Agenda

1. Level 1 Stream Condition Assessment
2. Stream Assessment Reach*
3. Visual Channel Condition
4. Riparian Buffer
5. Visual In-Stream Habitat*
6. Visual Channel Alteration
7. Determining Condition Index and Impact Factor
8. Calculating Debits
9. Assessing Mitigation Plans
10. Calculating Credits

Most scientists regarded the new streamlined peer-review process as ‘quite an improvement.’
Level 1 Stream Condition Assessment

- Rapid Qualitative Assessment for All Ephemeral and Intermittent Streams and for Impacts Less than 500 Linear Feet to Intermittent Streams with Perennial Pools, Perennial Streams and Wadeable Rivers.
- Assesses condition of Physical, Chemical and Biological function.
- Assess past anthropogenics.
3 Functions in 4 Parameters

- Visual Channel Geometry
  - Physical
- Riparian Buffer
  - Chemical
  - Physical
- TCEQ Aquatic Life Use
  - Chemical
  - Biological
- Anthropogenics
Stream Assessment Reach

Transect

- Transect is fixed length sampling unit of 350 feet placed within set intervals commensurate with the project.
- Projects proposing impacts to less than 500 linear feet of ephemeral, intermittent or perennial streams will be assessed using 3 Transects placed no less than 125 feet apart and no greater than 200 feet apart.
- Projects proposing impacts to 500 linear feet or greater to an ephemeral and/or intermittent stream will add 1 Transect for each additional 500 feet of impact.
Visual Channel Condition

- Qualitative Measure of Physical Function designed to assess stream channel by assessing
  - Channel Geometry
    - Incision
    - Overwidening
    - Entrenchment
  - Channel Stability
    - Bank surface protection through vegetation
    - Bar deposition
    - Bank erosion
  - Connection to Active Floodplain.
    - Visual estimate of bankfull

Check out lane on White Oak Bayou
# Scoring Visual Channel

<table>
<thead>
<tr>
<th>Score</th>
<th>Geometry</th>
<th>Stability</th>
<th>Floodplain</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Optimal - 5</strong></td>
<td>Very little incision or widening</td>
<td>$\geq 80%$ vegetative cover, stable point bars</td>
<td>Access to active floodplain</td>
<td>No armor</td>
</tr>
<tr>
<td><strong>Suboptimal - 4</strong></td>
<td>Slightly Incised some erosion</td>
<td>$60-70%$ vegetative cover, point bars present</td>
<td>Access to bankfull benches or new floodplain</td>
<td>$1-25%$ armored</td>
</tr>
<tr>
<td><strong>Marginal – 3</strong></td>
<td>Incised and widened</td>
<td>$40-59%$ vegetative cover, heavy transient sediments</td>
<td>No connection to floodplain</td>
<td>$36-50%$ Armored</td>
</tr>
<tr>
<td><strong>Poor - 2</strong></td>
<td>Incised or overwidened and vertically/laterally unstable</td>
<td>Near vertical banks, substantial sedimentation, numerous erosion scars</td>
<td>No connection to floodplain</td>
<td>$51%$ armored.</td>
</tr>
<tr>
<td><strong>Severe - 1</strong></td>
<td>Deeply incised (or excavated), Streambed elevation below average rooting</td>
<td>Many erosion scars,</td>
<td>No connection to floodplain</td>
<td>Channel altered or channelized or $100%$ armor</td>
</tr>
</tbody>
</table>
Channelized
A Riparian buffer is defined as the zone of vegetation adjacent to streams, rivers, creeks or bayous.

The ideal riparian buffer would be 100% coverage of the assessment area by the native woody vegetation community with no additional land use.

An estimate of the percent area that each cover type occupies may be made from visual estimates made on-the-ground or by measuring each different area to obtain its dimensions.
Riparian Buffer Calculation

- Buffer with 30% native woody community species with no wetlands present (Low Suboptimal Score = 4)
- Buffer with 30% native woody community species and wetland present (High Suboptimal Score = 4.5)
- Buffer with > 60% native woody community species cover and wetlands present (Optimal = 5)
- Maintained Grasses (Poor Score = 2)
- Impervious Area (Severe Score = 1)
- Stream
Visual In-Stream Habitat

- Way too Subjective
Aquatic Life Use

- Based on the aquatic life use category score assigned to the stream segment by the TCEQ published in the Texas Integrated Report for Clean Water Act Sections 305(b) and 303(d).

- Specific criteria tested may include; water temperature, pH, chloride, sulfate, dissolved oxygen (DO), total dissolved solids (TDS) as well as fish and macroinvertebrate communities.

## UL Score

<table>
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<tr>
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<tbody>
<tr>
<td>Aquatic Life</td>
<td>Aquatic Life Score of <em>High.</em></td>
<td>Aquatic Life Score of <em>Intermediate</em></td>
<td>Aquatic Life Score of <em>Limited.</em></td>
<td>Aquatic Life Score of <em>Minimal.</em></td>
</tr>
<tr>
<td>Score of <em>Exceptional</em></td>
<td>Perennial streams that have not been assessed are also assumed to have an Aquatic Life Score of <em>High.</em></td>
<td>Streams with Perennial Pools that have not been assessed are also assumed to have an Aquatic Life Score of <em>Limited.</em></td>
<td>Intermittent and ephemeral streams that have not been assessed are also assumed to have an Aquatic Life Score of <em>Minimal.</em></td>
<td></td>
</tr>
<tr>
<td>Score – 5</td>
<td>Score – 4</td>
<td>Score – 3</td>
<td>Score – 2</td>
<td>Score – 1</td>
</tr>
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</table>

BUILDING STRONG®
Visual Channel Alteration

- Accounts for previous anthropogenic modification to the stream.
- Easiest parameter to sample, requires least explanation.
- Generally accurate results.
Transect Data Sheet

1. Channel Condition: Assess the cross-section of the stream and prevailing condition (erosion, accretion)

<table>
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<tr>
<th>Visual Channel Condition Parameter</th>
<th>Optimal</th>
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<td>Channel is slightly eroded with indications of active erosion. Indicators of instability include scoured banks and/or downward tilted bedrock.</td>
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Score: 5

Notes:

2. Riparian Buffers: Assess both banks' 100 foot linear areas along the entire EWS.

<table>
<thead>
<tr>
<th>Riparian Buffers</th>
<th>Optimal</th>
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<th>Marginal</th>
<th>Poor</th>
<th>Severe</th>
</tr>
</thead>
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<tr>
<td>Buffers are properly maintained and are considered healthy.</td>
<td>![Image of riparian buffer]</td>
<td>![Image of riparian buffer]</td>
<td>![Image of riparian buffer]</td>
<td>![Image of riparian buffer]</td>
<td>![Image of riparian buffer]</td>
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<tr>
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Condition Scores: 5

Name:

Right Bank: % Erosion Area: 0%

Left Bank: % Erosion Area: 0%

3. Aquatic Use: The Transect is assessed based on the aquatic life use category score assigned to the stream segment by the TCEQ.

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<td>Aquatic Life Score: Low</td>
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Score: 5

Notes:

4. Channel Alteration: Stream changes, either natural or anthropogenic, upstream may affect habitat conditions downstream.

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Score: 5

Notes:
Calculating Condition

Assessing Transect Condition Index:
The first step is to assess the Condition Index (CI) for each Transect sampled. Each Transect is sampled for the following variables:
- Channel Condition Variable (CV) = Score 1-5
- Riparian Buffer Variable (BV) = Score 1-5
- Aquatic Use Variable (UV) = 1-5
- Channel Alteration Variable (AV) = 1-5

The CI is calculated using an arithmetic mean, or average score. The CI shall be calculated for each Transect sample. The calculation for determining CI is:

\[ \text{CI} = \frac{(CV+BV+UV+AV)}{4} \]

Assessing Reach Condition Index
Similar to the CI for each Transect, an arithmetic mean is used to calculate the Reach Condition Index (RCI). A single RCI is calculated for each stream segment, or reach, proposed for impact. The calculation for determining RCI is:

\[ RCI = \frac{\sum_{n=1}^{Y} \text{CI}_n}{Y} \]

RCI = Reach Condition Index
CI = Condition Index for each Transect
Y = Number of Transects
Functional Delta

- 33 CFR 332.3(a)(1) requires the district engineer to determine the compensatory mitigation to be required in a DA permit…capable of compensating for the aquatic resource functions that will be lost as a result of the permitted activity.
- Since stream are rarely, if ever, completely destroyed during construction, the revision is designed to quantify functional loss resulting from the project.

\[(\text{Pre-construction RCI}) - (\text{Post-construction RCI}) = \Delta\]
Determining Impact Factor

- **Severe-IF Score 5** The proposed project will eliminate a stream, or result in a loss function equivalent to a 4-point change in Reach Condition Index.

- **Major-IF Score 4** The proposed project will result in a loss of function equivalent to a 3-point change in Reach Condition Index.

- **Moderate-IF Score 3** The proposed project will result in a loss of function equivalent to a 2-point change in Reach Condition Index.

- **Minor –IF Score 2** The proposed project will result in a loss of function equivalent to or less than a 1-point change in Reach Condition Index.

- **Temporary- If Score 1** Impacts are temporary and the site will be returned to pre-construction contours and elevations with no permanent loss of aquatic function.
Calculating Debits

Reach Condition Index x Impact Factor x Linear Feet of Impact = Debit
Avoidance and Minimization

- **Avoidance:** In the context of a stream, a project that will not affect stream stability.

- **Minimization:** In the context of streams, a project that will affect stream stability but includes design features that will maintain stability after normalization.
Assessing Restoration and Re-establishment Mitigation Plans

- Demonstrating a stream’s need for restoration/re-establishment is important; we should not assume a stream has impaired function based on a visual inspection that lacks the understanding of fluvial or hydrogeomorphology of the stream segment.

- There are two factors to evaluate on a proposed stream restoration/re-establishment project:
  - 1) the current condition of the stream’s functions.
  - 2) the proposed restoration method.

- Design/build specifications need to be about 70%
Calculating Credits

- Designed to account for all types of compensatory mitigation plans.
  - In-Kind/out of Kind
  - On-site/Off-site
  - PRM/Bank
- Re-Establishment
- Rehabilitation/Enhancement
- Preservation
Re-establishment

- Re-establishment means the manipulation of the physical, chemical, and biological characteristics of a site with the goal of returning natural/historic functions to a former or degraded aquatic resource.

- Re-establishment activities may include:
  1) the re-establishment of a channel on the original floodplain, using a relic channel or constructing a new channel;
  2) re-establishment of a floodplain at the existing level or higher but not at the original level; or
  3) re-establishment of a channel with a flood prone area, but without an active floodplain.

- Generates 3 credits per foot, includes required buffer work.
Re-establishment Restrictions

- All three geomorphic characteristics (i.e., pattern, profile, and dimension) are required to be addressed, as well as a net gain in aquatic area, for a stream to receive re-establishment credit.

- No rehabilitation and/or enhancement activities can be coupled with re-establishment on the same linear foot of stream channel. Credit is limited to three credits per linear foot of in-channel and buffer work for the mandatory first 100-foot of buffer work. Additional Credit for additional buffer between 100-200 feet is calculated pursuant to Section 5.2.2.

- Re-establishment mitigation credits cannot be generated for stream channel or streambank restoration if the mitigation segment is within 500 feet of a dam or a channelized/piped stream reach.

- No artificial hydrology allowed.

- Water rights should be established.
Rehabilitation and Enhancement

- **Rehabilitation** means the manipulation of the physical, chemical, or biological characteristics of a site with the goal of repairing natural/historic functions to a degraded aquatic resource. Results in a gain in aquatic resource function, but does not result in a gain in aquatic resource area.

- **Enhancement** means the manipulation of the physical, chemical, or biological characteristics of an aquatic resource to heighten, intensify, or improve a specific aquatic resource function(s). Results in the gain of selected aquatic resource function(s), but may also lead to a decline in other aquatic resource function(s). Does not result in a gain in aquatic resource area.
Rehabilitation and Enhancement Guidelines

- In order for a site to be considered for rehabilitation, pre-approved reference sites must be utilized to establish the natural/historic function goals.

- However, enhancement process shall simply target the Optimal and Suboptimal standards set forth in the Conditional Assessment Procedure.
Rehabilitation and Enhancement

- Chemical
  - Riparian Buffer work
- Physical
  - Streambank and Streambed Improvements
- Biological
  - Habitat Improvements
Preservation

- Credit for this activity is given when no work to a riparian buffer area is proposed but that area will be placed under perpetual protection through an appropriate real estate instrument.

- Riparian buffer preservation must meet the requirements contained in 33 CFR Part 332.3(h) on preservation.
  - Resource provides important function
  - Resources contribute significantly to the ecological sustainability of the watershed.
  - Resources are under threat of destruction or adverse modifications.

- High Quality (RCI = ≥4) streams receive 0.1 credits per linear feet for the inner 100 feet.

- Low Quality (RCI = 3-3.9) streams receive 0.05 credits per linear foot for the inner 100 feet.

- For the outer 100-200 feet of buffer, all streams receive 0.05 credits per linear foot.

- Preservation will not be allowed for streams that score below an RCI of 3
Summary

- SARs are dead, now we have Transects
- Assessment of Biologic Function has changed
- We look at the Functional Delta on streams.
- Impact Factor is a multiplier based on functional Delta rather than project type.
- Clarified guidelines for stream restoration/re-establishment
- Assess chemical, physical and biological functional lift rather than specific work types.
Questions?