

July 23, 2020

PML Ref.: 19CF012
Report: 4

Ms. Tammy Abbotts
P.O. Box 31
Singhampton, Ontario
N0C 1M0

Dear Ms. Abbotts

**MOE Guideline D-4 Assessment – Methane Gas Concentrations During Frozen Conditions
Proposed Abbotts Residential Development
Lansdowne Street
Thornbury, Ontario**

Peto MacCallum Ltd. (PML) is pleased to provide this letter with the results of the methane gas concentrations obtained during frozen conditions for the above noted project. Authorization for the work described in this report was provided by Ms. Tammy Abbotts in the signed Engineering Services Agreement Revised, dated June 18, 2019.

It is understood that Ms. Abbotts is planning a residential development for the 51 by 205 m parcel of land on the east side of Lansdowne Street in Thornbury (referred to herein as the 'Site'). The proposed concept plan includes 22 attached townhouse units, all fronting on a proposed single lane road (one-way), connecting Lansdowne Street and Huron Street. The Site covers an approximate plan area of 1.1 ha. A closed waste disposal site (landfill), MECP Inventory Number X2090 is located southwest of the Site at the corner of Huron Street and Lansdowne Street. The County of Grey and The Town of Blue Mountains Official Plan requires the application of the MOE D-4 Guideline (Land Use On or Near Landfills and Dumps) for proposals for land use changes on or near operating or non-operating landfills.

An MOE Guideline D-4 Assessment was conducted by PML for the Site with the findings presented in our report PML Ref.: 19CF012, Report 2, dated November 11, 2019. It is noted that Report 2 was issued prior to obtaining the frozen conditions methane gas concentrations due to project timeline constraints.

A Geotechnical Investigation was carried out concurrently for the Site during the MOE Guideline D-4 Assessment and the findings were reported under a separate cover (PML Ref. 19CF012, Report 1, dated October 16, 2019). It is also noted that an annual ground water level monitoring program has been completed and the findings were issued under a separate cover (PML Ref. 19CF012, Report 3, dated July 22, 2020).

Drawing 2-1 (Site Plan) shows the Site involved in the study in relation to the landfill.

Investigation Procedures

Peto MacCallum Ltd (PML) attended the Site on October 21, 2019 to collect the first round of methane gas concentrations and later attended the Site on February 20, 2020 to collect the second round of methane concentrations under frozen conditions. The weather on October 21, 2019 was cloudy with a temperature of about 14°C, and on February 20, 2020 was cloudy with flurries and a temperature of about -8°C.

Methane is an odourless, colourless flammable gas that can be formed by the decay of natural material and is common in landfills, marshes, septic systems, sewers and areas with buried organic soils.

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BARRIE, COLLINGWOOD, HAMILTON, KITCHENER, LONDON, TORONTO



Flammability limits (Explosive Limits) are the minimum and maximum concentrations (in air) of a flammable gas or vapour between which ignition can occur. Concentrations below the lower explosive limit (LEL) are too lean to burn, while concentrations above the upper explosive limit (UEL) are too rich and oxygen levels are too low to support combustion. All concentrations between the LEL and UEL are in the explosive range, and special precautions are required to prevent explosion or ignition.

To collect methane gas concentrations from inside the three wells on-Site, ASTM Method D7663-12 (Reapproved 2018) for Active Soil Gas Sampling in the Vadose Zone for Vapor Intrusive Evaluations was used. Monitoring of methane gas concentrations in the wells on-Site was performed using an RKI Eagle Portable Gas Detector with the aid of a Gilair 5 Pump for purging. The RKI Eagle was calibrated using methane by Argus-Hazco.

Findings

The findings of the methane gas measurements are summarized in the following table:

Location	Methane Gas Concentrations (ppm / %LEL)	
	October 21, 2019	February 20, 2020
BH2	35 / 0.1	5 / 0
BH3	5 / 0	15 / 0
BH5	6,000 / 12	440 / 0.01

Concentrations equal to or greater than the LEL are considered hazardous. To add a margin of safety, the MECP considers that concentrations greater than 20% LEL may be associated with still higher concentrations, exceeding the LEL. Therefore, methane concentrations greater than 20% LEL warn of conditions which could be potentially hazardous, and further investigation may be warranted and/or gas control systems should be designed to maintain concentrations below this level.

Conclusions and Recommendations

Based on the findings of our Report 2 and this letter, it is our opinion that the proposed residential subdivision development is unlikely to be adversely impacted by subsurface migration of combustible gas originating from the landfill site based on the following rationale:

1. The location of the landfill waste disposal footprint is more than 90 m from the Site and there are associated roadways and underground utilities that are likely to act as pathway interceptors.
2. BH2 was located in the southwest corner of the Site at the nearest portion to the landfill and did not contain soil or ground water contamination.
3. Methane gas readings in the monitoring wells were below 20% LEL during the two rounds of PML's methane monitoring visits, one of which was during frozen conditions.
4. The landfill has been closed for over 50 years.



In summary, the results of the MOE Guideline D-4 Assessment indicate there is not a concern of significant adverse affects from the landfill on the proposed residential development at the Site.

It should be noted soil and ground water conditions between and beyond the sampled locations may differ from those encountered during this assignment. PML should be contacted if impacted soil conditions become apparent during future development to further access and appropriately handle the materials, if any, and evaluate whether modifications to the conclusions documented in this report are necessary.

The assignment is subject to the Statement of Limitations that is included in Appendix A and must be read in conjunction with this report.

Closure

We trust this report is complete within our terms of reference, and the information presented is sufficient for your present purposes. If you have any questions, or when we may be of further assistance, please do not hesitate to call our office.

Sincerely

Peto MacCallum Ltd.

A handwritten signature in blue ink, appearing to read 'Joel Robinson', is positioned below the name.

Joel Robinson, BSc, EPt, GIT
Project Supervisor, Geoenvironmental and Hydrogeological Services

A handwritten signature in blue ink, appearing to read 'Melissa King', is positioned below the name.

Melissa King, P.Geo., QP_{ESA}
Associate
Discipline Head, Geoenvironmental and Hydrogeological Services

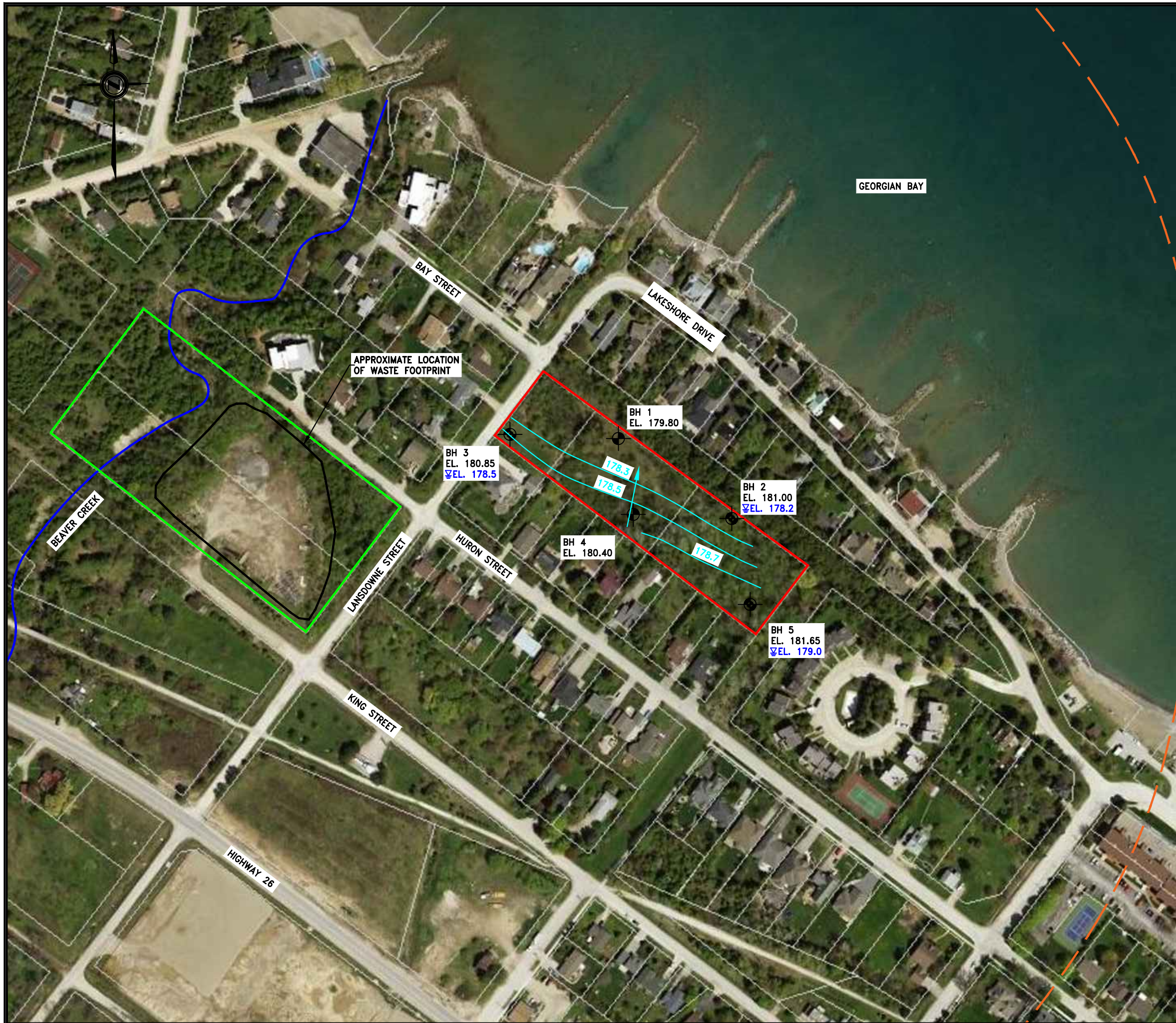
JR/MAK:tc

Enclosure(s):

Drawing 2-1 – Site Plan
Appendix A – Statement of Limitations

Distribution:

1 cc.: Client (email only)
1 cc: C.F. Crozier & Associates Inc. (email only)
1 cc: PML Barrie

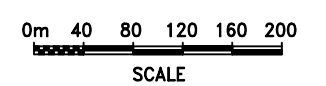


KEY PLAN
THORNBURY, ONTARIO

- LEGEND:**
- SITE LIMITS
 - THORNBURY CLOSED LANDFILL SITE
 - - - 500 m FROM THORNBURY CLOSED LANDFILL SITE
 - 178.7 INFERRED GROUND WATER ELEVATION CONTOUR (AUGUST 23, 2019)
 - INFERRED GROUND WATER FLOW DIRECTION
 - BH 1
EL. 179.80 BOREHOLE1
SURFACE ELEVATION
 - BH 2
EL. 181.00 BOREHOLE 2 (WITH MONITORING WELL)
SURFACE ELEVATION

NOTE:
GROUND WATER LEVELS OBTAINED ON AUGUST 23, 2019.

REFERENCE:
BASE PLAN PRODUCED FROM GIS INFORMATION FROM THE COUNTY OF GREY INTERACTIVE MAPPING SYSTEM.



SITE PLAN

MECP GUIDELINE D4 STUDY
PROPOSED ABBOTTS RESIDENTIAL DEVELOPMENT
LANSDOWNE STREET
THORNBURY, ONTARIO



DRAWN	JR	DATE	SCALE	PML REF.	DRAWING NO.
CHECKED	MAK	JULY 2020	AS SHOWN	19CF012	2-1
APPROVED	MAK				



APPENDIX A

Statement of Limitations

STATEMENT OF LIMITATIONS



This report is prepared for and made available for the sole use of the client named. Peto MacCallum Ltd. (PML) hereby disclaims any liability or responsibility to any person or entity, other than those for whom this report is specifically issued, for any loss, damage, expenses, or penalties that may arise or result from the use of any information or recommendations contained in this report. The contents of this report may not be used or relied upon by any other person without the express written consent and authorization of PML.

This report shall not be relied upon for any purpose other than as agreed with the client named without the written consent of PML. It shall not be used to express or imply warranty as to the fitness of the property for a particular purpose. A portion of this report may not be used as a separate entity: that is to say the report is to be read in its entirety at all times.

The report is based solely on the scope of services which are specifically referred to in this report. No physical or intrusive testing has been performed, except as specifically referenced in this report. This report is not a certification of compliance with past or present regulations, codes, guidelines and policies.

The scope of services carried out by PML is based on details of the proposed development and land use to address certain issues, purposes and objectives with respect to the specific site as identified by the client. Services not expressly set forth in writing are expressly excluded from the services provided by PML. In other words, PML has not performed any observations, investigations, study analysis, engineering evaluation or testing that is not specifically listed in the scope of services in this report. PML assumes no responsibility or duty to the client for any such services and shall not be liable for failing to discover any condition, whose discovery would require the performance of services not specifically referred to in this report.

The findings and comments made by PML in this report are based on the conditions observed at the time of PML's site reconnaissance. No assurances can be made and no assurances are given with respect to any potential changes in site conditions following the time of completion of PML's field work. Furthermore, regulations, codes and guidelines may change at any time subsequent to the date of this report and these changes may effect the validity of the findings and recommendations given in this report.

The results and conclusions with respect to site conditions are therefore in no way intended to be taken as a guarantee or representation, expressed or implied, that the Site is free from any contaminants from past or current land use activities or that the conditions in all areas of the Site and beneath or within structures are the same as those areas specifically sampled.

Any investigation, examination, measurements or sampling explorations at a particular location may not be representative of conditions between sampled locations. Soil, ground water, surface water, or building material conditions between and beyond the sampled locations may differ from those encountered at the sampling locations and conditions may become apparent during construction which could not be detected or anticipated at the time of the intrusive sampling investigation.

STATEMENT OF LIMITATIONS



Budget estimates contained in this report are to be viewed as an engineering estimate of probable costs and provided solely for the purposes of assisting the client in its budgeting process. It is understood and agreed that PML will not in any way be held liable as a result of any budget figures provided by it.

The Client expressly waives its right to withhold PML's fees, either in whole or in part, or to make any claim or commence an action or bring any other proceedings, whether in contract, tort, or otherwise against PML in any way connected with advice or information given by PML relating to the cost estimate or Environmental Remediation/Cleanup and Restoration or Soil and Ground Water Management Plan Cost Estimate.

Environmental site assessment studies are performed in different phases by the application of different levels of effort and expense. The phase or phases in this report and the level of effort proposed for this assignment were based solely on PML's understanding of the client's needs as described in the scope of services contained in this report.

This assessment does not wholly eliminate uncertainty regarding the potential for existing or future costs, hazards or losses in connection with the subject property and must be viewed as a mechanism to reduce risk rather than eliminate the risk of contamination concerns.

The parties agree that PML cannot and does not warrant or represent that bids or negotiated prices will not vary from the Environmental Remediation/Cleanup and Restoration or Soil and Ground Water Management Plan Cost Estimate. The parties further agree that nothing in their agreement shall be deemed to be a cost condition or representation that the project cleanup can be completed for the amount of the Environmental Remediation/Cleanup and Restoration or Soil and Ground Water Management Plan Cost Estimate or any other amount.

July 22, 2020

PML Ref.: 19CF012
Report: 3

Ms. Tammy Abbotts
P.O. Box 31
Singhampton, Ontario
N0C 1M0

Dear Ms. Abbotts

**Ground Water Level Monitoring
Proposed Abbotts Residential Development
Lansdowne Street
Thornbury, Ontario**

Further to our geotechnical Report 1 dated, October 16, 2019 and MEO Guideline D-4 Assessment Report 2, dated November 11, 2019, Peto MacCallum Ltd. (PML) herein provides a summary of ground water level monitoring results.

In accordance with the Terms of Reference, the ground water levels within the monitoring wells installed in the boreholes during the initial investigation (Boreholes 2, 3, 5) were to be monitored monthly for twelve months after installation. Details of the monitoring well installations were presented in the geotechnical reports along with readings from the first months.

Table 1, attached, provides the ground water levels for the entire twelve-month monitoring period. The stabilized ground water level ranged from 1.5 to 3.2 m below existing grade (elevation 180.1 to 177.8). It is noted the highest water levels typically occurred in April of 2020.

In accordance with O.Reg. 903, the wells are property of the Owner and will have to be decommissioned if no longer required. PML would be pleased to assist in this regard.

We trust this report is complete within our Terms of Reference. Please do not hesitate to call if you have any questions.

Sincerely

Peto MacCallum Ltd.



Geoffrey R. White, P.Eng.
Director
Manager, Geotechnical Services

GRW:tc

Enclosure(s):
Table 1: Ground Water Level Measurements

Distribution:
1 cc: Client (email only)
1 cc: C.F. Crozier & Associates Inc. (email only)
1 cc: PML Barrie



GROUND WATER LEVEL MEASUREMENTS

TABLE 1

Borehole	Borehole Ground Surface Elevation	Depth of Water Below Surface (m) / Elevation											
		Date											
		2019-08-23	2019-09-10	2019-10-21	2019-11-11	2019-12-04	2020-01-06	2020-02-20	2020-03-03	2020-04-13	2020-05-15	2020-06-23	2020-07-10
2	181.00	2.8 / 178.2	2.9 / 178.1	3.2 / 177.8	2.7 / 178.3	2.8 / 178.2	1.6 / 179.4	1.8 / 179.2	1.7 / 179.3	1.5 / 179.5	1.8 / 179.2	2.3 / 178.7	2.6 / 178.4
3	180.85	2.4 / 178.5	2.3 / 178.6	2.3 / 178.6	2.3 / 178.6	2.3 / 178.6	2.3 / 178.6	2.3 / 178.6	2.3 / 178.6	2.3 / 178.6	2.3 / 178.6	2.3 / 178.6	2.4 / 178.5
5	181.65	2.7 / 179.0	2.7 / 179.0	3.0 / 178.7	2.3 / 179.4	1.9 / 179.8	1.8 / 179.9	1.9 / 179.8	1.9 / 179.8	1.6 / 180.1	2.0 / 179.7	2.2 / 179.5	2.5 / 179.2