CITY OF GREATER SUDBURY
SITE PLAN CONTROL GUIDE

Last Update: January 13, 2022

APPENDIX D

SUBMISSION (DRAFTING AND DESIGN) DETAILS FOR SITE PLAN APPLICATIONS

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1.0 Preface and Definitions

Attractive and functional design is expected for all developments within the City of Greater Sudbury. This Guide is intended to compliment the various federal, provincial, and municipal acts, guidelines, manuals and by-laws that apply to developments by providing clarification and setting minimum design standards to encourage attractive and functional design; however, the City of Greater Sudbury encourages Site Plan proposals to exceed these standards.

For the purpose of this Appendix refer to the following definitions:

Should: Where should is used, the design detail is considered to be a best practice and the owner must make a reasonable attempt to satisfy the design detail.

Must/Shall: Where must or shall are used, the design detail is considered mandatory and must be satisfied.

Intensification: Development of a property, site or area which results in a net increase in density, floor area or units but does not significantly alter the site layout or increase the impervious area.

Interim Stormwater Management Report: A report that presents the data, methods, procedures and predicted results associated with the design of drainage works and erosion protection measures during site alteration or phasing of a development. The report shall be prepared by a Professional Engineer Licensed in Ontario and provide details on the techniques used to control storm runoff to allowable runoff rates, the method and volume of stormwater storage and the techniques used to address sediment and erosion control.

Geotechnical/Soils Report: A report that indicates the water table elevation and/or bedrock, and analyses soil composition to determine its infiltration rate, structural stability and ability to accommodate development.

Low Risk Site: A small site, not used for industrial or vehicle repair purposes or that does not contain fuel or material storage that may pose a risk to downstream lakes, rivers or ground water quality.

Lot Grading Professional – An Engineer, Architect, Land Surveyor, Landscape Architect and /or company providing these services. The Lot Grading Professional must be approved by the City and have a valid Certificate of Authorization to practice in their profession in the province of Ontario and valid professional liability insurance (i.e. errors and omissions insurance). Other individuals/companies meeting the above criteria/conditions may also qualify as a Lot Grading Professional.

Pre-development: The current condition present in the field at the project onset, or the last approved condition, or the condition as of 2006, whichever obtains the lowest runoff coefficients.

Pre/post-treatment: A facility installed upstream or downstream of a stormwater facility that provides a basic level of protection (60% TSS removal). Examples of acceptable pre/post-treatment include: hydrodynamic separators, enhanced swales, grass filter strips, storage tank filtration, or other equivalent pre-treatment systems that are shown to provide, at minimum, a basic level of protection (60% TSS removal).

Redevelopment: The creation of new units, uses or lots on previously developed land which significantly alters the site layout, and increases the impervious area. It may involve the partial or full demolition of a building and/or structure and the assembly of lands for development.

Site: The entire area under development, Redevelopment or Intensification.

Stormwater Management Report: A report that presents the data, methods, procedures and predicted results associated with the design of drainage works and erosion protection measures related to a development. The report shall be prepared by a Professional Engineer licensed in the province of Ontario and provide details on the techniques used to control storm runoff to allowable runoff rates, the method and volume of stormwater storage and the techniques used to address water quality requirements.

2.0 General Plan Drafting and Topographic Survey Details

1) The plans must be legible. All drawings shall be submitted with metric dimensions, to a standard metric scale (1:100, 1:200, 1:250, 1:300, 1:400, 1:500). Minimum scale to be 1:500.
2) Drawing size should generally be submitted on ARCH D (24x36) sheet size. Drawings size ARCH E (36x48) may be accepted for larger sites with building sizes greater than 3000m^2. Drawing size ARCH C (18 x 24) or ANSI B (11x17) may be accepted for smaller sites less than 500m^2 where minimal grading and servicing information is required.
3) Drawings must be oriented to read in landscape view.
4) Drawings must be folded to 8.5x11 or 8.5x14.
5) Drawings must be reproducible in black and white/greyscale and must not use colour or contain screenshot or photo quality images.
6) Drawings must not contain copy write notation that limits the ability to reproduce and distribute the drawings.
7) Existing conditions should appear faded in comparison to proposed work, and use a text size of 1.6mm or 2.0mm on the final hard copy.
8) Various utility lines should be identified and appear slightly darker than existing topography.
9) Proposed work should appear heavier than existing conditions, and use a text size of at least 2.0mm for notes elevations and dimensions on the final hardcopy.
10) key plan, indicating location of the site in respect to the City street network;

The following information should be included on all of the submitted plans

- □ note the date the topographic survey, used as a base for the plans, was completed and the name of the Lot Grading Professional responsible for the topographic survey information;
- □ identification of the proposed use of the site;
- □ name and address of firm preparing the plan;
- □ municipal address and/or Legal Description (Reference Plan, Lot, Concession and Registered Plan Lot Number);
- □ north arrow;
- □ legend;
- □ title block and revision block with dates for each revision;
- □ existing building structures and site details such as driveways, sidewalks, utilities, surface types etc. located, wherever possible and with the permission of the adjacent landowners, within 6.0m of the site;
- □ all existing and proposed driveways, road shoulders, traffic markings, curbs, curb cuts/depression, sidewalks, and ramps on both sides of the adjacent street;
- □ all man-made or natural features (i.e. watercourse, swale, culvert, retaining wall, embankment, catch basin) on or adjacent to the site;
- □ all main proposed features of the site shall be shown (all buildings, parking areas, driveways, above ground utilities, landscape areas, fencing and handrails, ditches, retaining walls, berms, trees, etc.);
- □ all existing utility services within the site, and on adjacent street, road allowance, boulevards and within 6.0m of the site, including all light standards and fixture location, traffic signals, utility structures, hydro transformer boxes, vaults and Bell chambers, hydro/telephone/cable poles, guys and pedestals;
- □ all necessary construction details and general notes are to be provided so as to accurately convey the design intent of the elements on the plan and to address the proposed built form;

- ☐ location of all vehicle and pedestrian entrances to and from the building;
- ☐ location and description of all existing and proposed property boundaries, adjacent street names, easements, right of-way widening, and reserves within or adjacent to the subject lands;
- ☐ sight triangles; and,
- ☐ signs (municipal and private) and parking meters.
- ☐ required professional seals.

3.0 Site Plan

All information on the Site Plan must be in conformance with the City of Greater Sudbury Zoning By-law, Ontario Building Code, and any other applicable bylaws and design standards. All information within the Municipal Right-of-Way must be in conformance with the CGS Engineering Design Manual. In addition the following design details and drawing information should also be presented.

3.1 Additional Planning Design Details

1) Relate the size, character and setting of proposed projects to the functions of adjacent streets and pedestrian networks. Buildings should generally be oriented parallel to the public rights-of-way or along the edge of a park or open spaces with a consistent front yard setback and close to pedestrian movement. On a corner site, development and intensification should be located along both street frontages and give prominence to the corner. On a site that terminates a street corridor, the development should acknowledge the prominence of that site.
2) Developments should be designed for the ease of pedestrians both on and Off-Site and encourage the separation of pedestrians and automobiles. Developments should be convenient to and accessible by persons with physical limitations and disabilities.
3) Incorporate architectural and landscape elements at the pedestrian level.
4) Consider the function and location of service and loading areas early in design development.
5) Crime Prevention Through Environmental Design (C.P.T.E.D) principles (i.e. elimination of ambiguous areas or entrapment areas, improved sightlines including ground floor views from the building, lighting levels and uniformity, clear definitions between public and private space, etc…) should be applied throughout the site to reduce the likelihood of criminal activity occurring on the site.
6) Opaque fencing, where required, must be constructed of solid materials (e.g. slats woven through chainlink fencing would not be permitted).
7) Orient buildings to take advantage of climatic conditions and utilize passive solar heating and cooling techniques. Minimize shadowing and uncomfortable wind conditions on surrounding streets, parks and open spaces to preserve their utility.
8) Consider the preservation and enhancement of the City's design features, scenic views and corridors in accordance with the CGS Official Plan.
9) In shoreline areas, particular consideration should be given to surface materials and design techniques that promote infiltration, as well as the maintenance and establishment of native vegetation.

3.2 Additional Vehicle Movement, and Parking Layout Design Details

1) Vehicles are required to enter and exit the site in a forward motion. Vehicle turning path templates may be required to ensure adequate turning radius and hammer heads are provided.
2) Surface parking should be limited between the front face of the building and the public right of way wherever possible.
3) Gova Plus Vehicles, must be accommodated onsite from the driveway entrance to the main building entrance without affecting the flow of two way traffic, and so that the vehicle can navigate the site in a forward motion at all times . Gova Plus vehicles must be modeled as a Medium Single Unit (MSU) vehicles as per the TAC standards, using the following dimensions: 2.5m wide, 8.5m long,5.3m wheel base, 0.9m overhang (Inside radius 6.0m and outside radius 11.0m.)

4) Where canopies/awnings are proposed over a driveway required for loading or fire access, the minimum clear height should be 4.2m.
5) Hard surface (i.e. asphalt, unit pavers, concrete, etc.) must be provided as follows:
    - Residential and Commercial zoned properties must provide hard surface for all proposed drive aisles, parking, loading spaces, and outdoor storage areas.
    - Institutional and Industrial zoned properties must provide hard surface for all required drive aisles, and parking spaces; except where the property is adjacent to a residential zoned property in which case loading spaces, and outdoor storage areas must be hard surface pavement as well.
    - Required for all accessible parking spaces and barrier free paths of travel.
6) A barrier curb or car park barrier system is required along all parking stalls that abut landscaped areas and buildings to prevent vehicles from overextending the parking space and impeding adjacent pedestrian routes or damaging landscaped areas or buildings. Precast bumper curbs may shift during snow removal activities and therefore should not be used for new development or where alternative measures can be implemented.
7) Snow storage areas must be identified and must not interfere with the required parking, drive aisles or loading areas. Snow storage areas must drain to stormwater quality treatment facilities but should not be located so as to negatively affect the treatment efficiency of the facility. Where sufficient room is not available on site for snow storage, accommodations must be made for snow removal to a certified off-site snow storage area.
8) Driveways and aisles should not exceed 35m in length. Where this length is exceeded, speed bumps, raised pedestrian cross walks or alternate traffic calming measures should be introduced.
9) Drive-through queuing lanes must accommodate turning radii for P type passenger vehicles as per the TAC standard. Minimum inside turning radius of 4.5m and outside turning radius of 8m
10) Refer to Section 10 below for additional design details for work within the Municipal Right-of-Way.

3.3 Additional Driveway Entrance Design Details

1) Generally, developments will be limited to one driveway entrance. Shared driveway entrances with adjacent property owners should be utilized on Arterial and Collector Roads, wherever possible. A reciprocal access agreement will be required in these circumstances.
2) Driveway entrance widths must not be wider than 9.1m. Where a driveway entrance wider than 9.1m is required for larger vehicles, vehicle turning path templates, and lane configurations must be shown on the drawings.
3) Where the Road adjacent to the property is constructed with curb and gutter and/or sidewalks, or where there is an asphalt shoulder, the access driveway located within the road right of way must have concrete curbs. Where there is an asphalt shoulder the curbs must extend to the shoulder and must include spillways, and tapers as per OPSD 604.01.
4) Zebra stripe markings to be provided at all driveway entrances where municipal sidewalks exist or are being proposed. Zebra stripes should be made with durable paint (to reduce fading and upkeep), 3.0m long, 0.6m thick and offset 1.2m.
5) Where municipal sidewalks do not cross the driveway entrance a 45cm thick stop bars must be installed along the width of the outbound lane, located 1.0m from the back of the curb depression.
6) Where gravel parking and drive aisles are permitted, at minimum the first 15m of the driveway entrance must be paved.
7) Entrances located in close proximity to signalized intersections should be located as far as possible (greater than 30m) from the intersection.
8) A sightline analysis may be required where an entrance is proposed along a vertical or horizontal curve in the road.

9) Further entrance requirements related with locations, width, slope and maintenance may be found in the Use of Private Entrance Bylaw (2011-220).

3.4 Additional Active Transportation Design Details

1) Main building entrances must be clearly visible and easily accessible from the public sidewalk.
2) A safe and well defined pedestrian walkway in accordance with AODA requirements, constructed with an approved hard surface, must be provided to all main building entrances with connections to municipal sidewalks, accessible parking spaces, and transit areas;
3) The pedestrian walkway should have a minimum width of 1.5m clear from vehicle overhang and shall be defined across driveways through line painting (zebra stripes) or raised pedestrian crossing/traffic calming humps.
4) Where municipal sidewalks do not exist along the frontage of the property, and where it is identified in the CGS Official Plan that sidewalks are required, the owner shall either contribute to the cost of the future installation of the sidewalk or install the sidewalk along the frontage of the site as determined by CGS staff.

   The contribution cost will be based on the City's contract unit prices for sidewalk work, and will be revised each year in June, as necessary. For estimate purposes, 2016 unit prices for sidewalk are as follows:

   - Sidewalk (as per City Standard) = $300.00/l.m
   - Boulevard Restoration (topsoil and sod) =$ 38.00/sq.m
   - Boulevard Restoration (asphalt and granular) =$ 58.00/sq.m

5) Where an existing sidewalk network is located within 100m of the site, the developer will be responsible to connect to the existing sidewalk from the site.
6) Bike racks should be located in a highly visible location within 15m of the main entrance, and must be securely fastened to the ground or building to prevent the rack from being removed. Bicycle racks must not be secured to interlocking pavers, stones or other surfaces that may easily be removed.
7) Bike racks must provide support to both maintain a bicycle in an upright position and lock the bicycle frame and wheel to the bicycle rack with a single U-lock. Refer to the Essential of Bike Parking Guide (by APBP) for further information on bike rack design.
8) Sidewalks should be provided within parking areas at 36m intervals, parallel with the desired path of travel to the building.
9) Bus shelters may be required for larger developments where increased ridership, generated by the development, is expected to meet the bus shelter policy.

3.5 Site Plan Drafting Details

In addition to the General Plan Drafting Details noted in Section 2.0 the following information should be included on all Site Plans, prepared and sealed by an OAA Licensed Professional or Lot Grading Professional:

□ use of existing and proposed buildings and number of storeys, including building blocks to be numbered and number of units (if there is more than one use in a building or on a lot, provide the floor area allocated to each use);

- ☐ overall dimensions (in metric) of all property boundaries and all buildings and structures (including retaining walls) existing or proposed on the site and abutting properties (where possible), including dimensions and setbacks sufficient to show the position of buildings and structures in relation to site boundaries;
- ☐ zoning of adjacent properties;
- ☐ location, design and construction details of garbage collection area, including required screening and method of collection;
- ☐ location of all outdoor storage and enclosure details;
- ☐ Layout of parking area and dimensions of parking spaces, barrier-free parking spaces, loading spaces, aisles, driveways, ramps, fire routes;
- ☐ identify type of parking area (i.e. open, underground, garage);
- ☐ layout and details of all curbs and vehicle stops.
- ☐ truck routes, turning radii and required fire access routes;
- ☐ location and dimension of all vehicle entrances, including width, turning radii and sight triangles;
- ☐ queuing requirements for drive-through, service stations, etc.
- ☐ label existing and proposed surface treatment (i.e. grass, paved, gravel).
- ☐ abutting road right-of-way width including the location and width of traffic islands, hydro poles, fire hydrants, sidewalks, etc.;
- ☐ location of all existing and proposed traffic signs;
- ☐ location and dimension of snow storage area or plans for snow removal off-site where space is constricted;
- ☐ identify material type and width of Municipal and private sidewalks and walkways;
- ☐ location and type of bicycle racks and method of securing to the ground;
- ☐ Identify regulated hazards (flood plains, wetlands, water courses, etc), and provide setbacks to all limits of development.
- ☐ Provide a completed site statistic table as per Table 3.1:

Site Statistics Table 3.1

Zoning		
Use(s) of Building(s) by Floor Area and/or Number of Residential Units		
	Provided	**Required**
Lot Area		
Lot Frontage		
Density in Dwelling Units/Hectare (residential lots only)		
Front Yard		
Rear Yard		
Interior Side or Corner Side Yard		
Interior Side or Corner Side Yard		
Building Area		
Gross Floor Area		
Net Floor Area		
% Lot Coverage and calculation		
% Lot Coverage Accessory Buildings (residential lots only) and calculation		
Height of Building(s)		
Number of Storeys		
Permitted Encroachments for Accessory Buildings, Structures and Ornamental Features		
Height of Accessory Building or Structure		
% Landscaped Open Space and calculation		
% Landscaping in a Surface Parking Area with >75 parking spaces and calculation		
% Paved Area and calculation		
% Graveled Area and calculation		
Parking Spaces, Calculation and Dimensions		
Spaces Provided Within a Structure or Garage, Dimensions		
Barrier Free Spaces, Calculation and Dimensions		
Bicycle Parking, Calculation and Dimensions		
Loading Spaces, Calculation and Dimensions		
Queueing Spaces, Calculation and Dimensions		
Width of Parking Aisles		
Width of Access Ramps and Driveways		
Yards Where Parking Areas are Permitted - Setbacks		
Site Triangle Distance		
Refuse Storage Area Setback		
Fence Height		
% Outdoor Display and Sales and calculation		
Outdoor Storage Setback, Fence Height and Screening		
Railroad Setback		
Clearing of Shoreline Buffer Area		
Fire Flow		

4.0 Landscape Plan

Landscape information may be included on the Site Plan or Grading Plan for smaller sites. All information on the Landscape Plan must be in conformance with the City of Greater Sudbury Zoning By-law. In addition the following design details and drawing information should also be presented.

4.1 Additional Landscaping Design Details

1) Landscaping is an important component of any development. Generally, the landscape design of any development or redevelopment should :
   - Contribute to the overall city image;
   - Enhance the public perception of the proposed development;
   - Preserve existing mature trees in order to provide shade canopy and maintain their aesthetic and heritage value;
   - Integrate existing natural features, including rock outcrops and hilltops that provide visual assets;
   - Provide a diversity of plant material and naturalizing;
   - Be integrated with stormwater management features;
   - Be easy to maintain without catchment areas that attract debris;
   - Provide all-season open space for the enjoyment of outdoor activities of the residents of the property (e.g. consider shading in summer and opportunities for wind breaks during winter);
   - Screen or buffer less attractive elements of the development such as the parking areas, loading areas, storage areas, garbage enclosures, with exceptions where opaque fencing is required.
2) Any part of any lot which is not occupied by buildings, structures, parking areas, driveways, loading spaces, agricultural uses, outdoor storage areas or any other permitted use, shall be maintained as landscaped open space.
3) All plant material is to be Canadian Nursery Trades Association standards as per guide specification for nursery stock. When possible all plant material is to be native Ontario materials. All plant substitutions are to be approved prior to planting.
4) Whenever possible, species native to the Greater Sudbury Area should be used (Refer to table 4.1 below). The use of native species helps to reduce the spread of invasive species and helps ensure the overall success of the planting. Deciduous trees are to be a minimum 70mm calliper (2.75") measured at 150mm (4.9') above ground;
5) Coniferous trees are to be a minimum height of 1.6m (5.25');
6) Adequate soil drainage and volume should be provided for all trees and landscaping to promote vigorous root growth, and to negate the effects of any road salt use. Tree pits or raised planter should be considered where sufficient room is not available.
7) At least 15m3 of high quality soil should be provided per tree and each tree (through sharing or alone) should have direct access to at least $30m^3$ of high quality soil. High quality soil must consists of a minimum 0.9m and maximum 1.2m depth, over and above any required drainage system and/or granular material, be uncompacted, and be sandy loam with the following composition.
   - Sand (50%-60%
   - Silt (20%-40%)
   - Clay (6%-10%)
   - Organic (2%-5%)

- pH = 7.5 or less

8) Tree species within the municipal right of way must meet the City's tree planting bylaw (2011-243).
9) The following trees are recommended for planting in areas that have high exposure to soil salt and aerosol salt. A Horticulturalist should be consulted for further tree species recommendations.
    - Chokecherry
    - Japanese Tree Lilac
    - tree form Pea shrubs
    - Ohio Buckeye
    - Blue Spruce
    - Honey Locust
10) Trees within the landscaped open space adjacent to the Right of Way, at a minimum, must be planted 6m on centre and be offset sufficiently from any services with appropriate root shields installed. Alternative landscape proposals will be considered to allow for more open space or where bedrock is high; however, it is anticipated that an equivalent number of trees will be provided as set out above.
11) Where property for a municipal right of way widening is required, the required landscape strip must be set back from the future property line.
12) Where a continuous hedgerow is required for screening, hedge species must be a minimum of 1m in height and be planted at minimum 600mm on centre or as recommended by a horticulturist.
13) The relocation of plants that would be destroyed by development activities is permitted, especially if the species are difficult to source through commercial greenhouses. However, the transplant of wild trees and hedges is generally not permitted.
14) Landscaping within the sight triangle must be in accordance with the Zoning By-law.
15) Existing and proposed services must be indicated on the landscape plan to confirm there are no conflicts with the landscaping.
16) Where street trees are planted near utilities, they should be planted as per the ESA "Planting Under Or Around Power line and Electrical Equipment Guide", or other guidelines provided by specific utilities, whichever is more stringent.

4.2 Landscaping Plan Drafting Details

In addition to the General Plan Details noted in Section 2.0 the following information should be included on all Landscape Plans:

- □ location and identification (in landscape industry standard symbols and notations) of all existing or proposed plant material, planting beds, sodded areas, berms and other soft surfaces;
- □ location, height and description of all existing and proposed retaining walls, fences, walls, vegetative screening, including cross section;
- □ plant list indicating full botanical name, common name, quality, caliper, height, spread, and any special plant material;
- □ trees along right-of-way;
- □ clearly indicate the location of all vegetation to be retained or removed;
- □ identify all recreational areas (i.e. tennis courts, swimming pools, splash pads, sports fields, play equipment).

Table 4.1 – Native Plant List for Sudbury and Surrounding Area

Aquatic and Wetland Plants

Scientific Name	English
Acorus calamus	Sweetflag
Caltha palustris	Marsh Marigold
Eupatorium maculatum	**Spotted Joe-Pye Weed**
Iris versicolor	**Blue Flag (Wild Iris**
Ledum groenlandicum	Labrador Tea
Nuphar variegatum	Yellow Pond Lily
Nymphaea odorata	Fragrant Water Lily
Pontederia cordata	Pickerelweed
Sarracenia purpurea	Northern Pitcher Plant
Sparganium americanum	Bur Reed
Typha latifolia	Common Cattail
Vaccinium macrocarpon	Cranberry
Juncus effusus	Soft Rush

Woody Plants

Scientific Name	English
Ables balsamea	Balsam Fir
Acer spicatum	Mountain Maple
Acer saccharinum	Silver Maple
Acer rubrum	Red Maple
Acer pennsylvanicum	Striped Maple
Alnus rugosa	Speckled Alder
Amelanchier canadensis	Saskatoon Berry
Betula papyrifera	Paper Birch
Betula alleghaniensis	Yellow Birch
Cornus sericea	Red-Osier Dogwood
Corylus cornuta	Beaked Hazelnut
Fraxinus nigra	Black Ash
Fraxinus pennsylvanica	Green Ash
Juglans cinerea	Butternut
Juniperus communis	Common Juniper
Larix laricina	Tamarack

Herbaceous Plants

Scientific Name	English
Allium cernuum	Nodding Wild Onion
Anaphalis margaritaceae	Pearly Everlasting
Andropogon gerardii	Big Bluestemmed Grass
Apocynum androsaemifolium	Spreading Dogbane
Aquilegia canadensis	**Wild Columbine**
Arctostaphylos uva-ursi	Bearberry
Asclepias incarnata	**Swamp Milkweed**
Aster lateriflorus	Calico Aster
Aster umbellatus	**Flat-topped White Aster**
Aster undulatus	Wavy Leaved Aster
Campanula rotundifolia	**Harebell**
Clematis virginiana	**Virgin's Bower**
Clintonia borealis	Bluebead lily
Cornus canadensis	Bunchberry
Corydalis sempervirens	**Pale Corydalis**
Cypripedium acaule	Pink Lady Slipper
Drosera rotundifolia	Round-Leaved Sundew
Epilobium angustifolium	**Fireweed**
Erigeron philadelphicus	Common Fleabane
Fragaria virginiana	Wild Strawberry
Gaultheria procumbens	Wintergreen
Impatiens capensis	Jewelweed
Kalmia angustifolia	Sheep Laurel
Lilium canadense	Canada Lily
Linnaea borealis	Twinflower
Lobelia cardinalis	**Cardinal Flower**
Maianthemum canadense	Canada Mayflower
Monarda fistulosa	**Wild Bergamot**
Oenothera biennis	**Evening Primrose**
Potintilla anserina	Silverweed
Rubus odoratus	Purple Flowering Raspberry
Rudbeckia hirta	**Black-Eyed Susan**
Saxifraga oppositifolia	Purple Saxifrage
Saxifraga virginiensis	Early Saxifrage
Silene acaulis	Moss Campion
Sisyrinchium angustifolium	Pointed Blue-Eyed Grass
Solidago rugosa	Rough-Stemmed Goldenrod
Solidago rigida	Hard-Leaved Goldenrod
Thalictrum polygamum	Tall Meadow Rue
Tiarella cordifolia	Foamflower
Trillium grandiflorum	Large Flowered Trillium
Vaccinium sps.	Blueberry
Veronica arvensis	Corn Speedwell
Veronica serpyllifolia	Thyme-Leaved Speedwell
Viola papilionacea	Common Blue Violet
Zizia aurea	**Golden Alexanders**

5.0 Lighting Plan

Lighting information may be included on the Site Plan or Servicing Plan for smaller sites. The following design details and drawing information should also be presented, where the development is adjacent to existing residential properties, or other light sensitive uses.

5.1 Additional Lighting Design Details

1) Lighting should provide visible, well-lit and safe spaces by considering Crime Prevention through Environmental Design principles.
2) Reduce light trespass on adjacent properties and municipal or regional road by incorporating the use of full cut-off fixtures, low wattage bulbs and flat glass fixtures to reduce glare and by directing it away from adjacent natural, residential and other sensitive areas.
3) Maximum of 1 foot-candle at the property line must be maintained.
4) Lighting should be designed to Illumination Engineering Society (I.E.S.) Guidelines to promote pedestrian and vehicle safety while minimizing ambient light pollution.
5) Lighting should be designed for dark sky protection.

5.2 Lighting Plan Drafting Details

In addition to the General Plan Details noted in Section 2.0 the following information should be included on all Lighting Plans, prepared and sealed by a Professional Engineer Licensed in the Province of Ontario with a valid Certificate of Authorization:

- □ location and design of all exterior lighting, including lighting fixture details;
- □ a separate lighting photometric plan for infill projects and major developments may be required, as determined by the City.

6.0 Building Elevation Plan (Architectural Plan)

Elevation Plans are generally required for all Site Plans with a CGS Official Plan designation of Downtown or Town Centre, or where the site abuts or is visible from an Arterial Road, Provincial Highway, or Navigable Waterbody.

6.1 Additional Building Elevation Design Details

1) Buildings, structures and other design elements that complement existing built form and character are encouraged by massing buildings to define the edges of streets, parks and open spaces in good proportion, and by creating appropriate transitions in scale to neighbouring existing or planned buildings.
2) Integrate servicing and utility functions within the building, where possible, or locate towards the sides or rear of the building and screen from adjacent streets.
3) Strive for a complementary design relationship adjacent to heritage resources.

The following information should be included on all Elevation Plans, prepared and sealed by an Architect:

6.2 Elevation Plan Drafting Details

- □ exterior material type and colour; Note, plans must not be in colour refer to Section 2.0.
- □ all roof structures, screening and mechanical equipment (penthouses, chimneys, roof top units, vents, air conditioning, etc.);
- □ location and dimensions of any existing or proposed roof or fascia signs.

7.0 Grading Plan

Grading information may be included on the Site Plan or Servicing Plan for smaller sites. Where grading information is indicated on other plans the grades indicated on the grading plan will take precedence, all other grading information should be removed or coordinated with the grading plan. All information on the Grading Plan must be in conformance with the City of Greater Sudbury Lot Grading Policy, Ontario Building Code, and any other applicable by-laws and design standards. In addition the following design details and drawing information should also be presented.

7.1 Additional Grading Design Details

1) All Retaining walls greater than 1.0m in height must comply with the Ontario Building Code, the Zoning By-law, and will require a Building Permit.
2) All slopes greater than 2:1 and greater than 1.0m in height shall include a pedestrian guard, designed in accordance with the requirements of the Ontario Building Code, fastened securely along the top of the slope. Where pedestrian access to the high part of the slope is not easily accessible, a 1.8m (6ft) high chain link fence may be used in place of a pedestrian guard.
3) All slopes greater than 2:1 and greater than 0.6m in height located adjacent to vehicular traffic shall include a vehicle guard, designed in accordance with the requirements of the Ontario Building Code, fastened securely along the top of the slope.
4) Slopes steeper than 3:1 are not walkable slopes, and are not permitted on residential developments or for surfaces where pedestrian traffic may be expected to occur.
5) Barrier free path of travel to all barrier free building entrances as per the Ontario Building code, must be provided for all accessible parking stalls and along all exterior walkways that connect to the municipal right of way.
6) Where ramps are not installed on a barrier free path of travel, a maximum grade of 5% with a maximum 3% cross fall must be used.
7) Where a ramp is required along a barrier free path of travel it must meet the requirements of the Ontario Building Code, where applicable; otherwise, the ramp must meet AODA requirements.
8) Maximum gradients for vehicles should be 6%, with a maximum 4% cross fall, and in no case shall the maximum gradient be greater than 8% with a maximum 6% cross fall.
9) Slopes less than 1% should generally be avoided on all vehicle and pedestrian areas. A minimum 2% slope is preferred.
10) Swales located in required privacy yards must include sub-drains where the slope is between 0.3% and 1.0% and must not be deeper than 300mm, with 3:1 side slopes.
11) Grades within required privacy yards must range between 1 and 7%, as per the Lot Grading Design Guidelines.
12) Grading within the site along the Municipal right of way should accommodate an urban cross section within the right of way. (i.e, a 2-4% cross fall from the property line to the curb or future curb)
13) Any existing Municipal ditch along the property line shall be regraded to meet City standards and shall be realigned to be located entirely within the right of way, where possible.
14) All new rock cuts greater than 2m in height must be designed and constructed to meet a Class B or Class C hazard rating with 100% rock fall debris retention based on the Ministry of Transportation publication “RHRON: Ontario Rockfall Hazard Rating System – Field Procedures Manual”

15) The clear zone width for the rock cut shall be measured from the edge of the traveled lane, sidewalk or Public Way whichever is closer. (Public way means a sidewalk, street, highway, square or another open space to which the public has access, as of right or by invitation, expressed or implied.)
16) Rock faces must be designed in accordance with OPSD 201.010 and/or the Roadside Design Manual (including Interceptor ditches, overburden removal, rock face slopes, etc.)
17) Rock faces must be located a sufficient distance from the property line so that, freeze thaw cycles do not cause the rock face to undermine adjacent properties overtime, and any required fencing or interceptor ditches can be maintained from the owners property and are located entirely on the owners property, unless an agreement registered on title is entered into with the adjacent property owner outlining maintenance requirements, etc.
18) Where rock blasting must occur a rock blasting report, prepared by an Engineer with a minimum of 5 years of rock blasting experience, must be provided to building services for review.
19) Gabion baskets and rock rubble slopes are not permitted.
20) Refer to Section 11 below for additional design details for work within the Municipal Right of Way.

7.2 Grading Plan Drafting Details

In addition to the General Plan Details noted in Section 2.0 the following information should be included on the Grading Plan prepared and sealed by a Lot Grading Professional:

- □ All Plans containing proposed grading information must be sealed by a Lot Grading Professional;
- □ Sufficient proposed and existing elevations at property line, back edge of sidewalk, top and bottom of curbs and retaining walls, road crown, site entrances and along the frontage of the property as required to show the design intent, ensure all drainage is retained within the site, and to reflect how the proposed grades match into the existing condition;
- □ arrows indicating the direction and slope of surface drainage on all paved, granular and grassed areas;
- □ proposed elevations at all locations where the grade changes on the site, including cross sections of any changes of elevation required to convey the design intent;
- □ proposed elevations at all building corners and all building access points, (i.e. ramps, entrances, and loading bays);
- □ drainage swales with cross section details,
- □ roof downspout locations and direction of drainage;
- □ rim elevations on all catchbasins and maintenance hole;
- □ wherever possible and with the permission of the adjacent landowners, existing elevations are required to be shown at 3.0m and 6.0m beyond the site limits;
- □ indicate locations where rock removal is required;
- □ erosion protection measures;
- □ geodetic grades as well as finished ground floor and lowest opening elevations, including basement floor elevations for all buildings requiring servicing.
- □ Slopes indicated as a percent or Horizontal:Vertical.

8.0 Servicing Plan

Servicing information may be included on the Site Plan or Grading Plan for smaller sites. All servicing information within the Municipal Right of Way must be in conformance with the City of Greater Sudbury Engineer Design Manual, Standard Drawings and Specifications, and all servicing information within the site must be in conformance with all applicable provincial regulations and guides, Ontario Building Code, the City's Sewer Use By-law (2010-188), and City's Water and Wastewater Systems By-law (2010-214) and the Backflow prevention bylaw (2017-217). In addition the following design details and drawing information should also be presented.

8.1 Additional Water Service Design Details

1) Only one water service connection to the municipal system is allowed per site;
2) Water services or sewers serving multiple buildings located on the same property, and water services 100mm or greater, must be designed and installed according to MECP guidelines
3) Generally, a live tap shall be made where service connections are two pipe sizes smaller than the main;
4) A single, or bulk water meter is required for all developments (residential, commercial, industrial). The water meter must be located on the domestic water service prior to splitting the flow to multiple buildings. The meter must be installed either in a water meter chamber or in a heated outbuilding easily accessible by City staff;
5) Blow-offs must be installed on all dead end watermains/services, or where a service is shared with multiple owners (condominium developments).
6) Ensure the length and size of the water service, relative to the demand, provides sufficient turnover time to maintain adequate residual chlorine levels;
7) Hydrant leads on site should not exceed 30m after the last domestic service connection.
8) Hydrants must be located in areas accessible directly from the required Fire route and must not be blocked by fences, ditches, parked cars, loading areas or any other barrier that would impede access. A 1.5m clearance must be maintained around a hydrant at all times.
9) The available fire flow, and pressure for domestic max day and hour at the property line, from the existing municipal watermains adjacent to the site, will be modeled by the City and the results provided to the owner. The owner or their authorized representative must confirm sufficient capacity is available for the water services within the site;
10) Required fire flows, in municipally serviced areas must be based on Fire Underwriter's Survey Guidelines; and on the Ontario Fire Marshal Guidelines in unserviced areas.
11) Service connections and disconnections must be in accordance with City's Protocol for New Watermain, Water Service and Wastewater Connections. Existing unused services must be abandoned at the Main.
12) Where existing services are proposed to be reused, an assessment of the service must be completed to ensure the service is suitable for reuse. Existing services with lead solder must not be reused, and must be abandoned at the main.
13) Prior to completing any construction activity within 10m of a trunk watermain greater than 350mm diameter, the owner will contact the City's Technical Services department to obtain a full list of requirements (i.e. contingency plan, communication plan, etc.).
14)
15) Field beds must be setback a minimum of 30m from the high water level associated with any adjacent watercourses.
16) Refer to Section 11 below for additional design details for work within the Municipal Right-of-Way.

8.2 Additional Sanitary Service Design Details

1) Only one sanitary service connection to the municipal system is allowed per site;
2) Sanitary services 150mm or greater shall be designed as a main, and must meet MECP guideline design requirements;
3) Sanitary test maintenance holes must be located entirely on the site, and are required for all non-residential sites;
4) Service connections 200mm or greater must be made with a maintenance hole located on the Main.
5) Provide a letter, sealed by an engineer, indicating the existing and proposed sanitary peak flow calculations in accordance with the City of Greater Sudbury Engineering Design Manual. The letter must also confirm there is capacity in the service connection to the site.
6) Service connections and disconnections must be in accordance with City's Protocol for New Watermain, Water Service and Wastewater Connections. Existing unused services must be abandoned at the Main.
7) Where existing services are proposed to be reused, an assessment of the service must be completed to ensure the service is structurally suitable for reuse. Existing clay pipes must not be reused, and must be abandoned at the main.
8) Refer to Section 11 below for additional design details for work within the Municipal Right of Way.

8.3 Additional Storm Service Design Details

1) Storm service connections should be limited to one per site;
2) All proposed catchbasins must contain a goss trap as per the City's Sewer Use By-law, unless a downstream quality control facility is in place. If catchbasin maintenance holes are being proposed the goss trap design must address upstream flows and associated water levels.
3) Refer to Section 11 below for additional design details for work within the Municipal Right of Way.

8.4 Servicing Drafting Guidelines

In addition to the General Plan Details noted in Section 2.0 the following information should be included on the Servicing Plan, prepared and sealed by a Professional Engineer Licensed in the Province of Ontario with a valid Certificate of Authorization:

- □ all Plans containing proposed servicing information must be sealed by a Professional Engineer.
- □ watermain services to the building with pipe material, diameters and obvert elevations at critical locations;
- □ details of any service connections to the City infrastructure;
- □ hydrant flange elevations and adjacent finished ground elevations shall be shown on all hydrants within or immediately adjacent to the site;
- □ well locations (if required);
- □ existing and proposed service locations, pipe material and diameter;
- □ Location of all hydrants including dimensions to the proposed building;

- ☐ sanitary sewers, storm sewers labeled with the following: pipe material, diameter, slope, pipe bedding, and pipe inverts at all manholes, catchbasins, points of connection to main, building face and at property line;
- ☐ identify and dimension catch basins, double catchbasins, ditches, culverts, ditch inlets and ditch outlets, manholes, hydrants, valves (boxes and chambers), Siamese connections and service shutoffs (municipal curb stops to be located within the right of way, 0.3m from the property line);
- ☐ rim elevations of all manholes and catchbasins;
- ☐ location and details of all proposed stormwater management controls/facilities indicated in the stormwater Management Report (if required);
- ☐ finished ground floor and basement floor elevations;
- ☐ septic system location (if required);
- ☐ drainage swales;

9.0 Construction Siltation Control Plan

Construction Erosion and Siltation Control (ESC) information may be included on the Site Plan, or Grading Plan, for smaller sites. All Siltation control must be in conformance with all applicable provincial regulations (OPSS 805) and best management practices, including Sustainable Technologies "Erosion and Sediment Control Guide for Urban Construction". In addition the following design details and drawing information should also be presented.

9.1 Additional Construction Siltation Design Details

1) Erosion and Sediment Control methods should consider approaches that firstly;
   - Eliminate or reduce erosion, and secondly;
   - Control Sediment release.
2) Given the importance of Low Impact Development Systems (LIDS) in stormwater management, it is imperative that LIDS are not to be used for sediment control.
3) Generally, single control points should be avoided and multiple systems and barriers should be used;
4) Erosion control measures must be applied to bare or under–stabilized soils in order to improve resistance to erosion by water and wind. Key areas of the site where erosion controls should be applied include:
   - Areas inactive for 30 days or longer,
   - Slopes,
   - Soil stockpiles,
   - Runoff conveyance channels,
   - Areas immediately downstream of water outlets,
   - Banks of detention ponds and sediment traps,
   - Other areas where erosion risk is high and runoff flows directly towards a sensitive area downstream.
5) Heavy duty sediment control fences are to be installed downslope of all disturbed areas.
6) Double row sediment control fence with at least one row being Heavy Duty are required upstream of natural heritage features and as Site conditions require;
7) Temporary check dams are to be provided in all downstream swales and ditches.
8) Include the following notes as a minimum:
   a) Sediment barriers, check dams, and temporary construction access to be installed prior to the beginning of construction.
   b) All sediment control devices to be routinely inspected and maintained in proper working order until areas are stabilized.
   c) Maximum allowed sediment accumulation at the sediment fencing is half the fence fabric height.
   d) After significant rain event, all sediment and erosion controls must be inspected and rectified as soon as possible
   e) If necessary, trucks will be washed down before leaving the site.
   f) The site will be wet down if necessary to control dust.
   g) Calcium chloride dust control must not be used in ground water protection areas and immediately upstream of bodies of water.
   h) All construction activity will comply with City of Greater Sudbury Noise Bylaw.

i) All construction vehicles to enter and exit site from temporary construction access as approved by the City of Greater Sudbury.

j) All topsoil stockpiles to be surrounded with sediment control fencing.

k) Filter fabric to be placed under grates and lids on all onsite and downstream catchbasins to trap sediment. Silt traps are to be cleaned regularly and are not to be removed until all construction activity is complete. Filter fabric for silt control to be Terra Fix 270R or approved equivalent.

l) Where construction activity occurs within the City right of way, sediment controls will be placed on the catchbasins on public streets across the property's frontage.

m) Street sweeping, catchbasin cleaning and dust control are the responsibility of the developer and must be kept under control on all roadways to the satisfaction of the General Manager of Growth and Infrastructure.

n) Surface erosion protection must be applied for all disturbed areas, subject to erosion, until vegetation is established.

o) A log book shall be kept onsite indicating inspection schedules, repairs made, & any concerns noted.

p) Additional materials such as clear stone, filter fabric, pumps, hoses and siltsoxx, or approved equivalent to be kept onsite at all times for conducting repairs to sediment control measures;

q) Engineered changes to the ESC measures may be required as site conditions change.

r) Any dewatering occurring onsite must be in accordance with an approved dewatering plan, which must include silt traps.

s) Refuelling, equipment maintenance, and hazardous material storage must take place a minimum of 30m from any watercourse or environmentally sensitive area.

t) An approved spill management plan is to be kept onsite at all times.

u) Spills are to be reported immediately to the MECP spills action center at 1-800-268-6060

v) Temporary fuel and other hazardous material storage is to be located minimum 30m away from any watercourse or environmentally sensitive area.

9.2 Construction Siltation Drafting Guidelines

In addition to the General Plan Details noted in Section 2.0 the following information must be included on the Construction Siltation Control Plan prepared and sealed by a Lot Grading Professional:

- □ all plans containing proposed sediment and erosion control information must be sealed by a Lot Grading Professional;
- □ location and details of all temporary surface erosion protection required until vegetation is established;
- □ location and details of all sediment barriers, check dams, ponds, etc. required to prevent erosion and prevent the transfer of sediment off-site via construction vehicles;
- □ location and details of all temporary construction access and measures to be taken to prevent the transfer of sediment off-site;

10.0 Details, Cross Sections, and General Notes

Details, Cross Sections, and General Notes may be included on other drawings or on a separate Plan.

☐ Cross Sections should be provided at minimum when:

- requested by City staff to provide further clarification;
- service locations are in close proximity to building foundations;
- major changes in grade occur on the site;
- complex storm water management systems are proposed.
- Service connections are proposed within the right of way, to show sufficient clearance with existing services and utilities.

☐ The followings general notes must be provided as a minimum:

- The Engineer's certification submission for all work completed in the municipal right of way and all pipe work constructed on private property shall be in conformance with the City's Certification Requirements.
- Prior to commencing any work within the municipal right of way, the contractor or developer will obtain all necessary road occupancy permits, and service connection permits from the City's Engineering Services.
- All work within the City right-of-way shall be constructed in accordance with City of Greater Sudbury design standards and specification, or the Ontario Provincial Standards may, subject to the approval of the City of Greater Sudbury, be used where no standard or specification is noted.
- All disturbed areas within the municipal right-of-way shall be rectified to the original condition or better and to the satisfaction of the General Manager of Growth and Infrastructure.

11.0 Off-Site Servicing Plan

An Off-Site Servicing Plan is required where an Environmental Compliance Approval (ECA) from the Ministry of Environment, Conservation and Parks (MECP) is required (i.e. extension of any municipal sanitary, storm or watermains, not including service connections) or improvements are required within the Municipal Right of Way that effect municipal infrastructure outside the boulevard directly adjacent to the development property (not including service connections).

Off-Site Servicing information must be presented on separate plan and profile drawings, intersection drawings, and/or pavement marking drawings in accordance with the CGS Engineering Drawing Standards. All information presented on the off-site servicing plan and profile plans must be in accordance with all applicable Provincial and Municipal standards and guidelines (Including the CGS Supplemental Specifications, Engineering Design Manual, Ontario Traffic Manual, etc.). In addition the following design details and drawing information should also be presented.

11.1 Additional Off-Site Servicing Plan Design Details (including all Plans where work is proposed within the Municipal Right-of-Way)

1) All asphalt cuts within the Municipal right of way must be located outside the travelled portion of the roadway, along lane traffic markings
2) Asphalt cuts for proposed curb work must be located minimum 0.6m from the edge of asphalt.
3) Edge treatment must be installed along all asphalt joints
    - For all arterial/collector roads Denso-band size 15mmx45mm or approved equivalent shall be used.
    - For all local roads Denso-reinstatement tape size 2mmx 50mm or approved equivalent shall be used.
4) Specify Cathodic protection to be Denso tape, or approved equivalent, wrapped around all metal pipes and appurtenances, water services and fittings, excluding copper services, as per the manufactures specifications;
5) Appropriate cover for all services and mains should be provided in conformance with the CGS Engineering Design Manual. Where this cover cannot be obtained, and upon approval of the General Manger of Growth and Infrastructure, the pipe must be pre-insulated.
6) All service connections must be made perpendicular to the main, unless otherwise approved by the General Manager of Growth and Infrastructure.
7) Culverts must be no longer than 30m.
8) All Culverts larger then 900mm diameter must be Poly-Coated CSP or Concrete, where culverts greater than 1.8m diameter must be concrete box culverts.
9) All new rock cuts greater than 2m in height must be designed and constructed to meet a Class B or Class C hazard rating with 100% rock fall debris retention based on the Ministry of Transportation publication “RHRON: Ontario Rockfall Hazard Rating System – Field Procedures Manual”
10) The clear zone width for the rock cut shall be measured from the edge of the traveled lane, sidewalk or Public Way whichever is closer. (Public way means a sidewalk, street, highway,

square or another open space to which the public has access, as of right or by invitation, expressed or implied.)

11) Rock faces must be designed in accordance with OPSD 201.010 and/or the Roadside Design Manual (including Interceptor ditches, overburden removal, rock face slopes, etc.)

12) Rock faces must be located a sufficient distance from the property line so that, the freeze thaw cycles do not cause the rock face to undermine adjacent properties overtime, and any required fencing or interceptor ditches can be maintained from the owners property and are located entirely on the owners property, unless an agreement registered on title is entered into with the adjacent property owner outlining maintenance requirements, etc.

13) Where rock blasting must occur a rock blasting report, prepared by an Engineer with a minimum of 5 years of rock blasting experience, must be provided to building services for review.

12.0 Stormwater Management Report

Stormwater Management Controls must be in conformance with the current Ministry of the Environment, Conservation and Parks (MECP) Guidelines as well as the City of Greater Sudbury's Engineering Design Manual, watershed studies, and Conservation Sudbury (Nickel District Conservation Authority) requirements. In addition the following design details and report information should also be presented.

12.1 Additional Quality Control Design Details

1) Onsite Quality Control is required for the entire site, including pre development impervious areas. The quality control facilities must be sized to capture and treat a minimum 90% volume of the annual runoff on a long-term average basis without bypass
2) A minimum TSS and floatables removal rate is required for the site as follows:
   a) 80% (enhanced) is required to be achieved for all developments; unless stated otherwise in the Watershed Study.
   b) Subject to the City's discretion, 70% (normal) is required to be achieved for all Low Risk Intensification developments, developed prior to 2006, where no expansion to the impervious areas are proposed; unless stated otherwise in the Watershed Study.
3) Oil/Grit Separators must meet the following requirements:
   a) Oil/Grit Separators must utilize hydrodynamic separation and will be accepted only on new developments and Redevelopments where Pre/post-treatment is provided or subject to the City's discretion where they are introduced as part of a treatment train for the site. Examples of acceptable pre/post-treatment include; enhanced swales, grass filter strips, storage tank filtration, or other equivalent pre-treatment systems.
   b) Oil/Grit Separators will be accepted as standalone treatment devices on Intensification sites only.
   c) Oil/Grit Separators within the municipal road or located on municipal property must have exterior structural components made of concrete.
   d) Oil/Grit Separators must be designed with a minimum available sediment storage volume of 10m3/Ha of contributing paved area with an effective storage volume of 15% of the available sediment storage volume at which volume the unit still provides enhanced quality control prior to yearly maintenance of the unit.
   e) Oil/Grit Separators must be sized for 80% TSS removal using a 50 micron average particle size or fine particle size distribution as follows:

Particle (um)	(%)	Specific Gravity
20	20	1.3
60	20	1.8
150	20	2.2
400	20	2.65
2000	20	2.65

4) Low Impact Development (LID) practices must be designed in accordance with MECP Guidelines and the TRCA LID Guidelines as an interim guideline. http://sustainabletechnologies.ca/wp/wp-content/uploads/2013/01/LID-SWM-Guide-v1.0_2010_1_no-appendices.pdf

12.2 Interim (Phased) Stormwater Management

1) Any site alteration or phased project greater than 1ha must either;

- install the final stormwater management facility for the development ahead of construction as part of the initial phase of development, while ensuring sediments produced during construction will not negatively impact future performance of the facility, or
- provide and implement an Interim (phased) Stormwater Management Report.

12.3 Provisional Stormwater Management Plan (SWM) Details

1) A Provisional SWM Plan may be entered into for sites that meet all of the following criteria subject to approval by the General Manager of Growth and Infrastructure:

a) no expansion of the existing impervious surfaces proposed,

b) minimal regrading required,

c) life expectancy of the pavement surface exceeds 5 years,

d) proposed site use does not impose a significant risk to stormwater quality, and

e) Provisional SWM measures can be implemented on site.

2) Where a Provisional SWM Plan is being entered into, a Stormwater Management Report is required as part of the Site Plan Control Application and shall include the following:

a) All report requirements noted in section 12.4 below;

b) a Provisional SWM Plan, provided on a separate letter head and sealed by a Professional Engineer;

c) a Schedule for implementation of the Provisional SWM Plan;

d) and a Stormwater Maintenance protocol for the maintenance of the future stormwater measures to be implemented, provided on a separate letter head and sealed by a Professional Engineer.

3) The Provisional SWM Plan will be included in the Site Plan Agreement and will be registered on title. As a minimum the Provisional SWM Plan will state the following:

Until such time as the final stormwater management facilities are installed on the property, in accordance with the approved plans and Stormwater Management Report, the property will be maintained as follows:

a) *Goss traps to be installed on all Catchbasins.*

b) *After each rain event inspect all Catchbasins, and remove all floatables or Oil that may collect in the sump.*

c) *Weekly inspection of the property and removal of all garbage, excessive sediment or debris, and oil/gas spills.*

d) *In the event of an oil or gas spill, apply appropriate absorbent (sand or sawdust) to remove the spill immediately, and report all spills to all applicable regulatory bodies and to the City.*

e) *Semi Annual inspection of all Catchbasin sumps, and removal of all debris in excess of 300mm.*

f) *Annual early spring sweeping of parking lot and walkway to remove all winter sand, loose asphalt, and other sediment. Where loose asphalt is observed asphalt must be repaired.*

g) *Annual late fall Inspection of all flat roofs and eaves troughs, and removal of all leaves and sediment.*

h) *Maintain all grassed areas in good condition by watering and mowing as needed, and limit the use of fertilizer in accordance with the current City Lawn Fertilizer By-law.*

4) Upon approval of the Provisional SWM Plan and registration of the agreement an annual Provisional SWM Maintenance letter, signed by the property owner, must be provided to the City's Planning Services and a copy of the letter must be retained on the property. This letter must provide an update on the schedule to implement the final stormwater management facility and must indicate the Provisional SWM measures taken. Compliance with the Provisional Stormwater Management Plan will be reviewed and monitored by the City's By-law Enforcement Services.

5) Planning Services must be informed prior to implementation of the final stormwater management facilities. A site plan amendment may be required if the design of the Stormwater Management Facility changes significantly during implementation.

12.4 Additional Quantity Control Design Details

1) On-site quantity control is required to be provided on-site, unless determined otherwise by the City's Drainage Engineer based on watershed studies or local knowledge in the absence of watershed studies.

2) As a minimum Post to Pre-development controls must be provided for the 5 and 100 year storm events.

3) A 20% reduction in the pre-development flow rate is required for developments located in a Source Water Protection area with a vulnerable zone score >7.

4) A 15% reduction in the pre-development flow rate is required for developments located in the Junction Creek Water Shed.

5) For developments within areas controlled by Conservation Sudbury, and for flood assessment and design of major overland flow conveyance systems the design peak flow shall be the largest of those generated by the 100-year design storm or the Regional Storm (Timmins Storm).
6) Maximum ponding depth for parking lot storage should not exceed 300mm.
7) Generally, watershed boundaries must not be changed and are subject to review through Conservation Sudbury.

12.5 Exemptions for small sites

Subject to the City's discretion, a small site is any development with impervious surface areas (excluding the building) less than 0.085Ha (approx. 25 parking/queuing spaces) and building net floor area less than 500sq.m, and does not include developments where drainage within the site flows through or from an adjacent private property.

1) Where small Low Risk Sites are proposed (except sites where stormwater management is subject to review by other regulatory agencies) stormwater quality and quantity control requirements can be achieved without the need for a Stormwater Management Report through the use of the following:
    1. Enhanced grass swales, designed by a Lot Grading Professional, meeting the following requirements.
        a) Located along, or providing the equivalent length of, the proposed/existing parking and drive aisles.
        b) Maximum 25m wide contributing flow path across the adjacent impervious surface, with a maximum cross slope of 3% to ensure sheet flow conditions, directed to the enhanced swale.
        c) Trapezoidal swale cross section with a minimum bottom width of 1.0m.
        d) 3:1 maximum side slopes with a minimum swale depth of 0.3m.
        e) Minimum.0.5m wide grass filter strip/rounding between the top of swale and the pre-treatment device.
        f) Pre-treatment, along the length of the parking area at the top of swale.
        g) Maximum swale slope of 1%.
        h) Lined with a minimum of 300mm top soil and grass.
        i) Set back a minimum of 4m from all buildings.
    2. Grass filter strip, designed by a Lot Grading Professional, meeting the following requirements.
        a) Located along the length of the proposed/existing parking and drive aisles.
        b) Maximum 25m wide contributing flow path across the adjacent impervious surface, with a maximum cross slope of 3% to ensure sheet flow conditions, directed to the filter strip.
        c) Minimum filter strip width of 5m.
        d) Maximum filter strip slope of 1%.

e) Pre-treatment along the length of the parking area.

f) Lined with a minimum of 300mm top soil and grass.

3. Permeable Pavement or Pavers, designed by a Professional Engineer.

4. In addition to the above, Best Management Practices should be incorporated as follows:

a) Sheet flow of stormwater from parking lots to swales or landscape strips to convey flow instead of storm sewers.

b) Include trees, dense vegetation and other significant rain water reducing landscaping throughout the site.

c) Where sod is provided, topsoil should be well screened and tilled to a minimum 300mm deep.

d) Amend topsoil with compost to achieve an organic content of 8 to 15% by weight or 30 to 40% by volume.

e) Reduce grades throughout the site to below 3%.

f) Direct roof leaders to landscaped areas away from the buildings.

2) Sites that do not form part of a subdivision or consent, with proposed impervious surface areas (excluding the building) less than 0.020Ha (approximately 6 parking spaces) may be exempt from stormwater management requirements. However, some sites may still require stormwater management control under applicable provincial acts/regulations or where known drainage issues exist.

3) Cash in lieu of onsite quality and quantity controls will be considered for small existing developments where it is impractical to provide stormwater management on site; however stormwater best management practices should be incorporated into the lot design by a lot grading professional to the maximum extent possible.

1. In Lieu of onsite Quality Controls the cost of an appropriately sized OGS unit ($16/m2) will be prorated for the proposed paved surface area. These amounts are from 2019 and are subject to change to reflect current prices.

2. In lieu of onsite Quantity Controls the following contribution equation will be used based on the increase in impervious areas. These amounts are from 2019 and are subject to change, as necessary, to account for inflation:

- Residential = $1,000 up to the first 560sq.m and $1.79/sq.m after that.
- ICI = $2,000 up to the first 560sq.m and $3.57/sq.m after that.

12.6 Modeling Requirements

1) For the purposes of determining the Pre-development allowable peak flow for developments less than 1 hectare, the site must be modeled using the Rational Method/IDF Curves utilizing the following parameters. If alternate modeling methods are used to determine the allowable peak flow rate, the lower peak flow of the two methods will determine the allowable peak flow permitted for the development. Alternate modeling should utilize well established methods from the MTO design manual.

2) Depending on modeling methodology, provide calculations as follows:

1. Time of concentration.

    - Time of concentration must be analyzed separately for the pre and post development condition and must be based on the flow path, slope, and surface type from the most remote part of the site to the ultimate outlet for the site.
    - Time of concentration should be based on established methods and should include the time of flow in sewers.
    - Minimum time of concentration to be used is 10 minutes.

2. Runoff Coefficients

Surface	Runoff Coefficient
Pavement	0.95
Gravel	0.6
Roofs	0.95
Lawns	0.3
Dense Landscaping	0.2
Woodland on substantial soils	0.1
Bare Rock (other values should be interpolated)	
30% tree cover	0.70
50% tree cover	0.55
70% tree cover	0.40

For return periods of more than 10 years, increase the runoff coefficients above by 10%- 25 year, 20% - 50 year, 25% - 100 year

3. IDF Curve

$i=a/(t+b)^c$,

where, i = rainfall intensity (mm/hr), and t = rainfall duration (minutes)

Return Intervals (Years)	a	b	c
Yearly/90th percentile	28mm		
2	429.375	4.250	0.7325
5	600.938	4.000	0.7325
10	726.563	3.938	0.7400
25	847.030	3.938	0.7400
50	986.250	3.750	0.7375
100	1092.988	3.656	0.7350

Note: from section 6.1 of the CGS 2006 Stormwater Background Study.

12.7 Infiltration/Filtration Guidelines

1) Infiltration should not be considered for contributing catchment areas with activities that have a high risk of potential contamination (i.e. fuel sales or storage, auto repair, etc.)
2) Infiltration of runoff from landscaped or rooftop areas is encouraged. Infiltration of runoff from parking lots, roads and sidewalks should incorporate pre-treatment to ensure longevity of the system.
3) Sites located within well head protection areas should not infiltrate stormwater from parking lots, roads, sidewalks or other surfaces subjected to winter maintenance activities including snow storage. Where infiltration of these area within well head protection areas is permitted, pretreatment must be provided (e.g. OGS units, Bioswales, etc.).
4) Where infiltration is being proposed the Stormwater Management Report must be accompanied by a Geotechnical Report indicating the seasonally high ground water level and soil infiltration rate at each soil stratification.
5) Where infiltration/filtration facilities are proposed adjacent to a Municipal Road allowance or where the overall site slopes towards the road allowance a provision for minimizing infiltration into the road allowance must be provided.
6) Infiltration/Filtration facilities should include the following design considerations to ensure the quality objectives are meet:

    - Located greater than 1.0m above seasonally high groundwater or bedrock.
    - Located outside snow storage areas.
    - Filter media greater than 750mm in depth
    - Filter media phosphorus index values <30ppm (www.omafra.gov.on.ca)
    - Filter media comprised of a mixture of sand, fines and organic matter.
    - Filter surface covered with mulch and vegetation
    - Pre-treatment systems
    - Multiple treatment cells
    - Monitoring wells

7) Factors of Safety must be incorporated into the design infiltration rate to ensure longevity of the facility. The field measured infiltration rate should be divided by the applicable factor of safety indicated below to achieve the design infiltration rate for the proposed facility.

Factor of Safety = 2	**Factor of Safety = 3**
Permeameter or percolation test on site	Grain size analyses or other infiltration testing,
Loamy or sandy soil	Clayey soil
No nearby sensitive receptors	Sensitive receptors in near proximity e.g. buildings, foundations or vulnerable natural heritage features.

Source: https://wiki.sustainabletechnologies.ca/wiki/Design_infiltration_rate

12.8 Report Details

The following information must be included in the Stormwater Management Report prepared and sealed by a Professional Engineer Licensed in the Province of Ontario with a valid Certificate of Authorization:

- ☐ location map of the subject property;
- ☐ property description;
- ☐ post and pre development, internal and external drainage area plans indicating all flood and fill lines, overland flow routes, all upstream lands and diversion of any drainage routes, and modeling parameters used (i.e. run-off coefficients, areas, CN values, % imperviousness, etc.);
- ☐ schematic layout of existing and proposed storm sewer networks, including manhole and catchbasin descriptions coordinated with the Site Servicing Plan;
- ☐ schematic layout of the sub watershed showing the main watercourse, tributaries and trunk sewers;
- ☐ for more hydraulically complex sites provide a routing model schematic for minor and major systems illustrating catchment routing, ID, area, imperviousness/coefficient, SWM facilities, channels, sewers and outlets;
- ☐ provide descriptions of pre-development and post-development conditions including at minimum general ground cover, drainage patterns, existing/post development inlet and outlet locations in and from the site, respective storm release rates (pre and post development);;
- ☐ plans detailing storage facility locations, its separation from bedrock and/or seasonally high groundwater table where applicable, volumes and their representative water elevation at peaks for all storms modeled, control structures details, invert elevations, , and inlet / outlet locations including overflow structures where applicable;
- ☐ any supporting calculations, reports and drawings, such as:
  - o General Requirements and Assumptions
    - Calculation, and/or model input/output printout, where applicable, for pre and post development surface run-off.
    - Calculation and summary table of run-off coefficients, areas, % imperviousness, and times of concentration.
    - Calculation and/or model input/output printout, where applicable, of allowable release rate and required on site storage.
    - Methods of run-off attenuation and on site storage.
    - Stage-Storage-Discharge table for each SWM facility clearly indicating stage at which individual control outlets begin.
    - Design information on control outlets and emergency overflow structures such as weirs.
    - Measures to maintain or improve water quality.
    - Measures to minimize impact of run-off downstream, including erosion, flooding etc.

- Proposed roof control device locations, type, control release rates and corresponding storage volumes for flat roof portions; including a letter from the consultant designing the building confirming that the drains will be installed and will function as described in the Stormwater Management Report/site servicing drawings, and that the building will be designed to withstand the additional loads.
- Infiltration rates, including appropriate factors of safety.
- Water balance requirements, where applicable.
- Flow and storage summary tables which reference the associated drainage area, catchment ID, outlet(s) and differentiate between controlled and uncontrolled areas.
- Identify and show seasonal high groundwater levels in report and on drawings where infiltration facilities are proposed.
- A table summarizing required storage, provided storage and associated elevation and flow for the permanent pool, and 2 through 100 year return period and/or regional storm events for each facility.

o Quantity Control Section

- Runoff coefficient or imperviousness calculations.
- Analysis using appropriate storm distributions.
- Pre-development peak flow (m3/s).
- Post-development uncontrolled peak flow (m3/s).
- Post-development controlled peak flow (m3/s).
- SWM facility type.
- Stage – storage – discharge table.
- Outlet design and calculations.
- Total storage required (m3).
- Total storage provided (m3).
- Table to compare provided versus required and pre development outlet rates.
- Overland flow conveyance and design.
- External drainage conveyance (100 year and regional).

o Quality Control Section

- Level of Protection.
- Table showing permanent water requirements and provided.
- Extended detention calculation, volume and release time.
- 28mm Water Quality storm model and/or calculations.
- Drainage area to facility in hectares.
- Percentage Impervious.
- Pre-treatment devices and forebays.
- Forebay average flow rate at peak during water quality storm.
- Forebay design calculations as per The Ministry of the Environment design manual.
- Monitoring devices.
- Filter media type, depth, porosity, etc.
- Sizing information for OGS system(s).

o calculation of surface run-off;

- o ponding/water elevations corresponding to the required level of controls;
- o calculation of run-off coefficients, % imperviousness, and times of concentration;
- o calculation of permissible release rate and required on site storage;
- o methods of run-off attenuation and on site storage;
- o measures to maintain or improve water quality;
- o measures to minimize impact of run-off downstream, including erosion, flooding etc;
- o proposed roof control device locations, type, control release rates and corresponding storage volumes for flat roof portions;
- o in-situ percolation rates;

□ Maintenance Protocol for the proposed stormwater management (SWM) facility, provided on a separate letter head and sealed by a Professional Engineer; The Maintenance Protocol must outline the following as a minimum:

- o Indicate the periods that maintenance is required for the site and for each SWM facility, and outline the maintenance procedure.
- o Indicate the lifespan of the SWM facility and the periods at which review and monitoring of the system are required to ensure that the required level of treatment is being maintained.
- o Indicate the qualifications required to provide the maintenance/review/monitoring of the SWM facility.

□ spill prevention and contingency plan, covering information requirements as per O.Reg 224/07 where applicable, provided on a separate letter head and sealed by a Professional Engineer;

□ geotechnical reports and hydro-geological studies where applicable.

13.0 Additional Reports

13.1 Traffic Impact Study

The City of Greater Sudbury may require the completion of a Traffic Impact Study for any development regardless of size and land use. All proposed developments are considered on an individual basis in order to assess the need for a Traffic Impact Study; however, generally any development that generates more than 100 new vehicle trips in the peak hour will require a Traffic Impact Study. The Traffic Impact Study must provide an assessment of the adequacy of the existing or future transportation system to accommodate additional traffic generated by the proposed development or redevelopment. It shall recommend what, if any, improvements will be required to the roadway system in order to maintain a satisfactory level of service. The Traffic Impact Study must be prepared, signed and stamped by a qualified Professional Engineer.

Existing traffic information or clarification regarding the report requirements can be obtained directly through the Roads and Transportation department.

This Study must be provided through the Site Plan review process when requested.

13.2 Geotechnical Assessment

The purpose of a Geotechnical Assessment is to evaluate the soils and subsurface conditions of a site and to provide recommendations for the design and construction of the site pavement, services, building, etc. The Geotechnical Assessment must be prepared, signed and stamped by a qualified Professional Engineer.

This Study must be provided directly to Building Services, and must form the basis of the pavement and servicing design. Where there is a Regulated Hazard on or adjacent to the development the Geotechnical report must be provided directly to Conservation Sudbury.

13.3 Rock Blasting Report

The purpose of the rock blasting report is to ensure that all rock blasting, removal, and any proposed rock faces are constructed in a safe manner that does not negatively impact the surrounding properties, and provides for the long term.

The rock blasting report can be included in the geotechnical report, but it must be prepared in accordance with OPSS 120 by a Professional Engineer, with a minimum of five (5) years experience related to blasting. The report must include the following as a minimum:

a) How the work related to blasting shall be undertaken safely to protect adjoining structures and other infrastructure.

b) Recommendation and specifications as a minimum but not be limited to the following;

- Pre-blast survey of surface structures and infrastructure within affected area
- Trial blast activities
- Procedures during blasting
- Procedures for blasting near Critical infrastructure with special vibration considerations, including but not limited to rock tunnels, concrete pressure pipe, etc."

- Procedures for addressing blasting damage complaints
- Blast notification mechanism to adjoining residences
- Structural stability and certification of exposed rock faces

The blasting consultant retained by the Owner shall be independent of the contractor and any subcontractors doing blasting work. The blasting consultant shall be required to complete specified monitoring recommended in the report of vibrations levels and provide a report detailing those recorded vibration levels. Copies of the recorded ground vibration documents shall be provided to the contractor and contract administration weekly or upon request for this specific project.

The above noted report shall be submitted for review to the satisfaction of the Chief Building Official prior to the commencement of any removal of rock by blasting. Should the Owner's schedule require to commence blasting and rock removal prior to the site plan agreement having been signed, a site alteration permit shall be required.

After construction is complete the blasting consultant will be required to provide a PEO sealed Certification letter for all rock faces, created during the blasting, prior to building occupancy.

13.4 Hydrogeology Study

A Hydrogeology Study is required for all applications in areas serviced by private water and septic services. The Hydrogeology Study must be prepared, signed and stamped by a qualified Professional Engineer.

This Study must be provided to the Sudbury & District Health Unit.

13.5 Environmental Impact Study

An Environmental Impact Study is required for applications that affect significant or environmentally sensitive lands and/or waters. In addition to any external review agency requirements, the report shall include as a minimum a description of the environment that will be affected, description of the development proposal, an assessment of the expected impacts on the environment, a list of assumptions used in the assessment and recommendations regarding the actions necessary to prevent, mitigate or remedy the effects on the environment of the development proposal. The Environmental Impact Study must be prepared by a qualified Professional with relevant environmental expertise.

This Study must be provided through the Site Plan review process when requested.

13.6 Phase I Environmental Site Assessment

The first phase of the systematic identification and evaluation of the potential impacts of proposed developments relative to the physical, chemical and biological components of the environment. A Phase II or III Environmental Report may be required depending upon the recommendations of the Phase 1 Report.

This Assessment including an additional reports or records must be provided directly to Building Services, when requested.

13.7 Noise and Vibration Study

A Noise and/or Vibration Study is required where a sensitive land use (i.e., Residential, Hotel, Hospital, etc.) is proposed near a noise source (i.e. Railway, major roadway, industry) or where a

noise source (commercial or industrial use) is proposed adjacent to a sensitive land use. The report should follow the Ministry of the Environment's OCC guidelines and demonstrate that the appropriate criteria can be achieved. The report must include indoor and outdoor sound levels and recommend mitigation measures for the development which could include sound barriers, ventilation requirements, special building components and necessary warning clauses. The Noise and/or Vibration Study must be prepared, signed and stamped by a qualified Professional Engineer.

This Study must be provided through the Site Plan review process when requested, and a copy will be provided to Building Services.

13.8 Environmental Site Assessment

Generally, an Environmental Site Assessment is required for all applications where a land use change is proposed from an industrial or commercial use to a more sensitive land use (i.e., Residential). Initially a Phase I Environmental Site Assessment is required. Further investigation would be required when the Phase I Environmental Site Assessment identifies the possibility of site contamination. A Record of Site Condition may be required where a land use change is proposed to a more sensitive land use in accordance with Ontario Regulation 153/04.

This Study must be provided to Building Services.

13.9 Archaeological Report

An Archaeological Report is required for all applications in or near areas of archaeological potential, as determined by the criteria set out by the Ministry of Culture and the CGS Archeological Master Plan. Reports must be completed by an individual holding a valid archaeological license.

This Study must be provided through the Site Plan review process when requested.

13.10 Sun/Shadow Study (6 Storeys or Greater)

A study showing the effects of a development on sunlight reaching surrounding properties, buildings and adjacent public realm areas by calculating the shadow that will be cast by the development at different times of day in different seasons. Sun/Shadow Studies maybe required for official plan amendments, zoning by-law amendments and site plan applications for developments usually 20 metres or 6 storeys and greater in height.

Sun/Shadow tests should be done for March 21 and September 21 between the hours of 9 AM and 6 PM. The Sun/Shadow diagram should identify permanently shaded areas between the start of December to the end of February.

This Study must be provided through the Site Plan review process when requested.

13.11 Wind Study (6 Storeys or Greater)

A pedestrian wind model analysis is required for all six storey or taller buildings. For official plan and zoning by-law amendment applications a preliminary "Wind Impact Statement" by a qualified, registered Professional Engineer to professional standards is required. For site plan applications a detailed wind tunnel impact study shall be prepared by a qualified, registered professional engineer, and shall be based on a scale model simulation analysis, prepared to professional standards.

This Study must be provided through the Site Plan review process when requested.

1.0 Preface and Definitions

Attractive and functional design is expected for all developments within the City of Greater Sudbury. This Guide is intended to compliment the various federal, provincial, and municipal acts, guidelines, manuals and by-laws that apply to developments by providing clarification and setting minimum design standards to encourage attractive and functional design; however, the City of Greater Sudbury encourages Site Plan proposals to exceed these standards.

For the purpose of this Appendix refer to the following definitions:

Should: Where should is used, the design detail is considered to be a best practice and the owner must make a reasonable attempt to satisfy the design detail.

Must/Shall: Where must or shall are used, the design detail is considered mandatory and must be satisfied.

Intensification: Development of a property, site or area which results in a net increase in density, floor area or units but does not significantly alter the site layout or increase the impervious area.

Interim Stormwater Management Report: A report that presents the data, methods, procedures and predicted results associated with the design of drainage works and erosion protection measures during site alteration or phasing of a development. The report shall be prepared by a Professional Engineer Licensed in Ontario and provide details on the techniques used to control storm runoff to allowable runoff rates, the method and volume of stormwater storage and the techniques used to address sediment and erosion control.

Geotechnical/Soils Report: A report that indicates the water table elevation and/or bedrock, and analyses soil composition to determine its infiltration rate, structural stability and ability to accommodate development.

Low Risk Site: A small site, not used for industrial or vehicle repair purposes or that does not contain fuel or material storage that may pose a risk to downstream lakes, rivers or ground water quality.

Lot Grading Professional – An Engineer, Architect, Land Surveyor, Landscape Architect and /or company providing these services. The Lot Grading Professional must be approved by the City and have a valid Certificate of Authorization to practice in their profession in the province of Ontario and valid professional liability insurance (i.e. errors and omissions insurance). Other individuals/companies meeting the above criteria/conditions may also qualify as a Lot Grading Professional.

Pre-development: The current condition present in the field at the project onset, or the last approved condition, or the condition as of 2006, whichever obtains the lowest runoff coefficients.

Pre/post-treatment: A facility installed upstream or downstream of a stormwater facility that provides a basic level of protection (60% TSS removal). Examples of acceptable pre/post-treatment include: hydrodynamic separators, enhanced swales, grass filter strips, storage tank filtration, or other equivalent pre-treatment systems that are shown to provide, at minimum, a basic level of protection (60% TSS removal).

Redevelopment: The creation of new units, uses or lots on previously developed land which significantly alters the site layout, and increases the impervious area. It may involve the partial or full demolition of a building and/or structure and the assembly of lands for development.

Site: The entire area under development, Redevelopment or Intensification.

Stormwater Management Report: A report that presents the data, methods, procedures and predicted results associated with the design of drainage works and erosion protection measures related to a development. The report shall be prepared by a Professional Engineer licensed in the province of Ontario and provide details on the techniques used to control storm runoff to allowable runoff rates, the method and volume of stormwater storage and the techniques used to address water quality requirements.

2.0 General Plan Drafting and Topographic Survey Details

1) The plans must be legible. All drawings shall be submitted with metric dimensions, to a standard metric scale (1:100, 1:200, 1:250, 1:300, 1:400, 1:500). Minimum scale to be 1:500.
2) Drawing size should generally be submitted on ARCH D (24x36) sheet size. Drawings size ARCH E (36x48) may be accepted for larger sites with building sizes greater than 3000m^2. Drawing size ARCH C (18 x 24) or ANSI B (11x17) may be accepted for smaller sites less than 500m^2 where minimal grading and servicing information is required.
3) Drawings must be oriented to read in landscape view.
4) Drawings must be folded to 8.5x11 or 8.5x14.
5) Drawings must be reproducible in black and white/greyscale and must not use colour or contain screenshot or photo quality images.
6) Drawings must not contain copy write notation that limits the ability to reproduce and distribute the drawings.
7) Existing conditions should appear faded in comparison to proposed work, and use a text size of 1.6mm or 2.0mm on the final hard copy.
8) Various utility lines should be identified and appear slightly darker than existing topography.
9) Proposed work should appear heavier than existing conditions, and use a text size of at least 2.0mm for notes elevations and dimensions on the final hardcopy.
10) key plan, indicating location of the site in respect to the City street network;

The following information should be included on all of the submitted plans

- □ note the date the topographic survey, used as a base for the plans, was completed and the name of the Lot Grading Professional responsible for the topographic survey information;
- □ identification of the proposed use of the site;
- □ name and address of firm preparing the plan;
- □ municipal address and/or Legal Description (Reference Plan, Lot, Concession and Registered Plan Lot Number);
- □ north arrow;
- □ legend;
- □ title block and revision block with dates for each revision;
- □ existing building structures and site details such as driveways, sidewalks, utilities, surface types etc. located, wherever possible and with the permission of the adjacent landowners, within 6.0m of the site;
- □ all existing and proposed driveways, road shoulders, traffic markings, curbs, curb cuts/depression, sidewalks, and ramps on both sides of the adjacent street;
- □ all man-made or natural features (i.e. watercourse, swale, culvert, retaining wall, embankment, catch basin) on or adjacent to the site;
- □ all main proposed features of the site shall be shown (all buildings, parking areas, driveways, above ground utilities, landscape areas, fencing and handrails, ditches, retaining walls, berms, trees, etc.);
- □ all existing utility services within the site, and on adjacent street, road allowance, boulevards and within 6.0m of the site, including all light standards and fixture location, traffic signals, utility structures, hydro transformer boxes, vaults and Bell chambers, hydro/telephone/cable poles, guys and pedestals;
- □ all necessary construction details and general notes are to be provided so as to accurately convey the design intent of the elements on the plan and to address the proposed built form;

- ☐ location of all vehicle and pedestrian entrances to and from the building;
- ☐ location and description of all existing and proposed property boundaries, adjacent street names, easements, right of-way widening, and reserves within or adjacent to the subject lands;
- ☐ sight triangles; and,
- ☐ signs (municipal and private) and parking meters.
- ☐ required professional seals.

3.0 Site Plan

All information on the Site Plan must be in conformance with the City of Greater Sudbury Zoning By-law, Ontario Building Code, and any other applicable bylaws and design standards. All information within the Municipal Right-of-Way must be in conformance with the CGS Engineering Design Manual. In addition the following design details and drawing information should also be presented.

3.1 Additional Planning Design Details

1) Relate the size, character and setting of proposed projects to the functions of adjacent streets and pedestrian networks. Buildings should generally be oriented parallel to the public rights-of-way or along the edge of a park or open spaces with a consistent front yard setback and close to pedestrian movement. On a corner site, development and intensification should be located along both street frontages and give prominence to the corner. On a site that terminates a street corridor, the development should acknowledge the prominence of that site.
2) Developments should be designed for the ease of pedestrians both on and Off-Site and encourage the separation of pedestrians and automobiles. Developments should be convenient to and accessible by persons with physical limitations and disabilities.
3) Incorporate architectural and landscape elements at the pedestrian level.
4) Consider the function and location of service and loading areas early in design development.
5) Crime Prevention Through Environmental Design (C.P.T.E.D) principles (i.e. elimination of ambiguous areas or entrapment areas, improved sightlines including ground floor views from the building, lighting levels and uniformity, clear definitions between public and private space, etc…) should be applied throughout the site to reduce the likelihood of criminal activity occurring on the site.
6) Opaque fencing, where required, must be constructed of solid materials (e.g. slats woven through chainlink fencing would not be permitted).
7) Orient buildings to take advantage of climatic conditions and utilize passive solar heating and cooling techniques. Minimize shadowing and uncomfortable wind conditions on surrounding streets, parks and open spaces to preserve their utility.
8) Consider the preservation and enhancement of the City's design features, scenic views and corridors in accordance with the CGS Official Plan.
9) In shoreline areas, particular consideration should be given to surface materials and design techniques that promote infiltration, as well as the maintenance and establishment of native vegetation.

3.2 Additional Vehicle Movement, and Parking Layout Design Details

1) Vehicles are required to enter and exit the site in a forward motion. Vehicle turning path templates may be required to ensure adequate turning radius and hammer heads are provided.
2) Surface parking should be limited between the front face of the building and the public right of way wherever possible.
3) Gova Plus Vehicles, must be accommodated onsite from the driveway entrance to the main building entrance without affecting the flow of two way traffic, and so that the vehicle can navigate the site in a forward motion at all times . Gova Plus vehicles must be modeled as a Medium Single Unit (MSU) vehicles as per the TAC standards, using the following dimensions: 2.5m wide, 8.5m long,5.3m wheel base, 0.9m overhang (Inside radius 6.0m and outside radius 11.0m.)

4) Where canopies/awnings are proposed over a driveway required for loading or fire access, the minimum clear height should be 4.2m.
5) Hard surface (i.e. asphalt, unit pavers, concrete, etc.) must be provided as follows:
    - Residential and Commercial zoned properties must provide hard surface for all proposed drive aisles, parking, loading spaces, and outdoor storage areas.
    - Institutional and Industrial zoned properties must provide hard surface for all required drive aisles, and parking spaces; except where the property is adjacent to a residential zoned property in which case loading spaces, and outdoor storage areas must be hard surface pavement as well.
    - Required for all accessible parking spaces and barrier free paths of travel.
6) A barrier curb or car park barrier system is required along all parking stalls that abut landscaped areas and buildings to prevent vehicles from overextending the parking space and impeding adjacent pedestrian routes or damaging landscaped areas or buildings. Precast bumper curbs may shift during snow removal activities and therefore should not be used for new development or where alternative measures can be implemented.
7) Snow storage areas must be identified and must not interfere with the required parking, drive aisles or loading areas. Snow storage areas must drain to stormwater quality treatment facilities but should not be located so as to negatively affect the treatment efficiency of the facility. Where sufficient room is not available on site for snow storage, accommodations must be made for snow removal to a certified off-site snow storage area.
8) Driveways and aisles should not exceed 35m in length. Where this length is exceeded, speed bumps, raised pedestrian cross walks or alternate traffic calming measures should be introduced.
9) Drive-through queuing lanes must accommodate turning radii for P type passenger vehicles as per the TAC standard. Minimum inside turning radius of 4.5m and outside turning radius of 8m
10) Refer to Section 10 below for additional design details for work within the Municipal Right-of-Way.

3.3 Additional Driveway Entrance Design Details

1) Generally, developments will be limited to one driveway entrance. Shared driveway entrances with adjacent property owners should be utilized on Arterial and Collector Roads, wherever possible. A reciprocal access agreement will be required in these circumstances.
2) Driveway entrance widths must not be wider than 9.1m. Where a driveway entrance wider than 9.1m is required for larger vehicles, vehicle turning path templates, and lane configurations must be shown on the drawings.
3) Where the Road adjacent to the property is constructed with curb and gutter and/or sidewalks, or where there is an asphalt shoulder, the access driveway located within the road right of way must have concrete curbs. Where there is an asphalt shoulder the curbs must extend to the shoulder and must include spillways, and tapers as per OPSD 604.01.
4) Zebra stripe markings to be provided at all driveway entrances where municipal sidewalks exist or are being proposed. Zebra stripes should be made with durable paint (to reduce fading and upkeep), 3.0m long, 0.6m thick and offset 1.2m.
5) Where municipal sidewalks do not cross the driveway entrance a 45cm thick stop bars must be installed along the width of the outbound lane, located 1.0m from the back of the curb depression.
6) Where gravel parking and drive aisles are permitted, at minimum the first 15m of the driveway entrance must be paved.
7) Entrances located in close proximity to signalized intersections should be located as far as possible (greater than 30m) from the intersection.
8) A sightline analysis may be required where an entrance is proposed along a vertical or horizontal curve in the road.

9) Further entrance requirements related with locations, width, slope and maintenance may be found in the Use of Private Entrance Bylaw (2011-220).

3.4 Additional Active Transportation Design Details

1) Main building entrances must be clearly visible and easily accessible from the public sidewalk.
2) A safe and well defined pedestrian walkway in accordance with AODA requirements, constructed with an approved hard surface, must be provided to all main building entrances with connections to municipal sidewalks, accessible parking spaces, and transit areas;
3) The pedestrian walkway should have a minimum width of 1.5m clear from vehicle overhang and shall be defined across driveways through line painting (zebra stripes) or raised pedestrian crossing/traffic calming humps.
4) Where municipal sidewalks do not exist along the frontage of the property, and where it is identified in the CGS Official Plan that sidewalks are required, the owner shall either contribute to the cost of the future installation of the sidewalk or install the sidewalk along the frontage of the site as determined by CGS staff.

   The contribution cost will be based on the City's contract unit prices for sidewalk work, and will be revised each year in June, as necessary. For estimate purposes, 2016 unit prices for sidewalk are as follows:

   - Sidewalk (as per City Standard) = $300.00/l.m
   - Boulevard Restoration (topsoil and sod) =$ 38.00/sq.m
   - Boulevard Restoration (asphalt and granular) =$ 58.00/sq.m

5) Where an existing sidewalk network is located within 100m of the site, the developer will be responsible to connect to the existing sidewalk from the site.
6) Bike racks should be located in a highly visible location within 15m of the main entrance, and must be securely fastened to the ground or building to prevent the rack from being removed. Bicycle racks must not be secured to interlocking pavers, stones or other surfaces that may easily be removed.
7) Bike racks must provide support to both maintain a bicycle in an upright position and lock the bicycle frame and wheel to the bicycle rack with a single U-lock. Refer to the Essential of Bike Parking Guide (by APBP) for further information on bike rack design.
8) Sidewalks should be provided within parking areas at 36m intervals, parallel with the desired path of travel to the building.
9) Bus shelters may be required for larger developments where increased ridership, generated by the development, is expected to meet the bus shelter policy.

3.5 Site Plan Drafting Details

In addition to the General Plan Drafting Details noted in Section 2.0 the following information should be included on all Site Plans, prepared and sealed by an OAA Licensed Professional or Lot Grading Professional:

□ use of existing and proposed buildings and number of storeys, including building blocks to be numbered and number of units (if there is more than one use in a building or on a lot, provide the floor area allocated to each use);

- ☐ overall dimensions (in metric) of all property boundaries and all buildings and structures (including retaining walls) existing or proposed on the site and abutting properties (where possible), including dimensions and setbacks sufficient to show the position of buildings and structures in relation to site boundaries;
- ☐ zoning of adjacent properties;
- ☐ location, design and construction details of garbage collection area, including required screening and method of collection;
- ☐ location of all outdoor storage and enclosure details;
- ☐ Layout of parking area and dimensions of parking spaces, barrier-free parking spaces, loading spaces, aisles, driveways, ramps, fire routes;
- ☐ identify type of parking area (i.e. open, underground, garage);
- ☐ layout and details of all curbs and vehicle stops.
- ☐ truck routes, turning radii and required fire access routes;
- ☐ location and dimension of all vehicle entrances, including width, turning radii and sight triangles;
- ☐ queuing requirements for drive-through, service stations, etc.
- ☐ label existing and proposed surface treatment (i.e. grass, paved, gravel).
- ☐ abutting road right-of-way width including the location and width of traffic islands, hydro poles, fire hydrants, sidewalks, etc.;
- ☐ location of all existing and proposed traffic signs;
- ☐ location and dimension of snow storage area or plans for snow removal off-site where space is constricted;
- ☐ identify material type and width of Municipal and private sidewalks and walkways;
- ☐ location and type of bicycle racks and method of securing to the ground;
- ☐ Identify regulated hazards (flood plains, wetlands, water courses, etc), and provide setbacks to all limits of development.
- ☐ Provide a completed site statistic table as per Table 3.1:

Site Statistics Table 3.1

Zoning		
Use(s) of Building(s) by Floor Area and/or Number of Residential Units		
	Provided	**Required**
Lot Area		
Lot Frontage		
Density in Dwelling Units/Hectare (residential lots only)		
Front Yard		
Rear Yard		
Interior Side or Corner Side Yard		
Interior Side or Corner Side Yard		
Building Area		
Gross Floor Area		
Net Floor Area		
% Lot Coverage and calculation		
% Lot Coverage Accessory Buildings (residential lots only) and calculation		
Height of Building(s)		
Number of Storeys		
Permitted Encroachments for Accessory Buildings, Structures and Ornamental Features		
Height of Accessory Building or Structure		
% Landscaped Open Space and calculation		
% Landscaping in a Surface Parking Area with >75 parking spaces and calculation		
% Paved Area and calculation		
% Graveled Area and calculation		
Parking Spaces, Calculation and Dimensions		
Spaces Provided Within a Structure or Garage, Dimensions		
Barrier Free Spaces, Calculation and Dimensions		
Bicycle Parking, Calculation and Dimensions		
Loading Spaces, Calculation and Dimensions		
Queueing Spaces, Calculation and Dimensions		
Width of Parking Aisles		
Width of Access Ramps and Driveways		
Yards Where Parking Areas are Permitted - Setbacks		
Site Triangle Distance		
Refuse Storage Area Setback		
Fence Height		
% Outdoor Display and Sales and calculation		
Outdoor Storage Setback, Fence Height and Screening		
Railroad Setback		
Clearing of Shoreline Buffer Area		
Fire Flow		

4.0 Landscape Plan

Landscape information may be included on the Site Plan or Grading Plan for smaller sites. All information on the Landscape Plan must be in conformance with the City of Greater Sudbury Zoning By-law. In addition the following design details and drawing information should also be presented.

4.1 Additional Landscaping Design Details

1) Landscaping is an important component of any development. Generally, the landscape design of any development or redevelopment should :
   - Contribute to the overall city image;
   - Enhance the public perception of the proposed development;
   - Preserve existing mature trees in order to provide shade canopy and maintain their aesthetic and heritage value;
   - Integrate existing natural features, including rock outcrops and hilltops that provide visual assets;
   - Provide a diversity of plant material and naturalizing;
   - Be integrated with stormwater management features;
   - Be easy to maintain without catchment areas that attract debris;
   - Provide all-season open space for the enjoyment of outdoor activities of the residents of the property (e.g. consider shading in summer and opportunities for wind breaks during winter);
   - Screen or buffer less attractive elements of the development such as the parking areas, loading areas, storage areas, garbage enclosures, with exceptions where opaque fencing is required.
2) Any part of any lot which is not occupied by buildings, structures, parking areas, driveways, loading spaces, agricultural uses, outdoor storage areas or any other permitted use, shall be maintained as landscaped open space.
3) All plant material is to be Canadian Nursery Trades Association standards as per guide specification for nursery stock. When possible all plant material is to be native Ontario materials. All plant substitutions are to be approved prior to planting.
4) Whenever possible, species native to the Greater Sudbury Area should be used (Refer to table 4.1 below). The use of native species helps to reduce the spread of invasive species and helps ensure the overall success of the planting. Deciduous trees are to be a minimum 70mm calliper (2.75") measured at 150mm (4.9') above ground;
5) Coniferous trees are to be a minimum height of 1.6m (5.25');
6) Adequate soil drainage and volume should be provided for all trees and landscaping to promote vigorous root growth, and to negate the effects of any road salt use. Tree pits or raised planter should be considered where sufficient room is not available.
7) At least 15m3 of high quality soil should be provided per tree and each tree (through sharing or alone) should have direct access to at least $30m^3$ of high quality soil. High quality soil must consists of a minimum 0.9m and maximum 1.2m depth, over and above any required drainage system and/or granular material, be uncompacted, and be sandy loam with the following composition.
   - Sand (50%-60%
   - Silt (20%-40%)
   - Clay (6%-10%)
   - Organic (2%-5%)

- pH = 7.5 or less

8) Tree species within the municipal right of way must meet the City's tree planting bylaw (2011-243).
9) The following trees are recommended for planting in areas that have high exposure to soil salt and aerosol salt. A Horticulturalist should be consulted for further tree species recommendations.
    - Chokecherry
    - Japanese Tree Lilac
    - tree form Pea shrubs
    - Ohio Buckeye
    - Blue Spruce
    - Honey Locust
10) Trees within the landscaped open space adjacent to the Right of Way, at a minimum, must be planted 6m on centre and be offset sufficiently from any services with appropriate root shields installed. Alternative landscape proposals will be considered to allow for more open space or where bedrock is high; however, it is anticipated that an equivalent number of trees will be provided as set out above.
11) Where property for a municipal right of way widening is required, the required landscape strip must be set back from the future property line.
12) Where a continuous hedgerow is required for screening, hedge species must be a minimum of 1m in height and be planted at minimum 600mm on centre or as recommended by a horticulturist.
13) The relocation of plants that would be destroyed by development activities is permitted, especially if the species are difficult to source through commercial greenhouses. However, the transplant of wild trees and hedges is generally not permitted.
14) Landscaping within the sight triangle must be in accordance with the Zoning By-law.
15) Existing and proposed services must be indicated on the landscape plan to confirm there are no conflicts with the landscaping.
16) Where street trees are planted near utilities, they should be planted as per the ESA "Planting Under Or Around Power line and Electrical Equipment Guide", or other guidelines provided by specific utilities, whichever is more stringent.

4.2 Landscaping Plan Drafting Details

In addition to the General Plan Details noted in Section 2.0 the following information should be included on all Landscape Plans:

- □ location and identification (in landscape industry standard symbols and notations) of all existing or proposed plant material, planting beds, sodded areas, berms and other soft surfaces;
- □ location, height and description of all existing and proposed retaining walls, fences, walls, vegetative screening, including cross section;
- □ plant list indicating full botanical name, common name, quality, caliper, height, spread, and any special plant material;
- □ trees along right-of-way;
- □ clearly indicate the location of all vegetation to be retained or removed;
- □ identify all recreational areas (i.e. tennis courts, swimming pools, splash pads, sports fields, play equipment).

Table 4.1 – Native Plant List for Sudbury and Surrounding Area

Aquatic and Wetland Plants

Scientific Name	English
Acorus calamus	Sweetflag
Caltha palustris	Marsh Marigold
Eupatorium maculatum	**Spotted Joe-Pye Weed**
Iris versicolor	**Blue Flag (Wild Iris**
Ledum groenlandicum	Labrador Tea
Nuphar variegatum	Yellow Pond Lily
Nymphaea odorata	Fragrant Water Lily
Pontederia cordata	Pickerelweed
Sarracenia purpurea	Northern Pitcher Plant
Sparganium americanum	Bur Reed
Typha latifolia	Common Cattail
Vaccinium macrocarpon	Cranberry
Juncus effusus	Soft Rush

Woody Plants

Scientific Name	English
Ables balsamea	Balsam Fir
Acer spicatum	Mountain Maple
Acer saccharinum	Silver Maple
Acer rubrum	Red Maple
Acer pennsylvanicum	Striped Maple
Alnus rugosa	Speckled Alder
Amelanchier canadensis	Saskatoon Berry
Betula papyrifera	Paper Birch
Betula alleghaniensis	Yellow Birch
Cornus sericea	Red-Osier Dogwood
Corylus cornuta	Beaked Hazelnut
Fraxinus nigra	Black Ash
Fraxinus pennsylvanica	Green Ash
Juglans cinerea	Butternut
Juniperus communis	Common Juniper
Larix laricina	Tamarack

Herbaceous Plants

Scientific Name	English
Allium cernuum	Nodding Wild Onion
Anaphalis margaritaceae	Pearly Everlasting
Andropogon gerardii	Big Bluestemmed Grass
Apocynum androsaemifolium	Spreading Dogbane
Aquilegia canadensis	**Wild Columbine**
Arctostaphylos uva-ursi	Bearberry
Asclepias incarnata	**Swamp Milkweed**
Aster lateriflorus	Calico Aster
Aster umbellatus	**Flat-topped White Aster**
Aster undulatus	Wavy Leaved Aster
Campanula rotundifolia	**Harebell**
Clematis virginiana	**Virgin's Bower**
Clintonia borealis	Bluebead lily
Cornus canadensis	Bunchberry
Corydalis sempervirens	**Pale Corydalis**
Cypripedium acaule	Pink Lady Slipper
Drosera rotundifolia	Round-Leaved Sundew
Epilobium angustifolium	**Fireweed**
Erigeron philadelphicus	Common Fleabane
Fragaria virginiana	Wild Strawberry
Gaultheria procumbens	Wintergreen
Impatiens capensis	Jewelweed
Kalmia angustifolia	Sheep Laurel
Lilium canadense	Canada Lily
Linnaea borealis	Twinflower
Lobelia cardinalis	**Cardinal Flower**
Maianthemum canadense	Canada Mayflower
Monarda fistulosa	**Wild Bergamot**
Oenothera biennis	**Evening Primrose**
Potintilla anserina	Silverweed
Rubus odoratus	Purple Flowering Raspberry
Rudbeckia hirta	**Black-Eyed Susan**
Saxifraga oppositifolia	Purple Saxifrage
Saxifraga virginiensis	Early Saxifrage
Silene acaulis	Moss Campion
Sisyrinchium angustifolium	Pointed Blue-Eyed Grass
Solidago rugosa	Rough-Stemmed Goldenrod
Solidago rigida	Hard-Leaved Goldenrod
Thalictrum polygamum	Tall Meadow Rue
Tiarella cordifolia	Foamflower
Trillium grandiflorum	Large Flowered Trillium
Vaccinium sps.	Blueberry
Veronica arvensis	Corn Speedwell
Veronica serpyllifolia	Thyme-Leaved Speedwell
Viola papilionacea	Common Blue Violet
Zizia aurea	**Golden Alexanders**

5.0 Lighting Plan

Lighting information may be included on the Site Plan or Servicing Plan for smaller sites. The following design details and drawing information should also be presented, where the development is adjacent to existing residential properties, or other light sensitive uses.

5.1 Additional Lighting Design Details

1) Lighting should provide visible, well-lit and safe spaces by considering Crime Prevention through Environmental Design principles.
2) Reduce light trespass on adjacent properties and municipal or regional road by incorporating the use of full cut-off fixtures, low wattage bulbs and flat glass fixtures to reduce glare and by directing it away from adjacent natural, residential and other sensitive areas.
3) Maximum of 1 foot-candle at the property line must be maintained.
4) Lighting should be designed to Illumination Engineering Society (I.E.S.) Guidelines to promote pedestrian and vehicle safety while minimizing ambient light pollution.
5) Lighting should be designed for dark sky protection.

5.2 Lighting Plan Drafting Details

In addition to the General Plan Details noted in Section 2.0 the following information should be included on all Lighting Plans, prepared and sealed by a Professional Engineer Licensed in the Province of Ontario with a valid Certificate of Authorization:

- □ location and design of all exterior lighting, including lighting fixture details;
- □ a separate lighting photometric plan for infill projects and major developments may be required, as determined by the City.

6.0 Building Elevation Plan (Architectural Plan)

Elevation Plans are generally required for all Site Plans with a CGS Official Plan designation of Downtown or Town Centre, or where the site abuts or is visible from an Arterial Road, Provincial Highway, or Navigable Waterbody.

6.1 Additional Building Elevation Design Details

1) Buildings, structures and other design elements that complement existing built form and character are encouraged by massing buildings to define the edges of streets, parks and open spaces in good proportion, and by creating appropriate transitions in scale to neighbouring existing or planned buildings.
2) Integrate servicing and utility functions within the building, where possible, or locate towards the sides or rear of the building and screen from adjacent streets.
3) Strive for a complementary design relationship adjacent to heritage resources.

The following information should be included on all Elevation Plans, prepared and sealed by an Architect:

6.2 Elevation Plan Drafting Details

- □ exterior material type and colour; Note, plans must not be in colour refer to Section 2.0.
- □ all roof structures, screening and mechanical equipment (penthouses, chimneys, roof top units, vents, air conditioning, etc.);
- □ location and dimensions of any existing or proposed roof or fascia signs.

7.0 Grading Plan

Grading information may be included on the Site Plan or Servicing Plan for smaller sites. Where grading information is indicated on other plans the grades indicated on the grading plan will take precedence, all other grading information should be removed or coordinated with the grading plan. All information on the Grading Plan must be in conformance with the City of Greater Sudbury Lot Grading Policy, Ontario Building Code, and any other applicable by-laws and design standards. In addition the following design details and drawing information should also be presented.

7.1 Additional Grading Design Details

1) All Retaining walls greater than 1.0m in height must comply with the Ontario Building Code, the Zoning By-law, and will require a Building Permit.
2) All slopes greater than 2:1 and greater than 1.0m in height shall include a pedestrian guard, designed in accordance with the requirements of the Ontario Building Code, fastened securely along the top of the slope. Where pedestrian access to the high part of the slope is not easily accessible, a 1.8m (6ft) high chain link fence may be used in place of a pedestrian guard.
3) All slopes greater than 2:1 and greater than 0.6m in height located adjacent to vehicular traffic shall include a vehicle guard, designed in accordance with the requirements of the Ontario Building Code, fastened securely along the top of the slope.
4) Slopes steeper than 3:1 are not walkable slopes, and are not permitted on residential developments or for surfaces where pedestrian traffic may be expected to occur.
5) Barrier free path of travel to all barrier free building entrances as per the Ontario Building code, must be provided for all accessible parking stalls and along all exterior walkways that connect to the municipal right of way.
6) Where ramps are not installed on a barrier free path of travel, a maximum grade of 5% with a maximum 3% cross fall must be used.
7) Where a ramp is required along a barrier free path of travel it must meet the requirements of the Ontario Building Code, where applicable; otherwise, the ramp must meet AODA requirements.
8) Maximum gradients for vehicles should be 6%, with a maximum 4% cross fall, and in no case shall the maximum gradient be greater than 8% with a maximum 6% cross fall.
9) Slopes less than 1% should generally be avoided on all vehicle and pedestrian areas. A minimum 2% slope is preferred.
10) Swales located in required privacy yards must include sub-drains where the slope is between 0.3% and 1.0% and must not be deeper than 300mm, with 3:1 side slopes.
11) Grades within required privacy yards must range between 1 and 7%, as per the Lot Grading Design Guidelines.
12) Grading within the site along the Municipal right of way should accommodate an urban cross section within the right of way. (i.e, a 2-4% cross fall from the property line to the curb or future curb)
13) Any existing Municipal ditch along the property line shall be regraded to meet City standards and shall be realigned to be located entirely within the right of way, where possible.
14) All new rock cuts greater than 2m in height must be designed and constructed to meet a Class B or Class C hazard rating with 100% rock fall debris retention based on the Ministry of Transportation publication “RHRON: Ontario Rockfall Hazard Rating System – Field Procedures Manual”

15) The clear zone width for the rock cut shall be measured from the edge of the traveled lane, sidewalk or Public Way whichever is closer. (Public way means a sidewalk, street, highway, square or another open space to which the public has access, as of right or by invitation, expressed or implied.)
16) Rock faces must be designed in accordance with OPSD 201.010 and/or the Roadside Design Manual (including Interceptor ditches, overburden removal, rock face slopes, etc.)
17) Rock faces must be located a sufficient distance from the property line so that, freeze thaw cycles do not cause the rock face to undermine adjacent properties overtime, and any required fencing or interceptor ditches can be maintained from the owners property and are located entirely on the owners property, unless an agreement registered on title is entered into with the adjacent property owner outlining maintenance requirements, etc.
18) Where rock blasting must occur a rock blasting report, prepared by an Engineer with a minimum of 5 years of rock blasting experience, must be provided to building services for review.
19) Gabion baskets and rock rubble slopes are not permitted.
20) Refer to Section 11 below for additional design details for work within the Municipal Right of Way.

7.2 Grading Plan Drafting Details

In addition to the General Plan Details noted in Section 2.0 the following information should be included on the Grading Plan prepared and sealed by a Lot Grading Professional:

- □ All Plans containing proposed grading information must be sealed by a Lot Grading Professional;
- □ Sufficient proposed and existing elevations at property line, back edge of sidewalk, top and bottom of curbs and retaining walls, road crown, site entrances and along the frontage of the property as required to show the design intent, ensure all drainage is retained within the site, and to reflect how the proposed grades match into the existing condition;
- □ arrows indicating the direction and slope of surface drainage on all paved, granular and grassed areas;
- □ proposed elevations at all locations where the grade changes on the site, including cross sections of any changes of elevation required to convey the design intent;
- □ proposed elevations at all building corners and all building access points, (i.e. ramps, entrances, and loading bays);
- □ drainage swales with cross section details,
- □ roof downspout locations and direction of drainage;
- □ rim elevations on all catchbasins and maintenance hole;
- □ wherever possible and with the permission of the adjacent landowners, existing elevations are required to be shown at 3.0m and 6.0m beyond the site limits;
- □ indicate locations where rock removal is required;
- □ erosion protection measures;
- □ geodetic grades as well as finished ground floor and lowest opening elevations, including basement floor elevations for all buildings requiring servicing.
- □ Slopes indicated as a percent or Horizontal:Vertical.

8.0 Servicing Plan

Servicing information may be included on the Site Plan or Grading Plan for smaller sites. All servicing information within the Municipal Right of Way must be in conformance with the City of Greater Sudbury Engineer Design Manual, Standard Drawings and Specifications, and all servicing information within the site must be in conformance with all applicable provincial regulations and guides, Ontario Building Code, the City's Sewer Use By-law (2010-188), and City's Water and Wastewater Systems By-law (2010-214) and the Backflow prevention bylaw (2017-217). In addition the following design details and drawing information should also be presented.

8.1 Additional Water Service Design Details

1) Only one water service connection to the municipal system is allowed per site;
2) Water services or sewers serving multiple buildings located on the same property, and water services 100mm or greater, must be designed and installed according to MECP guidelines
3) Generally, a live tap shall be made where service connections are two pipe sizes smaller than the main;
4) A single, or bulk water meter is required for all developments (residential, commercial, industrial). The water meter must be located on the domestic water service prior to splitting the flow to multiple buildings. The meter must be installed either in a water meter chamber or in a heated outbuilding easily accessible by City staff;
5) Blow-offs must be installed on all dead end watermains/services, or where a service is shared with multiple owners (condominium developments).
6) Ensure the length and size of the water service, relative to the demand, provides sufficient turnover time to maintain adequate residual chlorine levels;
7) Hydrant leads on site should not exceed 30m after the last domestic service connection.
8) Hydrants must be located in areas accessible directly from the required Fire route and must not be blocked by fences, ditches, parked cars, loading areas or any other barrier that would impede access. A 1.5m clearance must be maintained around a hydrant at all times.
9) The available fire flow, and pressure for domestic max day and hour at the property line, from the existing municipal watermains adjacent to the site, will be modeled by the City and the results provided to the owner. The owner or their authorized representative must confirm sufficient capacity is available for the water services within the site;
10) Required fire flows, in municipally serviced areas must be based on Fire Underwriter's Survey Guidelines; and on the Ontario Fire Marshal Guidelines in unserviced areas.
11) Service connections and disconnections must be in accordance with City's Protocol for New Watermain, Water Service and Wastewater Connections. Existing unused services must be abandoned at the Main.
12) Where existing services are proposed to be reused, an assessment of the service must be completed to ensure the service is suitable for reuse. Existing services with lead solder must not be reused, and must be abandoned at the main.
13) Prior to completing any construction activity within 10m of a trunk watermain greater than 350mm diameter, the owner will contact the City's Technical Services department to obtain a full list of requirements (i.e. contingency plan, communication plan, etc.).
14)
15) Field beds must be setback a minimum of 30m from the high water level associated with any adjacent watercourses.
16) Refer to Section 11 below for additional design details for work within the Municipal Right-of-Way.

8.2 Additional Sanitary Service Design Details

1) Only one sanitary service connection to the municipal system is allowed per site;
2) Sanitary services 150mm or greater shall be designed as a main, and must meet MECP guideline design requirements;
3) Sanitary test maintenance holes must be located entirely on the site, and are required for all non-residential sites;
4) Service connections 200mm or greater must be made with a maintenance hole located on the Main.
5) Provide a letter, sealed by an engineer, indicating the existing and proposed sanitary peak flow calculations in accordance with the City of Greater Sudbury Engineering Design Manual. The letter must also confirm there is capacity in the service connection to the site.
6) Service connections and disconnections must be in accordance with City's Protocol for New Watermain, Water Service and Wastewater Connections. Existing unused services must be abandoned at the Main.
7) Where existing services are proposed to be reused, an assessment of the service must be completed to ensure the service is structurally suitable for reuse. Existing clay pipes must not be reused, and must be abandoned at the main.
8) Refer to Section 11 below for additional design details for work within the Municipal Right of Way.

8.3 Additional Storm Service Design Details

1) Storm service connections should be limited to one per site;
2) All proposed catchbasins must contain a goss trap as per the City's Sewer Use By-law, unless a downstream quality control facility is in place. If catchbasin maintenance holes are being proposed the goss trap design must address upstream flows and associated water levels.
3) Refer to Section 11 below for additional design details for work within the Municipal Right of Way.

8.4 Servicing Drafting Guidelines

In addition to the General Plan Details noted in Section 2.0 the following information should be included on the Servicing Plan, prepared and sealed by a Professional Engineer Licensed in the Province of Ontario with a valid Certificate of Authorization:

- □ all Plans containing proposed servicing information must be sealed by a Professional Engineer.
- □ watermain services to the building with pipe material, diameters and obvert elevations at critical locations;
- □ details of any service connections to the City infrastructure;
- □ hydrant flange elevations and adjacent finished ground elevations shall be shown on all hydrants within or immediately adjacent to the site;
- □ well locations (if required);
- □ existing and proposed service locations, pipe material and diameter;
- □ Location of all hydrants including dimensions to the proposed building;

- ☐ sanitary sewers, storm sewers labeled with the following: pipe material, diameter, slope, pipe bedding, and pipe inverts at all manholes, catchbasins, points of connection to main, building face and at property line;
- ☐ identify and dimension catch basins, double catchbasins, ditches, culverts, ditch inlets and ditch outlets, manholes, hydrants, valves (boxes and chambers), Siamese connections and service shutoffs (municipal curb stops to be located within the right of way, 0.3m from the property line);
- ☐ rim elevations of all manholes and catchbasins;
- ☐ location and details of all proposed stormwater management controls/facilities indicated in the stormwater Management Report (if required);
- ☐ finished ground floor and basement floor elevations;
- ☐ septic system location (if required);
- ☐ drainage swales;

9.0 Construction Siltation Control Plan

Construction Erosion and Siltation Control (ESC) information may be included on the Site Plan, or Grading Plan, for smaller sites. All Siltation control must be in conformance with all applicable provincial regulations (OPSS 805) and best management practices, including Sustainable Technologies "Erosion and Sediment Control Guide for Urban Construction". In addition the following design details and drawing information should also be presented.

9.1 Additional Construction Siltation Design Details

1) Erosion and Sediment Control methods should consider approaches that firstly;
   - Eliminate or reduce erosion, and secondly;
   - Control Sediment release.
2) Given the importance of Low Impact Development Systems (LIDS) in stormwater management, it is imperative that LIDS are not to be used for sediment control.
3) Generally, single control points should be avoided and multiple systems and barriers should be used;
4) Erosion control measures must be applied to bare or under–stabilized soils in order to improve resistance to erosion by water and wind. Key areas of the site where erosion controls should be applied include:
   - Areas inactive for 30 days or longer,
   - Slopes,
   - Soil stockpiles,
   - Runoff conveyance channels,
   - Areas immediately downstream of water outlets,
   - Banks of detention ponds and sediment traps,
   - Other areas where erosion risk is high and runoff flows directly towards a sensitive area downstream.
5) Heavy duty sediment control fences are to be installed downslope of all disturbed areas.
6) Double row sediment control fence with at least one row being Heavy Duty are required upstream of natural heritage features and as Site conditions require;
7) Temporary check dams are to be provided in all downstream swales and ditches.
8) Include the following notes as a minimum:
   a) Sediment barriers, check dams, and temporary construction access to be installed prior to the beginning of construction.
   b) All sediment control devices to be routinely inspected and maintained in proper working order until areas are stabilized.
   c) Maximum allowed sediment accumulation at the sediment fencing is half the fence fabric height.
   d) After significant rain event, all sediment and erosion controls must be inspected and rectified as soon as possible
   e) If necessary, trucks will be washed down before leaving the site.
   f) The site will be wet down if necessary to control dust.
   g) Calcium chloride dust control must not be used in ground water protection areas and immediately upstream of bodies of water.
   h) All construction activity will comply with City of Greater Sudbury Noise Bylaw.

i) All construction vehicles to enter and exit site from temporary construction access as approved by the City of Greater Sudbury.

j) All topsoil stockpiles to be surrounded with sediment control fencing.

k) Filter fabric to be placed under grates and lids on all onsite and downstream catchbasins to trap sediment. Silt traps are to be cleaned regularly and are not to be removed until all construction activity is complete. Filter fabric for silt control to be Terra Fix 270R or approved equivalent.

l) Where construction activity occurs within the City right of way, sediment controls will be placed on the catchbasins on public streets across the property's frontage.

m) Street sweeping, catchbasin cleaning and dust control are the responsibility of the developer and must be kept under control on all roadways to the satisfaction of the General Manager of Growth and Infrastructure.

n) Surface erosion protection must be applied for all disturbed areas, subject to erosion, until vegetation is established.

o) A log book shall be kept onsite indicating inspection schedules, repairs made, & any concerns noted.

p) Additional materials such as clear stone, filter fabric, pumps, hoses and siltsoxx, or approved equivalent to be kept onsite at all times for conducting repairs to sediment control measures;

q) Engineered changes to the ESC measures may be required as site conditions change.

r) Any dewatering occurring onsite must be in accordance with an approved dewatering plan, which must include silt traps.

s) Refuelling, equipment maintenance, and hazardous material storage must take place a minimum of 30m from any watercourse or environmentally sensitive area.

t) An approved spill management plan is to be kept onsite at all times.

u) Spills are to be reported immediately to the MECP spills action center at 1-800-268-6060

v) Temporary fuel and other hazardous material storage is to be located minimum 30m away from any watercourse or environmentally sensitive area.

9.2 Construction Siltation Drafting Guidelines

In addition to the General Plan Details noted in Section 2.0 the following information must be included on the Construction Siltation Control Plan prepared and sealed by a Lot Grading Professional:

- □ all plans containing proposed sediment and erosion control information must be sealed by a Lot Grading Professional;
- □ location and details of all temporary surface erosion protection required until vegetation is established;
- □ location and details of all sediment barriers, check dams, ponds, etc. required to prevent erosion and prevent the transfer of sediment off-site via construction vehicles;
- □ location and details of all temporary construction access and measures to be taken to prevent the transfer of sediment off-site;

10.0 Details, Cross Sections, and General Notes

Details, Cross Sections, and General Notes may be included on other drawings or on a separate Plan.

☐ Cross Sections should be provided at minimum when:

- requested by City staff to provide further clarification;
- service locations are in close proximity to building foundations;
- major changes in grade occur on the site;
- complex storm water management systems are proposed.
- Service connections are proposed within the right of way, to show sufficient clearance with existing services and utilities.

☐ The followings general notes must be provided as a minimum:

- The Engineer's certification submission for all work completed in the municipal right of way and all pipe work constructed on private property shall be in conformance with the City's Certification Requirements.
- Prior to commencing any work within the municipal right of way, the contractor or developer will obtain all necessary road occupancy permits, and service connection permits from the City's Engineering Services.
- All work within the City right-of-way shall be constructed in accordance with City of Greater Sudbury design standards and specification, or the Ontario Provincial Standards may, subject to the approval of the City of Greater Sudbury, be used where no standard or specification is noted.
- All disturbed areas within the municipal right-of-way shall be rectified to the original condition or better and to the satisfaction of the General Manager of Growth and Infrastructure.

11.0 Off-Site Servicing Plan

An Off-Site Servicing Plan is required where an Environmental Compliance Approval (ECA) from the Ministry of Environment, Conservation and Parks (MECP) is required (i.e. extension of any municipal sanitary, storm or watermains, not including service connections) or improvements are required within the Municipal Right of Way that effect municipal infrastructure outside the boulevard directly adjacent to the development property (not including service connections).

Off-Site Servicing information must be presented on separate plan and profile drawings, intersection drawings, and/or pavement marking drawings in accordance with the CGS Engineering Drawing Standards. All information presented on the off-site servicing plan and profile plans must be in accordance with all applicable Provincial and Municipal standards and guidelines (Including the CGS Supplemental Specifications, Engineering Design Manual, Ontario Traffic Manual, etc.). In addition the following design details and drawing information should also be presented.

11.1 Additional Off-Site Servicing Plan Design Details (including all Plans where work is proposed within the Municipal Right-of-Way)

1) All asphalt cuts within the Municipal right of way must be located outside the travelled portion of the roadway, along lane traffic markings
2) Asphalt cuts for proposed curb work must be located minimum 0.6m from the edge of asphalt.
3) Edge treatment must be installed along all asphalt joints
    - For all arterial/collector roads Denso-band size 15mmx45mm or approved equivalent shall be used.
    - For all local roads Denso-reinstatement tape size 2mmx 50mm or approved equivalent shall be used.
4) Specify Cathodic protection to be Denso tape, or approved equivalent, wrapped around all metal pipes and appurtenances, water services and fittings, excluding copper services, as per the manufactures specifications;
5) Appropriate cover for all services and mains should be provided in conformance with the CGS Engineering Design Manual. Where this cover cannot be obtained, and upon approval of the General Manger of Growth and Infrastructure, the pipe must be pre-insulated.
6) All service connections must be made perpendicular to the main, unless otherwise approved by the General Manager of Growth and Infrastructure.
7) Culverts must be no longer than 30m.
8) All Culverts larger then 900mm diameter must be Poly-Coated CSP or Concrete, where culverts greater than 1.8m diameter must be concrete box culverts.
9) All new rock cuts greater than 2m in height must be designed and constructed to meet a Class B or Class C hazard rating with 100% rock fall debris retention based on the Ministry of Transportation publication “RHRON: Ontario Rockfall Hazard Rating System – Field Procedures Manual”
10) The clear zone width for the rock cut shall be measured from the edge of the traveled lane, sidewalk or Public Way whichever is closer. (Public way means a sidewalk, street, highway,

square or another open space to which the public has access, as of right or by invitation, expressed or implied.)

11) Rock faces must be designed in accordance with OPSD 201.010 and/or the Roadside Design Manual (including Interceptor ditches, overburden removal, rock face slopes, etc.)

12) Rock faces must be located a sufficient distance from the property line so that, the freeze thaw cycles do not cause the rock face to undermine adjacent properties overtime, and any required fencing or interceptor ditches can be maintained from the owners property and are located entirely on the owners property, unless an agreement registered on title is entered into with the adjacent property owner outlining maintenance requirements, etc.

13) Where rock blasting must occur a rock blasting report, prepared by an Engineer with a minimum of 5 years of rock blasting experience, must be provided to building services for review.

12.0 Stormwater Management Report

Stormwater Management Controls must be in conformance with the current Ministry of the Environment, Conservation and Parks (MECP) Guidelines as well as the City of Greater Sudbury's Engineering Design Manual, watershed studies, and Conservation Sudbury (Nickel District Conservation Authority) requirements. In addition the following design details and report information should also be presented.

12.1 Additional Quality Control Design Details

1) Onsite Quality Control is required for the entire site, including pre development impervious areas. The quality control facilities must be sized to capture and treat a minimum 90% volume of the annual runoff on a long-term average basis without bypass
2) A minimum TSS and floatables removal rate is required for the site as follows:
   a) 80% (enhanced) is required to be achieved for all developments; unless stated otherwise in the Watershed Study.
   b) Subject to the City's discretion, 70% (normal) is required to be achieved for all Low Risk Intensification developments, developed prior to 2006, where no expansion to the impervious areas are proposed; unless stated otherwise in the Watershed Study.
3) Oil/Grit Separators must meet the following requirements:
   a) Oil/Grit Separators must utilize hydrodynamic separation and will be accepted only on new developments and Redevelopments where Pre/post-treatment is provided or subject to the City's discretion where they are introduced as part of a treatment train for the site. Examples of acceptable pre/post-treatment include; enhanced swales, grass filter strips, storage tank filtration, or other equivalent pre-treatment systems.
   b) Oil/Grit Separators will be accepted as standalone treatment devices on Intensification sites only.
   c) Oil/Grit Separators within the municipal road or located on municipal property must have exterior structural components made of concrete.
   d) Oil/Grit Separators must be designed with a minimum available sediment storage volume of 10m3/Ha of contributing paved area with an effective storage volume of 15% of the available sediment storage volume at which volume the unit still provides enhanced quality control prior to yearly maintenance of the unit.
   e) Oil/Grit Separators must be sized for 80% TSS removal using a 50 micron average particle size or fine particle size distribution as follows:

Particle (um)	(%)	Specific Gravity
20	20	1.3
60	20	1.8
150	20	2.2
400	20	2.65
2000	20	2.65

4) Low Impact Development (LID) practices must be designed in accordance with MECP Guidelines and the TRCA LID Guidelines as an interim guideline. http://sustainabletechnologies.ca/wp/wp-content/uploads/2013/01/LID-SWM-Guide-v1.0_2010_1_no-appendices.pdf

12.2 Interim (Phased) Stormwater Management

1) Any site alteration or phased project greater than 1ha must either;

- install the final stormwater management facility for the development ahead of construction as part of the initial phase of development, while ensuring sediments produced during construction will not negatively impact future performance of the facility, or
- provide and implement an Interim (phased) Stormwater Management Report.

12.3 Provisional Stormwater Management Plan (SWM) Details

1) A Provisional SWM Plan may be entered into for sites that meet all of the following criteria subject to approval by the General Manager of Growth and Infrastructure:

a) no expansion of the existing impervious surfaces proposed,

b) minimal regrading required,

c) life expectancy of the pavement surface exceeds 5 years,

d) proposed site use does not impose a significant risk to stormwater quality, and

e) Provisional SWM measures can be implemented on site.

2) Where a Provisional SWM Plan is being entered into, a Stormwater Management Report is required as part of the Site Plan Control Application and shall include the following:

a) All report requirements noted in section 12.4 below;

b) a Provisional SWM Plan, provided on a separate letter head and sealed by a Professional Engineer;

c) a Schedule for implementation of the Provisional SWM Plan;

d) and a Stormwater Maintenance protocol for the maintenance of the future stormwater measures to be implemented, provided on a separate letter head and sealed by a Professional Engineer.

3) The Provisional SWM Plan will be included in the Site Plan Agreement and will be registered on title. As a minimum the Provisional SWM Plan will state the following:

Until such time as the final stormwater management facilities are installed on the property, in accordance with the approved plans and Stormwater Management Report, the property will be maintained as follows:

a) *Goss traps to be installed on all Catchbasins.*

b) *After each rain event inspect all Catchbasins, and remove all floatables or Oil that may collect in the sump.*

c) *Weekly inspection of the property and removal of all garbage, excessive sediment or debris, and oil/gas spills.*

d) *In the event of an oil or gas spill, apply appropriate absorbent (sand or sawdust) to remove the spill immediately, and report all spills to all applicable regulatory bodies and to the City.*

e) *Semi Annual inspection of all Catchbasin sumps, and removal of all debris in excess of 300mm.*

f) *Annual early spring sweeping of parking lot and walkway to remove all winter sand, loose asphalt, and other sediment. Where loose asphalt is observed asphalt must be repaired.*

g) *Annual late fall Inspection of all flat roofs and eaves troughs, and removal of all leaves and sediment.*

h) *Maintain all grassed areas in good condition by watering and mowing as needed, and limit the use of fertilizer in accordance with the current City Lawn Fertilizer By-law.*

4) Upon approval of the Provisional SWM Plan and registration of the agreement an annual Provisional SWM Maintenance letter, signed by the property owner, must be provided to the City's Planning Services and a copy of the letter must be retained on the property. This letter must provide an update on the schedule to implement the final stormwater management facility and must indicate the Provisional SWM measures taken. Compliance with the Provisional Stormwater Management Plan will be reviewed and monitored by the City's By-law Enforcement Services.

5) Planning Services must be informed prior to implementation of the final stormwater management facilities. A site plan amendment may be required if the design of the Stormwater Management Facility changes significantly during implementation.

12.4 Additional Quantity Control Design Details

1) On-site quantity control is required to be provided on-site, unless determined otherwise by the City's Drainage Engineer based on watershed studies or local knowledge in the absence of watershed studies.

2) As a minimum Post to Pre-development controls must be provided for the 5 and 100 year storm events.

3) A 20% reduction in the pre-development flow rate is required for developments located in a Source Water Protection area with a vulnerable zone score >7.

4) A 15% reduction in the pre-development flow rate is required for developments located in the Junction Creek Water Shed.

5) For developments within areas controlled by Conservation Sudbury, and for flood assessment and design of major overland flow conveyance systems the design peak flow shall be the largest of those generated by the 100-year design storm or the Regional Storm (Timmins Storm).
6) Maximum ponding depth for parking lot storage should not exceed 300mm.
7) Generally, watershed boundaries must not be changed and are subject to review through Conservation Sudbury.

12.5 Exemptions for small sites

Subject to the City's discretion, a small site is any development with impervious surface areas (excluding the building) less than 0.085Ha (approx. 25 parking/queuing spaces) and building net floor area less than 500sq.m, and does not include developments where drainage within the site flows through or from an adjacent private property.

1) Where small Low Risk Sites are proposed (except sites where stormwater management is subject to review by other regulatory agencies) stormwater quality and quantity control requirements can be achieved without the need for a Stormwater Management Report through the use of the following:
    1. Enhanced grass swales, designed by a Lot Grading Professional, meeting the following requirements.
        a) Located along, or providing the equivalent length of, the proposed/existing parking and drive aisles.
        b) Maximum 25m wide contributing flow path across the adjacent impervious surface, with a maximum cross slope of 3% to ensure sheet flow conditions, directed to the enhanced swale.
        c) Trapezoidal swale cross section with a minimum bottom width of 1.0m.
        d) 3:1 maximum side slopes with a minimum swale depth of 0.3m.
        e) Minimum.0.5m wide grass filter strip/rounding between the top of swale and the pre-treatment device.
        f) Pre-treatment, along the length of the parking area at the top of swale.
        g) Maximum swale slope of 1%.
        h) Lined with a minimum of 300mm top soil and grass.
        i) Set back a minimum of 4m from all buildings.
    2. Grass filter strip, designed by a Lot Grading Professional, meeting the following requirements.
        a) Located along the length of the proposed/existing parking and drive aisles.
        b) Maximum 25m wide contributing flow path across the adjacent impervious surface, with a maximum cross slope of 3% to ensure sheet flow conditions, directed to the filter strip.
        c) Minimum filter strip width of 5m.
        d) Maximum filter strip slope of 1%.

e) Pre-treatment along the length of the parking area.

f) Lined with a minimum of 300mm top soil and grass.

3. Permeable Pavement or Pavers, designed by a Professional Engineer.

4. In addition to the above, Best Management Practices should be incorporated as follows:

a) Sheet flow of stormwater from parking lots to swales or landscape strips to convey flow instead of storm sewers.

b) Include trees, dense vegetation and other significant rain water reducing landscaping throughout the site.

c) Where sod is provided, topsoil should be well screened and tilled to a minimum 300mm deep.

d) Amend topsoil with compost to achieve an organic content of 8 to 15% by weight or 30 to 40% by volume.

e) Reduce grades throughout the site to below 3%.

f) Direct roof leaders to landscaped areas away from the buildings.

2) Sites that do not form part of a subdivision or consent, with proposed impervious surface areas (excluding the building) less than 0.020Ha (approximately 6 parking spaces) may be exempt from stormwater management requirements. However, some sites may still require stormwater management control under applicable provincial acts/regulations or where known drainage issues exist.

3) Cash in lieu of onsite quality and quantity controls will be considered for small existing developments where it is impractical to provide stormwater management on site; however stormwater best management practices should be incorporated into the lot design by a lot grading professional to the maximum extent possible.

1. In Lieu of onsite Quality Controls the cost of an appropriately sized OGS unit ($16/m2) will be prorated for the proposed paved surface area. These amounts are from 2019 and are subject to change to reflect current prices.

2. In lieu of onsite Quantity Controls the following contribution equation will be used based on the increase in impervious areas. These amounts are from 2019 and are subject to change, as necessary, to account for inflation:

- Residential = $1,000 up to the first 560sq.m and $1.79/sq.m after that.
- ICI = $2,000 up to the first 560sq.m and $3.57/sq.m after that.

12.6 Modeling Requirements

1) For the purposes of determining the Pre-development allowable peak flow for developments less than 1 hectare, the site must be modeled using the Rational Method/IDF Curves utilizing the following parameters. If alternate modeling methods are used to determine the allowable peak flow rate, the lower peak flow of the two methods will determine the allowable peak flow permitted for the development. Alternate modeling should utilize well established methods from the MTO design manual.

2) Depending on modeling methodology, provide calculations as follows:

1. Time of concentration.

    - Time of concentration must be analyzed separately for the pre and post development condition and must be based on the flow path, slope, and surface type from the most remote part of the site to the ultimate outlet for the site.
    - Time of concentration should be based on established methods and should include the time of flow in sewers.
    - Minimum time of concentration to be used is 10 minutes.

2. Runoff Coefficients

Surface	Runoff Coefficient
Pavement	0.95
Gravel	0.6
Roofs	0.95
Lawns	0.3
Dense Landscaping	0.2
Woodland on substantial soils	0.1
Bare Rock (other values should be interpolated)	
30% tree cover	0.70
50% tree cover	0.55
70% tree cover	0.40

For return periods of more than 10 years, increase the runoff coefficients above by 10%- 25 year, 20% - 50 year, 25% - 100 year

3. IDF Curve

$i=a/(t+b)^c$,

where, i = rainfall intensity (mm/hr), and t = rainfall duration (minutes)

Return Intervals (Years)	a	b	c
Yearly/90th percentile	28mm		
2	429.375	4.250	0.7325
5	600.938	4.000	0.7325
10	726.563	3.938	0.7400
25	847.030	3.938	0.7400
50	986.250	3.750	0.7375
100	1092.988	3.656	0.7350

Note: from section 6.1 of the CGS 2006 Stormwater Background Study.

12.7 Infiltration/Filtration Guidelines

1) Infiltration should not be considered for contributing catchment areas with activities that have a high risk of potential contamination (i.e. fuel sales or storage, auto repair, etc.)
2) Infiltration of runoff from landscaped or rooftop areas is encouraged. Infiltration of runoff from parking lots, roads and sidewalks should incorporate pre-treatment to ensure longevity of the system.
3) Sites located within well head protection areas should not infiltrate stormwater from parking lots, roads, sidewalks or other surfaces subjected to winter maintenance activities including snow storage. Where infiltration of these area within well head protection areas is permitted, pretreatment must be provided (e.g. OGS units, Bioswales, etc.).
4) Where infiltration is being proposed the Stormwater Management Report must be accompanied by a Geotechnical Report indicating the seasonally high ground water level and soil infiltration rate at each soil stratification.
5) Where infiltration/filtration facilities are proposed adjacent to a Municipal Road allowance or where the overall site slopes towards the road allowance a provision for minimizing infiltration into the road allowance must be provided.
6) Infiltration/Filtration facilities should include the following design considerations to ensure the quality objectives are meet:

    - Located greater than 1.0m above seasonally high groundwater or bedrock.
    - Located outside snow storage areas.
    - Filter media greater than 750mm in depth
    - Filter media phosphorus index values <30ppm (www.omafra.gov.on.ca)
    - Filter media comprised of a mixture of sand, fines and organic matter.
    - Filter surface covered with mulch and vegetation
    - Pre-treatment systems
    - Multiple treatment cells
    - Monitoring wells

7) Factors of Safety must be incorporated into the design infiltration rate to ensure longevity of the facility. The field measured infiltration rate should be divided by the applicable factor of safety indicated below to achieve the design infiltration rate for the proposed facility.

Factor of Safety = 2	**Factor of Safety = 3**
Permeameter or percolation test on site	Grain size analyses or other infiltration testing,
Loamy or sandy soil	Clayey soil
No nearby sensitive receptors	Sensitive receptors in near proximity e.g. buildings, foundations or vulnerable natural heritage features.

Source: https://wiki.sustainabletechnologies.ca/wiki/Design_infiltration_rate

12.8 Report Details

The following information must be included in the Stormwater Management Report prepared and sealed by a Professional Engineer Licensed in the Province of Ontario with a valid Certificate of Authorization:

- ☐ location map of the subject property;
- ☐ property description;
- ☐ post and pre development, internal and external drainage area plans indicating all flood and fill lines, overland flow routes, all upstream lands and diversion of any drainage routes, and modeling parameters used (i.e. run-off coefficients, areas, CN values, % imperviousness, etc.);
- ☐ schematic layout of existing and proposed storm sewer networks, including manhole and catchbasin descriptions coordinated with the Site Servicing Plan;
- ☐ schematic layout of the sub watershed showing the main watercourse, tributaries and trunk sewers;
- ☐ for more hydraulically complex sites provide a routing model schematic for minor and major systems illustrating catchment routing, ID, area, imperviousness/coefficient, SWM facilities, channels, sewers and outlets;
- ☐ provide descriptions of pre-development and post-development conditions including at minimum general ground cover, drainage patterns, existing/post development inlet and outlet locations in and from the site, respective storm release rates (pre and post development);;
- ☐ plans detailing storage facility locations, its separation from bedrock and/or seasonally high groundwater table where applicable, volumes and their representative water elevation at peaks for all storms modeled, control structures details, invert elevations, , and inlet / outlet locations including overflow structures where applicable;
- ☐ any supporting calculations, reports and drawings, such as:
  - o General Requirements and Assumptions
    - Calculation, and/or model input/output printout, where applicable, for pre and post development surface run-off.
    - Calculation and summary table of run-off coefficients, areas, % imperviousness, and times of concentration.
    - Calculation and/or model input/output printout, where applicable, of allowable release rate and required on site storage.
    - Methods of run-off attenuation and on site storage.
    - Stage-Storage-Discharge table for each SWM facility clearly indicating stage at which individual control outlets begin.
    - Design information on control outlets and emergency overflow structures such as weirs.
    - Measures to maintain or improve water quality.
    - Measures to minimize impact of run-off downstream, including erosion, flooding etc.

- Proposed roof control device locations, type, control release rates and corresponding storage volumes for flat roof portions; including a letter from the consultant designing the building confirming that the drains will be installed and will function as described in the Stormwater Management Report/site servicing drawings, and that the building will be designed to withstand the additional loads.
- Infiltration rates, including appropriate factors of safety.
- Water balance requirements, where applicable.
- Flow and storage summary tables which reference the associated drainage area, catchment ID, outlet(s) and differentiate between controlled and uncontrolled areas.
- Identify and show seasonal high groundwater levels in report and on drawings where infiltration facilities are proposed.
- A table summarizing required storage, provided storage and associated elevation and flow for the permanent pool, and 2 through 100 year return period and/or regional storm events for each facility.

o Quantity Control Section

- Runoff coefficient or imperviousness calculations.
- Analysis using appropriate storm distributions.
- Pre-development peak flow (m3/s).
- Post-development uncontrolled peak flow (m3/s).
- Post-development controlled peak flow (m3/s).
- SWM facility type.
- Stage – storage – discharge table.
- Outlet design and calculations.
- Total storage required (m3).
- Total storage provided (m3).
- Table to compare provided versus required and pre development outlet rates.
- Overland flow conveyance and design.
- External drainage conveyance (100 year and regional).

o Quality Control Section

- Level of Protection.
- Table showing permanent water requirements and provided.
- Extended detention calculation, volume and release time.
- 28mm Water Quality storm model and/or calculations.
- Drainage area to facility in hectares.
- Percentage Impervious.
- Pre-treatment devices and forebays.
- Forebay average flow rate at peak during water quality storm.
- Forebay design calculations as per The Ministry of the Environment design manual.
- Monitoring devices.
- Filter media type, depth, porosity, etc.
- Sizing information for OGS system(s).

o calculation of surface run-off;

- o ponding/water elevations corresponding to the required level of controls;
- o calculation of run-off coefficients, % imperviousness, and times of concentration;
- o calculation of permissible release rate and required on site storage;
- o methods of run-off attenuation and on site storage;
- o measures to maintain or improve water quality;
- o measures to minimize impact of run-off downstream, including erosion, flooding etc;
- o proposed roof control device locations, type, control release rates and corresponding storage volumes for flat roof portions;
- o in-situ percolation rates;

□ Maintenance Protocol for the proposed stormwater management (SWM) facility, provided on a separate letter head and sealed by a Professional Engineer; The Maintenance Protocol must outline the following as a minimum:

- o Indicate the periods that maintenance is required for the site and for each SWM facility, and outline the maintenance procedure.
- o Indicate the lifespan of the SWM facility and the periods at which review and monitoring of the system are required to ensure that the required level of treatment is being maintained.
- o Indicate the qualifications required to provide the maintenance/review/monitoring of the SWM facility.

□ spill prevention and contingency plan, covering information requirements as per O.Reg 224/07 where applicable, provided on a separate letter head and sealed by a Professional Engineer;

□ geotechnical reports and hydro-geological studies where applicable.

13.0 Additional Reports

13.1 Traffic Impact Study

The City of Greater Sudbury may require the completion of a Traffic Impact Study for any development regardless of size and land use. All proposed developments are considered on an individual basis in order to assess the need for a Traffic Impact Study; however, generally any development that generates more than 100 new vehicle trips in the peak hour will require a Traffic Impact Study. The Traffic Impact Study must provide an assessment of the adequacy of the existing or future transportation system to accommodate additional traffic generated by the proposed development or redevelopment. It shall recommend what, if any, improvements will be required to the roadway system in order to maintain a satisfactory level of service. The Traffic Impact Study must be prepared, signed and stamped by a qualified Professional Engineer.

Existing traffic information or clarification regarding the report requirements can be obtained directly through the Roads and Transportation department.

This Study must be provided through the Site Plan review process when requested.

13.2 Geotechnical Assessment

The purpose of a Geotechnical Assessment is to evaluate the soils and subsurface conditions of a site and to provide recommendations for the design and construction of the site pavement, services, building, etc. The Geotechnical Assessment must be prepared, signed and stamped by a qualified Professional Engineer.

This Study must be provided directly to Building Services, and must form the basis of the pavement and servicing design. Where there is a Regulated Hazard on or adjacent to the development the Geotechnical report must be provided directly to Conservation Sudbury.

13.3 Rock Blasting Report

The purpose of the rock blasting report is to ensure that all rock blasting, removal, and any proposed rock faces are constructed in a safe manner that does not negatively impact the surrounding properties, and provides for the long term.

The rock blasting report can be included in the geotechnical report, but it must be prepared in accordance with OPSS 120 by a Professional Engineer, with a minimum of five (5) years experience related to blasting. The report must include the following as a minimum:

a) How the work related to blasting shall be undertaken safely to protect adjoining structures and other infrastructure.

b) Recommendation and specifications as a minimum but not be limited to the following;

- Pre-blast survey of surface structures and infrastructure within affected area
- Trial blast activities
- Procedures during blasting
- Procedures for blasting near Critical infrastructure with special vibration considerations, including but not limited to rock tunnels, concrete pressure pipe, etc."

- Procedures for addressing blasting damage complaints
- Blast notification mechanism to adjoining residences
- Structural stability and certification of exposed rock faces

The blasting consultant retained by the Owner shall be independent of the contractor and any subcontractors doing blasting work. The blasting consultant shall be required to complete specified monitoring recommended in the report of vibrations levels and provide a report detailing those recorded vibration levels. Copies of the recorded ground vibration documents shall be provided to the contractor and contract administration weekly or upon request for this specific project.

The above noted report shall be submitted for review to the satisfaction of the Chief Building Official prior to the commencement of any removal of rock by blasting. Should the Owner's schedule require to commence blasting and rock removal prior to the site plan agreement having been signed, a site alteration permit shall be required.

After construction is complete the blasting consultant will be required to provide a PEO sealed Certification letter for all rock faces, created during the blasting, prior to building occupancy.

13.4 Hydrogeology Study

A Hydrogeology Study is required for all applications in areas serviced by private water and septic services. The Hydrogeology Study must be prepared, signed and stamped by a qualified Professional Engineer.

This Study must be provided to the Sudbury & District Health Unit.

13.5 Environmental Impact Study

An Environmental Impact Study is required for applications that affect significant or environmentally sensitive lands and/or waters. In addition to any external review agency requirements, the report shall include as a minimum a description of the environment that will be affected, description of the development proposal, an assessment of the expected impacts on the environment, a list of assumptions used in the assessment and recommendations regarding the actions necessary to prevent, mitigate or remedy the effects on the environment of the development proposal. The Environmental Impact Study must be prepared by a qualified Professional with relevant environmental expertise.

This Study must be provided through the Site Plan review process when requested.

13.6 Phase I Environmental Site Assessment

The first phase of the systematic identification and evaluation of the potential impacts of proposed developments relative to the physical, chemical and biological components of the environment. A Phase II or III Environmental Report may be required depending upon the recommendations of the Phase 1 Report.

This Assessment including an additional reports or records must be provided directly to Building Services, when requested.

13.7 Noise and Vibration Study

A Noise and/or Vibration Study is required where a sensitive land use (i.e., Residential, Hotel, Hospital, etc.) is proposed near a noise source (i.e. Railway, major roadway, industry) or where a

noise source (commercial or industrial use) is proposed adjacent to a sensitive land use. The report should follow the Ministry of the Environment's OCC guidelines and demonstrate that the appropriate criteria can be achieved. The report must include indoor and outdoor sound levels and recommend mitigation measures for the development which could include sound barriers, ventilation requirements, special building components and necessary warning clauses. The Noise and/or Vibration Study must be prepared, signed and stamped by a qualified Professional Engineer.

This Study must be provided through the Site Plan review process when requested, and a copy will be provided to Building Services.

13.8 Environmental Site Assessment

Generally, an Environmental Site Assessment is required for all applications where a land use change is proposed from an industrial or commercial use to a more sensitive land use (i.e., Residential). Initially a Phase I Environmental Site Assessment is required. Further investigation would be required when the Phase I Environmental Site Assessment identifies the possibility of site contamination. A Record of Site Condition may be required where a land use change is proposed to a more sensitive land use in accordance with Ontario Regulation 153/04.

This Study must be provided to Building Services.

13.9 Archaeological Report

An Archaeological Report is required for all applications in or near areas of archaeological potential, as determined by the criteria set out by the Ministry of Culture and the CGS Archeological Master Plan. Reports must be completed by an individual holding a valid archaeological license.

This Study must be provided through the Site Plan review process when requested.

13.10 Sun/Shadow Study (6 Storeys or Greater)

A study showing the effects of a development on sunlight reaching surrounding properties, buildings and adjacent public realm areas by calculating the shadow that will be cast by the development at different times of day in different seasons. Sun/Shadow Studies maybe required for official plan amendments, zoning by-law amendments and site plan applications for developments usually 20 metres or 6 storeys and greater in height.

Sun/Shadow tests should be done for March 21 and September 21 between the hours of 9 AM and 6 PM. The Sun/Shadow diagram should identify permanently shaded areas between the start of December to the end of February.

This Study must be provided through the Site Plan review process when requested.

13.11 Wind Study (6 Storeys or Greater)

A pedestrian wind model analysis is required for all six storey or taller buildings. For official plan and zoning by-law amendment applications a preliminary "Wind Impact Statement" by a qualified, registered Professional Engineer to professional standards is required. For site plan applications a detailed wind tunnel impact study shall be prepared by a qualified, registered professional engineer, and shall be based on a scale model simulation analysis, prepared to professional standards.

This Study must be provided through the Site Plan review process when requested.