



BEAR RIVER PARCEL
STEAMBOAT SPRINGS, COLORADO

PROJECT CONSULTANTS

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A request for proposals from the City of Steamboat Springs for master planning The Bear River Parcel was released in the spring of 2003. The City had received a grant from Great Outdoors Colorado (GOCO) to pay for planning services.

The Bear River Parcel is an approximately 18-acre site that previously housed city sewage lagoons. The Yampa River runs along the southerly edge and a substantial wetland is included in the western third of the property. With the completion of an expansion of the sewage treatment plant, and pipeline improvements, the lagoons can be decommissioned and the site transformed to a city park.

With a master plan in place, the City will be in a position to develop this parcel in a logical fashion as funds become available.

Mountain West Design Group (MWDG) was retained June 2003 to provide site analysis, gather information from interested community members and, working through the design process, produce a project master plan.

MWDG is a design firm based in Steamboat Springs, Colorado dedicated to providing landscape architecture, site planning and water management. Previous local public projects include The Yampa River Botanic Park and Rotary Park Master Plans.

The design, review and approval process to date has included a series of four open houses. Open houses were for all community members with the public being encouraged to attend through newspaper advertisement and radio announcements. Letters of invitation totaling approximately 150 per open house were mailed directly to adjacent property owners as well as individual land owners in the Riverside Subdivision and adjacent mobile home park.



The basis of discussion and dates for the four open houses were as follows:

- * Site Analysis - August 20th, 2003
- * Conceptual Design - October 8th, 2003
- * Preliminary Design - November 13th, 2003
- * Final Master Plans - December 10, 2003 Review and referral by Steamboat Springs Parks and Recreation Commission.

The presented plans and subsequent notes from all open houses are presented in the following document.

A regular Park and Recreation Commission meeting was a part of the last Open House on December 10th, 2003. At the closure of the Bear River Parcel discussion, two motions were made and adopted:

- I. Combine draft master plans A and B into one master plan that would allow for the development of the park with approved uses while not encroaching upon land that may in the future be part of a river realignment.
- II. Make an effort to move forward with a plan to unite and coordinate downstream landowners interested in river realignment with the river realignment on City property.

The next and final step is preparation of Master plan C to address the first motion and completion of the following document for review and adoption by City of Steamboat Springs City Council.





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The City of Steamboat Springs Parks, Open Space and Recreational Services Department and Mountain West Design Group hosted the first Open House for the Bear River Parcel on August 20, 2003 at the Steamboat Springs Community Center. All surrounding neighbors were formally invited to attend the Open House via letter. Public announcements advertised in the *Steamboat Today* and broadcast on several local radio stations encouraged the rest of the community to join.

The objectives at the first Open House were as follows:

- ✦ Introduce the project and project consultants
- ✦ Present base information about the site illustrating historic issues and possible uses.
- ✦ Discuss community visions and goals for the site
- ✦ Gather community input and ideas via. public note taking

Three documents were presented at the first Open House; an Aerial Photo & Location Map (I-2), a Preliminary Site Analysis (I-3), and Preliminary Site Sections (I-4). The information helped familiarize the public with the site, location and scope of the Bear River Project. Following a brief introduction the meeting was opened to the audience to gather thoughts, ideas, and possibilities for the parcel. Major components of the discussion were documented during the meeting and are reflected in the chart at the right.

Following are issues that needed to be addressed prior to the next Open House:

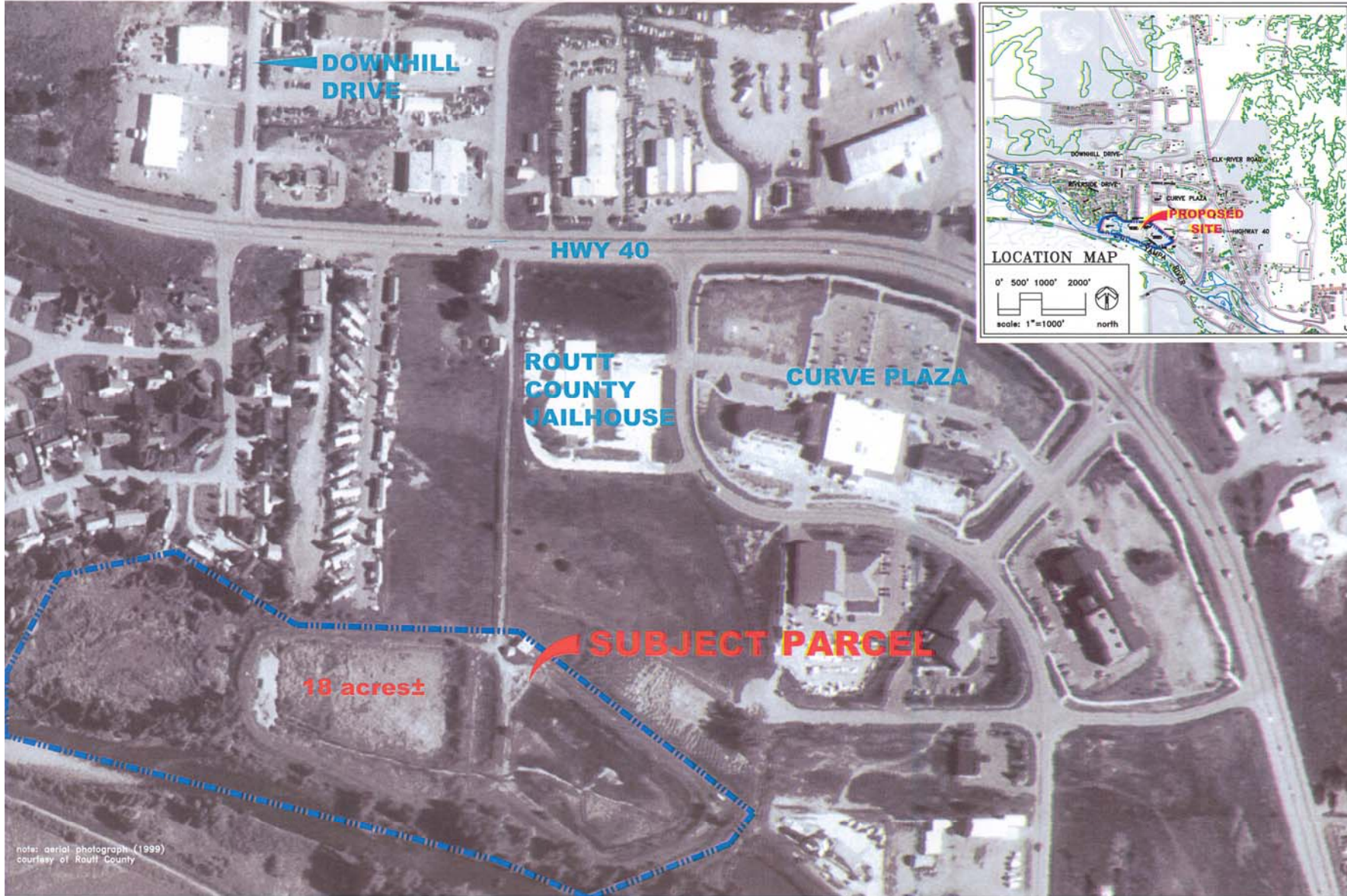
- ✦ Boundary Survey, including sewer line location
- ✦ Wetlands Delineation Mapping
- ✦ Use Concepts



Comments from the First Open House

COMPONENTS	CONCERNS	ACTION
Contiguous Open Space behind Riverside	Welfare of wildlife, bird-watching etc..	
Ball fields	Lights, fertilizers, herbicides, triple crown, parking, noise etc.	
Skate Park	Noise from ramps	Design materials
Dog Park	Containment, maintenance (waste clean-up, erosion)	
Floodplain river channel	Exact location, all or part of the site?	
Wetlands	Functionality, location	Wetland Delineation
Available funds for lagoon clean up?		Research
Access, Riverside neighborhood: vehicle, bike or walk?	Where? How wide?	
Soils	quality, type	Construction techniques
Additional land purchase?	A finger of private land between two public parcels for public access	Find out if purchase is even a possibility
Turf areas for unorganized use		
River access	Location	
Trails: Core Trail	Location & relationship to Riverside neighborhood	
Long-term care of park	Will there be enough funds to maintain park over the years?	
Tennis Courts	Parking, lights, enough space?	
Frisbee Golf		
Playgrounds, organized		
Rec Center / Pool?	Parking, enough space? Right location for use?	
Site property line	Is it correct? What is the actual site boundary?	Survey
Existing sewer line	Where is it? A conflict with planting & development?	Locate sewer line





SITE AERIAL PHOTO & LOCATION MAP

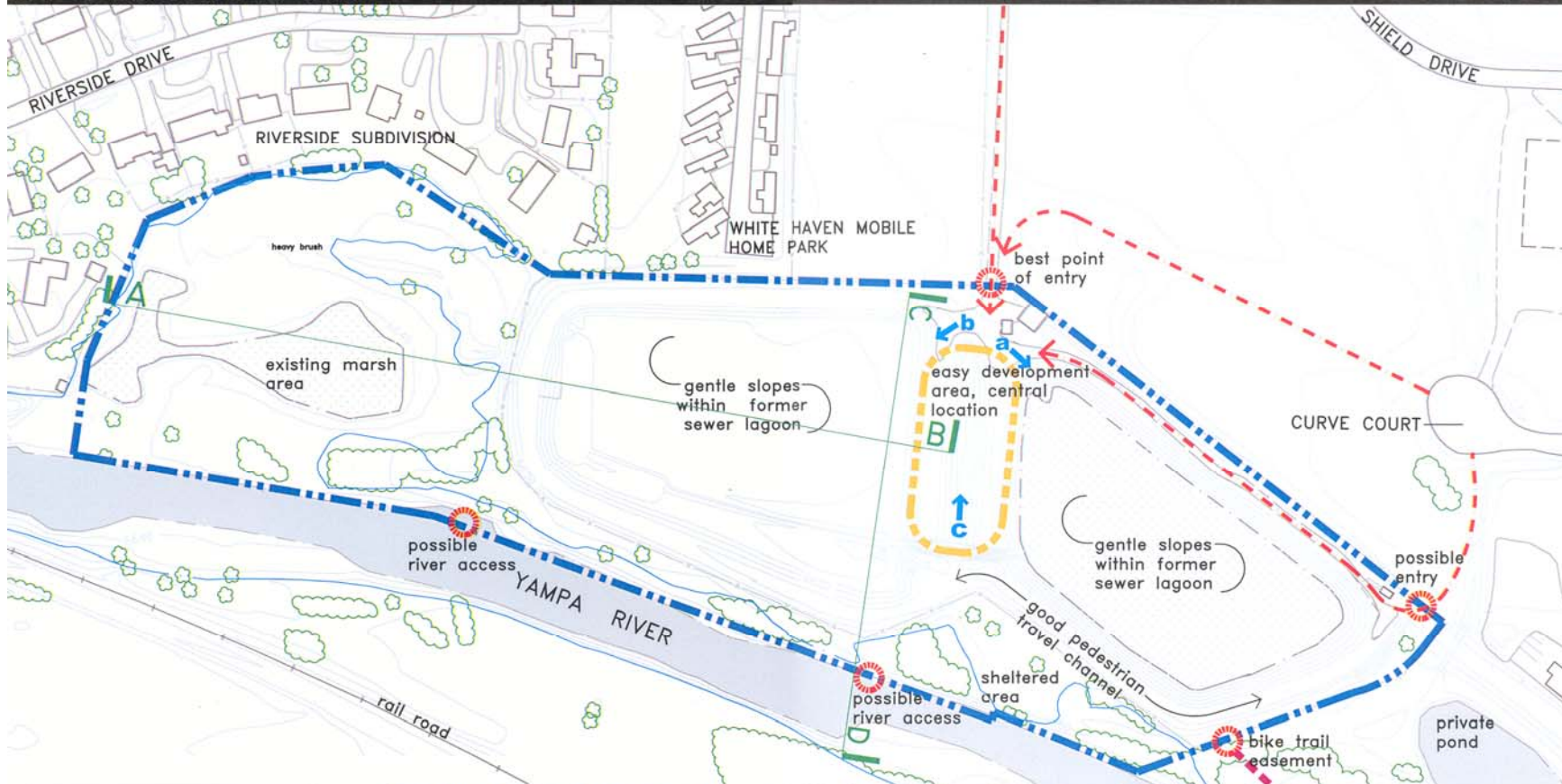
- Yampa River
- Curve Development
- Riverside Subdivision
- Site Location Map

Plan is not to scale

note: aerial photograph (1999)
courtesy of Routt County

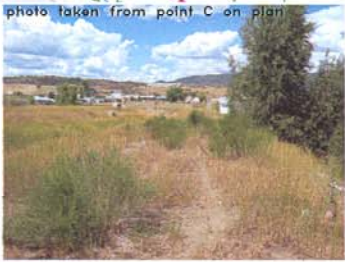
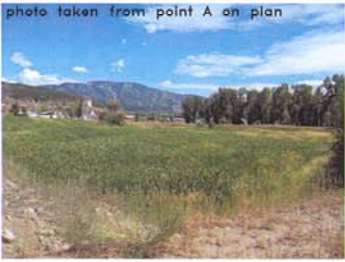
BEAR RIVER PARCEL
STEAMBOAT SPRINGS, COLORADO





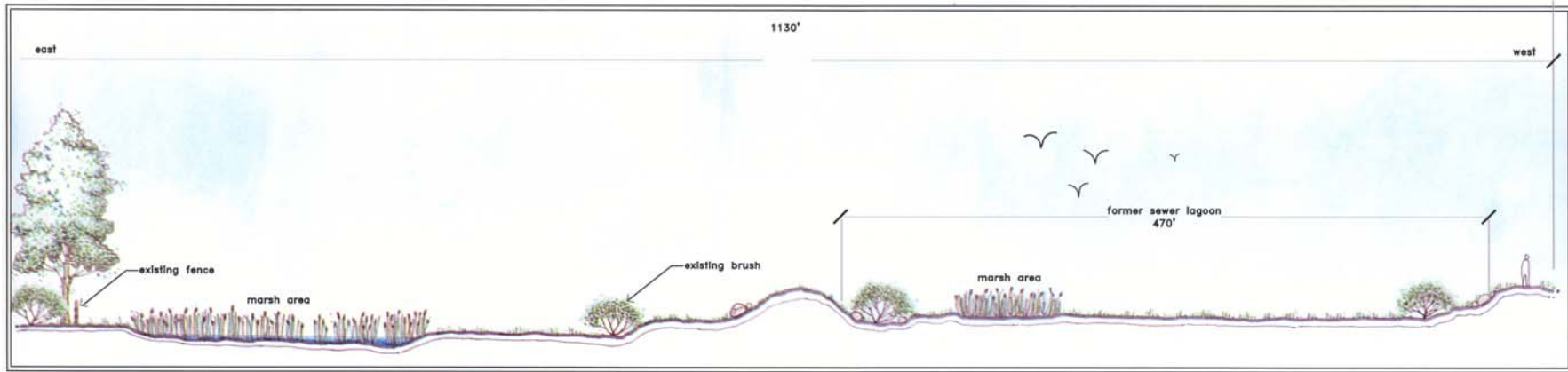
PRELIMINARY ANALYSIS
 -Existing conditions
 -Yampa Core Trail Connection
 -Riverside Subdivision
 -Site Sections A & B
 Plan is not to scale
 Base information provided by City of Steamboat Springs
 Planimetric Data
 October 25, 1994

LEGEND	
	approx. site boundary line
	floodplain, highwater (1998)
	existing fence
	existing topography
	existing water body
	marsh conditions
	existing vegetation
	existing structure

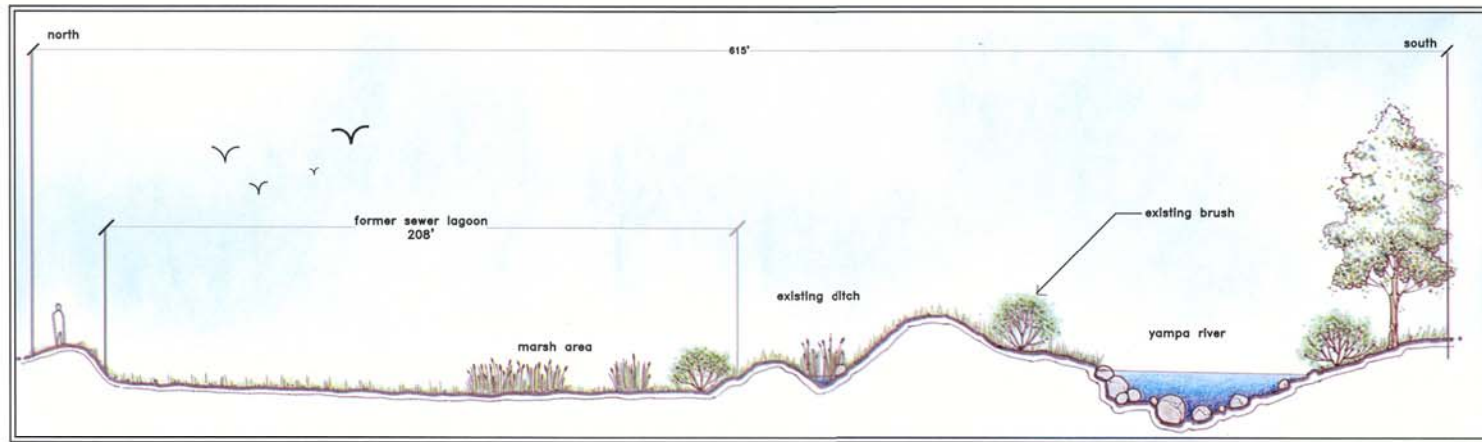


BEAR RIVER PARCEL
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① EXISTING CONDITIONS PARCEL SECTION A-B
horizontal scale: 1"=40'-0" vertical scale: 1:2 aprox.



② EXISTING CONDITIONS PARCEL SECTION C-D
not to scale

PRELIMINARY ANALYSIS SITE SECTIONS

Note: Sections are approximate and are meant to show horizontal and vertical relationships of site features



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Mountain West Design Group held the second Open House for the Bear River Parcel on October 8, 2003 at Olympian Hall, Howelsen Hill. Once again, all neighbors from the Bear River Parcel Area were formally invited to attend the Open House via letter. Public announcements advertised in the "Steamboat Today" and broadcast on several local radio stations encouraged the rest of the community to join and continue their input for the project.

The objective of the Second Open House was to provide updated site information and several illustrated Concept Diagrams the participants could choose from. (see II-3 & II-4) Following the first Open House in August, Landmark Consultants was hired to conduct a site survey (See II-2 for Survey) to include the following items:

- ✘ Site Boundaries
- ✘ Riverside Subdivision lot lines
- ✘ Site Topography
- ✘ Existing Vegetation
- ✘ Total Site Acreage

Using ideas and feedback from the first Open House held in August, four Concept Diagrams were created showing different uses and how they might relate to one another. (see II-4 for Concept Diagrams) The uses were organized from minimal site impact (A), containing only one use, to maximum site impact (D), containing up to seven uses. Following presentation and discussion the participants were asked to express their preference on the best Concept Diagram based on the information provided. The consensus was a combination of two concepts; B and C.

Listed are the issues that require attention prior to the next Open House:

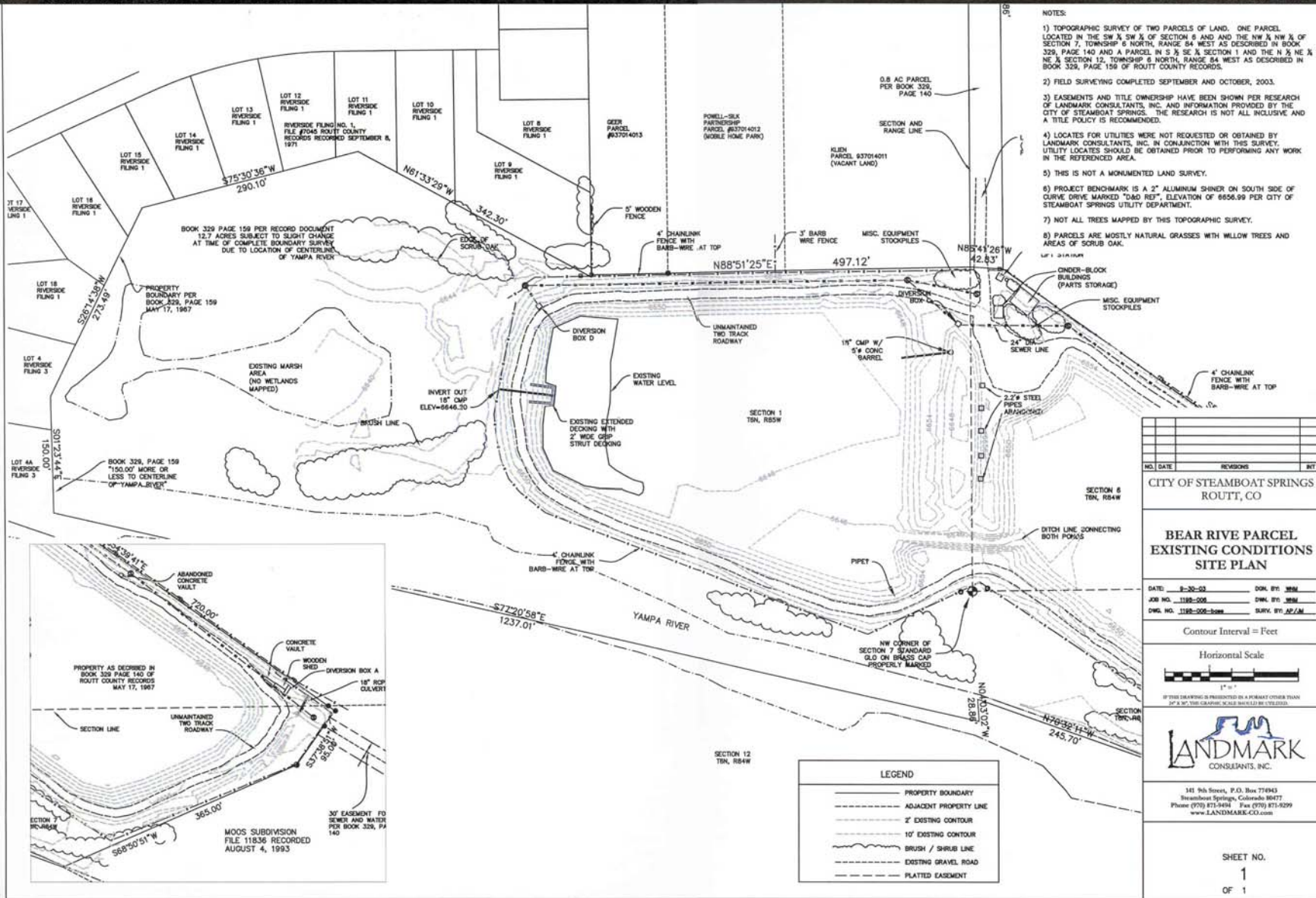
- ✘ Wetland Delineation Mapping
- ✘ Future Judicial Center
- ✘ River Realignment



Comments from the Second Open House

TOPICS	QUESTIONS & VIEWPOINTS
River Realignment	This opportunity may be the only chance to realign the river & slow down bank erosion. Will there be enough room for a river realignment and other uses as well?(yes) What about the safety of Riverside residents? Will there be a greater chance of flooding in the neighborhood? Need to revisit the Yampa River Realignment Study by Basin Hydrology, February 26, 2001. Bring Hydrologist on board?
River Access	Will there be overuse of the river access by commercial tubing companies? Do want access to the river.
Skate Park	If a concrete skate park is installed will skate park at Howelsen remain?(probably) No lighting is wanted at this time. A word of warning: concrete skate parks are very permanent. Will special consultants be brought in to help design a skate park if one is to be built?(yes) Will skaters get to help?(yes)
Access	Direct access off Curve Court is least likely without any easements across existing private property. Central access more likely following an existing easement along sewer line. Could there be access through future Judicial Center? Does there have to be vehicle access & parking? (yes)
Dog Park	Lack of clean-up, erosion. Too close to river for erosion problems. The town of Steamboat is a dog park in itself.
Tennis	No tennis, already enough courts in Steamboat
Picnic Area	Picnic area with shelter OK
Affordable Housing	A letter was received requesting that the site be considered for affordable housing.
Frisbee Golf	Frisbee Golf is wanted per several phone calls and e-mails
Organized Ball Fields	No organized ball fields are wanted due to a general fear that Triple Crown would be introduced to the park.
Open Play Fields	No organized fields are wanted, however unorganized turf space is ok.





- NOTES:
- 1) TOPOGRAPHIC SURVEY OF TWO PARCELS OF LAND. ONE PARCEL LOCATED IN THE SW ¼ SW ¼ OF SECTION 6 AND THE NW ¼ NW ¼ OF SECTION 7, TOWNSHIP 8 NORTH, RANGE 84 WEST AS DESCRIBED IN BOOK 329, PAGE 140 AND A PARCEL IN S ¼ SE ¼ SECTION 1 AND THE N ¼ NE ¼ NE ¼ SECTION 12, TOWNSHIP 8 NORTH, RANGE 84 WEST AS DESCRIBED IN BOOK 329, PAGE 156 OF ROUTT COUNTY RECORDS.
 - 2) FIELD SURVEYING COMPLETED SEPTEMBER AND OCTOBER, 2003.
 - 3) EASEMENTS AND TITLE OWNERSHIP HAS BEEN SHOWN PER RESEARCH OF LANDMARK CONSULTANTS, INC. AND INFORMATION PROVIDED BY THE CITY OF STEAMBOAT SPRINGS. THE RESEARCH IS NOT ALL INCLUSIVE AND A TITLE POLICY IS RECOMMENDED.
 - 4) LOCATES FOR UTILITIES WERE NOT REQUESTED OR OBTAINED BY LANDMARK CONSULTANTS, INC. IN CONJUNCTION WITH THIS SURVEY. UTILITY LOCATES SHOULD BE OBTAINED PRIOR TO PERFORMING ANY WORK IN THE REFERENCED AREA.
 - 5) THIS IS NOT A MONUMENTED LAND SURVEY.
 - 6) PROJECT BENCHMARK IS A 2" ALUMINUM SNIFFER ON SOUTH SIDE OF CURVE DRIVE MARKED "D&D REF", ELEVATION OF 6656.99 PER CITY OF STEAMBOAT SPRINGS UTILITY DEPARTMENT.
 - 7) NOT ALL TREES MAPPED BY THIS TOPOGRAPHIC SURVEY.
 - 8) PARCELS ARE MOSTLY NATURAL GRASSES WITH WILLOW TREES AND AREAS OF SCRUB OAK.

NO.	DATE	REVISIONS	BY

CITY OF STEAMBOAT SPRINGS
ROUTT, CO

**BEAR RIVE PARCEL
EXISTING CONDITIONS
SITE PLAN**

DATE: 8-30-03 DWN. BY: JMM
 JOB NO. 1188-006 DWN. BY: JMM
 DWG. NO. 1188-006-1000 SURV. BY: JZ/M

Contour Interval = Feet



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SHEET NO.
1
OF 1

**EXISTING
CONDITIONS SITE
PLAN**

Following the first open house held on August 20, 2003, Mountain West Design Group along with the City of Steamboat Springs hired Landmark Consultants to conduct a Site Survey to include the following items:

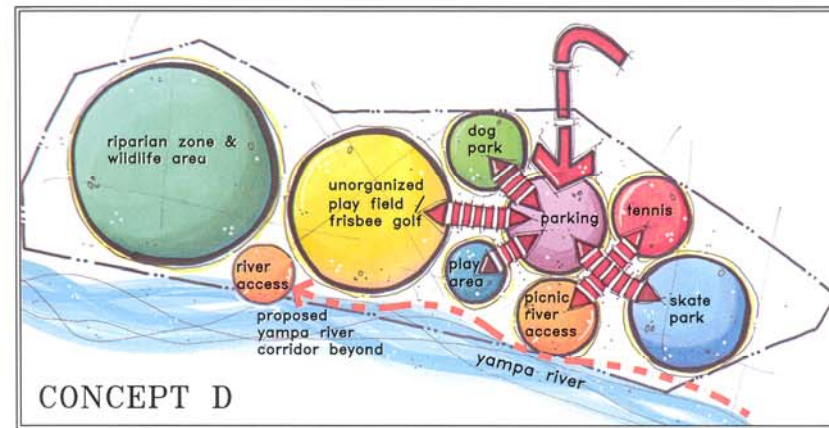
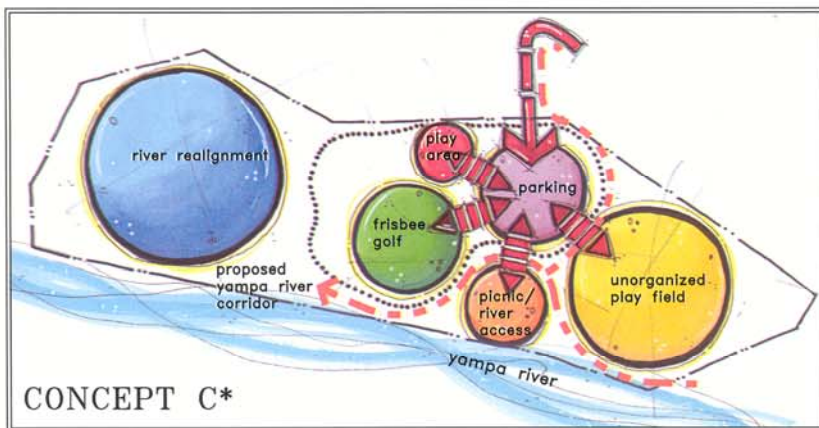
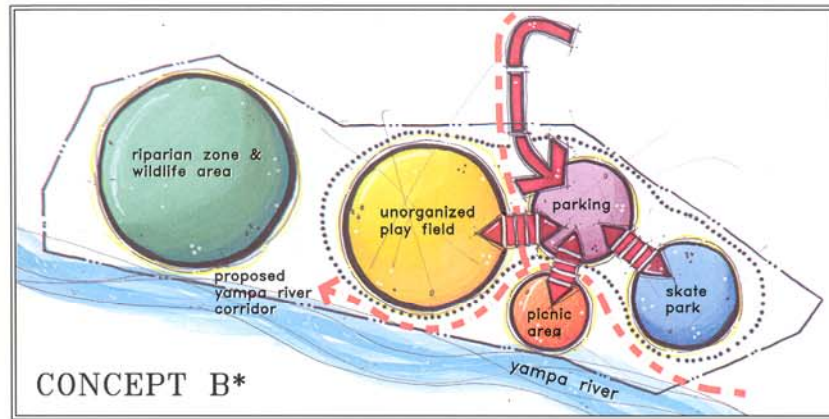
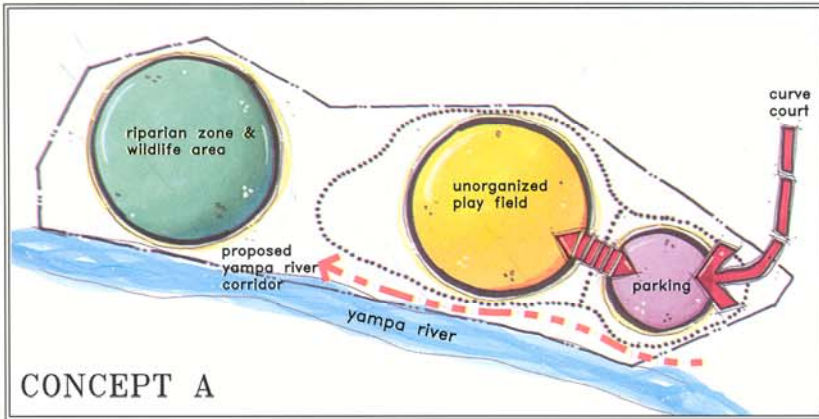
- Site Boundaries
- Riverside lot lines
- Site Topography
- Existing Vegetation
- Total Site Acreage
- Other Miscellaneous

Note reduction is not to scale.



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STEAMBOAT SPRINGS, COLORADO





LEGEND

	property line ±
	pedestrian access
	soft surface trail
	vehicle access
	yampa trail corridor

NOTES

1. All concepts to include structure containing rest room facilities.
2. Vehicle access in concept "A" would require the purchase of additional property to gain a right-of-way from Curve Court.
3. Vehicle access in concepts "B-D" would require widening of an existing utilities right-of-way.
4. * consensus concepts.

CONCEPT DIAGRAMS

Using ideas and feedback from the first Open House on August 20, 2003, Concept Diagrams were created showing different uses and how they might relate to one another.

Note: Concept Diagrams are not to scale and are meant to show uses and relationships only.



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BEAR RIVER PARCEL
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Mountain West Design Group held the Third Open House for the Bear River Parcel on November 13, 2003 at Centennial Hall. Once again, all surrounding neighbors were formally invited to attend the Open House via letter. Public announcements advertised in the Steamboat Today and broadcast on several local radio stations encouraged the rest of the community to join and review Schematic Plans for the Parcel.

The objective of the Third Open House was to provide updated site information and present two Schematic Plans from which to choose.

Following the Second Open House in October, IME was hired to provide Wetlands Delineation mapping in and around the Bear River Site. The preliminary plans for the Judicial Center were also acquired courtesy of Routt County. The new information was integrated with the Site Survey to create a scaled Existing Conditions Site Plan (III-2) for presentation at the Open House.

Two Schematic Plans (III-3 & III-4) were also presented and discussed during the meeting. Each plan contained activities / uses that were similar in nature and are as follows:

SCHEMATIC PLAN A (III-3)

- Riparian & Wildlife Area
- Unorganized Play Field
- Picnic Area with shelter
- Skate Park

SCHEMATIC PLAN B (III-4)

- Yampa River Realignment
- Frisbee Golf
- Playground
- Picnic Area with shelter
- Skate Park

The biggest difference between the two plans was a proposed River Realignment in Schematic Plan B. The River Realignment information was provided from a previous study by Basin Hydrology dated February 26, 2001.

Although the majority of uses were widely accepted, the River Realignment left many people with unanswered questions. There was concern about bank erosion, loss of wetlands, cost and flooding. Without a Hydrologist present at the meeting many of the topics could not be discussed. As a result the participants found it hard to formulate a decision on a single Schematic Plan.

The River Realignment issues required further information and it was concluded that at the following Open House a Hydrologist would attend to answer questions.



Comments from the Third Open House

TOPICS	QUESTIONS & VIEWPOINTS
River Realignment	Does it make sense to add only one meander? Don't we need several meanders together to make a difference? The realignment of the river would destroy natural wetlands that are not replaceable through mitigation. River realignment is not worth it. The river will do whatever it wants no matter what we do. Would river realign reduce or increase flooding in the Riverside Neighborhood? Could a River Realignment prevent council from putting in ball fields? River realignment sounds like a good idea but don't have enough facts to solidify a decision. Too many crucial unknown factors to make a decision.
River Access	Fishing will happen. Could be used as a commercial tubing take-out, parking should accommodate.
Skate Park	Are soils stable enough for concrete skate park? Really need a new skate park; old one is falling apart and dangerous. A new concrete skate park could bring in out of town visitors for competitions etc. Funding for these parks is available through many sources such as the Tony Hawk Foundation.
Access	Is there only one possible access at this point? (yes) Shouldn't there be access to the park through Riverside for neighborhood residents? Is it fair to make people across the street in Riverside drive?
Frisbee Golf	How does a Frisbee Golf course work with other users? Will people be in the way or be hit? Is an 18 hole course to tight for the site? (yes) Will 9 holes be enough to host tournaments? Would a different site with varying terrain be better for this use? What is the difference between Frisbee Golf & a Soccer Field in terms of maintenance? Frisbee Golf can be as simple or complex as you make it. It can be noninvasive and located in natural areas. The only structure you need is a simple basket stand that can be semi-portable. Pedestrian paths can go through and around the course.
Basketball Courts	Some additional Basketball Courts are badly needed in this town. Riverside does not want to see lights.
Outdoor Archery Range	Would like to see an Archery Range. Previous range behind airport was lost.
Funding	Will funds be available for this project? When? Funds are more readily available for Skate Parks and River Realignment. Has anything been priced? (not yet)
Triple Crown	Are we wasting our time at these meetings? The paper said Council will likely want fields for Triple Crown.



SURVEY NOTES:

- TOPOGRAPHIC SURVEY OF TWO PARCELS OF LAND. ONE PARCEL LOCATED IN THE SW 1/4 OF SECTION 8 AND THE OTHER PARCEL LOCATED IN THE SW 1/4 OF SECTION 9 AND ARE THE NEAR BY NEIGHBORS OF THE CITY OF STEAMBOAT SPRINGS. THE SURVEY WAS MADE BY THE CITY OF STEAMBOAT SPRINGS. THE SURVEY WAS MADE BY THE CITY OF STEAMBOAT SPRINGS. THE SURVEY WAS MADE BY THE CITY OF STEAMBOAT SPRINGS. THE SURVEY WAS MADE BY THE CITY OF STEAMBOAT SPRINGS.
- FIELD SURVEYING COMPLETED SEPTEMBER AND OCTOBER, 2003.
- DESCRIPTORS AND TITLE INFORMATION HAVE BEEN PROVIDED FOR REVISION OF LANDMARK CONSULTANTS, INC. AND INFORMATION PROVIDED BY THE CITY OF STEAMBOAT SPRINGS. THE SURVEY IS NOT ALL INCLUSIVE AND A TITLE POLICY IS RECOMMENDED.
- LOCATED FOR UTILITY WORK NOT REQUESTED OR OBTAINED BY THE CITY OF STEAMBOAT SPRINGS. THE SURVEY IS NOT ALL INCLUSIVE AND A TITLE POLICY IS RECOMMENDED.
- THIS IS NOT A MONUMENTED LAND SURVEY.
- DESCRIPTORS AND TITLE INFORMATION HAVE BEEN PROVIDED FOR REVISION OF LANDMARK CONSULTANTS, INC. AND INFORMATION PROVIDED BY THE CITY OF STEAMBOAT SPRINGS. THE SURVEY IS NOT ALL INCLUSIVE AND A TITLE POLICY IS RECOMMENDED.
- NOT ALL NEEDS SHOWN BY THIS TOPOGRAPHIC SURVEY.
- PARCELS ARE MOSTLY NATURAL GRASSES WITH YELLOW TREES AND AREAS OF BROWN GRASS.

SURVEY LEGEND

	PROPERTY BOUNDARY
	ADJACENT PROPERTY LINE
	2' EXISTING CONTOUR
	10' EXISTING CONTOUR
	BRUSH / SWALE LINE
	EXISTING GRAVEL ROAD
	PLATTED EASEMENT

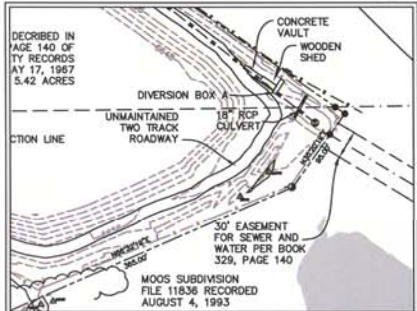
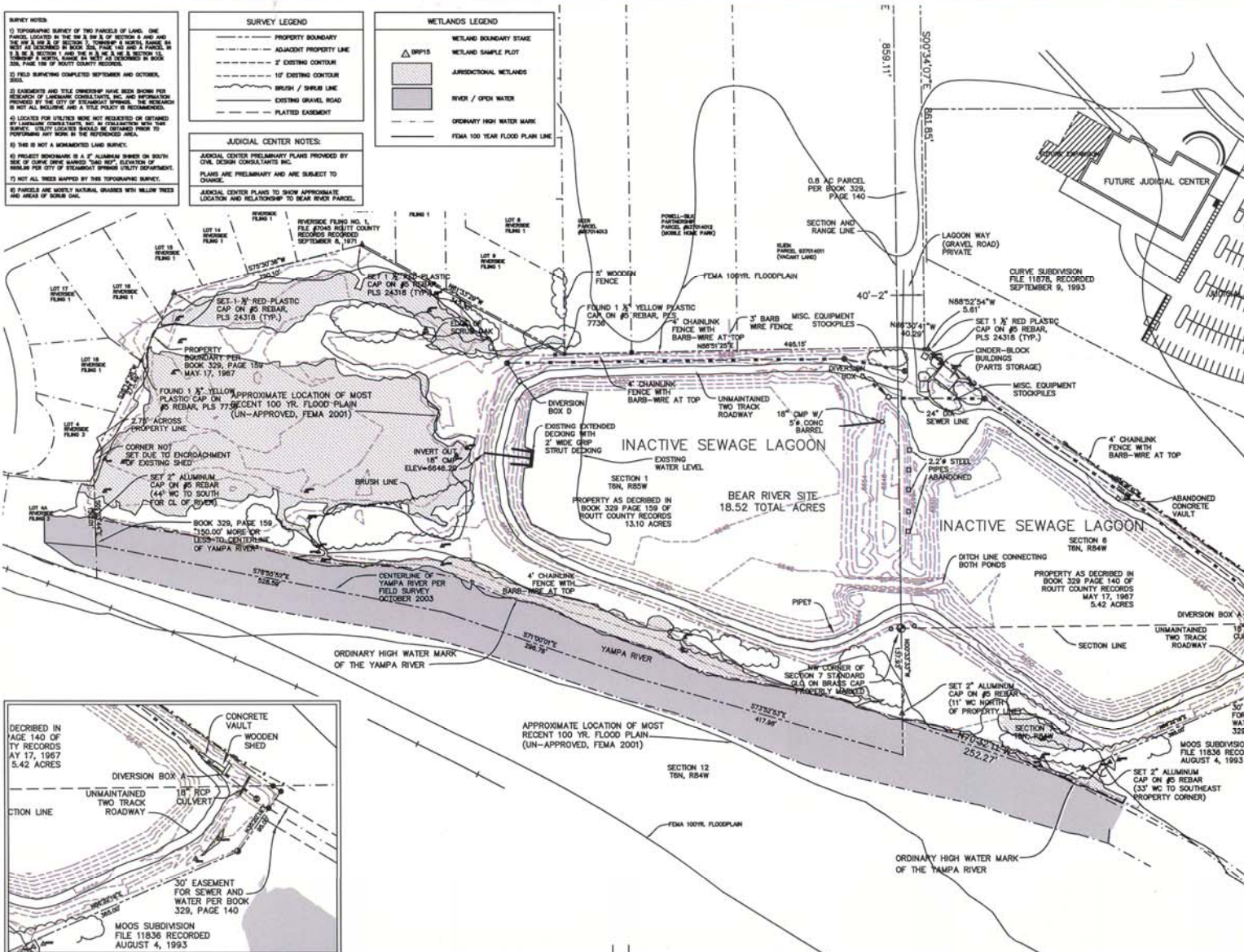
JUDICIAL CENTER NOTES:

JUDICIAL CENTER PRELIMINARY PLANS PROVIDED BY CIVIL DESIGN CONSULTANTS INC. PLANS ARE PRELIMINARY AND ARE SUBJECT TO CHANGE.

JUDICIAL CENTER PLANS TO SHOW APPROXIMATE LOCATION AND RELATIONSHIP TO BEAR RIVER PARCEL.

WETLANDS LEGEND

	WETLAND BOUNDARY STAKE
	WETLAND SAMPLE PLOT
	ARBORESCENT WETLANDS
	RIVER / OPEN WATER
	ORDINARY HIGH WATER MARK
	FEMA 100 YR FLOOD PLAIN LINE



CITY OF STEAMBOAT SPRINGS
ROUTT, CO

**BEAR RIVER PARCEL
EXISTING CONDITIONS
SITE PLAN**

DATE: 11-12-02 DGN. BY: JMM
 JOB NO. 1199-008 DWN. BY: JMM
 DWG. NO. 1199-008-308 SURV. BY: JG/CAM

Contour Interval = Feet

Horizontal Scale

1" = 30'

IF THIS DRAWING IS PROVIDED IN A FORMAT OTHER THAN
24" X 36" WITH GRAPHIC SCALE BOOKS BE UTILIZED.

LANDMARK
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SHEET NO.
1
 OF 3

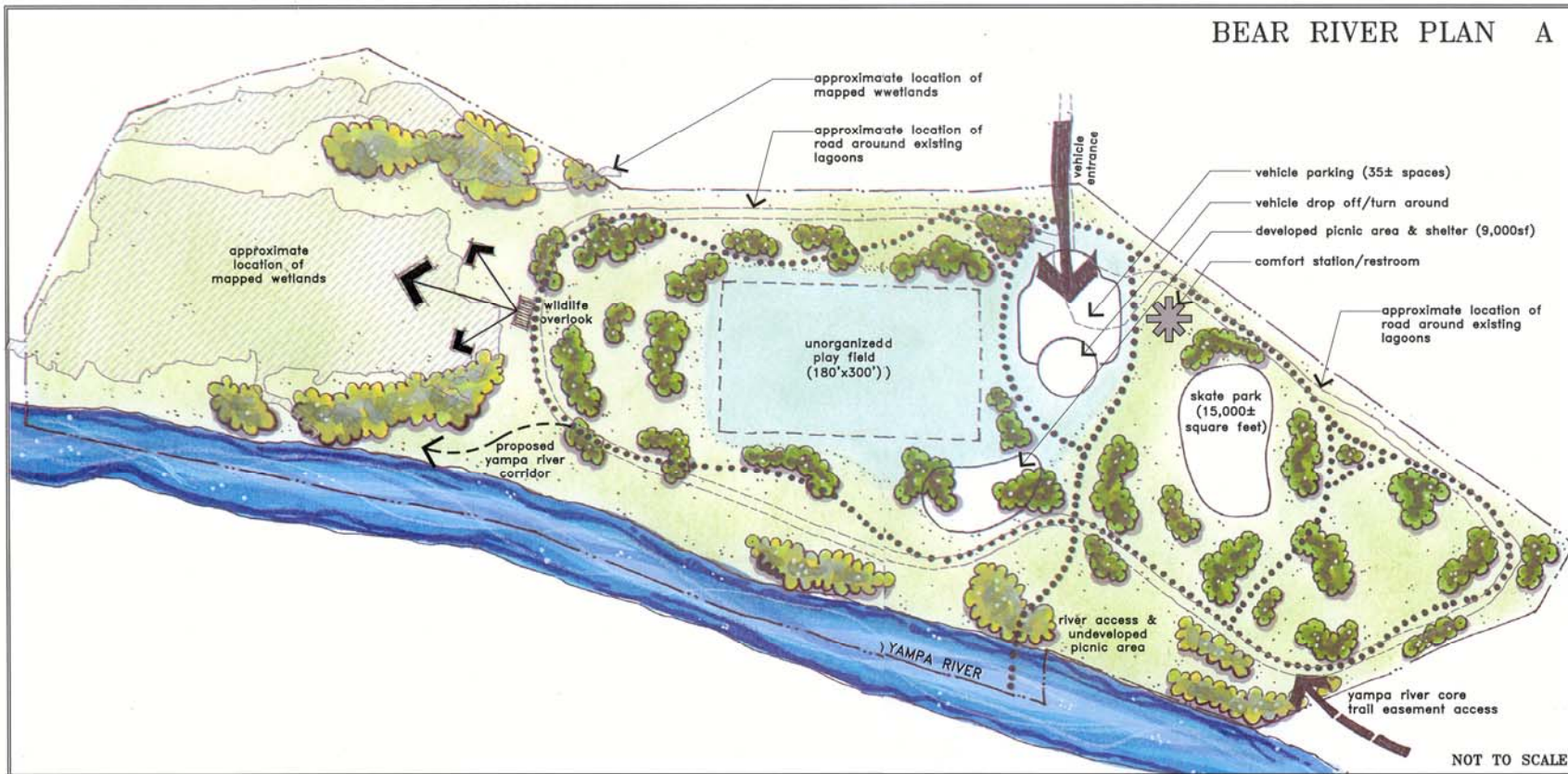
EXISTING CONDITIONS SITE PLAN

Following the 2nd Open House held on October 8, 2003 Mountain West Design Group along with the City of Steamboat Springs hired IME to perform Wetlands Delineation Mapping. The Preliminary Plans for the Judicial Center were also added courtesy of Routt County.

Reduction is not to scale

BEAR RIVER PARCEL
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SCHEMATIC PLAN A

- Riparian & Wildlife Area
- Unorganized Play Field
- Picnic Area w/shelter
- Skate Park

Plan is not to scale, and is meant to show approximate location of uses only.



LEGEND	
	site property line
	soft surface trail
	proposed vegetation
	existing vegetation
	unmaintained/natural area
	maintained area (sod, pavement, etc.)

SITE INVENTORY	
18.5 total site acres	
11.5± acres usable park	
6.15± acres riparian & wildlife area	
.20± acre picnic area	
.34± acre skate park	
.48± acre parking	
1.24± acres unorganized play field	
2.8± acres maintained area	
.53± miles around perimeter trail	

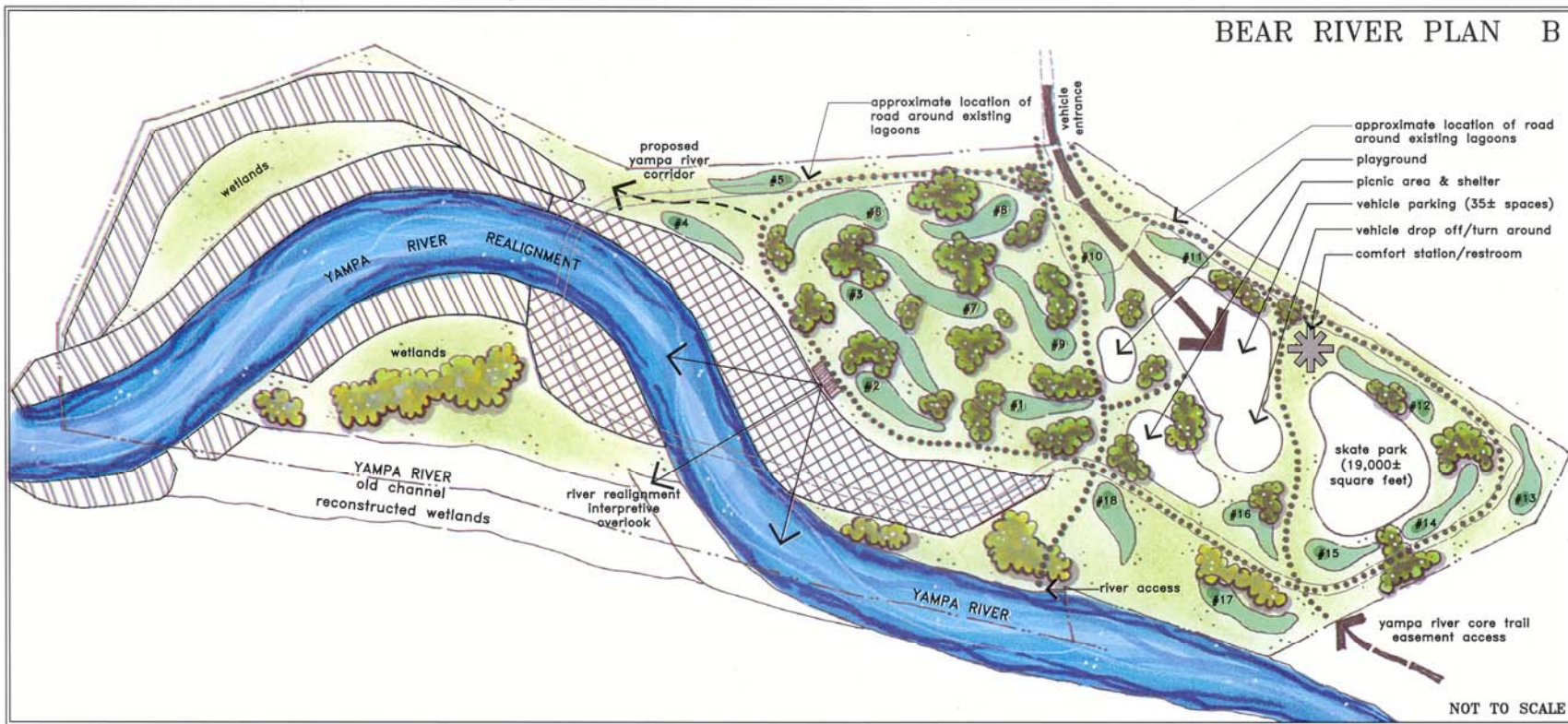
- NOTES**
1. Maintained area may contain irrigated sod and or mowed native grasses.
 2. Undeveloped picnic area to be furnished with several free standing tables placed throughout river access area.
 4. Developed picnic area to contain shelter, tables, barbecues and trash receptacles.
 5. Wildlife viewing platform may contain interpretive signage explaining the reclamation of the former sewage lagoons etc.
 6. Existing site road shown to delineate sewage lagoons in context with proposed design.
 7. River Access to have protected put-in/take-out.

BEAR RIVER PARCEL
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BEAR RIVER PLAN B

SCHEMATIC PLAN B



- Yampa River Realignment
- Frisbee Golf
- Playground
- Picnic Area w/shelter
- Skate Park

Plan is not to scale, and is meant to show approximate location of uses only.



LEGEND

- site property line
- soft surface trail
- proposed vegetation
- existing vegetation
- frisbee golf basket
- bank fill area
- bank cut area

SITE INVENTORY

18.5± acres total site
8.5± acres usable park
9.5± acres river realignment
.17± acres picnic area
.45± acres skate park
.48± acres parking
.40± miles around perimeter trail

- NOTES**
1. River realignment information based on Yampa River Realignment Study prepared for City of Steamboat Springs Parks & Recreation. Prepared by Basin Hydrology, Inc. on February 26, 2001.
 2. Frisbee Golf graphics are representative of numbers & possible locations only, and will not contain irrigated sod.
 4. Topography within recreational park space will be contoured with berms and varied slopes, to create a rolling field affect.
 5. Existing site road shown to delineate sewage lagoons in context with proposed design.
 6. River Access to have protected put-in/take-out.

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STEAMBOAT SPRINGS, COLORADO





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The City of Steamboat Springs Parks and Recreation Commission meeting held on December 10, 2003 at Olympian Hall included the fourth and final Open House for the Bear River Parcel before submittal to Council.

The objectives at the Parks & Rec Commission meeting were as follows:

- ✦ Present two alternate Master Plans. One with a river realignment (IV-3), and one without (IV-2)
- ✦ Answer questions pertaining to a possible River Realignment
- ✦ Evaluate all criteria and choose a single Master Plan for submittal to Council

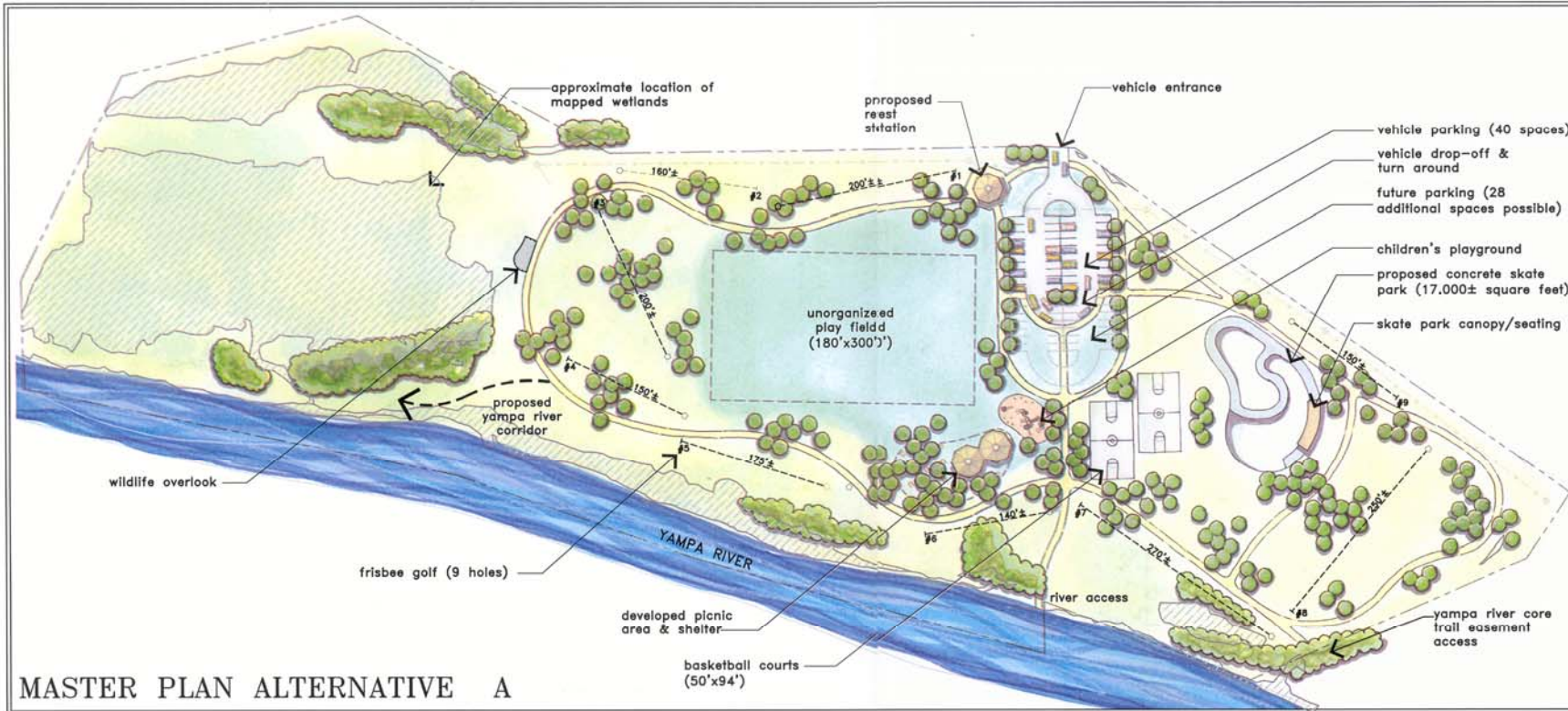
During the Parks & Rec Commission Meeting Mark Oliver of Basin Hydrology was present to answer questions regarding a River Realignment. Among the most common concerns were flooding, loss of wetlands, bank erosion and funding. Oliver was able to answer enough questions (see chart to right) to satisfy the audience as well as the Parks and Rec Commission. Parks & Rec motioned that a new alternate Master Plan "C" be created which would essentially be Alternate "B" without a River Realignment at this time. The new alternate proposed that the existing park plan be implemented as soon as possible, saving an area of land for a possible river meander in the future.

Alternate C was to be created and presented to council.



Comments from the Fourth Open House (Parks & Rec Commission Meeting)

QUESTIONS & CONCERNS	ANSWERS & DISCUSSION
Is there a greater value in realigning the river vs. losing the wetlands which are so fragile?	Any wetlands that might be destroyed would be transferred (including the soils) to the present channel which would act as a flood overflow.
What about flooding in Riverside Neighborhood?	A proposed 3 foot berm would be built to prevent flooding in Riverside and would withstand up to a 100 year flood based on Basin Hydrology Preliminary Studies.
If the meander does not happen, what then? Some people lost up to 8 feet of bank last year in the 10 year flood, will this continue?	If the meander, or meanders do not happen more bank erosion will happen downstream each year.
What is the status of the Wolf Run Ranch realignment? Would Wolf Run see the City as a partner in a combined effort to add several meanders to the Yampa River?	Wolf Run Ranch has a permit for river realignment until 2004 for 2 meanders and would like to see Bear River Parcel add a third meander, however Wolf Run does not want to be solely responsible for cost, and does not want to spend \$600,000 if no one wants a third meander.
What is the significance of installing only one meander vs. several?	Just one meander is not as effective as several, but will help reduce erosion and flooding.
It seems this project hinges on a lot of exterior issues, how is this going to affect the outcome?	City council ultimately will make the decision, it is out of our hands at that point.
Is there public access to the site at this time?	Yes, the City owns a 40 foot wide access from Highway 40.
Are the existing lagoons considered wetlands at this time? If they are dredged and lowered will they flood?	Would be surprised if the Army Corp. of Engineers would classify sewage lagoons as wetlands. After the lagoons are dredged and cleaned up, they would be partially or fully filled out of the flood plain.
What about funding for a river realignment?	\$90,000± in Legacy funds are available now for River Realignment.
Would realigning the river at a later time destroy or disrupt an existing park?	River Realignment is a big issue, it can happen now or later. In the meantime it would be nice to go ahead with the park in Alternate B, and leave the realignment part of plan B an option for the future.



MASTER PLAN ALTERNATIVE A

- Unorganized Play Field
- Frisbee Golf
- Playground
- Picnic Area w/shelter
- Skate Park
- Basket Ball Courts
- River Access

Plan is not to scale

MASTER PLAN ALTERNATIVE A

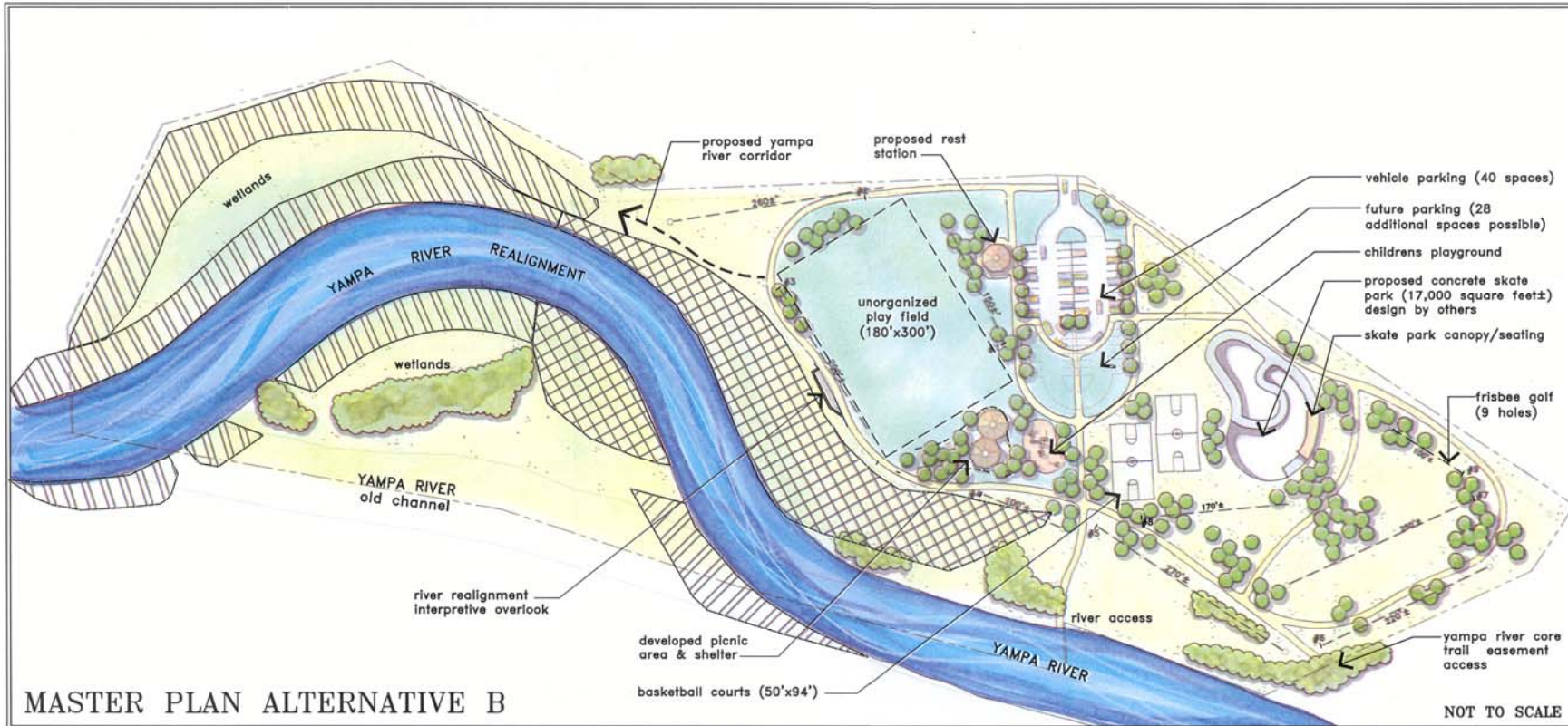
LEGEND	
	frisbee golf
	8' soft surface trail
	proposed vegetation
	existing vegetation
	unmaintained/natural area
	maintained area (sod, pavement, etc.)

SITE INVENTORY
18.5 total site acres
11.5± acres usable park
6.15± acres riparian & wildlife area
.20± acre picnic area
.39± acre skate park
.48± acre parking
1.24± acres unorganized play field
2.8± acres maintained area
.53± miles around perimeter trail

NOTES
1. Maintained area may contain irrigated sod and or mowed native grasses.
2. Developed picnic area to contain shelter, tables, barbecues and trash receptacles.
3. Wildlife overlook to provide viewing platform that may contain interpretive signage explaining the reclamation of the former sewage lagoons etc.
4. River Access to have protected put-in/take-out.
5. Several tables & benches to be dispersed throughout park.

BEAR RIVER PARCEL
STEAMBOAT SPRINGS, COLORADO





MASTER PLAN ALTERNATIVE B

- River Realignment
- Unorganized Play Field
- Frisbee Golf
- Playground
- Picnic Area w/shelter
- Skate Park
- Basket Ball Courts
- River Access

Plan is not to scale



LEGEND

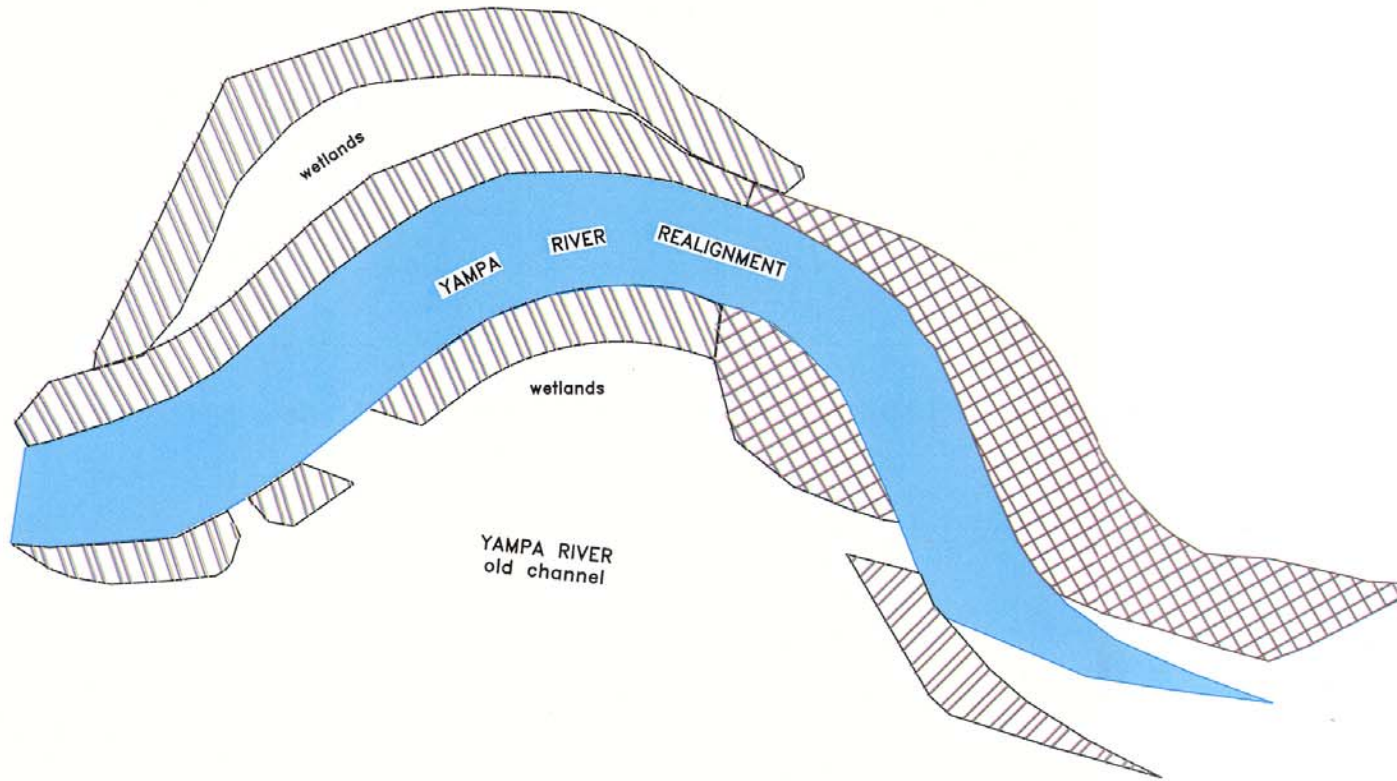
	soft surface trail
	proposed vegetation
	existing vegetation
	frisbee golf basket
	bank fill area
	bank cut area

SITE INVENTORY

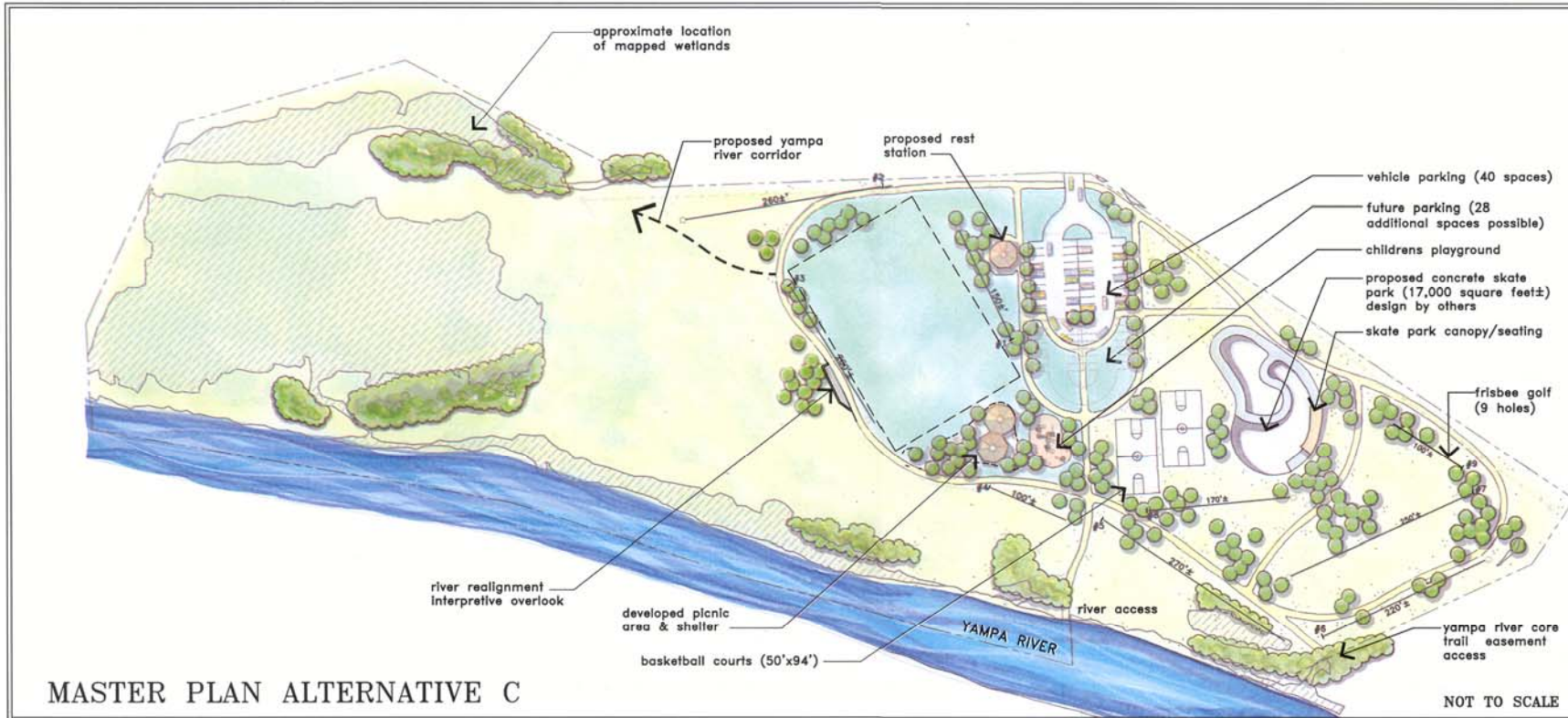
18.5± acres total site
8.5± acres usable park
9.5± acres river realignment
.17± acres picnic area
.45± acres skate park
.48± acres parking
.40± miles around perimeter trail

- NOTES**
1. River realignment information based on Yampa River Realignment Study prepared for City of Steamboat Springs Parks & Recreation. Prepared by Basin Hydrology, Inc. on February 26, 2001.
 2. Maintained area may contain irrigated sod and or mowed native grasses.
 3. Developed picnic area to contain shelter, tables (8±), barbecues and trash receptacles.
 4. River Access to have protected put-in/take-out.
 5. Several tables & benches to be dispersed throughout park.





WITH RIVER REALIGNMENT



MASTER PLAN ALTERNATIVE C

- River Realignment
- Unorganized Play Field
- Frisbee Golf
- Playground
- Picnic Area w/shelter
- Skate Park
- Basket Ball Courts
- River Access

Plan is not to scale



MASTER PLAN ALTERNATIVE C

LEGEND

- soft surface trail
- proposed vegetation
- existing vegetation
- frisbee golf basket
- bank fill area
- bank cut area

SITE INVENTORY

18.5± acres total site
8.5± acres usable park
9.5± acres river realignment
.17± acres picnic area
.45± acres skate park
.48± acres parking
.40± miles around perimeter trail

- NOTES**
1. River realignment information based on Yampa River Realignment Study prepared for City of Steamboat Springs Parks & Recreation. Prepared by Basin Hydrology, Inc. on February 26, 2001.
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BEAR RIVER PARCEL
STEAMBOAT SPRINGS, COLORADO





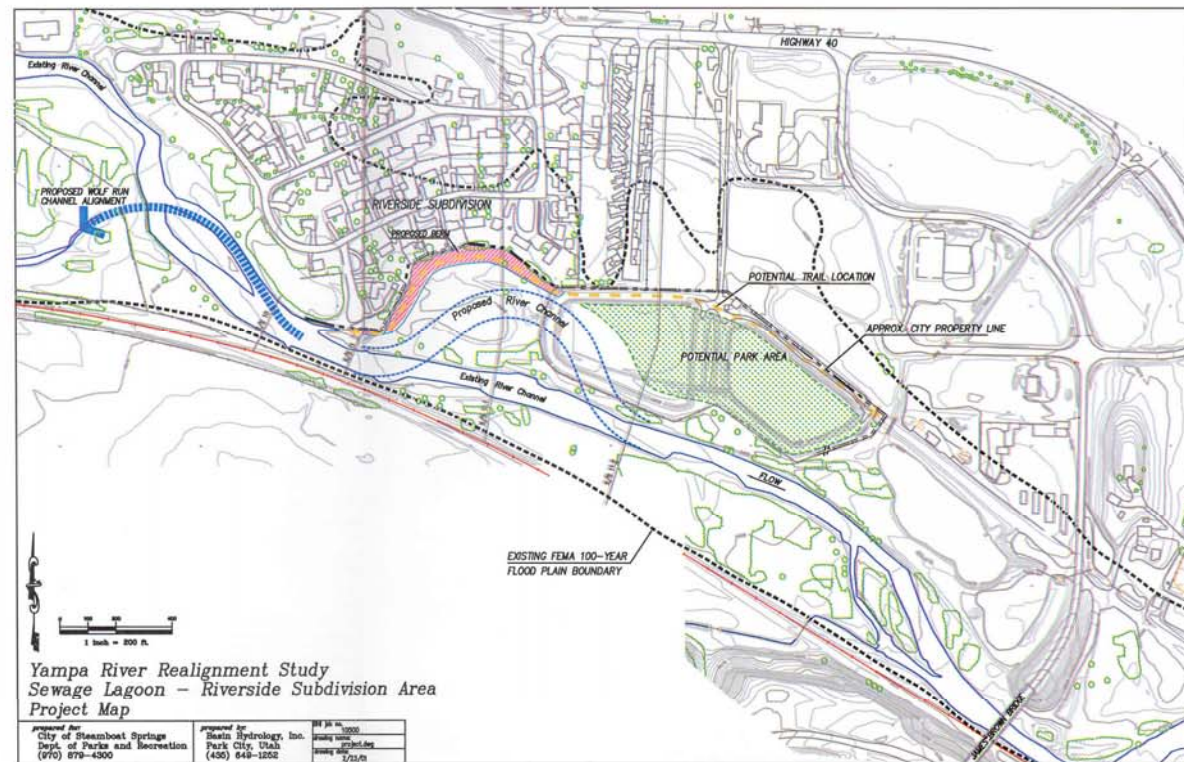
BEAR RIVER PARCEL
STEAMBOAT SPRINGS, COLORADO

INTRODUCTION

This study was performed for the City of Steamboat Springs (the City) to determine the feasibility of relocating a short reach of the Yampa River, including an evaluation of potential adverse impacts. Realignment of this reach would be an initial step toward restoring channel stability to a larger reach of river. This activity would occur in conjunction with the removal of the sewage lagoons, creation of a park and the construction of a major east-west trail. This project could tie into a potentially larger realignment - restoration project immediately downstream. In 1998, the Wolf Run Ranch project proposed to relocate the Yampa River into its former channel (from the Riverside Subdivision downstream to KOA Campground) to restore channel stability and limit active bank erosion. The study area is located immediately south of the Riverside Subdivision and approximately 2,100 feet west (downstream) of the James Brown Bridge (see Project Map).

For the purposes of this evaluation, the study area is more or less limited to the north side of the river from the eastern sewage lagoon (eastern end of City property) west to a point just downstream of the Riverside Subdivision cul-de-sac that terminates at the river. Information presented herein partially relies on studies performed for the Wolf Run Ranch realignment project and topographic information provided by the City. No field surveys were performed specifically for this study.

An Existing Conditions Map shows the study area including present-day and 1954 channel alignments, the sewage lagoon ponds, wetland areas, cross sections used to perform hydraulic evaluations, FEMA's 100 year flood plain boundaries and the Riverside Subdivision adjacent to the study area. A Conceptual Site Plan shows the channel realignment with geomorphically appropriate plan view geometry, required filling to define the new channel alignment, berming proposed to reduce flooding onto Riverside Subdivision lots, a trail alignment and partial regrading of the sewage lagoons to create flood plain area along the new channel. Cross sections show how the existing topography would be modified to accommodate channel realignment. A simplified backwater analysis shows existing flood water elevations and how they may change by channel realignment. Discussions below present the basic assumptions and approaches used to develop the Conceptual Site Plan. In addition, issues which will require further evaluation prior to project implementation are presented.



EXISTING AREA CHARACTERISTICS

The study area, owned by the City, contains two sewage lagoon ponds that are no longer used. These lagoons were used to limit peak flows into the sewer treatment plant. Since the plant has recently increased its treatment capacity, the lagoons can be eliminated. City property also contains a low lying area immediately west of the lagoons which supports wetlands and is inundated by high river flows each year. Immediately north of the wetland area, approximately nine Riverside Subdivision residential lots border City property.

Channel Presently, the Yampa River is basically straight through the study reach. Aerial photography from 1954 shows a river meander was located ~ 400' north of the present-day channel. That same photograph also showed a channel in the approximate present-day alignment. It is unclear which of these channels is older since no other aerial photographs were available for review. The northern channel is probably the older one based on evaluations by Basin Hydrology, Inc. and others of the Yampa River. It appears the area's rivers have become somewhat straighter due to watershed changes and loss of bank stabilizing vegetation earlier in the 1900's.

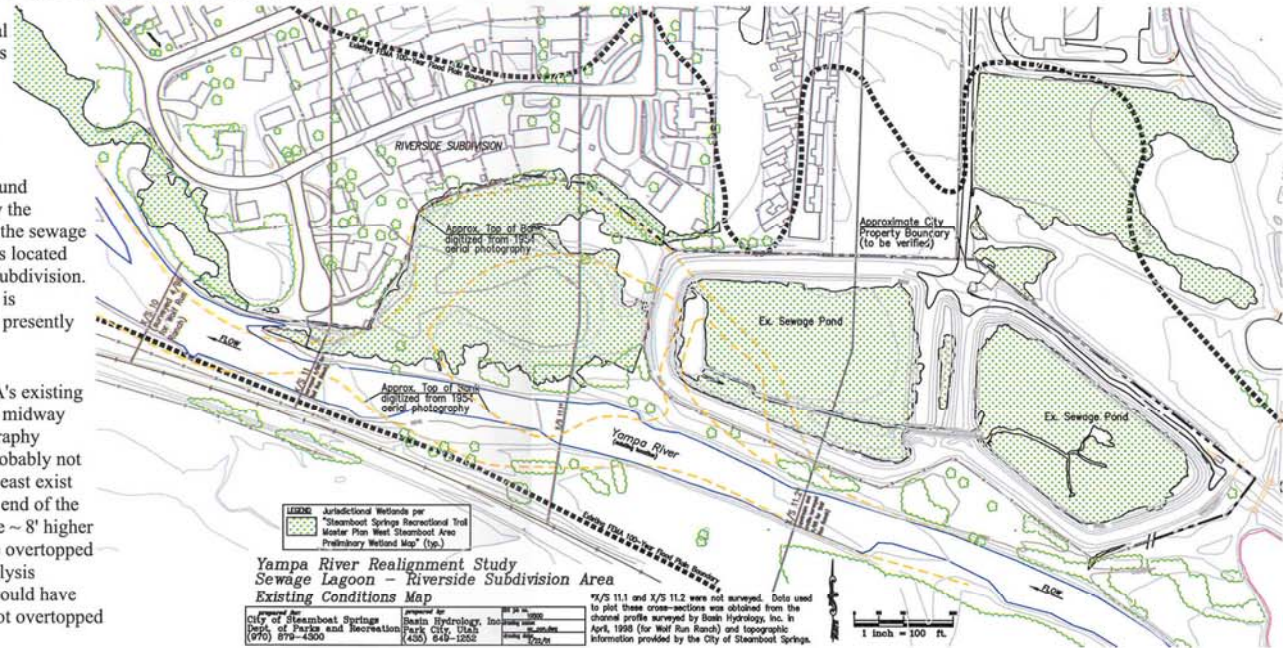
The present-day channel has a bankfull slope of approximately 0.41% through the study reach. Based on information obtained for the Wolf Run Ranch project, channel widths and average depths appear appropriate in this reach (at the downstream end of the study reach - x/s 11). No cross sectional information exists upstream of x/s 11, only profile information (bed, water surface and bankfull elevations). Based on available aerial photographs (1954, 1979, 1994 and 1997), the channel has maintained its present-day alignment from at least the James Brown Bridge downstream to the eastern sewage lagoon. Downstream from that point, the channel alignment location has varied.

Flood Plain The river's present-day flood plains (i.e., ground inundated when over bank flooding occurs) are limited by the presence of the railroad on the south side of the river and the sewage lagoons on the north side. The widest active flood plain is located west of the lagoons between the river and the Riverside Subdivision. This area is low because it was once the main channel. It is continuing to aggrade due to deposition of river fines and presently supports a wetland community.

The railroad grade forms the southern boundary of FEMA's existing 100 year flood plain and the northern boundary is located midway between the river and Highway 40. Based on City topography (~1993), the northern 100 year flood plain boundary is probably not accurate since the sewage lagoons and a large dike to the east exist along the north side of the river between the downstream end of the project area and the James Brown Bridge. These dikes are ~ 8' higher than the river's bankfull elevation and do not appear to be overtopped by the 100 year event based on the limited backwater analysis performed herein. In addition, it is likely that the State would have required the sewage lagoons be constructed so they are not overtopped by the 100 year event.

Definitive 100 year flood plain boundaries, reflecting present-day conditions, will be available when FEMA finalizes its current study in the City and County (due in 2002). Downstream of the lagoons, there is relatively low relief throughout most of the Riverside Subdivision between the river and Highway 40. This indicates the potential for the 100 year flood to inundate low areas of the subdivision west of the lagoons. Three cross sections are attached which show elevations from the railroad tracks to Highway 40 within the study area. Also attached are cross sections showing results from the backwater analysis performed for discharging ranging from bankfull to the 100 year event.

Backwater Analysis A backwater computer model (HEC-RAS, Army Corps of Engineers, 1997, v2.1) was used to approximate water elevations for various flows within the study area. The backwater analysis utilizes only three cross sections therefore its findings should only be considered approximate. This analysis was performed to approximate the water elevations of the existing river alignment and compare how water elevations would change based on the conceptual river realignment. The following table lists the discharges evaluated, by recurrence interval. These discharge values are based on peak discharge data from the USGS's Yampa River at Steamboat Springs gaging station (at 5th Street) using a "normal distribution" analysis of peak flow data from 1969 to 1997.



Flood Flows by Recurrence Interval

Recurrence Interval	Bankfull	2 year	5 year	10 year	25 year	50 year	100 year
ft ³ /sec	3200	3600	4560	5060	5600	5940	6540

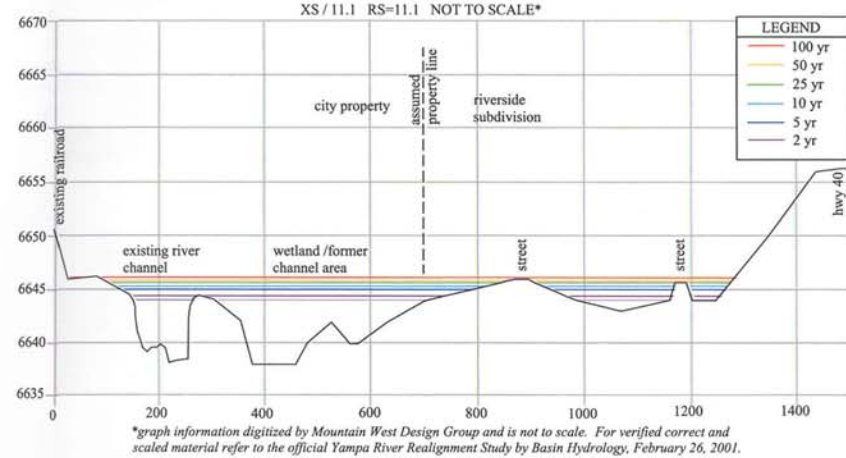
Attached are the three cross section (11, 11.1 and 11.2) showing the approximate location and elevation of various flood flows within the study area. This analysis shows the sewage lagoon dikes are higher than the 100 year flood event (see x/s 11.2) but lands north of it are at an elevation that would be inundated if a breach in the dikes occurs or there are openings along the dike system. Cross section 11.1 shows much of the Riverside Subdivision is subject to flooding since no dike or berm is present. Higher ground adjacent to the river at cross section 11 is not inundated by flood events evaluated herein, but lands near Highway 40 are subject to flooding by all events. This study did not evaluate the effects of berms, dikes, etc. upstream of cross section 11.2 to flooding within the project reach.

Dikes/Berms Lands north of the sewage lagoons are protected to some degree by the 8' high lagoon dikes. It appears that berms and dikes limit the lateral extent of flooding between the James Brown Bridge and the western lagoon. Land on the north side of the lagoons is relatively low and generally only a few feet higher than the top of the river bank (see cross section 11.2). Without these berms and dikes, it is likely that much of the land north of the river, at least in the study area, would be inundated on a relatively frequent basis.

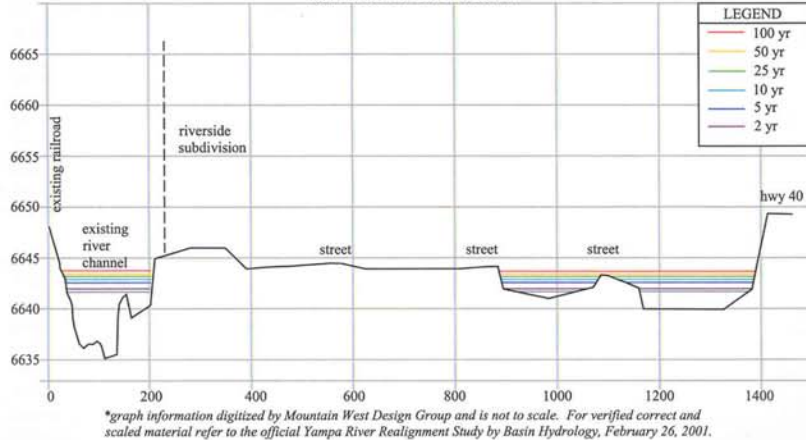
Wetlands The study area supports a 4.3 acre jurisdictional wetland area based on mapping from "Steamboat Springs Recreational Trail Master Plan West Steamboat Area Preliminary Wetland Map". This acreage only includes the low lying area immediately south of the residential lots maintained by natural hydrology. The wetland areas identified within the bottom of the two sewage lagoons was not considered herein as jurisdictional since they occur within sewage lagoon containment systems and it is doubtful that natural hydrology would support these two wetland areas should the lagoon dikes be removed.

The 4.3 acre wetland area was once part of the river channel based on 1954 aerial photography. The 1954 photography also shows a split channel at this location (see Existing Conditions Map for approximate 1954 channel locations). It is unclear whether the river abandoned the northern channel on its own or if it was "placed" in the present-day alignment by construction of the sewage lagoons. Since the 4.3 acre wetland qualifies as jurisdictional waters, authorization from the Army Corps of Engineers would be required to place fill within its boundaries.

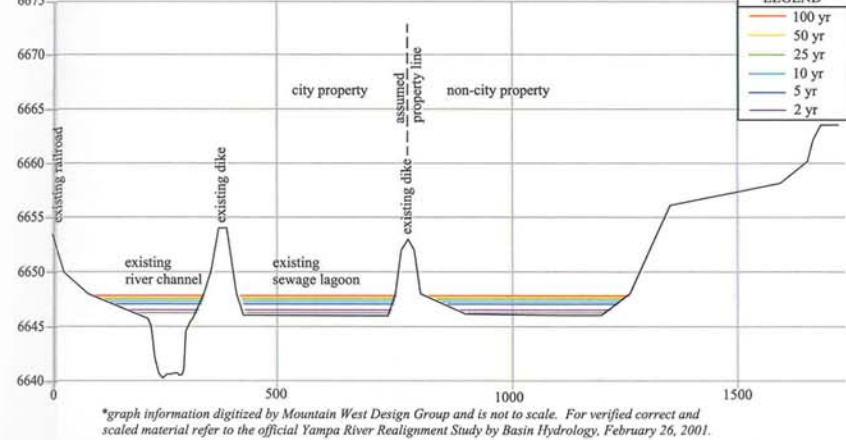
YAMPA RIVER SBS - SEWAGE LAGOON REMOVAL



YAMPA RIVER SBS - SEWAGE LAGOON REMOVAL



YAMPA RIVER SBS - SEWAGE LAGOON REMOVAL



PROPOSED AREA CHARACTERISTICS

The Conceptual Site Plan is based on the following design features. Although some variations of this concept could occur, it represents more or less the basic concept of how the realignment process should be evaluated since the approach used herein considers river morphology, flooding and flood plains, wetlands (impacts and mitigation), revegetation and river-riparian area processes and issues.

Design Features

Several site features and characteristics should be incorporated into any channel realignment at this location. These features are intended to maintain stable channel morphology, allow overbank flooding without increasing year-to-year flooding on adjacent lots within the Riverside Subdivision and minimize and/or replace impacts to jurisdictional wetlands. Specifics of each of these design features are described below.

Channel Features The proposed channel features such as cross section (i.e., width, depth, etc.), plan view geometry (i.e., radius of curvature, meander length and belt width, etc.) and profile (i.e., slope, etc.) are based on characteristics measured on adjacent reaches of the Yampa River and from empirical data for C-type streams.

The **cross section** used for this study is based on data obtained from the U.S. Geological Survey and verified at a number of measured cross sections on the Yampa River through town. A bankfull width of ~ 100' and a mean bankfull depth of ~ 5' are used. These dimensions yield a bankfull cross sectional area of ~ 500 ft². Minor deviations from these values occur depending on pool versus riffle sections.

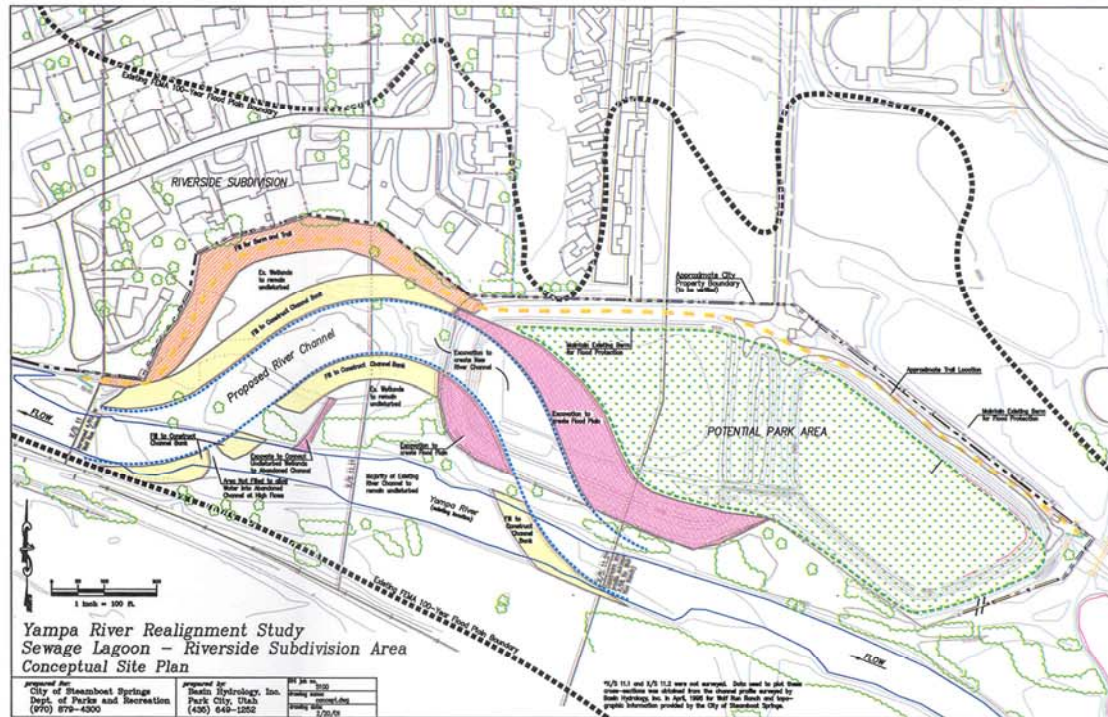
The **radius of curvature** (i.e., radius of meander's curve) used for the realigned channel is ~ 300'. Meanders immediately downstream (as proposed within the Wolf Run Ranch river realignment project) have radii of ~ 300' to ~ 340'. Empirical data for C-type streams (Rosgen, 1996) suggests that radius of curvature should be approximately two to four bankfull widths (or ~ 200' to 400', based on a bankfull width of 100').

The **meander length** used is ~ 1,200'. Downstream meanders (as proposed within the Wolf Run Ranch river realignment project) have meander lengths of ~ 1,400' to ~ 1,650' range. C-type streams typically have meander lengths of approximately 10 to 14 bankfull widths (or ~ 1,000' to 1,400'). A meander length of 1,200' is considered appropriate at this location since the channel is generally straighter upstream (yielding slightly longer meander lengths) and is (has been) more sinuous downstream (slightly shorter meander lengths). This length also minimizes the amount of land required from the sewage lagoons and works well with the meander radius and belt width used herein.

The **belt width** (i.e., cross-valley width of adjacent meanders) used is ~ 450'. Measured belt widths (as proposed within the Wolf Run Ranch river realignment project) have belt widths of ~ 320' to ~ 840'. Belt widths generally increase downstream since the channel is (has been) more sinuous downstream. C-type streams have belt widths of approximately 4 to 20 bankfull widths (~ 400' to 2,000'). A 450' belt width also minimizes the amount of land required from the sewage lagoons and works well with the meander radius and meander length used herein.

The **profile** of the realigned channel matches existing upstream and downstream channel bed and bankfull elevations at the tie-in locations but is ~ 260' longer. The realigned channel has an average bankfull slope of ~ 0.34% compared to the existing channel's slope of ~ 0.41%. The average profile through the proposed Wolf Run Ranch realignment project is ~ 0.41% compared to the existing channel alignment slope of ~ 0.56%. The realigned reach would ideally support both pools and riffles at the proper spacing (5 to 7 bankfull widths or 500' to 700').

Bank Stabilization The outside banks of the realigned meander need to be stabilized to prevent lateral channel migration and maintain channel/bank competence immediately following construction. Since this realignment is in an area bounded by homes and a railroad, more durable structures such as rock vanes and/or J-hooks would be appropriate. In addition to these structural features, an aggressive planting plan of trees (cottonwoods) and shrubs (willows, dogwoods, alders, currents, etc.) would further facilitate bank stabilization, improve aesthetics and benefit fisheries and wildlife.



*See page V-6 for enlargement of Conceptual Site Plan



Flood Plains Fill would be required to create/define the appropriate size channel and adjacent flood plains from its point of divergence to its point of convergence with the existing channel. This fill would redirect channel flows away from and back into the existing channel and define the channel within the low area (jurisdictional wetland) north of the residential lots. Where fill is required to redirect or define the realigned channel, a 50' width of fill is proposed. This width would minimize wetland impacts and provide a reasonable width for bank stabilization and revegetation activities. A narrower width may be desirable but 50' allows for vegetation establishment which will lower the likelihood that the channel would establish a new channel through low areas behind these constructed flood plain areas. Flood plain elevations should match the channel's bankfull elevation throughout the realigned reach to function properly. The exception would be on the inside of the meanders where the fill material (or excavated sewage lagoon berms) could be ~0.5' to 0.75' lower than bankfull. This lower elevation will facilitate sediment deposition during high flows and encourage natural revegetation with native species.

Removal of the south and west portion of the sewage lagoon dikes would also be required to restore flood plain area along the realigned channel. Flood plains formed by excavation are shown to be ~100' wide. This will allow the river to dissipate energy by over bank flooding and provide areas for revegetation which benefit aesthetics, fisheries and wildlife. Flood plain widths need to be narrower at the northwest corner of the west sewage lagoon to maintain existing dike height and at the downstream channel tie-in location (near x/s 11) since a limited amount of City property exists at this location. The site configuration shown on the Conceptual Site Plan results in the creation of ~1.4 acres of flood plain as a result of removing the sewage lagoon dikes. More flood plain acreage could be achieved but it is unclear how the City would utilize the reclaimed sewage lagoon area and how much land or configuration is required to accommodate that layout.

Backwater Analysis Based on a comparison between backwater analyses performed for the existing river alignment and the proposed realignment, the following findings are presented. These findings are based on a very limited and simplified analysis but they should be representative of actual conditions (a detailed and site specific analysis would be required to accurately reflect existing alignment and potential channel realignment characteristics).

No change in water elevations occurs at the downstream cross section (x/s 11) for any of the modeled discharges.

Water elevations at x/s 11.1 increase by ~0.15' for the bankfull discharge and increased by ~0.19' for the 100 year discharge.

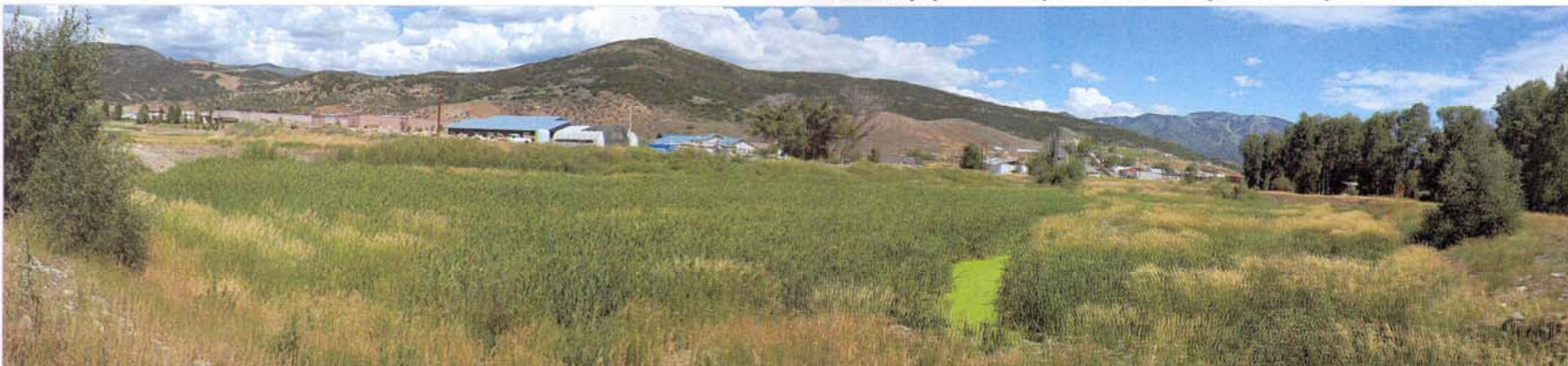
A 3.5' high constructed berm along the City - Riverside subdivision property line is not overtopped by the 100 year event (with or without channel realignment).

Three feet of fill placed within the area identified as Potential Park Area would preclude it from being inundated by the 100 year event.



Dikes/Berms Since it appears at least the eastern portion of the Riverside Subdivision experiences some level of flood protection by the existing sewage lagoon dikes, they should be retained, at least the north side dikes, to maintain the same level of protection. These berms could be reshaped for aesthetic and revegetation purposes but would ideally maintain the same elevation. However, additional backwater evaluations or upon review of FEMA's finalized flood study, these dikes could be lowered and still maintain the current level of flood protection (at least up to the 100 year event).

West of the sewage lagoons, there are no berms or dikes that limit flood waters from entering the Riverside Subdivision. Several of the lots bordering the potential channel realignment area have backyard elevations that are at and below the bankfull elevation of the present-day (and proposed) channel and are subject to flooding (based on the backwater analysis). To increase the flood protection for the lots between the sewage lagoons and the subdivision cul-de-sac, a dike or berm is proposed. As shown herein, this feature would be ~3.5' above the bankfull elevation at cross section 11.1. This elevation could be higher and match those of the sewage lagoon dikes but this would be ~8' higher than the ground elevation at the City - residential property line. A dike of this height would probably be unacceptable to residents due to visual impacts. Therefore, a lower elevation berm that increases the subdivision's level of flood protection is shown. The final height would need to consider residential flooding concerns and visual impacts but its design includes 4:1 slopes (H:V) for easy revegetation. The sewage lagoon dikes and the constructed berm proposed herein do not necessarily increase the level of flood protection of the subdivision downstream of the cul-de-sac since flood waters could enter the subdivision near the cul-de-sac and inundate areas north and west of that location. The existing dikes and proposed berm only serve to limit flooding within eastern portion of the subdivision.

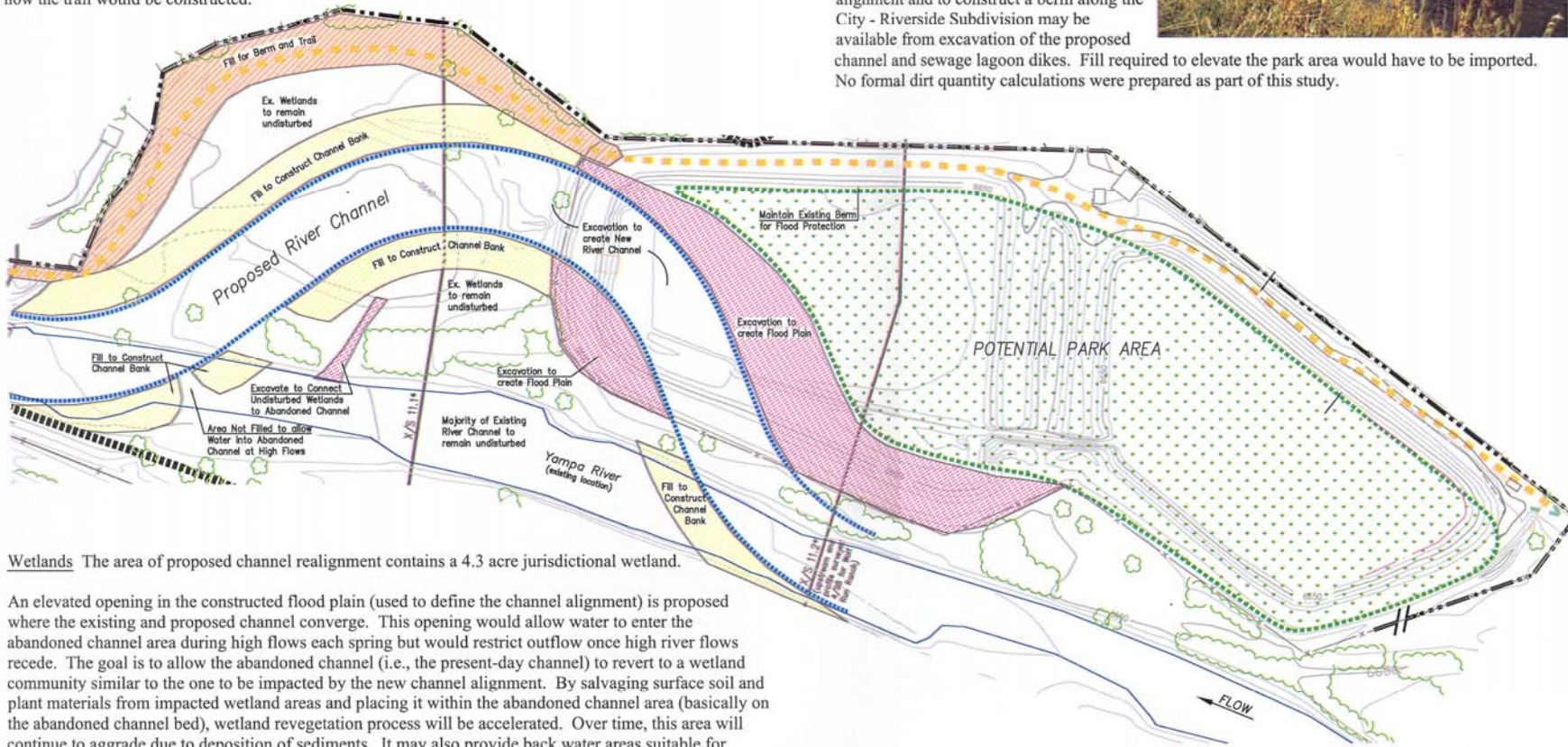


BEAR RIVER PARCEL
STEAMBOAT SPRINGS, COLORADO

Trail The trail alignment concept presented herein parallels the City's north property line from the east side of the sewage lagoons west to the Riverside Subdivision cul-de-sac (near x/s 11). The trail could either be on top or side of the existing or proposed berms/dikes. Along the residential lots, a 12' wide trail has been incorporated onto the south side of the proposed berm at an elevation that is ~ 2' above the bankfull elevation so it is not flooded by the 100 year event. A trail on the constructed flood plain along the north side of the realigned channel is considered inappropriate since the trail would be inundated by flood waters in most years for a few days to few weeks due to overbank flooding. Elevating the trail to limit inundation would create a berm and prevent flood waters from utilizing the flood plain area north of the trail. A trail at the south end of the Riverside cul-de-sac may be difficult to construct due to proximity of the City property line to the river bank. To construct a trail at this location would either require placement of fill within an already narrow flood plain/wetland area (undesirable) or obtaining an easement on non-City property (or a combination of both). The actual location of the property line will largely dictate where and how the trail would be constructed.

Useable Sewage Lagoon Area Based on this concept plan and the assumed property lines, removal of the sewage lagoons would provide ~ 5.6 acres for a park area. Three feet of fill (above the bankfull elevation) within the park area would prevent flooding for up to the 100 year event (based on the backwater analysis performed herein).

Fill Material Fill required to elevate the park area, to define the new channel alignment and to construct a berm along the City - Riverside Subdivision may be available from excavation of the proposed channel and sewage lagoon dikes. Fill required to elevate the park area would have to be imported. No formal dirt quantity calculations were prepared as part of this study.



Wetlands The area of proposed channel realignment contains a 4.3 acre jurisdictional wetland.

An elevated opening in the constructed flood plain (used to define the channel alignment) is proposed where the existing and proposed channel converge. This opening would allow water to enter the abandoned channel area during high flows each spring but would restrict outflow once high river flows recede. The goal is to allow the abandoned channel (i.e., the present-day channel) to revert to a wetland community similar to the one to be impacted by the new channel alignment. By salvaging surface soil and plant materials from impacted wetland areas and placing it within the abandoned channel area (basically on the abandoned channel bed), wetland revegetation process will be accelerated. Over time, this area will continue to aggrade due to deposition of sediments. It may also provide back water areas suitable for various life stages of native fisheries.

BEAR RIVER PARCEL
STEAMBOAT SPRINGS, COLORADO

POTENTIAL ENVIRONMENTAL CHANGES

Implementation of features shown on the Conceptual Site Plan would result in some environmental changes to the area. These changes, presented below, are based on limited site-specific information and a general understanding of the area and related processes.

Channel The proposed channel realignment would place the active channel closer to a residential subdivision. Large flood events could result in higher flow velocities near residential lots compared to the present-day alignment since the area near the residences is a backwater area. With the construction of a berm along the City - subdivision boundary, residents could expect increased flood protection. A detailed study would need to be performed (or wait for FEMA's study) to determine the actual berm elevation required to prevent flooding from recurrence intervals of up to the 100 year event. With an aggressive revegetation program, over-bank velocities could substantially be reduced on the north side of the realigned channel thereby promoting more flow conveyance on the south side of the realigned channel during flood events.

Bank Stabilization Adequate bank stabilization measures would be required to control lateral migration along the north side of the realigned channel and at the upstream and downstream tie-in locations. These structures would limit the river's ability to migrate towards the residential lots or railroad grade and would also provide additional fish habitat.

Flood Plains The channel realignment would only slightly alter flood elevations within the study area (increase to ~ 0.2' higher for the 100 year event) but the area of active flooding would shift from the north side of the present-day channel to the south side of the realigned channel. Removal of the near-river sewage lagoon dikes provides a net increase in flood plain area. It is likely areas within the Riverside Subdivision which presently experience frequent flooding would continue to experience flooding, unless a berm is constructed along the City - subdivision boundary. The water elevation in the channel would not change at the downstream end of the study area but could increase up to ~ 0.2' at the mid and upper cross sections for all the various discharges evaluated.

Dikes/Berms Construction of a berm along the City - Riverside Subdivision property line may be undesirable by some residents bordering the property line. Instead of having direct access to the river area, they would be separated by a low elevation berm. Such a berm would greatly reduce the flooding potential north of the property line and could aid in discouraging trespass by trail users. It may be necessary to construct a small swale on the north side of the berm to convey runoff water (from snowmelt or rain events) away from the lots since water now drains directly to the south into the wetland area. Such a swale would need to slope to the west.



Trail A new trail along the City - subdivision property line may be considered an adverse impact by residents bordering the property line since a trail would bring more people (and pets) through the area compared to the present. Other residents may consider the trail a benefit which provides a safer and more enjoyable means of non-motorized travel to downtown and resort areas.

Wetlands Channel realignment would impact ~ 3.0 acres of these wetlands due to construction of the berm/trail feature (~ 1.2 acres) and fill needed to define the new channel (~ 1.8 acres). An additional 1.1 acres of wetlands would be impacted by excavation of the realigned channel. To minimize impacts and to replace (mitigate) these wetlands while maintaining required river and flood plain processes, several features are proposed. They include limiting the width of fill required to define the channel to 50' on either side, not filling the entire wetland area and providing a surface hydrologic connection between the river and the undisturbed wetland areas on both sides of the new channel. Subsurface hydrologic connection would still remain but the goal is to provide a surface connection since the present-day wetland is at least partially supported by a direct connection with the river.

Wetland impacts could be reduced from those described above by reducing the width of the berm along the City - subdivision property line and to a lesser degree, the width of the fill needed to define the new channel alignment. Should the Army Corps of Engineers require additional wetland replacement, lands between the present-day channel and the railroad alignment could be excavated to increase wetland area as could areas within the sewage lagoons that are not proposed for active flood plain. Some credit from the Army Corps of Engineers should be requested for creation of additional flood plain area and increased channel length.



Shallow Water Table Because the river channel was once located along the City - subdivision property line (per 1954 aerial photography), it is likely the land within the Riverside Subdivision is already subject to shallow water tables. Elevated ground water is likely present from late spring to mid summer due to the subdivision's historic adjacency to the river and it lies within the river's low, broad valley bottom. The existing wetland area just south of the City - subdivision property line likely limits the rate at which shallow sub-surface water drains from this area compared to when the active channel existed at this location. This wetland area would tend to maintain elevated water tables north along the City - subdivision property line. By contrast, lands adjacent to river channels have high water tables generally only when the river is high but then quickly drain and become lower when the river levels decrease. In the river realignment concept, lots closest to the City - subdivision property line would experience this phenomenon more than would lots more distant since this draw down affect decreases with increasing distance from the river.

The installation of shallow water table monitoring piezometers within the study area would help correlate shallow water table elevations and durations with river stage. This would provide significant information regarding potential impacts of channel realignment on shallow water tables in this area.

Mr. Mike Campbell
 Mountain West Design Group
 P.O. Box 772107
 Steamboat Springs, CO 80477

February 16, 2004

RE: Bear River Parcel - Miscellaneous River Issues BHI No. 5100

Mr. Campbell:

Per your request, I have prepared this letter which addresses 1) the benefits of restoring just the Bear River parcel meander versus multiple meanders, 2) the functional value of existing and any replacement wetlands including their reestablishment time frames and acreages, and 3) the costs of restoring the Bear River parcel meander.

One versus Multiple Meander Restoration

As you are aware, rivers are dynamic and complex systems. Changing one of its functioning parameters upsets the balance of the other parameters. Based on our conceptual meander realignment design prepared in 2001, the Bear River meander would increase the Yampa River's channel length ~ 260'. This length in and of itself will not significantly increase this reach's (e.g., James Brown Bridge to KOA) overall channel length or stability nor dramatically improve stability on a local level. Due to the downstream meander cutoffs and the resulting channel adjustments that are still on-going, greater in-channel and bank work would be required at the downstream end of the realigned Bear River meander to protect the meander and relocated wetlands from channel adjustment processes that could adversely affect realignment efforts.

The reach downstream from the Bear River parcel has experienced two significant meander cutoffs resulting in an overly steep gradient. As a result, the river is attempting to regain stream length through lateral adjustments which in turn creates accelerated bank erosion. In addition, our 1998 channel surveys revealed that there are a couple of obvious channel headcuts (e.g., overly steep channel drops) with the most prominent one being just downstream of the Bear River parcel. These features migrate upstream and have the affect of lowering the channel bed which in turns tends to put more erosive pressures on adjacent banks.

Restoring the Bear River parcel meander and the two downstream meanders proposed by Wolf Run Ranch, stream length increases by ~ 1,300' to 1,400', which is significant. From a morphological perspective, this option is preferred as it is a "systems approach". It requires a much greater financial commitment but much is gained in channel stability including decreased bank erosion and improved riparian function and establishment. Meander restoration on this scale would eliminate existing headcuts whereas the Bear River meander restoration project could not.

From a cost perspective, the Bear River parcel meander will have the highest unit construction cost due to complete channel reconstruction and the moving and reestablishment of a wetland complex. By comparison, downstream meander restoration will generally involve only minor excavation and transferring of wetland materials.

Existing and Future Wetland Values

It should be noted that I have not performed a detailed site evaluation of these wetlands. Therefore, this discussion is based on limited field exposure, aerial photography evaluations and discussions with Riverside residents.

The subject wetlands are the result of the Yampa River abandoning its channel. Since the 1950's, water-carried sediment and debris have accumulated at this site which are slowly raising its elevation. Due to surface and subsurface connection with the river, it has long duration wetland hydrology - meaning it is inundated and/or saturated for expended periods, if not most of the year. It supports a mix of wetland grasses and woody shrubs.

Due to its connection to the river, it performs a number of wetland functions. These include sediment and nutrient retention, flood flow attenuation, ground water recharge and wildlife-riparian diversity. Of these functions, the first three are probably the most important although the area is relatively small compared to the river and watershed size. Adjoining residents likely create adverse affects which diminish its wildlife functions. This wetland also receives surface runoff from developed lands to the north. As such, it performs sediment and pollutant filtering prior to waters entering the river.

Should meander restoration be performed, wetland soil and plant materials would be salvaged and reapplied to properly regraded areas where the present-day channel is located. The new wetland area would be designed to mimic the topographic character of the existing wetland to replicate, to the extent possible, present-day hydrologic regime and river connectivity. Reapplying salvaged wetland soils and vegetation and supplemented by additional seeding and containerized plantings, greatly decrease reestablishment time and therefore its functional value.

Based on my river and wetlands experience, approximately three to five growing seasons would be required before the site has a "natural" appearance and has functional values approximating the present-day wetland area. The difference between the new and the existing wetland will be that wildlife-riparian diversity may increase slightly due to more isolation from human interactions but it would no longer be able to filter surface runoff from developed areas. Depending on final layout of the meander, trail, flood berm and park, there may be sufficient space to filter runoff from developed areas before it enters the river utilizing existing and/or created wetlands on the north side of the river.

Using the 2001 conceptual realignment plan and the wetland boundaries shown on the Bear River Parcel Existing Conditions Site Plan (11-13-03), it appears that ~ 1.8 acres of wetlands would be filled and excavated to accommodate channel realignment. Maximizing the west end of the parcel for wetland creation, ~ 2.1 acres could be achieved. Additional wetland acreage (~ 0.4 acres) could also be created by modifying the area between the 'unorganized play field' and the realigned river (see Alternative B, 12-10-03). Based on detailed site design, there is the potential that these impact acreages could be reduced and creation acreages could be increased.

Meander Costs

These costs were developed from the 2001 conceptual plan. They should be considered approximate (but may be a bit high). They do not include soil import or export, dealing with the sewage lagoon berms nor maximizing wetland creation.

CHANNEL CONSTRUCTION	excavation	\$76,000
	bank stabilization	\$28,000
	bank revegetation	\$10,000
	<i>subtotal</i>	<i>\$114,000</i>
WETLAND REESTABLISHMENT	grading (incl. in channel costs)	\$0
	reapply topsoil & vegetation	\$4,000
	revegetation	\$20,000
	<i>subtotal</i>	<i>\$24,000</i>
TRAIL & BERM CONSTRUCTION	grading	\$7,000
	revegetation	\$5,000
	<i>subtotal</i>	<i>\$12,000</i>
SURVEY, DESIGN & PERMIT		\$10,000
STAKING & CONSTR. OVERSIGHT		\$5,000
SUBTOTALS		\$165,000
CONTINGENCY (20%)		\$33,000
TOTAL		\$198,000

Please call if you have any questions regarding this matter.
 Sincerely, T. Mark Oliver

