Richmond Village Development Corporation – Green Lands Integrated Environmental Review

Updated Report

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Submitted To:

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List of Acronyms and Abbreviations

ANSI – Areas of Natural or Scientific Interest
cm – centimetres
CRZ – Critical Root Zone
DBH – Diameter at Breast Height
e.g. – *exempli gratia*
EIS – Environmental Impact Statement
ESA – *Endangered Species Act*
ESC – Erosion Sediment Control
i.e. – *id est*
IER – Integrated Environmental Review
ha - hectare
km – kilometre
m – metre
NEIA – Natural Environment & Impact Assessment Study
RVCA – Rideau Valley Conservation Authority
RVDC - Richmond Village Development Corporation
SAR – Species at risk
WDL – Western Development Lands

1.0 INTRODUCTION

This Integrated Environmental Review (IER) has been prepared by Kilgour & Associates Limited. on behalf of Richmond Village Development Corporation (RVDC) in support of their proposed residential developments in the Village of Richmond in Ottawa, Ontario.

The proposed residential developments will be an extension of their Fox Run community and will be constructed within areas adjacent to the east, west and north sides of the existing Fox Run development (Appendix A1 – Figure 1). The development parcels, collectively referred to as the Green Lands sites, occur north of Perth Street, and consist of 6409 Perth Street and 6363 Perth Street (i.e. to the west the Fox Run community north of Perth Street), and 6295 Perth Street (i.e. to the east of Fox Run north of Perth Street). The Green Lands sites collectively cover 17.8 hectares (ha). All areas subject to proposed development are zoned DR – Development Reserve (City of Ottawa, 2020a).

Fox Run is part of a broader area of development within the Western Development Lands (WDL) located on the western edge of Richmond Village. Fox Run, including the Green Lands sites specifically addressed within this report, is owned and is being developed by RVDC. For the Green Lands parcels, the residential development concept plan includes a mix of 160 single family homes and 175 townhomes (total 335 units) in the west portion, and 33 single family homes in the east portion (Appendix A1 – Figure 2).

This IER has been written to meet the requirements of the City of Ottawa Official Plan (OP; 2020b), Section 4.7.1 – "*Integrated Environmental Review to Assess Development Applications*". It is a presented as a report to accompany the draft plans submission for the proposed development on the Green Lands sites. This document presents information from studies completed to-date as part of the planning and approvals process for the proposed development. The intent of the report is to summarize the natural heritage information from the various environmental studies and to indicate findings that influence the detailed design of the proposed site plan.

Herein and as per OP Section 4.7.1 – Integrated Environmental Review to Assess Development Applications, Policy 2:

- a brief overview of the individual technical studies and other relevant environmental background material;
- graphic illustrations, showing the spatial features and functions (e.g. natural vegetation, watercourses,) as have been identified in the individual studies;
- a summary of the potential environmental concerns raised, the scope of environmental interactions between studies, and the total package of mitigation measures, including any required development conditions and monitoring, as recommended in individual studies;
- a summary of how the proposed design complies with the environmental policies contained in Section 4 of the OP;

- a statement with respect to how the recommendations of the support studies and the design with nature approach have influenced the design of the development; and

- an indication that the statement has been reviewed and concurred with by the individual sub consultants involved in the design team and technical studies.

This report has the following structure.

- Section 2.0 provides an overview of the environmental setting, as determined by the component studies.

- Section 3.0 provides a description of the proposed project.

- Section 4.0 discusses the potential environmental effects and required mitigation measures that are proposed by the proponent, or required by a regulating agency.

- Section 5.0 provides a summary of how the project and its proposed design comply with the environmental policies in Section 4 of the OP.

- Section 6.0 provides a statement on how the recommendations of the support studies and the "Design With Nature" approach have influenced the design of the development, per the requirements of Policy 4.7 of the OP.

- Section 7.0 is the statement that this IER has been reviewed and concurred with by the individual sub-consultants involved in the design and delivery of technical supporting studies.

- Appendix A provides figures and supporting documents.

2.0 ENVIRONMENTAL CONDITIONS

The *Natural Environment & Impact Assessment Study* (Kilgour & Associates Limited, Parish Geomorphic & Mattamy Homes Limited, 2010) was a comprehensive study of natural heritage features as they are associated with the broader Fox Run area, including the Green Lands sites. Updated studies specific to the Green Lands sites were completed between 2018-2020. This section provides an overview of the various technical studies related to the Green Lands sites and a summary of the environmental concerns identified.

2.1 Geotechnical

2.1.1 General Geotechnical Assessment

The preliminary geotechnical investigation of the Green Lands sites was carried out by Jacques Whitford (2007), with subsequent geotechnical investigations were carried out by Golder Associates Limited. (2020a). The area as having relatively flat topography, with undeveloped agricultural land usage (Jacques Whitford, 2007). In general, the subsurface conditions in Green Lands East and West consist of silty clay over sandy silt and glacial till (Golder Associates Limited, 2020a). The topsoil ranges in thickness from about 90 to 350 mm. Clay deposits were encountered at all the test hole locations across the Green Lands

sites with a stiff crust extending to depths ranging from about 2 to 3 m below the existing ground surface. The depth to groundwater across the sites ranged from 0.4 to 1.1 m. A practical refusal to auguring of boreholes was encountered below the clay layer at a depth of 5.9 m below the ground surface indicating either the bedrock surface or cobbles/boulders in glacial till.

2.1.2 Soil Quality

A Phase I Environmental Site Assessment completed for the Green Lands sites identified several potentially contaminating activities on the sites including additions of fill to the areas and some limited fuel storage, but concluded that there were no resultant areas of potential environmental concern and that no additional study was required (Golder Associates Limited, 2020c).

2.2 Terrestrial Environment

The terrestrial environments the Green Lands sites were most recently described in the *Environmental Impact Statement - Richmond Village Development Corporation: Laffin and Green Lands* (Kilgour & Associates Limited, 2022). This report reviewed natural heritage conditions on and near the site and also included the Tree Conservation Report for the proposed development. The area largely consists of agricultural fields (Kilgour & Associates Limited, 2022). Open areas of the Green Lands sites were planted in 2020 with soybean crops (Appendix A2 – Figure 3). The tree community within in the Green Lands (i.e. trees with a diameter at breast height [DBH] >10 centimetres [cm]) consisted of 12 common species of trees (i.e. no rare or at risk species) scattered along the perimeters of agricultural fields (Kilgour & Associates Limited, 2022).

No wooded areas (i.e. significant woodlands or otherwise) are located within 180 m of the Green Lands sites. No other significant terrestrial features (e.g. valley lands, Areas of Natural or Scientific Interest [ANSI], rural natural features, significant wetlands) are located within 1 kilometre (km; Kilgour & Associates Limited, 2022; Appendix A1 -Figure 1).

2.3 Aquatic Environment

The aquatic environments of the Green Lands were most recently described in the *Environmental Impact Statement - Richmond Village Development Corporation: Laffin and Green Lands* (Kilgour & Associates Limited, 2022). Two watercourses occur adjacent to the Green Lands sites (Appendix A2– Figure 3). The main channel of the Van Gaal Drain is located near the western edge of the eastern Green Lands site (Appendix A2 – Figure 3). The confluence of two tributaries form the main channel of the Van Gaal Municipal Drain (Appendix A2 – Figure 3). The eastern tributary, which has limited intermittent flows, is designated as part of the municipal drain. The western tributary has (near) permanent flows and contributes most of the water to the main channel, but does not have municipal drain status.

Under the approved realignment for the Van Gaal Municipal Drain, a new main channel was excavated along the northeast and northwest property lines and connected to the existing channel (Arbuckle Municipal Drain) downstream at Perth Street (Appendix A1 - Figure 2). All flows to the drain system upstream of the property (from VG-R2-2 and VG-R2-1) have been redirected to the northeast corner of the property. Existing flows from VG-R2-1 (the former reach of the municipal drain along the north side of the property) have been conveyed to enter the new channel near the northeast corner of the property.

The decommissioned main channel was infilled. This realignment work began in July, 2020 and, along with all associated landscaping, and was completed in October, 2021.

Setbacks for the feature as prescribed within the Jock River Subwatershed Study (Stantec, 2007) were to be consistent with the standard setback requirements as listed within the City's OP (City of Ottawa, 2020b): the 100-year floodplain (Appendix A3), meander belt allowance (Appendix A3), 30 m from normal high watermark; and geotechnical hazard. This is reiterated in the "Village of Richmond Environmental Management Plan" (the "EMP"). The EMP does indicate a specific required meander belt width, but this had been determined for the previous channel of the Van Gaal Drain (i.e. prior to its completed realignment through the Fox Run community) and is thus no longer considered valid. The realigned channel, being engineered, cannot meander beyond its design and therefore does not require a meander-belt setback.

The approved corridor plan provides for setbacks to the Van Gaal Drain that are different than those the called for under OP Policy 4.7.3.2. Per OP 4.7.3.7, and as allowed by the EMP, alternate setbacks are considered by the City on the basis of the following criteria:

- Slope of the bank and geotechnical considerations related to unstable slopes, as addressed in Council's Slope Stability Guidelines for Development Applications;
    - Based on the slope stability analysis of the realigned Van Gaal channel adjacent to the Phase 2 area carried out by Golder (2020) the currently proposed slopes are stable and no setback is required from the crest of the channel. It is also understood that the current design for the realigned Van Gaal channel incorporates erosion control measures and no setback for erosion is required. The minimum setback for the proposed slopes therefore only needs to incorporate the required access allowance of 6 metres from the crest of the channel.
- Natural vegetation and the ecological function of the setback area;
    - The natural landcover adjacent to existing Van Gaal Drain in the Phase 2 area had consisted of a narrow strip (2-4 m width) of tall grass with no trees separating the channel from active agricultural lands. The landscape plan for the realigned feature, which includes significant tree planting within the 60 m wide corridor to be located within the Fox Run community, was reviewed and approved by DFO and RVCA (Appendix A3).
- The nature of the abutting water body, including the presence of a flood plain; and
- The demonstrated lack of negative impacts on adjacent fish habitat.
    - The existing Van Gaal Drain in the Phase 2 area is a highly linearized channel consisting almost entirely of a single long run with riffles present only at the top and bottom ends. The realigned channel design incorporates channel improvements including a broader bankfull channel with a sinuous low-flow channel following principles of natural channel design, all situated within the 60 m wide renaturalized riparian corridor. The realignment and corridor arrangement within the Fox Run community (i.e. the positioning of the

channel within the corridor relative to the adjacent new community) were reviewed and approved by both DFO and RVCA considering the overall improvement to fish habitat and channel function (Appendix A3).

- The realigned channel, to be situated within the Fox Run community as indicated above, will be monitored for a period of five years to ensure a lack of negative impacts on the fish habitat as a requirement of the DFO and RVCA approvals (Appendix A3).

The "no-touch" area adjacent to the realigned Van Gaal Drain which would generally be associated with "setbacks" was established through a Municipal Drainage Act process as provided within the *Conditions for Draft Approval for Richmond Village North and South 6335 & 6350 Perth Street* (Appendix A3; here in "the Approval"). Per Condition 80 (EC3) of the Approval, the Van Gaal Drain is to be situated within a 60 m wide linear corridor. The western lot line of the corridor parcel abuts the rear lot lines of the east side of Phase 2. In accordance with Condition 82 (EC5) of the Approval, the final channel/corridor configuration (i.e. channel location within the corridor and landscape plan for the corridor block) was approved by the RVCA (RVCA Permit Number RV5-2919; Appendix A3). The centerline of the channel is approximately centred in the corridor, but the channel does meander somewhat along the block. The center line of the channel is ≥ 15 m from the zoned edges of the corridor block at any given point along the Phase 2 area. The channel center-line would be 30 m from the edge of the corridor if the channel was recreated as a linear feature. The realigned channel, however, has been designed with natural channel design principles to: (1) provide for self-maintenance; and (2) be more aesthetically appealing.

The entire corridor has been re-naturalized per the approved landscape plan for the realignment. The re-naturalized corridor provides the "no-touch" area of open space associated, with the drain (per the engineering drawings included in Appendix A3). The Van Gaal corridor boundaries mark the maximum of three setback considerations to the channel including:

a) A 9 m setback from the top-of-bank (where the top-of-bank corresponds with the edge of the sinuous channel). The 9 m setback from the top-of-bank was included within the plans for the Van Gaal realignment that were reviewed and accepted by both the RVCA and DFO as a design suitable for the protection of aquatic habitat within the drain;

b) Setbacks from the crest-of-slope. The crest-of-slope identifies the geotechnical development limit from the drainage channel (i.e all development must occur beyond the crest-of-slope to avoid geotechnical hazards). A further setback of 6 m is provided from the crest-of-slope for maintenance access on the east side of the channel. The RVCA approved the channel design with a 5 m setback for maintenance access on the west side of the channel; and

c) The expected floodplain. Note, the regulatory floodplain limit provides a development constraint directly by itself; there is no additional setback requirement per se from the floodplain line. The floodplain line considering the realigned channel has not yet been officially mapped by the RVCA. JF Sabourin and Associates (2017), however, prepared a detailed evaluation of the ability of the proposed realignment of the Van Gaal Drain to convey extreme flow events. JFSA (2017) concluded that flood flows (100-year event) would be contained within the boundaries of the corridor (i.e. the regulatory floodplain, once established, will not extend beyond the corridor boundaries).

These three limits are fully contained within the Van Gaal corridor boundaries. At any point along the length of the Van Gaal Drain within the Phase 2 area, one or more of these three lines extend to a corridor boundary, but at no point does any line extend beyond the corridor boundaries. The corridor boundaries thus mark the composite maximum of all regulatory lines required for environmental protection of aquatic habitat, for mitigation of geotechnical hazards to the adjacent communities (while providing suitable maintenance access), and for the prevention of flood risk, in accordance with the approach to setbacks for the feature per discussion with Matthew Hayley (City of Ottawa Natural Heritage Planner, with Anthony Francis, October 27, 2020).

No wetlands (provincially significant or otherwise) occur on or adjacent to the site (KAL, Parish Geomorphic & Mattamy Homes, 2010).

2.4 Species at Risk

Species at risk (SAR) potential at the Green Lands was most recently reviewed in the *Environmental Impact Statement - Richmond Village Development Corporation: Laffin and Green Lands* (Kilgour & Associates Limited, 2022). Only a single SAR was considered to have some potential to interact with the proposed development: Blanding's Turtle (*Emydoidea blandingii*).

No SAR turtles were observed on or near the project area during any KAL surveys and the areas north of Ottawa Street are not considered to be habitat (Kilgour & Associates, 2022). Regardless, a limited potential for transient individuals exists within the Van Gaal Drain given its proximity to the Jock River.

3.0 PROPOSED UNDERTAKING

The proposed project is an extension of the Fox Run residential community onto the Green Lands parcels (Appendix A1 – Figure 2). The residential development concept plan includes a mix of single-family homes and townhomes (67 rear lot townhomes, 166 townhomes and 139 singles for a total of 372 units). The western parcel includes the development of 0.99 ha of park space and ~0.68 ha landscaped area of riparian vegetation. The edge of the eastern parcel extends into the realigned corridor of the Van Gaal Drain, with 1.1 ha landscaped area of riparian vegetation. The residential units within both portions of the Green Lands site will share servicing with the existing Fox Run development.

3.1 Water Supply Servicing

Water servicing for the Green Lands western site was contemplated in the Village of Richmond Water and Sanitary Master Servicing Study (MSS) prepared by Stantec Consulting Limited (2011). The design concept consisted of a new public communal well system connected to the deep aquifer; the facility is now operational within the existing Fox Run community (David Schaeffer Engineering Limited, 2022). The Green Lands West area will be serviced internally by 150 mm, 200 mm and 300mm diameter watermains. The internal watermains will connect to watermain stubs that were installed as part of the Phase 1 development of the Fox Run community (a 300mm diameter stub to be extended from Equitation Circle across Perth Street) and the Phase 2 (north) construction from Oldenburg Avenue (and from future watermain installations from extensions of Oldenburg Avenue).

For the water supply for the Green Lands eastern site, it is proposed that watermains will be extended to provide water service from the Green Lands West area. Two crossings of the Van Gaal Drain are proposed to provide sufficient system pressures for this water supply connection. The preliminary analysis completed by Stantec indicates that the required system pressures are satisfied with the proposed configuration (David Schaeffer Engineering Limited, 2022).

3.2 Wastewater Management

The Village of Richmond is serviced primarily by City of Ottawa sanitary sewers that convey wastewater to the Richmond Pumping Station located south of the Jock River, on the northwest corner of Cockburn Street and York Street. The Richmond Pumping Station discharges to the Glen Cairn Trunk Sewer just south of Hazeldean and Robertson Road in Kanata (David Schaeffer Engineering Limited, 2022).

The Green Lands will be serviced by new gravity sewers designed in accordance with City of Ottawa design criteria which will connect to the existing sanitary sewer infrastructure constructed during the development of Fox Run Phase 1 and Phase 2 (North) areas (David Schaeffer Engineering Limited, 2022).

3.3 Stormwater Management

Stormwater conveyance for the Green Lands sites were originally contemplated in the *Stormwater Management Report for Richmond Village (South) Limited* (now known as RVDC; David Schaeffer Engineering Limited, 2013). The western area the Green Lands site will be serviced by a storm sewer system that will ultimately outlet to Storm Water Management (SWM) Pond 1. Pond 1 was designed and approved as a component of the existing Fox Run development south of Perth Street (David Schaeffer Engineering Limited, 2022).

For the eastern Green Lands site, major system flows will be conveyed through the internal road network where the 100-year event will be captured by required 100-year inlets prior to discharge to the Van Gaal Drain. Major events in excess of the 100-year event will outlet to the Van Gaal Drain. Unlike the Green Lands West area, inlet control devices will be employed to ensure that storm flows entering the minor system are limited to the pre-development limits. Quality control will be facilitated by an appropriately sized OGS unit prior to discharge (David Schaeffer Engineering Limited, 2022).

4.0 POTENTIAL EFFECTS AND MITIGATION

4.1 Geotechnical

4.1.1 Anticipated Effects

The Green Lands sites are underlain by compressible silty clay; if the grade is raised excessively, significant consolidation settlement will occur (Golder Associates Limited, 2020a). Following servicing of the site (as will typically occur in advance of house construction), some lowering of the groundwater level is expected (Golder Associates Limited, 2020a)

4.1.2 Required Mitigation

Based on the conditions encountered in the boreholes adjacent to the Green Lands sites, as well as preliminary field results from the current investigation, it is anticipated that the grade raise restrictions will be similar to the adjacent areas currently in development and will likely range from about 1.3 to 1.5 m at houses and about 2 m at roadways (Golder Associates Limited, 2020a). Achieving grade raises within these limits will likely require the use of lighter unit weight grade raise fills (i.e. unit weights ranging from 19.5 to as low as 18 kiloNewtons/m^3; Golder Associates Limited, 2020a)

The soils at the Green Lands sites are sensitive to disturbance from ponded water, construction traffic, and frost. If construction is carried out during periods of sustained below freezing temperatures, all subgrade areas should be protected from freezing (e.g. by using insulated tarps and/or heating).

A permit to take water may be required depending on proposed construction plan and timing of construction.

4.2 Erosion and Sediment

4.2.1 Anticipated Effects

Soil erosion occurs naturally and is a function of soil type, climate and topography (David Schaeffer Engineering Limited, 2022). The extent of erosions losses is exaggerated during construction where the vegetation has been removed and the top layer of soil is disturbed.

4.2.2 Required Mitigations

An erosion and sediment control (ESC) plan must be developed prior to the commencing construction by the project engineers. The ESC plan must include, at a minimum, the following considerations (David Schaeffer Engineering Limited, 2022):

- Erosion and sediment controls (ESC) must be in place during construction. The following recommendations to the contractor will be included in contract documents.
- Limit extent of exposed soils at any given time.
- Re-vegetate exposed areas as soon as possible.
- Minimize the area to be cleared and grubbed.
- Protect exposed slopes with plastic or synthetic mulches.
- Install silt fence to prevent sediment from entering existing ditches.
- No refueling or cleaning of equipment near existing watercourses.
- Provide sediment traps and basins during dewatering.
- Install filter cloth between catch basins and frames.
- Installation of mud mats at construction accesses.
- Construction of temporary sedimentation ponds to treat water prior to discharging into existing wetlands and watercourses.

4.3 Trees

4.3.1 Anticipated Effects

Most trees will be removed from the proposed development areas. The remaining vegetation on the site currently consists of soybean crops. The agricultural fields will be removed.

4.3.2 Required Mitigations

Swale slopes and grading around the periphery of the Green Lands parcels must be managed to optimize the potential for tree retention. The CRZ of either on adjacent properties will be confirmed and protected as part of the final swale design. A detailed inventory of trees on the periphery of the parcels must be completed as part of the detailed design to identify specific trees for retention where feasible within the front and/or rear yards of the new community.

To minimize impacts to trees adjacent to the Site, the following general protection measures are recommended as necessary during construction:

- Tree removal on Site should be limited to that which is necessary to accommodate construction.
- To minimize impact to remaining trees during Site development:
    - Erect a fence beyond the critical root zone (CRZ; i.e., 10x the DBH) of trees. The fence should be highly visible (orange construction fence) and paired with erosion control fencing. Pruning of branches is recommended in areas of potential conflict with construction equipment;
    - Do not place any material or equipment within the CRZ of trees;
    - Do not attach any signs, notices, or posters to any trees;
    - Do not raise or lower the existing grade within the CRZ of trees without approval;
    - Tunnel or bore when digging within the CRZ of a tree;
    - Do not damage the root system, trunk, or branches of any remaining trees; and
    - Ensure that exhaust fumes from all equipment are not directed towards any tree's canopy.

Specific trees to be planted on the site will be identified in the landscape plan for the development. Trees species identified in this plan however must be non-invasive and should be both native to the Ottawa area and tolerant of the site's generally urban setting. Final selection of tree species within the landscape plan must also consider the City of Ottawa's Clay Soils Policy. Recommended tree species to consider in the landscaping plan include Red Maple (*Acer rubrum*), White Spruce (*Picea glauca*), Pin Cherry (*Prunus pensylvanica*), White Birch (*Betula papyrifera*), Black Cherry (*Prunus nigra*), White Cedar (*Thuja occidentalis*) and Serviceberry (*Amelanchier* spp.) as other suitable candidate species. Burr Oak may be

considered where spacing allows for future showcase trees. Common Juniper (*Juniperus communis*), Maple-leaf Viburnum (*Viburnum acerifolium*), Nannyberry (*Viburnum lentago*) and Northern Bush-honeysuckle (*Diervilla lonicera*) may be considered as appropriate shrub species.

Trees are to be planted at a minimum of one tree per lot, with additional tree plantings to be included where feasible (e.g. in larger single lots, at the ends of rows of townhomes and/or in other public areas) with a target of planting the equivalent of 1.5 trees per lot through the broader community. Tree-planting along the realigned Van Gaal corridor was planned separately as part of the realignment works there and does not count towards the required tree count for this project.

In general, weathered silty clay soil has the potential to be sensitive to water depletion by trees of high-water demand during periods of dry weather. When trees draw water from the clayey soil, the clay may undergo shrinkage which can result in settlement of adjacent structures. It should be noted that tree planting restrictions varied across the previously developed areas of the Fox Run community depending of different soil deposits encountered (Golder Associates Limited., 2020a).

Removal of trees can only be undertaken following appropriate consultation with City planning staff.

4.4 Fish and Fish Habitat

4.4.1 Anticipated Effects

No surface water features are located directly within the proposed development areas, though the Van Gaal Drain and the western tributary to the Van Gaal Drain are located adjacent to the development (Appendix A1 – Figure 2). The proposed development increases the width of the natural riparian buffer along the channels and respects the required setbacks. As such, no negative impacts are anticipated to these features (Kilgour & Associates Limited, 2020).

4.4.2 Required Mitigation

The main channel of the Van Gaal Drain and the eastern tributary were realigned eastward in the summer of 2020. The new channel flow is now adjacent to the full length of the western edge of the eastern Green Lands parcel. The realignment work has been fully approved by both DFO and the RVCA.

Setbacks for the realigned Van Gaal Drain defined within the approved corridor plan are different than those called for under OP Policy 4.7.3.2. Per OP 4.7.3.7, and as allowed by the *Village of Richmond Environmental Management Plan* (“EMP”; City of Ottawa, 2010), alternate setbacks were allowed by the City on the basis of the following criteria:

- Slope of the bank and geotechnical considerations related to unstable slopes, as addressed in Council’s Slope Stability Guidelines for Development Applications;
    - Based on the slope stability analysis of the realigned Van Gaal channel adjacent to the Phase 2 area carried out by Golder (2020) the currently proposed slopes are stable and no setback is required from the crest of the channel. It is also understood that the current design for the realigned Van Gaal channel incorporates erosion control measures and no setback for erosion is required. The minimum setback for the proposed slopes therefore

only needs to incorporate the required access allowance of 6 metres from the crest of the channel.

- Natural vegetation and the ecological function of the setback area;

  - The natural landcover adjacent to existing Van Gaal Drain in the Phase 2 area had consisted of a narrow strip (2-4 m width) of tall grass with no trees separating the channel from active agricultural lands. The landscape plan for the realigned feature, which includes significant tree planting within the 60 m wide corridor to be located within the Fox Run community, was reviewed and approved by DFO and RVCA (Appendix A3).

- The nature of the abutting water body, including the presence of a flood plain; and

- The demonstrated lack of negative impacts on adjacent fish habitat.

  - The existing Van Gaal Drain in the Phase 2 area is a highly linearized channel consisting almost entirely of a single long run with riffles present only at the top and bottom ends. The realigned channel design incorporates channel improvements including a broader bankfull channel with a sinuous low-flow channel following principles of natural channel design, all situated within the 60 m wide renaturalized riparian corridor. The realignment and corridor arrangement within the Fox Run community (i.e. the positioning of the channel within the corridor relative to the adjacent new community) were reviewed and approved by both DFO and RVCA considering the overall improvement to fish habitat and channel function (Appendix A3).

  - The realigned channel, to be situated within the Fox Run community as indicated above, will be monitored for a period of five years to ensure a lack of negative impacts on the fish habitat as a requirement of the DFO and RVCA approvals (Appendix A3).

The “no-touch” area adjacent to the realigned Van Gaal Drain which would generally be associated with “setbacks” was established through a Municipal Drainage Act process as provided within the *Conditions for Draft Approval for Richmond Village North and South 6335 & 6350 Perth Street* (Appendix A3; here in “the Approval”). Per Condition 80 (EC3) of the Approval, the Van Gaal Drain is to be situated within a 60 m wide linear corridor. The western lot line of the corridor parcel abuts the rear lot lines of the east side of Phase 2. In accordance with Condition 82 (EC5) of the Approval, the final channel/corridor configuration (i.e. channel location within the corridor and landscape plan for the corridor block) was approved by the RVCA (RVCA Permit Number RV5-2919; Appendix A3). The centerline of the channel is approximately centred in the corridor, but the channel does meander somewhat along the block. The centerline of the channel is ≥ 15 m from the zoned edges of the corridor block at any given point along the development area within the Green Lands parcel. The channel centerline would be 30 m from the edge of the corridor if the channel was recreated as a linear feature. The realigned channel, however, has been designed with natural channel design principles to: (1) provide for self-maintenance; and (2) be more aesthetically appealing.

The entire corridor is currently being re-naturalized per the approved landscape plan for the realignment. Upon completion, the re-naturalized corridor will provide the “no-touch” area of open space associated

with the drain (per the engineering drawings included in AppendixA3). The Van Gaal corridor boundaries mark the maximum of three setback considerations to the channel including:

d) A 9 m setback from the top-of-bank (where the top-of-bank corresponds with the edge of the sinuous channel). The 9 m setback from the top-of-bank was included within the plans for the Van Gaal realignment that were reviewed and accepted by both the RVCA and DFO as a design suitable for the protection of aquatic habitat within the drain;

e) Setbacks from the crest-of-slope. The crest-of-slope identifies the geotechnical development limit from the drainage channel (i.e all development must occur beyond the crest-of-slope to avoid geotechnical hazards). A further setback of 6 m is provided from the crest-of-slope for maintenance access on the east side of the channel. The RVCA approved the channel design with a 5 m setback for maintenance access on the west side of the channel; and

f) The expected floodplain. Note, the regulatory floodplain limit provides a development constraint directly by itself; there is no additional setback requirement per se from the floodplain line. The floodplain line considering the realigned channel has not yet been officially mapped by the RVCA. JF Sabourin and Associates (2017), however, prepared a detailed evaluation of the ability of the proposed realignment of the Van Gaal Drain to convey extreme flow events. JFSA (2017) concluded that flood flows (100-year event) would be contained within the boundaries of the corridor (i.e. the regulatory floodplain, once established, will not extend beyond the corridor boundaries).

These three limits are fully contained within the Van Gaal corridor boundaries. At any point along the length of the Van Gaal Drain within the residential portions of the Green Lands parcel, one or more of these three lines extend to a corridor boundary, but at no point does any line extend beyond the corridor boundaries. The corridor boundaries thus mark the composite maximum of all regulatory lines required for environmental protection of aquatic habitat, for mitigation of geotechnical hazards to the adjacent communities (while providing suitable maintenance access), and for the prevention of flood risk.

Construction works near water during the development of the residential community will, at minimum, require standard erosion and sediment control mitigation measures to protect receiving waters from sediment-laden runoff, including:

- a multi-faceted approach to provide erosion and sediment control;
- retention of existing vegetation and stabilize exposed soils with vegetation where possible;
- limiting the duration of soil exposure and phase construction;
- limiting the size of disturbed areas by minimizing nonessential clearing and grading;
- minimizing slope length and gradient of disturbed areas;
- refuelling of machinery should occur >30 m from any watercourse;
- maintaining overland sheet flow and avoid concentrated flows; and
- storing/stockpiling all soil away (e.g. greater than 30 m) from watercourses, drainage features and top of steep slopes.

4.5 Species at Risk

4.5.1 Potential Effects

A single at risk was considered to have some potential to interact with proposed development: Blanding's Turtle (Kilgour & Associates Limited, 2022).

The proposed development does not impact the habitat of Blanding's Turtles, but it is possible that Blanding's Turtles could occur near new residential areas if travelling along the Van Gaal Drain. The application of appropriate structural design elements along the channels will prevent turtles travelling through the Village of Richmond from straying from the naturalized corridors, thereby limiting the potential for harm to individuals by traffic. With the application of appropriate mitigation measures, the potential for negative impacts to species at risk can be minimized.

4.5.2 Required Mitigation

No turtles were observed on or near the project area during any Kilgour & Associates Limited surveys, but limited potential for transient individuals exists. To prevent potential impacts to Blanding's Turtles, the proponent must implement the following measures during the construction phase:

- All areas subject to active works during the turtle nesting season (May 15-July 15; MNFR 2015) require the installation of temporary exclusion fencing around the perimeter prior to May 15. Properly installed and maintained standard silt fence can function as exclusion fence (Appendix A4);

- Prior to vegetation clearing, pre-construction sweeps of vegetated areas should be undertaken to ensure turtles are not present; and

- If possible, vegetation clearing should be undertaken outside of the active season of Blanding's turtle (generally taken to be April 1st to October 30th).

The fencing behind residential units backing on to either the Van Gaal is recommended to be designed and installed as permanent turtle exclusion fencing (Appendix A4) to ensure transient turtles potentially using these features as travel corridors do not stray from those routes while transiting the community. No roadway crossing of the Van Gaal are proposed.

While the area does not provide habitat for SAR birds of bats, vegetation clearing during the months of April thru October inclusive, should be preceded by a review by a qualified biologist to ensure the absence of transient SAR individuals. Clearing works must begin by pre-stressing the area to be cleared by running loud equipment for several minutes before commencing the clearing work.

4.6 General Wildlife

4.6.1 Potential Effects

Common wildlife species were observed on site, all of which are represented throughout the developed adjacent landscape. With the application of appropriate mitigation measures, the potential for negative impacts to these species can be minimized.

4.6.2 Required Mitigation

The following mitigation measures should be implemented during construction of the project to generally protect wildlife (Kilgour & Associates Limited, 2022):

- Areas shall not be cleared during sensitive times of the year for wildlife (breeding season; early spring to early summer), unless mitigation measures are implemented and/or the habitat has been inspected by a qualified Biologist.
- Do not harm, feed, or unnecessarily harass wildlife.
- Manage waste to prevent attracting wildlife to the site. Effective mitigation measures include litter prevention and keeping all trash secured in wildlife-proof containers and promptly removing it from the Site, especially during warm weather.
- Drive slowly and avoid hitting wildlife.
- Manage stockpiles and equipment on Site to prevent wildlife from being attracted to artificial habitat. Cover and contain any piles of soil, fill, brush, rocks and other loose materials and cap ends of pipes where necessary to keep wildlife out. Ensure that trailers, bins, boxes, and vacant buildings are secured at the end of each workday to prevent access by wildlife.
- Check the entire work site for wildlife prior to beginning work each day.
- Inspect protective fencing and/or other installed wildlife exclusion measures daily and after each rain event to ensure their integrity and continued function.
- Monitor construction activities to ensure compliance with the project-specific protocol (where applicable) or any other requirements.
- If SAR are encountered on the worksite, immediately stop all work and comply with the project-specific SAR protocol (where applicable; e.g. contact project Biologist to determine next steps).
- Buildings on Site should be inspected to ensure the absence of snakes, bats, and any other wildlife immediately prior to demolition. Bats may day-roost in buildings while snakes may be present in building foundations/walls in search of food, shelter, and/or overwintering habitat. Any wildlife present in buildings should be removed and safely relocated by a qualified person.
- The *Migratory Birds Convention Act* (Government of Canada, 1994) protects the nests and young of migratory breeding birds in Canada. The clearing of trees or vegetation should not take place between April 1 and August 15 unless a qualified Biologist has determined that no nesting is occurring within 5 days prior to the clearing (City of Ottawa, 2015).

- Follow the best practices for the construction and maintenance of bird-safe buildings, such as applying visual markers on windows to prevent birds from colliding with glass and reducing the intensity and direction of night lighting (turn off lights at night if possible). See https://flap.org/workplaces-safe-for-birds/ for more resources and tips on designing and maintaining bird-friendly buildings.

5.0 COMPLIANCE WITH POLICY 4.7 – ENVIRONMENTAL PROTECTION

A number of studies have been required by the City of Ottawa in the completion of an Integrated Environmental Review to assess a development application (Table 1). The study requirements and status for the development application demonstrate compliance to the requirements of the Official Plan.

Table 1. Demonstrated compliance with Policy 4.7 Environmental Protection

OP Section	Studies/Assessment Required	Where Required	Relevant Study and Status	Summary of Issue
4.7.1	Integrated environmental review to assess development applications	Summary of all environmental studies/assessments submitted with development application	This document	
4.7.2	Tree retention and planting	All plans of subdivision and site plans	Kilgour & Associates Limited (2022)	All existing trees on site will be removed. Trees will be planted at a target density of 1.5 trees per lot. The final landscape plan, however, has not been completed,
4.7.2	Demonstrate no impact on the natural features or on the ecological function for which the area is identified	On lands adjacent to significant portions of the habitat of endangered and threatened species	Kilgour & Associates Limited, Parish Geomorphic & Mattamy Homes Limited (2010) KAL (2022)	No valued woodlands, urban or rural natural areas, rare communities, wetlands, steep slopes or valleys, or ANSIs were observed on the site.
4.7.3	Demonstrate no negative impact on fish habitat; If there is impact – review by Department of Fisheries and Oceans	On or adjacent to fish habitat	Kilgour & Associates Limited (2022)	The Van Gaal Municipal Drain is to be realigned prior to construction on the Green Lands site as part of a separate project. The channel will be setback >30 m of the rear lot lines.
4.7.3	Erosion and sediment control plan	All development proposals	David Schaeffer Engineering Limited (2022)	ESC Plan requirements are detailed within the Design Brief.
4.7.3	Determine appropriate setback from rivers, lakes and streams	Development proposals adjacent to rivers, lakes and streams	Kilgour & Associates Limited, Parish Geomorphic & Mattamy Homes Limited (2010)	Setback for the Arbuckle Municipal Drain is equal to the 100 yr floodplain.
4.7.5	Hydrogeology/terrain analysis	Subdivisions based on private services	Study not required.	Subdivision based on shared / public services.

OP Section	Studies/Assessment Required	Where Required	Relevant Study and Status	Summary of Issue
4.7.5	Groundwater impact assessment	Groundwater resources areas	Golder Associates Limited. (2020a; 2020b)	Ground water levels may be lowered in the area.
4.7.5	Wellhead protection study	Wellhead Protection Area designated on Schedule K	OP Schedule K (City of Ottawa, 2020b)	The Fox Run development is within a wellhead protection area.
4.7.6	Stormwater site management plans	Site plan and subdivision and zoning amendment applications	David Schaeffer Engineering Limited (2022)	New community areas within the Green Lands site will connect to the proposed/approved SWM pond with outlet to the Arbuckle Municipal Drain.
4.7.7	Assessment of landscape feature	Geomorphic, Geological and Landform feature (designated on Schedule K); Features (e.g. ANSI) identified in other studies	Study not required.	No Features as identified on Schedule K of the City of Ottawa Official Plan.

6.0 INCORPORATION OF DESIGN WITH NATURE PRINCIPLES

Section 4.7 – Environmental Protection of the City of Ottawa Official Plan identifies planning objectives to support natural features and functions in the development of lands within the City (City of Ottawa, 2020b). The stated objectives are:

- Increasing forest cover across the city;
- Maintaining and improving water quality;
- Maintaining base flows and reducing peak flows in surface water;
- Protecting and improving the habitat for fish and wildlife in stream corridors;
- Protecting springs, recharge areas, headwater wetlands and other hydrological areas; and
- Managing resources by using low-maintenance, natural solutions.

The City of Ottawa desires that land developments achieve these objectives through design with nature. The purpose of this section is to demonstrate the compliance of the proposed development with the design with nature principles.

In support of the development application by RVDC, the various studies described above have been completed to identify significant natural resources that may be present on the site.

There were no significant environmental occurring on or being retained on the site.. That being said, the development application does support environmental initiatives identified by the City of Ottawa, as demonstrated above in Section 6. Additional measures are:

- The development area currently has limited tree coverage. While the residential development cannot produce new forest areas, canopy cover will be enhanced through tree plantings;
- Surface water drainage will be routed through City approved stormwater management systems so that objectives for stormwater quality will be met during and post construction; and
- The proposed project is being carried out in an area that does not and has not contained significant wetland habitat, or significant habitat for species considered rare, threatened or endangered species.

6.1 Integration of Energy Efficiency and Sustainable Design

Section 4.7 – Environmental Protection of the City of Ottawa Official Plan (City of Ottawa, 2020b) call for a description of how efficient and sustainable design principles have been incorporated into new developments following a Sustainable Design Checklist (now known as the Green Checklist; Table 2).

Table 2. City of Ottawa Site Plan Control Approval Green Checklist

ID	Question	Response
1a	Does the project proponent intent to seek LEED certification for this project?	No
1b	If yes, which level of LEED certification is the project intended or designed to meet?	None
1c	Will this project be seeking certification under another third-party green building rating system?	No
2	Will this project include renewable energy facilities and pursue a FIT or MicroFIT contract under the Ontario Power Authority's Feed-in Tarrif program?	No
3	Which features is the project designed to incorporate?	None

7.0 CLOSURE

The following persons have read this Integrated Environmental Review and agree that this document provides a reasonable summary of the highlights of their individual component studies.

Natural Environment, Aquatic Habitat, Tree Conservation Kilgour & Associates Limited: _____ Anthony Francis, PhD	**Geotechnical Investigation and Site Environmental Assent** Golder Associates Limited: _____
Stormwater Management David Schaeffer Engineering Limited: _____	

8.0 LITERATURE CITED

City of Ottawa. 2015. Protocol for Wildlife Protection during Construction. Availalable at: http://ottwatch.ca/meetings/file/309612/_Document_1_Protocol_for_Wildlife_Protection_During_Construction_pdf_Item_PROTOCOL_FOR_WILDLIFE_PROTECTION_DURING_CONSTRUCTION_UPDATED_Meeting_Planning_Committee_Date_2015_09_22_09_30_00

City of Ottawa. 2020a. geoOttawa Interactive web mapping application. Available at: http://maps.ottawa.ca/geoottawa/

City of Ottawa. 2020b. City of Ottawa Official Plan. Available at: https://ottawa.ca/en/planning-development-and-construction/official-plan-and-master-plans/official-plan

David Schaeffer Engineering Limited. 2013. Stormwater Management Report for Richmond Village (South) Limited. November 2013.

David Schaeffer Engineering Limited. 2020. Functional Servicing Report for Green Lands West & East, Laffin Lands (Western Development Lands) Richmond Village Development Corporation. July 2020.

David Schaeffer Engineering Limited. 2022. Functional Servicing Report for Richmnd North West/East (Western Development Lands) Caivan (Richmond North) Ltd. Fifth Submission. April 2022.

Golder Associates Limited. 2020a. DRAFT REPORT: Preliminary Geotechnical Report Green Lands West and Green Lands East. Report Number: 20144864-3000-01. June 30, 2019

Golder Associates Limited. 2020b. DRAFT REPORT: Preliminary Geotechnical Report Laffin Parcel. Report Number: 20144864-3000-01. July 9, 2019

Golder Associates Limited. 2020c. FINAL REPORT: Phase One Environmental Site Assessment 6409, 6363 and 6295 Perth Street, Ottawa, Ontario. Report Number: 19132930. July, 2019

Golder Associates Limited. 2020d. FINAL REPORT: Phase One Environmental Site Assessment 6305 Ottawa Street West, Ottawa, Ontario. Report Number: 2014486. May, 2019

i-Naturalist. 2020. A Community for Naturalists · iNaturalist. Available at: https://www.inaturalist.org

Jacques Whitford. 2007. Preliminary Geotechnical Investigation Report Proposed Residential Subdivision Perth and Ottawa Streets Richmond Area Ottawa, Ontario, dated 2007 (Jacques Whitford Project No.1026929)

Kilgour & Associates Limited, Parish Geomorphic & Mattamy Homes Limited. 2010. Natural Environment & Impact Assessment Study. February 2010.

Kilgour & Associates (KAL). 2020. Fish and Fish Habitat Risk Assessment for The Proposed Van Gaal Drain Realignment Project Updated Report. Report Date: January 28, 2020. Project Code: CAIV725.

Kilgour & Associates Limited. (KAL), 2022 Environmental Impact Statement - Richmond Village Development Corporation: Laffin and Green Lands. August 31, 2022.

Ministry of Natural Resources and Forestry. 2014. General Habitat Description for the Blanding's Turtle (*Emydoidea blandingii*) in Ontario.

Ministry of Natural Resources and Forestry, 2015. Survey Protocol for Blanding's Turtle (*Emydoidea blandingii*) in Ontario.

Stantec. 2007. Jock River Reach 1 Subwatershed Study - Final Report. 2 Volumes. Prepared by Stantec Consulting Ltd. June 2007.

Stantec Consulting Limited. 2011. Village of Richmond Water and Sanitary Master Servicing Study. Report date: June, 2011.

Appendix A
Figures and Supporting Documents

Appendix A1 – General Site Plans

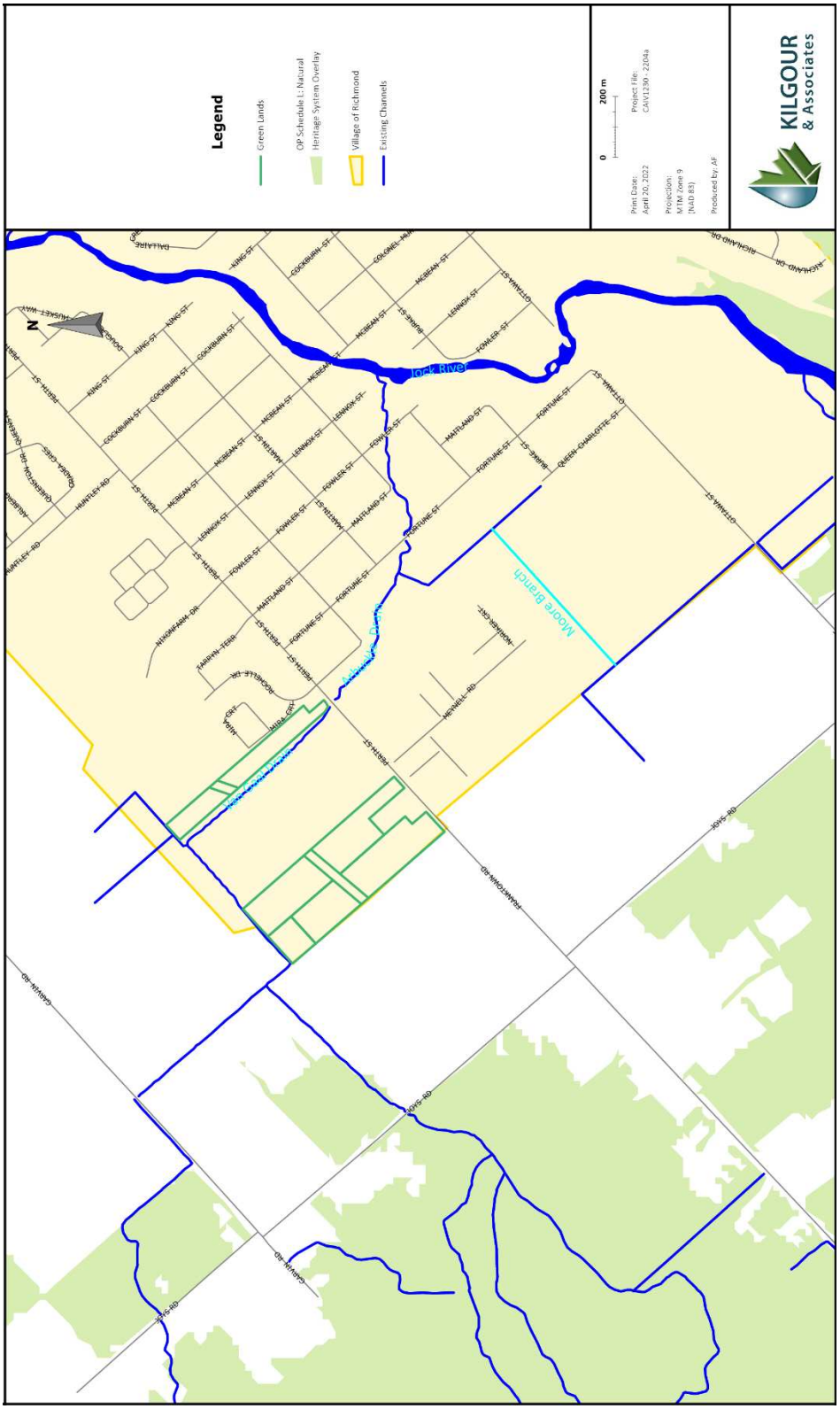


Figure 1. Site context

Figure 2. Proposed site development

Appendix A2 - Site natural heritage

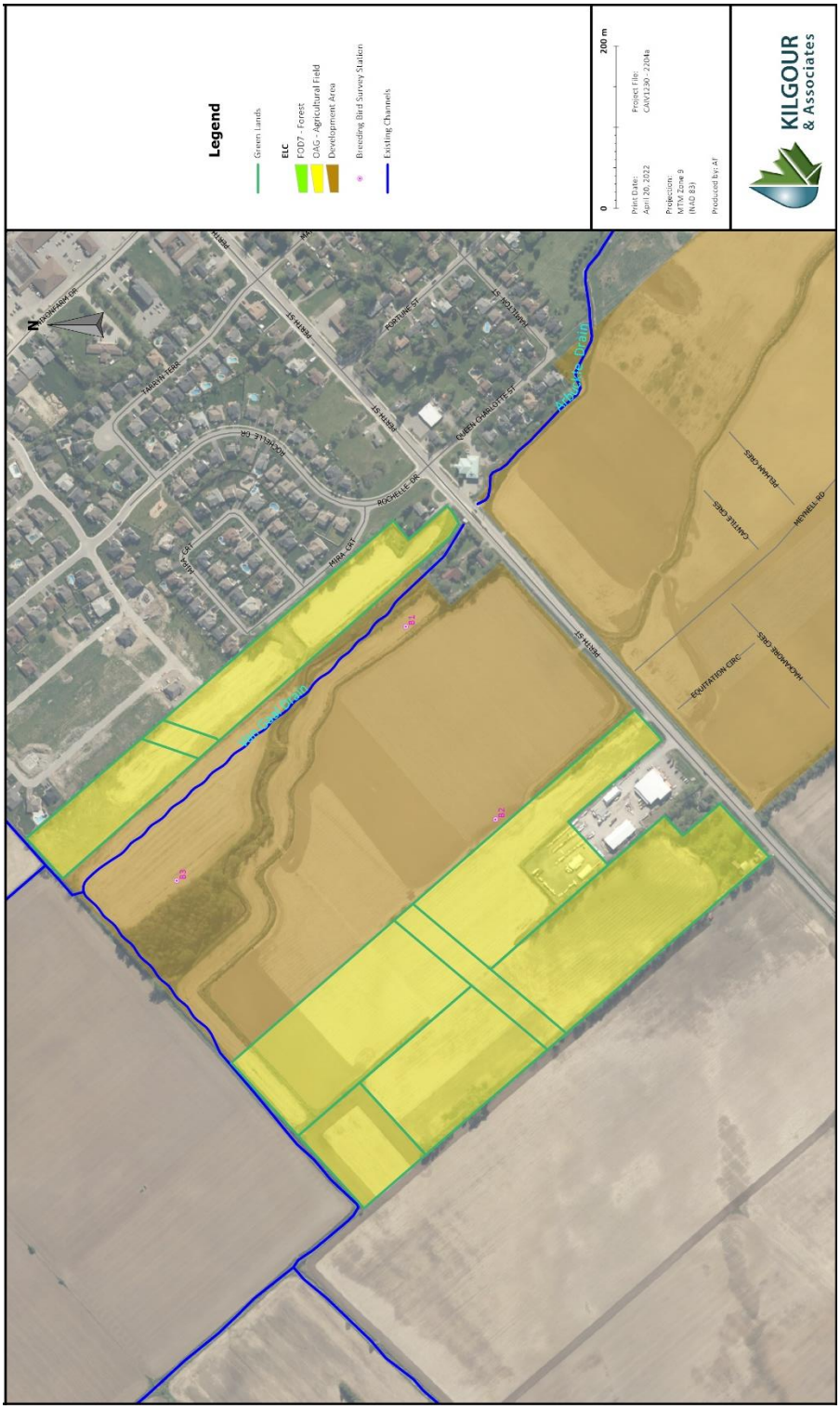


Figure 3. Initial site conditions

Appendix A3 – Permits to Alter the Van Gaal Drain

RVCA Letter of Permission —

Ont. Reg. 174/06, S. 28 *Conservation Authorities Act* 1990, As Amended.

January 23, 2020
File: RV5-2919
Contact: hal.stimson@rvca.ca (613) 692-3571 Ext 1127

Rideau Valley Conservation Authority

3889 Rideau Valley Drive
PO Box 599, Manotick ON K4M 1A5
T 613-692-3571 | 1-800-267-3504
F 613-692-0831 | www.rvca.ca

Mr. David Ryan
City of Ottawa
2155 Roger Stevens Dr.
North Gower, ON
K0A 2T0

Permit to alter a waterway under Section 28 of the *Conservation Authorities Act* for alterations to a municipal drain at Lot 22, Concession 3, Goulbourn Township, now in the Citv of Ottawa.

Dear Mr. David Ryan,

The Rideau Valley Conservation Authority has reviewed your application on behalf of the City of Ottawa and understands the proposal to be for:

> **The realignment of the Van Gaal Municipal Drain in accordance with the amended engineers report as prepared by Robinson Consulting dated January 2019 and approved by Ottawa City Council in June 2019. The watercourse is a tributary of the Jock River and is being relocated to accommodate area development. The new design is features natural channel design principles and upon completion is intended to reconfigure the existing flood plain. Final grades will need to be confirmed and submitted prior to RVCA accepting a change to the regulatory flood plain limits.**

This proposal was reviewed under Ontario Regulation 174/06, the "*Development, Interference with Wetlands, and Alteration to Watercourse and Shorelines*" regulation and the RVCA Development Policies (approved by the RVCA, Board of Directors), specifically Section 3.0 Alteration to Waterways. The proposal is not expected to impact the control of flooding, pollution, erosion or conservation of land providing conditions are followed.

PERMISSION AND CONDITIONS

By this letter the Rideau Valley Authority hereby grants you approval to undertake this project as outlined in your permit application but subject to the following conditions:

1. Approval is subject to the understanding of the project as described above and outlined in the application and submitted plans including:
    - Report titled "Amendments to the Engineer's Report for the Van Gaal Municipal Drain", Project No. B13056 prepared by Robinson Consultants Inc. Consulting Engineers dated January 2019.

- Drawing by NAK Design Strategies entitled Planting Plan III, Revision 9 dated May 30, 2019.
- Drawing by Coldwater Consulting Ltd. entitled Sections, Village of Richmond Channel Re-Alignment, Revision 6, dated May 27, 2019.
- Drawing by Coldwater Consulting Ltd. entitled Village of Richmond Channel Re-Alignment, Revision 6, dated May 27, 2019.

2. **A De-watering Plan and Sediment and Erosion Control Plan must be submitted by the contractor to this office for review prior to construction activities commencing.**

3. Any excess excavated material, as a result of the work or on-going maintenance, must be disposed of off-site in accordance with the Engineers Report or in a suitable location outside any regulatory floodplain and fill regulated area. RVCA must be consulted to ensure fill is not placed elsewhere within a flood plain.

4. It is recommended that you retain the services of a professional engineer to conduct on-site inspections to ensure adequacy of the work, verify stability of the final grade and slopes and confirm all imported fill is of suitable type and has been adequately placed and compacted.

5. **A final as built grading plan shall be submitted upon completion of the approved works prepared by an Ontario Land Surveyor or Professional Engineer licensed to practice in Ontario indicating that grades achieved on the site conform to those indicated on the approved plan and that the proposed flood plain storage volumes are achieved.**

6. Upon completion of the work a post effectiveness monitoring program is to be undertaken with monitoring and reporting after years 1,3 and 5 to ensure the compensation works are functioning as intended. The post effectiveness monitoring plan should contain a contingency plan for any necessary corrective actions.

7. Work in-water shall not be conducted at times when flows are elevated due to local rain events, storms or seasonal floods. Existing stream flows must be maintained downstream of the de-watered work area without interruption, during all stages of the work. There must be no increase in water levels upstream of the de-watered work area.

8. Only clean non-contaminated fill material will be used, and all work is to occur on your property, or if on other property, only with full authorization of the owner(s).

9. Sediment barriers should be used on site in an appropriate method according to the Ontario Provincial Standard Specifications (OPSS) for silt barriers as a minimum. If the sediment and erosion control methods include silt fence it should be placed along the shoreline to prevent overland flow on disturbed areas from entering the watercourse. Soil type, slope of land, drainage area, weather, predicted sediment load and deposition should be considered when selecting the type of sediment/erosion control.

10. Demolition or construction debris is not to be deposited in the waters of any creek; inert concrete/asphalt debris will be considered a deleterious substance. An emergency spill kit should be kept on site in case of fluid leaks or spills from machinery.

11. Sediment and erosion control measures shall be in place before any excavation or construction works commence. All sediment/erosion control measures are to be monitored

regularly by experienced personnel and maintained as necessary to ensure good working order. If the erosion and sedimentation control measures are deemed not to be performing adequately, the contractor shall undertake immediate additional measures as appropriate to the situation to the satisfaction of the Conservation Authority.

12. All materials and equipment used for the purpose of site preparation and project completion must be operated and stored in a manner that prevents any deleterious substance (e.g. petroleum products, silt, debris etc.) from entering the water.

13. The waters of the creek are NOT to be considered as machine staging areas. Activities such as equipment refuelling, and maintenance must be conducted away from the water to prevent entry of petroleum products, debris, or other deleterious substances into the water. All in-stream work on the new channel should be completed in the dry.

14. Operate machinery from outside the water, or on the water in a manner that minimizes disturbance to the banks or bed of the watercourse. Equipment shall not be cleaned in the watercourse or where wash-water can enter any watercourse. Machinery is to arrive on site in a clean condition and is to be maintained free of fluid leaks.

15. All disturbed soil areas must be appropriately stabilized to prevent erosion.

16. It is recommended that you ensure your contractor(s) are provided with a copy of this letter to ensure compliance with the conditions listed herein.

17. Develop a response plan that is to be implemented immediately in the event of a sediment release or spill of a deleterious substance. This plan is to include measures to: a) stop work, contain sediment-laden water and other deleterious substances and prevent their further migration into the watercourse and downstream receiving watercourses; b) notify the RVCA and all applicable authorities in the area c) promptly clean-up and appropriately dispose of the sediment-laden water and deleterious substances; and d) ensure clean-up measures are suitably applied so as not to result in further alteration of the bed and/or banks of the watercourse.

18. **There will be no in-water works between March 15 and June 30, of any given year to protect local aquatic species populations during their spawning and nursery time periods.**

19. Any aquatic species (fish, turtles) trapped within an enclosed work area are to be safely relocated outside of the enclosed area to the main watercourse downstream of the work zone.

20. The RVCA is to receive 48 hours' notice of the proposed commencement of the works to ensure compliance with all conditions. The applicant agrees that Authority staff may visit the subject property before, during and after project completion to ensure compliance with the conditions as set out in this letter of permission.

21. A new application must be submitted should any work as specified in this letter be ongoing or planned for or after January 23, 2022.

All other approvals as might be required from the Municipality, and/or other Provincial or Federal Agencies must be obtained prior to initiation of work. This includes but is not limited to the Drainage Act, the Endangered Species Act, the Ontario Water Resources Act, Environmental Protection Act, Public Lands Act, or the Fisheries Act.

By this letter the Rideau Valley Conservation Authority assumes no responsibility or liability for any flood, erosion, or slope failure damage which may occur either to your property or the structures on it or if any activity undertaken by you adversely affects the property or interests of adjacent landowners. This letter does not relieve you of the necessity or responsibility for obtaining any other federal, provincial or municipal permits. This permit is not transferable to subsequent property owners.

Should you have any questions regarding this letter, please contact Hal Stimson.

Terry K. Davidson

Terry K. Davidson P.Eng
Conservation Authority S. 28 Signing delegate
O. Reg. 174/06

c.c. A. Robinson, P. Eng., Robinson Consultants
K. Murphy, P. Eng., DSEL
A. Finnson, Caivan

- Pursuant to the provisions of S. 28(12) of the Conservation Authorities Act (R.S.O.1990, as amended.) any or all of the conditions set out above may be appealed to the Executive Committee of the Conservation Authority in the event that they are not satisfactory or cannot be complied with.
- Failure to comply with the conditions of approval or the scope of the project may result in the cancelling of the permission and/or initiation of legal action under S. 28(16) of the Act.
- Commencement of the work **and/or** a signed and dated copy of this letter indicates acknowledgement and acceptance of the conditions of the RVCA's approval letter concerning the application and the undertaking and scope of the project.

Name: _____ (print)

Signed: _____ Date: _____

Fisheries and Oceans Canada | Pêches et Océans Canada

Central and Arctic Region
520 Exmouth Street
Sarnia, Ontario
N7T 8B1

Région du centre et de l'arctique
520 rue Exmouth
Sarnia, Ontario
N7T 8B1

Your file *Votre référence*

April 1, 2020

Our file *Notre référence*

19-HCAA-00218

Project Manager
Richmond Village Development Corporation
2934 Baseline Road, Suite 302
Ottawa, ON
K2H 1B2

Attention: May Pham

Subject: Van Gaal Drain channel realignment – *Fisheries Act* Authorization

Dear Ms. Pham:

Pursuant to Paragraphs 34.4(2)(b) and 35(3)(b) for the authorization for work/undertaking/activity resulting in harmful alteration, disruption or destruction of fish habitat under the *Fisheries Act*, Fisheries and Oceans Canada (DFO) authorizes the carrying on of your proposed work, undertaking or activity that results in:

- the death of fish by means other than fishing and the harmful alteration, disruption or destruction of fish habitat which are prohibited under subsections 34.4(1) and 35(1) of the *Fisheries Act*.

The proposed project involves the realignment of approximately 900 m of the Van Gaal Drain that will result in the destruction of approximately 6,940 m^2 of fish habitat. The authorization under paragraphs 34.4(b) and 35(2)(b) of the *Fisheries Act* is attached.

Failure to comply with any of the terms or conditions of the attached authorization may lead to prosecution under the *Fisheries Act*.

A copy of this authorization should be kept on site while the work is in progress and upon request be provided to relevant federal or provincial officials. The authorization holder is responsible for ensuring work crews are familiar with, and able to adhere to, the conditions.

If you or anyone conducting work on your behalf have any questions please contact Jane Tymoshuk at our Burlington office at 365-292-0537 or by email at jane.tymoshuk@dfo-mpo.gc.ca.

Yours sincerely,

David Nanang, PhD
Regional Director General
Central & Arctic Region
Fisheries and Oceans Canada

CC: Jane Tymoshuk – Fisheries and Oceans Canada
Anthony Francis – Kilgour and Associates

ATTACHMENT: *Fisheries Act* Authorization

Paragraphs 34.4(2)(b) and 35(2)(b) *Fisheries Act* Authorization

Authorization issued to
Richmond Village Development Corporation *(hereafter referred to as the "Proponent")*
2934 Baseline Road, Suite 302
Ottawa, ON
K2H 1B2

Attention to:
May Pham, Project Manager

Location of Proposed Project
6335 Perth Street
Ottawa, ON
K0A 2Z0

Nearest community (city, town, village): Richmond
Municipality, district, township, county: City of Ottawa
Province: Ontario
Name of watercourse, waterbody: Van Gaal Drain
Longitude and latitude, UTM Coordinates: 18N 433300m E, 5004500m N

Description of Proposed Project

The proposed project of which the work, undertaking or activity authorized is a part involves:

To accommodate a new residential community, Richmond Village Development Corporation (RVDC) proposes to realign a portion of the Van Gaal Drain to increase the number of housing units on their property. The new channel will be relocated along the north and east boundaries of the property in a naturalized riparian corridor and reconnected to the existing channel (Arbuckle Drain) downstream at Perth Street in Richmond, Ontario.

Description of Authorized work(s), undertaking(s) or activity(ies) likely to result in the harmful alteration, disruption or destruction of fish habitat:

The work(s), undertaking(s), or activity(ies) associated with the proposed project described above, that are likely to result in the harmful alteration, disruption or destruction of fish habitat, are:

- Construction of a realigned channel for approximately 900 m of the Van Gaal Drain.

The authorized work(s), undertaking(s), or activity(ies) are likely to result in the following impacts to fish and fish habitat:

- Destruction of approximately 6,940 m^2 of habitat in the existing Van Gaal Drain as a result of permanent infilling of the existing channel.

Conditions of Authorization

The above described work, undertaking or activity must be carried on in accordance with the following conditions.

1. **Conditions that relate to the period during which the work, undertaking or activity can be carried on:**

   The work, undertaking or activity that is/are authorized to be carried on during the following period:

   From date of issuance to November 30, 2020

   If the Proponent cannot complete the work, undertaking or activity during this period, Fisheries and Oceans Canada (DFO) must be notified in advance of the expiration of the above time period. An application for amendment, suspension or cancellation of the authorization should be submitted to DFO.

   The periods during which other conditions of this authorization must be complied with are provided in their respective sections below.

2. Conditions that relate to measures and standards to avoid and mitigate impacts to fish and fish habitat:

2.1 Sediment and erosion control: Sediment and erosion control measures must be in place and shall be upgraded and maintained, such that release of sediment is avoided at the location of the authorized work, undertaking, or activity.

- 2.1.1 All erosion and sediment controls shall be in place and functioning around the area of planned daily work and offsetting activity prior to work commencing.
- 2.1.2 Erosion and sediment control measures shall be inspected daily and repaired or upgraded as required and temporary measures removed once the sites are stabilized.
- 2.1.3 All in-water works shall be conducted in an isolated area using coffer dams, turbidity curtains, or similar techniques when increased turbidity is anticipated.
- 2.1.4 Construction activities shall be scheduled to avoid rainy periods that may increase erosion and sedimentation.
- 2.1.5 Sediment-laden water from dewatering activities shall be managed to effectively mitigate the entry of sediment into any waterbody.
- 2.1.6 All pumped water shall be released with energy control systems in place to prevent scour.
- 2.1.7 All fill material, including construction rubble, rock, and soil, to be used in construction shall be clean and free of fine materials and debris prior to placement.
- 2.1.8 Clearing of riparian vegetation shall be kept to a minimum and where removal is necessary, proper clearing techniques shall be used.
- 2.1.9 Stockpiled material shall be stored in a manner that prevents its entry into nearby waterbodies.
- 2.1.10 All areas disturbed by any activity associated with the project shall be stabilized through revegetation with native species, suitable for the site, upon completion of the work.

2.2 List of measures and standards to avoid and mitigate impacts to fish and fish habitat:

- 2.2.1 Timing for in-water work(s), undertaking(s), or activity(ies) shall comply with the restricted activity period specified by the Ministry of Natural Resources and Forestry for the

protection of the local fish community during their critical life stages. No in-water works to be conducted from **March 15 to June 30** in any year.

2.2.2 Fish shall be removed from work areas (isolated and dewatered construction areas) by a qualified fisheries professional using standard, non-lethal methodology and multi-pass elimination and shall be relocated immediately into the drain downstream of the work area.

2.2.3 All water intakes used to dewater area(s) that may contain fish shall be screened according to DFO's *Freshwater Intake End-of-Pipe Fish Screen Guideline* (1995).

2.2.4 All machinery shall arrive on site in a clean condition and be maintained free of fluid leaks, noxious weeds, and invasive species.

2.2.5 Machinery shall be washed, refuelled, and serviced in such a way as to prevent any deleterious substances from entering the water.

2.2.6 A Spill Management Plan shall be implemented in the event of accidental spill.

2.3 Contingency measures: Described below, and as set out in the Van Gaal Drain Application, shall be put in place if monitoring required in condition 3 below indicates that the measures and standards to avoid and mitigate serious harm to fish are not successful.

2.3.1 Should a breach into the isolated work area occur, fish shall be salvaged using methodology outlined in section 2.2.2. The breach shall be identified and repaired prior to the recommencement of in-water work, with additional mitigation measures being implemented to ensure a breach does not re-occur.

2.3.2 Should monitoring of erosion and sediment control measures show that they are not functioning as intended, all work shall be halted and the issue corrected, or secondary control measure installed, prior to work recommencing.

2.3.3 Should re-suspended sediment be observed migrating outside of the work site, or monitoring of the turbidity identifies that levels are in exceedance of CCME Canadian Water Quality Guidelines for the Protection of Aquatic Life Total Particulate Matter and not settling within the expected timeframe, work shall cease and additional mitigation measures shall be installed to isolate the work area.

2.4 Dates by which these measures and standards shall be implemented: Measures and standards to avoid and mitigate impacts to fish and fish habitat shall be implemented prior to the commencement of construction activities and be maintained until project completion.

3. Conditions that relate to monitoring and reporting of measures and standards to avoid and mitigate impacts to fish and fish habitat:

3.1 Monitoring of avoidance and mitigation measures: The Proponent shall monitor the implementation of avoidance and mitigation measures referred to in section 2 of this authorization and report to DFO on a monthly basis until construction is complete and indicate whether the measures and standards to avoid and mitigate impacts to fish and fish habitat were conducted according to the conditions of this authorization. This shall be done, by:

3.1.1 Demonstration of effective implementation and functioning: Providing dated photographs and inspection reports to demonstrate effective implementation and functioning of mitigation measures and standards described above to limit the impacts to fish and fish habitat to what is covered by this authorization.

3.1.2 Contingency measures: Providing details of any contingency measures that were followed, to prevent impacts greater than those covered by this authorization in the event that mitigation measures did not function as described.

3.2 Other monitoring and reporting conditions: Not Applicable

4. **Conditions that relate to offsetting**

4.1 Letter of credit: DFO may draw upon funds available to DFO as the beneficiary of the letter of credit provided to DFO ($1,427,393.55) as part of the application for this authorization, to cover the costs of implementing and maintaining the offsetting measures required to be implemented under this authorization, including the associated monitoring measures included in section 5 of this authorization, in instances where the Proponent fails to implement these required measures.

4.2 Scale and description of offsetting measures: Offsetting shall be undertaken on the Fox Run Community development property north of Perth Street, Richmond, Ontario. The offsetting measures shall be carried out in accordance with the measures set out in the Proponent's offsetting plan dated February 23, 2017 (Coldwater, 2017). Measures shall include:

- 4.2.1 As per the Design Brief (Coldwater, 2017) for the proposed project, a new alignment for the west branch of the drain shall be constructed with channel improvements.
- 4.2.2 Similar improvement in the east branch shall occur but with the direction of flow reversed to convey flows from the west branch across the northwest edge of the site so the confluence of the east and west branches shall occur at the north corner of the property.
- 4.2.3 A new channel shall be constructed for the main drain in a southeast direction along the east side of the property and shall reconnect to the original channel immediately upstream of the existing culvert crossing under Perth St in the southeast corner of the site.
- 4.2.4 All segments of the new alignment shall follow natural-channel design principles, within a broader, bankfull channel with a sinuous low-flow channel (with a base width of approximately 1.0 m and side slopes of 2H:1V).
- 4.2.5 Six (6) boulder (300 mm to 600 mm diameter) cross-vanes shall be constructed within the new alignment (two (2) within the west branch and four (4) within the main drain).
- 4.2.6 Four (4) to five (5) boulders (600 mm to 900 mm diameter) shall be embedded in the stream bed as clusters upstream of each cross-vane.
- 4.2.7 Pools shall be excavated (0.5 m deep and 2.0 m long) downstream of the cross-vanes and lined with 300 mm of 'Type A' river gravel.
- 4.2.8 The bend at the confluence of the west and east branches shall be lined with R50 riprap.
  - 4.2.8.1 Live stakes shall be planted in the riprap along the upper slope of the main channel.
  - 4.2.8.2 Along the upper slope, lower slope, and channel bottom, the R50 riprap shall be top-dressed with 'Type A' river gravel.
  - 4.2.8.3 A stilling basin shall be formed at the junction of the west and east branches.
- 4.2.9 Two (2) sedimentation basins (1.0 m depth) shall be excavated in the realignment at the upstream end of the west branch and at the downstream end of the main drain. Basins shall be lined with 300 mm of 'Type A' river gravel.
- 4.2.10 All channel realignment segments shall be situated within a re-naturalized riparian corridor planted with native shrubs and trees as well as seed mixes to increase shading of the channel.

4.3 Offsetting criteria to assess the implementation and effectiveness of the offsetting measures: All fish habitat offsetting measures shall be completed and functioning according to the criteria below and as set out in the Proponents Offsetting Plan:

- 4.3.1 All offset structures and features shall be shown to be constructed as designed and stable, and shall be assessed by visual inspection.
- 4.3.2 The channel realignment shall be constructed by November 30, 2020 and shall be available to fishes immediately after construction. As-built report shall be provided no later than

December 31, 2020. The offsetting channel shall be assessed for fish presence and abundance, including evidence of at least three (3) native fish species (including White Sucker, Common Shiner and Mottled Sculpin) occupying the new channel and habitat features.

4.4 Contingency measures: If the results of monitoring, as required in section 5, indicate that the offsetting measures are not completed by the date specified and/or are not functioning according to the above criteria in 4.3, the Proponent shall give written notice to DFO and shall implement the contingency measures and associated monitoring measures, as contained within the approved offsetting plan (referenced in section 4.2), and, as set out in section 5 of this authorization, to ensure the implementation of the offsetting measures is completed and/or functioning as required by this authorization.

4.4.1 Scale and description of contingency measures: Should the initial offsetting plan not meet the requirements for offsetting associated with the authorization, the Proponent shall conduct the necessary works, undertakings or activities, to ensure the structural stability and ongoing functionality of any contingency offsetting habitat to the satisfaction of DFO.

4.4.2 Monitoring measures to ensure offsetting contingency is completed and/or functioning as required: The Proponent shall conduct monitoring as per the Offsetting Plan with additional requirements as determined by DFO, to document the success of any contingency offsetting habitat to the satisfaction of DFO, to meet the offsetting requirement associated with the Authorization.

4.5 The Proponent shall not carry on any work, undertaking or activity that will adversely impact the offsetting measures.

4.6 Other conditions related to offsetting: Not applicable.

5. **Conditions that relate to monitoring and reporting of implementation of offsetting measures (described in section 4):**

5.1 Schedule(s) and criteria: The Proponent shall conduct monitoring of the implementation of offsetting measures according to the timeline and criteria in the offsetting plan found in the :

5.1.1 List of timeline(s) and monitoring and reporting criteria:

5.1.1.1 Monitoring shall commence the year following the completion of construction to allow the habitat time to naturalize and become functional.

5.1.1.2 Form and stability of habitat features shall be assessed through visual inspections in spring of 2021 and 2023.

5.1.1.3 Fish habitat offsetting measures and any potential habitat limitations or enhancement opportunities shall be assessed through visual observation in spring of 2021 and 2023.

5.1.1.4 Fish presence shall be monitored at the offsetting features at a minimum of mid-spring in 2021 and 2023.

5.1.1.4.1 Fish sampling efforts (fish presence and abundance assessments) shall focus on the habitat usage by various fish species at various sample points (to be determined by the project biologist) along the length of the realignment.

5.1.1.5 A digital photographic record of pre-construction, during construction, and post-construction conditions shall be compiled using the same vantage points and direction to show that the approved works have been completed in accordance with the offsetting plan including offsetting and enhancement measures, site stabilization and restoration works.

5.2 List of reports to be provided to DFO: The Proponent shall report to DFO on whether the offsetting measures were conducted according to the conditions of this authorization by providing the following:

5.2.1 As-built report shall be due on or before December 31, 2020.
5.2.2 The results of the monitoring and reporting of the implementation of offsetting measures (described above in section 5.1.1) shall be submitted in an annual report to DFO before July 31st of each monitoring year (2021 and 2023).

5.3 Other monitoring and reporting conditions for offsetting: Not applicable.

Authorization Limitations and Application Conditions

The Proponent is solely responsible for plans and specifications relating to this authorization and for all design, safety and workmanship aspects of all the works associated with this authorization.

The holder of this authorization is hereby authorized under the authority of Paragraphs 34.4(2)(b) and 35(2)(b) of the *Fisheries Act*. R.S.C., 1985, c.F-14, to carry on the work(s), undertaking(s) and/or activity(ies) that are likely to result in impacts to fish and fish habitat as described herein.

This authorization does not purport to release the applicant from any obligation to obtain permission from or to comply with the requirements of any other regulatory agencies.

This authorization does not permit the deposit of a deleterious substance in water frequented by fish. Subsection 36(3) of the *Fisheries Act* prohibits the deposit of any deleterious substances into waters frequented by fish unless authorized by regulations made by Governor in Council.

At the date of issuance of this authorization, no individuals of aquatic species listed under the *Species at Risk Act* (SARA) were identified in the vicinity of the authorized works, undertakings or activities.

It is also your *Duty to Notify* DFO if you have caused, or are about to cause, the unauthorized death of fish by means other than fishing and/or the harmful alteration, disruption or destruction of fish habitat. Such notifications should be directed to (http://www.dfo-mpo.gc.ca/pnw-ppe/CONTACT-eng.html).

The failure to comply with any condition of this authorization constitutes an offence under Paragraph 40(3)(a) of the *Fisheries Act* and may result in charges being laid under said Act.

A copy of this authorization should be kept on site while the work is in progress and upon request be provided to relevant federal or provincial officials. The authorization holder is responsible for ensuring work crews are familiar with, and able to adhere to, the conditions.

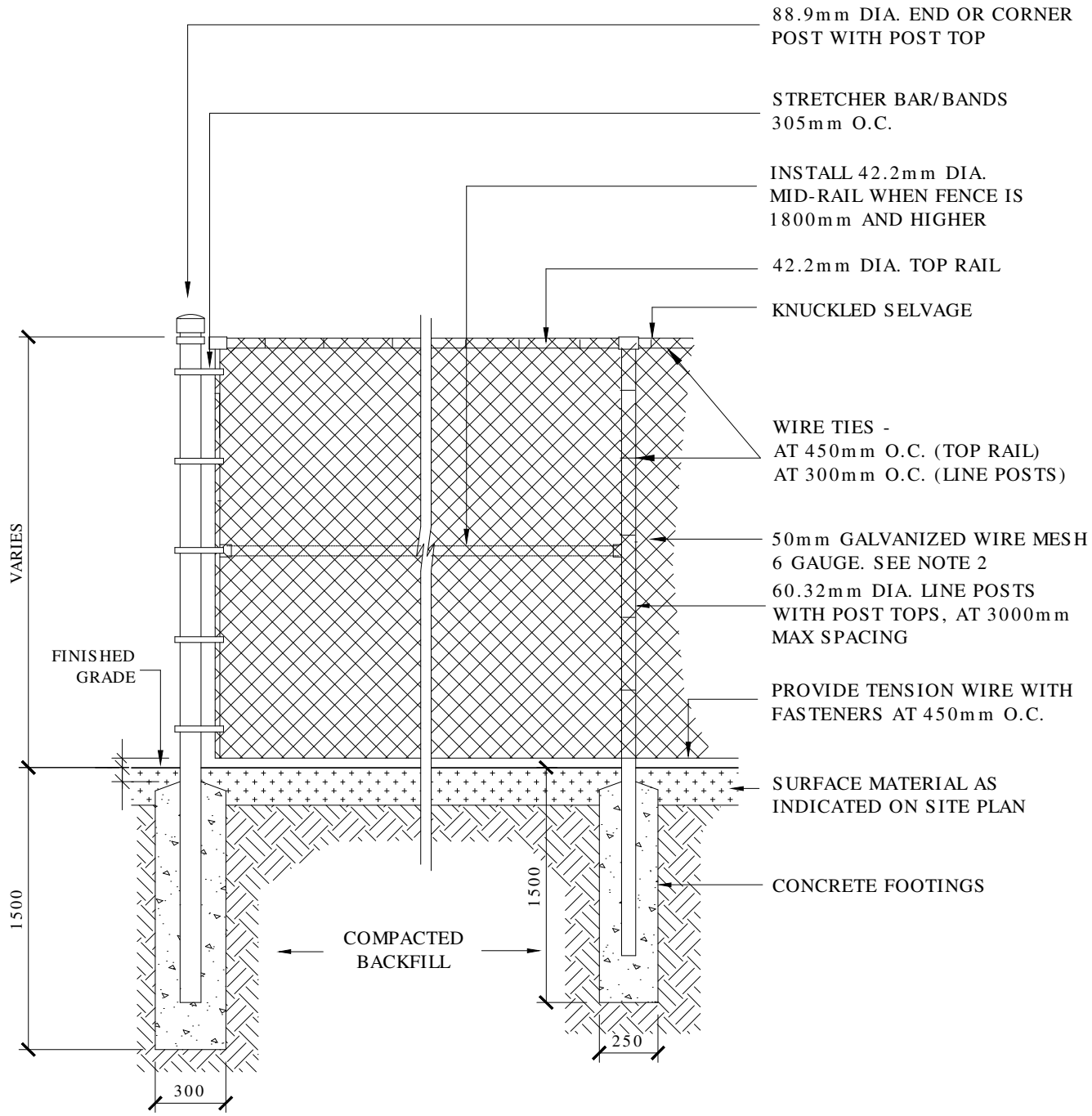
This authorization cannot be transferred or assigned to another party. If the work(s), undertaking(s) or activity(ies) authorized to be conducted pursuant to this authorization are expected to be sold or transferred, or other circumstances arise that are expected to result in a new Proponent taking over the work(s), undertaking(s) or activity(ies), the Proponent named in this authorization shall advise DFO in advance.

Date of Issuance: ___April 1, 2020_____

Approved by: _____

David Nanang, PhD
Regional Director General
Central and Arctic Region
Fisheries and Oceans Canada

Appendix A4 – Turtle Fencing Guidelines



NOTES:

1. ALL MEASUREMENTS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED
2. IF FENCE IS TO BE BLACK VINYL, THE FENCE SHOULD BE 9 GAUGE GALVANIZED WIRE CORE WITH BLACK VINYL COATING TO PROVIDE A TOTAL OF 6 GAUGE THICKNESS
3. POSTS, RAILS AND ALL OTHER HARDWARE SHOULD BE ELECTROSTATIC PAINTED
4. CONCRETE FOOTING SHALL BE CSA 30MPa CLASS F-1

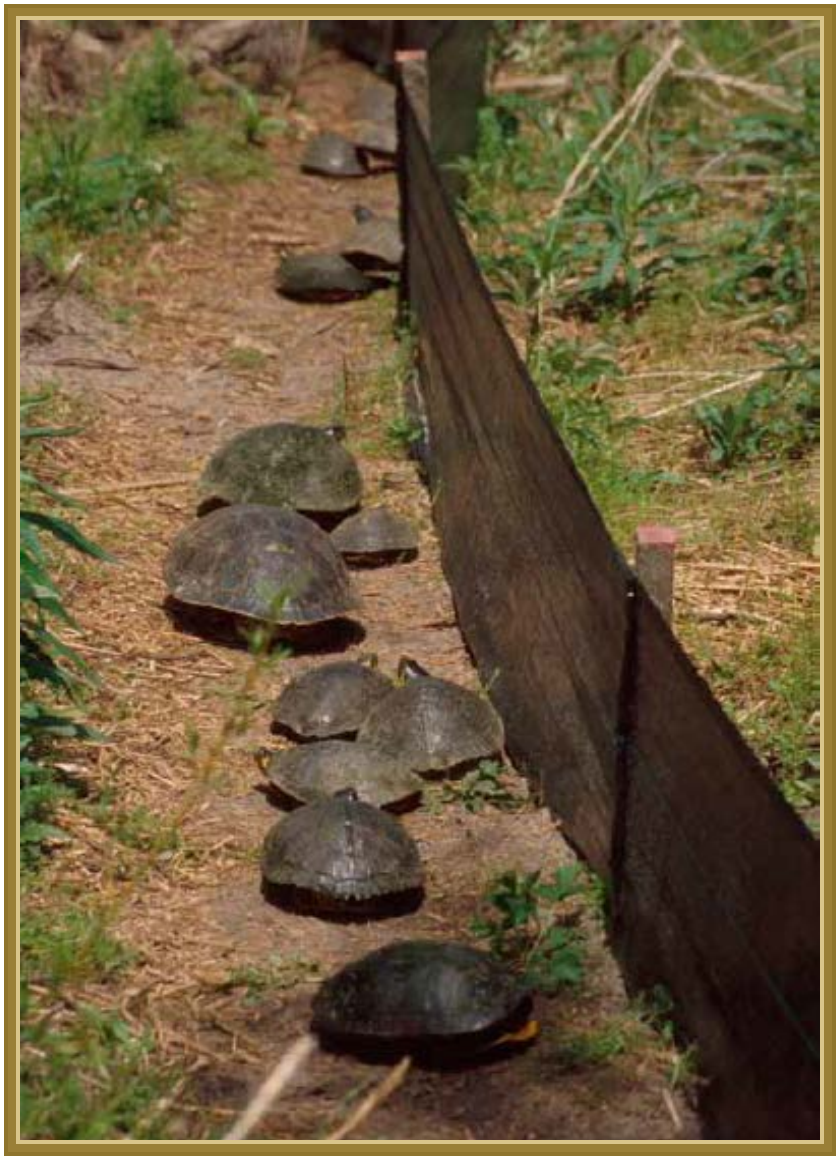
Ottawa	TITLE: CHAINLINK FENCE	DATE: FEB 2013 REV: FEB 2019 DWG No: F9

SPECIES AT RISK BRANCH
BEST PRACTICES TECHNICAL NOTE

REPTILE AND AMPHIBIAN EXCLUSION FENCING

Version 1.1

July 2013



Ministry of Natural Resources

Ontario

July 2013

Ontario Ministry of Natural Resources
Species at Risk Branch

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Cover illustration: Photograph by Matthew J. Aresco, Conservation Director, Nokuse Plantation

Before an activity can be initiated, permissions, approvals or authorizations may be required from MNR (e.g. Endangered Species Act authorization, Wildlife Scientific Collector's Authorization) or other agencies, levels of government (e.g. a conservation authority, municipality, federal or provincial government), or landowners. It is your responsibility to ensure that all necessary permissions, approvals and authorizations are acquired prior to proceeding with your activity.

This document presents information as of the point in time of publication and is meant to be updated through time as improved information becomes available.

Cette publication hautement spécialisée, Reptile and Amphibian Exclusion Fencing Best Practices n'est disponible qu'en anglais en vertu du Règlement 671/92 qui en exempte l'application de la Loi sur les services en français. Pour obtenir de l'aide en français, veuillez communiquer avec le ministère des Richesses naturelles au Pamela Wesley,705-755-5217.

Document History

Revision Number	Revision Date	Summary of Changes	Originated	Reviewed	Authorized
1.1	**June, 2013**	**Pre-publishing edits**	**June, 2013**	**June, 2013**	**June, 2013**

REPTILE AND AMPHIBIAN EXCLUSION FENCING - BEST PRACTICES -

The purpose of this guidance document is to provide an overview of proven design and installation techniques for reptile and amphibian exclusion fencing. Though this document points to site and species-specific design requirements, it is important to recognize that every situation is different. This guidance is not meant to replace site-specific advice obtained from local MNR staff or experienced exclusion fencing contractors. Moreover, exclusion fences are only effective when well planned, properly constructed, and maintained.

Exclusion fencing seeks to eliminate access to specific areas where activities that could harm animals are occurring (e.g. active aggregate operations, construction sites, and roads). The selection and installation of exclusion fencing can present some challenges, particularly if multiple species are being excluded. For example, some reptiles and amphibians are able to dig under fencing while others can climb over. Some may also take advantage of burrows dug by other animals. To maintain effectiveness, the bottom of the fence should be buried or secured firmly to the ground and minimum height recommendations (Table 1) are considered.

Exclusion fence design should consider the target species as well as those that might be unintentionally impacted. Fencing material should not pose a risk of entanglement or permit individuals to pass underneath or between openings. Landscape features such as topography and substrate need to be considered as they may constrain fencing design.

Including plans for fencing in advance of a project can increase efficiency and fence effectiveness. For example, long-term road projects that will include a permanent sound barrier could design the sound barrier such that it also meets the specifications of the required exclusion fence.

EFFECTIVE FENCE CHARACTERISTICS

The fence burial and height recommendations listed in Table 1 below have been compiled from scientific literature, established management practices, and practitioner best advice. These are general recommendations and at times other specifications may be more appropriate. For instance, in areas where the substrate does not permit fence burial, weighing down the fence with heavy items (e.g. sand bags) or backfilling may be acceptable. Where needed, speak with your local MNR staff or experienced exclusion fencing contractor to develop site-specific plans.

If multiple species are being excluded from the same area, and the species-specific fencing specifications differ, the uppermost minimum height and greatest depth recommendation should be used (Table 1). If you are excluding both Blanding's Turtle and Gray Ratsnake, for example, the exclusion fence should be a minimum of 2 m tall (see Gray Ratsnake section below for additional details).

Exclusion fences should be installed prior to emergence from hibernation. A survey of the enclosed/secluded area should be conducted immediately following fence installation to ensure that no individuals have been trapped on the wrong side of the fence.

Table 1. Recommended burial depth and height requirements of exclusion fencing for reptiles and amphibians. Recommended height is the height of the fence after it has been installed including the buried components and any installed overhangs or extended lips.

SPECIES	RECOMMENDED DEPTH OF FENCE BURIED (cm) *	RECOMMENDED HEIGHT OF FENCE (cm) **
Turtles – general	10 – 20	60
Eastern Musk Turtle, Wood Turtle	10 – 20	50
Massasauga, Eastern Hog-nosed Snake, Butler's Gartersnake, Queensnake	10 – 20	60
Gray Ratsnake & Eastern Foxsnake	10 – 20	200
Fowler's Toad	10 – 20	50
Snakes - general	10 – 20	100
Common Five-lined Skink	10 – 20	unknown
Salamanders	10 – 20	30

*** does not include the 10 cm horizontal lip that should extend outward an additional 10 – 20 cm (see Figure 2)**
**** the height of fencing has been provided as an approximate. Fencing materials may in fact not be available in proportions that would allow for these precise measurements. It is most effective, if the height and burial depth recommendations are met.**

DURATION OF ACTIVITIES & DEGREE OF ANTICIPATED DISTURBANCE

The type of disturbance, the proximity to disturbance, and the planned fence longevity are factors that influence which type of exclusion fence is most effective. For short-term activities (i.e. 1 to 6 months) such as minor road repairs, a light-duty geotextile fence is appropriate. Longer term or permanent fencing projects, however, require more durable materials such as – heavy-duty geotextile, wood, concrete, woven-wire, sheet metal, vinyl panels, or galvanized mesh.

GEOTEXTILE FENCES

Geotextile fences (e.g. silt fences) come in many types and qualities. They can be very effective for the temporary exclusion of reptiles and amphibians. For the purposes of this document, temporary use ranges from a few months up to 2-3 years. Winter weather is generally damaging to geotextile materials and the cost of maintenance over the long-term should be considered during the planning phase. Depending upon the quality, geotextile can be resistant to UV degradation and the bio-chemical soil environment.

Light-duty Geotextile Fencing:

Light-duty geotextile fencing is made of nylon material and is typically purchased with wooden stakes pre-attached at 2 m to 3 m intervals (Plate 1). It can also come without pre-attached stakes. Light-duty geotextiles are largely intended for projects with shorter durations of only a few months in duration and up to one season.

Geotextile fencing with nylon mesh lining should be avoided due to the risk of entanglement by snakes.

To use light-duty geotextile fencing:

- Fencing fabric is effective if attached to wooden, heavy plastic or metal stakes using heavy-duty wire staples or tie-wire (Figure 2).
- Secure the fence on posts that are placed at 2 m to 3 m apart. If using the greater recommended distance between posts, additional maintenance may be required to maintain effectiveness.
- Securely drive the stakes into the ground to a recommended depth of 30 cm. The fencing fabric should be buried to the recommended specifications in Table 1 and back-filled with soil.
- For snakes, supporting posts should be staked on the activity side (e.g. on the side facing the aggregate stock pile or the road - Figure 2).
- Light-duty geotextile fences are not effective where rocks or other hard surfaces prevent proper anchoring of fence posts and burial of the fence fabric.
- Light-duty geotextile fences are not effective where a large amount of concentrated run-off is likely or to cross streams, ditches or waterways without specific modifications.
- Contact your local MNR staff or experienced exclusion fencing contractor for advice and recommendations.
- See general best practices section below for additional details.

Generally, light-duty geotextile fences are not effective if they exceed 1 metre in height unless purposely manufactured for greater height (e.g. stakes placed at closer intervals or cross braces). If greater height is required consider using heavy duty geotextile, hardware cloth or other fencing materials.

Plate 1. Light-duty geotextile fencing with pre-attached wooden stakes used to exclude turtles from a road as seen on a regular maintenance check (photo credit: Brad Steinberg).

Heavy-duty Geotextile Fencing:

Heavy-duty geotextile fencing is typically constructed of a thick felt-like fabric. It may also be called 'double row' or 'trenched' fencing. For support, this fencing uses a woven wire fence (e.g. chain link) or some other structure (Plate 2). It is recommended that a minimum density of 270R or equivalent woven geotextile fabric is used.

Heavy-duty geotextile material can be effective for up to 2 or 3 years with proper maintenance. This type of fencing can be damaged by small mammals chewing through or torn by heavy debris (e.g. tree branches). Therefore, it may be best suited to turtles, which are less likely to take advantage of holes or tears in the fabric. If

used to exclude snakes or other animals, more maintenance may be required.

Heavy-duty geotextile fencing:

- The wire fence should be installed on the activity side to prevent animals from leveraging and climbing into the exclusion area while allowing the animal to escape if they find themselves on the wrong side (Figure 2).
- Geotextile fences across streams, ditches or waterways should have case-specific modifications.
- Contact your local MNR staff or experienced exclusion fencing contractor for advice.
- See light-duty geotextile section above and general best practices below for additional details.

Plate 2. Example of a heavy-duty geotextile fencing used to exclude snake species (photo credit: Jeremy Rouse).

HARDWARE CLOTH FENCES

Hardware cloth (also known as galvanized mesh or Birdscreen) is durable, cost effective and useful for excluding reptiles and amphibians. The fence should be made of heavy galvanized hardware cloth with a ¼ inch mesh. For fences intended to exclude small snakes, a ⅛ inch mesh may be more effective. In contrast, fencing intended to exclude turtle species can have a larger mesh size (e.g. ½ inch). Larger mesh may have a longer lifespan as it is constructed from a thicker material compared to smaller mesh sizes.

To use hardware cloth fencing:

- Secure the fence on posts placed a recommended 2.5 m apart with the stakes on the activity side (Figure 2).
- Pull the mesh taught and staple or secure with screws and a metal stripping to prevent the mesh from being ripped when pressure is applied.
- Installing a top rail or folding the mesh over a taut smooth wire reduces tearing (Plates 3 and 4).
- An outward facing lip installed on the species side ensures that snakes and amphibians are unable to climb or jump over the fence (Figure 2; Plate 4)
- Tears can be mended with 18-gauge galvanized wire.
- See general best practices section below for additional details.

Plate 3. Example of a galvanized mesh fencing used for the long-term exclusion of snakes and turtles from the adjacent highway (photo credit: Megan Bonenfant).

Plate 4. Long-term to permanent exclusion fencing using galvanized mesh with over-hanging lip to prevent animals from climbing or jumping over (photo credit: Megan Bonenfant).

WOOD LATH SNOW FENCING

In certain circumstances, wood lath snow fencing can be effective at excluding turtles. This fencing is typically constructed from soft wood slats that have been woven together with 13-gauge wire and is then attached to steel fence posts which have been driven into the ground.

Wood lath fencing is cost effective and can easily be laid down during the winter to prevent damage. The durability of the material, however, is not meant for very long-term use (e.g. more than 3 years), unless regular maintenance occurs.

To use wood lath snow fencing:

- The fencing should be attached to heavy plastic or metal stakes using heavy-duty wire staples or tie-wire.
- The stakes are recommended to be placed at 2 to 3 m intervals and securely driven into the ground 30 cm or more.
- Wood lath snow fencing across streams, ditches or waterways should have case-specific modifications.
- Wood lath snow fencing lends itself well to being combined with other types of material to ensure complete exclusion.
- See general best practices section below for additional details.

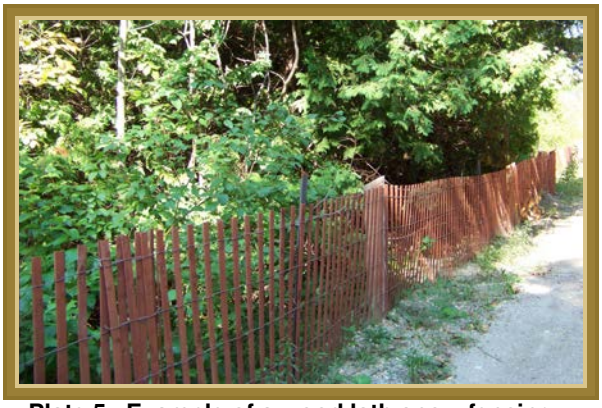

Plate 5. Example of a wood lath snow fencing used to exclude turtles (photo credit: Karine Beriault).

EXCLUSION FENCING FOR GRAY RATSNAKE AND EASTERN FOXSNAKE

Gray Ratsnake and Eastern Foxsnake are the largest snakes in Ontario - reaching nearly 2 m in length. They are also excellent climbers. For this reason, fencing intended to exclude either of these species has additional recommended design specifications.

- The fence should be at least 2 m high.
- The material on the species side (Figure 2) should be smooth to prevent the snakes from climbing into the excluded area.
- Stakes should be on the activity side of the fence (Figure 2).
- Due to the increase in fence height, it is valuable to decrease the distance between posts or install diagonal braces.
- See general best practices section below for additional details.

CONCRETE, SHEET METAL & VINYL WALLS

Concrete, metal or vinyl walls can stand alone or be combined with woven wire or chain link fences. They are durable, require minimal maintenance and are effective in excluding target species from high risk areas and guiding them to crossing structures or other desired locations (Plates 6 and 7). This fence type is comprised of a continuous vertical face of concrete, metal or vinyl sheeting with no gaps. Concrete walls can be installed as either pre-cast sections or pour directly in place.

Plate 6. Stand-alone continuous concrete wall used to exclude salamander species installed as pre-cast forms (photo credit: Steven Roorda).

Plate 7. Pre-formed vinyl sheeting fence intended to exclude salamanders for a construction site (photo credit: Herpetosure Ltd.)

The wall height depends upon the target species, but they are usually between 45 and 60 cm tall and buried 25 cm. Concrete, metal or vinyl exclusion fencing is most appropriate for salamanders, skinks, small snakes, and small turtles. For large turtle species, a chain link fence can be installed directly on top of the concrete wall for complete exclusion.

HABITAT CONNECTIVITY

Habitat connectivity is the connectedness between patches of suitable habitat or the degree to which the landscape facilitates animal movement. Exclusion fencing installed along roads or other large projects can effectively reduce or eliminate habitat connectivity for animals. In these scenarios, exclusion fencing should be considered with eco-passages in order to maintain connectivity. Fencing in isolation should be viewed as a temporary method to reduce mortality until species movement can be restored. Where eco-passages are not feasible they should be identified for consideration with any future road work or development to improve connectivity.

During the installation of fencing with an eco-passage, it is important that the fencing sits flush with the passage to ensure that

there are no gaps where animals can squeeze through.

Plate 7. A wood turtle travelling through a dry eco-passage. Ecopassages such as this help to ensure the long-term connectivity of seasonal habitat for this and other reptile and amphibian species (photo credit: Amy Mui).

GENERAL BEST PRACTICES:

- To deter digging, bury the fence 10 cm down with an additional 10 cm horizontal lip (Figure 2).
- Backfill and compact soil along the entire length on both sides of the fence (Figure 2).
- Once the fence is installed, a survey should be done to ensure that no individuals have been trapped inside (speak with MNR for survey advice).
- Exclusion fencing intended to exclude snakes should have the stakes installed on the activity side (opposite the normal requirement for sediment control fencing) to prevent snakes from using the stakes to maneuver over the fencing.
- For snakes and toads, the fence should have an overhanging lip on the species side (Figure 2).
- Fences should be inspected after spring thaw and at regular intervals throughout the active season, especially following heavy rain events. This is particularly important for geotextile fences. Any damage that affects the integrity of the fence (e.g. tears, loose edges, collapses, etc.) should be fixed promptly.
- Tall or woody vegetation on the species side of the fence should be managed if there is a risk that it may enable the animals to climb over. This is most important during spring and fall. Proceed cautiously to not harm animals protected plant species during vegetation removal.
- When installing an eco-passage, fencing or exclusion walls should be used as a guiding system to direct animals to passage openings.
- Natural screens such as trees or shrubs can help to reduce road access and can be combined with fencing to provide protection of individuals from predation.
- Install fences with a turn-around at the ends furthest from the wetland habitat and at any access areas to assist in redirecting animals away from any fence openings (Figure 1).
- Curving the ends of the fencing inward (i.e. away from the road or construction site) may help to reduce access to these locations. The ends may also be tied off to natural features on the landscape such as trees or rock cuts.

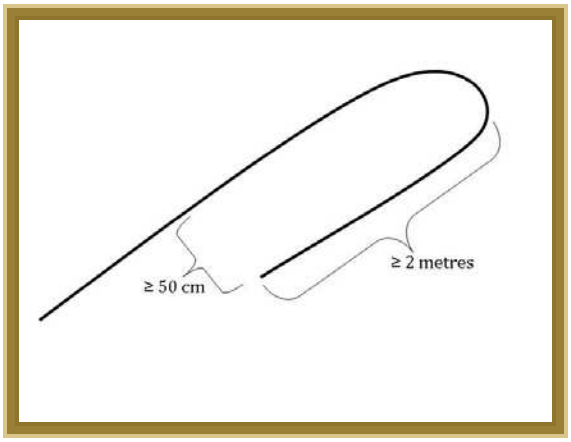

Figure 1. Diagram of the ends of the fence designed to curve inward in order to direct animals away from the area of exclusion.

WATER MOVEMENT & DRAINAGE

- In areas where surface water run-off may erode a soil-based backfill, consider using rocks or sand bags. Ensure these materials cannot be used by animals to climb over the fence.
- Where possible, minimize the number of water crossings: when necessary, it should occur where flow is minimal.
- Fence posts in waterways or areas prone to seasonal flooding should be driven rather than dug – unless following established best practices.
- Fencing should be placed above the high water mark anticipated for high water events such as spring freshet or periods of heavy or continuous rainfall.

TOPOGRAPHY:

- Fence posts should be closer together in undulating topography.
- Fences installed on slopes have a different effective height depending upon whether the animal will be approaching from the up or down slope. The fence height can be adjusted accordingly.

Improvements or questions regarding exclusion fencing can be brought to the local MNR Species at Risk Biologist or other MNR staff.

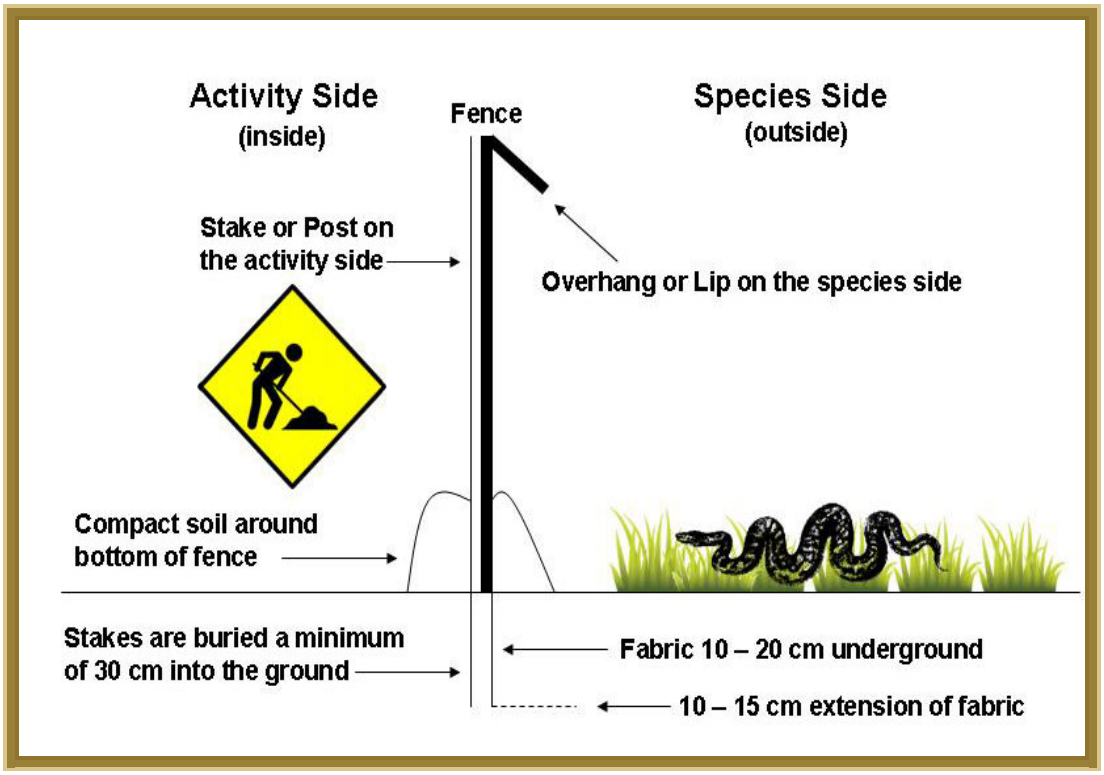

Figure 1. A side view of a basic exclusion fence including an overhang or flexible lip to deter animals from climbing or jumping over the fence. Placement of the stake on the Activity Side or on the inside of excluded area is also illustrated. This is particularly important for snake species which may use the stakes to maneuver over the fence.

RESOURCES:

ACO Systems Ltd., 2007. Wildlife fencing systems. Accessed July 2012. Available at: http://www.acocan.ca/wildlife/fence.htm.

Dodd, C.K, W.J. Barichivich, and L.L. Smith. 2004. Effectiveness of a barrier wall and culverts in reducing wildlife mortality on a heavily traveled highway in Florida. Biological Conservation 118: 619-631

Flat-tailed Horned Lizard Interagency Coordinating Committee. 2003. Flat-tailed horned lizard rangewide management strategy, 2003 revision. 80 pp., plus appendices.

Jochimsen, Denim M., Charles R. Peterson, Kimberly M. Andrews, and J. Whitfield Gibbons. 2004. A literature review of the effects of roads on amphibians and reptiles and the measures used to minimize those effects. USDA Forest Service.

KRCA, 2006. Silt Fence Installation and Maintenance. KRCA, Kawartha Region Conservation Authority Environmental Advisory Services, Port Hope, ON, 2 pp.

Long, K, and A. Robley, 2004. Cost Effective Feral Animal Exclusion Fencing for Areas of High Conservation Value in Australia. The Department of Environment and Heritage. Natural Heritage Trust, Victoria, Australia, 61 pp.

Queensland Department of Transport and Roads, 2010. Fauna Sensitive Road Design Manual, Volume 2: Preferred Practices. Chapter 9, Case Studies, Connecting Queensland, Road and Delivery Performance Division, Queensland Government, 134 pp.

Sarell, M, 2006. Living in Nature Series: How to Snake-proof you House and Yard. South Okanagan-Similkameen Stewardship

Program. The Land Conservancy of BC, Penticton, BC. 8 pp.

TWP Incorporated, Galvanzied Mesh for Snake Control. Accessed July 2012, Available at: http://www.twpinc.com.

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