ON-SITE TREE LIST (KEY PIECES)

Salvaged Type (Inches) | Approx. DBH | Notes | Large Wood Structure ID
--- | --- | --- | ---
1 | 20 | Downed A | 1
2 | 24 | Standing A | 2
3 | 24 | Standing B | 3
4 | 24 | Standing B | 4
5 | 24 | Standing C | 5
6 | 24 | Standing C | 6

FELLED LARGE TREES FOR WILDBOY CREEK LARGE WOOD STRUCTURES
PLACED FELLED TREES INTO LARGE WOOD STRUCTURES (KEY PIECE LWM)
PLACED TREES INTO LARGE WOOD STRUCTURES (RACKING LWM)

EXHISTING TREES TO BE FELLED WITH ROOTWAD INTACT AND HAND PLACED IN WILDBOY CREEK

LEGEND

FOLLOWING CONSTRUCTION OF LARGE WOOD STRUCTURES IN WILDBOY CREEK. SEE CONSTRUCTION SEQUENCE FOR TIMING.

CONTRACTOR SHALL DAM EXISTING SPRING WITH SANDBAGS AND GRAVITY FLOW SPRING WATER TO DOWNSTREAM OF WILDBOY CREEK CONFLUENCE WITH TEXAS CREEK. SPRINGWATER SHALL BE CONVEYED IN A 6-INCH DIA. CORRUGATED POLYETHELENE PIPE. PROVIDE 100 FEET LENGTHS TO MINIMIZE JOINTS AND PROVIDE WATERTIGHT COUPLERS. REMOVE PIPING AND SANDBAG DAM FOLLOWING CONSTRUCTION OF LARGE WOOD STRUCTURES IN WILDBOY CREEK. SEE SHEET LOCATION

EXISTING TREES TO BE FELLED WITH ROOTWAD INTACT AND HAND PLACED IN WILDBOY CREEK

ORDINARY HIGH WATER (OHW)

LEGEND

EXISTING TREES TO BE FELLED WITH ROOTWAD INTACT AND HAND PLACED IN WILDBOY CREEK

EXISTING TREES TO BE FELLED WITH ROOTWAD INTACT AND HAND PLACED IN WILDBOY CREEK

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LEGEND

- **TEMPORARY ACCESS ROADS (OFF ROAD)**
- **EXISTING GRADING**
- **CHANNEL CENTERLINE**
- **STRAWBALES**
- **SLASH**
- **FELLED LARGE TREES FOR WILDBOY CREEK LARGE WOOD STRUCTURES**
- **PLACED FELLED TREES INTO LARGE WOOD STRUCTURES (KEY PIECE LWM)**
- **PLACED TREES INTO LARGE WOOD STRUCTURES (RACKING LWM)**
- **SALVAGED DAM ROCK**
- **DELTAIC GRAVELS**
- **ORDINARY HIGH WATER (OHW)**
- **100 YR WATER SURFACE**

**LEGEND**

- **EXISTING WILDBOY CREEK THALWEG**
- **ORDINARY HIGH WATER (OHW)**
- **100YR WATER SURFACE**

**ON-SITE TREE LIST (KEY PIECES)**

<table>
<thead>
<tr>
<th>Tree #</th>
<th>Approx. Diameter (inches)</th>
<th>Notes</th>
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<td>28</td>
<td>Standing D</td>
<td>D</td>
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<tr>
<td>2</td>
<td>24</td>
<td>Standing D</td>
<td>D</td>
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<td>3</td>
<td>26</td>
<td>Standing D</td>
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<td>28</td>
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<td>D</td>
</tr>
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<td>6</td>
<td>30</td>
<td>Standing D</td>
<td>D</td>
</tr>
<tr>
<td>7</td>
<td>32</td>
<td>Standing D</td>
<td>D</td>
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<tr>
<td>8</td>
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<td>32</td>
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<td>D</td>
</tr>
<tr>
<td>10</td>
<td>30</td>
<td>Standing D</td>
<td>D</td>
</tr>
</tbody>
</table>

**PROFILE VIEW - WILDBOY CREEK STA. 5+00 TO 10+00**
**ON-SITE TREE LIST (KEY PIECES)**

<table>
<thead>
<tr>
<th>Slashed</th>
<th>Approx. Girth (inches)</th>
<th>Notes</th>
<th>Large Wood (structure ID)</th>
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</thead>
<tbody>
<tr>
<td>16</td>
<td>24 (Standing)</td>
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<tr>
<td>18</td>
<td>18 (Standing)</td>
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<tr>
<td>19</td>
<td>14 (Standing)</td>
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<tr>
<td>20</td>
<td>16 (Standing)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>15 (Standing)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **FELLED LARGE TREES FOR WILDBOY CREEK LARGE WOOD STRUCTURES**
- **PLACED FELLED TREES INTO LARGE WOOD STRUCTURES (KEY PIECE LWM)**
- **PLACED TREES INTO LARGE WOOD STRUCTURES (RAPPING LWM)**
- **SALVAGED DAM ROCK**
- **DELTAIC GRAVELS**
- **ORDINARY HIGH WATER (DHW)**

**LEGEND**

- **TEMPORARY ACCESS ROADS (OFF ROAD)**
- **EXISTING GRADING**
- **CHANNEL CENTERLINE**
- **STRAWSLICES**
- **SLASH**
- **EXISTING TREES TO BE FELLED WITH ROOTS IN PLACE, AND PLACED IN WILDBOY CREEK**
- **EXISTING SEEPAGE WALL**
- **PLACED FELLED TREES INTO LARGE WOOD STRUCTURES (KEY PIECE LWM)**

**PLAN VIEW**

- **H**
- **J**
- **K**

**PROFILE VIEW - WILDBOY CREEK STA. 10+00 TO 15+00**

- **LEGEND**

- **EXISTING WILDBOY CREEK THALWEG**
- **ORDINARY HIGH WATER (DHW)**
- **LARGE WOOD STRUCTURES (SEE DETAIL 1/72)**
- **100 YR WATER SURFACE**

**NOTES**

- **BASED ON FIELD CONDITIONS, MATERIAL Boulders ARE SUBJECT TO CHANGE ELEVATIONS OF LARGE WOOD PIECES, NOTE: SIZE AND STABILITY REQUIREMENTS.**

**SHEET LOCATION**

- **WILDBOY CREEK - PLAN**
- **AND PROFILE STA. 10+00 TO 15+00**
ON-SITE TREE LIST (KEY PIECES)

<table>
<thead>
<tr>
<th>Salvaged Tree</th>
<th>Approx. DBH (inches)</th>
<th>Notes</th>
<th>Large Wood Structure</th>
</tr>
</thead>
<tbody>
<tr>
<td>21</td>
<td>N</td>
<td>Standing M</td>
<td>Placement in Creek Thalweg</td>
</tr>
<tr>
<td>23</td>
<td>N</td>
<td>Standing N</td>
<td>Placement in Creek Thalweg</td>
</tr>
<tr>
<td>24</td>
<td>N</td>
<td>Standing O</td>
<td>Placement in Creek Thalweg</td>
</tr>
<tr>
<td>25</td>
<td>N</td>
<td>Standing D</td>
<td>Placement in Creek Thalweg</td>
</tr>
<tr>
<td>26</td>
<td>N</td>
<td>Standing P</td>
<td>Placement in Creek Thalweg</td>
</tr>
<tr>
<td>27</td>
<td>N</td>
<td>Standing P</td>
<td>Placement in Creek Thalweg</td>
</tr>
<tr>
<td>28</td>
<td>N</td>
<td>Standing P</td>
<td>Placement in Creek Thalweg</td>
</tr>
<tr>
<td>29</td>
<td>N</td>
<td>Standing P</td>
<td>Placement in Creek Thalweg</td>
</tr>
</tbody>
</table>

LEGEND

- **EXISTING WILDBOY CREEK THALWEG**
- **PLACED FELLED TREES INTO LARGE WOOD STRUCTURES (KEY PIECE LWM)**

LARGE WOOD STRUCTURES PLACED IN WILDBOY CREEK (SEE TYPICAL DETAILS SHEETS 72-76)

PLAN VIEW

CONTRACTOR SHALL DAM EXISTING SPRING WITH SANDBAGS AND GRAVITY FLOW SPRING WATER TO DOWNSTREAM OF WILDBOY CREEK CONFLUENCE WITH TEXAS CREEK. SPRING WATER SHALL BE CONVEYED IN A 6-INCH DIA. CORRUGATED POLYLETHENE PIPE. PROVIDE 100 FEET LENGTHS TO MINIMIZE JOINTS AND PROVIDE WATERTIGHT COUPLERS. REMOVE PIPING AND SANDBAG DAM FOLLOWING CONSTRUCTION OF LARGE WOOD STRUCTURES IN WILDBOY CREEK. SEE CONSTRUCTION SEQUENCE FOR TIMING.

PROFILE VIEW - WILDBOY CREEK STA. 15+00 TO 20+00

PROF 1

1. CONTRACTOR SHALL VERIFY SPECIFIC LOCATION, ALIGNMENT, AND ELEVATIONS OF LARGE WOOD PIECES, BOULDERS ARE SUBJECT TO CHANGE BASED ON FIELD CONDITIONS, MATERIAL SIZE AND STABILITY REQUIREMENTS.

2. **TEMPORARY ACCESS ROADS** (OFF ROAD)

3. **EXISTING GRADING**

4. **CHANNEL CENTERLINE**

5. **STRAWBALES**

6. **SLASH**

7. **100 YR WATER SURFACE**

8. **ORDINARY HIGH WATER (OHW)**

9. **DELTAIC GRAVELS**

10. **SALVAGED DAM ROCK**

11. **RACKING MEMBERS**

12. **LARGE WOOD STRUCTURES (KEY PIECE LWM)**

13. **LARGE WOOD STRUCTURES (RACKING LWM)**

14. **FELLED LARGE TREES FOR WILDBOY CREEK LARGE WOOD STRUCTURES**

15. **FELLED LARGE TREES IN WILDBOY CREEK LARGE WOOD STRUCTURES (KEY PIECE LWM)**

16. **FELLED LARGE TREES IN WILDBOY CREEK LARGE WOOD STRUCTURES (RACKING LWM)**

PROJECT TEAM

- **PARR excellence**
- **STATE OF WASHINGTON**
- **COWITZ INDIAN TRIBE**
- **KWONEESUM DAM**
- **REMOVAL DESIGN**
- **WILDBOY CREEK - PLAN AND PROFILE STA. 15+00 TO 20+00**

COWITZ INDIAN TRIBE

120 W. 26TH AVE VANCOUVER, WA, 98665

KNOWLEDGE

- **BS G T G B**
- **WILLIAM P. NICHOLS**
- **COWITZ INDIAN TRIBE**
- **KWONEESUM DAM**
- **REMOVAL DESIGN**
- **WILDBOY CREEK - PLAN AND PROFILE STA. 15+00 TO 20+00**

Bingen, WA 98605

www.ers4life.com

302 W. Steuben St. #6
ON-SITE TREE LIST (KEY PIECES)

<table>
<thead>
<tr>
<th>Slashed Tree #</th>
<th>Approx. DBH (inches)</th>
<th>Notes</th>
<th>Large Wood Structure</th>
</tr>
</thead>
<tbody>
<tr>
<td>30</td>
<td>34 Standing R</td>
<td></td>
<td></td>
</tr>
<tr>
<td>31</td>
<td>32 Standing R</td>
<td></td>
<td></td>
</tr>
<tr>
<td>32</td>
<td>30 Standing R</td>
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<tr>
<td>33</td>
<td>36 Standing R</td>
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<td>35</td>
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</tr>
<tr>
<td>36</td>
<td>32 Standing T</td>
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</table>

NOTE: SPECIFIC LOCATION, ALIGNMENT, AND ELEVATIONS OF LARGE WOOD PIECES, BOULDERS ARE SUBJECT TO CHANGE BASED ON FIELD CONDITIONS, MATERIAL SIZE AND STABILITY REQUIREMENTS.
ON-SITE TREE LIST (KEY PIECES)

<table>
<thead>
<tr>
<th>Saved Tree</th>
<th>Approx. O&amp;M (feet)</th>
<th>Notes</th>
<th>Large Wood Structure</th>
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<tbody>
<tr>
<td>37</td>
<td>30 Standing V</td>
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<tr>
<td>36</td>
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<td>39</td>
<td>30 Standing X</td>
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</tr>
<tr>
<td>40</td>
<td>30 Standing Y</td>
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</tr>
<tr>
<td>41</td>
<td>30 Standing Z</td>
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</tr>
<tr>
<td>42</td>
<td>30 Onewood Z</td>
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<tr>
<td>43</td>
<td>30 Standing Z</td>
<td></td>
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</tr>
</tbody>
</table>

LARGE WOOD STRUCTURES PLACED IN WILDBOY CREEK (SEE TYPICAL DETAILS SHEETS 72-76)

PROFILE VIEW - WILDBOY CREEK STA. 25+00 TO 30+00

LEGEND

- TEMPORARY ACCESS ROADS (OFF ROAD)
- EXISTING GRADING
- CHANNEL CENTERLINE
- STRAWBALES
- SLASH
- PLACED FELLED TREES INTO LARGE WOOD STRUCTURES (KEY PIECE LWM)
- PLACED FELLED TREES INTO LARGE WOOD STRUCTURES (RACKING LWM)
- SALVAGED DAM ROCK
- DELTAIC GRAVELS
- ORDINARY HIGH WATER (OHW)
- 100 YR WATER SURFACE

NOTE:
SPECIFIC LOCATION, ALIGNMENT, AND ELEVATIONS OF LARGE WOOD PIECES, BOULDERS ARE SUBJECT TO CHANGE BASED ON FIELD CONDITIONS, MATERIAL SIZE AND STABILITY REQUIREMENTS.

30+00 30+00 31+00 32+00 33+00 34+00 35+00 36+00 37+00 38+00 39+00 40+00 41+00 42+00 43+00 44+00 45+00 46+00 47+00 48+00 49+00 50+00 51+00 52+00 53+00 54+00 55+00 56+00 57+00 58+00 59+00 60+00 61+00 62+00 63+00 64+00 65+00 66+00 67+00 68+00 69+00 70+00 71+00 72+00 73+00 74+00 75+00 76+00 77+00 78+00 79+00 80+00 81+00 82+00 83+00 84+00 85+00 86+00 87+00 88+00 89+00 90+00 91+00 92+00 93+00 94+00 95+00 96+00 97+00 98+00 99+00 100+00
## WILDBOY CREEK LARGE WOOD STRUCTURE QUANTITIES

<table>
<thead>
<tr>
<th>Site A</th>
<th>Site B</th>
<th>Site C</th>
<th>Site D</th>
<th>Site E</th>
<th>Site F</th>
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<tbody>
<tr>
<td><strong>Log (Packing)</strong></td>
<td><strong>Log (Packing)</strong></td>
<td><strong>Log (Packing)</strong></td>
<td><strong>Log (Packing)</strong></td>
<td><strong>Log (Packing)</strong></td>
<td><strong>Log (Packing)</strong></td>
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<tr>
<td><strong>Log (Recovery)</strong></td>
<td><strong>Log (Recovery)</strong></td>
<td><strong>Log (Recovery)</strong></td>
<td><strong>Log (Recovery)</strong></td>
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<td><strong>Total Volume</strong></td>
<td><strong>Total Volume</strong></td>
<td><strong>Total Volume</strong></td>
<td><strong>Total Volume</strong></td>
<td><strong>Total Volume</strong></td>
</tr>
</tbody>
</table>

### Quantities

- **Wildboy Creek Large Wood Structure Quantiies**
- **Raw Quantities**
- **Site A**
- **Site B**
- **Site C**
- **Site D**
- **Site E**
- **Site F**

### Details

- **Site A & Site B**
- **Site C**
- **Site D**
- **Site E**
- **Site F**

---

### Design

- **Preliminary Design**
- **Removal Design**
- **Kwoneesum Dam**
- **Vancouver, WA, 98665**
- **7700 26th Ave**
- **Cowlitz Indian Tribe**

### Quantities

- **Wildboy Creek Large Wood Structure Quantiies**
- **Raw Quantities**
- **Site M**
- **Site N**
- **Site O**
- **Site P**
- **Site Q**
- **Site R**

---

### Additional

- **Wildboy Creek Large Wood Structure Quantiies**
- **Raw Quantities**
- **Site Y**
- **Site Z**
- **Site AA**
- **Site AC**

---

### Contact

- **William P. Norris**
- **Stage records**
- **Cowan Ross**
- **34576 8067-**
- **BNRP6/4/21**

---

### Information

- **Cowiltz Indian Tribe**
- **Wildboy Creek - Log Jam**
- **Quantiies**

---

### Notes

- **Raw Quantities**
- **Wildboy Creek Large Wood Structure Quantiies**
- **Site A**
- **Site B**
- **Site C**
- **Site D**
- **Site E**
- **Site F**

---

### Additional Information

- **Wildboy Creek Large Wood Structure Quantiies**
- **Raw Quantities**
- **Site M**
- **Site N**
- **Site O**
- **Site P**
- **Site Q**
- **Site R**
EXISTING GROUND
EXISTING NATIVE MATERIAL
HAND FELLED SILL LOG
KEY LOG PIECES
SALVAGED DELTAIC GRAVELS
SALVAGED DAM MATERIAL
PACKED SLASH
STRAWBALES
**TYPICAL DETAIL: CHANNEL SPANNING LARGE WOOD STRUCTURES**

- **EXISTING TREE TO BE PULLED DOWN, ROOTWAD INTACT, AND MOVED INTO PLACE BASED ON FIELD CONDITIONS** (SEE PLAN SHEETS)
- **EXISTING CHANNEL**

- **SILL LOG ANCHORED TO BEDROCK (SEE DETAILS, SHEET 73-77)**
- **SALVAGED DAM MATERIAL PLACED UPSTREAM OF SILL LOG. 1 FT. AT A 10:1 SLOPE. SALVAGED DELTAIC MATERIAL PLACED OVER SALVAGED DAM ROCK.**

- **PLACED SLASH AS COVER BENEATH LARGE WOOD**
- **RACKING MEMBERS ANCHORED TO BEDROCK (SEE DETAILS, SHEET 73-77)**
- **KEY PIECES OF WOOD ANCHORED TO BEDROCK (SEE DETAILS, SHEET 73-77)**
- **SALVAGED DAM MATERIAL PLACED UPSTREAM OF SILL LOG. ORIENTATION TO BE ADJUSTED BASED ON FIELD CONDITIONS**

- **PLACE SLASH AROUND KEY PIECES. ANCHORS AND STRAW BALES TO ASSIST IN PLUGGING OPENINGS PRIOR TO PLACING SALVAGED DAM ROCK.**

- **TYPICAL DETAIL: CHANNEL SPANNING LARGE WOOD STRUCTURES**

- **FLOW**
- **EXISTING TREES PLACED IN CHANNEL (SEE PLAN SHEETS) ANCHORED TO BEDROCK (SEE DETAILS SHEET 73-77)**
- **PLACE SLASH AROUND KEY PIECES. ANCHORS AND STRAW BALES TO ASSIST IN PLUGGING OPENINGS PRIOR TO PLACING SALVAGED DAM ROCK.**

- **TYPICAL PROFILE: CHANNEL SPANNING LARGE WOOD STRUCTURES**

- **STRAW BALE PLACED UPSTREAM OF SILL LOG, ORIENTATION TO BE ADJUSTED BASED ON FIELD CONDITIONS**

- **SALVAGED DAM MATERIAL PLACED UPSTREAM OF SILL LOG. 1 FT. SALVAGED DELTAIC MATERIAL PLACED OVER SALVAGED DAM ROCK.**

- **SILL LOG ANCHORED TO BEDROCK (SEE DETAILS, SHEET 73-77)**
- **PLACE SLASH AS COVER BENEATH LARGE WOOD**

- **TYPICAL DETAIL: CHANNEL SPANNING LARGE WOOD STRUCTURES**

- **FLOW**
- **PLACE SLASH AROUND KEY PIECES. ANCHORS AND STRAW BALES TO ASSIST IN PLUGGING OPENINGS PRIOR TO PLACING SALVAGED DAM ROCK.**

- **SILVEXE PLACED SLASH AS COVER BENEATH LARGE WOOD**

- **RACKING MEMBERS ANCHORED TO KEY PIECES (SEE DETAILS, SHEET 73-77)**

- **KEY PIECES OF WOOD ANCHORED TO BEDROCK (SEE DETAILS, SHEET 73-77)**

- **SALVAGED DAM MATERIAL PLACED UPSTREAM OF SILL LOG. ORIENTATION TO BE ADJUSTED BASED ON FIELD CONDITIONS**
EXISTING BED ROCK CHANNEL

SLASH PLACED IN LARGE WOOD STRUCTURES

SLASH PLACED IN LARGE WOOD STRUCTURES

1. **NOT TO SCALE**

**TYPICAL DETAIL: CHANNEL SPANNING LARGE WOOD STRUCTURES**

ANCHORING IN WILDBOY CREEK

THREADED REBAR THROUGH LOG, STEEL WASHER AND NUT FASTENERS, ON BOTH SIDES TO SECURE CHAIN (SEE NOTES). TENSION ALL SLACK OUT OF CHAIN BEFORE TIGHTENING DOWN NUT AND WASHER

SLASH PLACED IN VOID SPACES BETWEEN SILL LOG AND THE EXISTING BEDROCK CHANNEL

SHRUB PLACED IN LARGE WOOD STRUCTURES

- **NOT TO SCALE**

**TYPICAL SECTION: CHANNEL SPANNING LARGE WOOD STRUCTURES**

ANCHORING IN WILDBOY CREEK

LOG

SLASH PLACED IN LARGE WOOD STRUCTURES

ANCHORING IN WILDBOY CREEK

FLOW

THREADED REBAR EMBEDDED 12 IN. MIN. ADHERE WITH EPOXY, STEEL WASHER AND NUT FASTENERS, (SEE NOTES).

- **NOT TO SCALE**

**TYPICAL DETAIL: CHANNEL SPANNING LARGE WOOD STRUCTURES**

ANCHORING IN WILDBOY CREEK

THREADED REBAR THROUGH LOG, STEEL WASHER AND NUT FASTENERS, ON BOTH SIDES TO SECURE CHAIN (SEE NOTES). TENSION ALL SLACK OUT OF CHAIN BEFORE TIGHTENING DOWN NUT AND WASHER

NOTES:

1. THREADED REBAR SHALL BE 1-INCH DIAMETER THREADBAR, DYWIDAG (DSI UNDERGROUND) #8 OR APPROVED EQUAL, CONFORMING TO ASTM A615, GRADE 75 STEEL.
2. WASHERS SHALL BE SQUARE PLATE 1/4"X4"X4", MINIMUM. NUTS SHALL BE CAST HEX.
3. CHAIN SHALL BE 3/4-INCH, LONG LINK HIGH TEST GRADE 43.
4. ALL HARDWARE SHALL BE HOT DIPPED GALVANIZED.
5. EPOXY SHALL BE HILTI HIT RE 500 OR APPROVED EQUAL.

EXISTING BED ROCK CHANNEL

LOG

FLOW

THREADED REBAR EMBEDDED 12 IN. MIN. ADHERE WITH EPOXY, STEEL WASHER AND NUT FASTENERS, (SEE NOTES).
**EXISTING BEDROCK CHANNEL**

**LOG**

**PLACE LARGE WOOD TEMPORARILY WHERE SHOWN ON THE DRAWINGS. DRILL VERTICALLY THROUGH LARGE WOOD WITH 2 IN. HOLE.**

**SECTION VIEW**

**STEP 1. POSITION LOG AND DRILL HOLE**

**PLAN VIEW**

**EXISTING BEDROCK CHANNEL**

**LOG**

**STEP 2. DRILL BEDROCK HOLE**

**SECTION VIEW**

**BEDROCK ANCHORS WILL BE DRILLED VERTICALLY INTO BEDROCK T WITH A 1 1/4IN. DIA. HOLE 12 IN. MIN. INTO BEDROCK**

**PLAN VIEW**

**12 IN. MIN.**

**LOG**

**SECTION VIEW**

**STEP 3. CLEAN BEDROCK HOLE**

**PLAN VIEW**

**TEMPORARILY REMOVED LOG**

**BEDROCK**

**EXISTING BEDROCK CHANNEL**

**LOG**

**STEP 5. POSITION LOG ONTO THREADED REBAR**

**PARTIAL DETAIL: LARGE WOOD BEDROCK ANCHORING**

**PLAN VIEW**

**LOG**

**EXISTING BEDROCK CHANNEL**

**BEDROCK**

**STEP 6. SECURE LOG WITH WASHER AND NUT ON THREADED REBAR**

**PLAN VIEW**

**CHAIN**

**LOG**

**EXISTING BEDROCK CHANNEL**

**BEDROCK**

**STEP 4. EPOXY THREADED REBAR**

**SECTION VIEW**

**AFTER EPOXY HAS CURED, PLACE LARGE WOOD BACK INTO POSITION BY SLIDING THE THREADED REBAR THROUGH THE LARGE WOOD HOLES PREVIOUSLY DRILLED.**

**PLAN VIEW**

**LOG**

**EXISTING BEDROCK CHANNEL**

**BEDROCK**

**STEP 4. EPOXY THREADED REBAR**

**SECTION VIEW**

**THREADED REBAR THROUGH LOG, STEEL WASHER AND NUT FASTENERS ON BOTH SIDES TO SECURE CHAIN. TENSION ALL SLACK OUT OF CHAIN BEFORE TIGHTENING DOWN NUT AND WASHER.**

**PLAN VIEW**

**LOG**

**EXISTING BEDROCK CHANNEL**

**BEDROCK**

**STEP 5. POSITION LOG ONTO THREADED REBAR**

**PARTIAL DETAIL: LARGE WOOD BEDROCK ANCHORING**

**PLAN VIEW**

**LOG**

**EXISTING BEDROCK CHANNEL**

**BEDROCK**

**STEP 6. SECURE LOG WITH WASHER AND NUT ON THREADED REBAR**

**PLAN VIEW**

**CHAIN**

**LOG**

**EXISTING BEDROCK CHANNEL**

**BEDROCK**

**STEP 6. SECURE LOG WITH WASHER AND NUT ON THREADED REBAR**

**PARTIAL DETAIL: LARGE WOOD BEDROCK ANCHORING**

**PLAN VIEW**

**LOG**

**EXISTING BEDROCK CHANNEL**

**BEDROCK**

**STEP 5. POSITION LOG ONTO THREADED REBAR**

**PARTIAL DETAIL: LARGE WOOD BEDROCK ANCHORING**

**PLAN VIEW**

**LOG**

**EXISTING BEDROCK CHANNEL**

**BEDROCK**

**STEP 5. POSITION LOG ONTO THREADED REBAR**

**PARTIAL DETAIL: LARGE WOOD BEDROCK ANCHORING**

**PLAN VIEW**

**LOG**

**EXISTING BEDROCK CHANNEL**

**BEDROCK**

**STEP 4. EPOXY THREADED REBAR**

**SECTION VIEW**

**AFTER EPOXY HAS CURED, PLACE LARGE WOOD BACK INTO POSITION BY SLIDING THE THREADED REBAR THROUGH THE LARGE WOOD HOLES PREVIOUSLY DRILLED.**

**PLAN VIEW**

**LOG**

**EXISTING BEDROCK CHANNEL**

**BEDROCK**

**STEP 4. EPOXY THREADED REBAR**

**SECTION VIEW**

**THREADED REBAR THROUGH LOG, STEEL WASHER AND NUT FASTENERS ON BOTH SIDES TO SECURE CHAIN. TENSION ALL SLACK OUT OF CHAIN BEFORE TIGHTENING DOWN NUT AND WASHER.**

**PLAN VIEW**

**LOG**

**EXISTING BEDROCK CHANNEL**

**BEDROCK**

**STEP 5. POSITION LOG ONTO THREADED REBAR**

**PARTIAL DETAIL: LARGE WOOD BEDROCK ANCHORING**

**PLAN VIEW**

**LOG**

**EXISTING BEDROCK CHANNEL**

**BEDROCK**

**STEP 6. SECURE LOG WITH WASHER AND NUT ON THREADED REBAR**

**PARTIAL DETAIL: LARGE WOOD BEDROCK ANCHORING**

**PLAN VIEW**

**LOG**

**EXISTING BEDROCK CHANNEL**

**BEDROCK**

**STEP 6. SECURE LOG WITH WASHER AND NUT ON THREADED REBAR**

**PARTIAL DETAIL: LARGE WOOD BEDROCK ANCHORING**

**PLAN VIEW**

**LOG**

**EXISTING BEDROCK CHANNEL**

**BEDROCK**

**STEP 5. POSITION LOG ONTO THREADED REBAR**

**PARTIAL DETAIL: LARGE WOOD BEDROCK ANCHORING**

**PLAN VIEW**

**LOG**

**EXISTING BEDROCK CHANNEL**

**BEDROCK**

**STEP 4. EPOXY THREADED REBAR**

**SECTION VIEW**

**AFTER EPOXY HAS CURED, PLACE LARGE WOOD BACK INTO POSITION BY SLIDING THE THREADED REBAR THROUGH THE LARGE WOOD HOLES PREVIOUSLY DRILLED.**

**PLAN VIEW**

**LOG**

**EXISTING BEDROCK CHANNEL**

**BEDROCK**

**STEP 4. EPOXY THREADED REBAR**

**SECTION VIEW**

**THREADED REBAR THROUGH LOG, STEEL WASHER AND NUT FASTENERS ON BOTH SIDES TO SECURE CHAIN. TENSION ALL SLACK OUT OF CHAIN BEFORE TIGHTENING DOWN NUT AND WASHER.**

**PLAN VIEW**

**LOG**

**EXISTING BEDROCK CHANNEL**

**BEDROCK**

**STEP 5. POSITION LOG ONTO THREADED REBAR**

**PARTIAL DETAIL: LARGE WOOD BEDROCK ANCHORING**

**PLAN VIEW**

**LOG**

**EXISTING BEDROCK CHANNEL**

**BEDROCK**

**STEP 6. SECURE LOG WITH WASHER AND NUT ON THREADED REBAR**

**PARTIAL DETAIL: LARGE WOOD BEDROCK ANCHORING**

**PLAN VIEW**

**LOG**

**EXISTING BEDROCK CHANNEL**

**BEDROCK**

**STEP 5. POSITION LOG ONTO THREADED REBAR**
TYPICAL DETAIL: LOG TO LOG ANCHORING TO BEDROCK

ANGLE THREADED REBAR THROUGH LOG TO LOG CONNECTION TO ALLOW FOR NUTS TO BE EXPOSED AND TIGHTENED

EXISTING BED ROCK CHANNEL

PLACE WASHERS AND NUTS, THEN TIGHTEN NUTS UNTIL WOOD BEGINS TO CRUSH BENEATH WASHERS.

TYPICAL DETAIL: LOG TO LOG ANCHORING

PLACE WASHERS AND NUTS, THEN TIGHTEN NUTS UNTIL WOOD BEGINS TO CRUSH BENEATH WASHERS.
1-2 TON BOULDERS SALVAGED FROM SPILL WAY AND DAM MATERIAL

EXISTING BED ROCK CHANNEL

TYPICAL DETAIL: LARGE WOOD BOULDER BALLAST

NOT TO SCALE

SECTION VIEW

TYPICAL DETAIL: LARGE WOOD SINGLE BOULDER BALLAST WITH CHAIN

NOT TO SCALE

THREADED REBAR EMBEDDED 12 IN. MIN. ADHERE WITH EPOXY, STEEL WASHER AND NUT FASTENERS, (SEE NOTES).

PLACE WASHERS AND NUTS, THEN TIGHTEN NUTS UNTIL WOOD BEGINS TO CRUSH BENEATH WASHERS.

1-2 TON BOULDERS SALVAGED FROM SPILL WAY AND DAM MATERIAL

EXISTING BED ROCK CHANNEL

THREADED REBAR EMBEDDED 12 IN. MIN. ADHERE WITH EPOXY, STEEL WASHER AND NUT FASTENERS, (SEE NOTES).

EXHIBIT

302 W. Steuben St. #6
Bingen, WA 98605
www.ers4life.com

WILLIAM P. NORRIS
STEWART ENG.

PARR excellence

COWI.

KWONEESUM DAM
REMOVAL DESIGN

PRELIMINARY DESIGN

34576 8076- BNRP6/4/21
TYPICAL PLAN VIEW: LARGE WOOD CHANNEL SPANNING JAMS IN PROPOSED TRIBUTARIES

- Salvaged dam material placed upstream of sill log, 1 ft. at a 10:1 slope. Salvaged deltaic material placed over salvaged dam rock.
- Sill log placed upstream of sill log. 1 ft. at a 10:1 slope. Salvaged deltaic material placed over salvaged dam rock.
- Partially buried sill log
- Straw bale placed upstream of sill log. Orientation to be adjusted based on field conditions
- Bury logs and boulder ballast, TYP.
- Boulder ballast, TYP.
- Regrading salvaged soils
- See plan and cross-sections for dimensions

TYPICAL PROFILE: LARGE WOOD CHANNEL SPANNING JAMS IN PROPOSED TRIBUTARIES

- Straw bale placed upstream of sill log. Orientation to be adjusted based on field conditions
- Partially buried sill log
- Bury logs and boulder ballast
- Boulder ballast, TYP.
- Regrading salvaged soils
- See plan and cross-sections for dimensions

TYPICAL CROSS-SECTION: LARGE WOOD IN TRIBUTARY CHANNEL

- Förtrade salvaged soils
- Regrading salvaged soils
- Pack straw into void spaces
- Proposed channel bed
- Existing grade
- Proposed slope (see plans)
- See plan and cross-sections for dimensions

TYPICAL CROSS-SECTION: LARGE WOOD IN TRIBUTARY POOL

- Bury logs and boulder ballast, TYP.
- Boulder ballast, TYP.
- Regrading salvaged soils
- See plan and cross-sections for dimensions

NOT TO SCALE

NOTE: WOOD EXTENDING OFF BANKS NOT SHOWN FOR CLARITY
TYPICAL PLAN: FLOODPLAIN WOOD

1. LOG, TYP.
2. BOULDER BALLAST, TYP.

FINISHED GRADE

TYPICAL SECTION FLOODPLAIN WOOD

1. LOG, TYP.
2. BOULDER BALLAST, TYP.

FINISHED GRADE

TYPICAL DETAIL: SILL LOGS IN TRIBUTARIES

1. STRAW BALE PLACED UPSTREAM OF SILL LOG. 1 FT. AT A 10:1 SLOPE. SALVAGED DELTAIC MATERIAL PLACED OVER SALVAGED DAM ROCK.
2. SALVAGED SLASH PLACED IN CHANNEL SPANNING LOG JAMS
3. SALVAGED DAM MATERIAL PLACED UPSTREAM OF SILL LOG. 1 FT. AT A 10:1 SLOPE. SALVAGED DELTAIC MATERIAL PLACED OVER SALVAGED DAM ROCK.

SILL LOG, BOTH ENDS BURIED INTO BANK

FLOW

BOULDER BALLAST, TYP.

BURIED LOG END, MIN. 2 FT. DEPTH AT BURIED END

FINISHED GRADE

NATIVE MATERIAL

PRELIMINARY DESIGN

KWONEESUM DAM REMOVAL DESIGN

TYPICAL DETAILS
**Riparian Revegetation Table**

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Scientific Name</th>
<th>Size</th>
<th>Spacing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red osier dogwood</td>
<td>Cornus stolonifera</td>
<td>Cutting</td>
<td>1/LF</td>
</tr>
<tr>
<td>Sitka willow</td>
<td>Salix sitchensis</td>
<td>Cutting</td>
<td>1/LF</td>
</tr>
<tr>
<td>Scouler's willow</td>
<td>Salix scouleriiana</td>
<td>Cutting</td>
<td>1/LF</td>
</tr>
<tr>
<td>Salmonberry</td>
<td>Rubus spectabilis</td>
<td>1-Gallon Container</td>
<td>6' O.C.</td>
</tr>
<tr>
<td>Red alder</td>
<td>Alnus rubra</td>
<td>1-Gallon Container</td>
<td>6' O.C.</td>
</tr>
<tr>
<td>Big leaf maple</td>
<td>Acer macrophyllum</td>
<td>1-Gallon Container</td>
<td>6' O.C.</td>
</tr>
</tbody>
</table>

**Upland Revegetation Table**

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Scientific Name</th>
<th>Size</th>
<th>Spacing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Douglas fir</td>
<td>Pseudotsuga menziesii</td>
<td>1-Gallon Container</td>
<td>10' O.C.</td>
</tr>
<tr>
<td>Western red cedar</td>
<td>Thuja plicata</td>
<td>1-Gallon Container</td>
<td>10' O.C.</td>
</tr>
<tr>
<td>Thimbleberry</td>
<td>Rubus parviflorus</td>
<td>1-Gallon Container</td>
<td>6' O.C.</td>
</tr>
<tr>
<td>Salal</td>
<td>Gaultheria shallon</td>
<td>1-Gallon Container</td>
<td>6' O.C.</td>
</tr>
<tr>
<td>Western sward fern</td>
<td>Polystichum munitum</td>
<td>1-Gallon Container</td>
<td>6' O.C.</td>
</tr>
<tr>
<td>Western bracken fern</td>
<td>Pteridium aquilimum</td>
<td>1-Gallon Container</td>
<td>6' O.C.</td>
</tr>
</tbody>
</table>

**Native Seed Mix**

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Scientific Name</th>
<th>PLS lbs/acre</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blue wildrye</td>
<td>Elymus glaucus</td>
<td>20</td>
</tr>
<tr>
<td>California brome</td>
<td>Bromus carinatus</td>
<td>20</td>
</tr>
<tr>
<td>Slender hairgrass</td>
<td>Deschampsia elongata</td>
<td>10</td>
</tr>
</tbody>
</table>

Native seed mix to be applied to all disturbed areas.

**Conservation Plugs and Rhizomes Table**

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Scientific Name</th>
<th>Size</th>
<th>Spacing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mertens' sedge</td>
<td>Carex mertensis</td>
<td>Plug</td>
<td>2' O.C.</td>
</tr>
<tr>
<td>Smalling sedge</td>
<td>Carex microptera</td>
<td>Plug</td>
<td>2' O.C.</td>
</tr>
<tr>
<td>Daggerleaf rush</td>
<td>Juncus ensifolius</td>
<td>Plug</td>
<td>2' O.C.</td>
</tr>
</tbody>
</table>

Conservation plugs and rhizomes will be planted on tributary margins in areas backwatered by channel spanning large wood.

**Typical Detail: Live Cutting**

1. **NOT TO SCALE**

2. **Typical Detail: Planting Plugs**

**NOT TO SCALE**