Virgin River Master Plan
Washington County, Utah

Virgin River Comprehensive Watershed Analysis Meeting Presentation

Mesquite, Nevada

May 24, 2007

Introduction

- Following the extreme flooding events in January of 2005, the Washington County Water Conservancy District, in joint venture with St. George City, Washington City and Santa Clara City contracted with the team of Natural Channel Design (Tom Moody), JE Fuller Geomorphology (Jon Fuller) & Rosenberg Associates (Rick Rosenberg) to prepare a Comprehensive Master Plan to provide river management tools for both immediate and future activities along the Virgin River, Santa Clara River and Ft. Pierce Wash in the incorporated areas of Washington County, Utah.

Study Objectives

- Identify & prioritize the need to protect existing property, repair flood damage & install stream bank stabilization along the Virgin and Santa Clara Rivers.
- Develop a comprehensive Master Plan of geomorphic and engineering strategies to guide implementation of flood repair, stream bank stabilization & development along the Virgin and Santa Clara River in order to minimize the risk of lateral erosion, flooding and property damage from future floods.

Documents Available

- *Santa Clara River Master Plan prepared in June 2005.*
- *Draft Virgin River Master Plan prepared in May 2007.*
- Both documents provide guidelines and recommendations for reconstruction, management and long term maintenance of the river corridor.
- *Santa Clara River Stability Study prepared in June 2005.*
- *Draft Virgin River Stability Study prepared in May 2007.*
- Both documents provide updated Erosion Hazard Boundary Maps and recommendations.

Lessons Learned

- River management is a regional issue and will require cooperation from all the local governments including municipalities and Washington County.
- Specific guiding principles and recognized design standards should guide all reconstruction, management and maintenance of the River.
- Regulating development within Floodplain and Erosion Hazard Zones prevented additional damage from occurring during this flood event.
- Standard FEMA Floodplain Management Regulations are not sufficient to protect property from erosion damage.

Master Plan Concepts

GEOMORPHIC ASSESSMENTS

Reference Reaches

Wide riparian corridor
Banks rising away from channel
Lack of smooth erodable overbank
Well-vegetated (native/non-native)

MASTER PLAN CONTENTS

Recommendations

- Guiding Principles
- Channel/floodplain/terrace
- Revegetation
- Streambank stabilization
- Maintenance efforts

INTEGRATED WITH NRCS DIKES

Master Plan supplements NRCS dikes installed along the Santa Clara.

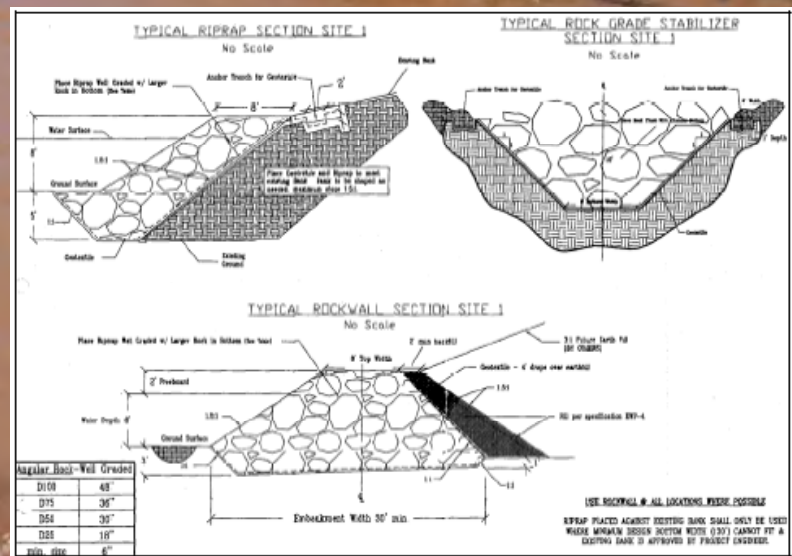
Designed to provide protection from similar floods

(less than 100 year flood)

~8-feet high

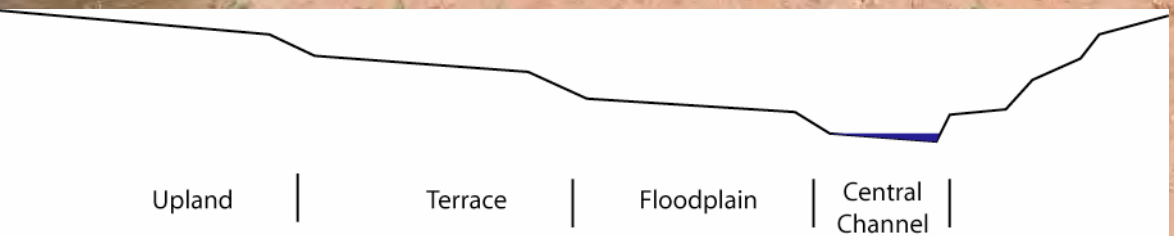
> 130 ft apart

Located in narrow, developed urban areas



GUIDING PRINCIPLES

1. Elevations rise away from channel
2. Roughness increases away from channel
3. Transitions should be gradual

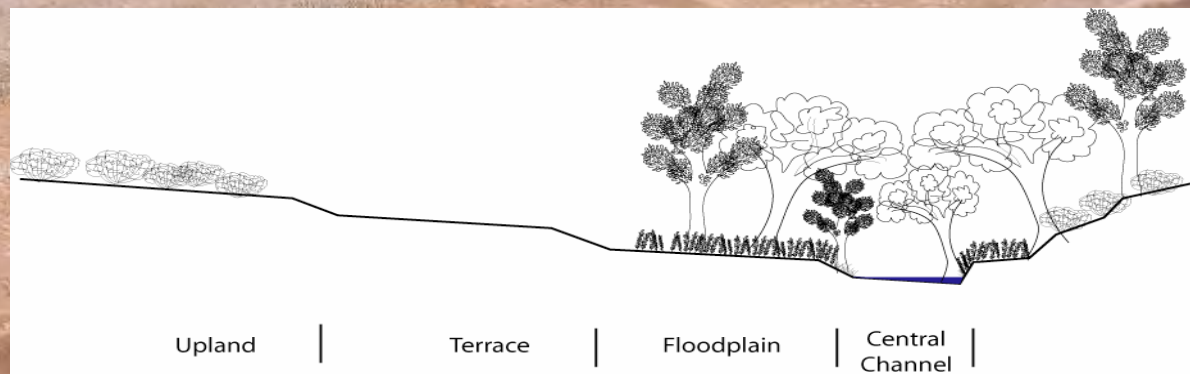


Low areas away from channel provide inviting paths for high flows.

GUIDING PRINCIPLES

1. Elevations rise away from channel
2. Roughness increases away from channel
3. Transitions should be gradual

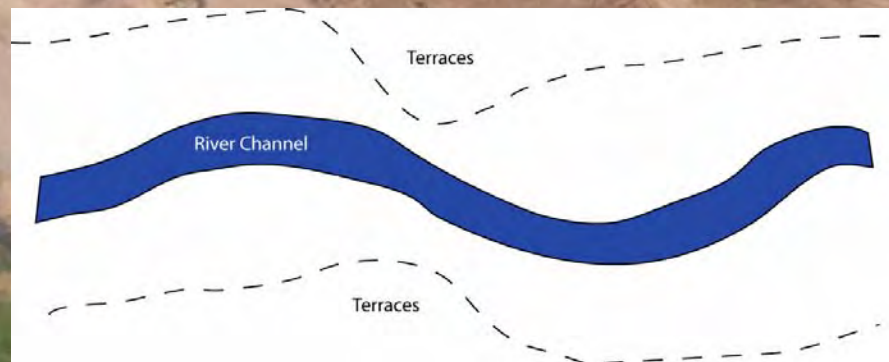
Bare ground away from channel provides inviting path for high flows.



GUIDING PRINCIPLES

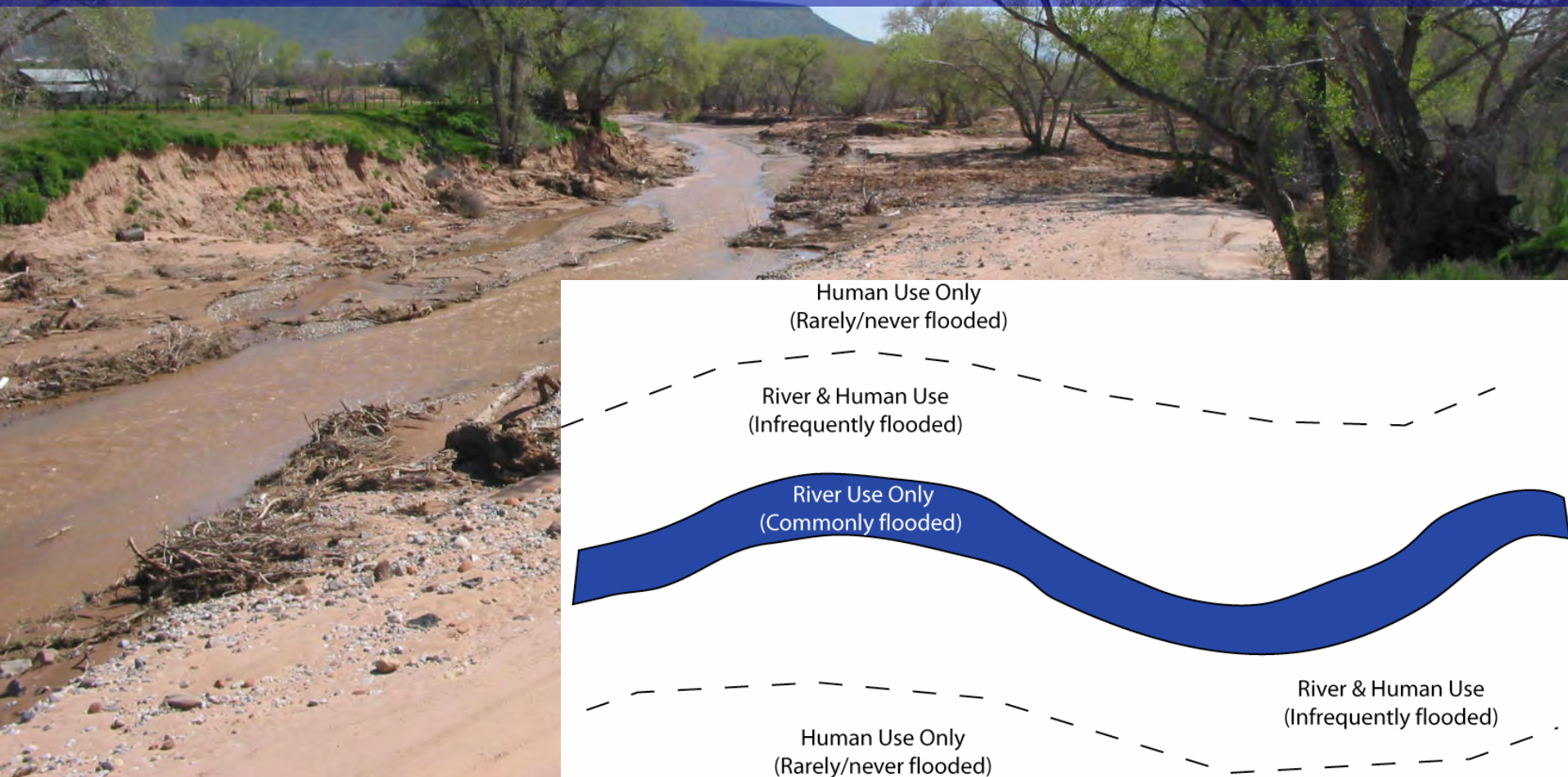
1. Elevations rise away from channel
2. Roughness increases away from channel
3. Transitions should be gradual

Channel meander smooth
Minimize constrictions



STREAM CORRIDOR

- Channel/floodplain, belongs to river, (commonly flooded)
- Terraces, shared by river and humans, (infrequently flooded)
- Uplands belongs to human (rarely or never flooded)



ALLUVIAL FEATURES

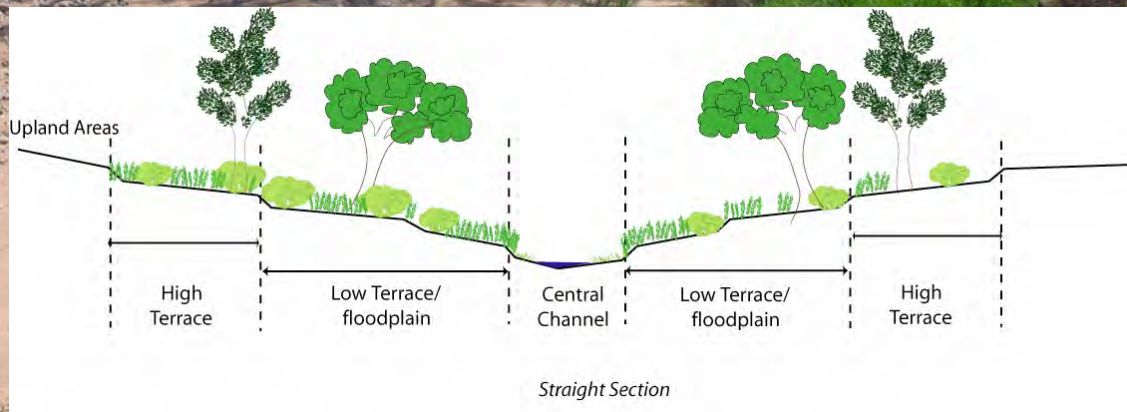
Forms are identified by elevation; reflect flooding frequency & erosion hazard.

HIGH TERRACE: Rarely flooded

LOW TERRACE:
Infrequently flooded

GEOMORPHIC FLOODPLAIN:
Commonly flooded

CHANNEL:
Carries low flows; bedload sediment

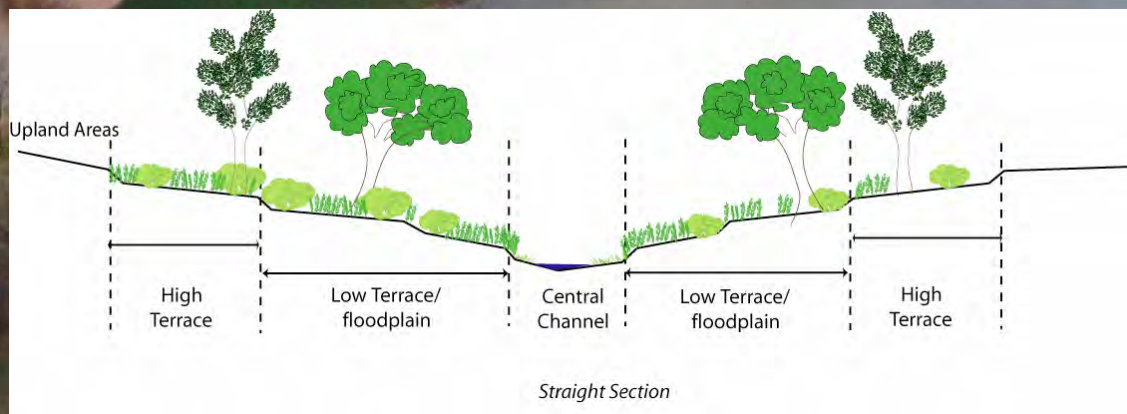


APPROPRIATE USES

CHANNEL/ GEOMORPHIC FLOODPLAIN: Pedestrian use only

LOW TERRACE: Ag fields, parks, golf courses, trails, no infrastructure

HIGH TERRACE: Ag fields, parks, golf courses, trails, some infrastructure



MAINTENANCE

REMOVING EXOTIC SPECIES

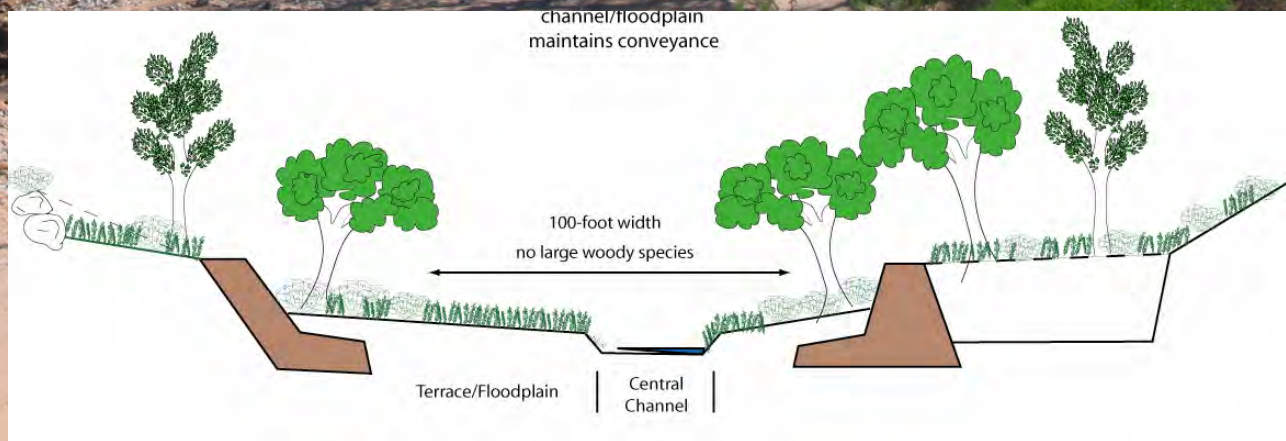
Tamarisk should to be removed but in bands parallel to channel beginning near the channel.

Remember: Roughness should increase away from channel.

MAINTENANCE

MAINTAIN CHANNEL CLEAR OF TREES:

A 100-foot band of channel and floodplain should be periodically cleared of large woody trees (> 2-inches) to reduce risk of future debris dams.



REGULATORY PERMITTING

Permits must be obtained for all stream work:

- **Army Corps of Engineers (404 permit)**
- **Utah State Engineer (Stream alteration permit)**
- **City permits**

Master Plan provides basis for streamlined permitting.

Implementation by Communities

- Adopt and implement the recommendations included in the River Master Plan & Stability Study documents.
- Amend existing flood control ordinances and policies to include river management policies that support preservation of the natural river systems.
- Regulate all development within the Erosion Hazard Zone by requiring special use permits that meet the requirements of the Master Plan & Stability Study.
- Secure funding to construct additional bank protection structures in areas of discontinuous NRCS dikes.
- Secure access to the river corridor for maintenance.

Implementation – cont.

- Implement and fund a long-term maintenance plan to remove large woody stems (2 inch & larger) from the channel to reduce the risk of future debris flows.
- Continue existing programs to remove tamarisk and other exotic species. Create programs to replant riparian areas with native riparian species.
- Make the City and County Land Use Plans consistant with the recommendations of the Master Plan and Stability Study. Add the Erosion Hazard Zones to existing Land Use Maps.
- Implement ongoing community education programs.

The Alternative.....