdf)

APEGBC Flood Mapping in BC: Professional Practice guidelines

<https://www.egbc.ca/getmedia/8748e1cf-3a80-458d-8f73-94d6460f310f/APEGBC-Guidelines-for-Flood-Mapping-in-BC.pdf>

Provincial Floodplain Maps

[https://www.env.gov.bc.ca/wsd/data\\_searches/fpm/reports/keyplans-html/oyster-river.html](https://www.env.gov.bc.ca/wsd/data_searches/fpm/reports/keyplans-html/oyster-river.html)

Oyster River LiDAR, 2016

[https://strathconard-my.sharepoint.com/:b/g/person/dsauer\\_srd\\_ca/Ec2lQZFwGm9HobDteudRS7kBKP\\_tFBDq4x4FCMD-sNq9WA?e=bunLa9](https://strathconard-my.sharepoint.com/:b/g/person/dsauer_srd_ca/Ec2lQZFwGm9HobDteudRS7kBKP_tFBDq4x4FCMD-sNq9WA?e=bunLa9)

Strathcona Regional District Floodplain Mapping Inventory

<https://srdgis.ca/flood/>

<https://srd.ca/services/emergency-preparedness/flood-maps-studies/>

Natural Disaster Mitigation Program Guidelines, Government of Canada

<https://www.publicsafety.gc.ca/cnt/mrgnc-mngmnt/dsstr-prvntn-mtqtn/ndmp/prgrm-gdlns-en.aspx>

Comox Valley Regional District. Oyster River / Saratoga Beach Risk Assessment (2018)

[https://www.comoxvalleyrd.ca/sites/default/files/docs/Projects-Initiatives/orsb\\_flood\\_risk\\_assessment\\_final\\_report.pdf](https://www.comoxvalleyrd.ca/sites/default/files/docs/Projects-Initiatives/orsb_flood_risk_assessment_final_report.pdf)

[https://www.comoxvalleyrd.ca/sites/default/files/docs/Projects-Initiatives/appb\\_hazardsensitivityanalysis.pdf](https://www.comoxvalleyrd.ca/sites/default/files/docs/Projects-Initiatives/appb_hazardsensitivityanalysis.pdf)

## 24.2 OPTIONAL, ADDITIONAL SCOPE - RIVERBANK INSPECTION

This optional, additional scope of work is to inspect the current condition of the north side of the Oyster River from the Eastern edge of the Glenmore Road dike to the eastern edge of the Oyster River Park property at 4878 Regent Road. **The Riverbank Inspection scope will only be awarded if it is within budget and will be a separate contract from the Flood mapping scope.**

Riverbank stabilization efforts have been implemented on the north shore of the Oyster River, starting in the mid-1970s. Additional riprap has been installed in response to subsequent flooding events, as recently as 2010. A holistic assessment of the current condition of the bank and the resilience of the stabilization efforts is required, along with any recommended improvements, their priority ranking, recommended timelines, and class D estimates for each measure. These details are needed to establish budgets for the ongoing management of the riverbank protection service.

The Riverbank Inspection and flood mapping projects are viewed as complementary, and it is assumed they would require similar resources and that there will be efficiencies achieved if both projects run concurrently. As part of your submission for this optional, additional scope of work, please describe how efficiencies can or cannot be achieved by combining these two scopes of work.

The Riverbank Inspection scope includes, but is not necessarily limited to, the following tasks:

- inspection of the Oyster River and current condition of the riverbank;
- inspection of the historic stabilization efforts;
- Identification of areas vulnerable to erosion or inundation under current conditions;
- Identification of areas vulnerable to erosion or inundation under future conditions related to climate risk and sea level rise;
- Identification of remediation measures, including recommendations for future inspections;
- prioritization of recommended remediation measures;
- recommended timing of remediation measures;
- class D estimates for all recommended measures, including cost escalation linked to the timing recommendations;
- review existing materials and utilize existing data wherever possible, including but not limited to provincially captured LiDAR raw data (2018/ 2019);

- process provincially captured LiDAR raw data (2018/ 2019) such that it may be used;
- conduct hydrologic analysis, including climate change forecasting (such as a future precipitation and sea level rise projections) and subsequent hydraulic modelling of several design flood scenarios to calculate new flood construction levels, extents, hazards and risks (as applicable);
- prepare draft maps and project report(s), have reviewed by senior reviewers with expertise in area of study and submit draft documents to client for review; and
- prepare final project reports and share findings with applicable stakeholders.

**Deliverables**

- a. An overview report with maps and photos capturing the findings and recommendations identified in the project scope.
- b. Copies of all relevant raw data used to make any recommendations or assessments, including inspection reports.

**Resources**

Appendix B

**25.0 PERMITS AND CERTIFICATES**

If necessary, the successful proponent will obtain, at its own cost, all necessary permits to carry out the work of this project. The contractor will be required to provide certificates of conformity with any requirements of authorities having jurisdiction.

**26.0 PROJECT SCHEDULE**

All activities will be finalized previous to the end of the UBCM Disaster risk Reduction and Climate Adaptation grant period by August 2025. The following schedule is provided as a guideline:

Description	Deliverable Date
RFP released	April 15, 2024
Deadline for receiving proposals	May 10, 2024
Awarding of contract	May 17, 2024
Project start date	May 2024
Delivery of draft report	March 2025
Presentation at regular board meeting	June 2025
Final reporting documents submitted to SRD	July 2025

Proponents should include in their responses whether or not they can comply with this timeline. In accordance with the evaluation criteria set out in this document, preference may be given to proponents that can complete the work of the contract within the schedule outlined herein.

Proponents submitting a proposal related to the Optional Scope of work should include a separate project schedule for the Optional Scope.

**27.0 CHANGE IN SCOPE**

The Regional District reserves the right to amend the scope of work during the term of the proposed contract. In such cases, the Regional District would request a quotation from the contractor for the change in scope.

**E. CONTRACT CONDITIONS**

By submission of a proposal, the Proponent agrees that should its proposal be successful, the Proponent will enter into a contract with the Regional District that subject to negotiation, may include the following contract clauses:

**28.0 COMPLIANCE WITH LAWS**

The contractor will give all notices and provide all permits, licenses and other approvals required to perform the work. The contractor will comply with all laws applicable to the work or performance of the contract.

**29.0 LAWS OF BRITISH COLUMBIA**

Any contract resulting from this RFP will be governed by and will be construed and interpreted in accordance with all laws in affect in the province of British Columbia.

**30.0 INDEMNITY**

Notwithstanding the provision of insurance coverage by the contractor, the contractor hereby agrees to indemnify and save harmless the Regional District, its officers, agents and employees from and against all claims, demands, losses, costs, damages, actions, suits or proceedings by whomever made, brought or prosecuted and in any manner based upon, arising out, related to, occasioned by or attributable to the activities of the contractor, its servants, agents, subcontractors and sub-operators, in providing the services and performing the work of the contract, excepting always liability arising solely out of the negligent act or omission of the Regional District.

**31.0 INSURANCE**

Any contract resulting from this RFP will require that the contractor, without limiting its obligations or liabilities and at its own expense, provide and maintain throughout the contract term:

- a. Comprehensive commercial general liability insurance in an amount not less than \$2,000,000 inclusive per occurrence, insuring against bodily injury and property damage and including liability assumed under the contract;
- b. Automobile liability on all vehicles owned, operated or licensed in the name of the contractor in an amount not less than \$5,000,000.

The Regional District is to be added as an additional insured and the policy shall contain a cross liability clause. All required insurance will be endorsed to provide the Regional District with 30 days advance written notice of cancellation or material change.

The contractor will provide the Regional District with evidence of the required insurance in the form of a certificate(s) of insurance, immediately upon execution and delivery of the contract.

**32.0 REGISTRATION WITH WORKSAFE BC**

The contractor and any approved subcontractors must be registered with WorkSafe BC and WCB coverage must be maintained for the duration of the contract. Prior to receiving any payment, the contractor may be required to submit a WCB Clearance Letter confirming all assessments have been paid and the contractor is in good standing. The contractor and any approved subcontractors shall abide by all provisions of the Workers Compensation Act of British Columbia.

**F. PROPOSAL FORM**

**RFP-0#-24**

**CLOSING DATE AND TIME  
12:00 NOON PACIFIC TIME MAY 10, 2024**

**This form must be completed, signed and included with the submission.**

The undersigned confirms that its submission is in response to the above noted RFP.

The proponent acknowledges receipt of Addenda # \_\_\_\_\_ through Addenda # \_\_\_\_\_.

**Proponent:**

**Address:**

**Contact  
Name:**

**Phone:**

**Fax:**

**Email:**

<b>Completed Price for Primary Scope</b>	<b>\$</b>
<b>Taxes</b>	<b>\$</b>
<b>Total Completed Price for Primary Scope</b>	<b>\$</b>

<b>Completed Price for Optional Scope</b>	<b>\$</b>
<b>Taxes</b>	<b>\$</b>
<b>Total Completed Price for Optional Scope</b>	<b>\$</b>

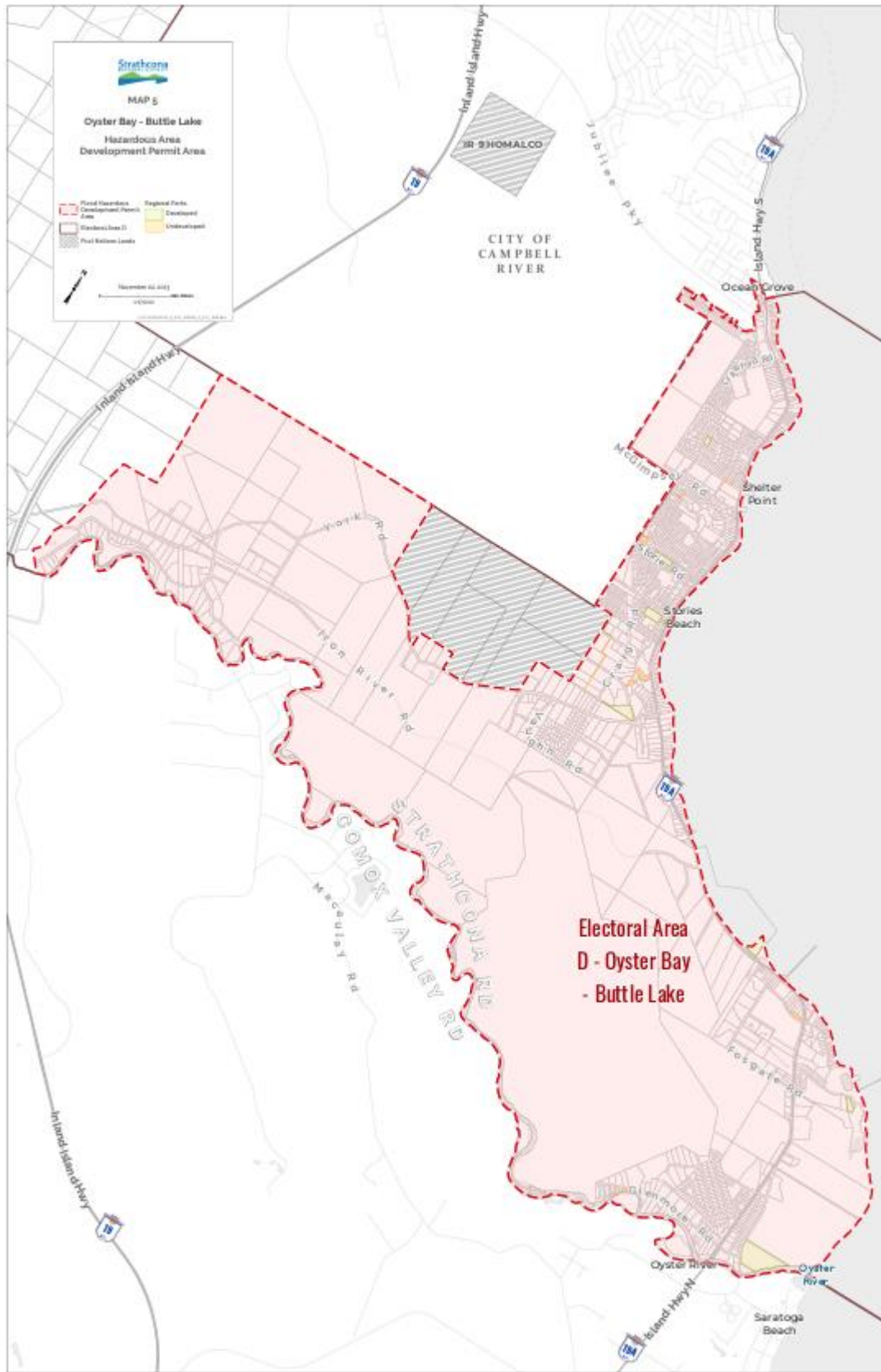
Proponents should ensure that all requirements of the RFP are dealt with in their proposal submission and that all materials and products proposed comply with the specifications therein.

\_\_\_\_\_  
**Authorized Signature**

\_\_\_\_\_  
**Name and Title**

\_\_\_\_\_  
**Date**

**G. APPENDIX A – FLOOD HAZARD DPA**



H. APPENDIX B - OPTIONAL, ADDITIONAL SCOPE: RIVERBANK INSPECTION



Figure 1: Riverbank Inspection Area

**OYSTER RIVER EROSION AND FLOOD PROTECTION**  
**CHRONOLOGICAL SUMMARY**

MARCH 8, 1996

November 5, 1975	High water on Oyster River caused some bank erosion - 150 cubic yards of riprap hauled to site.
January 19-26, 1976	Survey to obtain information needed for riprap bank protection cost estimate
March 24-April 5, 1976	Riprap placed downstream of the Island Highway Bridge on a 75-25 cost share agreement with the Regional District. See agreement dated March 23, 1976. Riprap cost \$19,986.25. Log Jam removal cost \$3,882.50
April 7, 1976	As-Constructed report by D. Finlay (MELP)
July 27, 1976	Agreement with Regional District of Comox Strathcona (75-25 Cost Share \$177,730.00) for 3678 lineal feet of bank protection (Riprap). In addition \$32,000 from Min. Of Highways for 667 lineal feet of bank protection. Also 52 rocks (130 cubic yards) placed for Fisheries (rock donated to Fisheries by Crown Zellerbach). Fisheries paid for the loading, hauling and placing.
Aug. 9 - Sept. 10, 1976	Construction of bank protection as per July 27, 1976 agreement. \$176,290.93 spent on a cost share basis with the Regional District.
Dec. 6 and 26, 1980	Oyster River floods - photos available. Description of damage done in Dec. 29, 1980 memo to Jake Wester (MELP) from Art McKenzie (MELP). See S/W B.C. December 1980 Flooding - Vancouver Island Flood Damage Repair (P.E.P.) report.
Jan. 1-8 1981	Emergency repair work done by D. Finlay on right bank of the Oyster River between the two bridges.
Jan. 5 - Feb. 2, 1981	Riprap and Log Jam work done by W.J. Wyngaards (MELP). Refer to DWG. 4918-73-31-13 dated Feb. 1982.
Jan. 6, 1981	Oyster River December 1980 flood divided into damaged areas by Aub Brown (MELP) report.
Jan. 22, 1981	Tour of damaged areas conducted by Aub Brown with rep. from the Reg. Dist.
April 6, 1981	Stephen Rogers (then Minister of Environment) states "Oyster River flood problem is a "high priority" ..
April, 1982	Preliminary Report on Oyster River Flooding and Erosion by Aub Brown.
May, 1984	Map showing existing works
May, 1988	Oyster River Water Management Plan.
July 21, 1988	Inspection Report of existing works by K. Bornemann (Inspector of Dykes Office)
Nov. 10-12 + Dec., 1990	Flood on Oyster River
Dec. 14, 1990	S/W B.C. Flooding - Proposed Restoration Works (O.I.C. 1819) report by B. McMullen (MELP)
March 3, 1990	Local referendum in favor of additional flood protection works. Apparently voted only enough money for Phase 1.
June, 1990	MELP Survey Project No. 90 15 R001 "As Constructed"
June 26, 1990	Inspection Report by Karl Bornemann (Inspector Of Dykes Office)
December 18, 1990	Provincial share for Phase 1 of the Flood Protection works is available.
February 4, 1991	Survey Request for Lorna Lane R/W downstream to existing riprap from R. Cameron (MELP)
February 4, 1991	Three Consulting firms asked to submit proposals for design work for flood control on the Oyster River. KPA Engineering Ltd. later awarded the contract.
March 1991	Phase 1 Design Report Completed (Y. Shumuk P. Eng. KPA designer)
March 28, 1991	Agreement signed between Regional District of Comox Strathcona and the Province of B.C. to cost share (75/25) dyke construction (Phase 1).
June 11- October 10, 1991	Oyster River area flood repair work (P.E.P.) and the construction of Phase 1 of the Oyster River Dyke completed (except for one property).
August 9, 1991	Final design drawings ( all modifications) by KPA completed.
December 4, 1991	Inspection by K. Bornemann (Inspector of Dykes Office).
January 19-29, 1992	Completed Oyster River Dyke on last remaining property
June 4, 1992	Inspection of newly completed works by K. Bornemann (Inspector of Dykes Office).
June 4, 1992	John Cooper (Reg. District) received addendum to the generic " Operations and Maintenance of Flood Control Works" manual.
July 1992	MELP Survey Project No. 92 21 R005 "As Constructed" completed.

D. Finlay - Deputy Inspector Of Dykes

C.C. Regional District Comox-Strathcona  
 MELP REGIONAL DISTRICT  
 CAMERON + LAWTON - LAWTON  
 LILIA MERIT

**Summary of Events impacting Oyster River Bank, Dike or residents in close proximity of either**

<b>Year</b>	<b>Date</b>	<b>Description</b>
<b>2009</b>	Nov-16	South end of Lorna Lane river bank eroded due to record high flows Glenmore Dike breach as per above
<b>2010</b>	Dec 24-27	Glenmore Rd residents experience localized flooding from high ground water levels due to severe rain event Wimbledon Rd residents localized flooding from high of ground water levels due to severe rain event
<b>2011</b>	Nov 24-27	Repeat flooding for Glenmore Rd residents from to high ground water levels due to severe rain event in combination with King Tides Repeat flooding for Wimbledon Rd residents from high ground water levels due to severe rain event in combination with King Tides
<b>2014</b>	Dec-09	Temporary berm installed as a emergency measure to retain the overflow of the Oyster River at the north end of the Glenmore Dike.

WA-5  
~~PL-SS-BC~~

Province of British Columbia  
Ministry of Environment  
Water Management Branch

Received  
by  
C. H. Lloyd  
22/82

PRELIMINARY REPORT ON  
OYSTER RIVER FLOODING AND EROSION

by

A. A. Brown, P. Eng.  
Senior Hydraulic Engineer

Victoria, B. C., April 1982

## SYNOPSIS

Flooding and erosion problems have occurred periodically on the Lower Oyster River over the past several years. In 1976, a cost-shared bank protection project was undertaken costing some \$160,000. In 1980, the Provincial Emergency Program funded repairs to the bank protection and logjam removal costing \$230,000.

The preliminary report proposing dyking and additional bank protection has been undertaken in response to a petition expressing concern over the possibility of the river jumping its banks and creating a new channel and to requests from individual landowners. The report proposes dyking estimated to cost \$216,000 and bank protection estimated at \$46,000. The dyking could, if desired, be carried out in three phases.

The report concludes that the question of funding and scope of the project should be determined prior to undertaking final design.

TABLE OF CONTENTS

	<u>Page No.:</u>
Title Page.....	i
Synopsis.....	ii
Key Map.....	iii
Site Plan.....	iv
Table of Contents.....	v
INTRODUCTION . . . . .	1
BACKGROUND . . . . .	1
THE PROBLEM . . . . .	2
REMEDIAL WORKS . . . . .	2
COSTS . . . . .	4
MATERIAL SOURCES . . . . .	5
COORDINATION AND APPROVALS . . . . .	6
SUMMARY AND CONCLUSIONS . . . . .	6

## INTRODUCTION

For approximately the last 15 years there have been erosion and flooding problems reported on the lower Oyster River. The river has its source at the 1000 metre level in Pearl Lake, approximately 5 km east of Buttle Lake. In this vicinity it drains peaks, such as Mt. Mitchell and Alexandra Peak which are up to 2000 metres high. From here it flows to the northeast, emptying into the Strait of Georgia some 46 km distant. See Drawings 4918-73-31-7 & 8. The drainage area is approximately 375 square km and includes several tributaries such as Adrian, Piggott and Woodhus Creeks and the Little Oyster River. The upper portion of the watershed is reported to have been logged recently. In the lower reaches the river occupies a u-shaped valley about 30 metres wide and is well contained until it emerges at upper Glenmore Road. See Drawing 4918-73-31-13. Here the river is currently occupying a channel along its stable southern margin. There are numerous old channel scars visible in aerial photographs in the area north of Glenmore Road. It thus appears that the river has at some previous time flowed in this area and that the sub-soil consists of gravel which the river deposited when it was flowing in that area.

Problems on the river normally occur in the late autumn, early winter when heavy rainfall and melting snow combine to cause high flows. Flooding and erosion have recently occurred on November 13, 1975 and December 26, 1980 when the average daily flow in the river was 260 and 220 cubic metres per second respectively. The estimated return period of these events is 5 to 8 years. The estimated one in 200 year flow is 500 cubic metres per second.

## BACKGROUND

In 1976, following the high flows in November 1975, bank protection was placed in three areas (see Drawing 4918-73-31-13) on a 75%-25% cost sharing basis with the local 25% share being provided through a specified services area created under the Regional District of Comox-Strathcona. A proposal to construct some dyking on upper Glenmore Road was deferred at that time.

In December 1980, high flows occurred again and considerable erosion and flooding damage was done in two areas. Extensive dyking and riprap repair work was undertaken to these two areas, on the left bank between the two highway bridges and on the right bank downstream of the old Island Highway bridge (as shown on Drawing 4918-73-31-13). In addition, minor repairs to the existing rock riprap were made and one large log jam and two smaller ones were removed. All this work was paid for under the Provincial Emergency Program at no cost to the residents. The cost was approximately \$230,000.

#### THE PROBLEM

Work under the Provincial Emergency Program was restricted to restoring the river system and existing works as near as possible to the condition which existed prior to the December 26, 1980 flooding. Two problem areas which are illustrated on Drawing 4918-73-31-14 are still outstanding. These problems are as follows:

1. Overbank flow from the old river channels in the upper Glenmore Road area still occurs during high water, flooding eight homes and cutting off traffic along Glenmore Road. In addition, the local residents are quite concerned that the river may, if not checked, jump its banks during high flow and create a new channel through a subdivision and the U.B.C. farm area to the north. A petition containing some 165 names expressing this concern was sent to the Minister on February 20, 1981.
2. Erosion on the left bank of the river just upstream of the end of the rock riprap placed in 1976 has occurred. The erosion area is some 150 metres long and the bank height varies from 6 metres at the lower end to 2.7 metres at the upper end. Requests for assistance have been received from two land-owners who have recently built new homes. No homes are at present threatened and only minor loss of land is occurring at this time, but the upstream end of the riprap placed in 1976 is being threatened.

#### REMEDIAL WORKS

The obvious solution to the flooding problem on upper Glenmore Road

would be to raise upper Glenmore Road and tie it to the high ground to the north with a spur dyke. This was the proposed solution in the 1976 report and would provide set back dykes with a considerable overbank flow area; it would also reduce the amount of bank protection needed on dykes and would leave a river corridor to allow for future river development.

Because of recent housing development in the upper Glenmore Road area, this solution would leave several houses unprotected. It is thus proposed to construct a dyke along the alignment as shown on Drawing No. 4918-73-31-15. The work required, from upstream to downstream, consists of raising the existing logging road (200 m), constructing 400 metres of new dyke around the homes at the end of Glenmore Road, raising Glenmore Road (130 m) and constructing 500 metres of new dyke to the high ground at Lorna Lane.

The crest of the proposed dyke should be 4 m wide (6.7 m wide on Glenmore Road) and should be built to an elevation of the flood of record plus one metre. The dyke face will be protected by a 1 m thick layer of rock riprap where erosion could cause damage to the dyke. See Drawing 4918-73-31-16 for details of typical cross sections.

The proposed remedial work in the erosion area is to smooth the existing alignment by cut and fill, to shape the bank to a 1:5:1 slope, and to place a 1 metre thick layer of rock riprap. See Drawing 4918-73-31-17 for typical cross sections.

COSTS

The estimated cost of the dyke construction is as follows:

1. Clearing and grubbing - 6300 m <sup>2</sup> @ \$1.50	\$ 9,450.00
2. Scarify existing paved road surface and remove to spoil - lump sum	\$ 1,000.00
3. Supply, haul and place dyke and road fill - 10,700 m <sup>3</sup> @ \$6.00	\$ 64,200.00
4. Supply, haul and place rock riprap for dyke bank protection - 3,100 m <sup>3</sup> @ \$25.00	\$ 77,500.00
5. Supply, haul and place cold mix road surfacing - 1,200 m <sup>2</sup> @ \$12.00	\$ 14,400.00
6. Internal drainage	
- supply and install two 500 mm Ø 14 m long CMP with flap gates - \$2,700.00	
- install flap gate on existing 24" Ø CMP at end of Lorna Lane - \$ 800.00	
Subtotal - \$3,500.00	\$ 3,500.00
7. Miscellaneous - replacement of fences, minor seeding, movement of power poles if necessary	\$ 10,000.00
8. Contingencies - 20%	<u>\$ 36,010.00</u>
	Subtotal \$216,060.00
	Say \$216,000.00

The estimated cost of the rock riprap bank protection is as follows:

1. Bank preparation - 150 lineal metres @ \$6.00	\$ 900.00
2. Supply, haul and place 1,500 m <sup>3</sup> of rock riprap @ \$25.00	\$ 37,500.00
3. Plus 20% for contingencies	<u>\$ 7,600.00</u>
	Subtotal \$ 46,000.00

Thus the total cost of dyking and bank protection proposed is - \$262,000.00

The dyking work could, if necessary, be carried out in 3 phases as follows: (See Drawing 4918-73-31-15.)

1. Phase I - Raise the existing logging road for 200 m and construct 400 metres of new dyke around the homes at the upper end of Glenmore Road. This would provide protection to the bulk of the homes most severely threatened during high water. In addition, it would greatly reduce the possibility of the river overflowing its banks during flood stages and eroding a new channel above the rock riprap works constructed in 1976. Since this area is the most vulnerable area to the creation of a new channel, reduction of this risk would represent a considerable benefit. The estimated cost of this work is \$86,000.
2. Phase II - Raise Glenmore Road for 130 metres and construct approximately 220 metres of new dyke. Since rock riprap bank protection is already in place in this section of river, the danger of the river creating a new channel by overbank flow from this section is not great. The proposed work will, however, prevent the river from overtopping Glenmore Road and will protect several homes from the threat of periodic flooding. The estimated cost of this work is \$97,000.
3. Phase III - Extend the dyke an additional 300 metres to the high ground east of Lorna Lane. This would close the gap and eliminate the threat of high water outflanking the dyke proposed in Phase II and flooding the lots west of Lorna Lane. The estimated cost of this work is \$33,000.

It should be noted that the rock riprap bank protection, estimated to cost \$46,000 is independent of the dyking project. It is recommended, that this work not be phased, but that it be done as a complete project.

#### MATERIAL SOURCES

Rock riprap from the Crown Zellerback pit at Wolf Lake was used for the 1976 project. Rock from a pit owned by Turnbull Trucking Ltd., Courtenay was used in the major repair work in 1980/81. The rock from both sources is quite sound and although the haul distance is considerable, no rock source of comparable quality is available locally. The rock from the Turnbull pit

is a little closer and is recommended if available.

There is a Ministry of Highways gravel pit located on Terrain Road approximately 1 km north on the Island Highway which may be suitable for dyke fill if available. Also, there are several gravel bars on the river which would be quite suitable if approval can be obtained from Federal Fisheries and the Fish and Wildlife Branch to remove material from the bars.

#### COORDINATION AND APPROVALS

Before this project can be implemented, various approval and permits have to be obtained and agreements entered into. Among the items which must be arranged for are:

1. Financing - A decision must be made on which parts of the project can be funded and a method of dividing the cost among the landowners benefitting must be decided upon. If financing is to be obtained through the Regional District of Comox-Strathcona, their concurrence is required.
2. An Approval under Section 7 of the Water Act is required for works in and about a stream from the Regional Water Manager, Nanaimo.
3. Concurrence on the project and on project timing must be obtained from the Federal Fisheries Service and the Fish and Wildlife Branch. In addition, their approval of using gravel from river bars will be required.
4. Right-of-way for construction and maintenance of the works must be obtained.
5. Since it is proposed to raise Glenmore Road and the logging road, the agreement of the District Manager of the Ministry of Highways and of Raven Timber Company, Campbell River will be necessary.

#### SUMMARY AND CONCLUSIONS

In order to solve the flooding and erosion problems along the lower Oyster River, it will be necessary to construct dykes, estimated to cost \$216,000 and to provide bank protection estimated to cost \$46,000. The dyking could, if desired, be undertaken in three phases, with Phase I being the highest and Phase III being the lowest priority. The bank protection is

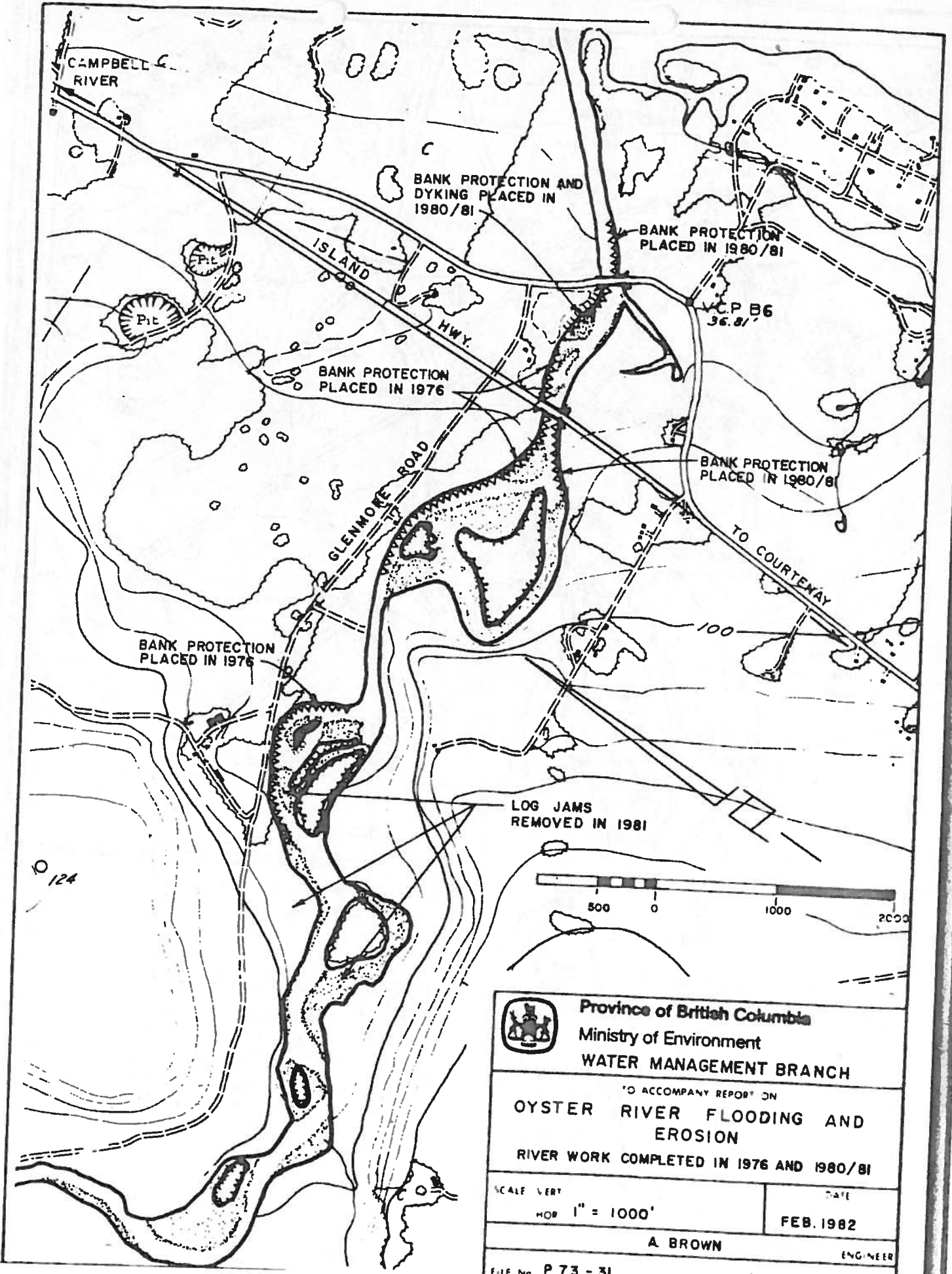
independent of the dyking.


Prior to undertaking detailed design and seeking the necessary approvals and agreements the question of funding and the scope of the project should be decided upon.

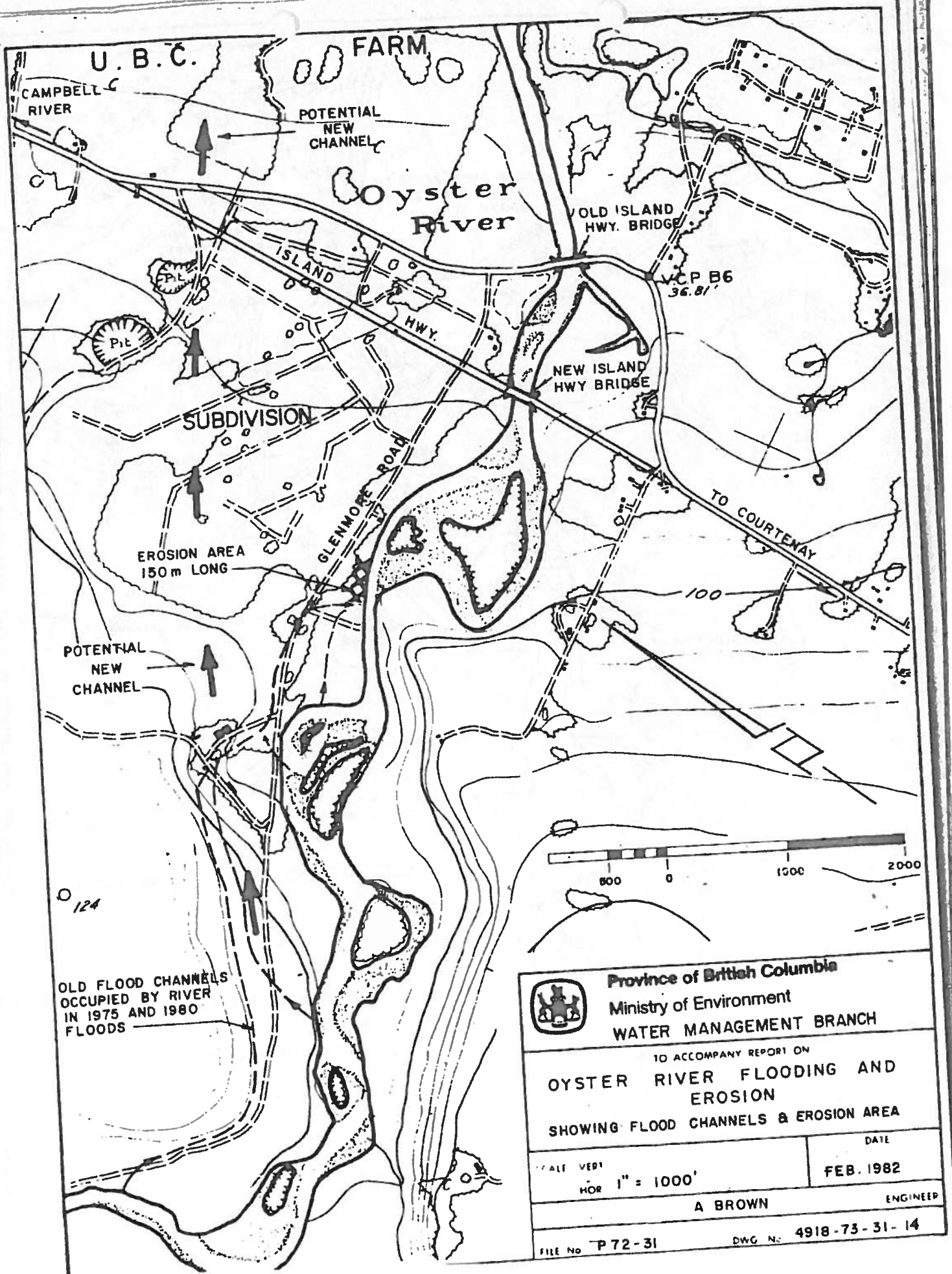
*A. A. Brown*

A. A. Brown, P. Eng.  
Senior Hydraulic Engineer  
Rivers Section  
Water Management Branch


AAB:sk1

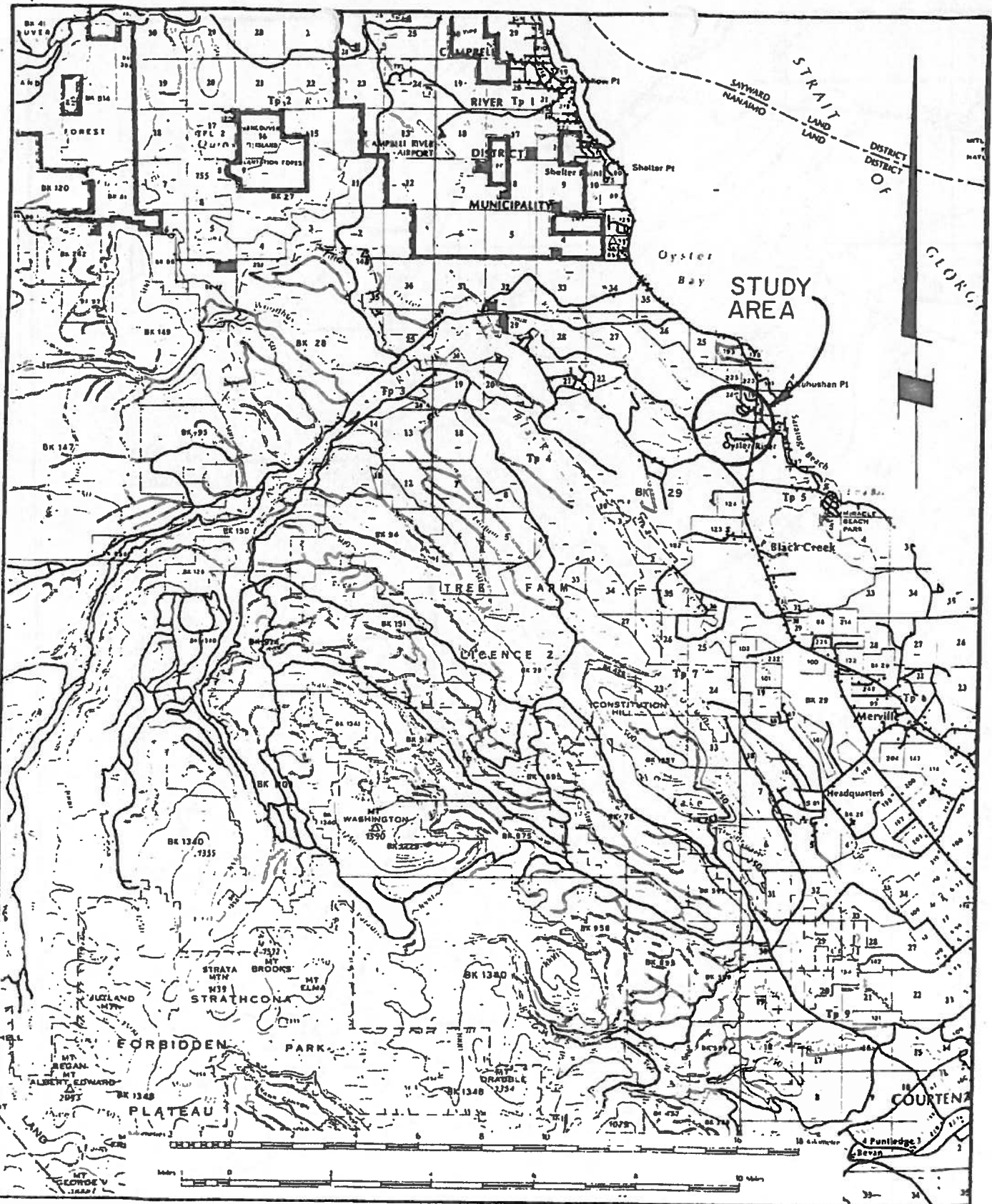


 <b>Province of British Columbia</b> <b>Ministry of Environment</b> <b>WATER MANAGEMENT BRANCH</b>	
TO ACCOMPANY REPORT ON <b>OYSTER RIVER FLOODING AND EROSION</b> <b>RIVER WORK COMPLETED IN 1976 AND 1980/81</b>	
SCALE VERT HOR 1" = 1000'	DATE <b>FEB. 1982</b>
<b>A. BROWN</b> ENGINEER	
FILE No P 73 - 31	DWG. No 4918-73-31-13



OLD FLOOD CHANNELS  
OCCUPIED BY RIVER  
IN 1975 AND 1980  
FLOODS

 <b>Province of British Columbia</b> <b>Ministry of Environment</b> <b>WATER MANAGEMENT BRANCH</b>	
TO ACCOMPANY REPORT ON <b>OYSTER RIVER FLOODING AND          EROSION</b> <b>SHOWING FLOOD CHANNELS &amp; EROSION AREA</b>	
SCALE VERT HOR 1" = 1000'	DATE <b>FEB. 1982</b>
<b>A BROWN</b> ENGINEER	
FILE No P 72-31	DWG No: 4918-73-31-14



Province of British Columbia  
 Ministry of Environment  
 WATER MANAGEMENT BRANCH

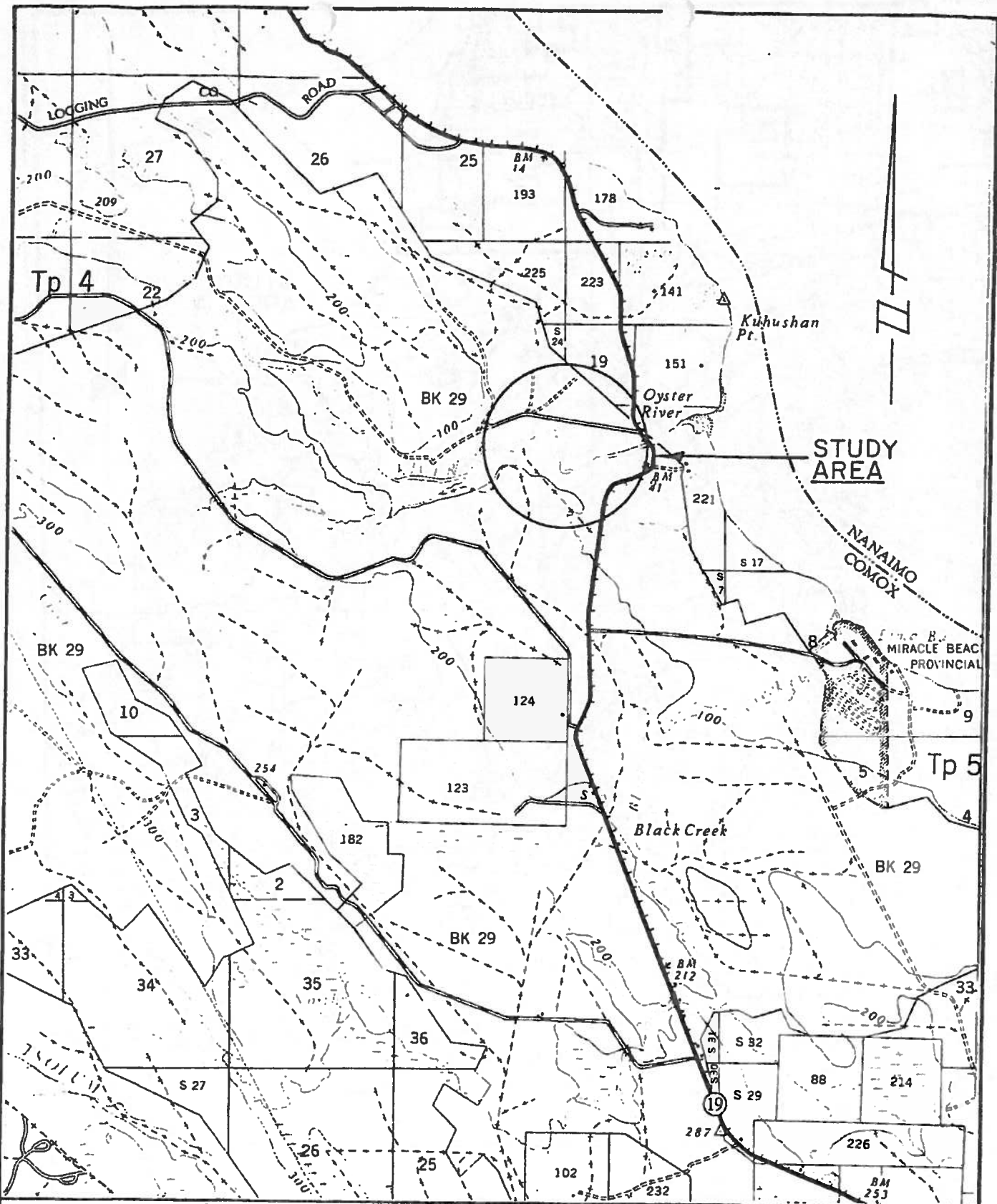
TO ACCOMPANY REPORT ON  
**OYSTER RIVER  
 FLOODING AND EROSION  
 KEY PLAN**

SCALE:  $1\text{ cm} = 1.6\text{ km}$   
 HOR: 1:162000

DATE  
**FEB 1976**

*Brown* A. BROWN ENGINEER  
 FILE No **0253756-19** DWG No **4918-73-31-7**

VANICAL 8589



Province of British Columbia  
 Ministry of Environment  
 WATER MANAGEMENT BRANCH

TO ACCOMPANY REPORT ON  
**OYSTER RIVER  
 FLOODING AND EROSION  
 SITE PLAN**

SCALE VERT  
 HOR 1 : 50,000

DATE  
 FEB, 1976

*A. Brown* A. BROWN ENGINEER  
 FILE No 0253786-19 DWG No 4918-73-13-8

VAN/CAL 8569

# BROKEN ROCK RIPRAP SPECIFICATIONS

SI METRIC UNITS

IMPERIAL UNITS

% BY WEIGHT FINER THAN	MASS (kg)	APPROX. EQUIVALENT DIAMETER (mm)	% BY WEIGHT FINER THAN	MASS (lb.)	APPROX. EQUIVALENT DIAMETER (Inches)
100			100		
NOT MORE THAN 50	300	600	NOT MORE THAN 50	660	24
NOT MORE THAN 10	40	300	NOT MORE THAN 10	90	12

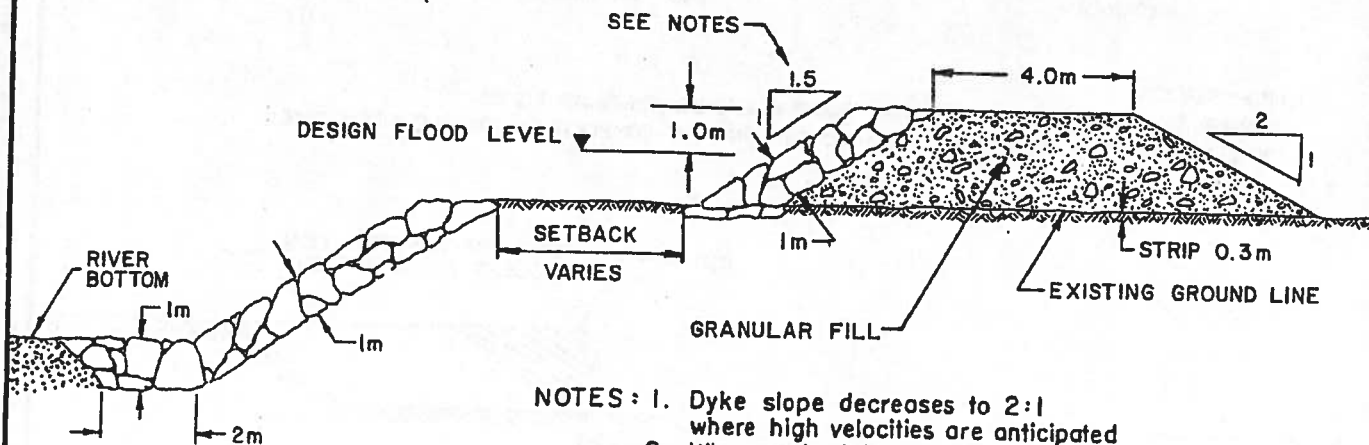
mm = MILLIMETRE

kg = KILOGRAM

1 kg = 2.2 lb

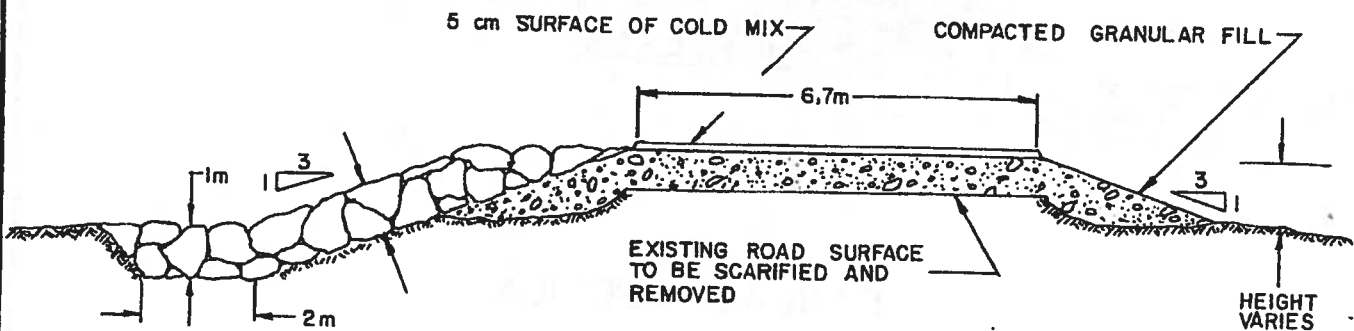
1000 mm = 1m (METRE) = 3.28 FEET

RIPRAP SHALL: 1. CONSIST OF DENSE, DURABLE, ROUGHLY EQUIDIMENSIONAL, ANGULAR PIECES.  
 2. BE CLEAN AND REASONABLY WELL GRADED COVERING THE COMPLETE ALLOWABLE SIZE RANGE.



- NOTES: 1. Dyke slope decreases to 2:1 where high velocities are anticipated  
 2. Where setback is sufficient no riprap is required on dyke

## PROPOSED DYKE



NOTE: Approach ramps to raised sections of Glenmore Road and logging roads should be 40:1

## PROPOSED RAISED SECTION OF GLENMORE ROAD



Province of British Columbia  
 Ministry of Environment  
 WATER MANAGEMENT BRANCH

TO ACCOMPANY REPORT ON  
**OYSTER RIVER  
 FLOODING AND EROSION**

SCALE VERT

HOR

NOT TO SCALE

DATE

MARCH, 1981

*A. Brown*

A. BROWN ENGINEER

FILE No. P-73-31

DWG No 4918-73-31-16

VANICAL 9569

# BROKEN ROCK RIPRAP SPECIFICATIONS

## SI METRIC UNITS

## IMPERIAL UNITS

% BY WEIGHT FINER THAN	MASS (kg)	APPROX. EQUIVALENT DIAMETER (mm)	% BY WEIGHT FINER THAN	MASS (lb.)	APPROX. EQUIVALENT DIAMETER (inches)
100	1100	900	100	2400	36
NOT MORE THAN 50	300	600	NOT MORE THAN 50	660	24
NOT MORE THAN 10	40	300	NOT MORE THAN 10	90	12

mm = MILLIMETRE

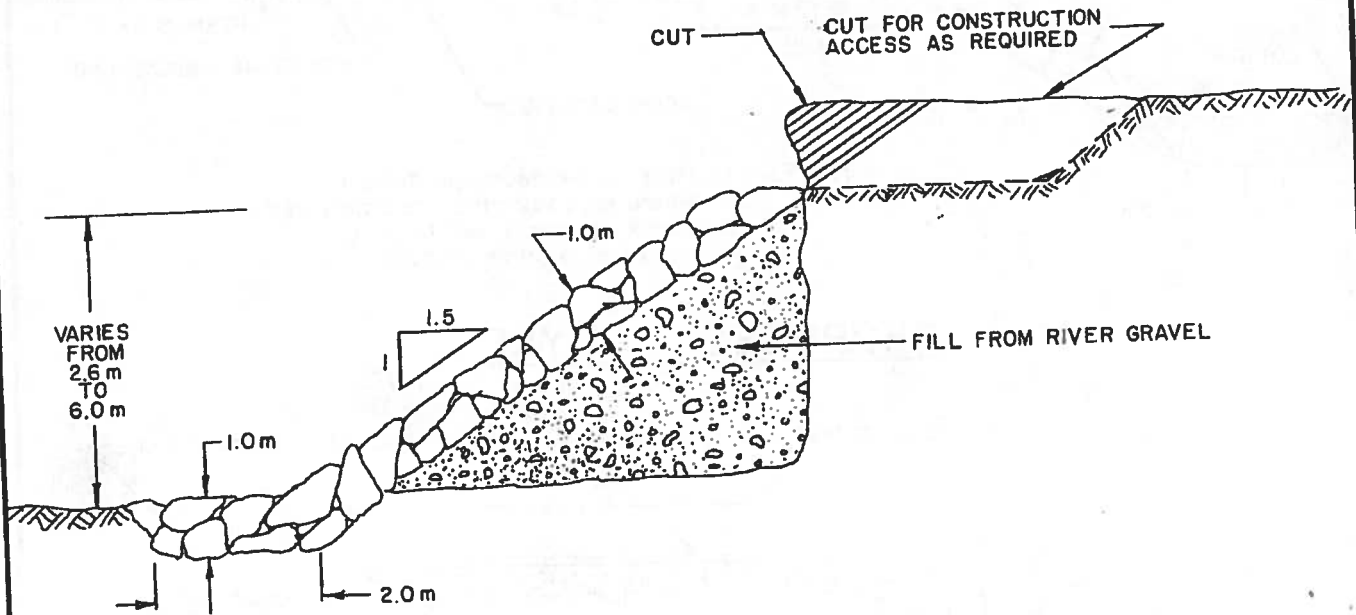
1000 mm = 1 m (METRE) = 3.28 FEET

kg = KILOGRAM

1 kg = 2.2 lb.

**RIPRAP SHALL :**

1. CONSIST OF DENSE, DURABLE, ROUGHLY EQUIDIMENSIONAL, ANGULAR PIECES.
2. BE CLEAN AND REASONABLY WELL GRADED COVERING THE COMPLETE ALLOWABLE SIZE RANGE.



**TYPICAL SECTION  
BROKEN ROCK RIPRAP**



**Province of British Columbia**  
 Ministry of the Environment  
 ENVIRONMENTAL AND ENGINEERING SERVICE  
 WATER INVESTIGATIONS BRANCH

TO ACCOMPANY REPORT ON  
**OYSTER RIVER  
 FLOODING AND EROSION**

*A. Brown*

A. BROWN ENGINEER

SCALE: VERT. N. T. S.  
 HOR. N. T. S.

DATE  
 MARCH 81

FILE No. P 73 - 31

DWG No. 4918-73-31-17

Province of British Columbia  
Ministry of Environment  
Water Management Branch

WA-5  
~~PL-SS-BC~~  
Received  
in hand  
from G. Lloyd  
Oct 22/82

PRELIMINARY REPORT ON  
OYSTER RIVER FLOODING AND EROSION

by

A. A. Brown, P. Eng.  
Senior Hydraulic Engineer

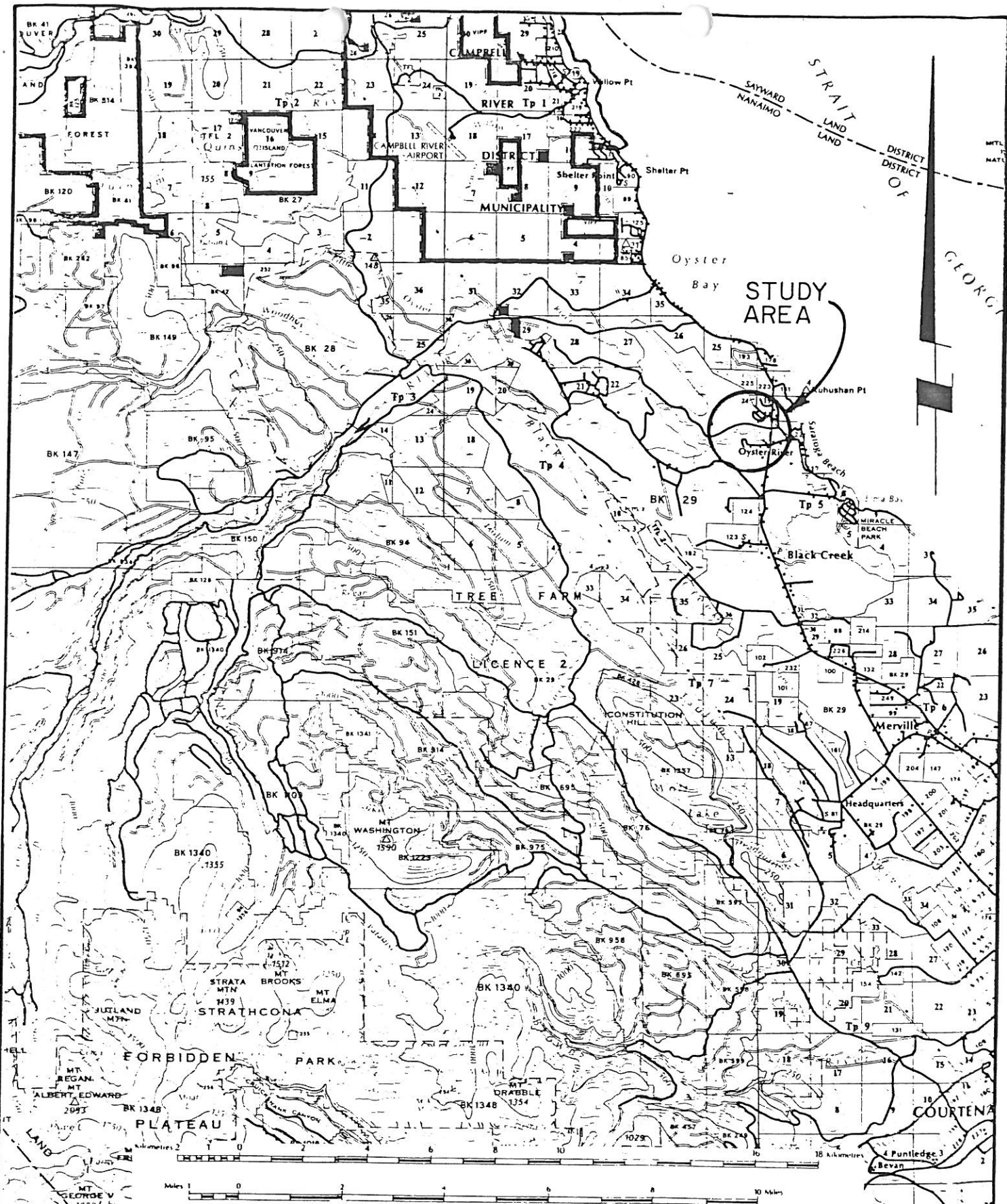
Victoria, B. C., April 1982

## SYNOPSIS

Flooding and erosion problems have occurred periodically on the Lower Oyster River over the past several years. In 1976, a cost-shared bank protection project was undertaken costing some \$160,000. In 1980, the Provincial Emergency Program funded repairs to the bank protection and logjam removal costing \$230,000.

The preliminary report proposing dyking and additional bank protection has been undertaken in response to a petition expressing concern over the possibility of the river jumping its banks and creating a new channel and to requests from individual landowners. The report proposes dyking estimated to cost \$216,000 and bank protection estimated at \$46,000. The dyking could, if desired, be carried out in three phases.

The report concludes that the question of funding and scope of the project should be determined prior to undertaking final design.



Province of British Columbia  
 Ministry of Environment  
 WATER MANAGEMENT BRANCH

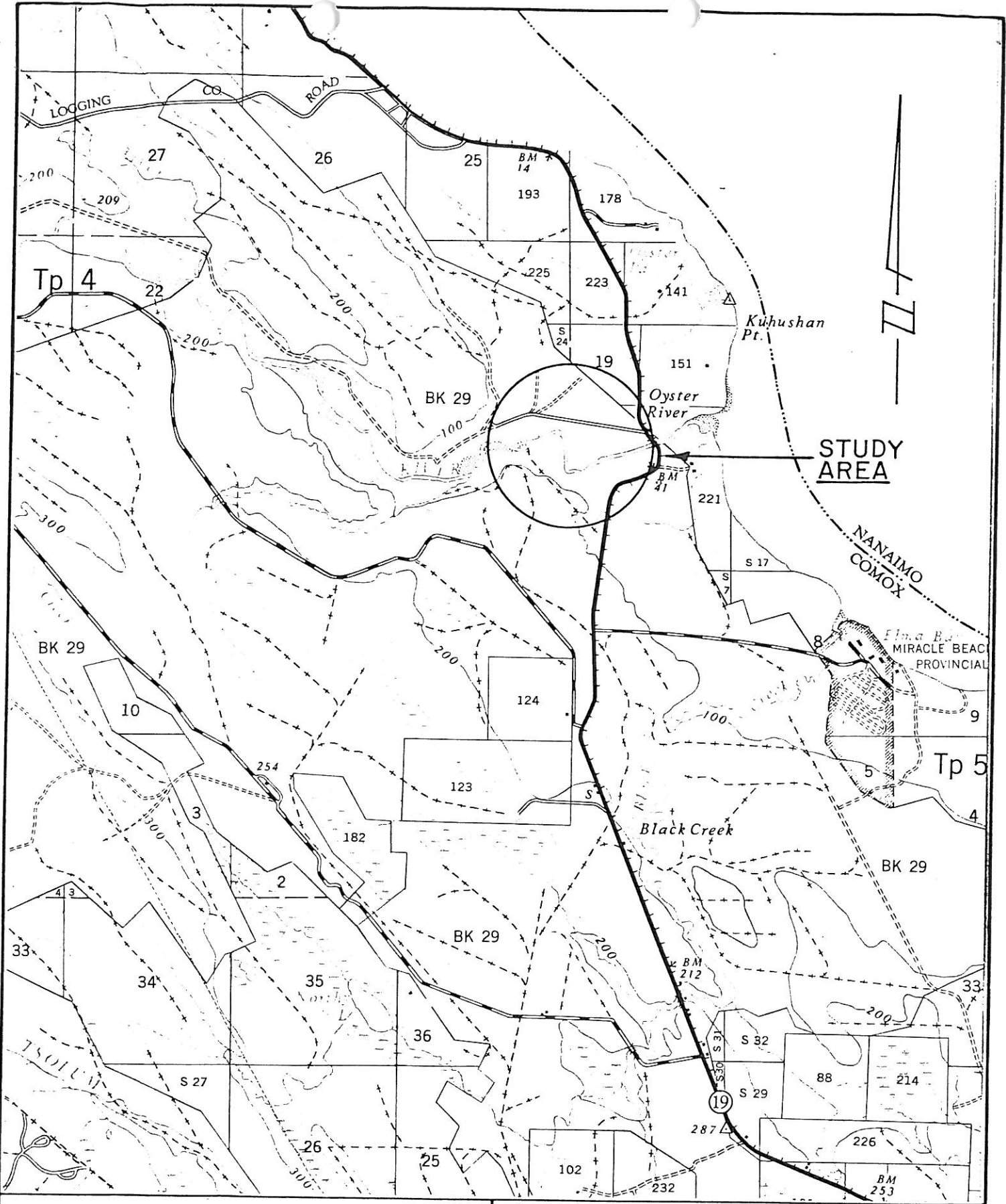
TO ACCOMPANY REPORT ON  
**OYSTER RIVER  
 FLOODING AND EROSION  
 KEY PLAN**

SCALE: ~~VERT~~ 1 cm = 1.6 km  
 HOR | 1:162000

DATE  
 FEB. 1976

*Brown* A. BROWN ENGINEER  
 FILE No. 0253756-19 DWG No. 4918-73-31-7

VANCAL B569



Province of British Columbia  
 Ministry of Environment  
 WATER MANAGEMENT BRANCH

TO ACCOMPANY REPORT ON  
**OYSTER RIVER  
 FLOODING AND EROSION  
 SITE PLAN**

SCALE: VERT  
 HOR 1 : 50,000

DATE  
 FEB, 1976

*A. Brown* A. BROWN ENGINEER

FILE No 0253786-19 DWG No 4918-73-13-8

VANCAL 8569

TABLE OF CONTENTS

	<u>Page No.</u>
Title Page.....	i
Synopsis.....	ii
Key Map.....	iii
Site Plan.....	iv
Table of Contents.....	v
INTRODUCTION . . . . .	1
BACKGROUND . . . . .	1
THE PROBLEM . . . . .	2
REMEDIAL WORKS . . . . .	2
COSTS . . . . .	4
MATERIAL SOURCES . . . . .	5
COORDINATION AND APPROVALS . . . . .	6
SUMMARY AND CONCLUSIONS . . . . .	6

## INTRODUCTION

For approximately the last 15 years there have been erosion and flooding problems reported on the lower Oyster River. The river has its source at the 1000 metre level in Pearl Lake, approximately 5 km east of Buttle Lake. In this vicinity it drains peaks, such as Mt. Mitchell and Alexandra Peak which are up to 2000 metres high. From here it flows to the northeast, emptying into the Strait of Georgia some 46 km distant. See Drawings 4918-73-31-7 & 8. The drainage area is approximately 375 square km and includes several tributaries such as Adrian, Piggott and Woodhus Creeks and the Little Oyster River. The upper portion of the watershed is reported to have been logged recently. In the lower reaches the river occupies a u-shaped valley about 30 metres wide and is well contained until it emerges at upper Glenmore Road. See Drawing 4918-73-31-13. Here the river is currently occupying a channel along its stable southern margin. There are numerous old channel scars visible in aerial photographs in the area north of Glenmore Road. It thus appears that the river has at some previous time flowed in this area and that the sub-soil consists of gravel which the river deposited when it was flowing in that area.

Problems on the river normally occur in the late autumn, early winter when heavy rainfall and melting snow combine to cause high flows. Flooding and erosion have recently occurred on November 13, 1975 and December 26, 1980 when the average daily flow in the river was 260 and 220 cubic metres per second respectively. The estimated return period of these events is 5 to 8 years. The estimated one in 200 year flow is 500 cubic metres per second.

## BACKGROUND

In 1976, following the high flows in November 1975, bank protection was placed in three areas (see Drawing 4918-73-31-13) on a 75%-25% cost sharing basis with the local 25% share being provided through a specified services area created under the Regional District of Comox-Strathcona. A proposal to construct some dyking on upper Glenmore Road was deferred at that time.

In December 1980, high flows occurred again and considerable erosion and flooding damage was done in two areas. Extensive dyking and riprap repair work was undertaken to these two areas, on the left bank between the two highway bridges and on the right bank downstream of the old Island Highway bridge (as shown on Drawing 4918-73-31-13). In addition, minor repairs to the existing rock riprap were made and one large log jam and two smaller ones were removed. All this work was paid for under the Provincial Emergency Program at no cost to the residents. The cost was approximately \$230,000.

#### THE PROBLEM

Work under the Provincial Emergency Program was restricted to restoring the river system and existing works as near as possible to the condition which existed prior to the December 26, 1980 flooding. Two problem areas which are illustrated on Drawing 4918-73-31-14 are still outstanding. These problems are as follows:

1. Overbank flow from the old river channels in the upper Glenmore Road area still occurs during high water, flooding eight homes and cutting off traffic along Glenmore Road. In addition, the local residents are quite concerned that the river may, if not checked, jump its banks during high flow and create a new channel through a subdivision and the U.B.C. farm area to the north. A petition containing some 165 names expressing this concern was sent to the Minister on February 20, 1981.
2. Erosion on the left bank of the river just upstream of the end of the rock riprap placed in 1976 has occurred. The erosion area is some 150 metres long and the bank height varies from 6 metres at the lower end to 2.7 metres at the upper end. Requests for assistance have been received from two land-owners who have recently built new homes. No homes are at present threatened and only minor loss of land is occurring at this time, but the upstream end of the riprap placed in 1976 is being threatened.

#### REMEDIAL WORKS

The obvious solution to the flooding problem on upper Glenmore Road

would be to raise upper Glenmore Road and tie it to the high ground to the north with a spur dyke. This was the proposed solution in the 1976 report and would provide set back dykes with a considerable overbank flow area; it would also reduce the amount of bank protection needed on dykes and would leave a river corridor to allow for future river development.

Because of recent housing development in the upper Glenmore Road area, this solution would leave several houses unprotected. It is thus proposed to construct a dyke along the alignment as shown on Drawing No. 4918-73-31-15. The work required, from upstream to downstream, consists of raising the existing logging road (200 m), constructing 400 metres of new dyke around the homes at the end of Glenmore Road, raising Glenmore Road (130 m) and constructing 500 metres of new dyke to the high ground at Lorna Lane.

The crest of the proposed dyke should be 4 m wide (6.7 m wide on Glenmore Road) and should be built to an elevation of the flood of record plus one metre. The dyke face will be protected by a 1 m thick layer of rock riprap where erosion could cause damage to the dyke. See Drawing 4918-73-31-16 for details of typical cross sections.

The proposed remedial work in the erosion area is to smooth the existing alignment by cut and fill, to shape the bank to a 1:5:1 slope, and to place a 1 metre thick layer of rock riprap. See Drawing 4918-73-31-17 for typical cross sections.

COSTS

The estimated cost of the dyke construction is as follows:

1. Clearing and grubbing - 6300 m <sup>2</sup> @ \$1.50	\$ 9,450.00
2. Scarify existing paved road surface and remove to spoil - lump sum	\$ 1,000.00
3. Supply, haul and place dyke and road fill - 10,700 m <sup>3</sup> @ \$6.00	\$ 64,200.00
4. Supply, haul and place rock riprap for dyke bank protection - 3,100 m <sup>3</sup> @ \$25.00	\$ 77,500.00
5. Supply, haul and place cold mix road surfacing - 1,200 m <sup>2</sup> @ \$12.00	\$ 14,400.00
6. Internal drainage	
- supply and install two 500 mm Ø 14 m long CMP with flap gates - \$2,700.00	
- install flap gate on existing 24" Ø CMP at end of Lorna Lane - <u>\$ 800.00</u>	
Subtotal - \$3,500.00	\$ 3,500.00
7. Miscellaneous - replacement of fences, minor seeding, movement of power poles if necessary	\$ 10,000.00
8. Contingencies - 20%	<u>\$ 36,010.00</u>
	Subtotal \$216,060.00
	Say \$216,000.00

The estimated cost of the rock riprap bank protection is as follows:

1. Bank preparation - 150 lineal metres @ \$6.00	\$ 900.00
2. Supply, haul and place 1,500 m <sup>3</sup> of rock riprap @ \$25.00	\$ 37,500.00
3. Plus 20% for contingencies	<u>\$ 7,600.00</u>
	Subtotal \$ 46,000.00

Thus the total cost of dyking and bank protection proposed is - \$262,000.00

The dyking work could, if necessary, be carried out in 3 phases as follows: (See Drawing 4918-73-31-15.)

1. Phase I - Raise the existing logging road for 200 m and construct 400 metres of new dyke around the homes at the upper end of Glenmore Road. This would provide protection to the bulk of the homes most severely threatened during high water. In addition, it would greatly reduce the possibility of the river overflowing its banks during flood stages and eroding a new channel above the rock riprap works constructed in 1976. Since this area is the most vulnerable area to the creation of a new channel, reduction of this risk would represent a considerable benefit. The estimated cost of this work is \$86,000.
2. Phase II - Raise Glenmore Road for 130 metres and construct approximately 220 metres of new dyke. Since rock riprap bank protection is already in place in this section of river, the danger of the river creating a new channel by overbank flow from this section is not great. The proposed work will, however, prevent the river from overtopping Glenmore Road and will protect several homes from the threat of periodic flooding. The estimated cost of this work is \$97,000.
3. Phase III - Extend the dyke an additional 300 metres to the high ground east of Lorna Lane. This would close the gap and eliminate the threat of high water outflanking the dyke proposed in Phase II and flooding the lots west of Lorna Lane. The estimated cost of this work is \$33,000.

It should be noted that the rock riprap bank protection, estimated to cost \$46,000 is independent of the dyking project. It is recommended, that this work not be phased, but that it be done as a complete project.

#### MATERIAL SOURCES

Rock riprap from the Crown Zellerback pit at Wolf Lake was used for the 1976 project. Rock from a pit owned by Turnbull Trucking Ltd., Courtenay was used in the major repair work in 1980/81. The rock from both sources is quite sound and although the haul distance is considerable, no rock source of comparable quality is available locally. The rock from the Turnbull pit

is a little closer and is recommended if available.

There is a Ministry of Highways gravel pit located on Terrain Road approximately 1 km north on the Island Highway which may be suitable for dyke fill if available. Also, there are several gravel bars on the river which would be quite suitable if approval can be obtained from Federal Fisheries and the Fish and Wildlife Branch to remove material from the bars.

#### COORDINATION AND APPROVALS

Before this project can be implemented, various approval and permits have to be obtained and agreements entered into. Among the items which must be arranged for are:

1. Financing - A decision must be made on which parts of the project can be funded and a method of dividing the cost among the landowners benefitting must be decided upon. If financing is to be obtained through the Regional District of Comox-Strathcona, their concurrence is required.
2. An Approval under Section 7 of the Water Act is required for works in and about a stream from the Regional Water Manager, Nanaimo.
3. Concurrence on the project and on project timing must be obtained from the Federal Fisheries Service and the Fish and Wildlife Branch. In addition, their approval of using gravel from river bars will be required.
4. Right-of-way for construction and maintenance of the works must be obtained.
5. Since it is proposed to raise Glenmore Road and the logging road, the agreement of the District Manager of the Ministry of Highways and of Raven Timber Company, Campbell River will be necessary.

#### SUMMARY AND CONCLUSIONS

In order to solve the flooding and erosion problems along the lower Oyster River, it will be necessary to construct dykes, estimated to cost \$216,000 and to provide bank protection estimated to cost \$46,000. The dyking could, if desired, be undertaken in three phases, with Phase I being the highest and Phase III being the lowest priority. The bank protection is

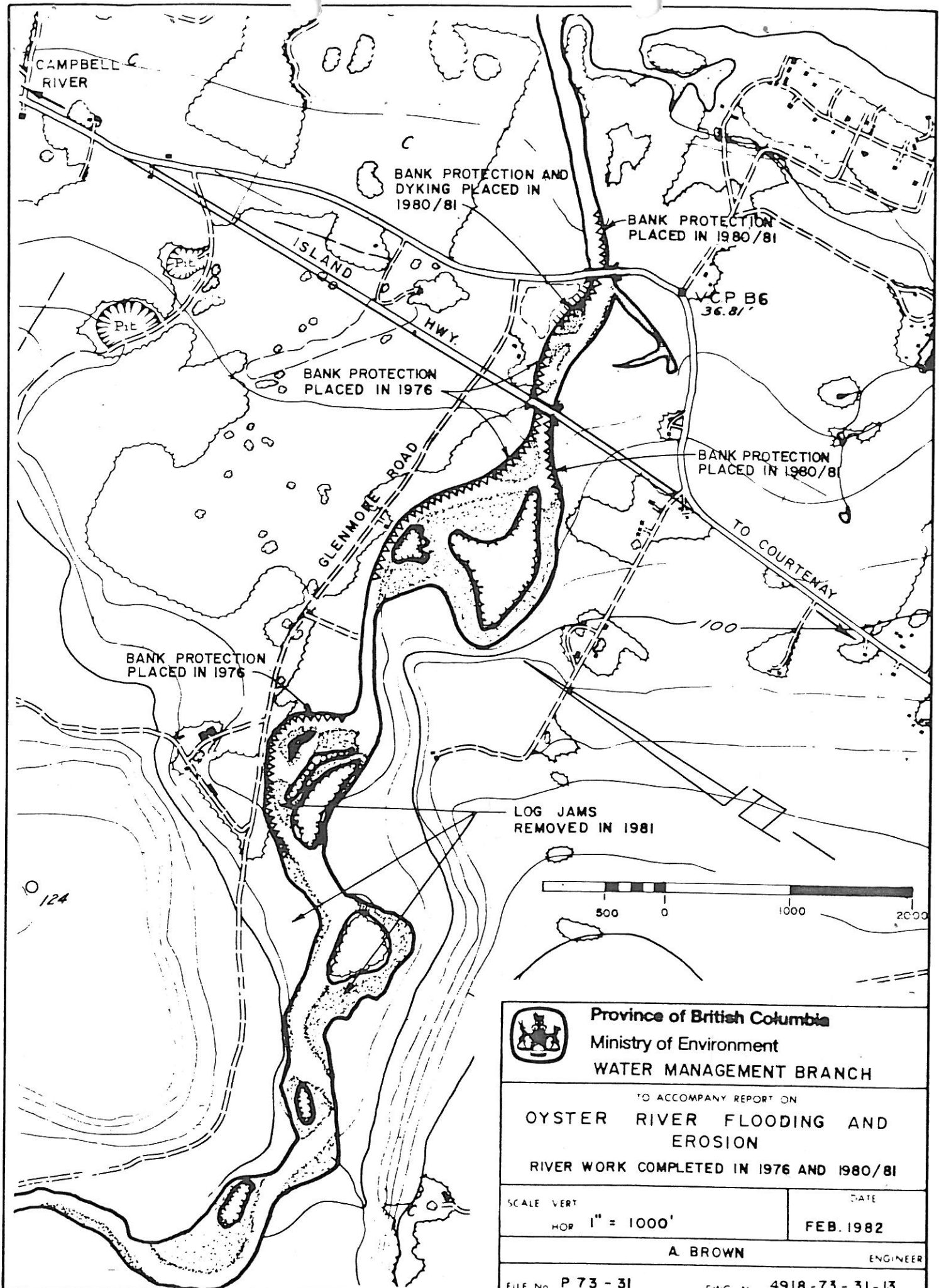
independent of the dyking.

Prior to undertaking detailed design and seeking the necessary approvals and agreements the question of funding and the scope of the project should be decided upon.



A. A. Brown, P. Eng.  
Senior Hydraulic Engineer  
Rivers Section  
Water Management Branch

AAB:sk1



CAMPBELL RIVER

BANK PROTECTION AND DYKING PLACED IN 1980/81

BANK PROTECTION PLACED IN 1980/81

ISLAND  
HWY.

VCP B6  
36.81'

BANK PROTECTION PLACED IN 1976

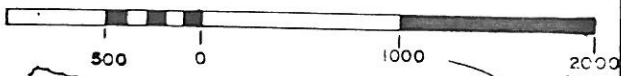
BANK PROTECTION PLACED IN 1980/81

GLENMORE ROAD

TO COURTENAY

BANK PROTECTION PLACED IN 1976

LOG JAMS REMOVED IN 1981



Province of British Columbia  
Ministry of Environment  
WATER MANAGEMENT BRANCH

TO ACCOMPANY REPORT ON  
OYSTER RIVER FLOODING AND EROSION  
RIVER WORK COMPLETED IN 1976 AND 1980/81

SCALE VERT  
HOR 1" = 1000'

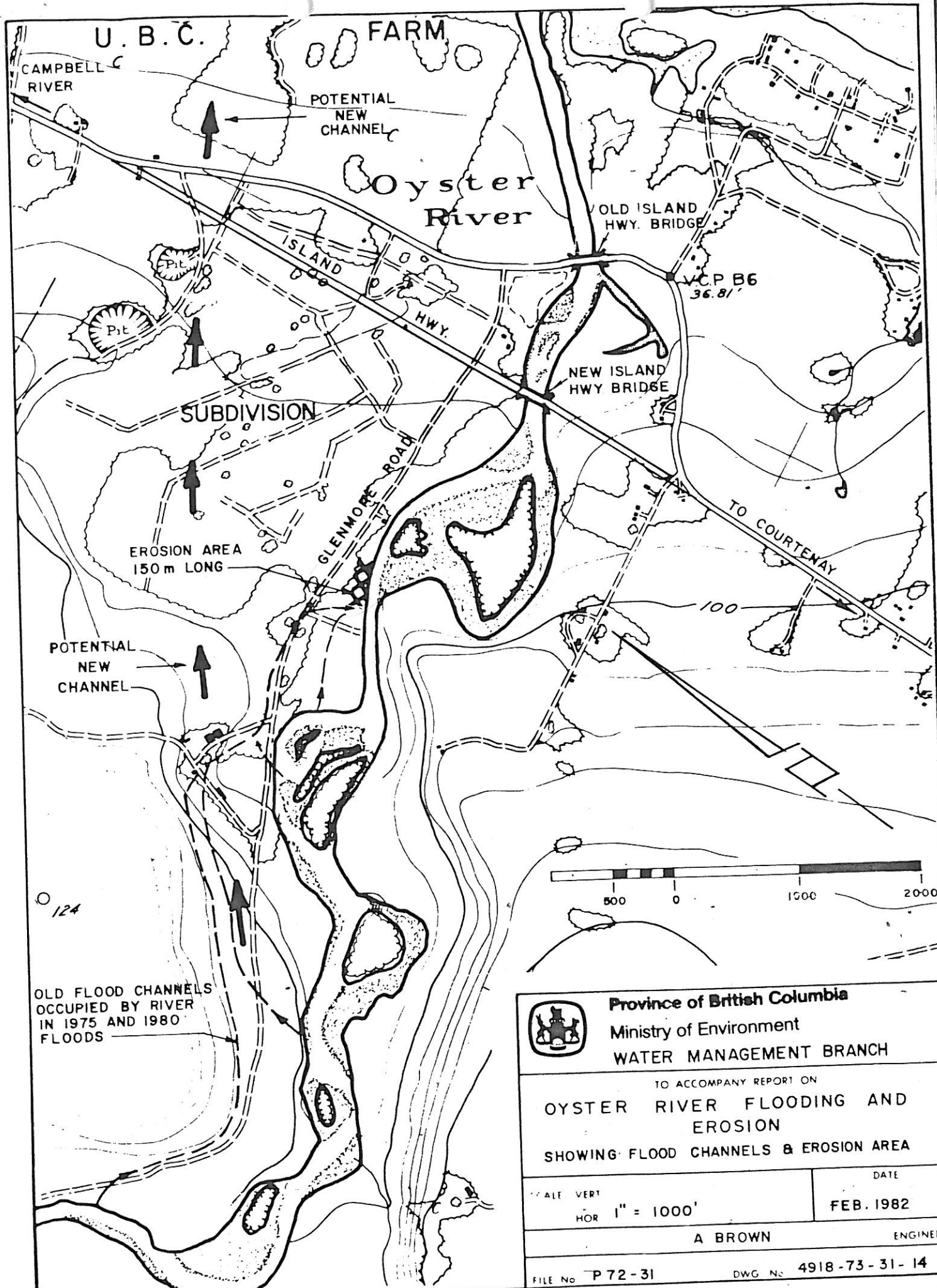
DATE  
FEB. 1982

A. BROWN

ENGINEER

FILE No P 73 - 31

DWG. No. 4918-73-31-13



U.B.C.

FARM

CAMPBELL RIVER

POTENTIAL NEW CHANNEL

Oyster River

OLD ISLAND HWY. BRIDGE

ISLAND

HWY.

V.C.P. B6  
36.81'

NEW ISLAND HWY BRIDGE

SUBDIVISION

GLENMORE ROAD


EROSION AREA  
150m LONG

TO COURTENAY

POTENTIAL NEW CHANNEL

124

OLD FLOOD CHANNELS  
OCCUPIED BY RIVER  
IN 1975 AND 1980  
FLOODS

 <p><b>Province of British Columbia</b> Ministry of Environment WATER MANAGEMENT BRANCH</p>	
<p>TO ACCOMPANY REPORT ON <b>OYSTER RIVER FLOODING AND EROSION</b> SHOWING FLOOD CHANNELS &amp; EROSION AREA</p>	
<p>SCALE VERT HOR 1" = 1000'</p>	<p>DATE FEB. 1982</p>
<p><b>A BROWN</b> ENGINEER</p>	
FILE No P 72-31	DWG No 4918-73-31-14

# BROKEN ROCK RIPRAP SPECIFICATIONS

SI METRIC UNITS

IMPERIAL UNITS

% BY WEIGHT FINER THAN	MASS (kg)	APPROX. EQUIVALENT DIAMETER (mm)	% BY WEIGHT FINER THAN	MASS (lb.)	APPROX. EQUIVALENT DIAMETER (Inches)
100			100		
NOT MORE THAN 50	300	600	NOT MORE THAN 50	660	24
NOT MORE THAN 10	40	300	NOT MORE THAN 10	90	12

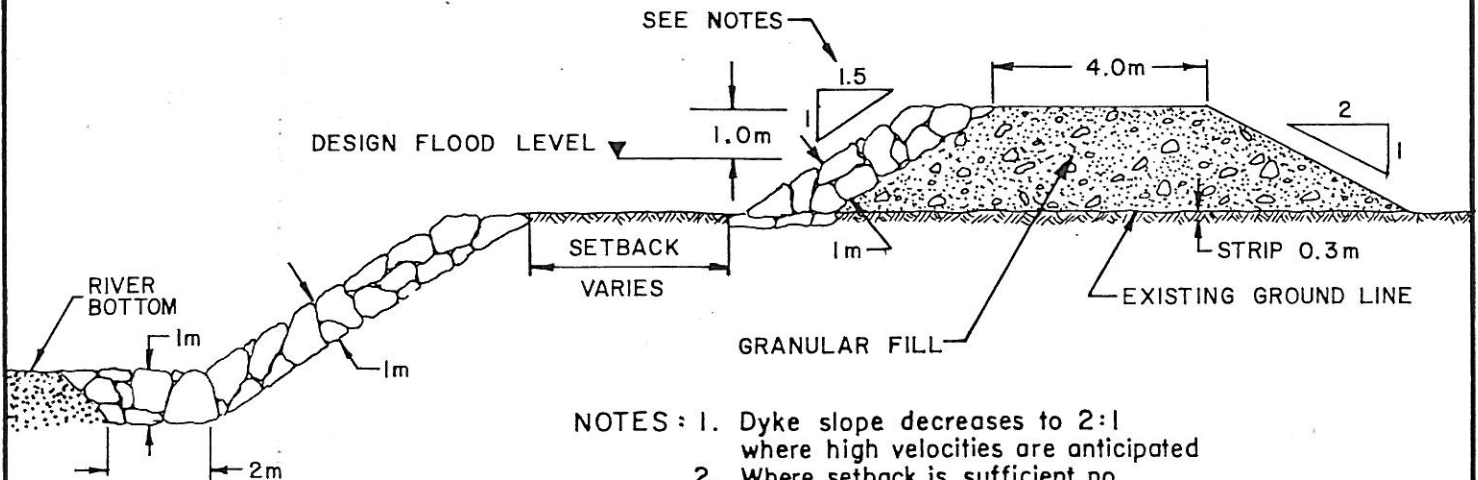
mm = MILLIMETRE

kg = KILOGRAM

1 kg = 2.2 lb

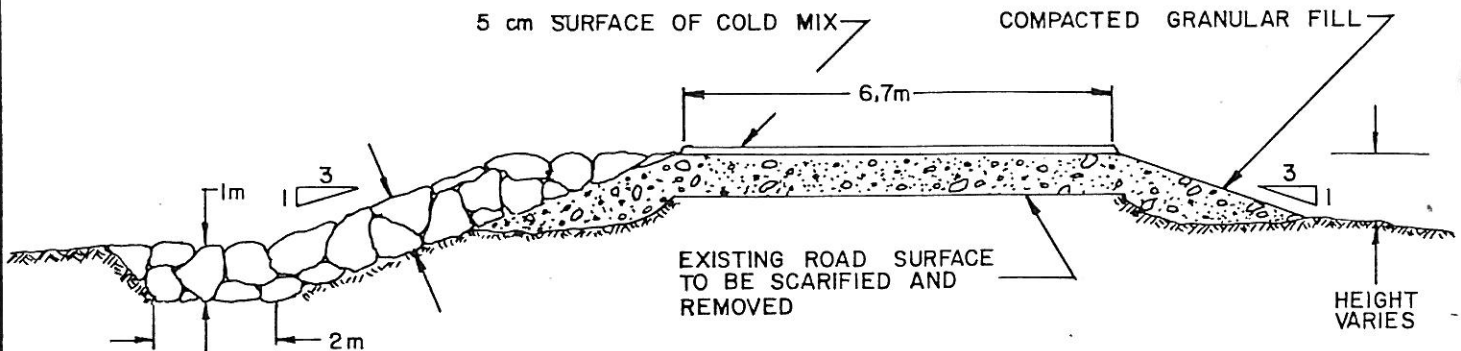
1000 mm = 1m (METRE) = 3.28 FEET

RIPRAP SHALL: 1. CONSIST OF DENSE, DURABLE, ROUGHLY EQUIDIMENSIONAL, ANGULAR PIECES.  
2. BE CLEAN AND REASONABLY WELL GRADED COVERING THE COMPLETE ALLOWABLE SIZE RANGE.



NOTES: 1. Dyke slope decreases to 2:1 where high velocities are anticipated  
2. Where setback is sufficient no riprap is required on dyke

## PROPOSED DYKE



NOTE: Approach ramps to raised sections of Glenmore Road and logging roads should be 40:1

## PROPOSED RAISED SECTION OF GLENMORE ROAD



Province of British Columbia  
Ministry of Environment  
WATER MANAGEMENT BRANCH

TO ACCOMPANY REPORT ON  
**OYSTER RIVER  
FLOODING AND EROSION**

*A. Brown*

A. BROWN ENGINEER

SCALE: VERT.

HOR.

NOT TO SCALE

DATE

MARCH, 1981

FILE No. P-73-31

DWG No. 4918-73-31-16

# BROKEN ROCK RIPRAP SPECIFICATIONS

## SI METRIC UNITS

## IMPERIAL UNITS

% BY WEIGHT FINER THAN	MASS (kg)	APPROX. EQUIVALENT DIAMETER (mm)	% BY WEIGHT FINER THAN	MASS (lb.)	APPROX. EQUIVALENT DIAMETER (inches)
100	1100	900	100	2400	36
NOT MORE THAN 50	300	600	NOT MORE THAN 50	660	24
NOT MORE THAN 10	40	300	NOT MORE THAN 10	90	12

mm = MILLIMETRE

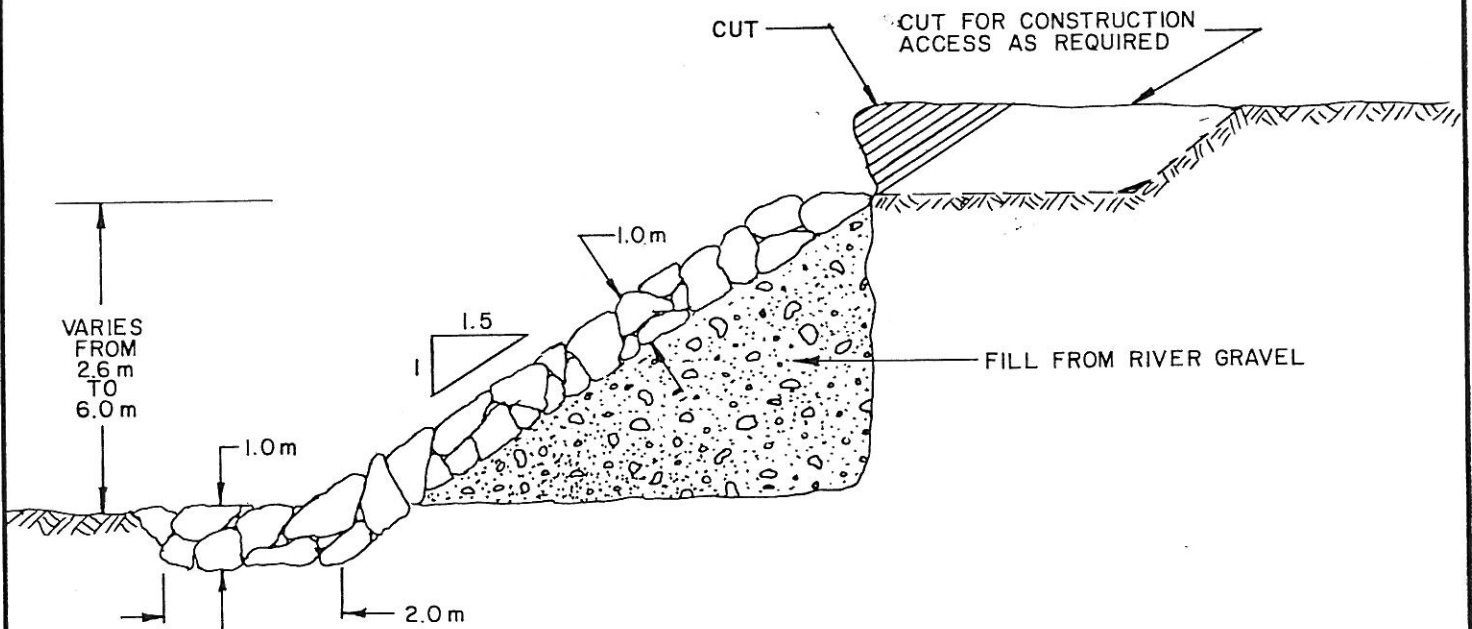
1000 mm = 1 m (METRE) = 3.28 FEET

kg = KILOGRAM

1 kg = 2.2 lb.

RIPRAP SHALL:

1. CONSIST OF DENSE, DURABLE, ROUGHLY EQUIDIMENSIONAL, ANGULAR PIECES.
2. BE CLEAN AND REASONABLY WELL GRADED COVERING THE COMPLETE ALLOWABLE SIZE RANGE.



**TYPICAL SECTION  
BROKEN ROCK RIPRAP**



**Province of British Columbia**  
 Ministry of the Environment  
 ENVIRONMENTAL AND ENGINEERING SERVICE  
 WATER INVESTIGATIONS BRANCH

TO ACCOMPANY REPORT ON  
**OYSTER RIVER  
 FLOODING AND EROSION**

*A. Brown*

A. BROWN ENGINEER

SCALE: VERT. N. T. S.

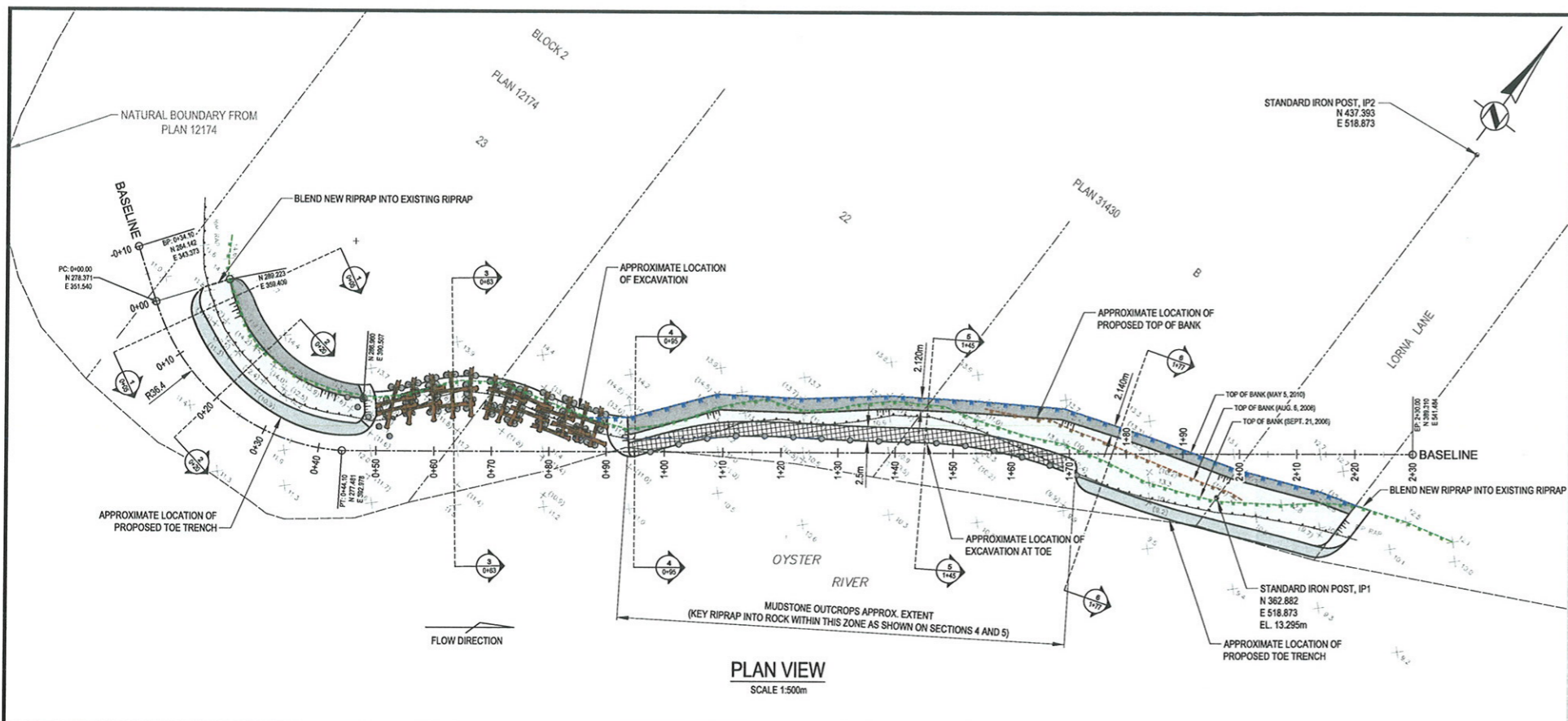
DATE

HOR. N. T. S.

MARCH 81

FILE No. P 73 - 31

DWG. No. 4918-73-31-17



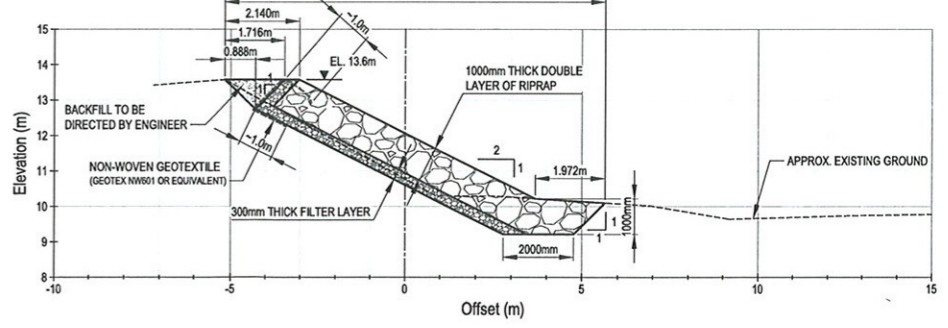
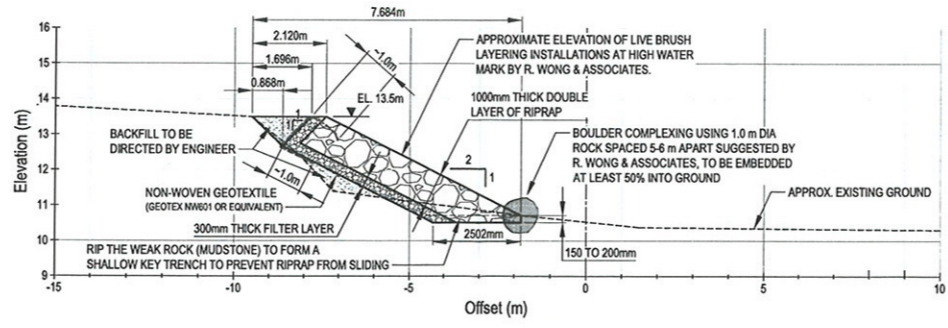
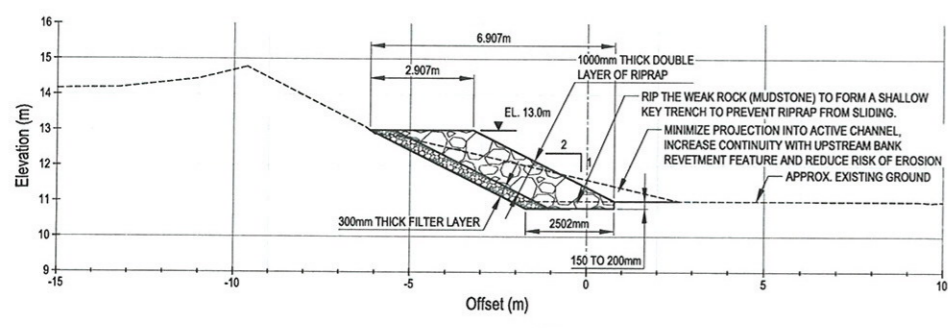
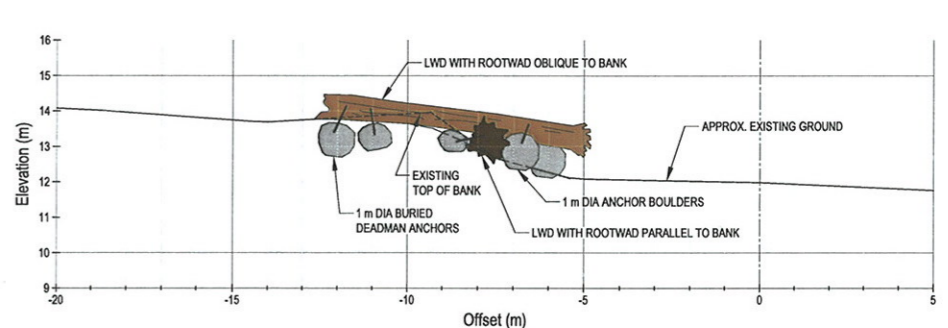
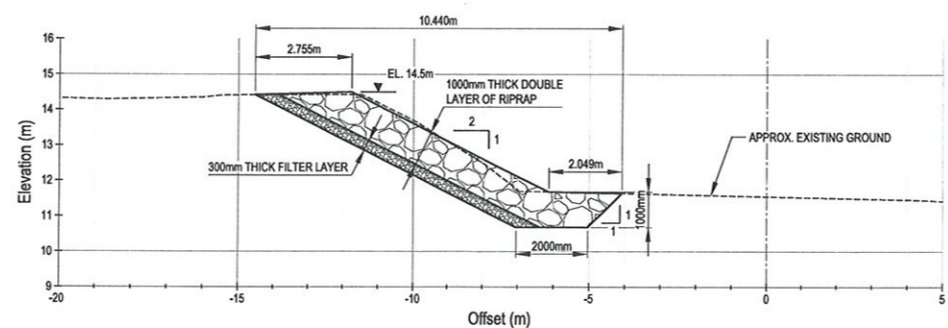
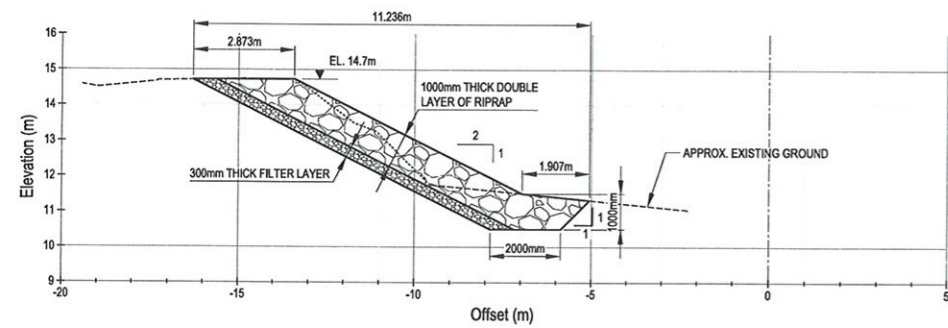
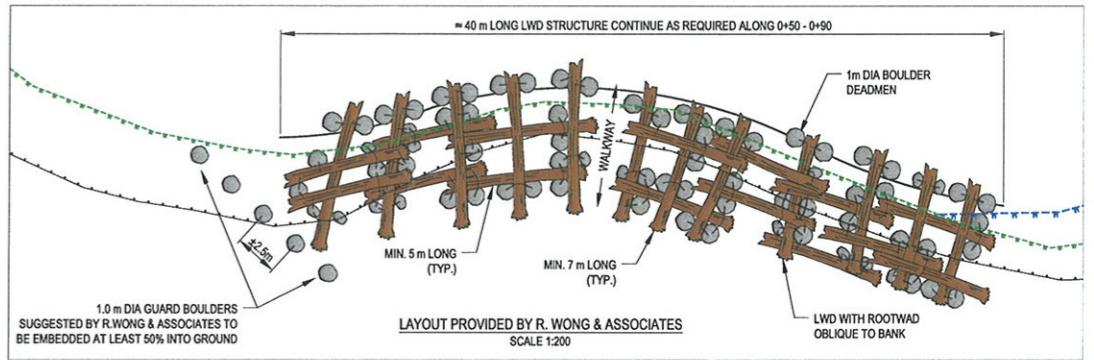
**TYPE 1 RIPRAP GRADATION**

% BY WEIGHT FINER THAN	WEIGHT (Kg)	APPROX. EQUIVALENT DIAMETER (mm)
100	1155	900
NOT MORE THAN 80	550	700
NOT MORE THAN 50	200	500
NOT MORE THAN 20	40	300

**TYPE 2 FILTER GRADATION**

% BY WEIGHT FINER THAN	WEIGHT (Kg)	APPROX. EQUIVALENT DIAMETER (mm)
NOT MORE THAN 100	13	200
NOT MORE THAN 80	—	95
NOT MORE THAN 50	—	42
NOT MORE THAN 20	—	17

- NOTES:**
- ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.
  - ALL ELEVATIONS ARE IN METRES ABOVE GEODETIC DATUM.
  - COORDINATES ARE ASSUMED AND LOCAL.
  - ALL ROCK RIPRAP SHALL CONSIST OF CLEAN, DURABLE, DENSE, ANGULAR PIECES, AND SHALL BE WELL-GRADED THROUGHOUT THE ALLOWABLE SIZE RANGE.
  - SEPTEMBER 21, 2006; AUGUST 6, 2008; AND MAY 5, 2010 SURVEYS BY: ROSS N. GLOVER B.C.L.S. BRITISH COLUMBIA LAND SURVEYOR 1-1841 COMOX AVENUE COMOX, B.C., V8M 3M3, PH# (250) 339-5624 FILE: 1612-108
  - BEARINGS ARE ASTRONOMIC AND DERIVED FROM PLAN 12174.
  - ELEVATIONS ARE GEODETIC AND DERIVED FROM BENCHMARK CM # 12492 (TABLE # 77C565), LEVATION BEING 11.583 METRES.
  - TOPOGRAPHY SKETCH OF THE BANK OF THE OYSTER RIVER ON LOTS 22 AND 23, PLAN 12174 AND LOT B, PLAN 31430 OF BLOCK 29, COMOX DISTRICT B.C.G.S. 92F.085
  - WOOD SPECIES SHALL BE DOUGLAS FIR, RED CEDAR, YELLOW CEDAR, SITKA SPRUCE OR WESTERN HEMLOCK UNLESS OTHERWISE SPECIFIED. NO DIMENSIONAL BEAMS OR TIMBERS, OR RED ALDER SPECIES, SHALL BE USED FOR STRUCTURAL WOOD SYSTEMS.
  - BALLAST ROCK SHALL BE COMPOSED OF SOUND BOULDER ROCK MEETING MINIMUM EQUIVALENT SPHERICAL SIZE OF 1 METER.
  - ROOTED LWD: MINIMUM DIAMETER OF 0.5 METERS AND 5 METER MINIMUM STEM LENGTH FOR PERPENDICULAR PLACEMENT PARALLEL TO BANK AND 7 METER MINIMUM STEM LENGTH FOR OBLIQUE AND PERPENDICULAR PLACEMENT.
  - LWD PLACED OBLIQUE AND PERPENDICULAR TO BANK AND DEADMAN PLACEMENT SHOULD AVOID DISTURBANCE TO MATURE RIPARIAN TREES.
  - ALL CABLE IS TO BE A MINIMUM 3/4" GALVANIZED STOCK WITH GALVANIZED DROP FORGED FITTINGS, EITHER CROSBY OR EQUIVALENT. CHAINS ARE NOT ALLOWED FOR INSTREAM USE.
  - DRILL & EPOXY - FOR 3/2" DIA CABLE USE 3/4" DIA ROCK DRILL BITS GLUED INTO BOULDERS USING HILTI HY150 OR EQUIVALENT FOR SUBMERGED APPLICATIONS.
  - ANCHOR OBLIQUE AND PERPENDICULAR LWD ONTO LEFT BANK USING BOULDER DEADMEN BURIED A MINIMUM OF 0.5 M BELOW THE SURFACE.
  - LEAVE AT LEAST 2 BOULDER PILES OVER TOP FOR POTENTIAL MAINTENANCE REQUIREMENTS.
  - DETAILED LAYOUT WAS BASED ON THE 2006 AND 2010 SURVEYS. SUBSEQUENT EROSION HAS CHANGED THE EXISTING TOP OF BANK LOCATION. CONSTRUCTION OF THE NEW BANK PROTECTION WORK WILL BE BASED ON A FIELD FIT TO MATCH THE EXISTING CONDITIONS.



- LEGEND**
- DENOTES STANDARD IRON POST FOUND
  - 13.2 DENOTES SPOT ELEVATION (2006 SURVEY)
  - 13.2 DENOTES SPOT ELEVATION (2010 SURVEY)
  - BOTTOM OF BANK 2006
  - TOP OF BANK 2006
  - TOP OF BANK 2008
  - TOP OF BANK 2010

Rev.	Date	By	App.	Description
3	2010-08-16	SC	SC	ISSUED FOR CONSTRUCTION
2	2010-06-30	SC	SC	ISSUED FOR TENDER
1	2010-06-15	SC	SC	ISSUED FOR REVIEW
0	2010-06-02	SC	SC	ISSUED FOR REVIEW

Design	Checked	Approved	Drawn
SC	SC	SC	JAB
2010 JUN 02	2010 JUN 02	2010 JUN 02	2010 JUN 02

**HAYCO HAY & COMPANY CONSULTANTS**  
 A DIVISION OF EBA  
 Suite 900 - 1066 West Hastings Street  
 Vancouver, B.C. Canada V6E 3K2  
 E-mail: hayco@hayco.com

Client: **STRATHCONA REGIONAL DISTRICT**  
 Project: **OYSTER RIVER BANK PROTECTION**

Drawing: **GENERAL ARRANGEMENT AND TYPICAL CROSS SECTIONS**  
 Drawing No.: **V13201292 - D 10 1**  
 Revision: **3**



### Electoral Area D - OYSTER RIVER Glenmore Road Dike

- Resource Road
- Oyster River Dike
- Regional Districts
- Oyster River 200 Yr. Floodplain

