DRAFT_Conceptual Design Proposal
- Lower Diamond Fork Creek -

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Brief Background Information

Diamond Fork Creek has been adversely affected by unnaturally high flows which were the result of streamflow that was imported to the basin from Strawberry Reservoir. These trans-basin diversions began in 1916 and continued until 2004, when a system of pipelines and tunnels (the Diamond Fork System) was completed as part of the Central Utah Project to carry the imported water to the confluence of Diamond Fork Creek and the Spanish Fork River.

Between 1916 and 2004, streamflow in the Diamond Fork was often high enough to mobilize the streambed for months at a time. In many areas, severe downcutting of the channel occurred, and the stream was effectively detached from its floodplain. In other locations, especially in the lower reaches, these high flows caused constant mobilization of the streambed material. The result was an extremely wide braided channel that was constantly shifting and moving. The activity of the channel bed prevented establishment of riparian vegetation in many areas because the surfaces where trees were germinating were reworked before the small trees could establish a firm root system.

Since 2004, the river has showed a remarkable trend toward recovery. Channels have narrowed in many locations and the riparian vegetation has returned along the banks of the stream. Although the trend toward recovery is promising, some locations remain where the river is straight and simple, and somewhat devoid of good aquatic habitat diversity. Some of these locations would benefit from active restoration. Still other areas along the floodplain have been cleared and leveled for agricultural purposes and/or grazed heavily and could benefit from restoration activities.

This report presents a conceptual design to restore a section of Diamond Fork Creek and its surrounding floodplain. It is intended to present several possible actions that would improve diversity within the riparian system of the Lower Diamond Fork.

Project Objectives

The proposed design is offered to help resource managers meet the general objective of enhancing the riverine ecosystem of the Lower Diamond Fork Creek area. The proposed activities would increase the diversity of aquatic and riparian habitats as well as create new habitats that are under-represented and/or no longer present in the ecosystem.

Conceptual Design Components

The proposed design includes a section of the Diamond Fork beginning at Highway 6, near the confluence with the Spanish Fork River, and extending upstream for approximately 9000 feet (Figure 1). This section of the stream offers the best chance for active restoration within the basin.

The proposed restoration activities suggested in this report are presented in Figure 2 at a scale that shows their relative positions within the overall project area. The components shown in Figure 2 can be divided into several major groupings:

1. Main Channel Components *(Diversion, Step Pool Section, Woody Debris)*
2. Southeast Meadow Components *(Wetland Ponds, Wetland Channel, Upland Enhancements, Excavated Depressions)*
3. Groundwater Wetlands
4. French Drain Components *(French Drain, French Drain Wetlands, French Drain Channel)*
5. Ditch System *(Existing Ditch, Possible Turnouts)*

Each of these major groupings, and the included individual features, will be discussed in the following sections.

Main Channel Components

The main channel of Diamond Fork Creek is responding quickly to the reduction of imported streamflow that began in 2004. The channel is narrowing and habitat is generally improving within the system, but one problem area remains extremely wide and straight and shows little sign of moving toward a better distribution of instream habitat diversity.

The problem area is shown in Figure 3 along with the location of two woody debris introduction sites that are proposed for this section. The debris introduction is intended to nudge the stream toward a meandering planform by forcing it to flow around the two debris jams. If meanders begin to form, the stream is likely to create a diversity of

habitat without further intervention. This approach limits the degree of disturbance from heavy equipment while still pushing the stream toward a more desirable condition.

The location of another component of the design, an irrigation diversion with a step-pool channel section, is also shown in Figure 3. An existing diversion point is present at this site which has become unusable in recent years. The Uited States own substantial water rights for use on the lower Diamond Fork Mitigation properties. The water rights provide for irrigation of 61 acres with a diversion rate of just under 4 cfs. The diversion can be repaired by raising the channel bed at the diversion point. The increase in bed elevation will be accomplished by using large rock to raise the bed just downstream of the diversion point. The bed elevation will be returned to the existing grade downstream of the structure by creating a series of steps and pools, again using large rock for stability. The details of this channel section have not been completed, but a feasibility assessment was completed on-site and we determined that this approach was possible. Water from this diversion will help support a series of wetlands that are detailed in the following section.

Southeast Meadow Components

The diversion discussed in the previous section will provide water for the proposed features in the Southeast Meadow, including excavated depressions, several small channels and a series of wetland ponds (Figure 4).

The general approach for restoration of the meadow includes excavation and contouring of the flat fields on the south and east sides of the main channel to provide subtle topographic diversity that is currently lacking. Some of the excavated material would be used to create local upland areas adjacent to the depressions and the remaining material would be placed and seeded at the base of the slopes on the south of the fields. The contouring would be followed by excavation of the ponds and small channels illustrated in Figure 4. The existing ditch could be used to distribute water to the various sections of channel and wetlands.

The main uncertainty in this proposed design involves the potential for water infiltration. Pond construction in another nearby area was unsuccessful because the water for the ponds simply infiltrated into the ground and the ponds did not fill. Water infiltration is expected, of course, but the degree of that infiltration cannot be determined at this time. The ditch has functioned in the past to deliver water to the fields, thus infiltration within the ditch is not excessive.

If infiltration concerns are a priority, the work in this meadow could be done in stages. The upstream-most section could be constructed and water introduced. If the infiltration is not excessive, additional sections could be constructed and evaluated in a similar manner. This approach would limit the risk of constructing ponds that may not fill. It is

important to remember that benefits would be realized simply by creating topographic diversity in the existing fields, even if the ponds didn't completely fill with water.

Groundwater Wetlands

At the downstream end of the proposed reach, the river is bounded on the north by a large wetland area which is ideally suited for construction of wetland ponds that are fed by groundwater. The general location of these proposed wetlands is shown in Figure 5. These ponds would be excavated into the existing ground surface to take advantage of the high water table in the area. They would not have a surface water connection, thus the water surface elevation in the ponds would fluctuate with the water table. Spoil from these wetlands could primarily be placed in adjacent uplands. The existing wetlands are choked with cattails and would benefit from removal of cattails and excavation of open water areas.

Equipment access to these wetlands is limited and would be difficult. Trackhoes may need to work from mats to avoid getting stuck. Large trucks probably couldn't operate in these wet areas, but could run on the upland areas on the north side.

French Drain Components

At the downstream end of the reach, on the southeast side of the stream, a small pasture presents another opportunity for wetland creation and riparian enhancement (Figure 6). Water for the area could be provided through a French drain from the main channel that would provide a relatively steady source for wetlands and riparian areas. A series of ponds and/or wet meadow areas could be created with minimal excavation cost. These areas could be sustained by the water from the drain. The present location shown for the drain was estimated in the field, but additional elevation data would be needed to determine its exact location.

Aerial Extent of Proposed Features

The aerial extent of the major features, proposed in this document, are summarized below in Table 1.

Table 1. Aerial extent of proposed features

Feature	Acres
Depressions	8.61
Upland Enhancements	3.39
Wetland Ponds	2.54
French Drain Wetlands	0.8
Woody Debris	0.06

Note that the wetland ponds would be mostly within the depressions, although some were not situated inside of excavated areas.

Summary

This conceptual design is intended to offer several possible activities that would enhance the riverine ecosystem of the Lower Diamond Fork area. Taken as a whole, these activities would increase the diversity of both aquatic and riparian habitats within the area. Feedback from the various state and federal agencies involved with the project will help to refine the project goals and the design components that will meet those goals. Further data collection and design work, followed by permitting and National Environmental Policy Act compliance, would be required before construction could begin.

Figure 1 - Aerial image of the proposed restoration area.

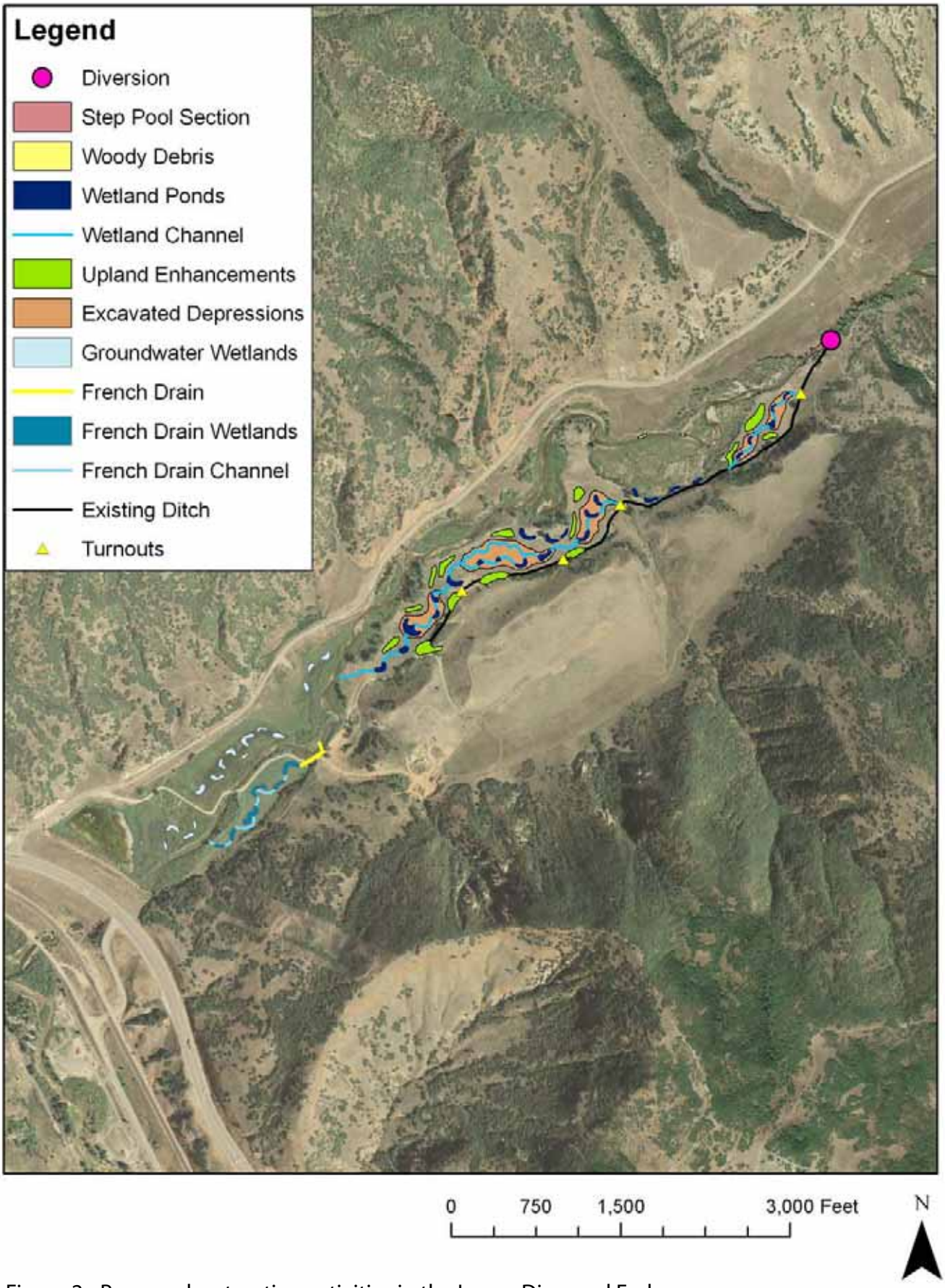

Figure 2 - Proposed restoration activities in the Lower Diamond Fork area.

Figure 3 - Main channel components.

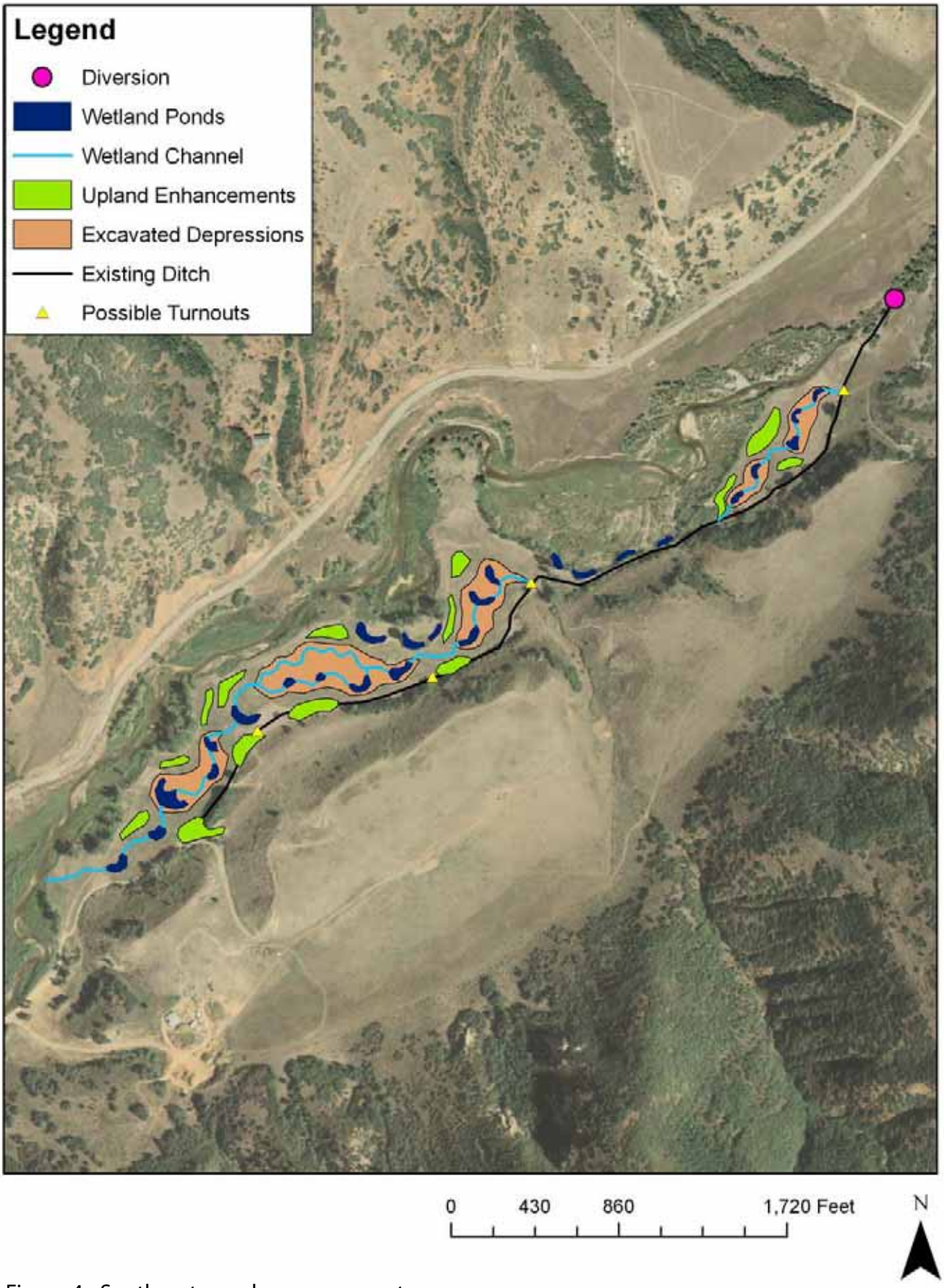

Figure 4 - Southeast meadow components.

Figure 5 - Groundwater wetlands.

Figure 6 - French drain components.