

CITY OF BURNABY

ENVIRONMENT AND WASTE MANAGEMENT COMMITTEE

HIS WORSHIP, THE MAYOR
AND COUNCILLORS

Re: Byrne Creek Watershed Stormwater Management Study

RECOMMENDATIONS:

1. **THAT** the Byrne Creek Watershed Stormwater Management Study Report be approved as the framework for the basin management plan for Byrne Creek; and
2. **THAT** the recommended action program as outlined in Table 1 be approved in principle and included in future capital program prioritization process.

REPORT

The Environment and Waste Management Committee, at its meeting held on 1997 February 11, received the attached report outlining the findings and recommendations contained in the Byrne Creek Stormwater Management Study. The study was undertaken to address issues such as run off quality, erosion, sedimentation and habitat enhancement opportunities.

The Committee approved the abovenoted recommendations and submits this report to Council for endorsement.

Respectfully submitted,

Mayor D.P. Drummond
Chair

: COPY - CITY MANAGER
- DIRECTOR ENGINEERING
- DIRECTOR FINANCE
- DIR. PLNG. & BLDG.
- ACTING DIR. REC. & CULT. SERV.
- ENVIRONMENTAL HEALTH OFFICER

Councillor D. Johnston
Member

Councillor D. Lawson
Member

TO: CHAIRPERSON & MEMBERS
ENVIRONMENT & WASTE
MANAGEMENT COMMITTEE

DATE: 1997 02 05

FROM: DIRECTOR ENGINEERING

FILE: 40-02-02

SUBJECT: BYRNE CREEK WATERSHED STORMWATER MANAGEMENT STUDY

PURPOSE: To present the stormwater management study report for the Byrne Creek watershed that outlines the principles and objectives of the study and recommends an action program to provide an integrated technical and environmental approach and solution.

RECOMMENDATION:

1. THAT the Committee recommend to Council that:
 - a) the Byrne Creek Watershed Stormwater Management Study Report be approved as the framework for the basin management plan for Byrne Creek; and
 - b) the recommended action program as outlined in Table 1 be approved in principle and included in future capital program prioritization process.

REPORT

1.0 INTRODUCTION

Byrne Creek is one of the most significant urban streams in the Burnaby south slope area. It serves as a major drainage conveyance system in the watershed and yet retains a significant environmental value including wildlife and fish habitat within the stream corridor.

The concerns of deteriorating run-off quality and of protecting the Byrne Creek corridor have prompted the City to undertake a stormwater management study to develop guidelines and strategies for future programs in the watershed. In the stormwater management study, both environmental assessment and technical analysis were conducted to develop a well balanced approach. Copies of the stormwater management report and the environmental assessment report have been provided to Council under separate cover.

This staff report summarizes the key components contained in the study and presents the recommended action program that has integrated the technical, environmental and watershed planning principles into one comprehensive plan. During the course of the study, meetings were held with representatives from the Department of Fisheries & Oceans, Ministry of Environment, Vancouver Angling & Game Club, and Burnaby Parks, Planning and Environmental Health departments to review the study findings and recommendations.

2.0 WATERSHED PLAN OBJECTIVES

The total area included in the study is approximately 360 ha. It encompasses all of the tributary area to Byrne Creek upstream of Marine Drive. The tributary area to Byrne Creek downstream of Marine Drive was the subject of earlier studies conducted under the Big Bend Master Drainage plan project and the Edmonds Town Centre Development - South project and therefore, is not repeated in this study. Although the watershed within the study area is largely developed, approximately 15% of the area is preserved as green space or parkland.

As urbanization and redevelopment continue to occur in the watershed, it has become necessary to undertake a comprehensive stormwater management study to develop guidelines and strategies to address the concerns of deteriorating run-off quality, erosion/sedimentation problems in the stream and diminishing habitat enhancement opportunities. The specific objectives of the proposed management plan for the Byrne Creek watershed are:

- to evaluate the existing drainage facilities and to identify future improvement works required,
- to recommend management strategies for the watershed incorporating both technical and environmental solutions,
- to recommend a watershed approach to protect and preserve Byrne Creek and its ecosystems,
- to develop an action plan with short and long term improvement programs that will provide a balanced approach to urban run-off control and environmental protection.

3.0 EXISTING WATERSHED CONDITION

A research into the history of the watershed revealed that the watershed was fully forested pre-1860. In 1861, a major fire occurred that damaged approximately half of the watershed area. Logging and development then followed in about 1878. By 1914, most of the watershed except the Byrne Creek corridor was cleared of vegetation for development of subdivisions. Essentially by 1959, the watershed looked much like present day with some exceptions in the Edmonds South area.

The current land use within the watershed is predominantly residential (approximately 58% of the total area). The Byrne Creek corridor is preserved and protected under heavy vegetation and tree covers which provide excellent habitat for wildlife and fish. In the 1996 fish sampling program, Coho salmon and Cutthroat trout were found to be predominant species that exist in most sections of Byrne Creek.

Although the creek corridor is protected from development activities, stream erosion and bank instability problems are evident. The erosion problem also leads to sedimentation concern in the flatter downstream section of Byrne Creek. In spite of the erosion and sedimentation existing in Byrne Creek, the overall condition of the creek is good.

4.0 **PROPOSED STORMWATER MANAGEMENT PLAN**

With the key issues in the watershed being related to the protection of the natural environment, providing habitat enhancement opportunities and better urban run-off management practices, the proposed stormwater management plan has been structured into six major components to reflect these key areas:

- Component 1: Storm Sewer and Culvert System
- Component 2: Stormwater Storage
- Component 3: Erosion and Sedimentation Control
- Component 4: Byrne Creek Habitat Management and Enhancement
- Component 5: Run-Off Control for Future Development
- Component 6: Watershed Stewardship and Public Communication

4.1 **Storm Sewer and Culvert System**

The existing storm sewers and culverts form the backbone of the drainage conveyance system in the basin. The hydraulic analysis has identified a number of pipes and culverts with limited capacity and requiring upgrading. In view of the fact that the pipe capacity issue concerns not only public safety and flood protection but also water quality and environmental health issues, it is important to include the infrastructure upgrading in the overall action plan. As the hydraulic modelling is based on empirical approach, it is recommended that further run-off data (quantity and quality) collection program and pipe video inspection be undertaken to confirm the structural, hydraulic and infrastructure upgrading requirements.

4.2 **Stormwater Storage**

Temporary stormwater storage during the peak discharge period and then release the stored water after the storm event provides a practical means of reducing peak flows in the receiving streams. A secondary benefit of stormwater storage is its ability to remove a large amount of sediments and pollutants contained in the urban run-off.

In the study, a total of five alternative storage sites were examined. Based on field assessment and technical analysis, two sites were selected that would provide the most effective land use and create the least environmental disruption. The two sites are located in Byrne Creek between 17th Avenue and 19th Avenue. The remaining three sites all located downstream of 19th Avenue offer excellent storage potential, however their limited site access and the significant vegetation and tree clearing required do not support the inclusion of these sites in the final plan. In addition to the two proposed ponds, another detention pond is proposed at the Marine Drive and Byrne Road area under an earlier study for the Edmonds Town Centre Development - South project. The proposed detention pond at Marine Drive and Byrne Road is scheduled for construction in 1998 in connection with the Marine Way/10th Avenue Connector construction program.

The hydraulic analysis concluded that the combined storage volume of the two recommended sites would be able to reduce the 2 year frequency flow in Byrne Creek at 19th Avenue from 1.65 m³/s to 0.56m³/s, a peak flow reduction of 66%.

4.3 Erosion and Sedimentation Control

Erosion and sedimentation is a concern for Byrne Creek due to its impact on the ecosystem, bank stability and flood control. Several alternatives were examined to determine the most cost effective and practical methods to minimize the impact of the erosion and sedimentation process. The final recommended plan includes a phased program of sediment control pond, bank stabilization and revegetation and check dam construction. The phased program would allow the City to progressively implement the work to suit financial constraints and to assess the effectiveness of the improvements over time.

4.4 Byrne Creek Management Area

In addition to implementing technical solutions to mitigate urban run-off effects in the stream, an effective management plan must be in place to control and guide activities that may occur within the environmentally sensitive Byrne Creek corridor.

As the building block of a comprehensive management plan, it is recommended that the guidelines for leave strip boundaries as outlined in the Land Development Guidelines for the Protection of Aquatic Habitat published by the Department of Fisheries & Oceans be adopted for use in Byrne Creek. The recommended guidelines may be used to strengthen existing City policy on watercourse protection and to guide future stream preservation programs.

4.5 Stormwater Run-Off Control for Future Development

As redevelopment occurs in the watershed, it offers opportunity to assess and incorporate stormwater management initiatives where practical in the development program without restricting the development potential or adding significant construction cost to the project.

In addition to the basic sediment control requirement for development sites, it is recommended that the use of infiltration basins/trenches and natural watercourses/wetlands be considered in each development project to enhance run-off quality from the site.

4.6 Watershed Stewardship and Public Communication

Watershed stewardship is a vital component in a successful stormwater management program. It brings a balanced and integrated approach to address environmental and technical issues with input from stakeholders in the basin.

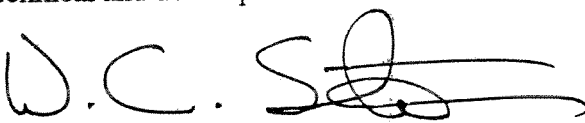
While the Department of Fisheries & Oceans, Ministry of Environment, and Vancouver Angling & Game Club have been and will continue to be involved in the review and implementation of the Byrne Creek stormwater management plan, communication to the public landowners and businesses must be established. As the first step of the stewardship program, it is recommended that public interpretation and information signage be installed in the stream corridor to promote community awareness and to support partnership with local groups on fish enhancement and vegetation planting opportunities.

5.0 RECOMMENDED ACTION PROGRAM

It has been recognized that the management of human activity, wildlife and fish habitat and urban run-off as individual issue would only provide partial solution to the environmental and technical problem in the watershed. Since these issues are inter-related, an integrated watershed management approach must be employed. For the Byrne Creek watershed study, it is found that the run-off quality, erosion, sedimentation and habitat enhancement opportunities are the leading concerns in the watershed. The final recommended strategy and management plan for the basin is designed to reflect these issues. For the purpose of better defining the recommended plan, the action items are grouped into three key target areas: environmental quality, hydraulics and hydrology, and watershed planning and management.

Although the total program recommended is of significant magnitude, it may be phased over several years to suit financial constraints. Capital construction costs estimates were prepared for major action items and would be included in future capital budgets for consideration. Other operation related projects such as data collection, infrastructure inspection and management initiatives would be incorporated in the regular operating and maintenance program as appropriate.

A summary of the recommended action items is given in Table 1. It is expected that the recommended program will be modified as stakeholders participate in future review. The Byrne Creek stormwater management study report is intended to serve as the starting block for the building of a comprehensive watershed action program. The planning, review and implementation process must be continued in order to achieve a well balanced approach inclusive of all the competing environmental, technical and development values in the basin.


DIRECTOR ENGINEERING

LSC:
Attach.

cc: City Manager
Director Planning & Building
Acting Director Recreation & Cultural Services
Chief Environmental Health Officer

Table 1: Proposed Action Program

Recommended Actions	Priority ¹	Estimated Capital Construction Cost
1. Environmental Quality		
a) Construct sediment control pond at Marine Drive.	S	\$70,000
b) Habitat enhancement: <ul style="list-style-type: none"> • repairs to existing weirs at 71m and 180m upstream of Marine Drive • construct low weirs to trap gravels upstream of the foot bridge • construct seepage channels and refuge ponds downstream of the foot bridge 	S S S	\$60-80,000
c) Establish stormwater quality monitoring and fish sampling programs in Byrne Creek.	S	\$10,000
d) Remove unstable debris from the riparian zone.	S, M	\$10,000
e) Implement a phased bank stabilization and re-vegetation program.	M, L	\$500-600,000
f) Construct seepage channels and refuge pools for habitat enhancement in Byrne Creek between the Hedley Avenue outfall and the SkyTrain crossing.	L	\$150-200,000
2. Hydraulics and Hydrology		
a) Establish a hydrometric data collection program.	S	\$10,000
b) Enhance sewer flushing program and correct cross-connection problems.	S	-
c) Complete video inspection of critical pipe sections.	S, M	-
d) Complete manhole inspection program.	S, M	-
e) Construct detention pond at Marine Drive and Byrne Road.	M	\$130,000
f) Initiate the technical and environmental design and construction for storage Sites 1 and 2.	M, L	\$220,000
g) Upgrade Byrne Creek culverts at: <ul style="list-style-type: none"> • 18th Avenue • old Griffiths Avenue right-of-way 	M, L	\$180,000
h) Compile and analyze flow data to confirm adequacy of the critical storm sewer sections.	M, L	-
i) Implement a phased check dams construction program.	M, L	\$200,000
3. Watershed Planning and Management		
a) Develop public interpretation and education signage in the stream corridor.	S	\$1,000
b) Develop guidelines on stormwater management practices for development projects.	S, M	-
c) Undertake public and industrial, commercial, and institutional education and communication programs on urban run-off quality and watershed stewardship.	M	-
d) Encourage community participation in fish enhancement and vegetation planting programs.	M, L	-

¹ S - Short Term (1 Year)
M - Medium Term (2-3 Years)
L - Long Term (Beyond 3 Years)

