FLOOD HAZARD ANALYSES

CHINA CREEK

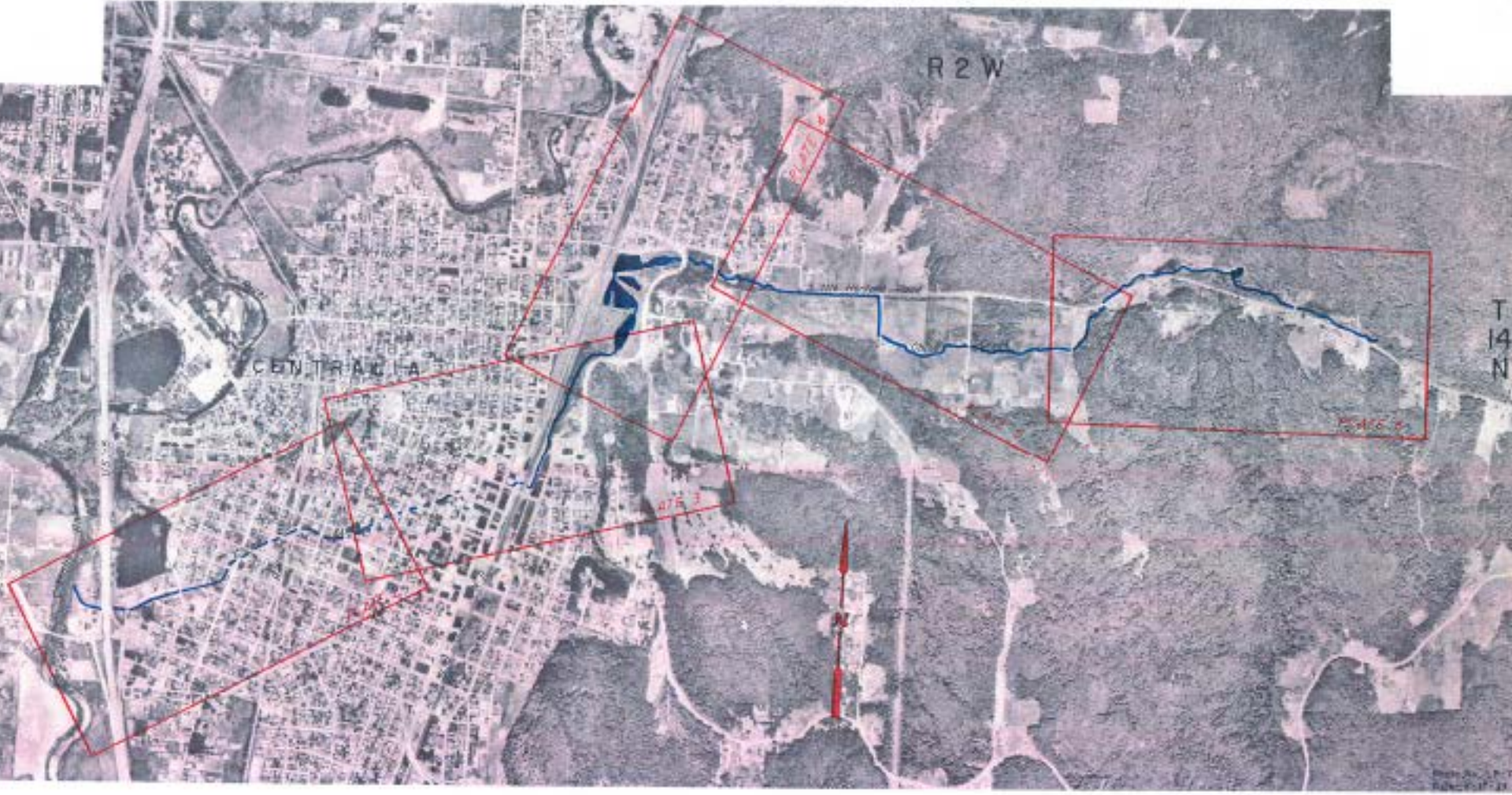
In the Vicinity of the City of Centralia
Lewis County, Washington

PREPARED BY
U.S. DEPT. OF AGRICULTURE
SOIL CONSERVATION SERVICE

IN COOPERATION WITH
CITY OF CENTRALIA
LEWIS COUNTY CONSERVATION DISTRICT
LEWIS COUNTY
WASHINGTON DEPARTMENT OF ECOLOGY

MARCH, 1977

USDA-SCS-PORTLAND, OR. 1977



LOCATION MAP

LEGEND

PLATE 2 — PLAN AND PROFILE SHEET COVERAGE

STREAM CHANNEL STUDIED

FLOOD HAZARD AREA INDEX

CHINA CREEK

LEWIS COUNTY, WASHINGTON

JULY 1976

PLATE 1

FLOOD PLAIN MANAGEMENT

The City of Centralia and Lewis County are currently under state flood plain management regulations of the Washington State Flood Control Act of 1935, 1960, and 1969, and the Washington Water Resources Act of 1971 including shoreline management. Lewis County has additional regulations covering new development and subdivisions. Centralia has building and development regulations related to flood hazards. Both Centralia and Lewis County have qualified under the Housing and Urban Development's (HUD) National Flood Insurance Program (NFIP) and are currently awaiting study results to implement planned flood plain management regulations. It is recommended that owners and occupiers of buildings and mobile homes consider purchasing flood insurance on their buildings and contents, especially those within the delineated flood-prone area.

Centralia is protected on the northeast by a levee on the Skookumchuck River. There are no other flood control measures planned or under construction. However, the Corps of Engineers is studying a levee proposal along the Chehalis River which would provide protection to all of the study area.

THE SCS HYDRAULIC MODEL AS A PLANNING TOOL

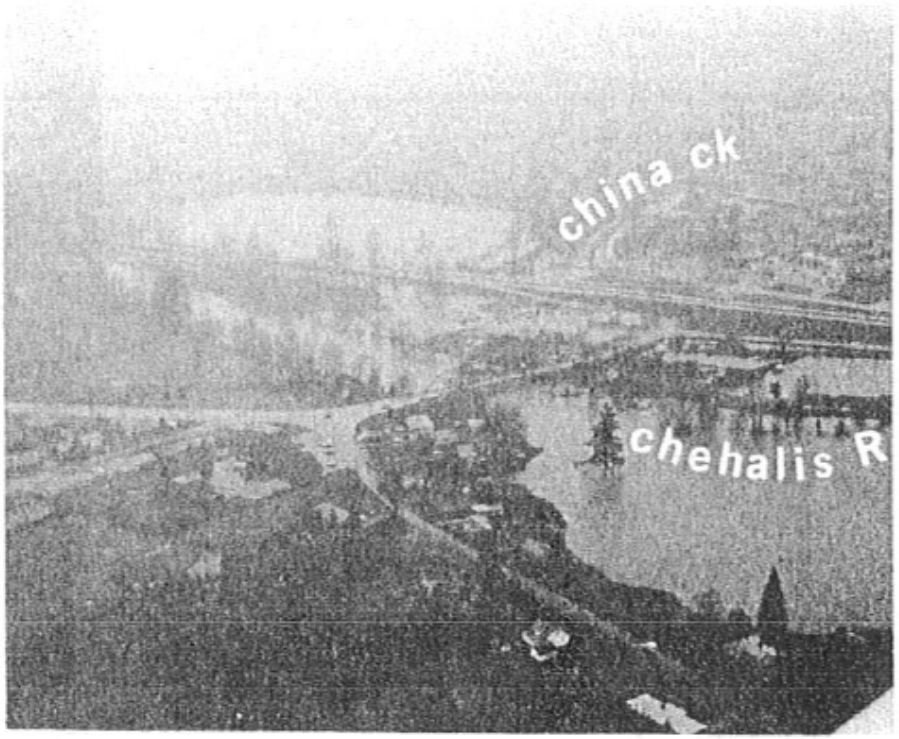
A major step has been accomplished in developing the computer model. It is now ready to be utilized to aid the local people and government officials in their decision making processes by providing the effects of alternative land uses, alternative structural changes to the stream and flood plain encroachments on overland flowage and storage.

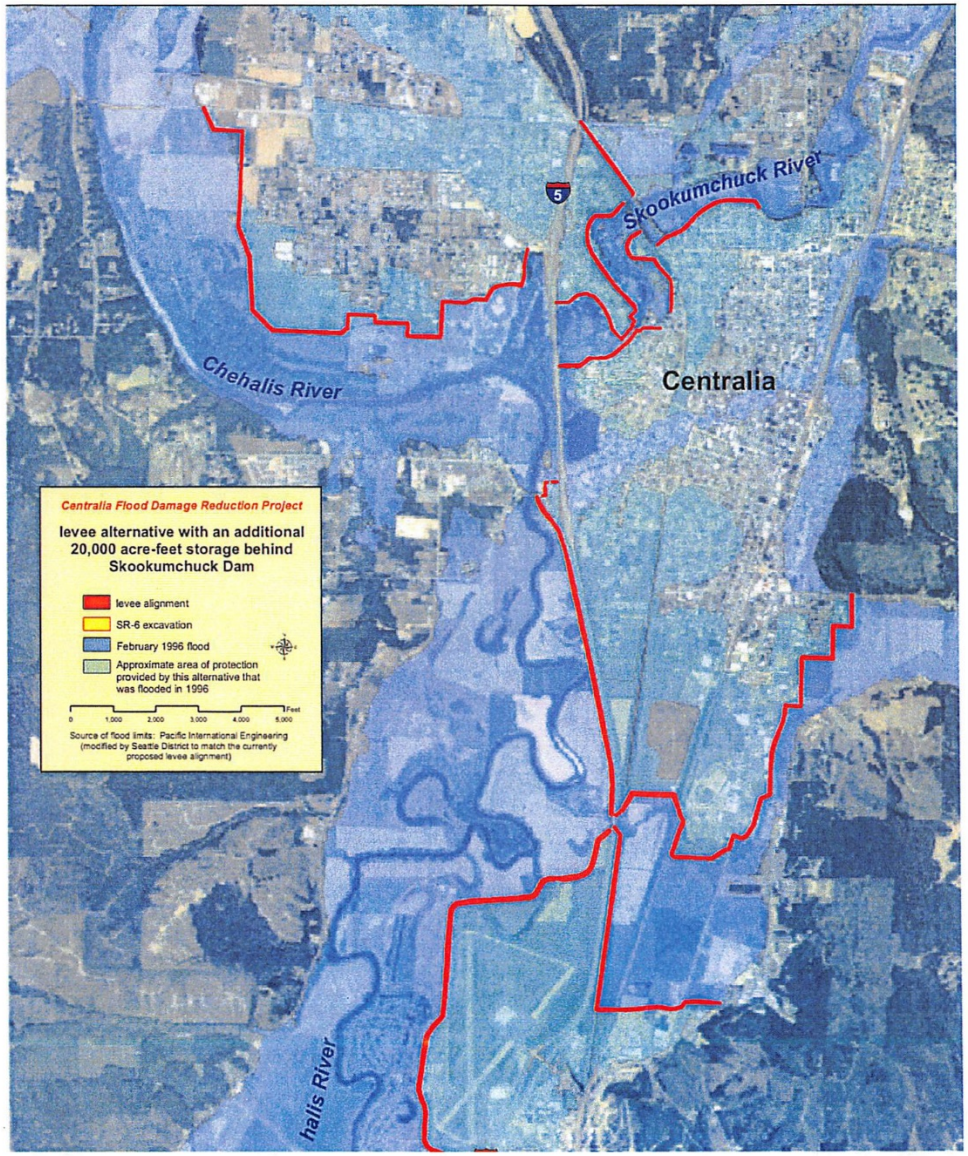
Written agreements will be required between interested groups and the Soil Conservation Service for SCS participation in updating or running the model program. The costs of additional analysis shall be shared by those requesting them. Interested agencies and consulting firms may also obtain the model program for their own use.

NEED FOR CONTINUED OBSERVATIONS

The data presented in this report have been derived from a limited history of past flood events. Observation of future flood heights and discharge should be continued and the computed values checked and refined by these observations. The assistance of individuals in the flood plain is required in this future observation program. Local residents should be encouraged to make accurate observations, including photographs of flood heights on their properties. These data should be collected and submitted to the local government units.

Photo No. 3 - 1974 SCS Photo Aerial of January 1974 storm. Chehalis River in foreground. Note China Creek is buried in backwater. Looking northeast over Centralia.




Skookumchuck River
5
Chehalis River
Centralia
Centralia Flood Damage Reduction Project
levee alternative with an additional 20,000 acre-feet storage behind Skookumchuck Dam
levee alignment
SR-6 excavation
February 1996 flood
Approximate area of protection provided by this alternative that was flooded in 1996
0
1,000
2,000
3,000
4,000
5,000
Feet
Source of flood limits: Pacific International Engineering (modified by Seattle District to match the currently proposed levee alignment)
halis River

include the flood control components that will be cost shared at 65 percent Federal, 35 percent non-Federal, and the additional components which will be 100 percent non-Federal.

6.2.2 Issues Requiring Additional Study During PED

6.2.2.1 Interior Drainage Analyses

The mainline project levee will include "minimum facilities" to relieve local runoff and potential ponding behind the levees for a low Chehalis River condition (i.e., gravity), as specified in EM 1110-2-1413. The minimum facilities will pass the local system design event without increasing interior flooding, therefore, no formal ponding areas are required.

6.2.2.1.1 China Creek Initiative

The local community will continue to look at what improvements can be constructed to solve all the flooding issues related to China Creek, which was not included in the Chehalis River Flood Reduction Study. The following describes the reconnaissance level study conducted by the local community to identify several alternatives to alleviate flooding in the China Creek Basin. The Corps will work with the community to see if China Creek qualifies for Federal interest under other Corps authorities.

A reconnaissance level evaluation was conducted to identify potential flood reduction alternatives for the China Creek drainage basin. The following structural flood control and reduction measures were reviewed and evaluated: pumping station, levee, gravity flood flow diversion, dry retention facilities for more storage capacity, channel modifications to increase channel hydraulic capacity, and creek relocation. Non-structural measures were reviewed but not evaluated. A preliminary evaluation of each of these flood reduction measures was conducted to identify potential flood reduction alternatives. The flood reduction measures were then evaluated independently, and in combination, to develop flood reduction alternatives capable of meeting the 100-year flood reduction design criteria. The size, location, flood reduction capability, cost, environmental impacts and benefits, and performance were factors in screening flood reduction measures to develop alternatives for the reconnaissance level evaluations. The construction cost for the 50-year and 25-year flood reduction design criteria was then determined for each alternative. The summary of this analysis is shown below.

TABLE 6-1 CHINA CREEK PRE-FEASIBILITY FLOOD REDUCTION ALTERNATIVES EVALUATION

Flood Control Alternative	Preliminary Cost Estimate**	Flood Reduction (STA 55+20)	Pros	Cons
1. Pumping Station No. 1	$10.7 million *($10.7 million)	400 cfs	• Failsafe operation at any flood event • Maximum operational flexibility to provide bypass regardless of Skookumchuck River/China Creek flood stage timing. • Minimal real estate acquisition	• High cost • Maintenance of pumping station • Large pumps required to pump long distance • RR crossing • Coordination & timing of RR crossing construction with BNSF (3rd party)
2. Pumping Station No. 2 with Gold Street Ring Levee	$11.4 million *($11.5 million)	380 cfs	• Failsafe operation at any flood event • Maximum operational flexibility to provide bypass regardless of Skookumchuck River/China Creek flood stage timing. • Minimal real estate acquisition	• High cost • Maintenance of pumping station • Coordination & timing of RR crossing construction with BNSF (3rd party)
3. Embankment Dam No. 1	$7.6 million *($12.1 million)	420 cfs	• Flood reduction for larger length of creek	• Impact to local residential neighborhood/environment • Large real estate acquisition • Environmental impact issues • Impact to Hanaford Road
4. Embankment Dam No. 2 with Pumping Station No. 3	$12.4 million *($13.5 million)	420 cfs	• Pumping Station provides additional capability for controlling peak flows	• High cost • Maintenance of pumping station • Impact to local residential neighborhood/environment • Large real estate acquisition • Impact to Hanaford Road
5. Embankment Dam No. 2 with Gold Street Ring Levee	$7.4 million *($8.6 million)	400 cfs	• Levee provides supplemental flow reduction with minimal impacts to environment and adjacent property owners.	• Impact to local residential neighborhood/environment • Large real estate acquisition • High project cost
6. Embankment Dam No. 2 with Urban Flood Wall	N/A	400 cfs	• Floodwall provides supplemental flow reduction	• Impact to local residential neighborhood/environment • Bridge/culvert rehabilitation cost • Large real estate acquisition cost
7. Embankment Dam No. 2 with Creek Excavation	N/A	400 cfs	• Excavation provides supplemental flow reduction	• Bridge/culvert rehabilitation cost • Sediment deposition would reduce channel capacity
8. Flood Flow Diversion with Gold Street Ring Levee	$7.3 million *($7.8 million)	395 cfs	• Low Cost • Minimal maintenance • Minimal land acquisition	• More detailed data collection and hydrologic analysis required to verify Skookumchuck River/China Creek flood stage timing • Coordination & timing of RR crossing construction with BNSF (3rd party)

TABLE 6-1 CHINA CREEK PRE-FEASIBILITY FLOOD REDUCTION ALTERNATIVES EVALUATION

Flood Control Alternative	Preliminary Cost Estimate**	Flood Reduction (STA 55+20)	Pros	Cons
9. Creek Relocation/ Restoration with Gold Street Ring Levee	$9.6 million *(11.9 million)	590 cfs (diversion of entire flow)	• Stream/habitat restoration • Reduced China Creek bridge/culvert rehabilitation construction costs • Increased public shoreline access • Low maintenance	• Coordination & timing of RR bridge reconstruction at new location with BNSF (3rd party) • Impact to residential neighborhood • More detailed data collection and hydrologic analysis

*Cost includes assumed $18,000/acre real estate acquisition and $100,000/structure acquisition costs.

**Costs are based on 100-year flow or 1996 flood event.

CHEHALIS RIVER BASIN FLOOD AUTHORITY

Chehalis River Basin Flood Relief Projects
2013-2015 Capital Budget

Scope/Scale -- Projects with a high likelihood of commencing construction in the next two years that should be considered for funding in the next State Capital Biennial Budget.

Initial project submittals (via this form) due to Scott Boettcher (scottb@sbgh-partners.com) by 10/05/2012.

Date:	10/5/2012
Project Name:	City of Centralia China Creek Flood Project
Project Location: Please be as precise as possible. Latitude/longitude coordinates are great!	China Creek from Yew Street east to Gold Street and Little Hanaford Road. China Creek Flood Impact Area: 46°43'03.55"N 122°57'32.93"W China Creek Runoff Area: 46°43'31.80"N 122°55'35.95"W
Project Contact: Please provide name, email and telephone number.	Kahle Jennings, City of Centralia Public Works Director 360-330-7512 kjennings@cityofcentralia.com
Lead Agency / Lead Entity:	City of Centralia
Project Description:	*The City proposes to design and construct a series of water retention structures in the China Creek watershed for short term storage of runoff during high rainfall events. The major emphasis will be on storage in the upper watershed but some off-channel storage in the flood-prone area along China Creek may be incorporated. The major components of the project are project design, property agreements with landowners where the structures will be located or property acquisition, SEPA review and permitting, and construction.* *The project concept and cost estimates are based on preliminary work done after the 1996 flood described in the U.S. Army Corps of Engineers Centralia Flood Damage Reduction Project Final General Reevaluation Report (June 2003, pages 157-160). The City has funded additional analysis of China Creek including computer modeling of watershed runoff, China Creek flow characteristics and floodwater storage options. The analysis is expected to be completed by the end of 2012.*

China Creek Watershed Analysis

City Council Presentation

April 9, 2013

CENTRALIA

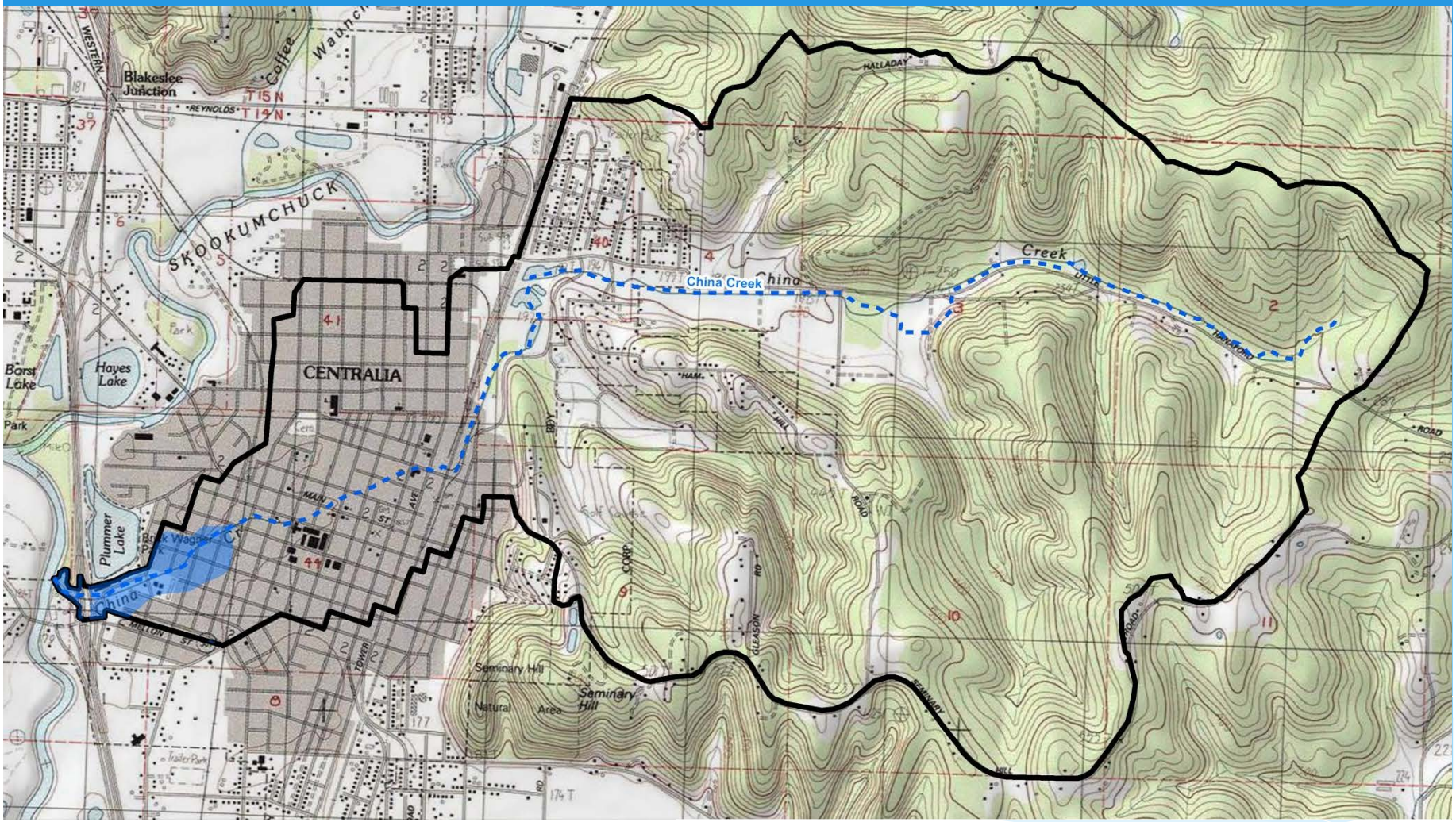
Utilities Department

Why this Analysis?

This is the first analysis of China Creek developed solely by the City as a planning-level, decision-making tool.

CENTRALIA
Utilities Department

Where is China Creek?



China Creek Watershed Boundary

What is this Analysis?

A computer model that uses best practices to estimate:

- surface runoff
- channel capacity

CENTRALIA
Utilities Department

HISTORIC CONDITIONS

2.5" of rainfall
generates **surface runoff**
that historically **exceeds capacity**
of China Creek
and occurs about every **3.5 years**
(11 times in last 30 years)

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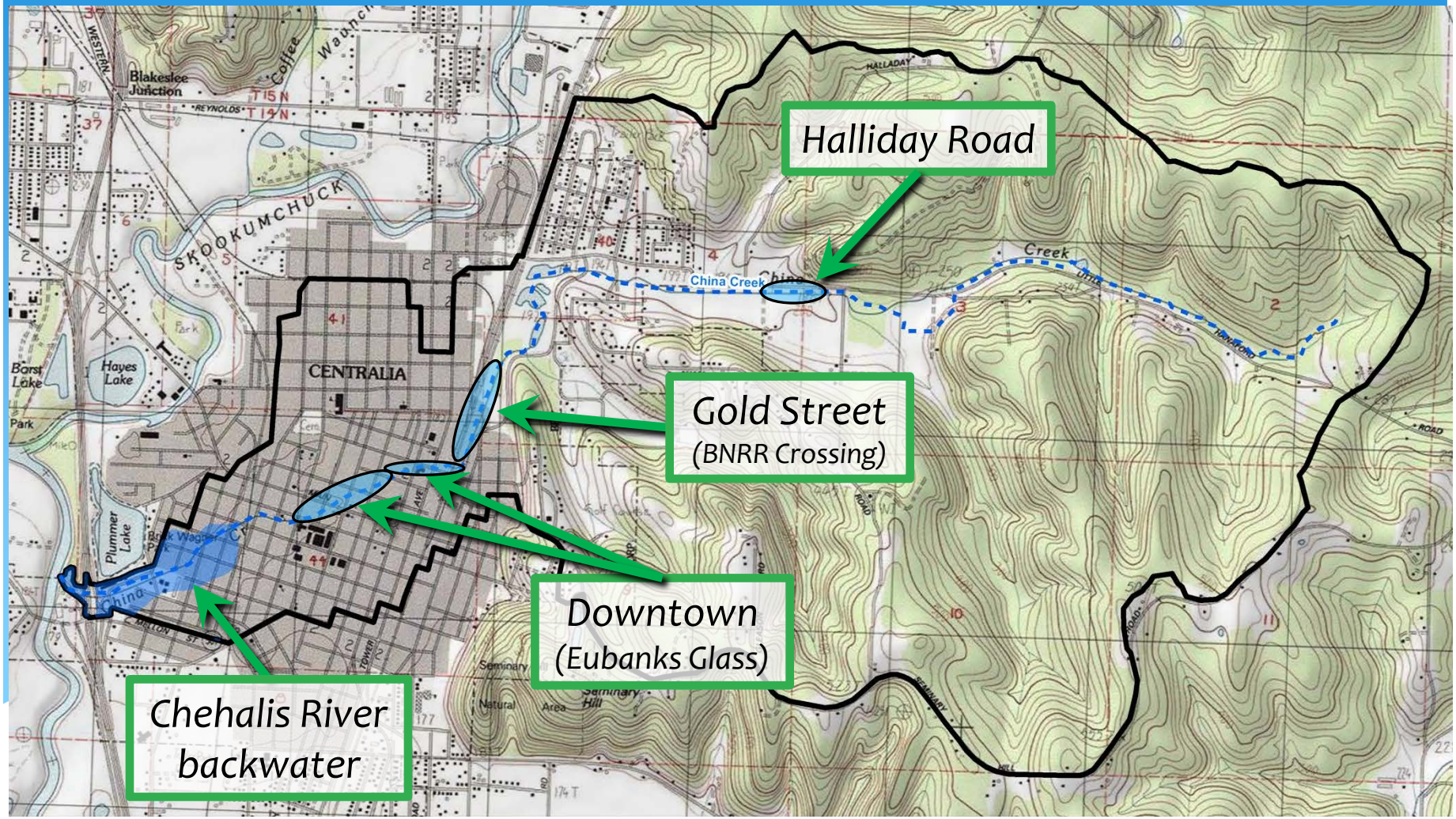
Utilities Department

HISTORIC PROBLEM AREAS



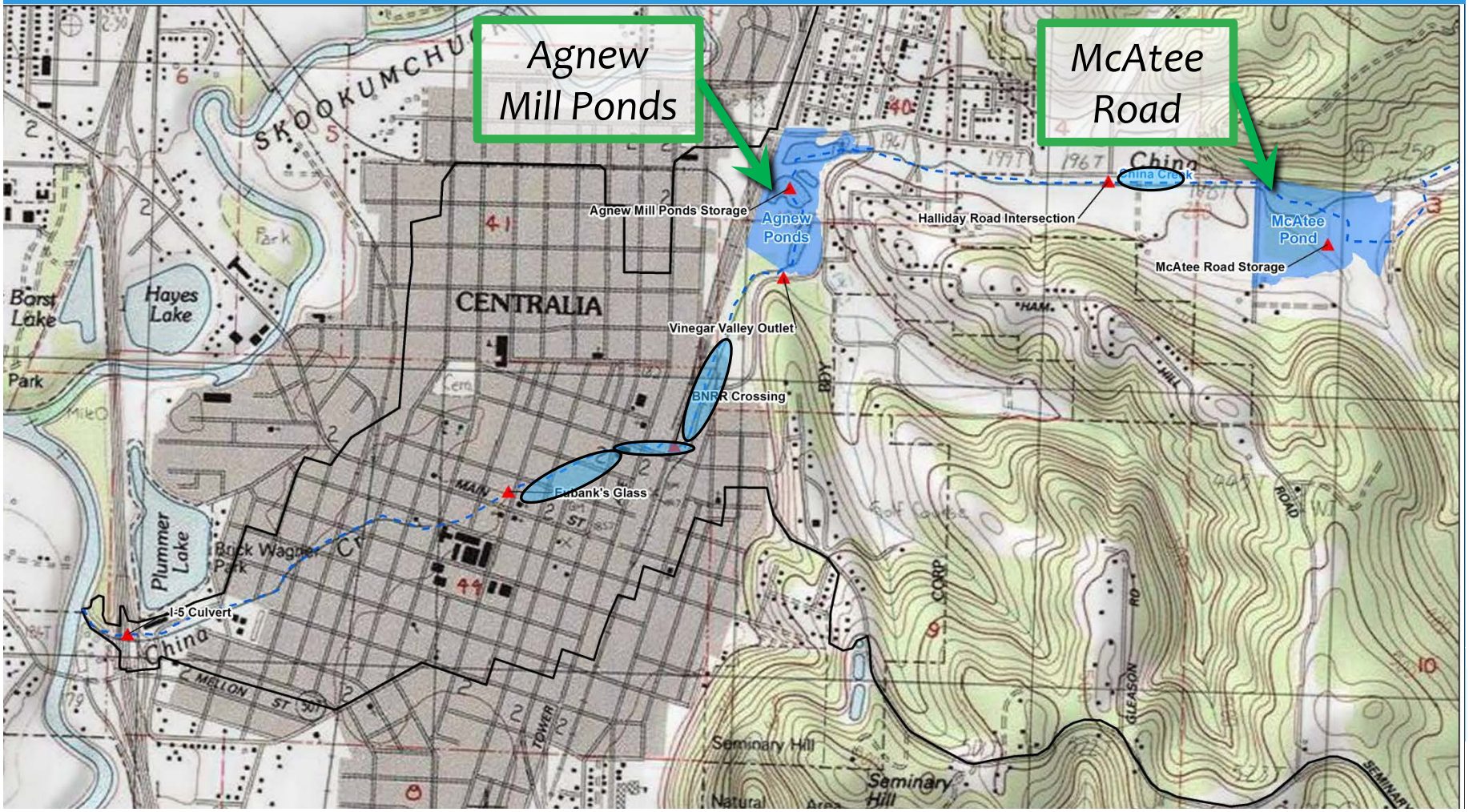
SCENARIOS MODELLED

City staff elected to evaluate two potential storage locations :

- McAtee Road
- Agnew Mill Ponds

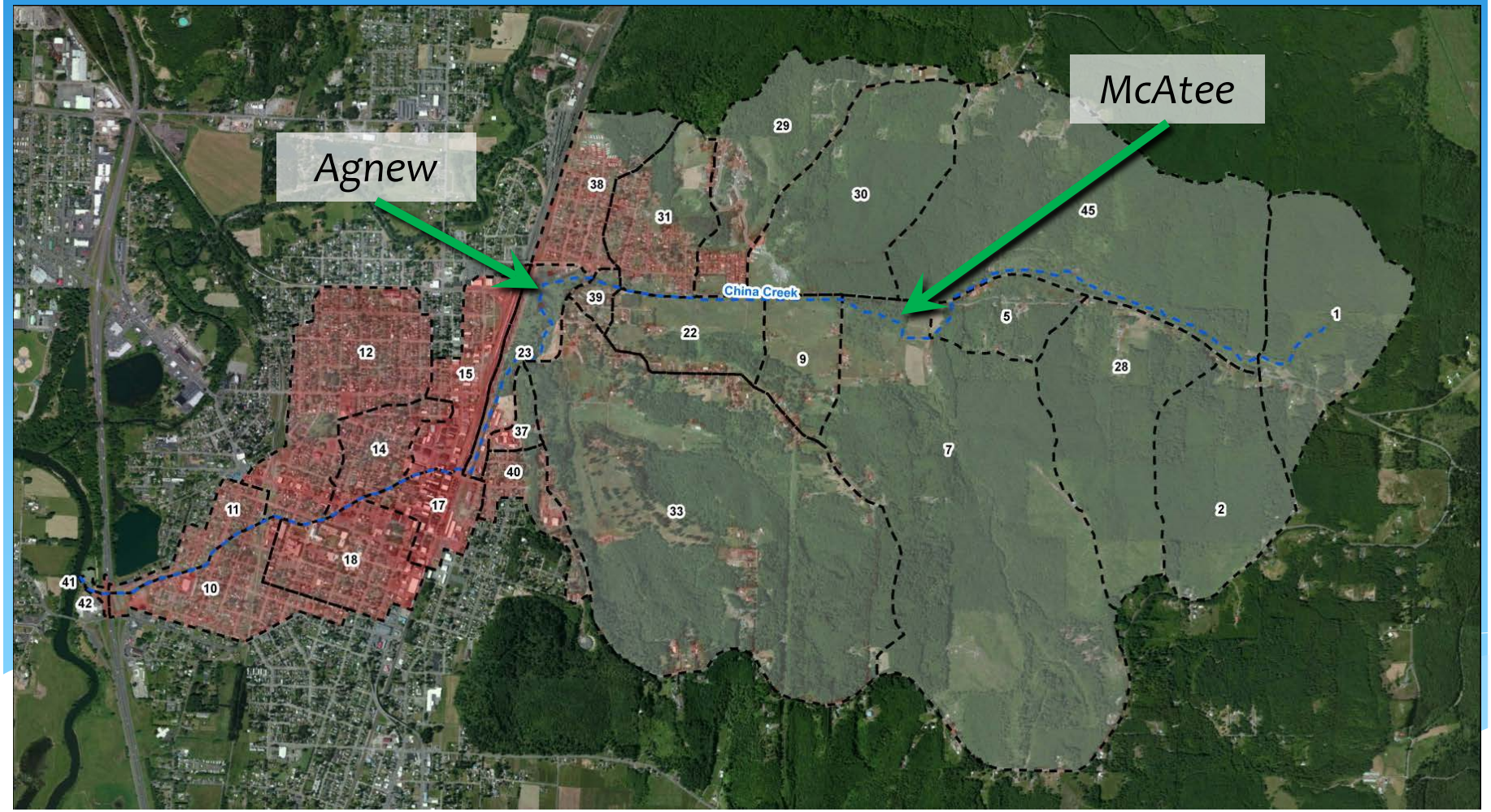
CENTRALIA
Utilities Department

STORAGE LOCATIONS



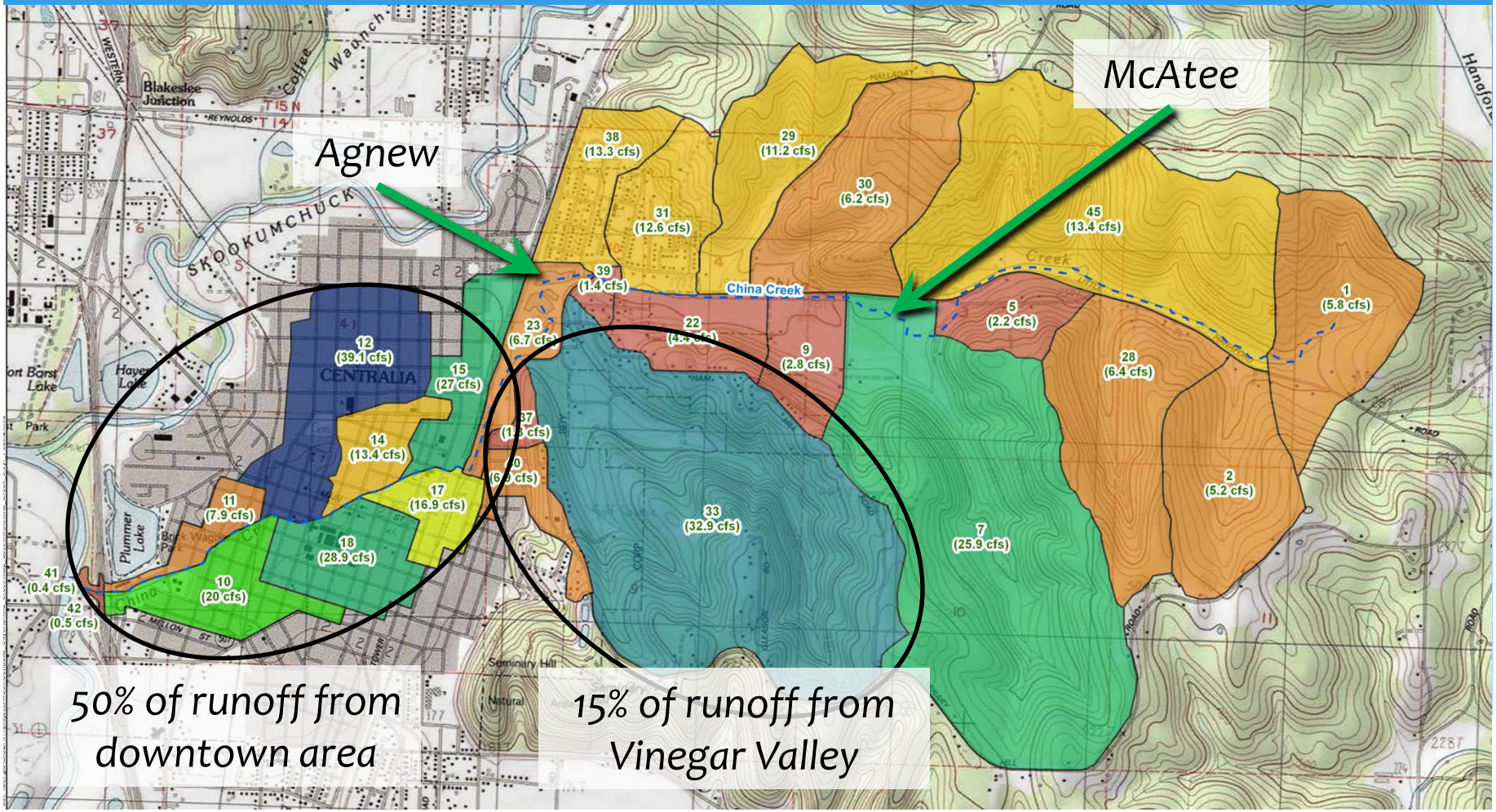
FINDINGS

Majority of drainage area is in upper watershed, and majority of impervious area is in lower watershed



FINDINGS

Majority of runoff is generated downstream of Agnew Pond and McAtee storage locations



SUMMARY

- McAtee Storage: higher cost for localized improvement area

- Agnew Storage: lower cost for minor reductions downtown for smaller, recurring storms

Evaluate Storage Locations

- Further analysis of Agnew Ponds
- Identify other potential storage locations for analysis:
  - Downtown area
  - Vinegar Valley

Enhance Channel Capacity

Before & After

China Creek near The Chronicle

Enhance Channel Capacity

Before & After

China Creek near Centralia College

Enhance Channel Capacity

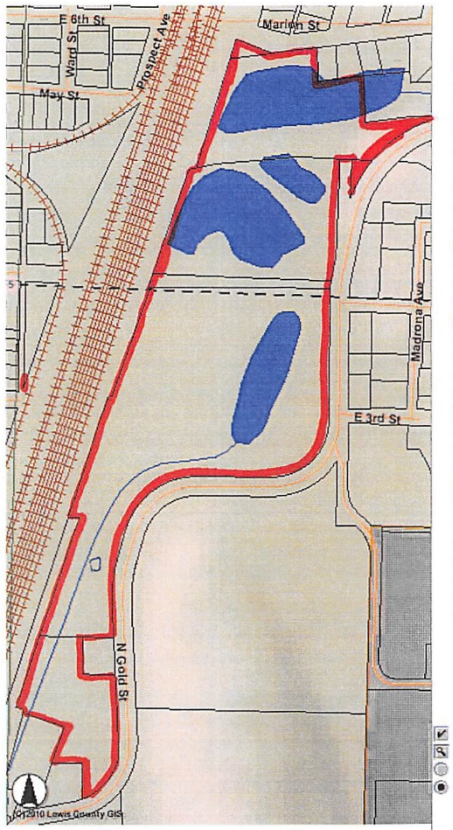
Other Opportunities

Google earth

feet 1000

meters 500

Search Map by Parcel# → SEARCH



LAYERS

- PARCELS
  - Tax Parcels
  - Labels
- BASE DATA
  - PLS, Sections
  - Roads & RRs
  - Streams
  - Water Bodies
  - Cities
  - Federal Lands
- CONTOURS
  - 2ft
  - 10ft & labels
  - Ctour Sources
- CRITICAL AREAS
  - Wetlands
  - Hydric Soils
  - Flood Zones
  - ShorelineEnv
- ZONING
  - Urban Reserves
  - County Zoning
  - Zoning Labels
- BACKGROUND
  - 2009 Aerial NAIP
  - 2008 Aerial WADNR
  - 2006 Aerial NAIP
  - 2003 Aerial WADNR
  - 1996 Aerial WADNR
  - Gray Hillshade
  - USGS Topo

Refresh Map

Auto Refresh

Help

- A visible group/layer, click to hide.
- A visible layer, but not at this scale.
- An inactive layer, click to make active.
- The active layer.

QuickZoom Select Community or City: Sec: 20 Twp: 14 Rge: 2W Go

Design to Store water to 192 foot elevation ((same as the 6-foot berm in study))

KJ 12/12/13

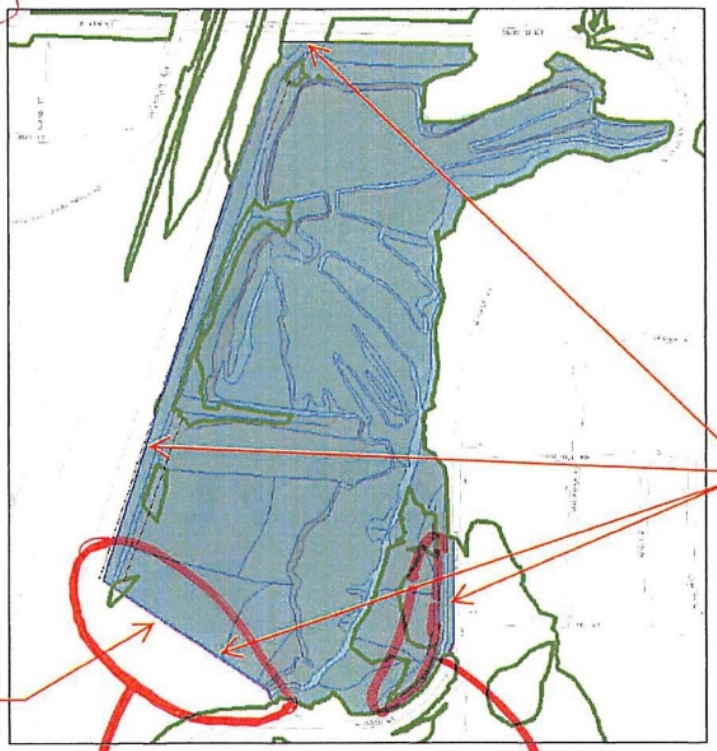


Figure 19. Outline of storage area considered in Agnew Mill Ponds analysis, up to an elevation of 192 feet

Move this berm South to pick up more storage area + flow from "Vinegar Valley" (i.e. Roswell)

KJ 12/12/13

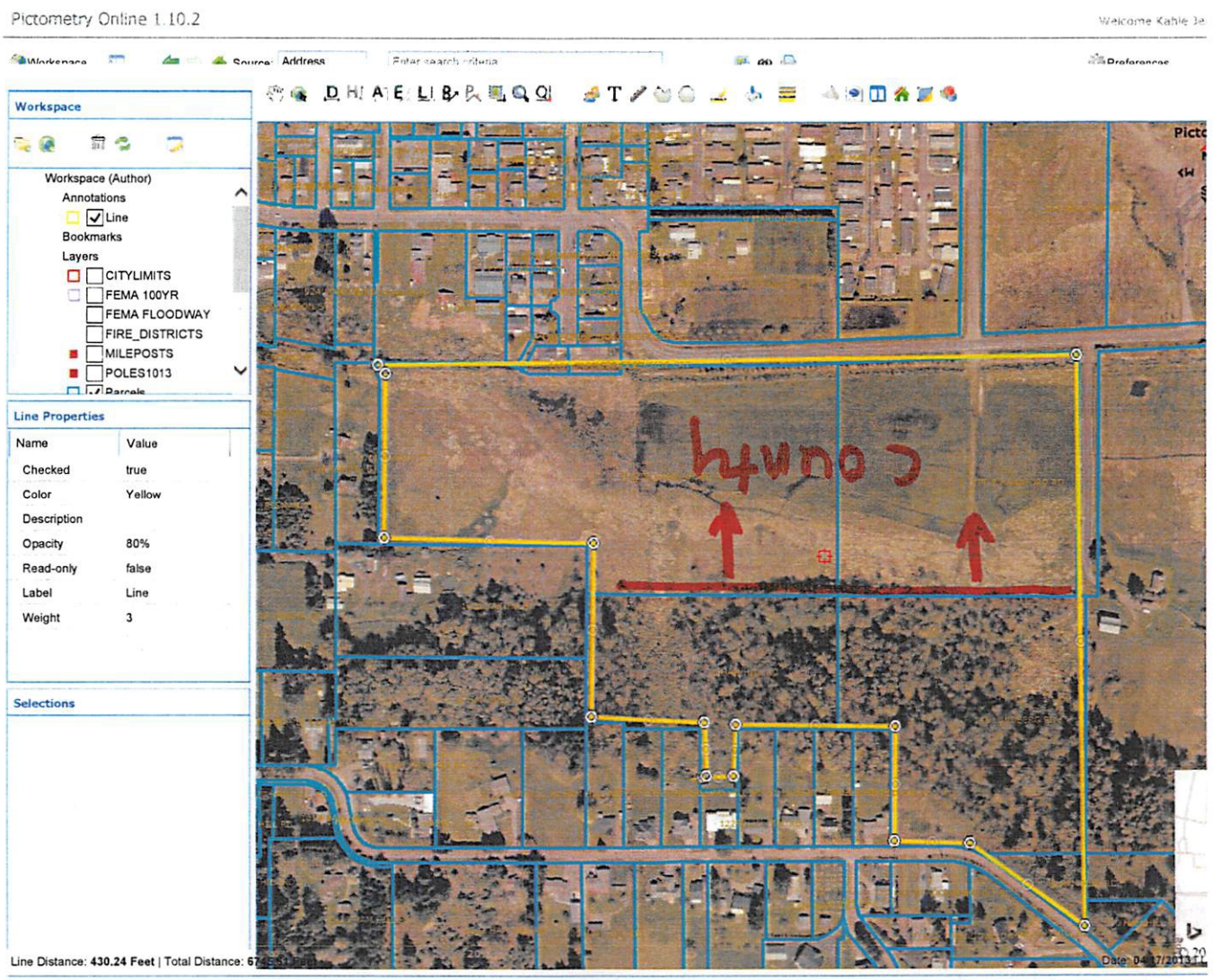
Excavate to mitigate for filling in floop plain to create berm

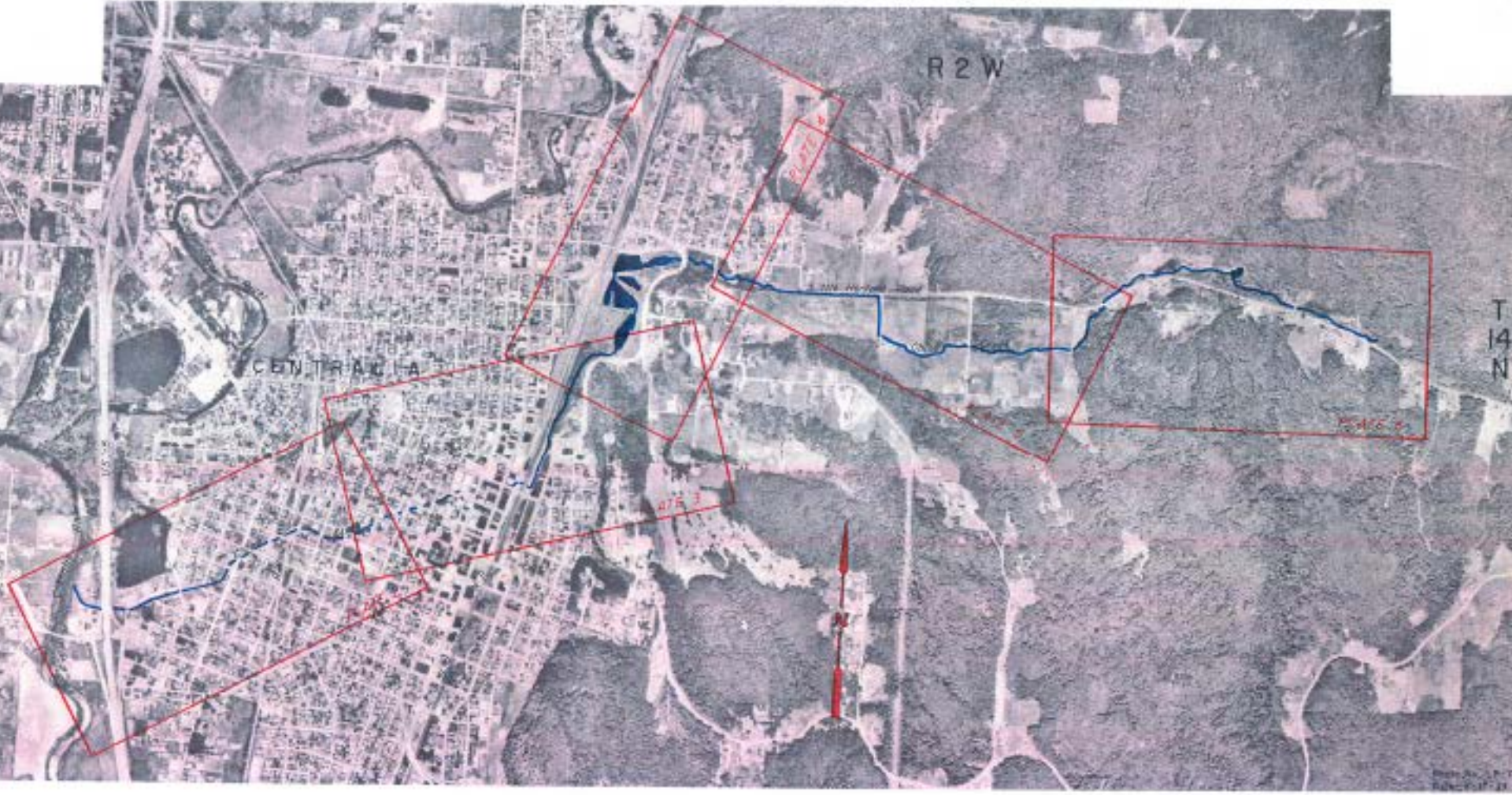
KJ 12/12/13

- Costs of design and permitting could use up all the flood mitigation funding the city received from WSDOT ($465,000)
- Started Conversation with Mark White, Chehalis Tribe Natural Resources Department Director
- That is when things really started to get interesting


WELCOME TO
Brookside Wetland
The Brookside Wetland was created to provide flood storage for the Johnson Creek watershed. This single wetland area can store up to 20 million gallons of flood water. To accomplish this, Johnson Creek was reconnected to its floodplain by removing the fill dirt and buildings that used to be here, returning the area to a more natural state. So now when Johnson Creek rises during a rainstorm, flood waters fill the Brookside Wetland—instead of neighboring homes and roads.
How Brookside Works.
JOHNSON CREEK
Get to know the locals.
Along with filtering flood waters, wetlands provide a habitat for waterfowl, reptiles, amphibians, beneficial aquatic insects and mammals.
Please
Keep dogs on leash and scoop.
Park and lock your bike.
Don't swim. Stumps and boulders hidden under water.
No fishing. Most fish here are endangered.
Killdeer
Talk to the animals. Keep an eye out for some of the year-round residents, including Killdeer, Wood Ducks, Hooded Mergansers, Long-Toed Salamanders, Pacific Tree Frogs and Western Painted Turtles. Seasonal visitors to the area include Rufous-Sided Towhees, Beavers, Osprey and Red-Tailed Hawks.
Fish have homes, too. Many of the fish that make their way through Brookside are endangered. That's why we've created special shaded areas for them to call home. Look for Steelhead, Chinook and Coho Salmon.
Darner Dragonfly
Where the green plants grow. Wetland plants come in all shapes and sizes. Tall trees and sprawling shrubs. Native flowers and grasses. See if you can spot Alder trees, Pacific Willow, Western Red Cedar, Red Osier Dogwood, Big Leaf Lupine, Camas and Slender Rush.
Oregon Grape
Lupine
To enjoy this beautiful wetland, please stay on the gravel paths. These carefully planned walkways will bring you closer to nature at work, without disturbing the fragile ecosystem that makes Brookside so unique.

ood waters fill the Brookside Wetland—instead of neighboring homes and roads.


Pictometry Online 1.10.2
Workspace
Workspace (Author)
Annotations
Line
Bookmarks
Layers
CITYLIMITS
FEMA 100YR
FEMA FLOODWAY
FIRE_DISTRICTS
MILEPOSTS
POLES1013
Line Properties
Name
Value
Checked
true
Color
Yellow
Description
Opacity
80%
Read-only
false
Label
Line
Weight
3
Selections
Line Distance: 430.24 Feet



LOCATION MAP

LEGEND

PLATE 2 — PLAN AND PROFILE SHEET COVERAGE

STREAM CHANNEL STUDIED

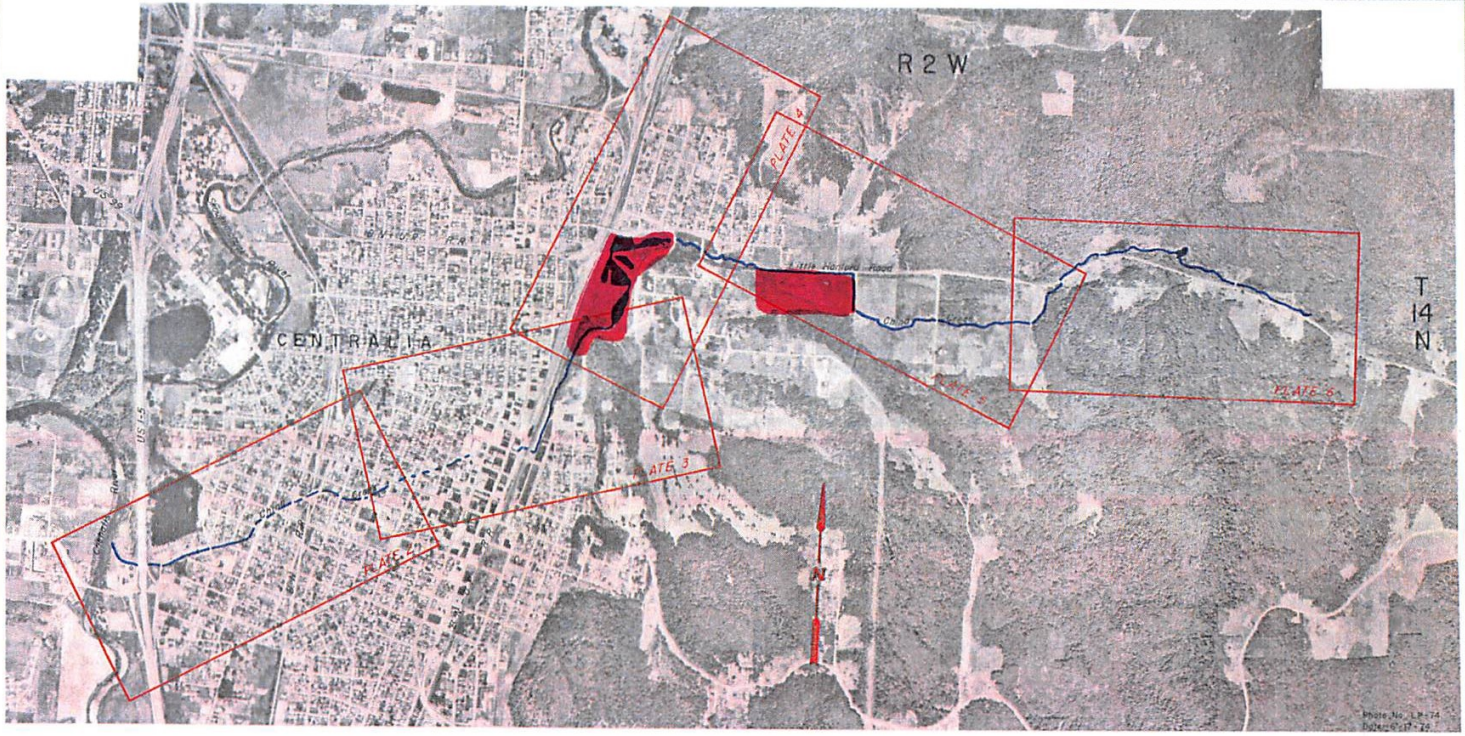
FLOOD HAZARD AREA INDEX

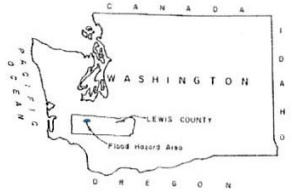
CHINA CREEK

LEWIS COUNTY, WASHINGTON

JULY 1976

PLATE 1





LOCATION MAP

LEGEND

PLATE 2 — PLAN AND PROFILE SHEET COVERAGE

STREAM CHANNEL STUDIED

FLOOD HAZARD AREA INDEX

CHINA CREEK

LEWIS COUNTY, WASHINGTON

JULY 1976

800 0 800 1600 2400 3200 Feet

PLATE 1

U.S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE