CITY OF COLWOOD
3300 Wishart Road | Colwood | BC V9C 1R1 | 250 478 5999
planning@colwood.ca | www.colwood.ca

File: DP000008

DEVELOPMENT PERMIT DP000008

THIS PERMIT, issued **January 26, 2024** is,

ISSUED BY: **CITY OF COLWOOD**, a municipality incorporated under the *Local Government Act*, 3300 Wishart Road, Victoria, BC, V9C 1R1

(the "City")

PURSUANT TO: Section 490 of the *Local Government Act*, RSBC 2015, Chapter 1

ISSUED TO: **TURNBERRY DEVELOPMENTS LTD.**
16209 Morgan Creek Cres
Surrey, BC V3Z 0J2

(the "Permittee")

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1. This Natural Hazards (Steeply Sloped) and Environmental (Riparian and Hillside) Permit applies to those lands within the City of Colwood described below, and any and all buildings, structures, and other development thereon:

   LOT 1 SECTION 63 ESQUIMALT PLAN VIP75627 EXCEPT PLAN VIP81143 AND VIP83075
   Mary Anne Crescent

   (the "Lands");

2. This Development Permit regulates the development and alterations of the Land to ensure the Natural Hazard and Environmental considerations for site preparation to enable a 69-lot subdivision and associated site improvements are consistent with the guidelines for areas designated as "Steeply Sloped", "Riparian" "Hillside" in the City of Colwood Official Community Plan (Bylaw No. 1700).

3. This Development Permit is **NOT** a Building Permit or a subdivision approval.

4. This Development Permit is issued subject to compliance with all of the bylaws of the City of Colwood that apply to the development of the Lands, except as specifically varied by Council or supplemented by this Permit.

5. The Director of Engineering and Development Services or their delegate may approve minor variations to the plans and specifications attached to and forming part of this Development Permit, provided that such minor variations are consistent with the overall intent of the original

plans and do not alter the environmental conditions of the development authorized by those plans.

6. If the Permittee does not substantially start the construction permitted by this Permit within 24 months of the date of this Permit, the Permit shall lapse.

7. The development is to be constructed in accordance with the following plans and specifications, which are attached to and form as part of this permit:

Schedule 1	Proposed Subdivision Plan prepared by JE Anderson & Associates dated June 20, 2023
Schedule 2	Environmental Impact Assessment prepared by Aqua-Tex Scientific Consulting Ltd. Dated December 11, 2023
Schedule 3	Geotechnical Report prepared by Ryzuk Geotechnical dated November 6, 2023
Schedule 4	Grading Plan prepared by JE Anderson & Associates dated January 17, 2024
Schedule 5	Erosion and Sediment Control Plan prepared by JE Anderson & Associates dated January 17, 2024

8. This Development Permit authorizes land alterations and site preparation to enable a 69-lot subdivision along with any and all associated onsite works and improvements. The Land shall not be altered, nor any buildings or structures constructed, except in accordance with the following conditions:

NATURAL HAZARD CONDITIONS

Geotechnical, Grading and Blasting

8.1. All works shall adhere to the assessment and recommendations contained in the Geotechnical Report prepared by Ryzuk Geotechnical (Schedule 3) and be in substantial compliance with the Grading Plan (Schedule 4) and be completed under the guidance and approval of the Project Geotechnical Engineer.

8.2. All blasting and geotechnical earth works shall be completed in accordance with the plans and recommendations contained in the Geotechnical Report by Ryzuk Geotechnical (Schedule 3).

8.3. All proposed grading works must be in substantial compliance with the Grading Plan (Schedule 4) and be completed under the guidance and approval of the Project Geotechnical Engineer.

8.4. Any recommended pre-blast surveys or additional geotechnical reporting included in or responding to the assessment recommendations in the Geotechnical Report (Schedule 3), shall be submitted to the City, to the satisfaction of the Director of Engineering and Development Services.

8.5. A detailed geotechnical review of each lot and the associated infrastructure will be required by a qualified geotechnical professional as outlined in the Preliminary Layout Assessment (PLA); this will include reviewing the stability of permanent cut slopes, slopes, and retaining structures and identifying safe building setbacks.

8.6. Building envelopes shall be set back from the toe of steep slopes no lesser than 5.0m or a horizontal distance equal to half the height of any slope steeper than 1H:1V but may be reduced if a rockfall catchment/barrier and/or rockfall control system be implemented, as reviewed and determined by a qualified geotechnical engineer.

8.7. This permit does not authorize any blasting on the site; additional permits will be required.

8.8. Any and all retaining walls must be under 1.2m and be terraced at a maximum 1:1 ratio.

ENVIRONMENTAL CONDITIONS

General

8.9. Where required, Federal and Provincial environmental approvals shall be obtained prior to any works occurring on the Lands.

8.10. Clearing of the lot prior to issuance of a Building Permit shall be limited to the minimum area required for construction.

8.11. It is the property owner's responsibility to ensure that physical works are compliant with the federal Migratory Birds Convention Act, 1994 and the provincial Wildlife Act with respect to bird nests. Both of these acts prohibit the disturbance or destruction of active nests and eggs.

Environmental Protection and Restoration

8.12. All recommendations from the Environmental Impact Assessment must be followed as outlined by Aqua-Tex Scientific Consulting Ltd (Schedule 2).

8.13. Monitoring of construction activities shall be required by the Project QEP, per the recommendations, to ensure no off-site release of contaminants into receiving aquatic habitat.

8.14. No tree removal has been permitted with this issued Development Permit; additional permits will be required.

8.15. A danger tree assessment by a Certified Tree Assessor shall be conducted after land alterations per the recommendations of the Environmental Impact Assessment (Schedule 2).

8.16. The installation of temporary barrier fencing per the recommendations of the Environmental Impact Assessment (Schedule 2) shall be installed prior to any construction and must be viewed and accepted with a site visit by Development Services Staff to the satisfaction of the Director of Engineering and Development Services.

Erosion and Sediment Control

8.17. All recommendations from the Erosion and Sediment Control Plan must be implemented as shown by the plan prepared by JE Anderson & Associates (Schedule 5).

8.18. Monitoring of the Erosion and Sediment Control Plan (Schedule 5) shall be maintained to ensure trees within the Riparian Assessment Area (RAA) are protected during construction.

8.19. Any necessary modifications to the Erosion and Sediment Control Plan (Schedule 5) to protect the RAA must be implemented, as prescribed, by the project QEP.

ISSUED ON THIS 26 DAY OF JANUARY, 2024

JOHN ROSENBERG, A.Sc.T
DIRECTOR OF ENGINEERING AND DEVELOPMENT SERVICES

Schedule 1

LOT 1, SECTION 63, ESQUIMALT DISTRICT, PLAN VIP75627, EXCEPT THAT PART IN PLAN VIP81143 AND VIP83075

V:_Projects\33742 – Turnberry Developments – Rem 1 Plan VIP75627\08 – Survey\33742_tent_2.dwg Plot Date: June 20, 2023

TURNBERRY DEVELOPMENTS LTD. TENTATIVE PLAN OF SUBDIVISION

Scale horiz. 1:750 Rev. Date 20230620

Sheet 1 of 1

Eng. Project No. 33742

J E ANDERSON & ASSOCIATES

SURVEYORS - ENGINEERS

VICTORIA NANAIMO PARKSVILLE CAMPBELL RIVER

PHONE: 250-727-2214 info@jeanderson.com

Aqua-Tex
Scientific Consulting Ltd. (1993)

390-7th Avenue,
Kimberley, B.C. V1A 2Z7
Tel: (250) 427-0260
Fax: (250) 427-0280
e-mail: aqua-tex@islandnet.com

201-3690 Shelbourne St
Victoria, B.C. V8R 4H2
Tel: (250) 598-0266
Fax: (250) 598-0263

To: Danny Carrier, BCSL (Ret.), J.E. Anderson Ltd.
Cc: Mike Weir, Developer, Turnberry Developments Ltd.
Development Services, City of Colwood
From: Wm. Patrick Lucey, M.Sc., R.P. Bio., CBiol., MRSB, Sr. Aquatic Ecologist
Date: December 11th, 2023
Re: **Revised Environmental Impact Assessment Report for Proposed Subdivision Development – Spotswood Terrace and Mary Anne Crescent**
File: /Users/Patrick/Documents/Projects/Turnberry Mike Weir/2023-12-06 Draft Updated EnvironmentalReport (VMP Widening)/Updated Environmental report_2023-12-06_Draft.docx

Dear Danny:

The attached Environmental Report consists of an update of the original Environmental Impact Assessment Report for Anne Murray Crescent, by Cascadia Biological Services (October 26th, 2012) (Appendix A).

This Aqua-Tex report – *"Revised Environmental Impact Assessment Report for Proposed Subdivision Development – Spotswood Terrace and Mary Anne Crescent"* – includes addressing the information:

- In the City of Colwood's email to you (Kelsea Fielden, August 28th, 2023) they requested comment on items required for the Environmental Development Permit submission. These additional items are included in either the Environmental Impact Assessment Report attached or in Appendices. The Appendices include:
  - The 2012 Cascadia Biological Services Environmental Report,
  - The Approved 2022 RAPR Assessment Report, and
  - A Photo-documentation of the current environmental landscape features.
- Ms. Yazmin Hernandez (Director of Development Services), in her email to Lynn Weir (November 2, 2023), requested additional information regarding the widening of VMP would have on adjacent aquatic landscape features:

  "*We received notification that a Riparian Areas Protection Report has been approved by the province. That said, the report does not illustrate the required frontage works along VMP. Staff requested the riparian report assesses whether the realizing the VMP road cross-section would impact the SPEA of the ponds currently located on private property. There is no evidence within the report that the QEP has assessed how the ultimate VMP road cross-section impact the SPEA. We will need a revised report that clearly articulates whether the widening of VMP would have implication son the SPEA. Similarly, please have the report updated to treat the ponds as sitting on private property, which is the current condition"* (Quote from Ms. Hernandez email).

The information in this report includes**:**

- Revised/updated Environmental Impact Assessment;
    - Field assessments and database review
    - Findings, observations and recommendations
    - 2012 Cascadia report – options and recommendations
- Widening of Veterans' Memorial Parkway (VMP);
    - Regulatory Considerations for widening VMP
    - Encroaching onto SWM Ponds
    - Recommendations for widening VMP
- Proposed Site Plan
- Original Environmental Impact Assessment Report for Anne Murray Crescent, by Cascadia Biological Services (Appendix A)
- 2022 Riparian Area Protection Regulation (RAPR) assessment report (Appendix B)
    - Tree Management Plan (prepared by others; partial report contained within RAPR report);
- Confirmation of RAPR assessment report Approval by the Province (Appendix B)
- 2023 Photographs of existing environmental condition on the property (Appendix C)

Development Permitting information prepared by others will include:

- Sediment and Erosion Control Plan;
- Stormwater Management Plan;
- Topographic Plan;
- Landslide Assessment; and
- Geotechnical Report.

I would be pleased to answer any questions you may have at your convenience.

Regards,

Wm. Patrick Lucey, M.Sc., RP Bio., CBiol, MRSB
Sr. Aquatic Ecologist

Mary Anne Crescent (Spotswood Terrace)

Revised & Updated Environmental Impact Assessment Report

Prepared for: Mike Weir, Turnberry Developments Ltd. **December 11, 2023**

***Prepared by*: Wm. Patrick Lucey, RP Bio, CBiol, MRSB, Aqua-Tex**

Lot 1, Section 63, Esquimalt District, Plan VIP75627, except that part in Plan VIP81143 and VIP83075

Aqua-Tex
Scientific Consulting Ltd. (1993)

Background Rationale for Revised/Updated Environmental Impact Assessment Report

This report is an update to the historical Environmental Impact Assessment (EIA) report prepared in 2012 for the previous owners of the property. The 2012 EIA report was prepared for Andrew Developments by Cascadia Biological Services for the property, then known as Anne Murray Crescent (Lot 1, Section 63, Esquimalt District, Plan VIP75627). The 2012 EIA report had the following findings:

- Land Use – property disturbed with majority of native vegetation removed; largely surrounded by residential development.
- Subject Property – 96% of property previously disturbed. Woodland Ecosystem is 100% disturbed and rated marginal with low habitat value due to fragmentation and isolation; provides some habitat for birds, der and other small mammals.
- Rare Plants/Wildlife/Ecosystems – No environmentally significant attributes. Potential habitat and biodiversity values are low due to previous disturbance.
- Waterbodies – No RAR applicable waterbodies or isolated ponds were identified onsite.

Mr. Danny Carrier, BCLS (Ret.) requested, on behalf of the current property owner (Turnberry Developments Ltd.), that the 2012 report be updated and revised to reflect the existing environmental conditions on the Property (Lot 1, Section 63, Esquimalt District, Plan VIP75627, except that part in Plan VIP81143 and VIP83075) (Figure 1). This updated report would be the basis for an Environmental Development Permit Application to Colwood as part of a Subdivision Application for the property.

The purpose of this updated and revised report is to address the following:

- Characterize the existing environmental conditions on the property, with specific reference to plant communities and invasive populations.
- Integrate the approved 2022 RAPR assessment report with reference to the historical stormwater management (SWM) ponds, adjacent to the VMP, and the treed community surrounding the SWM ponds.
- Comment on adjacent residential development that has changed since the original 2012 assessment report, with reference to the recent land use changes to the south.
- Potential for rare plants and other sensitive wildlife species, described/documented in Provincial data-bases, that may be known on the property.
- Comment on the management of the existing plant community that has developed on the disturbed landscape on the property.

In an email to Lynn Weir (November 2, 2023), Ms. Yazmin Hernandez (Director of Development Services) noted the following information regarding the widening of VMP would also be required.

> *"We received notification that a Riparian Areas Protection Report has been approved by the province. That said, the report does not illustrate the required frontage works along VMP. Staff requested the riparian report assesses whether the realizing the VMP road cross-section would impact the SPEA of the ponds currently located on private property. There is no evidence within the report that the QEP has assessed how the ultimate VMP road cross-section impact the SPEA. We will need a revised report that clearly articulates whether the widening of VMP would have implication son the SPEA. Similarly, please have the report updated to treat the ponds as sitting on private property, which is the current condition"* (Quote from Ms. Hernandez email).

I have reviewed the supplemental information requested by Colwood Planning with Mr. Carrier. Our understanding of the request is as follows.

- Given the City's proposed widening of VMP, what effect might the widened VMP have on the SWM ponds on the east side of VMP?
- Could the proposed widening of VMP be designed to minimize any loss of volume in each of the stormwater treatment and detention cells? If so, how might the widening be constructed to minimize reductions in pond volume?
- What Regulations might affect the widening of VMP and potential alteration of the SWM ponds?
- If the SWM ponds had to be moved laterally to the east, what constraints would existing regulations place on the realignment?

Field Assessments and Database Review

Databases that were reviewed included the CRD Natural Areas Atlas and the B.C. Conservation Data Centre - Province of British Columbia (Gov.bc.ca; https://www2.gov.bc.ca › plants-animals-ecosystem). The information in these databases is presented in the figures below.

The updated field assessment was conducted in two phases a comprehensive site assessment of the existing environmental conditions on the property (Appendix C: Photographs), and a detailed RAPR assessment resulting in an Assessment Report submitted and approved by the Province (Appendix B).

The existing environmental conditions on the property were assessed to characterize potential habitat values, with specific reference to sensitive species habitat. Figure 1 is the proposed Site Plan showing lot layouts, road networks, and adjacent landscapes. Figure 6 and Figure 7 are aerial photographs – 2013 and 2021, respectively; the most recent aerial photograph (2023, (Figure 8)) shows the minimal changes in the plant community and disturbance footprint since 2010 (Figure 9).

The 2012 original Cascadia Report documented the following key environmental landscape features:

- *Little native plant communities on adjacent properties in surrounding residential development.*
- *The subject property consists of a total area of 47.705 m2 (11.79 acres) of which over 96% has been previously disturbed. Further to the previous disturbances on the property, the proposed disturbances associated with the subdivision plan, include land alterations over 100% of poorly rated (marginal habitat) Woodland Ecosystem consisting of approximately 14 Garry Oak trees with groundcover consisting of various introduced species of grasses and shrubs.*
- *Overall, the ecosystem provides some habitat for birds, deer and other small mammals including raccoons etc. Overall, given the isolation of the ecosystem and fragmentation of available habitat, the ecosystem is considered of low value.*
- *From our assessment, there are no environmentally significant attributes including rocky outcrops, sharp-tailed snake habitat, wildlife trees, raptor nests, wildlife dens, rare plants/wildlife within the proposed disturbed area (Woodland Ecosystem). Overall, potential habitat and biodiversity values with the proposed disturbed area remain low due to previous disturbances and the introduction of non-native species.*

Aqua-Tex staff walked the property on August 2nd, 2023, in the afternoon (Photo 1). The weather was clear, scattered light cloud, following a lengthy period of very little rainfall (southern Vancouver Island is in a prolonged drought condition). The site assessment began at the south end of Mary Anne Crescent, then circumscribed the outside perimeter of the property to the northeast corner, extended inland to the peak elevation, then continued along the southeast property boundary. The assessment then followed along the south property boundary, crossing along the upper terrace adjacent to the steep slope leading downhill to the treed canopy adjacent to the stormwater ponds, crossing north to Spotswood Terrace, and then back to the beginning at Mary Anne Crescent. Photographs were taken to document the disturbance footprint, the almost

complete dominance of the plant community by invasive species, the scattered piles of rock, the internal road network, selected examples of the surrounding residential development, the thin border of trees and shrub understory, and the clearing on the adjacent property to the south. The site photo-documentation is to be found in Appendix C.

Findings, Observations and Recommendations

1. The property has remained relatively untouched since 2010. The site has been extensively photographed – Appendix C – documenting the near complete disturbance footprint, as noted in the Cascadia Report of 2012 (Appendix B).
2. The findings and observations by Aqua-Tex staff were similar to those in the Cascadia Report (2012), differences being accounted for by the 13 year period of time during which plant community development occurred. The harsh conditions of the disturbed site minimized the establishment of a natural plant community, primarily a result of a virtual absence of a recruitment plant community on adjacent landscapes.
3. The primary alteration has the been a significant infestation of invasive species, dominated by scotch broom, Himalayan blackberry, and agronomic grasses. Small clusters of red alder are also present (Photo 2 – Photo 22).
4. Small conifers, largely Douglas firs, have grown up on the rocky ground (*i.e.*, Photo 2), as singleton trees or in small copses.
5. The stockpiles of blast rock and crushed manufactured rock remain relatively untouched since 2010.
6. There is a narrow ribbon of trees along the east property boundary (Unnamed Lane), consisting of mixed Arbutus, young Douglas-fir, with an understory of blackberry and broom (Photo 16 and Photo 17).
7. The site is very dry with no visual water sources. No moist soils were observed, other than along the stormwater management ponds, adjacent to VMP.
8. Development of the property will result in a very high percentage of impermeable surfaces, leading to minimal infiltration of rainwater into the largely bed rock dominated landscape.
9. The narrow ribbon of trees and shrub understory along the east property boundary will become drier as rainwater runoff is captured and diverted into the municipal stormwater drainage system, largely being routed off-site in buried roadside culverts. An arborist report may provide an option for retaining some of this vegetation (Photo 16, Photo 17).
10. There was minimal mature habitat for birds and mammals, other than that along the east property boundary and the west property area associated with the stormwater ponds. The invasive plant community does function as a nesting, feeding, and refugium for small song birds, as well as for small mammals. The primary habitat lies within the stormwater ponds and the adjacent steep slope which has mature conifers and red alder, with an understory of mostly blackberry.
11. A search of the Provincial and CRD rare species, raptors, rare plants, amphibians, and reptiles confirms our updated field assessment – there are no known, documented examples sensitive species, nor is there any significant wildlife habitat present, other than that associated with the stormwater ponds, *i.e.*, mature plant community, water during the rainy seasons, migration corridor, albeit with a shrub understory dominated by invasive species (Figure 3 – Figure 5).
12. The existing habitat present on the property reflects the clusters of invasive dominated plants in which bird and small mammal habitat is provided. However, the proposed development will remove the invasive species as well as the isolated or small clumps of juvenile deciduous and coniferous trees.
13. Best Management Practices (BMPs) shall be implemented during the next phase of construction including bird nesting survey during the nesting season, small mammal dens survey, stormwater management measures, tree protection measures (if trees are to be retained), compensatory tree planting (if required), installation of bird nesting boxes (if approved by the Rocky Point Bird Observatory staff), adoption of native plantings as part of the Landscape Planting Plan, *et cetera*.

14. It is our understanding that the City of Colwood will require the stormwater runoff from the property to be discharged into the municipal storm sewers that flow into the SWM ponds adjacent to VMP. On-site detention of stormwater will be required for the design storm, with post-detention flows being routed into the municipal stormwater system.
15. The possibility of widening VMP within the municipal ROW will require verification the ponds have capacity for the design stormwater flows from the property.
16. Best Management Practices measures, as noted above, shall be prepared post-Development Permit and prior to any construction on the property.
17. Monitoring of construction activities shall be required, as part of the BMPs, to ensure no off-site release of contaminants into receiving aquatic habitat.

2012 Cascadia Report – Options and Recommendations

18. *Works within the proposed disturbed area will be monitored by a Registered Professional Biologist (R.P. Bio.) during the initial excavation to ensure wildlife is not harmed. This includes monitoring for any new avian nests as well as small mammal dens etc.;*
19. *Protect all of the Garry Oak trees through either conservation covenants consisting of a 3m no disturbance covenant or undertake habitat improvements post construction (re-plant 28 Garry Oak trees within the confines of the previously dedicated park area);*
20. *Limit disturbances where feasible along rear of properties;*
21. *As a result of the proposed disturbed area and vegetation removal, Cascadia Biological Services recommends that one nesting boxes (QEP to determine sizes and configuration) be installed within the previously dedicated park area (off site) 5) Landscape planting should maximize use of native species (QEP to provide lists of acceptable plant species).*

Widening of VMP

- The proposed widening of VMP would be based upon a 30 m wide road width (Figure 10).
- The cross section of the proposed widened VMP is shown in Figure 11.
- The widened VMP would result in the east edge of the road being close to the existing stormwater treatment ponds.
- Ms. Hernandez notes in her email that the SWM are *sitting on private property.* This statement is incorrect, the ponds lie within the existing VMP ROW, *i.e.*, lie on municipal property (Figure 10).
- There would be a significant loss of riparian vegetation along the west side of the ponds.
- Since the stormwater from the Spotswood Terrace and Mary Anne Crescent subdivision would be treated and detained on-site before discharge into the SWM ponds, there will be no change to the volume requirements in the existing ponds. This no-net-change in stormwater volume will be verified by a civil engineer.

Regulatory Considerations for Widening VMP

1. The RAPR does not apply to development deemed institutional by the local government. Applicable Colwood bylaws will establish if the widening of VMP qualifies as institutional. Designation should be verified with Provincial RAPR staff, at the time the widening of VMP is approved by Council.
2. It is our understanding that the stormwater ponds and outlet channel are manmade, not a channelized natural watercourse. Therefore, the *Water Sustainability Act (WSA)* does not apply to manmade drainage channels such as the SWM ponds and their linking culverts, *i.e.*, the *WSA* applies to natural watercourses.
3. Downstream of the ponds is a natural watercourse – Latoria Northeast Creek. The Creek is subject to the *WSA.* If the widening of VMP will include "*Changes in and Around a Stream*", the works would require a *WSA* Section 11 notification or approval (Figure 12).
4. Latoria Northwest Creek flows into Latoria Creek, classified as a fisheries stream by DFO. Therefore, the details of the project will need to be checked to determine if the project needs a review by DFO. If the project cannot comply with the fish and fish habitat protection provisions of the Fisheries Act by implementing measures to protect fish and fish habitat or applying a standard *Code of Practice*, then a DFO Project Review will be required.

Encroaching onto SWM Ponds

Should there be a requirement to shift the SWM ponds laterally to the east, there is approximately 4 metres of room within the municipal VMP ROW (Figure 11, upper image). However, this lateral shift of the ponds to the east would result in the pond's shallow side slope also shifting east, beyond the ROW. The lateral shift of the ponds would require that the majority of the eastern side slope to be constructed on private property. The east side slope shift would be onto the lower portion of a steep slope and may require assessment by a Geotechnical Engineer.

Shifting the ponds east would result a significant loss of existing riparian and terrestrial vegetation, including shrubs as well as trees. A number of the trees are mature conifers whose roots would be disturbed such that the trees could be deemed danger trees. The widening of VMP will require an Arborist Report to assess how the widening of VMP would affect the trees that are presently within the vegetated landscape east and west of the SWM ponds and channel connecting the ponds with Latoria Northwest Creek. We note that the widening of VMP will require an Arborist review for the entire length of VMP between Latoria Road and Sooke Road.

The SWM ponds have a 15m SPEA. Shifting the ponds east would extend the SPEA beyond its present boundary on the private land which would require approval by the land owner under an Agreement with the City of Colwood. Moving riparian setbacks further onto adjacent private land would require Provincial approval and a discussion with the RAPR staff, as the existing approved RAPR may need to be amended. As

described above, shifting the SPEA east would be onto a steep slope landscape, on which development would be unlikely to be approved.

Recommendations for Widening VMP

Minimizing the effect of the widened VMP's eastern edge on stormwater pond function could be addressed with the use of a vertical retaining wall to eliminate the need for a side slope and maintain a minimal footprint. A Mechanically Stabilized Earth (MSE) Vegetated Wall System (Figure 16), or something similar, has the added benefit of incorporating vegetation into the wall. This system was utilized along the edge of the VMP/Latoria Creek Roundabout where the road lies on the bank of Latoria Creek (Figure 13).

The use of a vertical wall system results in a narrow disturbance footprint beyond the sidewalk edge. There would be potential for a planting terrace along the upper edge of a vegetated wall system (Figure 13). A second planting terrace could be constructed at the base of the vegetated wall (Figure 15). The planting terraces, associated with a Vegetated Wall System, could be landscaped to provide a vegetated buffer between the sidewalk and the pond. The plant community would be a mix of shrubs along the sidewalk and trees within the lower terrace (Figure 15).

Figure 11 shows the vertical height of the sidewalk above the stormwater pond bottom, a height of about 1.5 metres, is similar to that on the south end of the VMP Roundabout (Figure 15). A Vegetated Wall System, with planting terraces, could be constructed within a 2 metre wide zone, beyond the edge of the sidewalk with a one metre intrusion into the west side of the pond. The 1 m intrusion into the pond would result in minimal loss of storage volume. An equal of storage volume could be obtained by excavating a small volume of the shallow side slope on the east side of the ponds.

Figures

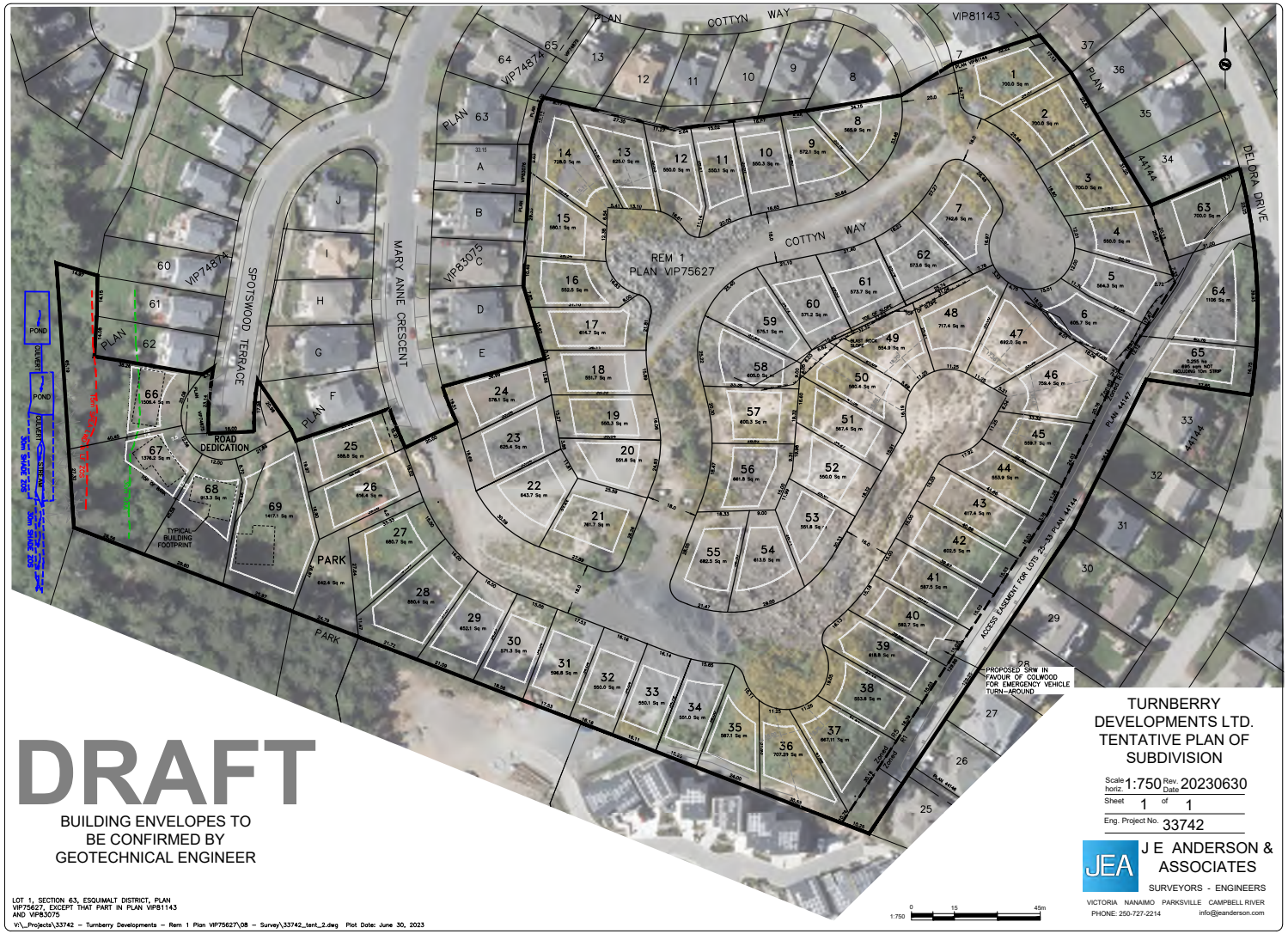

Figure 1. Site Plan, superimposed on aerial image, showing the property boundary (solid black line), proposed lot layout, internal road alignment and connection to adjacent subdivision roads, stormwater management ponds on the west side of the property (blue watercourses)(SPEA = dashed red line; RAA = dashed green line), mature treed canopy associated with latter watercourses, existing property disturbance footprint, and proposed SRW in favour of Colwood for Emergency vehicle turn-around (yellow arrow). Contrast this aerial image with those of Figure 6 and Figure 7.

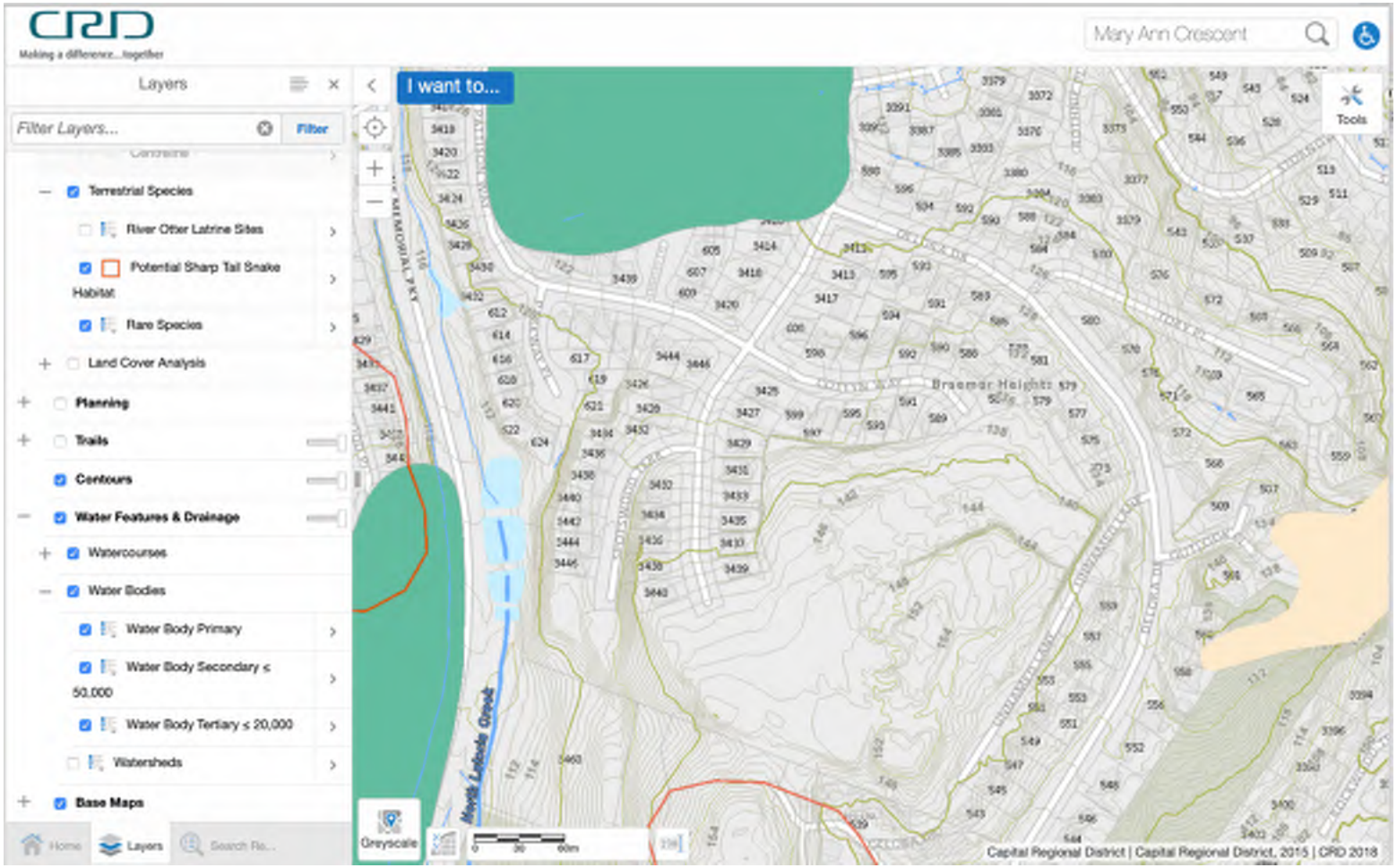

Figure 2. CRD Natural Areas Atlas map showing the elevation contours of the property. Note the slopes leading to a summit elevation (~154 m Geodetic) and the steep slopes on the western edge of the property adjacent to the SWM ponds (light blue rectangles). Proposed Lots 66 – 69 are located adjacent to these slopes (Figure 1).

Figure 3. CRD Natural Areas Atlas map showing sensitive ecosystems and potential habitat for rare species. The green polygon is Douglas-fir/dull Oregon-grape ecosystem (*Pseudotsuga menziesii* / *Mahonia nervosa*). The light yellow polygon is Terrestrial Herbaceous. The red line on the adjacent property to the south is potential Sharp-tailed snake habitat. No sensitive species are known to occur on the property, which is not surprising given the almost completely disturbed land scape associated with historical subdivision development (Figure 6; Appendix A report).

Figure 4. BC Conservation Data Centre occurrence map for the property showing the Douglas-fir/dull Oregon-grape ecosystem (*Pseudotsuga menziesii* / *Mahonia nervosa*) (dark blue polygons) that lie to the north and west of the property. These treed landscapes are not connected to the property, being separated by either residential development (north) or the VMP (west).

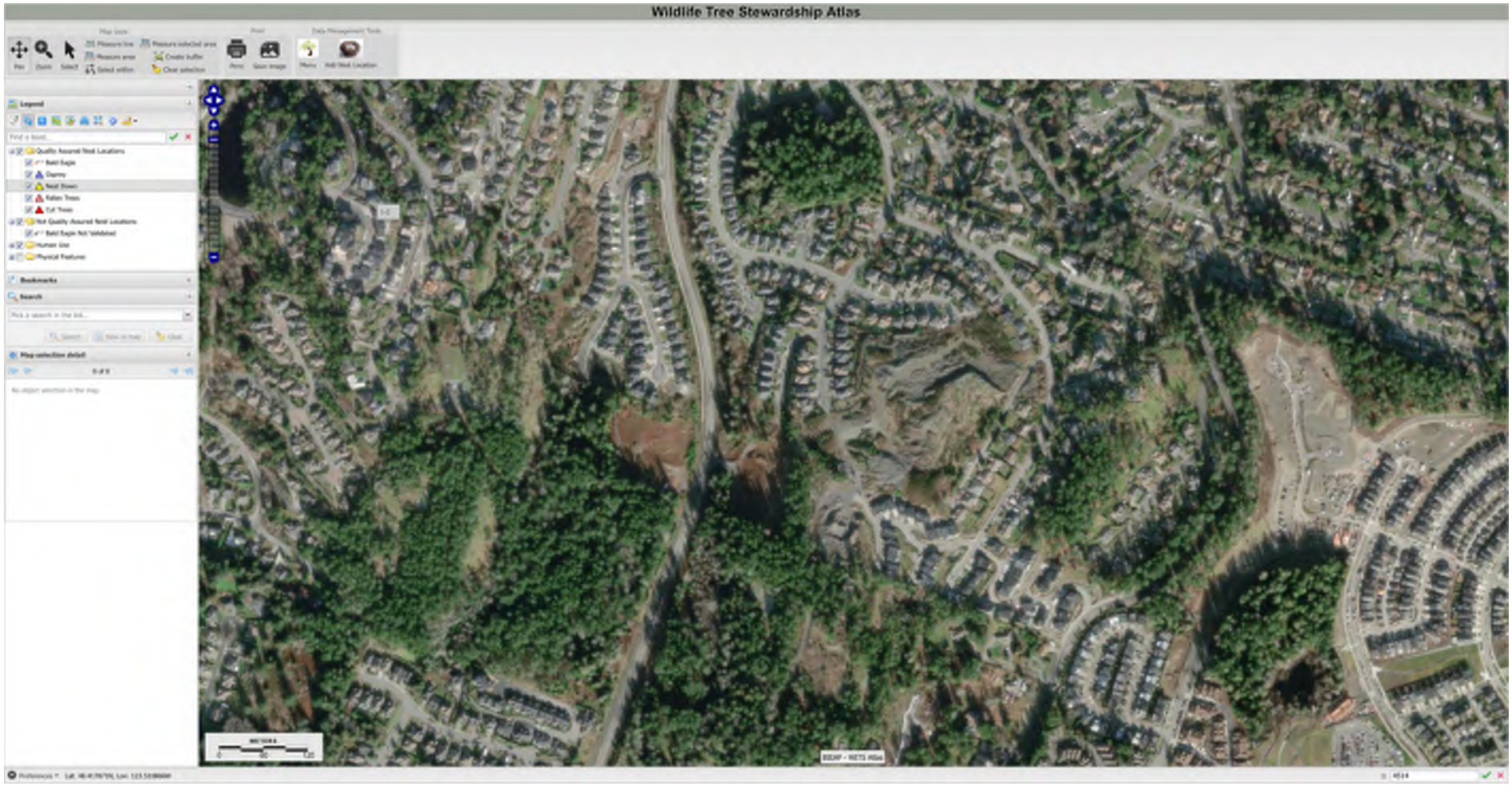

Figure 5. The property (yellow polygon) shown in the B.C. Wildlife Tree Stewardship Atlas (~2023 aerial image), indicating there are no known wildlife trees located on the property or in the adjacent area (~350 m from the property boundaries).

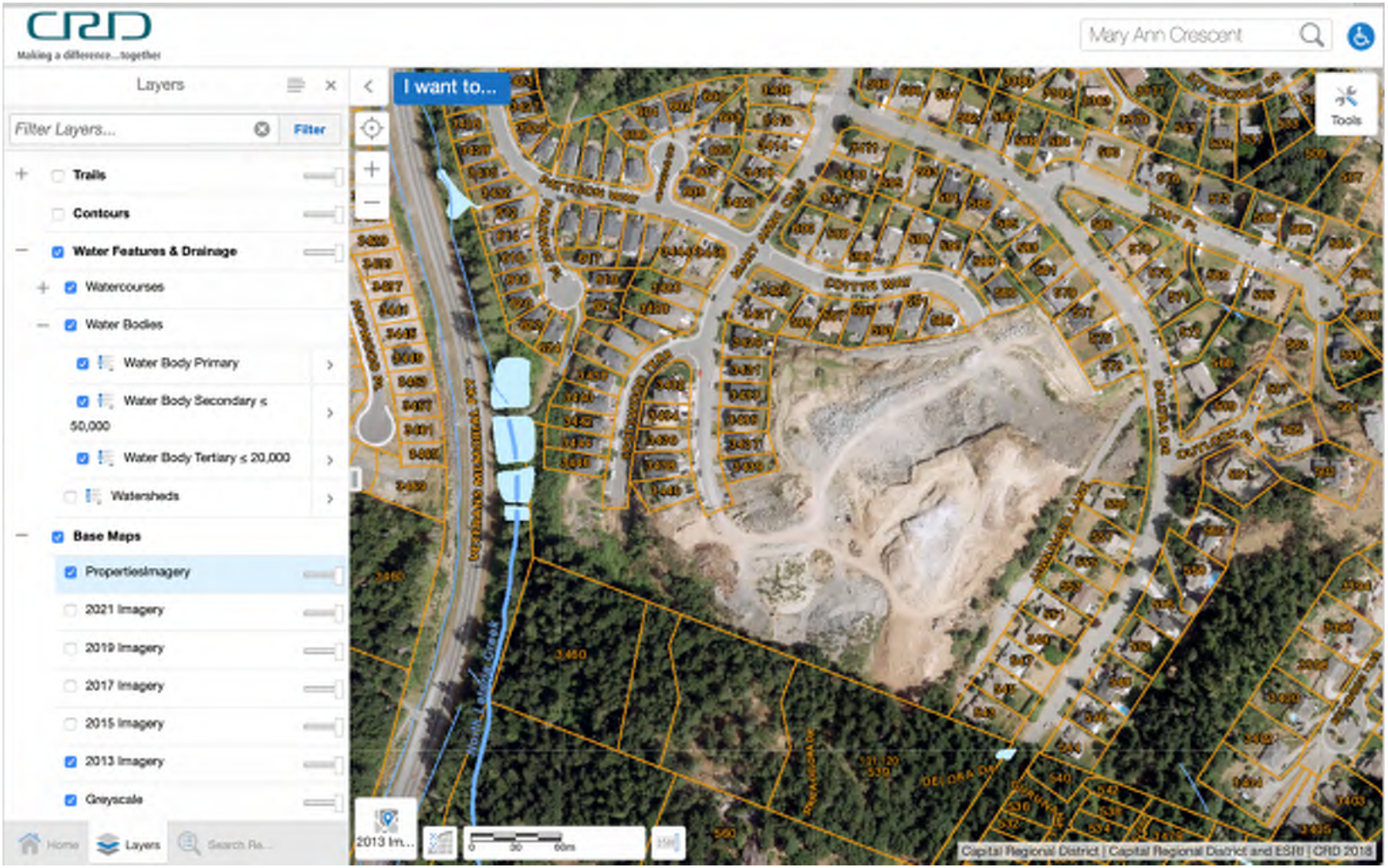

Figure 6. CRD Natural Areas Atlas map with an aerial photo from 2013 showing the property has been largely denuded of vegetation, with a narrow fringe along the eastern property boundary (yellow arrow) and the treed area associated with the steep slopes on the western property boundary (orange arrows). Development along the east property boundary (Figure 1) will result in a loss of rainwater as runoff is captured and routed into buried stormwater conveyance systems. Note the stock piles of crushed rock and internal construction roads. The properties to the south were treed with a canopy dominated by mid-aged (50 – 80 year old) conifers, with a few Garry Oaks. The man-made stormwater ponds and ditches lie upslope of the solid black bar, with North Latoria Creek flowing from its headwaters on the west side of VMP (not shown).

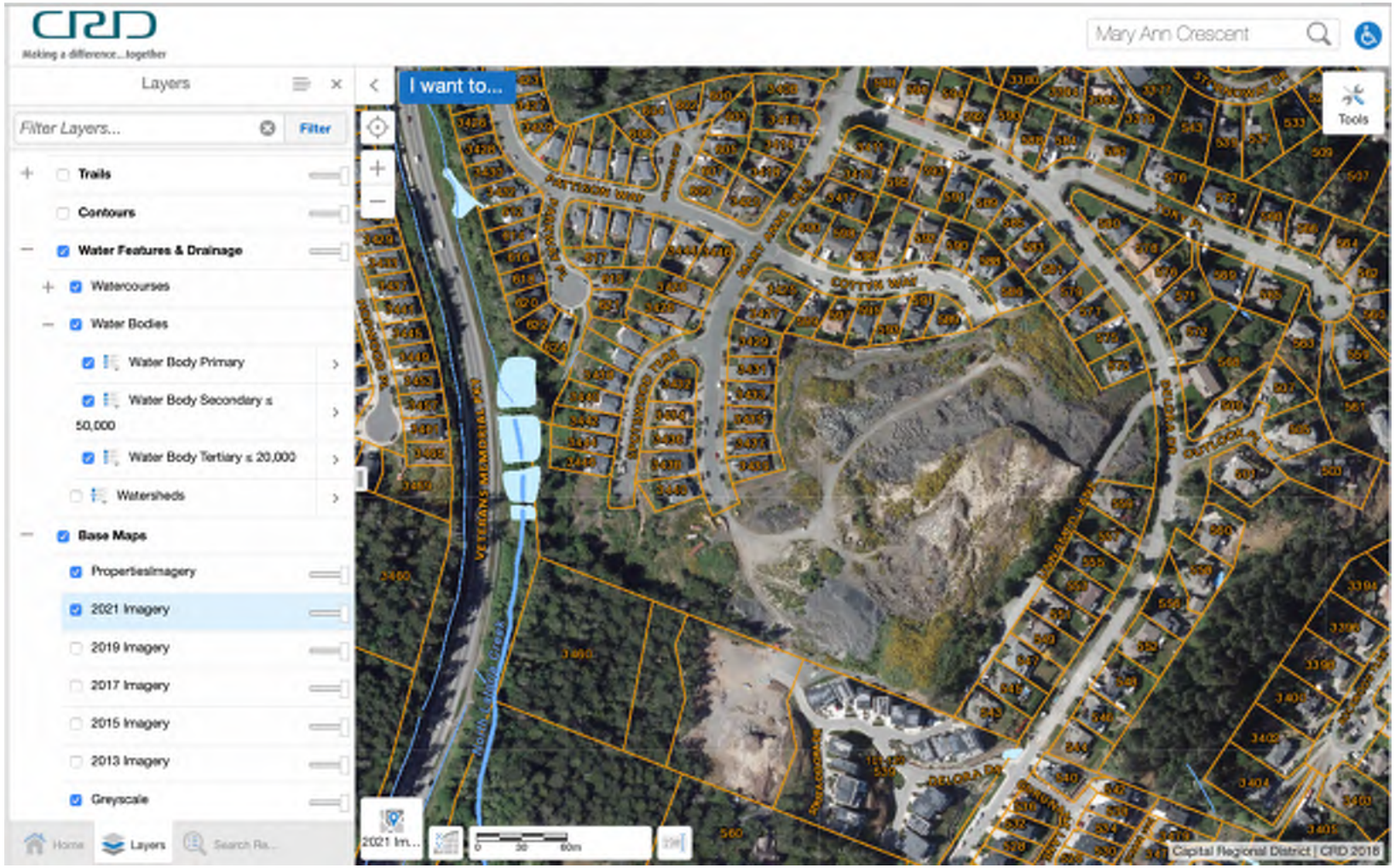

Figure 7. CRD Natural Areas Atlas map with an aerial photo from 2021 showing the property has remained untouched, with an ingrowth of invasive species (broom, Himalayan blackberry, minor quantities of red alder), with subdivision development and associated land clearing to the south having begun. The proposed development, including the proposed widening of VMP affects the three lower most ponds and the channel connecting the ponds with North Latoria Creek.

Figure 8. GoogleEarth image with aerial photo taken February 23, 2023 showing the approximate property (light orange polygon). Note the disturbance footprint has remained untouched since 2010 (Figure 9), but the property to the south has been cleared as part of a subdivision application. The treed canopy (yellow arrow) is a dedicated Colwood Park connectivity corridor to Havenwood Park.

Figure 9. GoogleEarth image with aerial photo taken July 7, 2010 showing the approximate property (light orange polygon) and that the property had been cleared of vegetation, with a few peripheral treed canopies let untouched (yellow arrows).

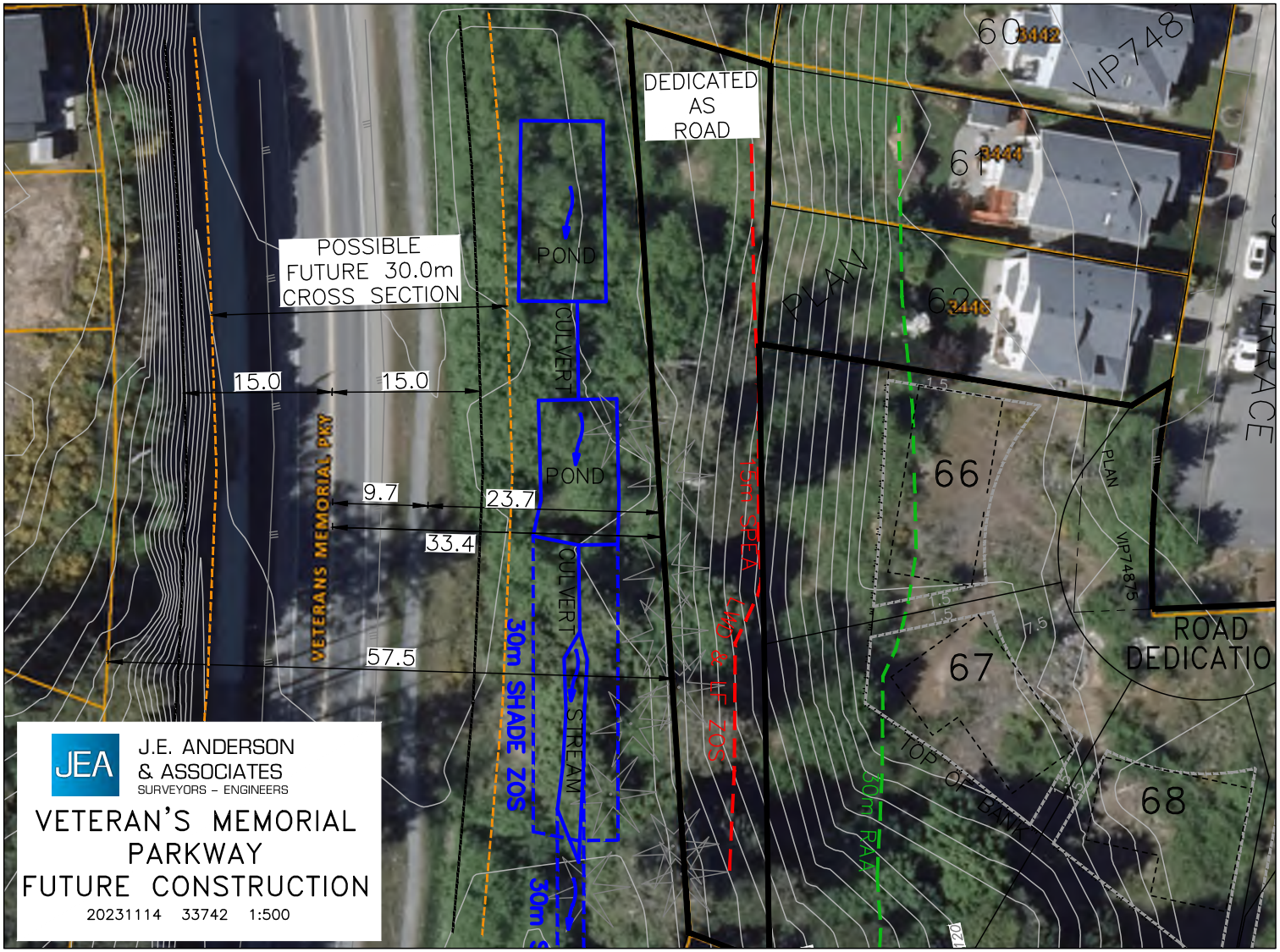

Figure 10. Site Plan showing the proposed widening of VMP (30m width; yellow arrows), relative to the existing stormwater treatment ponds (blue lines), subject property boundary (PL = black lines), and 15m SPEA (dashed red line). Note the ponds lie on municipal land.

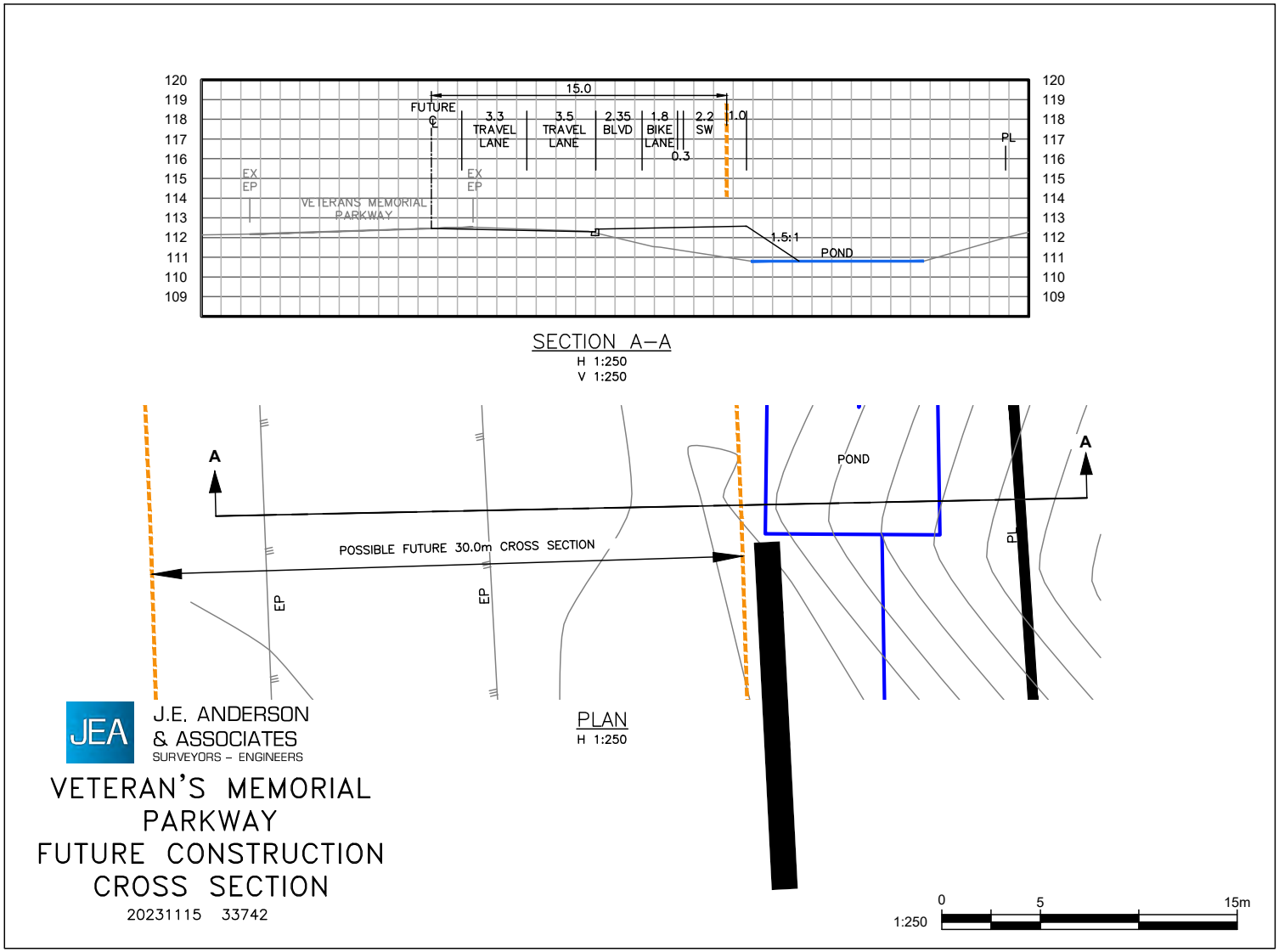

Figure 11. Cross section of proposed widened VMP roadway, relative to the stormwater treatment pond and subject property boundary (PL).

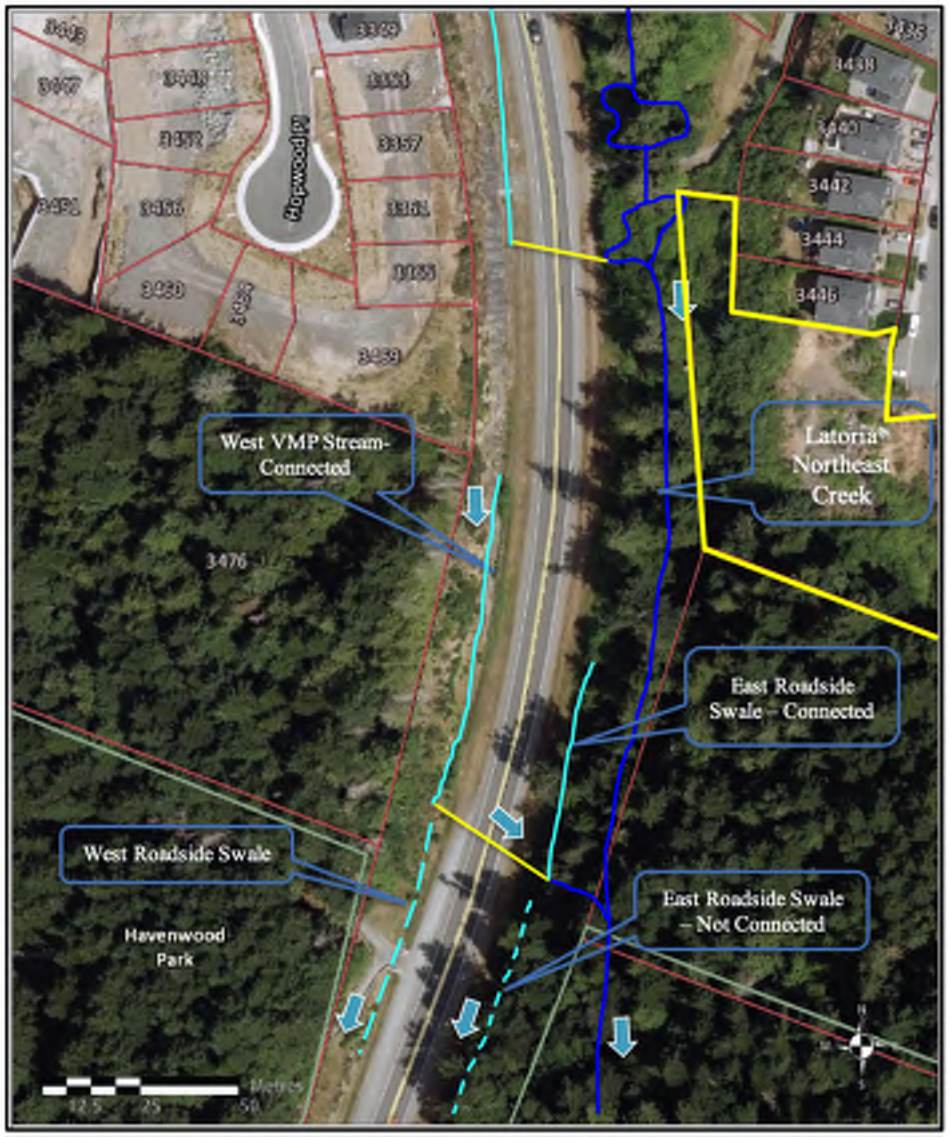

Figure 12. Sketch of Latoria Northeast Creek and the roadside swales along Veterans' Memorial Parkway. Solid lines (teal and dark blue) indicate channels directly connected to Latoria North Creek, while the dashed teal line represents the roadside swale which is not directly connected to Latoria North Creek; arrows denote the direction of flow. Sketch is approximate, this figure is intended for illustrative purposes only. The drainage lines are not an accurate alignment of each feature. Note that there is a wetland/pond shown adjacent to the northwest corner of the subject property (yellow line), from which a drainage channel flows south. Note the wetland/pond and stream reach adjacent to the subject property are virtually north-south. Image Source: CRD Regional Community Atlas (2013 orthophoto).

Figure 13. Constructed pond banks, located at the VMP/Latoria Road roundabout, showing the sidewalk, narrow, plantable gravel bench adjacent to the top of the structural retaining wall – Flex MSE Vegetated Wall System. Note the ~2 m planting terrace at the base of the wall.

Figure 14. Looking at the vertical Flex MSE Vegetated Wall System (height = ~2m (yellow arrow)). The planting terrace at the base of the wall consists of a sand/gravel lower terrace and a soil terrace above the sand/gravel terrace. The soil terrace is intended as a tree/shrub planting zone.

Figure 15. In this image the Flex MSE Vegetated Wall System height is ~1.2m high (yellow arrow). The planting terrace at the base of the wall is ~1.5m high. Note the distinct separation between the vertical wall, the planting terrace, and the gravel terrace.

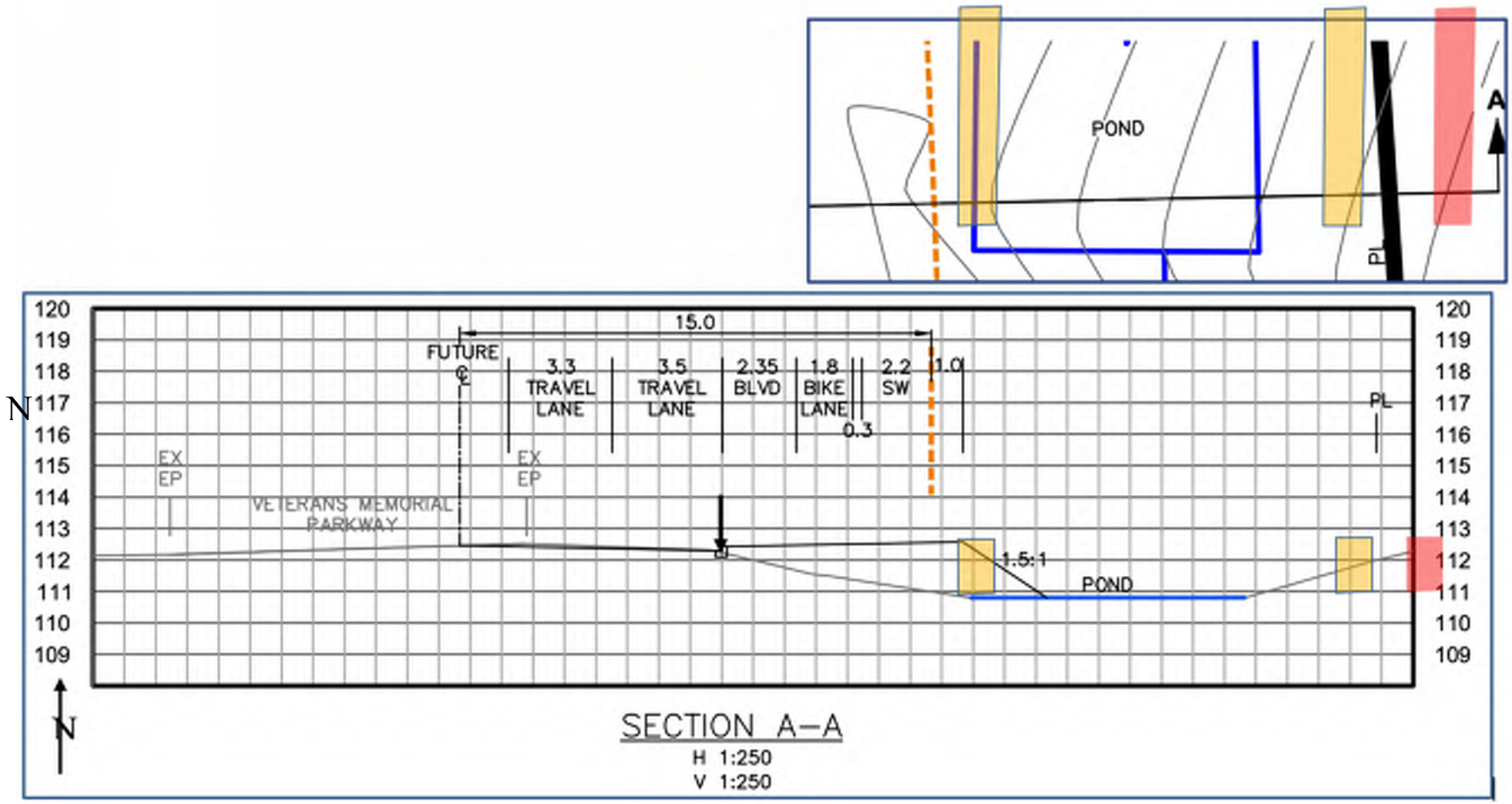

Figure 16. Coloured rectangles = Flex MSE retaining walls (1.0m wide X 2.0m Height). Current western sloping side wall of pond could be replaced with a vertical Flex MSE retaining wall, 7.5m west of existing SW Pond top-of-bank (black arrow); the eastern sloping side wall of pond could be replaced with a vertical Flex MSE, either within the VMP ROW (orange rectangle) or moved east on private land (red rectangle). If a "no-net-loss' of SW pond volume is required, the red Flex MSE vertical wall would be moved east to maintain the historical pond volume. Insert, upper right, shows the vertical Flex MSE retaining walls in Plan View.

Aqua-Tex
Scientific Consulting Ltd. (1993)

390-7th Avenue,
Kimberley, B.C. V1A 2Z7
Tel: (250) 427-0260
Fax: (250) 427-0280
e-mail: aqua-tex@islandnet.com

201-3690 Shelbourne St
Victoria, B.C. V8R 4H2
Tel: (250) 598-0266
Fax: (250) 598-0263

To: Kelsea Fielden, B.A., Planner 1, Development Services, City of Colwood
Cc: Danny Carrier, BCLS (Ret.), J.E. Anderson & Associates
Aqua-Tex Staff
From: Wm. Patrick Lucey, B.Sc., B.A., M.Sc., R.P. Bio., CBiol., MRSB, Sr. Aquatic Ecologist
Date: January 16, 2024
Re: **Mary Anne Cres Subdivision – RAPR Exemption**
File: /Users/Patrick/Documents/Projects/Turnberry Mike Weir/2024 RAPR Exemption–Memo to Kelsea Fielden-2024-01-16/2024-01-16_Memo to Kelsea Fielden RAPR Exemption.docx

Dear Kelsea:

Thank you for your email of January 15th, 2024 requesting clarification regarding the application of the RAPR to municipal Institutional works. I have copied the core question raised in your email here:

> I am reaching out regarding one aspect of the revised environmental report for the Mary Anne Cres/Spotswood subdivision dated Dec 11, 2024. I understand now that if the works are deemed institutional by the City, RAPR does not apply. The widening of VMP has been deemed institutional. The report notes:
>
> - There would be a significant loss of riparian vegetation along the west side of the ponds.
>
> Is a habitat loss compensation and replanting scheme required to mitigate that loss? The City would take a cash-in-lieu deposit for those works when they are completed.

My response to your questions are as follows:

1. The proposed widening of VMP, a City of Colwood road, would be deemed Institutional under the RAPR (Section 1.5.1 Types of Development; pg. 10. RAPR Technical Assessment Manual, 2019, Ver. 1). *The RAPR does not apply to institutional developments, but these are subject to the Federal Fisheries Act and Provincial Water Sustainability Act.*
   - Since the ponds are man-made stormwater treatment facilities, their function is to treat pollutants before the treated runoff enters fish habitat downstream.
   - The *Federal Fisheries Act* deems stormwater treatment facilities as non-fish habitat (Section 36): it prohibits the deposit of all deleterious substances into water frequented by fish, or to any place, under any conditions, where it may enter water frequented by fish. Thus, a stormwater management pond, designed to receive and treat deleterious substances, cannot also be classified as fish habitat, the treatment ponds being, therefore, exempt from the *Fisheries Act*.
   - Since the stormwater treatment ponds are man-made they are not subject to the *Water Sustainability Act (WSA), i.e., the WSA applies to natural watercourses.*
2. There will be significant loss of riparian vegetation adjacent to the west side of the stormwater treatment ponds.
   - These ponds are designed to receive and treat deleterious substances. The ponds are not intended to provide habitat for fish, or other aquatic species.

- The majority of the vegetation that has grown up beside the ponds consists of red alder and blackberry, with agronomic grasses having been planted beside the road to stabilize post-construction bare soils.

3. A habitat loss compensation and replanting scheme is not, in my opinion, required since the vegetation adjacent to the stormwater management ponds was not intended as habitat.
    - The vegetation adjacent to the ponds will regenerate naturally, as this is how the existing vegetation became established post-pond construction.
    - Existing vegetation adjacent to the ponds, such as red alder can be retained by having the Contractor, constructing the widening of VMP, install protection barriers to prevent inadvertent harm to the vegetation and the roots of the trees. The installation of temporary tree protection fencing is standard practice for road construction and is not part of a habitat management plan.

I trust the above addresses your question regarding the RAPR 'Exemption' for the possible future widening of VMP and riparian vegetation management adjacent to the stormwater management ponds.

Appendix A

Original Environmental Impact Assessment Report for Anne Murray Crescent, by Cascadia Biological Services (October 26th, 2012)

Schedule 3

Cascadia Biological Services
2150 Melrick Place
Sooke, BC
V9Z 0M9

October 26th 2012

City of Colwood
3100 Wishart Road
Victoria, British Columbia
Canada, V9C 1R1
Attn: Planner

Environmental Impact Assessment
Anne Murray Crescent

Purpose

This report is in response to a request by the City of Colwood for an assessment of environmentally significant attributes as well as potential impacts resulting from the proposed subdivision of Lot 1, Section 63, Plan VIP75627 – Esquimalt District (refer to Attachment A, B C for an overview map showing the subject property location, environmentally significant attributes and proposed housing layout respectively) in the City of Colwood. Located along the western edge (mid) of the city boundary with the City of Langford, the property has been identified on the CRD Natural Areas Atlas Maps as having no environmentally significant attributes from an overview mapping perspective. Refer to Attachment C.

Because of past disturbances and the limited potential for high value habitat, this assessment will determine if any areas within the subject property falls within existing environmentally sensitive areas not previously mapped, and if so, how best to mitigate and/or reduce the overall environmental impacts associated with the development. As well, the assessment is also required to determine if the Riparian Areas Regulations (RAR) legislation applies to the property in regards to watercourses that may be present on site and/or immediately adjacent to the property.

Background

At the request of Rex Coburn (Andrex Developments), Cascadia Biological Services was retained to conduct a environmental impact assessment of the proposed disturbed area (entire lot) associated with the subdivision of Lot 1, Section 63, Plan VIP75627 – Esquimalt as shown on Attachment B. Measuring approximately 47,705m^2 (11.79 acres) in area, our assessment focused on all remaining vegetated areas of the property, which

appeared to be in more of a natural state. These natural state areas are sporadically located and measure approximately 200 m^2 (0.04 acres) and represents 0.3% of the entire property. Fieldwork to assess the study area was completed by Thomas Roy, QEP of Cascadia Biological Services on October 23rd and October 24th 2012. The purpose of the site visit therefore was to examine the physical and biological attributes of the proposed disturbed area within the property, review proposed works, and to discuss how best to minimize or offset the environmental impacts resulting from the proposed subdivision. Prior to the field visit, an overview search of existing environmentally significant areas was conducted including a search of rare elements as documented by the BC Conservation Data Centre.

Environmental Assessment Findings

1) **Land Use** – Properties to the north, south, east and west of the subject property have been utilized for residential purposes. Most of the native vegetation in and around the subject property including neighbouring properties has been replaced by lawns and ornamental gardens comprised primarily of introduced species.

2) **Subject Property** - The subject property consists of a total area of 47,705 m^2 (11.79 acres) of which over 96% has been previously disturbed. Further to the previous disturbances on the property, the proposed disturbances associated with the subdivision plan, include land alterations over 100% of poorly rated (marginal habitat) Woodland Ecosystem consisting of approximately 14 Garry Oak trees with groundcover consisting of various introduced species of grasses and shrubs. For the sake of this assessment, poorly rated habitat is indicative of an indigenous ecosystem however, does not possess environmentally significant attributes including nesting/denning sites and/or rare plants. Overall, the ecosystem provides some habitat for birds, deer and other small mammals including raccoons etc. Overall, given the isolation of the ecosystem and fragmentation of available habitat, the ecosystem is considered of low value.

3) **Rare Plants/Wildlife/Ecosystems** – From our assessment, there are no environmentally significant attributes including rocky outcrops, sharp-tailed snake habitat, wildlife trees, raptor nests, wildlife dens, rare plants/wildlife within the proposed disturbed area (Woodland Ecosystem). Overall, potential habitat and biodiversity values with the proposed disturbed area remain low due to previous disturbances and the introduction of non-native species.

4) **Waterbodies** – No RAR waterbodies or isolated ponds were identified on-site during our assessment.

Options and Recommendations

From our environmental assessment of the subject property located at the end of Mary Anne Crescent, it is in my opinion that the proposed subdivision as shown in Attachment

B, will not adversely impact the environment if the following recommendations are adhered to:

1) Works within the proposed disturbed area will be monitored by a Registered Professional Biologist (R.P. Bio.) during the initial excavation to ensure wildlife is not harmed. This includes monitoring for any new avian nests as well as small mammal dens etc.;
2) Protect all of the Garry Oak trees through either conservation covenants consisting of a 3m no disturbance covenant or undertake habitat improvements post construction (re-plant 28 Garry Oak trees within the confines of the previously dedicated park area);
3) Limit disturbances where feasible along rear of properties;
4) As a result of the proposed disturbed area and vegetation removal, Cascadia Biological Services recommends that one nesting boxes (QEP to determine sizes and configuration) be installed within the previously dedicated park area (off site)
5) Landscape planting should maximize use of native species (QEP to provide lists of acceptable plant species).

If you have any questions regarding this assessment, please do not hesitate to contact me by means below.

Thanks for your time.

Thomas Roy, R.P. Bio.,
Cascadia Biological Services
www.cascadiabiological.com
2150 Melrick Place
Sooke BC

Cascadia Biological Services

Attachment A – Overview Map

Cascadia Biological Services

Attachment B – Lot Layout

Cascadia Biological Services

Attachment C – Overview with Sensitive Ecosystem Polygons Layer On

Attachment D – Typical Site Photographs

Plate #1 – Typical view of subject property

Plate #2 – Typical view of site with the occasional Garry oak present

Plate #3 – View from center of property facing southeast

TREE PROTECTION ZONE (TPZ)

Schedule 4

No grade change, storage of materials or equipment is permitted within this TPZ. TPZ protection barrier and sediment/erosion mitigation structures must not be removed without the written authorization of City of Colwood, Planning Department (250 478-5999).

ATTACHED TO AND FORMS PART OF DP-09-12 DRAWING 4 of 4

Consulting Arborist: _____

Phone Number: _____

Appendix B

2022 RAPR Assessment Report Approval (Province reference #7784) and RAPR Report

From: "Riparian Areas WLRS:EX" <RiparianAreas@Victoria1.gov.bc.ca>
Subject: Assessment #7784A Meets the Standards of RAPR
Date: March 1, 2023 at 3:38:55 PM PST
To: "Riparian Areas WLRS:EX" <RiparianAreas@Victoria1.gov.bc.ca>, "aqua-tex@islandnet.com" <aqua-tex@islandnet.com>
Cc: 'Capital Regional District' <jdfinfo@crd.bc.ca>

Report Number	**7784**	**Review Comments Iteration**	**A**
Date: 2023-03-01		Reviewed By:	

Review determination

This RAPR Assessment report has been reviewed by the Ministry of Water, Land and Resource Stewardship. The Ministry hereby provides notice that this report:

meets the assessment and reporting criteria for the Riparian Areas Protection Regulation. For more information please see the summary below.

If there are further questions, please contact RiparianAreas@Victoria1.gov.bc.ca.

Keystone Data

QEP	William Patrick Lucey, R.P.Bio.	
Local Government	Capital Regional District	
Location of Proposed Development (Address)	Mary Anne Crescent (Spotswood) Colwood, BC	
PID	025-720-813	
Legal Description	Lot 1, Section 63, Esquimalt District, Plan VIP75627, Except part in Plan VIP1143 and VIP83075 (PID 025 720 813).	
Stream	Name	Latoria Northeast Creek, Reach 1-3
	Type	Stream/Wetland

	Comments	Stream and stormwater treatment ponds
RAPR Assessment		
	Addressed	**Comments**
SPVT Correct	Yes	
ZOS' Correct	Yes	
SPEA Correct	Yes	RAPR minimum SPEA for channelized streams is 10 m. QEP has applied 15 m SPEA on all watercourses which exceeds the RAPR minimum setback.
Site Plan		
Site Plan	Yes	
SB/TOB	Yes	
RAA	Yes	
ZOS's	Yes	
SPEA	Yes	
Building Envelope	No	Site plan shows subdivision lot boundaries.
Development within SPEA	No	
Measures		
Measures Appropriate	Yes	
Danger Trees	Yes	
Windthrow	Yes	
Slope Stability	Yes	
Protection of Trees	Yes	
Encroachment	Yes	
Sediment and Erosion Control	Yes	
Stormwater Management	Yes	
Floodplain Concerns	Yes	

Professional Opinion

	Checked off	Comments
Section 7(a) Signed	No	
Section 7(b) Signed	Yes	
Environmental Monitoring	Yes	
Applied Methodology Correctly	Yes	

Comments

QEP RAPR Assessment Report states:
The property (6.04 ha/ ~15 acres) has been 95% cleared/blasted by the previous owner as per their Development Permit. This revised RAPR Report is to facilitate a Subdivision Application in support of the previous development scheme, under a revised 2022 Development Permit. A Site Plan has been designed, i.e., internal roads and lot layout. Special Measures will pertain to the steep banks that lie along the western property boundary. Details of the Special Measures have been used to inform the lot layout and internal roads.

The City of Colwood Land Use Bylaw riparian setback is 15.0 m. No relocation or infilling, or disturbance of any portion of a watercourse or water body is proposed, nor is any stream crossing proposed. No access to the subject property is proposed from VMP. The stream and riparian buffer are currently in a minimal state of Proper Functioning Condition (PFC) and will be maintained in this state. There are a number of mature cedar and fir trees within the SPEAs and Special Measures Zone. No modifications to the riparian vegetation within the SPEA or adjacent Special Measures management Zone are proposed.

The RAPR prescribes a 15 m SPEA for the two treatment ponds and a 5 m SPEA for the stream (ditch) channel. The 30 m shade ZOS, due south of the two treatment ponds, lies entirely within VMP road right-of-way. Given the need to protect the riparian plant community along all three Reaches a 15 m SPEA has been assigned, rather than applying the Method specified SPEA widths. This SPEA width

enhances the riparian protection for the mature conifers and young conifer understory. The SPEAs lands will be transferred to the City of Colwood as Park Land when the subdivision is Registered.

It is recognized that the SPEAs and ZOSs do not apply to the municipal VMP road right of- way. The ZOSs and SPEAs have been applied as if the property was private land. The buried connecting pipes, between the treatment ponds, have had a SPEA applied as if the connection was a surface channel. The original drainage ditch has become well-vegetated and is showing signs of trending toward stream-like characteristics. The transition between the downstream treatment pond and stream channel has had a 15 m SPEA applied across all three Reaches.

The SPEAs for the stream extend east onto the adjacent private subject property.

Review Comments

- It is understood that the City of Colwood Land Use Bylaw 15 m riparian setback exceeds the RAPR minimum SPEA setbacks.
- Watercourses that have been assessed meet the criteria for channelized streams (not ditches) under RAPR. QEP is applying SPEAs as if these watercourses were channelized streams, therefore the 15 m SPEA exceeds the RAPR minimum SPEAs.
- This RAPR Assessment Report meets the standards for subdivision only. If works are subsequently proposed within the RAA of these streams, the RAPR Assessment Report must be updated.
- It is understood that previous development on the site was in accordance with an issued Development Permit.

From: RiparianAreas@Victoria1.gov.bc.ca <RiparianAreas@Victoria1.gov.bc.ca>
Sent: November 21, 2022 3:24 PM
To: aqua-tex@islandnet.com; Riparian Areas, Region 1 LWRS:EX

<RARReg1@gov.bc.ca>; Riparian Areas LWRS:EX <RiparianAreas@Victoria1.gov.bc.ca>; DFO_EPMP@PAC.DFO-MPO.GC.CA
Subject: Assesment 7784 has been updated

This assessment has been updated. This notification is sent to you, Fisheries and Oceans Canada (DFO)and the BC Ministry of Environment.
Details of this assessment are included in this notification.
Check content to ensure correctness.
If it is incorrect, modify your assessment.

Assessment Details

Assessment ID::	7784	**Creation Date:**	2022-07-17
Status:	updated	**Last Modified:**	2022-11-21

Development Details

Development Type:	Other	**Proposed Start Date:**	2022-09-30
Area of Development (hectares):	5.000	**Proposed End Date:**	2024-12-31
Lot Area (hectares):	6.040	**Nature of Development:**	New
Riparian Length:	100.00	**Section 9 Part 7 Activities:**	N

Location Details

Local Government:	Colwood, City of	**DFO Area:**	South Coast Area

Region:	Vancouver Island	**Stream/River Type:**	Watercourse and Wetland
Parcel Identification (PID)/ Parcel Identification Number (PIN):	025-720-813	**Stream/River Name:**	Latoria Northeast Creek
Address Line 1:		**Watershed Code:**	920-031900
Address Line 2:		**Postal Code:**	
Latitude:	48°24'54"	**Longitude:**	123°30'12"

Developer Details

Contact First Name:	Michael	**Address Line 1:**	16209 Morgan Creek Cres
Contact Middle Name:		**Address Line 2:**	
Contact Last Name:	Weir	**City:**	Surrey
Province/State:	BC	**Postal/Zip Code:**	V3Z 0J2
Email Address:	mrmaweir@gmail.com	**Country:**	Canada
Company Name:	Turnberry Developments	**Phone #:**	604-671-0755

Primary QEP Details

Contact First Name:	William	**Address Line 1:**	390 7th Ave
Contact Middle Name:	Patrick	**Address Line 2:**	

Contact Last Name:	Lucey	**City:**	Kimberley
Designation:	Biologist	**Province/ State:**	BC
Registration #:	1467	**Postal/Zip Code:**	V1A 2Z7
Email Address:	aqua-tex@islandnet.com	**Country:**	Canada
Company Name:	Aqua-Tex Scientific Consulting Ltd.	**Phone #:**	250-427-5906

Secondary QEP Details

Name:	**Company**	**Address**	**Email**	**Phone**
Steven Voller	Seamount Consulting	6009 Jaynes Road Duncan Canada	seamount61@gmail.com	250-709-1550

[redacted]

Revised Riparian Areas Protection Regulation Assessment Report (RARNS #7784)

Prepared for: Mike Weir, Turnberry Developments Ltd. **November 21, 2022**

***Prepared by*: Wm. Patrick Lucey, RP Bio, CBiol, MRSB, Aqua-Tex**
Steve Voller, RP Bio, Seamount Consulting Ltd.

Aqua-Tex
Scientific Consulting Ltd. (1993)

Date	November 21, 2022

I. Primary QEP Information

First Name	William	Middle Name	Patrick		
Last Name	Lucey				
Designation	R.P. Bio	Company: Aqua-Tex Scientific Consulting Ltd.			
Registration #	1467	Email: aqua-tex@islandnet.com			
Address	390 7th Avenue				
City	Kimberley	Postal/Zip	V1A 2Z7	Phone #	250-427-5906
Prov/state	BC	Country	Canada		

II. Secondary QEP Information

First Name	Steven	Middle Name	Neil		
Last Name	Voller				
Designation	R.P. Bio.	Company: Seamount Consulting			
Registration #	1798	Email: seamount61@gmail.com			
Address	6009 Jaynes Road				
City	Duncan	Postal/Zip	V9L 3C4	Phone #	250-709-1550
Prov/state	B.C.	Country	Canada		

First Name		Middle Name	
Last Name			
Designation		Company:	
Registration #		Email:	
Address			
City		Postal	Phone #
Prov/state		Country	

III. Developer Information

First Name	Michael	Middle Name			
Last Name	Weir				
Company	Turnberry Developments Ltd.				
Phone #	604-671-0755	Email: mrmaweir@gmail.com			
Address	16209 Morgan Creek Crescent				
City	Surrey	Postal/Zip	V3Z 0J2		
Prov/state	BC	Country	Canada		

IV. Development Information

Development Type	Other		
Area of Development (ha)		Riparian Length (m)	100
Lot Area (ha)	6.04	Nature of Development	New
Proposed Start Date	2022-09-30	Proposed End Date	2024-12-31

V. Location of Proposed Development

Street Address (or nearest town)	Colwood BC						
Local Government	Capital Regional District			City	Colwood		
Stream Name	Latoria Northeast Creek						
Legal Description (PID)	025-720-813			Region	1 – Vancouver Island		
Stream/River Type	stream			DFO Area	18 – Vancouver Island		
Watershed Code	920-031900						
Latitude	48°	24’	54.4”	Longitude	-123°	30’	12.4”

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1. Executive Summary

This is a revised RAPR Assessment Report which has been prepared for Mike Weir, Turnberry Developments Ltd., for an undeveloped property located at Mary Anne Crescent (Spotswood), City of Colwood, which is subject to a revised Development Permit application (Figure 1 and Figure 2). The previous RAPR Assessment Report was assigned RARNS #7784. The property does not have a street address; the Legal description of the property is: Lot 1, Section 63, Esquimalt District, Plan VIP75627, Except part in Plan VIP1143 and VIP83075 (PID 025 720 813). The property boundary is as shown in grey below:

The property (6.04 ha/ ~15 acres) has been 95% cleared/blasted by the previous owner as per their Development Permit. This revised RAPR Report is to facilitate a Subdivision Application in support of the previous development scheme, under a revised 2022 Development Permit. A Site Plan has been designed, *i.e.*, internal roads and lot layout. Special Measures will pertain to the steep banks that lie along the western property boundary. Details of the Special Measures have been used to inform the lot layout and internal roads.

A linear series of manmade, stormwater treatment ponds and a drainage channel (ditch and culverts) lie beyond the western edge of the property boundary (Figure 3). These treatment ponds and drainage channel lie within a City of Colwood road right-of-way

(Veterans Memorial Parkway (VMP)). These aquatic features were constructed as part of a municipal stormwater management treatment facility for a subdivision located to the north of the existing Spotswood and Mary Anne Crescent subdivision. Drainage from the Provincial Government's construction of Veterans Memorial Parkway (VMP) also are routed into the treatment ponds for treatment. The treatment ponds and the ditch were constructed as sediment detention features and the drainage ditch routes runoff downslope to a natural watercourse, the latter lying within Colwood's Havenwood Park. The aquatic features in the subject property and under assessment – all man-made – have been significantly altered and modified over the past two decades. A neighbouring adjacent subdivision, immediately south, has been awarded a Development Permit and the forest on this latter subdivision has recently been cleared.

Over the past decade, previous assessments of the aquatic features associated with the construction of VMP have been conducted by the authors, as part of Rezoning applications for an adjacent property to the south of subject property. In consultation with Colwood Planning staff, for the purpose of applying the RAPR, the aquatic landscape features have been classified as a mix of streams (natural watercourses) and ditches (as defined under the RAPR). The drainage features associated with this report continue to function as sediment detention ponds, with a functional riparian plant community developing around the ponds and short ditches connecting the ponds. Downstream of the adjacent property to the south there is a natural watercourse downslope in Havenwood Park (Figure 3 and Figure 4). The subject property east of the Municipal VMP right-of-way consists of a steep slope with a flat terrace stretching east beyond the top-of-bank. The steep slope is not a ravine.

Since the subject property lies adjacent to the treatment ponds and stream (within the 30 m Riparian Assessment Area (RAA)), with a narrow sliver of development within the 30 m RAA, the subdivision application required a review of the subject property by Colwood Planning staff. Staff specified that a RAPR Assessment report is required to determine whether SPEA and Special Management Zones are required. Since most of the riparian landscape, surrounding the treatment ponds and stream, lie within the Municipal VMP right-of-way, the RAPR would verify to what extent any SPEAs would lie on the subject property. In addition, there is a Colwood OCP Bylaw which specifies a 15 m buffer for streams/wetlands/ponds. The lands within the SPEAs and 15 m municipal riparian boundary would be transferred to the City of Colwood as future Park Land.

The RAPR prescribes a 10 m SPEA for Latoria Northeast Creek and a 15 m SPEA for the two treatment ponds (). The 30 m shade ZOS due south of the two treatment ponds, lies entirely within the ZOSs associated with the aquatic features noted above; the 7.5 m shade ZOS assigned to the stream lies due south, parallel to the stream's HWMs.

It is recognized that the RAPR SPEAs and ZOSs do not apply to the municipal VMP road right-of-way. The ZOSs and SPEAS have been applied as if the property was private land. The buried connecting pipes, between the treatment ponds, have had a SPEA applied as if the connection was a surface channel. The original drainage ditch has become well-vegetated. The transition between the downstream treatment pond and stream channel has had a SPEA applied that begins as 15 m reducing to a 10 m SPEA.

The treatment ponds have a piped outlet structure that has both an intake and overflow inlet. An examination of the ponds revealed that the bankfull elevation and the overflow inlet elevation are coincident; there is no evidence that the treatment pond water levels

exceed the overflow inlet elevation. Therefore, we have prescribed the overflow inlet elevation as the HWM and as the stream boundary elevation. The treatment pond catchments are very small.

The stream channel below the downstream treatment pond has a narrow cross section and no functional floodplain. While the average slope is 2% (typical of a Rosgen C channel which has a floodplain), the man made/constructed channel morphology is a Rosgen B channel configuration, *i.e.*, it does not have a floodplain. The bankfull elevation is equivalent to the HWM / stream boundary.

The City of Colwood Land Use Bylaw riparian setback is 15.0 m. No relocation or in-filling, or disturbance of any portion of a watercourse or water body is proposed, nor is any stream crossing proposed. No access to the subject property is proposed from VMP.

The stream and riparian buffer are currently in a minimal state of Proper Functioning Condition (PFC) and will be maintained in this state. There are a number of mature cedar and fir trees within the SPEAs and Special Measures Zone. No modifications to the riparian vegetation within the SPEA or adjacent Special Measures management Zone are proposed.

Given the complexity of the stream channels in these headwater landscapes, the tributaries to Latoria Creek shall be referred to by the authors as follows (Figure 4):

- The tributary arm that flows from the headwater wetland through the west parcel of Havenwood Park, and under VMP shall be referred to as Latoria Northwest Creek.
- The tributary arm that flows parallel to VMP adjacent to the east side of VMP shall be referred to as Latoria Northeast Creek.
- The section of the tributary downstream of the confluence of the above two arms and until it flows into Latoria Creek shall be referred to as Latoria North Creek.

2. Introduction and Proposed Development

The property (6.04 ha/ ~15 acres) has been 95% cleared/blasted by the previous owner as *per* their Development Permit. This RAPR is a Subdivision Application assessment to support a former subdivision development scheme. The original site planning (Development Permit for previous subdivision expired in 2019) has been maintained, *i.e.*, internal roads and lot layout; Special Measures that will pertain to the steep banks that lie along the western property boundary, and rainwater management. No works are proposed that will affect slope stability; riparian vegetation within the SPEA and on the steep banks will be retained in their present condition (no tree removal is proposed).

There is a linear series of stormwater treatment ponds and a drainage channel (ditch) that lie beyond the western edge of the property boundary (Figure 3). These treatment ponds and drainage channel lie within a City of Colwood road right-of-way (Veterans Memorial Parkway (VMP)). These aquatic features were originally constructed as part of a subdivision north of the proposed subject property and as part of the Provincial Government's construction of VMP. The treatment ponds and the ditch were constructed as sediment detention features and the drainage ditch routes runoff from the subdivision and VMP downslope to a natural watercourse, the latter lying within Colwood's Havenwood Park. The aquatic features under assessment have been significantly altered

and modified over the past two decades. Other than the stormwater management, manmade treatment ponds and connecting ditches, there are no other aquatic features on the subject property.

Over the past decade, assessments of the aquatic features have been conducted by the authors, as part of a rezoning application for the adjacent property to the south of subject property. In consultation with Colwood Planning staff, for the purpose of applying the RAPR, the aquatic landscape features have been deemed to be a mix of 'streams' and 'ditches'. On the subject property, a functional riparian plant community has developed around the treatment ponds and ditches connecting the treatment ponds to the natural watercourse downslope in Havenwood Park (Figure 3 and Figure 4). There is a steep slope east of the aquatic landscape features; no development is proposed to occur on the steep slope and all existing vegetation within the 30 m RAA will be left undisturbed. There is a narrow portion of the 30 m RAA, beyond the top-of-bank (Figure 14) that was cleared of vegetation by a previous landowner.

Since the subject property lies adjacent to the treatment ponds and stream (within the 30 m Riparian Assessment Area (RAA)), the subdivision application review of the subject property by Colwood Planning staff specified that an RAPR Assessment report is required to determine the SPEAs and Special Management Zones. Since most of the riparian landscape, surrounding the treatment ponds and stream, lie within the Municipal VMP right-of-way, the RAPR would verify to what extent any SPEAs would lie on the subject property. In addition, there is a Colwood OCP Bylaw which specifies a 15 m buffer for streams/wetlands/ponds/ditches.

The RAPR prescribes a 15 m SPEA for the two treatment ponds and a 5 m SPEA for the stream (ditch) channel. The 30 m shade ZOS, due south of the two treatment ponds, lies entirely within VMP road right-of-way. Given the need to protect the riparian plant community along all three Reaches a 15 m SPEA has been assigned, rather than applying the Method specified SPEA widths. This SPEA width enhances the riparian protection for the mature conifers and young conifer understory. The SPEAs lands will be transferred to the City of Colwood as Park Land when the subdivision is Registered.

It is recognized that the SPEAs and ZOSs do not apply to the municipal VMP road right-of-way. The ZOSs and SPEAs have been applied as if the property was private land. The buried connecting pipes, between the treatment ponds, have had a SPEA applied as if the connection was a surface channel. The original drainage ditch has become well-vegetated and is showing signs of trending toward stream-like characteristics. The transition between the downstream treatment pond and stream channel has had a 15 m SPEA applied across all three Reaches.

The treatment ponds have a piped outlet structure that has both an intake and overflow inlet. An examination of the pond revealed that the bankfull elevation, the stream boundary, and the HWM and the overflow inlet elevation are coincident; there is no evidence that the treatment pond water levels exceed the overflow inlet elevation. Therefore, we have prescribed the overflow inlet elevation as the HWM / stream boundary elevation; this elevation is also equivalent to the bankfull elevation. The treatment pond catchments are very small.

The stream channel below the downstream treatment pond has a narrow cross section and no functional floodplain. While the average slope is 2% (typical of a Rosgen C channel which have floodplains), the man made/constructed channel morphology is a Rosgen B

channel configuration, *i.e.*, it does not have a floodplain, with as noted above the bankfull elevation equivalent to the HWM / stream boundary (SB). The City of Colwood Land Use Bylaw (2018 OCP) riparian setback is 15.0 m.

No relocation or in-filling, or disturbance of any portion of a watercourse or water body is proposed, nor is any stream crossing proposed. No access to the subject property is proposed from VMP. The proposed development is for a Subdivision Application, based upon the original Development Permit Lot Layout, the latter permit having lapsed in 2019.

The treatment ponds and ditches, and riparian buffer plant community, are currently in a low state of Proper Functioning Condition (PFC). There are a number of mature cedar and fir trees within the SPEAs and Special Measures Zone. No modifications to the riparian vegetation within the SPEA or adjacent Special Measures management Zone are proposed.

Given the complexity of the stream channels in these headwater landscapes, the tributaries to Latoria Creek shall be referred to by the authors as follows (Figure 4):

- The tributary arm that flows from the headwater wetland through the west parcel of Havenwood Park, and under VMP shall be referred to as Latoria Northwest Creek.
- The tributary arm that flows parallel to VMP adjacent to the east side of VMP shall be referred to as Latoria Northeast Creek.
- The section of the tributary downstream of the confluence of the above two arms and until it flows into Latoria Creek shall be referred to as Latoria North Creek.

The proposed timeline for construction of the subject property is late 2022 through 2023/24.

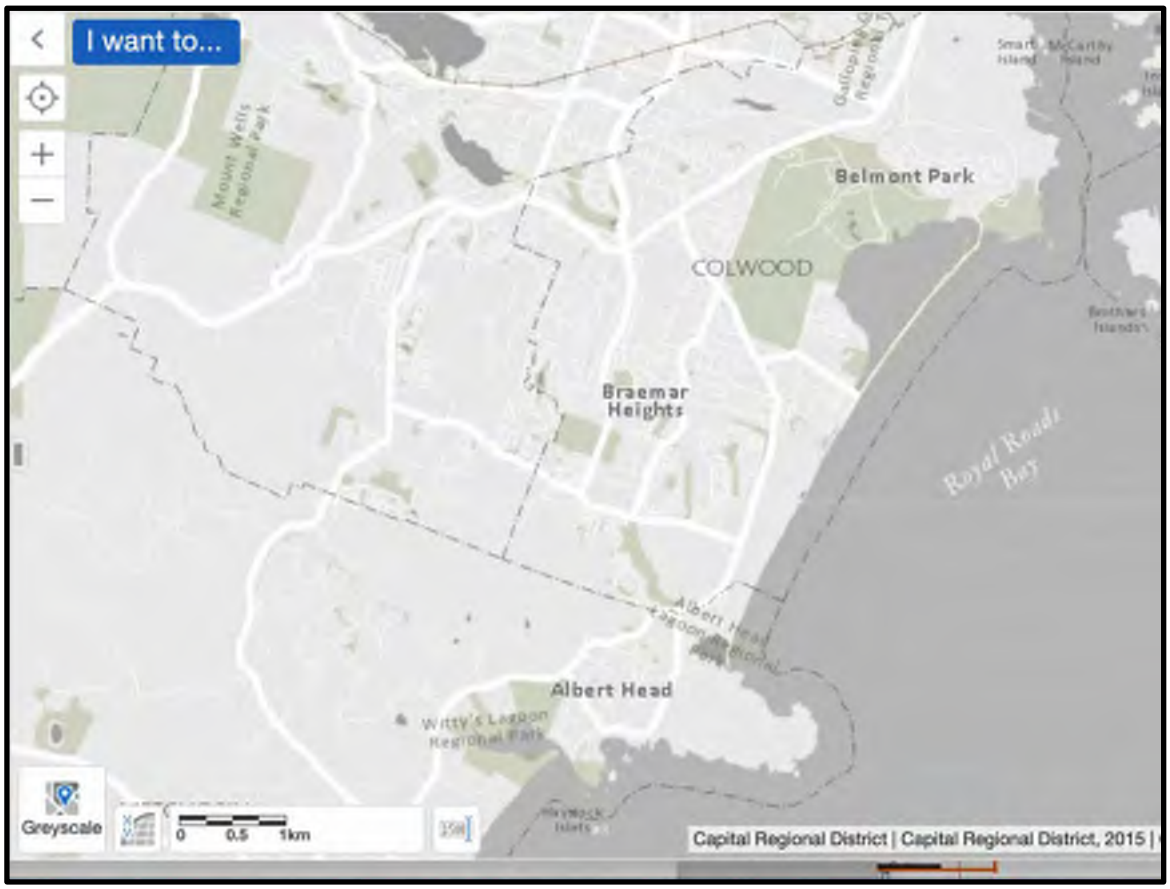

Figure 1. Aerial image of the City of Colwood showing the general location of the subject property (red arrow). Image from CRD Natural areas Atlas (2018).

Figure 2. Overview map showing the location of the subject property (yellow arrow), which lies adjacent to the Veterans' Memorial Parkway (VMP) (red arrow). Note the network of streams located in the surrounding catchments. Image Source: CRD Regional Community Atlas (2019 orthophoto).

Figure 3. Aerial photograph of the subject property (outlined in black, surrounding the orange polygon) and adjacent landscapes. Note the generic treatment ponds shown lying between VMP and the western boundary of the subject property. The treed property to the south (red arrows) and west of VMP is subject to a Rezoning application for a multifamily, high-density development. The yellow arrows delineate land designated as Colwood Parks. Detailed descriptions of the treatment ponds and stream connecting the latter to a natural watercourse downslope are provided below. Image Source: CRD Regional Community Atlas (2019 orthophoto).

3. Assessment Team

The field assessment was conducted by Patrick Lucey, R.P. Bio, with assistance from Steve Voller, RP Bio (Seamount Consulting Ltd.). This report was prepared by Mr. Lucey.

The experience of the QEP Riparian Assessment team is included as Appendix 1.

4. Watershed Overview

Latoria Creek Watershed covers approximately 200 ha and includes a small portion of the southwest corner of Triangle Mountain, Havenwood Park, a portion of the Olympic View Golf Course property, as well as residential and undeveloped properties on either side of Latoria Road between VMP and the ocean (Figure 4) (contrast this CRD catchment map with the detailed map of aquatic features in Figure 7). Latoria Creek adjacent to Latoria Road, which is between 1 and 3 m wide, drains through Latoria Creek Park, and ultimately discharges into Albert Head Lagoon. It has been ditched throughout most of its length along Latoria Road and is the receiving water for storm drainage. Latoria Creek contains sticklebacks, but does not appear to support salmonids in the upper reaches, due to an impassable barrier upstream of Albert Head Lagoon, which prevents anadromous species from migrating upstream. A pond upstream of Albert Head Lagoon was stocked with rainbow trout many years ago, but they do not appear to have colonized the stream. Steve Voller and Patrick Lucey have walked the reaches of Latoria Creek to conduct a fish trapping census of fisheries presence. Salmon are known to spawn and rear in the lowermost reach of the creek. The City of Colwood has for two decades proposed creating treatment pond habitat in the upper reaches, on municipal lands, to establish trout (Michael Baxter, P. Eng.; Colwood Municipal Engineer Ret.; Pers. Commun. 2007).

Latoria Northeast Creek (Figure 7) is a headwater tributary stream, draining a series of treatment ponds on the west side of the subject property (the latter lie within the Municipal VMP right-of-way). Latoria Northeast Creek flows south along the east side of VMP and flows into Latoria North Creek, which then flows into Latoria Creek (Figure 4).

The treatment ponds and drainage channels associated with the construction of VMP, and subdivisions lying north of the subject property (Figure 6), were designed as sediment treatment and detention facilities. Runoff from the series of sediment detention facilities were connected by a drainage ditch that eventually was routed south into a stream channel located in Havenwood Park. The latter drainage channel appears to have followed a natural watercourse, which was a headwater stream flowing into Latoria Creek.

Latoria Creek Watershed

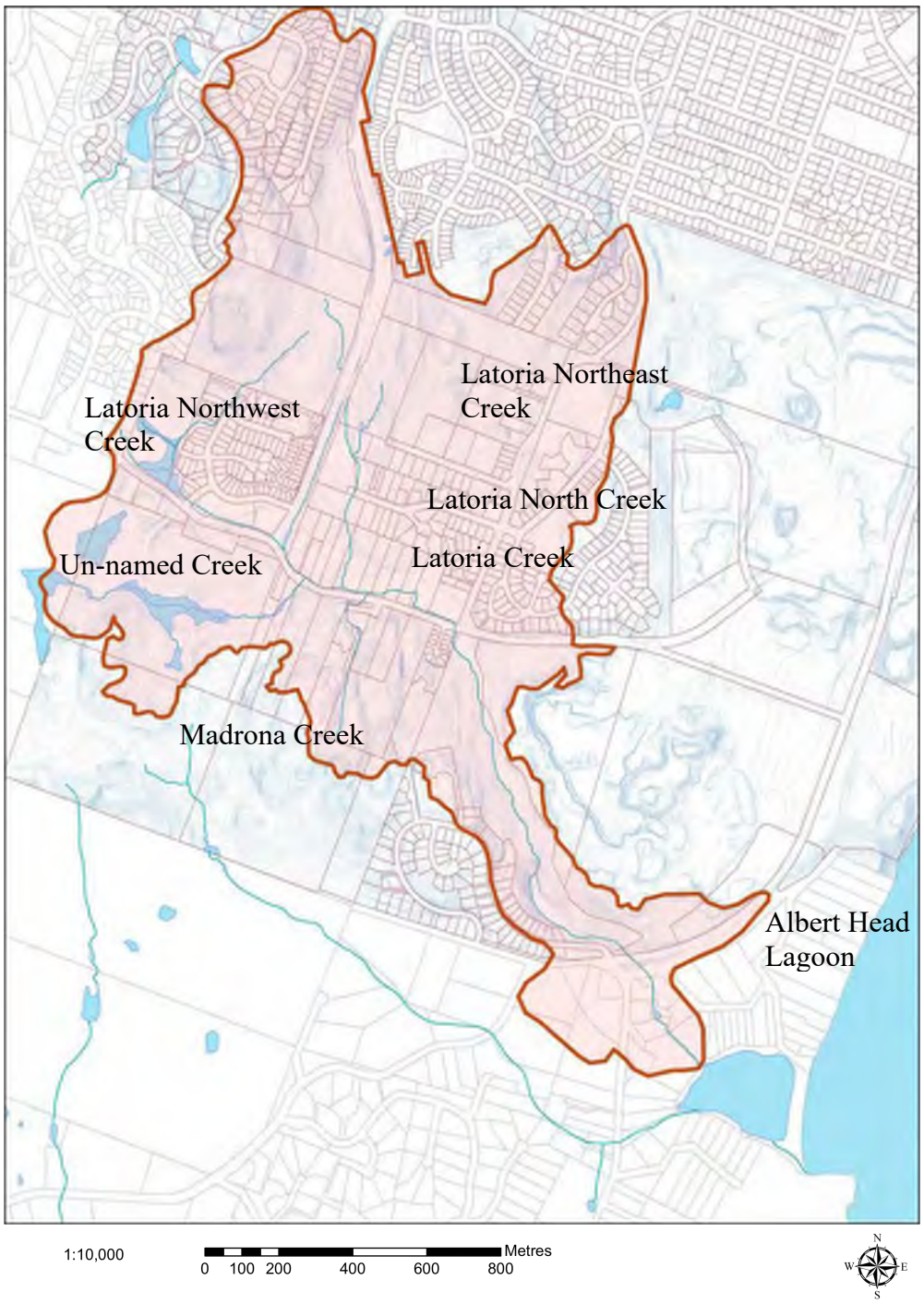

Figure 4. Latoria Creek Watershed showing the catchment, as well as the sub-catchment streams and riparian-wetland areas. The subject property is marked with the yellow arrow and orange polygon. Note this watershed map is a generalized drainage catchment. Contrast the headwater streams shown with those in Figure 7.

Precipitation

Precipitation measured near the subject property is greatest between November and January and typically falls as rain between 120 mm and 180 mm per month. During the dry period, rainfall averages around 25 mm per month. Temperatures average around 16°C in summer and 5-6°C in winter

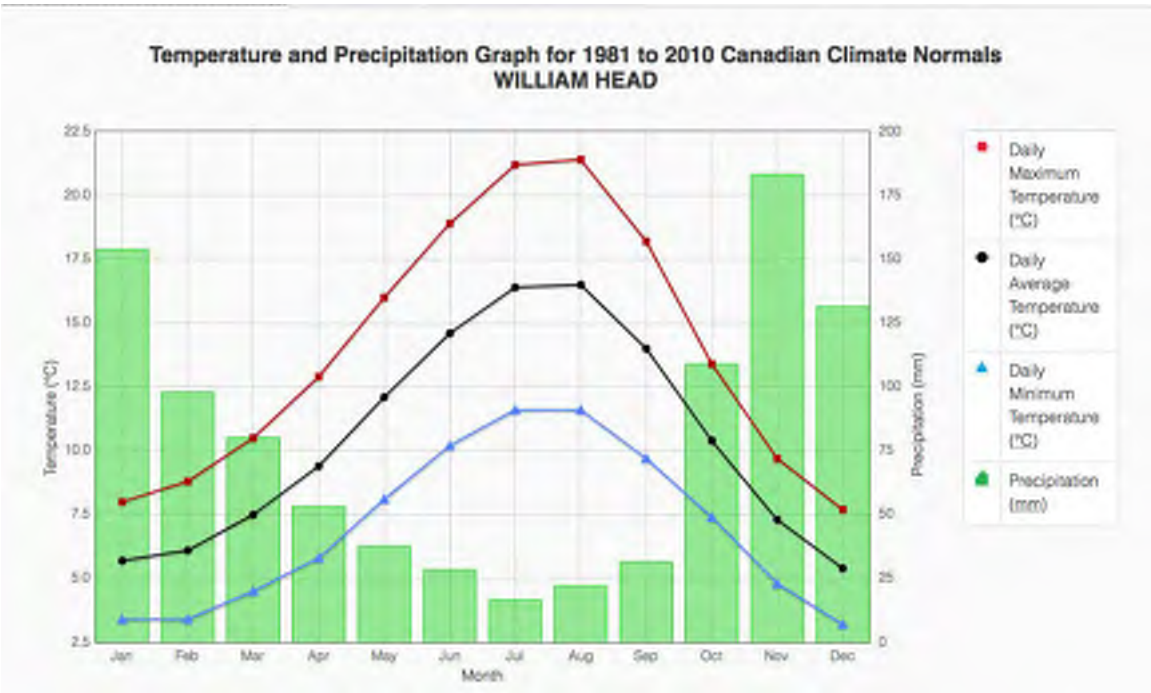

Figure 5. Graph of Environment Canada temperature and precipitation normals for 1981-2010 for the William Head weather station, located south of the subject property.

Table 1. Table of Environment Canada temperature and precipitation normals for 1981-2010 for the William Head weather station.

Temperature

1981 to 2010 Canadian Climate Normals station data

Temperature

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year	Code
Daily Average (°C)	5.7	6.1	7.5	9.4	12.1	14.6	16.4	16.5	14.0	10.4	7.3	5.4	10.5	C
Standard Deviation	1.3	1.4	1.1	0.9	1.0	0.9	1.0	0.8	1.0	0.8	1.6	1.4	1.3	C
Daily Maximum (°C)	8.0	8.8	10.5	12.9	16.0	18.9	21.2	21.4	18.2	13.4	9.7	7.7	13.9	C
Daily Minimum (°C)	3.4	3.4	4.5	5.8	8.1	10.2	11.6	11.6	9.7	7.4	4.8	3.2	7.0	C
Extreme Maximum (°C)	17.0	16.7	20.0	23.0	28.9	29.4	31.0	**31.1**	26.5	22.0	17.2	16.0		
Date (yyyy/dd)	2005/ 19	1963/ 08	2004/ 29	2006/ 24	1969/ 23	1966/ 15	1998/ 27	**1960/ 09**	1998/ 01	2003/ 01	1975/ 03	1980/ 26		
Extreme Minimum (°C)	-8.5	-11.0	-4.5	-0.6	1.1	3.9	6.0	5.0	2.2	-1.5	-9.5	**-13.9**		
Date (yyyy/dd)	1982/ 06	1989/ 01	1989/ 03	1963/ 02	1965/ 06	1972/ 07	2006/ 07	1980/ 29	1972/ 27	1984/ 31	1985/ 27	**1968/ 29**		

Precipitation

1981 to 2010 Canadian Climate Normals station data

Precipitation

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year	Code
Rainfall (mm)	150.1	94.3	78.6	53.1	37.6	28.3	16.6	22.1	31.4	108.8	160.7	128.8	930.3	C
Snowfall (cm)	3.7	3.6	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.1	2.4	2.6	13.8	C
Precipitation (mm)	153.8	97.9	80.1	53.1	37.6	28.3	16.6	22.1	31.4	108.9	163.1	131.4	944.1	C

Climate Patterns

In April 2017, the CRD published the *Climate Projections for the Capital Region* report. Models for precipitation and temperature were used to assess changes in climate expected by the 2050s and the 2080s. General climate projections for the region include wetter winters, drier summers, warmer average temperatures throughout the year (though unevenly distributed over the seasons), and "more intense extreme events". The following is an excerpt from this report:

> "As our climate warms, our region can expect the number of summer days above 25°C to triple, from an average of 12 days per year to 36 days per year. The 1-in-20 hottest day's temperature is projected to increase from 32°C to 36°C by the 2050s. These rising temperatures will result in a 22% increase in the growing season length and a 49% increase in growing degree days by the 2050s. This projected warming will have implications for regional ecosystems, watersheds, agriculture and horticulture, and communities. Warmer winters mean the region will experience a 69% decrease in the number of frost days, significantly impacting the natural environment…. The "new normal" is a climate that is almost entirely frost-free at lower elevations.
>
> Annual precipitation projections are a modest 5% increase by the 2050s and 12% by the 2080s. Projections indicate that the fall season will see the greatest increase in precipitation. This precipitation is expected during increasingly extreme events, with about 31% more precipitation on very wet days (95th percentile wettest days precipitation indicator) and 68% more on extremely wet days (99th percentile wettest days precipitation indicator). Despite the projected increased intensity of wet events, the amount of rain in summer is expected to decrease by 20%, while the duration of dry spells will lengthen by about 20%."

These climate projections may have a serious effect on stream habitats such as Latoria Creek and its headwater tributaries, including Latoria North Creek, and the latter's two headwater streams (Figure 3 and Figure 4 and Figure 7), especially since the lowest reach is a fish-bearing system. Warmer summer temperatures will increase water temperatures and lower dissolved oxygen concentrations in streams, as well as contribute to lower flows, both of which negatively impact cold-water fish stocks such as trout and salmon, found in the lowest reach of Latoria Creek, below the impassible falls upstream of Albert Head Lagoon (Figure 4). The heat dome during the summer of 2021 is a potential weather extreme that is predicted by Climate Change models (*i.e.*, UVic Climate Change Secretariat) to occur more often. Repeated extreme temperature events raise the threat of forest fires in the adjacent Colwood Havenwood Parks (Figure 3). Assessments of the Havenwood Parks forest stand health indicate the semi-mature trees (50 – 75 years old) have significant root rot, with significant blow down throughout both Park segments on either side of VMP.

Additionally, more extreme precipitation events in the fall (*i.e.*, November 13/14, 2021), winter and spring may cause higher flows, with increased velocities, and negatively affect fish-spawning habitat through channel erosion, and the deposition of sediment. The prolonged period of no rain (107 days) in the summer of 2022 left many streams in the core municipalities of the CRD with little or no surface flows. Streams that received significant groundwater baseflows had higher stream flows, *i.e.*, Bee and Selleck Creeks, the lower reaches of Colwood Creek. The linear series of connected treatment ponds, comprising the Latoria Northeast Creek provide significant storage capacity for large rainstorms, functioning as hydrologic shock absorbers, to limit discharge flows as a result of piped connections between each treatment pond (Figure 3).

5. Study Area and Fisheries Resources

The subject property lies within the Latoria Creek watershed (Figure 4). The property is located near the height of land that forms part of the headwaters of Latoria Northeast Creek, a tributary to Latoria North Creek. Latoria Northeast Creek and Latoria Northwest Creek, along with Latoria North Creek, are major tributaries to Latoria Creek (Figure 4 and Figure 7). Anecdotal information from neighbours living adjacent to the lowest reach of Latoria Creek indicate salmon, likely coho, spawn and rear in the lowest reach and in Albert Head Lagoon.

A search through the Provincial Fisheries Information Database Query (FIDQ) did not yield any results for Latoria North Creek or Latoria Creek; however, observations of threespine stickleback and signal crayfish have been made throughout Latoria Creek and sculpin and trout have been observed in the lower reaches (fish assessment studies conducted by S. Voller and T. Motyer, with assistance by the author). No fish trapping studies have been conducted to verify the presence, or absence, of fish in the upper reaches of Latoria Northeast Creek, where the project site is located. Latoria North Creek and, therefore, Latoria Northeast Creek, is assumed to be fish-bearing, for the purposes of this assessment, due to its connection to fish-bearing Latoria Creek. The description of Latoria Creek as a fish bearing stream has been discussed with DFO Fisheries Biologists who, based upon our fish assessment studies, have characterized Latoria as a fisheries stream subject to the Federal *Fisheries Act*.

6. Methods

A detailed RAPR field assessment was conducted for the site *per* standard RAPR methods (RAPR Technical Assessment Manual, V. 1, 2019). The Stream Boundary (HWM) was

identified in the field by S. Voller and the author and then surveyed by a BC Land Surveyor (J.E. Anderson and Associates Ltd.) and placed on a Site Plan. The J.E. Anderson Site Plan has been augmented by the addition of RAPR ZOSs and SPEAs as an overlay on the base survey drawing.

A previous riparian assessment of the reaches downstream of the subject property was conducted for an adjacent development. In the earlier riparian assessment of the stream reach downstream of the subject property, a 15.6 m SPEA, measured horizontally from the Stream Boundary, was calculated for the riparian setback for Latoria Northeast Creek. The minimum riparian setback prescribed in the Colwood OCP, and the 2019 *Fisheries Act*, is 15m. The treed canopy within the SPEA, in the reach downstream of the subject property, has been assessed by Dr. Julian Dunster, R.P.F., who, in consultation with this report's author, has provided recommendations for post-construction/development plant community management. The riparian field data for the property south of the subject property has been provided as a supplement to the stream data collected for this RAPR report.

7. Field Assessment

Latoria Northeast Creek

Latoria Northeast Creek flows south along the west edge of the subject property (Figure 7). Most of the stream lies within the road allowance for VMP. The riparian area surrounding the treatment ponds and short piped segments connecting the treatment ponds is dominated by red alder (*Alnus rubra)*, with a dense heavily overgrown understory of Himalayan blackberry (*Rubus armeniacus* Focke*)*; some salmonberry (*Rubus spectabilis*) occurs amongst the blackberries. Red alder does not tolerate shade and occupied the site quickly after disturbance associated with the construction of VMP and subdivision stormwater runoff treatment and detention.

There are several veteran trees and snags present in this area including western redcedar (*Thuja plicata*) and Douglas-fir (*Pseudotsuga menziesii*); a significant amount of blowdown was noted along the edge of the canopy adjacent to VMP on the adjacent property to the south. In the stream reach downstream of the last treatment pond other species present include: sword fern (*Polystichum munitum*), salmonberry (*Rubus spectabilis*), red alder (*Alnus rubra*), bigleaf maple (*Acer macrophyllum*), English holly (*Ilex aquifolium*), Daphne (*Daphne laureola*), and dull Oregon-grape *(Mahonia nervosa*). A few sword ferns occur along the shaded edge of VMP.

Latoria Northeast Creek begins near the height of land approximately 450 m upstream (north) of the subject property and flows south through a series of small treatment ponds largely within the road allowance for VMP. Downstream of the subject property, Latoria Northeast Creek flows southwest through Havenwood Park, eventually flowing into Latoria North Creek, which then flows into Latoria Creek along Latoria Road (Figure 4 and Figure 7). A significant amount of windthrow was also observed in the riparian zone in the adjacent property to the south of the subject property. The long-term trend for the treatment ponds and the stream reach on the neighbouring property to the south is increasing riparian bank stability, as the riparian vegetation becomes well established. The presence of the dense thickets of red alder are a limiting factor in riparian plant diversity in the understory, as the alder shades out shrubs and conifers. Left unmanaged the riparian vegetation will remain it its current condition until the red alder matures and dies, in approximately 40 – 50 years. Thinning of the red alder and replanting conifers, amongst a sedge / rush / forb understory would enhance riparian plant diversity and micro-habitats.

Veterans' Memorial Parkway; Roadside Channels

Along the VMP frontage of the subject property, there is a shallow grassy swale on the east side of VMP, between the road and Latoria Northeast Creek. This swale is present along the southern half of the property frontage. This swale intercepts and treats road runoff from VMP and is separated from Latoria North Creek by a large berm. The swale is located entirely within the road allowance for VMP. The east swale drains into Latoria Northeast Creek at the outlet of a cross culvert under VMP which conveys water from the west side of VMP to the Creek.

The east swale has not been included in the RAPR assessment because it is beyond the property boundary and would not have any SPEA setback implications for any proposed development on the subject property; this road runoff treatment swale lies entirely within the VMP road right-of-way. Given its location between VMP and Latoria Northeast Creek, any setbacks on the swale would be encompassed/overlapped within the SPEA for Latoria Northeast Creek. Also, the assessment team did not observe any evidence of soil or particulate partitioning that would meet the definition of a stream, or ditch, channel within any portion of the bioswale; runoff from VMP appears to consist solely of sheet flow across grass.

8. Detailed Hydrology of Treatment Ponds and Ditches

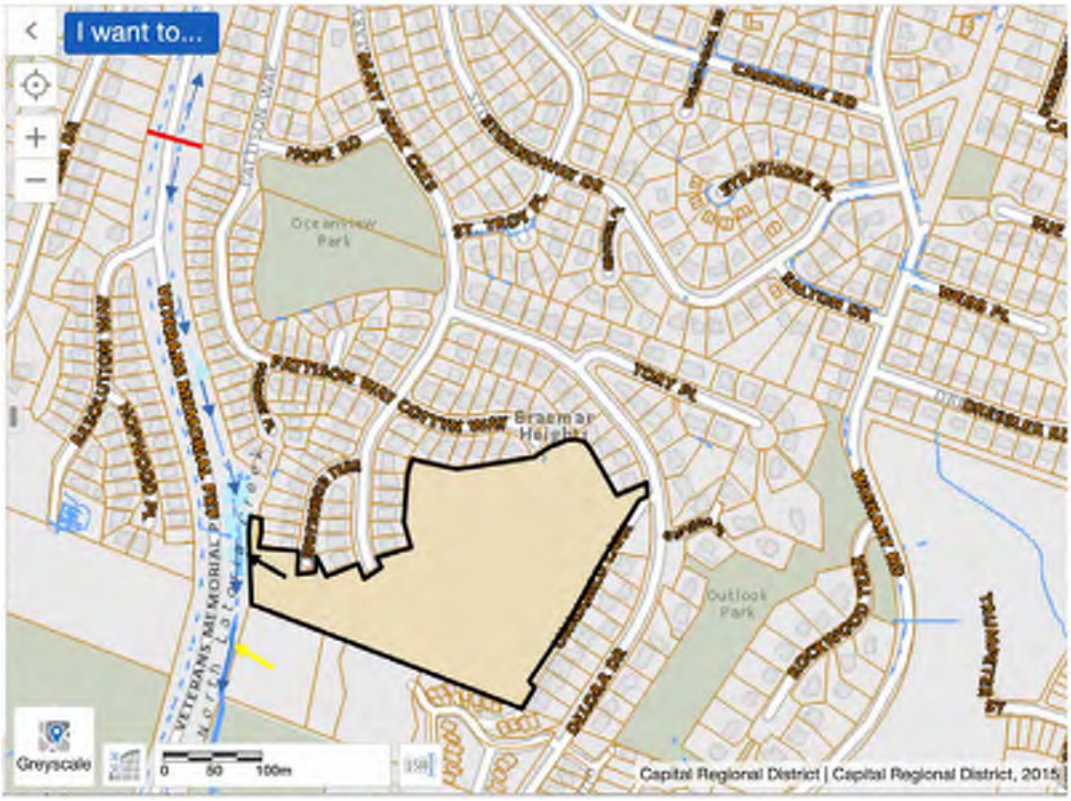

Figure 6. CRD NAA map of the Latoria Northeast Creek drainage routing. The red line is the height of land, blue arrows indicate flow direction. The black arrow indicates the stream assessment reach adjacent to the subject property; the yellow arrow indicates the stream assessment reach previously assessed for the adjacent property to the south (Figure 3). The field data for the stream assessment to the south has been provided in Section 8.

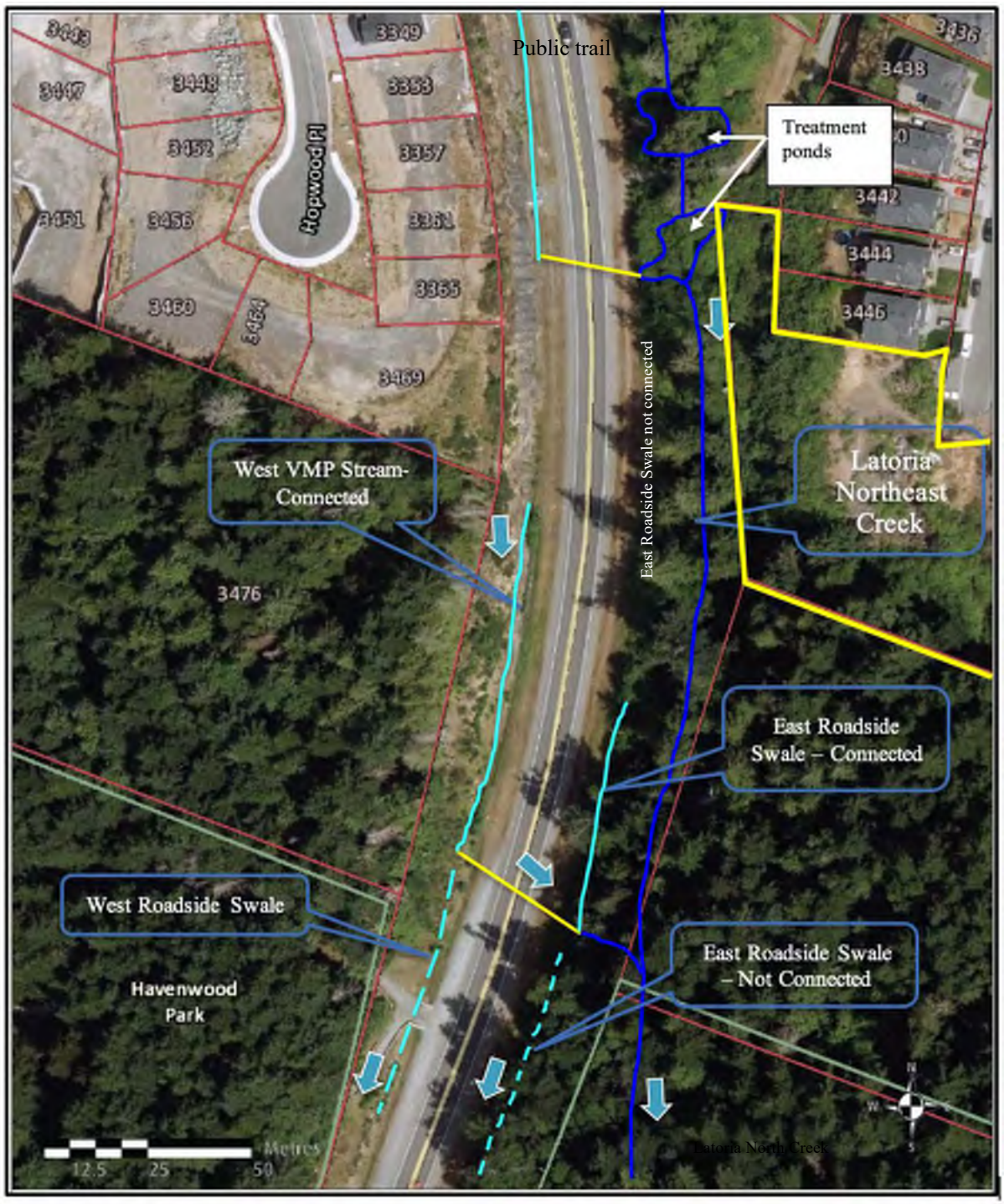

Figure 7. Sketch of Latoria Northeast Creek and the roadside swales along Veterans' Memorial Parkway. Solid lines (teal and dark blue) indicate channels directly connected to Latoria North Creek, while the dashed teal line represents the roadside swale which is not directly connected to Latoria North Creek; arrows denote the direction of flow. Sketch is approximate, this figure is intended for illustrative purposes only. The drainage lines are not an accurate alignment of each feature. Note that there is a treatment pond shown adjacent to the northwest corner of the subject property (yellow line), from which a drainage channel flows south. Note the treatment pond and stream reach adjacent to the subject property are virtually north-south. Contrast with Site Plan (Figure 14). Image Source: CRD Regional Community Atlas (2013 orthophoto).

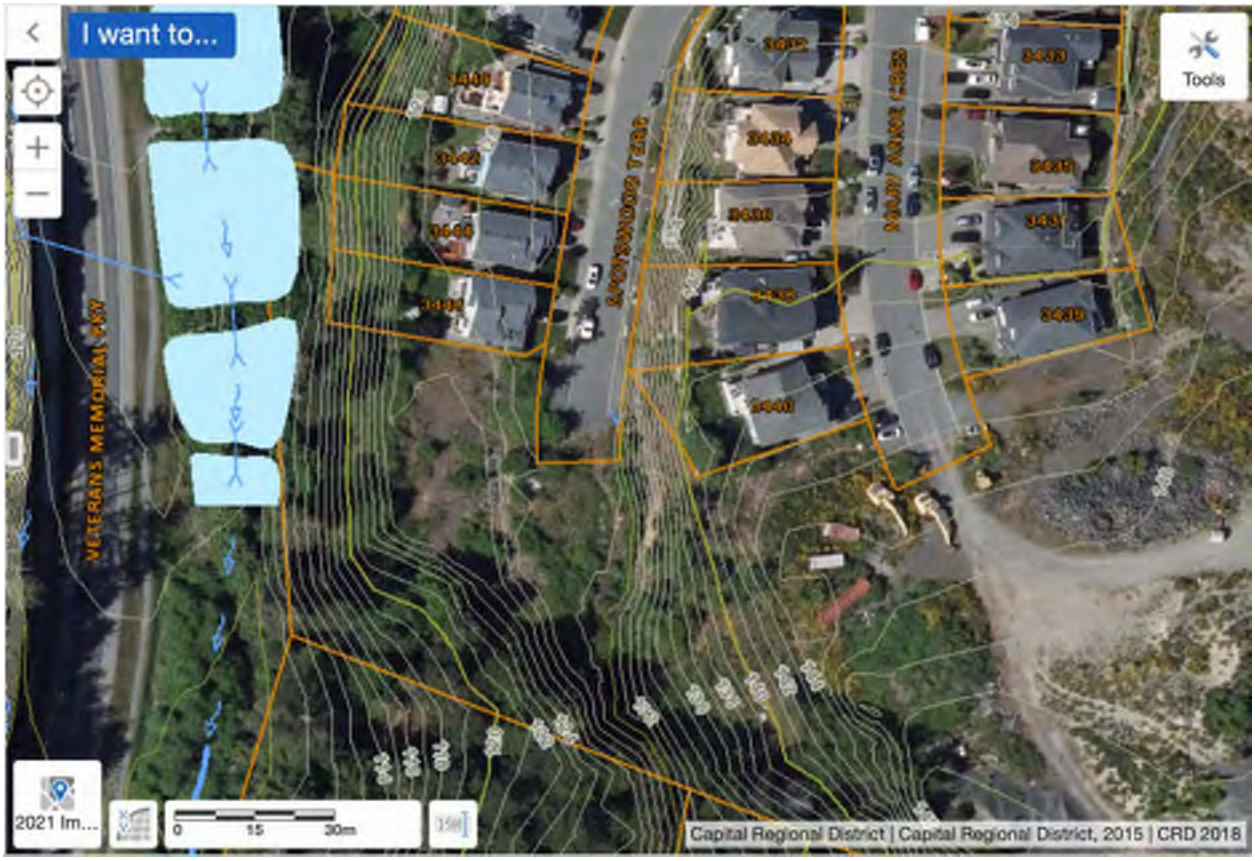

Figure 8. CRD NAA aerial map showing the approximate location of the treatment ponds, stream, and contour elevations (these blue features are illustrative and are not surveyed landscape features; see Figure 12). The subject property is outlined with a black line. Note the steep bank west of the upper terrace (Spotswood Terrace). The steep slope shall be protected from disturbance as it lies within the Special Measures management zone, as well as the steep slope Development Permit area under the Colwood OCP. There is a drainage ditch that routes roadside and stormwater runoff from the west side of VMP into a buried culvert, adjacent to the west side of VMP, which then flows in a culvert (Figure 10), under VMP (yellow arrow), discharging into the southwest corner of a treatment pond on the east side of VMP (Figure 9, Figure 10, and Figure 11).

Figure 9. Outlet of the drainage culvert under VMP (Figure 8) showing the blocked outlet consisting of a soil berm which prevents the free flow of periodic, low runoff volumes routed from the west side of VMP into a treatment pond on the east side of VMP. Image inserts of inlet of the culvert, noting that there is no rusted water line or evidence of regular stormwater flow.

Figure 10. View into the culvert (Figure 8) showing the narrow ribbon of sediment that lines the bottom of the culvert under VMP. Note the absence of a rust line on the bottom sides of the CSP culvert, indicating that there are only periodic low volumes of runoff flowing in the culvert. The sediment lining the bottom of the culvert has settled out to a depth equivalent to the height of the berm (Figure 9) obstructing flows through the culvert. The berm obstructing flow through the culvert results in runoff in the culvert becoming stagnant with sediment transport interrupted and sediment settling out. This condition reflects the minimal flows in the drainage catchment upstream of the outlet, indicating there is no stream or natural supply of water sufficient to maintain a sediment free culvert and prevent a berm from forming at the outlet of the culvert (Figure 9). This headwater drainage would be classified as a "stream" under the RAPR but allocated a SPEA under the "ditch" category.

Figure 11. Looking east across the treatment pond (Figure 8) at the culvert outlet under VMP (Figure 9) and the runoff flows which enter the southwest corner of the treatment pond. The vertical PVC “Tee” fitting which forms the outlet control structure for flows leaving the treatment pond. The “Tee” joint allows water in the pond to raise to the level of the invert of the culvert under the berm forming the downstream bank of the pond which then freely flows south through the berm (in a buried culvert) into the next treatment pond (Figure 8). Thus, the bankfull elevation of the treatment pond (a form of reservoir given it has a controlled outlet) is the invert of the pipe connected to the “Tee”. The top of the “Tee” is the equivalent of a spillway, as water levels in the pond can rise to the top elevation of the “Tee” and then flow down into the culvert under the berm. The top elevation of the “Tee” would be the HWM/SB of the reservoir. Note the water level in the immediate foreground of the photograph indicate the elevation of the invert of the culvert through the berm, as there is a very small flow of water through the ponds and culverts. The linear series of treatment ponds remain dry for about six months of the year.

9. Results of Proper Functioning Condition Assessment

(Note this section not required for RAPR- for benefit of City of Colwood).
The treatment pond and stream reach on the subject property was assessed on June 22, 2022; the reach on the adjacent property to the south was assessed on April 23, 2021. The two reaches were found to be in Proper Functioning Condition (PFC), but at the low end of PFC. Areas of concern included the fact that the riparian zone is improving slowly (given the dominance of the red alder and dense invasive species), it is subject to periodic disturbance, and that the conifers in the riparian zone are subject to root rot. The stream (ditch) course was constructed during the construction of Veterans' Memorial Parkway and subdivision east of VMP. The majority of land use management lies under the control of the City of Colwood. The presence of the treatment ponds upstream, designed to function hydrologically as surge detention structures, together with the very small catchment providing surface runoff into this headwater stream complex, effectively preclude high stream flows or stream velocities. Erosion and sediment deposition are not a significant feature of this stream's hydrological function. Sediment transport is interrupted by the treatment ponds. Typically, the loss of sediment transport in a stream may lead to "clear water erosion" which results in enhanced stream bank erosion. That does not appear to be the case in this stream system as the stream flows are rarely high enough to be erosive and the stream bottom has significant physical structures which prevent high stream velocities (woody material, roots, rock).

Remarks on the PFC Status

Potential Channel Type: Bc

Present Channel Type: Bc

Potential Riparian-Wetland Vegetation: Douglas fir, western redcedar, grand fir, dense deciduous understory of shrubs.

Existing Riparian-Wetland Vegetation: The channel and riparian areas in this reach are heavily overgrown with red alder (*Alnus rubra*), Himalayan blackberry (*Rubus armeniacus*), and salmonberry (Rubus spectabilis). There are a number of mature and veteran trees and snags present on the east bank, including western redcedar (Thuja plicata) and Douglas-fir (*Pseudotsuga menziesii*). Other species present include: sword fern (*Polystichum munitum*), salmonberry (*Rubus spectabilis*), red alder (*Alnus rubra*), bigleaf maple (*Acer macrophyllum*), English holly (*Ilex aquifolium*), Daphne (*Daphne laureola*), and dull Oregon-grape (*Mahonia nervosa*). Invasives are a co-dominant species amongst the native plant community.

Constraints: The channelized stream lies within the road allowance of a major municipal connector road (Veterans' Memorial Parkway). This channel is constrained by the road to the west and private land on which steep slopes predominate, to the east. The streambed lies within a municipal road allowance, as does all the western riparian area, while the eastern riparian area lies partially on municipal and private property. There is a natural regenerative understory of young conifers within the riparian zone. The risk of wildfire within the treed canopy in the riparian zone is moderate given the dense deciduous understory and the recommended removal or height reduction of the mature conifers. Fuel management loading within the riparian zone should be considered in the context of the adjacent treed Havenwood Park.

Potential Restoration: Planting of young conifers and deciduous trees within the riparian zone is recommended. Species of conifers recommended for replanting are grand fir, Douglas fir,

western redcedar, and Sitka spruce. Deciduous trees for replanting include bigleaf maple, Pacific dogwood, black hawthorn, and crab apple. After the clearing of large conifers, the creek will be able to stay in PFC with a deciduous shrub understory, while the new tree plantings grow. Note: given the small catchment and low gradient, this headwater stream is capable of maintaining bank soil stability with healthy shrub root systems. It does not require large trees for stability. Replanting within this bioswale ribbon would require approval from the municipality and would need to conform to municipal road shoulder maintenance requirements. There are long term municipal traffic management plans for a widening of VMP, which would include two additional vehicle lanes, a multi-purpose trail and/or sidewalk expansion on both sides of the road.

Additional Comments:

- Shared management of aquatic habitat. Stream lies primarily on VMP road allowance/ROW (municipal); minimal eastern riparian land on the subject property.
- There are currently extensive invasive species, especially Himalayan blackberry.
- The riparian SPEA is proposed to become municipal Park Land under an approved subdivision plan.

10. Results of Detailed Riparian Assessment

Latoria Northeast Creek

Refer to Section 3 of Technical Manual

Date: 2022-06-22

Description of Water bodies involved (number, type): Latoria Northeast Creek, Reach 1

Stream	
Wetland	X
Lake	
Ditch	
Number of reaches	1
Reach #	1

Channel width and slope and Channel Type (use only if water body is a stream or a ditch, and only provide widths if a ditch)

	Channel Width(m)		Gradient (%)
starting point			
upstream			
downstream			
Total: minus high /low			0
mean			
	R/P	C/P	S/P
Channel Type			

I, Wm. Patrick Lucey, R.P. Bio, hereby certify that:
a) I am a qualified environmental professional, as defined in the Riparian Areas Protection Regulation made under the *Riparian Areas Protection Act*;
b) I am qualified to carry out this part of the assessment of the development proposal made by the developer Turnberry Developments Ltd.;
c) I have carried out an assessment of the development proposal and my assessment is set out in this Assessment Report; and
d) In carrying out my assessment of the development proposal, I have followed the technical manual to the Riparian Areas Protection Regulation.

Site Potential Vegetation Type (SPVT)

	Yes	No
SPVT Polygons		X

Tick yes only if multiple polygons, if No then fill in one set of SPVT data boxes

I, Wm. Patrick Lucey, R.P. Bio, hereby certify that:
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d) In carrying out my assessment of the development proposal, I have followed the technical manual to the Riparian Areas Protection Regulation.

		LC	SH	TR	Method employed if other than TR
Polygon No:	1				
SPVT Type				X	
Polygon No:					
SPVT Type					
Polygon No:					

SPVT Type				

Zone of Sensitivity (ZOS) and resultant SPEA

Segment No:	1	If two sides of a stream involved, each side is a separate segment. For all water bodies multiple segments occur where there are multiple SPVT polygons						
LWD, Bank and Channel Stability ZOS (m)	15							
Litter fall and insect drop ZOS (m)	15							
Shade ZOS (m) max	30*	South bank	Yes	X	No			
Ditch	Justification description for classifying as a ditch (manmade, no significant headwaters or springs, seasonal flow)							
Ditch Fish Bearing	Yes		No		If non-fish bearing insert no fish bearing status report			
SPEA maximum	**30***	(For ditch use table3-7)						

Segment No:		If two sides of a stream involved, each side is a separate segment. For all water bodies multiple segments occur where there are multiple SPVT polygons						
LWD, Bank and Channel Stability ZOS (m)								
Litter fall and insect drop ZOS (m)								
Shade ZOS (m) max		South bank	Yes		No			
SPEA maximum		(For ditch use table3-7)						

Segment No:		If two sides of a stream involved, each side is a separate segment. For all water bodies multiple segments occur where there are multiple SPVT polygons						
LWD, Bank and Channel Stability ZOS (m)								
Litter fall and insect drop ZOS (m)								
Shade ZOS (m) max		South bank	Yes		No			
SPEA maximum		(For ditch use table3-7)						

I, Wm. Patrick Lucey, R.P.Bio., hereby certify that:

a) I am a qualified environmental professional, as defined in the Riparian Areas Protection Regulation made under the *Riparian Areas Protection Act*;
b) I am qualified to carry out this part of the assessment of the development proposal made by the developer Turnberry Developments Ltd.; ;
c) I have carried out an assessment of the development proposal and my assessment is set out in this Assessment Report; and
d) In carrying out my assessment of the development proposal, I have followed the technical manual to the Riparian Areas Protection Regulation.

Comments

- Within the series of man-made treatment ponds and buried inter-connecting culverts, stormwater runoff flows south in close proximity to VMP; the treatment ponds and connecting buried culverts/PVC pipes lie within the VMP road allowance (municipal property (Figure 14)).
- This headwater drainage system is connected downstream to Havenwood Stream, which in turn flows into Latoria Creek, a known fisheries stream.
- The SPEAs for the stream extend east onto the adjacent private subject property.
- ***Note:** The 15.0m SPEA width is equal to the 15m leave strip requirement in the Riparian Areas and Marine Shorelines Environmental Development Permit Guidelines of the City of Colwood OCP (2018).
- Treatment pond headwaters lie at the height of land ~450m upstream (north) (Figure 6) Minimal drainage arises from road runoff, with the majority of runoff generated by the subdivision east of VMP (Figure 15).
- Treatment pond riparian areas, and much of the treatment ponds themselves, are heavily overgrown with salmonberry (*Rubus spectabilis),* and Himalayan blackberry (*Rubus armeniacus), and red alder (Alnus rubra).*
- There are a few mature trees present on the eastern riparian bank of the subject property boundary (Figure 15), including western redcedar (*Thuja plicata)* and Douglas-fir (*Pseudotsuga menziesii)*.
- Other species present include: sword fern *(Polystichum munitum),* salmonberry (*Rubus spectabilis),* red alder (*Alnus rubra),* bigleaf maple (*Acer macrophyllum),* English holly (*Ilex aquifolium),* Daphne (*Daphne laureola),* and dull Oregon-grape (*Mahonia nervosa).*
- The SPEA for shade has been shown as overlapping the treatment pond downstream, with a 15 m SPEA lying east of the treatment pond/buried culverts connecting each pond to the next pond in series to the south. Buried culverts connecting treatment ponds receive the same SPEA as a treatment pond.
- Part of the SPEA adjacent to the east side of the treatment ponds/buried culverts lies on private land.
- The small headwater drainage stream (ditch) which conveys stormwater runoff from the west side of VMP has been excluded from this assessment because it lies entirely within the municipal road ROW (institutional use) and any associated SPEA would overlap with the treatment ponds RAAs and SPEAs.

Refer to Section 3 of Technical Manual

Date: 2022-06-22

Description of Water bodies involved (number, type): Latoria Northeast Creek, Reach 2

Stream	
Wetland	
Lake	
Ditch	X
Number of reaches	1
Reach #	1

Channel width and slope and Channel Type (use only if water body is a stream or a ditch, and only provide widths if a ditch)

	Channel Width(m)	Gradient (%)
starting point	2.2	
upstream	1.9	
	2.3	
downstream		2
	2.6	
	3.5	
Total: minus high /low	NA	
mean	2.5	2

	R/P	C/P	S/P
Channel Type	X		

I, Wm. Patrick Lucey, R.P. Bio, hereby certify that:

e) I am a qualified environmental professional, as defined in the Riparian Areas Protection Regulation made under the *Riparian Areas Protection Act*;

f) I am qualified to carry out this part of the assessment of the development proposal made by the developer Turnberry Developments Ltd.;

g) I have carried out an assessment of the development proposal and my assessment is set out in this Assessment Report; and

h) In carrying out my assessment of the development proposal, I have followed the technical manual to the Riparian Areas Protection Regulation.

Site Potential Vegetation Type (SPVT)

	Yes	No	
SPVT Polygons		X	Tick yes only if multiple polygons, if No then fill in one set of SPVT data boxes

I, Wm. Patrick Lucey, R.P. Bio, hereby certify that:

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g) I have carried out an assessment of the development proposal and my assessment is set out in this Assessment Report; and

h) In carrying out my assessment of the development proposal, I have followed the technical manual to the Riparian Areas Protection Regulation.

Polygon No:	1			Method employed if other than TR
	LC	SH	TR	
SPVT Type			X	

Polygon No:				Method employed if other than TR
	LC	SH	TR	
SPVT Type				

Polygon No:				Method employed if other than TR
SPVT Type				

Zone of Sensitivity (ZOS) and resultant SPEA

Segment No:	1	If two sides of a stream involved, each side is a separate segment. For all water bodies multiple segments occur where there are multiple SPVT polygons						
LWD, Bank and Channel Stability ZOS (m)	5.0							
Litter fall and insect drop ZOS (m)	5.0							
Shade ZOS (m) max	5.0	South bank	Yes	X	No			
Ditch	Justification description for classifying as a ditch (manmade, no significant headwaters or springs, seasonal flow)							
Ditch Fish Bearing	Yes	X	No		If non-fish bearing insert no fish bearing status report			
SPEA maximum	**5.0**	(For ditch use table3-7)						

Segment No:		If two sides of a stream involved, each side is a separate segment. For all water bodies multiple segments occur where there are multiple SPVT polygons						
LWD, Bank and Channel Stability ZOS (m)								
Litter fall and insect drop ZOS (m)								
Shade ZOS (m) max		South bank	Yes		No			
SPEA maximum		(For ditch use table3-7)						

Segment No:		If two sides of a stream involved, each side is a separate segment. For all water bodies multiple segments occur where there are multiple SPVT polygons						
LWD, Bank and Channel Stability ZOS (m)								
Litter fall and insect drop ZOS (m)								
Shade ZOS (m) max		South bank	Yes		No			
SPEA maximum		(For ditch use table3-7)						

I, Wm. Patrick Lucey, R.P.Bio., hereby certify that:

e) I am a qualified environmental professional, as defined in the Riparian Areas Protection Regulation made under the *Riparian Areas Protection Act*;

f) I am qualified to carry out this part of the assessment of the development proposal made by the developer Turnberry Developments Ltd.; ;

g) I have carried out an assessment of the development proposal and my assessment is set out in this Assessment Report; and

h) In carrying out my assessment of the development proposal, I have followed the technical manual to the Riparian Areas Protection Regulation.

Comments

- This stream (ditch) reach of Latoria Northeast Creek (Figure 7) lies adjacent to the west property boundary of the subject property, directly below the final treatment pond (Figure 8 and Figure 12). The stream alignment is due north-south.
- This reach of Latoria Northeast Creek lies within the VMP road allowance.
- Since this reach is ~30m in length, bankfull and stream boundary widths were made about every ~5m apart. The high/low widths were retained to calculate the mean width.
- As with Reach 1, the ZOS for shade of 5.0 m is on a due north-south trajectory and does not affect the horizontal SPEA setback, which is specified as 5.0 m.
- This reach is hydrologically distinct from the next man-made stream (ditch) reach to the south, so Reaches 2 and 3 (Figure 14) have been included to provide a complete picture of the drainage network above and below the subject property.
- The three Reaches constitute a man-made drainage network that flows into Latoria North Creek, which begins at the confluence of West VMP Stream and Latoria Northeast Creek

(Figure 7). Latoria North Creek (a stream, not a ditch) flows into Latoria Creek, a known fisheries stream.

- Since the treatment pond immediately upstream of this reach functions as a surge detention pond, there was no evidence of a 5-year floodplain, except at the very bottom of this reach. The latter, wider width of the stream arises from a debris jam of wood and blackberry infestation which has created an avulsion.
- The channel in this reach is heavily overgrown with red alder (*Alnus rubra*), Himalayan blackberry (*Rubus armeniacus), and* salmonberry (*Rubus spectabilis).*
- There are a number of mature and veteran trees and snags present on the east bank, including western redcedar (*Thuja plicata)* and Douglas-fir (*Pseudotsuga menziesii).*
- Other species present include: sword fern *(Polystichum munitum),* salmonberry (*Rubus spectabilis),* red alder (*Alnus rubra),* bigleaf maple (*Acer macrophyllum),* English holly (*Ilex aquifolium),* Daphne (*Daphne laureola),* and dull Oregon-grape (*Mahonia nervosa).*
- Three mature western red cedar and a mature Douglas fir (~250 years old) on the adjacent property to the south had been designated as danger trees. An attempt to retain them as wildlife trees failed as the trees became entangled and had to be dropped, as the faller declared the tangled trees a hazardous WorkSafeBC condition. The stumps and trunks will be left *in-situ*. Part of the trunks fall north onto the subject property and will be left, with branches removed to reduce the fire risk of ground fuel loading.
- **Note: To ensure that the trees on the east bank (left bank) of this reach are protected a 15.0 m SPEA has been assigned, rather than the Method-prescribed 5.0 m SPEA (for a ditch) (Figure 12 and Figure 14).**
- **The assigned 15 m SPEA is coincident with the Colwood Bylaw mandated 15 m Riparian Management Zone width.**
- **Colwood Bylaw mandated 15 m Riparian Management Zone width was applied to the property south of the subject property (this is the Reach 3 data shown in this RAPR).**
- All trees within the assigned 15 m SPEA will be included in the proposed municipal Park dedication (hence the larger assigned SPEA width).

Refer to Section 3 of Technical Manual

Date: 2020-06-23

Description of Water bodies involved (number, type): Latoria Northeast Creek, Reach 3

Stream	X
Wetland	
Lake	
Ditch	
Number of reaches	1
Reach #	1

Channel width and slope and Channel Type (use only if water body is a stream or a ditch, and only provide widths if a ditch)

	Channel Width(m)	Gradient (%)
starting point	5.0	
upstream	4.5	
	12.4	2
	6.8	
	4.2	
downstream	2.8	5
	6.2	
	3.7	5
	9.0	
	3.0	
	4.0	4
Total: minus high /low	46.4	
mean	5.2	4

	R/P	C/P	S/P
Channel Type		X	

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i) I am a qualified environmental professional, as defined in the Riparian Areas Protection Regulation made under the *Riparian Areas Protection Act*;
j) I am qualified to carry out this part of the assessment of the development proposal made by the developer; Turnberry Developments Ltd.;
k) I have carried out an assessment of the development proposal and my assessment is set out in this Assessment Report; and
l) In carrying out my assessment of the development proposal, I have followed the technical manual to the Riparian Areas Protection Regulation.

Site Potential Vegetation Type (SPVT)

	Yes	No	
SPVT Polygons		X	Tick yes only if multiple polygons, if No then fill in one set of SPVT data boxes

I, Wm. Patrick Lucey, R.P. Bio, hereby certify that:
i) I am a qualified environmental professional, as defined in the Riparian Areas Protection Regulation made under the *Riparian Areas Protection Act*;
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k) I have carried out an assessment of the development proposal and my assessment is set out in this Assessment Report; and
l) In carrying out my assessment of the development proposal, I have followed the technical manual to the Riparian Areas Protection Regulation.

		LC	SH	TR	Method employed if other than TR
Polygon No:	1				
SPVT Type				X	
Polygon No:					
SPVT Type					
Polygon No:					
SPVT Type					

Zone of Sensitivity (ZOS) and resultant SPEA

Segment No:	1 East	If two sides of a stream involved, each side is a separate segment. For all water bodies multiple segments occur where there are multiple SPVT polygons						
LWD, Bank and Channel Stability ZOS (m)	10.4							
Litter fall and insect drop ZOS (m)	15.0							
Shade ZOS (m) max	15.6*	South bank	Yes	X	No			
Ditch	Justification description for classifying as a ditch (manmade, no significant headwaters or springs, seasonal flow)							
Ditch Fish Bearing	Yes		No		If non-fish bearing insert no fish bearing status report			
SPEA maximum	**15.6***	(For ditch use table3-7)						

Segment No:	2 West	If two sides of a stream involved, each side is a separate segment. For all water bodies multiple segments occur where there are multiple SPVT polygons						
LWD, Bank and Channel Stability ZOS (m)	10.4							
Litter fall and insect drop ZOS (m)	15.0							
Shade ZOS (m) max	15.6	South bank	Yes		No	X		
SPEA maximum	**15.0***	(For ditch use table3-7)						

Segment No:		If two sides of a stream involved, each side is a separate segment. For all water bodies multiple segments occur where there are multiple SPVT polygons						
LWD, Bank and Channel Stability ZOS (m)								
Litter fall and insect drop ZOS (m)								
Shade ZOS (m) max		South bank	Yes		No			
SPEA maximum		(For ditch use table3-7)						

I, Wm. Patrick Lucey, R.P.Bio., hereby certify that:

i) I am a qualified environmental professional, as defined in the Riparian Areas Protection Regulation made under the *Riparian Areas Protection Act*;

j) I am qualified to carry out this part of the assessment of the development proposal made by the developer ; Turnberry Developments Ltd.,

k) I have carried out an assessment of the development proposal and my assessment is set out in this Assessment Report; and

l) In carrying out my assessment of the development proposal, I have followed the technical manual to the Riparian Areas Protection Regulation.

Comments

- **This reach is not on the subject property**.
- Latoria Northeast Creek flows south in close proximity to VMP; most of the stream lies within the road allowance. This Reach has a slight southwest alignment, resulting in two segments (east and west).
- Headwaters at height of land ~450m upstream.
- Channel is heavily overgrown with salmonberry (*Rubus spectabilis),* and Himalayan blackberry (*Rubus armeniacus).*
- Numerous veteran trees and snags present including western redcedar (*Thuja plicata)* and Douglas-fir (*Pseudotsuga menziesii)*; a significant amount of blowdown was noted along the edge of the canopy adjacent to VMP.
- Three mature western redcedar and a mature Douglas fir (~250 years old) on this property's SPEA had been designated as danger trees by the Arborist (Dr. Julian Dunster). An attempt to retain them as wildlife trees failed as the trees became entangled and had to be dropped, as the faller declared the tangled trees a hazardous WorkSafeBC condition. The stumps and trunks will be left *in-situ*. Part of the trunks fall north onto the subject property and will be left, with branches removed to reduce the fire risk of ground fuel loading.
- The Arborist report for the trees on this parcel and on the SPEA area revealed significant root rot, numerous danger trees, a significant risk of blow down, and an assignment of numerous danger trees within the SPEA. Therefore, a tree management plan for the SPEA was prepared which required danger trees to be left *in-situ* as wildlife trees, wherever possible, trunks to be left within the SPEA, and significant replanting of the understory with conifers.
- Other species present include: sword fern *(Polystichum munitum),* salmonberry (*Rubus spectabilis),* red alder (*Alnus rubra),* bigleaf maple (*Acer macrophyllum),* English holly (*Ilex aquifolium),* Daphne (*Daphne laureola),* and dull Oregon-grape (*Mahonia nervosa).*
- Flows into Latoria North Creek, which then flows into Latoria Creek at Latoria Road.
- The SPEA was increased to 15.6 m, coincident with the City of Colwood Bylaw 15 m riparian management setback (Riparian and Wet Area Guidelines of the Colwood OCP) and to protect riparian trees.
- The ZOS for shade of 15.6 m is on a due south trajectory and did not affect the horizontal SPEA and City of Colwood Bylaw setback of 15.0 m.
- The Site Plan for this reach has not been included.

11. Site Plans

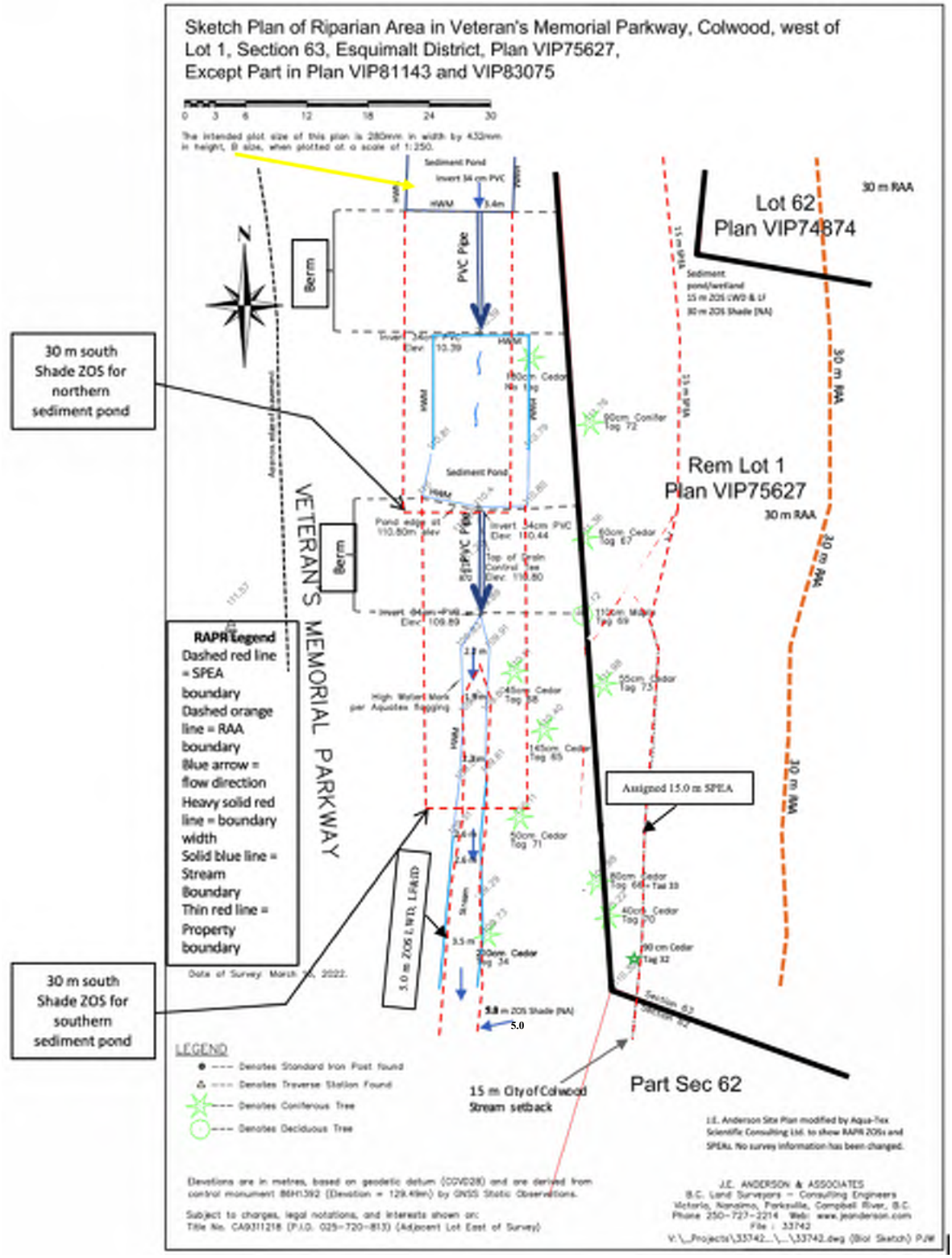

Figure 12. Site Plan of treatment ponds and stream (ditch) located west of the subject property (black line), lying within VMP road right-of-way. Yellow arrow = culvert under VMP (arrow added by Aqua-Tex to JEA drawing) discharging stormwater into the treatment pond (Figure 8). 15 m assigned SPEA line added by Aqua-Tex (redundant 5 m SPEA not shown).

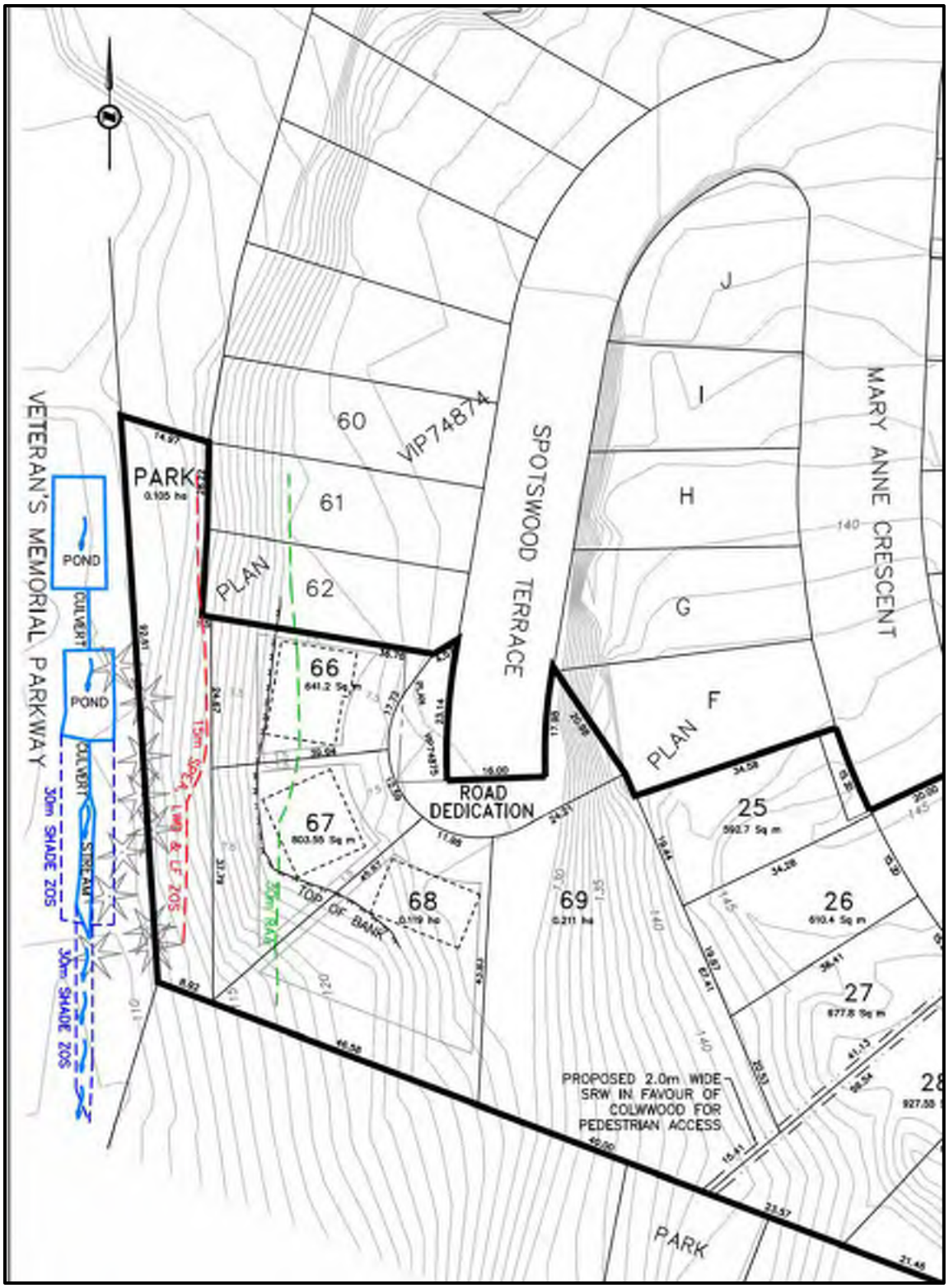

Figure 13. Site Plan of the subject property SPEA area. Close-up of SPEA area shown for convenience. See next two figures for plan of entire property.

Figure 14. Site Plan of the subject property showing the Lot Layout, internal roads, the proposed building envelope footprint for Lots 66, 67, and 68, for which each property lies within the outer edge of the 30 m RAA. Building footprints have been applied to the three Lots on which there is a portion of the 30 m RAA. Reaches overlaid on JEA drawing by Aqua-Tex (see Figure 12).

Figure 15. Ortho-photograph laid over the subdivision Site Plan. Reaches overlaid on JEA drawing by Aqua-Tex (see Figure 12).

12. Measures to Protect and Maintain the Riparian Setback

Measures – Danger Trees

Riparian vegetation in the SPEA, including trees, is vital to streamside soil function and stability and must be protected. The only vegetation management that is permitted in the SPEA is the treatment of Danger Trees. A Danger Tree is a tree that is a hazard to people or property due to its location or lean, its physical damage, overhead conditions, deterioration of its limbs, stem or root system, or any combination of these conditions.

- No trees within the 30 RAA (SPEA and Special Measures) (toe-of-slope to top-of-bank) will be removed or disturbed.
- There are no trees on Lots 66, 67, and 68 east of the top-of-bank within the 30 m RAA.
- No access road from VMP will be constructed within the 30 m RAA.
- No stormwater discharge will be routed through the 30 m RAA.
- All trees within the 15 m SPEA will be included in the municipal Park dedication.

1. Danger Trees	

I, Wm. Patrick Lucey, RP Bio. hereby certify that:

a) I am a qualified environmental professional, as defined in the Riparian Areas Protection Regulation made under the *Riparian Areas Protection Act*;

b) I am qualified to carry out this part of the assessment of the development proposal made by the developer Turnberry Developments Ltd.;

c) I have carried out an assessment of the development proposal and my assessment is set out in this Assessment Report; and in carrying out my assessment of the development proposal, I have followed the assessment methods set out in the Minister's technical manual to the Riparian Areas Protection Regulation.

Measures – Windthrow

Windthrow (trees knocked over due to wind) can be a risk to people and property, and if excessive, can result in a loss of function of riparian vegetation in the SPEA. Windthrow is especially a risk when adjacent forest or individual trees are cleared or new structures are built, thus changing wind patterns and creating new stresses on remaining trees that are not adapted to the new wind patterns. Adjacent forest stands are slated to be managed to accommodate a subdivision south of the subject property.

- Danger tree assessments will be conducted post-subdivision application approval, as specified by the City of Colwood Planning department.
- The mature trees within the VMP road right-of-way and on the adjacent private property will remain undisturbed unless there is the potential for a danger tree.
- If a danger tree has to be removed it will be assessed to verify whether it can be retained as a wildlife tree, with the upper trunk and branches left in the ground (provided this option does not create a fuel loading hazard).
- It is important to note that the trees lie within the municipal road right-of-way and tree management will be at the discretion of the City of Colwood, as SPEA management zones are to be dedicated as Park Land.

2. Windthrow	

I Wm. Patrick Lucey, RP Bio., hereby certify that:

a. I am a qualified environmental professional, as defined in the Riparian Areas Protection Regulation made under the *Riparian Areas Protection Act*;

b. I am qualified to carry out this part of the assessment of the development proposal made by the developer Turnberry Developments Ltd;

c. I have carried out an assessment of the development proposal and my assessment is set out in this Assessment Report; and in carrying out my assessment of the development proposal, I have followed the assessment methods set out in the Minister's technical manual to the Riparian Areas Protection Regulation.

Measures – Slope Stability

Typical field indicators of instability include buttress wood on trees, evidence of slumps or landslip, soil and rock accumulated on the uphill sides of trees, tension cracks in soil, poorly drained or gullied fine-textured soils, shallow or wet organic soils on slopes, or very steep slopes or debris at the bottom of slopes.

- There are no indicators of slope instability on the subject property, such as debris deposits at the base of the slope, excessive runoff in runnels, slope creep, pistol butting on the trees (as these are located at the base of the slope), *et cetera*.
- The project geotechnical engineer has commented that houses can be built on proposed Lots 66, 67, and 68 above the top of bank, as shown on the Site Plan (Figure 14), without disturbing or destabilizing the slope lying to the west of the top of bank.
- A detailed geotechnical assessment will be conducted post-subdivision application approval, as specified by the City of Colwood Planning department. The adjacent steep slope will be subject to Colwood's Natural Hazards Development Permit Guidelines, which shall be assessed as part of the OCP Bylaw for Steep Slopes.

3. Slope Stability	

I, Wm. Patrick Lucey, R.P. Bio., hereby certify that:

a. I am a qualified environmental professional, as defined in the Riparian Areas Protection Regulation made under the *Riparian Areas Protection Act*;

b. I am qualified to carry out this part of the assessment of the development proposal made by the developer Turnberry Developments Ltd ;

c. I have carried out an assessment of the development proposal and my assessment is set out in this Assessment Report; and in carrying out my assessment of the development proposal, I have followed the assessment methods set out in the Minister's technical manual to the Riparian Areas Protection Regulation.

Measures – Protection of Trees in the SPEA

Riparian vegetation in the SPEA, including trees, is vital to stream function and stability and must be protected. This includes root zones, which may extend beyond the SPEA boundary. The subject property has already been cleared by a previous owner; however the adjacent municipal property (road ROW) and vegetation will be protected.

- No trees within the SPEA or on adjacent Special Measures land, west of the top-of-bank, will be removed or disturbed.
- The SPEA in Reach 2 should be 5 m for a ditch, but has been increased to 15 m to protect the SPEA trees and to be in alignment with the City of Colwood 15 m setback from watercourses. Reach 3 is on the neighbouring property (downstream/ south) and has also been assigned a 15+ m SPEA.

Encroachment into the SPEA will be prevented with temporary orange fencing during construction (See Preventing Encroachment in the SPEA below).

- A Certified Danger Tree Assessor shall be retained prior to any danger trees being considered for removal outside the SPEA to ensure that the removal does not result in harm to trees within the SPEA. This assessment will be conducted by the City of Colwood or may be undertaken by the developer post-subdivision application approval, as specified by the City of Colwood Planning department.
- Photopoint Monitoring of the trees shall be photographed to document the health of the trees and shrub understory prior to construction, as a baseline of riparian health. This Photopoint baseline shall be used to assess post-construction conservation/protection of the SPEA and shall be used as part of the Post-construction Report. This assessment shall be conducted post-subdivision application approval, as specified by the City of Colwood Planning department.
- The design and implementation of the E&SC Plan will ensure that no harmful runoff leaves the construction footprint/disturbance zone (that shall be east of the top-of-bank) that could potentially harm tree roots or result in excessive soil deposition around tree roots, within that section of the 30 m RAA that lies west of the top-of-bank.
- The E&SC Plan, including Monitoring, shall be maintained to ensure trees are protected during construction.
- The site has previously been cleared on the upper terrace. No further clearing beyond the top-of-bank is proposed.

4. Protection of Trees	

I, Wm. Patrick Lucey, RP Bio, hereby certify that:

a. I am a qualified environmental professional, as defined in the Riparian Areas Protection Regulation made under the *Riparian Areas Protection Act*;
b. I am qualified to carry out this part of the assessment of the development proposal made by the developer Turnberry Developments Ltd;
c. I have carried out an assessment of the development proposal and my assessment is set out in this Assessment Report; and in carrying out my assessment of the development proposal, I have followed the assessment methods set out in the Minister's technical manual to the Riparian Areas Protection Regulation.

Measures – Preventing Encroachment in the SPEA

As part of the proposed subdivision, potential sites for dwellings are included on the site plan. There are no proposed buildings within the SPEA.

During construction, the terrace edge of the Special Measures Zone (top-of-bank) will be delineated with orange snow fencing, sediment control fencing, and signage. Orange snow fence shall be erected along the top-of-bank, on the upper terrace, to prevent intrusion during the construction phase beyond the top-of-bank edge.

- The temporary barrier fence shall be at least 1.5 metres in height; it shall be constructed of 2" x 4" lumber, with orange snow fencing attached to the wooden barrier. The fence shall remain in place until all construction activity has been completed and the structure has been commissioned for occupancy.
- Signage every 5 metres on the orange snow fencing will indicate the Special Measures Zone and that it is a non-disturbance management zone. Signage shall be printed using weatherproof materials.
- Note: the initial sediment control fence and orange snow fence are to be erected at the top-of-bank (west edge of upper terrace) prior to ANY construction.
- No construction shall proceed on-site until the snow and sediment fencing, plus signage, has been erected and confirmed, by the QEP, to meet an appropriate construction standard, established by the QEP or a Civil Engineer or a qualified carpenter.

5. Encroachment	

I, Wm. Patrick Lucey, R.P. Bio., hereby certify that:

a. I am a qualified environmental professional, as defined in the Riparian Areas Protection Regulation made under the *Riparian Areas Protection Act*;

b. I am qualified to carry out this part of the assessment of the development proposal made by the developer Turnberry Developments Ltd;

c. I have carried out an assessment of the development proposal and my assessment is set out in this Assessment Report; and in carrying out my assessment of the development proposal, I have followed the assessment methods set out in the Minister's technical manual to the Riparian Areas Protection Regulation.

Measures – Sediment and Erosion Control During Construction

Measures to prevent sediment flowing into the wetland shall be monitored under the supervision and monitoring of the QEP.

- A sediment and erosion control plan (S&ECP) shall be developed post-subdivision application approval but prior to ANY construction undertaken after a Building or any other Permit is issued.
- Prior to ANY development related construction on the property, the City of Colwood Planning staff shall be invited to conduct a site review to verify that the E&SC Plan has been properly implemented and that an E&SC Monitoring program has been authorized by the developer.
- The E&SC Plan shall include a Monitoring program to ensure the Plan has been properly implemented and functions as designed and that necessary modifications are implemented as prescribed by the project QEP.
- The Monitoring program is a core aspect of the Post-Development Report that shall be authorized by the developer as part of the E&SC Plan to verify that no RAPR HADD occurred during the construction. If a RAPR HADD occurred during construction the Monitoring program and Post-Development Report shall document the remedial measures taken to protect the SPEA.

The owner shall retain a contract professional Ecologist, Landscape Architect, or Engineer (*e.g.*, a QEP), who shall be responsible for designing an effective erosion and sediment control plan to ensure that during construction, no sediment-laden water enters that segment of the 30 m RAA, west of the top-of-bank, and that erosion of exposed soils does not occur such that the SPEA is damaged. The upper headwater streams and ditches flowing into Latoria Creek are deemed to be fish-bearing, therefore, there is zero tolerance for turbid or sediment-laden runoff entering the treatment ponds and stream, downslope of this development. The RAPR also prohibits treatment, including infiltration, of stormwater within the SPEA, acknowledging that the treatment ponds and their culvert connections were designed as treatment facilities.

The plan need not be complicated, but it should be followed carefully.

The Federal Fisheries Act prohibits the deposition of a deleterious substance (including sediment) in water frequented by fish. Furthermore, any stormwater discharges into adjacent receiving environments (especially freshwater ecosystems) must ensure that the Federal and Provincial water quality guidelines for the protection of aquatic life are not exceeded in the receiving environments. The Federal Guidelines are administered by the Canadian Council of Ministers of the Environment (CCME) and Provincial Guidelines are administered by a Provincial Ministry.

In order to comply with the Act and Guidelines, it is essential that any Erosion and Sediment Control Plan be designed to an adequate standard. Three documents that

outline general principles and approaches for managing stormwater and controlling sediment and erosion are:

- "Stormwater Planning: a Guidebook for British Columbia," produced by BC MoE (2002)i;
- "Land Development Guidelines for the Protection of Aquatic Habitat," produced by DFO (1992)ii; and
- "Storm water management for industrial activities: developing pollution prevention plans and best management practices," produced by the U.S. Environmental Protection Agency (1992)iii.

The EPA (1992) document has been found to be the most stringent in its standards and best management practices (BMPs), which meet and exceed provincial BMPs and guidelines. The principal requirement of the US EPA method is the development of a Stormwater Pollution Prevention Plan (SPPP or PPP), which must be implemented prior to commencement of any on-site construction activity. Guidelines for the implementation of a Pollution Prevention Plan are outlined below:

- Always maintain a clean and organized work area.
- Stage work to minimize the disturbed area and duration of exposure.
- Ensure that debris from demolition is properly contained and that debris does not enter the wetland and streams.
- Sediment control fences should be used to prevent sediment-laden water from entering the SPEA. Silt fences are useful for slowing, diverting and preventing runoff from entering a watercourse. It is not appropriate to use silt fences to try and filter flowing turbid water.
- Prevent upslope water from running over disturbed areas, using diversion berms or other methods to intercept flows.
- Wherever possible, preserve vegetation and cover soils. Stabilize disturbed areas as quickly as possible with temporary or permanent covers (e.g. straw/mulch, grass seed, tarp etc.).
- Ensure runoff velocities are maintained at the lowest practical value. Maintain sheet flow and avoid channelizing runoff.
- Use site-specific sediment control structures to ensure suspended solids are retained on-site wherever possible.
- Avoid the siting of soil and debris stockpiles near the SPEA.
- Prepare for and clean up any and all spills. Repair all equipment oil and fuel leaks. A Spill Cleanup Kit should be included as part of the heavy equipment operators' Standard Operating Procedures; all equipment operators should be properly trained in the use of the Spill Cleanup Kits.
- Take care when using concrete and ensure that fresh concrete and concrete wash water do not runoff into the streams or wetland. Un-cured concrete, and concrete wash water, is extremely toxic to aquatic organisms.
- Avoid the unnecessary use of water for cleaning to minimize the subsequent need for treatment of suspended solids.
- Ensure the regular inspection and monitoring of sediment control structures (e.g. silt fences, settling ponds etc.) as part of the construction program, particularly after rainstorm events. Remove sediment build-up to ensure continued effectiveness.
- Weekly inspections, combined with Photopoint Monitoring, are essential to monitor and document the effectiveness of the erosion and sediment control plan. See the

Environmental Monitoring section of this report for a more detailed description about environmental monitoring procedures recommended for this project.

6. Sediment and Erosion Control	

I, Wm. Patrick Lucey, R.P. Bio., hereby certify that:

a. I am a qualified environmental professional, as defined in the Riparian Areas Protection Regulation made under the *Riparian Areas Protection Act*;
b. I am qualified to carry out this part of the assessment of the development proposal made by the developer Turnberry Developments Ltd ;
c. I have carried out an assessment of the development proposal and my assessment is set out in this Assessment Report; and in carrying out my assessment of the development proposal, I have followed the assessment methods set out in the Minister's technical manual to the Riparian Areas Protection Regulation.

Measures – Stormwater Management

Care should be taken when designing the stormwater management measures to ensure there are no deleterious effects to the stream or wetland SPEAs. Stormwater flows must be discharged in a manner that prevents channelization and erosive forces, and prevents sediment deposition into the riparian management zones. There is zero tolerance for untreated runoff entering the riparian management zones.

- The stormwater management plan shall be designed by the project civil engineer with input from the project QEP.
- The stormwater management plan shall be designed at a time specified by the City of Colwood Planning department, *i.e.*, post-subdivision application approval.
- All services to the subject Lots shall be directed to existing municipal infrastructure on Spotswood.
- All storm drainage from the proposed Lots shall be directed to existing piping and no stormwater or perimeter drainage from the proposed Lots is intended be directed to the west over the top of bank. This design criterion shall be included in the storm water management plan to be attached to the Development Permit application, that will be required by the City of Colwood Planning Development. This administrative process has been specified by the City Planning staff as part of the post-subdivision application approval process.

7. Stormwater Management	

I, Wm. Patrick Lucey, RP Bio., hereby certify that:

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b. I am qualified to carry out this part of the assessment of the development proposal made by the developer Turnberry Developments Ltd ;
c. I have carried out an assessment of the development proposal and my assessment is set out in this Assessment Report; and In carrying out my assessment of the development proposal, I have followed the assessment methods set out in the Minister's technical manual to the Riparian Areas Protection Regulation.

Measures – Floodplain Concerns

There are no floodplain concerns on this site, within the treatment ponds, inter-treatment pond buried culvert connections, or open drainage ditches.

8. Floodplain Concerns (highly mobile channel)	NA

I, Wm. Patrick Lucey, R.P. Bio., hereby certify that:

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c.	I have carried out an assessment of the development proposal and my assessment is set out in this Assessment Report; and In carrying out my assessment of the development proposal, I have followed the assessment methods set out in the Minister's technical manual to the Riparian Areas Protection Regulation.

13. Field Reviews and Environmental Monitoring

In general, the most environmentally dangerous period of development is the initial construction phase when land is cleared of vegetation and graded to create a proper surface for construction. This initial phase tends to involve open exposed soils, often involves demolition and debris, and may involve contractors who are not familiar with the site or the required best management practices. As construction proceeds, risk generally declines. Soil disturbing activities should be scheduled for low-risk periods of prolonged dry weather, not in the wet winter season. If construction activities occur during rainy seasons appropriate increased measures to protect the RAA and SPEA shall be designed and implemented, including enhanced E&SC Monitoring. Monitoring shall include an E&SC Checklist documenting that Plan measures function properly, problems are addressed in an efficacious, timely manner, that no RAPR or DFO HADDs occurred, that all necessary remedial measures to address problems were implemented and function properly, and that monitoring frequency reflects season weather risks.

Field Reviews

A field review is required prior to initiation of any disturbance. Aqua-Tex, or another suitably qualified QEP, must be advised at least one week in advance of the work. The field review should confirm that the recommended measures are in place:

- Prior to site disturbance, the SPEA should be clearly marked across the width of the top-of-bank with orange snow fencing and signs indicating the debris and/or stockpiles of excavated material are not to be placed in or adjacent to the top-of-bank.
- An erosion and sediment control plan shall be developed, and appropriate monitoring measures included on a monitoring checklist (see recommendation in Measures – Sediment and Erosion Control During Construction).
- A silt fence should be installed along the top-of-bank adjacent to the proposed area of construction disturbance. Failure to implement this E&SC measure, prior to ANY construction activity, shall result in an immediate STOP WORK ORDER. The STOP WORK ORDER shall not be removed until the measure has been properly implemented and approved by the QEP and/or project civil engineer. Municipal Planning and Bylaw Enforcement staff shall be advised of the STOP WORK ORDER and its subsequent removal, at which time construction activity may commence.
- Prior to site disturbance, key locations on the site for monitoring photographs should be chosen. These should be locations which will not be disturbed by the development activities and enable photography of key site features. These locations should be used as Photopoint Monitoring locations where regular photographs will be taken (camera locations). These locations should provide a broad and complete overview of site activities in addition to specific areas of interest (*e.g.*, water clarity in the streams or wetland).

Environmental Monitoring

In order to ensure that the SPEA water quality is protected, the site should be monitored regularly to ensure that no erosion or sedimentation is occurring, that signage, fencing and erosion control measures are in place, and that stockpiles and debris do not enter the SPEA or

steep slopes within the RAA. The use of repeat photography is a simple method for documenting site conditions and should be a core component of the environmental monitoring program – this method is called Photopoint Monitoring.

Photopoint Monitoring is a standardized procedure, developed largely by Dr. Fred Hall of the U.S. Forest Service, for taking precisely replicable photographs of resources that require long-term management[iv]. Photopoint Monitoring is both a qualitative and quantitative tool that can assist in detecting unacceptable conditions in target resources before severe or irreversible changes occur and allow time to implement corrective actions.

- During construction, the site should be checked on a weekly basis and after every significant rainstorm (6mm [1/4"] or greater).
- Repeat photos should be taken at each camera location as well as candid photos showing activities of interest and the general condition of the site.
- Photos should be time and date stamped and stored in a central location for future reference if requested.
- During weekly inspections, the environmental monitor should utilize a standardized checklist which includes all the items noted above as well as measures from the erosion and sediment control plan.
- The monitor should check that the items listed under "Field Reviews" above remain in place in addition to confirming the following:
    - Debris should be contained in construction bins and debris capable of being blown around by wind (plastics, asphalt shingles, etc.) should be contained in a bin or other container with a lid.
    - During months when rain is anticipated, stockpiles must be covered with tarps, poly or other means to prevent runoff. Ideally excavated material would be removed from site and properly disposed of in a designated facility.

The intent with environmental monitoring is to document changes to the landscape and that any such changes to the landscape have not resulted in harm to the ecology of the site or watershed.

14. Measures to Protect, Enhance, And Restore Ecosystem Values

It is our professional opinion, that this proposed development will not adversely affect the treatment pond and stream (ditch) habitat, acknowledging that these aquatic features lie within the municipal road right-of-way. The proposed development, subject to the conditions specified above, will ensure that the treatment pond and stream habitat shall be maintained in a state of Proper Functioning Condition, albeit at a low level. If danger trees are required to be modified the preferred modification shall be that they be retained as wildlife trees and that as much of the wood be retained within the riparian zone, provided this wood does not increase fuel loading to an unacceptable degree.

Wherever possible, the larger diameter trees will be retained as wildlife trees to support birds and other terrestrial wildlife and the wood on the forest floor will be retained to support amphibians and reptiles and to provide long term, woody sponge water retention structures, as an adaptation to predicted drier summers (under a changing climate scenario). The riparian zone will be fenced to prevent trampling and at the discretion of the City of Colwood invasive species will be removed.

15. Photos

Photo 1. Latoria Northeast Creek, showing a typical berm between the treatment ponds. The berms are a mix of large (~1.0 m diameter) shot rock, smaller rocks and soil. The berms are well vegetated with soil stabilizing root masses. Image taken 2022-06-24.

Photo 2. Typical PVC pipe inlet in a treatment pond. This pipe has a “T” inlet structure (yellow arrow) such that minor flows enter the pipe through the bottom of the T, while major flows enter at through the top of the T. The large rock berm in the foreground separates two treatment ponds and the lower treatment pond from the buried culvert connecting the two ponds. The high water mark was determined by assessing the elevation of the edge of vegetation and soil disturbance around the pond and the elevation of the top of the T inlet. These two elevations were coincident. We have selected the elevation of the top of the T as the stream boundary (HWM), given that there was no physical or visual evidence that a floodplain exists within the treatment pond. In practical terms the stream boundary, the bankfull, and the HWM elevation is the same, given the majority of flows enter the connecting culvert through the bottom of the T, i.e., the elevation of the invert of the buried culvert. Blue arrow is the direction of flow. Note the dense blackberry understory. Image taken 2022-06-24.

Photo 3. T inlet structure of the upper most treatment pond (yellow arrow). The bottom of the T is almost the same elevation as the invert of the buried culvert. Note the large rock berm separating this treatment pond from the adjacent treatment pond downstream. Blue arrow is the direction of flow. Note the dense blackberry understory with a young red alder tree overstory. Image taken 2022-06-24.

Photo 4. Looking upstream at large wood in the uppermost of the two treatment ponds. Note the red alder shrub understory and the dense blackberry surrounding the pond. Image taken 2022-06-24

Photo 5. Westernmost edge of upper most treatment pond adjacent to VMP. Note the large western red cedar lying at the edge of the vegetation. Image taken 2022-06-24.

Photo 6. Looking east across the large rock berm separating the two treatment ponds. Image taken 2022-06-24.

Photo 7. Dense blackberry understory at the edge of the downstream treatment pond. Image taken 2022-06-24.

Photo 8. Looking at the discharge end of the PVC pipe downstream of the lowermost treatment pond. The dashed blue arrow is the small stream (ditch) flowing south. Note the treed canopy within the riparian zone (SPEA). This stream receives low flows. Image taken 2022-06-24.

Photo 9. Mid-channel in the stream downstream of the lower treatment pond. Note the large wood in the channel and the ferns lining the edge of the channel. The southwest corner of the subject property, adjacent to the stream, is marked by the yellow arrow (Figure 8). Image taken 2022-06-24.

Photo 10. Large cedar tree at the lower end of the stream reach (Figure 12) (Tag 34; 201 cm diameter). Image taken 2022-06-24.

Photo 11. Latoria Northeast Creek looking upstream from southern property boundary. Note the ferns adjacent to the stream boundary/HWM, indicating minimal flow fluctuations, given the very small headwater catchment. This image is typical of the stream channel downstream of the reach on the subject property. Photo taken on June 22nd, 2020.

16. Riparian Assessment Assurance Statement - Qualified Environmental Professional

To: The City of Colwood
3300 Wishart Road
Victoria BC V9C 1R1
Canada

November 19, 2022

With reference to the Riparian Areas Protection Regulation for the property:

Mary Ann Crescent (Spotswood) PID 025-720-813
Legal description or PID and civic address of the property

The undersigned hereby gives assurance that he/she is a Qualified Environmental Professional:

Wm. Patrick Lucey, R.P. Bio., and Steve Voller, R.P. Bio. are members of the College of Applied Biology of BC.

I have signed, sealed and dated, and thereby certified, the attached riparian assessment report on the property in accordance with the *Professional Practice Guidelines – Legislated Riparian Assessments* and with the assessment methods. That report must be read in conjunction with this statement.

In preparing that report I/we have:

- ☒ Collected and reviewed appropriate background information
- ☒ Reviewed the development proposal on the property
- ☒ Conducted field work on and, if required, beyond the property
- ☒ Reported on the results of the field work on and, if required, beyond the property
- ☐ Incorporated recommendations or assessment results from other specialists
- ☒ Prescribed measures to protect and maintain the integrity of the streamside protection and enhancement area
- ☒ Prescribed measures to avoid the occurrence of a HADD*
- ☒ Reported on the requirements for field reviews or environmental monitoring of the property during or following site works for the proposed development and recommended who should conduct those field reviews or environmental monitoring
- ☒ Reviewed the riparian assessment report with the client and explained the content and the measures required to be implemented.

I/we hereby confirm that in my/our professional opinion, based on the conditions contained in the attached riparian assessment report, as required by the Riparian Areas Regulation (Section 4):

Check one:

☐ If the development is implemented as proposed there will be no harmful alteration, disruption or destruction of natural features, functions and conditions that support fish life processes in the riparian assessment area.

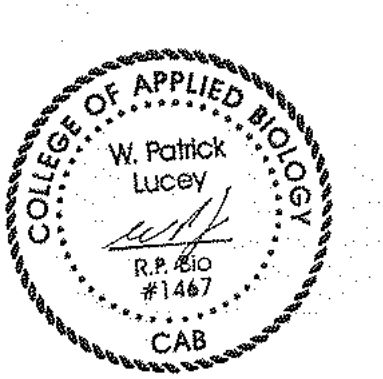
☒ If the streamside protection and enhancement areas identified in the report are protected from the development and the measures prescribed in the report as necessary to protect the integrity of those areas from the effects of the development are implemented by the developer, there will be no harmful alteration, disruption or destruction of natural features, functions and conditions that support fish life processes in the riparian assessment area, and

Check one:

☐ with one or more recommended registered covenants

☒ without any registered covenant.

Signature, seal and date



November 21, 2022

**HADD – harmful alteration, disruption or destruction of natural features, functions and conditions that support fish life processes*

17. Professional Opinion

Qualified Environmental Professional opinion on the development proposal's riparian assessment.

Date November 19th, 2022

1. I/We, Wm. Patrick Lucey R.P.Bio.,

Please list name(s) of qualified environmental professional(s) and their professional designation that are involved in assessment.)

hereby certify that:

a) I am/We are qualified environmental professional(s), as defined in the Riparian Areas Protection Regulation made under the *Riparian Areas Protection Act*;
b) I am/We are qualified to carry out the assessment of the proposal made by the developer Turnberry Developments, which proposal is described in section 3 of this Assessment Report (the "development proposal"),
c) I have/We have carried out an assessment of the development proposal and my/our assessment is set out in this Assessment Report; and
d) In carrying out my/our assessment of the development proposal, I have/We have followed the specifications of the Riparian Areas Protection Regulation and assessment methodology set out in the minister's manual; AND

2. As qualified environmental professional(s), I/we hereby provide my/our professional opinion that:

a) N/A the site of the proposed development is subject to undue hardship, (**if applicable, indicate N/A otherwise**) and
b) X the proposed development will meet the **riparian protection standard** if the development proceeds as proposed in the report and complies with the measures, if any, recommended in the report.

[NOTE: "Qualified Environmental Professional" means an individual as described in section 21 of the Riparian Areas Protection Regulation.]

18. Statement of Limitations

The information presented in this report was compiled and interpreted exclusively for the purposes of complying with the City of Colwood's 2018 OCP, with respect to watercourse setbacks and the Riparian Areas Protection Regulation. Aqua-Tex provided this report for the client, Mike Weir (Turnberry Developments), solely for the purpose noted above.

Aqua-Tex has exercised reasonable professional skill, care and diligence to assess the information acquired during the preparation of this report but makes no guarantees or warranties as to the accuracy or completeness of this information. The information contained in this report is based upon, and limited by, the circumstances and conditions acknowledged herein, and upon information available at the time of its preparation. The information provided by others is believed to be accurate but cannot be guaranteed.

Copying or distribution of this report, in whole or in part, is not permitted without the express permission of the client. Use or reliance on the information contained in the report, other than by the client or City of Colwood, is not permitted without the written permission of Aqua-Tex.

The success of the measures prescribed to protect the riparian area assume diligent work practices and construction methods on the part of the clients and their contractors. If Aqua-Tex, or another qualified QEP, is not retained to carry out field reviews and/or environmental monitoring, Aqua-Tex will be unable to provide assurance that the work was completed to an acceptable standard or to sign a conformance statement (*e.g.*, post development completion report) if required by the local government.

This report **remains valid for five years** only if the site conditions remain unaltered and the proposed development remains the same. If the development plans change, or if site conditions change, the report may no longer be valid.

19. Appendix 1: Experience of Assessment Team

Date:	2022-July-15
Name of Qualified Environmental Professional (QEP):	Wm. Patrick Lucey
Professional designation:	R.P. Bio., C. Biol., MRSB
Professional association:	College of Applied Biology of BC; Royal Society of Biology (UK)
Registration number:	1467; P0119549
Training in Riparian Areas Protection Regulation assessment methods	
Organization or agency delivery training:	Vancouver Island University
Name of trainer:	Lora Tryon
Date of training sessions:	November 2005 and July 2020
Other relevant education, training or experience	
RAR Professional Practice Guidelines Training, Nanaimo BC	May 2018
Field Soil Description and Classification, Wayne Blashill, P.Ag. (Instructor). Columbia Mountains Institute, Revelstoke BC	June 2017
Forest and Range Evaluation Program (FREP) riparian protocol training, 3-day course. Mr. Derek Tripp, instructor. Victoria BC	November 2016
BCWF Wetland Institute- Eastern Vancouver Island	September 2014
Riparian Roads Workshop- US National Riparian Roads Team, Portland OR	May 2001
CVRD Development Services RAR Workshop, Duncan BC	April 2015
RAR QEP Workshop, Nanaimo BC	January 2013
RAR QEP Workshop, Victoria BC	January 2013
RAR QEP Workshop, Nanaimo BC	February 2012
Applied Fluvial Geomorphology, Level 1. Dr. Dave Rosgen (Instructor) Wildland Hydrology, Pagosa Springs, CO.	June 2006
Greenline Vegetation Monitoring for Riparian Areas. Dr. Alma Winward (Instructor), Richfield, Utah	July 2000
Instructor Training PFC Train the Trainer- US National Riparian Service Team	May 1999
Proper Functioning Condition (PFC) Assessment Training. US National Riparian Service Team. Whistler, Pemberton and Victoria.	March 1998
Proper Functioning Condition (PFC) Assessment Training. Oregon State University, Klamath Falls, OR	August 1997
M.Sc., Biology, University of Victoria. Thesis: Periphyton functional and structural response, within semi-natural surrogate streams, to artificially induced water quality perturbations	1994

B.A. (WD) Geography, University of Victoria. Aquatic Resource Management	1990	
B.Sc. Biology (marine biology & oceanography, freshwater ecology, limnology)	1981	
Riparian assessments completed or contributed to	**Primary QEP**	**Secondary QEP**
1. Lantzville Foothills Estates (Kettle Creek) (2006-02-20) (#52)	Patrick Lucey	Paul DeGreeff, BCSLA
2. 1945 Sooke Road (Colwood Creek) (2006-04) (not uploaded)	Patrick Lucey	Cori Barraclough Don Skinner, RP Bio Arborist
3. 551 Latoria Road ("Madrona Creek"- unnamed tributary of Latoria Creek) (2006-04-09)	Patrick Lucey	
4. Arbutus Mountain Estates - Phase 1 (Shawnigan Creek) (2006-03-29) (#60)	Patrick Lucey	Lehna Malmkvist, RP Bio.
5. Westlock Rd. Subdivision (Trumpeter Pointe) (Quamichan Lake) (2005-08-18) (#77)	Patrick Lucey	Rick Lloyd P.Eng.
6. 1404 Wild Cherry Drive (Metchosin Creek) (2006-04-15) (#78)	Patrick Lucey	
7. Westlock Rd. Subdivision (Trumpeter Pointe) (Quamichan Lake) (2006-04-25) (#77 revision)	Patrick Lucey	Rick Lloyd P.Eng.
8. Baranti Developments (Mill Bay Tributary) (2007-04-25) (#435)	Patrick Lucey	Lehna Malmkvist, RP Bio., Alec Morse, P.Eng., Don Skinner, RP Bio
9. Waldy Road (Cowichan Bay) (2008-01-08) (#726)	Patrick Lucey	Lehna Malmkvist, RP Bio.
10. 1545 Cowichan Bay Road (2008-12-08) (#727)	Patrick Lucey	Lehna Malmkvist, RP Bio.
11. Westhills Community (Langford Lake & tributaries) (2008-06-12) (not submitted- Langford not registered in RAR database)	Patrick Lucey	Lehna Malmkvist, RP Bio.
12. Oasis Lake (Sooke Lake Road) (2008-06-24) (#972)	Patrick Lucey	
13. 2215 Clearihue Road (Shawnigan Lake) (2008-06-26) (#976)	Patrick Lucey	
14. 3031 Phillips Road (Sooke River) (2008-08-12 updated 2009-01) (#1044)	Patrick Lucey	Lehna Malmkvist, RP Bio.
15. 3501 Paradise Valley Road (Cheakamus River) (2008-09-23) (#1097)	Patrick Lucey	Lehna Malmkvist, RP Bio. Brian LaCas, P.Eng.

16. 9270 Lochside Drive (Reay Creek) (2008-11-24) (#1157)	Patrick Lucey	Cori Barraclough
17. Sooke Business Park (3220 Otter Point Rd) (2008-06-05 revised 2008-12-18) (#1180)	Patrick Lucey	Lehna Malmkvist, RP Bio
18. Goldstream Avenue (Millstream Creek) (2010-02-17) (#1557)	Patrick Lucey	
19. Stebbings Road (VanHorne Creek) (2010-04-14; modified 2011-01-11) (#1597)	Patrick Lucey	Lehna Malmkvist, RP Bio.
20. Morgan Maples RV Park (Chemainus River trib) (2010-04-26) (#1610)	Patrick Lucey	Lehna Malmkvist, RP Bio.
21. Elkington Forest – Comprehensive (Shawnigan Creek tribs) (2010-07-23) (#1712)	Patrick Lucey	
22. 1785 Whiffen Spit Road (Wright Road Creek) (2010-07-27) (#1723)	Patrick Lucey	
23. Elkington Forest (Creek 19B) (2010-12-09) (#1850)	Patrick Lucey	
24. 3055 Phillips Road (Sooke River) (2010-12-17) (#1857)	Patrick Lucey	
25. St. Rose of Lima - 2191 Townsend Road (Knott Creek) (2011-01-10) (#1876)	Patrick Lucey	Cori Barraclough
26. 1585 W. Shawnigan Lake Road (Shawnigan Lake) (2011-01-13) (#1878)	Patrick Lucey	
27. 2585 Selwyn Road (Millstream Creek) (not submitted- Langford not registered in RAR database)	Patrick Lucey	
28. 1609 Keating Cross Road (Graham Creek) (2010-12-03) (not submitted at client request)	Patrick Lucey	Cori Barraclough
29. 2637 Savory Road (Florence Lake) (2011-05-3) (#LANGFORD- NOT UPLOADED TO RARNS)	Patrick Lucey	
30. Goodwin Farms-Munn Road (Fizzle Creek) (2011-06-06) (#2054)	Patrick Lucey	Cori Barraclough
31. 2907 Phillip St Duncan (Holmes Creek) (2011-09-09) (#2131) (note: also submitted as #2112- should be deleted, wrong regional district)	Patrick Lucey	
32. Sahtlam Lodge (Cowichan River) (2011-09-16) (#2145)	Patrick Lucey	
33. Lot 6, Shawnigan Lake Road (Van Horne Creek) (2011-09-16, updated	Patrick Lucey	

2011-10-03, updated 2012-02-06) (#2147)		
34. 227 Meadowbrook Road, Saanich BC (OCP revision- not uploaded) (2012-01-25)	Patrick Lucey	
35. Elkington Trailhead Creek #19 (2012-06-19) (#2412)	Patrick Lucey	Shane Moore, P. Geo.
36. Elkington Creek 17 and Lower Elkington Tributary (2012-08-08, revised 2018-09) (#2482)	Patrick Lucey	
37. 288/290 Beecher Bay Road (2013-09-04) (#2877)	Patrick Lucey	
38. 1591 W. Shawnigan Lake Road, Don Calveley (Shawnigan Lake) (#2478)	Patrick Lucey	
39. 2054 Butler Avenue, Gary Henshaw (Shawnigan Lake) (2013-04-12) (#2749)	Patrick Lucey	
40. 5080 Cowichan Lake Road, Deborah Juch (2014-07-10) (Simple Assessment Tributary to Cowichan River) (#3181)	Patrick Lucey	Justin Straker, P.Ag.
41. 875 Whittaker Road, Spectacle Creek & Unnamed Tributary (2015-08-21) (#3689)	Patrick Lucey	
42. 820 Latoria Road, Unnamed Tributary to Pritchard Creek, JTC Investment Group (2015-07-26) (#LANGFORD-NOT UPLOADED TO RARNS)	Patrick Lucey	
43. Craigflower Creek, Fort Victoria RAR, Goodwill Investments Ltd. (2015-07-21) (#3662)	Patrick Lucey	
44. 6244 Rodolph Road, Central Saanich Creek, Aplomado Developments (2014-08-26) (#3226)	Patrick Lucey	Don Skinner RP Bio., Arborist
45. 2000 Renfrew Road, Shawnigan Lake (2014-07-28) (#3182)	Patrick Lucey	
46. Pritchard Creek, TJBS Holdings (Aug. 2012) (#LANGFORD- NOT UPLOADED TO RARNS)	Patrick Lucey	
47. 2219 London Road, Shawnigan Lake (2014-08-26) (#3227)	Patrick Lucey	
48. Dovedale Road; Lot 41, Tributary to Shawnigan Lake (2014-10-22) (#3293)	Patrick Lucey	
49. 2010 Renfrew Road Shawnigan Lake (2014-11-05) (#3304)	Patrick Lucey	

50. 989 Kangaroo Road, Hewitt Creek Wetland & Unnamed Tributary (2015-03-29) (#3461)	Patrick Lucey	
51. 3999 Renfrew Road Koksilah River (2015-07-12) (#3476)	Patrick Lucey	
52. 774 Latoria Road, Pritchard Creek (2015-03-31) (# LANGFORD- NOT UPLOADED)	Patrick Lucey	
53. 1660 Monterey Avenue (2015-05-26) (#3562)	Cori Barraclough	Patrick Lucey
54. 3590 Gilbert Drive (2016-04-27) (#4015)	Patrick Lucey	
55. 2319 Stevenson Road, Shawnigan Lake, (2016-06-22) (#4085)	Patrick Lucey	
56. Lot 4, Ark Road. Roofmart. (2017-04-26) (#4595)	Patrick Lucey	
57. 1939 and 1945 Sooke Road, Brookes Westshore School, Colwood Creek. (2017-03-30) (#4605	Patrick Lucey	Cori Barraclough
58. 360 Stebbings Road, Goldstream Heights, Tributary to Van Horne Creek. (2017-06-13) (#4637)	Patrick Lucey	
59. 468,474 and 476 Millstream Rd., Millstream Creek, (2017-06-02) (#XXXX). NOT UPLOADED TO RARNS	Patrick Lucey	Tracy Motyer, Richard Brimmel, P.Eng., (Geotechnical) Jan Hoel, P.Eng. (stormwater), Tom Talbot (arborist)
60. 1105 Cypress Road, Tharratt Brook (2017-11-03) (#4879)	Patrick Lucey	Tracy Motyer
61. Horizon Terrace, Pritchard Creek (2018-03-29) (# LANGFORD- NOT UPLOADED)	Patrick Lucey	
62. 6140 Payne Road, Duncan (2018-06-11) (#5215)	Steve Voller	Tracy Motyer
63. YMCA Camp Thunderbird, Glinz Lake, Mark Dodd (2018-10-12) (#5425)	Cori Barraclough	Tracy Motyer
64. Goldstream Heights, Tarras. (2018-12-04) (# 2018)	Patrick Lucey	Cori Barraclough Tracy Motyer
65. 2368 Renfrew Road, Dan Nikirk, Shawnigan Lake (2018-12-13) (#5514)	Patrick Lucey	Cori Barraclough Tracy Motyer
66. 1393 Turner Lane, John Laurie, Cobble Hill (2018-12-31; revised 2019-04-26) (#5542)	Patrick Lucey	Tracy Motyer

67. 7069 East Saanich Road, Darleen Taylor, Saanichton (2019-03-15) (#5632)	Cori Barraclough	
68. 2222 Renfrew Road, Len Wansbrough, Shawnigan Lake (2019-03-25) (#5549)	Patrick Lucey	Steve Voller
69. 2220 Renfrew Road, Tom Wilson, Shawnigan Lake (2019-04-12) (#Noname 17 – Submitted by email to Charlotte Billingham, FLNRORD)	Patrick Lucey	Cori Barraclough
70. PID 009-861-823, Millstream Road, District of Highlands (CRD Korene Torney, P. Geo., PMP, Supervisor, Geo-Environmental Programs (2019-08-22) (#5868a)	Patrick Lucey	Cori Barraclough
71. PID 009-861-815 & 024-273-163, Millstream Road, District of Highlands (CRD Korene Torney, P. Geo., PMP, Supervisor, Geo-Environmental Programs (2019-08-22) (#5869a)	Patrick Lucey	Cori Barraclough
72. 2201 Clearihue Road, Shawnigan Lake (CVRD); Calvin Cook; (#5860)	Patrick Lucey	
73. 2040 Cullin Road, Shawnigan Lake (CVRD); Glen MacDonald; (#5916)	Patrick Lucey	
74. 4890 Munn Road, District of Highlands; Ethan and Natasha Ghidoni; (#5934)	Patrick Lucey	
75. 2054 Butler Avenue, Shawnigan Lake (CVRD); Gary & Lynn Henshaw; (#6500)	Patrick Lucey	
76. 2143 Fulford-Ganges Road, Salt Spring Island (Islands Trust); Suzanne Drzymala; (#6505)	Cori Barraclough	Tracy Motyer
77. 2904 Leigh Road, Langford, Doug & Heidi Foord	Patrick Lucey	Don Skinner
78. 3068 Renfrew Road (Litster) #6997	Patrick Lucey	
79. Lot 4 Ark Road (Woodsmere) (#7061 A update to #4595)	Patrick Lucey	Tracy Motyer
80. 1996 Renfrew Road (Johnston) (#7300) (#7300A)	Patrick Lucey	Cori Barraclough
81. 5611 Culverton Road (Larry Davidson) (#7347)	Patrick Lucey	Steve Voller
82. 1531 Cowichan Bay Road (Kim Johanssen) (Waldy Road) (#7462)	Patrick Lucey	Cori Barraclough
83. 594 Latoria Road (Moji Shahab) (#7547)	Patrick Lucey	Cori Barraclough

84. Spotswood (Michael Weir) (#7784)	Patrick Lucey	Steve Voller
85. 2104 Butler Road (Jody Large) (#7848)	Patrick Lucey	Tracy Motyer

20. References

[i] British Columbia Ministry of Environment. 2002. Stormwater Planning: a Guidebook for British Columbia.
http://www.env.gov.bc.ca/epd/epdpa/mpp/stormwater/stormwater.html

[ii] Department of Fisheries and Oceans Canada. 1992. Land Development Guidelines for the Protection of Aquatic Habitat.
www.dfo-mpo.gc.ca/Library/165353.pdf

[iii] United States Environmental Protection Agency (EPA). 2007. Developing Your Stormwater Pollution Prevention Plan: A Guide for Construction Sites. EPA 833-R-06-004.

[iv] Hall, F.C., 2001. Ground-based photographic monitoring. Gen. Tech. Rep. PNW-GTR-503. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 340 p. http://www.fs.fed.us/pnw/pubs/gtr503/

Appendix C

2023 Photographs of existing environmental condition on the property

Photo 1. Numbers = locations of photographs shown below. The property was walked in a clockwise manner, following the photopoint location numbers, in chronological order.

Photo 2. Looking west across the end of Mary Anne Crescent and Spotswood Terrace (Figure 1). Note the thin agronomic grass cover, broom, and small conifers. The conifers were not present in the 2010 historical images.

Photo 3. Looking northwest across the rear yards of homes on Mary Anne Crescent. Note the broom, dried agronomic grasses, and blackberry. Windrows of crushed rock can be seen at the left hand side of the image.

Photo 4. There is a near vertical lock block wall separating the north property boundary from the adjacent subdivision. Note the stockpiled blast rock piles to the upper right hand side of the image. Invasive species dominate the sparse vegetation.

Photo 5. Looking southwest along an internal construction road. Note the dominance of invasive species and the dry conditions of the agronomic grasses.

Photo 6. Looking southeast across the terrace lying north of the bedrock peak elevation. The vegetation is sparse, dominated by invasives, with a few small conifers visible. Note the absence of blackberry in this area, likely due to the absence of soil moisture.

Photo 7. Looking northeast across the broom dominated landscape.

Photo 8. Looking north at the end of Cottyn Way (Braemar Heights). The large deciduous trees, upper left hand corner, lie on the adjacent residential property. Broom dominates the landscape in the foreground.

Photo 9. Looking southeast - invasives dominate the sparse plant community. Soil moisture is absent for most of the year resulting in poor plant cover and a thin organic covering the bedrock.

Photo 10. Looking north down slope to homes on Cottyn Way. Note sparse cover and large blast rock.

Photo 11. Looking at the Cottyn Way homes backing onto the property; stockpiles of blast rock dominate this portion of the property.

Photo 12. Looking east across blast rock and sparse plant community. Note apical leader on young conifer.

Photo 13. Looking south across the bedrock parent upper terrace toward the peak elevation.

Photo 14. Looking southeast across the blasted bedrock west of the Unnamed Lane (Figure 6).

Photo 15. Looking along Unnamed Lane at the near vertical rock edge.

Photo 16. Looking east at the Arbutus tree canopy adjacent to Unnamed Lane (Figure 6).

Photo 17. Looking northwest across Unnamed Lane at the Arbutus treed border on the east property boundary.

Photo 18. Looking southwest across the large stockpiles of crushed rock. Note the narrow ribbon of invasives and the adjacent subdivision development. The yellow arrow is the connecting, corridor to Havenwood Park.

Photo 19. Looking southeast across the low mound of dense invasives, with adjacent residential homes.

Photo 20. Looking east across the low mound of dense invasives, with a few scattered deciduous trees.

Photo 21. Looking west through the corridor Colwood Park. Note the absence of understory and desiccated grasses. The VMP is visible in the background.

Photo 22. Looking west across the lower southwest steep slope of the property and desiccated plants.

RYZUK GEOTECHNICAL
Engineering & Materials Testing
6-40 Cadillac Ave, Victoria, BC, V8Z 1T2 Tel: 250-475-3131 E-mail: mail@ryzuk.com www.ryzuk.com

November 6, 2023
File No: 11242-1

Turnberry Development Ltd.
16209 Morgan Creek Crescent
Surrey, BC
V3Z 0J2

Attn: Michael Weir (mrmaweir@gmail.com)

Re: Proposed Subdivision
Lot 1, Section 63, Esquimalt District Plan VIP75627

As requested, we attended the referenced site on September 29, 2022, to complete a site reconnaissance of the property to visually assess the existing site conditions as such relate to the geotechnical aspects of the proposed subdivision/development. We have also reviewed the civil plans for this subdivision, dated August 1, 2023, which have been issued by JE Anderson & Associated (JEA) for Development Permit Application (see attached). From the Preliminary Layout Assessment issued by the City of Colwood (Colwood or City herein) on March 7, 2023, we understand that the property is located inside Colwood's Hillside, Sensitive Ecosystems, and Natural Hazards Development Permit Areas (DPA), as per the City's Official Community Plan (OCP), Bylaw No. 1700. In accordance with the Natural Hazards DPA guidelines, development on lands with slopes greater than 30% must be avoided unless a qualified geotechnical professional can provide the following: recommendations for mitigation measures to reduce the risk of natural hazards, conditions and form of development necessary to reduce the risk of potential natural hazards to acceptable levels, and a geotechnical evaluation of the property to certify that the site is safe for the intended use and outline development requirements to ensure human safety and slope stability. According to this DPA, development is not permitted within 10 m from the crest or toe of steep slopes or within 15 m from the crest or toe where slopes are steeper than 30% unless otherwise recommended by a qualified geotechnical professional. In this regard, we have prepared this report to address slope instability and other geological hazards pertaining to the proposed subdivision and provide our preliminary geotechnical recommendations for development. Our associated observations, comments, and recommendations are contained herein. Our work has been carried out in accordance with Section 56 of the Community Charter and is subject to the previously accepted Terms of Engagement.

SITE DESCRIPTION & PROPOSED DEVELOPMENT

The site is bounded by residential lots and Delora Drive to the east, and the terminus of Cottyn Way and residential lots to the north. To the west, the property is bounded by residential lots, the

terminuses of Mary Anne Crescent/Spotswood Terrace, and Veterans Memorial Parkway. The south end of the property is bound by undeveloped forested land and the Delora Drive subdivision. The property was mostly cleared of vegetation and subject to previous earthworks activities, including rock excavation (blasting) and fill placement, under a 2012 Development Permit; however, site preparation was only partially completed at this time, and further site preparation work will be required following Development Permit approval.

We understand that a 69 lot subdivision is proposed on the property and that development (pending Development Permit Approval) would consist of site/lot grading and the construction of roadways and site servicing. JEA's Preliminary Heat Map shows that the cut and fill heights for site grading would range up to approximately 10 m and 2.5 m, respectively. JEA's Section drawings show various cross-sections of the proposed grading throughout the property, and the locations of the sections are shown on JEA's Preliminary Grading, Sample Lines Road B, and Sample Lines Road D drawings. From these drawings, we understand that a combination of permanent cutslopes/slopes and retaining structures will be required to accommodate grade changes to create level lots and level to gently sloping roadways. We understand that permanent rock cutslopes on the property would generally be less than 7 m tall and that natural bedrock outcroppings will be retained where possible. We also understand that retaining structures would comprise up to 5 m tall tiered boulder stack walls and that wall tiers would be less than 1.2 m tall. In accordance with Colwood's retaining wall guidelines, terraced retaining walls should have a 1H:1V (Horizontal to Vertical) separation between tiers, or development variance and building permits would be required.

From our recent correspondence with JEA, we understand that servicing for the development would be standard municipal servicing. We understand that storm/sewer services would be deep enough for most of the subdivided lots to facilitate gravity flow and that on-site pump systems would be used for any of the lots where this is not practicable. Lastly, we understand that perimeter drains and roof leaders would be directed to stormwater management systems located in the front of the lots.

The layout of the subdivision is shown in our attached Geotechnical Site Plan. The approximate locations of the Site Photos and site features referenced in the following sections of this report are also shown in this Plan.

SURFACE & SUBSURFACE CONDITIONS

As shown in JEA's Preliminary Grading drawing, the existing site topography generally slopes down towards all property lines from a topographical peak near the middle of the property. This drawing shows that there is roughly a maximum relief of 35 m throughout the site from approximately 155 m geodetic (geo) to 120 m geo. The attached section drawings show the existing topography of the site at various cross section locations throughout the property.

The site has been mostly cleared of vegetation, and the remaining vegetation generally comprises areas of grass, shrubs, and sparsely spaced juvenile to medium sized trees. The most densely vegetated portion of the site is the west end, roughly within Lots 66 to 69.

There are existing rock cutlopes on the property from previous earthwork activities that are generally located along the east/north boundaries of the topographical peak (as shown in Site Photo 1), the east

end of Spotswood Terrace's road dedication area (as shown in Site Photo 2), and along the west perimeter of the access road located at the northeast corner of the site between Lots 5/6 and 64/65. The rock cutslope located at the east end of the road dedication area is roughly 12 m tall, and all remaining cutslopes are generally less than 7 m tall. The cutslopes are generally configured at 1H:6V (Horizontal to Vertical) or shallower slopes. Elsewhere, existing slopes generally range from very gently to steeply sloping (up to approximately 1H:1V or 100%), with the steepest slopes being located at the west end of the site, within Lots 66 to 69.

There are existing retaining walls at the north end of the site, roughly along the exterior property lines of Lots 10 to 17. These walls are located at/near property lines and consist of a combination of concrete lock block and rock and mortar retaining walls that support the grade changes between the site and the neighbouring residential properties. We were not involved with the construction of these walls and are unsure of their design or the construction methodology used. In addition, there are also stockpiles of soil and rock fill on the site, ranging in gradation from boulders to gravel. The approximate locations of these stockpiles are shown on JEA's Surface Site Conditions drawing, dated September 28, 2022, which we have attached for reference.

At the west end of the site on the low side of Lots 66 and 67, there is a riparian area associated with a linear series of manmade stormwater treatment ponds and drainage channel beyond the western property line within the Veterans Memorial Parkway Right of Way. The proposed building envelopes of Lots 66 and 67 are outside of the 15 m Streamside Protection and Enhancement Area (SPEA) setback and at least 10 m higher in elevation than the ponds/drainage channel.

The site terrain is generally bedrock-controlled, with some shallow pockets of organics and native mineral soil in the local bedrock depressions. Exceptions to this are at the north end of the site where there is existing fill (as shown in Photo 3) and the low/west side of lots 66 to 68 where native mineral soil (silty sand) was exposed at the surface. We are unsure of the material type and methodology used for fill placement, and from the surface, such was observed to generally consist of poorly graded 300 mm minus blast rock fill. The bedrock on site was observed to comprise massive fine-grained extrusive igneous bedrock (inferred basalt). This is consistent with the bedrock mapping of the area, which indicates that the bedrock on site is part of the Metchosin Igneous Complex. No groundwater seepage was observed within the assessed areas on the property.

GEOTECHNICAL ASSESSMENT

During our site assessment, no indications of slope instability or other geological failure hazard that would preclude safe development, including soil erosion and flooding from the stormwater treatment ponds and drainage channel, were noted. We expect that JEA's proposed civil plans would be feasible from a geotechnical perspective, and we consider there to be buildable areas on all of the subdivided lots; however, the proposed building footprints would need to be suitably offset from the toe/crest of the steep slopes (existing/proposed rock/soil cutslopes and rock/soil/fill slopes), in addition to the existing/proposed retaining structures. Reduced setbacks from what is recommended in the Geotechnical Recommendations section of this report may be feasible; however, this would require further site investigation, analysis, and possibly stabilization work. We note that the following recommendations are preliminary and that a detailed geotechnical review of each lot and the associated infrastructure would be provided under separate cover by a qualified geotechnical

professional during development, as required by the PLA. This would include reviewing the stability of permanent cutslopes, slopes, and retaining structures and identifying safe building setbacks based on this review.

No indications of historical and potential rockfall hazard, such as displaced boulders or detachable blocks of bedrock that could negatively impact the proposed development were observed. This includes no observable unstable rock features along the faces of the existing rock cutslopes in the assessed areas. However, rockfall hazard may be generated during construction and would require removal, stabilization, or implementation of protection measures under the supervision of a qualified geotechnical professional; see the Geotechnical Recommendations sections of this report for more details.

No indications of soil erosion were also observed in the assessed areas where mineral soil and existing fill were present at the surface. We expect that the thickness of surficial fill and mineral soil is likely shallow (less than 3 m) and that slopes are predominantly bedrock controlled, given that bedrock exposures were ubiquitous throughout the property. Lastly, we do not consider the development to be at risk of flooding, given that the proposed building envelopes at least 10 m above and 15 m away horizontally from the stormwater treatment ponds and drainage channel.

GEOTECHNICAL RECOMMENDATIONS

We recommend that building envelopes be set back and/or that foundations be embedded such that building foundations are behind the following retaining structure, rock slope, and fill/soil slope setbacks: a 1H:1V line projected up from the heel of any existing retaining wall, provided approved bearing is confirmed within this zone by a qualified geotechnical professional; a 1H:1V line projected up from the toe of any rock slope for foundations bearing directly atop bedrock; a 2H:1V line projected up from the toe of any fill/soil slope for foundations bearing on undisturbed native mineral soil and/or engineered fill. A reduced offset from the slope crests may be feasible (if desired), particularly for rock slopes. However, this would require a slope stability analysis to confirm slope stability in accordance with current Engineers and Geoscientists British Columbia's (EGBC) Professional Practice Guidelines for Landslide Assessments in British Columbia and possibly stabilization work.

Where structures are proposed below steep bedrock and fill/soil slopes, appropriate setbacks, barriers, catchment areas, and/or rockfall control systems would be required to ensure proposed downslope structures are not negatively impacted by rockfall under static and seismic conditions. Rockfall could consist of dislodged boulders/cobbles associated with natural weathering of the exposed bedrock/fill/soil slopes generated during construction or propelled boulders/cobbles during a seismic event. For preliminary purposes, we recommend that building envelopes be set back from the toe of steep slopes by the lesser of 5 m or a horizontal distance equal to half the height of any slope steeper than 1H:1V. However, this setback can likely be reduced if a rockfall catchment/barrier and/or rockfall control system (e.g., drapery mesh) is implemented; such should be reviewed by a qualified geotechnical professional during construction.

For permanent rock cutslopes, we typically recommend a 1H:6V or flatter slope geometry; for permanent fill/soil slopes, we typically recommend a 2H:1V or flatter slope geometry. A qualified

geotechnical professional will need to inspect all permanent slopes once finalized to determine if stabilization work is required for public safety. According to WorkSafeBC guidelines, all temporary excavations graded steeper than 0.75H:1V and deeper than 1.2 m must be inspected and approved by a qualified geotechnical professional prior to worker entry or approach within a distance to the excavation depth.

The bedrock within the assessed areas on site was generally observed to be massive, strong, and slightly weathered. Nevertheless, the quality of bedrock on the property may be variable, and rock excavation may expose and/or exacerbate existing fractures (the locations/orientations of such which are unknown), resulting in rock cutslopes requiring extensive scaling and/or stabilization. We are unsure of the depth required for storm/sewer services; however, we expect that rock excavation will be required to achieve the design grades for installation.

During rock excavation, we strongly recommend that a controlled blasting method be used where final rock cutslopes will be near homes/roads, such as pre-shearing or line drilling, to minimize blasting damage to the face of the permanent rock slopes, thereby reducing the risk for rock removal, and possibly reinforcement work required prior and during construction. We further recommend that vibration monitoring during rock blasting be undertaken to ensure that peak particle velocities (PPV) are kept below threshold values to ensure adjacent structures are not damaged.

We do not consider the existing in place on site fill to be suitable for foundation support given that such is not well graded and we are unsure of how it was placed/compacted. However, the site sourced fill, including the stockpiled material, may be suitable for reuse as engineered fill once removed and assessed; this should be reviewed by a qualified geotechnical professional during construction.

We recommend that site preparation include the removal of all organics, loose/disturbed material, and existing fill to expose undisturbed native mineral soil and/or bedrock. If required, the design grades can be recovered using engineered fill, consisting of approved material placed and compacted under geotechnical supervision to a specified density. Collected stormwater should be conveyed to the stormwater management systems, and we understand that septic fields will not be used, i.e., sewage will be conveyed to the municipal system.

CLOSURE

Based on the above and provided our recommendations are followed, it is our professional opinion that the proposed development would not expose persons or property to slope instability or other geological failure hazard and that the proposed civil plan would be feasible from a geotechnical perspective. Our assessment considers a 2% probability of exceedance in 50 years for seismically induced slope instability. As such, provided development is carried out as detailed in this report in accordance with the applicable BC Building Code, we consider that the land may be used safely for the use intended, pursuant to and in accordance with Section 56 of the Community Charter. Colwood is an approved and authorized user of its report and may rely on its information for Development Permit approval.

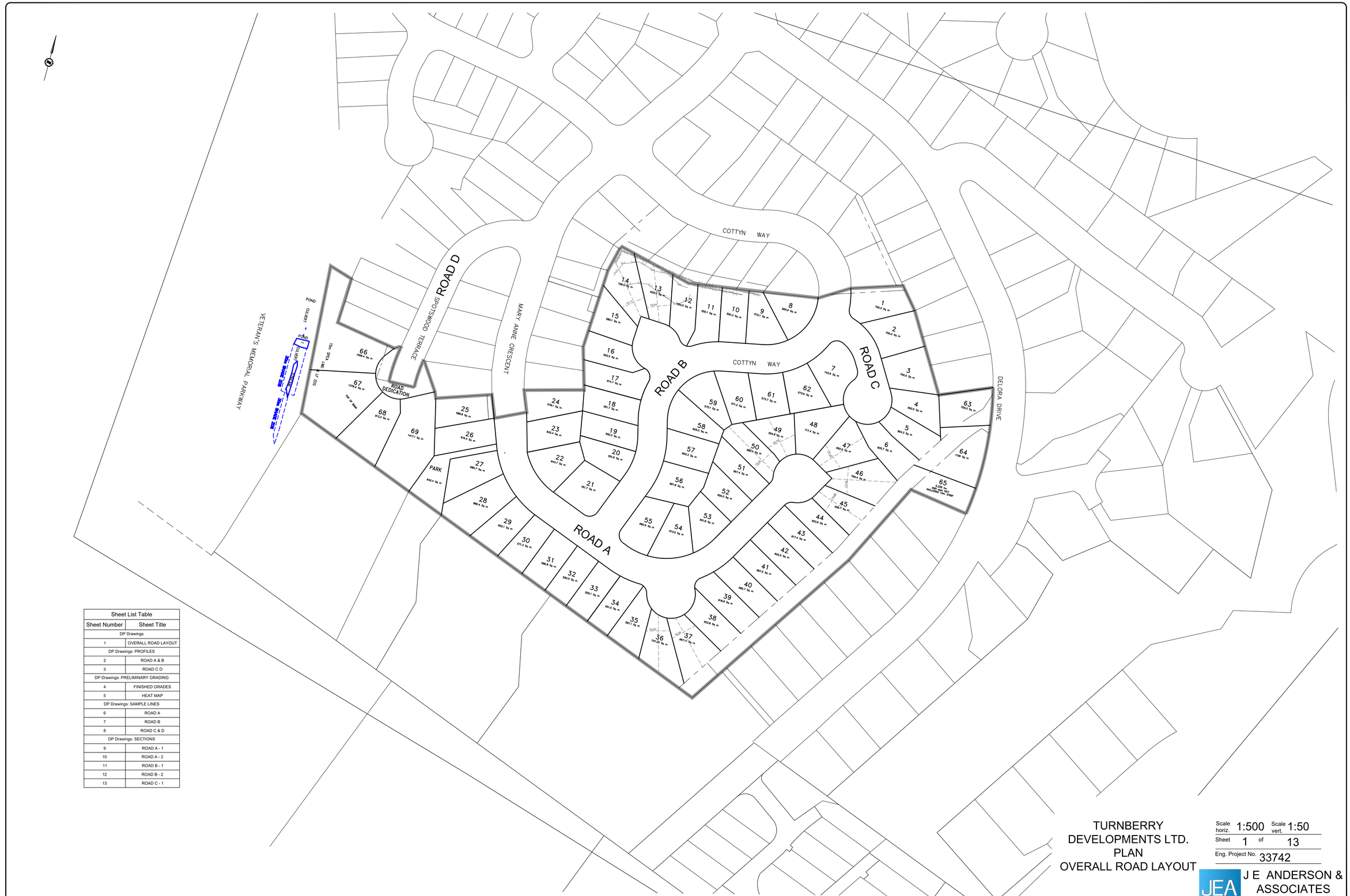
We trust the preceding is suitable for your purposes at present. Please don't hesitate to contact our office if we can be of further assistance.

Sincerely,
Ryzuk Geotechnical
Reviewed by Laura Lessingham, P.Geo.
PN1002996

Jordan Gybels, P.Eng.
Intermediate Geotechnical Engineer

Attachments:
- JEA's Civil Plans
- Ryzuk Geotechnical Site Plan
- JEA's Surface Site Conditions Drawing
- Site Photos

cc: Danny Carrier – danrcarrier@gmail.com



Sheet List Table	
Sheet Number	Sheet Title
DP Drawings	
1	OVERALL ROAD LAYOUT
DP Drawings: PROFILES	
2	ROAD A & B
3	ROAD C D
DP Drawings: PRELIMINARY GRADING	
4	FINISHED GRADES
5	HEAT MAP
DP Drawings: SAMPLE LINES	
6	ROAD A
7	ROAD B
8	ROAD C & D
DP Drawings: SECTIONS	
9	ROAD A - 1
10	ROAD A - 2
11	ROAD B - 1
12	ROAD B - 2
13	ROAD C - 1

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TURNBERRY DEVELOPMENTS LTD.
PLAN
OVERALL ROAD LAYOUT

Scale horiz. 1:500 Scale vert. 1:50
Sheet 1 of 13
Eng. Project No. 33742

1:1000 0 20 60m

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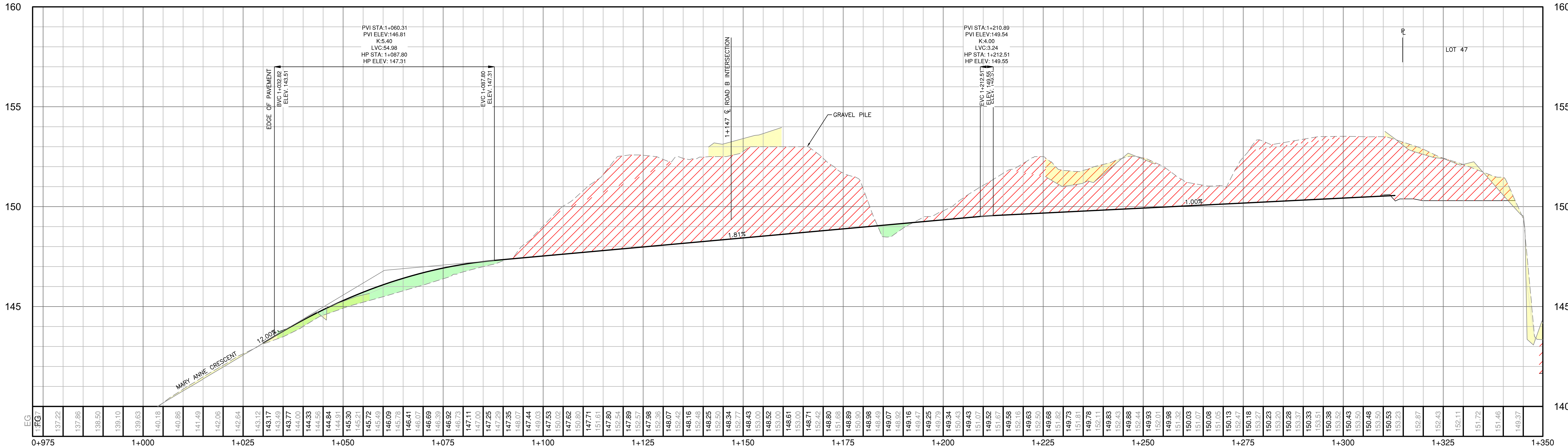
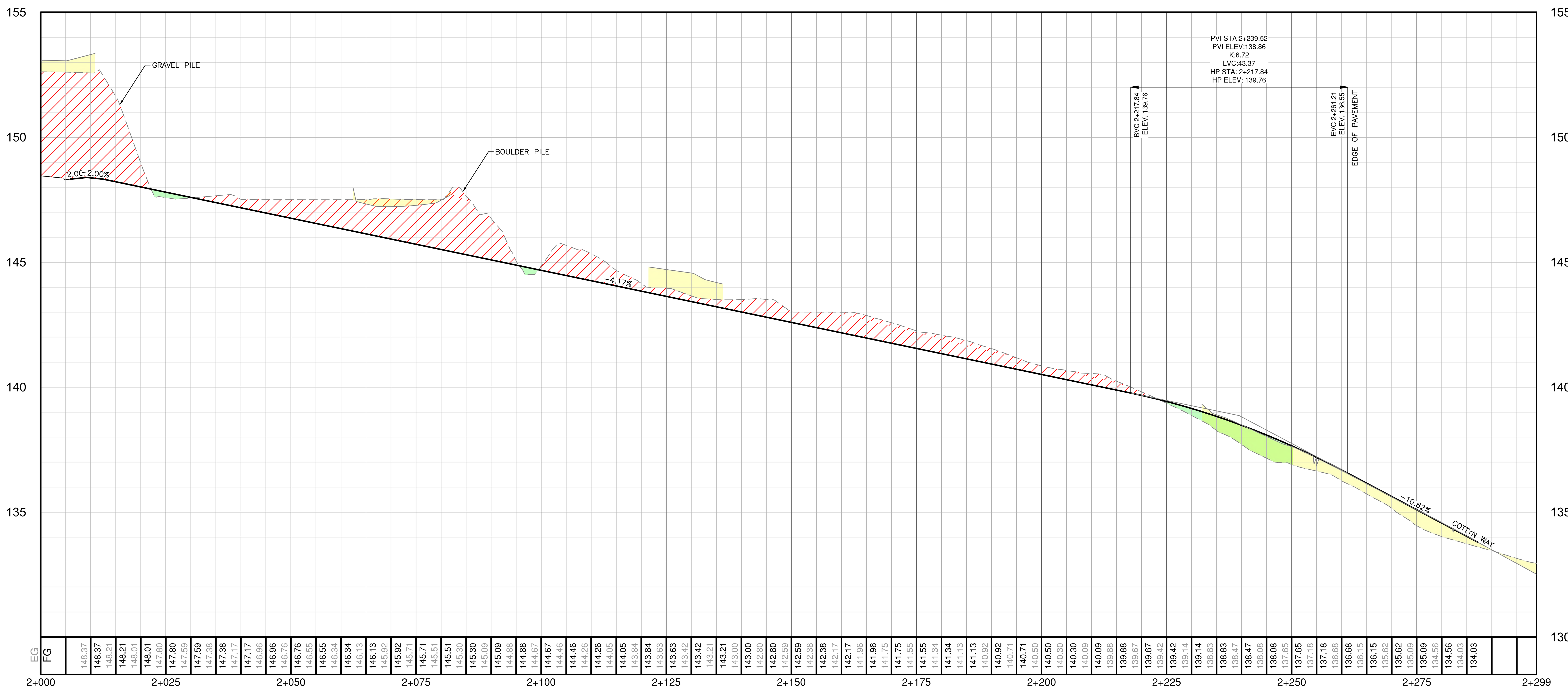
SURVEYORS - ENGINEERS
VICTORIA NANAIMO PARKSVILLE CAMPBELL RIVER
PHONE: 250-727-2214 info@jeanderson.com



PROFILE – ROAD A
H 1:500
V 1:100



PROFILE – ROAD B
H 1:500
V 1:100

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TURNBERRY DEVELOPMENTS LTD.
PRELIIMARY PROFILES
ROAD A & B

Scale horiz. 1:500 Scale vert. 1:50
Sheet 2 of 13
Eng. Project No. 33742

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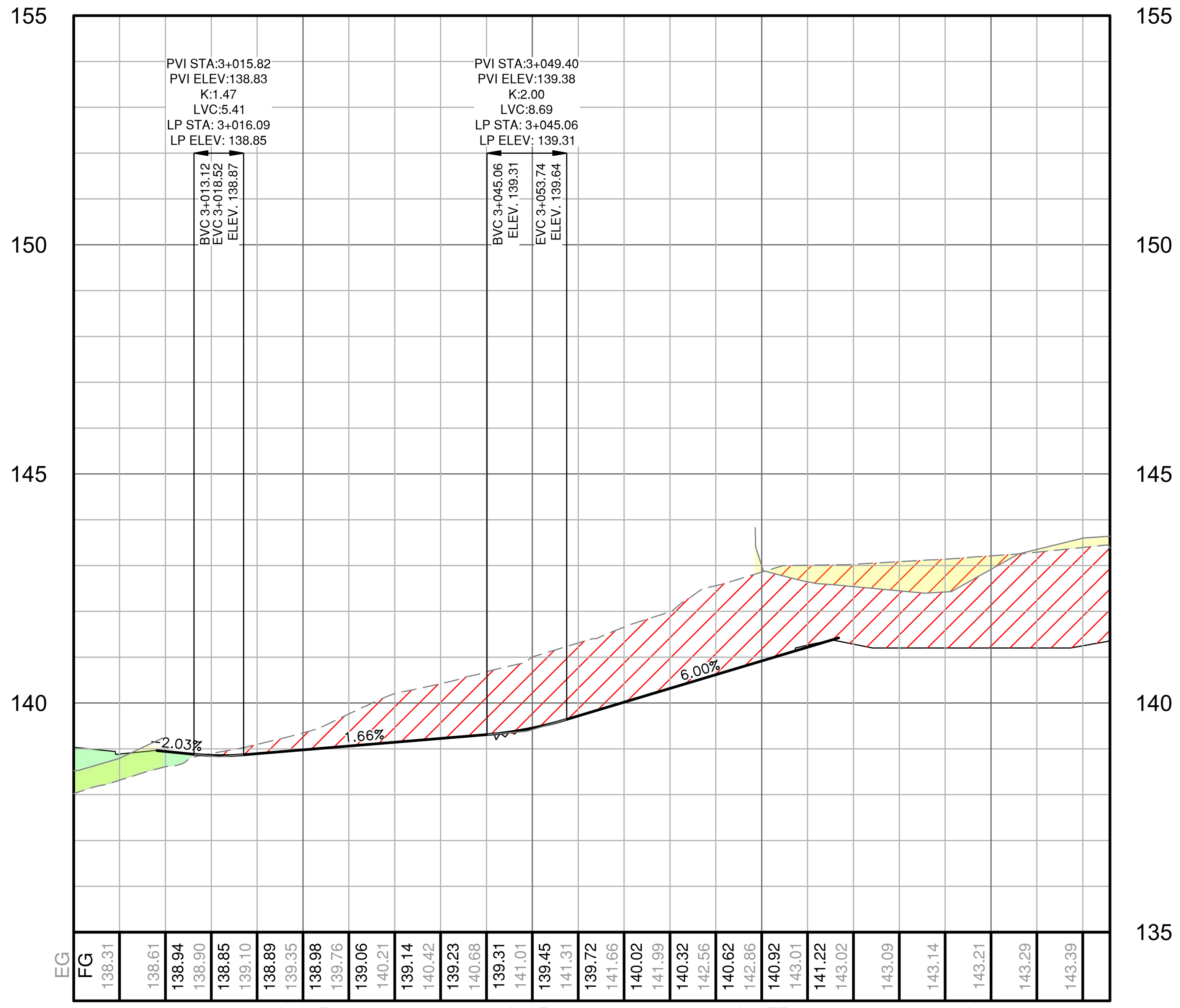
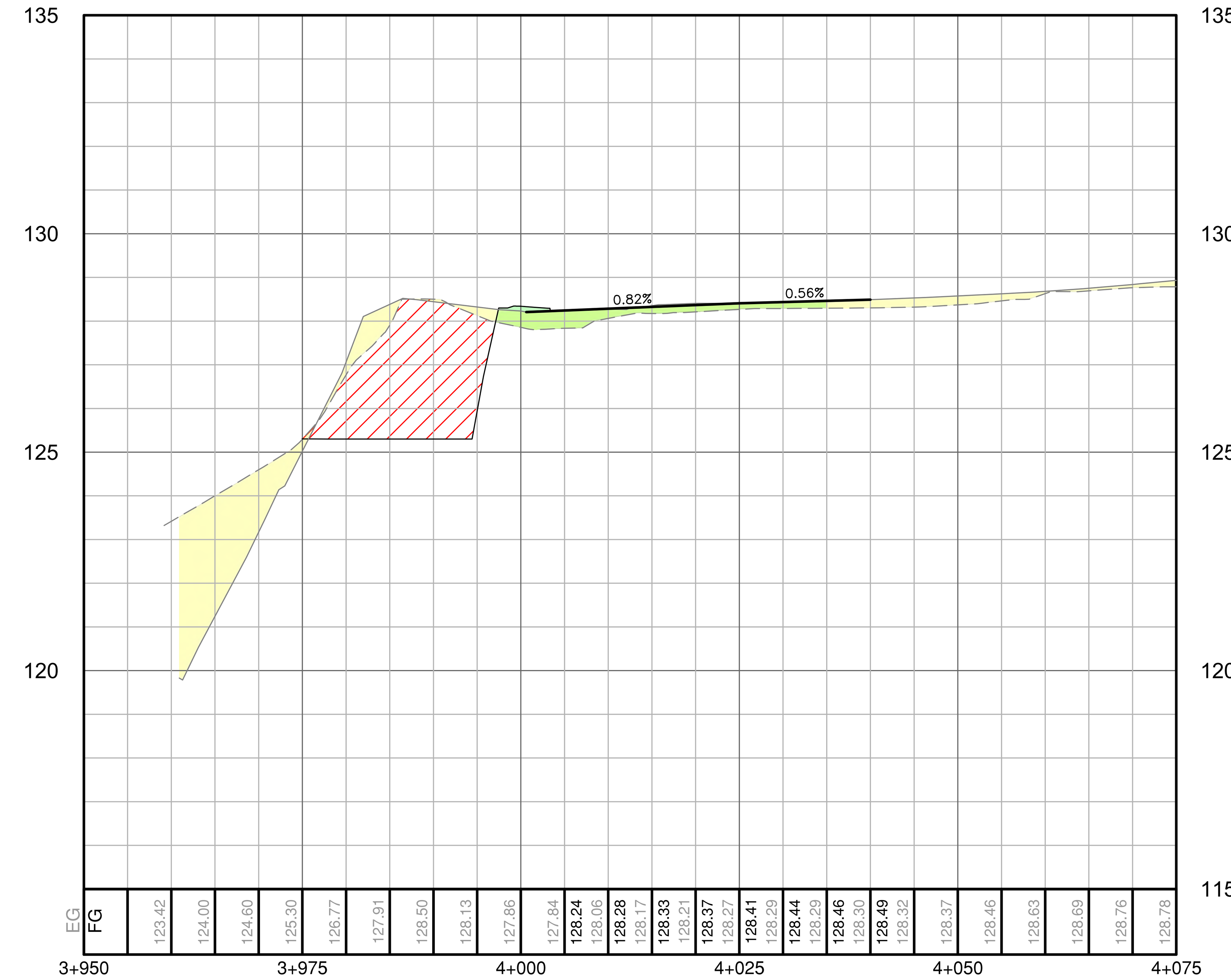
1:500 0 10 30m

V:_Projects\33742 – Turnberry Developments – Rem 1 Plan VIP75627\07 – Engineering\02 – Drawings & Sketches (Eng)\33742 – production – DP – PLAN –



PROFILE – ROAD C
H 1:500
V 1:100



PROFILE – ROAD D
H 1:500
V 1:100

TURNBERRY DEVELOPMENTS LTD.
PRELIMINARY PROFILES
ROAD C D

Scale horiz.	1:500	Scale vert.	1:50
Sheet	3	of	13
Eng. Project No.	33742		

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1:500 0 10 30m

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TURNBERRY DEVELOPMENTS LTD.
PRELIMINARY GRADING
FINISHED GRADES

Scale horiz. 1:500 Scale vert. 1:50
Sheet 4 of 13
Eng. Project No. 33742

1:500 0 10 30m

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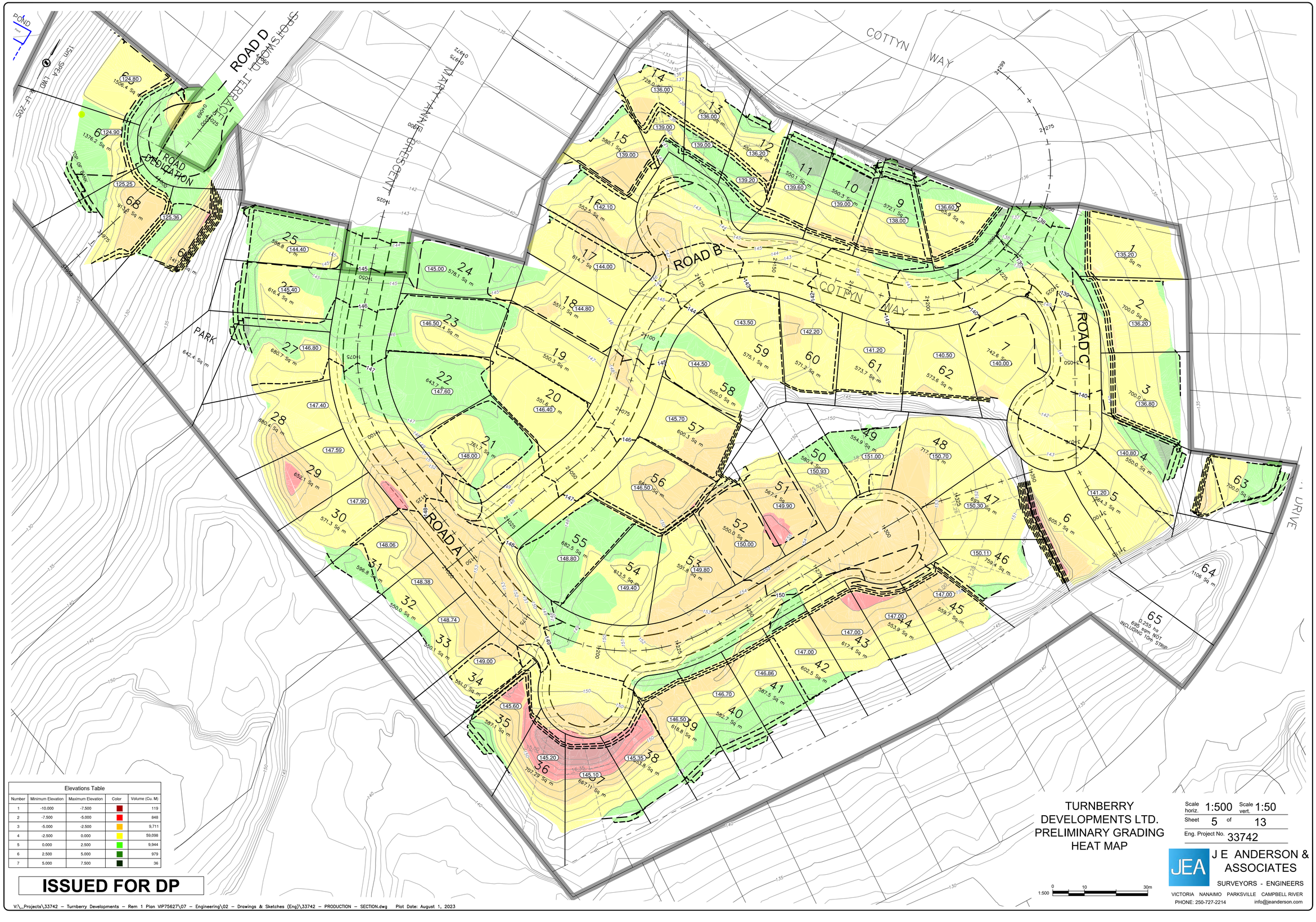

Elevations Table				
Number	Minimum Elevation	Maximum Elevation	Color	Volume (Cu. M)
1	-10.000	-7.500		119
2	-7.500	-5.000		848
3	-5.000	-2.500		9,711
4	-2.500	0.000		59,098
5	0.000	2.500		9,944
6	2.500	5.000		979
7	5.000	7.500		36

ISSUED FOR DP

TURNBERRY DEVELOPMENTS LTD.
PRELIMINARY GRADING HEAT MAP

1:500 0 10 30m

Scale horiz. 1:500 Scale vert. 1:50
Sheet 5 of 13
Eng. Project No. 33742

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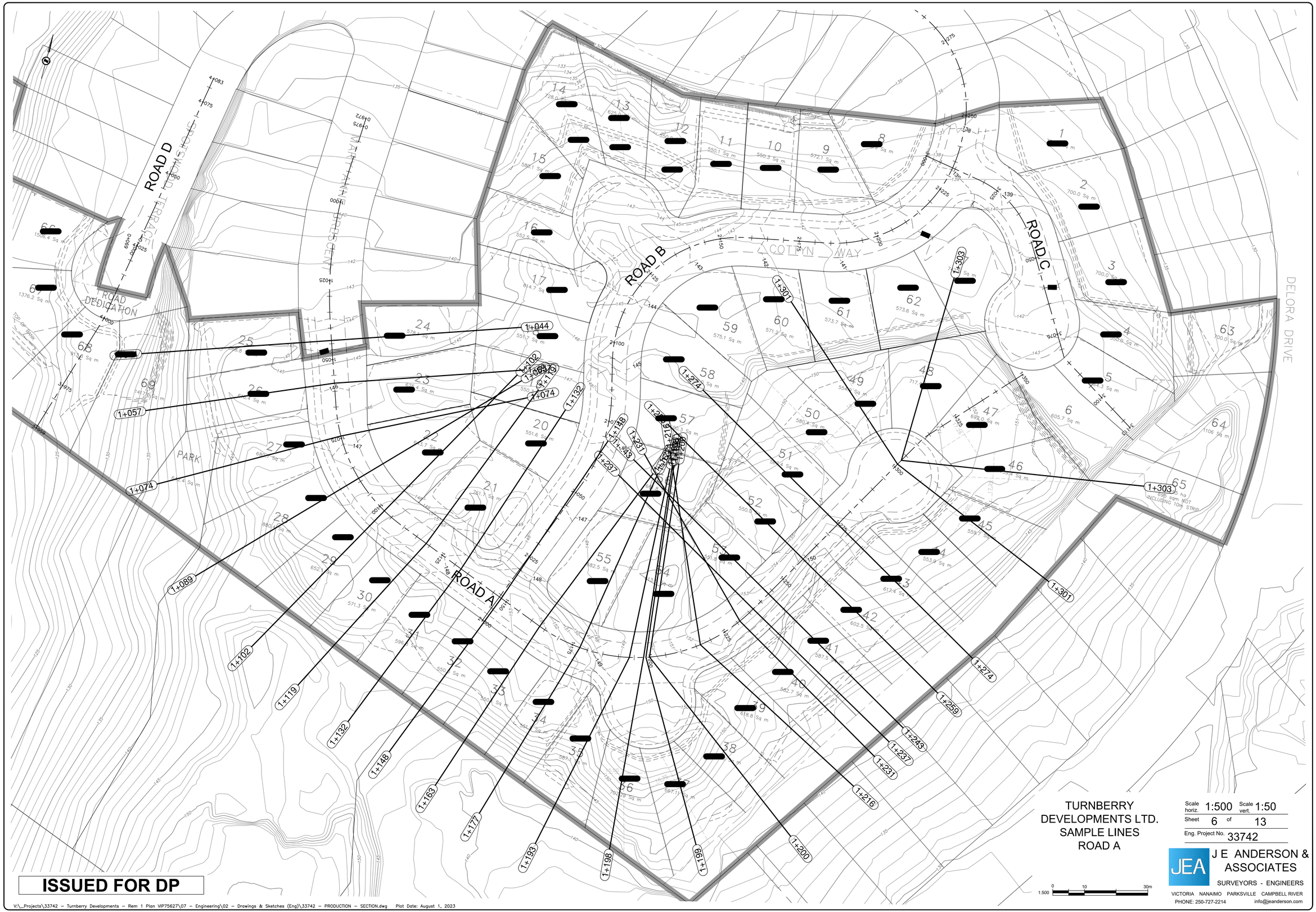

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TURNBERRY DEVELOPMENTS LTD.
SAMPLE LINES
ROAD A

1:500 0 10 30m

Scale horiz. 1:500 Scale vert. 1:50
Sheet 6 of 13
Eng. Project No. 33742

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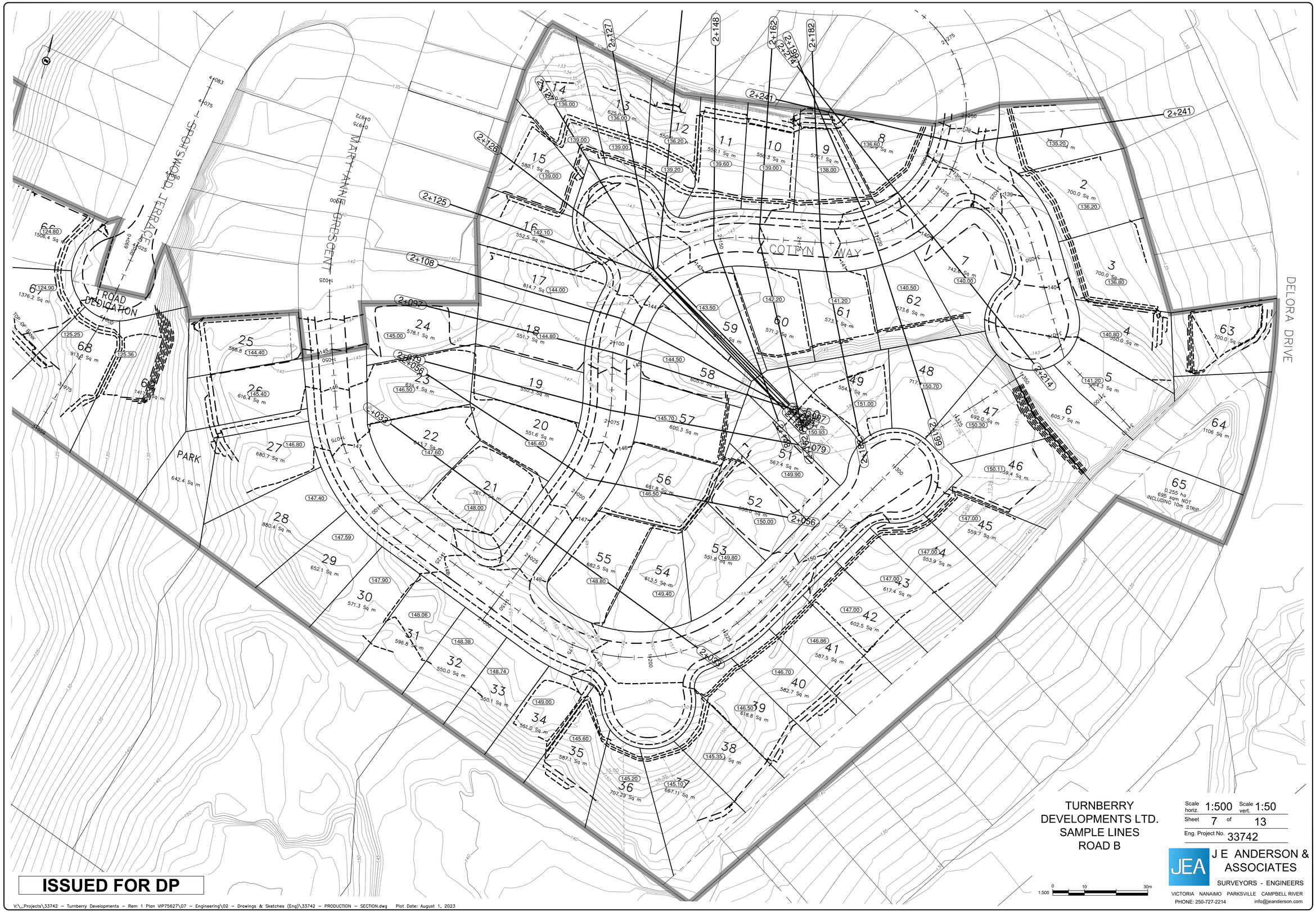

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TURNBERRY DEVELOPMENTS LTD.
SAMPLE LINES
ROAD B

Scale horiz. 1:500 Scale vert. 1:50
Sheet 7 of 13
Eng. Project No. 33742

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TURNBERRY DEVELOPMENTS LTD.
SAMPLE LINES
ROAD C & D

1:500 0 10 30m

Scale horiz. 1:500 Scale vert. 1:50
Sheet 8 of 13
Eng. Project No. 33742

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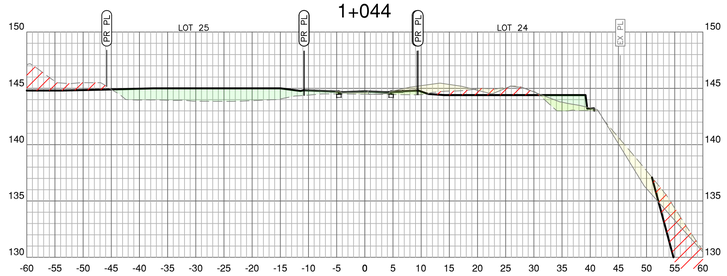

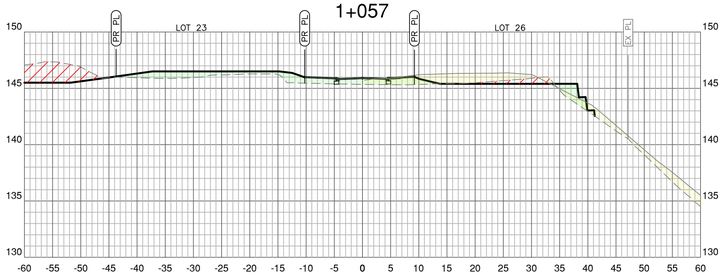

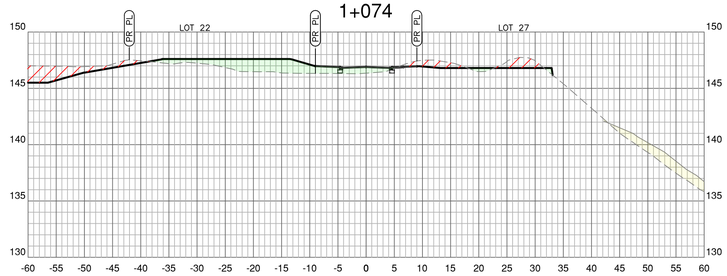

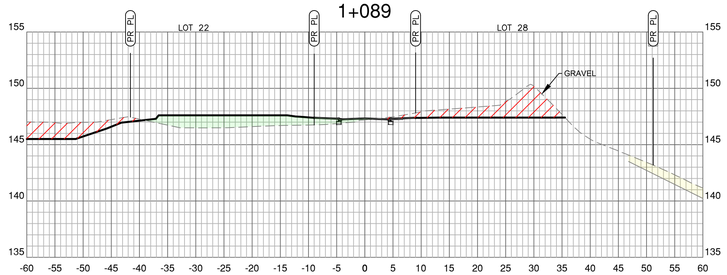

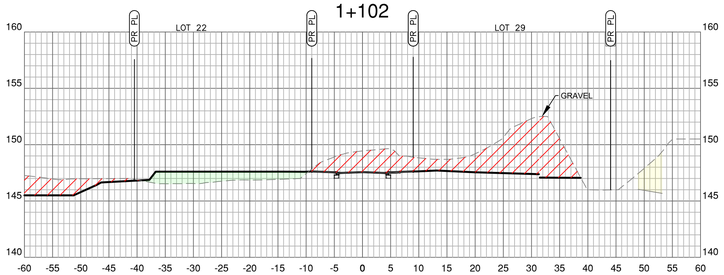

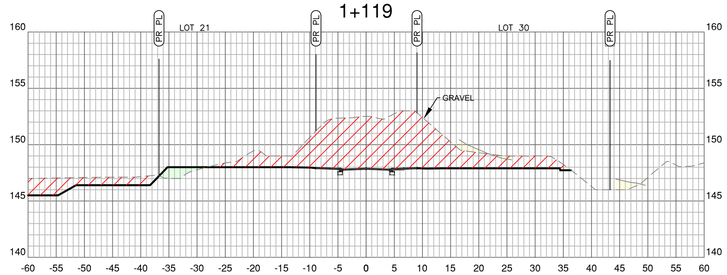

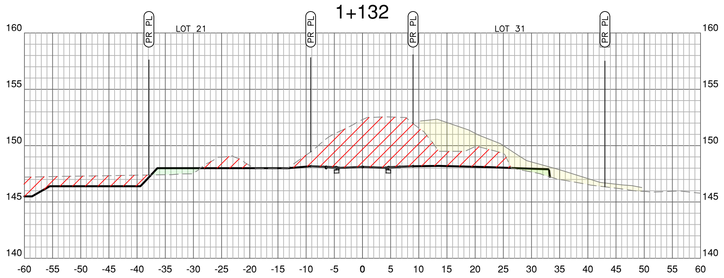

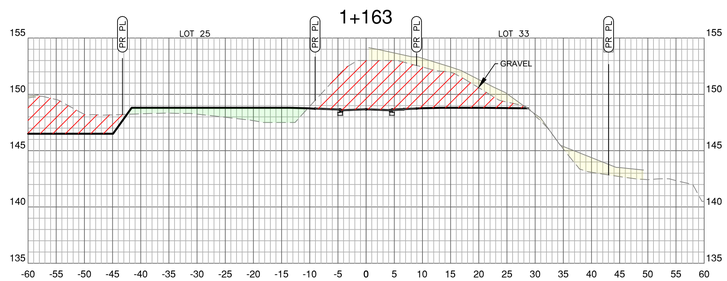

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TURNBERRY DEVELOPMENTS LTD.
SECTIONS
ROAD A - 1

Scale horiz. 1:500 Scale vert. 1:50
Sheet 7 of 13
Eng. Project No. 33742

1:500 0 10 30m

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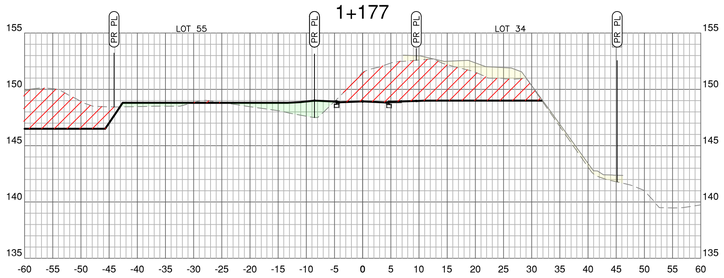

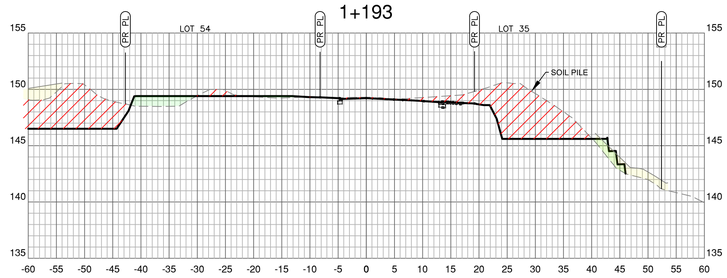

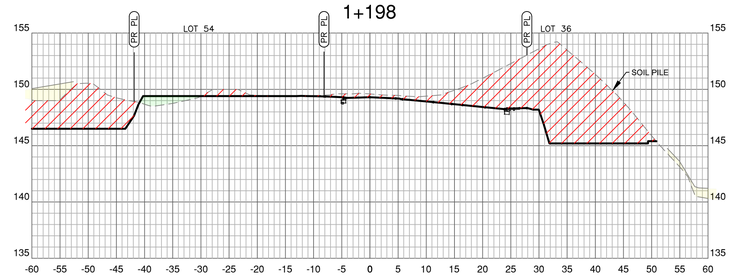

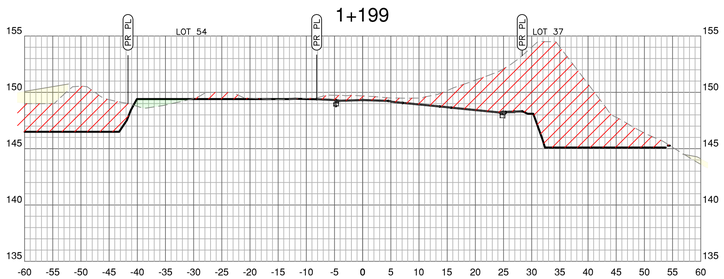

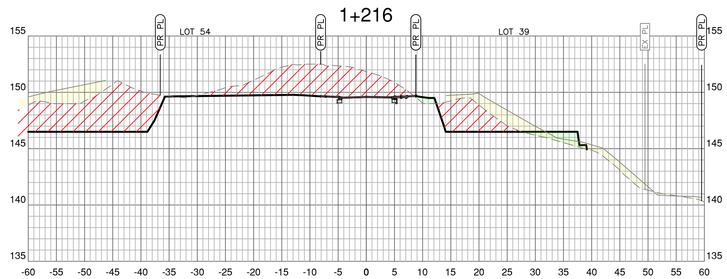

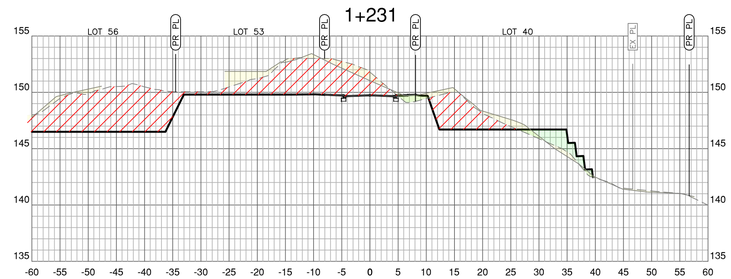

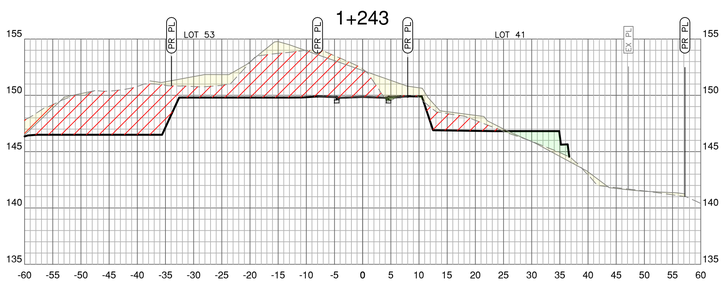

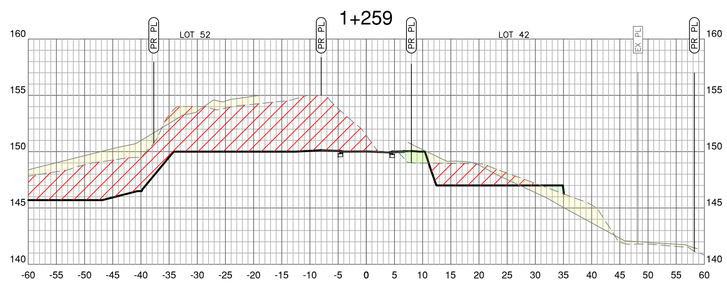

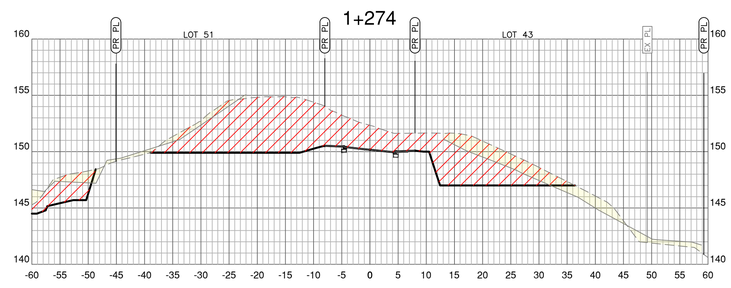

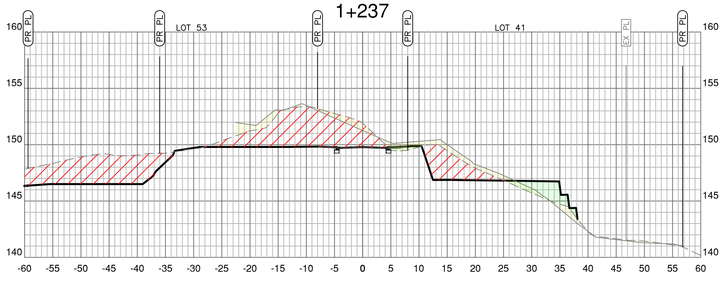

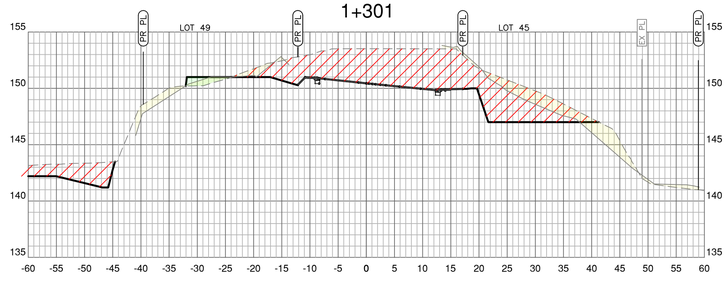

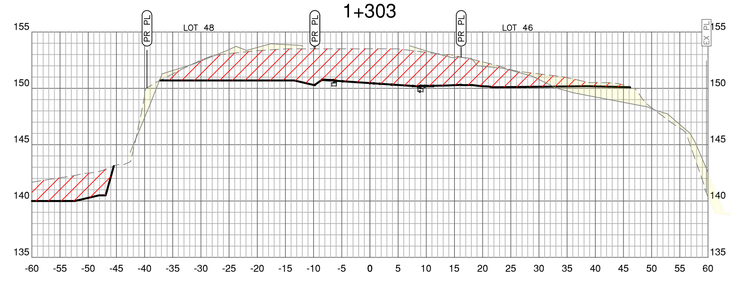

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TURNBERRY
DEVELOPMENTS LTD.
SECTIONS
ROAD A - 2

1:500 0 10 30m

Scale horiz. 1:500 Scale vert. 1:50
Sheet 8 of 13
Eng. Project No. 33742

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SURVEYORS - ENGINEERS
VICTORIA NANAIMO PARKSVILLE CAMPBELL RIVER
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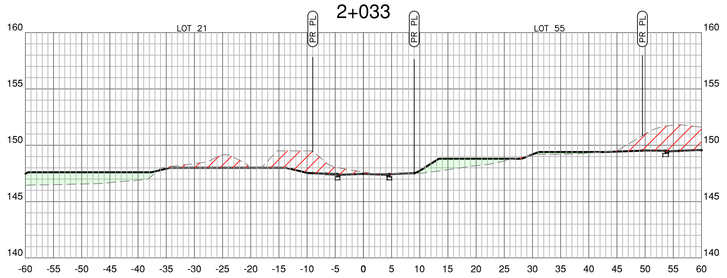

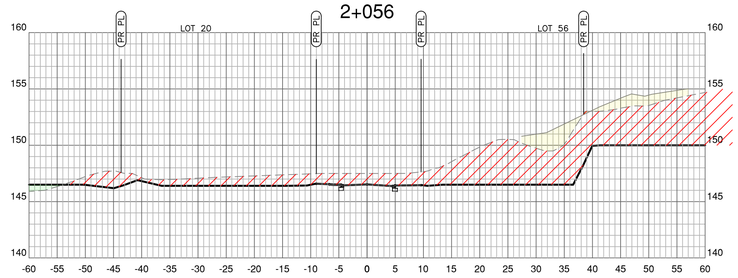

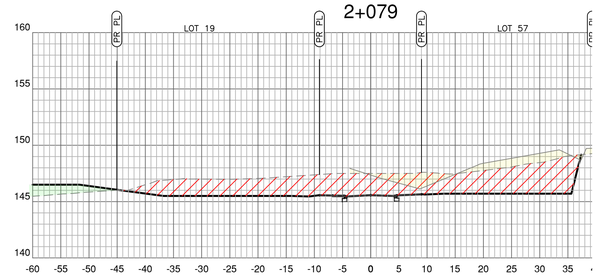

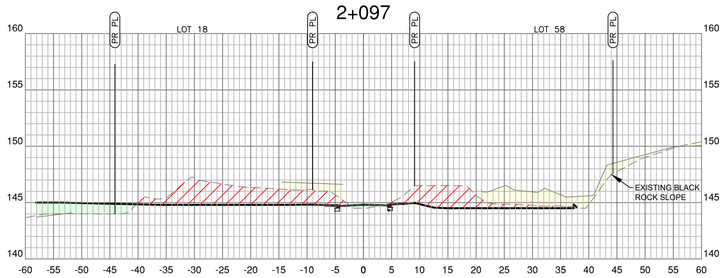

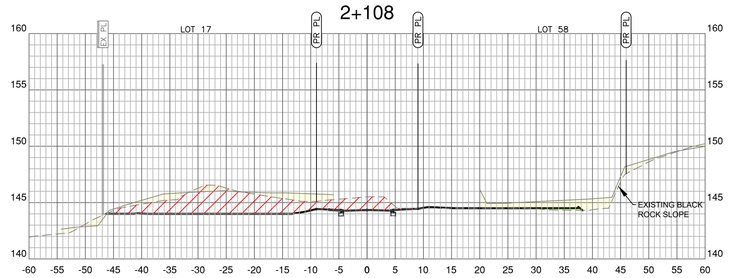

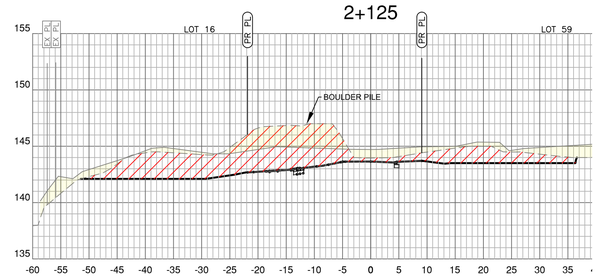

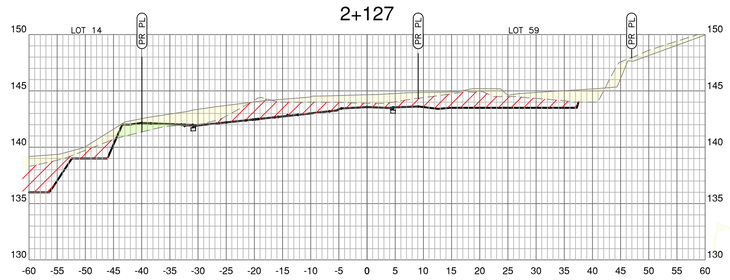

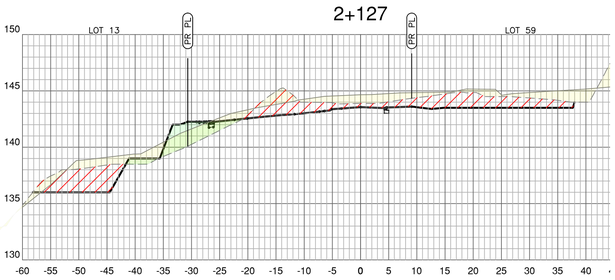

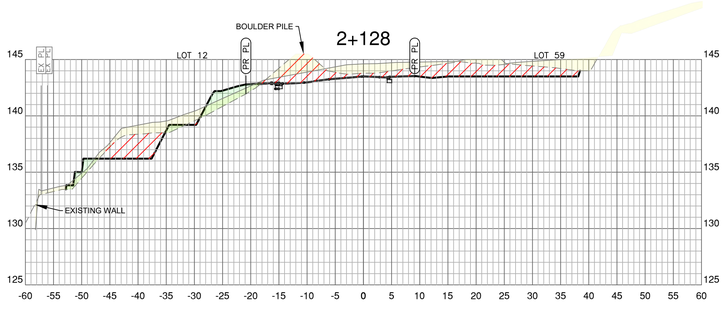

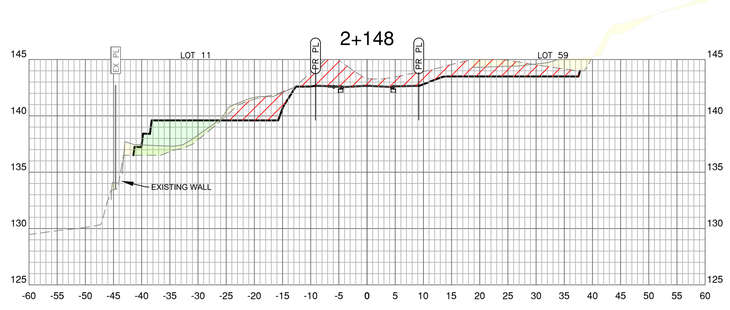

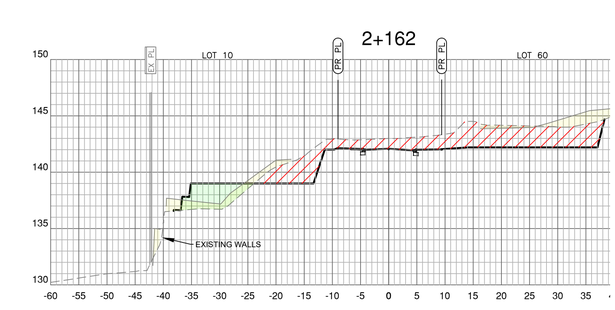

ISSUED FOR DP

TURNBERRY DEVELOPMENTS LTD.
SECTIONS
ROAD B - 1

Scale horiz. 1:500 Scale vert. 1:50
Sheet 11 of 13
Eng. Project No. 33742

1:500 0 10 30m

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SURVEYORS - ENGINEERS
VICTORIA NANAIMO PARKSVILLE CAMPBELL RIVER
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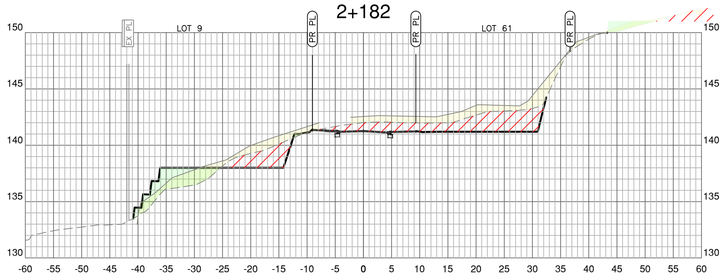
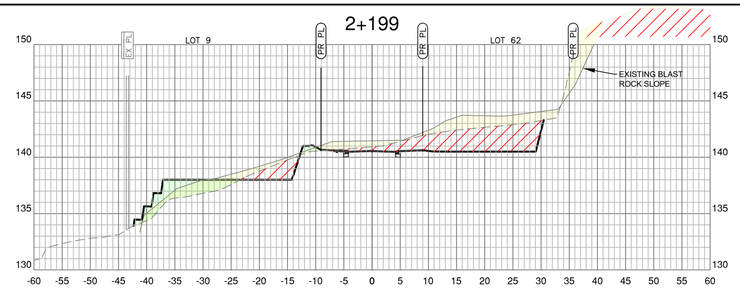
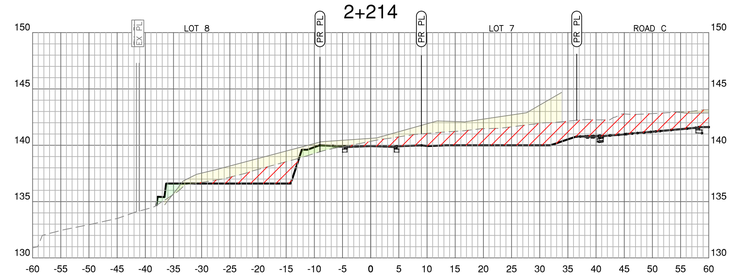
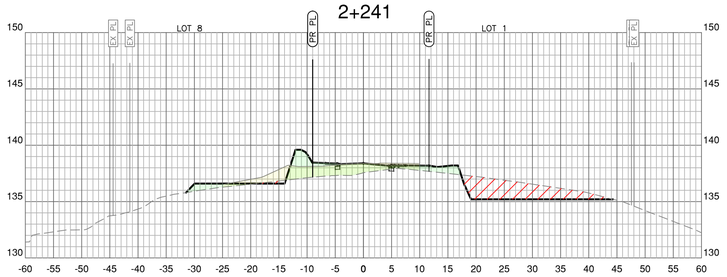
V:_Projects\33742 – Turnberry Developments – Rem 1 Plan VIP75627\07 – Engineering\02 – Drawings & Sketches (Eng)\33742 – PRODUCTION – SECTION.dwg Plot









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TURNBERRY
DEVELOPMENTS LTD.
SECTIONS
ROAD B - 2

1:500 0 10 30m

Scale horiz. 1:500 Scale vert. 1:50
Sheet 12 of 13
Eng. Project No. 33742

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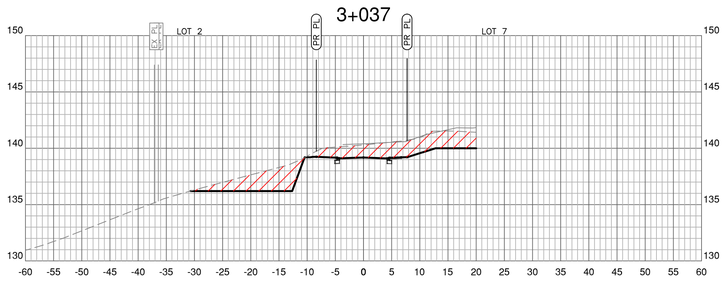
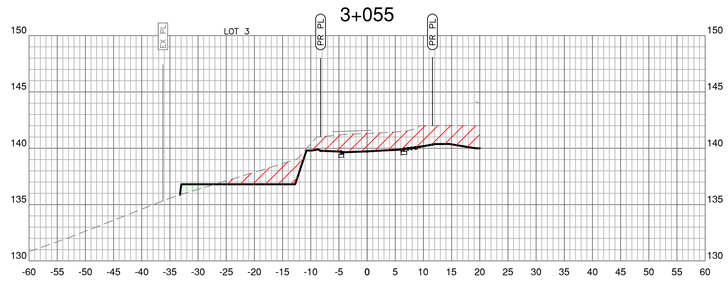
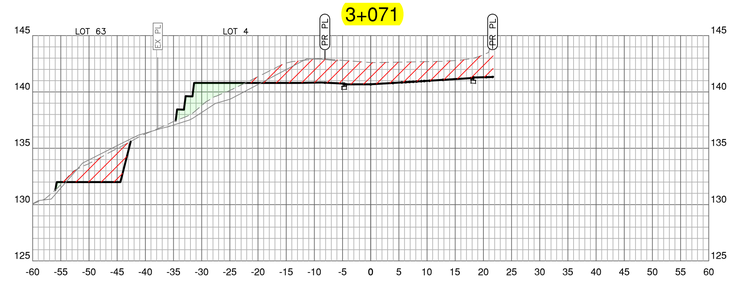
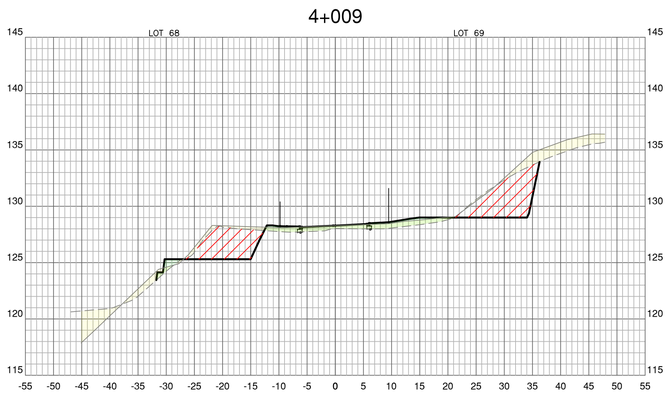
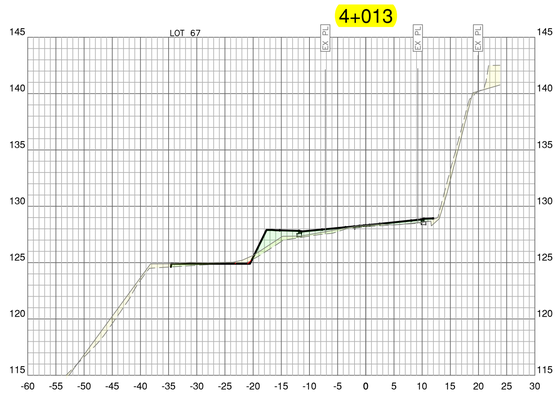


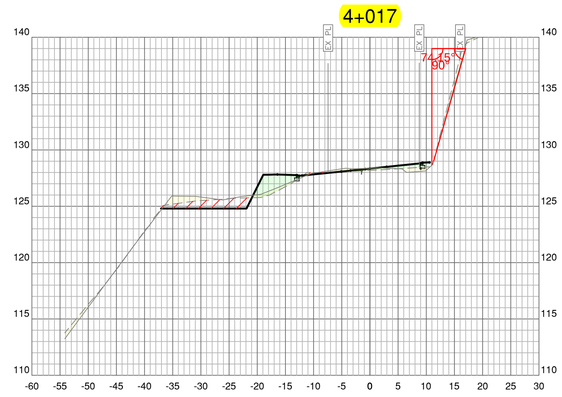




ROAD C







ROAD D

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V:_Projects\33742 – Turnberry Developments – Rem 1 Plan VIP75627\07 – Engineering\02 – Drawings & Sketches (Eng)\33742 – PRODUCTION – SECTION.dwg Plot Date: August 1, 2023

TURNBERRY
DEVELOPMENTS LTD.
SECTIONS
ROAD C - 1

1:500 0 10 30m

Scale horiz. 1:500 Scale vert. 1:50
Sheet 13 of 13
Eng. Project No. 33742

JEA
J E ANDERSON & ASSOCIATES
SURVEYORS - ENGINEERS
VICTORIA NANAIMO PARKSVILLE CAMPBELL RIVER
PHONE: 250-727-2214 info@jeanderson.com

LEGEND:

- Existing Rock Cutslopes
- Existing Retaining Walls

0 75
1:1500 UNITS - metres (m)

NOTES

1. This drawing is scaled for 11x17 sheet and does not require further scaling to fit. Scales will differ if printed on different sheet size.
2. Base plan taken from JE Anderson & Associates' Tentative Plan of Subdivision drawing, dated June 30, 2023.

RYZUK GEOTECHNICAL
ENGINEERING & MATERIALS TESTING
#6-40 CADILLAC AVENUE - VICTORIA, BC V8Z 1T2
TEL: 250-475-3131
mail@ryzuk.com

REV.	DESCRIPTION	YY/MM/DD	DRAWN BY
00	ISSUED FOR REPORT	23/11/06	JJAG

SEAL

PTPN: 1002996

PROJECT No.	11242-1
CLIENT	TURNBERRY DEVELOPMENT LIMITED
EOR/LEAD	JJAG/LBL
PROJECT TITLE	PROPOSED SUBDIVISION
REVIEW	LBL
PROJECT ADDRESS	COTTYN WAY - COLWOOD, BC
SCALE	1:1500
DRAWING PACKAGE	**GEOTECHNIAL ASSESMENT**
SHEET No.	1 of 1
SHEET NAME	**GEOTECHNICAL SITE PLAN**

R:\Ryzuk Data\8-11000 to 8-11999\11242-1 Mary Anne Cres & Cottyn Way\4 Ryzuk Drawings\Working\11242-1 2023.08.26 Geotechnical Site Plan.jjag.dwg

TURNBERRY DEVELOPMENTS LTD. SURFACE SITE CONDITIONS

Scale horiz. NTS Date 20220928

Sheet 1 of 1

Eng. Project No. 33742

J E ANDERSON & ASSOCIATES

SURVEYORS - ENGINEERS

VICTORIA NANAIMO PARKSVILLE CAMPBELL RIVER

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LOT 1, SECTION 63, ESQUIMALT DISTRICT, PLAN VIP75627, EXCEPT THAT PART IN PLAN VIP81143 AND VIP83075

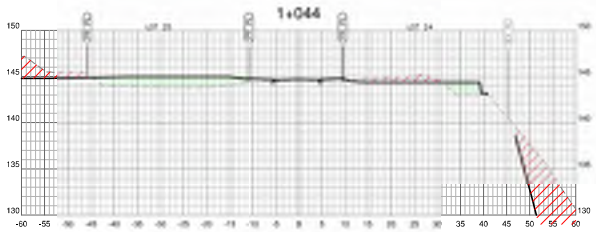
V:_Projects\33742 – Turnberry Developments – Rem 1 Plan VIP75627\08 – Survey\33742_tent_1.dwg Plot Date: September 28, 2022

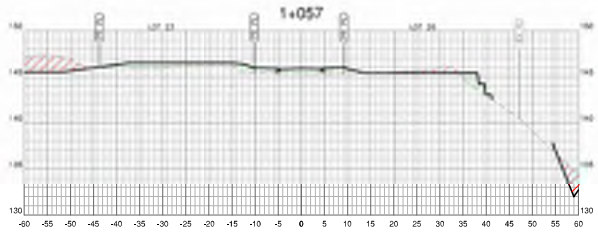
Site Photo 1: Showing Rock Cutslope Along East Topographical Peak Boundary – Looking North

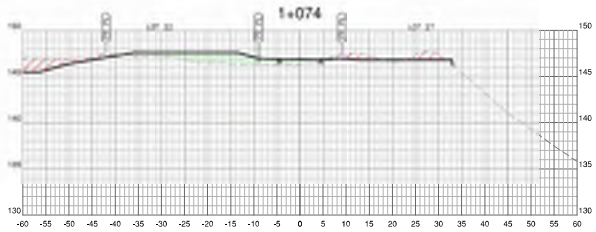
Site Photo 2: Showing Spotswood Terrace Road Dedication Rock Cutslope – Looking East

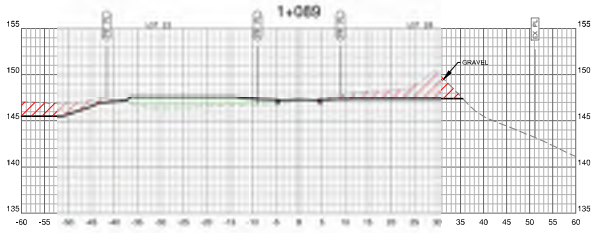
Site Photo 3: Showing Existing Fill At North End of Property – Looking Northwest

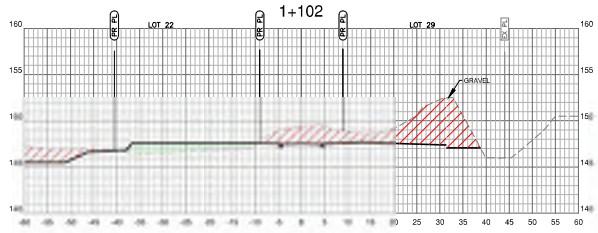
Schedule 4

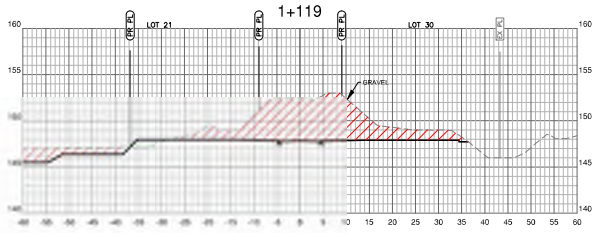


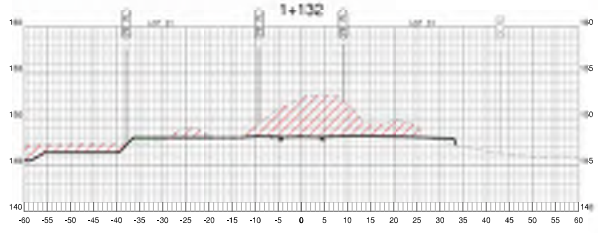


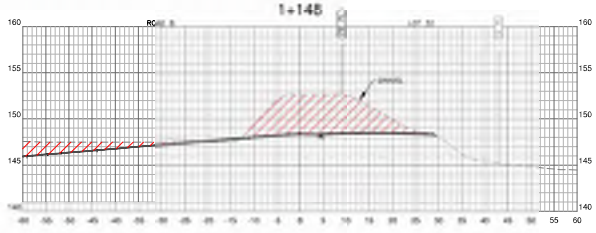


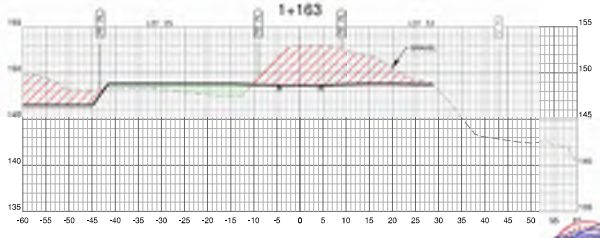












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SECTIONS
ROAD A - 1

Scale horiz. 1:500 Scale vert. 1:
Sheet 10 of 16
Eng. Project No. 33742

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SURVEYORS - ENGINEERS
VICTORIA NANAIMO PARKSVILLE CAMPBELL RIVER
PHONE 250.727.2214 info@jeanderson.com

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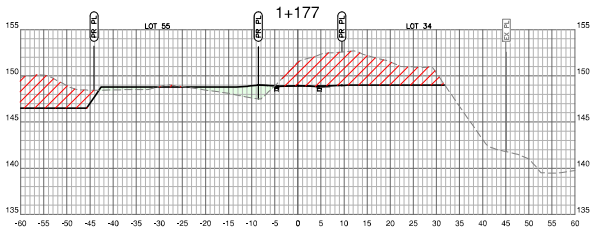

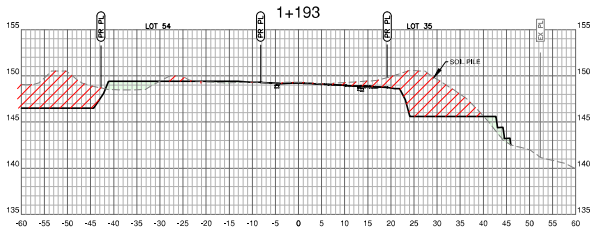

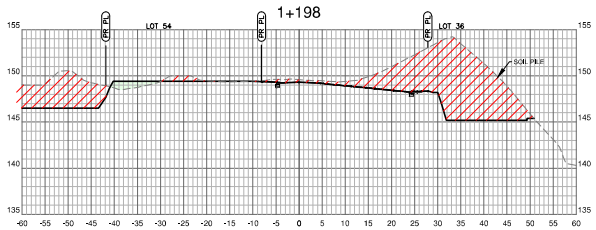

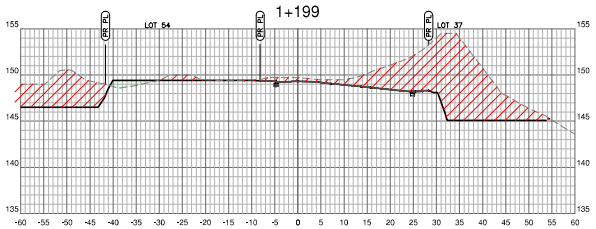

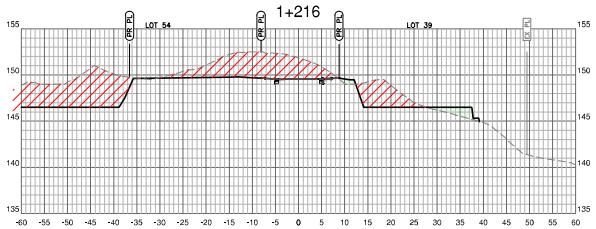

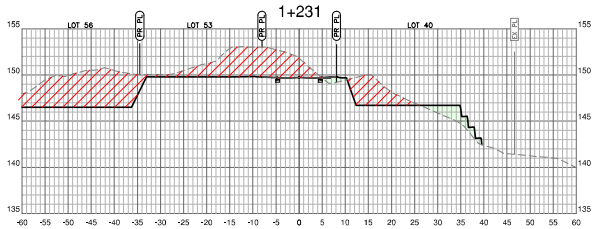

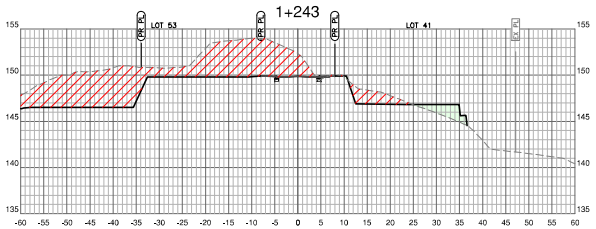

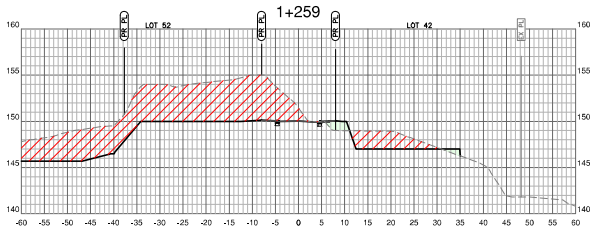

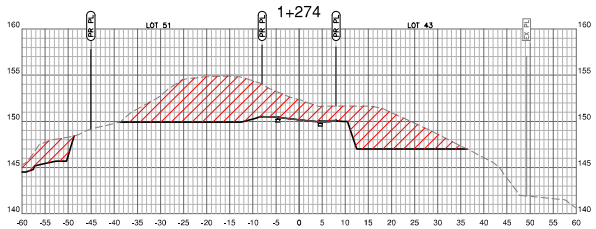

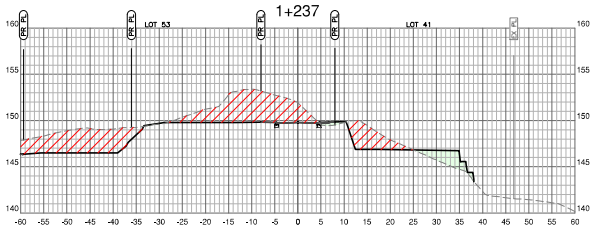

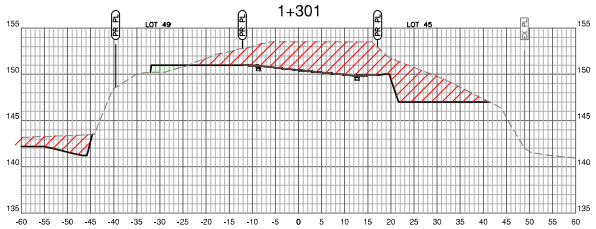

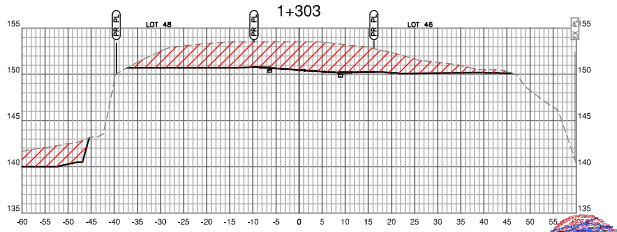

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SECTIONS
ROAD A - 2

Scale horiz. 1:500 Scale vert. 1:500

Sheet 11 of 16

Eng. Project No. 33742

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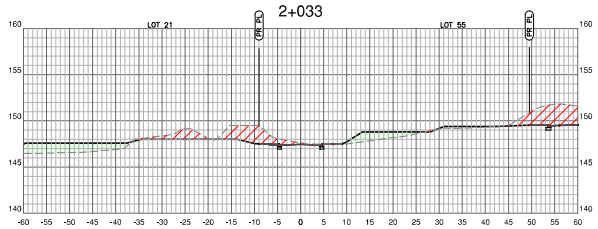

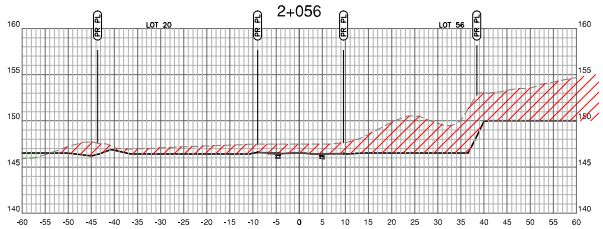

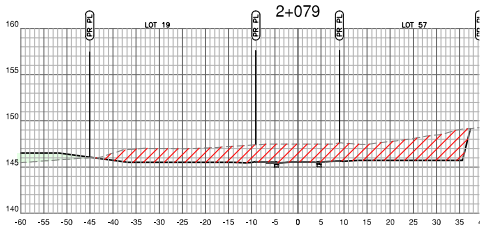

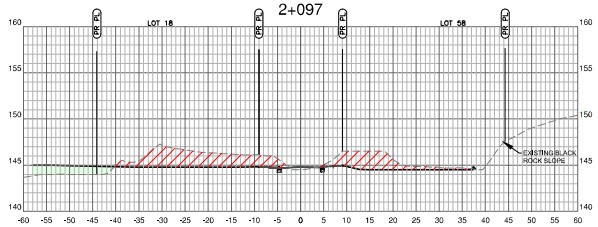

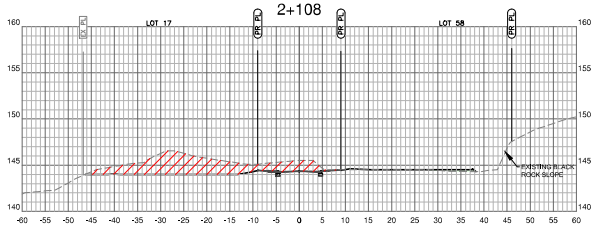

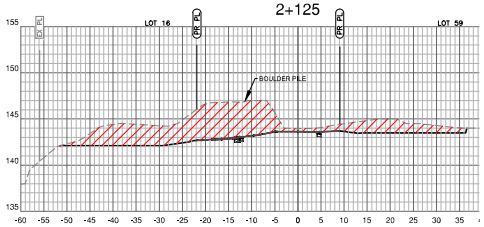

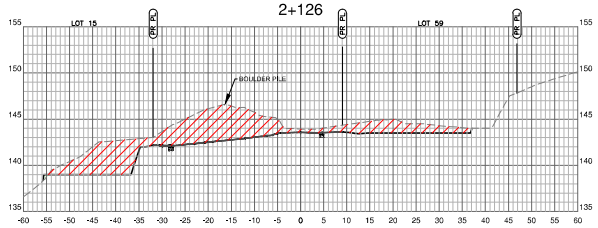

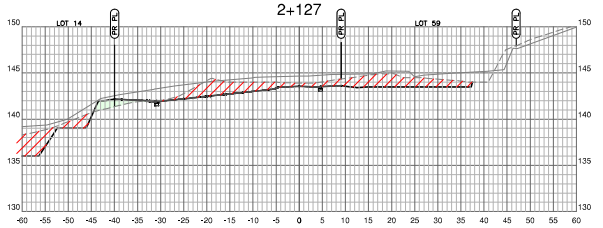

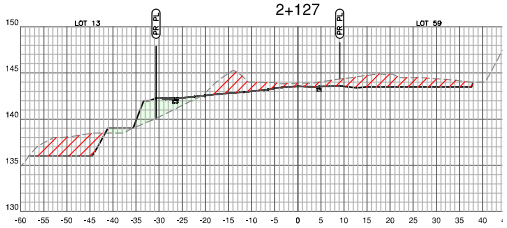

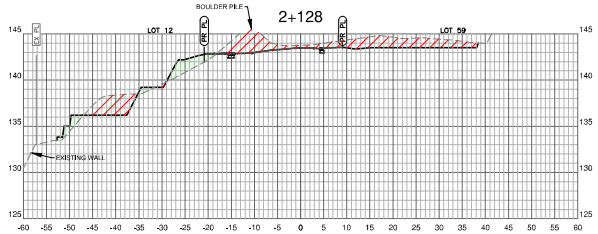

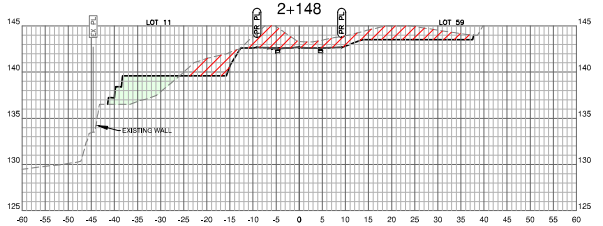

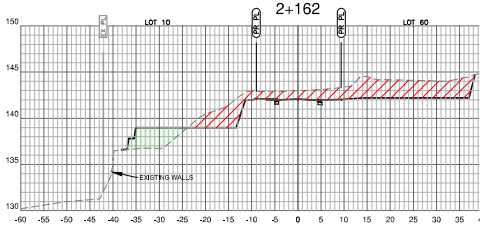

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SECTIONS
ROAD B - 1

1:500 0 10 30m

Scale horiz. 1:500 Scale vert. 1:500
Sheet 12 of 16
Eng. Project No. 33742

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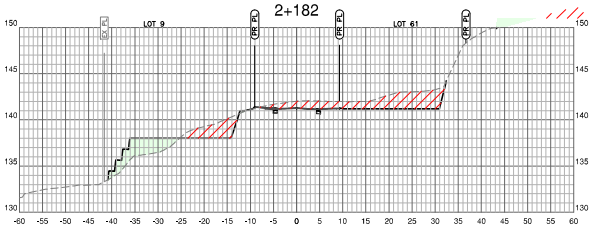

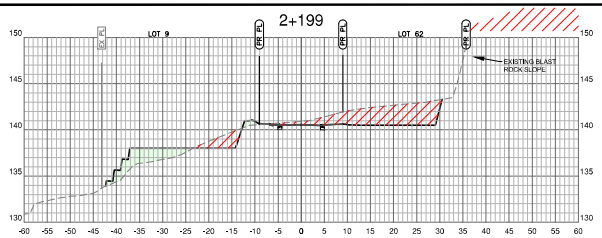

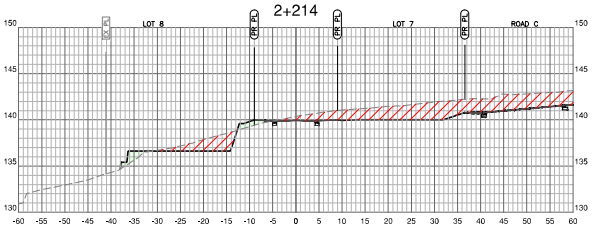

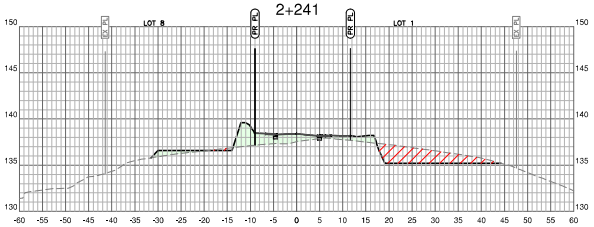

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SECTIONS
ROAD B - 2

1:500 0 10 30m

Scale horiz. 1:500 Scale vert. 1:50

Sheet 13 of 16

Eng. Project No. 33742

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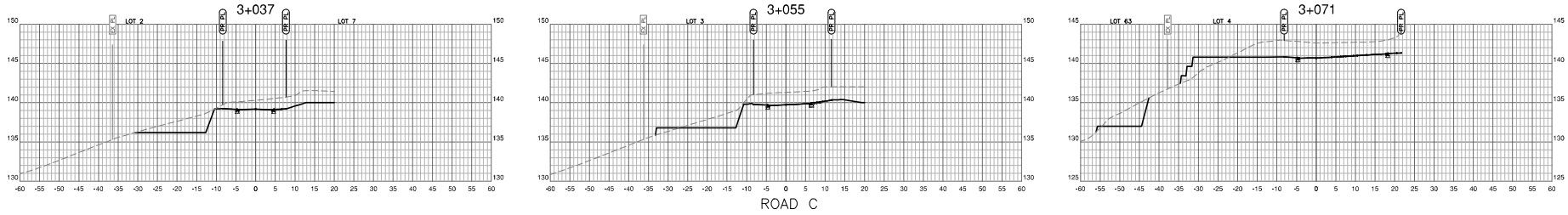

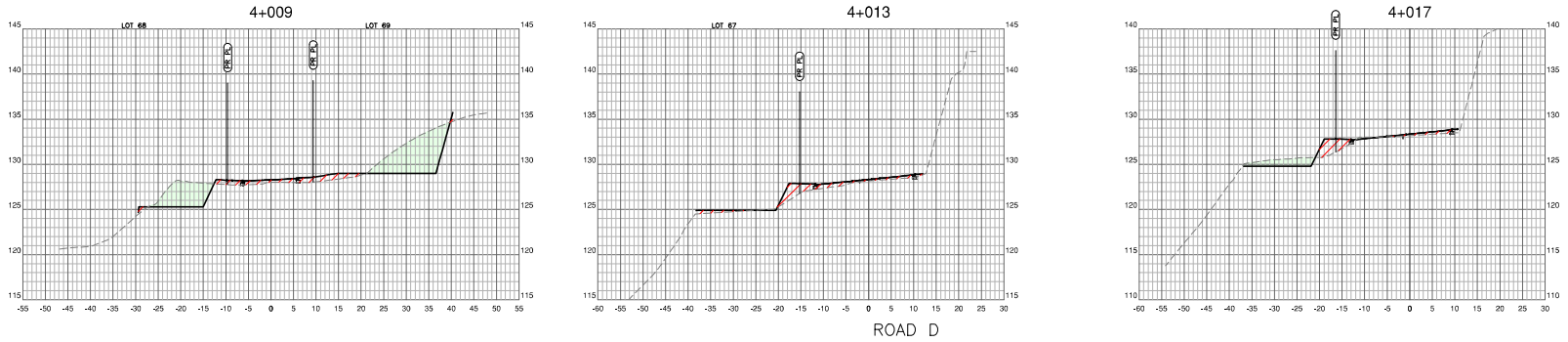

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SECTIONS
ROAD C - 1

Scale horiz. 1:500 Scale vert. 1:500
Sheet 14 of 16
Eng. Project No. 33742

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Schedule 5

GENERAL EROSION PREVENTION & SEDIMENT CONTROL NOTES

1. CONTRACTOR IS RESPONSIBLE FOR ENSURING ALL EROSION AND SEDIMENT CONTROL MEASURES ARE IN PLACE AND IN WORKING CONDITION PRIOR TO ANY LAND DISTURBING ACTIVITY INCLUDING CLEARING OR GRADING. EROSION AND SEDIMENT CONTROL MEASURES SHALL BE APPROVED BY THE ENGINEER PRIOR TO THE COMMENCEMENT OF WORK. ONCE APPROVED, THE SITE MUST BE MAINTAINED BY THE CONTRACTOR THROUGH THE LIFE OF THE PROJECT, AS SHOWN ON THE PLANS. ADDITIONAL MEASURES MAY BE REQUIRED TO MEET SITE CONDITIONS.

2. THE CONTRACTOR IS RESPONSIBLE FOR MAINTAINING EROSION PREVENTION AND SEDIMENT CONTROL BMPS DURING AND AFTER INSTALLATION OF ALL UTILITY WORK ASSOCIATED WITH UTILITY TRENCHES.

3. PRIOR TO ANY SITE EXCAVATION, ALL STORM DRAIN INLETS SHALL BE PROTECTED DOWN SLOPE FROM ANY DISTURBED OR CONSTRUCTION AREAS PER STANDARD INLET PROTECTION DETAIL ON SHEET C105 TO PREVENT SEDIMENT FROM ENTERING THE STORM DRAINAGE SYSTEM PRIOR TO PERMANENT STABILIZATION OF THE DISTURBED AREAS. CLEAN INLET FILTER AS NECESSARY TO MAINTAIN DRAINAGE. REMOVE FILTER AND CLEAN CATCH BASINS FOLLOWING COMPLETION OF SITE WORK.

4. NEWLY CONSTRUCTED OR MODIFIED INLETS AND CATCH BASINS SHALL BE PROTECTED FROM SEDIMENT IMMEDIATELY UPON INSTALLATION.

5. THE CONTRACTOR SHALL NOT ALLOW SEDIMENT OR DEBRIS TO ENTER NEW OR EXISTING PIPES, CATCH BASINS OR INFILTRATION SYSTEMS. IF THIS OCCURS, THE CONTRACTOR SHALL REMOVE ALL ACCUMULATED SEDIMENT FROM THE CATCH BASINS, DRYWELLS, AND STORM PIPES IMMEDIATELY. FINAL ACCEPTANCE WILL NOT BE ISSUED BY THE CITY UNTIL THIS OCCURS.

6. PRIOR TO LEAVING A CONSTRUCTION SITE OR PRIOR TO DISCHARGING INTO AN INFILTRATION SYSTEM, SEDIMENT-LADEN WATER SHALL PASS THROUGH A SEDIMENT POND, TRAP, OR OTHER APPROVED BMP SYSTEM.

7. ALL EXPOSED AND UNWORKED SOILS SHALL BE STABILIZED BY THE APPROPRIATE BEST MANAGEMENT PRACTICES (BMPS). FROM OCTOBER 1 TO APRIL 30, NO SOILS SHALL BE EXPOSED AND UNWORKED FOR MORE THAN TWO (2) DAYS. FROM MAY 1 TO SEPTEMBER 30, NO SOILS SHALL BE EXPOSED AND UNWORKED FOR MORE THAN SEVEN (7) DAYS.

8. SOIL STOCKPILES SHALL BE STABILIZED FROM EROSION, PROTECTED WITH SEDIMENT TRAPPING MEASURES, AND WHEN POSSIBLE, BE LOCATED AWAY FROM STORM DRAIN INLETS, WATER WAYS AND DRAINAGE CHANNELS.

9. CONTRACTOR TO ENSURE SOIL STABILIZATION MEASURES ARE INITIATED IMMEDIATELY AFTER EARTH-DISTURBING ACTIVITIES HAVE PERMANENTLY COMPLETED OR WITHIN 14 CALENDARS IF TEMPORARILY CEASED. THE STABILIZATION MUST BE COMPLETED WITHIN 14 CALENDAR DAYS AFTER BEING INITIATED.

10. CONSTRUCTION ROADS AND PARKING AREAS SHALL BE STABILIZED WHEREVER THEY ARE CONSTRUCTED, WHETHER PERMANENT OR TEMPORARY, FOR THE USE OF CONSTRUCTION TRAFFIC.

11. IF THE BMPS APPLIED TO A SITE ARE INSUFFICIENT TO PREVENT SEDIMENT FROM REACHING WATER BODIES, ADJACENT PROPERTIES, STORM FACILITIES OR PUBLIC RIGHT-OF-WAY, THEN THE CITY SHALL REQUIRE ADDITIONAL BMPS.

12. IF THE DISTRICT INSPECTOR OR ENGINEER(S) HAS EVIDENCE OF POOR CONSTRUCTION PRACTICES OR IMPROPER EROSION PREVENTION BMPS, CITATIONS AND /OR A STOP WORK ORDER SHALL BE ISSUED UNTIL PROPER MEASURES HAVE BEEN TAKEN AND APPROVED BY THE DISTRICT OF SAANICH.

PROTECTION OF ADJACENT PROPERTIES. ROADS/STREETS AND PAVED SURFACES

13. PROVIDE A 12-INCH DEEP PAD OF CRUSHED ROCK FOR A DISTANCE OF 100 FEET INTO THE SITE FOR ALL ACCESS POINTS UTILIZED BY CONSTRUCTION EQUIPMENT AND TRUCKS. PAD WIDTH SHALL BE A MINIMUM OF 20 FEET. ALL VEHICLES LEAVING THE SITE SHALL EGRESS ACROSS THE PAD. ACCUMULATED SEDIMENT SHALL BE PERIODICALLY REMOVED, OR ADDITIONAL ROCK SHALL BE PLACED UPON THE PAD SURFACE. ROCK SHALL BE CLEAN 4-INCH TO 8-INCH QUARRY SPALLS. ALL MATERIALS SPILLED, DROPPED, WASHED OR TRACKED FROM VEHICLES ONTO ROADWAYS OR INTO STORM DRAINS SHALL BE REMOVED IMMEDIATELY. MECHANICAL BROOM SWEEPERS ARE NOT ALLOWED.

14. IF SEDIMENT, MUD OR DEBRIS IS TRANSPORTED ONTO A PAVED SURFACE OR ROADWAY, THE PAVED SURFACES SHALL BE THOROUGHLY CLEANED WITH HIGH EFFICIENCY STREET SWEEPERS AT THE END OF EACH WORKDAY, OR MORE OFTEN IF NECESSARY. PUBLICLY TRAVELED PAVED SURFACES NEED TO BE CLEANED IMMEDIATELY. SIGNIFICANT SOIL DEPOSITS SHALL BE REMOVED FROM ROADS BY SHOVELING AND SWEEPING. STREET WASHING IS NOT ALLOWED UNLESS APPROVED BY THE DIRECTOR AND ONLY AFTER SEDIMENT IS REMOVED IN THE MANNER DESCRIBED ABOVE. MECHANICAL BROOM SWEEPERS ARE NOT ALLOWED.

15. SLURRY AND CUTTINGS SHALL BE VACUUMED DURING CUTTING AND SURFACING OPERATIONS. COLLECTED SLURRY AND CUTTINGS SHALL BE DISPOSED OF IN A MANNER THAT DOES NOT VIOLATE GROUNDWATER OR SURFACE WATER QUALITY STANDARDS.

16. A WHEEL WASH MAY BE REQUIRED IF CONSTRUCTION ENTRANCE IS NOT SUFFICIENT IN PREVENTING SEDIMENT FROM BEING TRACKED ONTO PAVEMENT. WHEEL WASH SHALL BE PER STANDAR[illegible]

MINIMIZIN[illegible]

17. TH[illegible] DUST CON[illegible] CONTROL [illegible] WIND SC[illegible] WITH RED[illegible] MATERIAL[illegible]

POLLUTION PREVENTION & CONTROL MEASURE

18. THE CONTRACTOR IS RESPONSIBLE FOR PREVENTING THE DISCHARGE OF THE FOLLOWING FROM THE CONSTRUCTION SITE:

- WASTEWATER FROM WASHOUT OF CONCRETE, UNLESS MANAGED BY AN APPROPRIATE CONTROL.
- WASTEWATER FROM WASHOUT AND CLEANOUT OF STUCCO, PAINT, FORM RELEASE OILS, CURING COMPOUNDS AND OTHER CONSTRUCTION MATERIALS, UNLESS MANAGED BY AN APPROPRIATE CONTROL.
- FUELS, OILS, OR OTHER POLLUTANTS USED IN VEHICLE AND EQUIPMENT OPERATION AND MAINTENANCE. NOTE: ONLY CONSTRUCTION EQUIPMENT CAN BE FUELED OR MAINTAINED ONSITE.
- SOAPS, SOLVENTS, OR DETERGENTS USED IN VEHICLE AND EQUIPMENT WASHING
- TOXIC OR HAZARDOUS SUBSTANCES FROM A SPILL OR OTHER RELEASE.

LIQUID WASTE OR WASH WATER WILL NEED TO BE DIRECTED TO LEAK PROOF CONTAINERS AND THEN DISPOSED OF OFFSITE PER LOCAL REQUIREMENTS. THE CONTRACTOR IS RESPONSIBLE FOR CONSTRUCTING, SIZING AND MAINTAINING THE LEAK PROOF CONTAINERS AS REQUIRED AND SHALL CONSULT WITH THE ENGINEER PRIOR TO CONSTRUCTION ACTIVITIES. THE CONTRACTOR SHALL NOT ALLOW LIQUID WASTE OR WASH WATER TO ENTER THE MUNICIPAL STORM OR SEWER SYSTEMS.

20. THE CONTRACTOR WILL BE RESPONSIBLE FOR REPORTING SPILLS PER THE CAPITAL REGIONAL DISTRICTS GUIDELINES AND WILL REQUIRE REPORTING TO;

20.1. EMERGENCY MANAGEMENT BC - 1.800.663.3456 AND,

20.2. [illegible]

[illegible]

LEGEND

(IP) INLET PROTECTION	SILT CONTROL FENCING
(CE) CONSTRUCTION ENTRANCE	CONSTRUCTION ENTRANCE AREA

TURNBERRY DEVELOPMENTS LTD.

PRELIMINARY EROSION AND SEDIMENT CONTROL PLAN

Scale horiz. 1:1000 Scale vert.

Sheet 15 of 16

Eng. Project No. 33742

J E ANDERSON & ASSOCIATES

SURVEYORS - ENGINEERS

CAMPBELL RIVER

info@jeanderson.com

ISSUED FOR DP - 20240117

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