Denzil Stewart Nature Park
Riverbank Restoration
Demonstration Project

LOGAN RIVER CONSERVATION ACTION PLAN
Logan, Utah

PROJECT LOCATION MAP

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2 GENERAL NOTES AND QUANTITIES
3 BANK, CHANNEL, AND RIPARIAN IMPROVEMENTS SITE PLAN
4 PLANTING PLAN
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GENERAL NOTES

Project Limits
All construction activity shall be confined to the project limits (footprint) including any sloughing/stockpile areas. Do not disturb, excavate or work beyond project limits without permission from the Project Manager.

Existing Conditions
Verify all conditions and dimensions on site.

Survey Staking
Survey staking is the responsibility of the Contractor.

Permits
The Contractor is required to comply with all construction related requirements in each permit issued for the project.

Logan City Standards and Specifications
All construction shall be in accordance with the latest City of Logan Standards and Specifications for the design and construction of public improvements.

Utilities
Utility locations have not been surveyed. It is the responsibility of the Contractor to perform all utility locations at least 48 hours prior to excavation, call 1(800)662-4111. It is the responsibility of the Contractor to protect all existing sewer, water, gas and electric utilities encountered in the work. Any relocation or improvements of utilities shall be accurately noted on as-built drawings and issued to the Project Manager at the completion of the project.

Temporary Construction Facilities
All temporary utilities and facilities will be the responsibility of the Contractor. A construction trailer is not required. Potable water is not available on site and shall be provided by the Contractor. A chemical toilet of suitable type shall be provided and maintained by the Contractor at all times. The Contractor is responsible for job site conditions and the safety for human life during the course of construction. This requirement shall apply continuously during the period of construction and is not limited to normal working hours.

The Contractor shall keep job site area clean, hazard free and dispose of all debris, rubbish and construction waste, and remove all abandoned materials from the site. All disturbed staging and access areas are to be restored to pre-construction condition. The Contractor is responsible to reclaim (regrade, seed and mulch) construction features not specified as imported material.

Storm Water Pollution Prevention Plan Items
1. No earth shall be disturbed until erosion control measures are in place.
2. Erosion control measures will be maintained and remain in place until re-vegetation success measures have been achieved.
3. Preparation of a Storm Water Pollution Prevention Plan; design, layout, installation, and maintenance of erosion/sediment control BMPs; submittal of NOI; and acquisition of UPDES Storm Water General Permit for Construction Activities (UTR300000) is the responsibility of the Contractor.

4. The Contractor is responsible for implementing and utilizing Best Management Practices (BMPs) to prevent storm water runoff and water pollution during construction activities. The Contractor is responsible for supplying equipment and plans that provide both dust and fire control during project construction. Use caution when working in and around wet areas. If potential hazardous materials are encountered, contact the Project Manager immediately.

Construction Spoils and Waste Handling
Items encountered below grade and not shown on the drawings shall be brought to the attention of the Project Manager. All construction spoils and waste are the responsibility of the Contractor and shall be disposed of at an approved landfill facility.

Clearing and Grubbing
Existing cobbles/materials shall be carefully removed and stored for re-use, or disposed of at an approved landfill facility. All existing vegetation not in designated excavation areas and not designated for removal is to be protected in place. Completely remove stumps, roots, shrubs, weeds, and other debris protruding from the ground in areas to be excavated.

Site Earthwork and Grading
The Contractor is responsible for all site earthwork and grading activities to meet designs identified in plans and details, which are intended to show final result of design. Modifications may be required to suit job site conditions encountered during construction and shall be included in as-built drawings provided to the Project Manager at the completion of project.

All river channel banks affected by construction activities shall be stabilized and protected throughout construction.

Backfill material shall utilize suitable excavated soils or suitable imported material.

Existing cobble / gravel material shall be retained to use as a 6 inch thick minimum layer of armor underneath the placed and spreaded topsoil.

Existing Topsoil shall be excavated and salvaged by Contractor for use in landscaping and backfill activities. Topsoils used in landscaping shall have acidity range (pH) from 5.5 to 7.5 and a minimum organic content of 2%. Topsoil shall be placed at 80% to 90% maximum dry density and subsoil at 85% minimum compaction as determined by the Standard Proctor Method (ASTM D698-66T or AASHTO T99). All existing topsoils shall be salvaged to the extent possible.

Site Construction Notes
1. All seeding activities shall occur during the designated seeding and planting window from September 15 to December 1 or as otherwise authorized by the Project Manager.
2. Where ground conditions are damp and equipment traffic would result in excessive ground compaction and rutting, use construction mats to access active work areas.
3. Inspect paved roads and walkways adjacent to the project site regularly for mud tracking; sweep roadways as needed and ensure roads are left clean at the end of each shift.
4. Clean site and dispose of construction waste as permitted.

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Sheet Title: GENERAL NOTES AND QUANTITIES

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Quantity</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Survey (Stake Elevations and Layout)</td>
<td>1</td>
<td>Lump Sum</td>
</tr>
<tr>
<td>2</td>
<td>Site Clearing</td>
<td>1,300</td>
<td>Square Yard</td>
</tr>
<tr>
<td>3</td>
<td>Strip, Stockpile and Spread Topsoil</td>
<td>1,300</td>
<td>Square Yard</td>
</tr>
<tr>
<td>4</td>
<td>Excavation (Cut)</td>
<td>1,000</td>
<td>Cubic Yard</td>
</tr>
<tr>
<td>5</td>
<td>Retain 6 Inch Thick Minimum Cobble / Gravel Armor (Material from on site)</td>
<td>160</td>
<td>Cubic Yard</td>
</tr>
<tr>
<td>6</td>
<td>Place Imported Topsoil - 6 inches thick</td>
<td>160</td>
<td>Cubic Yard</td>
</tr>
<tr>
<td>7</td>
<td>Cut and Remove Existing PVC Culvert</td>
<td>20</td>
<td>Linear Feet</td>
</tr>
<tr>
<td>8</td>
<td>Install Vegetated Rock Lined Channel (Rock material from on site)</td>
<td>50</td>
<td>Linear Feet</td>
</tr>
<tr>
<td>9</td>
<td>Install Irrigation System (heads, pipe, valves, fittings)</td>
<td>1</td>
<td>Lump Sum</td>
</tr>
<tr>
<td>10</td>
<td>Broadcast Riparian / Upland Seed Mix</td>
<td>0.25</td>
<td>Acre</td>
</tr>
<tr>
<td>11</td>
<td>Install Hydromulch and Tackifier</td>
<td>0.25</td>
<td>Acre</td>
</tr>
<tr>
<td>12</td>
<td>Install Shrubs (By Thickness)</td>
<td>85</td>
<td>Each</td>
</tr>
<tr>
<td>13</td>
<td>Install Trees (By Others)</td>
<td>90</td>
<td>Each</td>
</tr>
<tr>
<td>14</td>
<td>Perform In-Channel Finish Work (improve pools and riffle habitats)</td>
<td>40</td>
<td>Hours</td>
</tr>
<tr>
<td>15</td>
<td>Install Toe Rock Boulders at Channel Bank</td>
<td>50</td>
<td>Linear Feet</td>
</tr>
<tr>
<td>16</td>
<td>Remove Existing Trees</td>
<td>1</td>
<td>Lump Sum</td>
</tr>
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</table>
NOTE:
REMOVE 3 LARGE CRACK WILLOWS. FIELD VERIFY QUANTITY AND LOCATIONS WITH OWNER'S REPRESENTATIVE.
### PLANTING PLAN

#### Denzil Stewart Nature Park

**Riverbank Restoration Demonstration Project**

**LOGAN RIVER CONSERVATION ACTION PLAN**

Logan, Utah

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#### PLANTING LEGEND

- **KEY**
  - **TREES**
    - Betula occidentalis / Water Birch (10)
    - Populus angustifolia / Narrowleaf Cottonwood (50) (symbol = group of 10 x)
    - Acer negundo / Box Elder (5)
    - Acer grandidentatum / Bigtooth Maple (20) (symbol = group of 5 x)
  - **SHRUBS**
    - Salix lutea / Yellow Willow (20)
    - Cornus sericea / Redosier Dogwood (20)
    - Sambucus canadensis / Blue Elderberry (10)
    - Rosa woodsii / Woods Rose (5)
    - Ribes aureum / Golden Current (20)
    - **Riparian / Upland Seed Mix and Hydromulch** (0.25 acre)

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#### RIPARIAN / UPLANDSEED MIX

<table>
<thead>
<tr>
<th>SEED NO.</th>
<th>SPECIES NAME</th>
<th>Number of seeds per pound</th>
<th>Pounds of pure live seed per acre</th>
<th>Percent of mix</th>
<th>Seeds per square foot</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Carex morrowii</td>
<td>444,000</td>
<td>1.5</td>
<td>7.20%</td>
<td>15</td>
</tr>
<tr>
<td>2</td>
<td>Carex pauciflora</td>
<td>654,000</td>
<td>1.0</td>
<td>7.19%</td>
<td>15</td>
</tr>
<tr>
<td>3</td>
<td>Elymus lanceolatus</td>
<td>154,000</td>
<td>4.0</td>
<td>6.60%</td>
<td>14</td>
</tr>
<tr>
<td>4</td>
<td>Elymus trachycaulis</td>
<td>159,000</td>
<td>4.0</td>
<td>6.60%</td>
<td>15</td>
</tr>
<tr>
<td>5</td>
<td>Elymus canadensis</td>
<td>115,000</td>
<td>4.0</td>
<td>4.97%</td>
<td>11</td>
</tr>
<tr>
<td>6</td>
<td>Junice multiflora</td>
<td>10,900,000</td>
<td>0.10</td>
<td>11.79%</td>
<td>25</td>
</tr>
<tr>
<td>7</td>
<td>Linum lewisii</td>
<td>170,000</td>
<td>3.0</td>
<td>5.51%</td>
<td>12</td>
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<tr>
<td>8</td>
<td>Geranium viscosissimum</td>
<td>32,000</td>
<td>2.0</td>
<td>1.12%</td>
<td>2</td>
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<tr>
<td>9</td>
<td>Iris missouriensis</td>
<td>2,000</td>
<td>0.20</td>
<td>0.04%</td>
<td>1</td>
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<tr>
<td>10</td>
<td>Verbena hastata</td>
<td>1,792,800</td>
<td>0.5</td>
<td>8.69%</td>
<td>21</td>
</tr>
<tr>
<td>11</td>
<td>Asclepias tuberosa</td>
<td>102,400</td>
<td>2.0</td>
<td>2.21%</td>
<td>5</td>
</tr>
<tr>
<td>12</td>
<td>Lupinus argenteus</td>
<td>18,300</td>
<td>3.0</td>
<td>0.65%</td>
<td>1</td>
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<tr>
<td>13</td>
<td>Gallisia aristaefolia</td>
<td>132,000</td>
<td>2.0</td>
<td>2.82%</td>
<td>6</td>
</tr>
<tr>
<td>14</td>
<td>Penstemon tenuiflorus</td>
<td>400,000</td>
<td>2.0</td>
<td>8.60%</td>
<td>18</td>
</tr>
<tr>
<td>15</td>
<td>Penstemon cyananthus</td>
<td>290,000</td>
<td>2.0</td>
<td>8.27%</td>
<td>13</td>
</tr>
<tr>
<td>16</td>
<td>Cleome serrulata</td>
<td>85,900</td>
<td>2.0</td>
<td>1.43%</td>
<td>3</td>
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<tr>
<td>17</td>
<td>Erigeron speciosus</td>
<td>1,608,000</td>
<td>0.5</td>
<td>8.65%</td>
<td>16</td>
</tr>
<tr>
<td>18</td>
<td>Helianthus molliflorus</td>
<td>1,055,000</td>
<td>0.5</td>
<td>5.72%</td>
<td>12</td>
</tr>
<tr>
<td>19</td>
<td>Eriogonum nauseosum</td>
<td>400,000</td>
<td>2.0</td>
<td>2.16%</td>
<td>5</td>
</tr>
</tbody>
</table>

**TOTAL**

36.60  100.00%  212

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**Sheet Title:** PLANTING PLAN

**Date:** 10/04/2016

**Designed by:** T.A. / D.O.
**Drawn by:** S.D.
1. THIS PORTION OF THE IRRIGATION SYSTEM IS DESIGNED FOR MAXIMUM OF 13 GALLONS PER MINUTE AT 65 PSI STATIC MIN. VERIFY THE AVAILABLE WATER PRESSURE AT THE P.O.C. PRIOR TO CONSTRUCTION. REPORT ANY DIFFERENCE BETWEEN THE WATER PRESSURE SHOWN ON THE PLANS AND THE ACTUAL PRESSURE READING AT THE P.O.C. TO THE OWNER'S REPRESENTATIVE IN WRITING.

2. IT IS THE CONTRACTORS RESPONSIBILITY TO BE KNOWLEDGEABLE OF ALL UTILITIES, STRUCTURES AND GRADE DIFFERENCES ON THE SITE AND TO REPAIR OR REPLACE ALL ITEMS DAMAGED BY HIS WORK AT NO ADDITIONAL COST TO THE OWNER.

3. DO NOT DELIBERATELY INSTALL THE IRRIGATION SYSTEM AS SHOWN ON THESE PLANS IF THERE ARE ANY OBVIOUS OBSTRUCTIONS OR INCONSISTENCIES IN THE FIELD THAT MIGHT NOT HAVE BEEN ANTICIPATED IN THE IRRIGATION DESIGN. NOTIFY THE OWNER'S REPRESENTATIVE OF ANY SUCH DIFFERENCES IN WRITING.

4. ADJUST ALL SPRINKLER HEADS, VALVES AND EQUIPMENT FOR OPTIMUM COVERAGE, AND ADJUST ARC RADIUS AND NOZZLE OF EACH SPRINKLER TO AVOID SPRAYING ONTO WALKS, STREETS, BUILDING, ETC.

5. COORDINATE IRRIGATION HEAD LOCATIONS WITH PLANT MATERIAL PLACEMENT.

6. THIS IRRIGATION DESIGN IS DIAGRAMMATIC. WHERE VALVES, PIPING AND ETC. ARE SHOWN OUTSIDE OF PLANTING AREAS, THE INTENT IS FOR THIS EQUIPMENT TO BE INSTALLED WITHIN THE PLANTING AREAS.

7. INSTALL ALL IRRIGATION EQUIPMENT NOT DETAILED OR SPECIFIED BUT REQUIRED FOR A FULLY OPERATING SYSTEM PER MANUFACTURERS SPECIFICATIONS.

8. COORDINATE WITH CITY PERSONNEL TO REVISE ALL EXISTING IRRIGATION EQUIPMENT AS NEEDED.

9. IRRIGATION SYSTEM IS INTENDED SOLELY FOR USE DURING PLANT ESTABLISHMENT PERIOD AND DROUGHT CONDITIONS.
HAUL ROAD / CONSTRUCTION ENTRANCE
NOT TO SCALE

FILL AREA. CONTACT S.D. CROOKSTON
(435)760-2408 BEFORE PLACING FILL MATERIAL.

PROJECT AREA OF EXCAVATION
HAUL ROAD / CONSTRUCTION ENTRANCE

Denzil Stewart Nature Park
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Sheet No. 6
Sheet Title: DETAILS

K:\Projects\1945.4_LoganRiverDenzilStewart

Designed By: T.A. / D.O.
Drawn By: S.D.

BIOWEST PN:
#1945.5

Date: 10/04/2016
NOTES:
1. SET ROCKS SO THEY SIT SECURELY AND ARE FITTED TOGETHER.
2. COORDINATE BOULDER PLACEMENT WITH PROJECT HYDROLOGIST.

TOE ROCK
1" = 4'-0"

COBBLE ROCK FROM ON SITE:
6 INCH TO 8 INCH DIAMETER
1'-6"
12" DEEP
INSTALL SEED MIX AND
HYDROMULCH AS SHOWN
ON PLANS.
GRADE VARIES
INSTALL BOULDER (96" DIA. TO 48" DIA.)
BURY 1/3 TO 1/2 MASS. BURY LARGEST BOULDERS AT
THE TOE. FILL VOIDS WITH SMALLER ROCKS.

VEGETATED ROCK LINED CHANNEL AT DAYLIGHTED CULVERT
1" = 4'-0"

10'

COBBLE ROCK FROM ON SITE:
10 INCH TO 12 INCH DIAMETER.
18 INCH MINIMUM DEPTH.

TAPER EDGES OF
ROCK COBBLE UPHILL INTO
EXISTING SIDE SLOPE

PLACE TOP OF ROOTBALL
1" ABOVE FINISH GRADE

TREE PLANTING
NOT TO SCALE

POPULUS SPECIES ONLY
6" WOOD STAKE OR METAL
"T" POST ATTACHED TO
WIRE CAGE. SUFFICIENT TO
Support cage (3 TOTAL).
BURY WIRE CAGE 6 INCHES.
WIRE CAGE TO BE STAYLOCK
GAME FENCING, OR EQUAL.

NOTES:
1. ALL TREES MUST BE INSTALLED AND
MAINTAINED AT TRUE VERTICAL.
2. COORDINATE BOULDER PLACEMENT WITH PROJECT HYDROLOGIST.

ROCK COBBLE AT DAYLIGHTED CULVERT
1" = 4'-0"

SHRUB PLANTING
NOT TO SCALE

PLACE TOP OF ROOTBALL
1" ABOVE FINISH GRADE

TOPSOIL BACKFILL
IRRIGATION ISOLATION VALVE
N.T.S.

IRRIGATION VALVE WITH BATTERY-OPERATED CONTROLLER
N.T.S.

IRRIGATION PIPE TRENCHING
N.T.S.

DESIGNED BY: T.A. / D.O.
DRAWN BY: S.D.

BIOWEST PN: #1945.5
Sheet No. 8

LOGAN RIVER CONSERVATION ACTION PLAN
Logan, Utah