

January 5, 2012

Mr. Chris MacAulay
Sent via email: chris.macaulay@bsci.com

Maritime Project No.: 13512

Dear Mr. MacAuley:

**RE: Wetland Determination and Delineation –
Charleswood Drive and Cumberland Way, Windsor Junction, NS**

At your request, Maritime Testing (1985) Limited (Maritime) has conducted a wetland verification and delineation program on the above mentioned property to assess for the presence of wetlands that could pose limitations to development. A site location Google earth image is presented below. A wetland delineation sketch is attached.



GENERAL OVERVIEW OF WETLAND DETERMINATION PROCEDURE

Wetlands are determined by Maritime based on soil type and depth, hydrology and vegetation at test locations (i.e., test pits or soil probes, and vegetation surveys surrounding the subsurface test locations).

For an area to be considered wetland, it must satisfy certain wetland criteria including soil, hydrology and vegetation properties that are wetland indicators. There are specific 'rules' that are followed in considering the indicators present and the strength of the evidence in making a determination that a wetland is present. A general overview is as follows.

Wetland soils typically have either 8 inches or more of organic deposits (i.e., when organic matter piles up faster than it decomposes, this is a sign of anaerobic decomposition (lack of oxygen due to water saturation) which is slower than aerobic decomposition) or have other hydric properties such gleyed or low chroma coloured soils (indicators that iron has been depleted from the upper 12 inches of soil in a wet environment). Wetland hydrology is indicated by inundation or saturated conditions within 12 inches of the ground surface during the growing season, or evidence of flooding such as drift lines, sediment deposits, water-stained leaves, etc. Hydrophytic vegetation is either tolerant of or thrives in wet conditions. To assess for hydrophytic vegetation, we survey the vegetation to determine the indicator status of the dominant plants in all three layers of growth (i.e., tree layer, shrub layer and herbaceous layer). The indicator status is abbreviated as U for upland (typically requires dry conditions), FAC for facultative (can live in wet or dry conditions), OBL for obligate (requires wet conditions) or some degree between these (e.g. FACW, for the wet side of facultative).

INVESTIGATION RESULTS

Field reconnaissance was conducted on September 6 to 8 and 13, 2011. At encountered wet areas within the sites, Maritime evaluated the three criteria, vegetation, hydrology and soil, which are necessary for wetland determinations. Soil probes and vegetation surveys were conducted at all of the potential wetlands. Where all required wetland characteristics were present, the wetland boundaries were determined by Maritime, delineated with flagging tape, and the positions were acquired with a handheld GPS unit. The wetlands and watercourses identified by Maritime are presented with the development concept plan in Figure 1, attached.

Wetland 1

An open water marsh was observed north of Windgate Drive on the southwest portion of the property. The wetland was observed to be fed by a small watercourse that enters from the southeast. According to provincial mapping, a watercourse also enters the northern part of the wetland. The wetland discharges via a watercourse to Second Lake, to the south. The swamp is

present on provincial 1:10,000 mapping. At the soil probe location, the hydrology was consistent with wetlands (i.e. saturation within 12 inches of the ground surface). The dominant vegetation was hydrophytic (i.e. either tolerant of or requiring wet conditions), with more than 50% of the dominants being FAC or wetter. Additionally, the water table was within 12 inches. This site meets all wetland criteria and therefore we consider this site to be a wetland. The three required wetland criteria are present and described below.



Vegetation:

Tree Layer - black spruce (*Picea mariana*, FAC), and red maple (*Acer rubrum*, FAC) along wetland edges.

Shrub Layer – leather leaf (*Chamaedaphne calyculata*, OBL), black spruce (*Picea mariana*, FAC) red maple (*Acer rubrum*, FAC), and wire birch (*Betula populifolia*, FAC) on edges.

Herbaceous Layer – white water lily (*Nymphaea odorata* Soland. In Ait.-OBL), sphagnum moss (*Sphagnum spp.*, OBL), Virginia Cotton-grass (*Eriophorum*

virginicum L., OBL), and sedges (*Carex spp.*– Most are FAC to OBL).

Soil:

Hydrogen sulphide odour; 8 inches peat over rock at wetland edge.

Hydrology:

Saturated surface and standing water.

Wetland 2

A treed fen was observed on the western side of the property. The wetland is located in a depression between two ridges with an intermittent watercourse flowing throughout. The watercourse enters to the north of the wetland and exits to the south. The wetland and watercourse are not present on provincial mapping. At the soil probe location, the hydrology was consistent with wetlands (i.e. saturation within 12 inches of the ground surface). The dominant vegetation was hydrophytic (i.e. either tolerant of or requiring wet conditions), with more than 50% of the dominants being FAC or wetter. Additionally, the water table was within 12 inches. This site meets all wetland criteria and therefore we consider this site to be a wetland. The three required wetland criteria are present and described below.



Vegetation:

Tree Layer - black spruce (*Picea mariana*-FACW), yellow birch (*Betula alleghaniensis*, FAC), fir (*Abies balsamea*-FAC), and red maple (*Acer rubrum*, FAC) with raised roots.

Shrub Layer – saplings of black spruce (*Picea mariana*-FACW), yellow birch (*Betula alleghaniensis*, FAC), fir (*Abies balsamea*-FAC), and red maple (*Acer rubrum*, FAC).

Herbaceous Layer – sphagnum moss (*Sphagnum spp.*-OBL), sedges (*Carex spp.*– Most are FAC to OBL), and northern starflower (*Trientalis borealis*-FAC); an unidentified moss/liverwort was also present throughout much of the wetland.

Soil:

0-6” - peat and organic silt, hydrogen sulphide odour

6-11” -mucky silt/clay, tight, wet, 2.5Y 3/1

11-13” -silty sand, compact, wet, Gley1 5/10Y

Hydrology:

Saturated surface and standing water, intermittent watercourse.

Wetland 3

A treed fen was investigated at the east side of the property near Charleswood Drive. The wetland receives water from an intermittent watercourse which enters from the north. Another watercourse enters from the west in the south portion of the wetland. The wetland drains via a watercourse located on the eastern side of the wetland and another watercourse to the south. The wetland is not present on provincial mapping. At the soil probe location, the hydrology was consistent with wetlands (i.e. saturation within 12 inches of the ground surface). The dominant vegetation was hydrophytic (i.e. either tolerant of or requiring wet conditions), with more than 50% of the dominants being FAC or wetter. Additionally, the water table was within 12 inches. This site meets all wetland criteria and therefore we consider this site to be a wetland. The three required wetland criteria are present and described below.



Vegetation:

Tree Layer - yellow birch (*Betula alleghaniensis*-FAC), and fir (*Abies balsamea*-FAC) with raised roots.

Shrub Layer – saplings of yellow birch (*Betula alleghaniensis*-FAC) and fir (*Abies balsamea*-FAC), and Canada holly (*Ilex verticillata*-FACW).

Herbaceous Layer – sphagnum moss (*Sphagnum spp.*-OBL), sedges (*Carex spp.*– Most are FAC to OBL), sensitive

fern (*Onoclea sensibilis*, FACW), marsh fern (*Thelypteris thelypteroides*-FACW), interrupted fern (*Osmunda claytoniana L.*-FAC), and northern starflower (*Trientalis borealis*-FAC),.

Soil:

0-3”- peat, hydrogen sulphide odour

3-6”-mucky silt, tight, wet, 2.5Y3/2

6-12”-silt/clay, tight, wet, 10YR4/3, redox masses present

Hydrology:

Saturated surface and standing water, intermittent watercourses.

Wetland 4

A treed fen was observed to the north of Wetland 3. The wetland is located in a depression between two ridges and has an intermittent watercourse which enters from the north and discharges to the south towards Wetland 3. The wetland is not present on provincial mapping. At the soil probe location, the hydrology was consistent with wetlands (i.e. saturation within 12 inches of the ground surface). The dominant vegetation was hydrophytic (i.e. either tolerant of or requiring wet conditions), with more than 50% of the dominants being FAC or wetter. Additionally, the water table was



within 12 inches. This site meets all wetland criteria and therefore we consider this site to be a wetland. The three required wetland criteria are present and described below.

Vegetation:

Tree Layer – black spruce (*Picea mariana*-FACW), white ash (*Fraxinus Americana* L.- FAC), fir (*Abies balsamea*-FAC), and red maple (*Acer rubrum*, FAC).

Shrub Layer – saplings of black spruce (*Picea mariana*-FACW), white ash (*Fraxinus Americana* L.- FAC), fir (*Abies balsamea*-FAC), red maple (*Acer rubrum*, FAC), and striped maple (*Acer pensylvaicum*-FACU) .

Herbaceous Layer – sphagnum moss (*Sphagnum spp.*-OBL), horsetail (*Equisetum spp.*- FAC to OBL), sensitive fern (*Onoclea sensibilis*, FACW), cinnamon fern (*Osmunda cinnamomea*, FACW), ostrich fern (*Matteuccia struthiopteris* (L.) Todaro-FACW), and marsh fern (*Thelypteris thelypteroides*-FACW).

Soil:

0-2' peat over rock, hydrogen sulphide odour.

Hydrology:

Saturated surface and standing water, intermittent watercourse.

Wetland 5

A treed bog was investigated in the northern portion of the property and south of a provincially mapped watercourse. The wetland appeared to receive water from precipitation and discharged to the south in groundwater and an intermittent drainage channel. The wetland is not present on provincial mapping. At the soil probe location, the hydrology was consistent with wetlands (i.e. saturation within 12 inches of the ground surface). The dominant vegetation was hydrophytic (i.e.



either tolerant of or requiring wet conditions), with more than 50% of the dominants being FAC or wetter. Additionally, the water table was within 12 inches. This site meets all wetland criteria and therefore we consider this site to be a wetland. The three required wetland criteria are present and described below.

Vegetation:

Tree Layer - larch (*Larix laricina*-FACW), wire birch (*Betula populifolia*, FAC), red maple (*Acer rubrum*, FAC), yellow birch (*Betula alleghaniensis*-FAC), and red spruce (*Picea rubens*-FACU) with raised roots.

Shrub Layer – saplings of larch (*Larix laricina*-FACW), wire birch (*Betula populifolia*, FAC), red maple (*Acer rubrum*, FAC), yellow birch (*Betula alleghaniensis*-FAC), and red spruce (*Picea rubens*-FACU), Canada holly (*Ilex verticillata*-FACW), and rhodora (*Rhododendron canadense*-FACW).

Herbaceous Layer – sphagnum moss (*Sphagnum spp.*, OBL), Virginia Cotton-grass (*Eriophorum virginicum* L., OBL), cinnamon fern (*Osmunda cinnamomea*, FACW), and sedges (*Carex spp.*– Most are FAC to OBL).

Soil:

0-4"- peat/organic silt

4-6"-silt, compact, wet, 10YR4/1

6-10"-sandy silt, tight, wet, 10YR6/1 (redox 10YR6/8) over rock.

Hydrology:

Saturated surface and standing water.

Wetland 6

A treed bog was observed north of the corner of Carriage Road and Chartwell Road. The wetland receives water from a culvert to the south and an intermittent watercourse that enters to the north and discharges to the west. The watercourse eventually discharges to Wetland 1. The wetland is not present on provincial mapping. At the soil probe location, the hydrology was consistent with wetlands (i.e. saturation within 12 inches of the ground surface). The dominant vegetation was



hydrophytic (i.e. either tolerant of or requiring wet conditions), with more than 50% of the dominants being FAC or wetter. Additionally, the water table was within 12 inches. This site

meets all wetland criteria and therefore we consider this site to be a wetland. The three required wetland criteria are present and described below.

Vegetation:

Tree Layer - black spruce (*Picea mariana*-FACW), red maple (*Acer rubrum*, FAC), yellow birch (*Betula alleghaniensis*-FAC), fir (*Abies balsamea*- FAC) with raised roots.

Shrub Layer – saplings of black spruce (*Picea mariana*-FACW), red maple (*Acer rubrum*, FAC), yellow birch (*Betula alleghaniensis*-FAC), fir (*Abies balsamea*- FAC), Canada holly (*Ilex verticillata*-FACW).

Herbaceous Layer – sphagnum moss (*Sphagnum spp.*, OBL), sensitive fern (*Onoclea sensibilis*-FACW), cinnamon fern (*Osmunda cinnamomea*, FACW), sedges (*Carex spp.*– Most are FAC to OBL).

Soil:

0-4"-sand

4"-2'- peat/muck over rock, hydrogen sulphide odour.

Hydrology:

Near surface, intermittent watercourse.

Watercourses and Drainage Channels

There are two mapped watercourses on the property, as well as several small watercourses and drainage channels.

The first watercourse originates north of the property and flows east through the northern portion of the property. A tributary was also observed entering the watercourse from the north. The watercourse discharges to Third Lake. There are no wetlands associated with this watercourse; however, Wetland 5 is present to the south and may contribute water to the watercourse. This watercourse is identified as the northernmost drainage swale on the development concept plan provided to Maritime.

The second watercourse originates from Wetland 3 in the southeastern portion of the property. The watercourse discharges to a small pond south of the property. The watercourse is intermittent from its source at Wetland 3 to the pond. There are no wetlands associated with this watercourse.

Several areas identified as drainage swales on the development concept plan provided to Maritime were investigated. The first swale on the west portion of the property was observed to be a watercourse flowing north to south. This watercourse joined with a watercourse that drains from Wetland 2. The combined watercourse flows south through Wetland 6, then west where it

discharges to Wetland 1. We did not follow the watercourse in its entirety between Wetland 6 and Wetland 1 since we did not observe wetlands along that section of watercourse which the surveyor had already mapped.

An intermittent watercourse was also observed to flow north to south through Wetland 4 to Wetland 3.

A drainage channel was observed to the east of the properties on Charleswood Drive. The channel is in a depression between two ridges, is dominated by cattails and jewelweed, and discharges into Wetland 3. The source was not observed.

SUMMARY

Six wetlands were identified and delineated on the property, as well as several watercourses. The wetlands and watercourses are presented with the development concept plan, Figure 1, attached.

CLOSING

We trust this meets with your present requirements. Should you have any questions, please contact the undersigned at your convenience.

Sincerely Yours,
Maritime Testing (1985) Limited



Lisa Ladouceur, CET
Environmental Technologist



Doreen Chenard, B.Sc. in Agr.
Manager, Environmental Division

Attachment



Ref: Concept Plan of Proposed Subdivision of Lands in Windsor Junction, HRM, NS, Dated September 20, 2010, Provided by Alan Gallant, NS Land Surveyor.