Ada County Highway District's
Fecal Coliform Bacteria
DNA Sampling Plan

Introduction

In 1994 the lower Boise River was placed on the State 303(d) list for impairment of primary and secondary contact recreation designated uses. A result of the 303(d) listing was the development of a Total Maximum Daily Load (TMDL) for fecal coliform bacteria for the lower Boise River. Fecal coliform bacteria in a stream are the result of wastes from warm-blooded animals. While fecal coliform bacteria are not a direct threat to human health, fecal coliform concentrations have been demonstrated to correspond with pathogens in the water that threaten human health. The TMDL, approved by EPA on January 25, 2000, requires reductions in fecal coliform of up to 98% from non-point sources in order to meet the primary contact recreation standard of 50 organisms/100ml at Parma.

The large bacteria reductions served as an impetus for the Lower Boise River Water Quality Plan (LBRWQP) to better understand the bacteria problem. A little research revealed a fairly new technology called DNA fingerprinting that would pinpoint the sources of fecal coliform bacteria found in the lower Boise River.

In March, 1998 the LBRWQP submitted a 319 grant for a fecal coliform DNA fingerprinting program in the lower Boise River watershed. The grant was subsequently approved in May, 1999. The LBRWQP fecal coliform bacteria DNA testing program will begin in April, 2000 and end in September, 2000. LBRWQP has invited interested parties and stakeholders in the watershed to partner in the sampling program. ACHD has joined this partnership to sample a few ACHD owned and operated storm drain outfalls.

Purpose

Sampling data collected through Ada County Highway District's (ACHD) NPDES stormwater sampling program has indicated the presence of elevated levels of fecal coliform at some of ACHD's NPDES sampling site locations. Fecal coliform DNA fingerprinting is sought to better understand the source of the elevated bacterial levels and guide ACHD's future mitigation strategies to meet NPDES and TMDL requirements.

Sampling Strategy

ACHD personnel will sample two sites. Samples will be collected at the storm drain outfalls located off 9th Street and Walnut Street in Boise, Idaho. Fifty samples will be collected from each site for a total of 100 samples. Samples will be collected during storm events. For the purpose of this study, storm events are defined as precipitation events creating stormwater runoff. Storm events will be sampled during the two LBRWQP DNA 319 grant designated periods 1) spring

high flow (April 10 – June 10, 2000) and 2) irrigation flow (July 10 – September 10, 2000).
Because measurable storm events are a rarity in the Boise area during the July 10 – September 10 sampling period, the majority of the 100 samples will be collected during the April 10 – June 10 sampling period. In order to obtain 50 samples from each site during this short time period, a minimum of 5 samples will be collected ideally, during the first flush of each storm. (Please Note: To increase the number of storm events sampled, sampling may begin as early as mid-March depending upon Boise City Water Quality Lab's schedule.)

Site Descriptions
The two proposed sampling sites outfall directly to the Boise River via complex subsurface storm drain networks. Because of their close proximity to the river, the sites may be surcharged during the spring runoff season. With this in mind, alternative sampling sites upstream of the outfalls are currently being located. The alternative sites will be above the river's high flow level, thus the sites will not be influenced by Boise River back flows. Detailed site descriptions follow.

9th Street
The 9th Street outfall is located at the southern terminus of 9th Street (Figure 1, Photo 1). The site drains approximately 210 acres. The watershed is comprised of primarily of commercial (85%) and high-density residential (15%) land uses (Figure 1-a).

Walnut Street
The Walnut site is located on Walnut Street (Figure 2, Photo 2). The site currently serves as an ACHD NPDES sampling site. The site drains an area approximately 495 acres in size. Land use is comprised of the following: 280 acres (57%) residential, 53 acres (11%) high density residential, 160 acres (32%) open space, and 1.5 acres (<1%) commercial and industrial.

Sampling Techniques and Protocol
Samples will be collected by the grab sampling technique. Depending on outfall volumes, samples will be collected in one of two ways. If flow volumes and hazards are low, samples will be collected by hand filling a sterile 250 ml nalgene bottle placed directly in the outflow. This method leaves less room for sample contamination and is the preferred sampling method. If flow volumes are high and/or there is a potential for hazard at the site (slippery access, etc.), samples will be collected with an extendable pole. The pole method entails attaching an emptied (on site to prevent contamination), modified, distilled water bottle, with duct tape, to an extendable painters pole. The pole is then lowered into the outflow and filled. Once filled, the distilled water bottle is raised and the sample is poured into a sterile 250 ml nalgene bottle. Each sample will be labeled on site with the following information: site location, sample number, time, date, and sampling personnel.

1-10
1-9
1-8
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1-4
1-3
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4-10
4-3
4-6
4-4
4-5
6-2
6-1
6-3
4-2
5-5
5-4
5-6
5-3
5-2
4-1
5-1

RUN OFF TO BOISE CITY LATERAL

COURT HOUSE SITE

Storm Drain Outfall location

9th Street

MORRISON

FIGURE 1

Drainage Area

LEGEND

MAJOR TRUNKLINE
S.D. FACILITIES
6-1 SUB BASIN LABEL

N

PROJECT NO. 199035
FILENAME 199035FD2A.DWG

KELLER ASSOCIATES

Ada County Highway District

H & H ANALYSIS - DOWNTOWN BOISE
MAJOR TRUNK LINES

FIGURE NO. 2

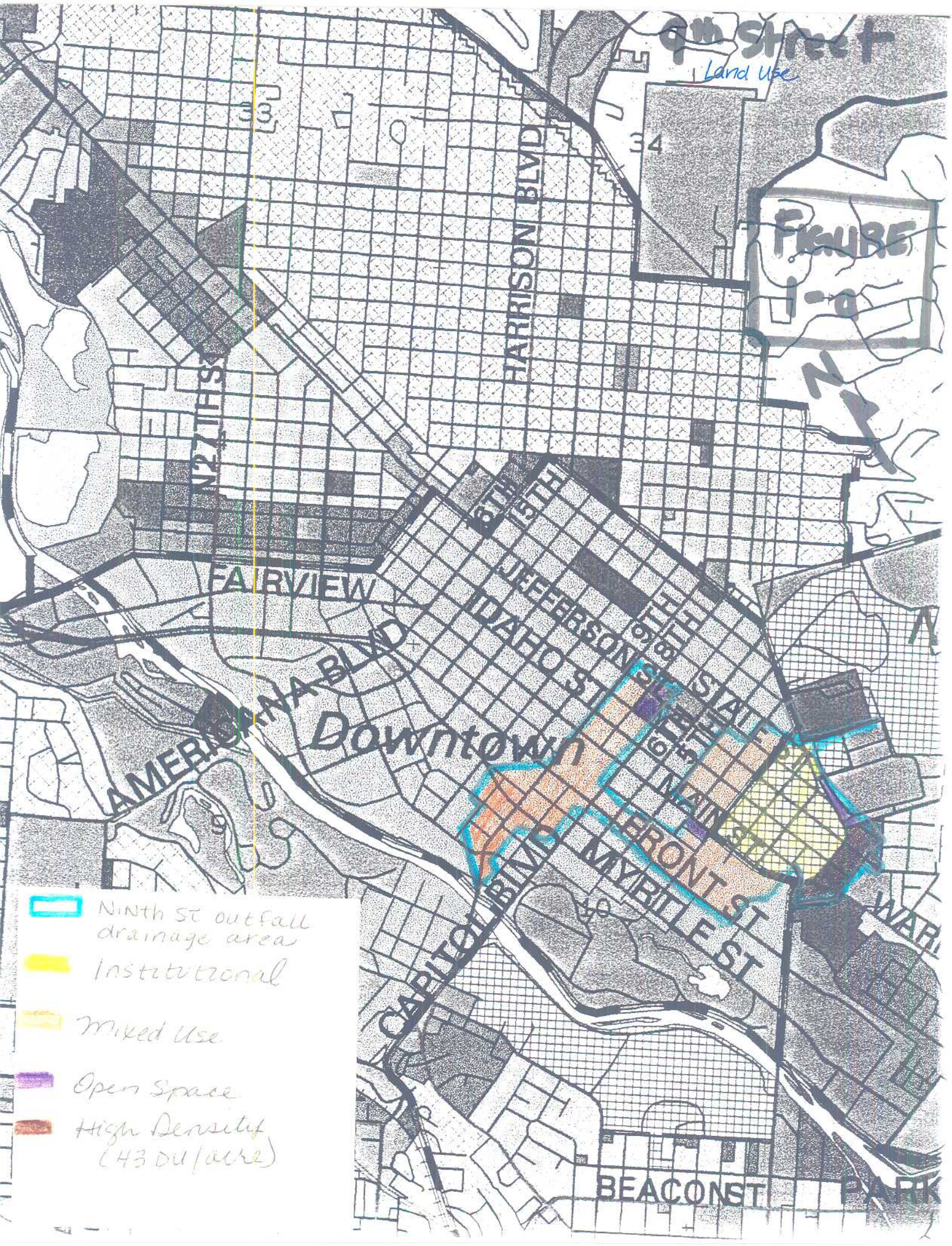
9th Street
Land Use
FIGURE
I-a
33
34
N 27TH ST
HARRISON BLVD
6TH
5TH
FAIRVIEW
JEFFERSON
IDAHO ST
6TH
5TH
STATE
MAIN ST
AMERICANA BLVD
Downtown
FRONT ST
MYRTLE ST
CAPITOL BLVD
WARM
BEACON ST
PARK
Ninth St outfall drainage area
Institutional
Mixed Use
Open Space
High Density (43 DU/acre)

PHOTO 1

PHOTO 2

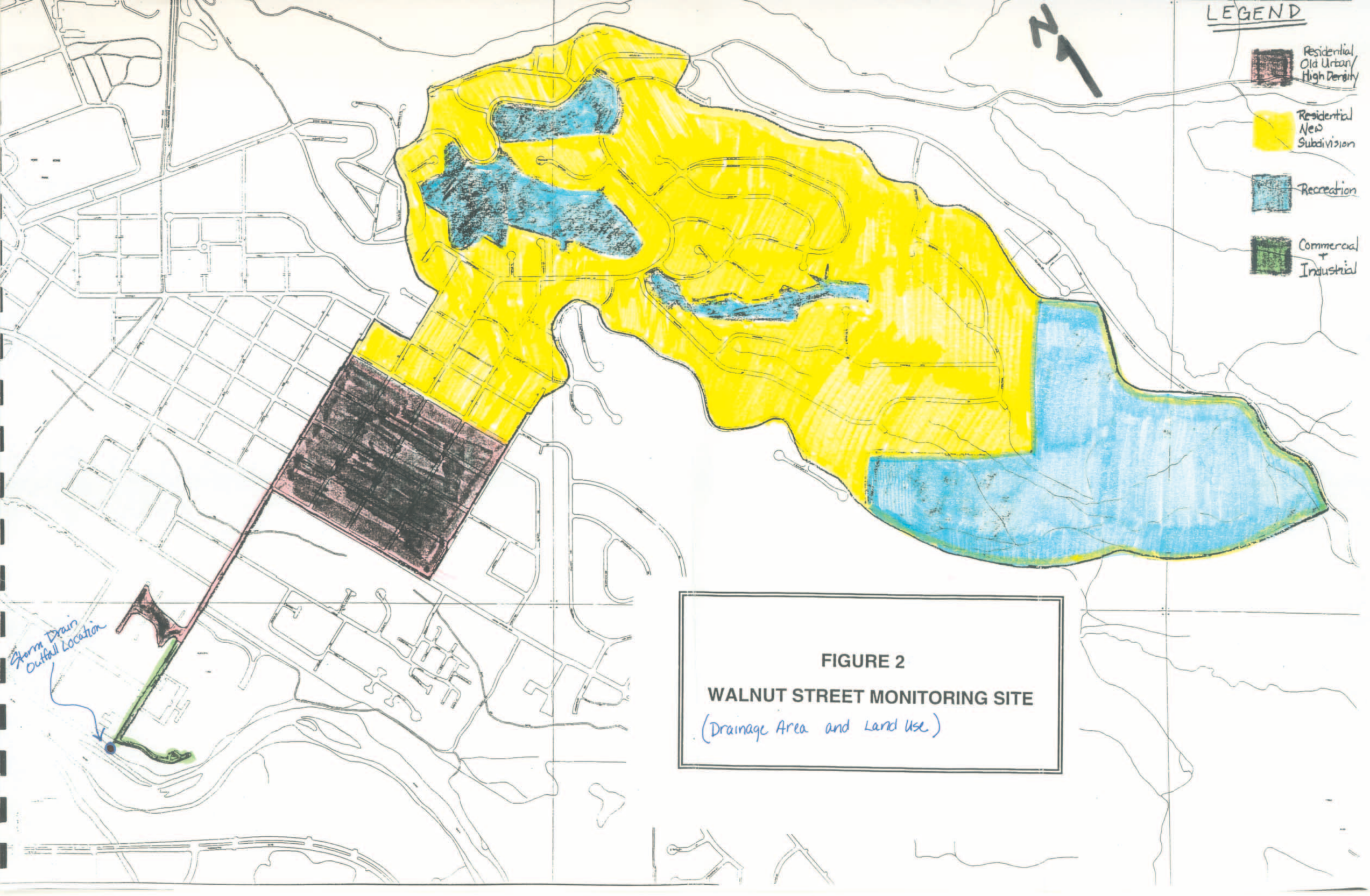

FIGURE 2

WALNUT STREET MONITORING SITE

(Drainage Area and Land Use)

Samples will be placed on ice immediately after collection. Iced samples will be delivered to the Boise City Water Quality Lab within 6 hours of sample collection. Boise City Water Quality Lab will filter and culture samples for fecal coliform in accordance with the Membrane Filtration Technique (Standard Methods, 18th Edition) using m-FC agar by DIFCO. The cultured samples will be shipped by overnight mail to Dr. Mansour Samadpour at the University of Washington School of Health and Community Medicine Seattle, Washington for DNA typing.

Sampling Equipment
labeled 250 ml nalgene sample bottles
cooler
ice or ice packs
extendable painters pole
plastic gallon bottles of distilled water
duct tape
nitrile sampling gloves
pocket knife
Sharpie marker pen

Sample Costs
DNA fingerprinting - 100 water samples @ $150/sample = $15,000