

# **Gavan Subdivision Wetland Impact Mitigation Plan City and Borough of Sitka January 15, 1997**

## **BACKGROUND**

The City and Borough of Sitka (CBS) recently designed and oversaw construction of roads and utilities to serve the Gavan Subdivision Local Improvement District. The Corps of Engineers (Corps) and the Alaska Department of Fish and Game (ADF&G) issued Notices of Violation to the CBS related to unauthorized work in wetlands and a creek. Subsequent letter agreements between CBS and the Corps and between CBS and ADF&G specified steps that CBS will take to resolve those agencies' concerns. The Corps recommended in condition #4 of its October 30, 1996, letter that the CBS prepare a plan describing how the CBS would mitigate project impacts. This document is the mitigation plan.

The Corps also stated in its October 30, 1996, letter that the actions CBS would take to comply with the October 22, 1996, CBS/ADF&G agreement would satisfy the Corps' condition #1. A separate Cutthroat Creek Mitigation Plan (draft attached) describes how CBS plans to satisfy the CBS/ADF&G agreement, and thus the Corps' condition #1. The creek mitigation plan is still in draft form; the final plan agreed upon by CBS and ADF&G is how CBS plans to satisfy the Corps' condition #1.

## **WETLAND FUNCTIONS AND IMPACTS**

Installing the Gavan Subdivision infrastructure has affected the natural functions of wetlands and of Cutthroat Creek and its tributaries. The final version of the creek restoration plan referenced above will state how the CBS will mitigate adverse effects on creek functions and this plan focuses on mitigating wetland impacts. Wetland and creek functions are interdependent so the contents of these two plans overlap.

Wetland functions and project impacts on those functions are discussed in a January 15, 1997, memorandum prepared by HDR Alaska, Inc. Many of the functions performed by the subdivision's wetlands could also be performed by non-wetland forests. All of the wetland functions have been degraded to some extent by removal of vegetation, soil disturbance, or change of natural drainage patterns. The mitigation measures described below that have been or will be implemented reduce the adverse effects of the loss of wetland functions.

The Corps of Engineers asserts that road construction caused permanent loss of 2.3 acres of wetlands. This estimate represents the area of the Johnston Street, Mills Street, and Georgeson Loop rights-of-way within the wetlands Corps staff delineated. It assumes that the entire 60-foot-wide right-of-way was permanently converted to upland. City staff estimated the area filled in wetlands delineated by the Corps at 1.5 acres, based on the measured widths of fill, including unnecessary sidecast material. The CBS will be removing excess sidecast material from within the Johnston and

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Mills Street rights-of-way, bringing the fill width closer to the designed 35 feet; along Georgeson Loop the excavation and fill area does not include the entire right-of-way nor was the entire right-of-way wetland; and part of Mills Street probably included in Corps' calculations was constructed prior to this project. Therefore, the area of permanent wetland loss for which compensation was requested (2.3 acres) should be less than that calculated by the Corps. Other areas affected include trenches where utilities have been laid.

In addition to absolute wetland area affected, the mitigation plan must also take into account the importance of the wetlands lost. Steve Penaluna of the Corps of Engineers characterized the subdivision's wetland as "moderate value". The "value" of a wetland is not clearly defined, but is commonly subjectively assigned based on a professional's assessment of the functions a wetland performs, the context of the wetland; and the importance of the wetland's functions, generally to human society. The sloping wetland forest found in Gavan Subdivision is common in the Sitka area and throughout Southeast Alaska. The subdivision wetlands' uniqueness and the main reason for human interest in them is their role in supporting Cutthroat Creek. Because of the site wetlands' role in moderating Cutthroat Creek flow and their contribution of important components of the creek's resident fish habitat (woody debris, cover, shade, quiet, food), assigning them an overall "moderate" value seems appropriate; wetlands farther from the creek would generally have lower value, and those immediately adjacent to it have high value. The wetlands adversely affected by construction include lower value areas (along much of Georgeson Loop and the east part of Johnston Street), moderate value wetlands (along the western part of Johnston Street), and high value sites (at Mills Street). This mitigation plan focuses on protecting the highest value wetlands and on implementing measures that support Cutthroat Creek's fish population.

**MITIGATION PLAN**

Designing measures that will mitigate, or lessen, the adverse effects of a development project is typically done prior to undertaking the development, if it is done at all. Mitigation measures include avoiding impacts to natural resources, minimizing the effects of the impacts that cannot be avoided, restoring resources that are or were adversely affected, and compensating for unavoidable adverse effects. Although it did not initially prepare a formal plan, the CBS effectively incorporated many mitigative measures into its coordination of Gavan Subdivision development for the subdivision's property owners. In addition to those avoidance and minimization actions, the CBS plans to undertake many other protection and restoration measures. To offset unavoidable impacts, the CBS will also permanently set aside a key one-acre wetland area that represents "on-site, in-kind" compensation for lost resources. If ADF&G approves, the CBS will enhance the value of that area and improve creek conditions by restoring flow to the creek channel that traverses it. These and other mitigation measures are described below.

**Avoidance**

The City and Borough of Sitka has done the following to avoid impacts to wetland functions:

- Removed the lots south of Lots 22 to 26 and the lot east of 26 from the subdivision plat to provide a buffer zone for the creek (approximately 55,200 s.f.; most mapped as wetland).

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- Designated a greenbelt area behind the school through which the creek runs (about 27,250 s.f.).
- Agreed to preserve Lot 27 (17,172 s.f., all wetland; at a cost to CBS of \$50,000)—a high value wetland area. The highest quality spawning habitat in this creek system is found in a tributary that crosses Lot 27. The CBS will apply some type of deed restriction that permanently prevents development of this lot. Minor work such as improvement and repair of trails will be allowed.
- Instead of subdividing an unneeded road easement, the CBS dedicated two areas just southeast of Charteris as greenbelt to protect the natural drainage patterns and vegetative cover (26,400 s.f., approximately half of which was mapped as wetland).

By these avoidance measures—most initiated by the CBS during subdivision planning—the CBS has precluded development of wetland area and upland area crucial to creek health totaling about 2.9 acres. These measures have saved in public ownership and management approximately 1,380 feet of the main stem of Cutthroat Creek and its most important spawning tributary.

**Minimization**

The following measures will help limit adverse effects of the necessary infrastructure and lot development:

- Instead of routing drainage from above Lots 40, 41, 42, and 55 down roadside ditches, the CBS constructed a storm drainage system to carry flow underground to the main stem of Cutthroat Creek. This protects the quality of the water entering the creek, maintaining its natural temperature and sediment load, as well as protects the natural timing of the water's input to the creek. An energy dissipation structure (rocks) will be placed at the outfall. The underground drainage system was built at an approximate cost to the lot owners of \$67,000.
- Through the building permit process or deed restriction, the CBS will require protection of the drainageway down the side of Lot 63, nearest Lot 64. Runoff from the area of Lots 57 to 61 will be directed toward Lot 63 via the sanitary sewer easement along the back lot lines. Maintaining this flow will help ensure adequate quality and quantity of water to support the tributary on Lot 27.

These measures protect natural flows of three creek tributaries to the extent possible without unduly infringing on rights of property owners. One of these tributaries serves as the headwaters of a key spawning channel.

**Restoration**

The CBS has committed to complete the following:

- Remove excess sidecast material from the Johnston Street right-of-way, from the Mills Street creek crossing area, and from behind Lots 22 and 23.
- Plant vegetation and place instream structures to improve fish habitat along the reach of Cutthroat Creek that was crossed by the sewer line just north of the ballfields. This is more fully described in the creek restoration plan presented to the ADF&G.

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- Reshape the creek channel downstream of Mills Street: improve definition of the channel leading under Mills Street; place rocks at the outlet of the storm drain to diffuse water energy and prevent erosion; and install a structure to prevent upstream migration of fish into the channel on Lot 22.
- Reset the culvert under Johnston Street to intercept flow from Lots 4 and 5 and transmit it to the channel on Lot 13.

**Compensation**

The CBS will complete the following work to fully compensate for unavoidable and accidental adverse impacts that resulted from developing the necessary infrastructure for Gavan Subdivision:

- In the early 1980s, the CBS routed "Cutthroat Creek" into a culvert at Kashevaroff Street, through which it is carried to the sea. This was done to eliminate the contamination of Turnaround Creek waters (on the opposite side of the landfill) that resulted from "Cutthroat Creek" draining to it through a culvert under the landfill. A 75-foot-long reach of Cutthroat Creek just upstream of the diversion at Kashevaroff was directed into a new channel that carried it straight to the new culvert.

If ADF&G agrees that the CBS need not provide for fish passage at Mills Street, the CBS will route the lower end of "Cutthroat Creek" back through a 150-foot-long reach of the channel it occupied prior to the early 1980s. The original channel is in an entirely natural condition and provides excellent vegetation and overhanging bank cover and deep pools. It is much more valuable fish habitat than is the 75-foot reach of constructed channel. This restored channel will provide superior winter, low-flow, and flood-flow habitat for cutthroat. The diversion back into the original channel will entail removing accumulated sediment from the upstream 10 feet of the original channel; placing an earthen, rock, and log berm across the upper end of the present channel; and planting shrubs and saplings on that berm.

The reclaimed original channel will discharge into the upper end of a ditch that extends northeastward from the culvert. That ditch now holds stagnant water and provides poor fish habitat that can easily be improved by the throughflow. The ditch is easily visible to people walking up the Kashevaroff right-of-way to the ballfields, so nature observers will also benefit from the improved creek conditions.

- The CBS has recently acquired the property southeast of Lots 27-31 from private citizens and has not yet designated a use for it. As compensation for subdivision wetland impacts, the CBS will use legally binding measures to preserve the property behind (southeast of) Lots 27, 28, and part of Lot 29 up to approximately the 80-foot elevation contour as far southeast as the extension of the Kashevaroff Street right-of-way. This property is the most important parcel not yet protected to ensure the continued health of the creek and its riparian functions. Deed restrictions, a conservation easement, or similar measures will forbid detrimental clearing of vegetation, disturbance of the soil, and alteration of natural drainage patterns, except for potential future restoration or enhancement activities. Such restrictions will not preclude transfer

1/15/97

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of ownership from the CBS, but will ensure protection of the site's natural functions. The area is approximately 43,000 s.f., or 1.0 acre.

This area is similar to the wetlands on Lots 27 and 28. Its value is presently slightly degraded because the creek that once ran through it was diverted directly to the Kashevaroff storm drain inlet. Once the creek is rediverted into its original channel, the parcel will again serve its important riparian support functions. Most of the property has a dense overstory of Sitka spruce and western hemlock that provides thermal cover that prevents freezing in the winter. A diversity of deciduous shrubs overhangs the original creek channel, serving as visual cover and as habitat for invertebrates that fall into the creek and feed the fish. Discharge of groundwater that contributes to base flow of Cutthroat Creek occurs throughout the area to be set aside, and includes an important seep that flows diagonally across the property into a backwater of the original creek channel. The site also provides habitat for non-aquatic organisms that need old-growth forest.

The area to be protected will also serve valuable social functions. Part of it can be viewed from the raised platform previously constructed by the school for environmental education. The school actively uses the existing greenbelt and creek area for outdoor, hands-on learning. It can also be accessed and viewed from the Kashevaroff right-of-way and ballfields.

These actions permanently preserve one acre of high-value wetland that was, until recently, privately owned and is not yet formally protected. They exchange 75 feet of low value creek for 150 feet of high value creek habitat, improve another 75 feet of ditch, provide fish access to an important backwater area, and protect a tributary of the original channel.

**Mitigation Summary**

By sensitively planning its development of Gavan Subdivision, the CBS avoided many potential impacts to Cutthroat Creek, and minimized other potentially adverse effects. Through the measures it implemented in advance and those it now plans to undertake, the CBS has effectively protected the main stem of Cutthroat Creek and the immediately adjacent wetlands. It has ensured continued high-quality base flow from key tributaries, and has taken all reasonable steps to maintain the natural soil and vegetation along those tributaries without infringing on private property owners' rights. Work on two creek segments will restore many of those reaches' habitat qualities, and redirection of the creek into an original channel will improve part of the creek relative to pre-project conditions.

The wetland and riparian upland area permanently protected by CBS under existing and planned measures in and adjacent to Gavan Subdivision totals almost four (3.9) acres. The areas set aside are moderate and high value wetlands, and are those most critical for ensuring the integrity of Cutthroat Creek's habitat. Together with the instream and riparian habitat restoration measures, the CBS has reduced the overall magnitude of impact of its Gavan Subdivision work to the extent practicable. The mitigation measures effectively protect the most valuable wetland and creek functions.

## Memorandum

To: Gavan Subdivision File

From: Anne Leggett *AL*

Date: January 15, 1997

Subject: Wetland Functions and Construction Impacts

# HDR

Gavan Subdivision lies at about the 100-foot elevation, on a bench at the toe of a ridge that extends to about 2,200 feet height. According to City officials, near-surface deposits in the subdivision are varied, including muck over volcanic ash, glacial till, or bedrock; and a large area of colluvium from a past landslide (unsorted rock, organics, logs) over ash, glacial till, or solid rock. The ash and till would be essentially impermeable. The muck would be only slightly permeable; the landslide deposits might transmit water quite readily; and bedrock permeability is variable.

The subdivision's location at the toe of a slope and its impermeable substrate would force groundwater to the surface. Groundwater is discharged throughout the lower part of the subdivision, resulting in saturated soils, tiny ponded areas among tree roots, and running seeps. The ground is generally uneven and higher spots are relatively dry. Water generally runs diffusely over the surface and through the soils to Cutthroat Creek at the base of the slope. In some sites, the water collects in small channels that feed the main creek (the lot 27 tributary, for example). Long before construction in Gavan Subdivision, some tributaries that historically flowed through the subdivision area were diverted eastward constructed above the subdivision and others were diverted southwest by interception and routing to a storm drain along Charteris Street. The creek is still fed by a small tributary that originates in a fen near the west corner of the subdivision (behind Lots 1 and 2), one that flows from the upper Charteris area down to Johnston Street via the greenbelt, two tributaries that enter the subdivision near the water tank, and springs that originate within the subdivision. Cutthroat Creek used to be a tributary of Turnaround Creek, but was diverted from under the landfill and into a storm drain that leads instead directly to Sitka Sound.

Approximately one-third of Gavan Subdivision was mapped by the Corps of Engineers as wetland. In this area, the land supports a mature forest of Sitka spruce (*Picea sitchensis*) and western hemlock (*Tsuga heterophylla*), with western red cedar (*Thuja plicata*) also present in some areas. Most of the forest is old-growth, so the understory is well developed and fairly open. Tall shrubs include blueberries (*Vaccinium alaskaense* or *V. ovalifolium*), huckleberry (*Vaccinium parvifolium*), and rusty menziesia (*Menziesia ferruginea*). Herbs and other ground-level plants include deer fern (*Blechnum spicant*), Devil's club (*Oplopanax horridus*), foamflower (*Tiarella trifoliata*), goldthread (*Coptis asplenifolia*), bunchberry (*Cornus canadensis*), skunk cabbage (*Lysichiton americanum*), trailing bramble (*Rubus pedatus*), and abundant mosses and liverworts. Along the main stem of Cutthroat Creek, salmonberry (*Rubus spectabilis*) and alder (*Alnus* sp.) are also common. Areas adjacent to the subdivision that were disturbed prior to subdivision

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development, particularly toward the landfill and adjacent to the school, now support dense stands of red alder (*Alnus rubra*). Other dominant plants that might be observed during the summer were not were not readily visible during the December site visit.

**Wetland Functions**

The wetlands in Gavan Subdivision perform many important functions, some of which are not specific to wetlands but which could also occur equally well in upland forests. Important hydrologic functions of the wetland areas are moderation of groundwater discharge, and subsurface and surface water storage. The undisturbed substrate meters the water out slowly and steadily, providing base flow of high-quality, moderate-temperature water to the main channel of Cutthroat Creek. The soils store water that would otherwise flow directly to the creek. During runoff events, the irregularities in the soil surface allow detention of water as well as settling of particulate matter that runoff might be carrying. If particulate or dissolved pollutants were carried into the wetlands, many of these would also be retained and potentially transformed to harmless substances. Surface vegetation protects underlying soils from erosion. To the extent that the main stem or smaller channels overflow their banks during high flows, the vegetation and rough ground of the adjacent wetlands would slow that water and retain some of it for later return to the stream.

The mature forest canopy intercepts rain- and snowfall, preventing much of it from ever reaching the ground, thus lowering peak creek flows and providing important winter habitat for deer. Evergreen trees provide cover that moderates both summer and winter temperatures for terrestrial and aquatic organisms. The forest provides trees that fall into the creek and become incorporated into its banks, providing cover and velocity diversity for resident fish, a nonerodible surface for dissipation of energy of flowing water, and a substrate for inhabitation by organisms of the aquatic ecosystem. The shrub and herb cover directly over the creek serves as cover for the fish and provides food in the form of invertebrates that fall from the vegetation into the creek. Organic debris that falls or washes into the creek serves as food in downstream aquatic and marine ecosystems. All these functions would be performed equally well by upland forests.

Apart from their support of the aquatic ecosystem, these forested wetlands serve to maintain vegetation and fauna, habitat structure, and ecosystem processes characteristic of moist to wet old-growth and mature spruce-hemlock forests in this region. (An upland forest would perform equivalent functions.) For example, these include providing a diversity of all types of organisms, various sizes and ages of living and dead plants that provide habitat for other biota, and characteristic cycling of elements and compounds through the ecosystem. Undisturbed forests serve as corridors for daily and seasonal movement of animals.

Some of the wetlands in and adjacent to Gavan Subdivision have also served social functions for the last decade or more. The CBS has designated the creek corridor to serve as a greenbelt. CBS and school staff, students, and the Alaska Department of Fish and Game have expended time, energy, and money to restore parts of the creek that needed to be moved for school construction, and have constructed walkways through undisturbed parts of the creek corridor. The area is now used for outdoor education and is open for enjoyment by the public.

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While all of the above functions are important for general ecosystem health, those which are associated with support of Cutthroat Creek are most valued by humans and least able to be sustained in another location. Wetland forest is common in the Sitka area; creeks supporting cutthroat and visited by people are less common. Additionally, since societal effort has been successfully invested in restoration and enhancement of this creek, its importance to the community of Sitka is magnified. Wetlands' performance of hydrologic functions and contribution to natural processes of the aquatic ecosystem (such as providing food, cover, and channel structural diversity) are most important to protect as Gavan Subdivision is developed and should be the focus of the mitigation plan.

**Wetland Impacts**

Construction of Gavan Subdivision infrastructure has affected the natural functions of the area's wetlands, as is inevitable with human development. The Corps of Engineers asserts that road construction caused permanent loss of 2.3 acres of wetlands. City staff measured the area filled in wetlands at 1.5 acres. Once the excess fill is removed from along Johnston and Mills Streets and from behind Lots 22 and 23, the area represented by road cut or fill within wetlands delineated by the Corps will probably be closer to the area measured by the City. Other areas affected include trenches where utilities have been laid.

Clearing vegetation and replacing native soil with road beds increases the amount of precipitation that reaches the ground and speeds runoff to the creek. Ditches along roads carry water directly to the creek, faster than if the water flowed overland. Increasing the efficiency of water flow to the creek causes "flashier" flows that may damage creek habitat and cause flooding. Ditches may catch particulates and other pollutants that are transported into the creek, where they may settle or may be washed to the sea. Development of each lot will add to these effects in proportion to the amount of clearing and filling.

Road prisms and utility trenches backfilled with permeable materials may act as french drains, intercepting downslope drainage, transporting it down the trench, and depriving areas downslope of the fill of subsurface and surface flow. In Gavan Subdivision, most of these "french drains" appear to discharge the water at the lowest points within the subdivision—at the Mills Street creek crossing and at the southeast corner of Georgeson Loop near lot 27—as much as 300 feet lower in the creek system than the water might have otherwise run into the creek. The sanitary sewer line that leaves the subdivision may conduct groundwater out of the Cutthroat Creek drainage. No new storm drains carry water out of the subdivision. Faulty placement of the culvert across Johnston Street may be depriving the creek upstream of Mills Street of some water, but that water probably reenters the creek at Mills Street.

While infrastructure construction has affected water flow patterns in these ways, potential hydrologic impacts have been avoided and minimized by actions already undertaken by the CBS (described below) and can be mitigated further as described in the creek and wetland mitigation plans. Designating a greenbelt along most of the main stem—from Mills Street to Kashevaroff Street—and protecting Lot 27 have conserved many existing wetland forest functions, and allow for future enhancement of the habitat. Setting aside original drainageways as greenbelt at the

*Gavan Subdivision**Wetland Functions and Impacts*

west corner of the subdivision has conserved some of the natural water detention functions and will protect the quantity and quality of water feeding the creek above Mills Street. CBS has already committed to resetting the culvert under Johnston Street so the impact of that error will be eliminated. Diverting two tributaries from above the subdivision, underground down Mills Street, and into the creek where it crosses Mills Street has effectively protected that water from pollution and temperature changes as it flows through the subdivision without significantly affecting the timing of its flow to the creek.

Previously undisturbed wetland forest habitat has been lost along the roads and the sewer line on the backs of lots 22 to 25. While this represents a reduction in acreage of a naturally functioning ecosystem, this loss is most important to human society where the forest directly supported the creek ecosystem—at the Mills Street creek crossing, at the sewer crossing of the creek next to the playground, and upstream of the tributary that crosses lot 27. Creek habitat in these areas has been degraded by loss of evergreen tree cover, vegetation overhanging the creek, undisturbed banks, and natural channel structure and diversity.

Social functions of the area wetlands have been nearly unaffected except along the sewer line crossing of the creek. The additional measures CBS plans to implement should limit overall impacts to wetland functions to a level well within the range of standards to which subdivision development projects have typically been held.



March 4, 1997

Milt Luddington  
City and Borough of Sitka  
100 Lincoln Street  
Sitka, Alaska 99833

Subject: Cutthroat Creek, Site surveys

Dear Milt:

To proceed with design of stream restoration projects on Cutthroat Creek we will need some survey information at four sites. The four sites are:

- Site B&C Kashevaroff right-of-way and original stream channel
- Site G Sewerline Crossing South of Lot 26
- Site H SW bank of creek along ball field behind lots 23-24
- Site K Immediately Downstream of Mills street.

The site labeling is based upon a memo dated 2/21/97 which I have attached. Also attached is a map showing each site. Following is the minimum plan, profile and section information needed for each site. All surveys can be done using assumed horizontal and vertical control, all that is required is relative information at each site. Plan data will be used to develop site plans in Auto Cadd release 12. Information should be provided in this format. Sections should be provided as a hand sketch with approximate horizontal and vertical dimensions noted.

Site B&C - Kashevaroff right-of-way and original stream channel

Horizontal and vertical location of the thalweg (deepest part) of the existing channel, the old channel and the ditch along with typical sections of each. I understand that the original channel is a difficult location to get into due to heavy brush, if so, I can make do with a taped length of this channel and ground and water surface elevations at each end. Be sure to pick up the invert elevation (I.E.) of the culvert.

Site G - Sewerline Crossing South of Lot 26

Horizontal and vertical location of the channel, creek banks, edge of vegetation, sewer alignment and school fence line.

Typical section of creek at sewer crossing and at an undisturbed upstream location.

HDR Alaska, Inc.

2525 C Street  
Suite 308  
Anchorage, Alaska  
99503-2639

Telephone  
907 274-2000  
Fax  
907 274-2022

Site H - SW bank of creek along ball field behind lots 23-24

Horizontal and vertical location of the channel, creek banks, edge of vegetation, and ball field fence line where creek is parallel to the fence.

Typical section at closest point to fence.

Determine ball field drainage.

Site K - Immediately Downstream of Mills street

Horizontal and vertical location of the road, culverts, storm drain outfall, channel, creek banks and edge of vegetation from the road to 50 feet downstream of the road. Pick up the upstream and downstream I.E. and the diameters of the two road culverts and the stormdrain.

Please call with questions. Thanks for your help.

--Sincerely,

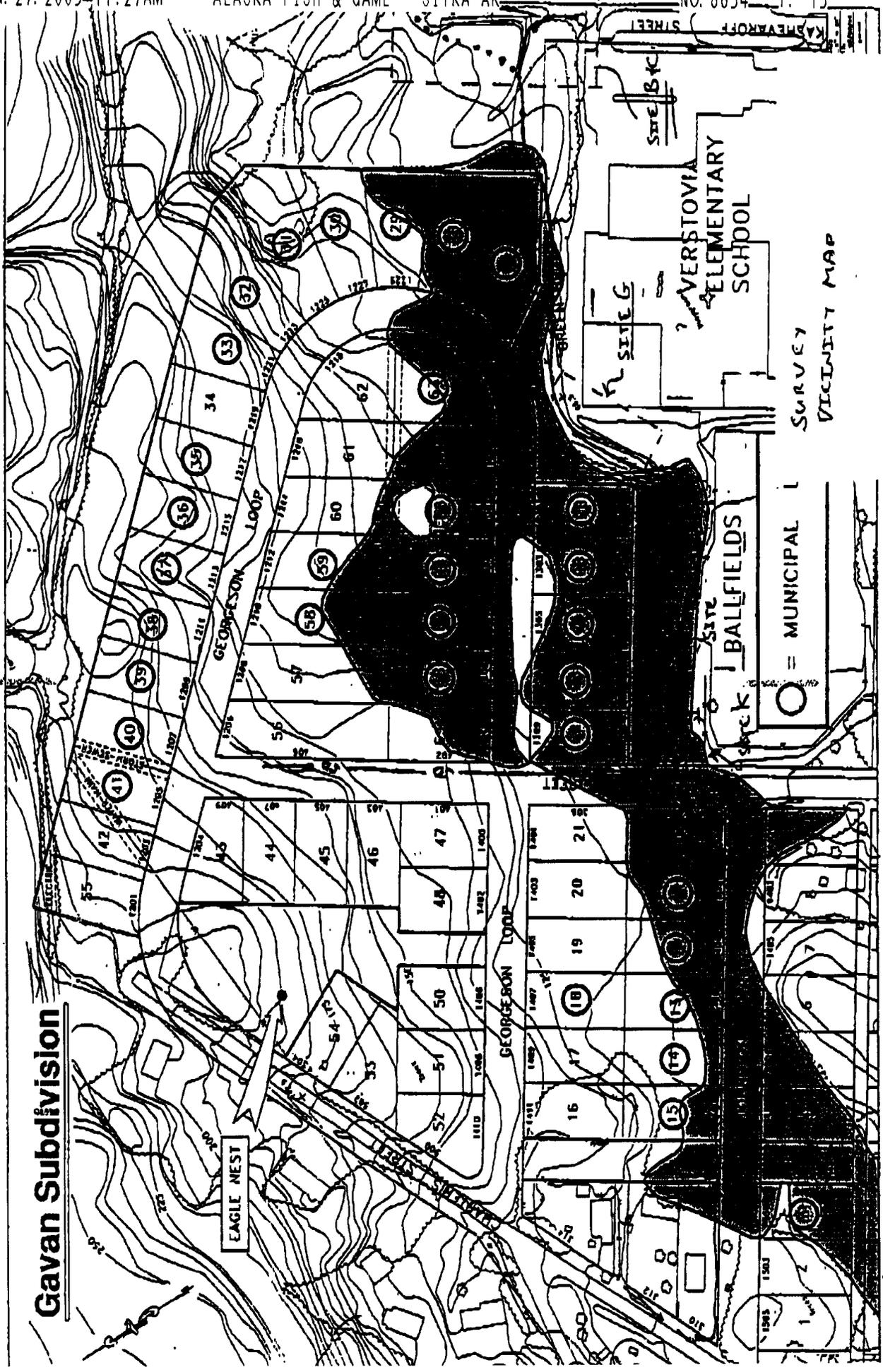
HDR Alaska, Inc.



Bob Butera, P.E.

cc: Larry Harmon  
Anne Leggett, HDR  
Dan Billman, HDR

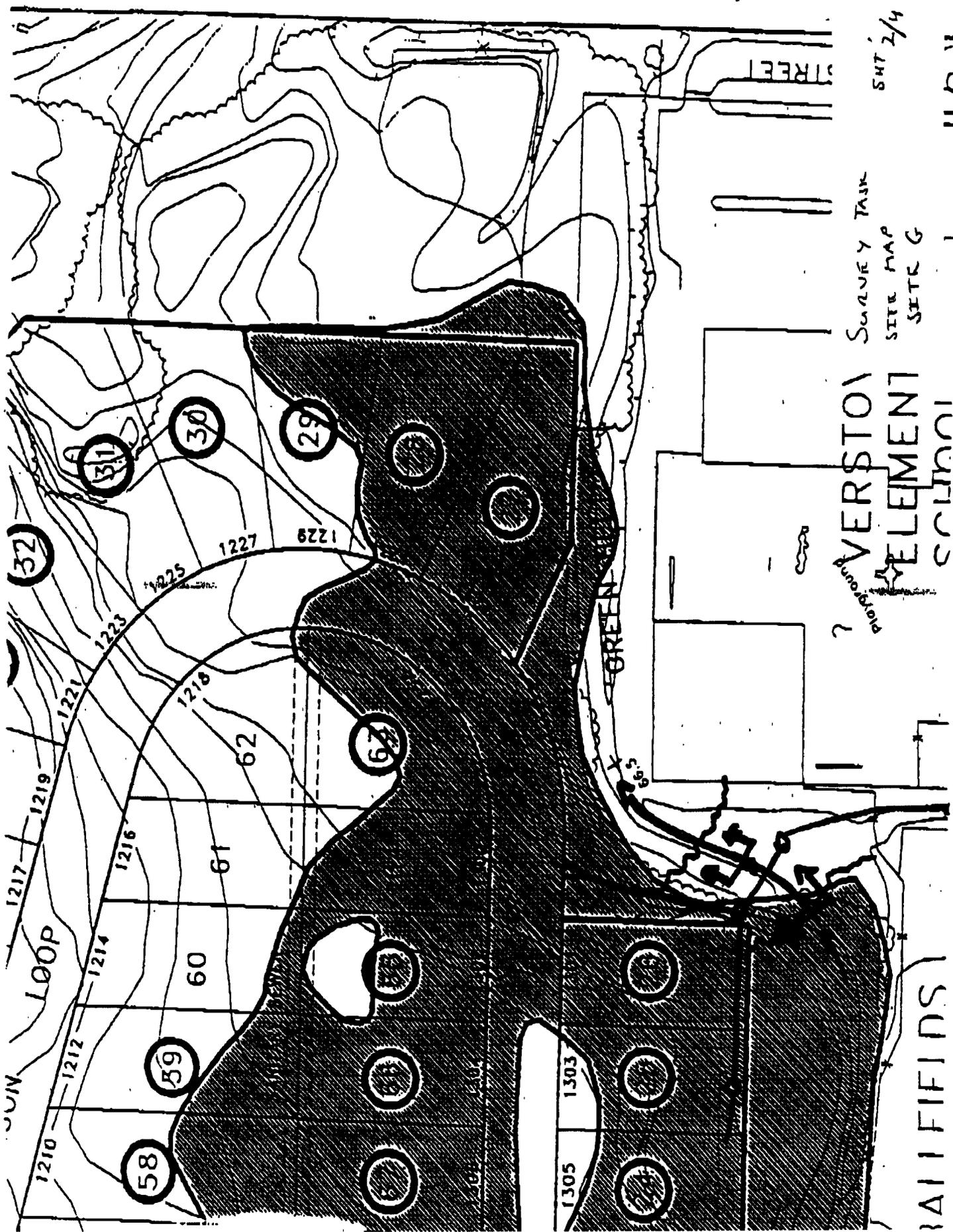
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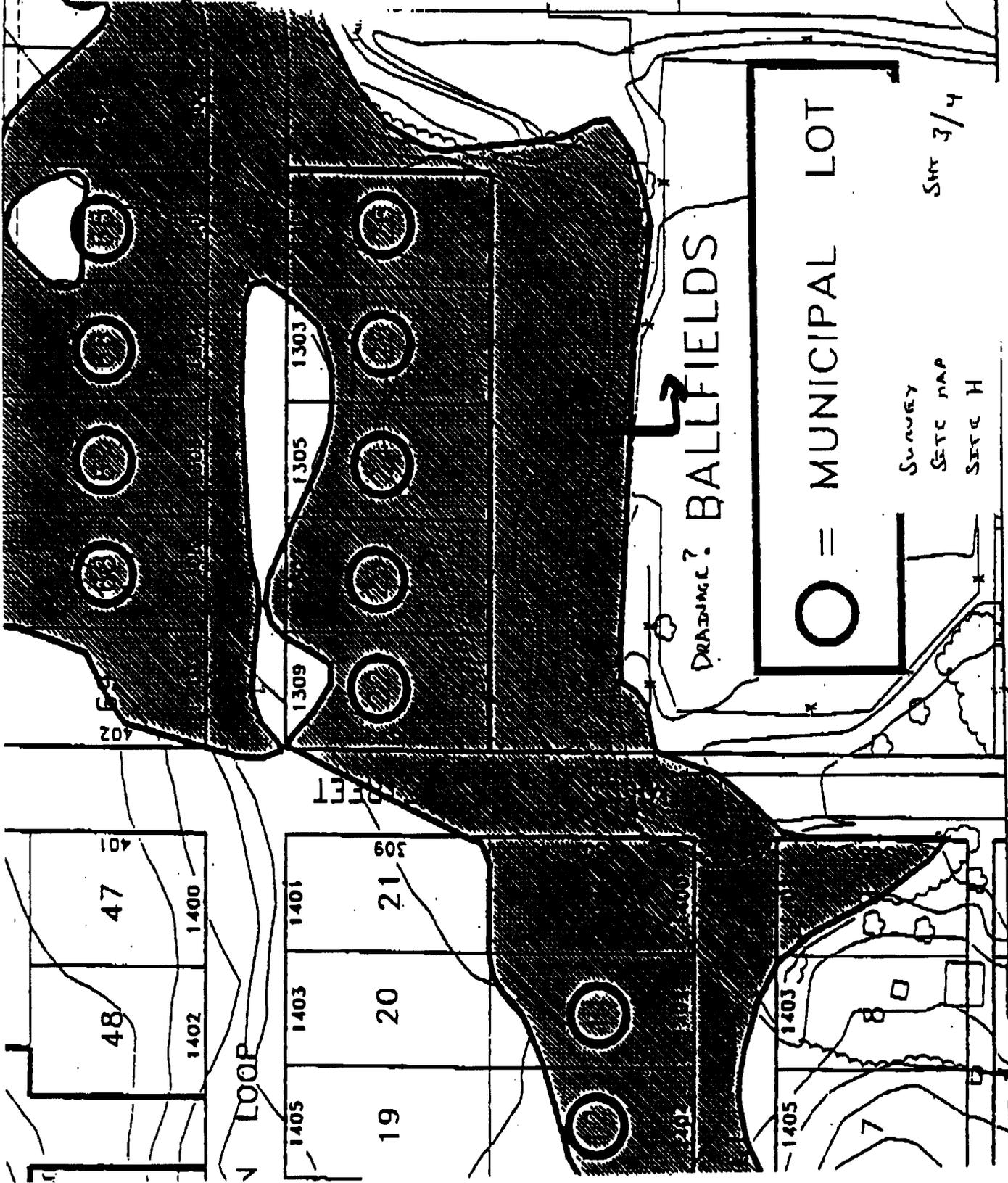


# Gavan Subdivision

\* SITE LABELING BASED ON APPENDIX A MEMO DATED 2/21/97







DRAINAGE? BALLFIELDS

O = MUNICIPAL LOT

SURVEY  
SETC MAP  
SETC H

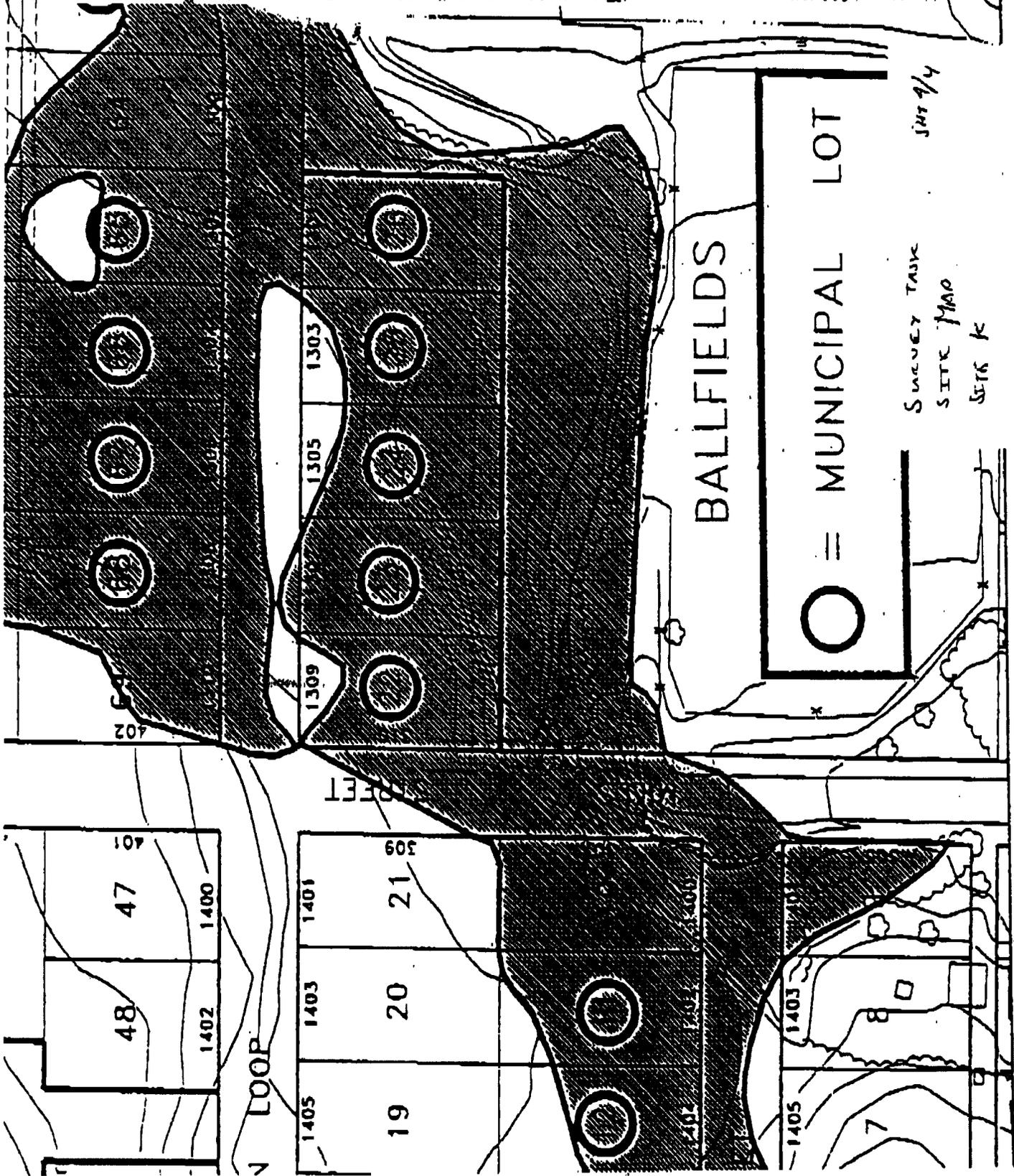
SMR 3/4

48	47
1402	1400

V LOOP

1405	1403	1401
19	20	21
		69

1405	1403
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BALLFIELDS

○ = MUNICIPAL LOT

SURVEY TAPE  
SITE MAP  
SITE K

SITE 4/4

N LOOP

STREET

402

48 47 401

1402 1400

1405 1403 1401 19 20 21 309

1402 1400

1405 1403

7

1

## Appendix A

**Gavan Subdivision**  
**Summary of Actions to be Taken to Meet ADF&G Requirements**

	Project Location	Description	Agency Coordination Needs
A	Kashevaroff Street Storm Drain	Clean debris from inlet. Construct debris screen. Accumulated sediment will be released to downstream.	none, project will be coordinated with projects B&C, ADF&G requests to be present when blockage is removed
B	Ditch in extension of Kashevaroff Street ROW.	The CBS may choose in the future to use the Kashevaroff right-of-way for a road or driveway to access property to the NE. In that case, the ditch (which presently does not carry the creek) may need to be moved. Because the CBS may later propose to move the creek or its southeast bank, it will apply limited enhancement effort to this reach. Enhance ditch's habitat value by placing approximately 8 log structures in or along the 80' channel. The log structures will create over hanging cover and be anchored into the bank. Thin alders along the northwest bank to promote growth of conifers.	ADF&G to review final plans and help select alders to be thinned.
C	Approx. 100' SE of Lot 28 back lot line.	Divert the creek back into the original channel south of Lots 27 and 28 near the teaching platform. Clear accumulated mud from the head of the original channel. Block the excavated channel now occupied by the creek with a log and earthen structure that allows high flows to pass into the excavated channel. Plant saplings and shrubs on parts of diversion structure above ordinary high water. Leave the old channel as a backwater for fish to hide in during floods. Thin existing alders near diversion to promote regrowth of conifers. If determined to be necessary after elevations are surveyed during final design, include structures (for example, log sills) that set bed elevations to prevent head cutting. Hand construction techniques will be emphasized where appropriate.	ADF&G to provide input on diversion structure form and location, and to review final design.
D	Lot 27	Incorporate this lot into the City-owned greenbelt.	None
E	Vicinity of Lots 58 to 64.	<ul style="list-style-type: none"> <li>a) Construct ditch sills to slow ditch flow into the Lot 63 tributary. These should be placed on the east side of the culvert inlet and west side of the outlet. This work will emphasize slowing storm water flows in ditch.</li> <li>b) Line the ditch along the south side of Lot 63 with impermeable silt under the shot rock.</li> <li>c) Maintain the lot 63 tributary in its natural condition through lot development restrictions.</li> <li>d) Capture the lots 57 to 61 seepage and overland flow in a ditch along the sewer easement. Direct this flow into the tributary on lot 63. Incorporate erosion control structures or materials in ditch construction.</li> <li>e) Work with the owner of lot 64 to not allow infiltration of</li> </ul>	None

	Project Location	Description	Agency Coordination Needs
		the flow into his building pad. f) Work with the owners of lots 37, 39, and 57 to 60 to direct the flow from the lots 37 and 39 culverts into the sewer line catchment system. Incorporate erosion control structures or materials in ditch construction. g) Plant shrubs and trees and maintain cover over the sewer line ditch.	
F	Sewer easement southeast of Lot 26.	Block the sewer easement off Georgeson Loop and on lot 26 with logs or boulders to discourage access to the area by four wheelers or vehicles.	None
G	Sewer line crossing of creek S of Lot 26.	The steps of this work are: a) leave the creek bottom materials and creek slope as they presently are b) place logs in and over the channel for flow diversity and create holding areas - 4 of these will be placed. c) use log bank stabilization to narrow the low flow channel and create undercut banks about 1 foot tall - 8 of these will be placed, 4 on each side about 8 feet apart. d) create a flood plain bench on either side of the channel e) fill the floodplain bench with soil for planting f) plant the floodplain with a mix of spruce, hemlock, and native shrubs, and control alder invasion g) replant surrounding disturbed area to maintain water quality and shade	ADF&G to review final plans.
H	SW bank of creek along ballfields behind approx. Lots 23-24.	Where creek runs along toe of ball field fill, the left bank has no vegetative cover and some bank material is unstable. A log "terrace" revetment will be constructed to prevent further bank erosion. The area will be planted with trees and shrubs.	ADF&G to review final plans.
I	Remove fill from creek bank behind lots 22 and 23	Excess fill material was pushed downhill from the sewer easement behind Lots 22 and 23. The material is unstable now and some has slid into the creek. The material in the creek and on the lower bank will be removed by hand, and the excess material on the upper bank pushed back into the sewer easement to maintain bank integrity.	none
J	Install energy dissipation at the Mills Street storm drain outfall.	The pool at the storm drain outfall will be deepened and large rocks placed in the pool to dissipate the energy of the water flowing out of the storm drain.	none
K	Immediately downstream of Mills Street.	Remove excess fill deposited here. Contour channel banks to make channel narrower. Plant banks with spruce and hemlock seedlings and saplings and native shrubs and herbs.	ADF&G to review final plans.
L	In Mills Street ditch, upslope and NE of storm drain outfall.	Block fish access to channel by constructing a 12" waterfall of logs just upstream of the confluence of the ditch and the creek.	none
M	Lots 11 through 15.	Apply restrictions to development of these lots to protect water quality. Restrictions will be developed by the CBS, in cooperation with the Corps of Engineers, and will probably be applied through the Section 404 permitting process, plat notes, or the building permit process.	CBS to coordinate with Corps of Engineers and supply a copy of the final plan to

b. 2/21

	Project Location	Description	Agency Coordination Needs
			ADF&G.
N	Johnston Street, between Lots 5 and 13.	Reset culvert to catch flow from Lots 4 and 5 and convey it through road prism. Set upstream invert within a foot of the preconstruction ground level. Line ditch at culvert inlet with ash or till to minimize water infiltration into road fill. Fish passage will not be provided.	none
O	NW side of Johnston St., along greenbelt, Lots 15 and 14.	Direct surface flow outfalling from pipe described below and that flowing SW down the greenbelt away from the road, into an existing swale along the fronts of lots 14 and 15.	none
P	SE corner of Charteris/Johnston Streets Intersection	Divert low to moderate flows from the Charteris ditch into a 6"-diameter pipe buried from the diversion to the greenbelt area NW of Lot 15. High flows will continue to be directed into the Charteris storm drain system.	none

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