

Floodplain Storage Compensation

Direction on the Completion of Cut/Fill Designs and Associated Plans

Floodplains provide valuable areas for water storage and conveyance during large storm events, and typically extend beyond the banks of a given watercourse or waterbody and into the adjacent lands. Preservation of this storage volume and conveyance area is vital to ensuring that the water elevation associated with a given flood is not raised, thus worsening the hazard for the neighbouring landowners and the remainder of the watershed.

A cut and fill design may be approved by the Conservation Authority in some limited cases, where it is required to enlarge or modify a building envelope, and may be considered an acceptable approach on a site by site basis provided the placement of fill does not affect the control of flooding, erosion, dynamic beaches, pollution or the conservation of land.

In order to ensure the above goals are met **placed fill must be minimized to the extent possible** based on the following general guidance:

- Fill will only be permitted to facilitate primary structures and those part of septic systems that are required to be floodproofed. Fill will not be permitted to floodproof accessory structure, pools, or landscaping features.
- Buildings will be kept at the minimum elevation required to facilitate floodproofing (ie. lowest opening at 0.3 m above the flood elevation, fill to the flood elevation for 2 to 3 meters beyond building foundation).
- The structure and fill pad must be placed within the property in the area of least flood depth. Otherwise, where flood depth is consistent through the property, or where an inappropriate volume of fill is required to access the point of least flood depth, the structure and associated fill must be placed at a minimum setback to the road as per physical constraints and municipal by-law.
- The footprint of the structure and associated fill pad must be oriented within the property as to minimize the overall fill volume.
- The side slopes of all placed fill must be placed at a slope no less than 3 horizontal to 1 vertical. Steeper side slopes may be permitted where supported by design.
- Fill material must not be susceptible to erosion by ice and/or water.
- Fill placed around the building footprint must be limited to the flood elevation (or as required to facilitate positive drainage), for a maximum distance of 3 m.
- Fill will be permitted to facilitate an access/egress route along the shortest distance between the municipal road allowance and the main door to the structure, to a maximum running surface width of 3 m, and to an elevation no greater than 0.3 m below the flood elevation or as otherwise approved by Conservation Sudbury.
- Fill placement will not be permitted within a floodway.
- Fill placement will not be permitted in areas subject to 1 metre or greater of flooding during the regulatory storm event.

In order to compensate for any fill placed within the floodplain, **a cut volume of equal or greater quantity will be required elsewhere within the same parcel of land or within the same reach, if approved by Conservation Sudbury**. Compensatory cut plans must be developed based on the following guidance:

- The cut and fill volumes are required to be **Incrementally Balanced** in 0.5 m elevation increments. Note: The intention of this approach is to ensure that water elevations associated with storms of return periods lower than the regulatory event are not raised.
- Only the volume of removed material below the regulatory flood elevation will be included in the compensatory cut volume calculation.
- The full extent of cut areas must be hydraulically connected to the adjacent floodplain via overland flow (ie. must completely drain overland to watercourse, waterbody or wetland)
- Cut areas will tie back into original ground elevations at their perimeter at a slope no greater than 3 horizontal to 1 vertical.
- Cuts are not permitted within wetlands, below the annual high water mark of a lake or below the bankfull elevation of a stream.

Cut and Fill Design Plan Requirements

Cut and fill operations will require the submission and approval of detailed plans that meet the above guidance. Plans must be completed and stamped by a Professional Engineer, Ontario Land Surveyor or Certified Lot Grading Professional. The following information is required on all Cut and Fill Plans:

- *General Information*, including:
 - Name and signature of certified professional
 - Date of survey or information collection
 - Date of plan preparation and revision number
 - Property identifiers including municipal address and legal description
 - Scale and scale bar
 - Reference to geodetic datum
- *Existing Conditions* extending a minimum of 10 m beyond the property boundaries (where applicable), including:
 - Property boundaries
 - Existing contours at minimum 0.5 m increments
 - Delineation of top and bottom of any slopes
 - Existing ground features including tree lines, driveways and gravel pad limits
 - Watercourses including centerline, top of bank, current water level, high water mark and flood elevation (where applicable)
 - Ditches and drainage swales
 - Culverts and drainage structures
 - Wetland limits
 - Waterbodies (where applicable) including current water level, high water mark (as determined in field), and floodplain elevation
 - Footprint of all structures, complete with finished floor elevations
 - Floodplain limit with labelled elevation

- Other relevant features as they appear on the property.
- *Proposed Grading Details, including:*
 - Fill Plan Details
 - Footprint and finished floor elevation of all proposed structures
 - Proposed spot elevations and grades around structure, limits of fill pads, and driveway surfaces
 - Delineation of septic systems including tanks, filter beds and mantles as well as associated grading details
 - Delineation of top and bottom of any fill slopes including slope label (ie. 3H:1V)
 - Limits of all fill areas **extending to the toe of slope**
 - Existing and proposed spot elevations at limits of fill (ie. show matching at toe of slope)
 - Original and modified floodplain limits
 - A note on the type and source of all fill material
 - A note on how and when all new fill will be stabilized
 - Sediment control measures
 - Cut Plan Details
 - Limits of cut area extending from top of cut to tie in point with original ground (to ensure hydraulic connectivity)
 - Delineation of top and bottom of cut slopes including slope label (ie. 3H:1V)
 - Spot elevations and grades over cut area
 - Minimum of one cross section of cut area depicting original ground, proposed ground, and flood elevation
 - Original and modified floodplain limits
 - A note or description of where cut material will be placed or disposed of
 - Sediment control measures
 - A note on how all exposed soils within the cut area will be stabilized
- *Cut and Fill Volume Calculations, including:*
 - A table of the volume of fill placed and cut below the floodplain elevation calculated in 0.5 m intervals as follows:

Calculation Summary for Design Cut/Fill Volumes Placed Below the Regulatory Flood Elevation				
Regulatory Flood Elevation = 279.53 m (example only)				
Interval	Elevation (example only)	Fill Volume (m³)	Cut Volume (m³)	NET Cut/Fill (m³)
1	279.03 m - 279.53 m	#	#	#
2	278.53 m – 279.03 m	#	#	#
3	278.03 m – 278.53 m	#	#	#
<i>Continue Rows as Required...</i>				
TOTAL	278.03 m – 279.53 m	#	#	#

- Cut and Fill Notes:
 - An overall surplus cut will be permitted
 - Where a net cut for any given interval can not be achieved, consideration will be given to obtaining the required difference of the cut volume from the lower interval
 - Where the cut and fill calculations include 3 or more intervals Conservation Sudbury may require the extent of each interval to be depicted on the plans with distinct hatching

As-Built Drawing

Following the completion of the fill placement, cut extraction or grading operations, the proponent will be required to submit an as-built survey depicting that the finished grades are in conformity with the approved plans. This survey shall be prepared and certified by a Professional Engineer or an Ontario Land Surveyor and must be referenced to geodetic datum.

The as-built drawing is to include constructed spot elevations with distinctive font/colour/symbol overlaid on the approved cut plans, and a recalculated volume summary table based on as-built conditions.

Where the cut and fill is required to create a suitable building envelope for the construction of a structure, lot grading must be completed, and verification submitted to the satisfaction of our office, before permission will be granted for the erection of structures. In some cases, only verification of the cut will be required prior to construction, and lot grading associated with the fill will be required following construction. In all cases where the proponent must verify that the structure meets floodproofing requirements, this will be required after the foundation has been established.