## 2.5 Stream Setback Area

### Description

Stream setbacks (also known as streamways or riparian buffer areas) minimize property damage and protect water quality by providing areas where over bank flooding, meander migration, and stream processes freely occur and thereby encourage stability, habitat, and water quantity and quality functions. On high quality creeks and rivers these areas represent the most biologically diverse and active areas where in-stream and riparian habitat abounds, sediments are exported to floodplain areas, pollutants are assimilated and stormwater is stored and conveyed. On more impacted or lower quality creeks and rivers, stream setbacks represent areas where meander migration or floodplain redevelopment is likely to occur and where natural stream adjustments are predicted to occur.

This practice establishes the setback area based on the predicted belt width of stream, the lowest elevation ground in the valley and the stream location. The streamway is determined at intervals using the stream's drainage area and regional or locally developed stream data. Ideally, local government should map these areas so that they are centered on the areas most subject to flooding. In lieu of this mapping, individual parcels shall have stream setbacks located on site plans as this practice describes.

Note: This practice reflects the site development scale. Additional resources should be consulted when developing a model ordinance or implementing stream setbacks throughout a watershed or community.

To provide the greatest benefits, riparian areas should be predominately native vegetation, preferably forested. However, passive uses such as trails and picnic areas may be maintained.

Stream setbacks are strongly linked to the protection of public health or safety of watershed residents by setting aside areas that:

- Reduce flood hazards resulting from high flows and high velocities;
- Recharge groundwater;
- Reduce pollution in stream flows and surface water by filtering, settling and chemical transformation in floodplain areas and stream side soils;
- Reduce sediment loads from stream bank erosion; and allow recovery of previously degraded or channelized streams;
- Provide adequate room for stream meander patterns or channel migration;
- Provide high quality habitats for wildlife;
- Limit the need for costly measures such as channel armoring that would otherwise be necessary to protect structures and reduce property damage;
- Protect natural aesthetics and the environmental quality of stream corridors and the value of nearby property.

## Conditions Where Practice Applies

Setbacks are appropriate for all sizes of stream channels from ephemeral or intermittent streams up to large rivers. The importance of these areas increases as a watershed is developed. Streams and associated corridors most subject to encroachment or modification (drainage areas less than 10 square miles) are most in need of established protection. These size channels are small enough that they can be more easily modified and are less likely to have adequately mapped or protected floodplain areas.

The width of the setback area is based on empirical stream data and the predicted belt width of the stream, but setback areas on sites with existing development must be implemented to minimize potential conflicts between current landuses and the stream setback. For example, setback shall be implemented to ensure that development gets no closer to the stream, thus effectively setting the setback for that parcel at the line of the existing foundation/structure. Still the recommended setback area provides the zone where channel movement is predicted and stream processes are most beneficial and should be sustained as much as possible.

## Planning Considerations

### *The Stream Setback is Based Primarily on Stream Processes*

The stream setback is based on the most critical land area needed to sustain natural stream processes. These processes are responsible for the common meandering pattern that streams exhibit and for channel and floodplain forms that are dynamically stable and beneficial to water quality and overall stream integrity. With this in mind, it should be noted that many Ohio streams are not in the condition of "best potential". Many have been altered directly by straightening or channelization or degraded in response to landuse changes within the watershed. Thus the existing meander pattern (the stream's plan form) is often narrower than it was historically and erosion and deposition may be working to re-establish a wider pattern along with a more dynamically stable channel form. A stream setback establishes the area in which these processes can continue to occur.

While this area provides many benefits it may need to be expanded to accomplish additional objectives. For instance, some communities may require more extensive preservation of floodplain or upland wildlife areas.

### *Existing Local Requirements*

Some counties, townships and municipalities across Ohio have already adopted riparian setbacks. In the event that these setbacks differ from those described here, the larger of these is suggested. Please note when comparing distances that this practice predicts the full meander belt width that contains the stream, while other local stream protection setbacks may utilize a setback distance from each bank of the stream. To compare this practice to a setback distance from each bank, the latter should be doubled and added to the width of the stream for proper comparison (see Figure 2.5.1).

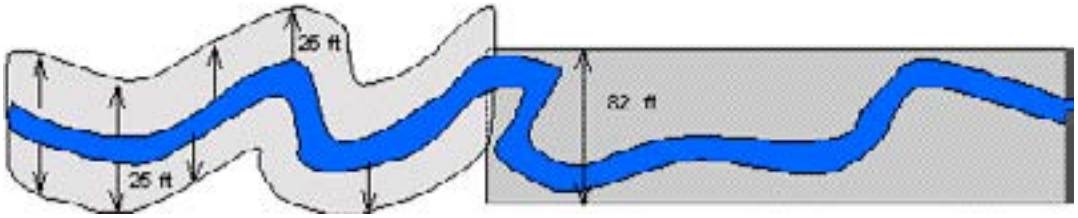



**Figure 2.5.1 Comparing a traditional stream setback to the streamway-based setback.**

### *Encourage Rehabilitation of Streams in the Stream Setback –*

Because so many Ohio streams have been channelized or have degraded it is advantageous to promote channel and floodplain rehabilitation activities that provide channels with greater access to an active floodplain. This will insure more natural stability and higher function. General grading that occurs during development may provide an opportunity to rehabilitate an entrenched stream and therefore provide a higher quality stream corridor. Applicable practices may be floodplain rehabilitation, primarily lowering of high banks. This setback practice does not limit rehabilitation activities.

### *Adjustments to the Setback Width*

In some circumstances, site conditions justify altering the width of the setback area. These may be situations of narrow, confined valleys smaller than the setback width, floodplains that extend beyond the area, wetlands contiguous to the area, or adjacent hillsides prone to slippage or being undercut as a result of stream flows. This is best accomplished with GIS or other more regional tools that can be used to incorporate adjustments to the setback area width.

For large rivers with extensive setback areas, further refinement of acceptable land uses within the area may be necessary. After maintaining a forested riparian area immediately adjacent to the river, other uses such as open fields or recreation areas are appropriate provided that the floodplain characteristics are not impaired.

## Design Criteria

### *Calculating the Setback Area Width*

The setback area width is a total width, which crosses the channel and is calculated according to the drainage area (square miles).

#### *Size:*

The setback area shall combination of two overlapping areas, one Streamway based and the other based on a minimum distance from the channel bank, equivalent to 1 channel width as illustrated in Figure 2.5.2.

The Streamway size appropriate to accommodate the meander belt is:

$$\text{Streamway width} = 147\ (\text{Drainage Area in square miles})^{0.38}$$

*(Approximately 10 channel widths)*

In addition, at no point shall the distance between the setback boundary and the channel be less than:

$$\text{Minimum distance from channel} = 14.7\ (\text{Drainage Area in square miles})^{0.38}$$

*(Approximately 1 channel width)*

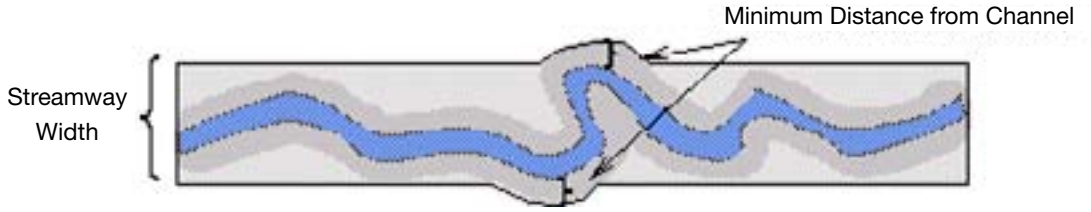



**Figure 2.5.2 Setback areas combine the streamway and a minimum distance from the channel.**

### *Location*

A Streamway is more a feature of a valley than individual bends or the present location of a channel , thus the setback area may not always be exactly centered over the stream, especially as streams meander.. It is more aptly visualized as a flood path or roughly the flood way. Thus, setback areas should be fit to the valleys. They shall be positioned so that corresponding left and right boundary elevations match and the setback area incorporates the lowest elevations in the valley.

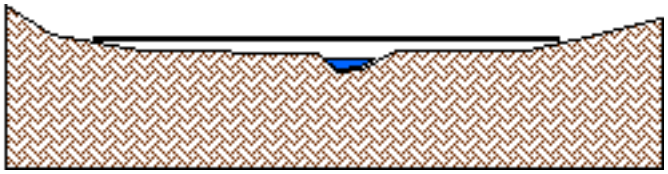


**Figure 2.5.3 Center setback areas over the floodway with matching elevations at either boundary.**

### *Avoid concentrating flow into the setback area*

Maintaining diffuse sheet flow into the setback area maximizes the treatment processes that occur in riparian and floodplain areas. Convert concentrated flows from storm drains and swales (with limited drainage areas) to uniform shallow sheet flow as it enters the stream setback area. Grading and constructing level spreaders can help accomplish this. Ditches and streams with access to an active floodplain will better utilize these areas than deep entrenched channels.

### *Insure long-term protection of the area*

Zoning, conservation easements and public ownership are options to consider long-term protection of the area. Local government may utilize zoning to set appropriate landuses for the stream setback area. In addition, many local governments will accept ownership of such properties if deeded in fee simple to the community. In this case, a credit may be applicable toward local open space or parkland set aside requirements.

Conservation easements offer one of the best ways to protect riparian areas. These maintain private ownership, while maintaining the limitations on the uses and actions that can be taken in the setback area. Easements can be held by a legally qualified conservation organization (such as a land trust) or a government agency. Easements should be regularly monitored and violations of easement agreements addressed in order to insure long-term protection.

### *Clearly identify the setback area boundaries on the plat map, construction plans and the site*

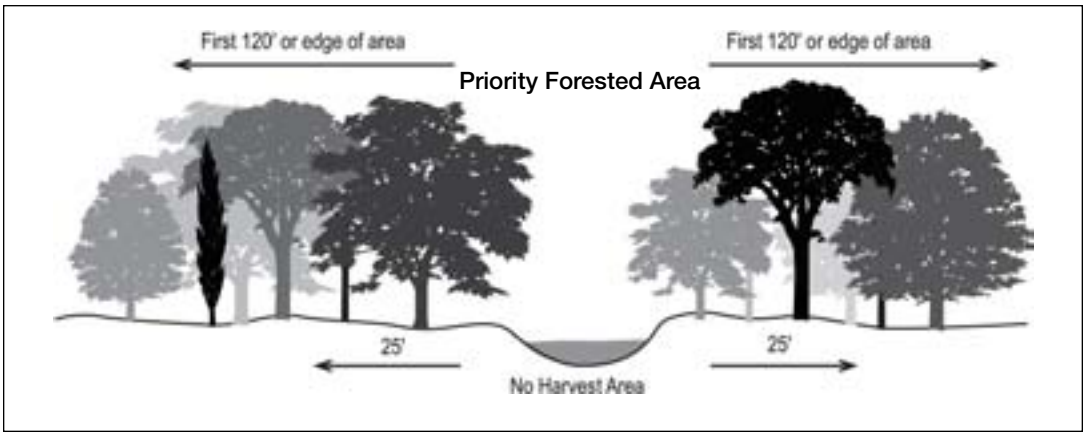
Install temporary fencing and best management practices appropriately to prevent encroachment during construction.

Following construction erect a fence or visual barrier identifying the area or portions of the area, which are to be no-mow zones or permanently forested areas. Sections of split rail or similar unobtrusive fencing provide a visual marker that will allow the area to remain distinct of other landuses.

*Vegetative Goals*

Setback areas are to be established in native vegetation, which for most Ohio streams is forest. Areas may also be divided into primary (closest to the stream) and secondary areas with different vegetative targets that allow for surrounding landuses. Forested areas should be maintained for a minimum of the first 50 feet of the area on either bank.

Harvesting on privately held areas should not be done within 25 feet of either bank. Removal of invasive species is allowable at anytime and is highly recommended for maintenance of the setback as a natural area.




## References

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