Making a difference...together

REPORT TO MAGIC LAKE ESTATES WATER AND SEWER LOCAL SERVICES COMMITTEE
MEETING OF TUESDAY, JUNE 17, 2014

SUBJECT **CHART DRIVE SEPTIC SYSTEM – EVALUATION OF REPLACEMENT OPTIONS**

ISSUE

On April 14, 2014, the Capital Regional District (CRD) received a written Order from Island Health Authority to stop discharging to the Chart Drive septic field. This report presents two options to address long-term solutions regarding the failed septic field at Chart Drive for the committee's consideration.

BACKGROUND

On April 25, 2014, the CRD staff presented a report outlining both short-term and long-term solutions for addressing the failed septic field at Chart Drive.

Short-Term Solution

At this meeting, the committee approved spending up to $15,000 from the Magic Lake Estates Sewer Capital Reserve Fund (#1042) to temporarily haul the septage from the Chart Drive pump station and to dispose the material into the collection system upstream of Schooner wastewater treatment plant. CRD staff started hauling the material on May 2, 2014. Based on the first few weeks of operations, staff are better able to quantify the extent of hauling needed to empty out the tanks. Based on those observations, it has been determined that the costs are approximately $1,000 per week. Based on the efforts to date and understanding of pumping and hauling costs, it is estimated that there will be, sufficient funds to continue the operations until mid to late August. At that time, until a long-term solution is provided additional funds will be required to carry-on with the pumping and hauling operations. The committee should expect a staff report in the near future requesting additional funds.

The funds in the Magic Lake Capital Reserves (#1042) as of December 31, 2013 is $307,257. The Committee has since approved; $15,000 for the Chart Drive pumping and hauling to Schooner Wastewater Treatment Plant, $15,000 for the hydrogeological investigation of the septic field, and $28,000 for the Schooner Bypass request to Ministry of Environment in order to clean the oxidation tank at the plant. The remaining funds is approximately $249,257.

Long-Term Solution

At the meeting, the committee also approved $15,000 funding from the Magic Lake Estates Sewer Capital Reserve Fund (#1042) to: evaluate the feasibility of constructing a new septic field on the existing site with the assistance a local engineering expert and conduct hydrogeological testing if required; refine cost estimates to allow a comparison of the two options.

As a result, the CRD staff retained Payne Engineering as the local professional engineering company with extensive experience building and refurbishing septic systems on the both Vancouver Island and the Gulf Islands. Payne Engineering travelled to the site on May 1, 2014 and evaluated the site for suitability for a septic system that meets current Provincial standards. A site evaluation memo was provided indicating that the site had significant issues (drainage and soils) and the design of the replacement system would be complex.

Payne Engineering submitted their initial report on May 14, 2014 (see Appendix A). The report evaluates two alternatives for replacement of the septic system. The report indicates that the preferred option is to pump via force main to the Schooner Treatment Plant (Alternative 2).

After discussion with Michael Payne, he indicated that raised sand beds will effectively treat the sewage and is not compromised by the poor subsurface conditions. Staff requested Payne Engineering to provide a more detailed cost estimate for Alternative 1 and staff completed a more detailed cost estimate for Alternative 2 (see Appendix B).

Further correspondence with both MOE and Payne Engineering is included in Appendix C.

ALTERNATIVES

Alternative 1

1. That the Magic Lake Estates Water and Sewer Local Services Committee approve the replacement of Chart Drive Septic System with new raised sand beds using a pressure distribution network with timed dosing; a new pump station; septic tank with screening; SCADA; and drainage improvements.

2. Direct staff to prepare a referendum question regarding funding for the project, for inclusion on the ballot of fall 2014 elections; and

3. Direct staff to report back on the overall project schedule timelines to the completion of the project.

Alternative 2

1. That the Magic Lake Estates Water and Sewer Local Services Committee approve the replacement of the Chart Drive Septic System with a new pump station and septic tank with screening, and a new force main/gravity main to the Schooner wastewater treatment plant.

IMPLICATIONS

Alternative 1 – The replacement of the septic field with a raised sand bed is estimated to cost $700,000, including design, construction, project administration and contingencies. Environmentally, the process is greener as there is no sludge produced on a regular basis. The impact on the taxpayer based on a 15 year MFA loan is $107.79 based 714 taxable folios.

Alternative 2 – The installation of a new pump station and force main to the existing gravity system on Schooner Way at Privateers is estimated to cost $1,100,000, including design, construction, project administration and contingencies. . The impact on the taxpayer based on a

15 year MFA loan is $169.38 based 714 taxable folios.

Please be aware that pumping and hauling will continue through the process, as well as, design and construction, which anticipated completion is August 2015. The estimated cost is $65,000.

It should be noted in discussions with the Payne Engineering that the operating and maintenance cost of the two alternatives are very similar. Depending on the alternative selected by the Committee, it is recommended after we build and operate the system over a year, staff report back to the Committee to determine whether the operating budget should be adjusted or not. The goal is to ensure that regular maintenance is undertaken to maximize service life and meet the public health requirements and the Sewerage Regulations of BC.

As you are aware, in the 2014 budget deliberations, the Magic Lake Estates Water and Sewer Local Services Committee are approved in principle a five-year Financial Plan with a 2015 item of $500,000 to address the Chart Drive septic system.

The capital project was described as:

The Chart Drive septic system, which provides sewer service to 18 properties, has reached the end of its useful life and requires replacement. A project plan, including conceptual design and budgetary cost estimate for the elimination of this septic system and replacement with pumping to the Schooner plant, will be developed in 2014. The budget for this item is an order of magnitude estimate only and will be refined for the 2014 referendum to seek public approval to borrow funds for this work.

The CRD staff's assessment is consistent with the direction of the Committee, including the need to go to a referendum.

Should the Committee approve the recommendation, this would address one of the issues identified in the Asset Condition Evaluation and Engineering Study of the Magic Lake Estates Wastewater System prepared by Stantec in January 2012. This report was shared with the Committee in July 2012. Staff are preparing a report regarding the remaining improvements for the Committee's consideration. Due to the Order issued by the Island Health Authority, Chart Drive septic field is the top priority.

Funding Approval Options

There are currently insufficient funds in the Reserve ($249,257) to fund this project, therefore it is recommended to fund the project through a new loan requiring a new loan authorization bylaw. There are two options for approval of a loan authorization bylaw under the Local Government Act to undertake this project. The two options are:

1. Alternative Approval Process
2. Referendum Process

Each of the option has its own merits and is outlined for the Committee's consideration.

Alternative Approval Process (AAP)

Local/Regional governments can use the Alternative Approval Process under Part 2, Section

801.3 of the *Local Government Act* to obtain participating area approval of a loan authorization bylaw. It is most commonly used in relation to long-term borrowing bylaws as it is a less expensive option than using a referendum.

Based on the above tentative schedule the AAP would take approximately six (6) months.

Referendum Process

The referendum process is typically used to seek approval by assent of the electors under Part 2 of Section 801.2 of the *Local Government Act* , where for a participating area, a majority of the valid votes are counted in favour of the bylaw to fund a project. Typically, a referendum question is developed and then reviewed by the Inspector of Municipalities at the Province, requesting the electors to approve the borrowing of a specified amount of funds for the project. Due to the upcoming election (November 15th, 2014) there is an option to coordinate this referendum with the election. There may be some economy realized by this approach but is not a requirement to do so.

Based on the above tentative schedule the referendum would take approximately seven (7) months.

Typically, the cost to conduct an AAP process is approximately $5,000 and $10,000 for a Referendum.. The pumping and hauling is another consideration and with a Referendum, there is an additional cost approximately $4,500 over the AAP.

Implications of either the AAP or Referendum being Unsuccessful

In review of the Public Health Act and Sewerage System Regulation there are no provisions that relate to the local/regional governments' ability to borrow or carry out work irrespective of the approval requirements in either the Local Government Act or the Community Charter.

As a result, if either of the processes are unsuccessful, the Committee will still have to abide by the Island Health Authority's Order. This means we would have to continue hauling septage from Chart Drive pump station and to dispose the material into the collection system upstream of Schooner wastewater treatment plant at a cost of $1,000 per week; as this expense was not included in the 2014 operating budget, an increase in the 2015 user charge would be required to fund this work.

CONCLUSION

The replacement of the Chart Drive septic system with new raised sand beds using a pressure distribution network with timed dosing; a new pump station; septic tank with screening; SCADA; and drainage improvements is a recognized effective method and Payne Engineering has indicated that it will successfully treat the sewage from the Chart Drive Sewage System to meet the required regulations, while being the most economical alternative. A referendum is required to secure funding for this project.

It is also important to develop the overall project schedule that includes: seeking the Committee's approval, Provincial approvals, the referendum date, approval of loan authorization bylaw, engineering design, tender, construction, etc. to completion of the project. This will

provide an idea of the length of time (and estimate of cost) that is still needed to temporarily pump and haul the material from Chart Drive septic field to Schooner wastewater treatment plant in order to comply with the Island Health Authority's Order.

RECOMMENDATIONS

That the Magic Lake Estates Water and Sewer Local Services Committee:

1. Approve the replacement of the Chart Drive Septic System with new raised sand beds using a pressure distribution network with timed dosing; a new pump station; and septic tank with screening; SCADA; and drainage improvements;

2. Direct staff to prepare a referendum question regarding funding for the project, for inclusion on the ballot of fall 2014 elections; and

3. Direct staff to report back on the overall project schedule timelines to the completion of the project.

Craig Gottfred, P.Eng.
Manager, Regional Wastewater

Tim Tanton, MPA, P.Eng.
Senior Manager, Infrastructure Engineering
Concurrence

Peter Sparanese, P.Eng.
Senior Manager, Infrastructure Operation
Concurrence

Ted Robbins, B.Sc., C.Tech.
General Manager, Integrated Water Services
Concurrence

CG/PS/TR:ls

Attachments: Appendix A – Site Reconnaissance and Feasibility Review for Replacement of Community Wastewater Drainfields at Chart Drive, Pender Island, Michael Payne, May 14, 2014.
Appendix B Cost Estimates
Appendix C Additional Correspondence
Appendix D Approval Process Options

APPENDIX A

Site Reconnaissance and Feasibility Review

PEG | Payne Engineering Geology

1230 Maple Road, North Saanich, Canada, V8L 5P7 Phone: 250-655-3604

E-mail: PayneEngineering@shaw.ca

14 May 2014

PEG file: CRD-8-1

Capital Regional District
Integrated Water Services
479 Island Highway
Victoria, BC
V9B 1H7

Attention: Mr Craig Gottfred, P.Eng.

Site Reconnaissance and Feasibility Review for Replacement of Community Wastewater Drainfields at Chart Drive, Pender Island

1. Introduction

This letter reviews options and recommends action for replacement of the drainfields for the CRD-owned Chart Drive septic system on Pender Island. Briefly, the problem is that the two drainfields have failed hydraulically, and the CRD asked PEG (Payne Engineering Geology) to recommend a solution. The following table lists relevant details of the property, the project, and the responsible professionals.

Table 1: Property and Project Summary

Owner:	Capital Regional District		
Location:	Map: See Figure 1, Appendix 4 Civic address: Chart Drive Legal: Lot 66, Section 9, Cowichan Land District, VIP22335. PID: 003-219-658 Lot area: 0.35 hectares (0.87 acres)		
CONTACTS	Name & Affiliation	Location	Phone
Owner	Craig Gottfred, CRD	Victoria	250-474-9620
Project engineer	Dale Puskas, CRD	Victoria	250-474-9648
Operator	Al Kruger, CRD	Pender Island	250-507-8037
PREVIOUS SITE WORK AND REPORTS: See Appendix 2.			

SEWAGE	Existing Sewage System	Source and Note
Design flows:	14,320 Lpd (Litres per day)	*From original design by MPT Engineering*
Regulatory flow:	24,534 Lpd	*Based only on BC Standard Practice Manual, Version 2; for 18 houses.*
Full-time occupancy:	6 residences	*From A.Kruger, CRD.*
Measured flows:	Winter average 2,809 Lpd (468 Lpd per fulltime residence)	*Based on measured wintertime water use, provided by D.Puskas, CRD. Sewage flow is not measured.*
Collection:	Gravity sewer	*Design drawing*
Treatment:	Septic tank, 34,095 litres	*Design drawing*
Discharge:	To ground	
Dispersal method:	Pump to distribution box or boxes	
Infiltration:	Subsurface trenches, total design length 500 m (1,640 ft)	*See Figure 2. Trench dimensions: 0.74 m deep; 0.45 m wide.*
Current regulation:	BC Sewerage System Regulation	*This is the regulation that would probably apply to a major repair or replacement. The BC Municipal Wastewater Regulation would apply if the system continued to discharge to ground and the peak-day wastewater flow exceeded 22,700 Lpd.*
Design guides:	Professional Practice Guidelines, Onsite Sewerage Systems (McMurtrie et al, 2013). BC Standard Practice Manual (Ralston, 2007).	*There are no known drinking water wells within 90 metres. See Appendix 2 for list of references.*

The overall purpose of this review was to advise the CRD on a solution for the hydraulically-failing drainfields. The agreed objectives of this review were as follows:

1. Visit the property for a one-day reconnaissance to evaluate problems and potential causes.
2. Estimate the land area needed for drainfields versus the land area available.
3. Evaluate the technical feasibility of repairing or replacing the drainfield on that same property.
4. Recommend one or more types of infiltration systems that may be feasible.
5. Recommend short-term or immediate site improvements.
6. Advise on site evaluation and design of a replacement drainfield, if appropriate.
7. Evaluate a range of repair options and recommend the most appropriate option.

This letter is subject to the attached Statement of General Conditions (Appendix 1).

2. Field Notes

Appendices 3 and 4 summarize our field observations and measurements, including the following:

- 21 GPS (Global Positioning System) waypoints
- two shallow test pits
- photographs
- site sketch (Figure 3, Appendix 4)

3. Discussion

3.1 Problems with the Existing Drainfields

The following is a summary of drainfield problems identified during consultation with CRD staff and during my site reconnaissance:

1. EFFLUENT SURFACING: We noted surfacing or seepage of water, generally a mixture of water and septic tank effluent, over the drainfields in three main locations: (1) east third of the Upper East Drainfield; (2) west third of the Upper East Drainfield; (3) east third of the Lower West Drainfield (see Appendix 3).
2. HEALTH ORDER: This sewage system is not yet in compliance with the Health Order dated April 14, 2014.
3. SUSPECTED INFLOW AND INFILTRATION: Wintertime inflow and infiltration into the gravity collection sewers has not been assessed and is suspected to be substantial, based on conversations with Island-based CRD staff.
4. AS BUILT DETAILS: The system was not built as designed and we could not find an as-built drawing. As a result, operation and maintenance staff have little knowledge of the workings of the system including locations of valves and distribution boxes.
5. UPSLOPE SEEPAGE: The drainfields have been constructed by building two benches using cut and fill. We conclude that the lower part of the cut bank has been excavated below the water table, at least at the southeast corner of the Upper East Drainfield. As a result, parts of the drainfields are saturated or submerged for at least a few months of the year and, as a result, cannot properly absorb and treat the septic tank effluent (see Appendix 3 and Figure 3).
6. DENSE SOIL: The observed drainfield soils consist of very gravelly sand, loamy sand, and sandy loam. In an undisturbed, loose, natural state, soils with these textures are commonly moderately to highly permeable and well suited for infiltration. However, in these two drainfield areas, the soil has been compacted and was observed to be dense. The USDA consistence class is Very Firm (Appendix 3). The result is that the soil has low permeability.

During my review, I identified several potential causes for these problems including the following:

1. SIZE OF THE PROPERTY: The total area of the property is too small for a drainfield system of this type, using trickle gravity dispersal to narrow subsurface trenches.
2. SITE EVALUATION: There is no record of site evaluation that identifies the soil characteristics or depth of the water table.
3. SIZING OF THE DRAINFIELDS: Under current standards, the appropriate design flow is approximately 22,700 Lpd. For preliminary system sizing, the appropriate peak-day soil hydraulic loading rate is 25 Lpd/sqm. For a system of infiltration trenches of width 0.45 m, the appropriate minimum length of infiltration trenches is 2,000 metres. By comparison, this system, as built, has an estimated total installed trench length of only 360 metres.
4. DESIGN OF THE SYSTEM: The design of the system does not provide for diverting of upslope drainage or for property downslope drainage near the rock knoll.
5. CONTOUR LENGTH: The system was built over a relatively short contour length of about 60 m, whereas current engineering standards specify a minimum length of 200 m. This short length leads to mounding of the water table, causing or aggravating saturation of the drainfield.
6. EXCAVATION OF STEEP CUT BANK: The method of construction resulted in excavating the upper slope to below or near to the water table.
7. COMPACTION OF FILL: Fill was over-compacted resulting in a relatively low permeability infiltration surface.
8. AGING SEWER: It is common for aging sewers to develop leaks that lead to infiltration of groundwater into the sewer pipes, especially in winter.
9. AGING DRAINFIELD: At least three aging problems have probably caused or aggravated drainage problems at these drainfields: (1) settling and deterioration of distribution boxes causing uneven distribution; (2) physical deformation or plugging of wooden distribution laterals; (3) gradual plugging of the soil in areas with hydraulic overloading and soil saturation.
10. MAINTENANCE: Overall, there is little evidence of regular monitoring and maintenance of the drainfields.

3.2 Land Area Available for Drainfields

Using current design standards, we have estimated the land area needed for a replacement drainfield, versus land area available.

This analysis is based on a system of replacement drainfields, using pressure distribution of screened septic tank effluent (Type 1) to sand mounds. For this system, the land area needed is estimated at 1,000 to 1,500 square metres. The land area available is estimated

at 2,100 square metres, after accounting for a buffer strip around the property, and discounting the area of the rocky knoll. Hence, the land area available is adequate for discharge of septic tank effluent, without necessarily resorting to a treatment plant. However, as discussed below, there are some advantages to using a treatment plant.

3.3 Feasibility of Rebuilding Drainfields on this Property

Based on this analysis, it is technically feasible to replace the existing drainfields with new drainfields consisting of sand mounds combined with sand blanket drains, curtain drains, and other drainage improvements. However, as discussed below, this alternate system would be relatively complex, the system would require more monitoring and maintenance than a typical drainfield system, and the risks of hydraulic failure would be higher than for an ocean discharge pipe.

Section 4 of this report (below) discussed advantages and disadvantages of a range of options.

3.4 Feasible Options for Replacement Drainfields

The most suitable type of infiltration system for this property, considering the history and current condition of the land, would be pressure-dosing to a system of sand mounds, or raised seepage beds. The soil and drainage conditions are not suitable for subsurface infiltration trenches or beds, or for at-grade beds.

3.5 Immediate Site Improvements

Our memo of 2 May 2014 recommends short-term or immediate measures at the drainfield site to reduce health hazards arising from surfacing of effluent over and down-slope from the drainfields.

3.6 Recommendations for Design of a Replacement Drainfield

Based on discussion with CRD engineering staff, the CRD has yet to decide whether to replace the existing drainfields or select a different option, such as pumping effluent into a nearby sewage system.

If the CRD does decide to replace the existing drainfields, I can provide specific recommendations for this, including the following general steps:

- Selecting qualified design professionals.
- Site evaluation, including test pits, soil permeability tests, and other soil and groundwater testing.

- Evaluation of site conditions relative to applicable standards.
- Design of a system suited to the site, including design drawings and specifications.
- Registration or filing of documents with the Health Authority.
- Installation and professional review of installation and commissioning of the new system.

4. Repair Options Considered

4.1 Options Not Considered Feasible

From a site reconnaissance and review of background information, the following options are not considered technically feasible for repair of the existing drainfields, with reference to applicable provincial regulations and design standards.

(1) Continue with a septic tank (Type 1) system with pressure distribution to subsurface trenches or beds on the same property, with improved drainage.

(2) Upgrade using a treatment system, with pressure distribution to subsurface trenches or beds on the same property, with improved drainage. This option provides treatment, but cannot solve the problems with the high water table and over-compacted soils.

(3) Discharge the effluent to new drainfields, or other dispersal system, located on another nearby property. The 2012 Stantec report (Hahn and Cote, 2012) indicates that there are no suitable properties nearby.

4.2 Options Considered Feasible

The following is a list of technically feasible options with a brief discussion of relative advantages and disadvantages:

(4) Rebuild drainfields on the same property using the existing septic tank with pressure distribution to large sand mounds, with drainage improvements. With septic tank effluent, the replacement drainfields will cover most of the available space on the property. ADVANTAGES: Compared with other options, this option has a low capital cost; the Stantec study estimated a capital cost of $400,000, not including engineering design and hydrogeology and geotechnical studies (Hahn and Cote, 2012). DISADVANTAGES: However, operation and maintenance costs would be high. This system would be complex, and frequent monitoring and maintenance would be necessary to manage risks. Though technically feasible, due to the risks and associated long term monitoring and maintenance costs, Option 4 is not the recommended solution.

(5) Rebuild drainfields on the same property using an advanced secondary treatment plant with pressure distribution to smaller sand mounds, with drainage improvements.

ADVANTAGES: Compared with other options, this option has a low capital cost, similar to Option 4 above. Compared with Option 4, Option 5 saves costs for imported sand, but this is approximately balanced by the cost of the treatment plant. DISADVANTAGES: Operation and maintenance costs would be high, somewhat higher than Option 4 above. Option 5 would be complex, and frequent monitoring and maintenance would be necessary to manage risks. As with Option 4, Option 5 is technically feasible but the associated long term, high monitoring and maintenance costs does not make Option 5 a recommended solution.

(6) Pump effluent into a small diameter STEP (Septic Tank Effluent Pump) sewer that connects into the nearby Schooner Way sewer, existing wastewater treatment plant, and ocean discharge pipe. ADVANTAGES: The main advantage of this option is relative simplicity and, as a result, low long-term operation and maintenance costs, and low risk of failure of the discharge system. An ocean discharge pipe is very simple and low maintenance compared with pressure distribution to sand mound drainfields. DISADVANTAGES: This option has the highest initial capital cost, previously estimated at $400,000, but the long-term operating costs will be relatively low compared to Option 4 and Option 5.

5. Conclusions and Recommendations

The following is a summary of our conclusions and recommendations based on a site reconnaissance and analysis of options.

1. During this review, we found several problems with the existing drainfields, and several causes of these problems. As a result, we found no options for a simple and inexpensive repair.

2. This review indicates that the simplest and most economical long-term option for this sewage system is to pump the septic tank effluent into the nearby Schooner Way Wastewater Treatment Plant (Option 6 above).

3. It is considered technically feasible to replace the drainfields. However, this would involve a complex and expensive design. The resulting drainfield system would require considerable monitoring and maintenance to manage the risks of future problems.

4. There is an immediate concern regarding the health effects of surfacing effluent over the drainfields. The recent pumping of the septic tank will reduce the health risks. Our memo of 2 May 2014 recommends immediate measures to further reduce health risks.

5. If the Capital Regional District decides to abandon these drainfields and connect this sewage system to the Schooner Way system, then there is no need for further evaluation of the soil and groundwater conditions on this property.

Please phone if you have further questions.

Sincerely,

Payne Engineering Geology Limited

M.I.Payne

DN: cn=Michael Payne, o=Payne Engineering Geology Ltd., ou, email=PayneEngineering@shaw.ca, c=CA
Date: 2014.05.14 14:43:04 -07'00'

Michael Payne, PEng, PGeo

Appendices:

1) Statement of General Conditions
2) References
3) Field Notes
4) Figures

Report distribution list:

C. Gottfred, D. Puskas, CRD, Victoria

A. Kruger, CRD, Pender Island

C. Petersmeyer, Thurber Engineering, Victoria

Appendix 1: Statement of General Conditions

Scope of this Report

This review report satisfies only those objectives stated in the introduction. Payne Engineering Geology (PEG) has not conducted a *Site Investigation*, *Hydrogeology Study* or *Environmental Impact Assessment*.

Use of this Report

This Payne Engineering Geology (PEG) report pertains only to a specific project. If the project is modified, then our client will allow us to confirm that the report is still valid. We prepared this report only for the benefit of our Client and those agencies authorized by law to regulate our Client's activities. No others may use any part of this report without our written consent. To understand the content of this report, the reader must refer to the entire, signed report. We cannot be responsible for the consequences of anyone using only a part of the report, or referring only to a draft report. This report reflects our best judgement based on information available at the time. Any use of this report, or reliance on this report, by a third party is the responsibility of that third party. We accept no responsibility for damages, if any, suffered by a third party as a result of decisions made or actions taken based on this report.

Reliance on Provided Information

PEG has relied on the accuracy and completeness of information provided by its client and by other professionals. We are not responsible for any deficiency in this document that results from a deficiency in this information.

Logs of Test Holes or Wells and Subsurface Interpretations

Ground and ground water conditions always vary across a site and vary with time. Test hole and well logs show subsurface conditions only at the locations of the test hole or well. The precision with which geological and geotechnical reports show subsurface conditions depends on the method of excavation or drilling, the frequency and methods of sampling and testing, and the uniformity of subsurface conditions.

Descriptions of Geological Materials and Water Wells

This report includes descriptions of natural geological materials, including soil, rock, and ground water. PEG based these descriptions on observations at the time of the study. Unless otherwise noted, we based the report's conclusions and recommendations on these observed conditions.

Risks and Liability

We recommend that our client engage PEG to review all design drawings and constructed works that are based on our conclusions and recommendations. This is a requirement of the *Association of Professional Engineers and Geoscientists of BC*.

Standard of Care

We exercise a standard of care consistent with that level of skill and care ordinarily exercised by professionals currently practising under similar conditions.

Appendix 2: References

References

BC Assessment Authority, 22 April 2014. *BC Assessment Property Details.* Provided to PEG by CRD staff. 1 page.

Giles, G.E., 10 August 2009. *CRD – Chart Road Septic Field.* Report to Thurber Engineering. 2 pages.

Hahn, M., and G. Cote, January 2012. *Magic Lake Estates Sewerage System, Asset Condition Evaluation and Engineering Study, Final Report.* Stantec report to CRD. 47 pages.

Ingimundson, B., 13 August 2009. *Magic Lake Estates, Chart Drive Communal Effluent Disposal Field Investigations, Preliminary Site Reconnaissance.* Thurber Engineering memorandum to CRD. 4 pages.

Laughlin, Chris, 10 April 2014. *Order Under the Public Health Act – Chart Drive.* Order issued to Capital Regional District. 2 pages.

McMurtrie, R., M. Payne, and I. Ralston, January 2013. *Professional Practice Guidelines, Onsite Sewerage Systems, Version 1.2.* Published by Association of Professional Engineers and Geoscientists of British Columbia, Burnaby, BC.

MPT Engineering Company Ltd, 1975. Set of 10 design drawings prepared for Gulf Industries Ltd.

Ralston, Ian (editor), 21 September 2007. *Sewerage System Standard Practice Manual, Version 2.* Prepared by the Technical Review Committee of the BC Onsite Sewage Association. Published by BC Ministry of Health.

Other Information Retained on File

In addition to the references listed above, PEG has retained the following documents on file:

- original field notes
- digital photographs
- calculation of land area requirements based on design sewage flow rates and soil hydraulic loading rates

Appendix 3: Field Notes

GPS Waypoints

Map	WP	UTM Zone 10 (m)		Feature	Note
d1	03	476954	5402699	Ditch	Dry. 0.5 m deep. Drains north. No common rush. *Common rush (Juncus effusus) grows in soil that is wet to saturated for most of the year.*
d2	04	476954	5402675	Ditch	Dry. No common rush. Photos.
d3	11	476997	5402658	Ditch	Southwest of upper drainfield. Dry. No common rush. At base of a cut bank with well-drained gravelly soil.
d4	19	477021	5402651	Ditch	Upper end of ditch. Standing water in ditch.
d5	08	477000	5402682	Ditch	0.5 m deep. Seepage in ditch. Drains to northwest.
db	05	476967	5402682	Distribution box:	Outlets on west side. No inflow and fluid level is below outlets.
ip	12	477001	5402642	Iron pin	South of Upper East Drainfield. Soil is well drained.
mh	02	476942	5402732	Manhole:	Close to the road and near septic tank inlet.
pt	01	476934	5402717	Pump tank:	Beside pump house. Access covered by wooden box.
r1	16	477017	5402689	Rock knoll (Rk):	North end of knoll.
r2	17	477019	5402667	Rk	South end of knoll.
r3	18	477003	5402676	R	NW edge of knoll.
stp1	20	476987	5402681	Test pit:	Shallow hand dug test pit; depth 40 cm.
stp2	21	477008	5402659	Test pit:	Depth 45 cm.
sw1	09	476982	5402688	Standing Water (SW):	Common rush on 30% slope north of the drainfields.
sw2	10	476981	5402678	SW	Southwest edge of standing water.
sw3	13	477019	5402641	SW	Seepage southeast of Upper East Drainfield, at base of 70% cut slope.
sw4	14	477019	5402656	SW	East edge of pit or sinkhole with barricades, standing water and sewage odour. Pit measured 6 m by 6 m. Common rush around the pit.
sw5	15	477001	5402675	SW	Area of standing water and saturated ground at west end of the Upper East Drainfield. Sewage odour. No common rush.
sw6	06	Not available		SW	Standing water on east side of the Lower West Drainfield. West edge of the wet area. Common rush.
sw7	07	Not available		SW	East edge of standing water, at base of a fill slope. Drain rock has been placed over base of the slope. Common rush.

Date: 1 May 2014. Locations from Garmin GPSmap 60Cx; accurate to +/- 10 m.

Map = label on Figure 3: Site Sketch in Appendix 4. WP = Waypoint

Shallow Test Pits

General Information

Date:	1 May 2014
Excavator:	Hand shovel
Logged by:	M.I. Payne, P.Eng., P.Geo.
Locations:	See Figure 3.

Test Pit Logs

TP-1 Location: East end of the Lower West Drainfield. Waypoint 20.

Depth *Cm*	Colour *(2)*	USDA texture *(1)*	coarse gravel *(3)*	Structure type, grade	USDA consistence *(4) (5)*	Roots Depth	Roots quant, size	Mottles depth	Mottles quant, contrast	Moisture
0 - 10	Dark brown	Topsoil	10%	Granular 1	Very friable		Common Medium		none	Sat
10 - 40	Brown	Loamy sand and sandy loam, gravelly	20%	Massive – single grain 0	Very firm	40	Few medium		none	Sat
40	BOTTOM	Hit a wooden structure (pipe?) at depth 40 cm. No sewage odour.						Moderate seepage		

TP-2 Location: Centre of the Upper East Drainfield. Waypoint 21.

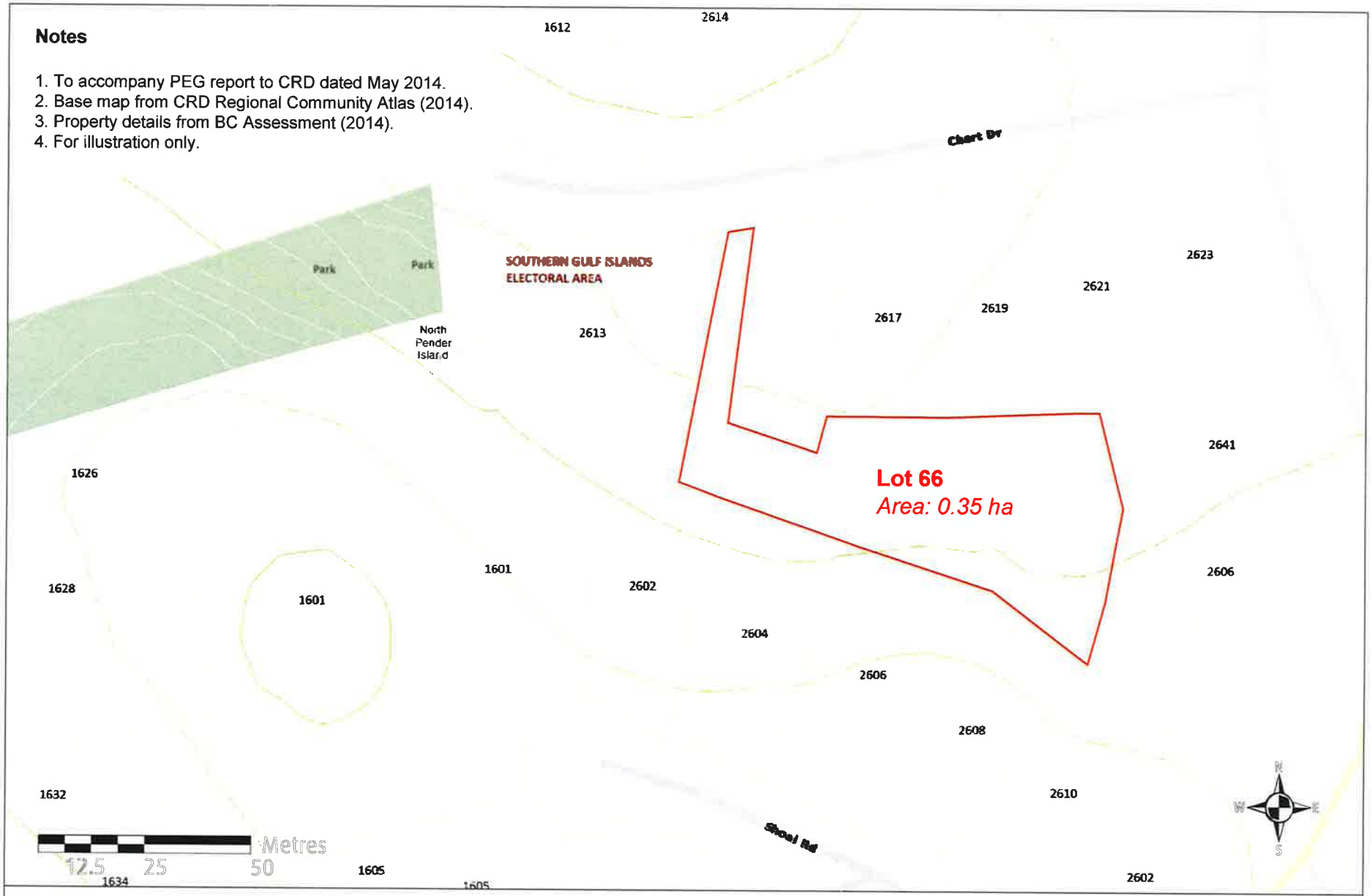
Depth *Cm*	Colour	USDA texture	coarse gravel	Structure type, grade	USDA consistence	Roots Depth	Roots quant, size	Mottles depth	Mottles quant, contrast	Moisture
0 - 5	Dark brown	Topsoil	10%	Granular 2	Very friable		Few coarse		none	Wet
5 - 45	Yellowish brown	Sand and loamy sand, gravelly	20%	Single grain 0	Very firm	5-10	Few fine		none	Moist
45	BOTTOM							No seepage		

Appendix 4: Figures

See following pages.

Notes

1. To accompany PEG report to CRD dated May 2014.
2. Base map from CRD Regional Community Atlas (2014).
3. Property details from BC Assessment (2014).
4. For illustration only.



Important

This map is for general information purposes only. The Capital Regional District (CRD) makes no representations or warranties regarding the accuracy or completeness of this map or the suitability of the map for any purpose. This map is not for navigation. The CRD will not be liable for any damage, loss or injury resulting from the use of the map or information on the map and the map may be changed by the CRD at any time.

Printed Fri, May 9, 2014

Payne Engineering Geology

FIGURE 1: Location Plan
Chart Drive Septic System, Pender Island, BC

PEG file CRD-8 Report 1 Figure 1 Rev. 1

Regional Community Atlas
Capital Regional District
gis@crd.bc.ca
http://www.crd.bc.ca

Scale approx. 1 : 400

Notes

1. To accompany report to CRD dated May 2014.
2. Copied from MPT Engineering dwg dated approx 1968.
3. For illustration only; not as-built.

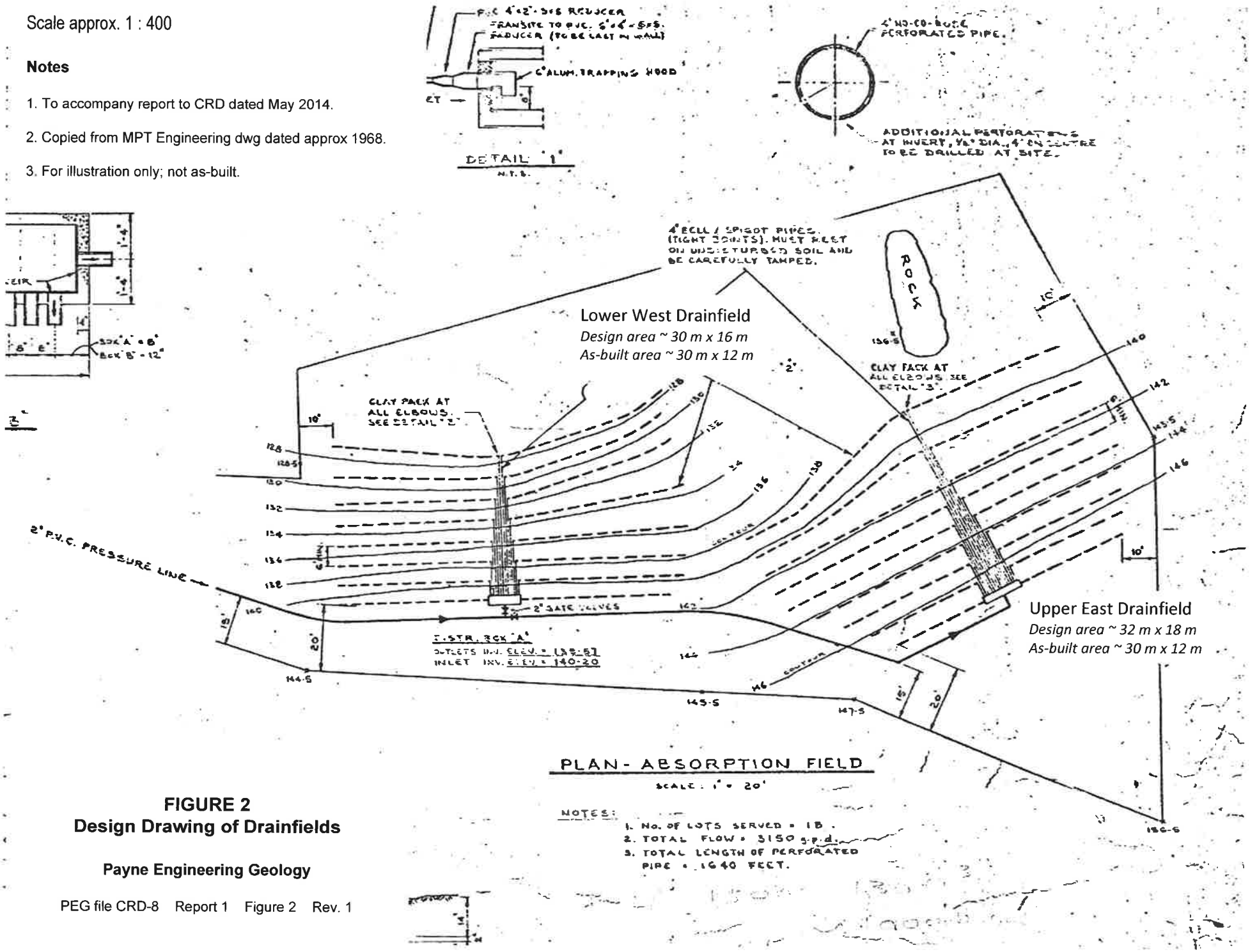


FIGURE 2
Design Drawing of Drainfields

Payne Engineering Geology

PEG file CRD-8 Report 1 Figure 2 Rev. 1

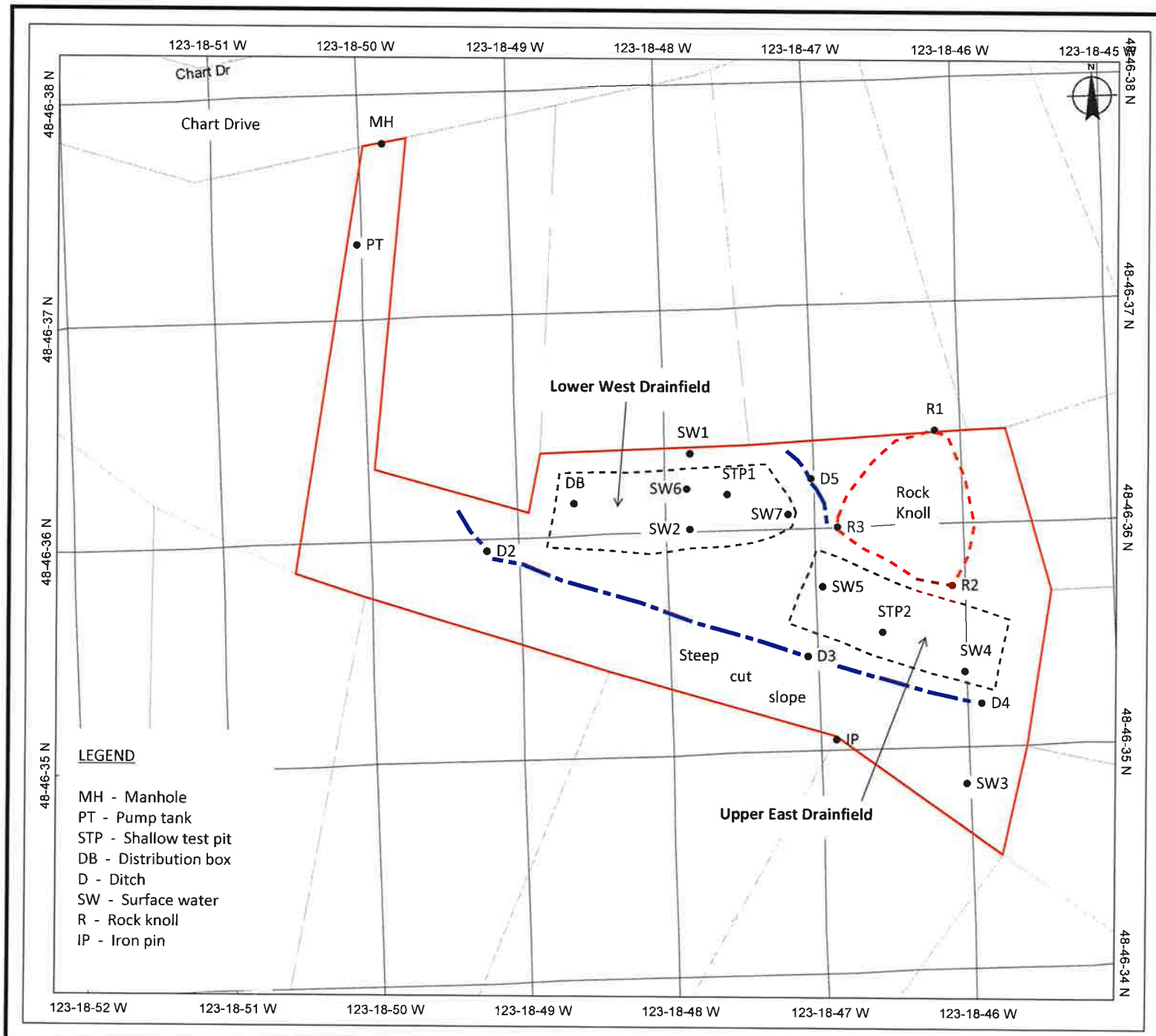


FIGURE 3
Site Sketch

Chart Drive Septic System
Pender Island, BC

Payne Engineering Geology

PEG file CRD-8
Report 1
Figure 3
Rev. 1

Notes

1. To accompany PEG report to CRD dated May 2014.

2. Base plan from BC Water Resources Atlas (2014).

3. Mapping approximate, based on field GPS accurate to +/- 10 m.

4. For illustration only.

Appendix B

Construction Cost Estimates

APPENDIX B COST ESTIMATES

Table B1 Alternative No.1 - Replacement with Raised Sand Bed Septic Field

Replacement with Raised Sand Bed Septic Field		
Description	**Percentage**	**Cost**
Construction (As per report)		360,800
Contingency	30%	108,240
Sub-Total A		469,040
Engineering (CRD)	10%	46,904
Consultant Services	15%	70,356
Hydrogeology	5%	23,452
Operations Staff	10%	46,904
Administration	5%	23,452
Sub-Total B		234,520
	Total A + B	**703,560**
	TOTAL	**$700,000**

Table B2 Alternative No.2 - New Pump Station and Force Main

New Pump Station and Force Main		
Description	**Percentage**	**Cost**
Force Main Construction		552,000
Pump Station		55,000
Contingency	30%	182,100
Sub-Total A		789,100
Engineering (CRD)	10%	78,910
Consultant Services	15%	118,365
Hydrogeology	4%	31,564
Operations Staff	10%	78,910
Administration	5%	39,455
Sub-Total B		347,204
	Total A + B	**1,136,304**
	TOTAL	**$1,100,000**

PEG | Payne Engineering Geology

1230 Maple Road, North Saanich, Canada, V8L 5P7 Phone: 250-655-3604

E-mail: PayneEngineering@shaw.ca

23 May 2014

PEG file: CRD-8-1

Capital Regional District
Integrated Water Services
479 Island Highway
Victoria, BC, V9B 1H7

Attention: Mr Craig Gottfred, P.Eng.

Preliminary Construction Cost Estimate for Replacement Community Wastewater Drainfields at Chart Drive, Pender Island

1. Introduction

This letter provides our initial estimate of the costs to construct replacement sand mound drainfields for the failing Chart Drive septic system on Pender Island. The Payne Engineering Geology (PEG) report of 14 May 2014 reviews the background to the current problem and proposed solution.

This letter provides an initial cost estimate for planning purposes only. PEG has not prepared design drawings or sketches for the replacement drainfields. This estimate is based on preliminary sizing of the system and on typical prices for similar sewage systems. This letter is subject to the attached Statement of General Conditions (Appendix 1).

2. Construction Cost Estimate

We estimate it will cost $541,200 to replace the existing drainfield with new sand mound drainfields.

This is the estimated cost for replacement drainfields designed and installed to current standards, and based on preliminary system sizing and typical unit prices. Appendix 2 lists the basis for this cost estimate.

Please phone if you have further questions.

Sincerely,

Payne Engineering Geology Limited

DN: cn=Michael Payne, o=Payne Engineering Geology Ltd., ou, email=PayneEngineering@shaw.ca, c=CA
Date: 2014.05.23 15:35:05 -07'00'

Michael Payne, PEng, PGeo

Appendices

1) Statement of General Conditions
2) Construction Cost Estimate

Report distribution list

C. Gottfred, D. Puskas, A. Kruger @ Capital Regional District

C. Petersmeyer @ Thurber Engineering

Appendices

Appendix 1: Statement of General Conditions

Scope of this Report

This review report satisfies only those objectives stated in the introduction.

Use of this Report

This Payne Engineering Geology (PEG) report pertains only to a specific project. If the project is modified, then our client will allow us to confirm that the report is still valid. We prepared this report only for the benefit of our Client and those agencies authorized by law to regulate our Client's activities. No others may use any part of this report without our written consent. To understand the content of this report, the reader must refer to the entire, signed report. We cannot be responsible for the consequences of anyone using only a part of the report, or referring only to a draft report. This report reflects our best judgement based on information available at the time. Any use of this report, or reliance on this report, by a third party is the responsibility of that third party. We accept no responsibility for damages, if any, suffered by a third party as a result of decisions made or actions taken based on this report.

Reliance on Provided Information

PEG has relied on the accuracy and completeness of information provided by its client and by other professionals. We are not responsible for any deficiency in this document that results from a deficiency in this information.

Changed Conditions

Conditions encountered by others at this site may differ significantly from what we encountered, either due to natural variability of subsurface conditions, or as a result of construction activities. Our client will inform us about any such changes, and will give us an opportunity to review our recommendations. Recognizing changed soil and rock conditions, or changed well conditions, requires experience. Therefore, during construction or remediation, a qualified professional should be employed to visit the site with sufficient frequency to observe whether conditions have changed significantly.

Risks and Liability

We recommend that our client engage PEG to review all design drawings and constructed works that are based on our conclusions and recommendations. This is a requirement of the *Association of Professional Engineers and Geoscientists of BC.*

Standard of Care

We exercise a standard of care consistent with that level of skill and care ordinarily exercised by professionals currently practising under similar conditions.

Appendix 2: Construction Cost Estimate

Item	Quantity	Unit	Unit cost	Cost	Comment
Pump out	3	LS	$3,400	$10,200	*based on construction time 4-6 weeks (1)*
Mob/demob	1	LS	$10,000	$10,000	
Access road	60	m	$150	$9,000	
Site preparation	3000	sqm	$5	$15,000	
Key trenches, supply and install	90	m	$100	$9,000	*in poorly drained areas*
Fill sand: Layer 1, supply/install	900	cu.m.	$50	$45,000	*thickness 0.3 m over area 3000 sqm (2)*
Mound Sand: Supply only	600	cu.m.	$25	$15,000	*thickness 0.6 m over area 1000 sqm*
Mound Sand: Trucking only	600	cu.m.	$40	$24,000	*Includes allowance for ferry travel*
Mound Sand: Install only	600	cu.m.	$30	$18,000	
Fill sand: Layer 2, supply/install	600	cu.m.	$50	$30,000	*thickness 0.3 m over area 2000 sqm*
Pressure distribution system	2000	m	$60	$120,000	*includes pumps, pipes, gravel bed, electr.*
Cover soil, supply/install	900	cu.m.	$40	$36,000	*thickness 0.3 m over area 3000 sqm*
Interceptor drain, supply/install	110	m	$120	$13,200	*based on depth 1.5 m*
Toe drain, supply/install	80	m	$80	$6,400	*based on depth 0.75 m*
Subtotal for construction				$360,800	
Engineering, hydrogeology	25%	of	$360,800	$90,200	*25% of construction subtotal (3)*
Subtotal w/ engineering				$451,000	
Contingency	25%	of	$360,800	$90,200	*CRD-specified contingency*
Total				$541,200	

General Notes

This estimate is based on preliminary system sizing and typical unit prices for similar systems.
We have not prepared a conceptual or preliminary design.

Footnotes

(1) Based on typical pump-out cost of $0.10 per litre and tank size of 34,000 litres.
(2) Based on suitable fill sand being available on Pender Island.
(3) Allowance loosely based on 5% hydrogeology and geotechnical services; 12% engineering design; and 8% engineering and hydrogeology construction review services. Includes consultant travel costs to Island.

Magic Lakes Estates Wastewater
Chart Drive Septic System Replacement
Preliminary Cost Estimate for Pump Station and Forcemain

	Description	Quantity	Units	Unit Cost	Amount
1. Sanitary Forcemain					
1.1	100mm Dia. PVC Sanitary Forcemain	880	lin.m	$ 325	$ 286,000
1.2	Air Valves	1	each	$ 3,000	$ 3,000
1.3	1050mm Dia. Manhole, max. 2m depth	1	each	$ 7,000	$ 7,000
1.4	Tie-in to Ex. SMH 243 at Spyglass Rd	1	Lump Sum	$ 8,500	$ 8,500
1.5	Trench Rock Removal (50% of trench)	792	m^3	$ 310	$ 245,520
	Sub-Total A				*$ 550,020*
2. Pump Station					
2.1	Package System, c/w pumps and FRP wet well	1	Lump Sum	$ 39,000	$ 39,000
2.2	Pump Controls	1	Lump Sum	$ 6,000	$ 6,000
	Sub-Total B				*$ 45,000*
				Subtotal A + B	**$ 595,020**
				Engineering Design (10%)	$ 59,502
				Construction Services (18%)	$ 107,104
				Subtotal	$ 761,626
				Contingency (25%)	$ 190,410
				Total	**$ 952,036**

**Note No demolition/decomissioning is included

Appendix C

Relevant Correspondence

Dale Puskas

From: Berube, Conrad ENV:EX <Conrad.Berube@gov.bc.ca>
Sent: Thursday, May 29, 2014 11:27 AM
To: Dale Puskas
Cc: Craig Gottfred
Subject: RE: Small Sewerage system discussion

Hi Dale—

I chatted with Kirsten White and she confirmed my understanding that it has been difficult for sand mound systems to meet the terms of the MWR in this region. However, in contrast to the information that I provided indicating that statutory decision makers are no longer involved in approving sewage systems (which, in the main, must "simply" comply with the terms of the MWR), Section 84 indicates that specific approval **is** required for sand mounds and seepage beds:

> 84 A discharger may use sand mounds and seepage beds only if both of the following requirements are met:
>
> (a) sand mounds and seepage beds are constructed using American Society for Testing and Materials C33 sand to reduce percolation;
>
> (b) the discharger is authorized by a director to use the sand mounds and seepage beds.

Take care,

c

From: Dale Puskas [mailto:dpuskas@crd.bc.ca]
Sent: Thursday, May 29, 2014 8:24 AM
To: Berube, Conrad ENV:EX
Cc: Craig Gottfred
Subject: RE: Small Sewerage system discussion

That's great Conrad, I appreciate your feedback and comments.

Regards,

Dale K. Puskas, P.Eng.
Project Engineer
Capital Regional District
Integrated Water Services
479 Island Highway
Victoria BC V9B 1H7
Tel: (250) 474-9648

Fax: (250) 474-9652

From: Berube, Conrad ENV:EX [mailto:Conrad.Berube@gov.bc.ca]
Sent: Wednesday, May 28, 2014 4:53 PM
To: Dale Puskas
Cc: Craig Gottfred
Subject: RE: Small Sewerage system discussion

Hi Dale—

I can confirm that encapsulates my understanding (although I can't guarantee that my understanding is accurate ;-)—I'll try to remember ask around about the history of mounded systems on the island and get back to you...

Here's my general blurb on the MWR if it is useful to you:

The responsibility for regulating sewage disposal is shared between the Ministry of Environment (MOE), the Ministry of Health Services (MHS) and the federal agency Environment Canada; sewage discharge from the structures and vehicles observed on-site must have provincial authorization (with additional federal requirements pertaining to discharges to the marine environment).
The regulation of sewerage systems handling 22,700 litres or less per day of sewage effluent discharged to distribution fields falls under the purview of the MHS's Sewerage System Regulation (SSR):
http://www.health.gov.bc.ca/protect/lup_onsite.html
The regulation of sewerage systems discharging to the marine environment or handling 22,700 litres or more to ground falls under the MOE's Municipal Wastewater Regulation
(MWR): http://www.bclaws.ca/EPLibraries/bclaws_new/document/ID/freeside/87_2012
In addition in 2009 the federal government rolled out the Canada-wide Strategy for the Management of Municipal Wastewater Effluent (http://www.ccme.ca/ourwork/water.html?category_id=81) and the Wastewater Systems Effluent Regulations (http://laws-lois.justice.gc.ca/eng/regulations/SOR-2012-139/FullText.html) came into force in 2012.

Here's some websites related to registration under the Municipal Wastewater Regulation (MWR):

EMA sections 14(3) & 14(4) http://www.bclaws.ca/EPLibraries/bclaws_new/document/LOC/freeside/--%20E%20--/Environmental%20Management%20Act%20SBC%202003%20c.%2053/00_Act/03053_02.xml#section14

MWR de-permitting policy & procedure
http://www2.gov.bc.ca/assets/gov/topic/7BE6D1629C96685698920E29284EBCF4/register_msd/depermitting_msd.pdf
(basically this says that no significant amendments to existing permits for sewage will be accepted and that, instead, currently permitted facilities would have to comply with the MWR)

Municipal Wastewater Regulation and Supporting Documents
http://www2.gov.bc.ca/gov/topic.page?id=7A4B2F3C732544548A9B53862EB7F138

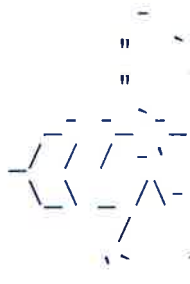
Municipal Wastewater Guidelines
http://www2.gov.bc.ca/gov/topic.page?id=7A4B2F3C732544548A9B53862EB7F138

British Columbia Field Sampling Manual for Continuous Monitoring plus the Collection of Air, Air-Emission, Water, Wastewater, Soil, Sediment and Biological Samples
http://www.env.gov.bc.ca/epd/wamr/labsys/field_man_pdfs/fld_man_03.pdf

British Columbia Environmental Laboratory Manual for the Analysis of Waters, Wastewaters, Sediments and Biological Materials
http://www.env.gov.bc.ca/epd/wamr/labsys/lab-man-09/pdf/title-page-2009.pdf

Environmental Impact Study Guideline
http://www.env.gov.bc.ca/epd/epdpa/mpp/pdfs/EIS_Guideline_Dec2000.pdf

Take care,



Conrad Bérubé
Environmental Protection Officer
Ministry of Environment
2080-A Labieux Road
Nanaimo, BC V9T 6J9
(250)751-3167; FAX:(250) 751-3103
email: conrad.berube@gov.bc.ca

From: Dale Puskas [mailto:dpuskas@crd.bc.ca]
Sent: Wednesday, May 28, 2014 4:12 PM
To: Berube, Conrad ENV:EX
Cc: Craig Gottfred
Subject: Small Sewerage system discussion

Conrad,

Please confirm our phone conversion earlier today regarding the CRD's sewerage system – Chart Drive: I had asked if a sand mound system has ever been accepted by MOE, and you had replied that a sand mound system in this region, to your knowledge, has not been registered as it's been hard for a registered professional to meet the requirements; you had mentioned that MOE deals with systems after they are registered, having flows over the 22,700 Lpd, and after having a registered professional conduct an Environmental Assessment; you had also mentioned that small systems that are above the 22,700 Lpd would be encouraged to look at options to reduce wastewater flows so that they do not fall under the MWR.

If I have made an error or omission please let me know.

Regards,

Dale K. Puskas, P.Eng.
Project Engineer
Capital Regional District
Integrated Water Services
479 Island Highway
Victoria BC V9B 1H7
Tel: (250) 474-9648
Fax: (250) 474-9652

Dale Puskas

From: Michael Payne <PayneEngineering@shaw.ca>
Sent: Thursday, May 29, 2014 3:16 PM
To: Dale Puskas
Subject: RE: Small Sewerage system discussion

Dale:

Yes. Under the SSR, many sand mound systems has been legally designed and installed on Vancouver Island and the Gulf Islands.

Also, to clarify, under the SSR, a sand mound does not require approval by any regulatory authority. The use of a sand mound is basically "pre-approved" under the SSR, since the sand mound system is included as a type of "standard practice" in the Standard Practice Manual, the design manual that accompanies the SSR.

The preliminary design flow rate of 936 Lpd per lot is based on measured flows, the flows that you provided. For existing systems, measured flow rates are preferred to flow rates from design tables, when determining a design flow for a system. The SSR allows for measured flows to be used, if properly analyzed and documented by a qualified professional such as a professional engineer.

For this particular system, more detailed analysis would be needed before properly establishing a design flow based on measured flows, but it is reasonable to expect that this analysis would lead to a design flow of less than 22,700 Lpd.

Even if we were to just use the table value that you refer to, 1136 Lpd per house, the design flow would be 20,448 Lps. This is still less than 22,700, so falls under the SSR.

I hope that this helps; if not, please phone me to discuss. Thanks.

Michael

From: Dale Puskas [mailto:dpuskas@crd.bc.ca]
Sent: May-29-14 2:58 PM
To: Michael Payne
Subject: RE: Small Sewerage system discussion

Thanks Michael for the quick reply, but just to clarify, sand mound systems, under the SSR, have been approved in the south island and gulf islands?

Also, how did you arrive at the design flow rate of 936 L/d? According to the Sewerage System Standard Practice Manual for 1-2 bedroom residence the minimum design flow rate is 1,136 L/d. I'm curious as we would like to get the system to fall under the SSR instead of the MMR.

Thanks,

Dale K. Puskas, P.Eng.
Project Engineer

Capital Regional District
Integrated Water Services
479 Island Highway
Victoria BC V9B 1H7
Tel: (250) 474-9648
Fax: (250) 474-9652

From: Michael Payne [mailto:PayneEngineering@shaw.ca]
Sent: Thursday, May 29, 2014 2:24 PM
To: Dale Puskas
Cc: Craig Gottfred
Subject: RE: Small Sewerage system discussion

Dale, Craig:

Thanks for that request for clarification regarding the Municipal Wastewater Regulation (MWR) and requirements of that regulation.

Please note that my analysis, and my report of May 14, are based on the prospect of this sewage system continuing to be regulated under the Sewerage System Regulation (SSR), not under the MWR.

This is a reasonable conclusion based on a conservative analysis of the information available. However, this is only a preliminary analysis; additional in-depth analysis could potentially lead to a different conclusion.

Based on the information available, a reasonable and conservative (i.e.: high) design flow for the sewage system would be about 16,850 litres per day. This is based on 18 lots with a peak day flow rate of 936 litres per day per lot. This is conservative based on the information available to date. Since this is less than 22,700 litres per day, the wastewater flow rate falls within the jurisdiction of the SSR.

Under the SSR, sand mounds can be built and the sand mound does not need to be approved by any regulatory authority. The sand mound or mounds must be designed by a professional engineer, or other qualified professional, with reference to appropriate design standards. There are at least a few appropriate design standards. Sand mounds are commonly designed and built under the SSR.

For this project, I did not see much likelihood that a repair to this system would fall under the jurisdiction of the MWR. However, if, for some reason, the system was found to fall under the MWR, then there would be several impediments to meeting the requirements of that regulation. In short, this sewage system and site would not be expected to meet the prescriptive requirements of the MWR for discharge to ground. The required regulatory approval of sand mounds would be just one of several impediments under the MWR.

However, as mentioned above, I did not see the MWR requirements as being relevant to this particular project, at least not based on the available information.

I trust this helps; please contact me if you have further questions; thanks.

Michael

Michael Payne, PEng, PGeo
Payne Engineering Geology Ltd
1230 Maple Road, North Saanich, BC, V8L 5P7
Office: 250-655-3604

Mobile: 250-516-5850
Email: PayneEngineering@shaw.ca

PEG file # CRD-8-1

From: Dale Puskas [mailto:dpuskas@crd.bc.ca]
Sent: May-29-14 1:28 PM
To: Michael Payne
Cc: Craig Gottfred
Subject: FW: Small Sewerage system discussion

Michael,

We've been in contact with MOE regarding the raised sand mound option, correspondence below, and we are becoming uncomfortable with this option for a solution for Chart Drive. To your knowledge, has this ever been successfully been implemented in this region either under the MWR or Sewerage System Regulation? From my correspondence with MOE, my impression is this hasn't successfully been approved.

Can you please comment to MOE's comments asap?

Thanks,

Dale K. Puskas, P.Eng.
Project Engineer
Capital Regional District
Integrated Water Services
479 Island Highway
Victoria BC V9B 1H7
Tel: (250) 474-9648
Fax: (250) 474-9652

From: Berube, Conrad ENV:EX [mailto:Conrad.Berube@gov.bc.ca]
Sent: Thursday, May 29, 2014 11:27 AM
To: Dale Puskas
Cc: Craig Gottfred
Subject: RE: Small Sewerage system discussion

Hi Dale—

I chatted with Kirsten White and she confirmed my understanding that it has been difficult for sand mound systems to meet the terms of the MWR in this region. However, in contrast to the information that I provided indicating that statutory decision makers are no longer involved in approving sewage systems (which, in the main, must "simply" comply with the terms of the MWR), Section 84 indicates that specific approval **is** required for sand mounds and seepage beds:

> **84** A discharger may use sand mounds and seepage beds only if both of the following requirements are met:

(a) sand mounds and seepage beds are constructed using American Society for Testing and Materials C33 sand to reduce percolation;

(b) the discharger is authorized by a director to use the sand mounds and seepage beds.

Take care,

c

From: Dale Puskas [mailto:dpuskas@crd.bc.ca]
Sent: Thursday, May 29, 2014 8:24 AM
To: Berube, Conrad ENV:EX
Cc: Craig Gottfred
Subject: RE: Small Sewerage system discussion

That's great Conrad, I appreciate your feedback and comments.

Regards,

Dale K. Puskas, P.Eng.
Project Engineer
Capital Regional District
Integrated Water Services
479 Island Highway
Victoria BC V9B 1H7
Tel: (250) 474-9648
Fax: (250) 474-9652

From: Berube, Conrad ENV:EX [mailto:Conrad.Berube@gov.bc.ca]
Sent: Wednesday, May 28, 2014 4:53 PM
To: Dale Puskas
Cc: Craig Gottfred
Subject: RE: Small Sewerage system discussion

Hi Dale—

I can confirm that encapsulates my understanding (although I can't guarantee that my understanding is accurate ;-)—I'll try to remember ask around about the history of mounded systems on the island and get back to you...

Here's my general blurb on the MWR if it is useful to you:

The responsibility for regulating sewage disposal is shared between the Ministry of Environment (MOE), the Ministry of Health Services (MHS) and the federal agency Environment Canada; sewage discharge from the structures and vehicles observed on-site must have provincial authorization (with additional federal requirements pertaining to discharges to the marine environment).

The regulation of sewerage systems handling 22,700 litres or less per day of sewage effluent discharged to distribution fields falls under the purview of the MHS's Sewerage System Regulation (SSR):
http://www.health.gov.bc.ca/protect/lup_onsite.html
The regulation of sewerage systems discharging to the marine environment or handling 22,700 litres or more to ground falls under the MOE's Municipal Wastewater Regulation
(MWR): http://www.bclaws.ca/EPLibraries/bclaws_new/document/ID/freeside/87_2012
In addition in 2009 the federal government rolled out the Canada-wide Strategy for the Management of Municipal Wastewater Effluent (http://www.ccme.ca/ourwork/water.html?category_id=81) and the Wastewater Systems Effluent Regulations (http://laws-lois.justice.gc.ca/eng/regulations/SOR-2012-139/FullText.html) came into force in 2012.

Here's some websites related to registration under the Municipal Wastewater Regulation (MWR):

EMA sections 14(3) & 14(4) http://www.bclaws.ca/EPLibraries/bclaws_new/document/LOC/freeside/--%20E%20--/Environmental%20Management%20Act%20SBC%202003%20c.%2053/00_Act/03053_02.xml#section14

MWR de-permitting policy & procedure
http://www2.gov.bc.ca/assets/gov/topic/7BE6D1629C96685698920E29284EBCF4/register_msd/depermitting_msd.pdf
(basically this says that no significant amendments to existing permits for sewage will be accepted and that, instead, currently permitted facilities would have to comply with the MWR)

Municipal Wastewater Regulation and Supporting Documents
http://www2.gov.bc.ca/gov/topic.page?id=7A4B2F3C732544548A9B53862EB7F138

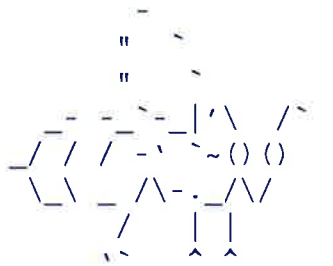
Municipal Wastewater Guidelines
http://www2.gov.bc.ca/gov/topic.page?id=7A4B2F3C732544548A9B53862EB7F138

British Columbia Field Sampling Manual for Continuous Monitoring plus the Collection of Air, Air-Emission, Water, Wastewater, Soil, Sediment and Biological Samples
http://www.env.gov.bc.ca/epd/wamr/labsys/field_man_pdfs/fld_man_03.pdf

British Columbia Environmental Laboratory Manual for the Analysis of Waters, Wastewaters, Sediments and Biological Materials
http://www.env.gov.bc.ca/epd/wamr/labsys/lab-man-09/pdf/title-page-2009.pdf

Environmental Impact Study Guideline
http://www.env.gov.bc.ca/epd/epdpa/mpp/pdfs/EIS_Guideline_Dec2000.pdf

Take care,



Conrad Bérubé
Environmental Protection Officer
Ministry of Environment
2080-A Labieux Road
Nanaimo, BC V9T 6J9
(250)751-3167; FAX:(250) 751-3103
email: conrad.berube@gov.bc.ca

From: Dale Puskas [mailto:dpuskas@crd.bc.ca]
Sent: Wednesday, May 28, 2014 4:12 PM

To: Berube, Conrad ENV:EX
Cc: Craig Gottfred
Subject: Small Sewerage system discussion

Conrad,

Please confirm our phone conversion earlier today regarding the CRD's sewerage system – Chart Drive: I had asked if a sand mound system has ever been accepted by MOE, and you had replied that a sand mound system in this region, to your knowledge, has not been registered as it's been hard for a registered professional to meet the requirements; you had mentioned that MOE deals with systems after they are registered, having flows over the 22,700 Lpd, and after having a registered professional conduct an Environmental Assessment; you had also mentioned that small systems that are above the 22,700 Lpd would be encouraged to look at options to reduce wastewater flows so that they do not fall under the MWR.

If I have made an error or omission please let me know.

Regards,

Dale K. Puskas, P.Eng.
Project Engineer
Capital Regional District
Integrated Water Services
479 Island Highway
Victoria BC V9B 1H7
Tel: (250) 474-9648
Fax: (250) 474-9652

This e-mail and any attachments are for the use of the intended recipient only and must not be distributed, disclosed, used or copied by or to anyone else. This e-mail and any attachments may be confidential, privileged and/or subject to the Freedom of Information and Protection of Privacy Act. If you receive this message in error, please delete all copies and contact the sender.

Thank you.

This e-mail and any attachments are for the use of the intended recipient only and must not be distributed, disclosed, used or copied by or to anyone else. This e-mail and any attachments may be confidential, privileged and/or subject to the Freedom of Information and Protection of Privacy Act. If you receive this message in error, please delete all copies and contact the sender.

Thank you.

This e-mail and any attachments are for the use of the intended recipient only and must not be distributed, disclosed, used or copied by or to anyone else. This e-mail and any attachments may be confidential, privileged and/or subject to the Freedom of Information and Protection of Privacy Act. If you receive this message in error, please delete all copies and contact the sender.

Thank you.

Appendix D

Loan Authorization Bylaw Approval Process

Alternative Approval Process (AAP)

Local/Regional governments can use the Alternative Approval Process under Part 4, Division 2 of the Community Charter as a method to gauge public opinion in regard to certain types of proposed bylaws, agreements, or other matters. It is most commonly used in relation to long-term borrowing bylaws. It is a less expensive option than using a referendum to gauge public opinion. It can be used whenever the legislation requires a local government to obtain the approval of the electors.

A local/regional government must publish a notice in a newspaper outlining the purposes of a proposed bylaw, agreement, or other matter where the approval of the electors is required. After the second of two notices is advertised, electors have 30 days in which to advise their local/regional government that in their opinion, the matter is of such significance that a referendum should be held. If more than 10% of the electors hold this opinion, then the local/regional government cannot proceed with the proposed bylaw, agreement, or other matter without holding a referendum.

The method by which the electors express their opinion is by signing an Elector Response Form and submitting it to their local government within 30 days of the second notice. It is the responsibility for the local/regional government to create the elector response form which can be designed to allow either a single elector or multiple electors to sign it.
The AAP process would probably take a little less time than a Referendum but the steps could be directly managed in a slightly different fashion.

The **AAP** process tentative schedule would probably look something like this:

Date	Action
June 17	• report to Committee to approve AAP process
July 16	• Staff report to Electoral Area SC with Bylaw and recommendation of AAP process; • Get estimate of # of electors in service area in order to estimate 10% of the electors • In preparation for CRD Board approval and advertising, draft • Notice of AAP process • Elector response form
August 13	• CRD Board gives first three readings of bylaw • After 3rd reading, Bylaw sent to Inspector of Municipalities for approval
	• Receive Ministerial approval
September 16	• CRD Board approves notice for AAP • Establish deadline for receiving elector response forms/area participants and numbers of electors – September • Publish notification in newspaper • Send copies of response forms/notice and bylaw to a local office for public posting
October 1 - 31	• Deadline for receiving elector response forms

	• If 10% of electors have submitted elector response forms, then sent to CRD Board for approval • Certificate of results of the AAP to Board (late Oct/Nov); Bylaw adopted
November 12	• CRD Board adopts the Bylaw
November 15 - December 15	• Once bylaw adopted, 30-day quashing period for loan authorization • Apply for Certificate of Approval from Ministry

The **Referendum** process tentative schedule would probably look something like this:

The referendum process is typically used to seek the assent of the electors under Part 4 of the Local Government Act section 801.2, where for a participating area, a majority of the votes counted as valid is in favour of the bylaw to fund a project. Typically a referendum question is developed and reviewed by the Municipal Inspector at the Province, requesting the electors to borrow a specific amount of funds for a specific project. Then a referendum is held to seek the assent of the electors in the participating service area. Due to the upcoming election (November 15th, 2014) there is an option to coordinate this referendum with the election. There may be some economy realized by this approach but is not a requirement to do so.

The referendum process tentative schedule would look something like this:

Date	Action
June 17	• report to Committee to approve Referendum;
July 16	• staff report to Electoral Area Services Committee with bylaw
August 13	• CRD Board gives 1st - 3rd readings, after 3rd reading Bylaw sent to Inspector of Municipalities for approval
Aug 26	• earliest date for Inspectors approval
Sep/Oct	• official advertising takes place in conjunction with local government elections
Nov. 15*	• Voting day
Dec 10	• if referendum successful, bylaw adopted by Board
Dec 11 - Jan 12 2015	• 30-day quashing period, request certificate of approval from Ministry