APPENDIX C8

DISTANCE-ELEVATION PLOTS

Figure C-8.1 : Distance-Water Elevation (Jan-29-15)

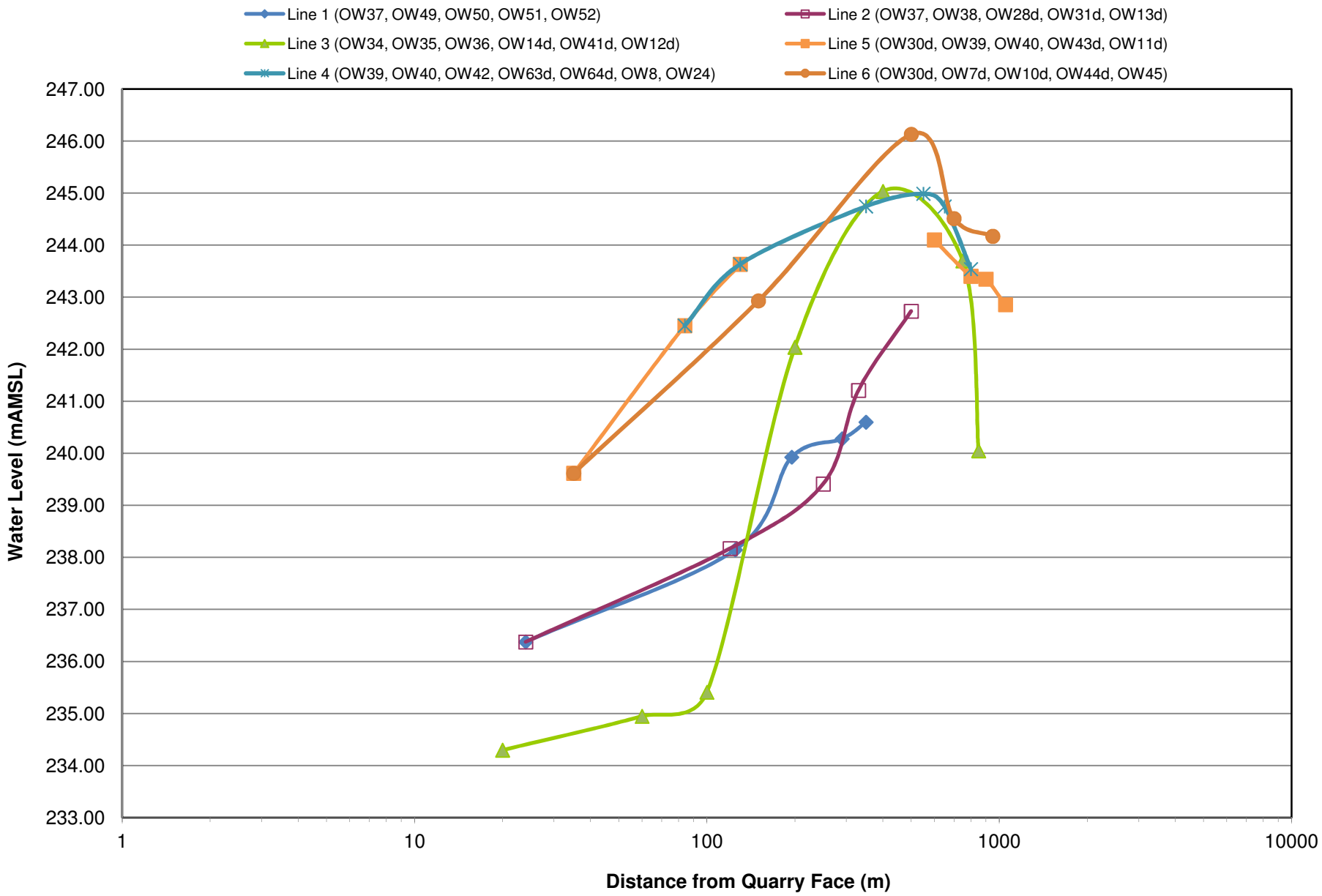


Figure C-8.2 : Distance-Water Elevation (Mar-13-15)

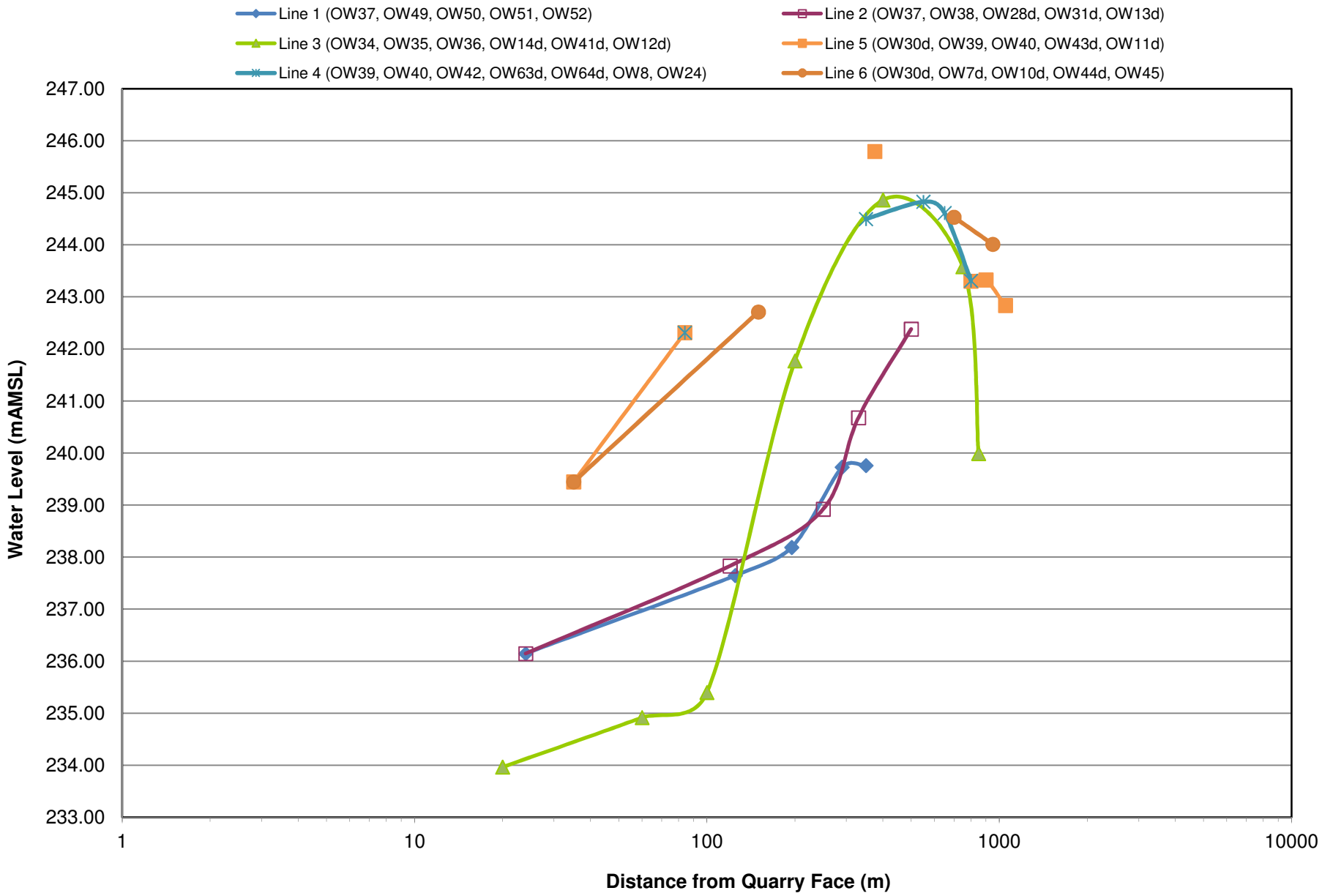


Figure C-8.3 : Distance-Water Elevation (April-27-15)

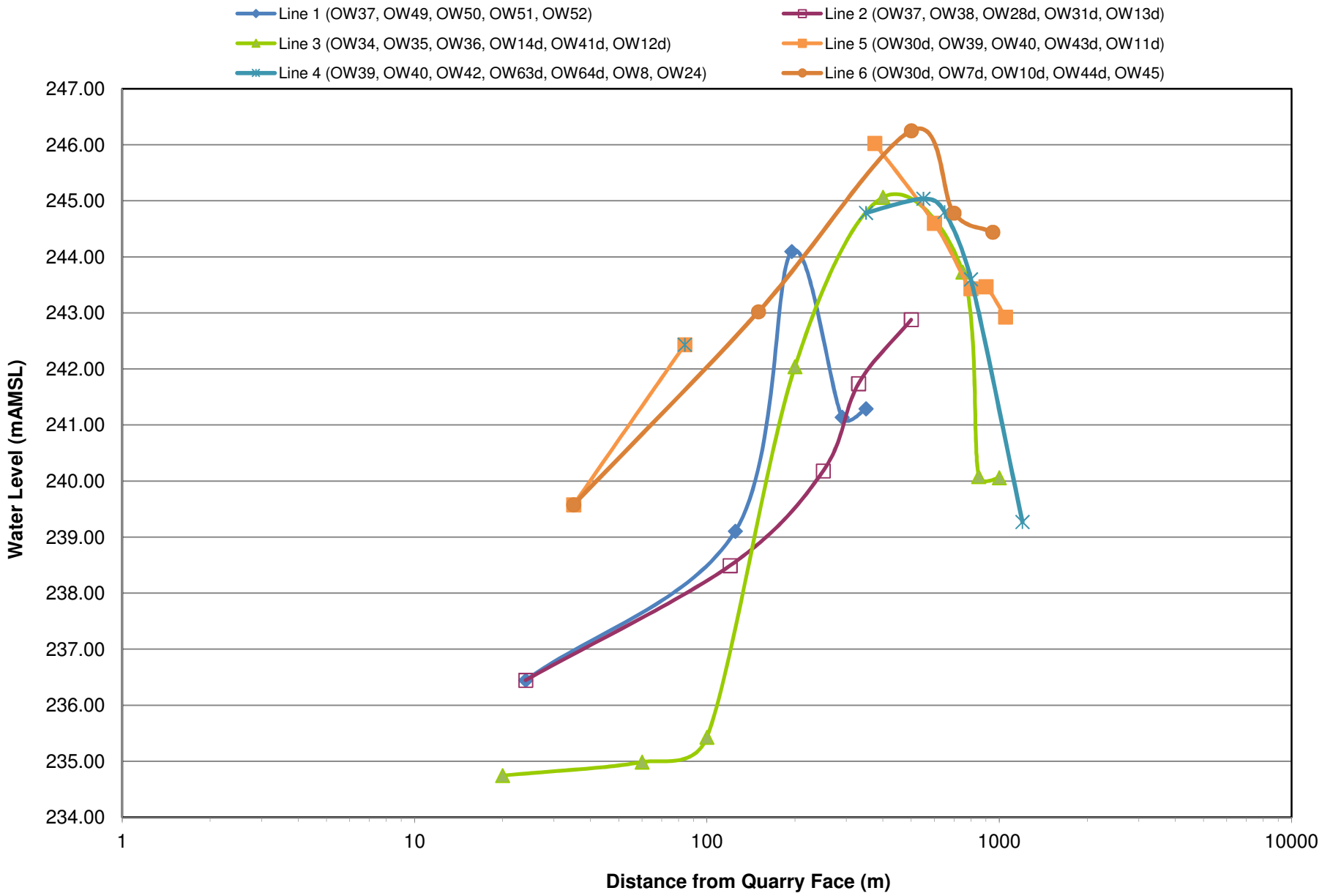


Figure C-8.4 : Distance-Water Elevation (May-29-15)

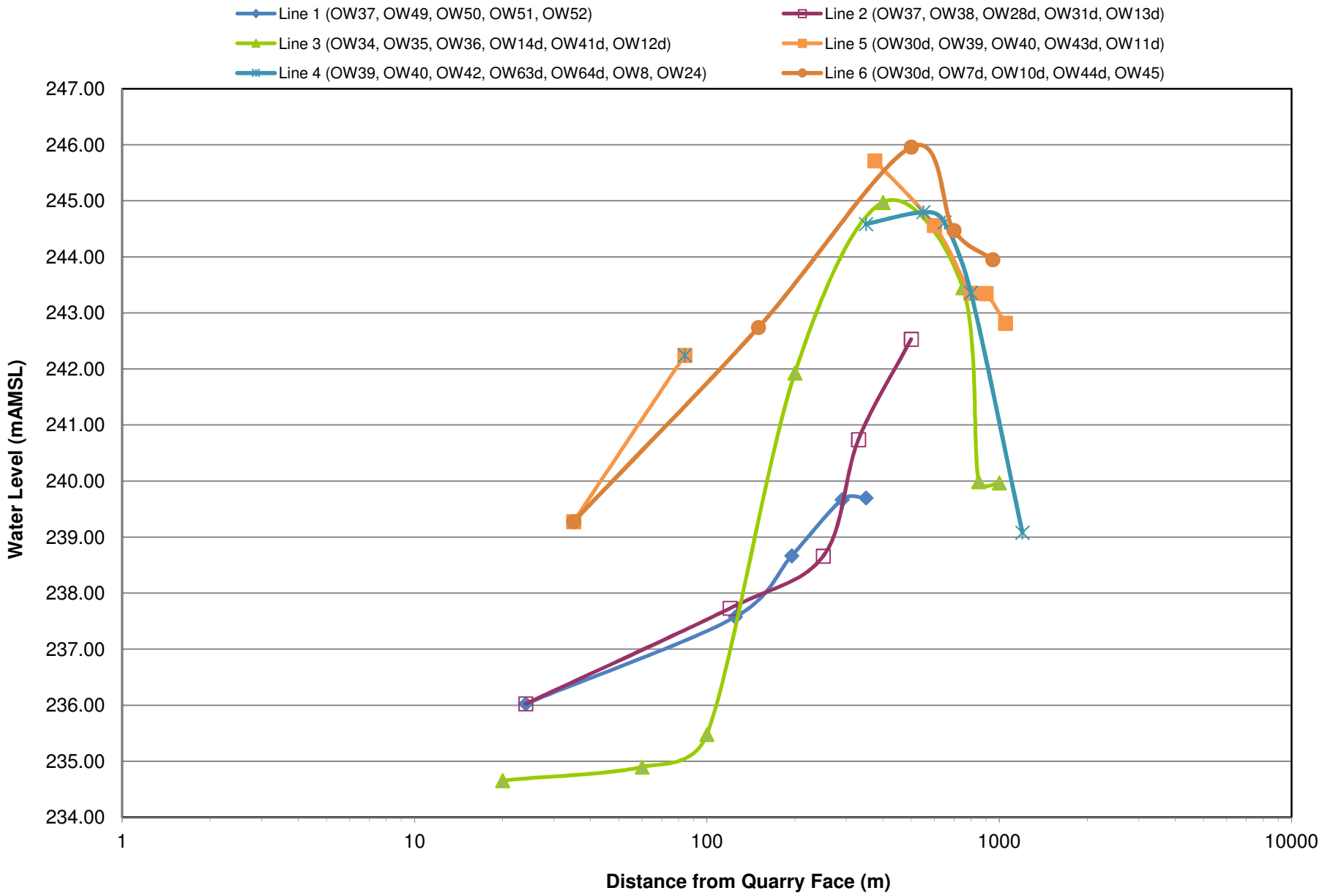


Figure C-8.5 : Distance-Water Elevation (June-30-15)

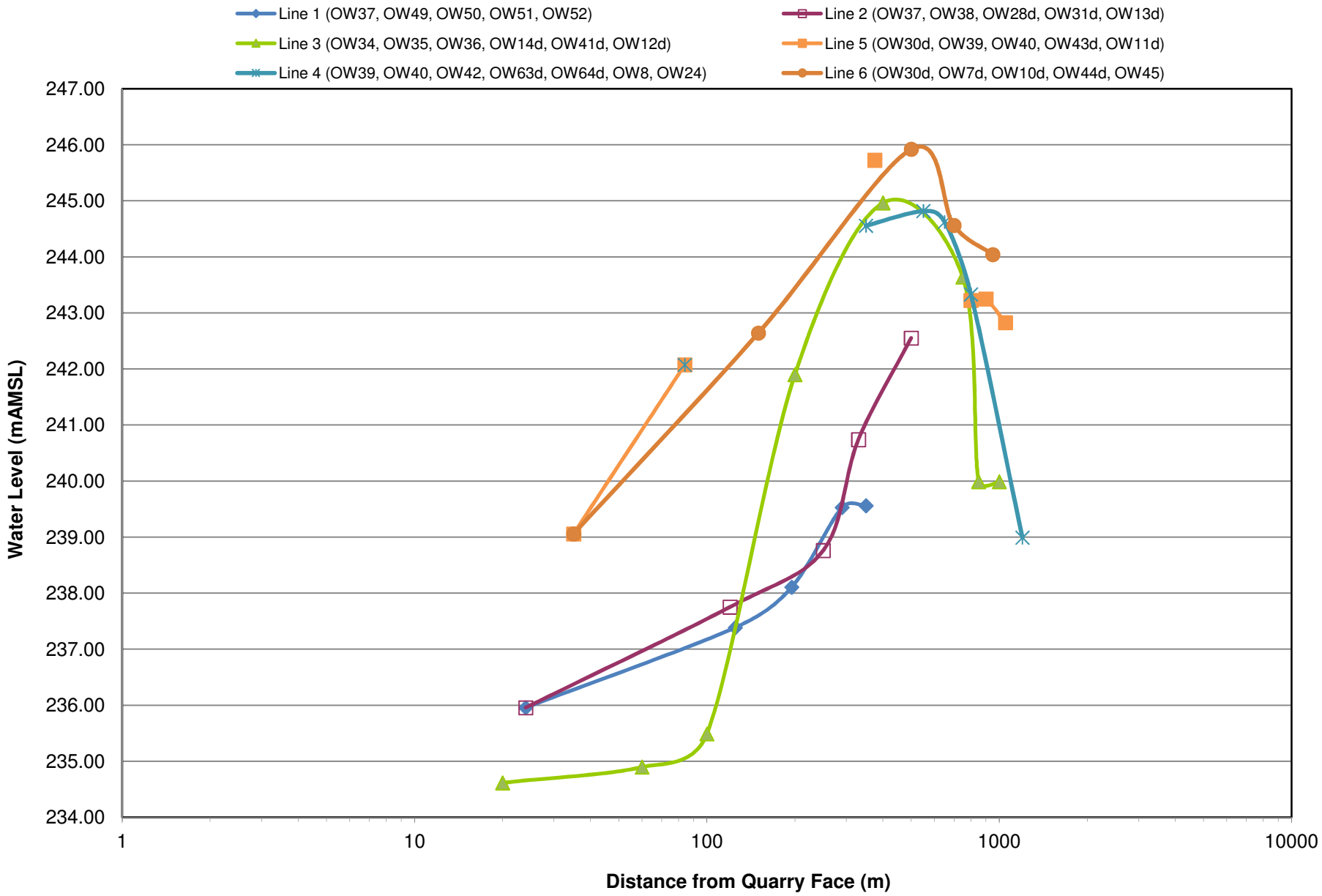


Figure C-8.6 : Distance-Water Elevation (July-28-15)

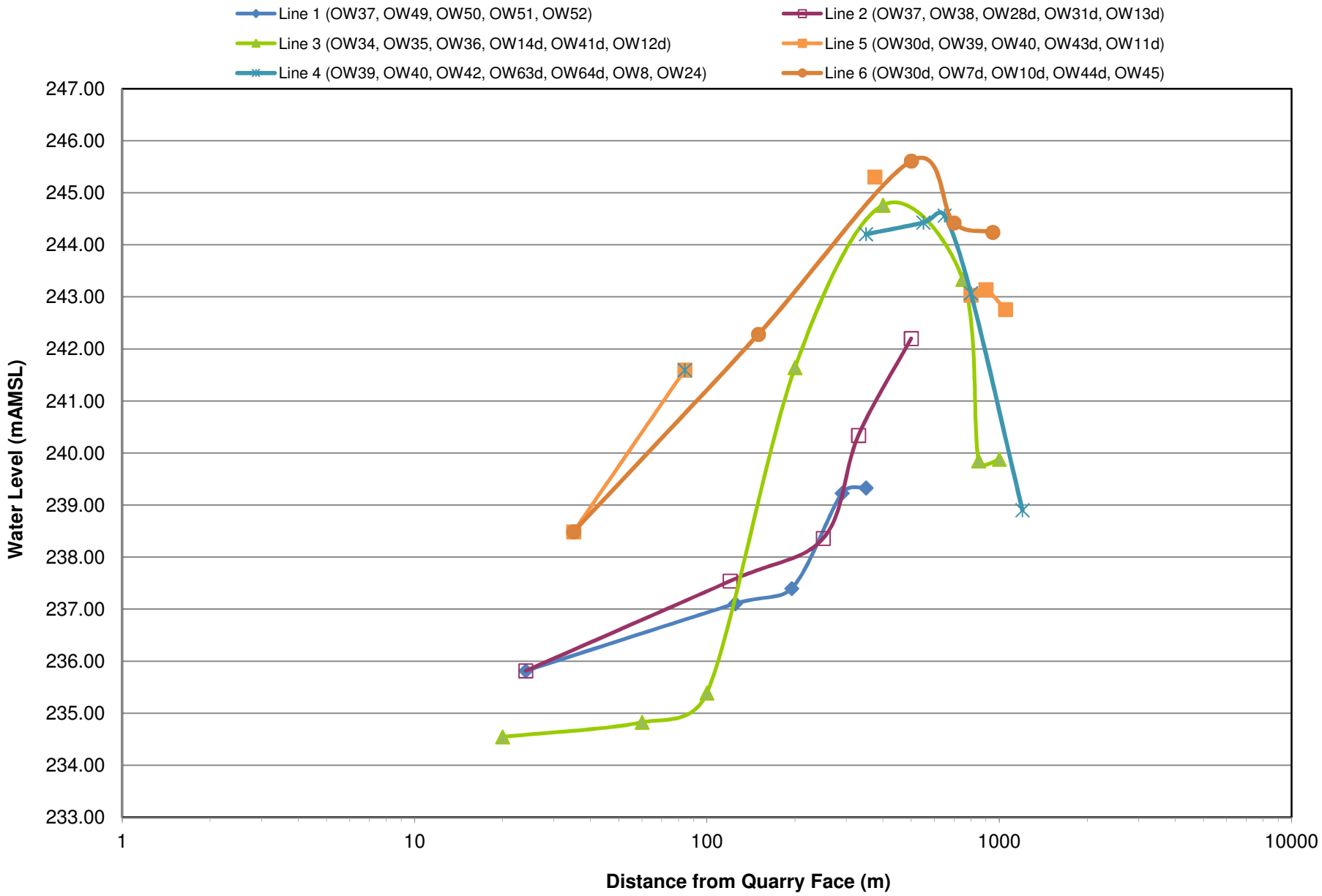


Figure C-8.7 : Distance-Water Elevation (Aug-27-15)

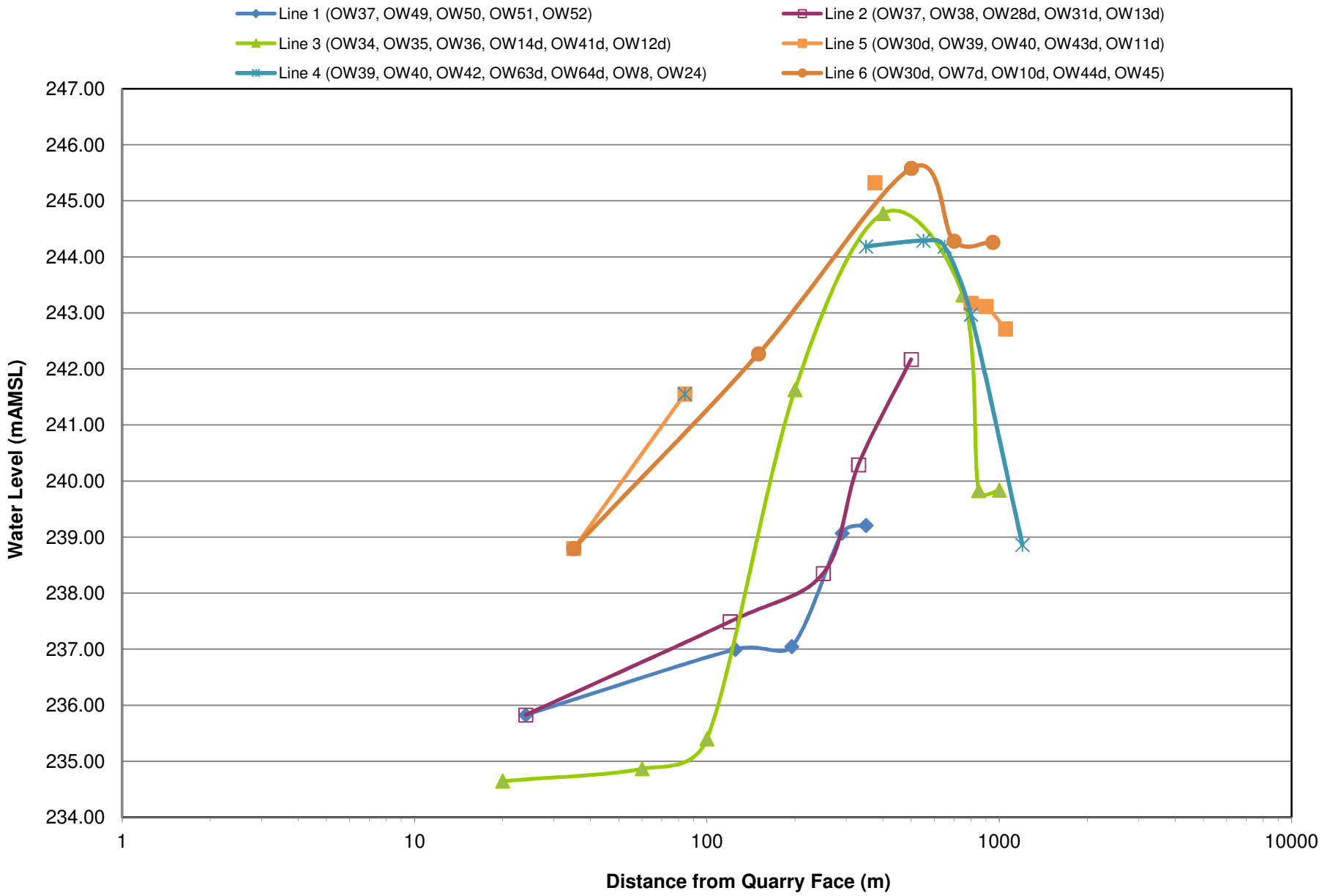


Figure C-8.8 : Distance-Water Elevation (Sept-29-15)

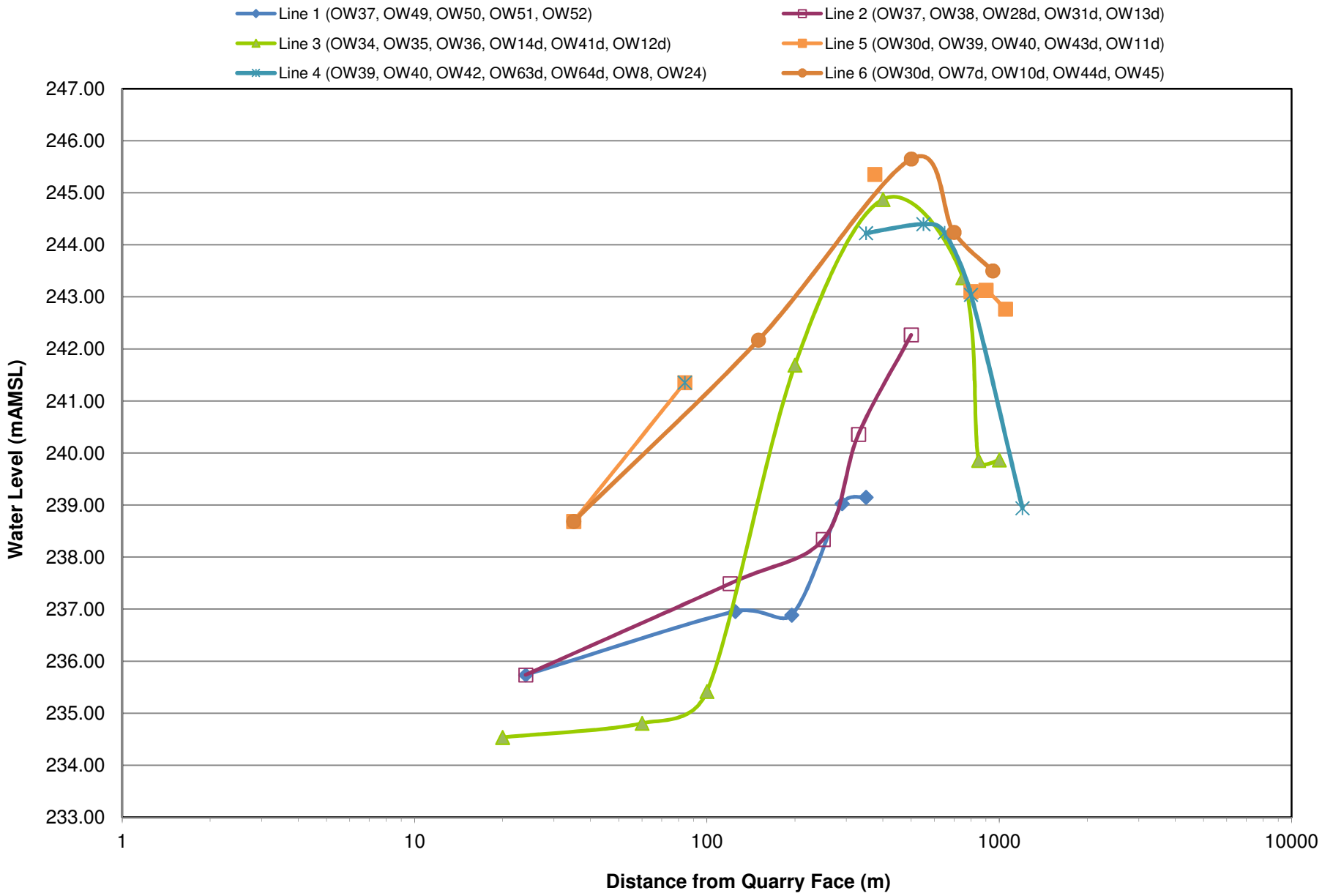


Figure C-8.9 : Distance-Water Elevation (Oct-22-15)

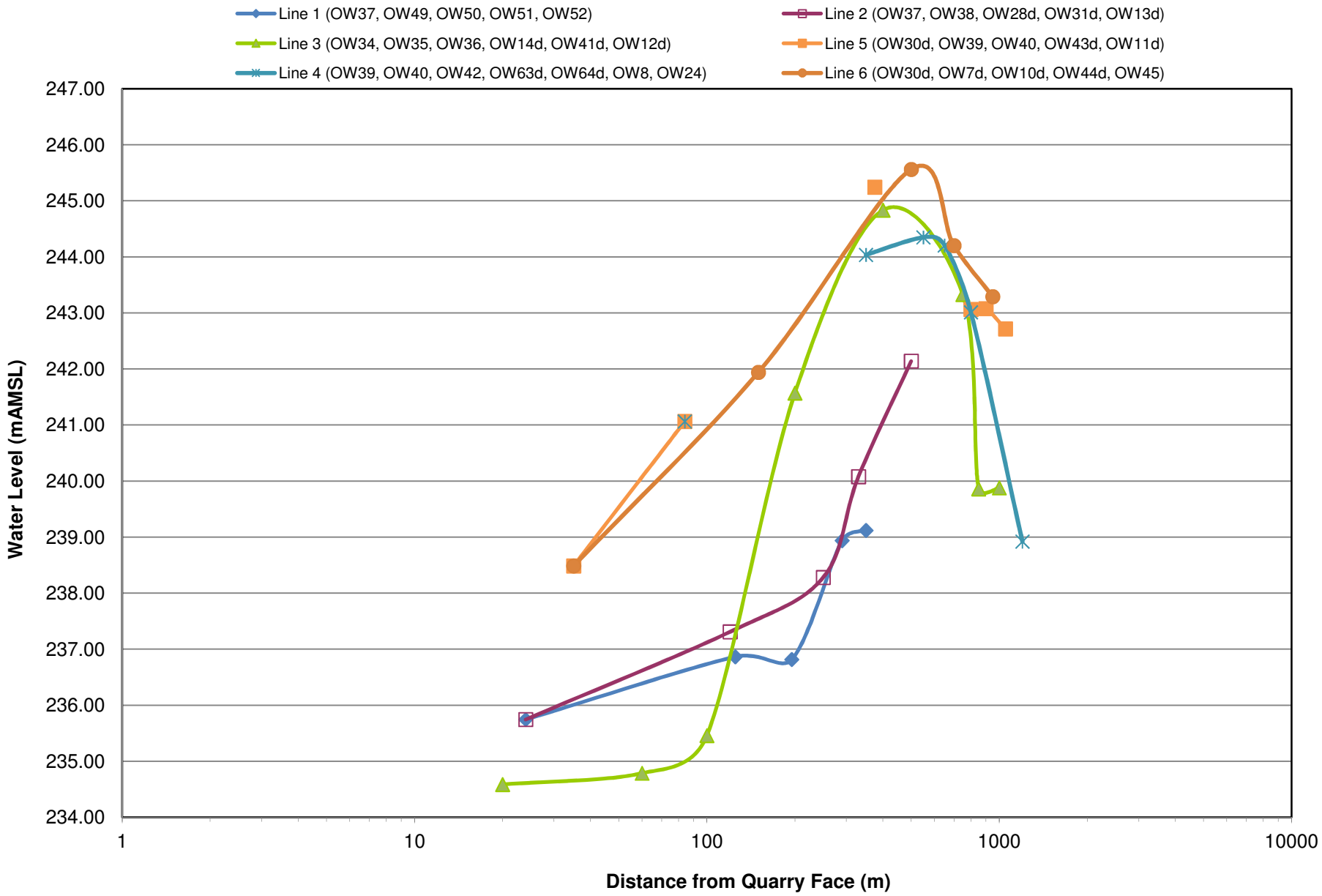


Figure C-8.10 : Distance-Water Elevation (Nov-17-15)

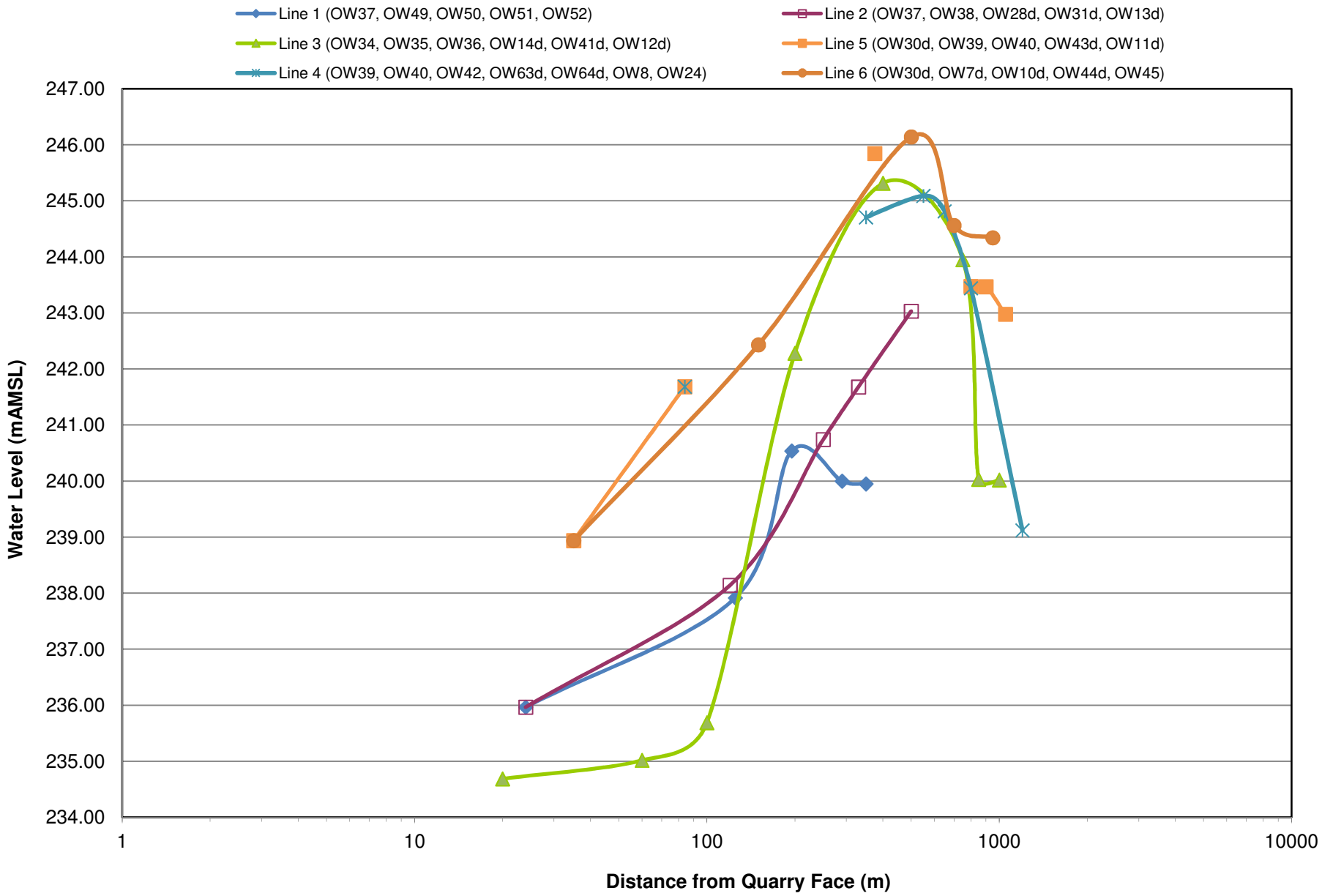
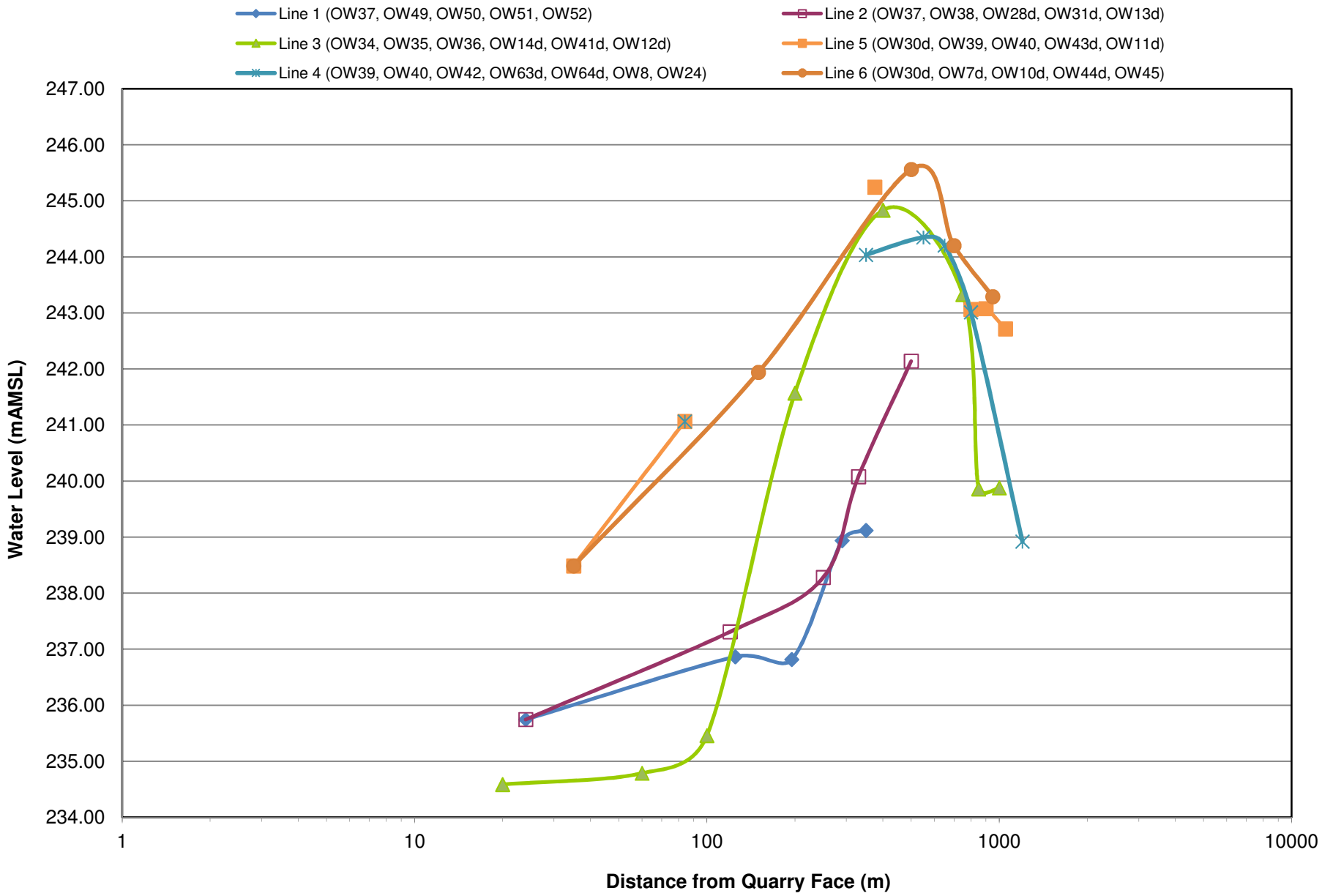
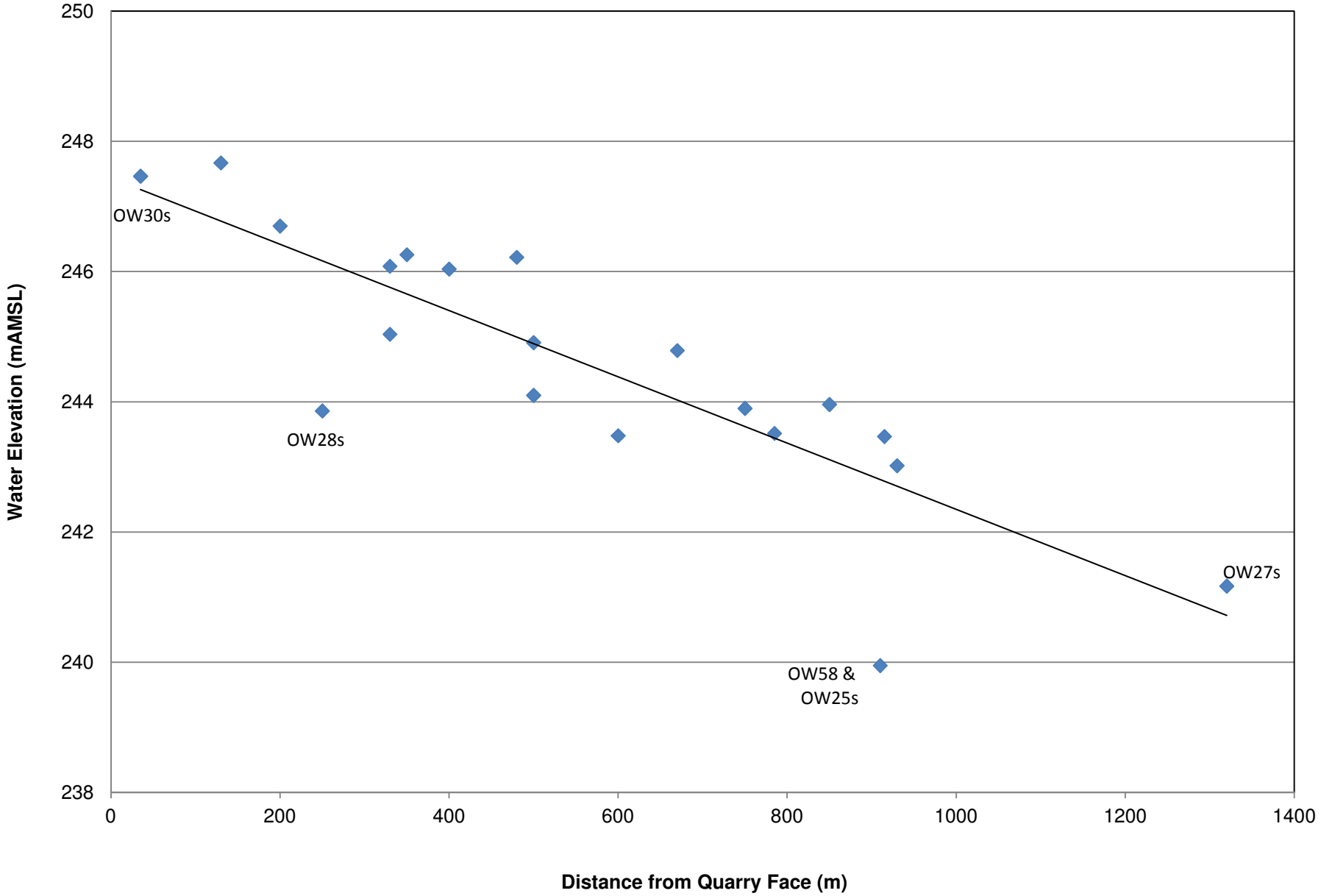


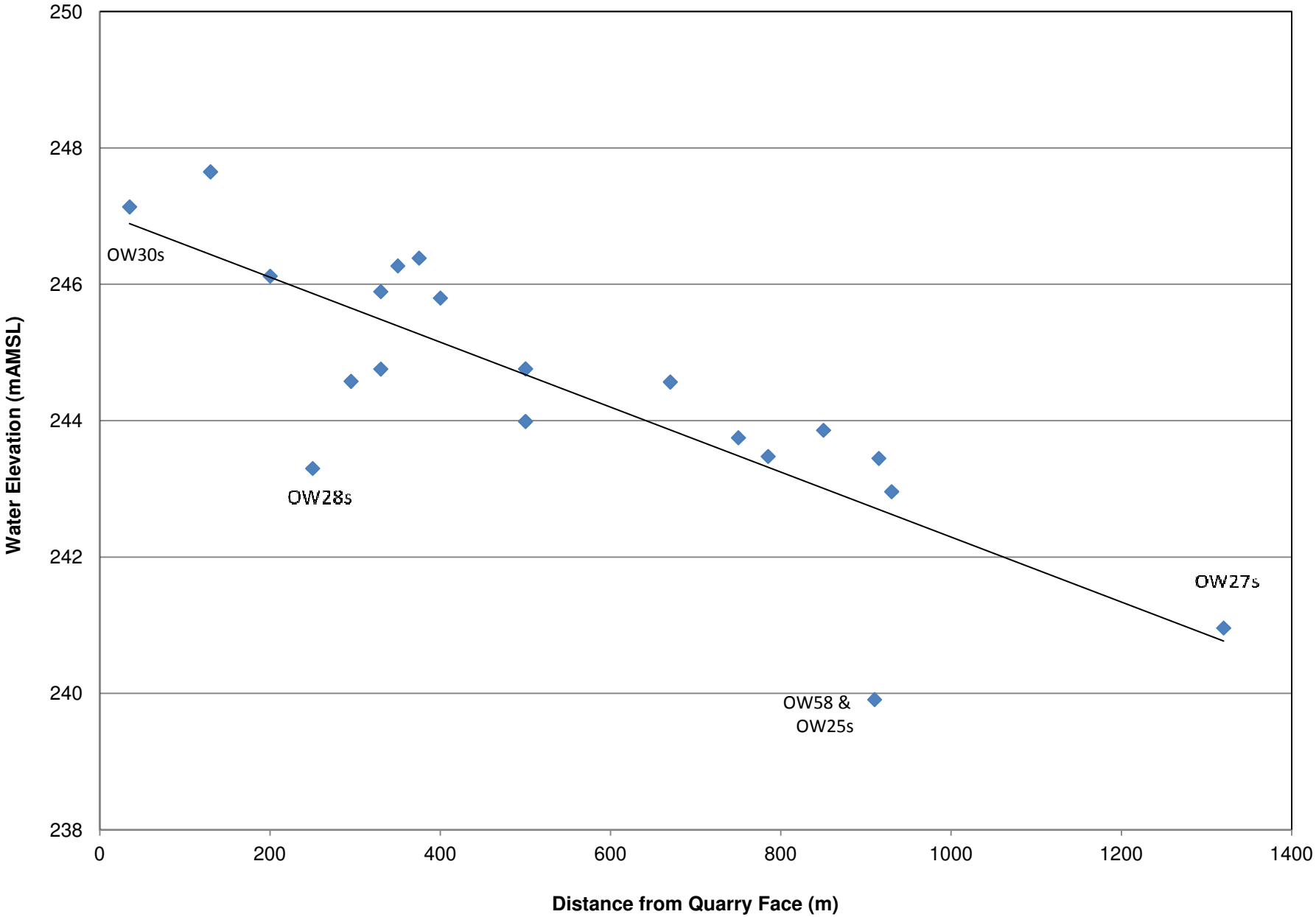
Figure C-8.11 : Distance-Water Elevation (Dec-23-15)



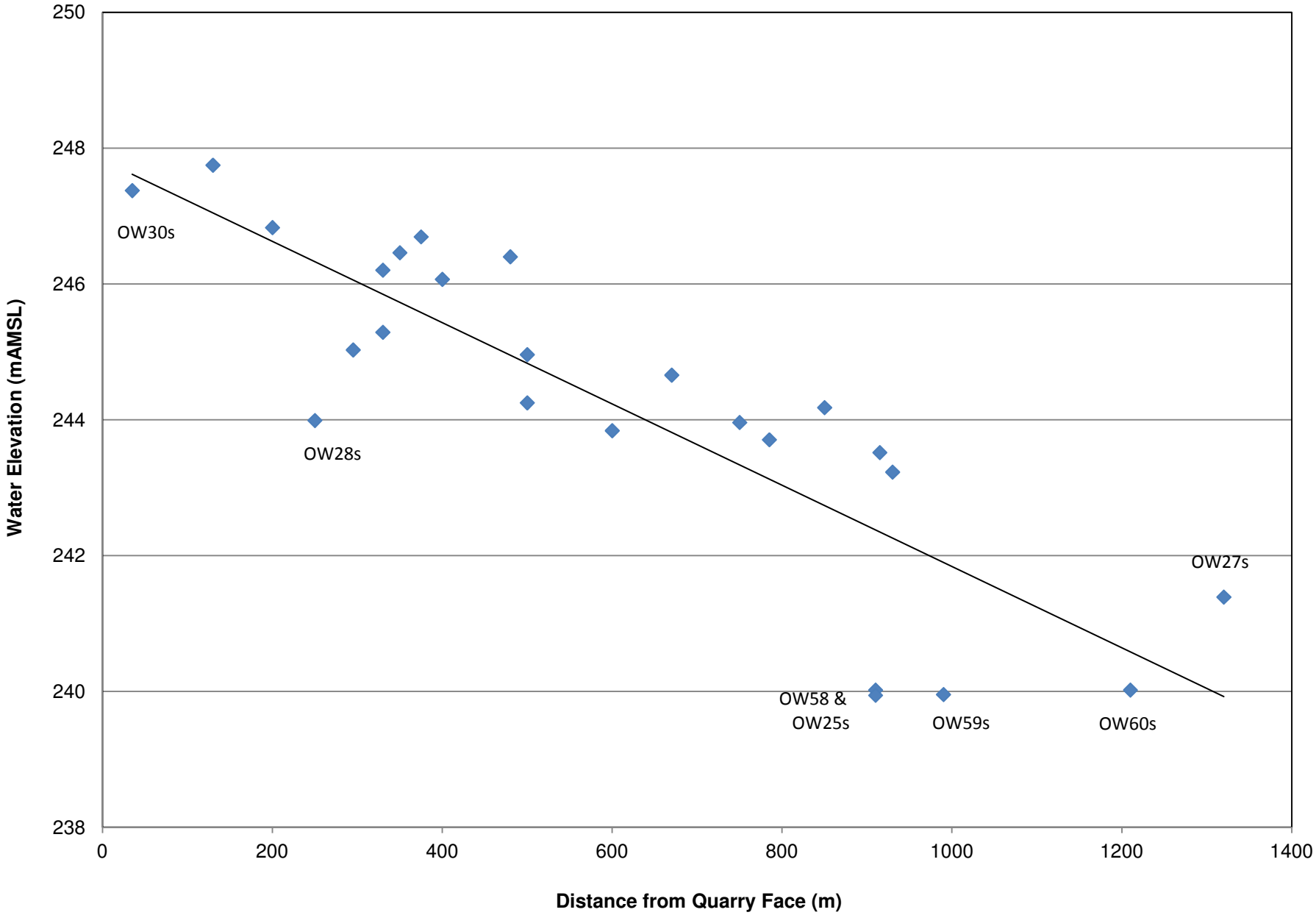
Hydrograph C-8.12: Distance-Water Elevation Shallow Bedrock (Jan- 29-15)



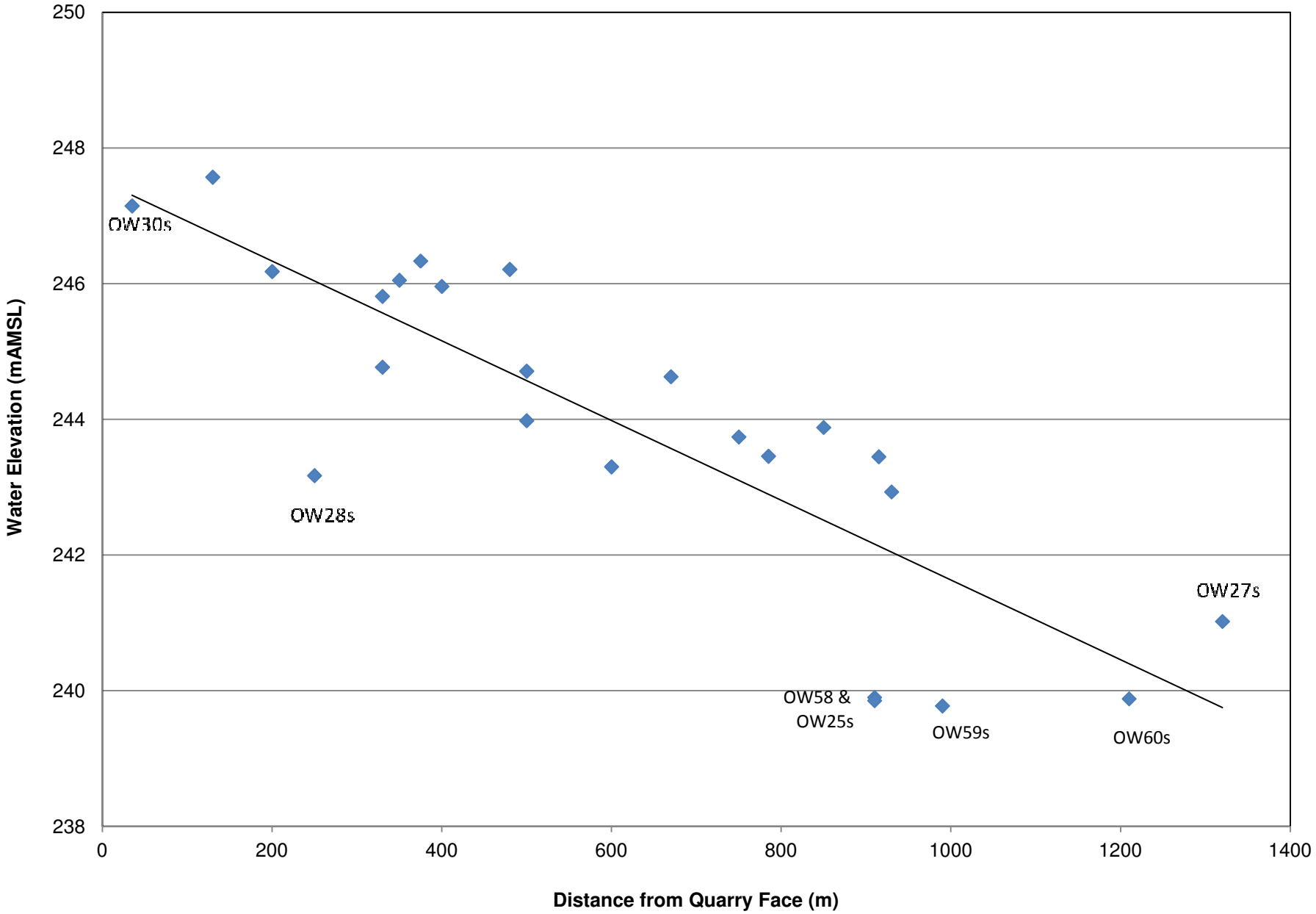
Hydrograph C-8.13: Distance-Water Elevation Shallow Bedrock (Mar- 13-15)



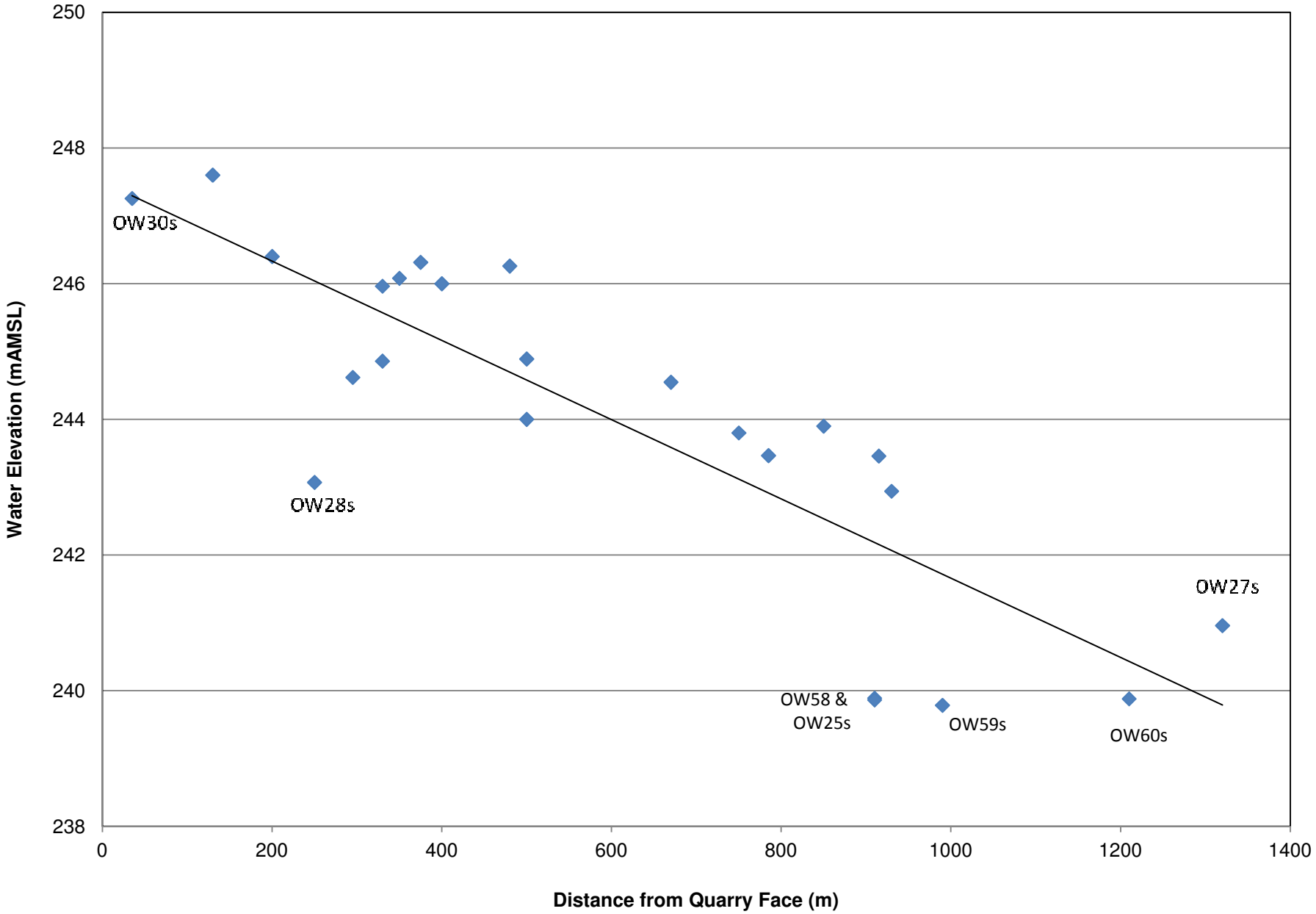
Hydrograph C-8.14: Distance-Water Elevation Shallow Bedrock (April-27-15)



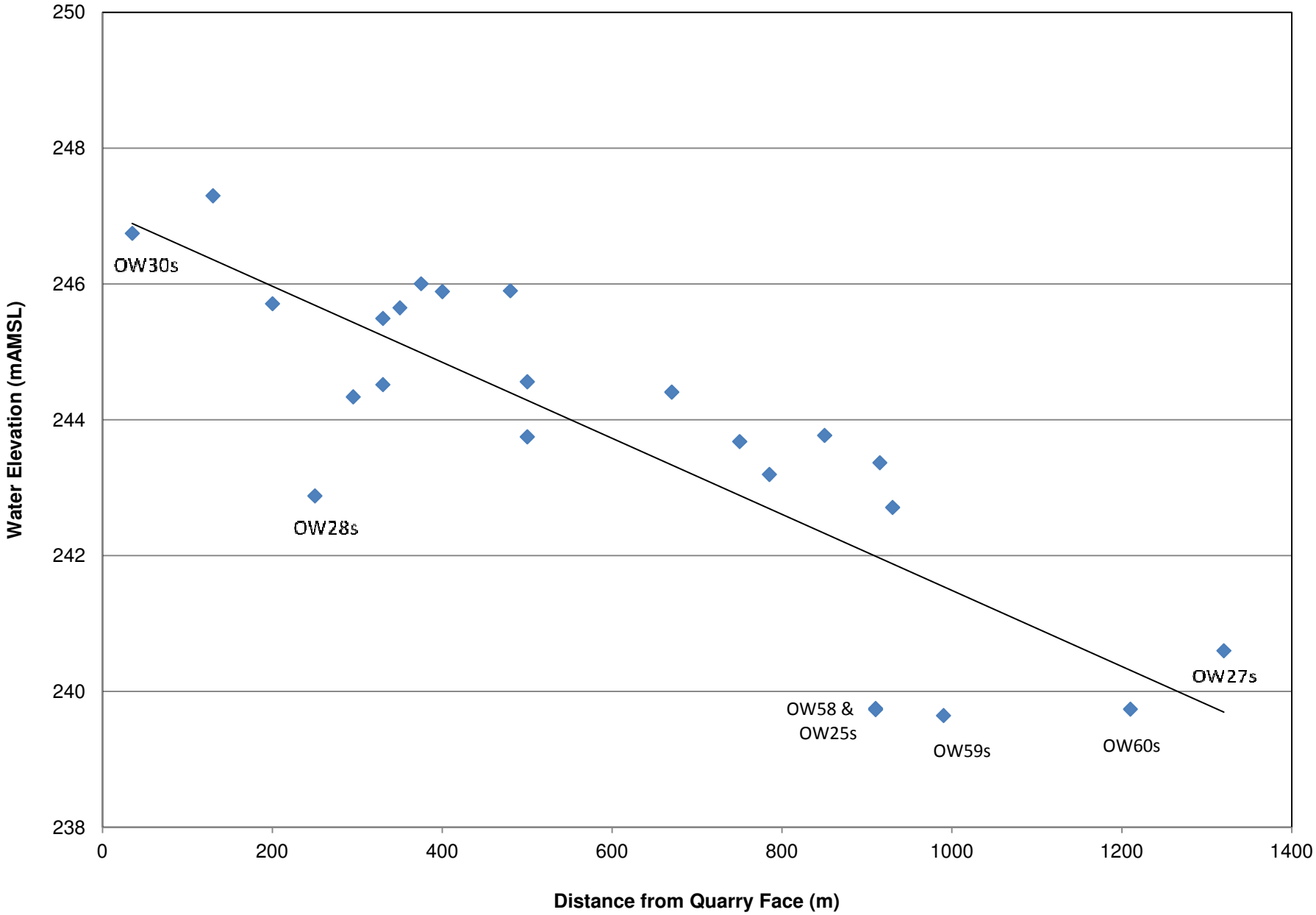
Hydrograph C-8.15: Distance-Water Elevation Shallow Bedrock (May-29-15)



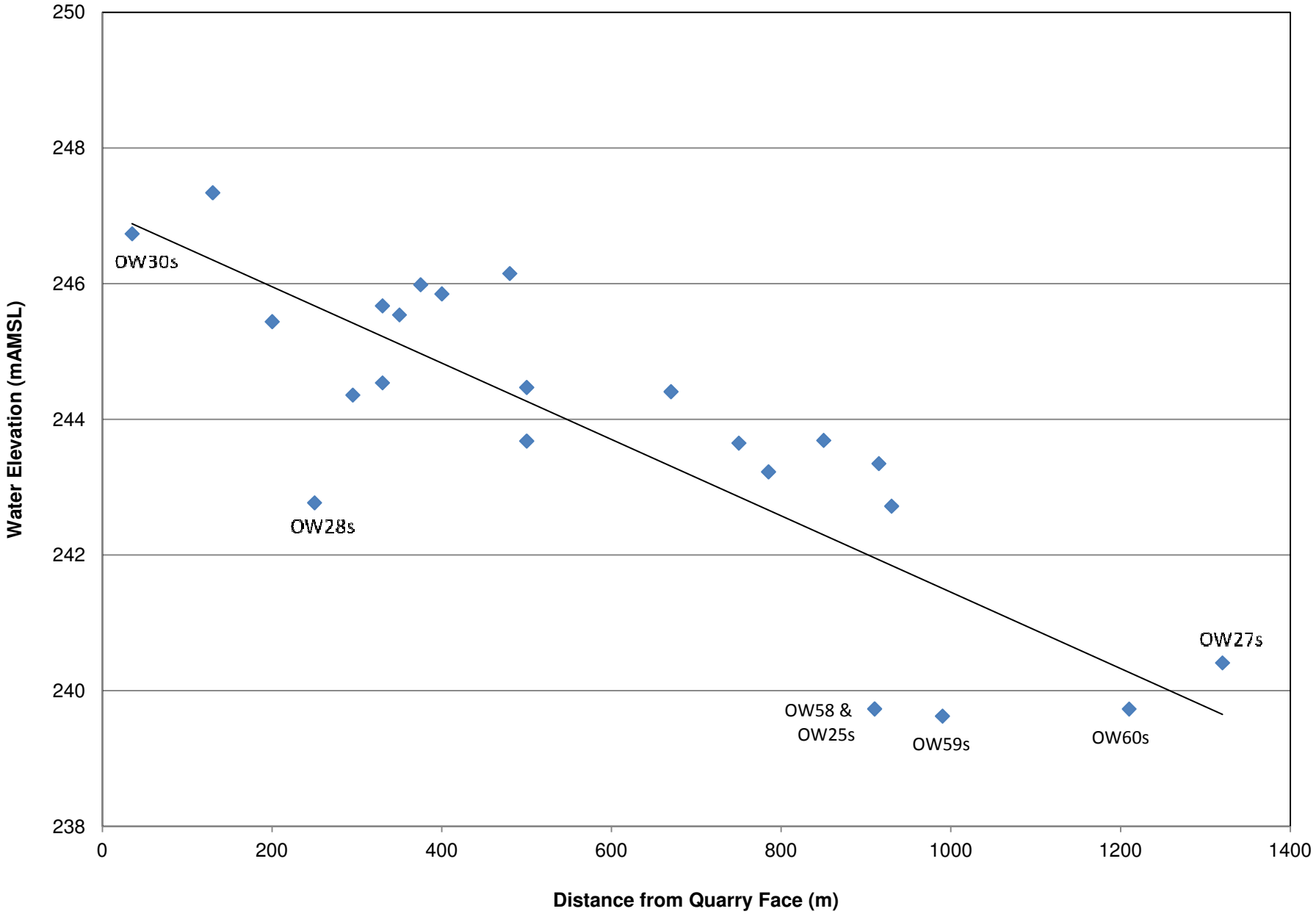
Hydrograph C-8.16: Distance-Water Elevation Shallow Bedrock (June-30-15)



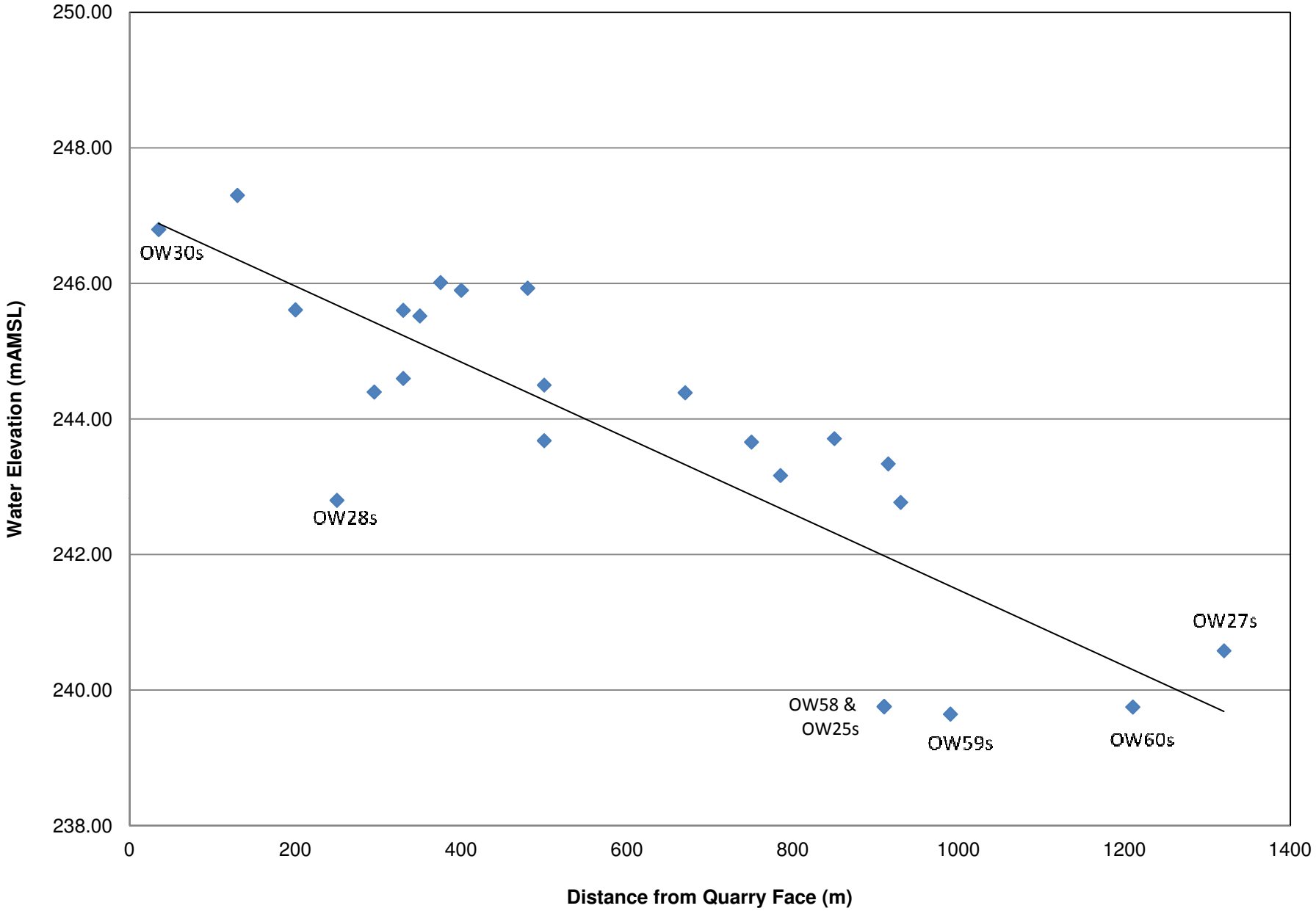
Hydrograph C-8.17: Distance-Water Elevation Shallow Bedrock (July-28-15)



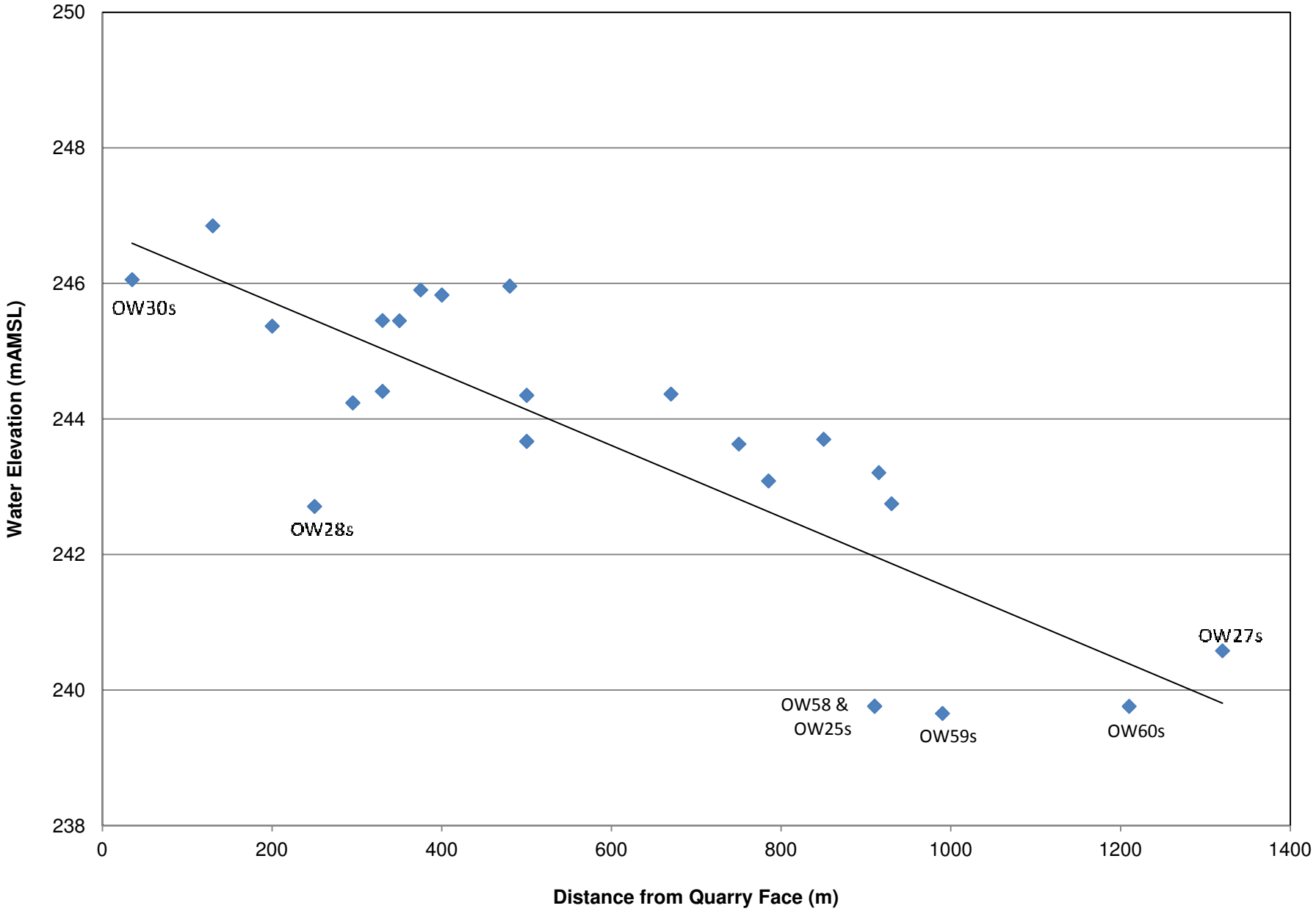
Hydrograph C-8.18: Distance-Water Elevation Shallow Bedrock (Aug-27-15)



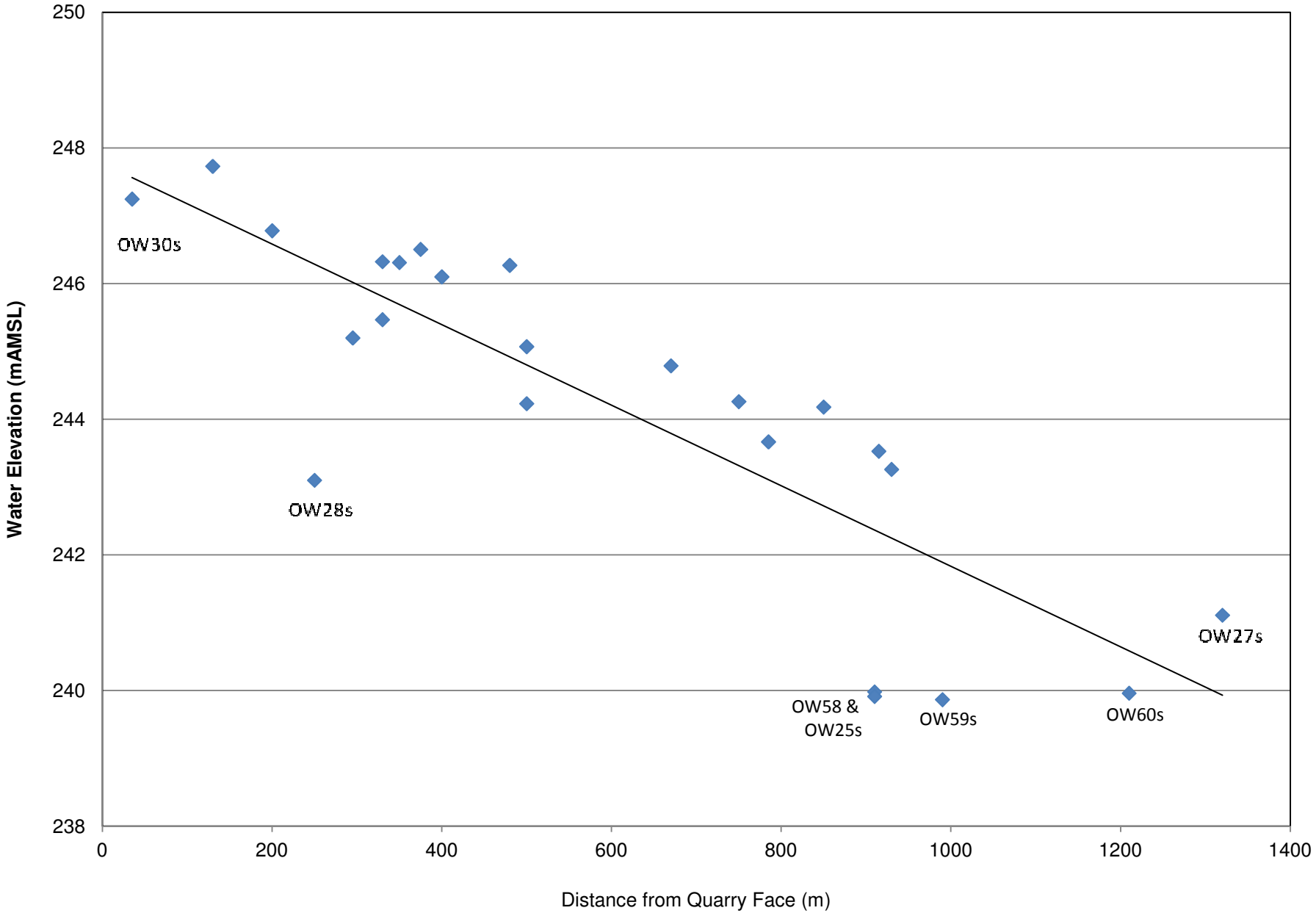
Hydrograph C-8.19: Distance-Water Elevation Shallow Bedrock (Sept-29-15)



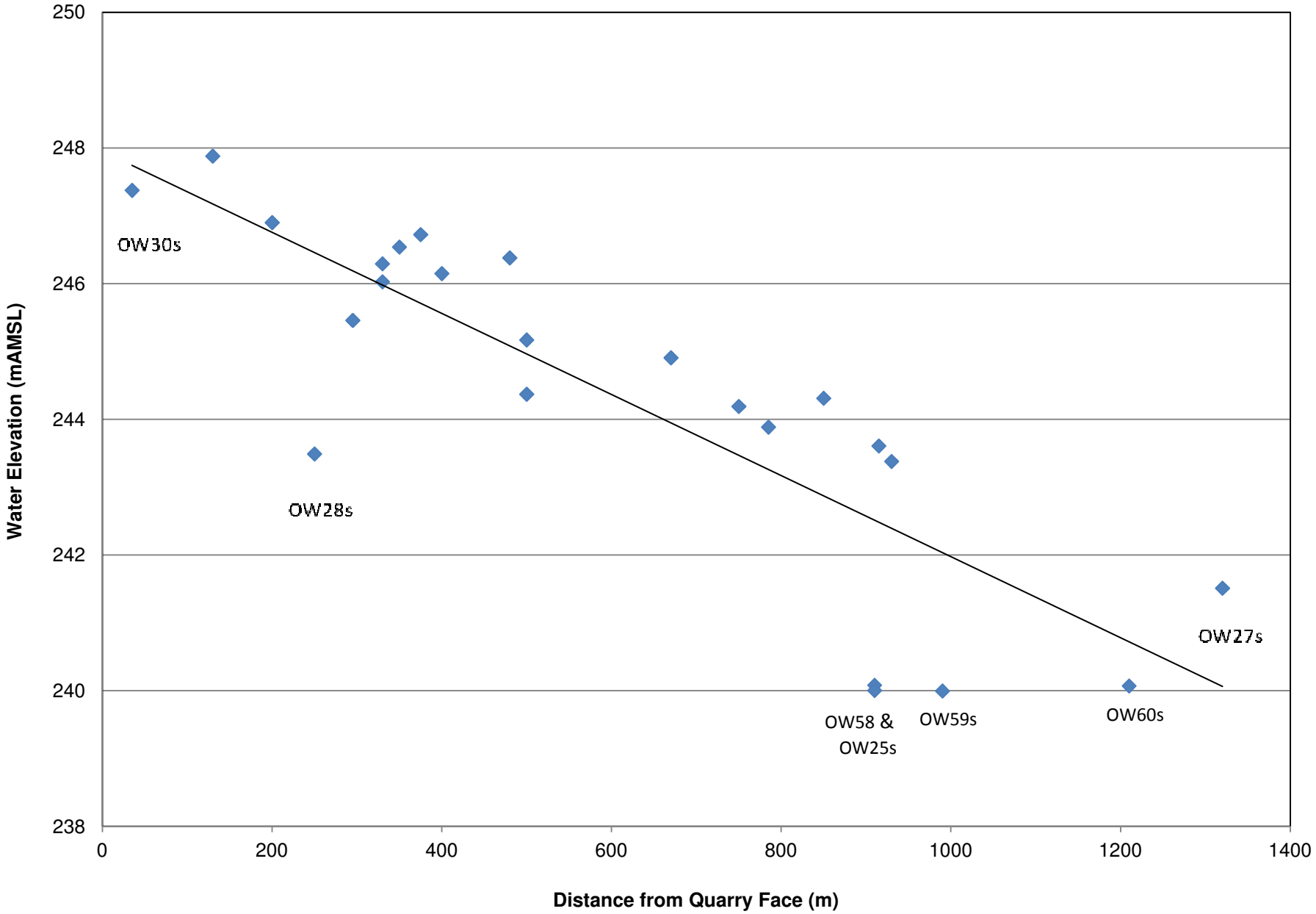
Hydrograph C-8.20: Distance-Water Elevation Shallow Bedrock (Oct- 22-15)



Hydrograph C-8.21: Distance-Water Elevation Shallow Bedrock (Nov-17-15)



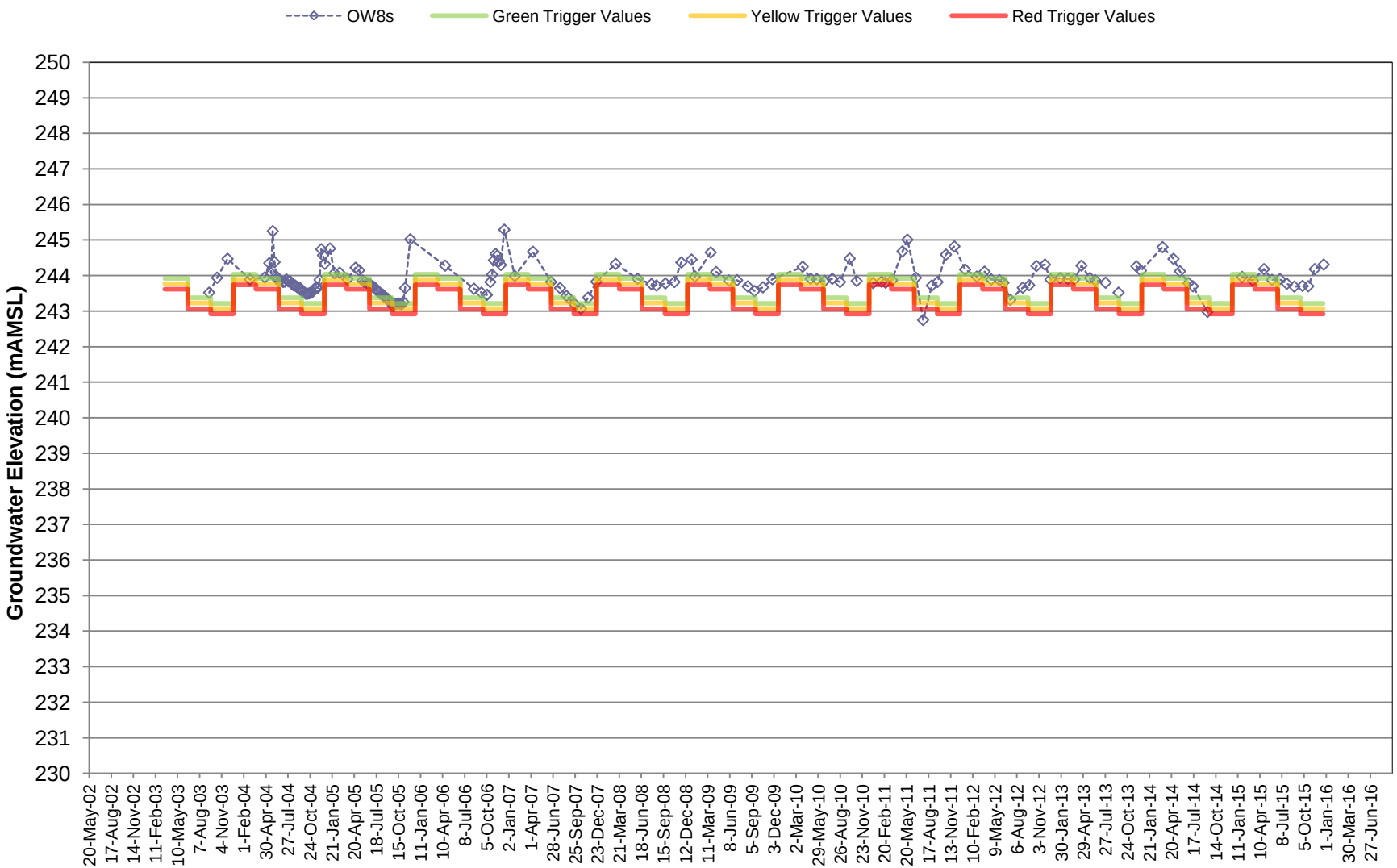
Hydrograph C-8.22: Distance-Water Elevation Shallow Bedrock (Dec-23-15)

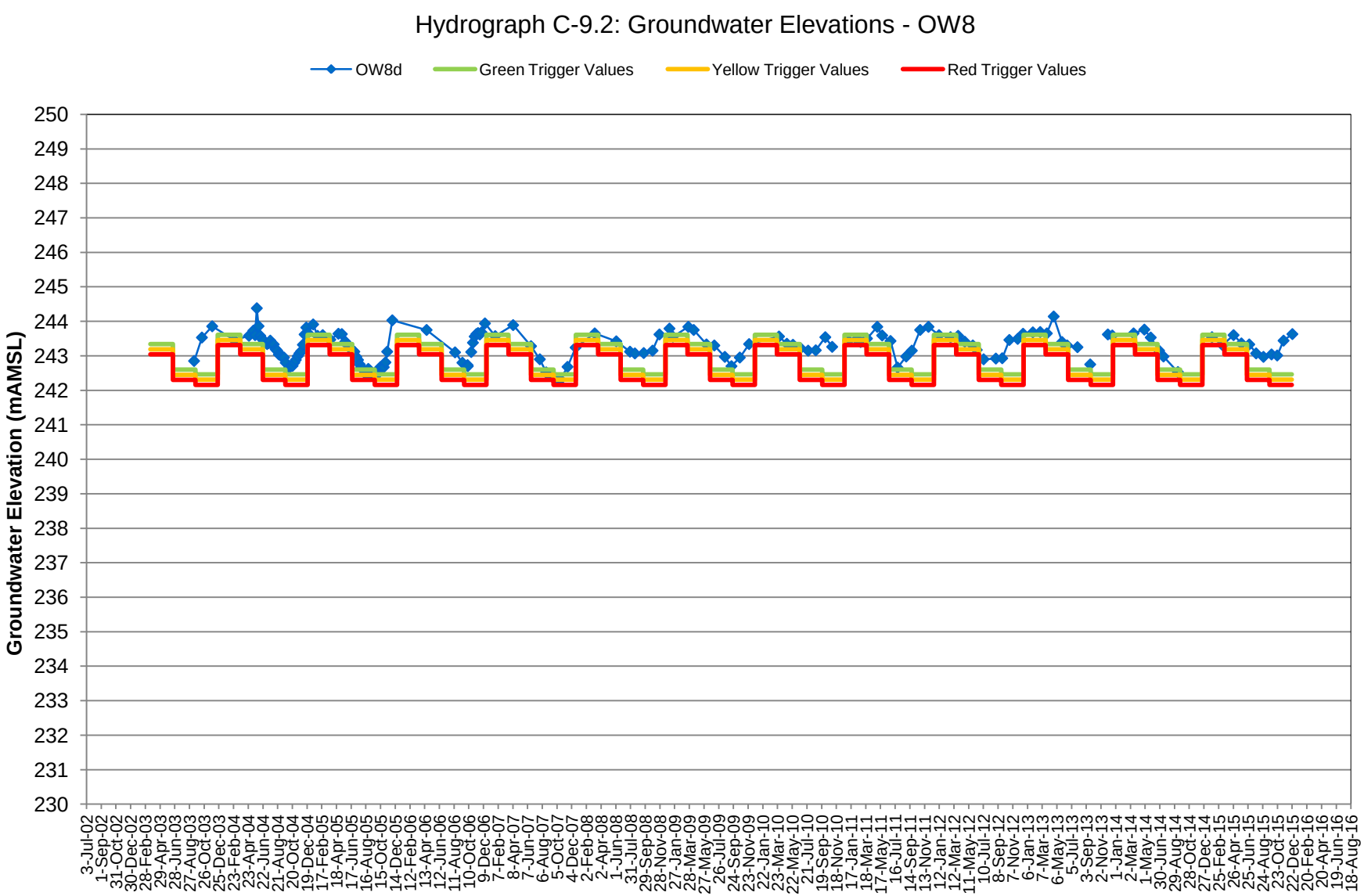


APPENDIX C9

SENTRY WELLS AND TRIGGER VALUES

Hydrograph C-9.1: Groundwater Elevations - OW8




Hydrograph C-9.2: Groundwater Elevations - OW8
OW8d
Green Trigger Values
Yellow Trigger Values
Red Trigger Values
Groundwater Elevation (mAMSL)
250
249
248
247
246
245
244
243
242
241
240
239
238
237
236
235
234
233
232
231
230
3-Jul-02
1-Sep-02
31-Oct-02
30-Dec-02
28-Feb-03
29-Apr-03
28-Jun-03
27-Aug-03
26-Oct-03
25-Dec-03
23-Feb-04
23-Apr-04
22-Jun-04
21-Aug-04
20-Oct-04
19-Dec-04
17-Feb-05
18-Apr-05
17-Jun-05
16-Aug-05
15-Oct-05
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12-Jun-06
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7-Feb-07
8-Apr-07
7-Jun-07
6-Aug-07
5-Oct-07
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1-Jun-08
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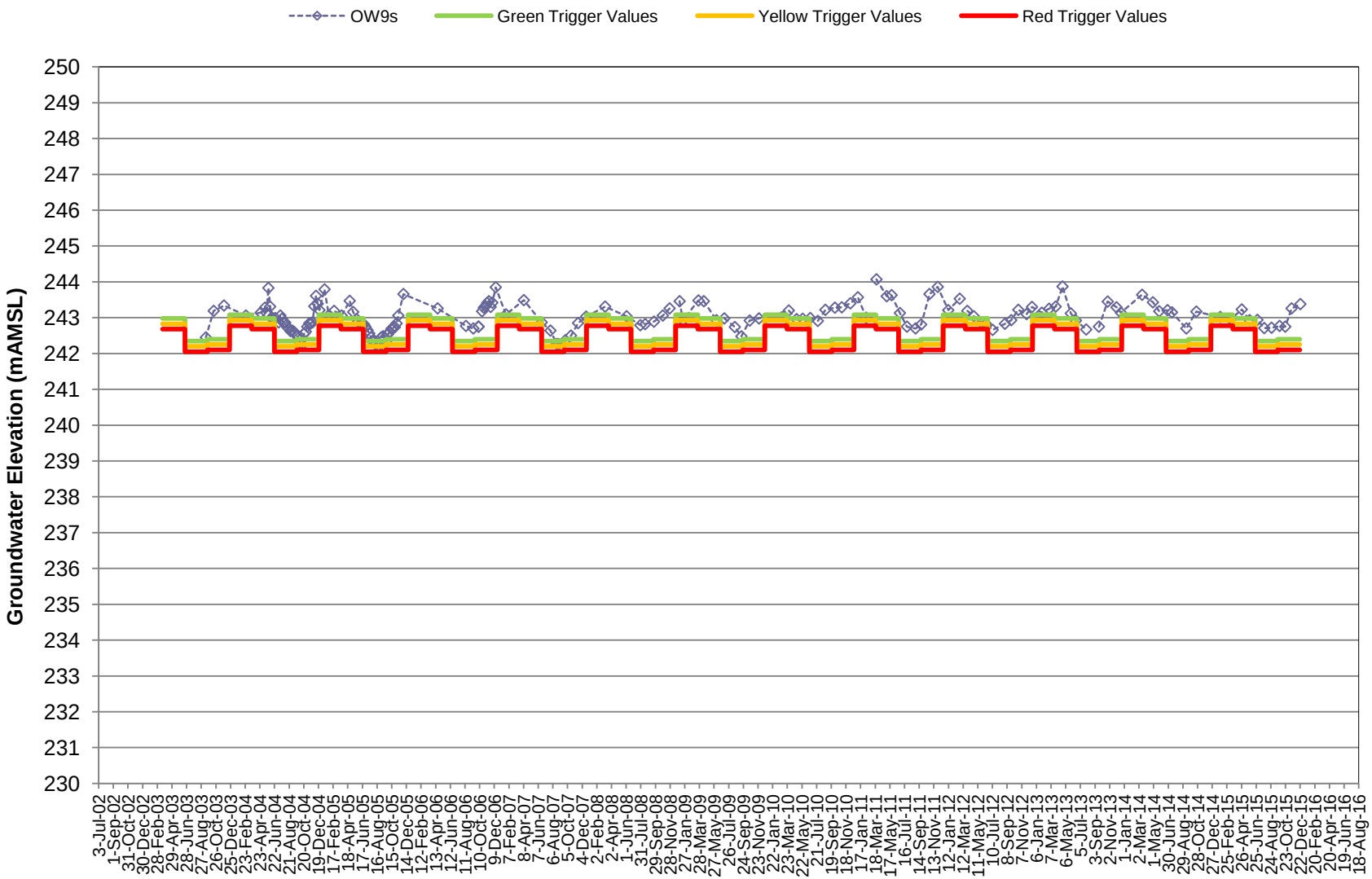
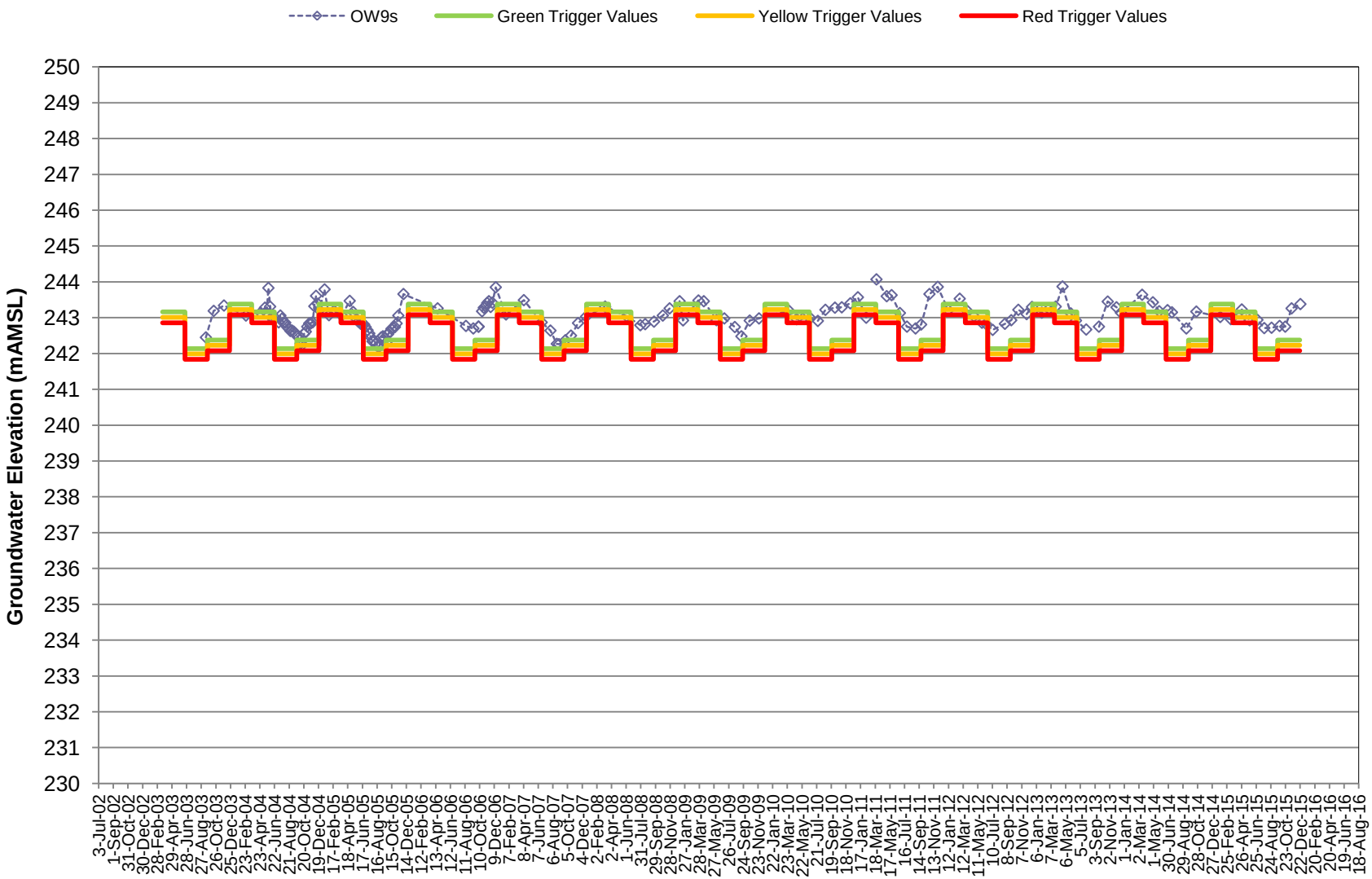
27-Dec-14
25-Feb-15
26-Apr-15
25-Jun-15
24-Aug-15
23-Oct-15
22-Dec-15
20-Feb-16
20-Apr-16
19-Jun-16
18-Aug-16

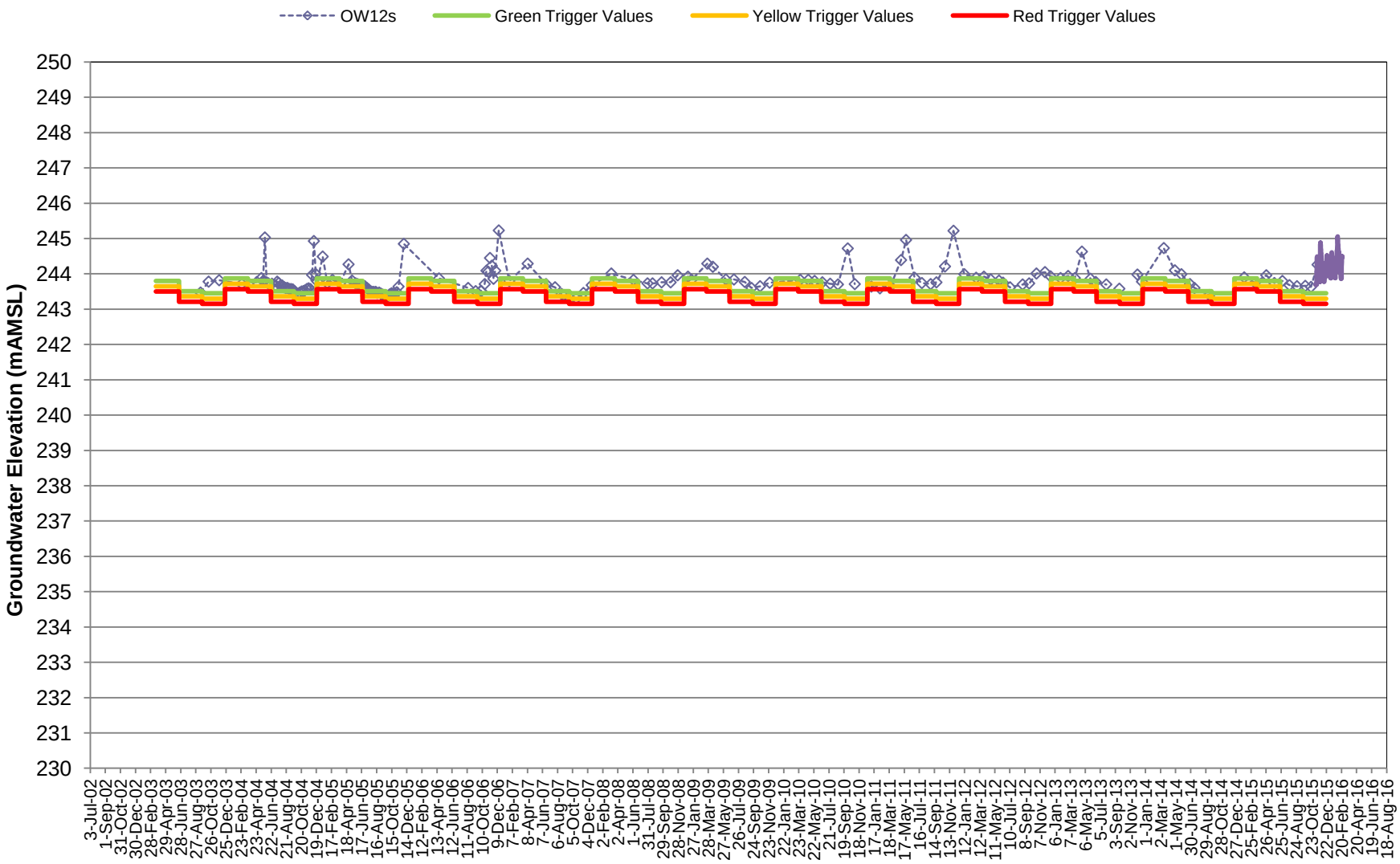
Hydrograph C-9.3: Groundwater Elevations - OW9 and OW10

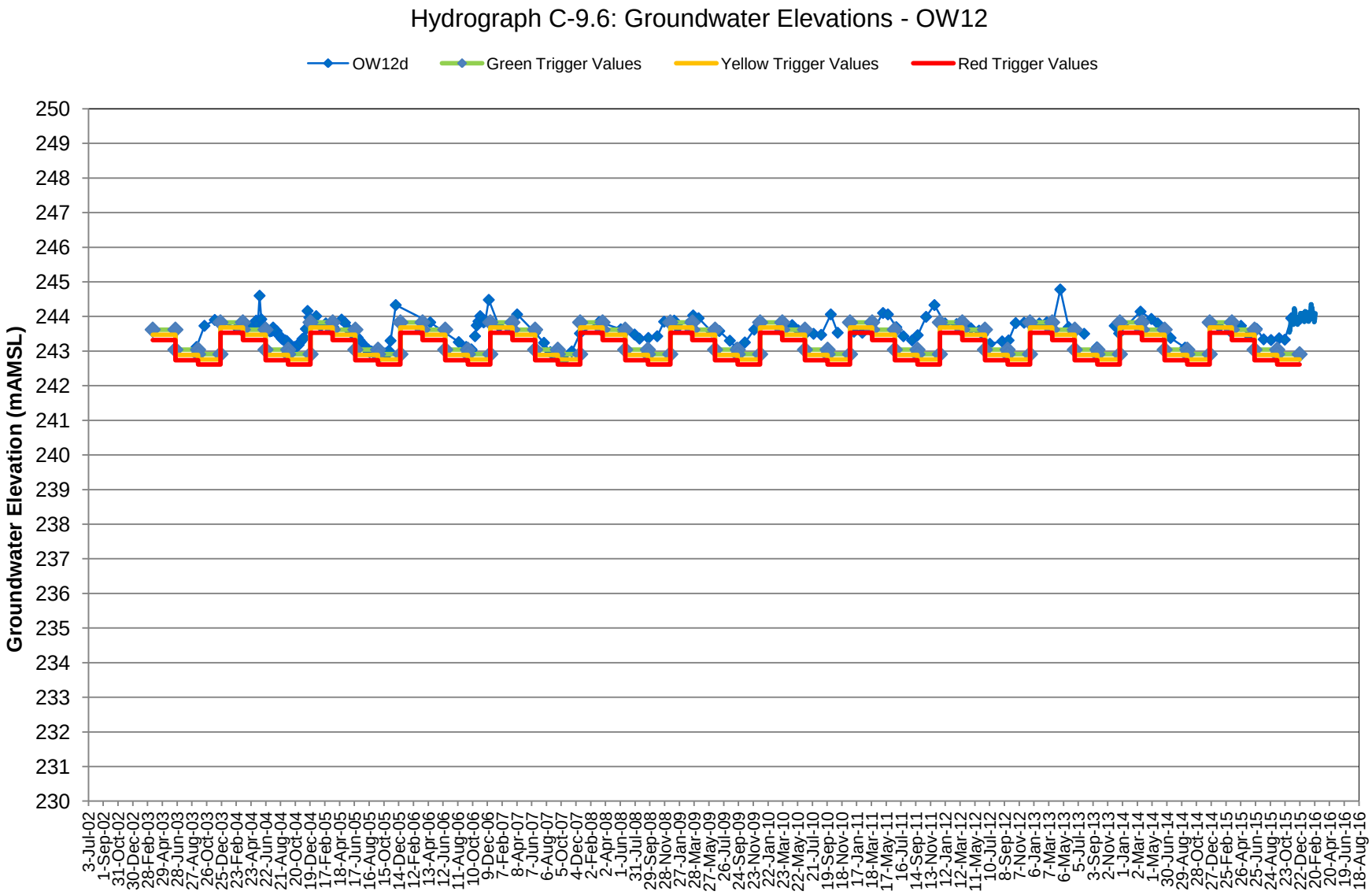


Hydrograph C-9.4: Groundwater Elevations - OW9 and OW10



Hydrograph C-9.5: Groundwater Elevations - OW12




Hydrograph C-9.6: Groundwater Elevations - OW12
OW12d
Green Trigger Values
Yellow Trigger Values
Red Trigger Values
Groundwater Elevation (mAMSL)
250
249
248
247
246
245
244
243
242
241
240
239
238
237
236
235
234
233
232
231
230
3-Jul-02
1-Sep-02
31-Oct-02
30-Dec-02
28-Feb-03
29-Apr-03
28-Jun-03
27-Aug-03
26-Oct-03
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23-Feb-04
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18-Mar-11
17-May-11
16-Jul-11
14-Sep-11
13-Nov-11
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25-Feb-15
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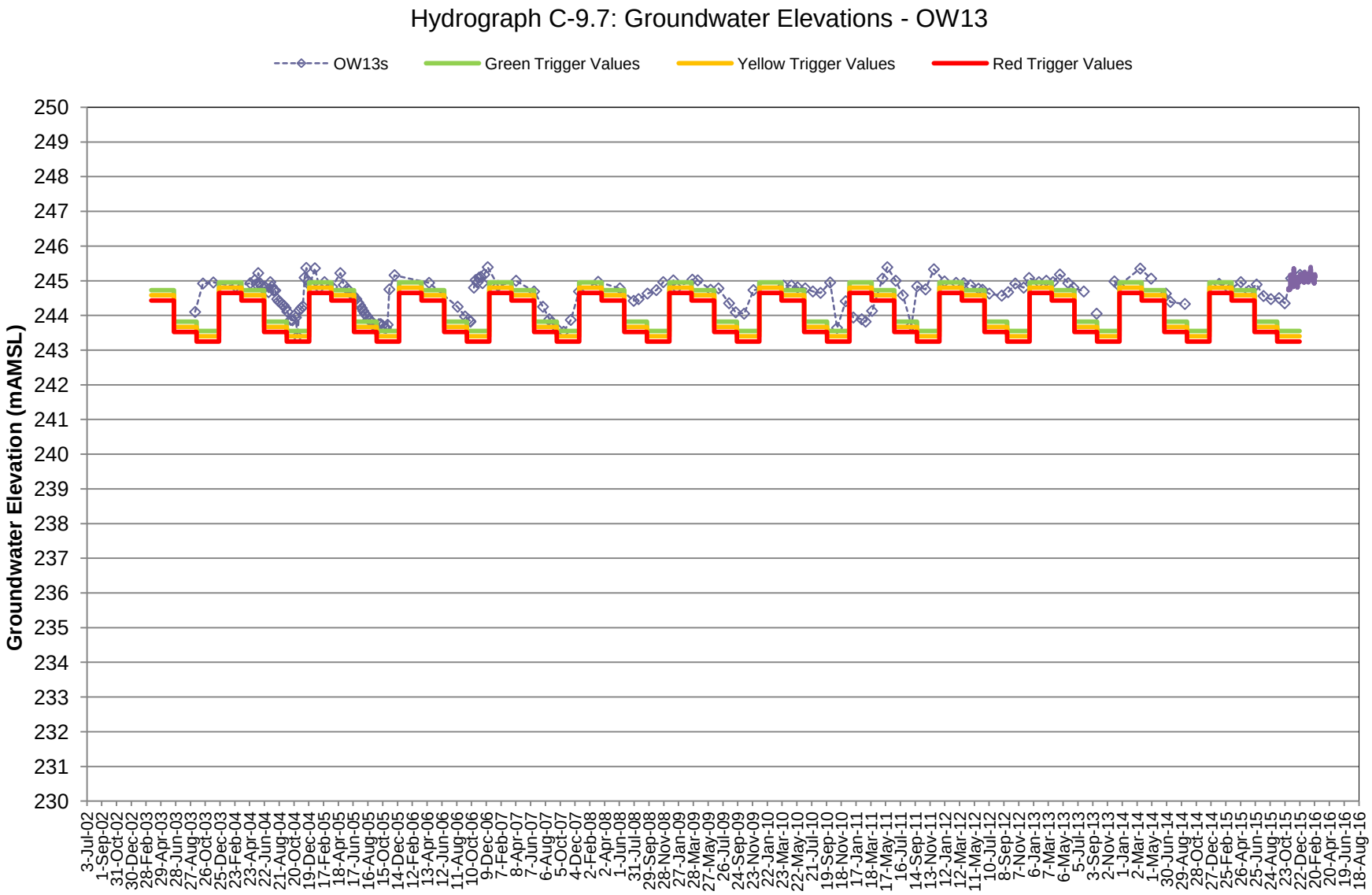
23-Oct-15
22-Dec-15
20-Feb-16
20-Apr-16
19-Jun-16
18-Aug-16


Hydrograph C-9.7: Groundwater Elevations - OW13
OW13s
Green Trigger Values
Yellow Trigger Values
Red Trigger Values
Groundwater Elevation (mAMSL)
250
249
248
247
246
245
244
243
242
241
240
239
238
237
236
235
234
233
232
231
230
3-Jul-02
1-Sep-02
31-Oct-02
30-Dec-02
28-Feb-03
29-Apr-03
28-Jun-03
27-Aug-03
26-Oct-03
25-Dec-03
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29-Sep-08
28-Nov-08
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28-Mar-09
27-May-09
26-Jul-09
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23-Nov-09
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22-May-10
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19-Sep-10
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27-Dec-14
25-Feb-15
26-Apr-15
25-Jun-15
24-Aug-15
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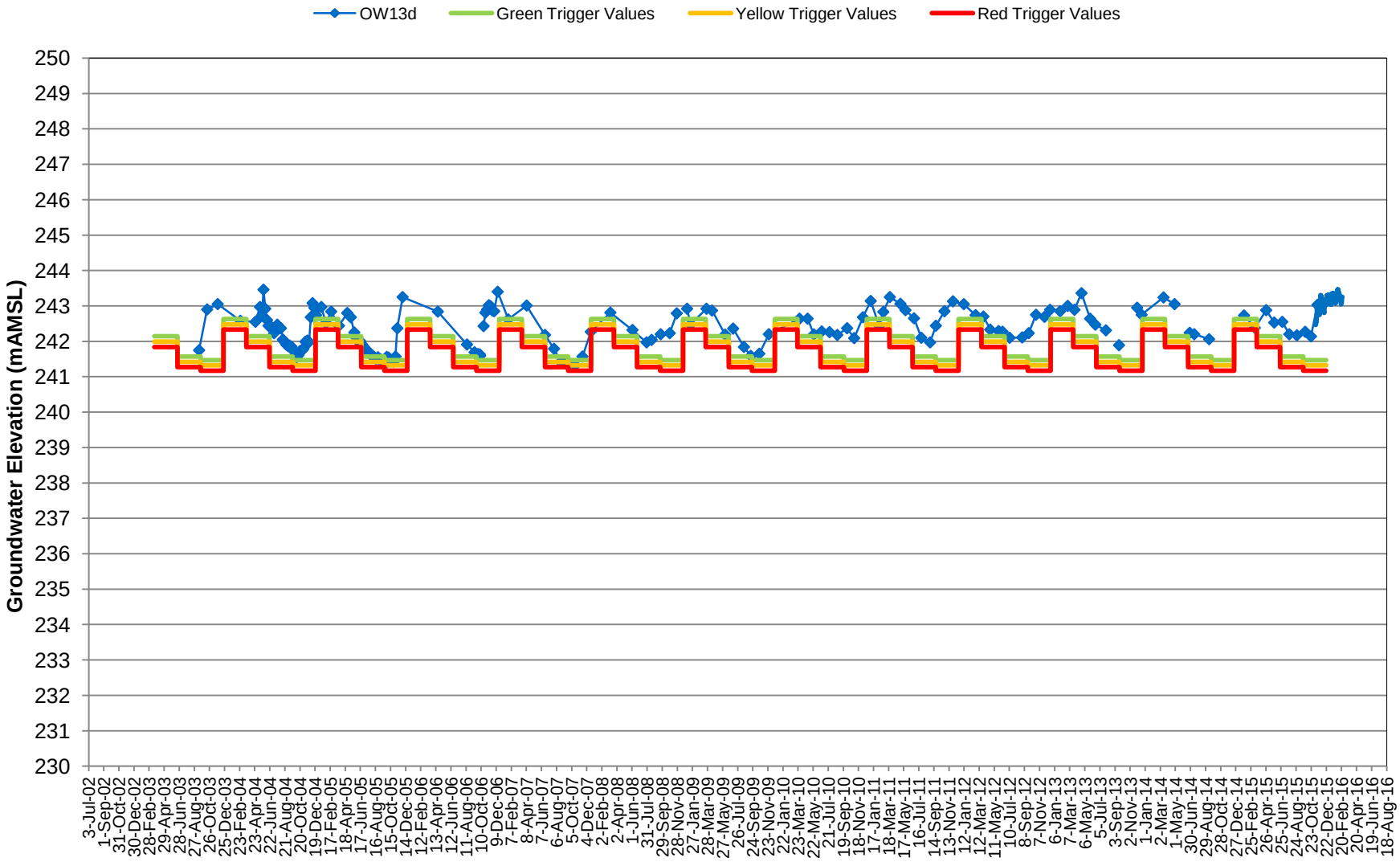
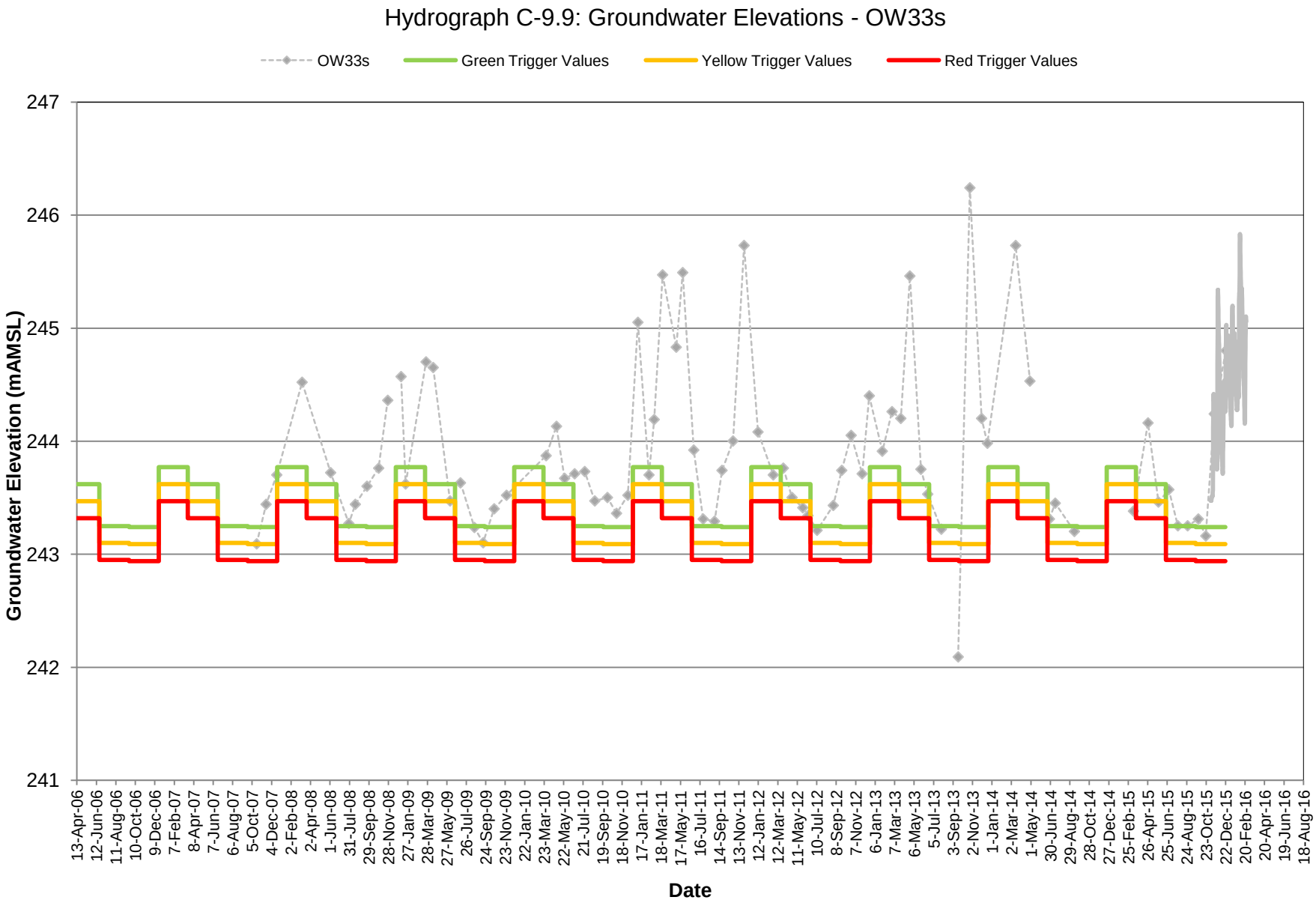
20-Apr-16
19-Jun-16
18-Aug-16

Hydrograph C-9.8: Groundwater Elevations - OW13




Hydrograph C-9.9: Groundwater Elevations - OW33s
OW33s
Green Trigger Values
Yellow Trigger Values
Red Trigger Values
Groundwater Elevation (mAMSL)
247
246
245
244
243
242
241
13-Apr-06
12-Jun-06
11-Aug-06
10-Oct-06
9-Dec-06
7-Feb-07
8-Apr-07
7-Jun-07
6-Aug-07
5-Oct-07
4-Dec-07
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29-Sep-08
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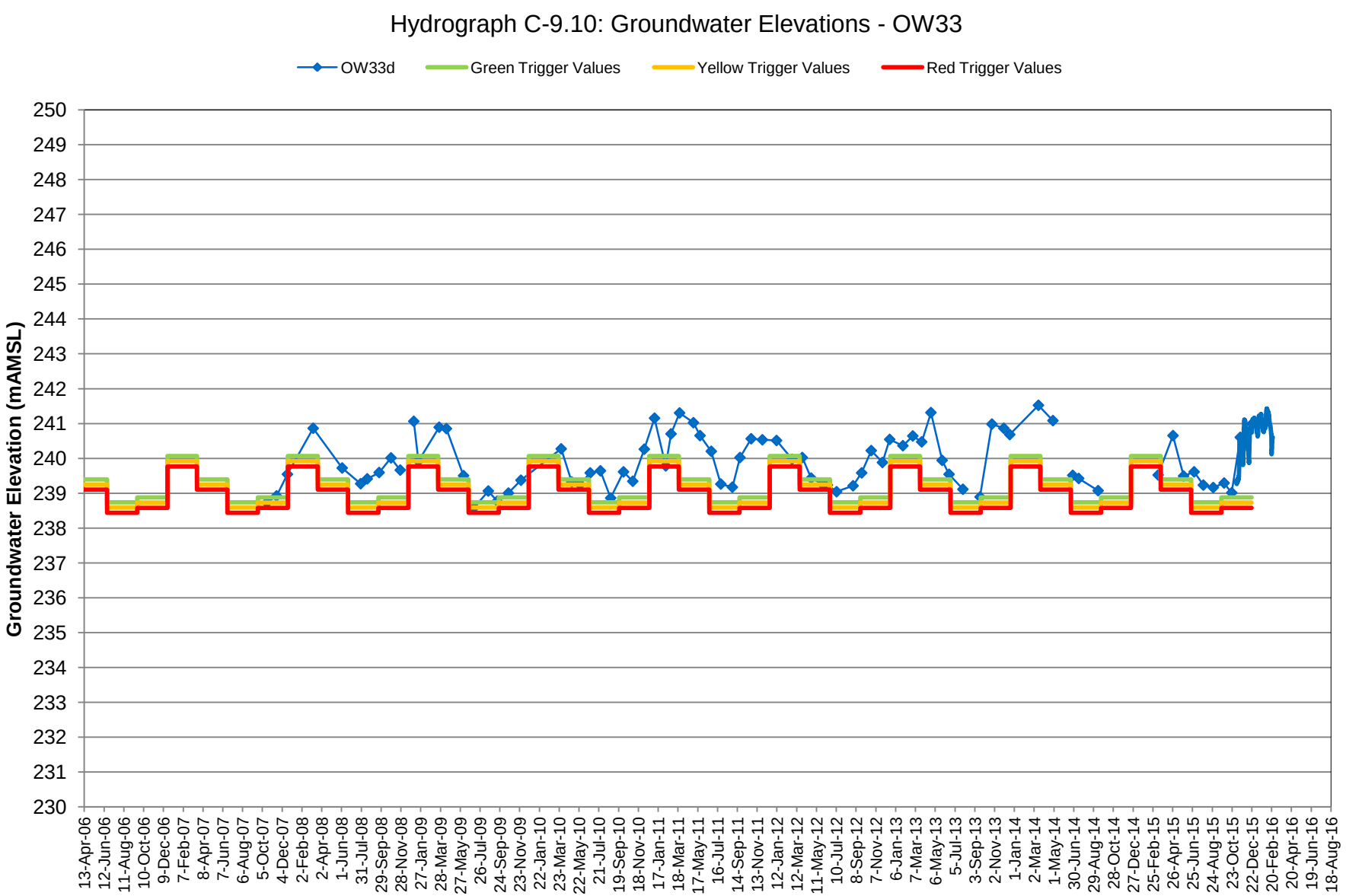
19-Jun-16
18-Aug-16
Date


Hydrograph C-9.10: Groundwater Elevations - OW33
OW33d
Green Trigger Values
Yellow Trigger Values
Red Trigger Values
Groundwater Elevation (mAMSL)
250
249
248
247
246
245
244
243
242
241
240
239
238
237
236
235
234
233
232
231
230
13-Apr-06
12-Jun-06
11-Aug-06
10-Oct-06
9-Dec-06
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7-Nov-12
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1-Jan-14
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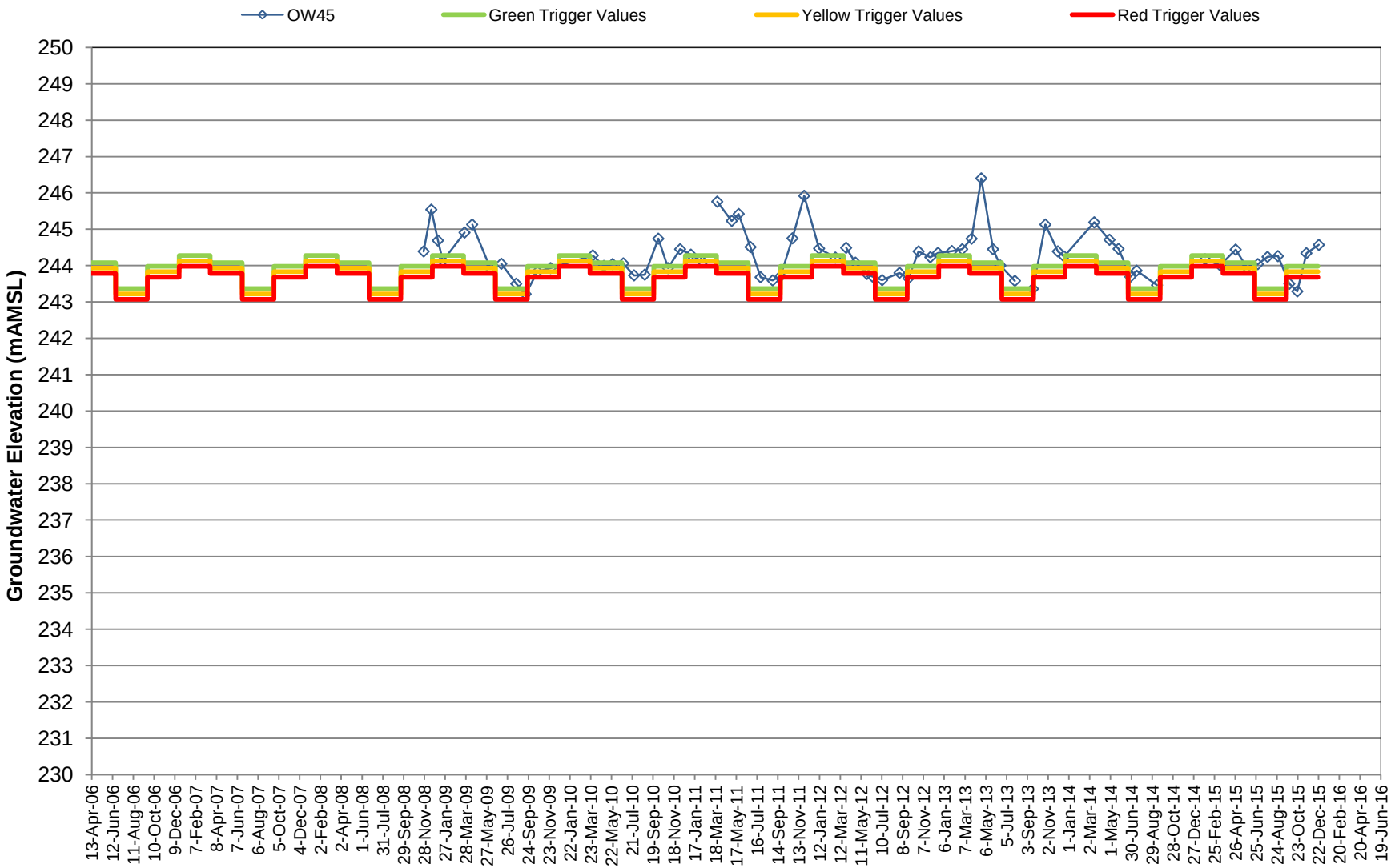
26-Apr-15
25-Jun-15
24-Aug-15
23-Oct-15
22-Dec-15
20-Feb-16
20-Apr-16
19-Jun-16
18-Aug-16


Hydrograph C-9.11: Groundwater Elevations - OW45
OW45
Green Trigger Values
Yellow Trigger Values
Red Trigger Values
Groundwater Elevation (mAMSL)
250
249
248
247
246
245
244
243
242
241
240
239
238
237
236
235
234
233
232
231
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12-Jun-06
11-Aug-06
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9-Dec-06
7-Feb-07
8-Apr-07
7-Jun-07
6-Aug-07
5-Oct-07
4-Dec-07
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31-Jul-08
29-Sep-08
28-Nov-08
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7-Mar-13
6-May-13
5-Jul-13
3-Sep-13
2-Nov-13
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1-May-14
30-Jun-14
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27-Dec-14
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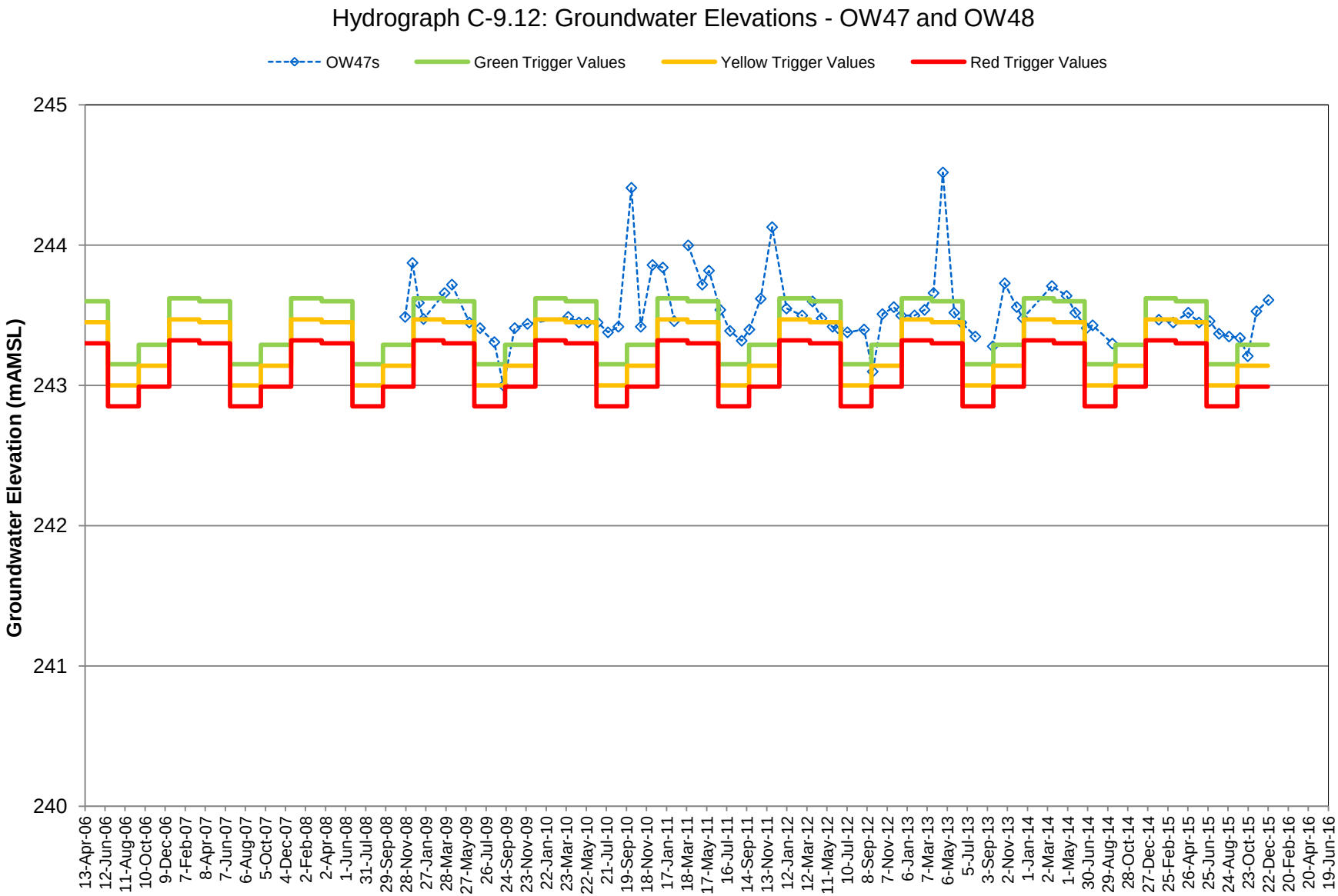
20-Apr-16
19-Jun-16


Hydrograph C-9.12: Groundwater Elevations - OW47 and OW48
OW47s
Green Trigger Values
Yellow Trigger Values
Red Trigger Values
Groundwater Elevation (mAMSL)
245
244
243
242
241
240
13-Apr-06
12-Jun-06
11-Aug-06
10-Oct-06
9-Dec-06
7-Feb-07
8-Apr-07
7-Jun-07
6-Aug-07
5-Oct-07
4-Dec-07
2-Feb-08
2-Apr-08
1-Jun-08
31-Jul-08
29-Sep-08
28-Nov-08
27-Jan-09
28-Mar-09
27-May-09
26-Jul-09
24-Sep-09
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18-Mar-11
17-May-11
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28-Oct-14
27-Dec-14
25-Feb-15
26-Apr-15
25-Jun-15
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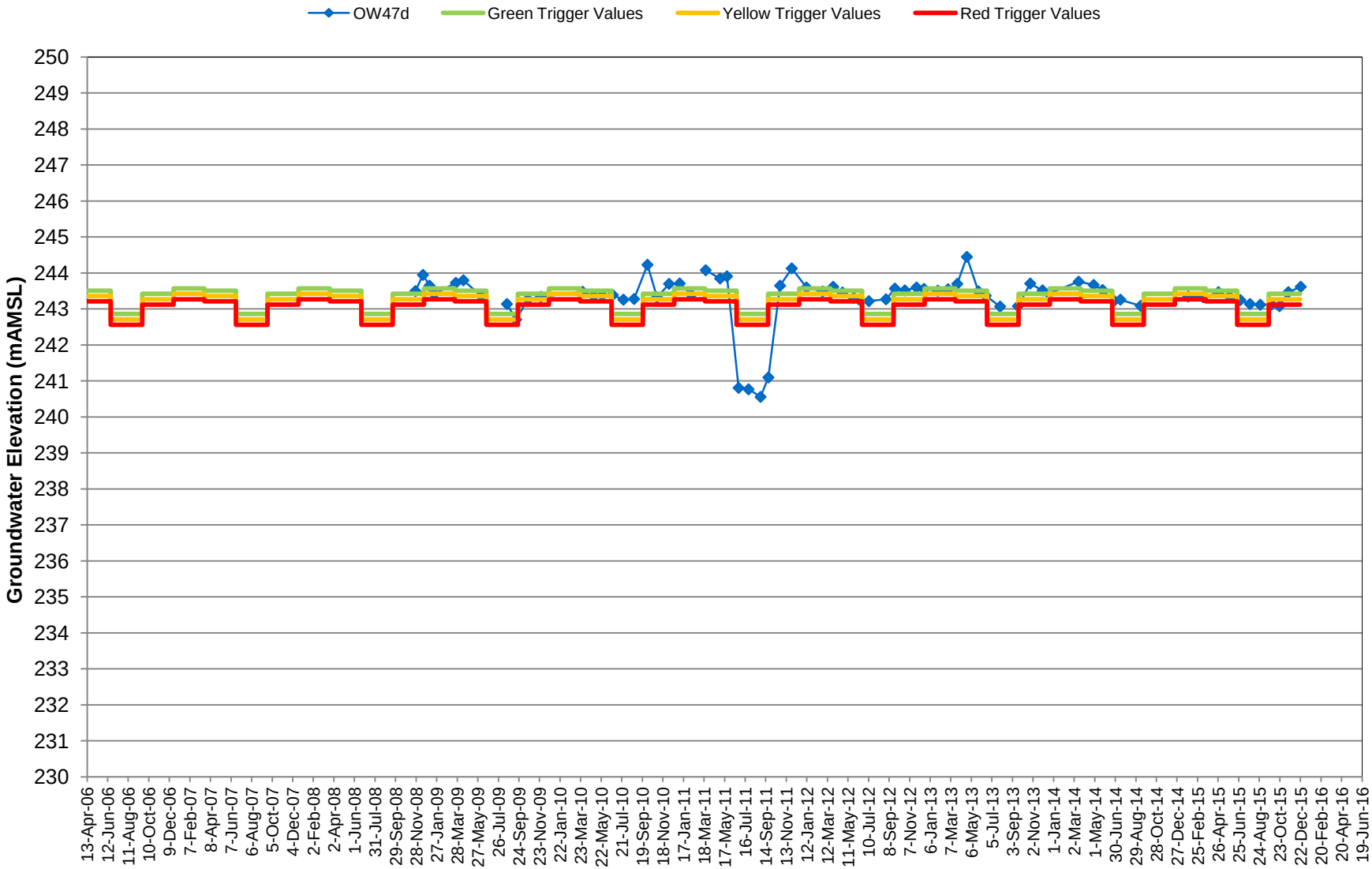
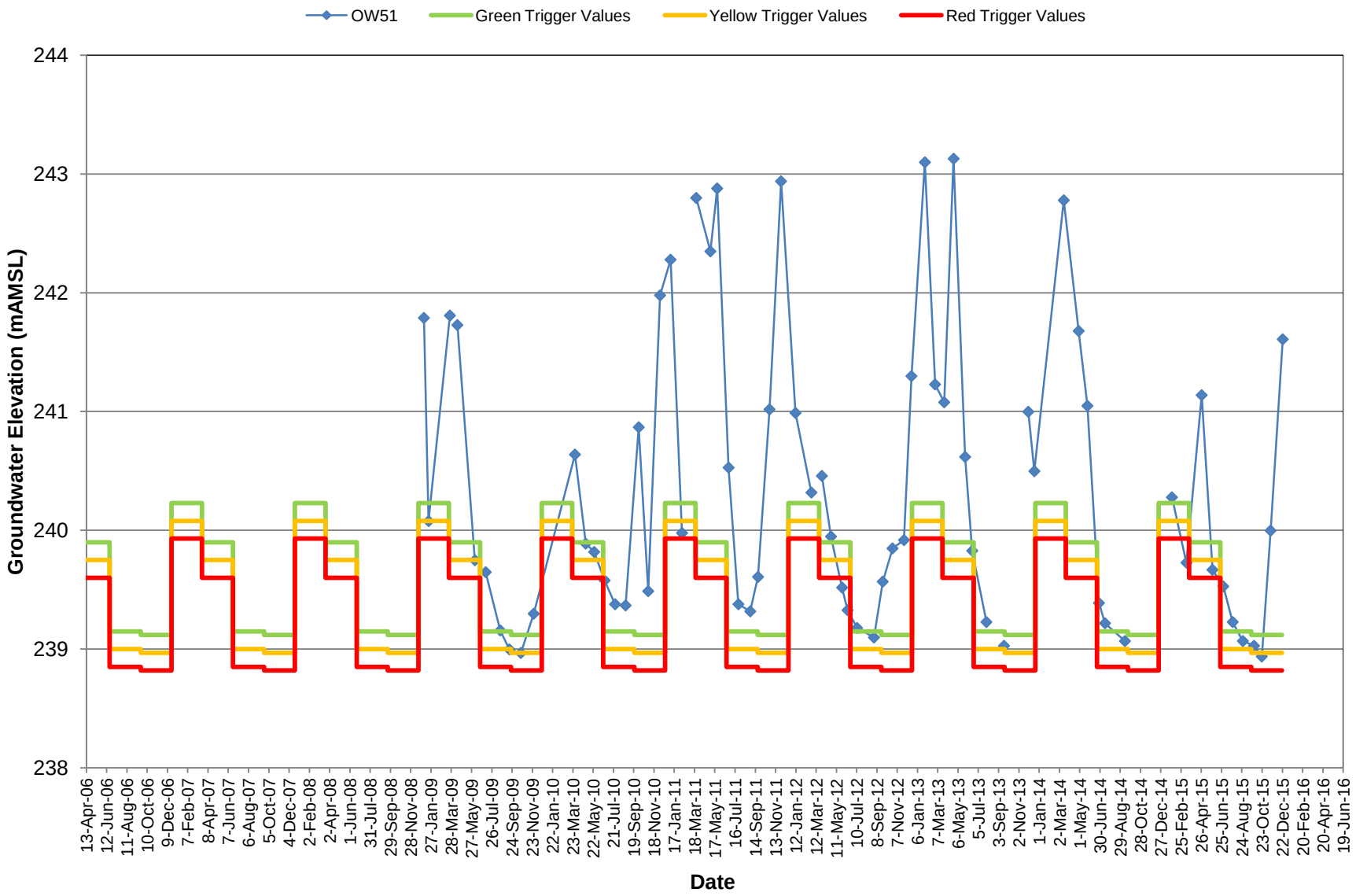
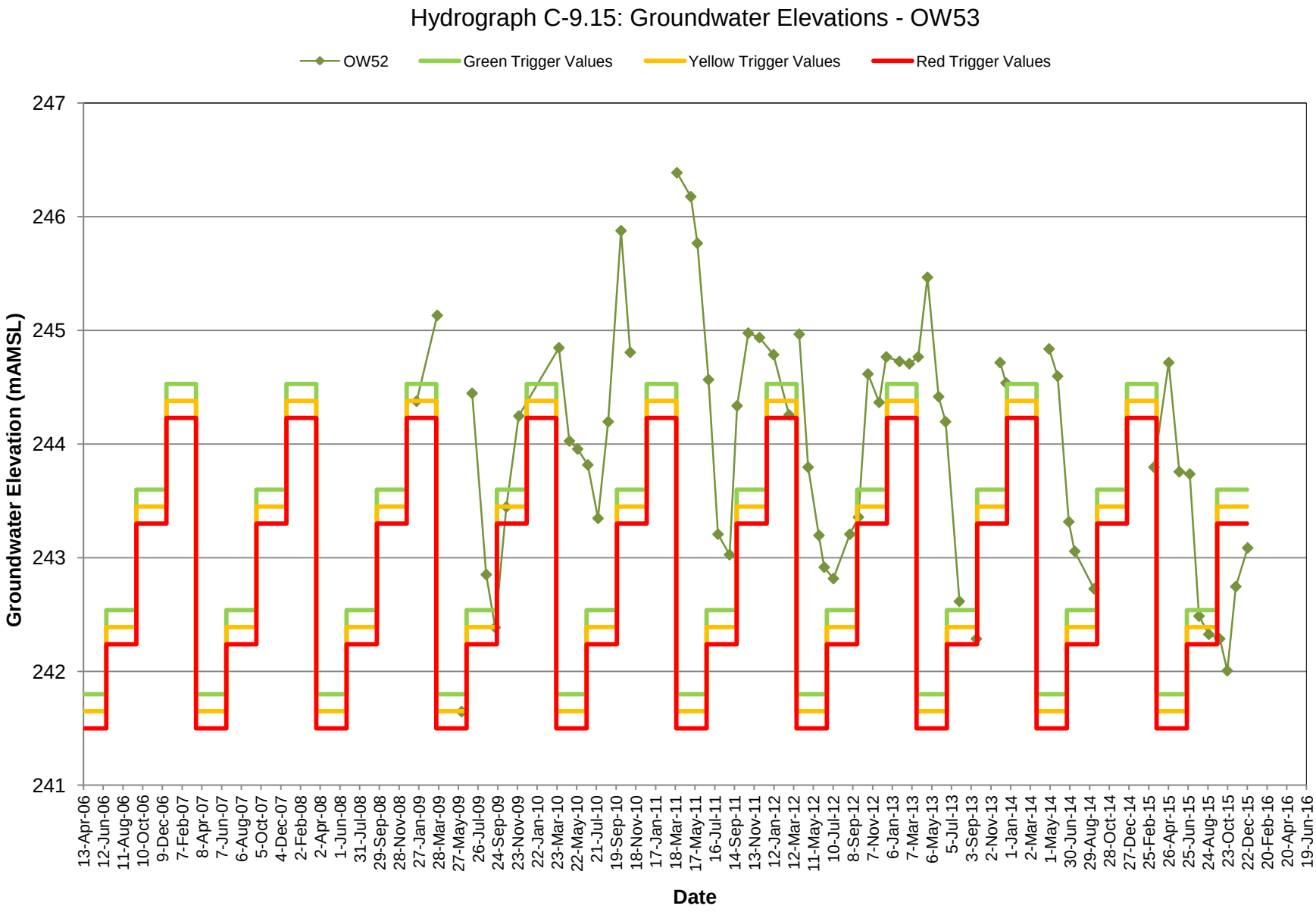
23-Oct-15
22-Dec-15
20-Feb-16
20-Apr-16
19-Jun-16

Hydrograph C-9.13: Groundwater Elevations - OW47 and OW48



Hydrograph C-9.14: Groundwater Elevations - OW51




Hydrograph C-9.15: Groundwater Elevations - OW53
OW52
Green Trigger Values
Yellow Trigger Values
Red Trigger Values
Groundwater Elevation (mAMSL)
247
246
245
244
243
242
241
13-Apr-06
12-Jun-06
11-Aug-06
10-Oct-06
9-Dec-06
7-Feb-07
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7-Jun-07
6-Aug-07
5-Oct-07
4-Dec-07
2-Feb-08
2-Apr-08
1-Jun-08
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29-Sep-08
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17-Jan-11
18-Mar-11
17-May-11
16-Jul-11
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5-Jul-13
3-Sep-13
2-Nov-13
1-Jan-14
2-Mar-14
1-May-14
30-Jun-14
29-Aug-14
28-Oct-14
27-Dec-14
25-Feb-15
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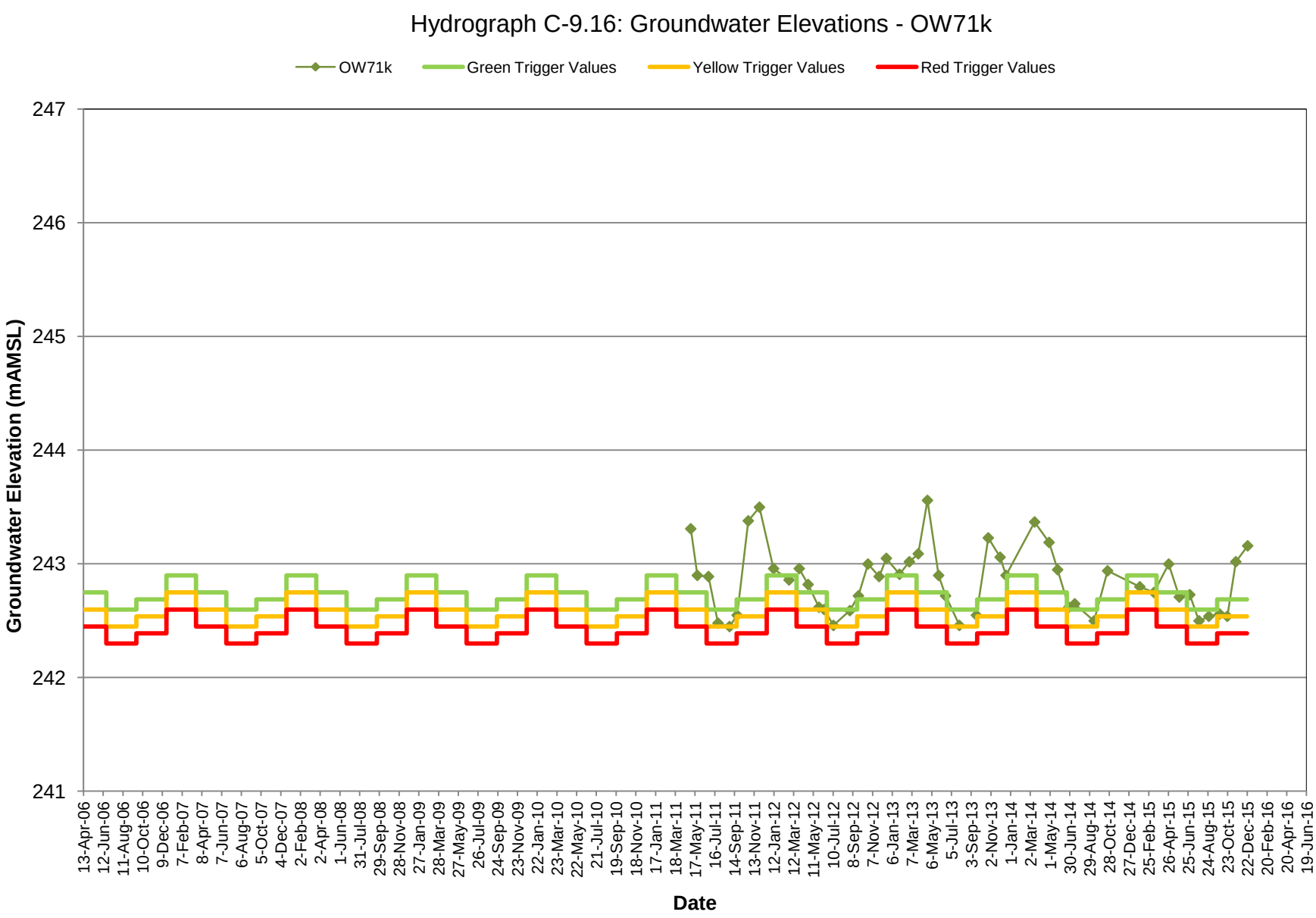
20-Apr-16
19-Jun-16
Date


Hydrograph C-9.16: Groundwater Elevations - OW71k
OW71k
Green Trigger Values
Yellow Trigger Values
Red Trigger Values
Groundwater Elevation (mAMSL)
247
246
245
244
243
242
241
13-Apr-06
12-Jun-06
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9-Dec-06
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8-Apr-07
7-Jun-07
6-Aug-07
5-Oct-07
4-Dec-07
2-Feb-08
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1-Jun-08
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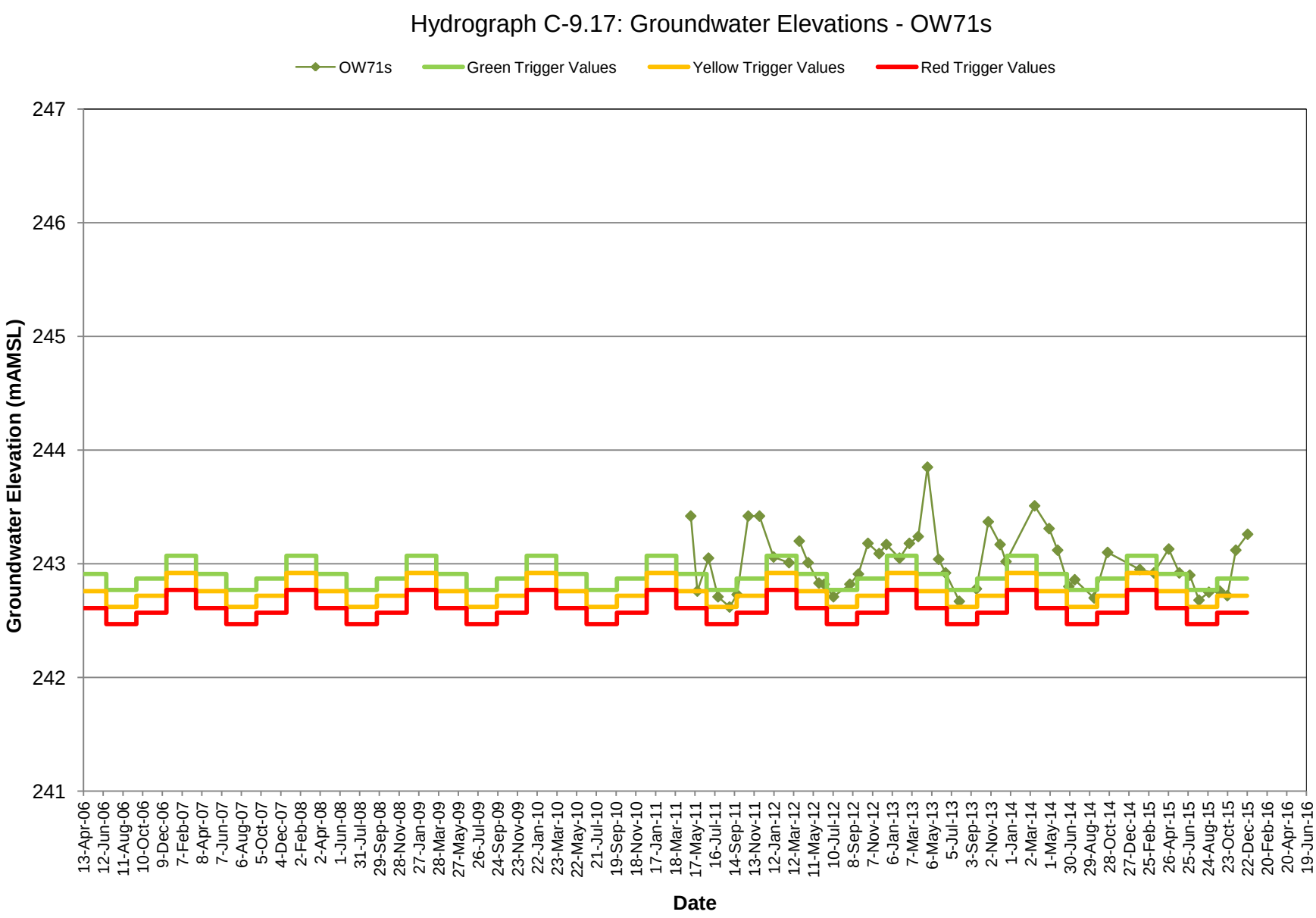
19-Jun-16
Date


Hydrograph C-9.17: Groundwater Elevations - OW71s
OW71s
Green Trigger Values
Yellow Trigger Values
Red Trigger Values
Groundwater Elevation (mAMSL)
247
246
245
244
243
242
241
13-Apr-06
12-Jun-06
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7-Feb-07
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7-Jun-07
6-Aug-07
5-Oct-07
4-Dec-07
2-Feb-08
2-Apr-08
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6-May-13
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28-Oct-14
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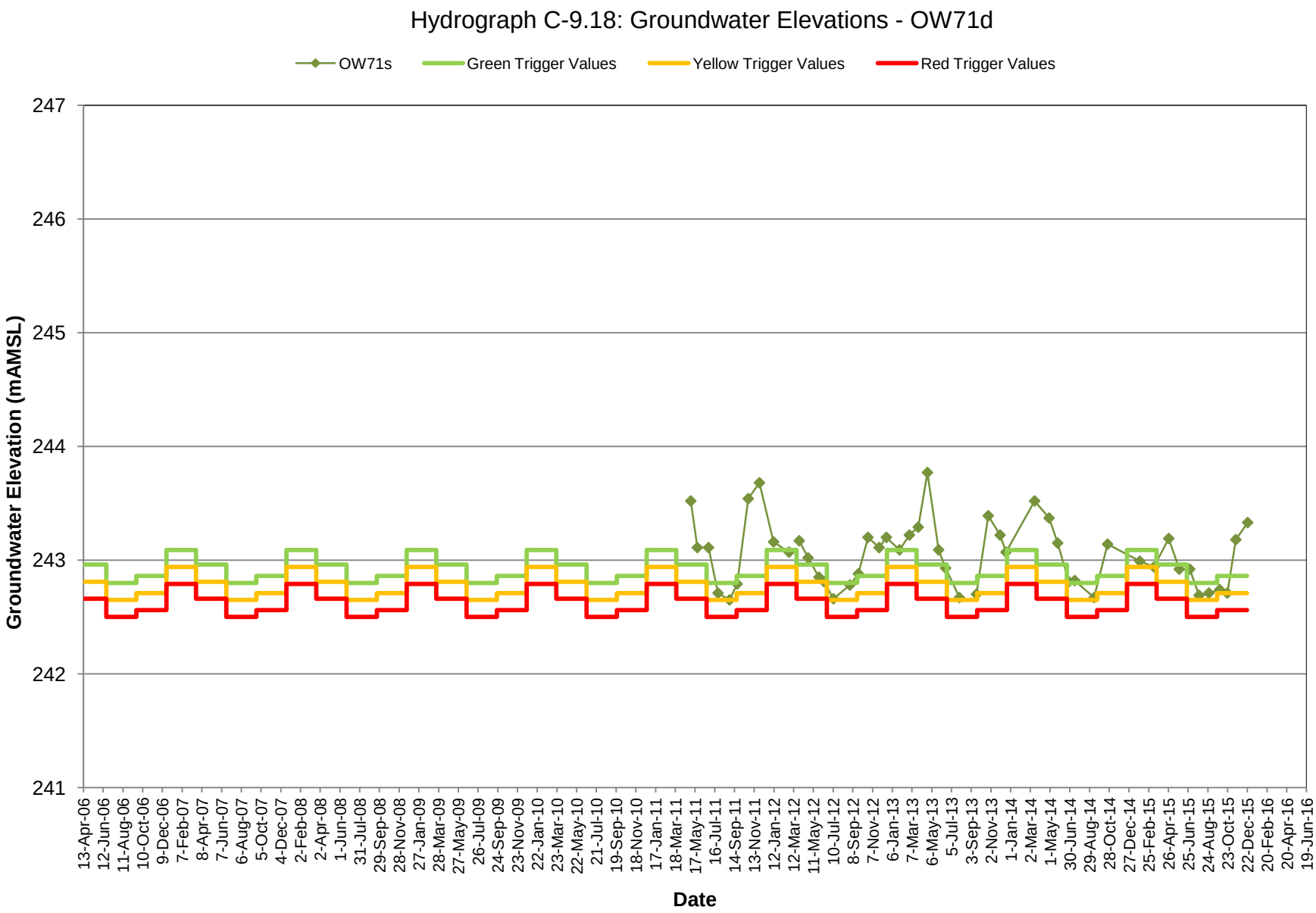
20-Apr-16
19-Jun-16
Date


Hydrograph C-9.18: Groundwater Elevations - OW71d
OW71s
Green Trigger Values
Yellow Trigger Values
Red Trigger Values
Groundwater Elevation (mAMSL)
247
246
245
244
243
242
241
13-Apr-06
12-Jun-06
11-Aug-06
10-Oct-06
9-Dec-06
7-Feb-07
8-Apr-07
7-Jun-07
6-Aug-07
5-Oct-07
4-Dec-07
2-Feb-08
2-Apr-08
1-Jun-08
31-Jul-08
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28-Nov-08
27-Jan-09
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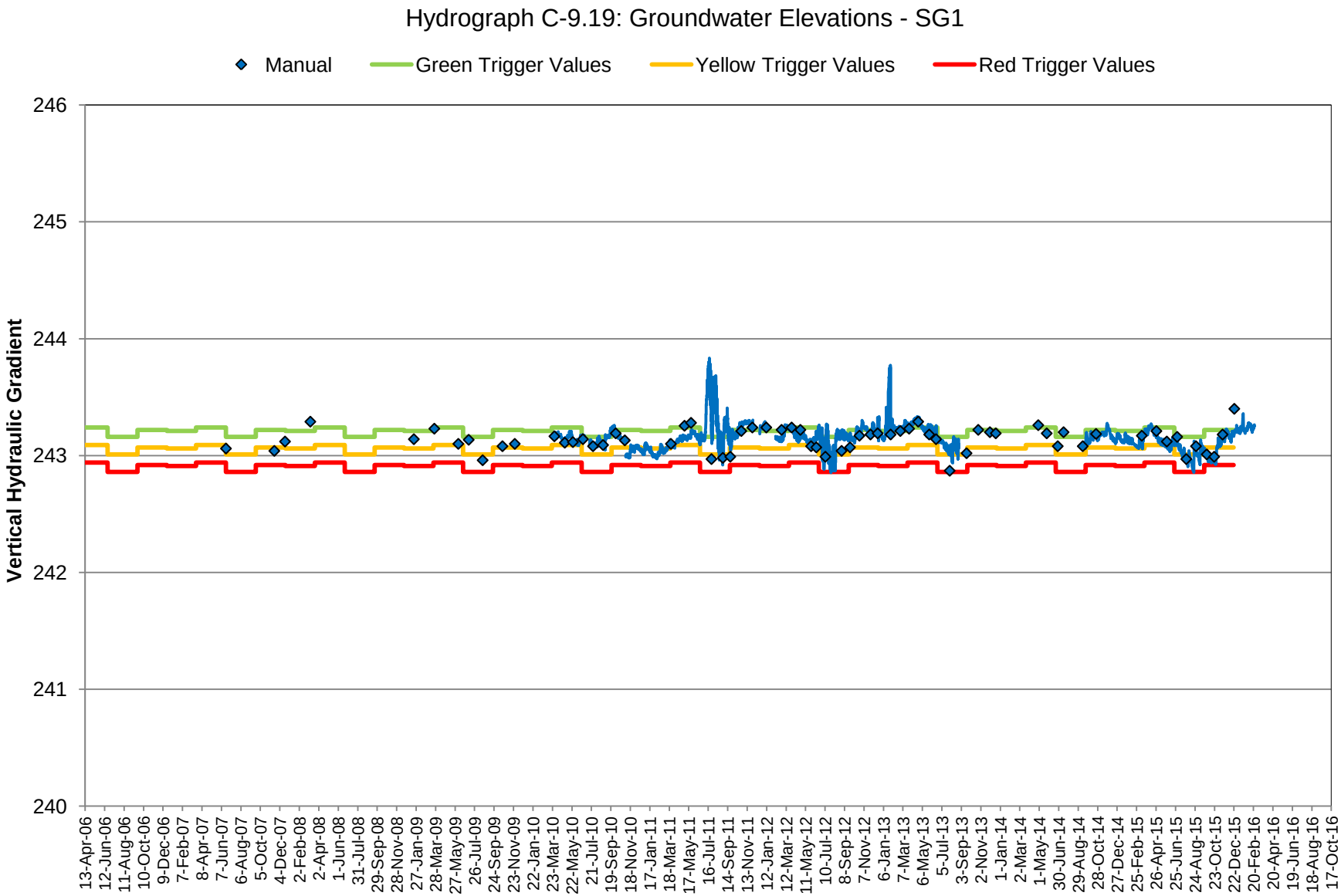
20-Apr-16
19-Jun-16
Date


Hydrograph C-9.19: Groundwater Elevations - SG1
Manual
Green Trigger Values
Yellow Trigger Values
Red Trigger Values
Vertical Hydraulic Gradient
246
245
244
243
242
241
240
13-Apr-06
12-Jun-06
11-Aug-06
10-Oct-06
9-Dec-06
7-Feb-07
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7-Jun-07
6-Aug-07
5-Oct-07
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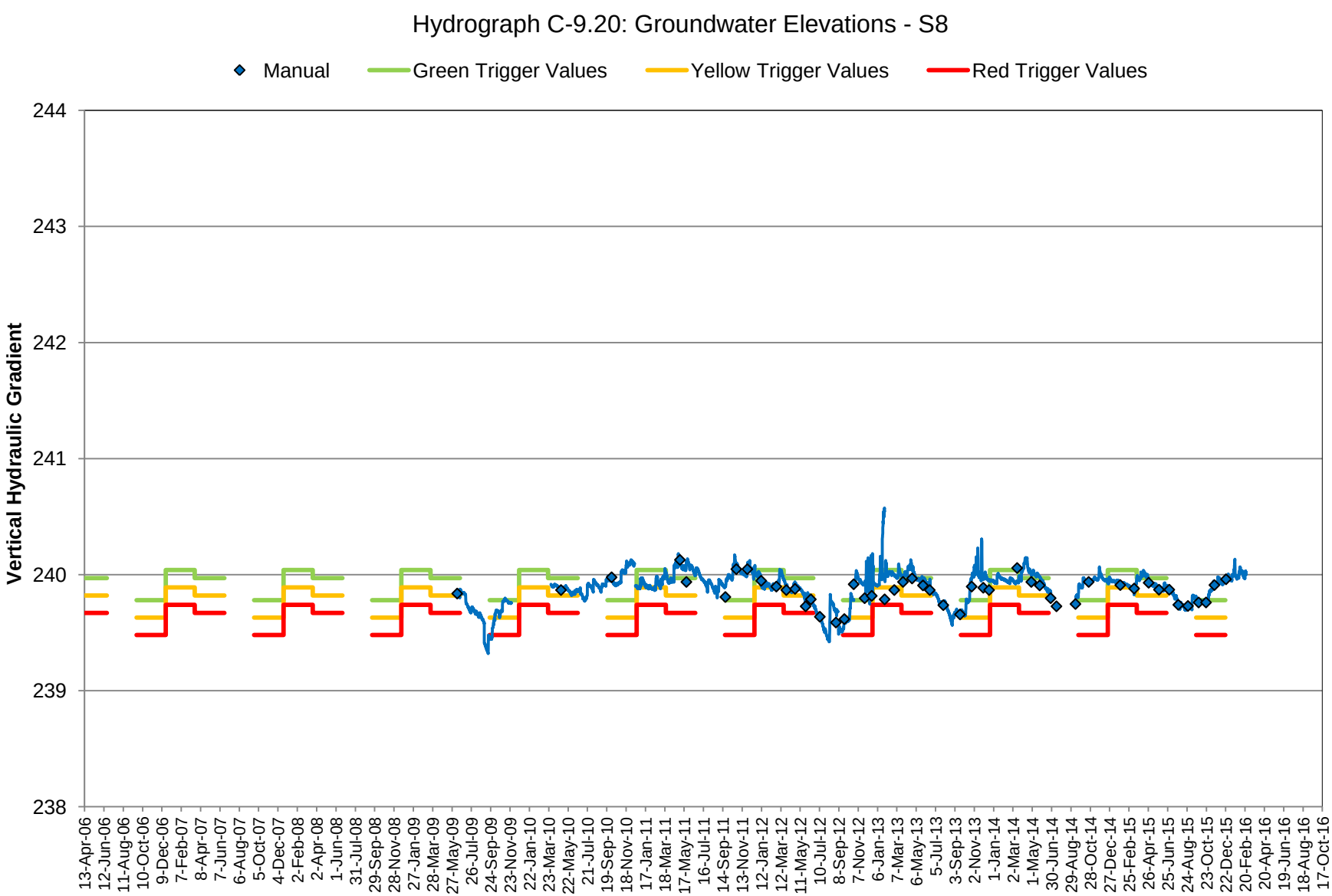
17-Oct-16


Hydrograph C-9.20: Groundwater Elevations - S8
Manual
Green Trigger Values
Yellow Trigger Values
Red Trigger Values
Vertical Hydraulic Gradient
244
243
242
241
240
239
238
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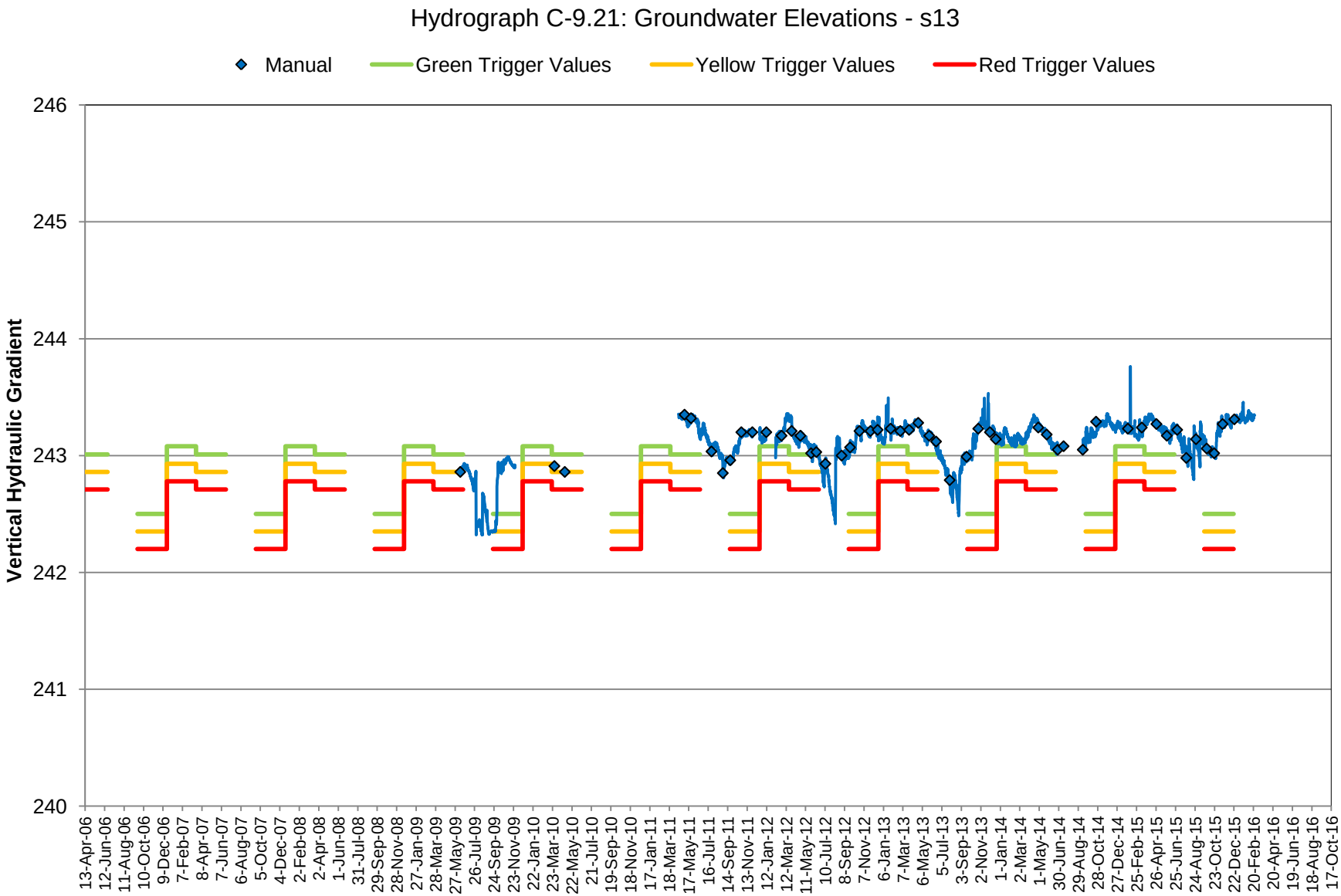
18-Aug-16
17-Oct-16


Hydrograph C-9.21: Groundwater Elevations - s13
Manual
Green Trigger Values
Yellow Trigger Values
Red Trigger Values
Vertical Hydraulic Gradient
246
245
244
243
242
241
240
13-Apr-06
12-Jun-06
11-Aug-06
10-Oct-06
9-Dec-06
7-Feb-07
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4-Dec-07
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1-Jun-08
31-Jul-08
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28-Oct-14
27-Dec-14
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25-Jun-15
24-Aug-15
23-Oct-15
22-Dec-15
20-Feb-16
20-Apr-16
19-Jun-16
18-Aug-16
17-Oct-16

APPENDIX C10

MITIGATION MEASURES

Mitigation measures are shown as a sequence of green, yellow and red actions in Appendix B. Whether green, yellow, or red actions are enacted depends on the observed values and if triggers are exceeded at each of the Sentry Wells, spring s8 and/or spring s13. In all three cases, the first step is to notify the quarry operator if there are any exceedences of green, yellow and red trigger values so that the appropriate action can be taken.

Green Action

The purpose of a green action is to identify changes prior to impacting groundwater and surface water features and implement investigative actions. If green trigger values are breeched, the first step is to notify the quarry operator. The Hydrogeologist and the Ecologist/Biologist shall also be notified so that proper actions can be implemented to determine the reason for the exceedence.

Actions involve increased monitoring frequency and recommendations for further investigation such as the installation of observation wells. The purpose of the investigation is to confirm the validity of the field data and, using pumping records, precipitation records, and additional water level data, determine the reason for the breech.

Green actions may include but may not be limited to:

- Increased frequency of monitoring;
- Further investigation using pumping records and site-specific precipitation records from an on-site weather station;
- Mapping the cone of influence using the most recent round of water levels;
- Installing observation wells, if required, to more accurately define the cone of influence of the quarry with respect to a certain receptor;
- Retaining an Hydrogeologist to complete an analysis/evaluation of the data collected such as:
    - Assess and interpret water levels and flows measured against historical patterns, seasonal lows, trigger values, pumping records and precipitation records on a monthly basis;
    - Compare monitoring data against trigger values on a monthly basis and make recommendations for monitoring program alterations if required;
    - Map cone of influence on a monthly basis and assess its size and shape; and
    - Provide an annual monitoring report and make recommendations for future monitoring.

Through this analysis, the intent is to track changes in water levels against the trigger limits and follow the progression of the cone of influence as the quarry develops. If through the analysis, it is deemed that a mitigation measure is required then, they will be implemented in close consultation with MNR.

Yellow Action

The purpose of the yellow action is to implement preventative measures to protect environmental receptors from being negatively impacted. If yellow trigger values are breeched, the first step is to notify the quarry operator. The Hydrogeologist and the Ecologist/Biologist shall also be notified so that proper actions can be implemented to mitigate the exceedence. The MNR and NEC will be notified within 72 hours and informed as to the Yellow Actions that will be implemented.

Yellow actions include mitigation measures such as preparation associated with augmenting flows or modifying ARA Site Plans. Once a mitigation measure has been implemented, the goal is to allow the environmental receptor to return to its background condition before the Keppel Quarry proceeds any further in the direction of the environmental receptor.

Yellow actions may include but may not be limited to:

- Initiating an internal interdisciplinary review of the monitoring data and the monitoring programs;
- Reviewing the Operation Plan for possible alterations, which may include but may not be limited to:
    - Changing or ceasing quarry operations in a certain direction; and/or
    - Changing the quarry floor elevation.
- Preparing to augment flows[1] to springs in the Shouldice Wetland or Glen Management Area;
    - flow augmentation shall be done in consultation with the Hydrogeologist to ensure adequate protection;
- Grouting fractures exposed by the quarry along active quarry faces immediately after a blast (as required);
- Continuing to monitor weekly until the system recovers[2] as determined by a Hydrogeologist; and/or
- Reporting the results of the Yellow Actions and make recommendations for the operation of the quarry (See Section 9.0 for more details regarding reporting requirements).

If Yellow Actions prove to be working whereby water levels in affected area have recovered[2] and there is no observed impact to the Shouldice Wetland and/or the springs in the Glen Management Area, then quarry activities can resume. Flows at the springs in these areas should occur naturally as determined by the Hydrogeologist and the Biologist/Ecologist.

Red Action

[1] Augmentation of flows to springs may be in the form of a pipe that directs water or an infiltration pond (as discussed in Section 4.8) that allows water to recharge the groundwater system.

[2] Recovered water levels means that water levels in the affected observation well(s) has returned above green trigger values for at least three monitoring events spaced one week apart.

The purpose of the red action is to reverse an observed impact to the bedrock groundwater system before an adverse effect is observed to the Shouldice Wetland or the Glen Management Area. If red trigger values are breeched, the first step is to notify the quarry operator. The Hydrogeologist and the Ecologist/Biologist shall also be notified so that proper actions can be implemented to mitigate the exceedence. The MNR and NEC will be notified within 24 hours and informed of the Red Actions that will be implemented.

Red actions include mitigation measures such as augmenting flows and stopping the quarry development until a sign off of acceptance has been obtained from the MNR indicating that the quarry can proceed once again. Once a mitigation measure has been implemented, the goal is to allow the environmental receptor to return to its background condition before the Keppel Quarry restarts.

Red actions may include but may not be limited to:

- Initiating an internal interdisciplinary review of the monitoring data and the monitoring programs;
- Stopping quarry operations until signoff is obtained by the MNR indicating the quarry may restart;
- Augmentation of flows to springs in the Shouldice Wetland, Glen Management Area or the affected area;
- Monitoring to determine the effectiveness of flow augmentation; and/or
- Reporting the results of the Red Actions and making recommendations for the operation of the quarry (See Section 9.0 for more details regarding reporting requirements).

If it is deemed that flow augmentation is effective[3], then quarry activities may resume in a direction that will not exacerbate the impact, provided that a sign-off acceptance from the MNR. If it is deemed by the Hydrogeologist, the Biologist/Ecologist, the owner/operator and the MNR that the quarry cannot operate without negatively impacting water levels in the Shouldice Wetland and/or the springs in the Glen Management Area then the need to close the quarry should be assessed.

Note: Red Actions are only to be implemented after assessment of climatological data to confirm that effects are caused by quarry operations, and not by unseasonably low precipitation.

[3] Groundwater levels in the impacted observation well(s) in Zone 3 have returned above green trigger values as determined by at least three monitoring events spaced one week apart.

APPENDIX C11

PHOTOGRAPHIC LOG

Photographic Log

Photograph No. 1 – Beaver Dam – April 30, 2010.

Photograph No. 2 – Beaver Dam Sinkhole – April 30, 2010.

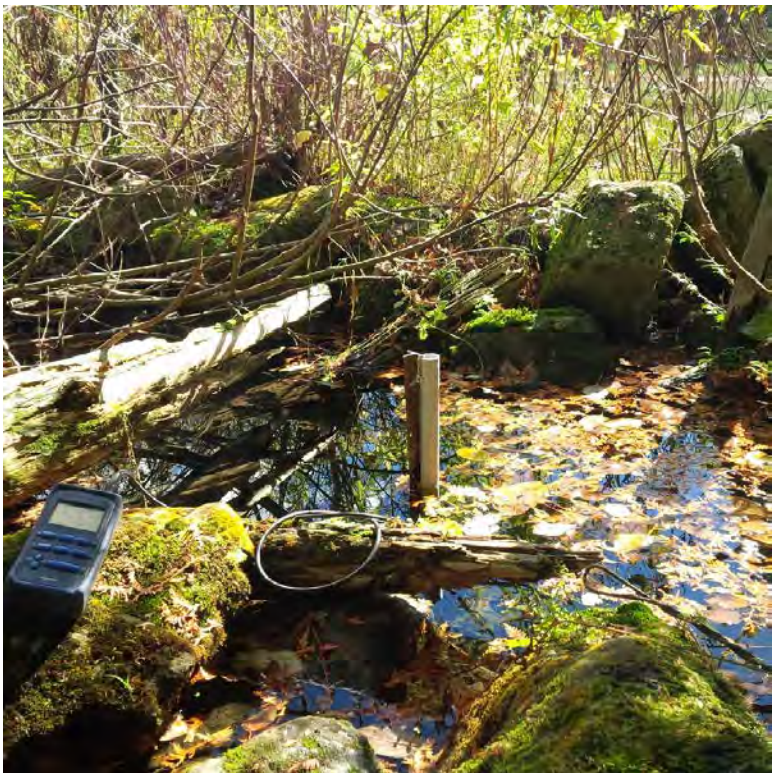
Photograph No. 3 – Beaver Dam Sinkhole – October 23, 2014.

Photograph No. 4 – Spring S3 – March 16, 2013.

Photograph No. 5 – Spring S8 – March 16, 2009.

Photograph No. 6 – Spring S8 – Oct 23, 2014.

Photograph No. 7 – OW59 – April 13, 2011.



Photograph No. 8 – Spring S13 – October 23, 2014.

Photograph No. 9 – Culvert 5A – May 22, 2012.

Photograph No. 10 – Dugout Pond and SG1 – October 23, 2014.

Photograph No. 11 – Ephemeral Pond – March 16, 2009.

APPENDIX D

ECOLOGICAL MONITORING PROGRAM

YEAR 1 : NEW KEPPEL QUARRY

ECOLOGICAL MONITORING REPORT

For The Adaptive Management Plan Inclusion

PREPARED FOR

H.S.C. Aggregates Ltd.

New Keppel Quarry
Part Lots 26, 27 and 28, Concession 10
Geographic Township of Keppel
Township of Georgian Bluffs, Grey County

BY

AWS

ENVIRONMENTAL CONSULTING INC.

Operating As Aquatic and Wildlife Services
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March, 2016

1. Introduction

This Year 1 Ecological Monitoring Report provides baseline data for future comparative analysis of the natural environment surrounding the New Keppel Quarry. The monitoring network shall be able to provide any 'trends through time' which could show unanticipated impacts to the surrounding woodlands and wetlands related to the extraction operations through the full AMP triggering review process.

With the ARA licence issued in the early spring of 2015, extraction operations have commenced within Phase 1A area, east of Grey Rd # 17. Additionally , site clearing within the northeast corner of Phase 1B area occurred in April/May 2015, along with commercial timber harvesting activity within portions of the northerly lands beyond the licence boundary. Due to this activity and safety concerns, portions of the ecological monitoring network for Year 1 data collection could not be collected in 2015, with further details provided under applicable reporting sections. As such, baseline data collection shall be completed in 2016 with a Year 1-Ecological Monitoring Supplement Report provided by calendar year's end.

To aid in report review and overlapping aspects of ecological monitoring vs. ecological mitigation requirements, the required natural environment mitigation aspects outlined on the approved Site Plan have been included into this Year 1 reporting being:

- NEC Development Permit Condition for Vegetative Screening-Tree Monitoring and Tree Replacement Plan for the Grey Rd # 17 corridor and portion of the Township Sideroad # 10.

- Condition 1.4 for 'Significant Flora Relocation' for identified species of conservation concern which occur within the extraction lands.

- Condition 1.9 for a 'Stewardship Management Plan' for the surrounding lands owned/managed by Harold Sutherland corporations to the New Keppel Quarry licence boundary.

- Condition 1.10 for 'Reforestation Plan, for portions of the open lands identified within the Stewardship Management Plan.

- Condition 1.12 for 'Terrestrial Invasive Flora Species Monitoring' for the licence lands and adjacent lands extending approximately 30m beyond the licence boundary.

In addition to the above noted provided data and Site Plan conditions met, an Action Plan-Summary has been provided for the 2016 Year 1-Ecological Monitoring Supplement Report and the 2016 Year 2-Ecological Monitoring Report.

2. Terrestrial Monitoring

i. EMA-1 ; Woodland Tree Health, Regeneration, Diversity

Three fixed forest plots have been established in Lot 26 and 27, north of the New Keppel Quarry licence lands. Location of the plots was based on the hydrogeological 'predicted groundwater flow pattern' as outlined in the Final AMP Figure No. 4 and Figure No. 5, in conjunction with site field conditions. Plot location mapping has been provided under Appendix 1. The center point for each of the three main plots is identifiable through numbered paint on a mature, healthy tree. Corner points have been fixed with colour coded metal bars for the main 20m x 20m plot plus the 2m x 2m and 1m x 1m sub-plots and. A detailed design of the plot configuration is provided under Appendix 1. Within the main plot, all trees which are >10cm dbh, have an aluminum numbered tag attached, for long-term monitor. All monitoring aspects of points I (a - i), II (a - d) and III (a - c) noted within the AMP-Ecological Monitoring Plan have been completed, with detailed data and site photographs provided under Appendix 1.

ii. EMA-2 ; Woodland Breeding Birds

Eight fixed woodland Point Counts have been established within Lot 26 and 27 north of the New Keppel Quarry licence lands. Location of the plots was based on the two transect Lines shown on the Final AMP Figure No. 5, Ecological Monitoring Network, with four point counts established along each transect line. Point Counts t location mapping has been provided under Appendix 2. The center point for each point count location has been GPS's and field marked on mature, healthy trees. Point Count data and site photographs are provided under Appendix 2.

3. Wetland Monitoring

i. EMA-3 ; The Glen Wetland / S1, S2

a) Flora Species Diversity

Two fixed 1m x 1m vegetation monitoring plots have been established immediately down gradient of Seep No. 1 (S1) and Seep No. 2 (S2). Plot corner points have metal stakes (replacing the marker flags shown on the site photos) driven into the solid underlying soils. Plot data and site photographs are provided under Appendix 3.

ii. EMA-4 ; Shouldice Wetland-Main Complex / S8, S9

a) Groundwater discharge

Groundwater discharge data is part of the hydrogeological monitoring role as outlined in the Water Resources program, undertaken by MTE. Future analysis of 'trend through time' from this baseline data through to active quarry activity, shall include an ecological review.

b) Flora Species Diversity

Two fixed 1m x 1m vegetation monitoring plots have been established immediately down gradient of Seep No. 8 (S8) and Seep No. 9 (S9). Plot corner points have metal stakes (replacing the marker flags shown on the site photos) driven into the solid underlying soils. Plot data and site photographs are provided under Appendix 3.

c) Anuran Monitoring Survey

For safety reasons , due to the on-site logging activity between late April to early June, 2015, no Anuran night time calling activity monitoring was collected in 2015. Anuran survey works for baseline monitoring shall be undertaken in April, May and June 2016 in accordance to noted protocols. Findings shall be provided in the Year 1-Ecological Supplement Report for baseline data collection. Given that no extraction activity has occurred west of Grey Rd #17 within the licence lands, this 1 year delayed data collection aspect is anticipated to have no measurable influence on long term 'trend through time' analysis.

iii. EMA-5 ; Ephemeral Pond

a) Surface water

Hydrology monitoring is outlined in the Water Resources program, part of works undertaken by MTE. Future analysis of 'trend through time' from this baseline data through to active quarry activity, shall include an ecological review.

b) & c) Amphibian Breeding Activity & Anuran Monitoring Survey

For safety reasons , due to the on-site logging activity between late April to early June, 2015, no Anuran night time calling activity or daytime egg mass searches was undertaken in 2015. Anuran survey works for baseline monitoring shall be undertaken in April, May and June 2016 in accordance to noted protocols. Findings shall be provided in the Year 1-Ecological Supplement Report for baseline data collection. Given that no extraction activity has occurred west of Grey Rd #17 within the licence lands, this 1 year delayed data collection aspect is anticipated to have no measurable influence on long term 'trend through time' analysis.

iv. EMA-6 ; Shouldice Wetland-Pond / S13 and East Park Head Creek Branch

a) Flora Species Diversity

Two fixed 1m x 1m vegetation monitoring plots have been established immediately in close proximity to S13. Sampling plot S13-A is situated approximately 3m east of spring S13 along the dug-ponds north perimeter. Plot S13-B is situated approximately 10m southwest of spring S13 outlet, along the dug-ponds western perimeter . Plot corner points have metal stakes (replacing the marker flags shown on the site photos) driven into the muck soils. Plot data and site photographs are provided under Appendix 3.

Two fixed 1m x 1m vegetation monitoring plots have been established within the dug-pond outlet channel. Sampling plot S13-C is situated approximately 10m downstream from the dug-ponds south perimeter and situated within the outlet channel, which was 'dry' in August 2015. Plot S13-D is situated further downstream, approximately 30m south of the dug-ponds south perimeter and along the western bank of the outlet channel. No flowing waters were observed within this outflow channel, from the dug-pond outlet to a point 50m downstream (20m beyond S13-D). The upper 25m section of the surveyed outlet channel had extensive graminoid growth while the lower portion of the surveyed channel (within the conifer stand environment) was primary bare muck soils. Two small pools of standing waters were observed within this lower surveyed section but no fish or aquatic invertebrates were evident.

All four plot corner points have metal stakes (replacing the marker flags shown on the site photos) driven into the underlying soils. Plot data and site photographs are provided under Appendix 3.

b) Macro-Invertebrate Diversity

During the August 2015 monitoring period, attempts were made to undertake aquatic invertebrate sampling within the 'dug-pond' feature and the 'outflow channel'. Surface waters were present within the central area of the dug-pond (see site photos for S13-A) however, they were inaccessible by chest-waders due to extensive organic/muck build up extending 2-3m out from the pond edge (marginally wade able

area). Accessible surface water areas around the pond perimeter were very shallow in depth (<4cm but with 1m of underlying muck) with extensive emergent vegetation growth present, making a 'sweep' collection method with a hand held mesh dip inefficient for sampling. Within the outflow channel, no surface waters were present at S13-C (see site photos) and only a small isolated standing pool was present adjacent to S13-D. Sampling efforts at this S13-D pool were undertaken, with no invertebrates captured.

c) Anuran Monitoring Survey

For data consistency relating to Anuran survey works, with baseline monitoring activity delayed till 2016 for EMA-4 and EMA-5, monitoring survey works for EMA-6 were delayed till 2016. Survey works shall be undertaken in April, May and June 2016 in accordance to noted protocols. Findings shall be provided in the Year 1-Ecological Supplement Report for baseline data collection. Given that no extraction activity has occurred west of Grey Rd #17 within the licence lands, this 1 year delayed data collection aspect is anticipated to have no measurable influence on long term 'trend through time' analysis.

4. Vegetative Screening: Tree Preservation Plan & Replacement Plan

i. Zone 1

Screening Trees along the east side of Grey Rd #17 (see AMP Figure No. 6) to the New Keppel Quarry extraction Area 1, were assessed in September 2014 in accordance to the AMP-Tree Monitoring Protocol. Appendix 4 provides the 2014 data summary and identifies required 'replacement trees' along with numbered trees that are very close to protocol replacement requirement due to poor growing or health standards. Replacement Screening Trees shall be identified in the summer of 2016 with tree replacement protocols provided in the Year 1- Supplemental Monitoring Report.

ii. Zone 2 and Zone 3

At this time, no monitoring data on the Screening Tree's situated along the western edge of Grey Rd # 17 and north edge of Concession Rd 10 that abut the extraction lands, has been collected following the Tree Preservation Plan. Some baseline data was collected and provided by Larry Porter (consulting Landscape Architect) through the initial submission of the 2014 Vegetation Inventory reporting. Pending the Zone 1 data review and discussions with Niagara Escarpment Commission staff, Zone 2 and Zone 3 data shall be collected and provided in the Year 2 - Ecological Monitoring Report.

5. Stewardship Management Plan

In accordance to the final-approved New Keppel Quarry Site Plan, Natural Environment condition No. 1.9, a long-term (20 year) management plan has been prepared for the non-quarry lands. This Stewardship Management Plan (SMP) covers all of the surrounding adjacent lands, uplands and wetlands, managed by Harold Sutherland which abut the New Keppel Quarry licence boundary. Said SWP has been provided under Appendix 5. Management direction is for natural environment protection, wildlife habitat and restoration of historically disturbed lands (former agricultural fields from the 1950's).

6. Forest Restoration and Woodlot Expansion

The 2005 NETR mitigation tree planting areas had identified five areas (F1 to F5) for tree planting having a total area of 9.6 ha. Subsequent Site Plan revisions due to 'licence boundary and extraction area amendments' and reduced natural woodland impacted areas, show the reforestation land targeted at 7.4ha. (F1 and F3).

Portions of these proposed re-forestation lands have had extensive natural regeneration over the last 10 years. Tree planting within portions of these originally planned reforestation areas would be impractical and counter-productive as site preparation would require early successional tree (2-3m in height) removal. As such, site investigations undertaken in October 2015 during the field assessment works of the required 'Stewardship Management Plan' (Site Plan condition 1.9 under Natural Environment) which covers the property lands beyond the licence boundary, identified four areas, compartments 7A, 7B, 7C and 7D under the Stewardship Management Plan suitable for tree planting. Appendix 6 provides the 2016 tree planting activity plan and compartment location mapping, having 4.07ha of open lands for tree planting. With 3.5ha of the original open-tree planting lands proposed in 2005, now under woodland tree growth through on-going active management over the last 10 years promoting both natural succession (adjacent to part of new compartment 7A) plus tree planting augmentation (adjacent to new compartment 7D), the total reforested lands shall be 7.57ha in the summer of 2016. Exceeding the approved Final Site Plan forest restoration and woodland expansion requirement.

7. Rare Plant Relocation

The original 2007 NETR had identified several flora species of conservation concern with colony mapping in the old licence boundary lands (Pre-Final Site Plan design) . Colonies were identified and mapped for relocation/transplanting outside of the licence lands. Given the passing time frame from this original survey works and that flora populations can fluctuate naturally, investigations for significant flora were updated in the summer of 2015. Appendix 7 provides the updated 2015 listing and colony location mapping of significant flora located within or close proximity to the licence boundary.

8. Invasive Species

As per the final approved New Keppel Quarry Site Plan, Natural Environment point 1.12, a Terrestrial Invasive Species Survey within the licence lands and its 30m adjacent lands is required. This survey was undertaken in August 2015, with Appendix 8 providing a listing and primary invasive species colony sites mapped.

9. 2016 Action Plan

With some incomplete monitoring survey works that were to be undertaken in Year 1 (2015), the following survey works shall be completed in 2016 following noted protocols, with findings provided as a Year 1 Ecological Supplement Report, due by December 31, 2016:

- EMA-4, Anuran night time calling survey : April, May and June 2016
- EMA-5, Amphibian breeding activity survey/egg mass search: April, May and June 2016
- EMA-5, Anuran night time calling survey: April, May, June 2016
- EMA-6, Anuran night time calling survey: April, May, June 2016

In accordance to the Ecological Monitoring Network-Frequency of data collection for Year 2, the following survey works shall be completed in 2016 following noted protocols, with findings provided as a Year 2 Ecological Monitoring Report, due by April 1, 2017:

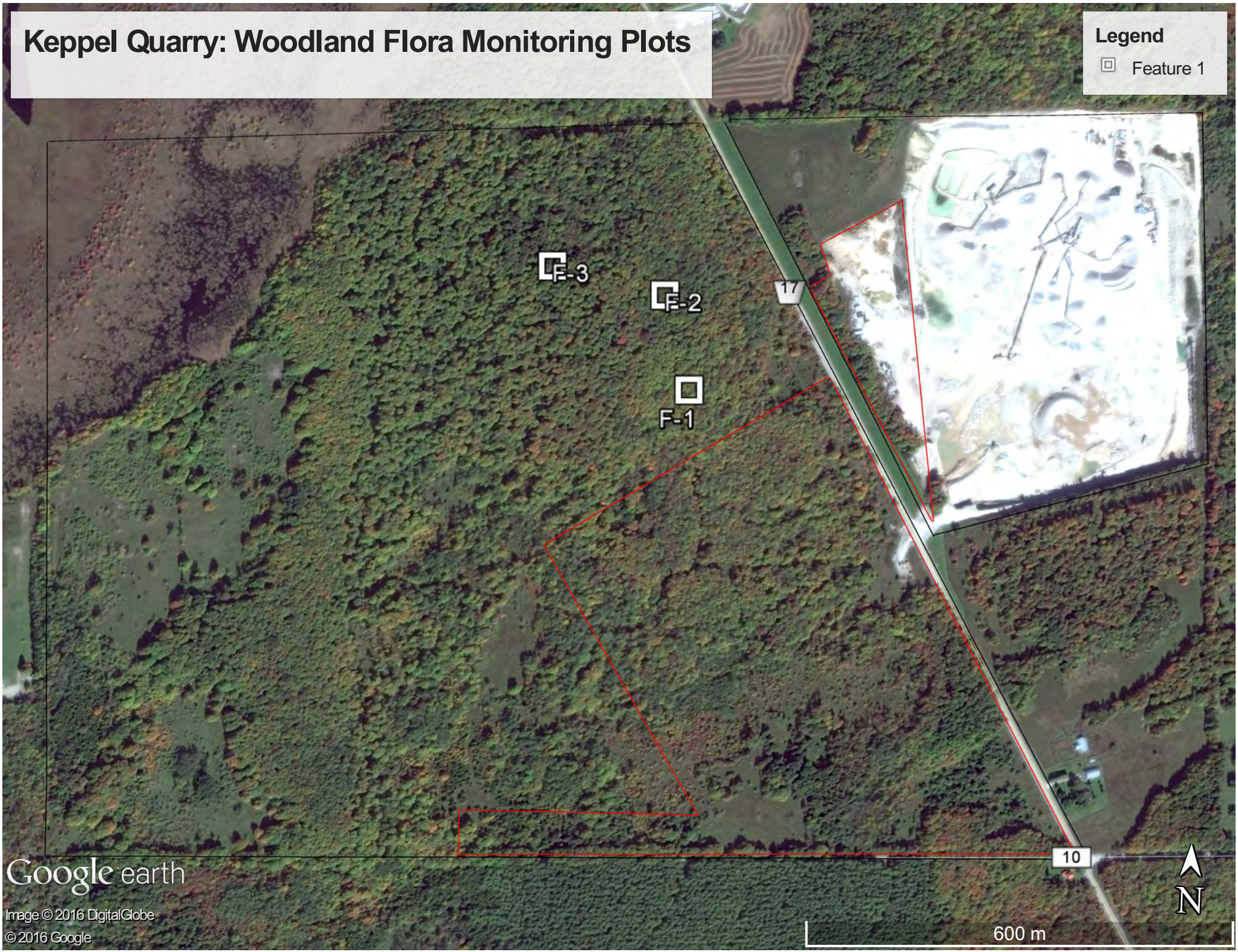
- EMA-1, Upland Woodland vegetation survey, data and comparison analysis with Year 1
- EMA-6, Wetland flora survey, data and comparison analysis with Year 1
- EMA-6, Wetland macroinvertebrate sampling, data and comparison analysis with Year 1
- Forest Restoration & Expansion, data findings Year 1 post-planting survival rates.
- Tree Preservation Plan- Road Corridor Screening Trees
    - Zone 1 Tree Replacement Protocol
    - Zone 2 and Zone 3, Tree Monitoring data and Tree Replacement Protocol if required

Respectfully Submitted

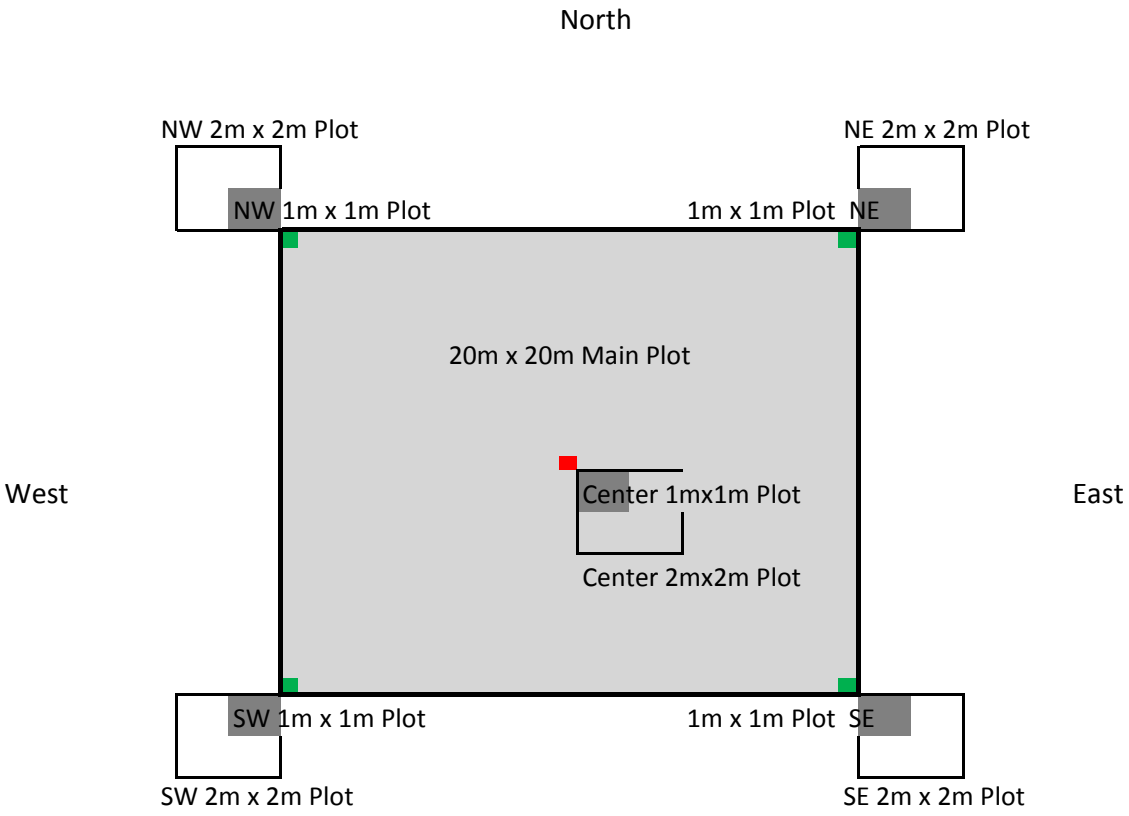
John Morton, President AWS Environmental Consulting Inc.

APPENDIX 1

EMA-1 Woodland Plots


Keppel Quarry: Woodland Flora Monitoring Plots
Legend
Feature 1
F-3
F-2
F-1
17
10
N
600 m
Google earth
Image © 2016 DigitalGlobe
© 2016 Google

Keppel Quarry: Woodland Vegetation Monitoring Plot Layouts



LEGEND

Center Point Tree, Numbered

Corner Points with Permanent Metal Coloured Stakes

Main Plot (1) : 20m x 20m

Upper Canopy Trees : Species, DBH, Crown Class, Avg. Height

Tree Composition: Species in Height Ranges and % Cover in Plot

Standing Dead Trees: Species, DBH, Height, Decay Class

Corner Plots (4) : 2m x 2m with permanent corner metal coloured stakes

Regeneration Trees: Species, Height Range up to 2m

Ground Flora Plots (5) : 1m x 1m with permanent coloured metal stakes

Ground Vegetation Composition: Species, % Coverage of Plot

EMA-1 Woodland Vegetation Monitoring Plot Data

Plot No.: **F-1** Date: 2015, August 12

Surveyors: John Morton, Judith Jones GPS Center Point : 500134 Easting, 4942528 Northing +/-7m

Main Plot: 20m x 20m

Upper Main Canopy Live Trees (>10cm dbh) Basal Area : 18 sq. m/ha

Tree Number	Species		DBH cm	Crown Class	Crown Vigour Rating	Three Tree Heights
	Common Name	Latin Name				
1	Sugar Maple	*Acer saccharum*	28	1	1	20.0m
2	Sugar Maple	*Acer saccharum*	22	1	1	
3	Sugar Maple	*Acer saccharum*	14	2	3	
4	Sugar Maple	*Acer saccharum*	18	1	1	
5	Sugar Maple	*Acer saccharum*	34	1	1	21.5m
6	Sugar Maple	*Acer saccharum*	12	2	2	
7	Sugar Maple	*Acer saccharum*	14	2	1	
8	Sugar Maple	*Acer saccharum*	24	1	1	
9	Sugar Maple	*Acer saccharum*	32	1	1	
10	Sugar Maple	*Acer saccharum*	24	1	2	
11	Sugar Maple	*Acer saccharum*	10	3	3	
12	Sugar Maple	*Acer saccharum*	26	1	1	
13	Sugar Maple	*Acer saccharum*	20	1	1	
14	Sugar Maple	*Acer saccharum*	36	1	2	
15	Sugar Maple	*Acer saccharum*	12	2	2	
16	Sugar Maple	*Acer saccharum*	22	1	1	19.5m
17	Sugar Maple	*Acer saccharum*	12	3	2	
18	Sugar Maple	*Acer saccharum*	26	1	1	
19	Sugar Maple	*Acer saccharum*	26	1	1	
20	Sugar Maple	*Acer saccharum*	16	1	1	
					Avg. Ht =	20.3m

Canopy Layer Composition

Canopy Ht.	Species Latin Name / Percentage of Canopy Area Occupied in Plot
>10m	*Acer saccharum / 92%*
2-10 m	*Ostrya virginiana / 20% ; Acer saccharum / 10%*
0.5 to 2m	*Fraxinus sp. / 3% ; Tilia americana / 1%*
0 to 0.5m	*Fraxinus sp./ 25% ; Clinopodium vulgare / 20% ;*
	Adiantum pedatum / 8% ; Thalictrum dioica / 1%

Standing Dead Trees

	Species (If Determinable)		DBH	Total	
	Common Name	Latin Name	cm	Height m	Decay Class
1	Sugar Maple	*Acer saccharum*	8	16	3
2	Sugar Maple	*Acer saccharum*	8	10	4
3	Sugar Maple	*Acer saccharum*	6	5	5
4	Sugar Maple	*Acer saccharum*	8	14	4
5					

Downed Trees & Woody Debris

No.	Logs : > 20cm avg. diameter			Polewood: 10cm to 20cm diameter		
	Length m	Compass Bearing from Main End	Decay Class	Length m	Compass Bearing from Main End	Decay Class
1	3	312 degrees	2			
2	4	250 degrees	1			
3						
4						
5						
6						

Branches : 4cm to 10cm		Woody Debris : < 4cm	
General Quanity	% Coverage of Plot Area	General Quanity	% Coverage of Plot Area
Minor	10	Moderate	15

2m x 2m Plot : Regeneration Trees

Plot : NE

Species Latin Name	Height Range				
	16 to 35cm	36 to 55cm	56 to 75cm	76 to 95 cm	96 to 200cm
Fraxinus sp.	5	2	0	0	0
Acer saccharum	0	0	1	0	0
Cornus alternifolia	2	1	0	0	0

Additional Notes:

Plot : SE

Species Latin Name	Height Range				
	16 to 35cm	36 to 55cm	56 to 75cm	76 to 95 cm	96 to 200cm
Tilia americana	0	2	0	0	0
Fraxinus sp.	2	1	0	0	1
Amelanchier cf. sanguinea	0	0	0	0	1
Cornus alternifolia	0	0	0	0	1

Additional Notes:

Plot : SW

Species Latin Name	Height Range				
	16 to 35cm	36 to 55cm	56 to 75cm	76 to 95 cm	96 to 200cm
Fraxinus sp.	6	1	1	1	1
Cornus alternifolia	2	0	0	0	0
Prunus serotina	0	1	0	0	0

Additional Notes:

Plot : NW

Species Latin Name	Height Range				
	16 to 35cm	36 to 55cm	56 to 75cm	76 to 95 cm	96 to 200cm
Prunus serotina	3	0	0	0	0
Fraxinus sp.	2	0	0	0	0

Additional Notes: 2 clumps of *Asplenium scolopendrium* on boulder just outside NW corner of this plot

Plot : Center

Species Latin Name	Height Range				
	16 to 35cm	36 to 55cm	56 to 75cm	76 to 95 cm	96 to 200cm
Fraxinus sp.	4	6	0	0	0
Prunus serotina	0	1	0	0	0

Additional Notes:

1m x 1m Plot : Ground Vegetation Composition (Note: ' * ' denotes a Non-Native Species)

Plot : **NE**	
Species Latin Name	Percentage Cover
Thalictrum dioicum	95
Viola blanda	5
Arctium minus	2
Fraxinus sp.	2
Trillium grandiflorum	1
Symphyotrichum lateriflorum	1
Carex arctata	P
* *Clinopodium vulgare*	P
Carex cf. pedunculata	P

Plot : **SE**	
Species Latin Name	Percentage Cover
Duff	50
Woody Debris	35
Cornus alternifolia	6
Fraxinus sp.	4
Prunus serotina	4
Amelanchier cf. sanguinea	3
Moss	2
Crataegus sp.	1
* *Clinopodium vulgare*	P

Plot : **SW**	
Species Latin Name	Percentage Cover
Duff	56
moss on a boulder	20
Fraxinus sp.	10
Symphyotrichum lateriflorum	5
Cornus alternifolia	3
Carex pedunculata	2
* *Verbascum thapsis*	2
* *Clinopodium vulgare*	1
* *Solanum dulcamara*	1
Melilotus alba	P
Anemone virginiana	P
Ostrya virginiana	P

Plot: **NW**	
Species Latin Name	Percentage Cover
Duff	65
Bare earth	25
Moss	4
Carex pedunculata	2
Cornus alternifolia	2
Prunus serotina	1
Fraxinus sp.	1
Maianthemum canadense	P

Plot : **Center**	
Species Latin Name	Percentage Cover
Duff	60
Adiantum pedatum	30
Woody debris	8
Fraxinus sp.	6
Prunus serotina	5
Ostrya virginiana	P
* *Clinopodium vulgare*	P
Thalictrum dioicum	P

EMA-1 Woodland Vegetation Monitoring Plot Data

Plot No.: **F-2** Date: 2015, August 12

Surveyors: John Morton, Judith Jones GPS Center Point: 500095 Easting

4942660 Northing +/- 3m

Main Plot: 20m x 20m

Upper Main Canopy Live Trees Basal Area : 24 sq. m/ha

Tree Number	Species		DBH cm	Crown Class	Crown Vigour Rating	Three Tree Heights
	Common Name	Latin Name				
1	White Ash	*Fraxinus americana*	33	1	1	21.5m
2	Sugar Maple	*Acer saccarum*	38	1	1	
3	Sugar Maple	*Acer saccarum*	14	3	2	
4	Sugar Maple	*Acer saccarum*	24	1	1	
5	Sugar Maple	*Acer saccarum*	18	1	1	
6	Sugar Maple	*Acer saccarum*	26	1	1	
7	Sugar Maple	*Acer saccarum*	18	1	1	
8	Sugar Maple	*Acer saccarum*	18	1	1	
9	Sugar Maple	*Acer saccarum*	12	3	2	
10	Sugar Maple	*Acer saccarum*	18	2	2	
11	Sugar Maple	*Acer saccarum*	12	4	1	
12	Sugar Maple	*Acer saccarum*	12	4	2	
13	Sugar Maple	*Acer saccarum*	24	1	1	19.0m
14	Sugar Maple	*Acer saccarum*	16	1	3	
15	Sugar Maple	*Acer saccarum*	22	1	1	
16	Sugar Maple	*Acer saccarum*	18	1	1	
17	Sugar Maple	*Acer saccarum*	14	2	2	
18	Sugar Maple	*Acer saccarum*	10	4	2	
19	Sugar Maple	*Acer saccarum*	20	1	2	18.0m
20	Sugar Maple	*Acer saccarum*	20	1	2	
21	Sugar Maple	*Acer saccarum*	26	1	1	
22	Sugar Maple	*Acer saccarum*	26	1	1	
23	Sugar Maple	*Acer saccarum*	24	1	1	
24	Balsam Poplar	*Populus balsamifera*	28	1	1	
25	Sugar Maple	*Acer saccarum*	12	4	2	
26	Sugar Maple	*Acer saccarum*	10	4	1	
27	Sugar Maple	*Acer saccarum*	14	1	2	
28	Sugar Maple	*Acer saccarum*	14	1	2	
					Avg. =	19.5m

Canopy Layer Composition Note : 'P' represents Present or < 1% Coverage

Canopy Ht.	Species Common Name / Percentage of Canopy Area Occupied in Plot
>10m	*Acer saccharum / 88% ; Fraxinus americana/ 3% ; Populus balsamifera / 3%*
2-10 m	*Ostrya virginiana / 1% ; Acer saccharum / P*
0.5 to 2m	*Fraxinus sp. / P ; Brachyelytrum erectum / P ;*
	Symphyotrichum lateriflorum / P ; Ostrya virginiana / P
0 to 0.5m	*Adiantum pedatum / 75% ; Carex pedunculata / 8% ; Viola pubscens / 2% ;*
	Caulophyllum thalictroides / 1% ; Clinopodium vulgare / 1% ; Symphyotrichum lateriflorum / 1%

Standing Dead Trees

No.	Species (If Determinable)		DBH cm	Total Height m	Decay Class
	Common Name	Latin Name			
1	Sugar Maple	*Acer saccarum*	12	14	3
2					
3					
4					
5					

Downed Trees & Woody Debris

	Logs : > 20cm avg. diameter			**Polewood: 10cm to 20cm diameter**		
	Length m	Compass Bearing from Main End	Decay Class	Length m	Compass Bearing from Main End	Decay Class
1	8	300 degrees	3	7	280 degrees	1
2	9	276 degrees	4	3	200 degrees	2
3	4	125 degrees	1			
4	9	85 degrees	5			
5						
6						

Branches : 4cm to 10cm		**Woody Debris : < 4cm**	
General Quanity	% Coverage of Plot Area	General Quanity	% Coverage of Plot Area
Minor	10	Minor	10

2m x 2m Plot : Regeneration Trees

Plot : NE

Species Latin Name	Height Range				
	16 to 35cm	36 to 55cm	56 to 75cm	76 to 95 cm	96 to 200cm
Fraxinus sp.	4	1	0	0	0

Additional Notes:

Plot : SE

Species Latin Name	Height Range				
	16 to 35cm	36 to 55cm	56 to 75cm	76 to 95 cm	96 to 200cm
Ostrya virginiana	2	0	0	0	1
Fraxinus sp.	6	0	0	0	0

Additional Notes:

Plot : SW

Species Latin Name	Height Range				
	16 to 35cm	36 to 55cm	56 to 75cm	76 to 95 cm	96 to 200cm
Fraxinus sp.	6	1	0	0	0

Additional Notes:

Plot : NW

Species Latin Name	Height Range				
	16 to 35cm	36 to 55cm	56 to 75cm	76 to 95 cm	96 to 200cm
Ostrya virginiana	1	0	0	0	5
Fraxinus sp.	1	0	0	0	0

Additional Notes:

Plot : Center

Species Latin Name	Height Range				
	16 to 35cm	36 to 55cm	56 to 75cm	76 to 95 cm	96 to 200cm
Prunus serotina	2	1	0	0	0
Cornus alternifolia	1	0	0	0	0

Additional Notes:

1m x 1m Plot : Ground Vegetation Composition (Note: ' * ' denotes a Non-Native Species)

Plot : **NE**

Species Latin Name	Percentage Cover
Duff	52
Fraxinus sp.	20
Geranium robertianum	18
Symphyotrichum cordifolium	1
Viola blanda	1
Eupatorium rugosum	2
Polygonatum pubescens	6
Taraxicum officinale	P
Symphyotrichum lateriflorum	P
Brachyelytrum eretum	P

Plot : **SE**

Species Latin Name	Percentage Cover
Duff	90
Ostrya virginiana	12
Bare earth	7
Fraxinus sp.	2
Schizachne purpurascens	1
Epipactis helleborine	P
Geranium robertianum	P
Verbascum thapsis	P
Symphyotrichum lateriflorum	P
Viola pubscens	P

Plot : **SW**

Species Latin Name	Percentage Cover
Duff	30
Fraxinus sp.	28
Dryopteris carthusiana	20
moss	20
Viola pubscens	2
Arisaema triphyllum	1
Ostrya virginiana	P
Carex pensylvanica	P
Trillium grandiflorum	P

Plot: **NW**

Species Latin Name	Percentage Cover
Duff	80
Ostrya virginiana	50
bare earth	12
* *Clinopodium vulgare*	4
Maianthemum canadense	1
Fraxinus sp.	1
* *Geranium robertianum*	1
Symphyotrichum lateriflorum	1
* *Taraxicum officinale*	P
Trillium grandiflorum	P
Carex pensylvanica	P

Plot : **Center**

Species Latin Name	Percentage Cover
Duff	36
moss	30
Caulophyllum thalictroides	12
Prunus serotina	6
Clinopodium vulgare	4
Viola pubscens	3
Brachyelytrum eretum	3
Actaea rubra	2
Maianthemum canadense	2
Hepatica acutiloba	2
Adiantum pedatum	P

EMA-1 Woodland Vegetation Monitoring Plot Data

Plot No.: **F-3** Date: 2015, August 12

Surveyors: John Morton, Judith Jones GPS Center Point: 499935 Easting

4942695 Northing +/- 3m

Main Plot: 20m x 20m

Upper Main Canopy Live Trees Basal Area : 12 sq. m/ha

Tree Number	Species		DBH cm	Crown Class	Crown Vigour Rating	Three Tree Heights
	Common Name	Latin Name				
1	White Ash	*Fraxinus americana*	20	1	1	18.0m
2	Sugar Maple	*Acer saccharum*	14	1	1	
3	Sugar Maple	*Acer saccharum*	12	2	1	
4	Black Cherry	*Prunus serotina*	14	1	1	
5	Sugar Maple	*Acer saccharum*	12	1	1	
6	White Ash	*Fraxinus americana*	36	1	1	22.0m
7	Sugar Maple	*Acer saccharum*	12	2	1	
8	Sugar Maple	*Acer saccharum*	16	1	1	
9	Sugar Maple	*Acer saccharum*	16	2	2	
10	Sugar Maple	*Acer saccharum*	14	2	3	
11	Basswood	*Tilia americana*	32	1	1	
12	White Ash	*Fraxinus americana*	18	1	1	17.5m
13	White Ash	*Fraxinus americana*	18	2	1	
14	Green Ash	*Fraxinus pennsylvanica*	16	2	2	
15	Green Ash	*Fraxinus pennsylvanica*	12	2	2	
16	Green Ash	*Fraxinus pennsylvanica*	14	1	1	
					Avg. Ht. =	19.2m

Canopy Layer Composition Note: 'P' represents Present or < 1% Coverage

Canopy Ht.	Species Common Name / Percentage of Canopy Area Occupied in Plot
>10m	*Fraxinus americana / 30% ; Acer saccharum / 12% ; Tilia americana / 20% ; Prunus serotina / 3%*
2-10 m	*Acer saccharum / 5% ; Ostrya virginiana / 2%*
0.5 to 2m	*Prunus virginiana / 3% ; Symphyotrichum lateriflorum / 2% ; Cornus alternifolia / P*
0 to 0.5m	*Acer saccharum / 25% ; Geranium robertianum / 5% ; Hypericum perforatum / 1 % ;*
	Carex pedunculata / 1% ; mix of others / 3%

Standing Dead Trees

No.	Species (If Determinable)		DBH	Total	
	Common Name	Latin Name	cm	Height m	Decay Class
1	Sugar Maple	*Acer saccharum*	6	14	3
2	White Ash	*Fraxinus americana*	6	12	4
3					
4					
5					

Downed Trees & Woody Debris

No.	**Logs : > 20cm avg. diameter**			**Polewood: 10cm to 20cm diameter**		
	Length m	Compass Bearing from Main End	Decay Class	Length m	Compass Bearing from Main End	Decay Class
1	12	17 degrees	1	14	285 degrees	1
2	8	310 degrees	1	10	275 degrees	1
3				6	300 degress	1
4				7	250 degrees	2
5				3	200 degrees	4
6						

Branches : 4cm to 10cm		**Woody Debris : < 4cm**	
General Quanity	% Coverage of Plot Area	General Quanity	% Coverage of Plot Area
Moderate	15	Moderate	20

2m x 2m Plot : Regeneration Trees

Plot : NE

Species Latin Name	Height Range				
	16 to 35cm	36 to 55cm	56 to 75cm	76 to 95 cm	96 to 200cm
Acer saccharum	0	1	0	0	0
Ulmus americana	1	0	0	0	0

Additional Notes:

Plot : SE

Species Latin Name	Height Range				
	16 to 35cm	36 to 55cm	56 to 75cm	76 to 95 cm	96 to 200cm
Acer saccharum	1	0	0	0	0
Fraxinus sp.	4	0	0	1	0
Prunus serotina	1	0	0	0	0

Additional Notes: A bedrock open crevice runs through this plot

Plot : SW

Species Latin Name	Height Range				
	16 to 35cm	36 to 55cm	56 to 75cm	76 to 95 cm	96 to 200cm
Fraxinus sp.	1	0	0	0	0

Additional Notes:

Plot : NW

Species Latin Name	Height Range				
	16 to 35cm	36 to 55cm	56 to 75cm	76 to 95 cm	96 to 200cm
Acer saccharum	0	1	0	0	0

Additional Notes:

Plot : Center

Species Latin Name	Height Range				
	16 to 35cm	36 to 55cm	56 to 75cm	76 to 95 cm	96 to 200cm
Acer saccharum	7	0	0	0	0
Prunus serotina	2	0	0	0	0

Additional Notes:

1m x 1m Plot : Ground Vegetation Composition (Note: ' * ' denotes a Non-Native Species)

Plot : **NE**

Species Latin Name	Percentage Cover
Rubus strigosus	28
Solidago altissima	25
* Clinopodium vulgare	25
Acer saccharum	12
Duff and bare earth	5
Ulmus americana	3
* Taraxicum officinale	1
Symphyotrichum lateriflorum	1
Fragaria virginiana	P
Geum canadense	P
* Geranium robertianum	P
* Potentilla recta	P
Glyceria striata	P
* Epipactis helleborine	P
Viola pubscens	P
* Ranunculus acris	P

Plot : **SE**

Species Latin Name	Percentage Cover
Acer saccharum	45
Symphyotrichum lateriflorum	30
Duff	17
* Geranium robertianum	5
Fraxinus sp.	2
Solidago altissima	1
Asplenium trichomanes	P
* Clinopodium vulgare	P
* Taraxicum officinale	P

Plot : **SW**

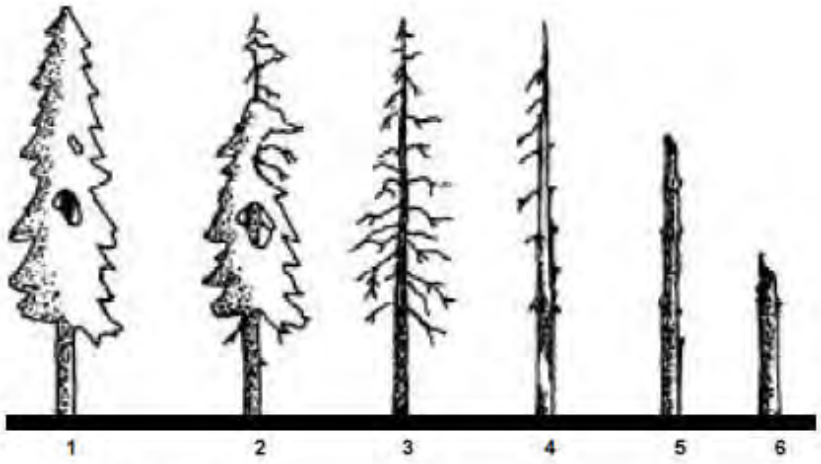
Species Latin Name	Percentage Cover
Bare earth	86
Woody debris	8
Fraxinus sp.	3
Rubus strigosus	2
* Hypericum perforatum	1
* Clinopodium vulgare	P
sterile grass sp?	P

Plot: **NW**

Species Latin Name	Percentage Cover
Duff and bare earth	42
Woody debris	40
Moss	12
* Geranium robertianum	4
Carex interior	2
* Hypericum perforatum	P
Circaea lutetiana	P

Plot : **Center**

Species Latin Name	Percentage Cover
Woody debris and Duff	95
Acer saccharum	2
Symphyotrichum lateriflorum	1
* Taraxicum officinale	1
* Geranium robertianum	1



1 Healthy, live tree
2 Declining live tree, part of canopy lost
3 Very recently dead, no canopy, bark intact, branches intact
4 Recently dead, bark peeling, only large branches intact
5 Older dead tree, 90 percent of bark lost, few branch stubs, broken top
6 Very old dead tree, advanced decay, no branches, parts of the stem have rotted away

EMAN Ecosystem Monitoring Partnership Ontario

Appendix 1

LOG DECOMPOSITION CLASS:

Log Characteristics	Class 1	Class 2	Class 3	Class 4	Class 5
Bark	Intact	Intact	Trace	Absent	Absent
Twigs	Present	Absent	Absent	Absent	Absent
Texture	Intact	Intact to soft	Hard, large pieces	Small, soft blocky pieces	Soft and powdery
Shape	Round	Round	Round	Round to oval	Oval
Colour of wood	Original colour	Original colour	Original colour to faded	Light brown to faded brown or yellowish	Faded to light yellow or grey
Portion of log on ground	Log elevated on support points	Log elevated on support points but sagging slightly	Log is sagging near ground	All of log on ground	All of log on ground

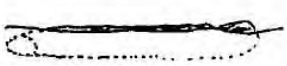
Log Decomposition Examples:

Decomposition Class 1

Decomposition Class 2

Decomposition Class 3

Decomposition Class 4



Decomposition Class 5

Photo No. 1: F-1, Center Point tree of Main Plot

Photo No. 2: looking south through Main Plot, Quarry north berm in background

Photo No. 3: F-1, NW Corner Plot

Photo No. 4: F-1, NE Corner Plot

Photo No. 5: F-1, SE Corner Plot

Photo No. 6: F-1, SW Corner Plot

Photo No. 7: F-2, Center Point tree of Main Plot, looking south

Photo No. 8: F-2, Main Plot looking north, center 2m x 2m plot in foreground

Photo No. 9: F-2, NW corner plot

Photo No. 10: F-2, NE corner plot, numerous boulders

Photo No. 11: F-2, SW corner plot

Photo No. 12: F-2, SE corner plot

Photo No. 13: F-3, Center Point tree, looking north

Photo No. 14: F-3, looking north from southeast corner through Main Plot

Photo No. 15: F-3, NW Corner Plot, significant slash/woody debris

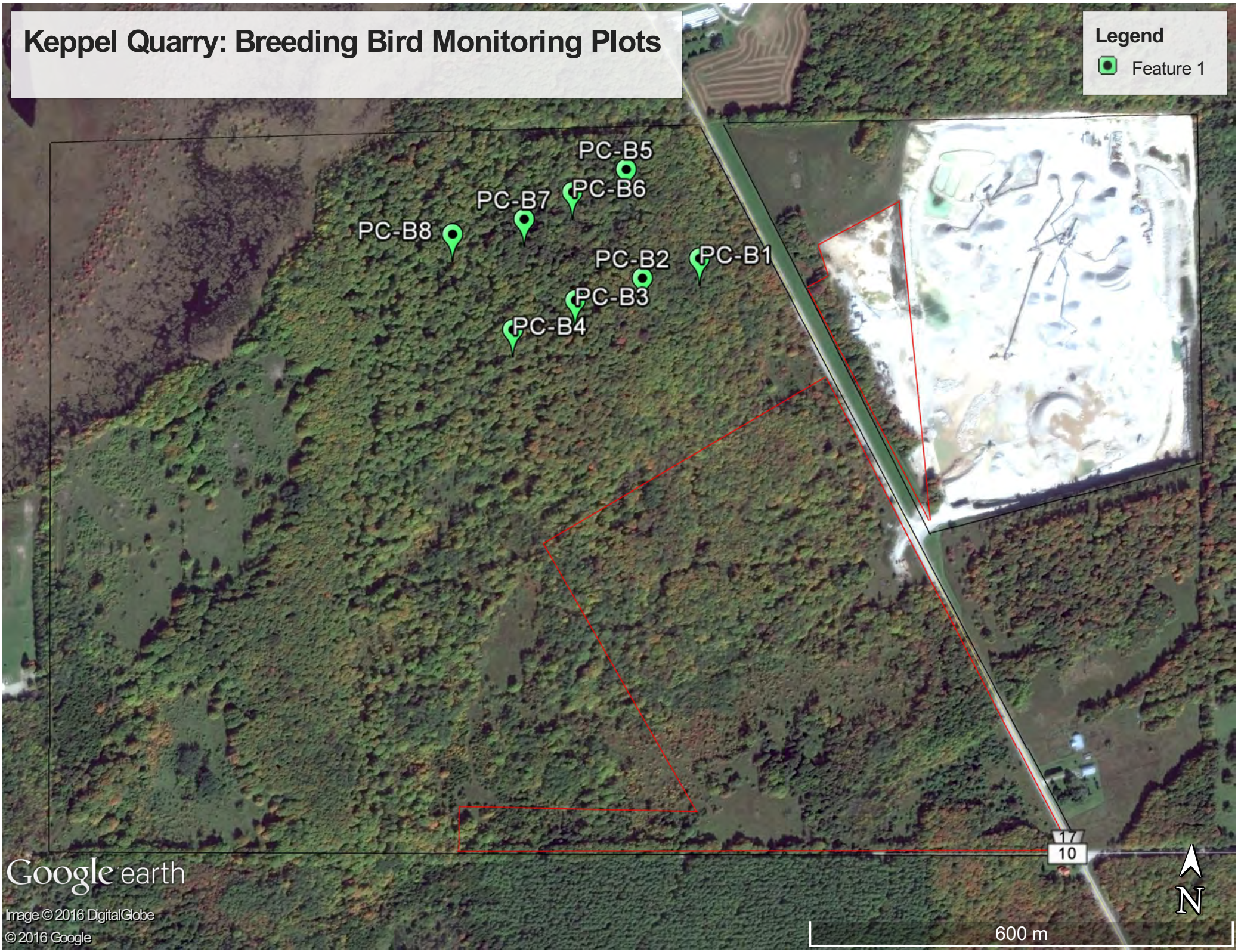
Photo No. 16: F-3, NE Corner Plot, within skidder trail

Photo No. 17: F-3, SE Corner Plot, bedrock fracture(W-E orientation) through plot

Photo No. 18: F-3, SW Corner Plot, within skidder trail and moderate slash

Appendix 2

EMA-2 Woodland Breeding Bird Point Counts


Keppel Quarry: Breeding Bird Monitoring Plots
Legend
Feature 1
PC-B5
PC-B6
PC-B7
PC-B8
PC-B2
PC-B1
PC-B3
PC-B4
17
10
N
600 m
Google earth
Image © 2016 DigitalGlobe
© 2016 Google

EMA-2 : Breeding Bird Point Count Data

Weather: Air Temp = 17C, Wind Speed = 12-19 km/hr, No Percip. Date: 2015, June 10

South Transect Line

Plot No. : 1	GPS Co-ordinate:	500145 Easting 4942676 Northing +/- 9m	Start Time:	0630

Species Common Name	Breeding Code	Estimated Number (s)
American Robin	Po-H	1
Downy Woodpecker	Pr-P	2
White Breasted Nuthatch	Po-H	1
Black-capped Chickadee	Po-H	1

Plot No. : 2	GPS Co-ordinate:	500065 Easting 4942645 Northing +/- 7m	Start Time:	0640

Species Common Name	Breeding Code	Estimated Number (s)
American Redstart	Po-H	1
Downy Woodpecker	Po-H	1
White-breasted Nuthatch	Po-H	1
Blue Jay	Pr-P	2
Northern Cardinal	Po-H	1

Plot No. : 3	GPS Co-ordinate:	499971 Easting 4942610 Northing +/- 6m	Start Time:	0650

Species Common Name	Breeding Code	Estimated Number (s)
Blue Jay	Pr-P	2
American Robin	Po-H	1
White-throated Sparrow	Po-H	1
Downy Woodpecker	Po-H	1
Ovenbird	Po-H	1

Plot No. : 4	GPS Co-ordinate:	499884 Easting 4942565 Northing +/-7m	Start Time:	0700

Species Common Name	Breeding Code	Estimated Number (s)
White-breasted Nuthatch	Po-H	1
Red-eyed Vireo	Po-H	1
American Redstart	Pr-D	3
Ovenbird	Po-S	1
Hairy Woodpecker	Po-H	1
Downy Woodpecker	Pr-P	2

North Transect Line

Plot No. : 5	GPS Co-ordinate:	500036	Easting	Start Time:	0750
		4942798	Northing +/- 9m		

Species Common Name	Breeding Code	Estimated Number (s)
American Robin	Pr-P	2
Black-capped Chickadee	Po-H	1
Eurpean Starling	Po-H	1
Downy Woodpecker	Po-H	1
Chipping Sparrow	Pr-P	3
American Goldfinch	Po-H	2

Plot No. : 6	GPS Co-ordinate:	499961	Easting	Start Time:	0740
		4942763	Northing +/- 3m		

Species Common Name	Breeding Code	Estimated Number (s)
Rose-breasted Grosbeak	Po-H	1
Hairy Woodpecker	Po-H	1
Downy Woodpecker	Po-H	1
American Crow	Ob-X	1

Plot No. : 7	GPS Co-ordinate:	499894	Easting	Start Time:	0730
		4942722	Northing +/- 9m		

Species Common Name	Breeding Code	Estimated Number (s)
Red-eyed Vireo	Po-H	1
White-breasted Nuthatch	Po-H	1
Black-capped Chickadee	Po-H	1
American Redstart	Po-H	1
Rose-breasted Grosbeak	Po-H	1
Ovenbird	Po-H	1

Plot No. : 8	GPS Co-ordinate:	499793	Easting	Start Time:	0720
		4942697	Northing +/- 7m		

Species Common Name	Breeding Code	Estimated Number (s)
Wood Thrush	Po-H	1
Rose-breasted Grosbeak	Po-H	2
Red-eyed Vireo	Po-H	1
American Robin	Po-H	1

EMA-2 : Breeding Bird Point Count Data

Weather: Air Temp = 15C, Wind Speed = 12-15 km/hr, No Percip. Date: 2015, June 24

South Transect Line

Plot No. : 1	GPS Co-ordinate:	500145 Easting 4942676 Northing +/- 9m	Start Time:	0730

Species Common Name	Breeding Code	Estimated Number (s)
American Robin	Conf- AE	1
Downy Woodpecker	Pr-P	3
White Breasted Nuthatch	Pr-P	2
Ruffed Grouse	Po-H	1

Plot No. : 2	GPS Co-ordinate:	500065 Easting 4942645 Northing +/- 7m	Start Time:	0740

Species Common Name	Breeding Code	Estimated Number (s)
American Redstart	Po-H	1
Downy Woodpecker	Po-H	1
Baltimore Oriole	Po-H	1
Blue Jay	Pr-P	2
Black-capped Chickadee	Pr-D	3

Plot No. : 3	GPS Co-ordinate:	499971 Easting 4942610 Northing +/- 6m	Start Time:	0750

Species Common Name	Breeding Code	Estimated Number (s)
Blue Jay	Po-S	1
American Robin	Po-H	1

Plot No. : 4	GPS Co-ordinate:	499884 Easting 4942565 Northing +/-7m	Start Time:	0800

Species Common Name	Breeding Code	Estimated Number (s)
White-breasted Nuthatch	Pr-D	3
Red-eyed Vireo	Po-H	1
American Redstart	Pr-D	2
Ovenbird	Po-S	1
Hairy Woodpecker	Pr-V	1
Downy Woodpecker	Pr-P	2

North Transect Line

Plot No. : 5	GPS Co-ordinate:	500036 Easting 4942798 Northing +/- 9m	Start Time:	0850
Species Common Name		Breeding Code	Estimated Number (s)	
American Robin		Po-S	1	
Black-capped Chickadee		Po-H	2	
Downy Woodpecker		Po-H	1	
Blue Jay		Po-S	1	

Plot No. : 6	GPS Co-ordinate:	499961 Easting 4942763 Northing +/- 3m	Start Time:	0840
Species Common Name		Breeding Code	Estimated Number (s)	
Rose-breasted Grosbeak		Pr-P	2	
Winter Wren		Po-H	1	
Downy Woodpecker		Po-H	1	

Plot No. : 7	GPS Co-ordinate:	499894 Easting 4942722 Northing +/- 9m	Start Time:	0830
Species Common Name		Breeding Code	Estimated Number (s)	
Red-eyed Vireo		Po-H	1	
White-breasted Nuthatch		Po-H	1	
Wood Thrush		Po-S	1	
American Redstart		Pr-A	1	
Wild Turkey		Con-NY	7	
Ovenbird		Po-H	1	

Plot No. : 8	GPS Co-ordinate:	499793 Easting 4942697 Northing +/- 7m	Start Time:	0820
Species Common Name		Breeding Code	Estimated Number (s)	
Wood Thrush		Po-H	1	
Rose-breasted Grosbeak		Pr-D	3	
Red-eyed Vireo		Pr-D	2	
Ovenbird		Po-H	1	

Photo No. 1: Plot No. 1, looking north with Center Point Tree

Photo No. 2: Plot No. 1, looking south with Center Point Tree

Photo No. 3: Plot No. 2, looking north with Center Point Tree

Photo No. 4: Plot No. 2, looking south with Center Point Tree

Photo No. 5: Plot No. 3, looking north with Center Point Tree

Photo No. 6: Plot No. 3, looking south with Center Point Tree

Photo No. 7: Plot No. 4, looking south with Center Point Tree

Photo No. 8: Plot No. 4, looking north with Center Point Tree

Photo No. 9: Plot No. 5, looking south with Center Point Tree

Photo No. 10: Plot No. 5, looking north with Center Point Tree

Photo No. 11: Plot No. 6, looking north with Center Point Tree

Photo No. 12: Plot No. 6, looking south with Center Point Tree

Photo No. 13: Plot No. 7, looking north with Center Point Tree

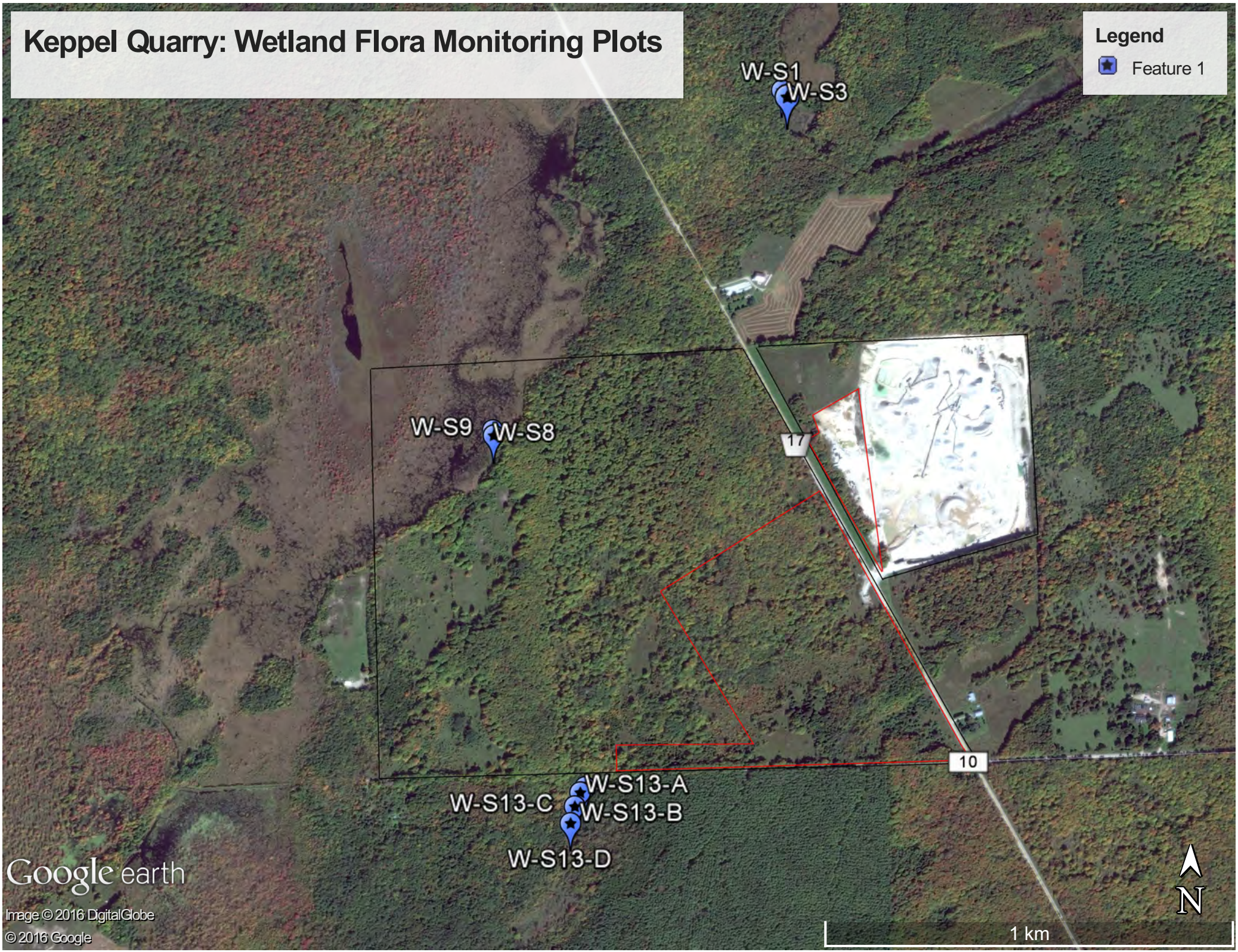
Photo No. 14: Plot No. 7, looking south with Center Point Tree

Photo No. 15: Plot No. 8, looking north with Center Point Tree

Photo No. 16: Plot No. 8, looking south with Center Point Tree

Appendix 3

EMA-3, 4 and 6 : Wetland Flora Plots


Keppel Quarry: Wetland Flora Monitoring Plots
Legend
Feature 1
W-S1
W-S3
W-S9
W-S8
17
10
W-S13-A
W-S13-C
W-S13-B
W-S13-D
Google earth
Image © 2016 DigitalGlobe
© 2016 Google
N
1 km

Wetland Flora Monitoring

Vegetation Composition : All Plots are 1m x 1m

Site: EMA-3 ; The Glen Date: 2015, August 12

Plot No.: **S1**		
Species Latin Name	Percentage Cover	
	Emergent	Submergent
Veronica anagalis-aquatica	75	0
* *Solanum dulcamara*	1	0
* *Nasturtium officinale*	24	0
GPS Co-ordinates: 500232 E ; 4943487 N		

Plot No. : **S2**		
Species Latin Name	Percentage Cover	
	Emergent	Submergent
Chrysosplenium americanum	47	0
Moss on logs	28	
* *Tussilago farfara*	26	0
Impatiens capensis	25	0
* *Epilobium hirsutum*	16	0
Leersia oryzoides	15	0
Eupatorium perfoliatum	5	0
* *Scirpus atrovirens*	2	0
* *Rumex crispus*	1	0
Clematis virginiana	1	0
Symphyotrichum puniceum	1	0
* *Solanum dulcamara*	P	0
Scutellaria lateriflora	P	0
GPS Co-ordinates: 500246 E ; 4943458 N		

Site: EMA-4 ; Main Shouldice Wetland

Plot No.: **S8**		
Species Latin Name	Percentage Cover	
	Emergent	Submergent
Gyceria borealis	35	0
Leersia oryzoides	18	0
Lysimachia sp. Sterile	6	0
Sparganium emersum	5	0
Ludwigia palustris	4	0
Mentha arvensis	2	0
Phalaris arundinacea	2	0
Galium palustris	1	0
* *Ranunculus acris*	P	0
* *Carex spicata*	P	0
Poa palustris	P	0
Scutellaria lateriflora	P	0
Cicuta bulbifera	P	0
Typha latifolia	P	0
Bare mud	40	
GPS Co-ordinates: 499521 E ; 4942615 N		

Plot :	**S9**	
Species Latin Name	Percentage Cover	
	Emergent	Submergent
Ludwigia palustris	45	0
Carex hystericina	20	0
Eleocharis palustris	18	0
* *Sagittaria latifolia*	4	0
Lysimachia sp. sterile	6	0
Sparganium emersum	5	0
Leersia oryzoides	4	0
Asclepias incarnata	P	0
Mentha arvensis	P	0
Typha latifolia	P	0
Galium palustris	P	0
Scutellaria lateriflora	P	0
Cicuta bulbifera	P	0
GPS Co-ordinates:	499519 E ; 4942628 N	

Site: EMA-6 ; Shouldice Wetland - Pond Area Date: 2015, August 12

Plot No.:	**S13-A**	
Species Latin Name	Percentage Cover	
	Emergent	Submergent
Juncus alpinoarticulatus	95	0
* *Nasturtium officinale*	4	0
Salix discolor	4	0
Salix lucida	1	0
Glyceria borealis	2	0
* *Agrostis gigantea*	P	0
* *Solanum dulcamara*	P	0
Galium palustris	P	0
Lemna minor	P	0
GPS Co-ordinates:	499757 E ; 4941755 N	

Plot No. :	**S13-B**	
Species Latin Name	Percentage Cover	
	Emergent	Submergent
Juncus alpinoarticulatus	95	0
Leersia oryzoides	1	0
* *Nasturtium officinale*	7	0
* *Agrostis gigantea*	1	0
* *Solanum dulcamara*	3	0
Symphyotrichum puniceum	P	0
GPS Co-ordinates:	499745 E ; 4941742 N	

Plot No.: **S13-C**		
Species Latin Name	Percentage Cover	
	Emergent	Submergent
* *Agrostis gigantea*	45	0
Leersia oryzoides	35	0
Scirpus atrovirens	10	0
Ranunculus hispidus	8	0
Impatiens capensis	2	0
Caltha palustris	P	0
Galium palustris	P	0
Sium suave	P	0
GPS Co-ordinates: 499732 E ; 4941708 N		

Plot No. : **S13-D**		
Species Latin Name	Percentage Cover	
	Emergent	Submergent
Galium palustris	P	0
* *Scutellaria lateriflora*	P	0
Leersia oryzoides	88	0
* *Nasturtium officinale*	10	0
Bare mud	6	0
Woody debris	5	0
Ranunculus hispidus	3	0
* *Solanum dulcamara*	1	0
Ludwigia palustris	1	0
Sium suave	1	0
GPS Co-ordinates: 499722 E ; 4941667 N		

Notes: ' * ' denotes, a Non-Native Species
' P ' denotes, Present but < 1% coverage

Plot Flora Inventory Listing with Floristc Quality Assessment (FQA) Scores

Latin Name	Common Name	Prov. Status	FQA	
			CC	CW
* *Agrostis gigantea*	Redtop	Exotic	0	0
Asclepias incarnata	Swamp Milkweed	NAR	6	-5
Caltha palustris	Wild Calia	NAR	8	-5
Carex hystericina	Porcupine Sedge	NAR	5	-5
* *Carex spicata*	Spiked Sedge	Exotic	0	5
Chrysosplenium americanum	American Golden-saxifrage	NAR	8	-5
Cicuta bulbifera	Bulb-bearing Water-hemlock	NAR	5	-5
Clematis virginiana	Virginia Virgins-bower	NAR	3	0
Eleocharis palustris	Creeping Spike-rush	NAR	6	-5
* *Epilobium hirsutum*	Hairy Willowherb	Exotic	0	-4
Eupatorium perfoliatum	Common Bonset	NAR	2	-4
Galium palustris	Marsh Bedstraw	NAR	5	-5
Glyceria borealis	Northern Manna Grass	NAR	8	-5
Impatiens capensis	Spotted Jewelweed	NAR	4	-3
Juncus alpinoarticulatus	Alpine Rush	NAR	5	-5
Leersia oryzoides	Rice Cutgrass	NAR	3	-5
Lemna minor	Lesser Duckweed	NAR	2	-5
Ludwigia palustris	Marsh Seedbox	NAR	5	-5
Lysimachia sp. sterile	Fringed Loosestrife	NAR	4	-3
Mentha arvensis	Field Mint	NAR	3	-3
* *Nasturtium officinale*	Watercress	Exotic	0	-5
Phalaris arundinacea	Reed Canary Grass	NAR	0	-4
Poa palustris	Fowl Bluegrass	NAR	5	-4
* *Ranunculus acris*	Tall Buttercup	Exotic	0	-2
Ranunculus hispidus var. caricetorum	Swamp Buttercup	NAR	5	-5
* *Rumex crispus*	Curly Dock	Exotic	0	-1
Sagittaria latifolia	Broad-leaved Arrowhead	NAR	4	-5
Salix discolor	Pussy Willow	NAR	3	-3
Salix lucida	Shining Willow	NAR	5	-4
Scirpus atrovirens	Dark-green Bulrush	NAR	3	-5
* *Scutellaria lateriflora*	Mad Dog Skullcap	NAR	5	-5
Sium suave	Hemlock Water-parsnip	NAR	4	-5
* *Solanum dulcamara*	Climbing Nightshade	Exotic	0	0
Sparganium emersum	Green-fruited Burreed	NAR	5	-5
Symphyotrichum puniceum	Swamp Aster	NAR	6	-5
* *Tussilago farfara*	Colt's-foot	Exotic	0	3
Typha latifolia	Broad-leaved Cattail	NAR	3	-5
Veronica anagalis-aquatica	Water Speedwell	Exotic	0	-5

Ontario Ministry of Natural Resources, 'Floristic Quality Assessment' (**FQA**) Scoring System:

CC = Coefficient of Conservatism, ranked 0 (grows anywhere) to 10 (very specific habitat requirements)

CW = Coefficient Wetness Index, values from -5 (very wet) to 5 (very dry)

Photo No. 1: S1 looking upstream

Photo No. 2: S1 looking downstream

Photo No. 3: S2 looking upstream

Photo No. 4: S2 looking downstream

Photo No. 5: S8 looking upstream

Photo No. 6: S2 looking downstream

Photo No. 7: S9 looking upstream

Photo No. 8: S9 looking downstream

Photo No. 9: S13-A looking north from pond edge into woodlands

Photo No. 10: S13-A, looking south over ponds north edge located 3m east of seep 13

Photo No. 11: S13-B, looking north along west side of pond edge, located 10m south of seep 13

Photo No. 12: S13-B, looking south

Photo No. 13: S13-C, looking north within dry outlet channel, 10m downstream from pond

Photo No. 14: S13-C, looking south

Photo No. 15: S13-D, looking northeast, upstream adjacent standing pool waters in outlet channel, located 30m downstream from pond

Photo No. 16: S13-D, looking southwest, downstream, adjacent mud flats of outlet channel

Appendix 4

NEC Tree Screening : Preservation & Replacement Plan

HSC Ltd.: Keppel Quarry- Area 1, Tree Preservation Screening Monitoring, 2014

Tree No.	Species	DBH 2cm class	No. Stems	Total Tree Height	Crown Class (1/2/3/4)	% Live Crown	Evidence of Dieback (Yes/No)				Evidence of Health Stressors			Growing Condition	General Health Condition
							Dead Twigs	Dead Upper Branches	Leaf Defol.	Leaf Discolor.	Wounds	Visible Insect Impacts	Others		
1	Mh	44	1	21m	1	100	N	N	N	N	1 Callous	None	None	Good	Excellent
2	Aw	22	1	18m	2	85	Y	Y	Y	N	None	None	None	Good	Good
3	Aw	28	1	20m	1	95	Y	Y	N	N	3 Callous	None	Pruning	Good	Good
4	Aw	28	1	21m	1	100	N	N	N	N	2 Callous	None	Pruning	Good	Good
5	Mh	46	1	22m	2	100	N	N	N	N	None	None	None	Excellent	Excellent
6	Aw	22	1	17m	3	100	N	N	N	N	None	None	None	Excellent	Excellent
7	Aw	34	1	23m	2	100	N	N	N	N	None	None	None	Excellent	Excellent
8	Aw	18	1	17m	3	95	Y	Y	N	N	I Open	None	None	Fair	Good
9	Mh	34	1	23m	1	100	N	N	N	N	None	None	None	Excellent	Excellent
10	Mh	36	1	23m	2	85	Y	Y	Y	Y	1 Cal. + 1 Op.	None	Pruning	Good	Fair
11	Mh	30	1	22m	2	100	N	N	N	N	None	None	None	Excellent	Excellent
12	Mh	20	1	18m	2	45	Y	Y	Y	Y	2 Open	None	T. Canker	Poor	Poor-Dying
13	Mh	26	1	20m	1	75	Y	Y	Y	Y	None	None	None	Good	Fair
14	Gone- Tree has been removed														
15	Mh	20	1	21m	1	100	N	N	N	N	None	None	None	Excellent	Excellent
16	Mh	20	1	17m	2	30	Y	Y	Y	Y	2 Open	None	None	Poor	Poor-Dying
17	Mh	14	1	16m	1	45	Y	Y	Y	Y	1 Open	None	None	Poor	Poor-Dying
18	Mh	32-30+32	3	23m	1	70	Y	Y	Y	Y	3 Callous	None	None	Fair	Fair
19	Ir	22	1	17m	3	75	Y	Y	N	N	None	None	None	Good	Good
20	Mh	18	1	20m	1	95	N	N	N	N	None	None	Pruning	Good	Good
21	Aw	30	1	24m	1	95	Y	N	N	N	None	None	None	Excellent	Excellent
22	Mh	18	1	18m	2	80	Y	Y	Y	Y	2 Open	None	None	Good	Fair
23	Aw	42	1	26m	1	95	Y	N	N	N	None	None	None	Excellent	Excellent
24	Ir	18	1	10m	3	65	Y	Y	N	N	Broken Top	None	None	Fair	Fair
25	Aw	18	1	18m	1	100	N	N	N	N	None	None	None	Excellent	Excellent
26	Mh	16	1	15m	2	80	Y	Y	Y	Y	None	None	None	Good	Good
27	Mr	18+16+14+12	4	20m	2	80	Y	T	N	N	1 Callous	None	None	Fair	Good

HSC Ltd.: Keppel Quarry- Area 1, Tree Preservation Screening Monitoring, 2014

Tree No.	Species	DBH 2cm class	No. Stems	Total Tree Height	Crown Class (1/2/3/4)	% Live Crown	Evidence of Dieback (Yes/No)				Evidence of Health Stressors			Growing Condition	General Health Condition
							Dead Twigs	Dead Upper Branches	Leaf Defol.	Leaf Discolor.	Wounds	Visible Insect Impacts	Others		
28	Mh	18+16+14	3	21m	2	65	Y	Y	Y	Y	2 Open	None	1 Dead Stem	Fair	Fair
29	Mh	26	1	21m	2	85	Y	Y	N	Y	3 Open	None	None	Fair	Fair
30	Mh	22	1	20m	2	90	Y	N	N	Y	3 Open	Cat.	None	Fair	Poor
31	Mh	24	1	22m	2	95	Y	N	N	Y	3 Op + 1 Cal.	Cat.	None	Fair	Fair
32	Aw	18	1	21m	1	100	N	N	N	N	None	None	None	Excellent	Excellent
33	Mh	16	1	17m	2	95	Y	N	N	N	1 Callous	None	None	Excellent	Excellent
34	Mh	28	1	24m	1	100	N	N	N	N	None	None	None	Excellent	Excellent
35	Bu	40+34	2	26m	1	35	Y	Y	Y	Y	17 Open	None	Canker	Poor	Poor-Dying
36	Ag	18	1	18m	2	95	Y	N	N	Y	None	None	None	Good	Excellent
37	Mh	18	1	19m	2	100	N	N	N	Y	None	None	None	Excellent	Excellent
38	Cb	28	1	21m	2	85	Y	Y	N	N	None	None	None	Excellent	Excellent
39	Mh	20	1 (or 3)	21m	2	100	N	N	N	N	None	None	None	Excellent	Excellent
40	Mh	30	1 (or 3)	24m	2	100	N	N	N	N	None	None	None	Excellent	Excellent
41	Mh	24	1 (or 3)	22m	2	100	N	N	N	N	None	None	None	Excellent	Excellent
42	Mh	16	1	18m	3	75	Y	Y	Y	Y	None	None	None	Fair	Good
43	Mh	28	1	20m	1	100	N	N	N	N	None	None	None	Excellent	Excellent
44	Ba	32	1	24m	1	100	N	N	N	N	None	None	None	Excellent	Excellent
45	Mh	28+26+14	3	22m	1	100	N	N	N	N	None	None	None	Excellent	Excellent
46	Aw	34	1	23m	1	70	Y	Y	Y	Y	None	None	None	Good	Fair
47	Ir	16	1	15m	4	70	Y	T	Y	Y	Broken Top	None	None	Fair	Fair
47B	Mh	20	1	21m	1	100	N	N	N	N	None	None	None	Excellent	Excellent
48	Mh	24+20	2	20m	2	95	N	N	N	N	1 Open	None	None	Excellent	Good
49	Mh	34+22	2	24m	1	80	Y	Y	Y	Y	None	None	None	Good	Good
50	Bp	24	1	23m	2	100	N	N	N	N	None	None	None	Excellent	Excellent
51	Mh	30	1	25m	1	100	N	N	N	N	None	None	None	Excellent	Excellent
52	Aw	20	1	24m	1	100	N	N	N	N	None	None	None	Excellent	Excellent

HSC Ltd.: Keppel Quarry- Area 1, Tree Preservation Screening Monitoring, 2014

Definitions

Species:
Mh = Sugar Maple
Aw - White Ash
Ir = Ironwood
Ba = Basswwod
Bp = Balsam Poplar
Mr = Red Maple
Ag = Green Ash

Crown Class:
1 = Dominate, Full Sun
2 = Co-Dominate, Sun on 2 Sides
3 = Intermediate, Sun from Above
4 = Suppressed, Shaded

Wounds:
Open = Cambium layer exposed
Callous = Closed Wound, Scar Tissue

Insects:
Cat. = Forest Caterpillar
EAB = Emerald Ash Borer (Note: No external evidence on main stems of Ash Trees for ' EAB' on-site)

EAB monitoring followed published guide ' Survey Guide for Detection of Emerald Ash Borer, Natural Resources Canada, 2007'

% Live Crown : Those in Red Text demonstrate concern for Tree Preservation, Protocol Measures To Be Activated

Tree Number :
Those highlighted in Red require Tree Preservation Replacement, for Screening Purposes **= 5**
Those highlighted in Yellow require Tree Preservation Action, for Screening Purposes = **5**

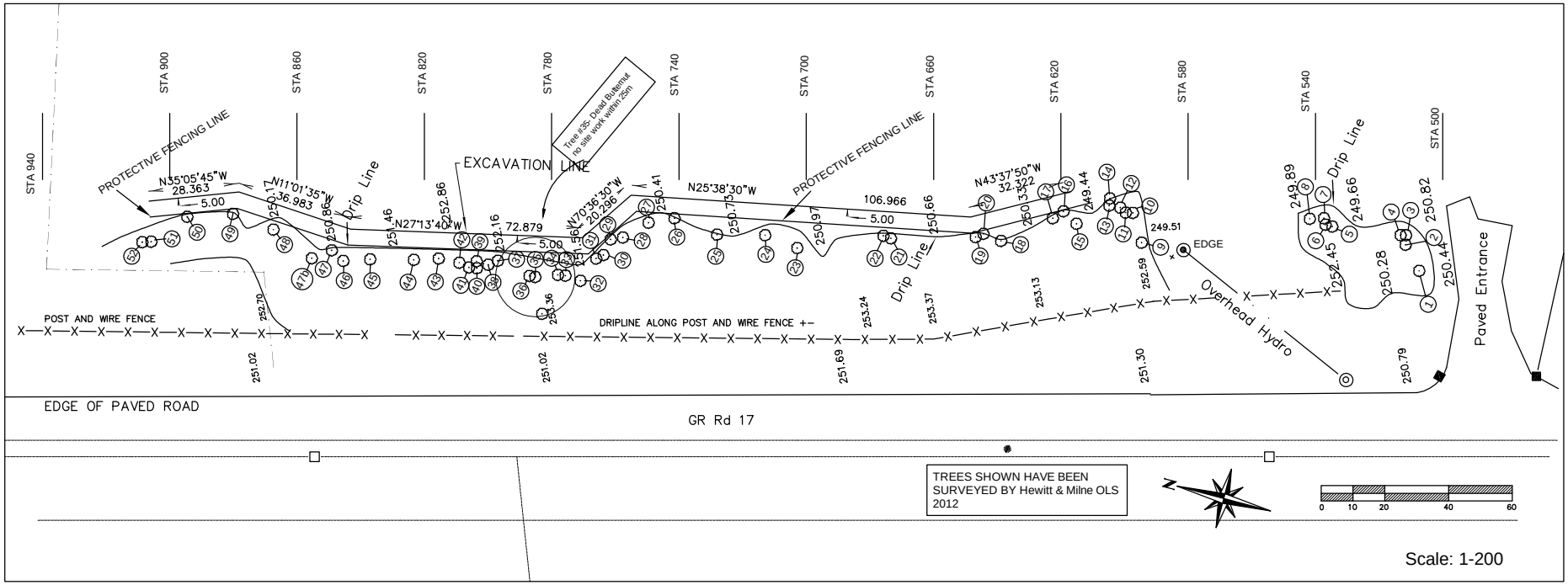


Figure 1- Zone One

EXISTING TREE

TREE NUMBER
(see VEGETATION Report)

Appendix 5

Stewardship Management Plan

STEWARDSHIP MANAGEMENT PLAN (SMP)

Harold Sutherland : Keppel Quarry Area Land Holdings, Keppel Township

This stewardship plan provides direction for management activities for a 20-year period from: January 1, 2016 to December 31, 2026. The plan format follows an accepted template of a Stewardhip Plan under the Provincial Managed Forest Tax Incentive Program (MFTIP), though the subject lands are presently not under MFTIP. Management direction is focused on preservation of sensitve lands, wildlife habitat and restoration of disturbed lands.

This Stewardship Plan is comprised of 4 property parcels all managed by Harold Sutherland and owned by corporations in which Harold Sutherland has signing authority.
The Plan encompasses the natural environment adjacent to the H.S.C. Aggregates Ltd. `Keppel Quarry`, but does not include said lands licenced that are under the Aggregate Resources Act. This Plan is to address the required Natural Environment Mitigation section 1.9 on the approved Final Site Plan for the New Keppel Quarry.

Section 1A : Property owner information

1.1 Registered property owner

Property Description: Lot 25, Concession 10

Area: 100.00 ac Assessment Roll No. : 420362000403600

ARA Lands : 0.00 ac SMP coverage : 100.00 ac

Name: H.S.C. Aggregates Ltd c/o Harold Sutherland

1.2 Registered property owner

Property Description: Lot 26, Concession 10

Area: 100.00 ac Assessment Roll No. : 420362000403700

ARA Lands : 0.00 ac SMP coverage : 100.00 ac

Name: Bluewater Logging Ltd. c/o Harold Sutherland

1.3 Registered property owner

Property Description: Part Lot 27 & SW Part Lot 28, Concession 10

Area: 87.00 ac Assessment Roll No. : 420362000403800

ARA Lands : 0.00 ac SMP coverage : 100.00 ac

Name: H.S.C. Aggregates Ltd c/o Harold Sutherland

1.4 Registered property owner

Property Description: NE Part Lot 27 & Part Lot 28, Concession 10

Area: 76.59 ac Assessment Roll No. : 420362000404101

ARA Lands : 0.00 ac SMP coverage : 100.00 ac

Name: Harold Sutherland Construction Ltd. c/o Harold Sutherland

1.5 Contact Information for all property lands:

Address: 323545 East Linton SRD, R.R. No. 2, Kemble, Ont.

Postal Code: N0H 1S0

Tel. Home: N.A.

Tel. Work: 519-376-5698

Fax: 519-371-6121

E-mail: Jennifer Prentice V.P. : jennifer@hsc-ltd.com

Section 1B : Stewardship Management Plan Author

1.5 Name: John Morton / AWS Environmental Consulting Inc.

Address: 242090 Conc. Rd 3

Postal Code: N0H 2K0

Tel. Home: N.A.

Tel. Work: 519-372-2303

Fax: 519-372-1990

E-mail: aws@gbtel.ca

Section 2B : Property information summary

Assessment Roll Number	Total Area	ARA Lands	Stewardship Plan Coverage
420362000403600	100.00	0.00	100.00
420362000403700	100.00	10.13	89.87
420362000403800	87.00	67.2	19.8
420362000404101	76.59	65.29	11.3
	363.59 ac	142.62ac	220.97 ac

Section 2C: Federal, provincial and local policies and regulations

Forestry Act
Grey County Tree cutting bylaw
Grey Sauble Conservation Authority Regulatory Lands
Niagara Escarpment Plan
Provincial Natural Heritage Policies for Significant Wetlands, ANSI and Species-At-Risk
Federal Fisheries Act and Species-At-Risk

Section 3: Past history

3.1 Past activities

Much of the southern portion of Lot 26 and 27 were actively farmed pre 1950's with pockets of Apple Orchard, old field environments , and concrete water troughs still evident.

Lot 25 also historically had cattle grazing activity pre-1950's and two small abandoned gravel pits are still evident today.

The northern portion of Lot 26 and 27 also exhibit a high level of Karst Topograpghy, with exposed bedrock, limestone boulders and numerous bedrock fractures some being 10m+ in length, 20cm in width and 2m + in depth.

The northern portion of Lot 26 and Lot 27 were selectively cut in the spring of 2015 for marked sawlogs following sustainable forestry practices (compartment numbers 1 and 2).

In the spring of 2016, sub-compartment numbers 7A, 7B, 7C and 7D will be planted with a mixture of native conifer and hardwwod trees at an average density of 875 trees/ac.

Sub-compartments 7D and 7E were planted with a mixture of conifer and hardwood seedlings over the last 10 years.

3.2 Surrounding landscape, 5km's beyond the Stewardship Plan boundaries.

To the north of Lot 25, the Open Swamp environment continues on for another 2km and also extends several km's further southwest from Concession Rd 10, all being part of the Provincially Significant Wetland -Shouldice Wetland Complex.

Along the north perimeter of Lot 26 and 27 are Consevation Authority owned lands which had a sustainable foresty hardwood timber harvest approximatly 10 years ago. Similarily south of Lot 26 and 27 are Conservationn Authority owned lands in Conifer Plantiation which had a commercial thinning operation in the winter of 2014

The abutting property west of Lot 25 is an active Gun Range owned be a local club.

Within the remainder of the lands of Lot 25, 26, 27 and 28 is an active Quarry known as ' Keppel Quarry' owned and operated by H.S.C. Aggregates Ltd which also own portions of the subject lands within this Plan. Along the east side of Grey Rd 17, Keppel Quarry commenced operations in the late 1980's, with the quarry recently receiving approval for licencing in 2015 along the west side of Grey Rd 17.

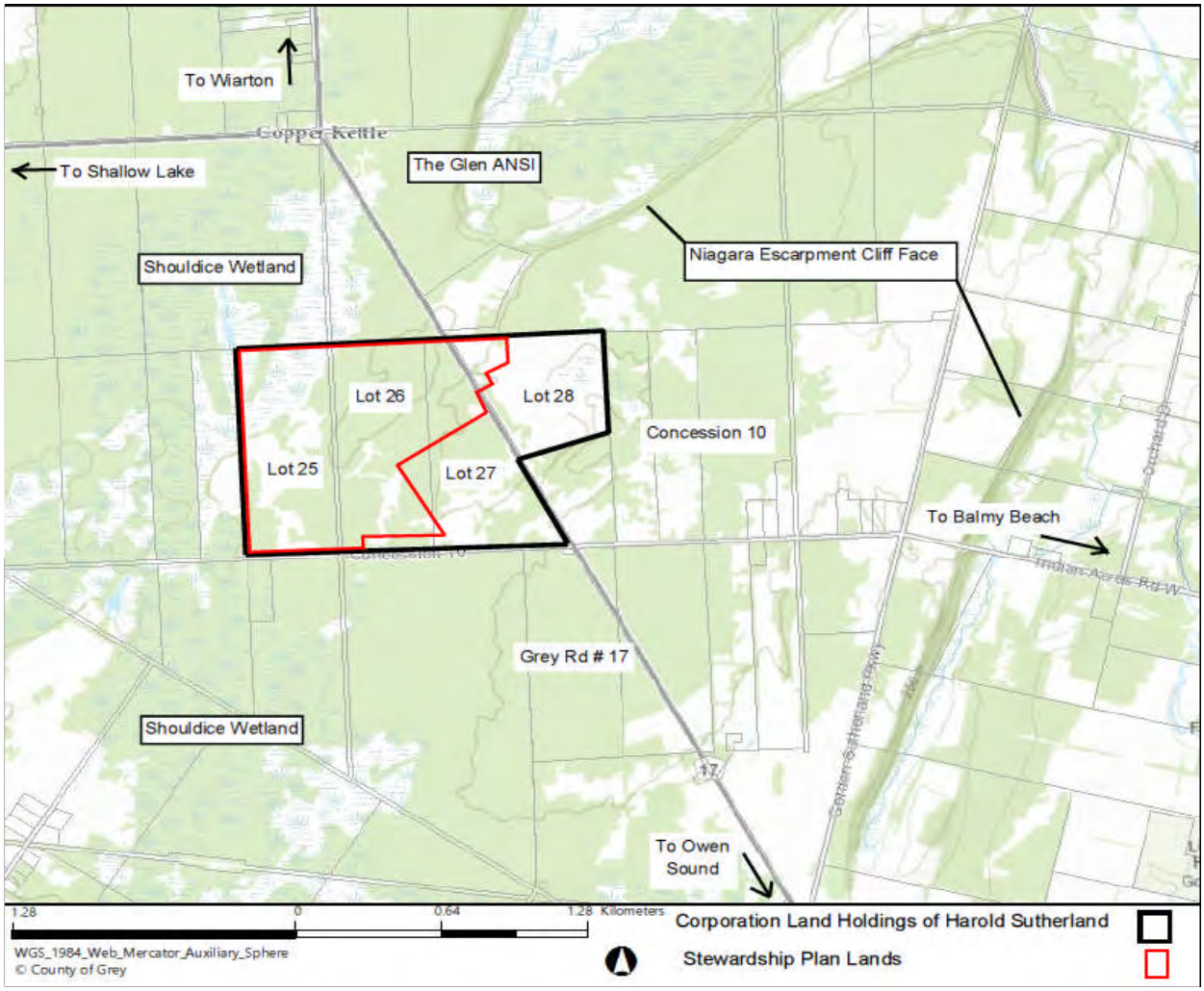
Wildlife movement activity has been documented along the Wetland-Upland transition Zone providing a linkage area between the 'Glen ANSI' which runs through and from the subject property to the Niagara Escarpment located approx 3km northeast of the subject properties. Management activities within this Stewardship Plan are focused on both Environmental Protection and Widlife Habitat to maintain the unique Hardwood Forests stands on Limestone Karst, Significant Wetland features/function, Life Scoience ANSI feature and functions and Widlife Habitat plus Wildlife Corridor functions.

Section 4A: Property location map and the surrounding area

Property Ownership: H.S.C. Aggregates Ltd. and Bluewater Logging Ltd. and
Harold Sutherland Construction Ltd. All c/o Harold Sutherland

Full Property : Lots 25, 26 , 27 and Part Lot 28, Concession 10
Geograpghic Township of Keppel, Township of Geaorgian Bluffs

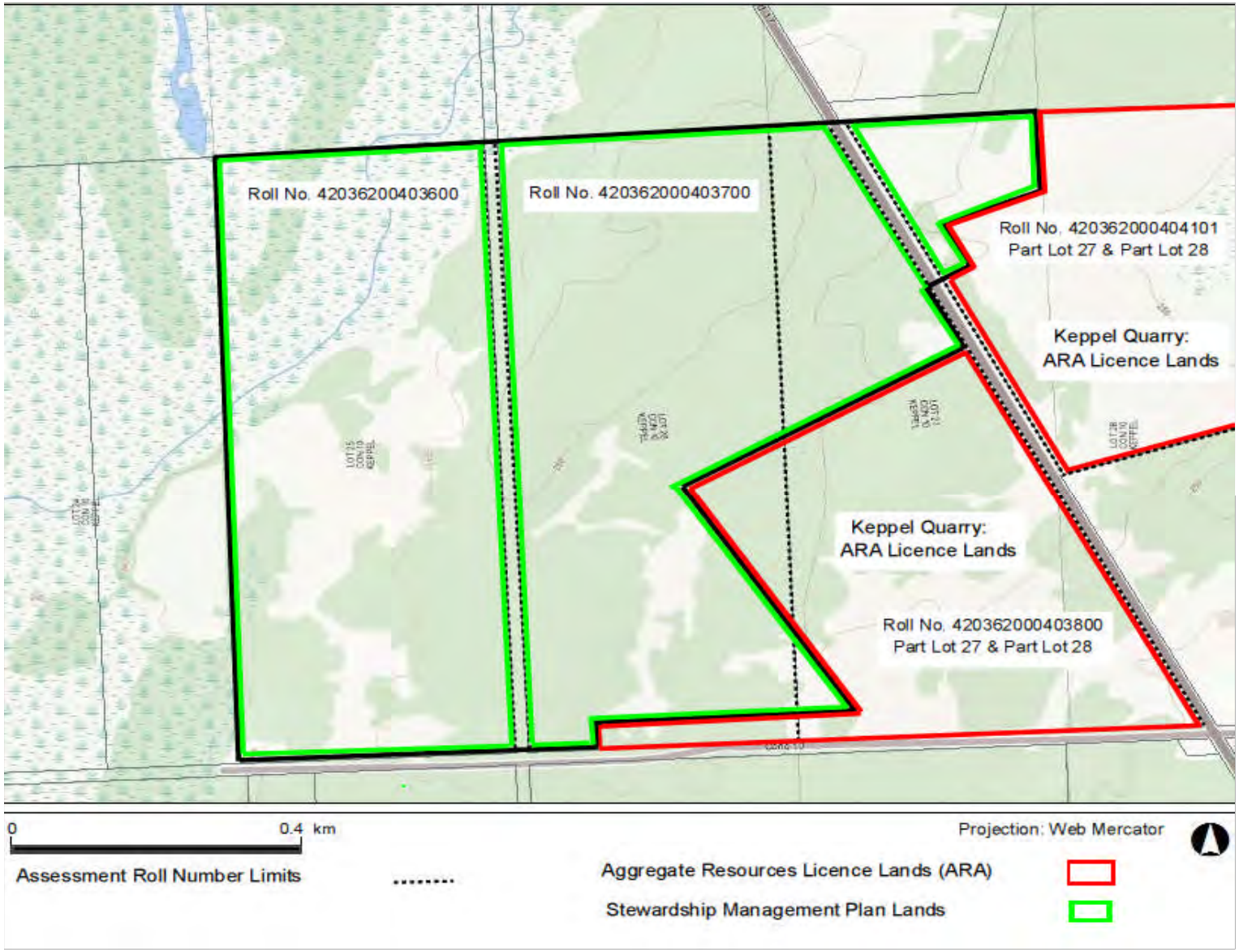
Stewardship Plan Area : Lot 25, Part Lot 26 and 27, Concession 10
Geograpghic Township of Keppel, Township of Geaorgian Bluffs



Source: Grey County web site with Ontario Base Map features showing:
Property Parcels, Road Fabric, Watercourses, Major Elevation Contour Lines,
Woodlands and Wetlands, Hamlet of Copper Kettle

Section 4B: Property and Plan Delineation

Total Stewardship Plan Area: 220.97 ac



Section 5: Landowner objectives

5.1 **Your general objectives**
(For the next 20 years, indicate how important and rank the objectives with rank 1 being the most important and 6 being the least important)

Management objective	Ranking (1 to 6)
Environmental protection	1
Forest Products	6
Investment	5
Recreation	3
Wildlife	2
Nature appreciation	4

5.2 **Details about your property level objectives**

Environmental protection:

No development permissible and site alteration within the uplands will be for active land management activities only following sustainable forestry and best management practices for wildlife habitat promotion and forest restoration.

Forest Products:

Timber harvesting undertaken in the spring of 2015, no further commercial timber harvesting proposed for the next 15 years, with stand assessment undertaken prior to any further tree cutting activity.

Investment:

Primary investment of lands are under Aggregate Resources Act licensing. Remainder of property lands 'Plan Area' will be maintained and managed as a Natural Environment.

Recreation:

Limited due to Quarry safety issues and concerns. Trail maintenance to maintain access throughout Plan Lands.

Wildlife:

Through habitat maintenance : vernal ponds for amphibian breeding, open grasslands for waterfowl nesting, conifer stands for cover habitat. Through restoration/enhancement works achieved through: reforestation, tree diversity, soft and hard mass producing species promotion.

Nature appreciation:

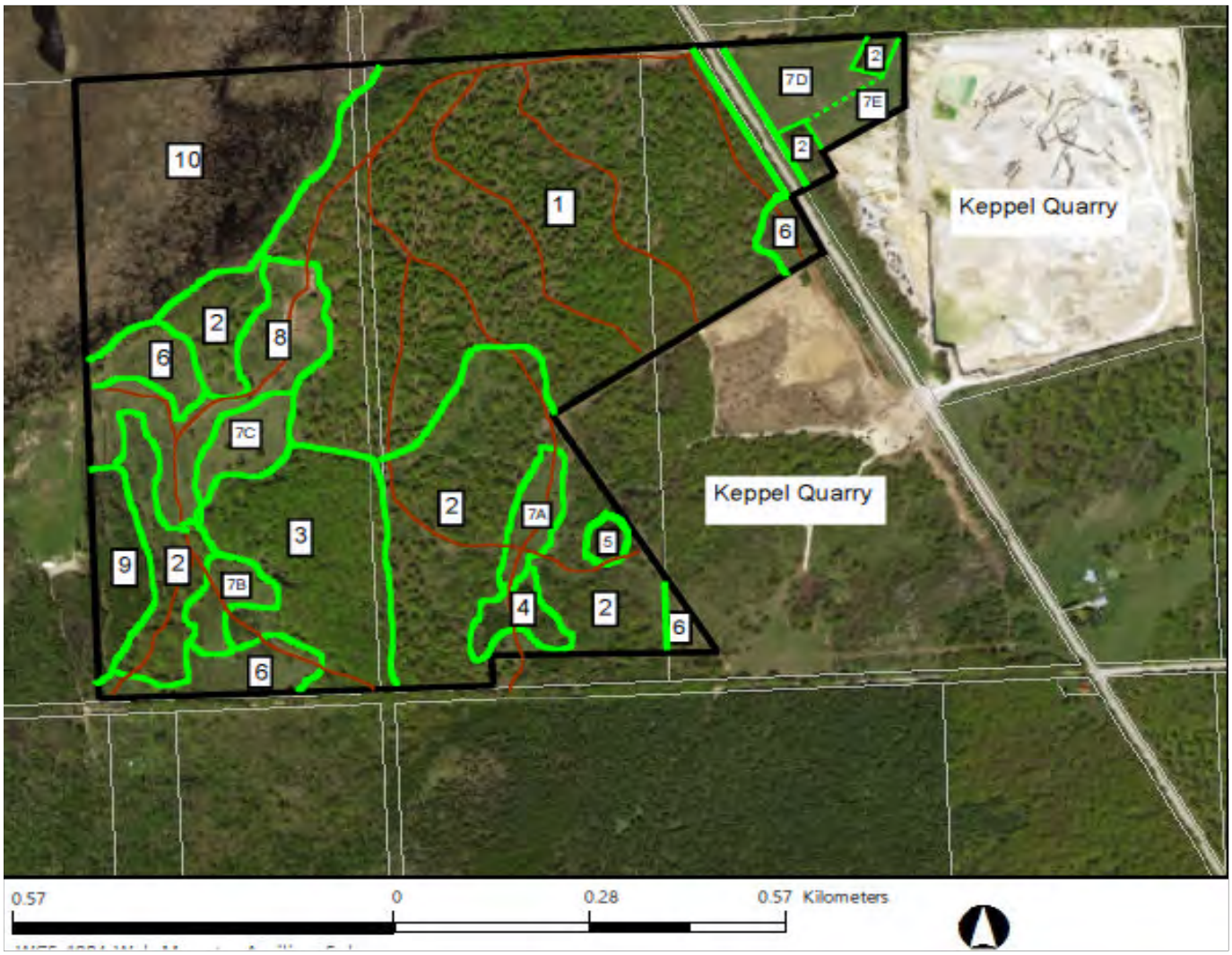
Environmental protection of sensitive lands: Wetlands, ANSI and Sugar Maple-Boulders stand (compartment No. 3)

5.3 How will you achieve your objectives?

On-going monitoring activity in conjunction with monitoring of quarry activities with activity works designed by professional consults and available for review by agencies and public steering committee.

Section 6 : Detailed Property Map, Management Compartments

Base Map Source: Grey County web site with 2015 air photo



LEGEND

Stewardship Plan Boundary

Compartment Boundary

Compartment Numbers (1 to 10) 1

Trail Network

Section 7: Getting to know your upland areas

7.1 Compartment number & name: **No. 1 , Mature Maple - Ash**

Area = **82.27 ac** Lot 25 = 10.0ac, Lot 26 = 54.47ac , Lot 27 = 17.8ac

7.2 Compartment characteristics

Soil Type	[ ] light (generally sand)		Soil depth	[X] very shallow (< 15cm)
	[X] medium (generally loam)			[ ] shallow (15-30cm)
	[ ] heavy (generally clay)			[ ] moderate (>30cm)
Stony	[X] Yes	[ ] No	Topography	[X] flat
Drainage	[X] well drained			[ ] gently rolling
	[ ] moderate			[ ] steep
	[ ] poor		Accessibility	[ ] year-round
				[X] seasonal

7.3 Compartment History

Much of this compartment is comprised of the Life Science ANSI- Shouldice Forest.
Commercial tree harvesting undertaken in the spring of 2015 following Sustainable Forestry Practices

7.4 Inventory

Note: If the compartment is dominated by trees, complete the Forested Compartment Description (below). If the compartment has few trees, complete the Open Area Description

Forest compartment description

Much woody debris on forest floor	[X] Yes	[ ] No
Good diversity of understory plants	[X] Yes	[ ] No
Signs of grazing or other disturbances	[ ] Yes	[X] No
Good regen. of seedlings/saplings	[X] Yes	[ ] No
Trees generally younger	[ ] Yes	[X] No
Trees generally older growth	[ ] Yes	[X] No
Trees generally the same age	[ ] Yes	[X] No
Trees of all sizes and ages	[X] Yes	[ ] No

Tree species found

		Percent
Species :	Sugar Maple	50 %
Species :	White Ash	20 %
Species :	Balsam Poplar	15 %
Species :	White Birch	10 %
Species :	Others	5 %

Estimated height of trees:	22	m
Average diameter at breast height:	32	cm
Estimated age of majority of trees:	100	yrs

Open area description

Agricultural areas	[ ] pasture
	[ ] cropland
Other areas	[ ] old field
	[ ] exposed rock
	[ ] hydro or pipeline corridor
	[ ] shallow limestone alvar
	[ ] native grass prairie
	[ ] sparsely treed savannah
Other features	[ ] small open areas
	[ ] small rock knobs/barrens
	[ ] fencerows
	[ ] small wet areas
	[ ] beaver floods
	[ ] pond, stream
	[ ] lake

General cover type determination:

[ ] coniferous forest	[X] deciduous forest	[ ] mixed forest
[ ] coniferous plantation	[ ] deciduous plantation	[ ] mixed plantation

Section 7: Getting to know your upland areas

7.1 Compartment number & name: **No. 2, Mixed Hardwoods**

Area = **45.8ac** Lot 25=14.5ac, Lot 26= 28.0ac, Lot 27 = 3.3ac

7.2 Compartment characteristics

Soil Type	[ ]	light (generally sand)	Soil depth	[ ]	very shallow (< 15cm)
	[X]	medium (generally loam)		[X]	shallow (15-30cm)
	[ ]	heavy (generally clay)		[ ]	moderate (>30cm)
Stony	[X]	Yes [ ] No	Topography	[ ]	flat
Drainage	[ ]	well drained		[X]	gently rolling
	[X]	moderate		[ ]	steep
	[ ]	poor	Accessibility	[ ]	year-round
				[X]	seasonal

7.3 Compartment History

Within Lot 26 some past fuelwood/select cutting, remaing compartment areas show no active historical management activity.

7.4 Inventory

Note: If the compartment is dominated by trees, complete the Forested Compartment Description (below). If the compartment has few trees, complete the Open Area Description

Forest compartment description

Much woody debris on forest floor	[X]	Yes	[ ]	No
Good diversity of understory plants	[X]	Yes	[ ]	No
Signs of grazing or other disturbances	[ ]	Yes	[X]	No
Good regen. of seedlings/saplings	[X]	Yes	[ ]	No
Trees generally younger	[ ]	Yes	[X]	No
Trees generally older growth	[ ]	Yes	[X]	No
Trees generally the same age	[ ]	Yes	[X]	No
Trees of all sizes and ages	[X]	Yes	[ ]	No

Tree species found

		Percent
Species :	Sugar Maple	%
Species :	Balsam Poplar	%
Species :	White Ash	%
Species :	Beech	%
Species :		%

Estimated height of trees:	20	m
Average diameter at breast height:	28	cm
Estimated age of majority of trees:	70	yrs

Open area description

Agricultural areas	[ ]	pasture
	[ ]	cropland
Other areas	[ ]	old field
	[ ]	exposed rock
	[ ]	hydro or pipeline corridor
	[ ]	shallow limestone alvar
	[ ]	native grass prairie
	[ ]	sparsely treed savannah
Other features	[ ]	small open areas
	[ ]	small rock knobs/barrens
	[ ]	fencerows
	[ ]	small wet areas
	[ ]	beaver floods
	[ ]	pond, stream
	[ ]	lake

General cover type determination:

[ ]	coniferous forest	[X]	deciduous forest	[ ]	mixed forest
[ ]	coniferous plantation	[ ]	deciduous plantation	[ ]	mixed plantation

Section 7: Getting to know your upland areas

7.1 Compartment number & name: **No. 3, Sugar Maple-Boulders**

Area = **20.0ac** Lot 25 = 20.0ac

7.2 Compartment characteristics

Soil Type	[ ] light (generally sand)	Soil depth	[ ] very shallow (< 15cm)
	[X] medium (generally loam)		[X] shallow (15-30cm)
	[ ] heavy (generally clay)		[ ] moderate (>30cm)
Stony	[X] Yes [ ] No	Topography	[X] flat
Drainage	[ ] well drained		[ ] gently rolling
	[X] moderate		[ ] steep
	[ ] poor	Accessibility	[ ] year-round
			[X] seasonal

7.3 Compartment History

Terrian has extensive limestone boulders (0.5m to 2m diam)covered in moss's throughout the stand
No evidence of past cutting or site disturbances

7.4 Inventory

Note: If the compartment is dominated by trees, complete the Forested Compartment Description (below). If the compartment has few trees, complete the Open Area Description

Forest compartment description

Much woody debris on forest floor	[ ] Yes	[X] No
Good diversity of understory plants	[X] Yes	[ ] No
Signs of grazing or other disturbances	[ ] Yes	[X] No
Good regen. of seedlings/saplings	[ ] Yes	[X] No
Trees generally younger	[ ] Yes	[X] No
Trees generally older growth	[X] Yes	[ ] No
Trees generally the same age	[X] Yes	[ ] No
Trees of all sizes and ages	[ ] Yes	[ ] No

Tree species found

		Percent
Species :	Sugar Maple	95 %
Species :	Others	5 %
Species :		%
Species :		%
Species :		%

Estimated height of trees:	24 m
Average diameter at breast height:	36 cm
Estimated age of majority of trees:	125 yrs

Open area description

Agricultural areas	[ ] pasture
	[ ] cropland
Other areas	[ ] old field
	[ ] exposed rock
	[ ] hydro or pipeline corridor
	[ ] shallow limestone alvar
	[ ] native grass prairie
	[ ] sparsely treed savannah
Other features	[ ] small open areas
	[ ] small rock knobs/barrens
	[ ] fencerows
	[ ] small wet areas
	[ ] beaver floods
	[ ] pond, stream
	[ ] lake

General cover type determination:

[ ] coniferous forest	[X] deciduous forest	[ ] mixed forest
[ ] coniferous plantation	[ ] deciduous plantation	[ ] mixed plantation

Section 7: Getting to know your upland areas

7.1 Compartment number & name: **No. 4, White Cedar**

Area = **2.3ac for MFTIP**

Lot 26 = 2.3ac

Stewardship Plan, Compartment 4 = 2.3ac

7.2 Compartment characteristics

Soil Type	[ ] light (generally sand)		Soil depth	[ ] very shallow (< 15cm)
	[X] medium (generally loam)			[X] shallow (15-30cm)
	[ ] heavy (generally clay)			[ ] moderate (>30cm)
Stony	[X] Yes	[ ] No	Topography	[X] flat
Drainage	[ ] well drained			[ ] gently rolling
	[X] moderate			[ ] steep
	[ ] poor		Accessibility	[ ] year-round
				[X] seasonal

7.3 Compartment History

No evidence of past management actvity, historicallly (pre 1950's) cattle access in stand

7.4 Inventory

Note: If the compartment is dominated by trees, complete the Forested Compartment Description (below). If the compartment has few trees, complete the Open Area Description

Forest compartment description

Much woody debris on forest floor	[ ] Yes	[X] No
Good diversity of understory plants	[ ] Yes	[X] No
Signs of grazing or other disturbances	[ ] Yes	[X] No
Good regen. of seedlings/saplings	[ ] Yes	[X] No
Trees generally younger	[ ] Yes	[X] No
Trees generally older growth	[ ] Yes	[X] No
Trees generally the same age	[X] Yes	[ ] No
Trees of all sizes and ages	[ ] Yes	[X] No

Tree species found

		Percent
Species :	White Cedar	85 %
Species :	Balsam Poplar	15 %
Species :		%
Species :		%
Species :		%

Estimated height of trees:	14 m
Average diameter at breast height:	20 cm
Estimated age of majority of trees:	80 yrs

Open area description

Agricultural areas	[ ] pasture
	[ ] cropland
Other areas	[ ] old field
	[ ] exposed rock
	[ ] hydro or pipeline corridor
	[ ] shallow limestone alvar
	[ ] native grass prairie
	[ ] sparsely treed savannah
Other features	[ ] small open areas
	[ ] small rock knobs/barrens
	[ ] fencerows
	[ ] small wet areas
	[ ] beaver floods
	[ ] pond, stream
	[ ] lake

General cover type determination:

[X]	coniferous forest	[ ]	deciduous forest	[ ]	mixed forest
[ ]	coniferous plantation	[ ]	deciduous plantation	[ ]	mixed plantation

Section 7: Getting to know your upland areas

7.1 Compartment number & name: **No. 5, Soft Maple**

Area = **1.0ac** Lot 26 = 1.0ac

7.2 Compartment characteristics

Soil Type	[ ] light (generally sand)	Soil depth	[ ] very shallow (< 15cm)
	[ ] medium (generally loam)		[ ] shallow (15-30cm)
	[X] heavy (generally clay)		[X] moderate (>30cm)
Stony	[ ] Yes [X] No	Topography	[X] flat
Drainage	[ ] well drained		[ ] gently rolling
	[ ] moderate		[ ] steep
	[X] poor	Accessibility	[ ] year-round
			[X] seasonal

7.3 Compartment History

Seasonally flooded vernal pool habitat
No evidence of past disturbances

7.4 Inventory

Note: If the compartment is dominated by trees, complete the Forested Compartment Description (below). If the compartment has few trees, complete the Open Area Description

Forest compartment description

Much woody debris on forest floor	[X] Yes	[ ] No
Good diversity of understory plants	[X] Yes	[ ] No
Signs of grazing or other disturbances	[ ] Yes	[X] No
Good regen. of seedlings/saplings	[X] Yes	[ ] No
Trees generally younger	[ ] Yes	[X] No
Trees generally older growth	[ ] Yes	[X] No
Trees generally the same age	[ ] Yes	[X] No
Trees of all sizes and ages	[X] Yes	[ ] No

Tree species found

		Percent
Species :	Silver Maple	50 %
Species :	Green Ash	20 %
Species :	White Cedar	10 %
Species :	Balsam Fir	10 %
Species :	Balsam Poplar	10 %

Estimated height of trees:	18 m
Average diameter at breast height:	26 cm
Estimated age of majority of trees:	80 yrs

Open area description

Agricultural areas	[ ] pasture
	[ ] cropland
Other areas	[ ] old field
	[ ] exposed rock
	[ ] hydro or pipeline corridor
	[ ] shallow limestone alvar
	[ ] native grass prairie
	[ ] sparsely treed savannah
Other features	[ ] small open areas
	[ ] small rock knobs/barrens
	[ ] fencerows
	[ ] small wet areas
	[ ] beaver floods
	[ ] pond, stream
	[ ] lake

General cover type determination:

[ ] coniferous forest	[X] deciduous forest	[ ] mixed forest
[ ] coniferous plantation	[ ] deciduous plantation	[ ] mixed plantation

Section 7: Getting to know your upland areas

7.1 Compartment number & name: **No. 6, Early Successional Hardwoods**

Area = **10.0ac** Lot 25 = 8.0ac, Lot 27 = 2.0ac

7.2 Compartment characteristics

Soil Type	[ ] light (generally sand)	Soil depth	[ ] very shallow (< 15cm)
	[X] medium (generally loam)		[ ] shallow (15-30cm)
	[ ] heavy (generally clay)		[X] moderate (>30cm)
Stony	[ ] Yes [X] No	Topography	[X] flat
Drainage	[X] well drained		[ ] gently rolling
	[ ] moderate		[ ] steep
	[ ] poor	Accessibility	[ ] year-round
			[X] seasonal

7.3 Compartment History

Old field environments with historical cattle grazing (pre 1950's)
Natural regeneration of early successional decidous tree species and tall shrubs

7.4 Inventory

Note: If the compartment is dominated by trees, complete the Forested Compartment Description (below). If the compartment has few trees, complete the Open Area Description

Forest compartment description

Much woody debris on forest floor	[ ] Yes	[X] No
Good diversity of understory plants	[ ] Yes	[X] No
Signs of grazing or other disturbances	[X] Yes	[ ] No
Good regen. of seedlings/saplings	[ ] Yes	[X] No
Trees generally younger	[X] Yes	[ ] No
Trees generally older growth	[ ] Yes	[X] No
Trees generally the same age	[X] Yes	[ ] No
Trees of all sizes and ages	[ ] Yes	[X] No

Tree species found

		Percent
Species :	Trembling Aspen	30 %
Species :	Balsam Poplar	20 %
Species :	Hawthorn	20 %
Species :	Sugar Maple	15 %
Species :	Others	15 %

Estimated height of trees:	12 m
Average diameter at breast height:	14 cm
Estimated age of majority of trees:	30 yrs

Open area description

Agricultural areas	[ ] pasture
	[ ] cropland
Other areas	[ ] old field
	[ ] exposed rock
	[ ] hydro or pipeline corridor
	[ ] shallow limestone alvar
	[ ] native grass prairie
	[ ] sparsely treed savannah
Other features	[ ] small open areas
	[ ] small rock knobs/barrens
	[ ] fencerows
	[ ] small wet areas
	[ ] beaver floods
	[ ] pond, stream
	[ ] lake

General cover type determination:

[ ] coniferous forest	[X] deciduous forest	[ ] mixed forest
[ ] coniferous plantation	[ ] deciduous plantation	[ ] mixed plantation

Section 7: Getting to know your upland areas

7.1 Compartment number & name: **No. 7, Mixed Plantation**

Area = **20.1 ac** 7A = 3.6ac, 7B = 4.0ac, 7C = 4.5ac, 7D = 5.4ac, 7E = 2.6ac

7.2 Compartment characteristics

Soil Type	[ ] light (generally sand)	Soil depth	[ ] very shallow (< 15cm)
	[X] medium (generally loam)		[ ] shallow (15-30cm)
	[ ] heavy (generally clay)		[X] moderate (>30cm)
Stony	[ ] Yes [X] No	Topography	[X] flat
Drainage	[ ] well drained		[ ] gently rolling
	[X] moderate		[ ] steep
	[ ] poor	Accessibility	[ ] year-round
			[X] seasonal

7.3 Compartment History

Old field environments with pre-1950's cattle grazing. Compartment 7D planted with scattered conifers over last 10 years. Compartment 7E planted with landscape size Hardwood saplings 5 years ago. Compartments 7A, 7B, 7C & 7D to be planted with mix seedlings in 2016

7.4 Inventory

Note: If the compartment is dominated by trees, complete the Forested Compartment Description (below). If the compartment has few trees, complete the Open Area Description

Forest compartment description

Much woody debris on forest floor	[ ] Yes	[X] No
Good diversity of understory plants	[ ] Yes	[X] No
Signs of grazing or other disturbances	[X] Yes	[ ] No
Good regen. of seedlings/saplings	[ ] Yes	[X] No
Trees generally younger	[X] Yes	[ ] No
Trees generally older growth	[ ] Yes	[X] No
Trees generally the same age	[X] Yes	[ ] No
Trees of all sizes and ages	[ ] Yes	[X] No

Tree species found

		Percent
Species :	White Pine	30 %
Species :	White Cedar	30 %
Species :	Sugar Maple	15 %
Species :	Red Oak	15 %
Species :	Black Cherry	10 %

Estimated height of trees:	1 m
Average diameter at breast height:	4 cm
Estimated age of majority of trees:	3 yrs

Open area description

Agricultural areas	[ ] pasture
	[ ] cropland
Other areas	[ ] old field
	[ ] exposed rock
	[ ] hydro or pipeline corridor
	[ ] shallow limestone alvar
	[ ] native grass prairie
	[ ] sparsely treed savannah
Other features	[ ] small open areas
	[ ] small rock knobs/barrens
	[ ] fencerows
	[ ] small wet areas
	[ ] beaver floods
	[ ] pond, stream
	[ ] lake

General cover type determination:

[ ] coniferous forest	[ ] deciduous forest	[ ] mixed forest
[ ] coniferous plantation	[ ] deciduous plantation	[X] mixed plantation

Section 7: Getting to know your upland areas

7.1 Compartment number & name: **No. 8, Open Area**

Area = **5.0ac** Lot 25 = 5.0ac

7.2 Compartment characteristics

Soil Type	[ ] light (generally sand)	Soil depth	[ ] very shallow (< 15cm)
	[X] medium (generally loam)		[ ] shallow (15-30cm)
	[ ] heavy (generally clay)		[X] moderate (>30cm)
Stony	[ ] Yes [X] No	Topography	[X] flat
Drainage	[ ] well drained		[ ] gently rolling
	[X] moderate		[ ] steep
	[ ] poor	Accessibility	[ ] year-round
			[X] seasonal

7.3 Compartment History

Old field environments with pre-1950's cattle grazing, now dominated in grasses with some scattered tall shrubs and Hawthorns throughout. Two small (<1ac) scattered old (1950's) gravel pits. Habitat functions as a waterfowl nesting area for the adjacent Significant Shouldice Wetland

7.4 Inventory

Note: If the compartment is dominated by trees, complete the Forested Compartment Description (below). If the compartment has few trees, complete the Open Area Description

Forest compartment description

Much woody debris on forest floor	[ ] Yes	[ ] No
Good diversity of understory plants	[ ] Yes	[ ] No
Signs of grazing or other disturbances	[ ] Yes	[ ] No
Good regen. of seedlings/saplings	[ ] Yes	[ ] No
Trees generally younger	[ ] Yes	[ ] No
Trees generally older growth	[ ] Yes	[ ] No
Trees generally the same age	[ ] Yes	[ ] No
Trees of all sizes and ages	[ ] Yes	[ ] No

Tree species found

		Percent
Species :		%
Species :		%
Species :		%
Species :		%
Species :		%

Estimated height of trees:	m
Average diameter at breast height:	cm
Estimated age of majority of trees:	yrs

Open area description

Agricultural areas	[ ] pasture
	[ ] cropland
Other areas	[X] old field
	[ ] exposed rock
	[ ] hydro or pipeline corridor
	[ ] shallow limestone alvar
	[ ] native grass prairie
	[ ] sparsely treed savannah
Other features	[X] small open areas
	[X] small rock knobs/barrens
	[ ] fencerows
	[ ] small wet areas
	[ ] beaver floods
	[ ] pond, stream
	[ ] lake

General cover type determination:

[ ] coniferous forest	[ ] deciduous forest	[ ] mixed forest
[ ] coniferous plantation	[ ] deciduous plantation	[ ] mixed plantation

Section 7B: Getting to know your wetland areas

(Fill out a separate form for each wetland compartment)

7B.1 Compartment number & name: **No. 9, Cedar Swamp**

Area: **6.0 ac** Lot 25 = 6.0ac

7B.2 Compartment characteristics

Soil Type

- [X] muck
- [ ] peat
- [ ] silt
- [ ] marl
- [ ] sand

Main source of water

- [ ] creek
- [X] runoff
- [ ] natural pond/lake
- [X] snow melt
- [ ] spring
- [ ] tile drain
- [ ] groundwater seepage

Accessibility to compartment: [ ] year-round [X] seasonal

7B.3 Compartment history

- [ ] flooded year-round
- [X] flooded spring only
- [X] dries mid-summer
- [ ] human-made impoundment
- [ ] beaver impoundment
- [X] water at or near ground table
- [X] wetland has been evaluated by OMNR

Average yearly water level depth: 20cm

Wetland name and class: Shouldice Wetland Complex, Class 1
Additional information: Adjacent property to west, North Grey Gun Club/ Shooting Range

7B.4 Inventory

Note: If trees and shrubs cover more than 25% of the compartment area, complete the left side of the form (below). If less than 25% of the compartment is covered by trees and/or shrubs then complete the right side of the form (below)

Trees or Shrubs cover more than 25%

Most trees are dead	[ ] Yes	[X] No
Mostly shrubs	[ ] Yes	[X] No
Good diversity of understory plants	[X] Yes	[ ] No
Signs of grazing or disturbances	[ ] Yes	[X] No
Good regeneration of trees	[X] Yes	[ ] No
Trees generally younger	[ ] Yes	[X] No
Trees generally older growth	[ ] Yes	[X] No
Trees generally the same age	[ ] Yes	[X] No
Trees of all sizes and ages	[X] Yes	[ ] No

Tree species found		Percent
Species:	White Cedar	80 %
Species:	Balsam Poplar	15 %
Species:	Others	5 %
Species:		%
Species:		%

Estimated height of trees: 16 m
Average diameter at breast height: 20 cm
Estimated age of majority of trees: 60 yrs

Trees or Shrubs cover less than 25%

- [ ] No Open Water
- [ ] Some Open Water

Dominant Vegetation Form

- [ ] emergent
- [ ] submergent
- [ ] floating

Composed mostly of :

- [ ] cattails, rushes, grasses
- [ ] sedges
- [ ] mosses

Other features:

- [ ] Headwaters to a watercourse
- [ ] Stream bisecting compartment
- [ ] Permanent Pond

Additional information:

General cover type or Wetland type

- [ ] bog
- [ ] fen
- [ ] marsh
- [ ] thicket swamp
- [ ] deciduous swamp
- [X] coniferous swamp
- [ ] dead tree/ flooded swamp
- [ ] mixed swamp

Section 7B: Getting to know your wetland areas

(Fill out a separate form for each wetland compartment)

7B.1 Compartment number & name: **No. 10, Open Swamp**

Area: **28.5ac** Lot 25 = 28.0ac, Lot 26 = 0.5ac all PSW

7B.2 Compartment characteristics

Soil Type
- [X] muck
- [ ] peat
- [ ] silt
- [ ] marl
- [ ] sand

Main source of water
- [X] creek
- [ ] runoff
- [ ] natural pond/lake
- [ ] snow melt
- [X] spring
- [ ] tile drain
- [ ] groundwater seepage

Accessibility to compartment:
- [ ] year-round
- [X] seasonal

7B.3 Compartment history

- [X] flooded year-round
- [ ] flooded spring only
- [ ] dries mid-summer
- [ ] human-made impoundment
- [ ] beaver impoundment
- [ ] water at or near ground table
- [X] wetland has been evaluated by OMNR

Average yearly water level depth: 1m

Wetland name and class: Shouldice Wetland Complex, Class 1
Additional information: Significant water level fluctuations from beaver dams and Karst Sinkholes

7B.4 Inventory

Note: If trees and shrubs cover more than 25% of the compartment area, complete the left side of the form (below). If less than 25% of the compartment is covered by trees and/or shrubs then complete the right side of the form (below)

Trees or Shrubs cover more than 25%

Most trees are dead	[X] Yes	[ ] No
Mostly shrubs	[ ] Yes	[ ] No
Good diversity of understory plants	[ ] Yes	[ ] No
Signs of grazing or disturbances	[ ] Yes	[ ] No
Good regeneration of trees	[ ] Yes	[ ] No
Trees generally younger	[ ] Yes	[ ] No
Trees generally older growth	[ ] Yes	[ ] No
Trees generally the same age	[ ] Yes	[ ] No
Trees of all sizes and ages	[ ] Yes	[ ] No

Tree species found	Percent
Species:	%
Species:	%
Species:	%
Species:	%
Species:	%

Estimated height of trees: m
Average diameter at breast height: cm
Estimated age of majority of trees: yrs

Trees or Shrubs cover less than 25%

- [ ] No Open Water
- [X] Some Open Water

Dominant Vegetation Form
- [X] emergent
- [ ] submergent
- [ ] floating

Composed mostly of :
- [X] cattails, rushes, grasses
- [ ] sedges
- [ ] mosses

Other features:
- [ ] Headwaters to a watercourse
- [X] Stream bisecting compartment
- [ ] Permanent Pond

Additional information:
Groundwater seeps near confluence area of Compartment No. 8 , No. 1 and No. 10, Lot 25

General cover type or Wetland type

- [ ] bog
- [ ] fen
- [ ] marsh
- [ ] thicket swamp
- [ ] deciduous swamp
- [ ] coniferous swamp
- [X] dead tree/ flooded swamp
- [ ] mixed swamp

Getting to know the wildlife

7.5 Description of wildlife for: [ ] Compartment number:

[X] Entire Property:

Wildlife Observations

Wildlife species	Season / Activity / Comments
Mammals:	
White-tailed Deer	Seasonal - Summer Range, Comp. No. 1 to 9
Black bear	Seasonal - Summer Range, Comp. No. 1 to 9
Coyote	Seasonal - Summer Range, Comp. No. 1 to 9
Snowshoe Hare	Year-Round in Comp. No , 2, 4 and 9
Birds:	
Wild Turkey	Seaonal-Summer Range Comp No. 1 to 9
Numerous Migratory Song Birds	Seasoinal- All Compartments
Waterfowl	Seasonal-Nesting in Comp 8, Summer Range Comp 10
Amphibians/Reptiles:	
Frogs/Toads	Breeding habitat in Compt. No. 5 and 10
Turtles	Nesting in Comp 8, Year-Round in Comp 10
Fish:	
Warm water fish community-Cyprinidae (Minnows and Mud-Minnows)	Year Round in Comp. No. 10
Insects:	
No SAR Species	Seasonal -Summer Range, All Compartments
Rare Plants:	
Hart's-tongue Fern (Prov. Rare)	Compartment No. 1 and 3
Several Locally Rare species	Comprtment No. 1 and 2

	Habitat features	**Details / Comments**
X	Snags	Compartment No. 1, 2, 3 and 9
X	Cavity trees	Compartment No. 1, 2 and 3
	Supercanopy trees	
X	Mast trees (soft/hard fruit bearing)	Scattered Hawthorn and Apple in Comp. No. 6, 7 and 8
X	Conifer thickets	Compartment No. 4 and 9
X	Stick nests	Occassional Raptor nesting activity in Comp. No. 1
	Heronry	
X	Fallen or dead trees	Compartment No. 1, 2, 3, 4, 5 and 9
	Dens or dug holes	
X	Wildlife trails/corridors	Along transitional habitat adjacent to Comp No. 10
	Deer wintering yard	
	Deer bedding area	
X	Waterfowl nesting	Compartment No. 8
X	Waterfowl feeding	Compartment No. 10
X	Waterfowl breeding pair habitat	Compartment No. 10
X	Waterfowl brood habitat	Compartment No. 10
	Snake hibernaculum	
X	Other food sources	Grasses and Insects, Compartment No. 5 and No. 8

7.6 Upland Objectives

Compartment No.: 1 **Compartment Name:** Mature Maple-Ash

A) Long-term Objectives (What do you want this compartment to be like in 20 years ?)

Maturity of stand, environmental protection area given ANSI values/features

B) Short-term activities (What activities, if any, do you have planned in this compartment over the next 10 years that will help reach your long-term objectives ?)

Compartment area = 82.27ac of which 66.9ac is within the Life Science ANSI- Shouldice Forest.
Landowner is participating in the Conservation Land program. Remaing 15.37ac of stand now under MFTIP. Stand was commercially harvested for Sawlogs in spring of 2015. No future cutting activity to be undertaken. Monitor for Forest Health.

Conservation Land Designation

Eligible for Conservation Land Tax Incentive Program ? [X] Yes [ ] No [ ] Don't know

Type of Conservation land — Portion of Compartment, Not All ANSI

- [ ] Provincially significant wetland
- [ ] Habitat of endagered species
- [ ] Community conservation lands
- [X] Provincially significant Area of Natural & Scientific Interest
- [ ] Escarpment Natural area in the Niagara Escarpment Plan

Compartment No.: 2 **Compartment Name:** Mixed Hardwoods

A) Long-term Objectives (What do you want this compartment to be like in 20 years ?)

Maturity of stand and maintain tree species diversity for improved wildlife habitat and carrying capacity of lands.

B) Short-term activities (What activities, if any, do you have planned in this compartment over the next 10 years that will help reach your long-term objectives ?)

Compartment area = 45.80ac all under MFTIP.
Some select commercial cutting activity at north end of compartment No. 2 in Lot 26. All other comparments No. 2 parcels in natural condition. Monitor Forest Health and promote wildlife habitat.

Conservation Land Designation

Eligible for Conservation Land Tax Incentive Program ? [ ] Yes [X] No [ ] Don't know

Type of Conservation land

- [ ] Provincially significant wetland
- [ ] Habitat of endagered species
- [ ] Community conservation lands
- [ ] Provincially significant Area of Natural & Scientific Interest
- [ ] Escarpment Natural area in the Niagara Escarpment Plan

7.6 Upland Objectives

Compartment No.: 3 **Compartment Name:** Sugar Maples-Boulders

A) Long-term Objectives (What do you want this compartment to be like in 20 years ?)

Environmentally sensitive area due to terrain (Boulders and Karst).
Maintain in a natuiral environment as to existing conditions.

B) Short-term activities (What activities, if any, do you have planned in this compartment over the next 10 years that will help reach your long-term objectives ?)

Site has a significant number of large (0.5m to 2.0m) diameter of boulders stewen throughout, making access within stand difficult other than walking. Boulders are heavily covered in moss's.
To maintain site conditions requires a dense closed upper canopy, no tree removal other than those posing health & saftey concerns.

Conservation Land Designation

Eligible for Conservation Land Tax Incentive Program ? [ ] Yes [X] No [ ] Don't know

Type of Conservation land

- [ ] Provincially significant wetland
- [ ] Habitat of endagered species
- [ ] Community conservation lands
- [ ] Provincially significant Area of Natural & Scientific Interest
- [ ] Escarpment Natural area in the Niagara Escarpment Plan

Compartment No.: 4 **Compartment Name:** White Cedar

A) Long-term Objectives (What do you want this compartment to be like in 20 years ?)

Monitor forest health and encourage stand expansion southward through natural regeneration and periodic spot planting.

B) Short-term activities (What activities, if any, do you have planned in this compartment over the next 10 years that will help reach your long-term objectives ?)

Some minor historical site disturbances from cattle access from previous landowner-farmer.
Stand in good health exhibiting good regeneration.
Monitor stand health and minor expansion of south boundary into a small clearing.

Conservation Land Designation

Eligible for Conservation Land Tax Incentive Program ? [ ] Yes [X] No [ ] Don't know

Type of Conservation land

- [ ] Provincially significant wetland
- [ ] Habitat of endagered species
- [ ] Community conservation lands
- [ ] Provincially significant Area of Natural & Scientific Interest
- [ ] Escarpment Natural area in the Niagara Escarpment Plan

7.6 Upland Objectives

Compartment No.: 5 **Compartment Name:** Soft Maple

A) Long-term Objectives (What do you want this compartment to be like in 20 years ?)

Environmental sensitive lands given seasonal flooding conditions and pocket organic soils.
Provides speacilized breeding habitat for local amphibians.
Monitor forest health and maintain hydrology input/functions.

B) Short-term activities (What activities, if any, do you have planned in this compartment over the next 10 years that will help reach your long-term objectives ?)

Monitor for amphibian breeding use through calling survey's
Monitor and maintain seasonal hydrology input functions.

Conservation Land Designation

Eligible for Conservation Land Tax Incentive Program ? [ ] Yes [X] No [ ] Don't know

Type of Conservation land

[ ]	Provincially significant wetland	[ ]	Provincially significant Area of Natural & Scientific Interest
[ ]	Habitat of endagered species	[ ]	Escarpment Natural area in the Niagara Escarpment Plan
[ ]	Community conservation lands		

Compartment No.: 6 **Compartment Name:** Early Successional Hardwoods

A) Long-term Objectives (What do you want this compartment to be like in 20 years ?)

Maintain key function of this habitast type for widlife habitat, may require some select
tree thinning dependent upon growing conditions.
Monitor stand for health and flora species divisity and maturity.

B) Short-term activities (What activities, if any, do you have planned in this compartment over the next 10 years that will help reach your long-term objectives ?)

Site conditions of scattered exposed rock and shallow soil depths have limited tree regeneration
and tree growth creating ideal habitat for early successional birds and forage habitat for
mammals due to numerous shrub species throughout stand.

Conservation Land Designation

Eligible for Conservation Land Tax Incentive Program ? [ ] Yes [X] No [ ] Don't know

Type of Conservation land

[ ]	Provincially significant wetland	[ ]	Provincially significant Area of Natural & Scientific Interest
[ ]	Habitat of endagered species	[ ]	Escarpment Natural area in the Niagara Escarpment Plan
[ ]	Community conservation lands		

7.6 Upland Objectives

Compartment No.: **7** **Compartment Name:** **Mixed Plantation**

A) Long-term Objectives (What do you want this compartment to be like in 20 years ?)

Monitor health of stands with promotion of tree species diversity and eventual natural regeneration.
May require select thinning of conifers in year 15-20, dependent upon growing conditions (shallow soils) to promote natural regeneration of hardwwods.

B) Short-term activities (What activities, if any, do you have planned in this compartment over the next 10 years that will help reach your long-term objectives ?)

Monitor all 5 sub-compartments for tree survival and maturity, growing standards.
Periodic in-filling if required, for next three years to maintain desired tree density and diversity.
Sub-compartment No. 7E is monitored and regulated for natural landscape environment by the NEC development control conditions, thus limited management options.

Conservation Land Designation

Eligible for Conservation Land Tax Incentive Program ? [ ] Yes [X] No [ ] Don't know

Type of Conservation land

[ ] Provincially significant wetland	[ ] Provincially significant Area of Natural & Scientific Interest
[ ] Habitat of endagered species	[ ] Escarpment Natural area in the Niagara Escarpment Plan
[ ] Community conservation lands	

Compartment No.: **8** **Compartment Name:** **Open Area**

A) Long-term Objectives (What do you want this compartment to be like in 20 years ?)

Maintain open area for key wildlife life cycle functions.
May require 'bush hogging' in 10-15 years to cut back sapling regeneration in some areas.

B) Short-term activities (What activities, if any, do you have planned in this compartment over the next 10 years that will help reach your long-term objectives ?)

Monitor stand for natural sucession within the old field environment.

Conservation Land Designation

Eligible for Conservation Land Tax Incentive Program ? [ ] Yes [X] No [ ] Don't know

Type of Conservation land

[ ] Provincially significant wetland	[ ] Provincially significant Area of Natural & Scientific Interest
[ ] Habitat of endagered species	[ ] Escarpment Natural area in the Niagara Escarpment Plan
[ ] Community conservation lands	

7B.6 Wetland or Open Lands Objectives

Compartment No.: **9** **Compartment Name:** **Cedar Swamp**

A) Long-term Objectives (What do you want this compartment to be like in 20 years ?)

Environmentaly sensitive lands, leave as is.
Monitor tree health periocically.

B) Short-term activities (What activities, if any, do you have planned in this compartment over the next 10 years that will help reach your long-term objectives ?)

Environmentaly sensitive lands, leave as is.
Monitor tree health periocically.

Conservation Land Designation

Eligible for Conservation Land Tax Incentive Program ? [X] Yes [ ] No [ ] Don't know

Type of Conservation land

[X]	Provincially significant wetland	[ ]	Provincially significant Area of Natural & Scientific Interest
[ ]	Habitat of endagered species	[ ]	Escarpment Natural area in the Niagara Escarpment Plan
[ ]	Community conservation lands		

Compartment No.: **10** **Compartment Name:** **Open Swamp**

A) Long-term Objectives (What do you want this compartment to be like in 20 years ?)

Environmentaly sensitive lands, leave as is.
Monitor water fluctuations within the wetland.

B) Short-term activities (What activities, if any, do you have planned in this compartment over the next 10 years that will help reach your long-term objectives ?)

Environmentaly sensitive lands, leave as is.
Monitor hydrology input functions for upland environment (karst topograpghy) to the wetland
environment through groundwater seep discharge monitoring.

Conservation Land Designation

Eligible for Conservation Land Tax Incentive Program ? [X] Yes [ ] No [ ] Don't know

Type of Conservation land

[X]	Provincially significant wetland	[ ]	Provincially significant Area of Natural & Scientific Interest
[ ]	Habitat of endagered species	[ ]	Escarpment Natural area in the Niagara Escarpment Plan
[ ]	Community conservation lands		

Section 8 : Ten Year activity summary

Compartment	Objective	Activity	Quantity	Year Scheduled
1, 2, 4, 6, 7 and 8	Trail Network	Maintainence: Removal of fallen debris	Approx. 4.5kms	Annually
1, 2 and 3	Forest Health	Monitor general tree health and diease/insect impacts for significant outbreaks and address with professional on correct response	148.07 ac	2016 2017 2020 2023 2026
4	White Cedar expansion: habitat diversity for wildlife	Monitor stand and promote cedar cover habitat through natural regeneration along the south perimeter with periodic augmentation of cedar seedling planting.	2.3ac current stand area, expand to 3.0 to 3.5ac	2017 2022
5	Wildlife Habitat: Amphibian Breeding	Monitor hydrology input for maintaince of seasonal spring flooding, corrective measures if required.	1.0ac	Annually
6	Wildlife Habitat: Early Successional and Tall Shub areas	Monitor stands with periodic select/minimal removal of undesirable larger trees.	10.0ac	2021 2026
7	Woodland Expansion	Monitor tree survival rates post spring 2016 planting, if mortility rates exceed target levels, for 3-years post planting, than augmentation planting.	17.5 ac	2017 2018 2019 2023
8	Wildlife Habitat: Open habitat for nesting and forage	Monitor old grass field environment with periodic select/minimal removal of trees	5.0ac	2020 2025
9	Wildlife Habitat: Conifer cover habitat	Maintain existing canopy cover and wetland features, no site disturbances.	6.0ac	2020 2025
10	Wildlife Habitat: Significant Wetland Feature	Monitor groundwater seeps along wetland edge within Lot 25 for input sourcee	3 Seeps along 40m section of wetland edge.	Annually

Section 9: 20 Year report of activities

Compartment No.	Activity	Date	Proposed Quantity	Quantity Completed	Comments

Section 10 : Plan Notes, Contacts and General Comments

MFTIP Approver: John Morton of AWS Environmental Consulting Inc.
519-372-2303, aws@gbtel.ca

Appendix 6

Tree Planting Plan

AWS

AWS Environmental Consulting Inc.
(Operating as Aquatic and Wildlife Services)
242090 Concession Rd. 3 Keppel,
R.R. # 1, Shallow Lake, Ontario, Canada, N0H 2K0

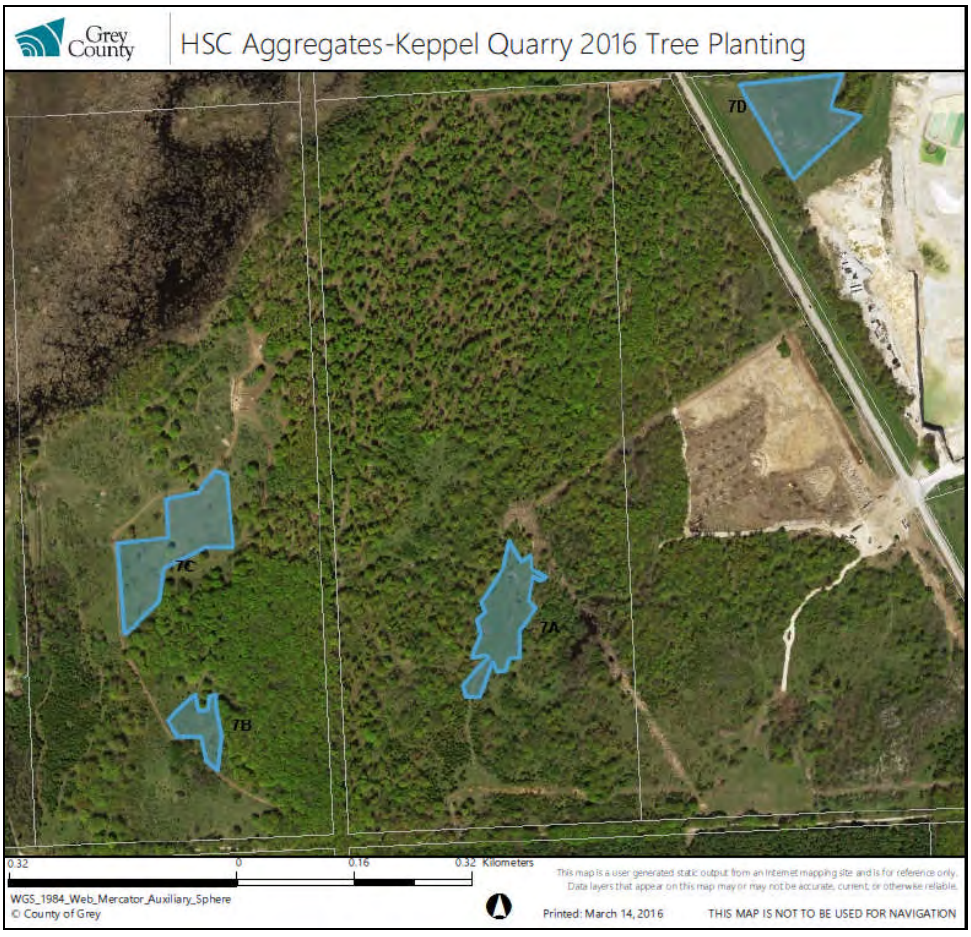
Office: 519-372-2303, Email: aws@gbtel.ca
Web site: www.awsenvironmental.ca

March 21,2016

H.S.C Aggregates Ltd.
Memo To : Dave Munro, Aggregate Sales & Compliance

Re: 2016 Tree Planting Schedule

In conjunction with the Stewardship Management Plan (SMP), the following provides greater detail of tree planting targets to meet the Site Plan condition No. 1.10 under Natural Environment Mitigation, with minor modifications to the 'planting areas' as per outlined in the 2015 Ecological Monitoring Report (section 5) and management compartment No. 7 under the SMP. Tree planting compartment 7A, 7B, 7C and 7D mapped below with planting targets for each sub-compartment.



Sub-compartment 7A

- Area = 0.95 ha or 2.35 ac
- Full or 100% planting stocking density required
- Average tree planting density at 2.5m between rows and 1.7m spacing between trees
- Density target = 0.95 x (10000/4.25) = approximately 2235
- Planting requirement of 2200 trees, with a minimum height of 25cm at time of planting, composition being :
    - Native Conifers seedlings = 2000
        - White Pine = 1500
        - White Cedar = 250
        - White Spruce = 250
    - Native Hardwood seedlings = 200
        - A mix of various species which could be: Red Oak, White Birch, Black Cherry, Sugar Maple, Aspen/Poplar (non-hybrid)
          and access road bisecting compartment,

Sub-Compartment 7B

- Area = 0.37 ha or 0.9 ac
- Scattered trees/tall shrubs existing throughout compartment, thus target density level of 60% planting of total area
- Average tree planting density at 2.5m between rows and 1.7m spacing between trees
- Density target = (0.37 x (10000/4.25)) x.6 = 522

- Approximately 500 trees, with a minimum height of 25cm at time of planting, composition being :
    - Conifers = 400
        - White Pine = 200
        - White Cedar = 100
        - White Spruce = 100
    - Hardwood = 100
        - A mix of various species which could be: Red Oak, White Birch, Black Cherry, Sugar Maple, Aspen/Poplar (non-hybrid)

Sub-Compartment 7C

- Area = 1.47 ha or 3.63ac
- A few scattered mature trees and tall shrubs through compartment, thus target density level of 90% planting of total area.
- Average tree planting density at 2.5m between rows and 1.7m spacing between trees
- Planting density target = (1.47 x (10000/4.25)) x.9 = 3113
- Planting requirement of 3100 trees, with a minimum height of 25cm at time of planting, composition being:
    - Conifers = 2800
        - White Pine = 2000
        - White Cedar = 300
        - White Spruce = 500
    - Hardwood = 300
        - A mix of various species which could be: Red Oak, White Birch, Black Cherry, Sugar Maple, Aspen/Poplar (non-hybrid)

Sub-Compartment 7D

- Area = 1.28 ha or 3.16ac
- Full or 100% planting stocking density required
- Average tree planting density at 2.5m between rows and 1.7m spacing between trees
- Density target = 1.28 x (10000/4.25) = 3011
- Planting requirement of 3000 trees, with a minimum height of 25cm at time of planting, composition being:
    - Conifers = 2500
        - White Pine = 1800
        - White Cedar = 200
        - White Spruce = 500
    - Hardwood = 500
        - A mix of various species which could be: Red Oak, White Birch, Black Cherry, Sugar Maple, Aspen/Poplar (non-hybrid)

Total Planting Numbers:

Total Planting area = 4.07ha (10.06 ac) for 8,800 trees

Conifers = 7,700 trees at a 25cm minimum height, composition of:

- White Pine seedlings = 5,500 ; White Cedar seedlings = 850 ; White Spruce seedlings = 1,350

Hardwoods = 1,100 trees at a 25cm minimum height, mix of species which could be :

- Red Oak, White Birch, Black Cherry, Sugar Maple and/or Aspen/Poplar seedlings, 25cm minimum height = 300

Average planting density = 2162 trees /ha or 875 trees/ac

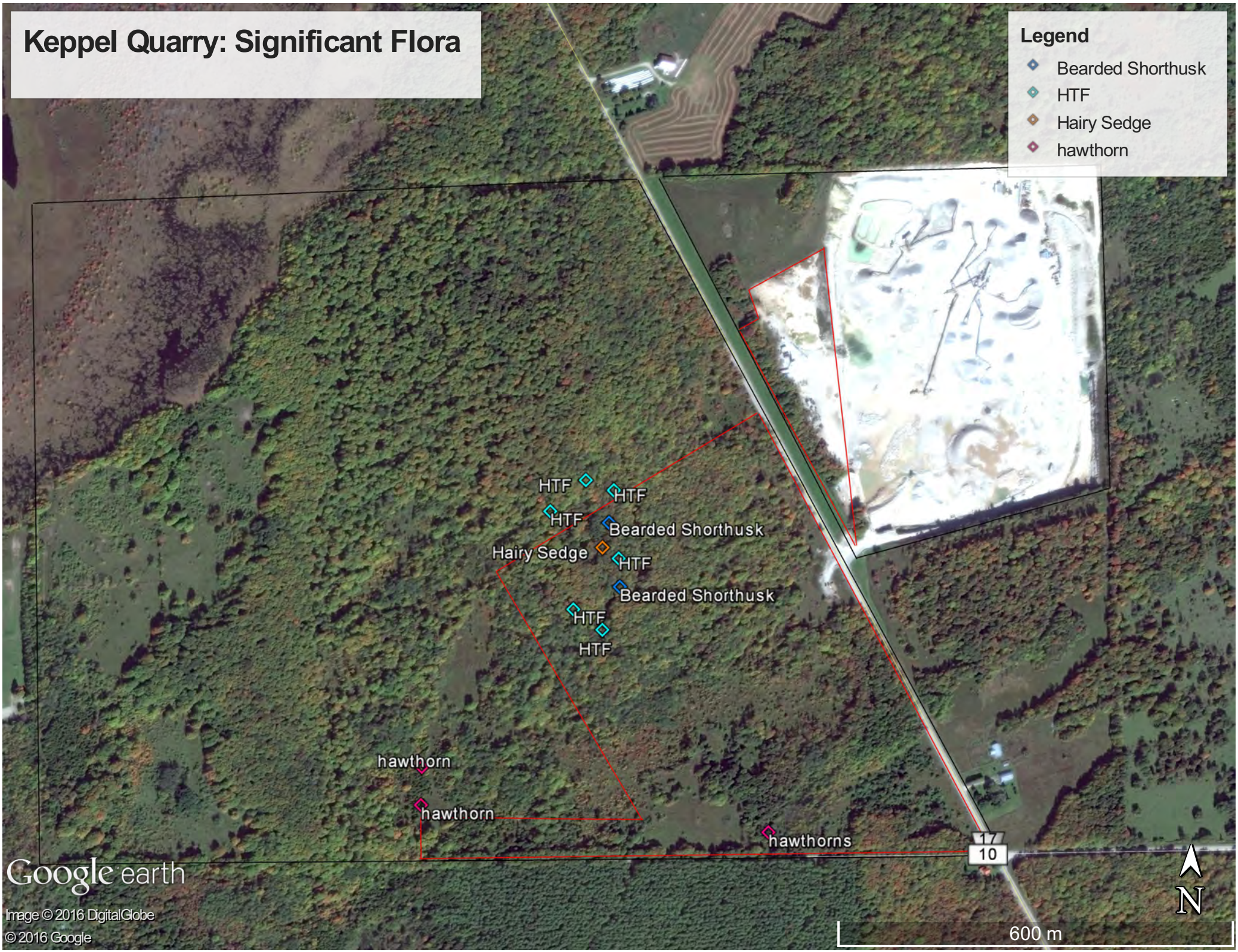
Respectfully Submitted

_____

John Morton,
President, AWS Environmental Consulting Inc.

Appendix 7

2015 Significant Flora Update

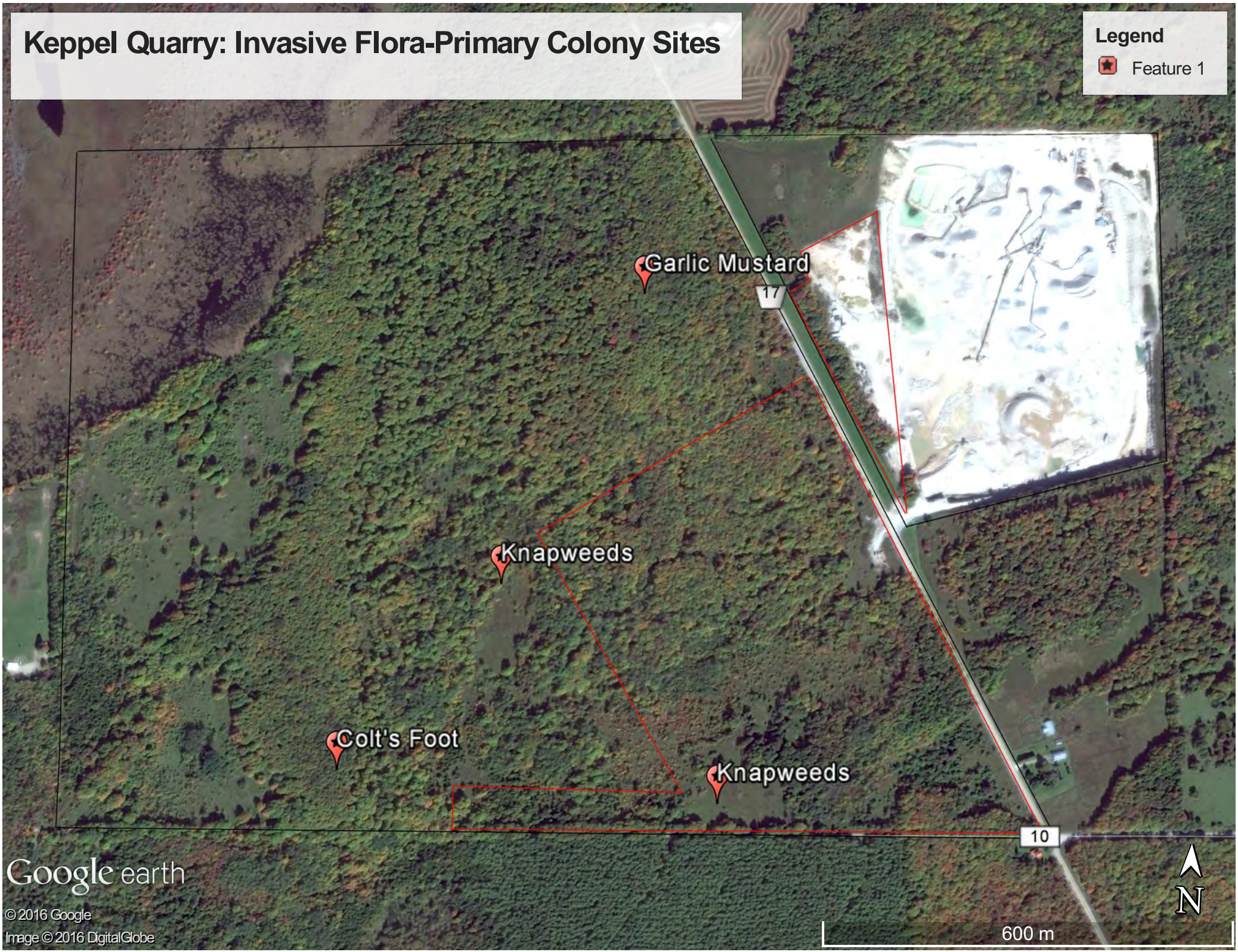

Keppel Quarry: Significant Flora
Legend
Bearded Shorthusk
HTF
Hairy Sedge
hawthorn
HTF
HTF
HTF
Bearded Shorthusk
Hairy Sedge
HTF
Bearded Shorthusk
HTF
HTF
HTF
hawthorn
hawthorn
hawthorns
17
10
N
600 m
Google earth
Image © 2016 DigitalGlobe
© 2016 Google

NEW KEPPEL QUARRY: RARE SPECIES LOCATIONS, 2015

Latin Name	Common Name	Easting	Northing	Details
Crataegus sp-?	Hawthorn	499832	4941945	1 small tree ~5 m tall. Flagged AWS #1.
Crataegus sp-?	Hawthorn	499832	4942003	2 small trees, Flagged AWS #2 and #3 (5 m west of #2).
Crataegus sp-?	Hawthorn	500363	4941918	Several hawthorns some could be C. macracantha.
Asplenium scolopendrium	Hart's-tongue Fern	500060	4942249	>100
Asplenium scolopendrium	Hart's-tongue Fern	500068	4942228	this area flagged AWS #4
Asplenium scolopendrium	Hart's-tongue Fern	500093	4942255	this area flagged AWS #4
Asplenium scolopendrium	Hart's-tongue Fern	500086	4942271	this area flagged AWS #4
Asplenium scolopendrium	Hart's-tongue Fern	500067	4942292	good habitat here for transplanting
Asplenium scolopendrium	Hart's-tongue Fern	500091	4941996	a few plants also about 30m east up hill flagged as AWS #5
Brachyelytrum erectum	Bearded Short Husk	500127	4942285	abundant over >10 sq m at edge of new road and cleared area
Asplenium scolopendrium	Hart's-tongue Fern	500128	4942327	a few plants on NE side of blocks Flagged as AWS #6
Carex hirtifolia	Hairy Sedge	500102	4942347	Very abundant, Flagged as AWS #7
Carex hirtifolia	Hairy Sedge	500102	4942347	One clump on a boulder, Flagged as AWS #7
Brachyelytrum erectum	Bearded Short Husk	500108	4942382	Abundant, Flagged as AWS #8
Asplenium scolopendrium	Hart's-tongue Fern	500114	4942431	A few tiny ferns, Flagged as AWS #9
Asplenium scolopendrium	Hart's-tongue Fern	500074	4942444	~20 plants, Flagged as AWS #10
Asplenium scolopendrium	Hart's-tongue Fern	500020	4942397	~50 plants, Flagged as AWS #11
Asplenium scolopendrium	Hart's-tongue Fern	499546	4942071	25+ plants, Flagged as AWS #12
Asplenium scolopendrium	Hart's-tongue Fern	499546	4942007	
Asplenium scolopendrium	Hart's-tongue Fern	499549	4941991	1 fern on E side of boulder
Asplenium scolopendrium	Hart's-tongue Fern	499620	4941986	5 on N side of blocks also more 30 m east.
Thamnobryum alleghaniensis	Allegany moss	499669	4941999	Flagged as AWS #14
Thamnobryum alleghaniensis	Allegany moss	499640	4941932	Flagged as AWS #14
Thamnobryum alleghaniensis	Allegany moss	499672	4941966	Flagged as AWS #14
Asplenium scolopendrium	Hart's-tongue Fern	499672	4941966	a couple ferns present

Appendix 8

Terrestrial Invasive Flora Species Monitoring


Keppel Quarry: Invasive Flora-Primary Colony Sites
Legend
Feature 1
Garlic Mustard
17
Knapweeds
Colt's Foot
Knapweeds
10
N
600 m
Google earth
© 2016 Google
Image © 2016 DigitalGlobe

KEPPEL QUARRY INVASIVE SPECIES MONITORING

Latin Name	Common Name	Easting	Northing	Location Description
Alliaria petiolata	Garlic Mustard	500081	4942667	EMA-1 Plot 1B, a few plants present
Centaurea spp.	Knapweeds	500222	4941919	clearings south end of area
Centaurea spp.	Knapweeds	499888	4942226	northern-most clearing at south end of area
Tussilago farfara	Colt's Foot	499659	4941942	along trail between clearings, south end of property

APPENDIX E

BLAST MONITORING PROGRAM

APPENDIX E1

BLAST DESIGN

CONSBEC INC.

MINING+CONSTRUCTION

September 1, 2015

Sutherland CONSTRUCTION

Mike Sutherland
VP Operations

Work (519) 376-5698
Fax (519) 371-6121
Cell (519) 379-5855

RE: Blast Design for Harold Sutherland Constructions Keppel Quarry

Dear Mr. Mike Sutherland

The following design information is being submitted in response to a requirement of the NEC Development Permit for the Keppel Quarry and for no other purpose. This design is the property of Consbec Inc. and is based on Consbec Inc. carrying out the work.

Definitions

In this document:

(a) "Designated Blast Area" means the area within which there is potential for rock displacement (or fly rock) and includes the area identified in this document under the heading Blast Design Requirements sub-paragraph (f) a.
(b) "Blast Design" means the blast design described in this document and includes any amendments as provided for herein.
(c) "Blaster in Charge" means the duly qualified blaster in charge of a blast or series of blasts.

Blast Design Requirements

(a) Design PPV of 12.5 mm/s at 110 m to a structure, Peak Sound Pressure with a 2.1 m collar < 128 dBl. (Based on single hole per delay with a maximum charge of 200 kgs)
(b) Consbec and industry standard recommends double priming any holes greater than 10 m in depth.
(c) Drilling parameters
    a. Number of holes per blast will vary.
    b. Patterns will range in meters from 3.05 x 3.66 to 3.35 x 3.96 for a 113 mm hole
    c. Orientation of square blast patterns will be away (perpendicular) from hazards where possible.
    d. Depth of drill holes will be 15 to 17 m but may vary in different areas of the quarry.
(d) Loading parameters
    a. Collar will range from 1.5 to 2.5 meters for production holes.
    b. Toe load will consist of a 225 g booster.
    c. Hole delays will be 25ms and row delays will vary from 25ms to 200ms. Non electric, or electronic detonators will be used.

d. Max charge/delay for a 113 mm hole expected to be 190 to 200 kgs in production holes.

(e) Column load will be Consbec Gold bulk emulsion explosives (density ranging from 1.23 to 1.28 g/cc).

(f) Designated Blast Area will comprise:
   a. 300 m or as designated by the Blaster in Charge, whichever is greater.
   b. Open production blasting - no persons in the Designated Blast Area.

(g) Should site conditions change, this blast plan will be required to be amended by the undersigned or by the Blaster in Charge.

Safety - Consbec's Blasting Procedures

Blasting Procedures (c/w Audible Warning System)

Proper signage postings as per the General Blasting Regulations will apply as to prohibit inadvertent entry into the Designated Blast Area.

Prior to any blast a controlled area shall be established. All personnel not involved with the actual detonation must stand back a safe distance as established by the Blaster in Charge. The workmen involved with the detonation must stand back at a reasonable distance from the time the "blast imminent" signal is given until the "all clear" has been sounded.

The Blaster in Charge shall position himself/herself at the minimum distance practical from the blast.

Immediate personnel shall vacate vehicles and take a position of safety that provides full body cover to protect against possible fly rock strike when a blast is about to take place. Each person shall take their individual cover when the "Blast" signal sounds (i.e., cover should not be shared). The Blaster in Charge shall, where practical, direct all personnel to take a position of safety at the back of a blast rather than in front of the face.

Only one person shall be in charge of initiating a blast sequence and blasting. This person shall be the Blaster in Charge. This person shall personally supervise and be responsible for all connections and for detonating the blast. No change of responsibility shall take place.

Blasting signals shall be sounded before every blast.

Prior to initiating the blast warning system:

- The Blaster in Charge shall complete his blast inspection.
- The Blaster in Charge shall clear all personnel from the Designated Blast Area to a safe distance.
- The Blaster in Charge shall ensure all pertinent traffic and, if applicable, road and access road traffic is halted.
- The Blaster in Charge shall retreat to a safe firing distance while checking the controlled area and confirming that the guards are posted and the controlled area is secure.

The following audible blast warning system shall be employed for all blasting on the project:

(a) Blast Imminent
   - One minute before the blast is to be detonated, the Blaster in Charge will give three short blasts of air horn/siren.
   - Should there be an interruption to the blast routine once the "Blast Imminent" signal has been given, the procedure shall be required to re-start the entire blast signal procedure.

(b) Blast Signal
   - Immediately prior to detonation, one short siren will be sounded.

(c) All Clear Signal

- Immediately prior to detonation, one short siren will be sounded.

(c) All Clear Signal

- The Blaster in Charge shall check the blast site to ensure that all charges have detonated and, if so, shall order the 'ALL CLEAR' Signal to be sounded. (One long blast of the air horn/siren).
- The warning system used for blast signals shall be a distinct sounding air horn/siren from any other siren used on construction. Use of vehicle horns as blast signals will not be permitted.

After every blasting sequence the Blaster in Charge shall conduct a thorough post-blast inspection of the blast area for cut-offs or misfires and shall ensure that any undetonated explosives are properly destroyed by blasting prior to any other work proceeding.

This post-blast inspection shall be performed before the "all-clear" signal is sounded.

Incomplete loading operations - In the case of loading operations not completing the preparation of a blast, the blast must be marked off with ribbon and/or markers or pylons to alert others of the present danger.

Reporting under the *Environmental Protection Act* (Ontario)

The government of Ontario now requires that all rock displacement occurring out of the normal course of events is to be reported to the Ministry of the Environment. Consbec Inc. does not report rock displacement within the Designated Blast Area as this is where we expect rock displacement to occur. Please refer to the Designated Blast Area as defined in this document. Note that the Designated Blast Area may encompass neighboring property.

The purpose of blasting is to displace rock. We design our blasts to contain the displacement of rock within the Designated Blast Area. We take all precaution to avoid rock displacement beyond the originally identified area, however in preparing the blast it could become apparent that we will be unable to contain rock displacement within the originally identified area (e.g. because of previously unknown or unanticipated ground or site conditions). If this occurs, we will amend the Designated Blast Area accordingly before undertaking the blast. Thereafter, we will reassess the ground or site conditions and, where appropriate we will work with our customer to redesign subsequent blasts to accommodate the new conditions.

In the event rock is displaced beyond the Designated Blast Area, in addition to our contractual obligations to provide notice, we will immediately report the event to the Ministry of the Environment. We will then attempt to determine the cause and will work with our customer to design subsequent blasts to avoid rock displacement beyond the Designated Blast Area.

Conclusion

If you have any questions or require additional information please advise.

Regards,

CONSBEC INC
MINING+CONSTRUCTION

LICENSED PROFESSIONAL ENGINEER
R. P. WALKER
01.09.15
PROVINCE OF ONTARIO

Richard Walker
General Manager

APPENDIX E2

EVENT REPORTS

Instantel Event Report

Date/Time	Long at 16:05:03 December 1, 2015
Trigger Source	Geo: 1.000 mm/s
Range	Geo: 254.0 mm/s
Record Time	5.0 sec at 1024 sps

Serial Number	BE12756 V 10.72-8.17 MiniMate Plus
Battery Level	6.5 Volts
Unit Calibration	February 9, 2015 by Instantel
File Name	N756G4UI.0F0

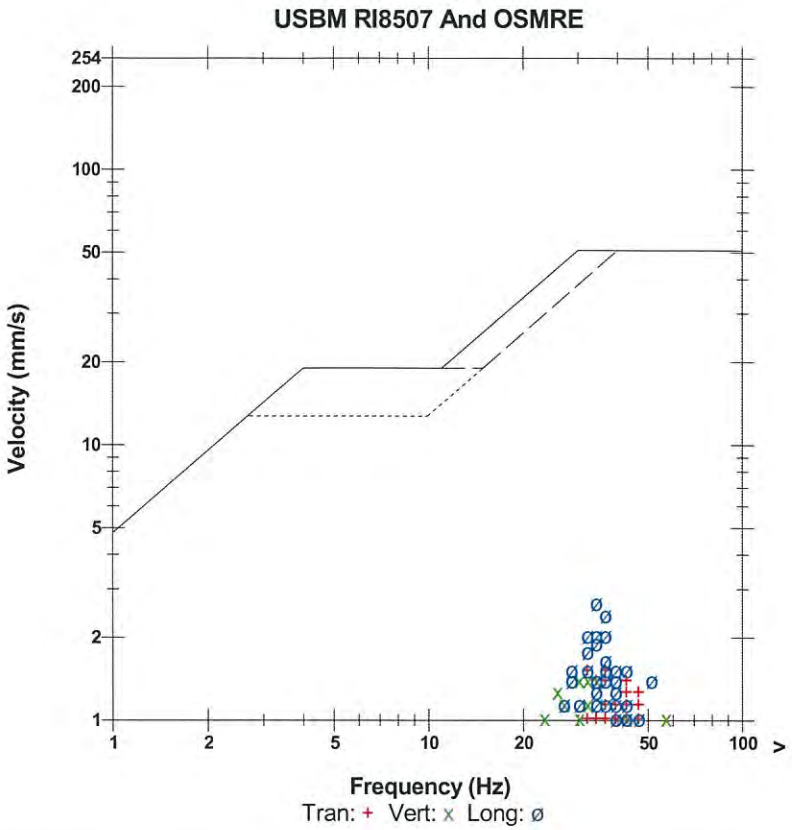
Notes
Location: Keppel Quarry
Client: Harold Sutherland Construction
User Name: Rob Mantha
General: Setup at McGregor House

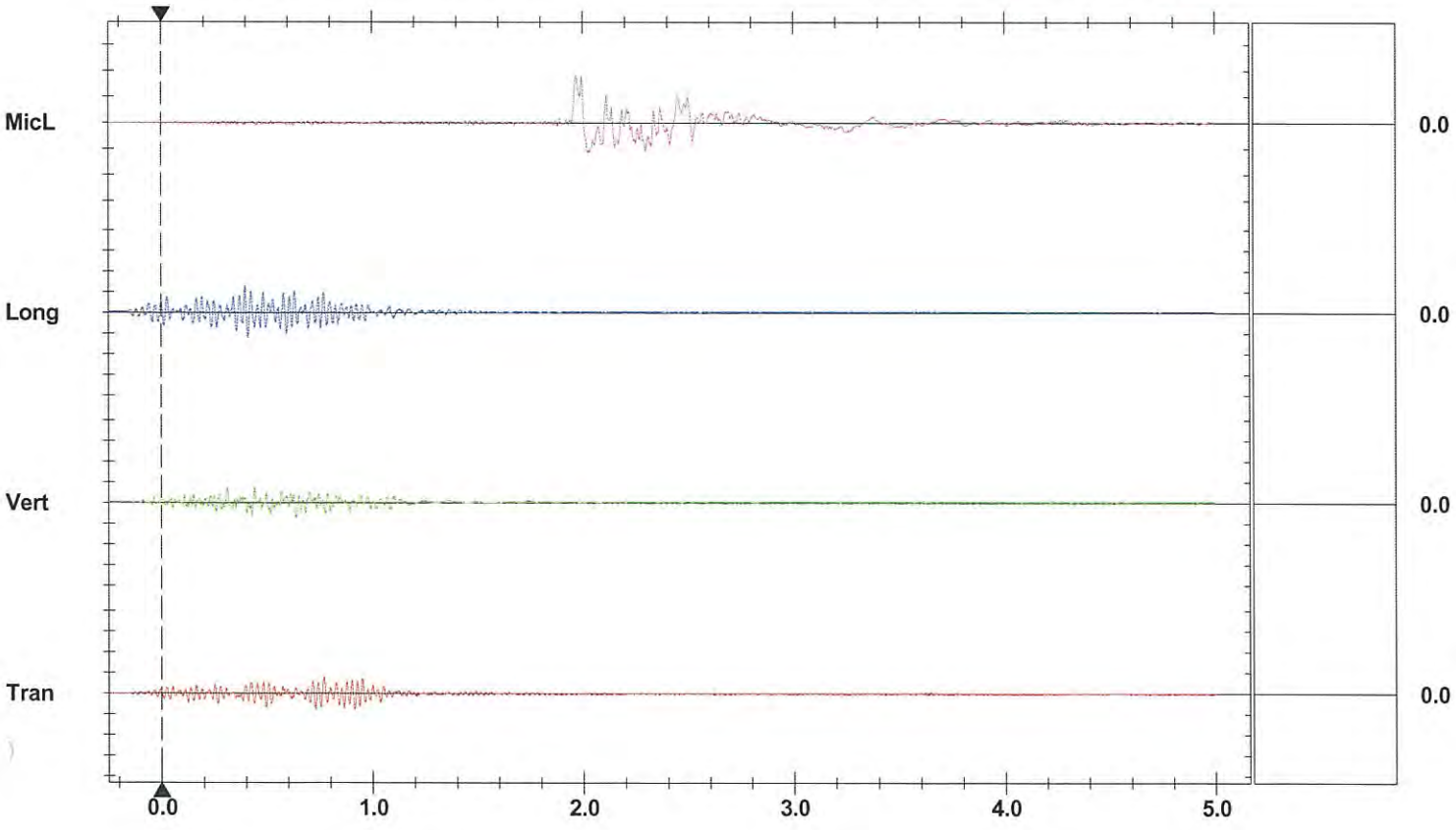
Extended Notes
Combo Mode December 1, 2015 15:52:13

Microphone	Linear Weighting
PSPL	119.3 dB(L) at 1.968 sec
ZC Freq	7.1 Hz
Channel Test	Disabled

	Tran	Vert	Long	
PPV	1.524	1.397	2.667	mm/s
ZC Freq	37	32	34	Hz
Time (Rel. to Trig)	0.730	0.310	0.397	sec
Peak Acceleration	0.040	0.040	0.066	g
Peak Displacement	0.008	0.008	0.011	mm
Sensor Check	Disabled	Disabled	Disabled	
Frequency	***	***	***	Hz
Overswing Ratio	***	***	***	

Peak Vector Sum 2.768 mm/s at 0.397 sec





Time Scale: 0.20 sec/div **Amplitude Scale:** Geo: 2.000 mm/s/div Mic: 10.000 pa.(L)/div
Trigger = ▶— — —◀

Sensor Check

Instantel Event Report

Date/Time	Vert at 16:07:14 December 1, 2015
Trigger Source	Geo: 0.984 mm/s
Range	Geo: 127.0 mm/s
Record Time	4.0 sec at 1024 sps

Serial Number	3219 V 2.61 MiniMate
Battery Level	6.6 Volts
Unit Calibration	February 6, 2015 by Instantel
File Name	E219G4WC.S20

Notes
Location: Keppel Quarry
Client: Harold Sutherland Construction Ltd.
User Name: Rob Mantha
Converted: December 2, 2015 08:32:40 (V10.72)

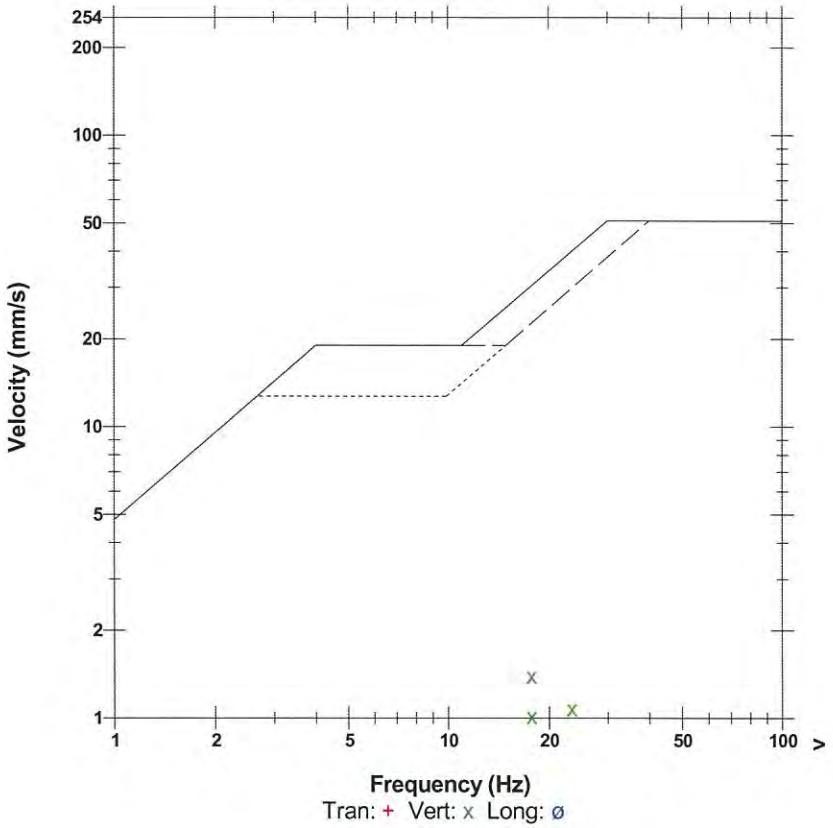
Extended Notes
Setup at Ruthven Farm entrance

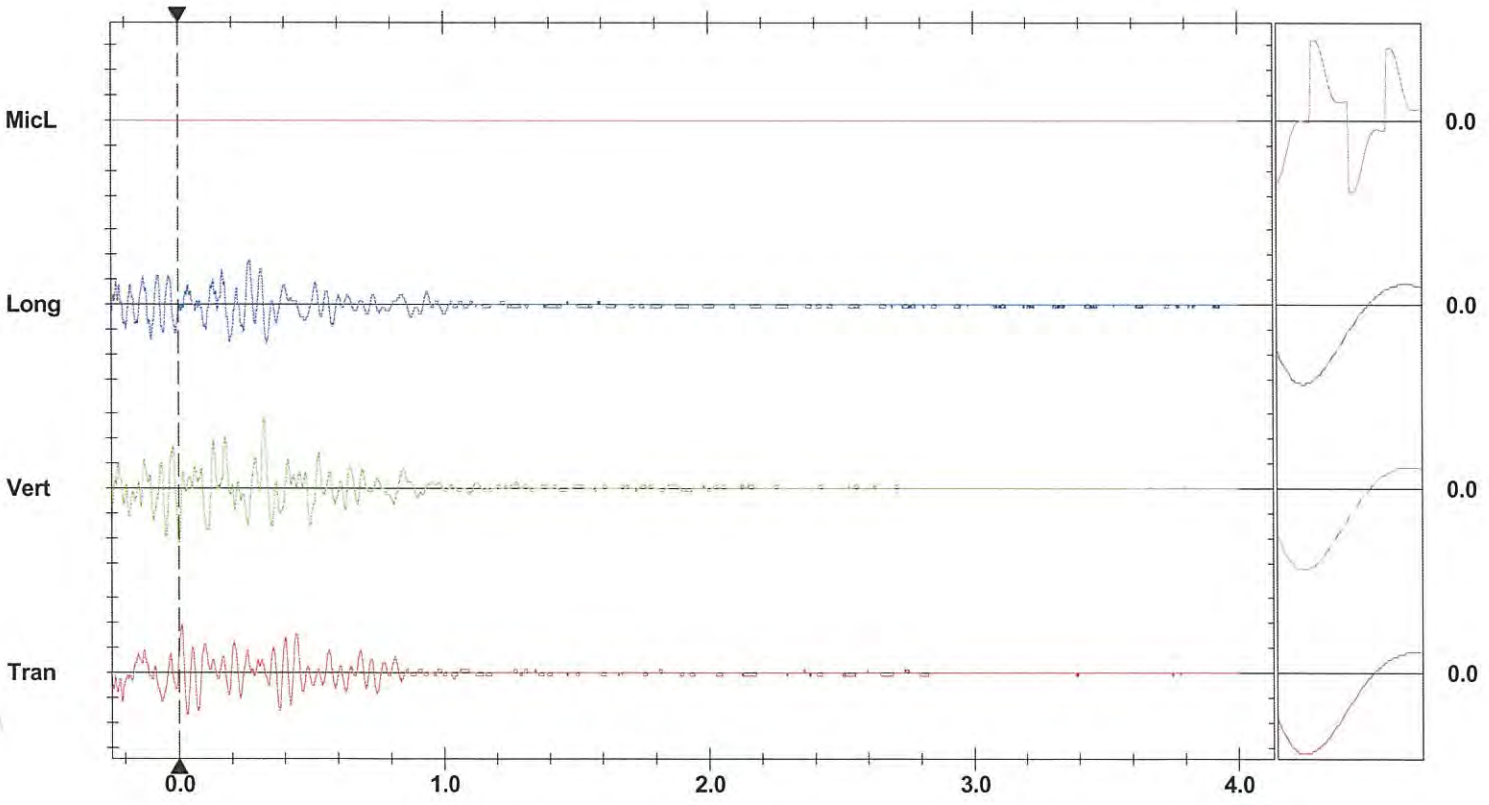
Microphone Linear Weighting
PSPL <100 dB(L)
ZC Freq N/A
Channel Test Passed (Freq = 20.0 Hz Amp = 207 mv)

	Tran	Vert	Long	
PPV	0.953	1.397	0.889	mm/s
ZC Freq	20	18	18	Hz
Time (Rel. to Trig)	0.015	0.323	0.271	sec
Peak Acceleration	0.013	0.020	0.013	g
Peak Displacement	0.007	0.012	0.007	mm
Sensor Check	Passed	Passed	Passed	
Frequency	7.6	8.0	8.1	Hz
Overswing Ratio	3.5	3.9	3.9	

Peak Vector Sum 1.429 mm/s at 0.326 sec
N/A: Not Applicable

USBM RI8507 And OSMRE





Time Scale: 0.20 sec/div **Amplitude Scale:** Geo: 0.500 mm/s/div Mic: 5.000 pa.(L)/div
Trigger = ▶———◀

Sensor Check

Instantel

Event Report

Instantel

Date/Time Long at 16:07:12 December 1, 2015
Trigger Source Geo: 2.000 mm/s
Range Geo: 254.0 mm/s
Record Time 5.0 sec at 1024 sps

Serial Number BE16234 V 10.72-8.17 MiniMate Plus
Battery Level 6.2 Volts
Unit Calibration August 20, 2015 by Instantel
File Name R234G4UI.400

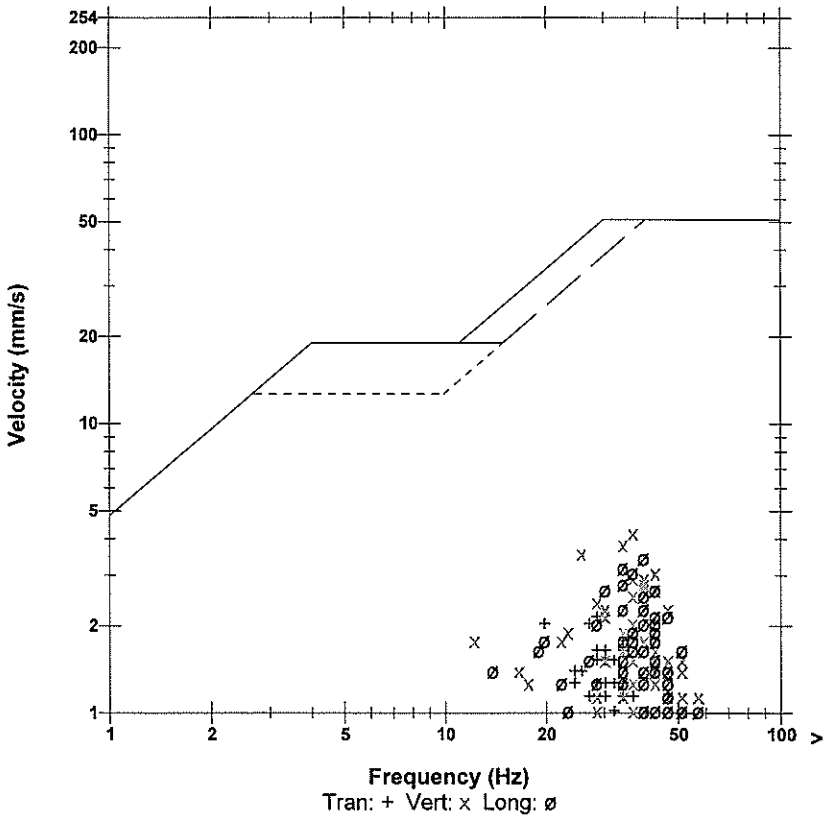
Notes
Location: Keppel Quarry
Client: Sutherland Construction
User Name: Consbec Inc.
General: Blast Vibration Monitoring

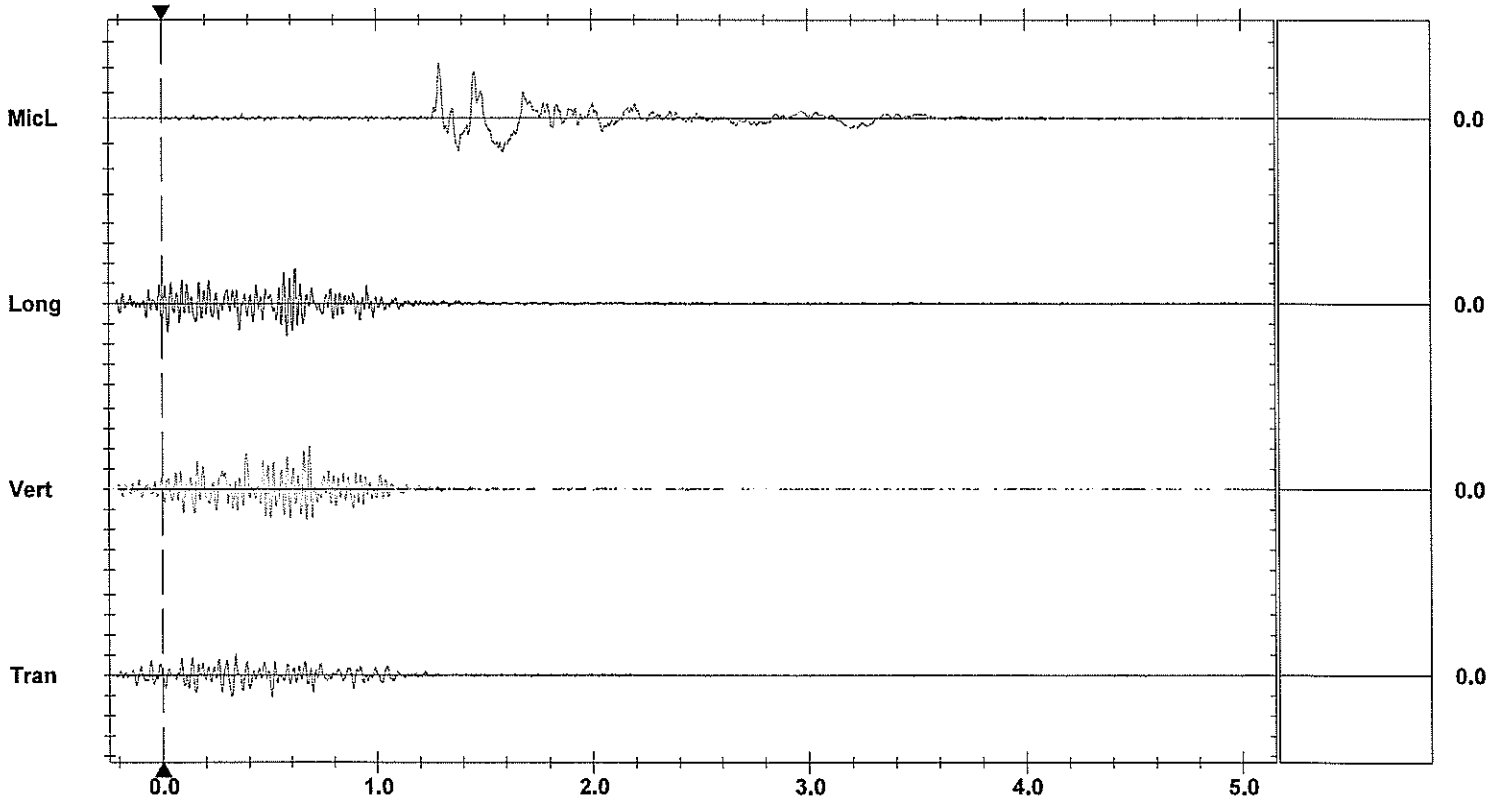
Microphone Linear Weighting
PSPL 120.6 dB(L) at 1.292 sec
ZC Freq 10 Hz
Channel Test Disabled

	Tran	Vert	Long	
PPV	2.159	4.191	3.429	mm/s
ZC Freq	28	37	39	Hz
Time (Rel. to Trig)	0.506	0.685	0.619	sec
Peak Acceleration	0.053	0.106	0.093	g
Peak Displacement	0.016	0.025	0.016	mm
Sensor Check	Disabled	Disabled	Disabled	
Frequency	***	***	***	Hz
Overswing Ratio	***	***	***	

Peak Vector Sum 4.633 mm/s at 0.581 sec

USBM RI8507 And OSMRE





Time Scale: 0.20 sec/div **Amplitude Scale:** Geo: 2.000 mm/s/div Mic: 10.000 pa.(L)/div
Trigger = ▶—— ——◀

Sensor Check

Instantel

Event Report

Instantel

Date/Time Long at 16:07:18 December 1, 2015
Trigger Source Geo: 2.000 mm/s
Range Geo: 254.0 mm/s
Record Time 5.0 sec at 1024 sps

Serial Number BE13292 V 10.72-8.17 MiniMate Plus
Battery Level 6.3 Volts
Unit Calibration February 18, 2015 by Instantel
File Name O292G4UI.460

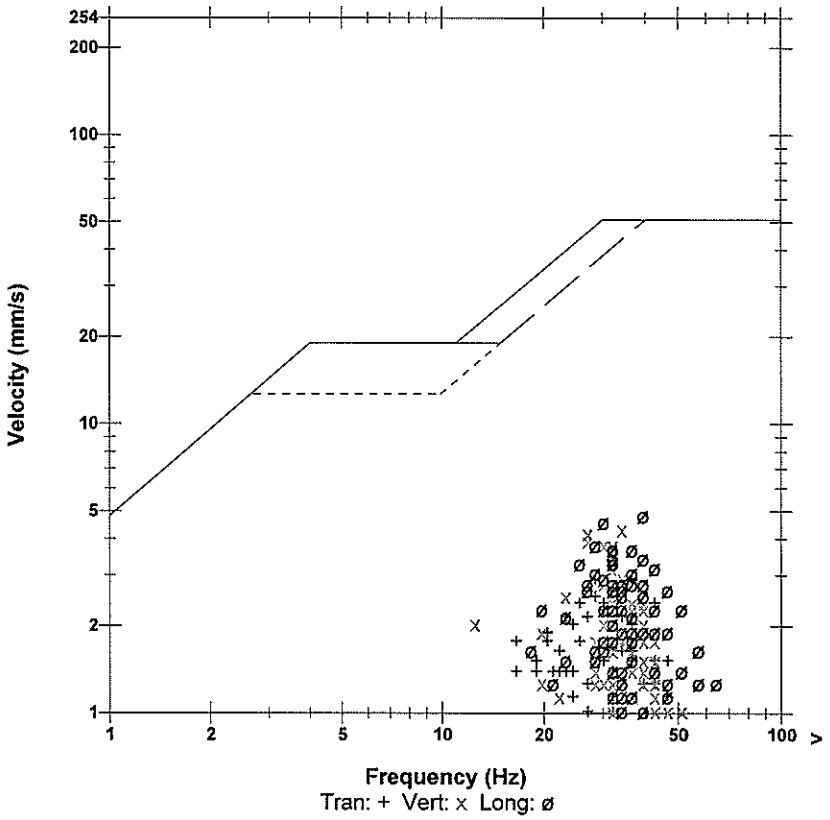
Notes
Location: Keppel Quarry
Client: Sutherland Construction
User Name: Consbec Inc.
General: Blast Vibration Monitoring

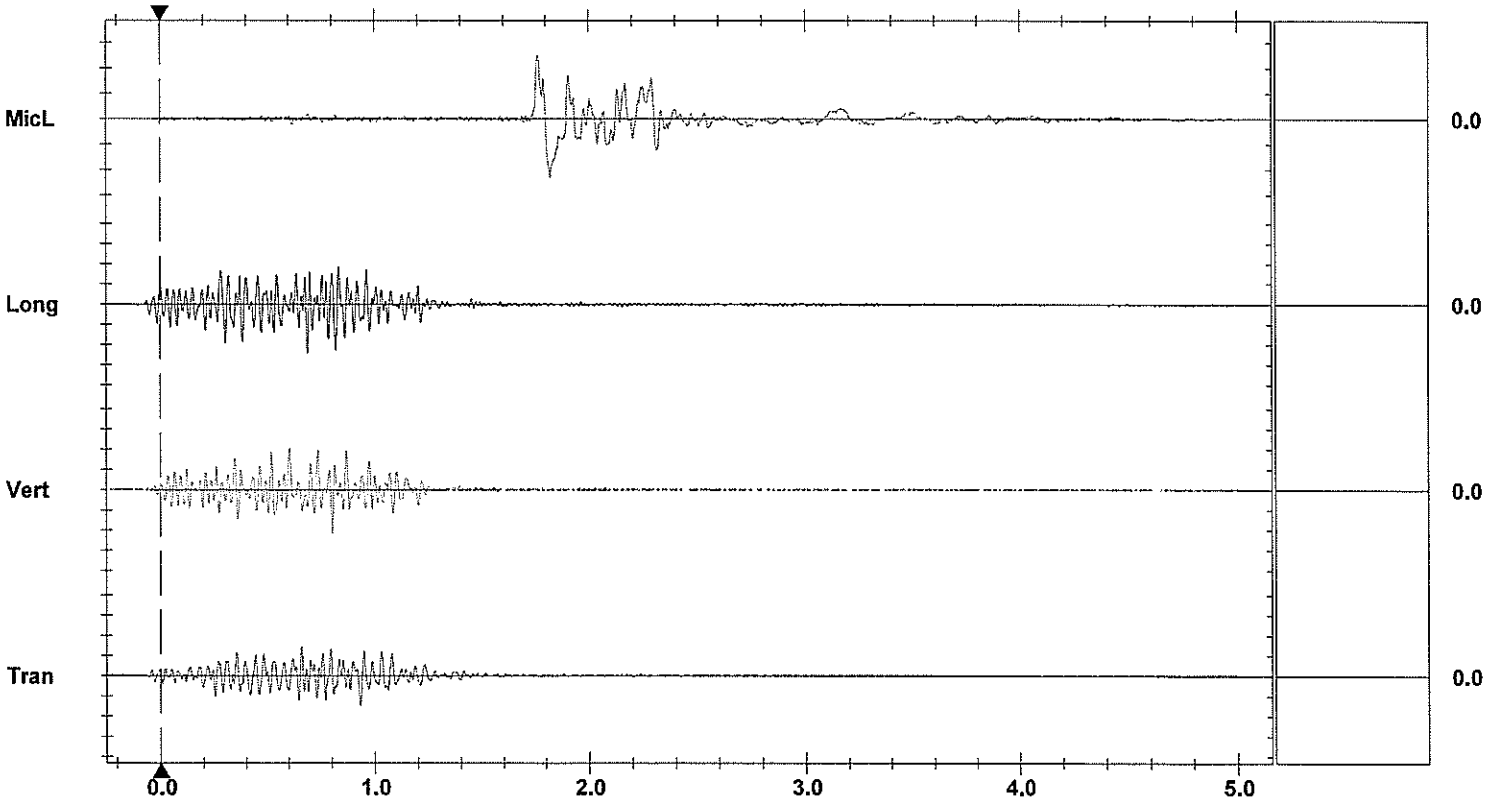
Microphone Linear Weighting
PSPL 122.0 dB(L) at 1.764 sec
ZC Freq 7.3 Hz
Channel Test Disabled

	Tran	Vert	Long	
PPV	2.921	4.318	4.826	mm/s
ZC Freq	37	34	39	Hz
Time (Rel. to Trig)	0.658	0.803	0.688	sec
Peak Acceleration	0.080	0.080	0.133	g
Peak Displacement	0.016	0.023	0.024	mm
Sensor Check	Disabled	Disabled	Disabled	
Frequency	***	***	***	Hz
Overswing Ratio	***	***	***	

Peak Vector Sum 5.256 mm/s at 0.688 sec

USBM RI8507 And OSMRE





Time Scale: 0.20 sec/div **Amplitude Scale:** Geo: 2.000 mm/s/div Mic: 10.000 pa.(L)/div
Trigger = ▶—— ——◀

Sensor Check

Event Report

Date/Time	Long at 09:11:20 November 10, 2015
Trigger Source	Geo: 2.000 mm/s
Range	Geo: 254.0 mm/s
Record Time	5.0 sec at 1024 sps

Serial Number	BE17339 V 10.72-8.17 MiniMate Plus
Battery Level	6.1 Volts
Unit Calibration	July 27, 2015 by Instantel
File Name	S339G3R2.UW0

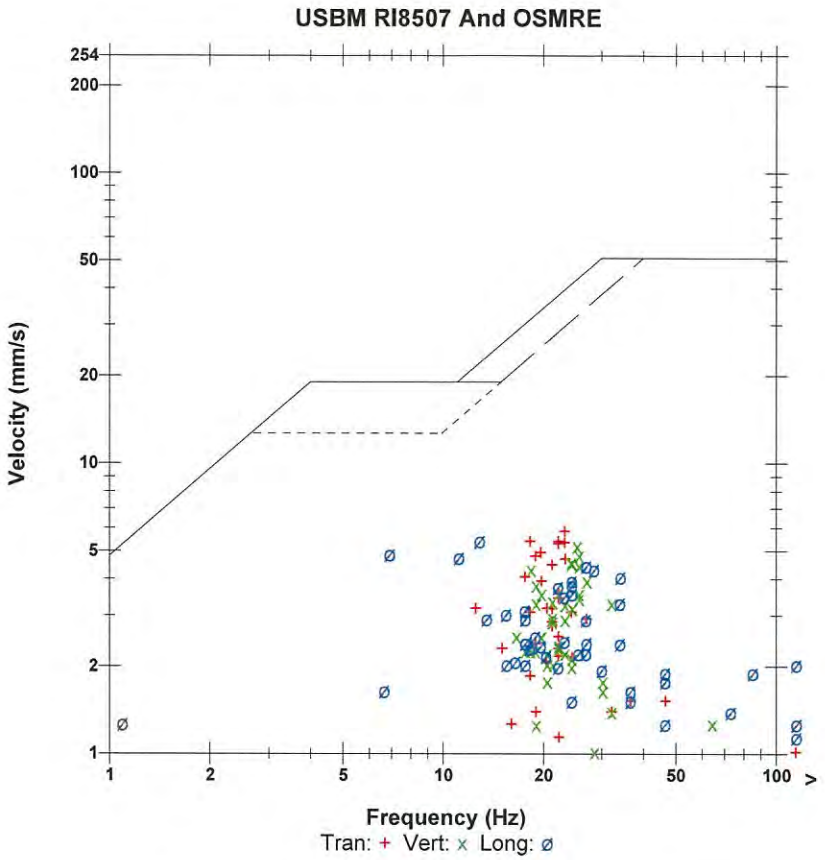
Notes

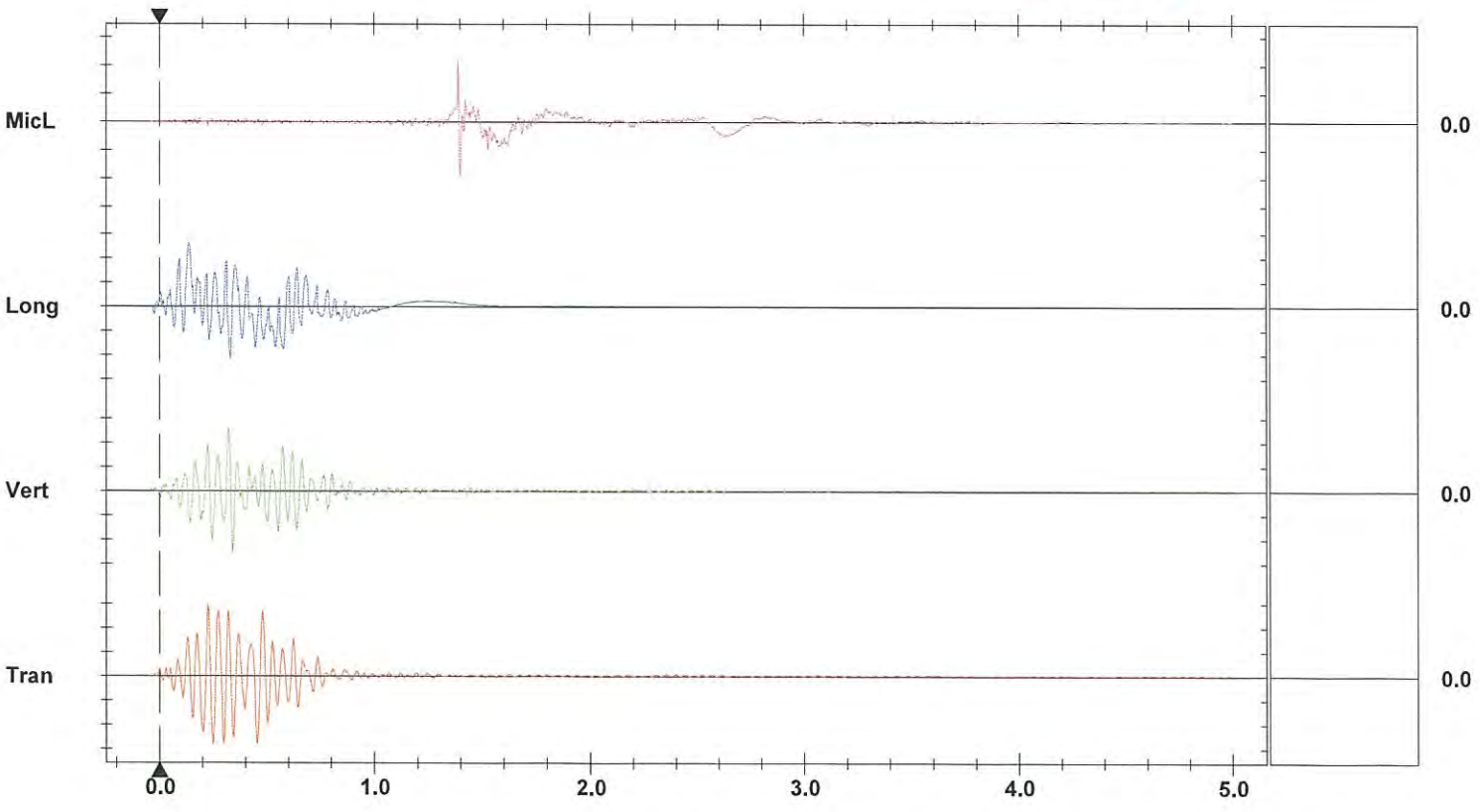
Location:	Keppel Quarry – RITCHIE PROPERTY.
Client:	Sutherland Construction
User Name:	Consbec Inc.
General:	Blast Vibration Monitoring

Microphone	Linear Weighting
PSPL	127.1 dB(L) at 1.392 sec
ZC Freq	9.3 Hz
Channel Test	Disabled

	Tran	Vert	Long	
PPV	5.938	5.183	5.289	mm/s
ZC Freq	23	24	12	Hz
Time (Rel. to Trig)	0.224	0.319	0.136	sec
Peak Acceleration	0.252	0.225	0.490	g
Peak Displacement	0.130	0.083	0.187	mm
Sensor Check	Disabled	Disabled	Disabled	
Frequency	***	***	***	Hz
Overswing Ratio	***	***	***	

Peak Vector Sum 20.06 mm/s at 0.318 sec





Time Scale: 0.20 sec/div **Amplitude Scale:** Geo: 2.000 mm/s/div Mic: 20.00 pa.(L)/div

Trigger = ▶—— ——◀

Sensor Check

Event Report

Date/Time	Vert at 09:11:25 November 10, 2015
Trigger Source	Geo: 2.000 mm/s
Range	Geo: 254.0 mm/s
Record Time	5.0 sec at 1024 sps

Serial Number	BE17338 V 10.72-8.17 MiniMate Plus
Battery Level	6.2 Volts
Unit Calibration	August 13, 2015 by Instantel
File Name	S338G3R2.V10

Notes

Location:	Keppel Quarry - CRAMP PROPERTY
Client:	Sutherland Construction
User Name:	Consbec Inc.
General:	Blast Vibration Monitoring

Extended Notes

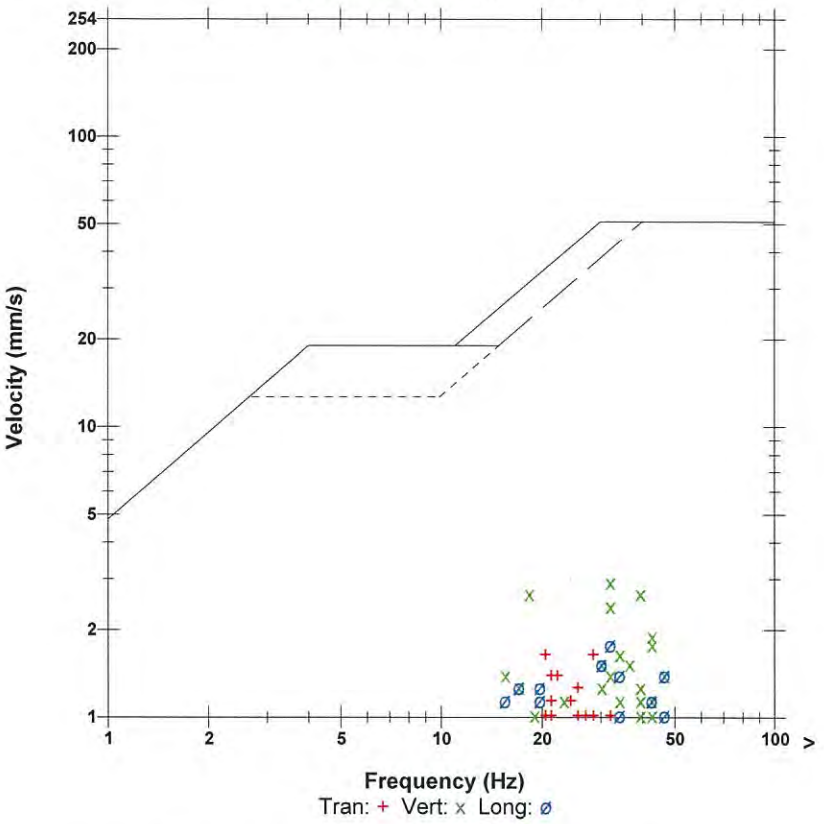
Combo Mode November 10, 2015 08:21:17

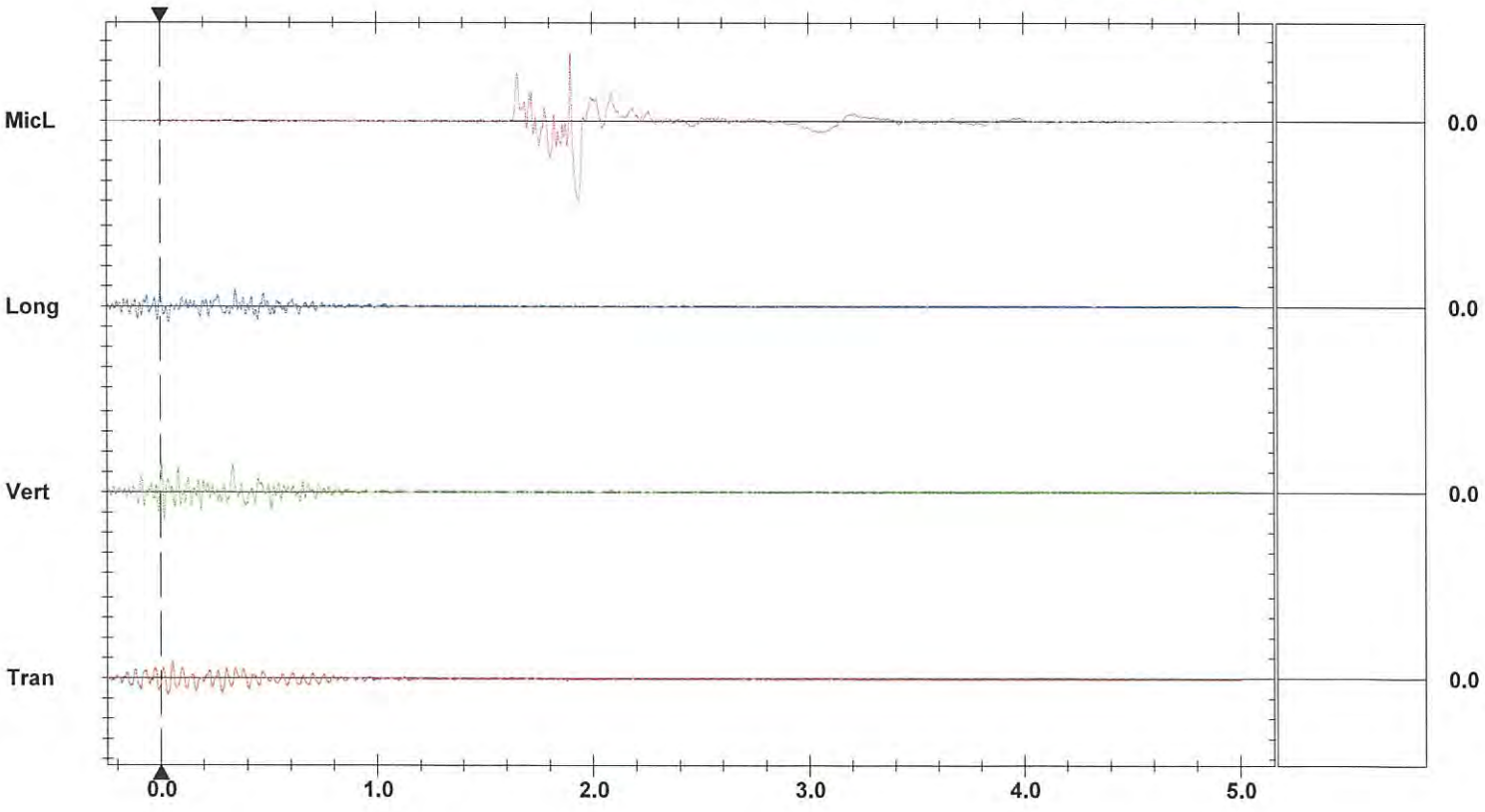
Microphone	Linear Weighting
PSPL	126.0 dB(L) at 1.938 sec
ZC Freq	10 Hz
Channel Test	Disabled

	Tran	Vert	Long	
PPV	1.651	2.921	1.778	mm/s
ZC Freq	20	32	32	Hz
Time (Rel. to Trig)	0.030	0.004	0.345	sec
Peak Acceleration	0.040	0.066	0.040	g
Peak Displacement	0.013	0.019	0.011	mm
Sensor Check	Disabled	Disabled	Disabled	
Frequency	***	***	***	Hz
Overswing Ratio	***	***	***	

Peak Vector Sum 3.029 mm/s at 0.002 sec

USBM RI8507 And OSMRE





Time Scale: 0.20 sec/div **Amplitude Scale:** Geo: 2.000 mm/s/div Mic: 10.000 pa.(L)/div

Sensor Check

Trigger = ▶—— ——◀

Instantel

Event Report

9:12 AM (TIME CHANGE) RM

Date/Time Long at 10:12:07 November 10, 2015
Trigger Source Geo: 0.984 mm/s
Range Geo: 127.0 mm/s
Record Time 4.0 sec at 1024 sps

Serial Number 3219 V 2.61 MiniMate
Battery Level 6.4 Volts
Unit Calibration February 6, 2015 by Instantel
File Name E219G3T0.C70

Notes
Location: Keppel Quarry
Client: Harold Sutherland Construction Ltd.
User Name: Rob Mantha
Converted: November 10, 2015 10:29:23 (V10.72)

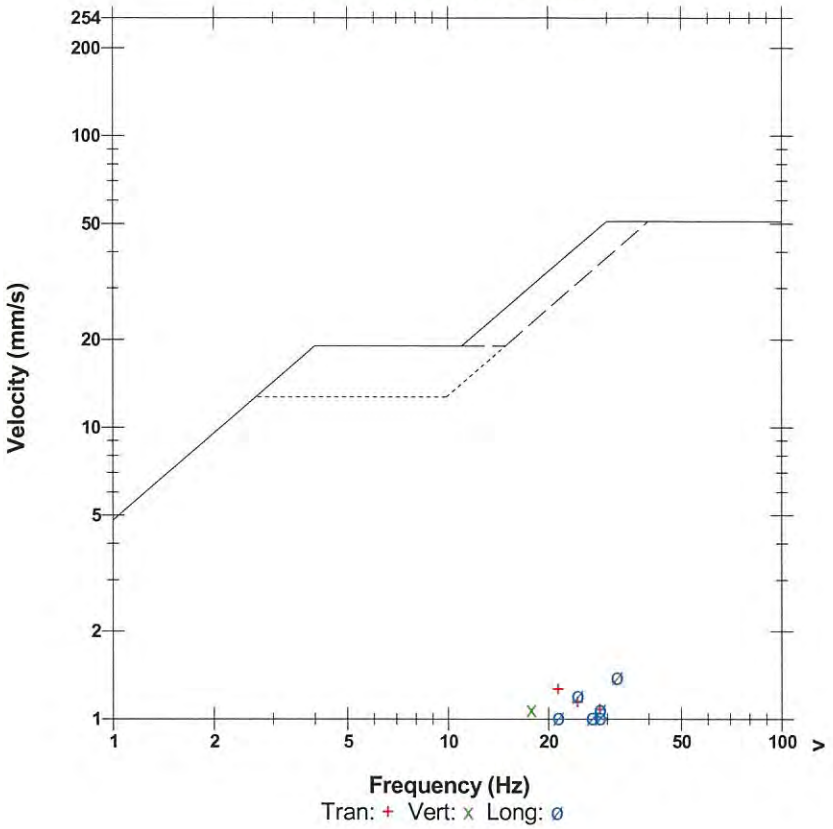
Extended Notes
Setup at Ruthven Farm Entrance

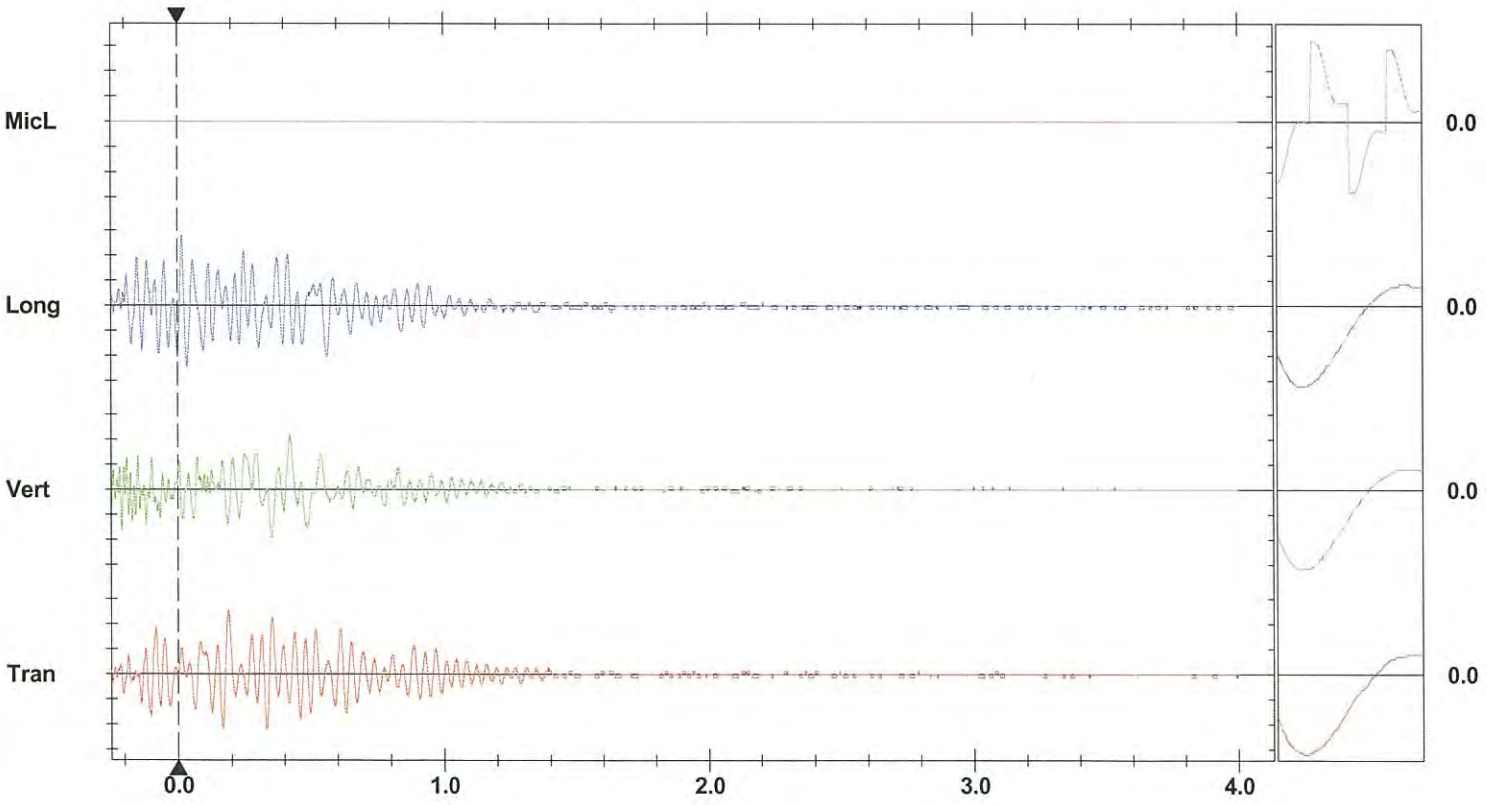
Microphone Linear Weighting
PSPL <100 dB(L)
ZC Freq N/A
Channel Test Passed (Freq = 20.0 Hz Amp = 207 mv)

	Tran	Vert	Long	
PPV	1.270	1.080	1.397	mm/s
ZC Freq	20	15	28	Hz
Time (Rel. to Trig)	0.188	0.422	0.017	sec
Peak Acceleration	0.020	0.027	0.027	g
Peak Displacement	0.010	0.010	0.009	mm
Sensor Check	Passed	Passed	Passed	
Frequency	7.6	8.1	8.1	Hz
Overswing Ratio	4.0	3.6	3.8	

Peak Vector Sum 1.572 mm/s at 0.017 sec
N/A: Not Applicable

USBM RI8507 And OSMRE





Time Scale: 0.20 sec/div **Amplitude Scale:** Geo: 0.500 mm/s/div Mic: 5.000 pa.(L)/div
Trigger = ▶——◀

Sensor Check

Event Report

9:11 AM (TIME CHANGE) RM

Date/Time	Long at 10:11:15 November 10, 2015
Trigger Source	Geo: 1.000 mm/s
Range	Geo: 254.0 mm/s
Record Time	5.0 sec at 1024 sps

Serial Number	BE12756 V 10.72-8.17 MiniMate Plus
Battery Level	6.2 Volts
Unit Calibration	February 9, 2015 by Instantel
File Name	N756G3R5.MR0

Notes
Location: Keppel Quarry
Client: Harold Sutherland Construction
User Name: Rob Mantha
General: Setup at McGregor House front yard

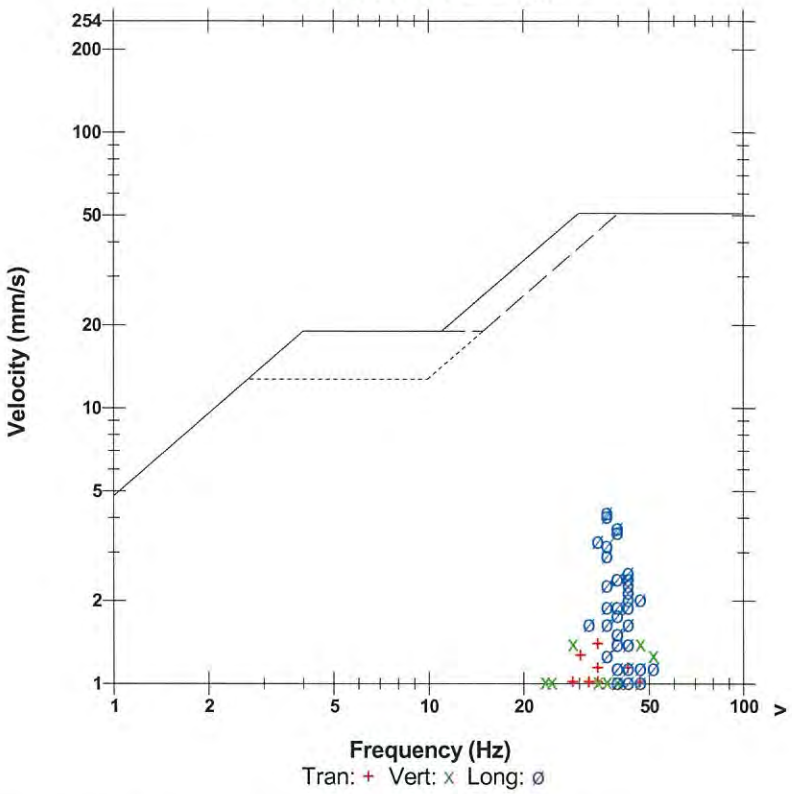
Extended Notes
Combo Mode November 10, 2015 09:52:04

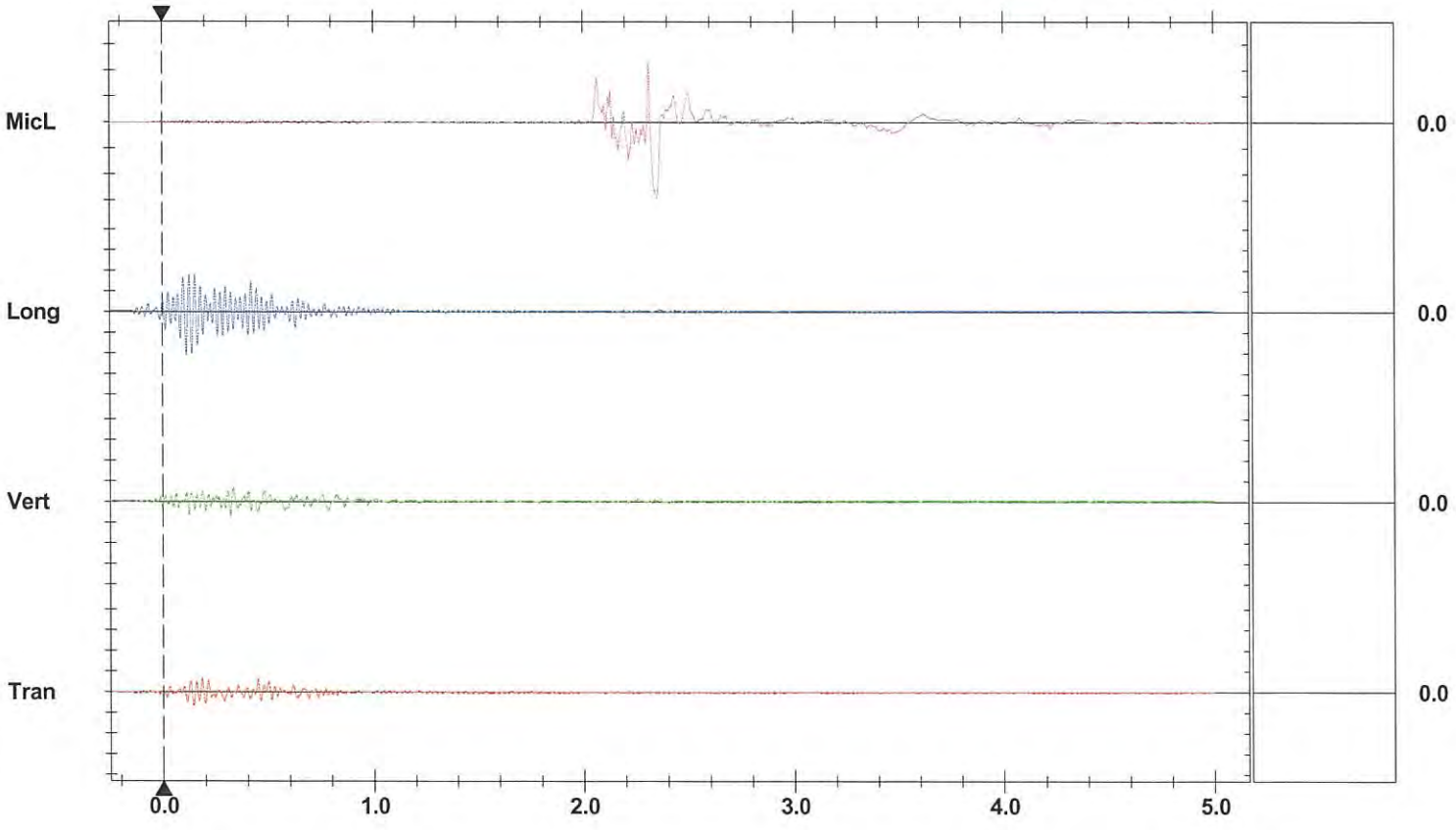
Microphone	Linear Weighting
PSPL	123.2 dB(L) at 2.352 sec
ZC Freq	10 Hz
Channel Test	Disabled

	Tran	Vert	Long	
PPV	1.397	1.397	4.191	mm/s
ZC Freq	34	47	37	Hz
Time (Rel. to Trig)	0.144	0.317	0.112	sec
Peak Acceleration	0.040	0.040	0.119	g
Peak Displacement	0.007	0.010	0.018	mm
Sensor Check	Disabled	Disabled	Disabled	
Frequency	***	***	***	Hz
Overswing Ratio	***	***	***	

Peak Vector Sum 4.403 mm/s at 0.112 sec

USBM RI8507 And OSMRE





Time Scale: 0.20 sec/div **Amplitude Scale:** Geo: 2.000 mm/s/div Mic: 10.000 pa.(L)/div
Trigger = ▶— — —◀

Sensor Check

Instantel

Event Report

Instantel

Date/Time Long at 10:10:09 September 30, 2015
Trigger Source Geo: 1.000 mm/s
Range Geo: 254.0 mm/s
Record Time 5.0 sec at 1024 sps

Serial Number BE17339 V 10.72-8.17 MiniMate Plus
Battery Level 6.2 Volts
Unit Calibration July 27, 2015 by Instantel
File Name S339G1N8.8X0

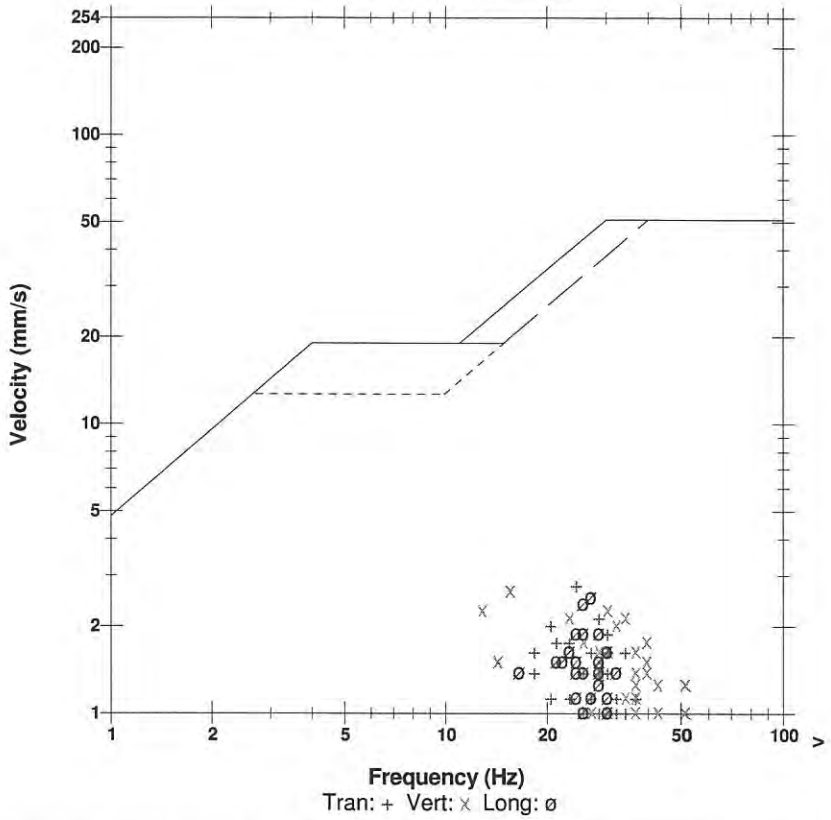
Notes
Location: Keppel Quarry
Client: Sutherland Construction
User Name: Consbec Inc.
General: Blast Vibration Monitoring

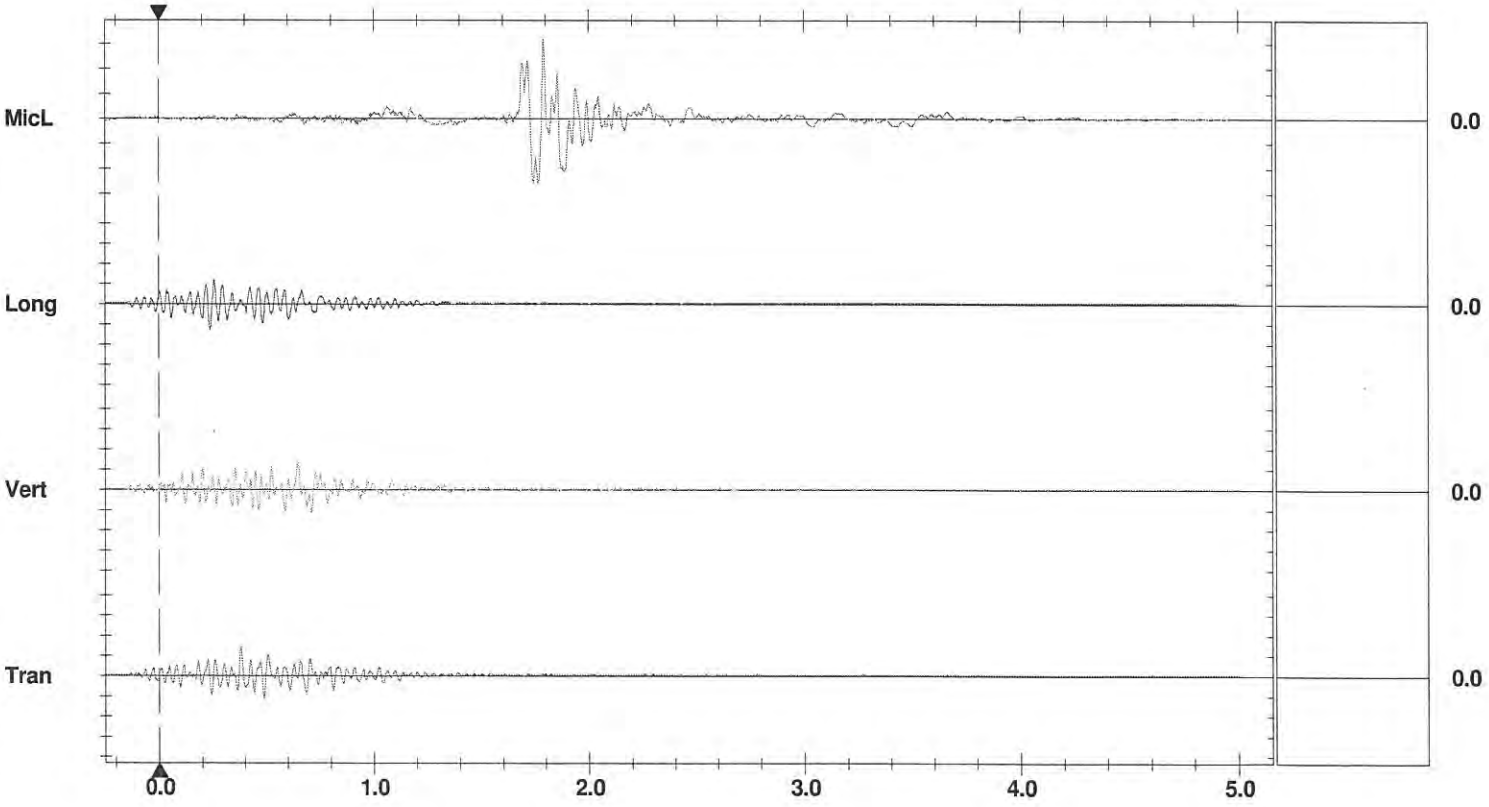
Microphone Linear Weighting
PSPL 124.0 dB(L) at 1.791 sec
ZC Freq 22 Hz
Channel Test Disabled

	Tran	Vert	Long	
PPV	2.794	2.667	2.540	mm/s
ZC Freq	24	16	27	Hz
Time (Rel. to Trig)	0.382	0.646	0.237	sec
Peak Acceleration	0.053	0.053	0.053	g
Peak Displacement	0.017	0.023	0.014	mm
Sensor Check	Disabled	Disabled	Disabled	
Frequency	***	***	***	Hz
Overswing Ratio	***	***	***	

Peak Vector Sum 2.978 mm/s at 0.240 sec

USBM RI8507 And OSMRE





Time Scale: 0.20 sec/div **Amplitude Scale:** Geo: 2.000 mm/s/div Mic: 10.000 pa.(L)/div
Trigger = ▶—— ——◀

Sensor Check

Instantel

Event Report

Instantel

Date/Time Long at 10:10:11 September 30, 2015
Trigger Source Geo: 1.000 mm/s
Range Geo: 254.0 mm/s
Record Time 5.0 sec at 1024 sps

Serial Number BE17338 V 10.72-8.17 MiniMate Plus
Battery Level 6.3 Volts
Unit Calibration August 13, 2015 by Instantel
File Name S338G1N8.8Z0

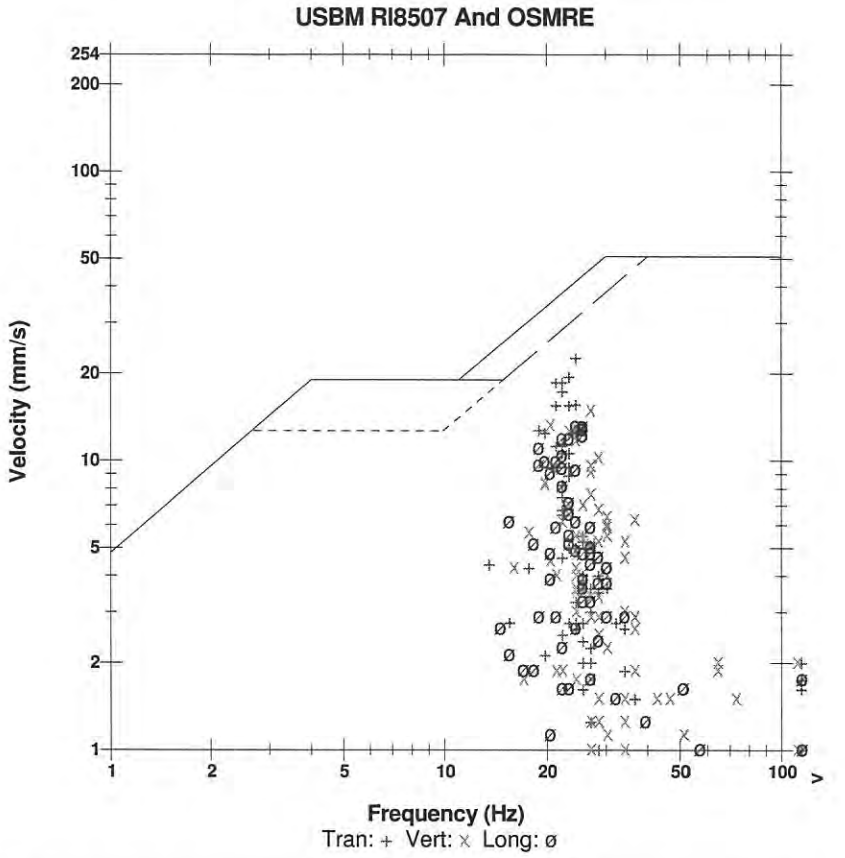
Notes
Location: Keppel Quarry
Client: Sutherland Construction
User Name: Consbec Inc.
General: Blast Vibration Monitoring

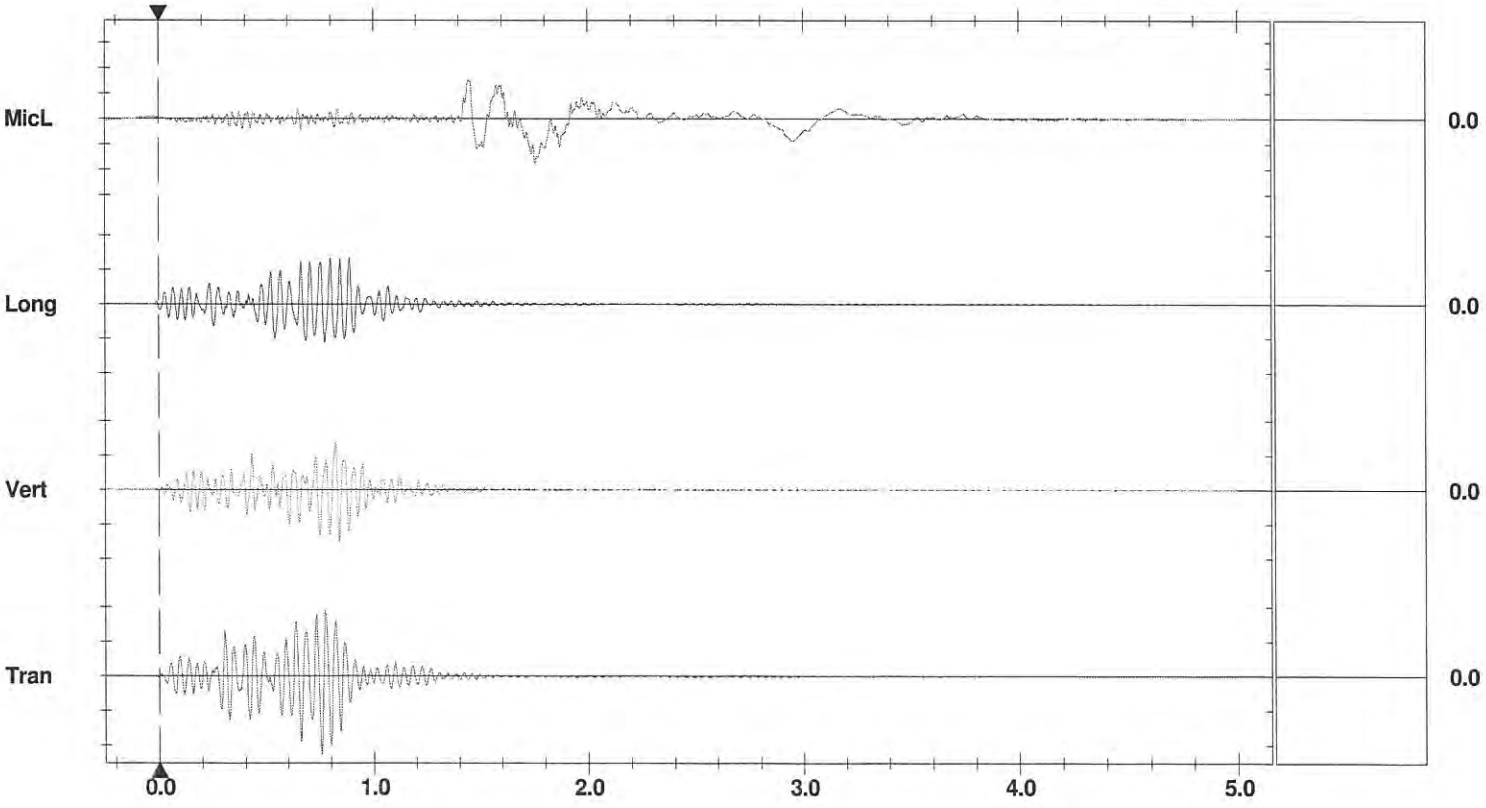
Extended Notes
Combo Mode September 30, 2015 09:44:07

Microphone Linear Weighting
PSPL 119.0 dB(L) at 1.755 sec
ZC Freq 2.2 Hz
Channel Test Disabled

	Tran	Vert	Long	
PPV	22.99	15.11	13.33	mm/s
ZC Freq	24	27	24	Hz
Time (Rel. to Trig)	0.755	0.840	0.800	sec
Peak Acceleration	0.371	0.305	0.252	g
Peak Displacement	0.143	0.103	0.089	mm
Sensor Check	Disabled	Disabled	Disabled	
Frequency	***	***	***	Hz
Overswing Ratio	***	***	***	

Peak Vector Sum 27.23 mm/s at 0.754 sec





Time Scale: 0.20 sec/div **Amplitude Scale:** Geo: 10.000 mm/s/div Mic: 10.000 pa.(L)/div
Trigger = ▶—— ——◀

Sensor Check

Instantel

Event Report

Date/Time	Long at 09:58:08 September 30, 2015
Trigger Source	Geo: 1.000 mm/s
Range	Geo: 254.0 mm/s
Record Time	5.0 sec at 1024 sps

Serial Number	BE12756 V 10.72-8.17 MiniMate Plus
Battery Level	6.3 Volts
Unit Calibration	February 9, 2015 by Instantel
File Name	N756G1N7.OW0

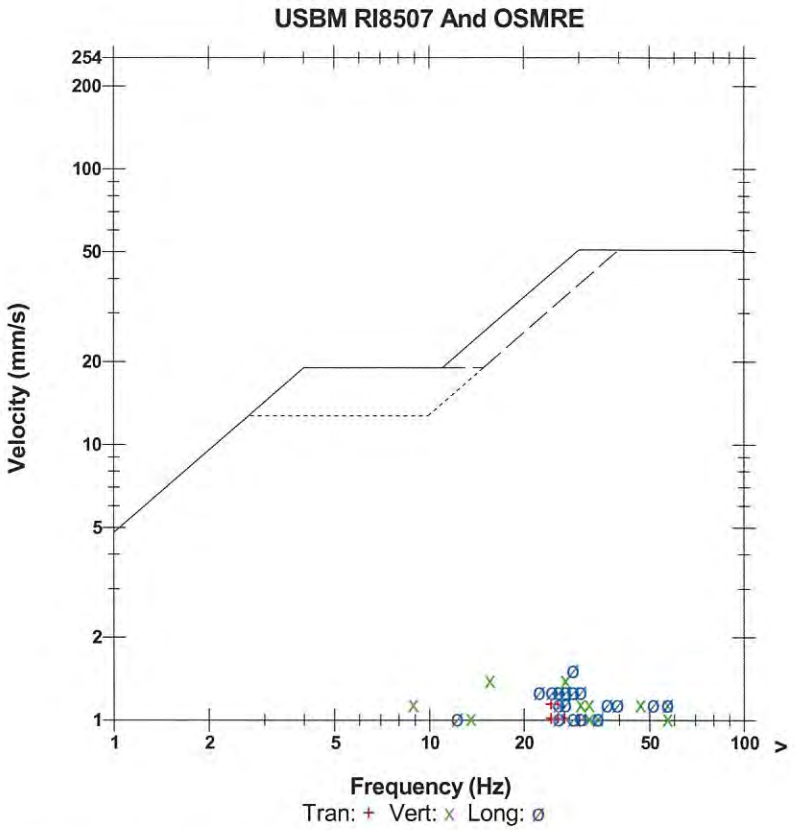
Notes
Location: Keppel Quarry
Client: Harold Sutherland Construction
User Name: Rob Mantha
General: Setup at Ruthven Farm Entrance

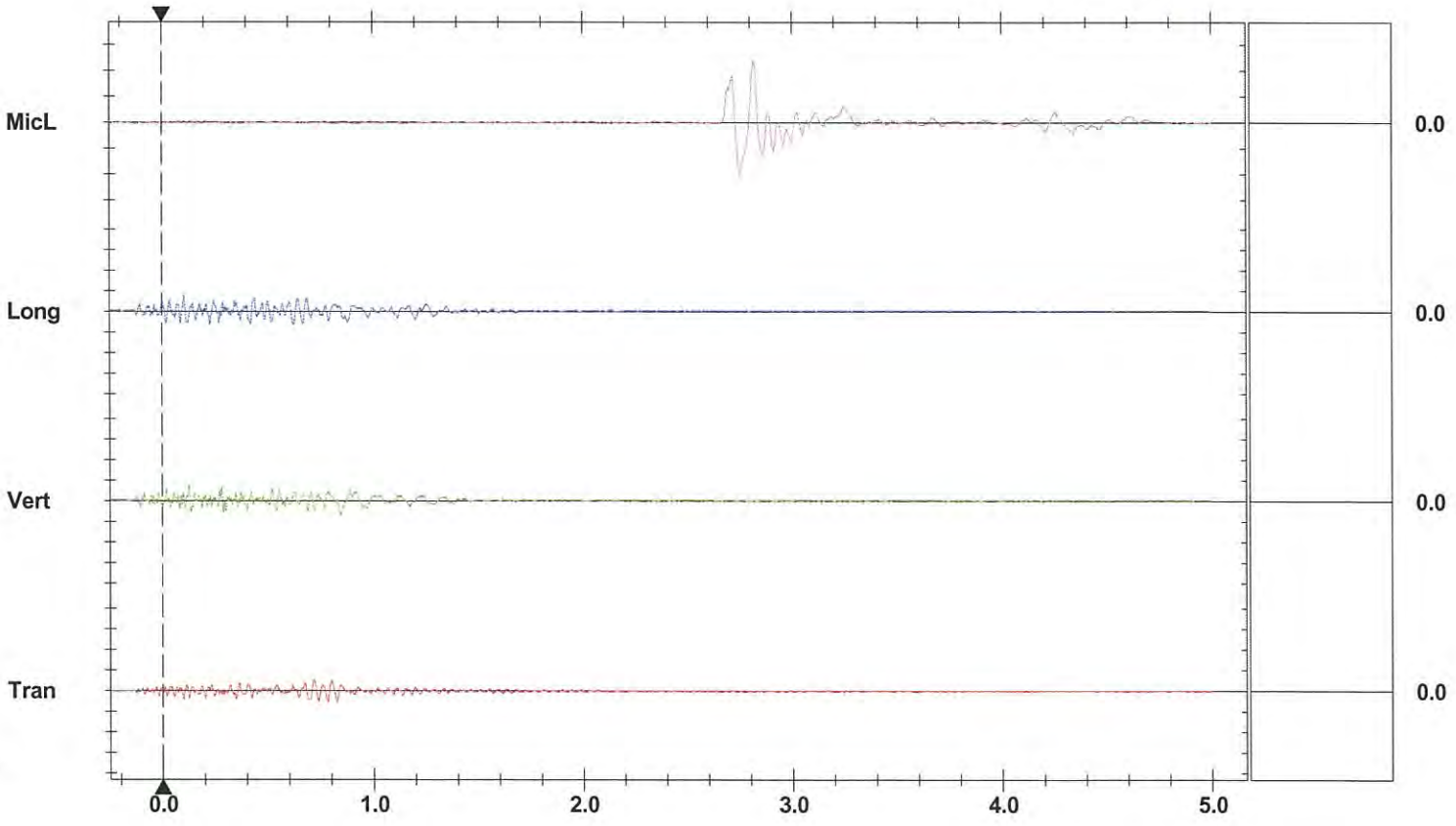
Extended Notes
Combo Mode September 30, 2015 09:38:03

Microphone	Linear Weighting
PSPL	121.6 dB(L) at 2.818 sec
ZC Freq	12 Hz
Channel Test	Disabled

	Tran	Vert	Long	
PPV	1.143	1.397	1.524	mm/s
ZC Freq	26	27	28	Hz
Time (Rel. to Trig)	0.719	0.125	0.104	sec
Peak Acceleration	0.027	0.053	0.040	g
Peak Displacement	0.008	0.018	0.013	mm
Sensor Check	Disabled	Disabled	Disabled	
Frequency	***	***	***	Hz
Overswing Ratio	***	***	***	

Peak Vector Sum 1.840 mm/s at 0.125 sec





Time Scale: 0.20 sec/div **Amplitude Scale:** Geo: 2.000 mm/s/div Mic: 10.000 pa.(L)/div
Trigger = ▶— — —◀

Sensor Check

Instantel

Event Report

Date/Time	Long at 10:09:16 September 30, 2015
Trigger Source	Geo: 0.984 mm/s
Range	Geo: 127.0 mm/s
Record Time	4.0 sec at 1024 sps

Serial Number	3219 V 2.61 MiniMate
Battery Level	6.5 Volts
Unit Calibration	February 6, 2015 by Instantel
File Name	E219G1P2.VG0

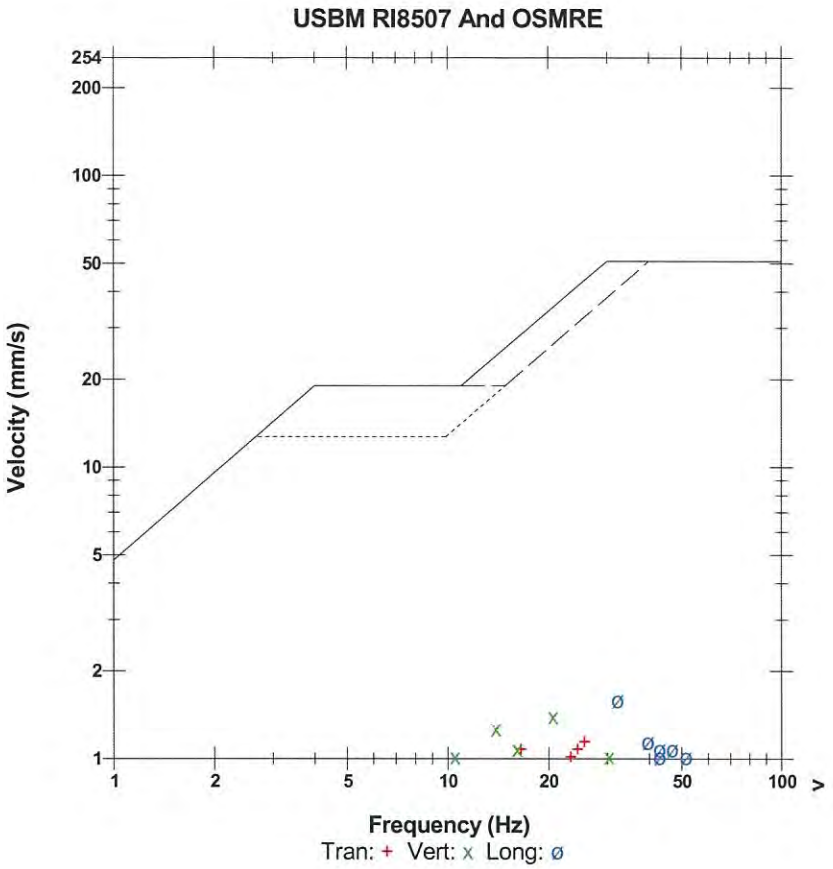
Notes
Location: Keppel Quarry
Client: Harold Sutherland Construction Ltd.
User Name: Rob Mantha
Converted: September 30, 2015 15:46:19 (V10.72)

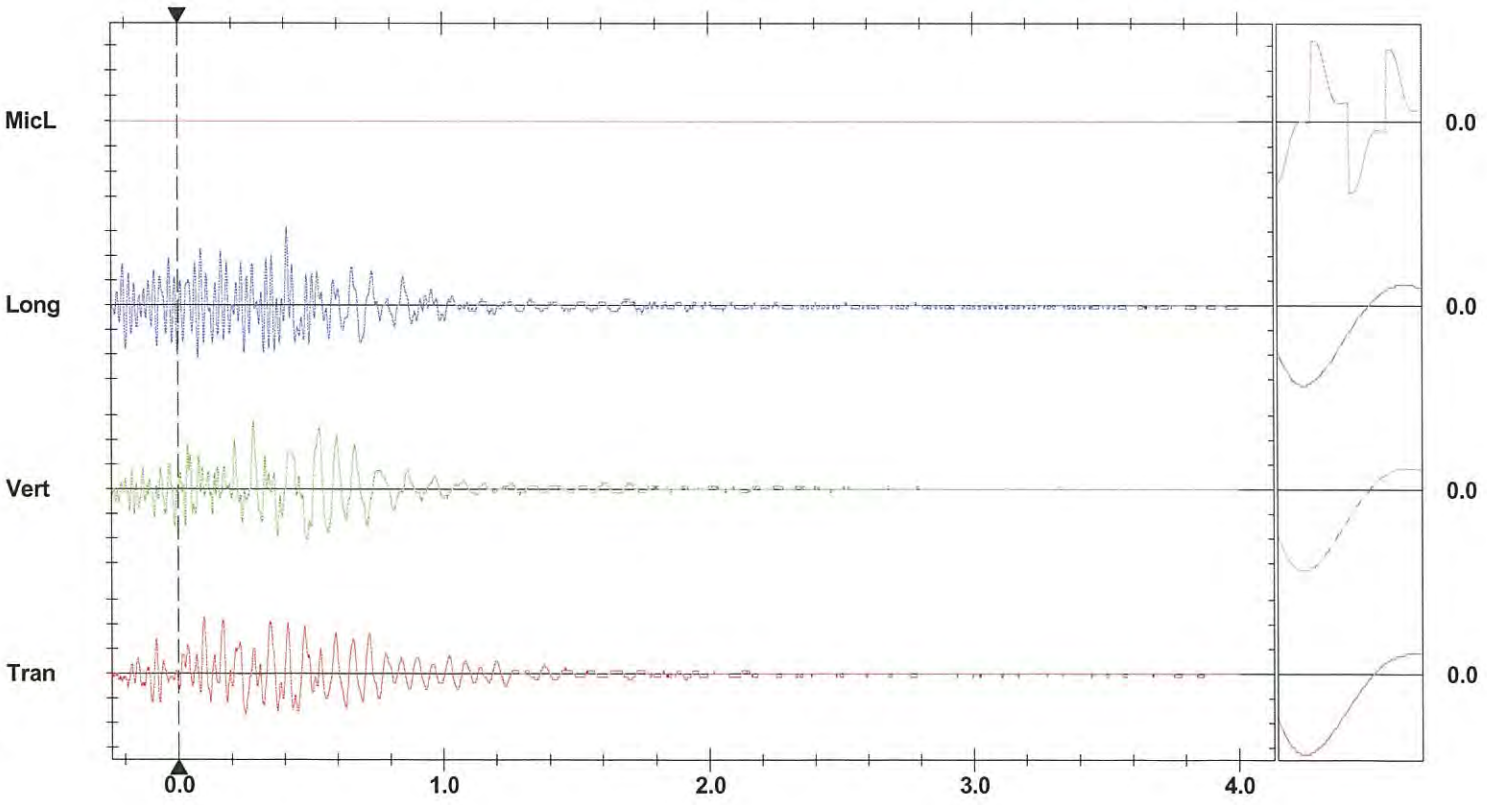
Extended Notes
Set up at McGregor House, front yard

Microphone	Linear Weighting
PSPL	<100 dB(L)
ZC Freq	N/A
Channel Test	Passed (Freq = 20.0 Hz Amp = 206 mv)

	Tran	Vert	Long	
PPV	1.143	1.397	1.588	mm/s
ZC Freq	26	20	32	Hz
Time (Rel. to Trig)	0.096	0.284	0.411	sec
Peak Acceleration	0.027	0.033	0.033	g
Peak Displacement	0.011	0.015	0.011	mm
Sensor Check	Passed	Passed	Passed	
Frequency	7.6	8.0	8.0	Hz
Overswing Ratio	3.9	3.9	3.9	

Peak Vector Sum 1.937 mm/s at 0.412 sec
N/A: Not Applicable





Time Scale: 0.20 sec/div **Amplitude Scale:** Geo: 0.500 mm/s/div Mic: 5.000 pa.(L)/div
Trigger = ▶——◀

Sensor Check

Instantel

Event Report

Instantel

Date/Time	Vert at 09:39:53 September 4, 2015
Trigger Source	Geo: 2.000 mm/s
Range	Geo: 254.0 mm/s
Record Time	5.0 sec at 1024 sps

Serial Number	BE17338 V 10.72-8.17 MiniMate Plus
Battery Level	6.3 Volts
Unit Calibration	August 13, 2015 by Instantel
File Name	S338G0B1.IH0

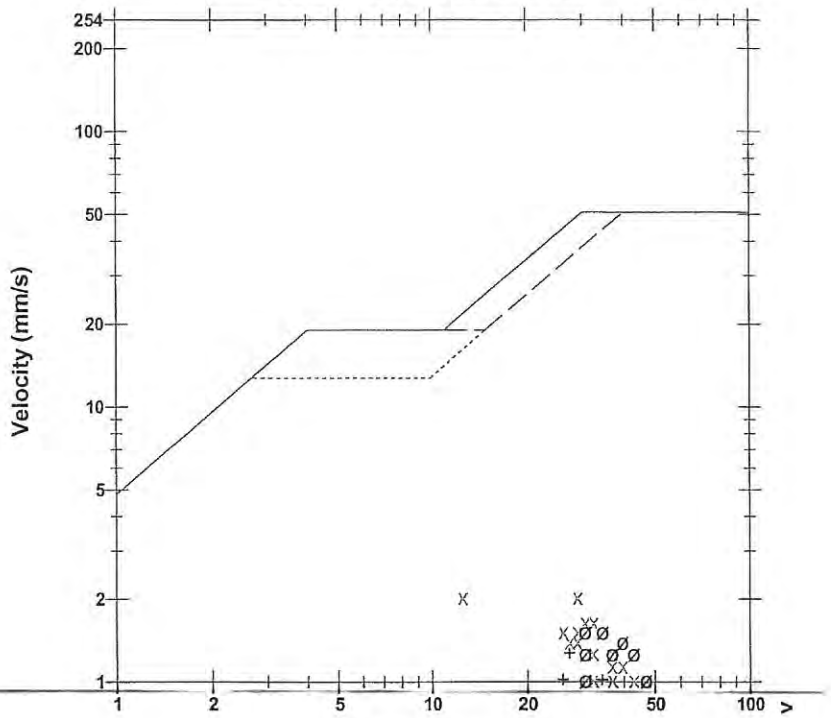
Notes
Location: Keppel Quarry
Client: Sutherland Construction
User Name: Consbec Inc.
General: Blast Vibration Monitoring

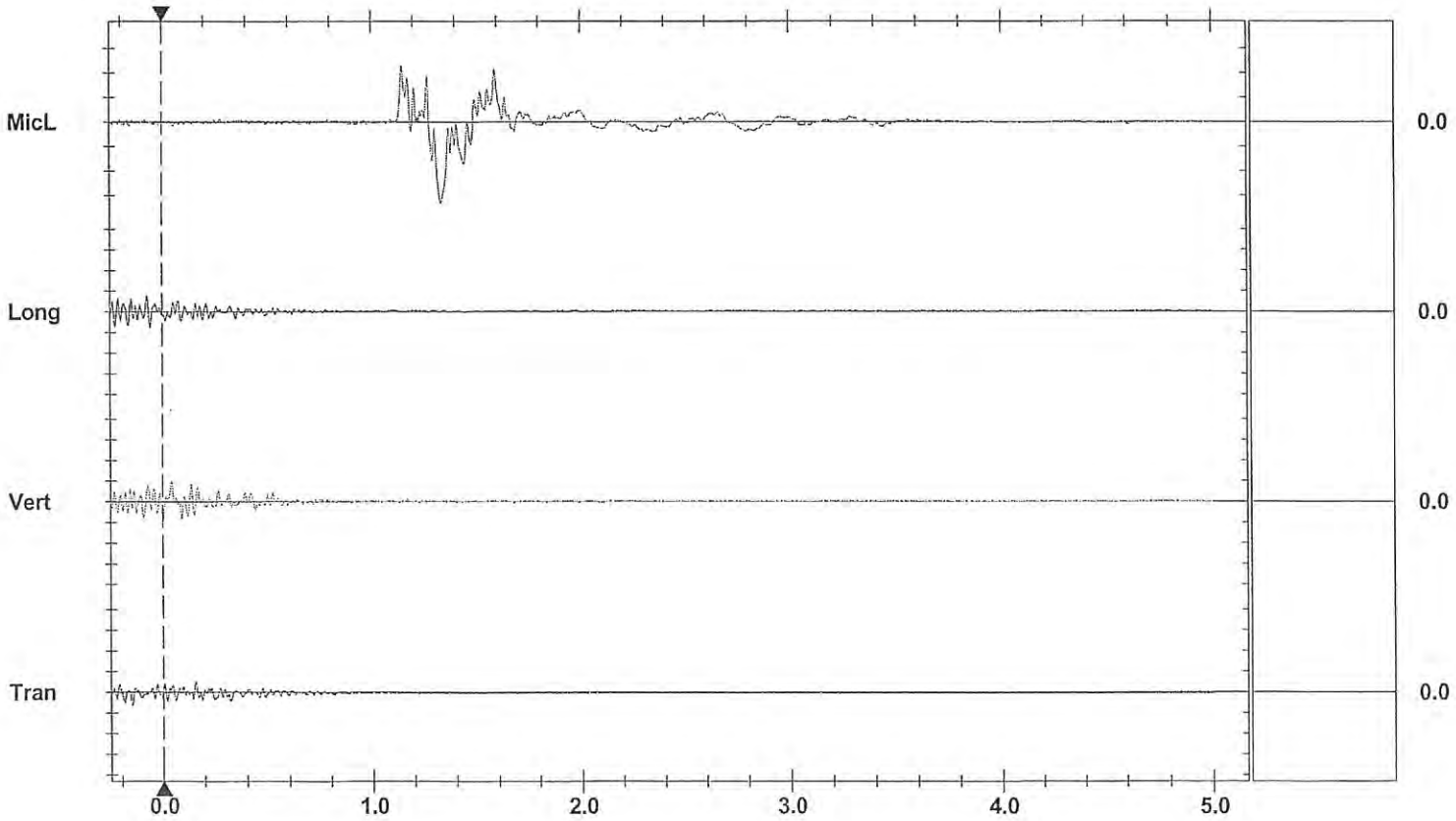
Microphone	Linear Weighting
PSPL	124.3 dB(L) at 1.334 sec
ZC Freq	2.4 Hz
Channel Test	Disabled

	Tran	Vert	Long	
PPV	1.270	2.032	1.524	mm/s
ZC Freq	27	28	30	Hz
Time (Rel. to Trig)	-0.153	0.000	-0.074	sec
Peak Acceleration	0.027	0.040	0.040	g
Peak Displacement	0.008	0.016	0.008	mm
Sensor Check	Disabled	Disabled	Disabled	
Frequency	***	***	***	Hz
Overswing Ratio	***	***	***	

Peak Vector Sum 2.159 mm/s at -0.071 sec

USBM RI8507 And OSMRE





Time Scale: 0.20 sec/div **Amplitude Scale:** Geo: 2.000 mm/s/div Mic: 10.000 pa.(L)/div Sensor Check
Trigger =

Instantel

Event Report

Date/Time	Long at 09:39:27 September 4, 2015
Trigger Source	Geo: 0.984 mm/s
Range	Geo: 127.0 mm/s
Record Time	4.0 sec at 1024 sps

Serial Number	3219 V 2.61 MiniMate
Battery Level	6.5 Volts
Unit Calibration	February 6, 2015 by Instantel
File Name	E219G0CW.5R0

Notes

Location:	Keppel Quarry
Client:	Harold Sutherland Construction Ltd.
User Name:	Rob Mantha
Converted:	September 4, 2015 16:33:33 (V10.72)

Extended Notes

Setup at Ruthvenn Farm laneway

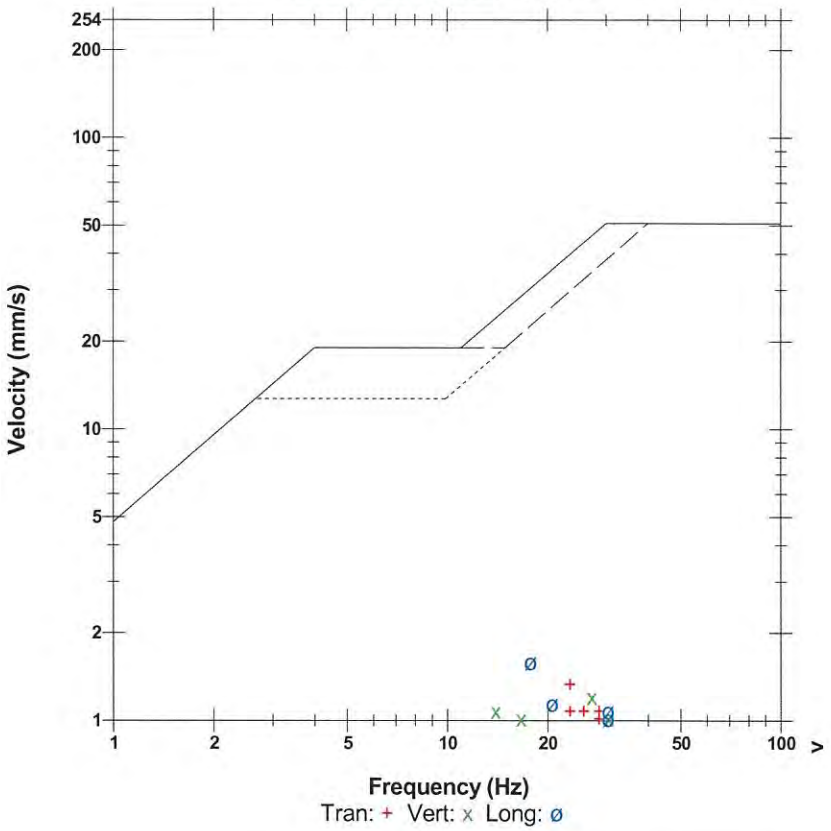
Microphone	Linear Weighting
PSPL	<100 dB(L)
ZC Freq	N/A
Channel Test	Passed (Freq = 20.0 Hz Amp = 206 mv)

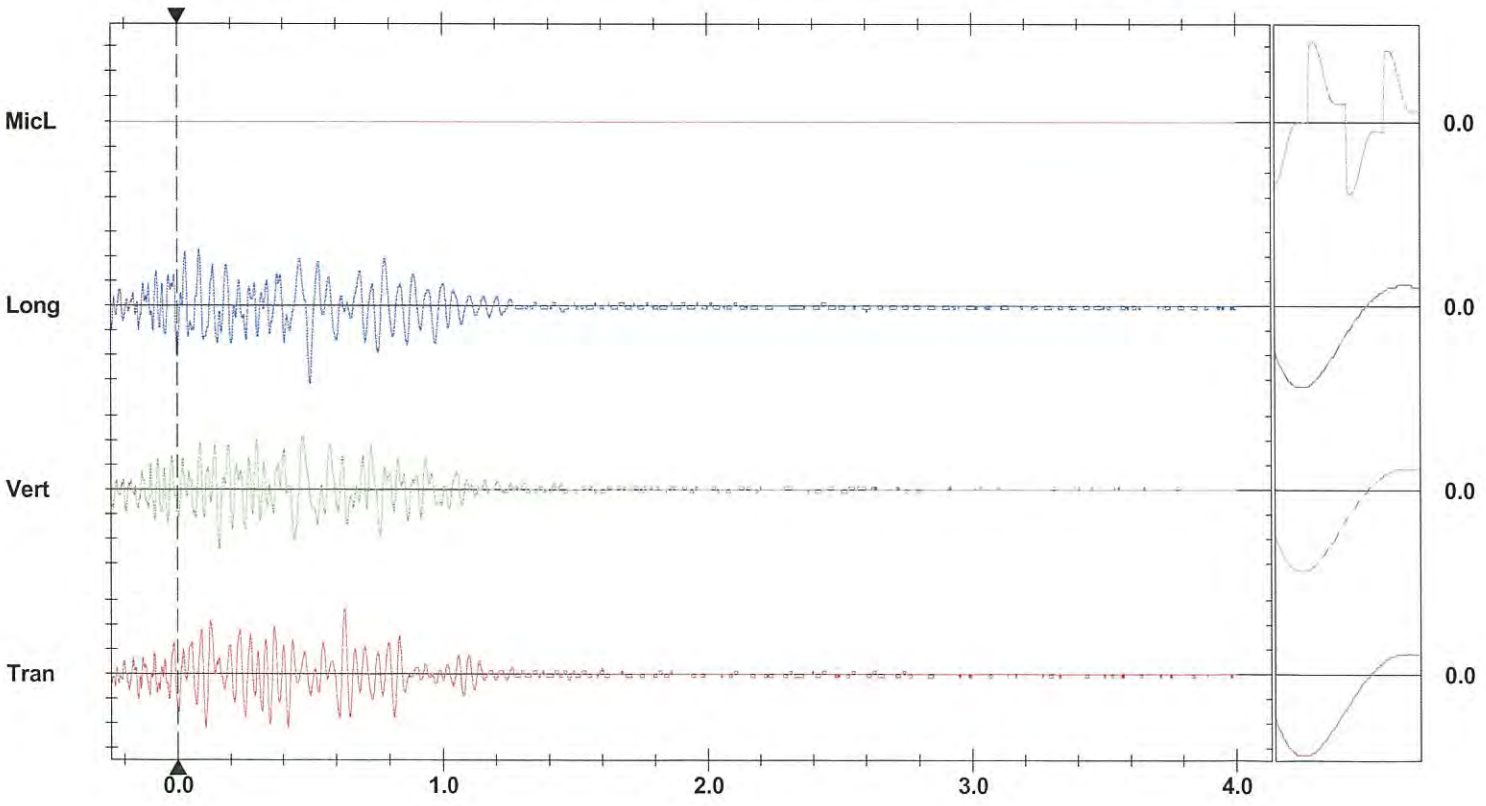
	Tran	Vert	Long	
PPV	1.334	1.207	1.588	mm/s
ZC Freq	23	27	18	Hz
Time (Rel. to Trig)	0.632	0.157	0.503	sec
Peak Acceleration	0.020	0.020	0.027	g
Peak Displacement	0.009	0.011	0.012	mm
Sensor Check	Passed	Passed	Passed	
Frequency	7.7	8.0	8.0	Hz
Overswing Ratio	3.5	3.9	3.8	

Peak Vector Sum 1.667 mm/s at 0.505 sec

N/A: Not Applicable

USBM RI8507 And OSMRE





Time Scale: 0.20 sec/div **Amplitude Scale:** Geo: 0.500 mm/s/div Mic: 5.000 pa.(L)/div

Sensor Check

Trigger =

Event Report

Date/Time	Vert at 09:29:53 September 4, 2015
Trigger Source	Geo: 1.000 mm/s
Range	Geo: 254.0 mm/s
Record Time	5.0 sec at 1024 sps

Serial Number	BE12756 V 10.72-8.17 MiniMate Plus
Battery Level	6.3 Volts
Unit Calibration	February 9, 2015 by Instantel
File Name	N756G0B1.1T0

Notes
Location: Keppel Quarry
Client: Harold Sutherland Construction
User Name: Rob Mantha
General: Setup on McGregor House front yard

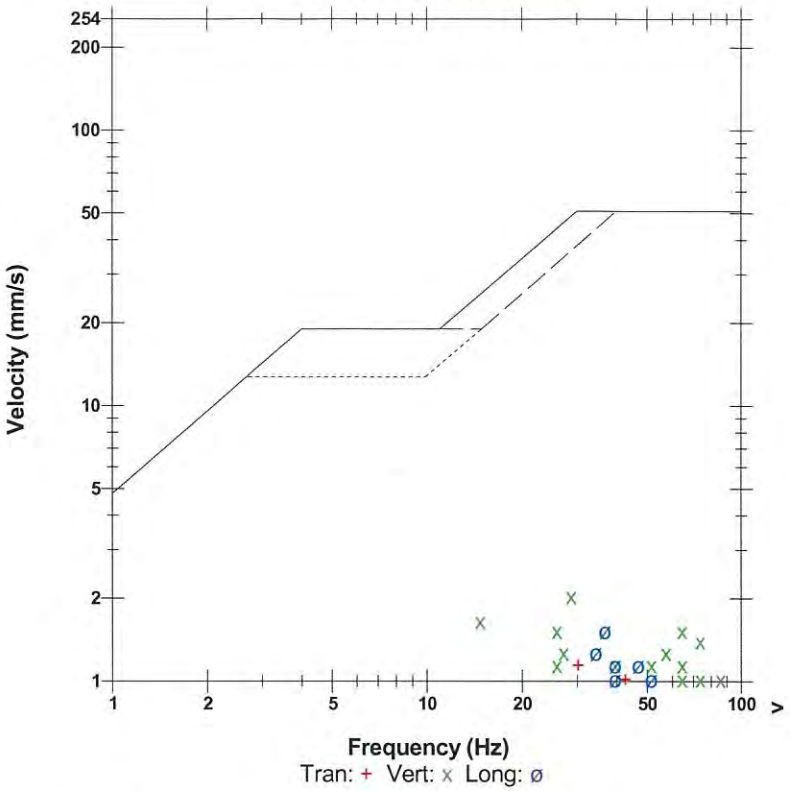
Extended Notes
Combo Mode September 4, 2015 08:57:34

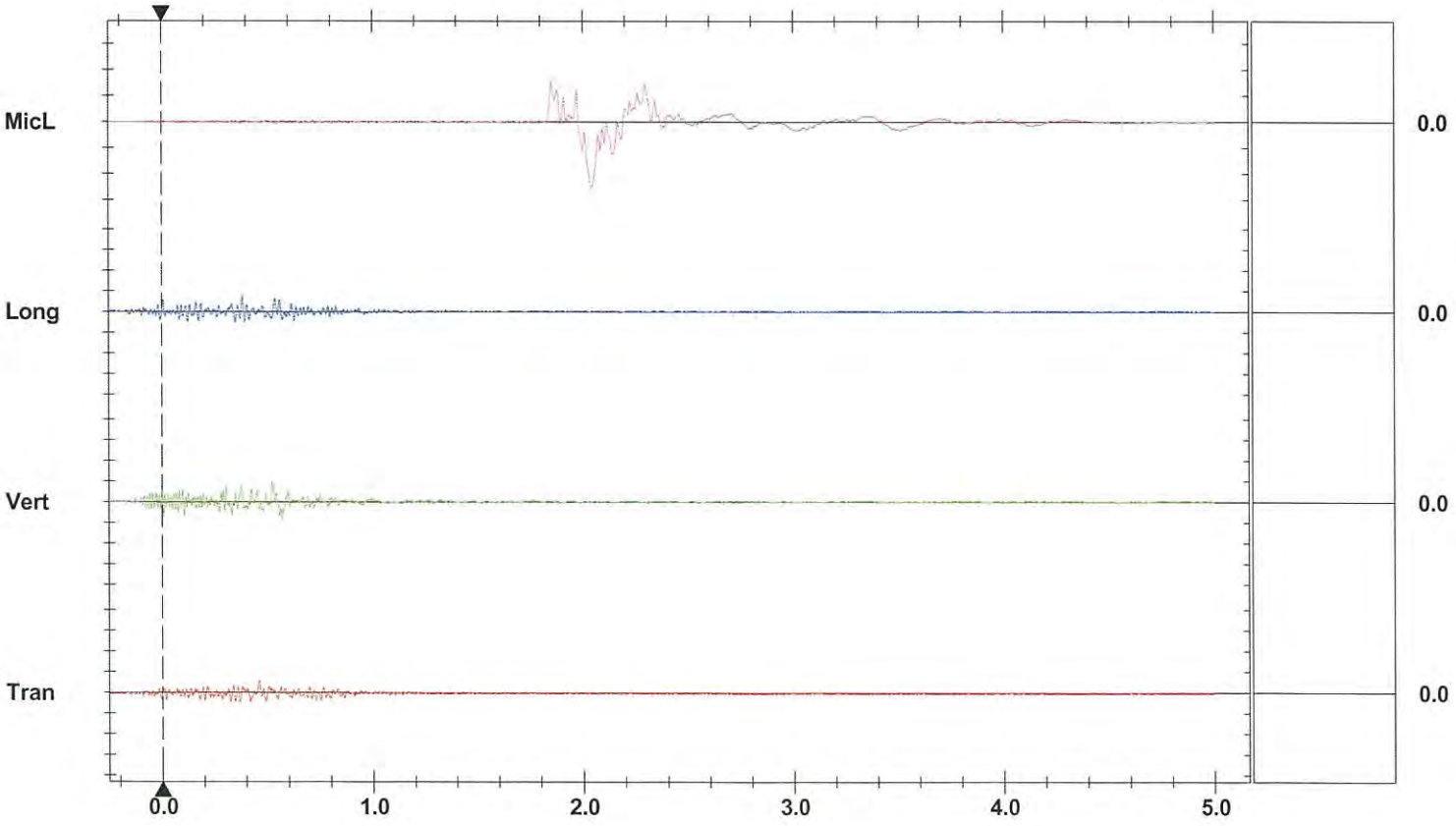
Microphone	Linear Weighting
PSPL	122.1 dB(L) at 2.042 sec
ZC Freq	3.8 Hz
Channel Test	Disabled

	Tran	Vert	Long	
PPV	1.143	2.032	1.524	mm/s
ZC Freq	30	28	37	Hz
Time (Rel. to Trig)	0.459	0.522	0.382	sec
Peak Acceleration	0.040	0.066	0.040	g
Peak Displacement	0.006	0.015	0.006	mm
Sensor Check	Disabled	Disabled	Disabled	
Frequency	***	***	***	Hz
Overswing Ratio	***	***	***	

Peak Vector Sum 2.163 mm/s at 0.522 sec

USBM RI8507 And OSMRE





Time Scale: 0.20 sec/div **Amplitude Scale:** Geo: 2.000 mm/s/div Mic: 10.000 pa.(L)/div Sensor Check
Trigger = ▶———◀

Instantel

Event Report

Instantel

Date/Time	Tran at 12:03:11 August 5, 2015
Trigger Source	Geo: 2.000 mm/s
Range	Geo: 254.0 mm/s
Record Time	5.0 sec at 1024 sps

Serial Number	BE13291 V 10.72-8.17 MiniMate Plus
Battery Level	6.4 Volts
Unit Calibration	June 5, 2015 by Instantel
File Name	O291FYRO.5B0

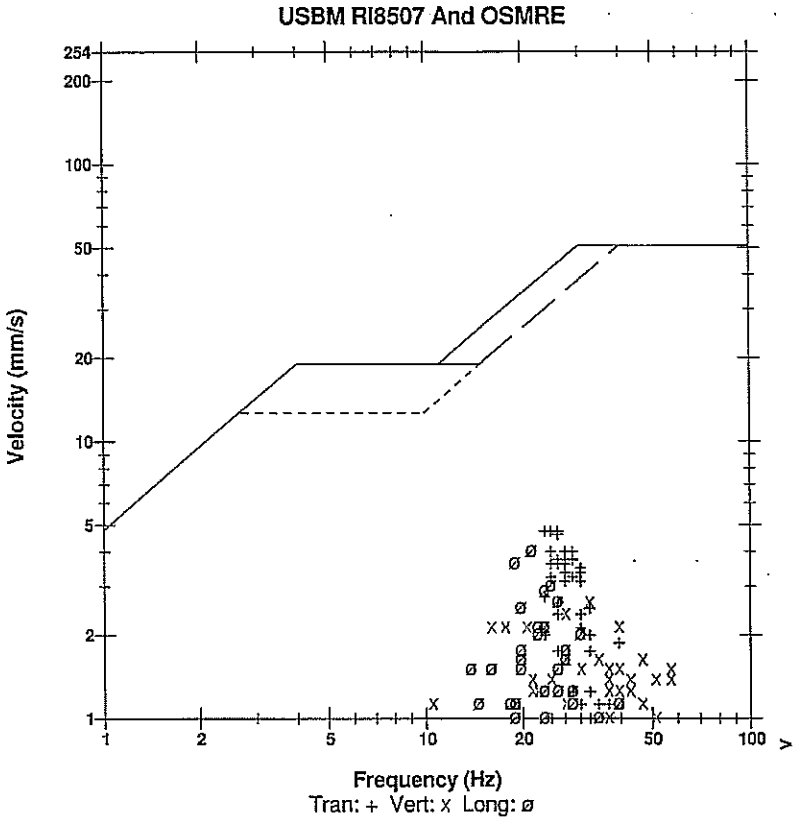
Notes

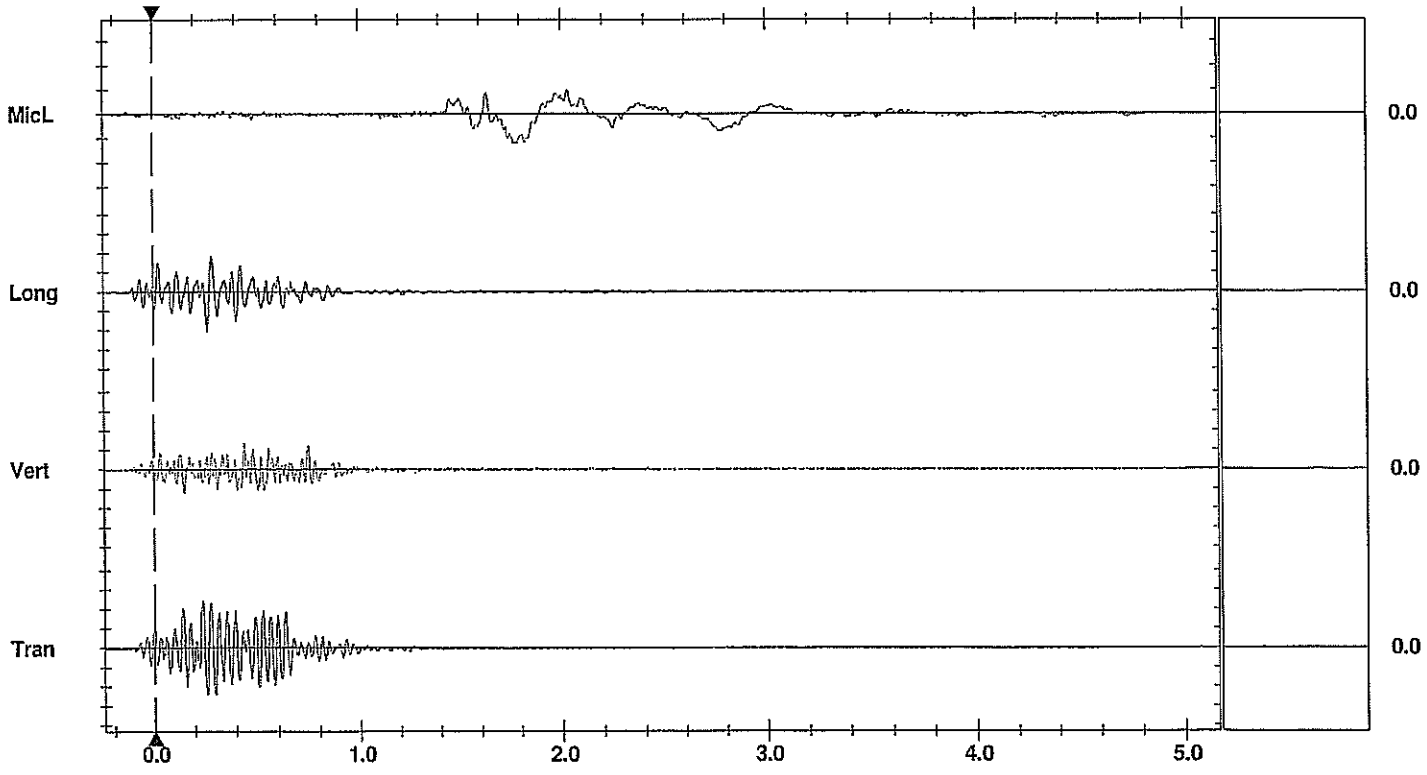
Location:	Kepple Quarry
Client:	Sutherland Construction
User Name:	Consbec
General:	Blast Vibration Monitoring

Microphone	Linear Weighting
PSPL	115.7 dB(L) at 1.770 sec
ZC Freq	2.4 Hz
Channel Test	Disabled

	Tran	Vert	Long	
PPV	4.826	2.667	4.064	mm/s
ZC Freq	24	32	21	Hz
Time (Rel. to Trig)	0.239	0.439	0.265	sec
Peak Acceleration	0.106	0.066	0.066	g
Peak Displacement	0.035	0.021	0.030	mm
Sensor Check	Disabled	Disabled	Disabled	
Frequency	***	***	***	Hz
Overswing Ratio	***	***	***	

Peak Vector Sum 5.812 mm/s at 0.261 sec





Time Scale: 0.20 sec/div **Amplitude Scale:** Geo: 2.000 mm/s/div Mic: 10.000 pa.(L)/div

Sensor Check

Trigger =

Instantel

Event Report

Instantel

Date/Time	Long at 12:03:10 August 5, 2015
Trigger Source	Geo: 2.000 mm/s
Range	Geo: 254.0 mm/s
Record Time	5.0 sec at 1024 sps

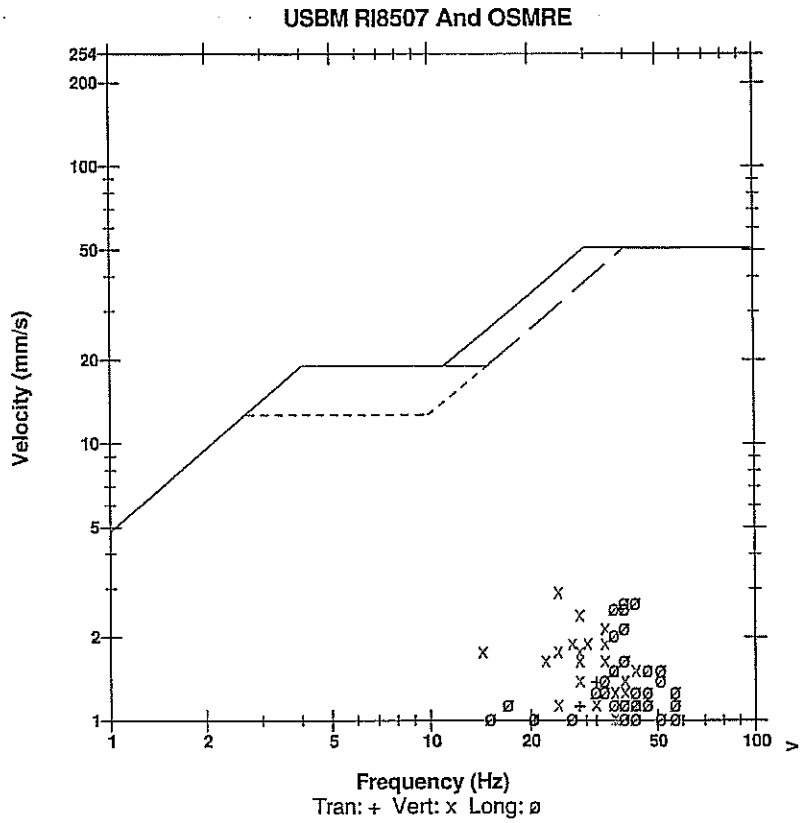
Serial Number	BE16234 V 10.72-8.17 MiniMate Plus
Battery Level	6.3 Volts
Unit Calibration	August 12, 2014 by Instantel
File Name	R234FYRO.5A0

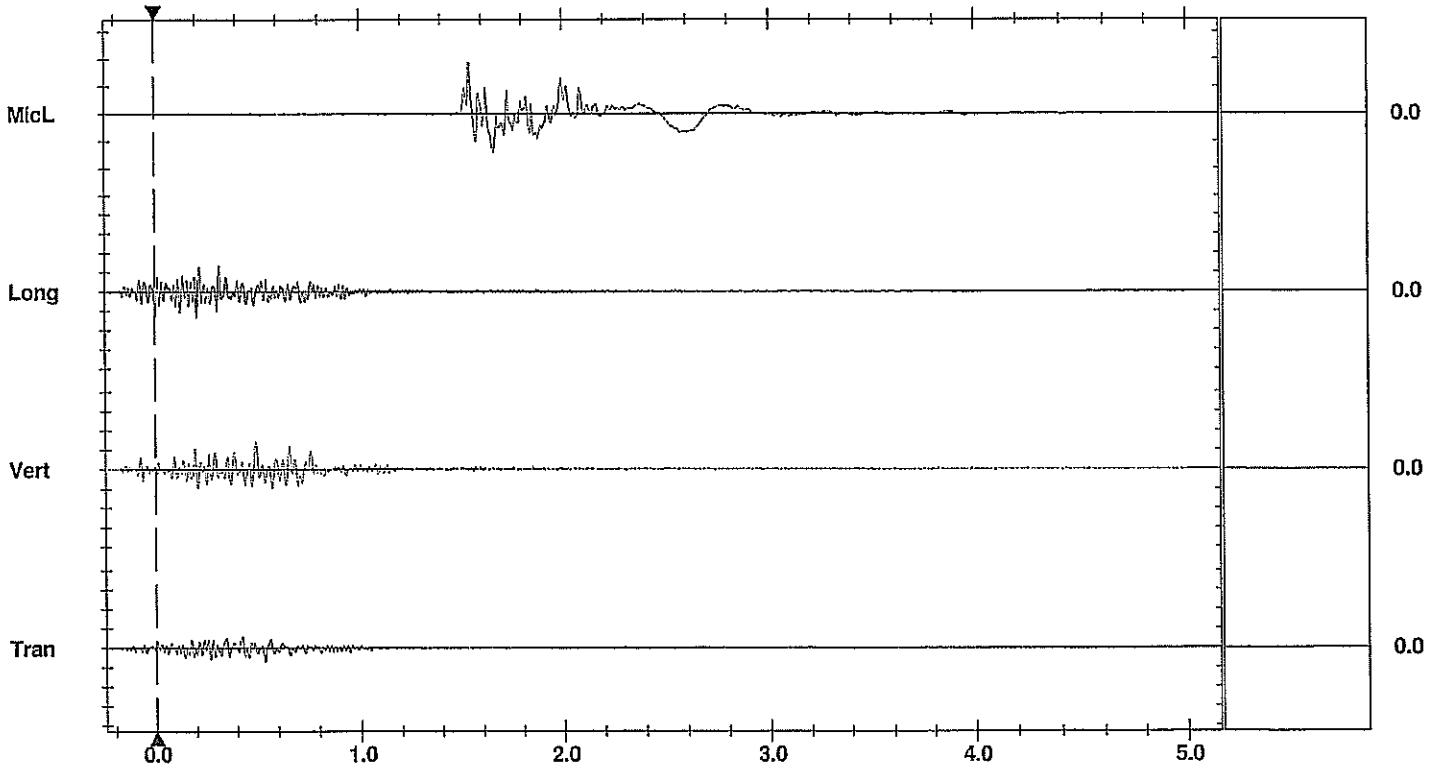
Notes
Location: Keppel Quarry
Client: Sutherland Construction
User Name: Consbec Inc.
General: Blast Vibration Monitoring

Microphone	Linear Weighting
PSPL	125.3 dB(L) at 1.541 sec
ZC Freq	8.5 Hz
Channel Test	Disabled

	Tran	Vert	Long	
PPV	1.397	2.921	2.667	mm/s
ZC Freq	32	24	43	Hz
Time (Rel. to Trig)	0.535	0.495	0.205	sec
Peak Acceleration	0.040	0.053	0.066	g
Peak Displacement	0.007	0.018	0.011	mm
Sensor Check	Disabled	Disabled	Disabled	
Frequency	***	***	***	Hz
Overswing Ratio	***	***	***	

Peak Vector Sum 3.175 mm/s at 0.207 sec





Time Scale: 0.20 sec/div **Amplitude Scale:** Geo: 2.000 mm/s/div Mic: 20.00 pa.(L)/div Sensor Check
Trigger = ▶—— ——◀

Instantel

Event Report

Date/Time	Long at 11:55:21 August 5, 2015
Trigger Source	Geo: 1.000 mm/s
Range	Geo: 254.0 mm/s
Record Time	5.0 sec at 1024 sps

Serial Number	BE12756 V 10.72-8.17 MiniMate Plus
Battery Level	6.3 Volts
Unit Calibration	February 9, 2015 by Instantel
File Name	N756FYRN.S90

Notes

Location:	Keppel Quarry
Client:	Harold Sutherland Construction
User Name:	Rob Mantha
General:	Doug Wilde Residence, 302377 Gr. Rd. 170

Extended Notes

Combo Mode August 5, 2015 11:40:08

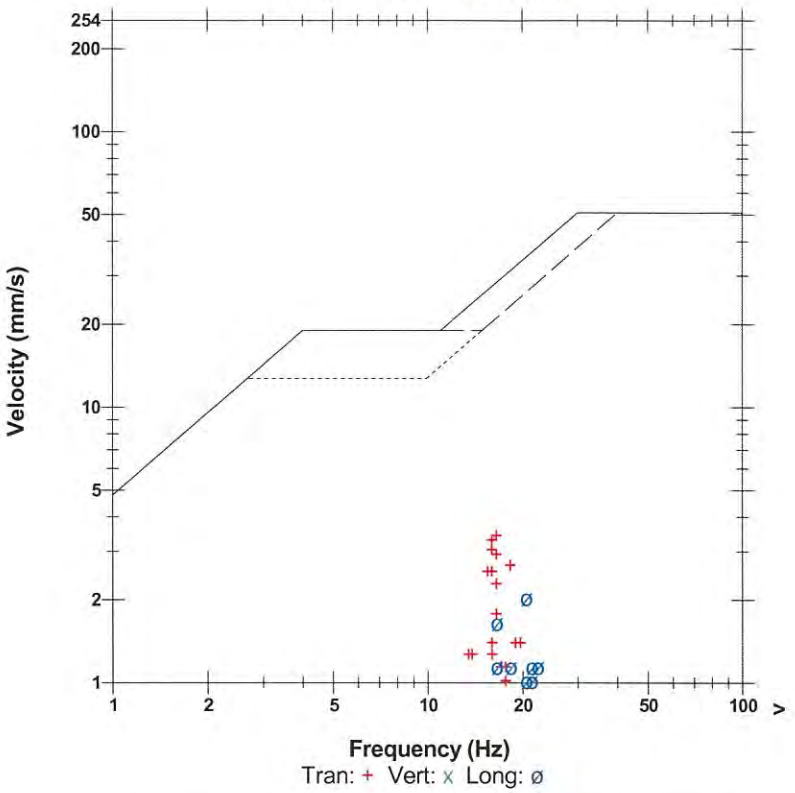
Microphone	Linear Weighting
PSPL	95.92 dB(L) at 4.979 sec
ZC Freq	N/A
Channel Test	Disabled

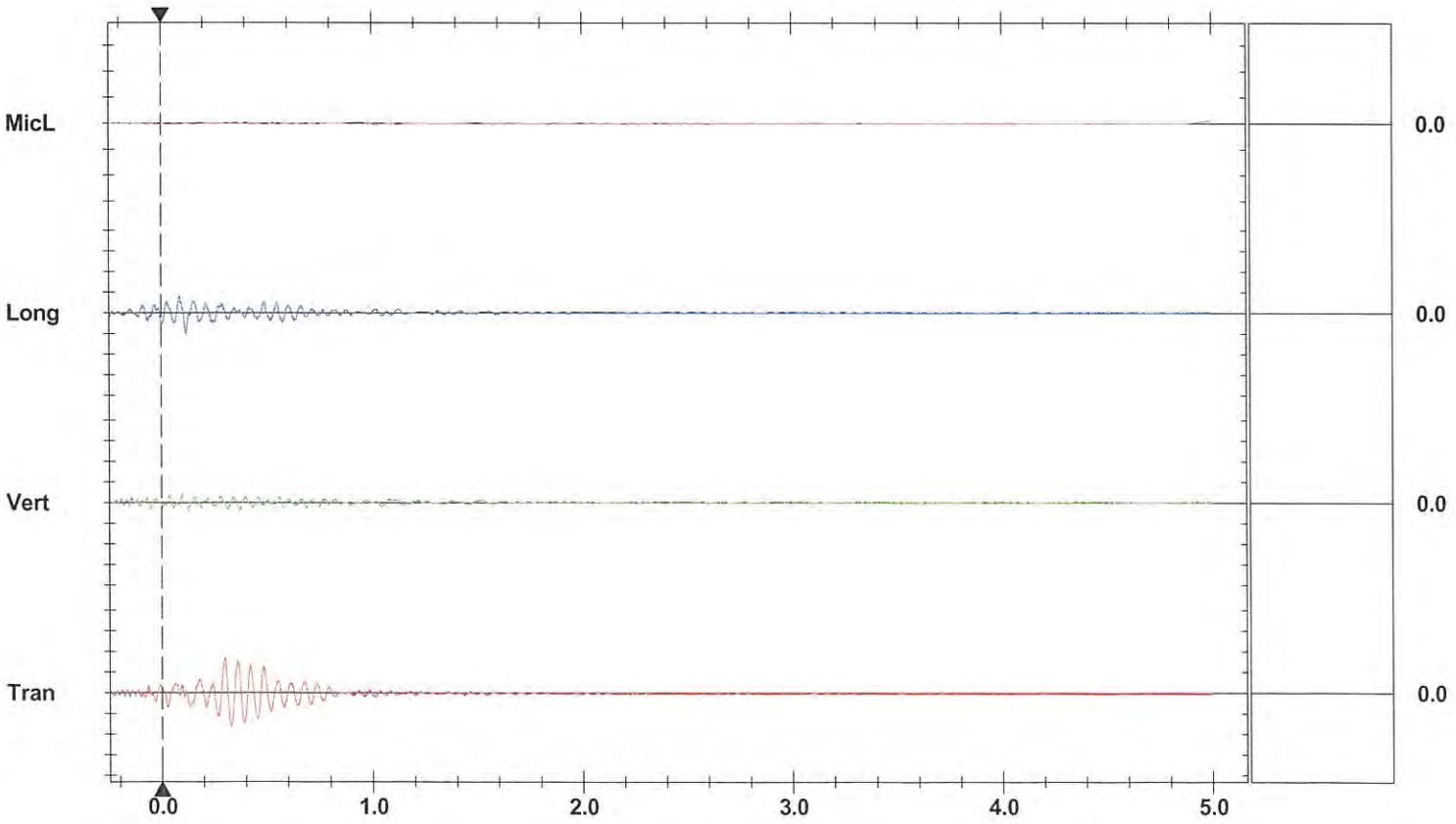
	Tran	Vert	Long	
PPV	3.429	0.889	2.032	mm/s
ZC Freq	17	30	20	Hz
Time (Rel. to Trig)	0.300	0.099	0.118	sec
Peak Acceleration	0.040	0.027	0.027	g
Peak Displacement	0.034	0.007	0.014	mm
Sensor Check	Disabled	Disabled	Disabled	
Frequency	***	***	***	Hz
Overswing Ratio	***	***	***	

Peak Vector Sum 3.438 mm/s at 0.300 sec

N/A: Not Applicable

USBM RI8507 And OSMRE





Time Scale: 0.20 sec/div **Amplitude Scale:** Geo: 2.000 mm/s/div Mic: 10.000 pa.(L)/div

Sensor Check

Trigger = ▶——————◀

Event Report

Date/Time	Tran at 12:03:04 August 5, 2015
Trigger Source	Geo: 0.984 mm/s
Range	Geo: 127.0 mm/s
Record Time	4.0 sec at 1024 sps

Serial Number	3219 V 2.61 MiniMate
Battery Level	6.5 Volts
Unit Calibration	February 6, 2015 by Instantel
File Name	E219FYTI.T40

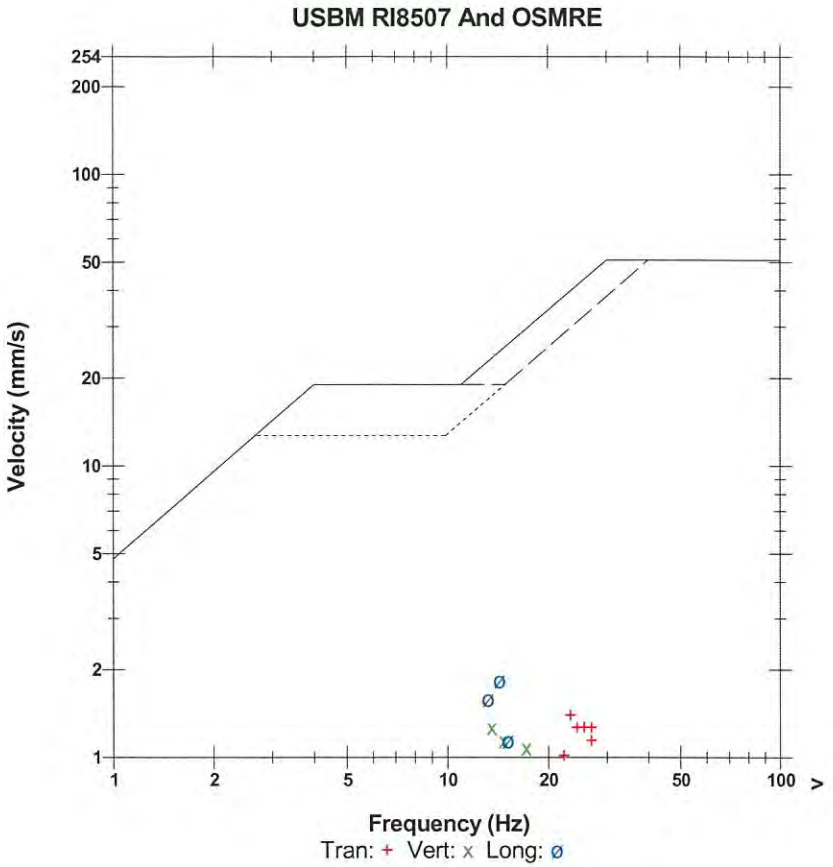
Notes
Location: Keppel Quarry
Client: Harold Sutherland Construction Ltd.
User Name: Rob Mantha
Converted: August 5, 2015 13:54:29 (V10.72)

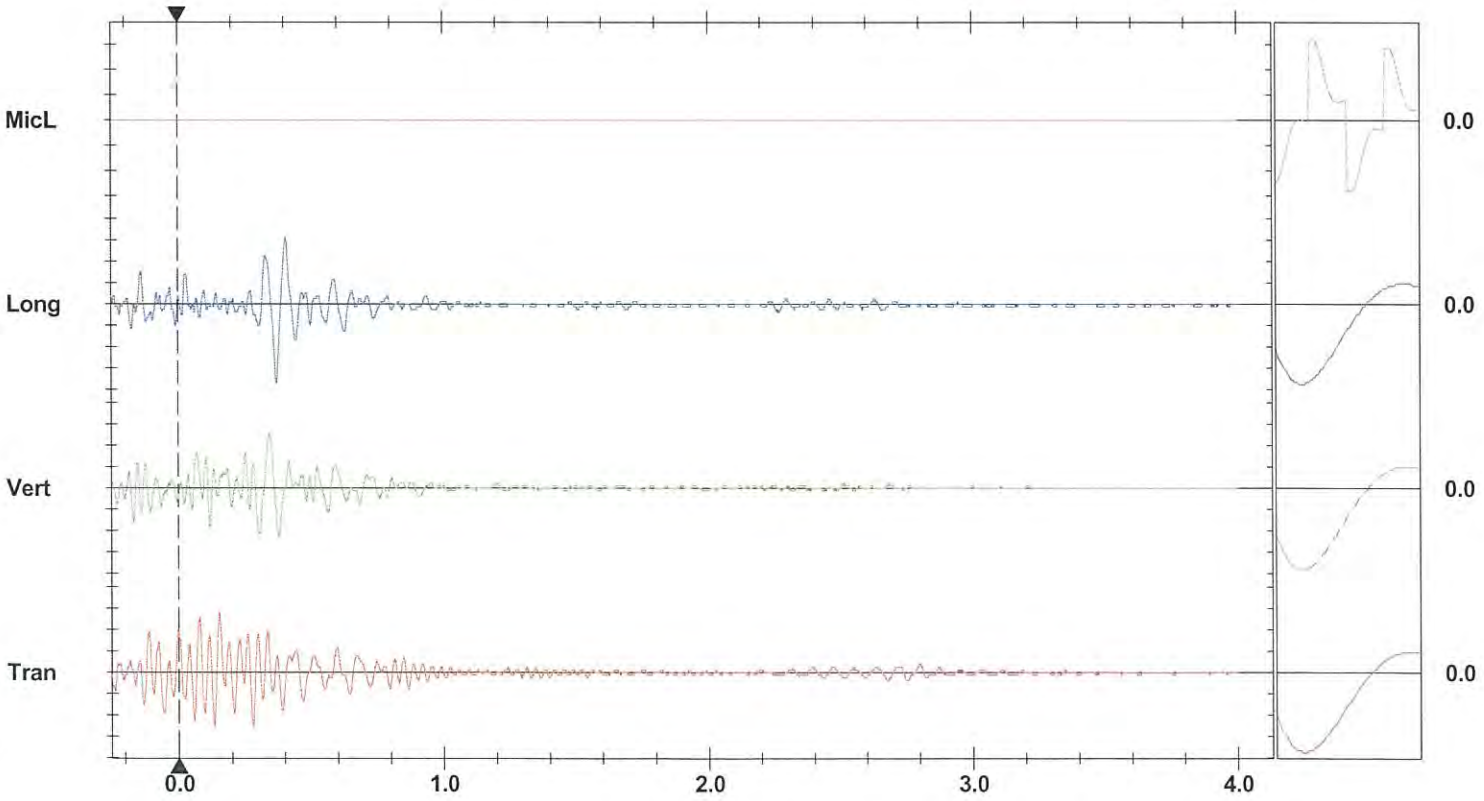
Extended Notes
Setup at Ruthven Farm laneway

Microphone Linear Weighting
PSPL <100 dB(L)
ZC Freq N/A
Channel Test Passed (Freq = 20.0 Hz Amp = 206 mv)

	Tran	Vert	Long	
PPV	1.397	1.270	1.842	mm/s
ZC Freq	22	13	14	Hz
Time (Rel. to Trig)	0.153	0.343	0.371	sec
Peak Acceleration	0.027	0.020	0.020	g
Peak Displacement	0.009	0.015	0.017	mm
Sensor Check	Passed	Passed	Passed	
Frequency	7.6	8.0	8.1	Hz
Overswing Ratio	4.0	3.9	3.9	

Peak Vector Sum 2.048 mm/s at 0.373 sec
N/A: Not Applicable





Time Scale: 0.20 sec/div **Amplitude Scale:** Geo: 0.500 mm/s/div Mic: 5.000 pa.(L)/div
Trigger = ▶——◀

Sensor Check

Instantel

Event Report

Date/Time	Long at 10:20:50 June 30, 2015
Trigger Source	Geo: 1.000 mm/s
Range	Geo: 254.0 mm/s
Record Time	5.0 sec at 1024 sps

Serial Number	BE12756 V 10.72-8.17 MiniMate Plus
Battery Level	6.3 Volts
Unit Calibration	February 9, 2015 by Instantel
File Name	N756FWWV.EQ0

Notes

Location:	Keppel Quarry
Client:	Harold Sutherland Construction
User Name:	Rob Mantha
General:	Setup front yard of McGregor House

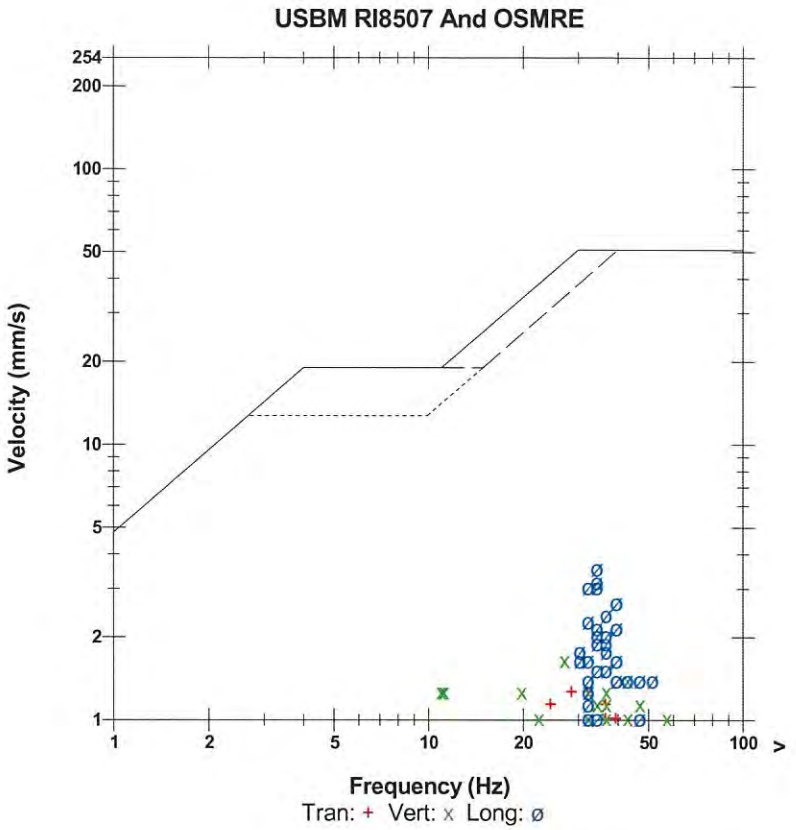
Extended Notes

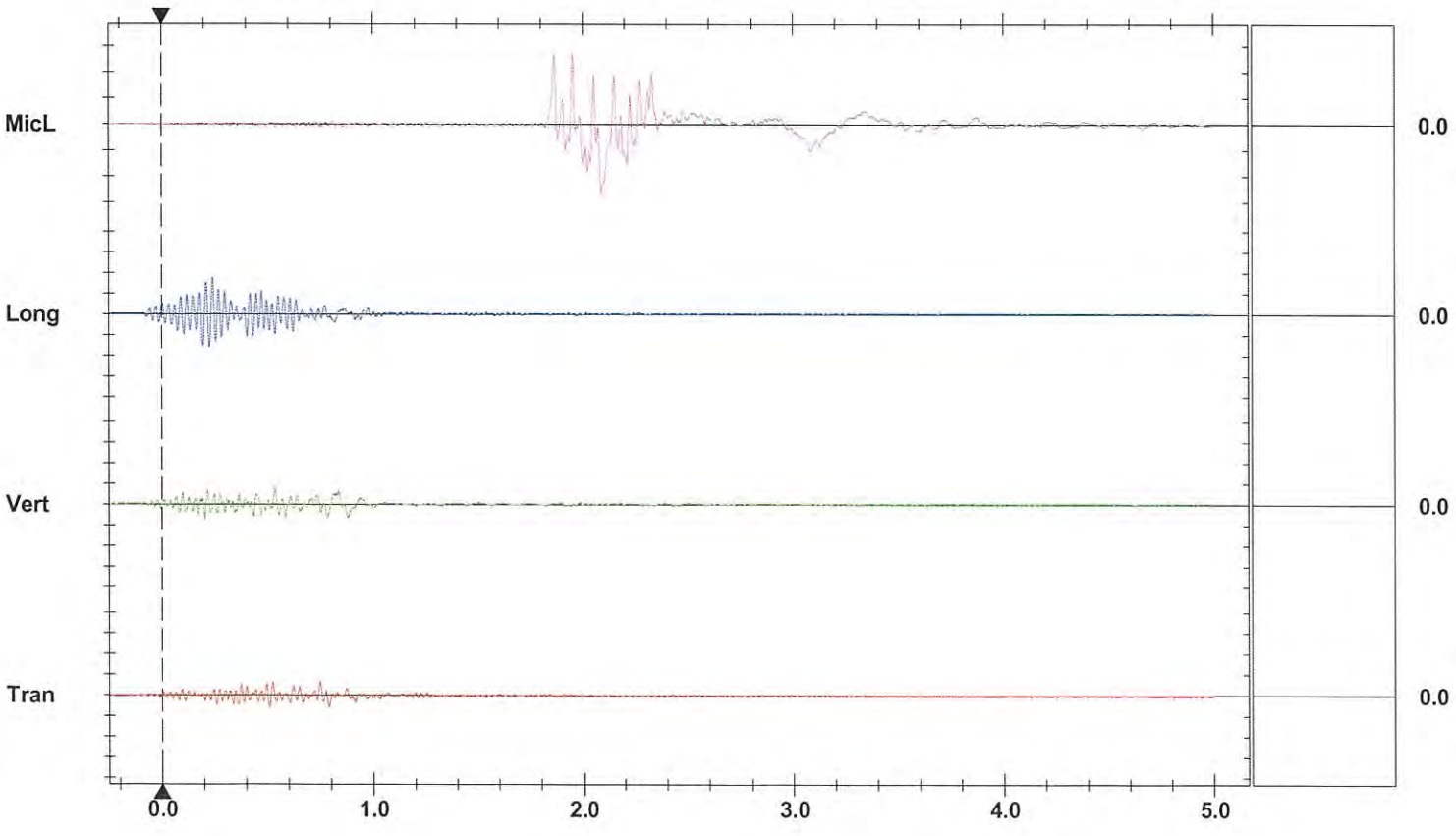
Combo Mode June 30, 2015 09:53:23

Microphone	Linear Weighting
PSPL	122.8 dB(L) at 1.953 sec
ZC Freq	26 Hz
Channel Test	Disabled

	Tran	Vert	Long	
PPV	1.270	1.651	3.556	mm/s
ZC Freq	32	27	34	Hz
Time (Rel. to Trig)	0.523	0.534	0.241	sec
Peak Acceleration	0.027	0.040	0.080	g
Peak Displacement	0.007	0.020	0.017	mm
Sensor Check	Disabled	Disabled	Disabled	
Frequency	***	***	***	Hz
Overswing Ratio	***	***	***	

Peak Vector Sum 3.565 mm/s at 0.241 sec





Time Scale: 0.20 sec/div **Amplitude Scale:** Geo: 2.000 mm/s/div Mic: 10.000 pa.(L)/div

Sensor Check

Trigger = ▶——◀

Instantel

Event Report

Date/Time	Long at 10:26:20 June 30, 2015
Trigger Source	Geo: 1.000 mm/s
Range	Geo: 127.0 mm/s
Record Time	4.0 sec at 1024 sps

Serial Number	3219 V 2.61 MiniMate
Battery Level	6.5 Volts
Unit Calibration	February 6, 2015 by Instantel
File Name	E219FWYQ.BW0

Notes
Location: Keppel Quarry
Client: Harold Sutherland Construction Ltd.
User Name: Rob Mantha
Converted: June 30, 2015 11:41:20 (V10.72)

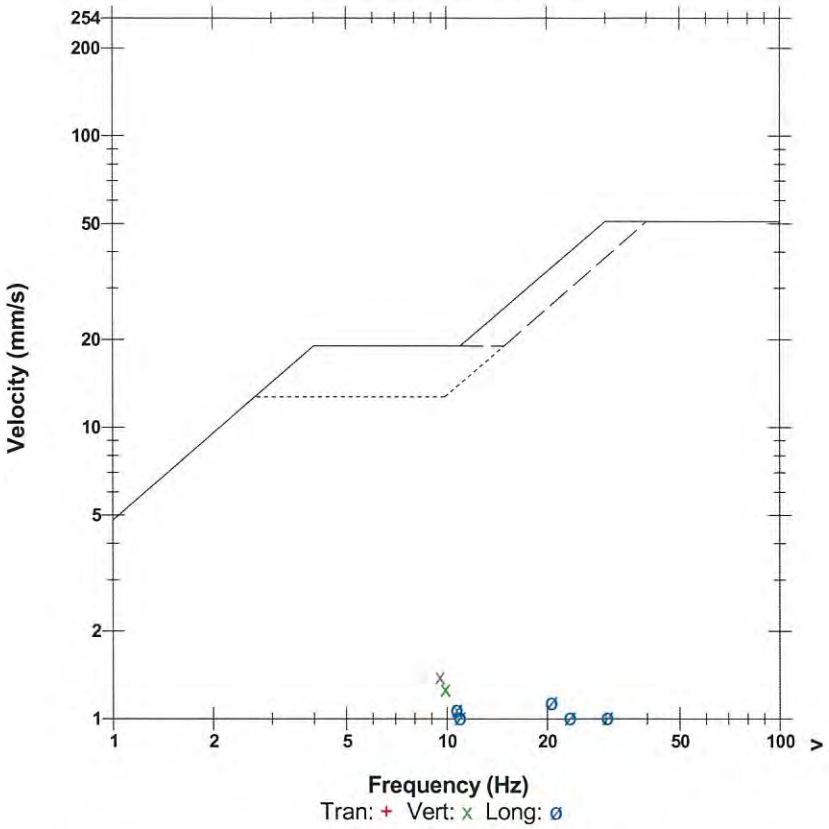
Extended Notes
Setup at Ruthven Farm laneway

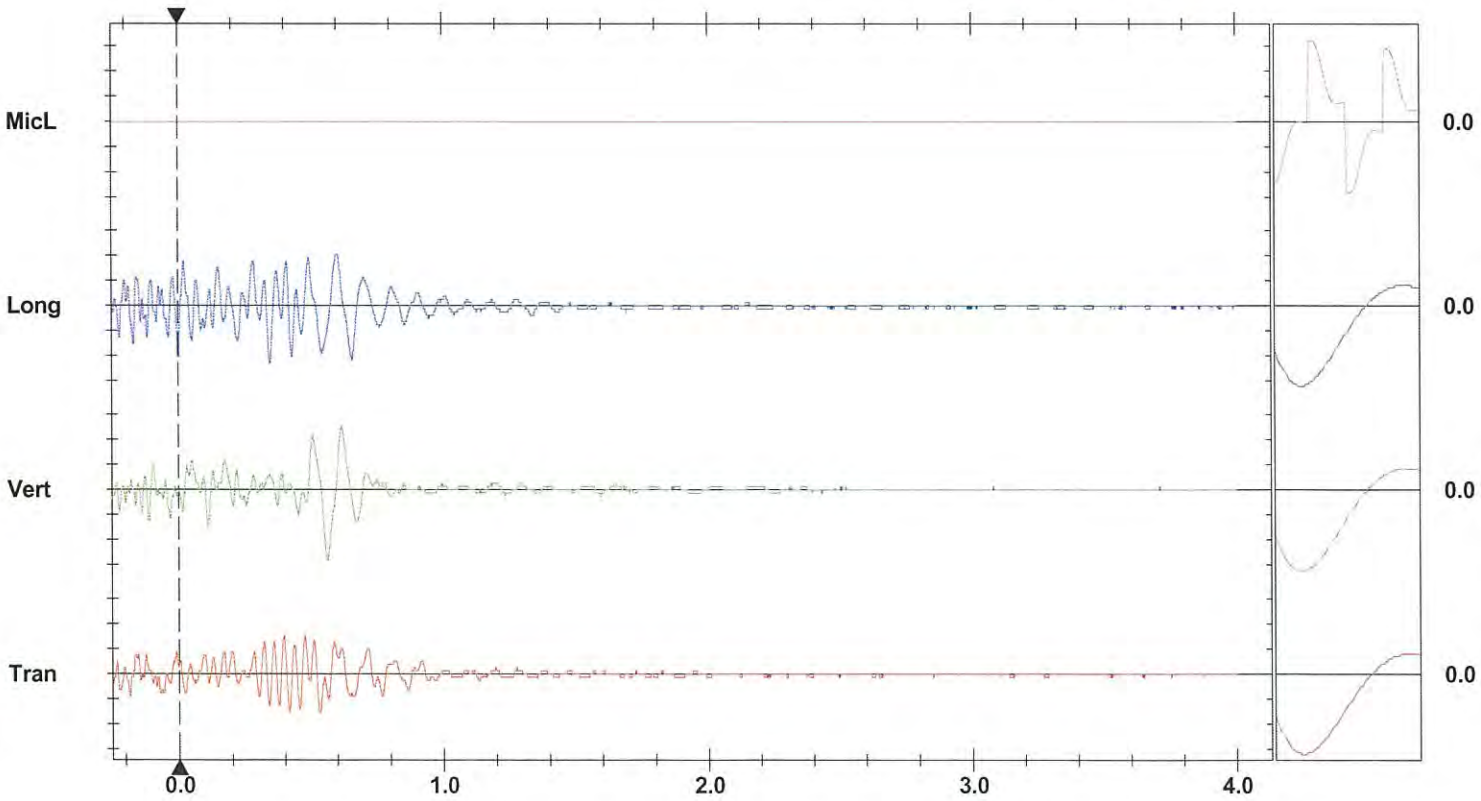
Microphone Linear Weighting
PSPL <100 dB(L)
ZC Freq N/A
Channel Test Passed (Freq = 20.0 Hz Amp = 207 mv)

	Tran	Vert	Long	
PPV	0.762	1.397	1.143	mm/s
ZC Freq	26	9.0	20	Hz
Time (Rel. to Trig)	0.396	0.562	0.346	sec
Peak Acceleration	0.013	0.013	0.027	g
Peak Displacement	0.011	0.021	0.015	mm
Sensor Check	Passed	Passed	Passed	
Frequency	7.6	8.0	8.0	Hz
Overswing Ratio	4.0	3.9	3.9	

Peak Vector Sum 1.572 mm/s at 0.562 sec
N/A: Not Applicable

USBM RI8507 And OSMRE





Time Scale: 0.20 sec/div **Amplitude Scale:** Geo: 0.500 mm/s/div Mic: 5.000 pa.(L)/div
Trigger = ▶— — —◀

Sensor Check

Instantel

Event Report

Instantel

Date/Time	Tran at 10:25:56 June 30, 2015
Trigger Source	Geo: 2.000 mm/s
Range	Geo: 254.0 mm/s
Record Time	5.0 sec at 1024 sps

Serial Number	BA10985 V 10.72-8.17 BlastMate III
Battery Level	6.1 Volts
Unit Calibration	September 25, 2014 by Instantel
File Name	L985FWWV.N80

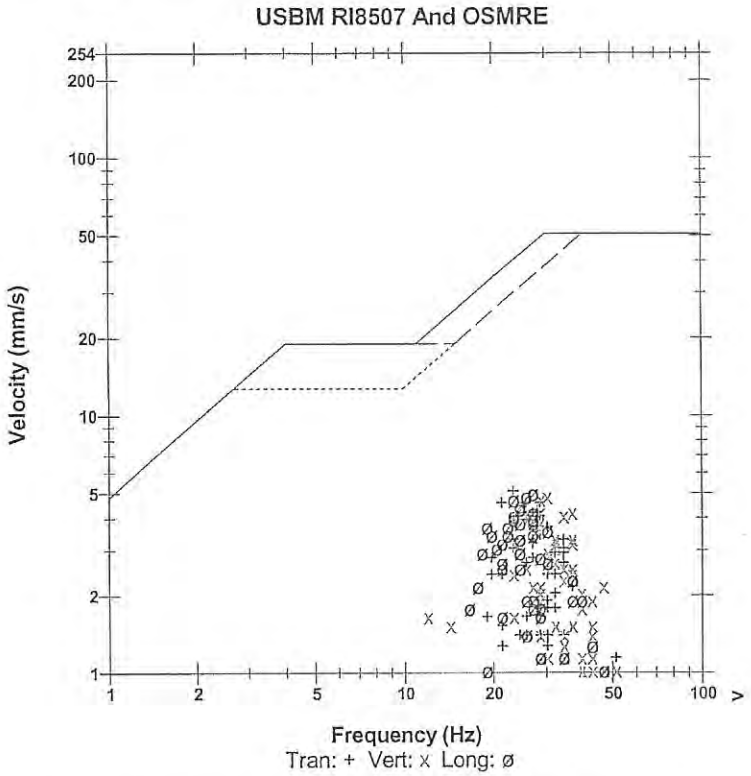
Notes

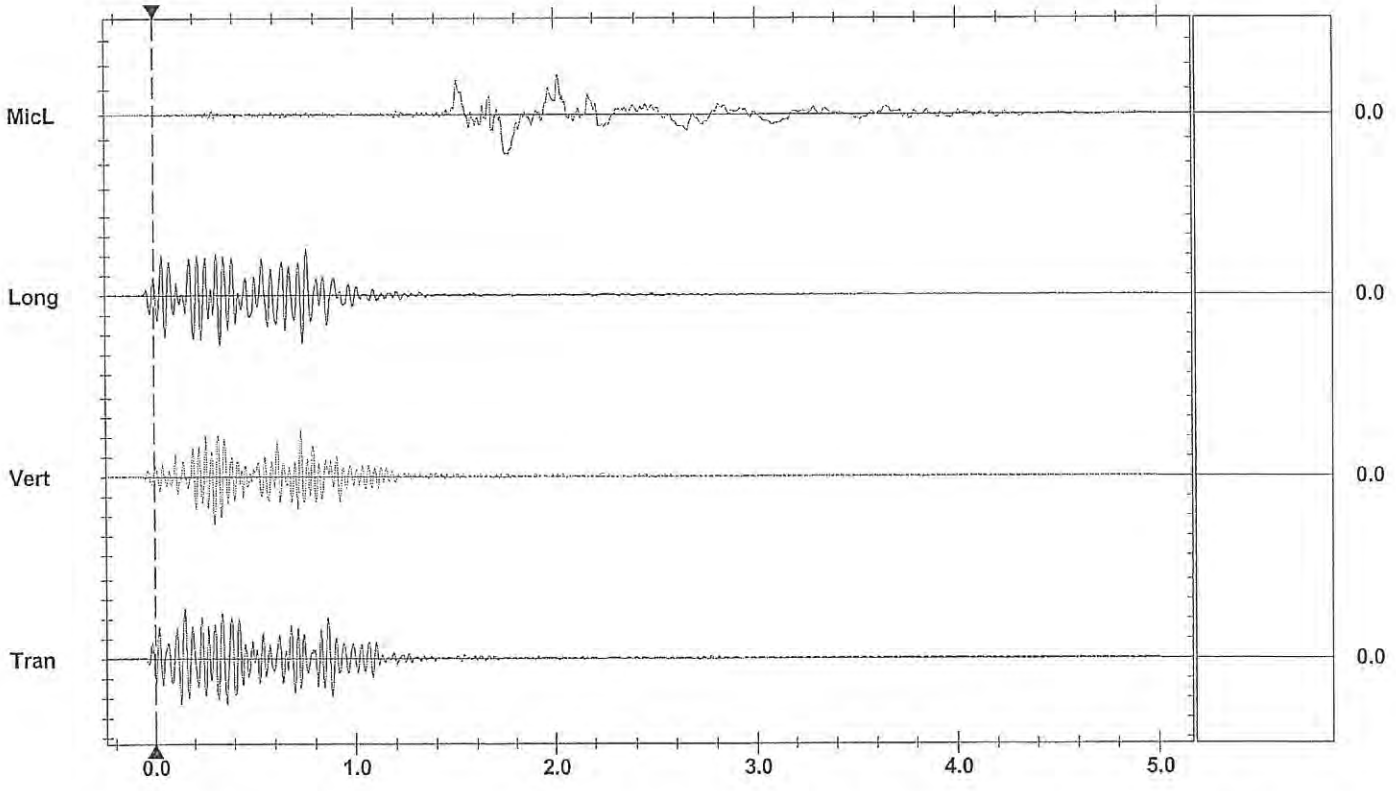
Location:	Kepple Quarry
Client:	Sutherland Construction
User Name:	Consbec Inc
General:	Blast Vibration Monitoring

Microphone	Linear Weighting
PSPL	118.3 dB(L) at 1.755 sec
ZC Freq	4.1 Hz
Channel Test	Disabled

	Tran	Vert	Long	
PPV	5.080	4.826	4.953	mm/s
ZC Freq	23	30	27	Hz
Time (Rel. to Trig)	0.151	0.303	0.334	sec
Peak Acceleration	0.106	0.106	0.093	g
Peak Displacement	0.033	0.026	0.031	mm
Sensor Check	Disabled	Disabled	Disabled	
Frequency	***	***	***	Hz
Overswing Ratio	***	***	***	

Peak Vector Sum 7.419 mm/s at 0.337 sec





Time Scale: 0.20 sec/div **Amplitude Scale:** Geo: 2.000 mm/s/div Mic: 10.000 pa.(L)/div

Sensor Check

Trigger = ▶——————◀

Instantel

Event Report

Instante

Date/Time	Long at 10:25:55 June 30, 2015
Trigger Source	Geo: 2.000 mm/s
Range	Geo: 254.0 mm/s
Record Time	5.0 sec at 1024 sps

Serial Number	BE17339 V 10.72-8.17 MiniMate Plus
Battery Level	6.1 Volts
Unit Calibration	July 15, 2014 by Instantel
File Name	S339FWWV.N70

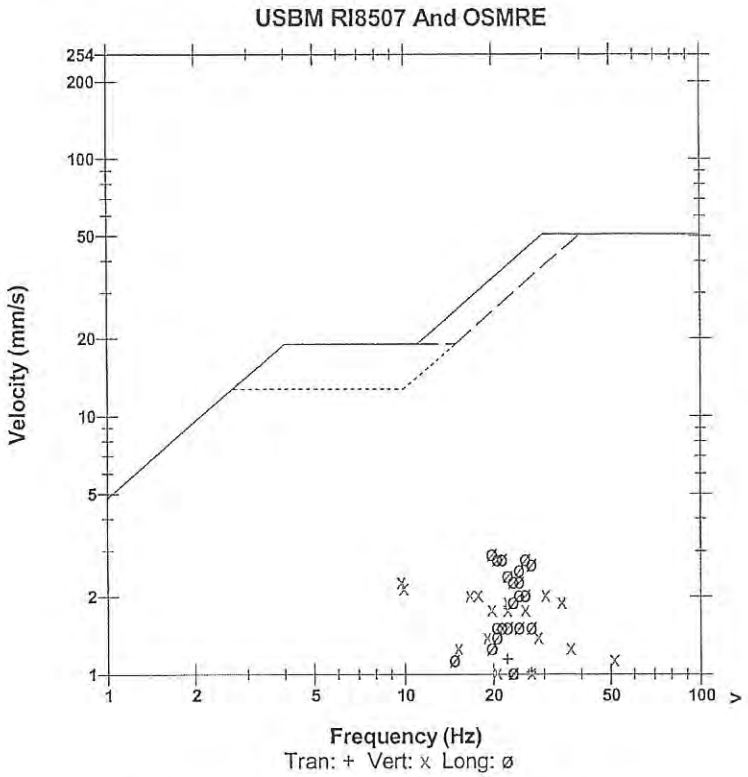
Notes

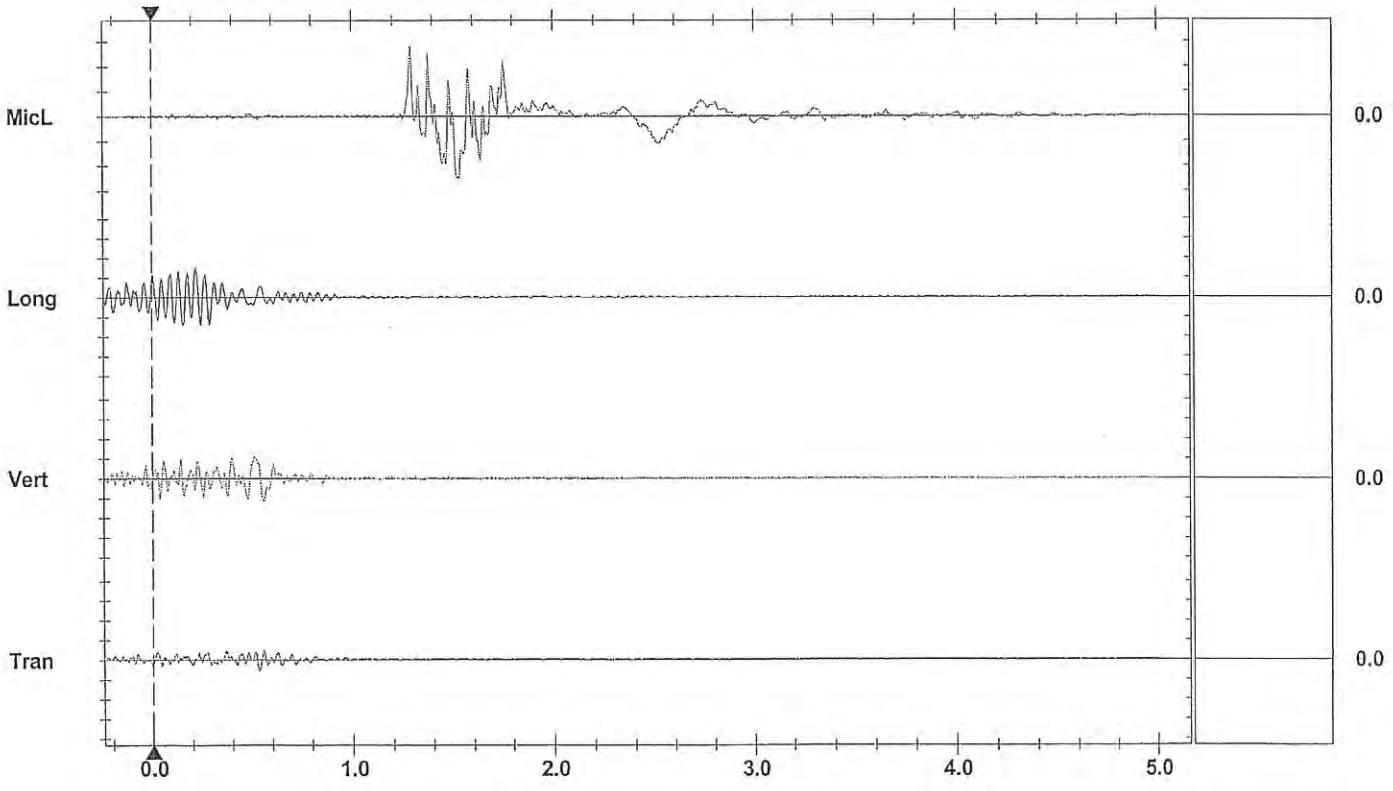
Location:	Kepple Quarry
Client	Sutherland Construction
User Name:	Consbec
General:	Blast Vibration Monitoring

Microphone	Linear Weighting
PSPL	123.0 dB(L) at 1.291 sec
ZC Freq	9.5 Hz
Channel Test	Disabled

	Tran	Vert	Long	
PPV	1.143	2.286	2.921	mm/s
ZC Freq	22	9.7	20	Hz
Time (Rel. to Trig)	0.530	0.554	0.217	sec
Peak Acceleration	0.027	0.040	0.066	g
Peak Displacement	0.009	0.040	0.024	mm
Sensor Check	Disabled	Disabled	Disabled	
Frequency	***	***	***	Hz
Overswing Ratio	***	***	***	

Peak Vector Sum 3.321 mm/s at 0.156 sec





Time Scale: 0.20 sec/div **Amplitude Scale:** Geo: 2.000 mm/s/div Mic: 10.000 pa.(L)/div

Sensor Check

Trigger = ▶———◀

Instantel

Event Report

Date/Time	Long at 10:58:36 May 26, 2015
Trigger Source	Geo: 1.000 mm/s
Range	Geo: 254.0 mm/s
Record Time	5.0 sec at 1024 sps

Serial Number	BE12756 V 10.72-8.17 MiniMate Plus
Battery Level	6.2 Volts
Unit Calibration	February 9, 2015 by Instantel
File Name	N756FV43.TO0

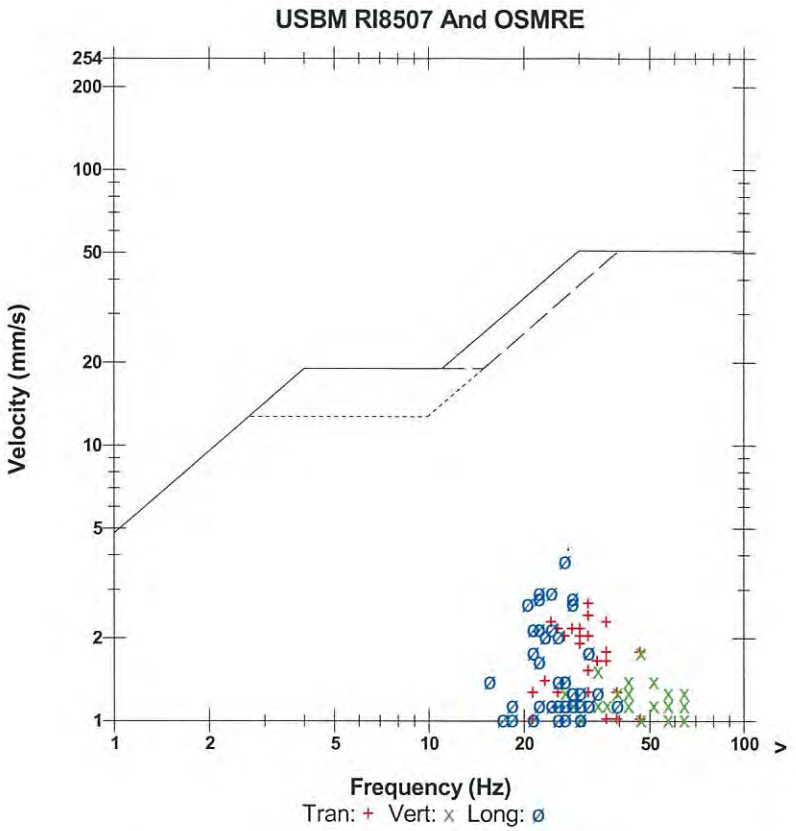
Notes
Location: KEPPEL QUARRY
Client: Harold Sutherland Construction
User Name: ROB MANTHA
General: SET-UP AT RUTHVEN ENTRANCE EAST SIDE

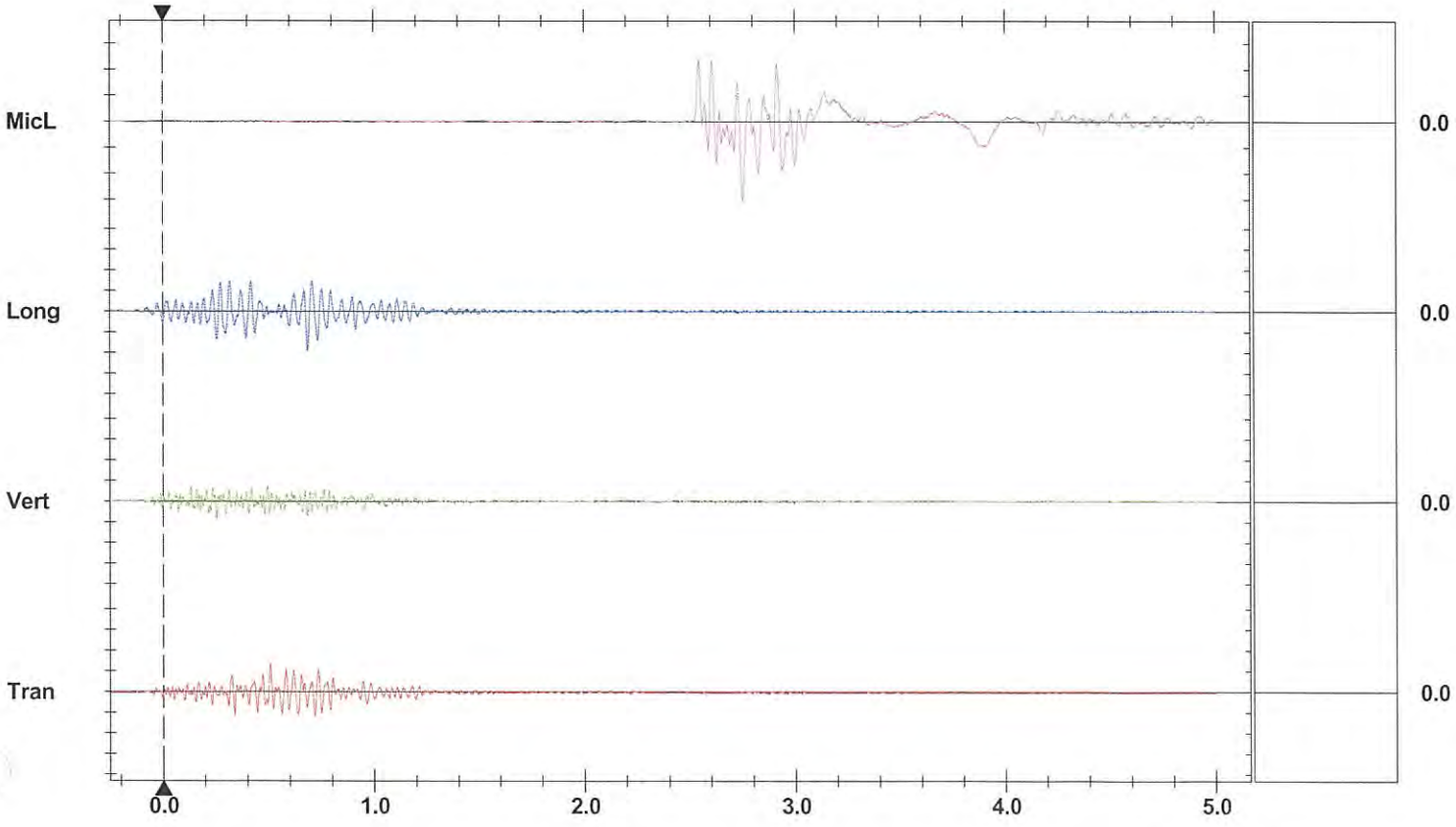
Extended Notes
Combo Mode May 26, 2015 09:45:26

Microphone	Linear Weighting
PSPL	123.7 dB(L) at 2.755 sec
ZC Freq	15 Hz
Channel Test	Disabled

	Tran	Vert	Long	
PPV	2.667	1.778	3.810	mm/s
ZC Freq	32	47	27	Hz
Time (Rel. to Trig)	0.510	0.255	0.687	sec
Peak Acceleration	0.053	0.053	0.066	g
Peak Displacement	0.015	0.007	0.022	mm
Sensor Check	Disabled	Disabled	Disabled	
Frequency	***	***	***	Hz
Overswing Ratio	***	***	***	

Peak Vector Sum 4.098 mm/s at 0.686 sec





Time Scale: 0.20 sec/div **Amplitude Scale:** Geo: 2.000 mm/s/div Mic: 10.000 pa.(L)/div
Trigger = ▶——◀

Sensor Check

Instantel

Event Report

Instantel

Date/Time	Long at 11:00:39 May 26, 2015
Trigger Source	Geo: 2.000 mm/s
Range	Geo: 254.0 mm/s
Record Time	5.0 sec at 1024 sps

Serial Number	BE17339 V 10.72-8.17 MiniMate Plus
Battery Level	6.2 Volts
Unit Calibration	July 15, 2014 by Instantel
File Name	S339FV43.X30

Notes
Location: Kepple Quarry
Client Sutherland Construction
User Name: Consbec
General: Blast Vibration Monitoring

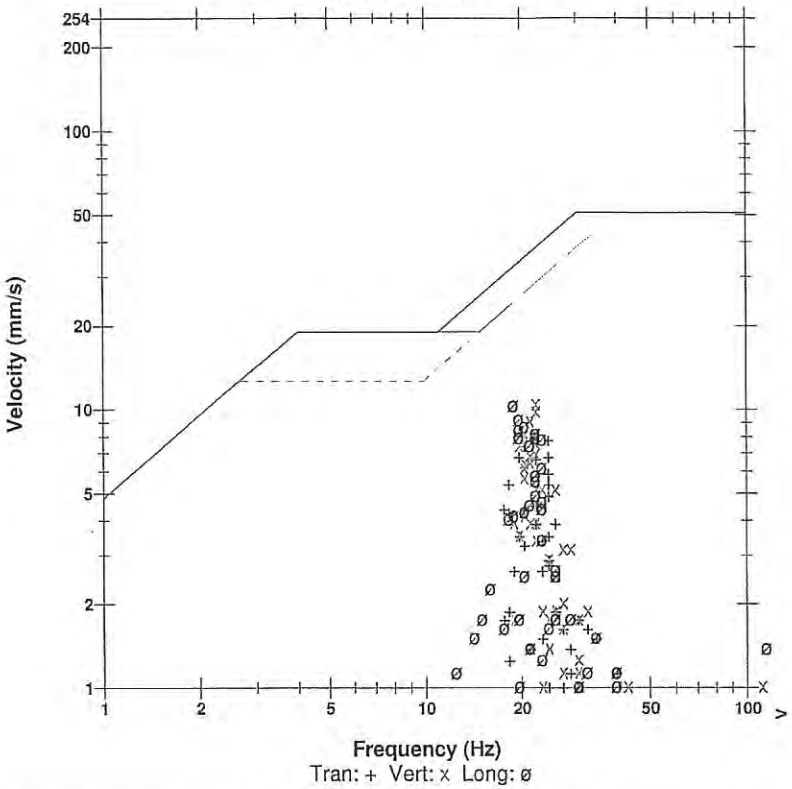
Extended Notes
Combo Mode May 26, 2015 10:35:03

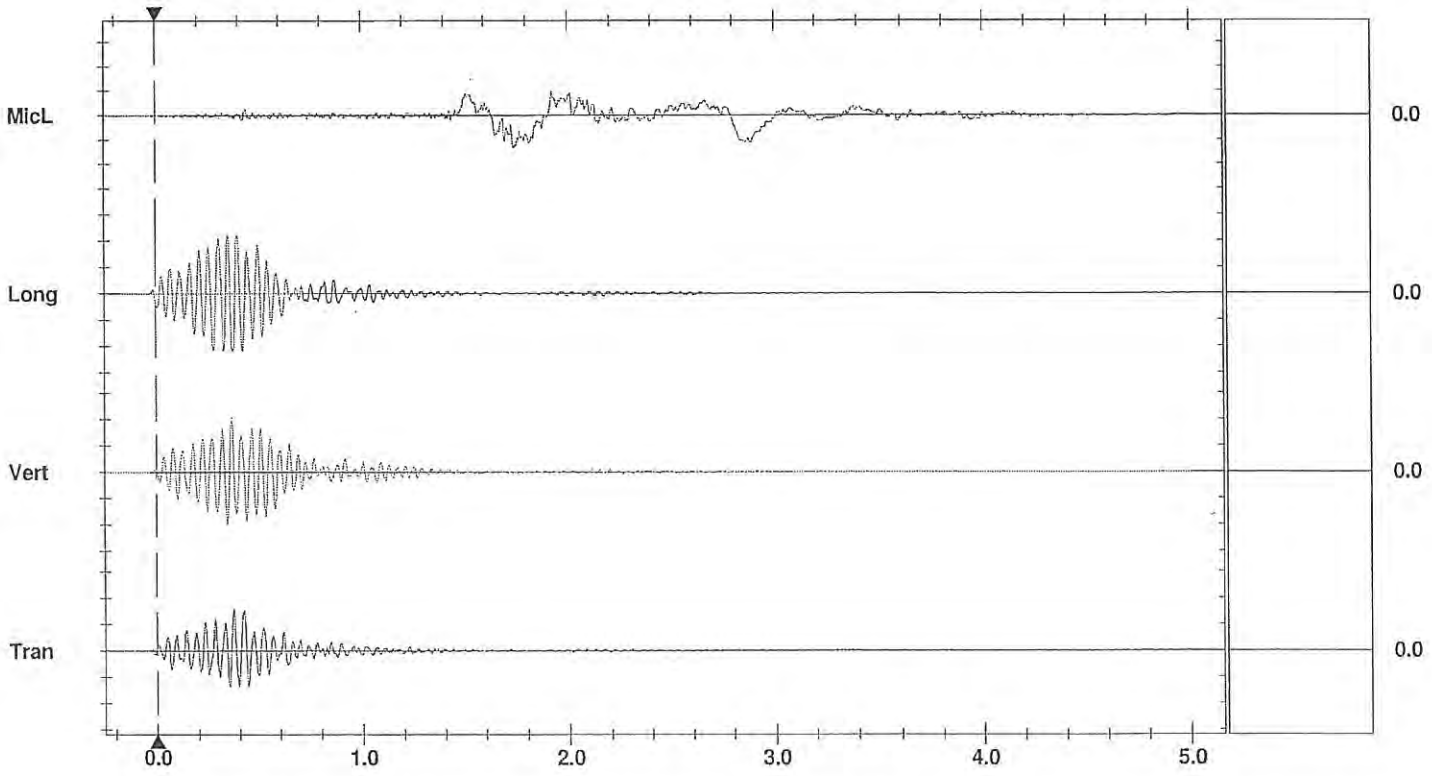
Microphone	Linear Weighting
PSPL	116.4 dB(L) at 1.742 sec
ZC Freq	2.0 Hz
Channel Test	Disabled

	Tran	Vert	Long	
PPV	7.874	10.54	10.48	mm/s
ZC Freq	24	22	22	Hz
Time (Rel. to Trig)	0.372	0.364	0.372	sec
Peak Acceleration	0.133	0.186	0.212	g
Peak Displacement	0.060	0.074	0.107	mm
Sensor Check	Disabled	Disabled	Disabled	
Frequency	***	***	***	Hz
Overswing Ratio	***	***	***	

Peak Vector Sum 11.44 mm/s at 0.370 sec

USBM RI8507 And OSMRE





Time Scale: 0.20 sec/div **Amplitude Scale:** Geo: 5.000 mm/s/div Mic: 10.000 pa.(L)/div
Trigger = ▶—— ——◀

Sensor Check

Instantel

Event Report

Instantel

Date/Time	Long at 11:00:44 May 26, 2015
Trigger Source	Geo: 2.000 mm/s
Range	Geo: 254.0 mm/s
Record Time	5.0 sec at 1024 sps

Serial Number	BE13291 V 10.72-8.17 MiniMate Plus
Battery Level	6.4 Volts
Unit Calibration	May 21, 2014 by Instantel
File Name	O291FV43.X80

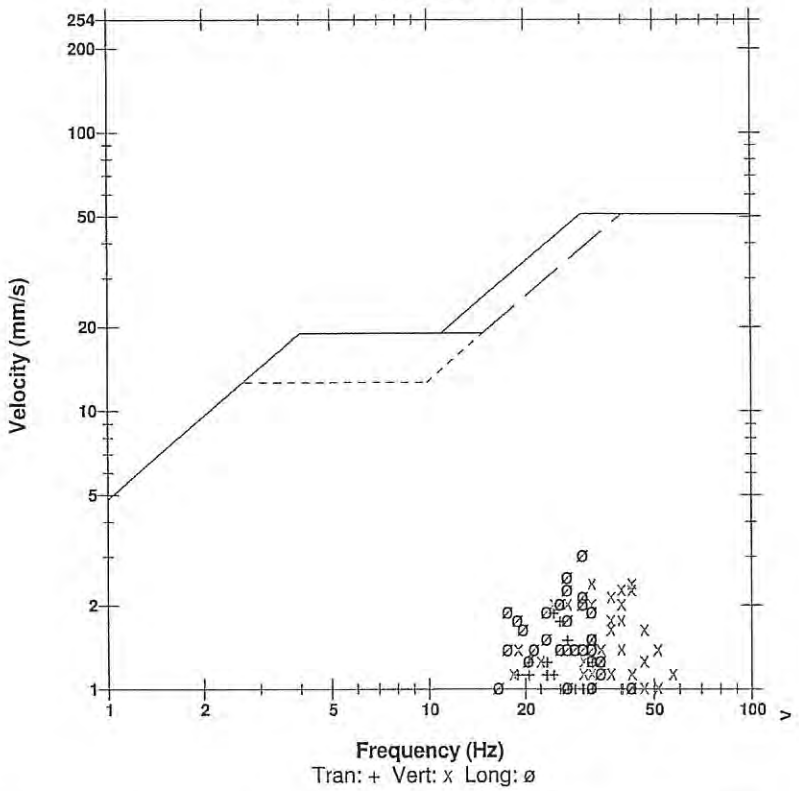
Notes
Location: Kepple Quarry
Client: Sutherland Construction
User Name: Consbec
General: Blast Vibration Monitoring

Microphone	Linear Weighting
PSPL	126.1 dB(L) at 1.467 sec
ZC Freq	21 Hz
Channel Test	Disabled

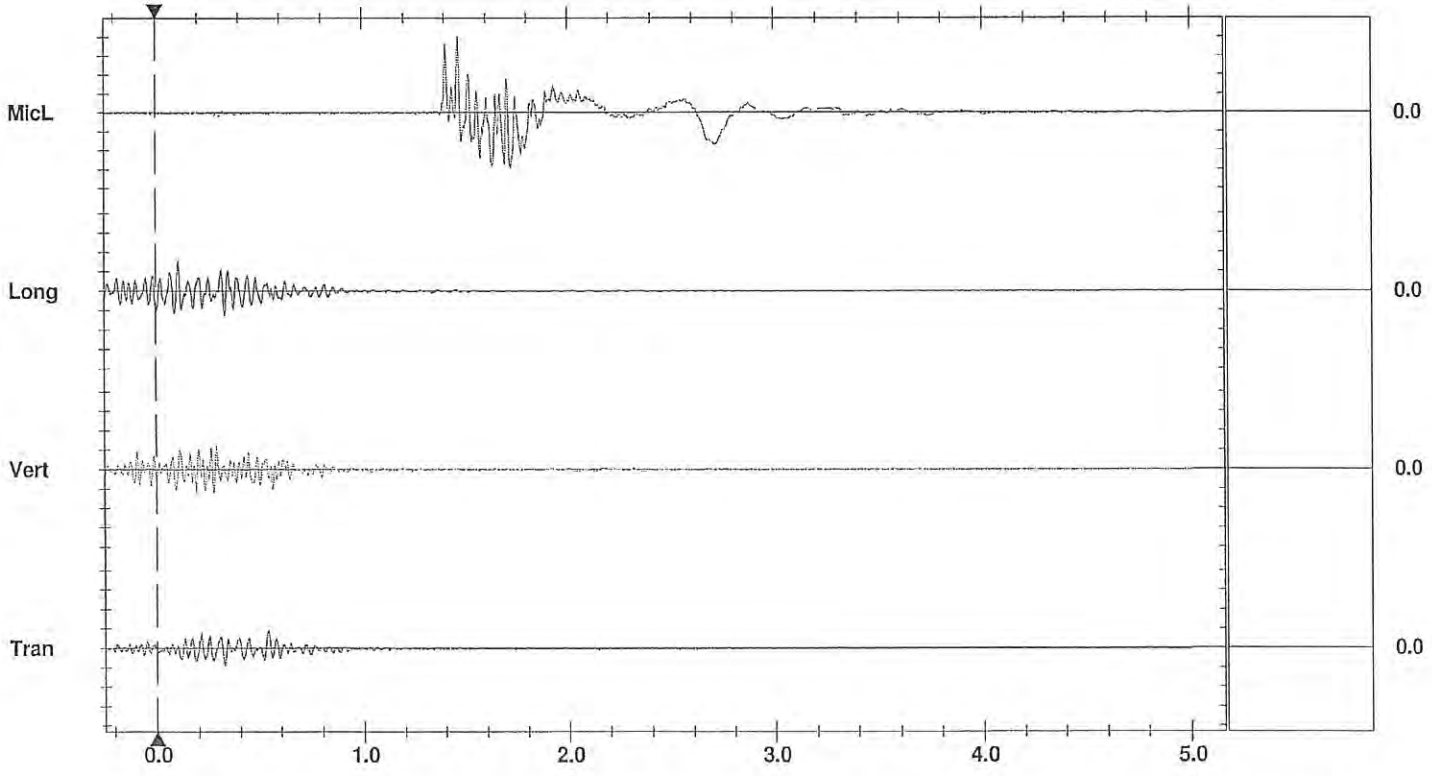
	Tran	Vert	Long	
PPV	1.905	2.413	3.048	mm/s
ZC Freq	24	43	30	Hz
Time (Rel. to Trig)	0.536	0.274	0.107	sec
Peak Acceleration	0.040	0.066	0.066	g
Peak Displacement	0.012	0.013	0.016	mm
Sensor Check	Disabled	Disabled	Disabled	
Frequency	***	***	***	Hz
Overswing Ratio	***	***	***	

Peak Vector Sum 3.471 mm/s at 0.110 sec

USBM RI8507 And OSMRE



Frequency (Hz)
Tran: + Vert: x Long: ø



Time Scale: 0.20 sec/div **Amplitude Scale:** Geo: 2.000 mm/s/div Mic: 10.000 pa.(L)/div
Trigger = ▶—— ——◀

Sensor Check