

**SURFICIAL SOIL INVESTIGATION  
PROPOSED OYSTER BAY DEVELOPMENT  
OYSTER BAY, BC**

**Prepared for:**

**G5 Management Ltd.  
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Richmond, BC V6Y 3B4**

**Prepared by:**

**Levelton Consultants Ltd.  
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**May 28, 2004  
File: 604-0103**

## EXECUTIVE SUMMARY

Levelton Consultants Ltd. was retained by G5 Management Ltd. to complete a preliminary surficial soil investigation on a property in Oyster Bay, BC. The approximately 202 ha (500 acre) development is on the west side of Highway 19A. At the time of the investigation, additional roads were being constructed and no services had been installed. The purpose of the investigation was to complete a preliminary surficial soil assessment for potential septic areas for the 100 proposed lots to be developed.

The investigation entailed advancing 37 testpits along the existing roads at the site. The testpits were completed utilizing a tracked excavator operated by Hardcore Construction Ltd of Gambier Island, BC. The fieldwork was undertaken on March 29 and 30, 2004.

Depth to groundwater varied widely throughout the site. Generally, groundwater was encountered deeper in the southern central portion (area of lots 33 to 48 and 60 through 71) with shallower depths recorded in the north and northwest section of the site. A ditch, located along the southeast trending road (area of proposed lots 1 through 11 and further southeast) in the eastern portion of the site, significantly lowers the depth to groundwater on the northeastern side of the ditch.

The thickness of the surficial sand and gravel and the depth of the groundwater are the controlling factors for whether or not on-site septic disposal fields are feasible. The Subdivision Standards of the Vancouver Island Health Authority (VIHA) state that a 1 ha (2.41 acre) lot, serviced by an approved waterworks system, requires a minimum of 0.91 m (36") of native mineral soil depth above the highest seasonal water table for subdivision approval.

Based on the soil and groundwater observations during the testpitting program, it appears that for the most part, the southwestern side of the site may be conducive to individual septic systems (Figure 2) The eastern side of the site appears to be quite variable for feasibility of septic disposal, but may be acceptable in certain areas.

According to the Subdivision Standards, each proposed lot is required to have a minimum of 4 testpits and two percolation test completed. Levelton recommends that these be completed on each proposed lot before subdivision plans are finalized.



## TABLE OF CONTENTS

	Page:
Cover Letter	
Executive Summary	i
1.0 INTRODUCTION.....	1
2.0 SCOPE OF WORK.....	1
3.0 FIELD WORK.....	1
4.0 RESULTS.....	1
4.1 Soil Profile.....	1
4.2 Groundwater.....	2
5.0 DISCUSSION.....	2
6.0 CONCLUSIONS AND RECOMMENDATIONS.....	3
7.0 CLOSURE.....	3

## FIGURES

- Figure 1 Site Location
- Figure 2 Site Plan with Locations of Testpits

## APPENDICES

- Appendix 1 Figures
- Appendix 2 Testpit Logs
- Appendix 3 Standard Limitations

## **1.0 INTRODUCTION**

Levelton Consultants Ltd. was retained by G5 Management Ltd. to complete a preliminary surficial soil investigation of a property in Oyster Bay, BC (Figure 1). The approximately 202 ha (500 acre) property is on the west side of Highway 19A, south of Campbell River. At the time of the investigation, no services had been installed and the site was being logged. A residential development consisting of 101 lots has been proposed for the site (Figure 2).

The purpose of the investigation was to complete a preliminary surficial soil assessment in terms of the feasibility to develop individual septic disposal systems for the proposed lots, based on observed soil and groundwater conditions during a testpitting operation.

## **2.0 SCOPE OF WORK**

The scope of work was developed in consultation with Mr. Dick Wright of Focus Intec and was as follows:

- Advance and log testpits along the existing logging roads throughout the site;
- Prepare a report outlining the findings of the investigation and based on the results, assess the potential of the site for preliminary septic disposal options.

## **3.0 FIELD WORK**

Levelton was on-site March 29 and 30, 2004 to complete the field portion of the investigation. Thirty seven test pits (TP1 to TP37) were advanced along existing roads throughout the site to depths of up to 4.5 m below ground using a tracked excavator supplied by Hardcore Construction Ltd of Gambier Island, BC. Testpits were logged by Levelton personnel to investigate the depths and physical characteristics of the on-site surficial soils. Global Positioning system (GPS) measurements were recorded for all testpit locations. Testpits could not be advanced in the southeastern portion of the property, as the area was inaccessible. Testpit locations are shown on Figure 2 and the logs are presented in Appendix 2.

## **4.0 RESULTS**

### **4.1 Soil Profile**

Generally, the soil profile consists of a layer of topsoil down to approximately 0.2 m, followed by sand and gravel, with a varying percentage of silt. The sand and gravel was underlain by a till encountered at depths varying from 0.6 m to 3 m in the eastern portion of the site and, where encountered, a silt/clay unit at depths from 0.7 m to 1.4 m in the western portion. Testpit logs are presented in Appendix 2.



## 4.2 Groundwater

It is assumed that groundwater is flowing to the northeast, towards the waters of Discovery Passage.

The depth to groundwater varied widely throughout the site from no seepage at all in TP-25 to approximately 0.6 m below grade in TP-30 and TP-7. Generally, groundwater levels were deeper in the north central portion (area of proposed lots 1 through 11) and southern sections (area of proposed lots 33 to 48 and 60 through 71) with shallower depths recorded in the northwest section of the site.

## 5.0 DISCUSSION

The thickness of the surficial sand and gravel (percable soil) and the depth to groundwater are the controlling factors for whether or not individual on-site septic disposal fields are feasible. The Subdivision Standards of the Vancouver Island Health Authority (VIHA) state that a 1 ha (2.41 acre) lot, serviced by an approved waterworks system, requires a minimum of 0.91 m (36") of native mineral soil depth above the highest seasonal water table for subdivision approval. The following table presents a summary of the testpit depths, depth to groundwater and any septic limiting soil layer encountered.

Table 1 – Feasibility for Septic Disposal

Testpit	Depth of potentially percable soils (m)	Observed Depth to Water (m)	Feasible for Septic System	Testpit	Depth of potentially percable soils (m)	Observed Depth to Water (m)	Feasible for Septic System
1	1.8	1.4	Y	20	>1.4	0.66	N
2	0.6	1	N	21	>0.8	0.8	N
3	1.3	0.5	N	22	>2.2	0.8	N
4	0.9	1.2	Y	23	>1.5	1.2	Y
5	>1.8	-	Y	24	>1.8	1.5	Y
6	>3.0	1.2	Y	25	>1.4	-	Y
7	>2.5	0.6	N	26	>1.2	-	Y
8	>3.3	1.1	Y	27	>1.4	1.2	Y
9	>1.7	1.5	Y	28	>2.2	2	Y
10	>1.2	0.8	N	29	0.8	0.8	N
11	>3.6	1.5	Y	30	>1.8	0.6	N
12	>1.2	0.8	N	31	>1.4	0.8	N
13	>1.7	0.8	N	32	>1.8	0.7	N
14	>3.6	-	Y	33	>1.8	0.6	N
15	>2.0	1.8	Y	34	>2.1	0.6	N
16	>1.4	-	Y	35	>1.8	-	Y
17	0.6	0.6	N	36	>1.6	0.9	Y
18	1.4	1.7	Y	37	>1.1	1.0	Y
19	0.9	0.9	Y				

Notes:

- signifies no groundwater encountered in testpit

It appears that the groundwater level will be the predominantly limiting factor for septic disposal at the site. The observed groundwater level was generally quite high and ranged from 0.5 to over 2 m

below ground. The surficial soil appears to be a loose sandy material and should be sufficiently permeable. Individual percolation tests would be necessary to confirm the suitability of the surficial soils.

Drainage ditches may be used to lower the water table in certain instances. A ditch is located along the southeast trending road in the eastern portion of the site which significantly lowers the depth to groundwater on the eastern side of the road (TP1, TP-2, TP-4, TP-6, TP-8, TP-9, TP-11 and TP-15). However, ditches must be used with care, as the outflow cannot be directed to a neighbouring property.

## **6.0 CONCLUSIONS AND RECOMMENDATIONS**

The investigation entailed advancing 37 testpits along the existing roads at the site. Generally, the soil profile consists of a layer of topsoil down to approximately 0.2 m. In all the testpits, sand and gravel with varying percentages of silt was encountered under the topsoil. A glacial till layer was encountered in the eastern portion, and clay was encountered in certain areas in the western portion of the site, under the sand and gravel.

Depth to groundwater varied widely throughout the site. Generally, groundwater was encountered deeper in the southern central portion (area of lots 33 to 48 and 60 through 71) with shallower depths recorded in the north and northwest section of the site. A ditch, located along the southeast trending road (area of proposed lots 1 through 11 and further southeast) in the eastern portion of the site, significantly lowers the depth to groundwater on the northeastern side of the ditch.

The thickness of the surficial sand and gravel and the depth of the groundwater are the controlling factors for whether or not on-site septic disposal fields are feasible. The Subdivision Standards of the Vancouver Island Health Authority (VIHA) state that a 1 ha (2.41 acre) lot, serviced by an approved waterworks system, requires a minimum of 0.91 m (36") of native mineral soil depth above the highest seasonal water table for subdivision approval.

Based on the soil and groundwater observations during the testpitting program, it appears that for the most part, the southwestern side of the site may be conducive to individual septic systems (Figure 2) The eastern side of the site appears to be quite variable for feasibility of septic disposal, but may be acceptable in certain areas.

According to the Subdivision Standards, each proposed lot is required to have a minimum of 4 testpits and two percolation test completed, with reserve field areas identified. Levelton recommends that these be completed on each proposed lot before subdivision plans are finalized.

## **7.0 CLOSURE**

The findings of this investigation are based on the interpretation of data obtained at site-specific locations. Evaluation and conclusions do not preclude that physical conditions can vary between





areas of investigation and test pits. Hence, this report should be used for information purposes only and should not be regarded as a certification of the actual character of the site.

This report has been prepared by Levelton Consultants Ltd. to provide an assessment of the potential for individual on-site septic disposal systems for the proposed lots on the site. The conclusions made in this report reflect the information available at the time of preparation. No other warranty, expressed or implied, is made. Any use which a third party makes of this report, or any reliance on or decisions to be made or actions based on it, are the responsibility of such third parties. Levelton accepts no responsibility for damages, if any, suffered by a third party as a result of decisions made or actions based on this report.

We trust this information meets your needs at the present time and we appreciate the opportunity to be of service to you. Please contact the undersigned if you have any questions in the interim.

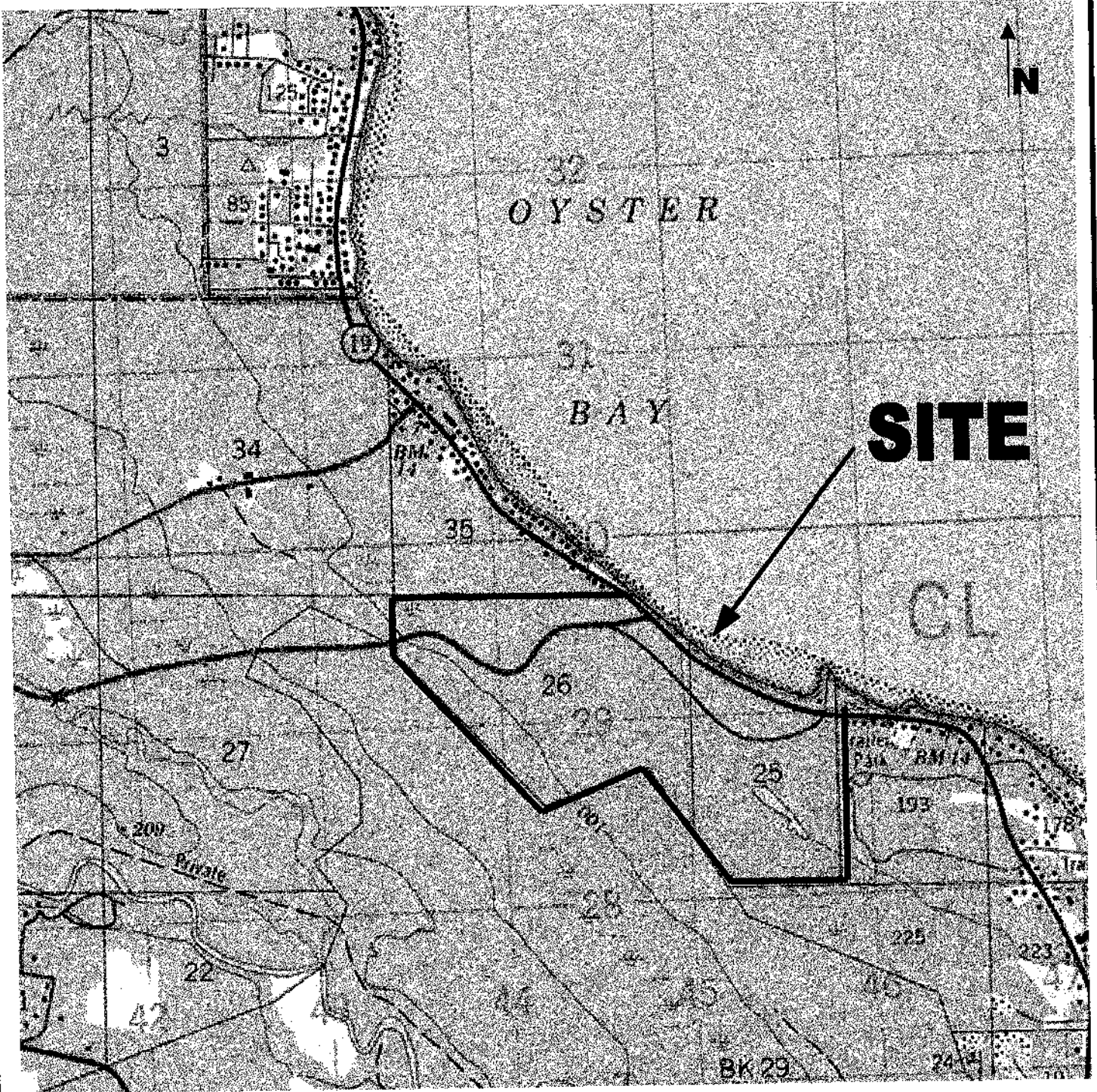
Yours truly,  
**Levelton Consultants Ltd.**


Prepared by:

Per:    
Steven M. Carballeira, P. Geo.  
Environmental Geoscientist

Reviewed by:  
Brad Loffler, P. Eng., P. Geo.  
Senior Environmental Engineer

**APPENDIX 1  
FIGURES**



	PROJECT:		Surficial Soil Investigation		
	TITLE:		Site Location Plan		
	CLIENT:		G5 Management Ltd.		
DRAWING NO.:	DATE:	FILE NO.:	SCALE:	DRAWN BY:	REV NO.:
Figure 1	20 April 2004	604-0103	NTS	SMC	



**APPENDIX 2  
TESTHOLE LOGS**

Project No: 604-0103

Project: Oyster Bay Dev. - Soil Investigation

Client: Focus Intec

Location: Oyster Bay, BC

**Test Pit: TP-01**

Engineer: Steven M. Caballeira, P.Geo.

Depth (m)	Symbol	Description	Remarks
0		Ground Surface	
0.2		<b>Topsoil</b> dark brown, damp, organics	
0.4		<b>Sand</b> medium, trace silt, trace gravel, loose, brown, moist, uniform.	
0.8		<b>Sand and Gravel</b> medium, trace silt, loose, grey/green, moist, rounded.	
1.4		<b>Sand</b> medium, compact, grey/green, damp.	-Wet below 1.4m.
1.8		<b>Sand (Till)</b> coarse, very dense, grey/green, wet.	-Groundwater seepage at bottom of test pit.
2.0		End of Test Pit	
2.2			
2.4			
2.6			
2.8			
3.0			
3.2			
3.4			
3.6			
3.8			

Drill Method: Excavator

Drill Date: 29 March 2003



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Project No: 604-0103

Project: Oyster Bay Dev. - Soil Investigation

Client: Focus Intec

Location: Oyster Bay, BC

**Test Pit: TP-02**

Engineer: Steven M. Caballeira, P.Geo.

Depth (m)	Symbol	Description	Remarks
0		Ground Surface	
0.2		<b>Topsoil</b> dark brown, damp, organics.	
0.4		<b>Silty Sand</b> medium, some silt, loose, brown, dry.	
0.6		<b>Sand and Gravel</b> medium, trace silt, firm, grey, moist, sub rounded.	
0.8		<b>Sand (Till)</b> coarse, trace silt, very dense, grey, moist.	
1.0			- Groundwater seepage at 1m.
1.2		End of Test Pit	
1.4			
1.6			
1.8			
2.0			
2.2			
2.4			
2.6			
2.8			
3.0			
3.2			
3.4			
3.6			
3.8			

Drill Method: Excavator shovel

Drill Date: 29 March 200



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Project No: 604-0103

Project: Oyster Bay Dev. - Soil Investigation

Client: Focus Intec

Location: Oyster Bay, BC

**Test Pit: TP-03**

Engineer: Steven M. Caballeira, P.Geo.

Depth (m)	Symbol	Description	Remarks
0		Ground Surface	
0.2		<b>Topsoil</b> dark brown, damp, organics.	
0.4		<b>Sand</b> medium, loose, brown, damp.	
0.6		<b>Sand and Gravel</b> coarse, trace cobbles (8cm dia.), compact, green, moist.	
1.0			
1.2			
1.4		<b>Sand (Till)</b> coarse, dense, oxidized, grey, wet.	
1.6		<b>Sand and Gravel</b> medium, trace silt, trace cobbles, compact, grey-green, moist.	
1.8		End of Test Pit	
2.0			
2.2			
2.4			
2.6			
2.8			
3.0			
3.2			
3.4			
3.6			
3.8			

-Heavy groundwater seepage at 0.5m.

Drill Method: Excavator shovel

Drill Date: 29 March 2004



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Project No: 604-0103

Project: Oyster Bay Dev. - Soil Investigation

Client: Focus Intec

Location: Oyster Bay, BC

**Test Pit: TP-04**

Engineer: Steven M. Caballeira, P.Geo.

Depth (m)	Symbol	Description	Remarks
0		Ground Surface	
0.2		<b>Topsoil</b> dark brown, damp, organics.	
0.4		<b>Silty Sand</b> medium, trace silt, loose, brown, damp.	
0.8		<b>Sand and Gravel</b> medium, trace silt, loose, moist, green, rounded.	
1.2		<b>Sand (Till)</b> coarse, trace silt, very dense, green, moist.	-Groundwater seepage at 1.2m
1.6		<b>Sand and Gravel</b> medium, trace silt, trace cobble (7cm dia.), loose, grey, moist, subrounded.	
1.8		End of Test Pit	
2.0			
2.2			
2.4			
2.6			
2.8			
3.0			
3.2			
3.4			
3.6			
3.8			

Drill Method: Excavator shovel

Drill Date: 29 March 2003



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Project No: 604-0103


Project: Oyster Bay Dev. - Soil Investigation

Client: Focus Intec

Location: Oyster Bay, BC

**Test Pit: TP-05**

Engineer: Steven M. Caballeira, P.Geo.

Depth (m)	Symbol	Description	Remarks
0		Ground Surface	
0.2		<b>Fill</b> reworked surficial material, predominantly medium sand, loose, brown, damp.	
0.4			
0.6			
0.8	<b>Sand</b> medium, soft, brown, moist.		
1.0	<b>Sand and Gravel</b> medium, compact, green, moist. -Less compact below 1.2m.		
1.2			
1.4			
1.6			
1.8			
2.0		End of Test Pit	-No groundwater seepage.
2.2			
2.4			
2.6			
2.8			
3.0			
3.2			
3.4			
3.6			
3.8			

Drill Method: Excavator

Drill Date: 29 March 2003



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Project No: 604-0103

Project: Oyster Bay Dev. - Soil Investigation

Client: Focus Intec

Location: Oyster Bay

**Test Pit: TP-06**

Engineer: Steven M. Caballeira, P.Geo.

Depth (m)	Symbol	Description	Remarks
0		Ground Surface	
0.2		<b>Topsoil</b> dark brown, damp, organics	
0.4		<b>Sand</b> medium, loose, brown, damp.	
0.6			
0.8			
1.0			
1.2			
1.4		<b>Sand and Gravel</b> medium, some cobbles (15cm dia.), compact, green, wet.	
1.6			
1.8			
2.0			
2.2			
2.4			
2.6			
2.8			
3.0			
3.2		End of Test Pit	
3.4			
3.6			
3.8			

-Heavy groundwater seepage at 1.2m.

Drill Method: Excavator

Drill Date: 29 March 2003



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Project No: 604-0103

Project: Oyster Bay Dev. - Soi Investigation

Client: Focus Intec

Location: Oyster bay, BC

**Test Pit: TP-07**

Engineer: Steven M. Caballeira, P.Geo.

Depth (m)	Symbol	Description	Remarks
0		Ground Surface	
0.2		<b>Topsoil</b> dark brown, damp, organics	
0.4		<b>Sand</b> medium, trace silt, loose, green, damp.	
0.6			-Heavy groundwater seepage at 0.6m
0.8		<b>Sand and Gravel</b> medium, trace silt, compact, green, saturated, sub rounded.	
1.0			
1.2			
1.4			
1.6			
1.8		<b>Sand and Gravel</b> coarse, compact, mottled grey and red, oxidized, sub rounded.	
2.0			
2.2			
2.4			
2.6		End of Test Pit	
2.8			
3.0			
3.2			
3.4			
3.6			
3.8			

Drill Method: Excavator shovel

Drill Date: 29 March 2003



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Project: Oyster Bay Dev. - Soil Investigation

Client: Focus intec

Location: Oyster Bay, BC

**Test Pit: TP-08**

Engineer: Steven M. Caballeira, P.Geo.

Depth (m)	Symbol	Description	Remarks
0		Ground Surface	
0.2		<b>Topsoil</b> dark brown, damp, organics	
0.4		<b>Sand</b> medium, loose, brown, moist.	
0.8		<b>Sand</b> medium, compact, green, wet .	
1.1			-Heavy groundwater seepage at 1.1m
1.4		<b>Sand and Gravel</b> medium, compact, green, highly oxidized, wet.	
1.8		-grey and non-oxidized below 1.8m.	
3.4		End of Test Pit	

Drill Method: Excavator shovel

Drill Date: 29 March 2004



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**Test Pit: TP-09**

Project: Oyster Bay Dev. - Soi Investigation

Client: Focus Intec

Engineer: Steven M. Caballeira, P.Geo.

Location: Oyster Bay, BC

Depth (m)	Symbol	Description	Remarks
0		Ground Surface	
0.2		<b>Topsoil</b> dark brown, damp, organics.	
0.4			
0.6		<b>Silty Sand</b> fine, some silt, loose, light brown, dry.	
0.8			
1.0		<b>Sand</b> medium, compact, green, moist.	
1.2			
1.4			
1.6		<b>Sand and Gravel</b> coarse, trace cobbles, dense, green, wet, sub rounded.	-Groundwater seepage at 1.5m.
1.8		End of Test Pit	
2.0			
2.2			
2.4			
2.6			
2.8			
3.0			
3.2			
3.4			
3.6			
3.8			

Drill Method: Excavator shovel

Drill Date: 29 March 2003



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Project: Oyster Bay Dev. - Soil Investigation

Client: Focus Intec

Location: Oyster Bay, BC

**Test Pit: TP-10**

Engineer: Steven M. Caballeira, P.Geo.

Depth (m)	Symbol	Description	Remarks
0		Ground Surface	
0.2		<b>Topsoil</b> dark brown, damp, organics.	
0.4		<b>Sand</b> medium, trace silt, loose, green, dry.	
0.8		<b>Sand and Gravel</b> coarse, compact, green, wet, rounded.	-Groundwater seepage at 0.8m.
1.2		End of Test Pit	
1.4			
1.6			
1.8			
2.0			
2.2			
2.4			
2.6			
2.8			
3.0			
3.2			
3.4			
3.6			
3.8			

Drill Method: Excavator shovel

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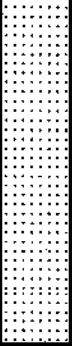
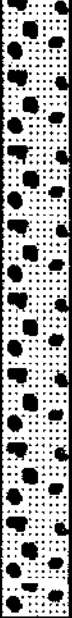
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Client: Focus Intec

Location: Oyster Bay, BC

**Test Pit: TP-11**

Engineer: Steven M. Caballeira, P.Geo.

Depth (m)	Symbol	Description	Remarks
0		Ground Surface	
0.2		<b>Topsoil</b> dark brown, damp, organics.	
0.4			
0.6		<b>Sand</b> medium, trace silt, loose, green, dry.	
0.8			
1.0			
1.2			
1.4			
1.6			-Groundwater seepage at 1.5m.
1.8		<b>Sand and Gravel</b> coarse, compact, green, moist, sub rounded.	
2.0			
2.2			
2.4			
2.6			
2.8			
3.0			
3.2			
3.4			
3.6			
3.8		End of Test Pit	

Drill Method: Excavator shovel

Drill Date: 29 March 2003



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Project: Oyster Bay Dev. - Soil Investigation

Client: Focus Intec

Location: Oyster Bay, BC

**Test Pit: TP-12**

Engineer: Steven M. Caballeira, P.Geo.

Depth (m)	Symbol	Description	Remarks
0		Ground Surface	
0.2		<b>Topsoil</b> dark brown, damp, organics.	
0.4		<b>Sand</b> medium, trace silt, loose, green, wet.	
0.8		<b>Sand and Gravel</b> coarse, compact, green, wet, rounded.	-Heavy groundwater seepage at 0.8m.
1.2		End of Test Pit	
1.4			
1.6			
1.8			
2			
2.2			
2.4			
2.6			
2.8			
3			
3.2			
3.4			
3.6			
3.8			

Drill Method: Excavator shovel

Drill Date: 29 March 2003



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Project No: 604-0103

Project: Oyster Bay Dev. - Soil investigation

Client: Focus Intec

Location: Oyster Bay, BC

**Test Pit: TP-13**

Engineer: Steven M. Caballeira, P.Geo.

Depth (m)	Symbol	Description	Remarks
0		Ground Surface	
0.2		<b>Topsoil</b> dark brown, damp, organics	
0.4		<b>Sand</b> medium, trace silt, loose, green, wet.	
0.6		<b>Gravel</b> Coarse, loose, green, wet, angular.	
0.8		<b>Sand</b> medium, trace silt, compact, green, moist.	-Heavy groundwater seepage at 0.8m.
1.2		<b>Sand and Gravel</b> Coarse, trace cobbles (12cm dia.), compact, green, moist.	
1.8		End of Test Pit	
2.0			
2.2			
2.4			
2.6			
2.8			
3.0			
3.2			
3.4			
3.6			
3.8			

Drill Method: Excavator shovel

Drill Date: 29 March 2003



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**Test Pit: TP-14**

Project: Oyster Bay Dev. - Soil Investigation

Client: Focus Intec

Engineer: Steven M. Caballeira, P. Geo.

Location: Oyster Bay, BC

Depth (m)	Symbol	Description	Remarks
0		Ground Surface	
0.2		<b>Topsoil</b> dark brown, damp, organics.	
0.4		<b>Sand</b> fine, loose, brown, moist.	
0.6		<b>Sand</b> fine, loose, grey, dry.	
1.2		<b>Gravel</b> medium, compact, grey, moist, sub rounded.	
1.6		<b>Sand</b> medium, compact, grey, moist.	
1.8		<b>Sand and Gravel</b> medium, compact, grey, moist, sub rounded.	
3.6		End of Test Pit	-No groundwater seepage.
3.8			

Drill Method: Excavator shovel

Drill Date: 29 March 2003



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Sheet: 1 of 1

Project No: 604-0103

Project: Oyster Bay Dev. - Soil Investigation

Client: Focus Intec

Location: Oyster Bay, BC

**Test Pit: TP-15**

Engineer: Steven M. Caballeira, P.Geo.

Depth (m)	Symbol	Description	Remarks
0		Ground Surface	
0.2		<b>Topsoil</b> dark brown, damp, organics.	
0.4		<b>Sand</b> fine, loose, brown, moist.	
0.6			
0.8			
1.0			
1.2		<b>Sand and Gravel</b> medium, compact, green, moist.	
1.4		<b>Sand</b> coarse, trace silt, compact, green, moist.	
1.6			
1.8		<b>Sand and Gravel</b> medium, trace silt, compact, green, moist, sub rounded.	
2.0			-Groundwater seepage at 1.8m.
2.2		End of Test Pit	
2.4			
2.6			
2.8			
3.0			
3.2			
3.4			
3.6			
3.8			

Drill Method: Excavator shovel

Drill Date: 29 March 2003



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Sheet: 1 of 1

Project No: 604-0103

Project: Oyster Bay Dev. - Soil Investigation

Client: Focus Intec

Location: Oyster Bay, BC

**Test Pit: TP-16**

Engineer: Steven M. Caballeira, P.Geo.

Depth (m)	Symbol	Description	Remarks
0		Ground Surface	
0.2		<b>Topsoil</b> dark brown, damp, organics.	
0.4		<b>Sand</b> fine, loose, brown, moist.	
0.8		<b>Sand</b> coarse, trace silt, loose, green, moist.	
1.2		<b>Sand and Gravel</b> medium, trace silt, dense, green, moist, rounded.	
1.4		End of Test Pit	-No groundwater seepage.
1.6			
1.8			
2.0			
2.2			
2.4			
2.6			
2.8			
3.0			
3.2			
3.4			
3.6			
3.8			

Drill Method: Excavator shovel

Drill Date: 29 March 2003



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Sheet: 1 of 1

Project No: 604-0103

Project: Oyster Bay Dev. - Soil Investigation

Client: Focus Intec

Location: Oyster Bay, BC

**Test Pit: TP-17**

Engineer: Steven M. Caballeira, P.Geo.

Depth (m)	Symbol	Description	Remarks
0		Ground Surface	
0.2		<b>Topsoil</b> dark brown, damp, organics.	
0.4			
0.6		<b>Sand</b> fine, trace silt, loose, heavily oxidized, red, dry.	-Root penetration to 0.5m. -Groundwater seepage at 0.6m. -Groundwater level at 0.6m after 6 hours.
0.8			
1.0		<b>Clayey Sand</b> fine, trace silt, some gravel (2cm dia.), dense, light grey, moist.	
1.2			
1.4		End of Test Pit	
1.6			
1.8			
2.0			
2.2			
2.4			
2.6			
2.8			
3.0			
3.2			
3.4			
3.6			
3.8			

Drill Method: Excavator shovel

Drill Date: 30 March 2003



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Sheet: 1 of 1

Project No: 604-0103

Project: Oyster Bay Dev. - Soil Investigation

Client: Focus Intec

Location: Oyster Bay, BC

**Test Pit: TP-18**

Engineer: Steven M. Caballeira, P.Geo.

Depth (m)	Symbol	Description	Remarks
0		Ground Surface	
0.2		<b>Topsoil</b> cobbled (16cm dia.), dark brown, damp, organics.	
0.4		<b>Sand and Gravel</b> coarse, trace silt, some cobbles (16cm dia.), compact, green, slight oxidation, moist, sub rounded.	
1.2			-Groundwater level at 1.2m after after 6 hours.
1.4		<b>Silt</b> trace sand, trace clay, dense, light grey, moist.	
1.7			-Groundwater seepage at 1.7m.
2		End of Test Pit	
2.2			
2.4			
2.6			
2.8			
3			
3.2			
3.4			
3.6			
3.8			

Drill Method: Excavator shovel

Drill Date: 30 March 2003



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Sheet: 1 of 1

Project No: 604-0103





**Test Pit: TP-19**

Project: Oyster Bay Dev. - Soil Investigation

Client: Focus Intec

Location: Oyster Bay, BC

Engineer: Steven M. Caballeira, P.Geo.

Depth (m)	Symbol	Description	Remarks
0		Ground Surface	
0.2		<b>Topsoil</b> dark brown, damp, organics.	
0.4		<b>Sand</b> fine, trace silt, loose, heavily oxidized, brown/red, damp, moist.	
0.8		<b>Sand</b> medium, dense, green, oxidized, moist.	-Groundwater level at 0.8m after 5 hours.
1.0		<b>Silt</b> trace clay, compact, grey, moist.	-Groundwater seepage at 0.9m.
1.2		End of Test Pit	
1.4			
1.6			
1.8			
2.0			
2.2			
2.4			
2.6			
2.8			
3.0			
3.2			
3.4			
3.6			
3.8			

Drill Method: Excavator shovel

Drill Date: 30 March 2003



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Sheet: 1 of 1

Project No: 604-0103

Project: Oyster Bay Dev. - Soil Investigation

Client: Focus Intec

Location: Oyster Bay, BC

**Test Pit: TP-20**

Engineer: Steven M. Caballeira, P.Geo.

Depth (m)	Symbol	Description	Remarks
0		Ground Surface	
0.2		<b>Topsoil</b> dark brown, damp, organics.	
0.4		<b>Sand</b> medium, loose, brown, dry.	-Groundwater level at 0.4m after 5 hours.
0.6			-Groundwater seepage at 0.6m
0.8		<b>Sand</b> coarse, compact, green, oxidized, wet.	
1.2			
1.4		<b>Sand and Gravel</b> coarse, dense, green, wet.	
1.6		End of Test Pit	
1.8			
2.0			
2.2			
2.4			
2.6			
2.8			
3.0			
3.2			
3.4			
3.6			
3.8			

Drill Method: Excavator shovel

Drill Date: 30 March 2003



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Sheet: 1 of 1

Project No: 604-0103

Project: Oyster Bay Dev. - Soi Investigation

Client: Focus Intec

Location: Oyster Bay, BC

**Test Pit: TP-21**

Engineer: Steven M. Caballeira, P.Geo.

Depth (m)	Symbol	Description	Remarks
0		Ground Surface	
0.2		<b>Topsoil</b> dark brown, damp, organics.	
0.4		<b>Sand</b> medium, loose, green, dry.	
0.6			-Groundwater level at 0.6m after 5 hours.
0.8		<b>Sand and Gravel</b> coarse, loose, green, wet, sub rounded.	-Groundwater seepage at 0.8m.
1.0		End of Test Pit	
1.2			
1.4			
1.6			
1.8			
2.0			
2.2			
2.4			
2.6			
2.8			
3.0			
3.2			
3.4			
3.6			
3.8			

Drill Method: Excavator shovel

Drill Date: 30 March 2003



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Sheet: 1 of 1

Project No: 604-0103

Project: Oyster Bay Dev. - Soil Investigation

Client: Focus Intec

Location: Oyster Bay, BC

**Test Pit: TP-22**

Engineer: Steven M. Caballeira, P. Geo.

Depth (m)	Symbol	Description	Remarks
0		Ground Surface	
0.2		<b>Topsoil</b> dark brown, damp, organics	
0.4		<b>Sand</b> fine, loose, brown, oxidized, moist.	
0.6		<b>Sand</b> fine, loose, green, moist.	-Groundwater level at 0.6m after 4 hours.
0.8			-Groundwater seepage at 0.8m.
1.2		<b>Sand</b> fine, loose, grey, moist.	
2.2		End of Test Pit	
2.4			
2.6			
2.8			
3.0			
3.2			
3.4			
3.6			
3.8			

Drill Method: Excavator shovel

Drill Date: 30 March 2003



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Sheet: 1 of 1

Project No: 604-0103

Project: Oyster Bay Dev. - Soil Investigation

Client: Focus Intec

Location: Oyster Bay, BC

**Test Pit: TP-23**

Engineer: Steven M. Caballeira, P.Geo.

Depth (m)	Symbol	Description	Remarks
0		Ground Surface	
0.2		<b>Topsoil</b> dark brown, damp, organics.	
0.4		<b>Sand</b> fine, loose, brown, oxidized, moist.	
1.2		<b>Sand</b> fine, some silt, loose, green, wet.	-Groundwater level at 1.1m after 4 hours. -Groundwater seepage at 1.2m.
1.4		<b>Sand</b> fine, dense, grey, moist.	
1.6		End of Test Pit	
1.8			
2.0			
2.2			
2.4			
2.6			
2.8			
3.0			
3.2			
3.4			
3.6			
3.8			

Drill Method: Excavator shovel

Drill Date: 30 March 2003



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Sheet: 1 of 1

Project No: 604-0103

Project: Oyster Bay Dev. - Soil Investigation

Client: Focus Intec

Location: Oyster Bay, BC

**Test Pit: TP-24**

Engineer: Steven M. Caballeira, P.Geo.

Depth (m)	Symbol	Description	Remarks
0		Ground Surface	
0.2		<b>Topsoil</b> dark brown, damp, organics.	
0.4			
0.6		<b>Sand</b> medium, dense, brown, oxidized, moist.	
0.8			
1			
1.2		<b>Sand and Gravel</b> medium, compact, dark brown/green, moist, rounded.	-Groundwater level at 1.1m after 4 hours.
1.4			-Light groundwater seepage at 1.5m.
1.6			
1.8			
2		End of Test Pit	
2.2			
2.4			
2.6			
2.8			
3			
3.2			
3.4			
3.6			
3.8			

Drill Method: Excavator shovel

Drill Date: 30 March 2003



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Sheet: 1 of 1

Project No: 604-0103

**Test Pit: TP-25**

Project: Oyster Bay Dev. - Soil Investigation

Client: Focus Intec

Location: Oyster Bay, BC

Engineer: Steven M. Caballeira, P.Geo.

Depth (m)	Symbol	Description	Remarks
0		Ground Surface	
0.2		<b>Topsoll</b> dark brown, damp, organics.	
0.4		<b>Sand</b> medium, loose, brown, oxidized, moist.	
0.8		<b>Sand and Gravel</b> medium, trace cobbles (10cm dia.), compact, green, wet, sub rounded.	
1.2		<b>Sand</b> medium, compact, grey, moist.	
1.4		End of Test Pit	-No groundwater seepage
1.6			
1.8			
2.0			
2.2			
2.4			
2.6			
2.8			
3.0			
3.2			
3.4			
3.6			
3.8			

Drill Method: Excavator shovel

Drill Date: 30 March 2003



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Sheet: 1 of 1

Project No: 604-0103




Project: Oyster Bay Dev. - Soil Investigation

Client: Focus Intec

Location: Oyster Bay, BC

**Test Pit: TP-26**

Engineer: Steven M. Caballeira, P.Geo.

Depth (m)	Symbol	Description	Remarks
0		Ground Surface	
0.2		<b>Topsoil</b> dark brown, damp, organics.	
0.4		<b>Sand</b> fine, loose, brown, oxidized, moist.	
1.0		<b>Silty Sand</b> fine, compact, grey, dry	
1.2		End of Test Pit	-No groundwater seepage.
1.4			
1.6			
1.8			
2.0			
2.2			
2.4			
2.6			
2.8			
3.0			
3.2			
3.4			
3.6			
3.8			

Drill Method: Excavator shovel

Drill Date: 30 March 2003



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Sheet: 1 of 1

Project No: 604-0103

Project: Oyster Bay Dev. - Soil Investigation

Client: Focus Intec

Location: Oyster Bay, BC

**Test Pit: TP-27**

Engineer: Steven M. Caballeira, P.Geo.

Depth (m)	Symbol	Description	Remarks
0		Ground Surface	
0.2		<b>Topsoil</b> dark brown, damp, organics.	
0.4		<b>Sand</b> medium, loose, red/brown, oxidized, moist.	
0.6			-Groundwater level at 0.6m after 4 hours.
1.0		<b>Sand and Gravel</b> medium, compact, dark brown/red, heavily oxidized, wet, sub rounded.	
1.2			-Heavy groundwater seepage at 1.2m.
1.4		<b>Gravel</b> medium, trace sand, compact, dark brown/red, moist, sub rounded.	
1.6		End of Test Pit	
1.8			
2.0			
2.2			
2.4			
2.6			
2.8			
3.0			
3.2			
3.4			
3.6			
3.8			

Drill Method: Excavator shovel

Drill Date: 30 March 2003



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Sheet: 1 of 1

Project No: 604-0103

**Test Pit: TP-28**

Project: Oyster Bay Dev. - Soil Investigation

Client: Focus Intec

Engineer: Steven M. Caballeira, P.Geo.

Location: Oyster Bay, BC

Depth (m)	Symbol	Description	Remarks
0		Ground Surface	
0.2		<b>Topsoil</b> dark brown, damp, organics.	
0.4		<b>Silty Sand and Gravel</b> fine, trace silt, compact, light brown, rounded.	
0.6			
0.8			
1.0		<b>Sand</b> fine, trace silt, some cobbles (15cm dia.), soft, compact, light brown, moist, rounded.	
1.2			
1.4			
1.6			
1.8			
2.0			
2.2		<b>Silt</b> trace clay, some cobbles (15cm dia.), dense, grey, moist.	-Light groundwater seepage and water level at 2m.
2.4		End of Test Pit	
2.6			
2.8			
3.0			
3.2			
3.4			
3.6			
3.8			

Drill Method: Excavator shovel

Drill Date: 30 March 2003



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Sheet: 1 of 1

Project No: 604-0103




Project: Oyster Bay Dev. - Soil Investigation

Client: Focus Intec

Location: Oyster Bay, BC

**Test Pit: TP-29**

Engineer: Steven M. Caballeira, P.Geo.

Depth (m)	Symbol	Description	Remarks
0		Ground Surface	
0.2		<b>Topsoil</b> dark brown, damp, organics.	
0.4		<b>Sand</b> fine, loose, red, oxidized, moist.	
0.8		<b>Sandy Silt</b> fine, trace clay, some cobbles (10cm dia.), compact, wet.	-Groundwater level at 0.6m after 3 hours. -Heavy groundwater seepage at 0.8m.
1.4		End of Test Pit	
1.6			
1.8			
2.0			
2.2			
2.4			
2.6			
2.8			
3.0			
3.2			
3.4			
3.6			
3.8			

Drill Method: Excavator shovel

Drill Date: 30 March 2003



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Sheet: 1 of 1

Project No: 604-0103

Project: Oyster Bay Dev. - Soil Investigation

Client: Focus Intec

Location: Oyster Bay, BC

**Test Pit: TP-30**

Engineer: Steven M. Caballeira, P.Geo.

Depth (m)	Symbol	Description	Remarks
0		Ground Surface	
0.2		<b>Topsoil</b> dark brown, damp, organics.	
0.4		<b>Sand and Gravel</b> medium, compact, green, moist, sub rounded.	
0.6			-Moderate groundwater seepage at 0.6m.
0.8		<b>Silty Sand and Gravel</b> fine, some cobbles (5cm dia.), dense, green, wet, sub rounded.	
1.0			
1.2			
1.4			
1.6			
1.8		<b>Silty Sand</b> fine, some coarse gravel, dense, grey, moist.	
1.7			-Groundwater level at 1.7m after 3 hours.
2.0		End of Test Pit	
2.2			
2.4			
2.6			
2.8			
3.0			
3.2			
3.4			
3.6			
3.8			

Drill Method: Excavator shovel

Drill Date: 30 March 2003



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Sheet: 1 of 1

Project No: 604-0103

Project: Oyster Bay Dev. - Soil Investigation

Client: Focus Intec

Location: Oyster Bay, BC

**Test Pit: TP-31**

Engineer: Steven M. Caballeira, P.Geo.

Depth (m)	Symbol	Description	Remarks
0		Ground Surface	
0.2		<b>Topsoil</b> dark brown, damp, organics.	
0.4		<b>Sand and Gravel</b> medium, loose, red/brown, moist, sub rounded.	
0.8		<b>Silty Sand and Gravel</b> medium, loose, green, moist, subrounded.	-Light groundwater seepage at 0.8m.
1.4		<b>Silty Sand</b> fine, trace cobbles (10cm dia.), compact, grey, moist.	-Groundwater level at 1.3m after 3 hours.
1.6		End of Test Pit	
1.8			
2.0			
2.2			
2.4			
2.6			
2.8			
3.0			
3.2			
3.4			
3.6			
3.8			

Drill Method: Excavator shovel

Drill Date: 30 March 2003



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Sheet: 1 of 1

Project No: 604-0103

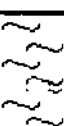
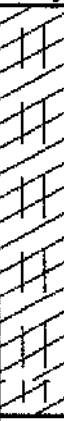
Project: Oyster Bay Dev. - Soil Investigation

Client: Focus Intec

Location: Oyster Bay, BC

**Test Pit: TP-32**

Engineer: Steven M. Caballeira, P.Geo.

Depth (m)	Symbol	Description	Remarks
0		Ground Surface	
0.2		<b>Topsoil</b> black, wet, organics	
0.4			
0.6		<b>Silty Clay</b> dense, mottled orange and grey, moist.	-Groundwater level at 0.7m after 3 hours.
0.8			
1.0			
1.2			
1.4		-grey and no mottling below 1.4m.	
1.6			
1.8		End of Test Pit	
2.0			
2.2			
2.4			
2.6			
2.8			
3.0			
3.2			
3.4			
3.6			
3.8			

Drill Method: Excavator shovel

Drill Date: 30 March 2003



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Sheet: 1 of 1

Project No: 604-0103

Project: Oyster Bay Dev. - Soil Investigation

Client: Focus Intec

Location: Oyster Bay, BC

**Test Pit: TP-33**

Engineer: Steven M. Caballeira, P.Geo.

Depth (m)	Symbol	Description	Remarks
0		Ground Surface	
0.2		<b>Topsoil</b> dark brown, damp, organics.	
0.4		<b>Sand</b> medium, loose, red, oxidized, moist.	
0.6		<b>Sand and Gravel</b> medium, loose, green, wet, sub rounded.	-Heavy groundwater seepage and -Groundwater level at 0.6m after 2 hours.
1.0		<b>Silty Gravel</b> coarse, trace clay, dense, grey, moist, subrounded.	
1.8		End of Test Pit	
2.0			
2.2			
2.4			
2.6			
2.8			
3.0			
3.2			
3.4			
3.6			
3.8			

Drill Method: Excavator shovel

Drill Date: 30 March 2003



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Sheet: 1 of 1

Project No: 604-0103

Project: Oyster Bay Dev. - Soil Investigation

Client: Focus Intec

Location: Oyster Bay, BC

**Test Pit: TP-34**

Engineer: Steven M. Caballeira, P.Geo.

Depth (m)	Symbol	Description	Remarks
0		Ground Surface	
0.2		<b>Topsoil</b> dark brown, damp, organics.	
0.4		<b>Sand</b> fine, loose, red, oxidized, wet.	
0.6			-Groundwater seepage at 0.6m.
0.8			-Groundwater level at 0.8m after 2 hours.
1.0		<b>Sand</b> fine, compact, grey, moist.	
1.2			
1.4			
1.6			
1.8			
2.0		<b>Sand</b> fine, compact, dark grey, wet.	
2.2		End of Test Pit	
2.4			
2.6			
2.8			
3.0			
3.2			
3.4			
3.6			
3.8			

Drill Method: Excavator shovel

Drill Date: 30 March 2003



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Sheet: 1 of 1

Project No: 604-0103

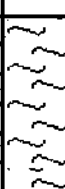
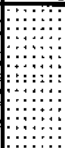

Project: Oyster Bay Dev. - Soil Investigation

Client: Focus Intec

Location: Oyster Bay, BC

**Test Pit: TP-35**

Engineer: Steven M. Caballeira, P.Geo.

Depth (m)	Symbol	Description	Remarks
0		Ground Surface	
0.2		<b>Topsoil</b> dark brown, damp, organics.	
0.4			
0.6			
0.8		<b>Sand and Gravel</b> medium, loose, green, moist, sub rounded.	
1			
1.2		<b>Gravel</b> medium, trace sand, loose, brown/red heavily oxidized, dry, rounded.	
1.4			
1.6			
1.8			
2		End of Test Pit	-No groundwater seepage.
2.2			
2.4			
2.6			
2.8			
3			
3.2			
3.4			
3.6			
3.8			

Drill Method: Excavator shovel

Drill Date: 30 March 2003



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Sheet: 1 of 1

Project No: 604-0103


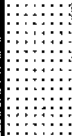

**Test Pit: TP-36**

Project: Oyster Bay Dev. - Soil Investigation

Client: Focus Intec

Location: Oyster Bay, BC

Engineer: Steven M. Caballeira, P.Geo.

Depth (m)	Symbol	Description	Remarks
0		Ground Surface	
0.2		<b>Topsoil</b> black, moist, organics.	
0.4		<b>Sand</b> fine, loose, some organic content, red/black, peaty, roots, moist.	
0.8		<b>Silty Gravel</b> medium, trace sand, trace clay, trace cobbles (20cm dia.), compact, grey, sub rounded.	-Light groundwater seepage at 0.9m.
1.6		End of Test Pit	-Groundwater level at 1.5m after 1 hour.
1.8			
2.0			
2.2			
2.4			
2.6			
2.8			
3.0			
3.2			
3.4			
3.6			
3.8			

Drill Method: Excavator shovel

Drill Date: 30 March 2003



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Sheet: 1 of 1

Project No: 604-0103




Project: Oyster Bay Dev. - Soil Investigation

Client: Focus Intec

Location: Oyster Bay, BC

**Test Pit: TP-37**

Engineer: Steven M. Caballeira, P. Geo.

Depth (m)	Symbol	Description	Remarks
0		Ground Surface	
0.2		<b>Topsoil</b> dark brown, damp, organics.	
0.4		<b>Sand</b> fine, loose, brown, dry.	
0.8		<b>Sand</b> medium, trace gravel, dense, moist, sub rounded.	
1.0			-Groundwater level at 1m after 1 hour.
1.2		End of Test Pit	
1.4			
1.6			
1.8			
2.0			
2.2			
2.4			
2.6			
2.8			
3.0			
3.2			
3.4			
3.6			
3.8			

Drill Method: Excavator shovel

Drill Date: 30 March 2003



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Sheet: 1 of 1

**APPENDIX 3  
STANDARD LIMITATIONS**



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## **STANDARD LIMITATIONS**

1. The findings and conclusions documented in this report have been prepared for specific application to this project and have been developed in a manner consistent with that level of care normally exercised by environmental professionals currently practicing under similar conditions in the area.
2. The findings of this report are based solely on data collected on site during this investigation and on the conditions of the site during the completion of the work. Levelton has relied on good faith on information provided by individuals and sources noted in the report. No other warranty, expressed or implied, is made.
3. If new information is developed in future work that affects the conclusions of this report, Levelton should be contacted to re-evaluate the conclusions of this report and provide amendments as required.
4. The service provided by Levelton in completing this report is intended to assist the client in a business decision. The liability of the site is not transferred to Levelton as a result of such services, and Levelton does not make recommendation regarding the purchase, sale, or investment in the property.