

August 13, 2019
Project No. 19-424-CAI

Via E-mail: paul.fuellbrandt@edmonton.ca
Original Will Remain on File

The City of Edmonton
11004 - 190th Street NW
Edmonton, Alberta
T5S 0G9

ATTN: Paul Fuellbrandt

RE: Anti-Icing Salinity Data Review
Edmonton, Alberta

Dear Mr. Fuellbrandt:

Nichols Environmental (Canada) Ltd. was retained by The City of Edmonton to conduct an Anti-Icing Salinity Data Review for a number of sites located across Edmonton, Alberta.

BACKGROUND

A planning and monitoring program was initiated to assess the effects of calcium chloride (CaCl_2), an anti-icing agent, on the soils and vegetation adjacent to treated roadways. In total, 18 sites across Edmonton, Alberta were selected and sampled in 2018 and 2019 as part of the assessment program. Twelve sites (S1 through S12) were selected by The City of Edmonton and six sites (SA through SF) were selected by the Urban Development Institute (UDI). Of the 18 sites, nine used only road salt (sand mixed with sodium chloride), while the other nine were in areas where CaCl_2 was also used. A total of 292 soil samples were collected from the sites at several distances from the road shoulder (1.5 m, 3.0 m, and 7.0 m) and depths (10 cm, 20 cm, and 30 cm). All samples were collected by City of Edmonton personnel and all laboratory analyses were completed by Element Materials Technology.

RESULTS

As part of the review, the road salt and CaCl_2 sites were separated for each sampling season, depth interval, and distance interval for both The City of Edmonton and UDI site groups.

City of Edmonton Sites (S1 through S12)

A summary of the City of Edmonton sites is provided in Table 1 (attached) and on Charts 1 and 2 (attached). Specific comparison tables for each sampling season, depth interval, and distance interval are also provided in Tables A-1 through A-18.

The average electrical conductivity (EC) and sodium absorption ratio (SAR) on road salt sites were 2.6 deciSiemens per metre (dS/m) and 13.8 (respectively), while the average EC and SAR on CaCl_2 sites were 3.6 ds/m and 11.6 (respectively). Overall, the road salt site group average would be classified as having an "Unsuitable" soil



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Construction
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condition rating, while the CaCl_2 site group average would be classified as "Poor". However, soil conditions were found to have higher percentages of "Good" and "Fair" ratings across most intervals for the road salt sites, while CaCl_2 sites generally had higher percentages of "Poor" and "Unsuitable" ratings. Sites that used CaCl_2 also reported overall higher concentrations for each parameter of concern at most depth and distance intervals. It should also be noted that elevated concentrations and "Poor/Unsuitable" soil condition ratings were found to be increased as both depth from surface and distance from the shoulder increased at those sites that used CaCl_2 , suggesting potential increased mobility and/or migration.

Urban Development Institute Sites (SA through SF)

A summary of the UDI sites is provided in Table 2 and on Charts 3 and 4. Specific comparison tables for each sampling season, depth interval, and distance interval are also provided in Tables A-19 through A-36.

The average EC and SAR on road salt sites were 1.8 dS/m and 2.4 (respectively), while the average EC and SAR on CaCl_2 sites were 1.5 ds/m and 2.8 (respectively). Overall, both site group averages would be classified as having a "Good" soil condition rating. Sites that used just road salt reported overall higher concentrations for each parameter of concern at most depth and distance intervals. However, soil conditions and concentrations were generally found to be similar to those of the same sampling interval within the opposite site group.

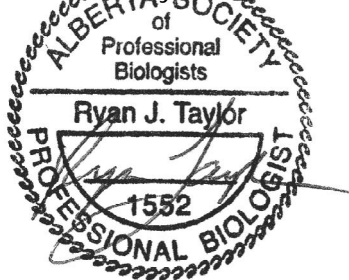
CLOSURE

We trust this meets your current requirements. If you have any questions, please contact our office at 780-484-3377 at your convenience.

Yours truly,
NICHOLS ENVIRONMENTAL (CANADA) LTD.
APEGA PERMIT TO PRACTICE NO. P6730

Kyle Jackson, C.E.T.
Senior Project Manager

Reviewed by



Ryan Taylor, P.Biol., EP
Northern Region Manager

KJ/RT/RWD/sam



13Aug19
R.W. (Rob) Dickie, P.Geol., R.E.T., EP
President

Attachments



TABLE: 1
 TITLE: COE SITE SUMMARY
 PROJECT#: 19-424-CAI
 CLIENT: The City of Edmonton
 PROJECT: Anti-Icing Salinity Data Review
 LOCATION: Edmonton, Alberta

| All Data - Road Salt | | | | | | | | |
|----------------------|-----|------|-----|------|------|------|-----------|------------|
| | EC | SAR | Ca | Cl- | Na | | Condition | |
| MIN | 0.5 | 1.1 | 6 | 25 | 35 | 44% | 27% | Good |
| MAX | 7.8 | 50.0 | 513 | 1690 | 1120 | | 18% | Fair |
| GEOMEAN | 1.9 | 8.3 | 55 | 236 | 220 | | 15% | Poor |
| AVERAGE | 2.6 | 13.8 | 89 | 464 | 344 | | 41% | Unsuitable |
| 2018 - Road Salt | | | | | | | | |
| | EC | SAR | Ca | Cl- | Na | | Condition | |
| MIN | 0.5 | 1.1 | 6 | 28 | 36 | 50% | 26% | Good |
| MAX | 7.5 | 50.0 | 513 | 1690 | 1120 | | 24% | Fair |
| GEOMEAN | 1.9 | 8.4 | 56 | 242 | 229 | | 11% | Poor |
| AVERAGE | 2.6 | 14.5 | 98 | 472 | 359 | | 39% | Unsuitable |
| 2019 - Road Salt | | | | | | | | |
| | EC | SAR | Ca | Cl- | Na | | Condition | |
| MIN | 0.5 | 1.2 | 14 | 25 | 35 | 39% | 28% | Good |
| MAX | 7.8 | 50.0 | 497 | 1510 | 1030 | | 11% | Fair |
| GEOMEAN | 1.9 | 8.3 | 53 | 231 | 212 | | 19% | Poor |
| AVERAGE | 2.7 | 13.2 | 80 | 455 | 329 | | 43% | Unsuitable |
| 10 cm - Road Salt | | | | | | | | |
| | EC | SAR | Ca | Cl- | Na | | Condition | |
| MIN | 0.5 | 1.1 | 6 | 30 | 35 | 53% | 25% | Good |
| MAX | 7.5 | 41.0 | 314 | 1690 | 818 | | 17% | Fair |
| GEOMEAN | 1.5 | 7.1 | 39 | 163 | 154 | | 8% | Poor |
| AVERAGE | 2.0 | 12.0 | 59 | 304 | 221 | | 39% | Unsuitable |
| 20 cm - Road Salt | | | | | | | | |
| | EC | SAR | Ca | Cl- | Na | | Condition | |
| MIN | 0.5 | 1.6 | 19 | 25 | 40 | 42% | 25% | Good |
| MAX | 6.0 | 50.0 | 325 | 1330 | 915 | | 17% | Fair |
| GEOMEAN | 1.9 | 8.9 | 50 | 230 | 229 | | 17% | Poor |
| AVERAGE | 2.5 | 14.9 | 67 | 469 | 357 | | 42% | Unsuitable |
| 30 cm - Road Salt | | | | | | | | |
| | EC | SAR | Ca | Cl- | Na | | Condition | |
| MIN | 0.6 | 1.6 | 21 | 35 | 64 | 39% | 19% | Good |
| MAX | 7.8 | 49.0 | 513 | 1630 | 1120 | | 19% | Fair |
| GEOMEAN | 2.6 | 9.1 | 83 | 350 | 302 | | 19% | Poor |
| AVERAGE | 3.4 | 14.6 | 140 | 617 | 453 | | 42% | Unsuitable |
| 1.5 m - Road Salt | | | | | | | | |
| | EC | SAR | Ca | Cl- | Na | | Condition | |
| MIN | 0.8 | 6.7 | 11 | 32 | 104 | 6% | 0% | Good |
| MAX | 7.8 | 50.0 | 513 | 1690 | 1120 | | 6% | Fair |
| GEOMEAN | 3.2 | 19.2 | 48 | 574 | 474 | | 19% | Poor |
| AVERAGE | 3.9 | 23.2 | 95 | 797 | 565 | | 75% | Unsuitable |
| 3.0 m - Road Salt | | | | | | | | |
| | EC | SAR | Ca | Cl- | Na | | Condition | |
| MIN | 0.6 | 3.3 | 6 | 44 | 70 | 28% | 6% | Good |
| MAX | 6.9 | 50.0 | 391 | 1630 | 1090 | | 22% | Fair |
| GEOMEAN | 2.2 | 12.1 | 48 | 303 | 292 | | 25% | Poor |
| AVERAGE | 2.8 | 15.6 | 76 | 499 | 381 | | 47% | Unsuitable |
| 7.0 m - Road Salt | | | | | | | | |
| | EC | SAR | Ca | Cl- | Na | | Condition | |
| MIN | 0.5 | 1.1 | 21 | 25 | 35 | 100% | 75% | Good |
| MAX | 3.0 | 5.2 | 325 | 320 | 168 | | 25% | Fair |
| GEOMEAN | 1.0 | 2.5 | 70 | 76 | 77 | | 0% | Poor |
| AVERAGE | 1.2 | 2.7 | 95 | 94 | 86 | | 0% | Unsuitable |

 = Favorable Condition/Concentration
Condition = Percentage of samples that are Good, Fair, Poor, Unsuitable

| All Data - CaCl ₂ | | | | | | | | |
|------------------------------|-----|------|------|------|------|-----|-----------|------------|
| | EC | SAR | Ca | Cl- | Na | | Condition | |
| MIN | 0.5 | 0.6 | 8 | 12 | 18 | 33% | 10% | Good |
| MAX | 9.3 | 38.0 | 1290 | 2310 | 2050 | | 23% | Fair |
| GEOMEAN | 2.9 | 7.7 | 117 | 326 | 308 | | 29% | Poor |
| AVERAGE | 3.6 | 11.6 | 221 | 572 | 464 | | 38% | Unsuitable |
| 2018 - CaCl ₂ | | | | | | | | |
| | EC | SAR | Ca | Cl- | Na | | Condition | |
| MIN | 0.7 | 0.6 | 8 | 19 | 23 | 31% | 13% | Good |
| MAX | 9.1 | 38.0 | 1290 | 2310 | 2050 | | 19% | Fair |
| GEOMEAN | 2.8 | 7.5 | 121 | 303 | 310 | | 31% | Poor |
| AVERAGE | 3.5 | 11.5 | 232 | 573 | 493 | | 37% | Unsuitable |
| 2019 - CaCl ₂ | | | | | | | | |
| | EC | SAR | Ca | Cl- | Na | | Condition | |
| MIN | 0.5 | 0.9 | 10 | 12 | 18 | 35% | 7% | Good |
| MAX | 9.3 | 36.0 | 866 | 1840 | 1550 | | 28% | Fair |
| GEOMEAN | 3.1 | 8.0 | 113 | 351 | 305 | | 26% | Poor |
| AVERAGE | 3.7 | 11.7 | 211 | 570 | 436 | | 39% | Unsuitable |
| 10 cm - CaCl ₂ | | | | | | | | |
| | EC | SAR | Ca | Cl- | Na | | Condition | |
| MIN | 0.5 | 0.6 | 8 | 16 | 18 | 44% | 22% | Good |
| MAX | 7.3 | 37.0 | 362 | 2040 | 1620 | | 22% | Fair |
| GEOMEAN | 2.0 | 6.6 | 67 | 200 | 190 | | 22% | Poor |
| AVERAGE | 2.5 | 10.7 | 104 | 378 | 298 | | 33% | Unsuitable |
| 20 cm - CaCl ₂ | | | | | | | | |
| | EC | SAR | Ca | Cl- | Na | | Condition | |
| MIN | 0.9 | 1.5 | 11 | 12 | 58 | 33% | 8% | Good |
| MAX | 6.6 | 38.0 | 760 | 1970 | 1610 | | 25% | Fair |
| GEOMEAN | 2.9 | 8.5 | 104 | 327 | 314 | | 25% | Poor |
| AVERAGE | 3.4 | 12.7 | 184 | 514 | 419 | | 42% | Unsuitable |
| 30 cm - CaCl ₂ | | | | | | | | |
| | EC | SAR | Ca | Cl- | Na | | Condition | |
| MIN | 1.1 | 1.6 | 17 | 19 | 112 | 22% | 0% | Good |
| MAX | 9.3 | 31.0 | 1290 | 2310 | 2050 | | 22% | Fair |
| GEOMEAN | 4.2 | 8.3 | 229 | 531 | 487 | | 39% | Poor |
| AVERAGE | 4.9 | 11.4 | 376 | 822 | 676 | | 39% | Unsuitable |
| 1.5 m - CaCl ₂ | | | | | | | | |
| | EC | SAR | Ca | Cl- | Na | | Condition | |
| MIN | 1.1 | 3.4 | 8 | 47 | 117 | 6% | 3% | Good |
| MAX | 9.3 | 37.0 | 509 | 2310 | 2050 | | 3% | Fair |
| GEOMEAN | 3.7 | 14.0 | 92 | 573 | 470 | | 36% | Poor |
| AVERAGE | 4.5 | 17.1 | 158 | 848 | 642 | | 58% | Unsuitable |
| 3.0 m - CaCl ₂ | | | | | | | | |
| | EC | SAR | Ca | Cl- | Na | | Condition | |
| MIN | 0.7 | 1.6 | 10 | 38 | 62 | 36% | 6% | Good |
| MAX | 9.3 | 38.0 | 1180 | 1640 | 1550 | | 31% | Fair |
| GEOMEAN | 2.7 | 8.9 | 91 | 358 | 300 | | 28% | Poor |
| AVERAGE | 3.5 | 11.6 | 213 | 532 | 418 | | 36% | Unsuitable |
| 7.0 m - CaCl ₂ | | | | | | | | |
| | EC | SAR | Ca | Cl- | Na | | Condition | |
| MIN | 0.5 | 0.6 | 31 | 12 | 18 | 58% | 22% | Good |
| MAX | 6.9 | 21.0 | 1290 | 1410 | 994 | | 36% | Fair |
| GEOMEAN | 2.5 | 3.7 | 192 | 169 | 207 | | 22% | Poor |
| AVERAGE | 2.8 | 6.1 | 292 | 335 | 334 | | 19% | Unsuitable |



TABLE: 2
 TITLE: UDI SITE SUMMARY
 PROJECT#: 19-424-CAI
 CLIENT: The City of Edmonton
 PROJECT: Anti-Icing Salinity Data Review
 LOCATION: Edmonton, Alberta

| All Data - Road Salt | | | | | | | |
|----------------------|-----|------|-----|-----|-----|------|---------------|
| | EC | SAR | Ca | Cl- | Na | | Condition |
| MIN | 0.5 | 0.4 | 66 | 3 | 18 | 92% | 60% Good |
| MAX | 4.6 | 11.0 | 595 | 948 | 440 | | 31% Fair |
| GEOMEAN | 1.6 | 1.6 | 166 | 103 | 84 | 8% | 8% Poor |
| AVERAGE | 1.8 | 2.4 | 189 | 207 | 125 | | 0% Unsuitable |
| 2018 - Road Salt | | | | | | | |
| | EC | SAR | Ca | Cl- | Na | | Condition |
| MIN | 0.5 | 0.4 | 66 | 3 | 18 | 96% | 67% Good |
| MAX | 4.6 | 6.3 | 506 | 948 | 256 | | 29% Fair |
| GEOMEAN | 1.5 | 1.5 | 165 | 90 | 80 | 4% | 4% Poor |
| AVERAGE | 1.7 | 2.1 | 188 | 197 | 113 | | 0% Unsuitable |
| 2019 - Road Salt | | | | | | | |
| | EC | SAR | Ca | Cl- | Na | | Condition |
| MIN | 0.7 | 0.5 | 91 | 16 | 20 | 88% | 54% Good |
| MAX | 4.0 | 11.0 | 595 | 670 | 440 | | 33% Fair |
| GEOMEAN | 1.7 | 1.8 | 166 | 117 | 88 | 13% | 13% Poor |
| AVERAGE | 1.9 | 2.8 | 190 | 217 | 137 | | 0% Unsuitable |
| 10 cm - Road Salt | | | | | | | |
| | EC | SAR | Ca | Cl- | Na | | Condition |
| MIN | 1.0 | 0.4 | 91 | 3 | 23 | 94% | 75% Good |
| MAX | 3.0 | 11.0 | 289 | 670 | 440 | | 19% Fair |
| GEOMEAN | 1.5 | 1.8 | 145 | 96 | 87 | 6% | 6% Poor |
| AVERAGE | 1.5 | 2.8 | 151 | 178 | 128 | | 0% Unsuitable |
| 20 cm - Road Salt | | | | | | | |
| | EC | SAR | Ca | Cl- | Na | | Condition |
| MIN | 0.6 | 0.5 | 84 | 14 | 20 | 94% | 69% Good |
| MAX | 3.3 | 9.9 | 388 | 818 | 415 | | 25% Fair |
| GEOMEAN | 1.5 | 1.7 | 139 | 100 | 81 | 6% | 6% Poor |
| AVERAGE | 1.7 | 2.6 | 156 | 202 | 123 | | 0% Unsuitable |
| 30 cm - Road Salt | | | | | | | |
| | EC | SAR | Ca | Cl- | Na | | Condition |
| MIN | 0.5 | 0.5 | 66 | 11 | 18 | 88% | 38% Good |
| MAX | 4.6 | 6.1 | 595 | 948 | 430 | | 50% Fair |
| GEOMEAN | 2.0 | 1.4 | 226 | 113 | 83 | 13% | 13% Poor |
| AVERAGE | 2.2 | 1.9 | 261 | 242 | 124 | | 0% Unsuitable |
| 1.5 m - Road Salt | | | | | | | |
| | EC | SAR | Ca | Cl- | Na | | Condition |
| MIN | 1.2 | 0.8 | 100 | 3 | 46 | 78% | 33% Good |
| MAX | 4.6 | 11.0 | 397 | 948 | 440 | | 44% Fair |
| GEOMEAN | 2.1 | 2.8 | 179 | 172 | 148 | 22% | 22% Poor |
| AVERAGE | 2.3 | 3.8 | 197 | 342 | 192 | | 0% Unsuitable |
| 3.0 m - Road Salt | | | | | | | |
| | EC | SAR | Ca | Cl- | Na | | Condition |
| MIN | 0.5 | 0.4 | 66 | 11 | 18 | 100% | 67% Good |
| MAX | 3.3 | 6.3 | 595 | 450 | 269 | | 33% Fair |
| GEOMEAN | 1.4 | 1.5 | 158 | 98 | 78 | 0% | 0% Poor |
| AVERAGE | 1.7 | 2.1 | 194 | 167 | 113 | | 0% Unsuitable |
| 7.0 m - Road Salt | | | | | | | |
| | EC | SAR | Ca | Cl- | Na | | Condition |
| MIN | 0.7 | 0.4 | 91 | 15 | 21 | 100% | 92% Good |
| MAX | 2.1 | 1.4 | 289 | 132 | 78 | | 8% Fair |
| GEOMEAN | 1.2 | 0.8 | 159 | 51 | 40 | 0% | 0% Poor |
| AVERAGE | 1.3 | 0.8 | 171 | 65 | 44 | | 0% Unsuitable |

= Favorable Condition/Concentration
Condition = Percentage of samples that are Good, Fair, Poor, Unsuitable

| All Data - CaCl ₂ | | | | | | | |
|------------------------------|-----|------|-----|-----|-----|------|----------------|
| | EC | SAR | Ca | Cl- | Na | | Condition |
| MIN | 0.4 | 0.2 | 42 | 7 | 8 | 86% | 61% Good |
| MAX | 3.1 | 13.0 | 523 | 716 | 503 | | 25% Fair |
| GEOMEAN | 1.2 | 1.6 | 105 | 55 | 63 | 14% | 11% Poor |
| AVERAGE | 1.5 | 2.8 | 143 | 141 | 109 | | 4% Unsuitable |
| 2018 - CaCl ₂ | | | | | | | |
| | EC | SAR | Ca | Cl- | Na | | Condition |
| MIN | 0.4 | 0.2 | 42 | 9 | 8 | 93% | 64% Good |
| MAX | 3.1 | 9.4 | 523 | 290 | 255 | | 29% Fair |
| GEOMEAN | 1.0 | 1.3 | 101 | 49 | 54 | 7% | 7% Poor |
| AVERAGE | 1.2 | 2.2 | 146 | 77 | 81 | | 0% Unsuitable |
| 2019 - CaCl ₂ | | | | | | | |
| | EC | SAR | Ca | Cl- | Na | | Condition |
| MIN | 0.5 | 0.3 | 45 | 7 | 11 | 79% | 57% Good |
| MAX | 3.1 | 13.0 | 439 | 716 | 503 | | 21% Fair |
| GEOMEAN | 1.4 | 1.8 | 109 | 61 | 74 | 21% | 14% Poor |
| AVERAGE | 1.7 | 3.3 | 140 | 204 | 138 | | 7% Unsuitable |
| 10 cm - CaCl ₂ | | | | | | | |
| | EC | SAR | Ca | Cl- | Na | | Condition |
| MIN | 0.6 | 0.2 | 49 | 11 | 8 | 90% | 70% Good |
| MAX | 2.8 | 9.2 | 292 | 688 | 382 | | 20% Fair |
| GEOMEAN | 1.1 | 1.1 | 114 | 60 | 49 | 10% | 10% Poor |
| AVERAGE | 1.3 | 2.2 | 132 | 134 | 91 | | 0% Unsuitable |
| 20 cm - CaCl ₂ | | | | | | | |
| | EC | SAR | Ca | Cl- | Na | | Condition |
| MIN | 0.4 | 0.6 | 45 | 7 | 18 | 90% | 70% Good |
| MAX | 3.0 | 8.0 | 431 | 709 | 337 | | 30% Fair |
| GEOMEAN | 1.1 | 1.6 | 102 | 51 | 64 | 10% | 10% Poor |
| AVERAGE | 1.4 | 2.5 | 137 | 141 | 99 | | 0% Unsuitable |
| 30 cm - CaCl ₂ | | | | | | | |
| | EC | SAR | Ca | Cl- | Na | | Condition |
| MIN | 0.6 | 1.1 | 42 | 14 | 24 | 75% | 50% Good |
| MAX | 3.1 | 13.0 | 523 | 716 | 503 | | 25% Fair |
| GEOMEAN | 1.4 | 2.3 | 98 | 54 | 85 | 25% | 13% Poor |
| AVERAGE | 1.7 | 3.8 | 165 | 148 | 145 | | 13% Unsuitable |
| 1.5 m - CaCl ₂ | | | | | | | |
| | EC | SAR | Ca | Cl- | Na | | Condition |
| MIN | 0.6 | 0.5 | 42 | 15 | 24 | 78% | 39% Good |
| MAX | 3.1 | 13.0 | 523 | 716 | 503 | | 39% Fair |
| GEOMEAN | 1.5 | 1.9 | 128 | 77 | 84 | 22% | 17% Poor |
| AVERAGE | 1.8 | 3.4 | 180 | 179 | 139 | | 6% Unsuitable |
| 3.0 m - CaCl ₂ | | | | | | | |
| | EC | SAR | Ca | Cl- | Na | | Condition |
| MIN | 0.7 | 1.7 | 83 | 60 | 67 | 100% | 100% Good |
| MAX | 1.6 | 3.8 | 109 | 279 | 143 | | 0% Fair |
| GEOMEAN | 1.1 | 2.5 | 94 | 128 | 100 | 0% | 0% Poor |
| AVERAGE | 1.2 | 2.7 | 95 | 163 | 106 | | 0% Unsuitable |
| 7.0 m - CaCl ₂ | | | | | | | |
| | EC | SAR | Ca | Cl- | Na | | Condition |
| MIN | 0.4 | 0.2 | 45 | 7 | 8 | 100% | 100% Good |
| MAX | 0.8 | 1.7 | 85 | 17 | 44 | | 0% Fair |
| GEOMEAN | 0.6 | 0.7 | 61 | 11 | 20 | 0% | 0% Poor |
| AVERAGE | 0.6 | 0.9 | 63 | 12 | 24 | | 0% Unsuitable |



CHART: 1
TITLE: COE CONCENTRATION VS. DEPTH CHARTS
PROJECT#: 19-424-CAI
CLIENT: The City of Edmonton
PROJECT: Anti-Icing Salinity Data Review
LOCATION: Edmonton, Alberta

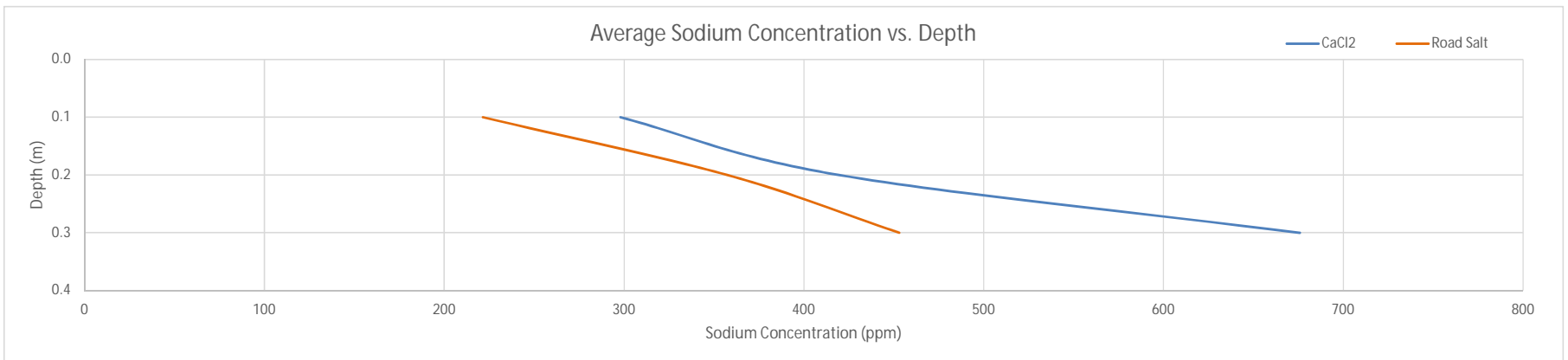
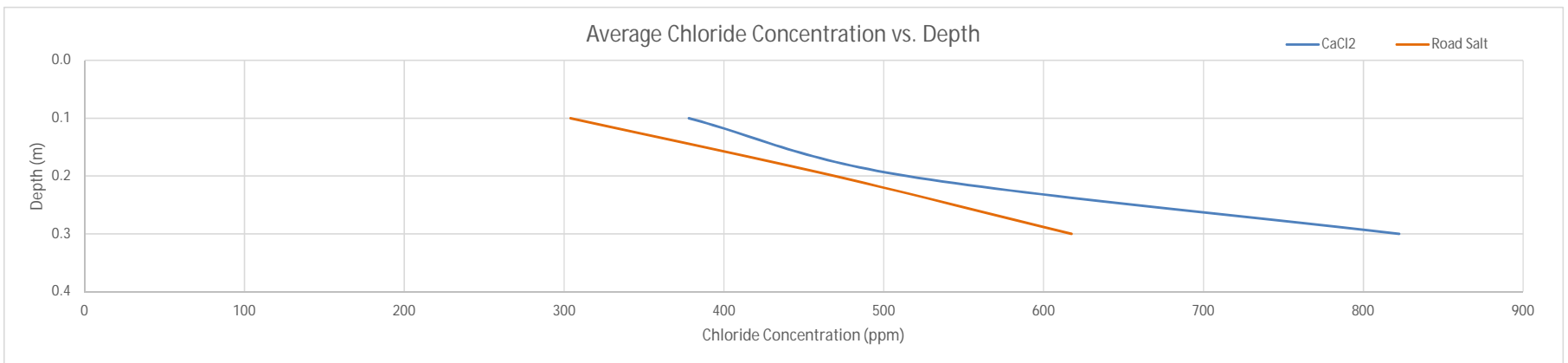
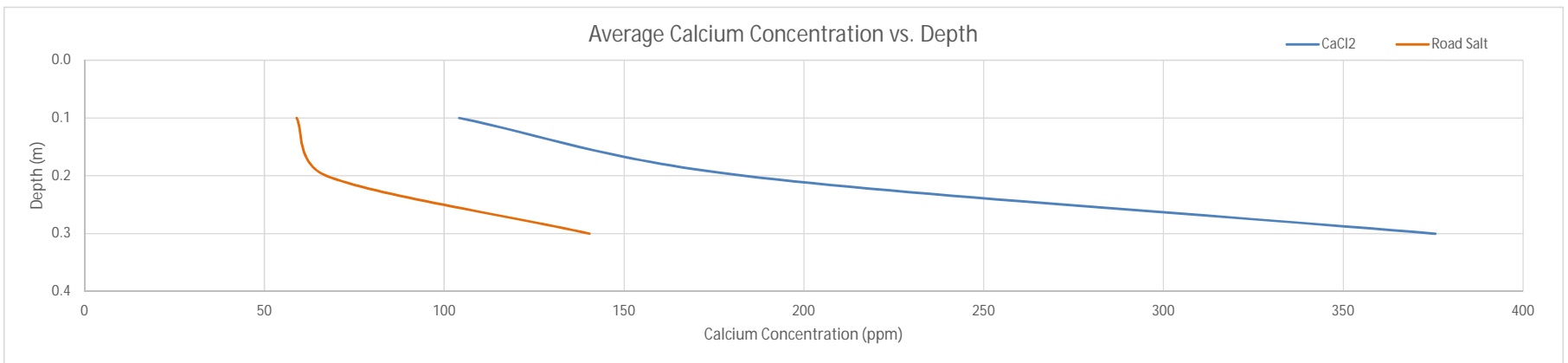
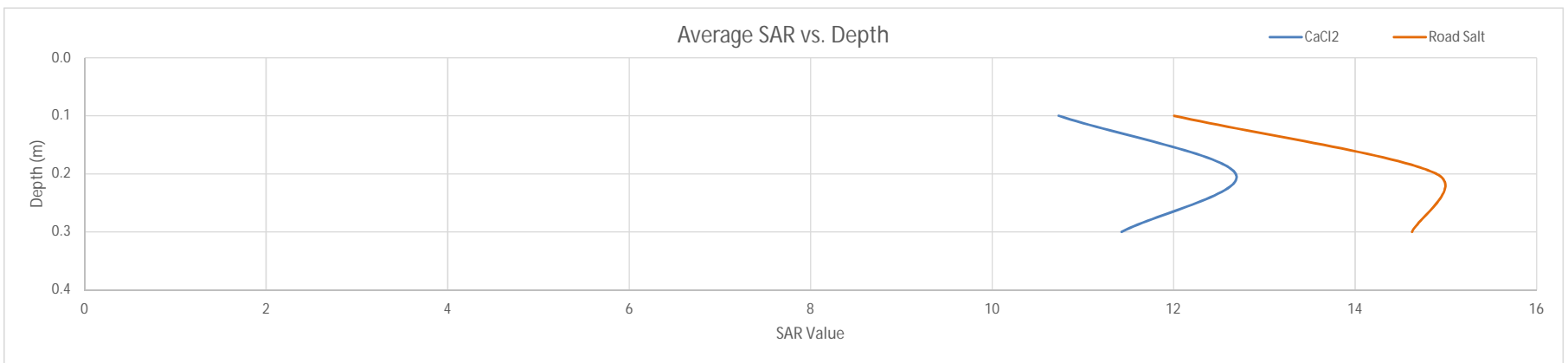
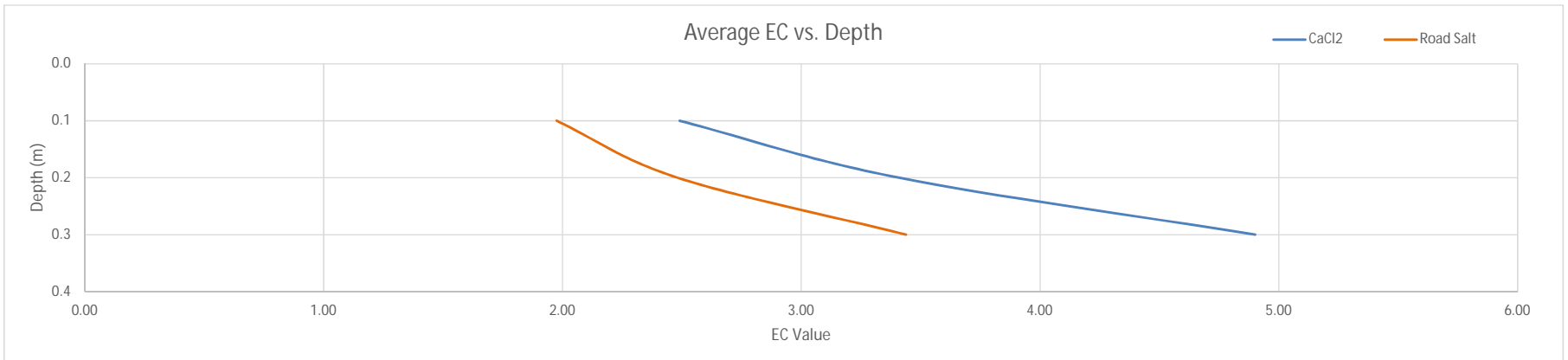




CHART: 2
TITLE: COE CONCENTRATION VS. HORIZONTAL DISTANCE CHARTS
PROJECT#: 19-424-CAI
CLIENT: The City of Edmonton
PROJECT: Anti-Icing Salinity Data Review
LOCATION: Edmonton, Alberta

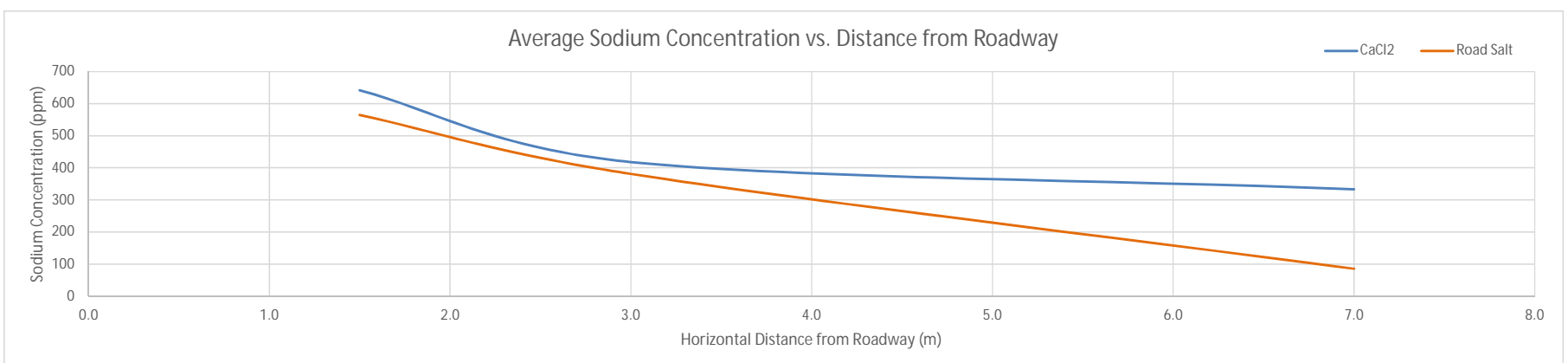
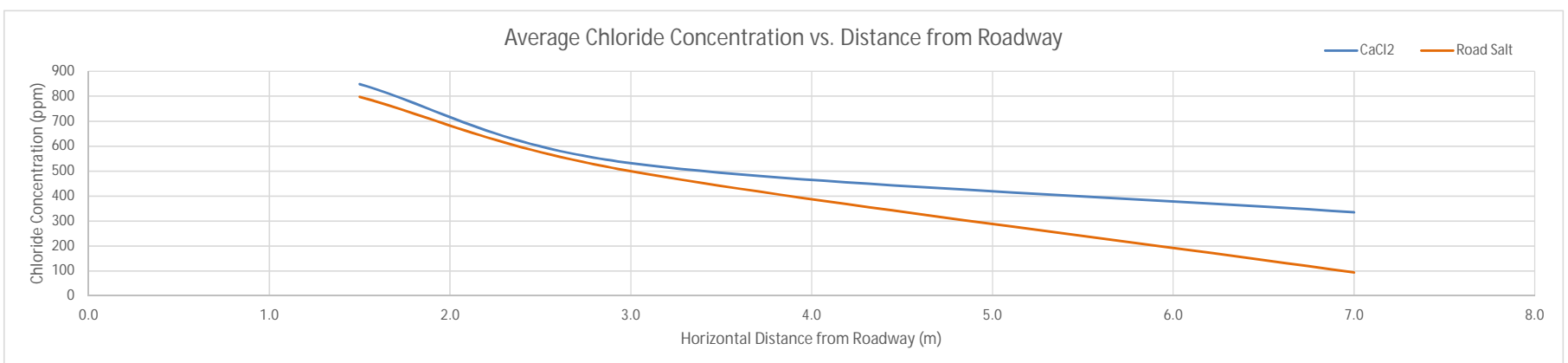
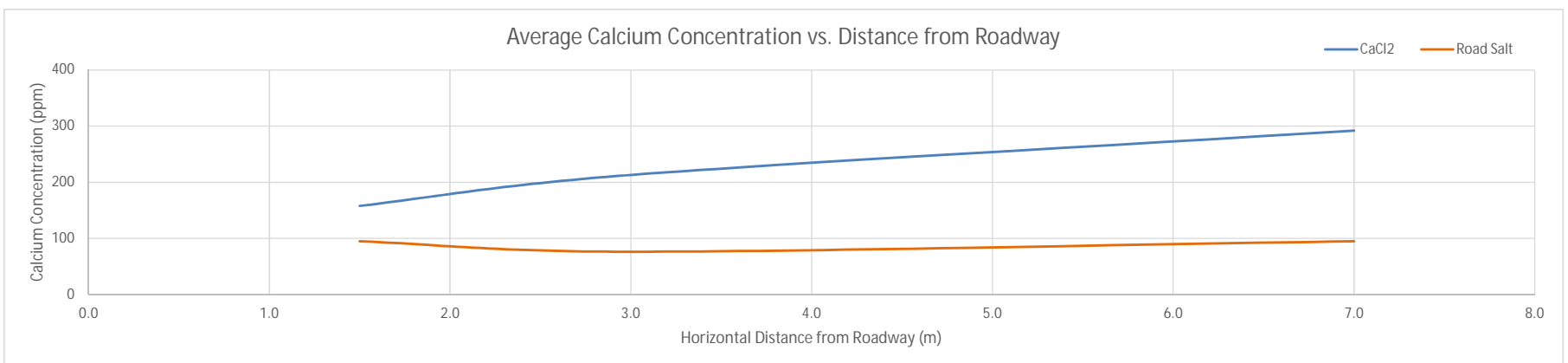
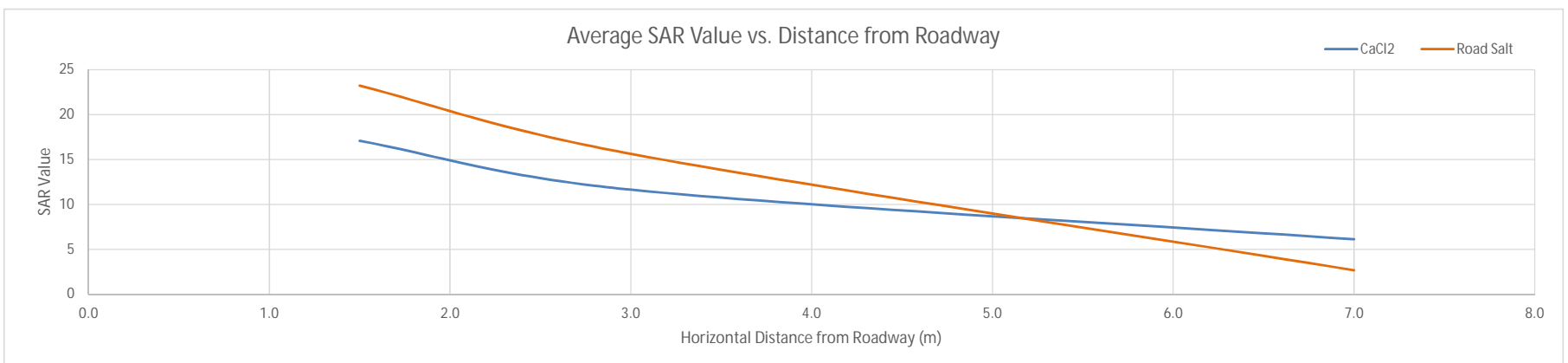
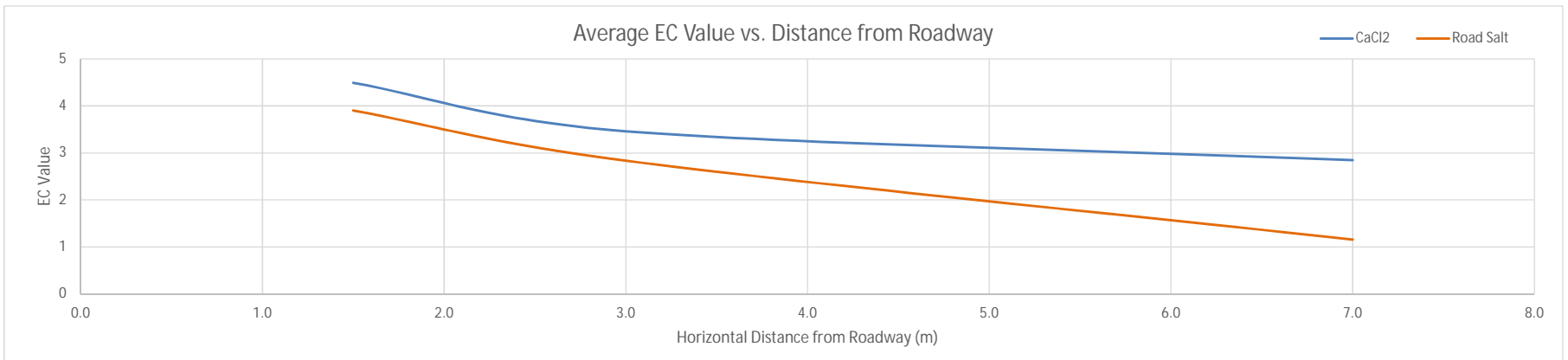




CHART: 3
TITLE: UDI CONCENTRATION VS. DEPTH CHARTS
PROJECT#: 19-424-CAI
CLIENT: The City of Edmonton
PROJECT: Anti-Icing Salinity Data Review
LOCATION: Edmonton, Alberta

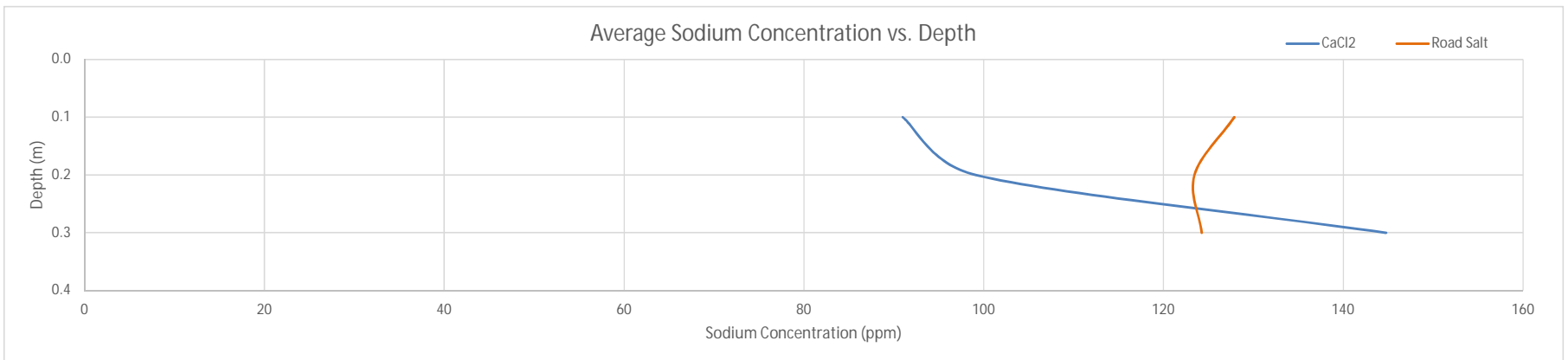
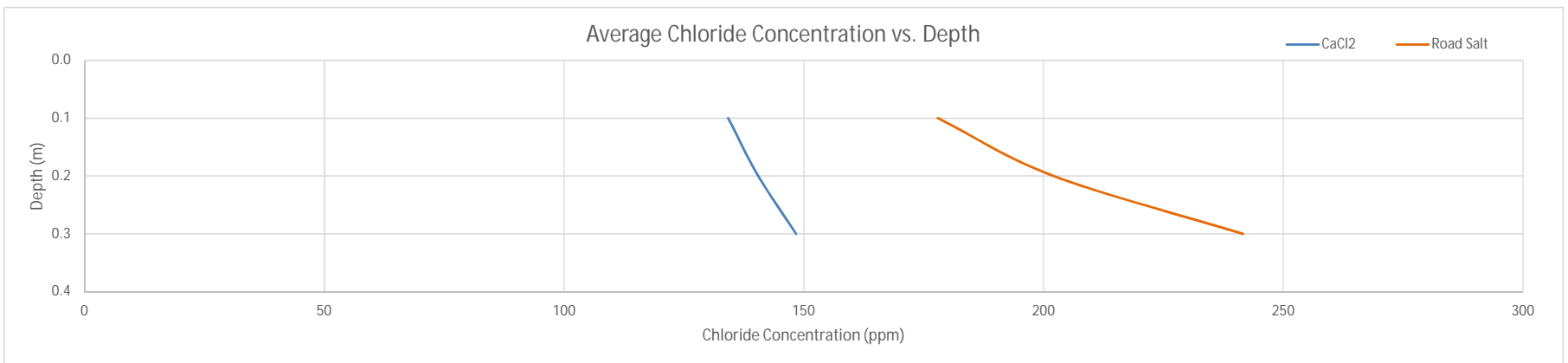
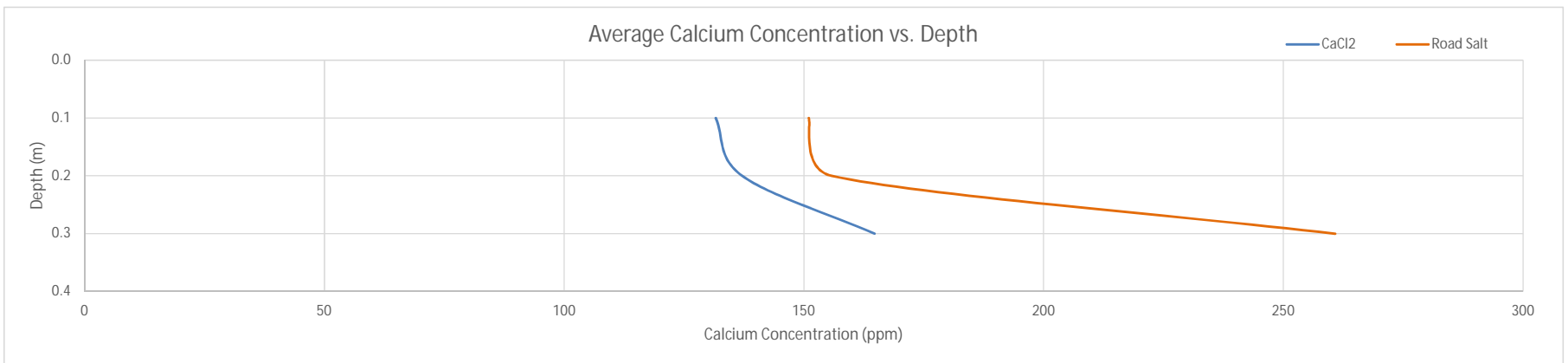
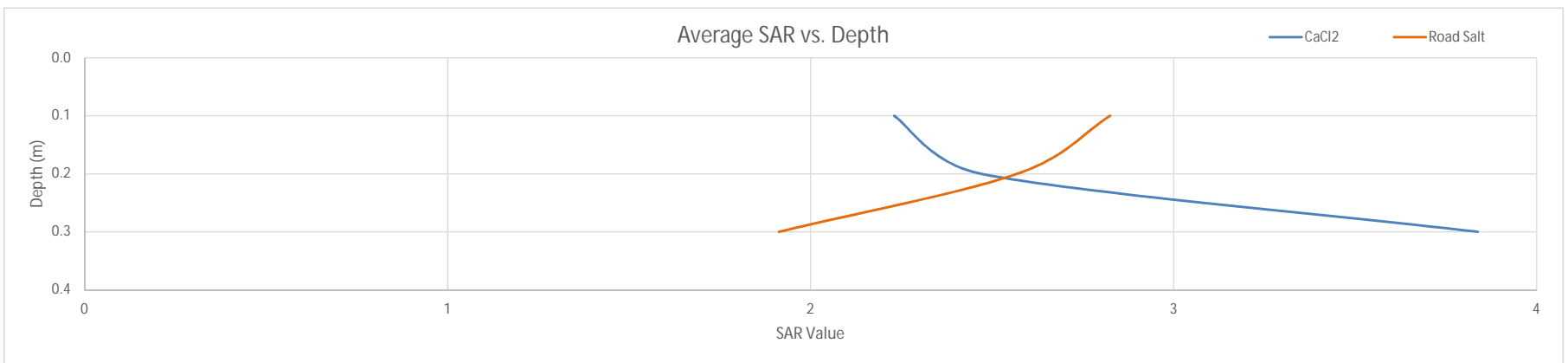
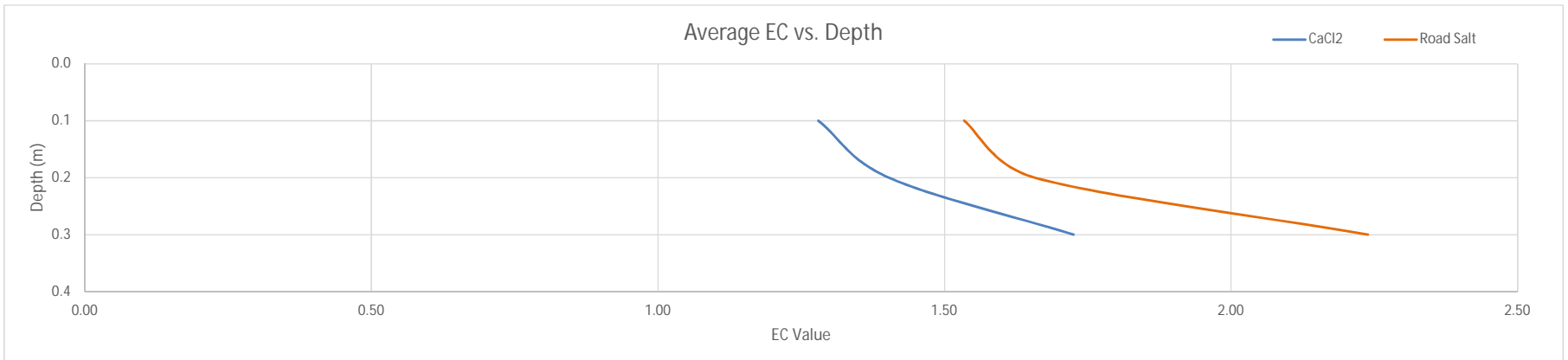




CHART: 4
TITLE: UDI CONCENTRATION VS. HORIZONTAL DISTANCE CHARTS
PROJECT#: 19-424-CAI
CLIENT: The City of Edmonton
PROJECT: Anti-Icing Salinity Data Review
LOCATION: Edmonton, Alberta

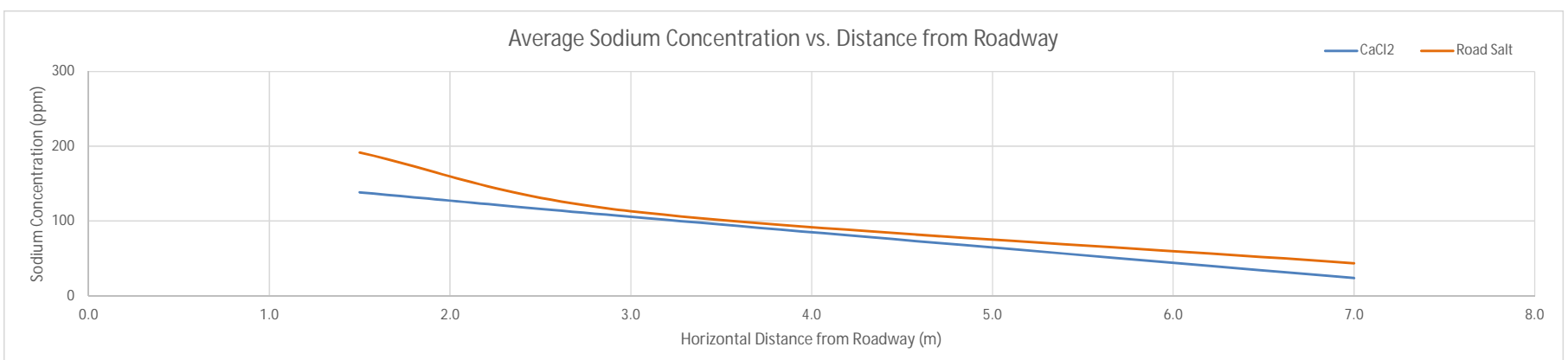
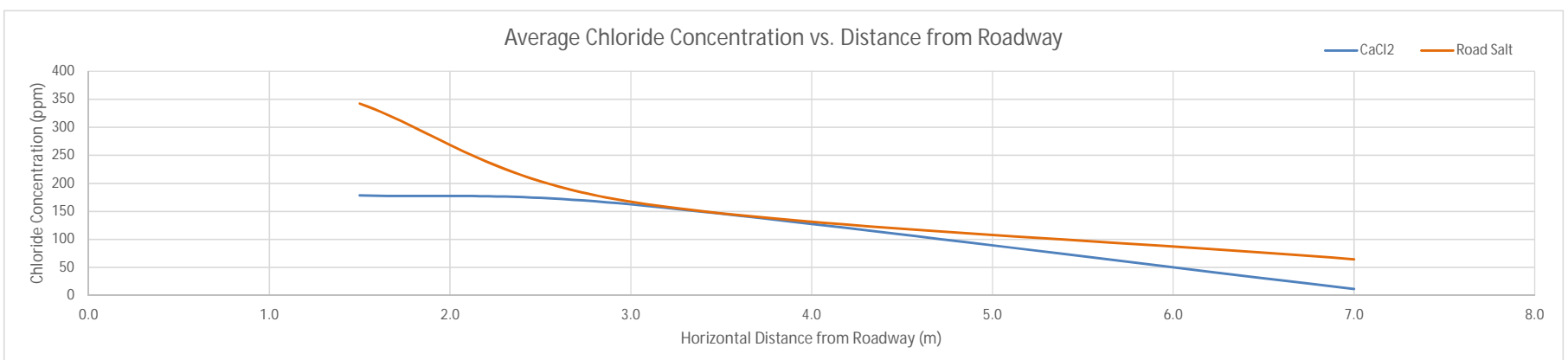
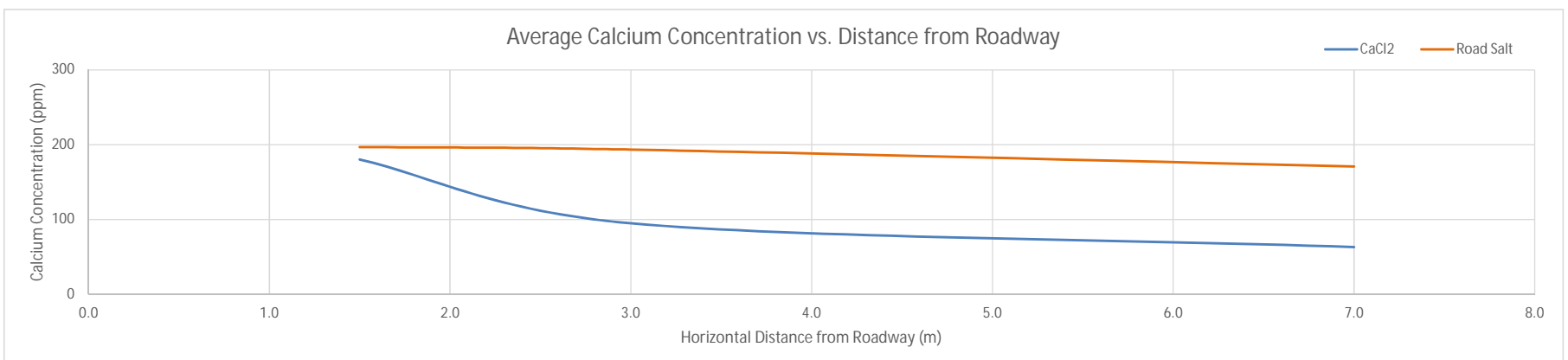
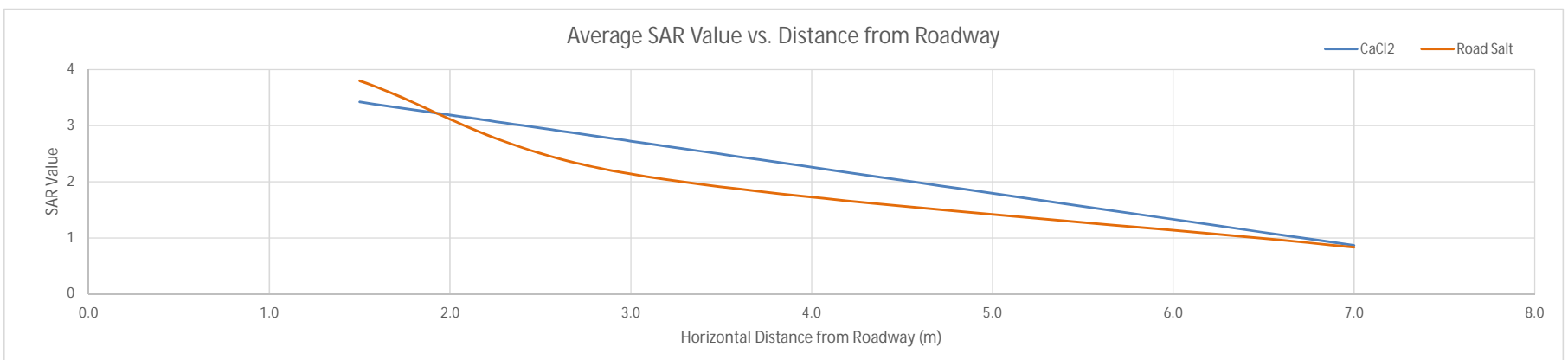
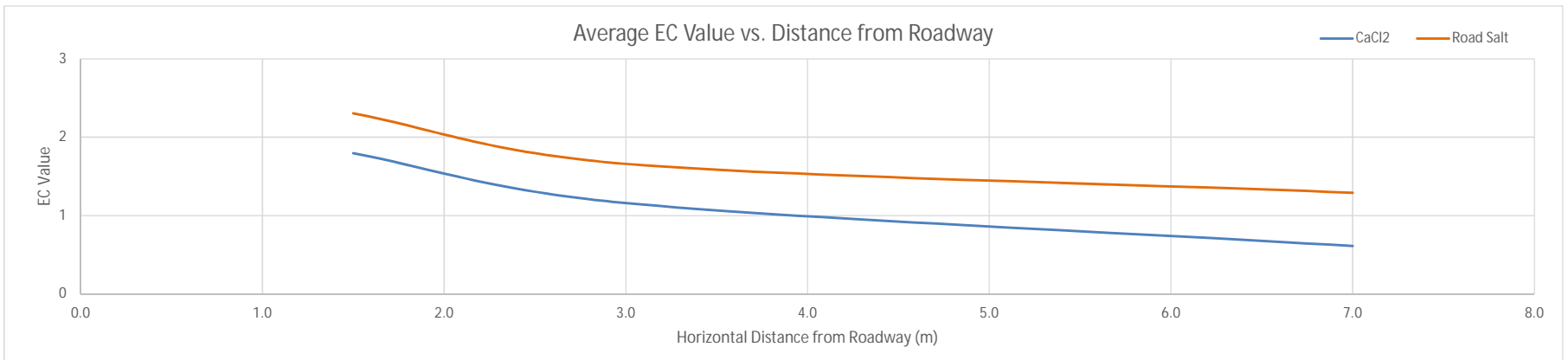




TABLE: A-1
 TITLE: SOIL ANALYSES - ALL COE ROAD SALT DATA
 PROJECT#: 19-424-CAI
 CLIENT: The City of Edmonton
 PROJECT: Anti-Icing Salinity Data Review
 LOCATION: Edmonton, Alberta

| 2019 Alberta* | Natural Area | EC | SAR | Rating | Calcium | Chloride | Sodium |
|---------------|--------------|-----|------|------------|-------------------------|----------|--------|
| | | <2 | <4 | Good | No Guidelines Available | | |
| | | 2-4 | 4-8 | Fair | | | |
| Fine Grained | Topsoil | 4-8 | 8-12 | Poor | | | |
| | | >8 | >12 | Unsuitable | | | |

| Sample ID | Depth (cm) | Date | EC | SAR | Rating | Calcium | Chloride | Sodium |
|-----------|------------|-------------|-----|------|------------|---------|----------|--------|
| S1-1.5 | 10 | 2-Nov-2018 | 0.8 | 6.7 | Fair | 19.5 | 32 | 104 |
| S1-1.5 | 10 | 27-May-2019 | 0.8 | 7.1 | Fair | 20.6 | 67 | 113 |
| S1-1.5 | 20 | 2-Nov-2018 | 1.0 | 10.1 | Poor | 31.5 | 158 | 231 |
| S1-1.5 | 20 | 27-May-2019 | 0.9 | 9.1 | Poor | 24.8 | 124 | 175 |
| S1-1.5 | 30 | 2-Nov-2018 | 1.5 | 13.3 | Unsuitable | 34.1 | 320 | 322 |
| S1-1.5 | 30 | 27-May-2019 | 1.2 | 12.1 | Unsuitable | 20.8 | 190 | 204 |
| S1-3.0 | 10 | 2-Nov-2018 | 0.7 | 3.6 | Good | 32.6 | 60 | 80 |
| S1-3.0 | 10 | 27-May-2019 | 0.6 | 3.3 | Good | 32.7 | 44 | 70 |
| S1-3.0 | 20 | 2-Nov-2018 | 0.6 | 5.3 | Fair | 24 | 50 | 105 |
| S1-3.0 | 20 | 27-May-2019 | 0.7 | 6.1 | Fair | 22.8 | 56 | 105 |
| S1-3.0 | 30 | 2-Nov-2018 | 0.8 | 7.4 | Fair | 25.9 | 116 | 151 |
| S1-3.0 | 30 | 27-May-2019 | 1.0 | 8.2 | Poor | 22.8 | 115 | 133 |
| S1-7.0 | 10 | 2-Nov-2018 | 0.7 | 2.7 | Good | 50.9 | 70 | 90 |
| S1-7.0 | 10 | 27-May-2019 | 0.5 | 1.4 | Good | 37.6 | 41 | 35 |
| S1-7.0 | 20 | 2-Nov-2018 | 0.5 | 3.5 | Good | 27 | 28 | 74 |
| S1-7.0 | 20 | 27-May-2019 | 0.5 | 2.9 | Good | 24.5 | 25 | 54 |
| S1-7.0 | 30 | 2-Nov-2018 | 0.7 | 5.2 | Fair | 30.5 | 55 | 122 |
| S1-7.0 | 30 | 27-May-2019 | 0.6 | 4.3 | Fair | 20.9 | 35 | 69 |
| S2-1.5 | 10 | 2-Nov-2018 | 1.7 | 21.8 | Unsuitable | 10.5 | 217 | 228 |
| S2-1.5 | 10 | 27-May-2019 | 3.2 | 28 | Unsuitable | 16 | 489 | 322 |
| S2-1.5 | 20 | 2-Nov-2018 | 3.3 | 37 | Unsuitable | 27 | 1090 | 885 |
| S2-1.5 | 20 | 27-May-2019 | 5.0 | 36 | Unsuitable | 37 | 1310 | 851 |
| S2-1.5 | 30 | 2-Nov-2018 | 5.0 | 32 | Unsuitable | 63 | 1440 | 1050 |
| S2-1.5 | 30 | 27-May-2019 | 5.0 | 31 | Unsuitable | 44 | 1230 | 799 |
| S2-3.0 | 10 | 2-Nov-2018 | 2.4 | 28 | Unsuitable | 11 | 341 | 297 |
| S2-3.0 | 10 | 27-May-2019 | 3.0 | 17 | Unsuitable | 36 | 563 | 334 |
| S2-3.0 | 20 | 2-Nov-2018 | 5.0 | 26 | Unsuitable | 82 | 1330 | 915 |
| S2-3.0 | 20 | 27-May-2019 | 4.5 | 23 | Unsuitable | 68 | 1130 | 723 |
| S2-3.0 | 30 | 2-Nov-2018 | 6.9 | 19.6 | Unsuitable | 208 | 1630 | 1090 |
| S2-3.0 | 30 | 27-May-2019 | 6.1 | 19.6 | Unsuitable | 139 | 1370 | 853 |
| S2-7.0 | 10 | 2-Nov-2018 | 1.0 | 3.3 | Good | 64.8 | 106 | 111 |
| S2-7.0 | 10 | 27-May-2019 | 0.9 | 4 | Fair | 54.1 | 131 | 126 |
| S2-7.0 | 20 | 2-Nov-2018 | 1.0 | 4.1 | Fair | 51.4 | 103 | 116 |
| S2-7.0 | 20 | 27-May-2019 | 1.0 | 4.6 | Fair | 53.9 | 102 | 136 |
| S2-7.0 | 30 | 2-Nov-2018 | 2.0 | 3.8 | Good | 128 | 221 | 164 |
| S2-7.0 | 30 | 27-May-2019 | 2.0 | 3.9 | Good | 125 | 180 | 162 |
| S3-1.5 | 10 | 2-Nov-2018 | 2.0 | 30 | Unsuitable | 11 | 372 | 383 |
| S3-1.5 | 10 | 27-May-2019 | 4.2 | 38 | Unsuitable | 20 | 939 | 585 |
| S3-1.5 | 20 | 2-Nov-2018 | 3.8 | 45 | Unsuitable | 22 | 1000 | 787 |
| S3-1.5 | 20 | 27-May-2019 | 6.0 | 50 | Unsuitable | 27 | 1280 | 866 |
| S3-1.5 | 30 | 2-Nov-2018 | 6.0 | 46 | Unsuitable | 37 | 1530 | 1030 |
| S3-1.5 | 30 | 27-May-2019 | 6.8 | 49 | Unsuitable | 39 | 1510 | 1030 |
| S3-3.0 | 10 | 2-Nov-2018 | 2.3 | 41 | Unsuitable | 5.6 | 314 | 259 |
| S3-3.0 | 10 | 27-May-2019 | 2.0 | 20 | Unsuitable | 14 | 299 | 234 |
| S3-3.0 | 20 | 2-Nov-2018 | 5.0 | 50 | Unsuitable | 25 | 1150 | 866 |
| S3-3.0 | 20 | 27-May-2019 | 3.5 | 31 | Unsuitable | 24 | 700 | 511 |
| S3-3.0 | 30 | 2-Nov-2018 | 5.6 | 45 | Unsuitable | 41 | 1530 | 1090 |
| S3-3.0 | 30 | 27-May-2019 | 5.3 | 37 | Unsuitable | 44 | 971 | 850 |
| S3-7.0 | 10 | 2-Nov-2018 | 1.0 | 3.7 | Good | 56.1 | 118 | 114 |
| S3-7.0 | 10 | 27-May-2019 | 0.9 | 3.5 | Good | 46.3 | 103 | 86 |
| S3-7.0 | 20 | 2-Nov-2018 | 1.0 | 2.9 | Good | 57.7 | 87 | 81 |
| S3-7.0 | 20 | 27-May-2019 | 0.7 | 3.1 | Good | 32 | 74 | 58 |
| S3-7.0 | 30 | 2-Nov-2018 | 2.7 | 2.6 | Fair | 319 | 171 | 168 |
| S3-7.0 | 30 | 27-May-2019 | 0.7 | 3.3 | Good | 29.5 | 80 | 64 |
| S7-1.5 | 10 | 2-Nov-2018 | 7.5 | 13.4 | Unsuitable | 314 | 1690 | 818 |
| S7-1.5 | 10 | 27-May-2019 | 7.1 | 13.2 | Unsuitable | 206 | 1180 | 564 |
| S7-1.5 | 20 | 2-Nov-2018 | 5.9 | 14 | Unsuitable | 197 | 1250 | 679 |
| S7-1.5 | 20 | 27-May-2019 | 4.1 | 9.4 | Poor | 145 | 804 | 379 |
| S7-1.5 | 30 | 2-Nov-2018 | 7.0 | 8.4 | Poor | 513 | 1250 | 670 |
| S7-1.5 | 30 | 27-May-2019 | 6.0 | 8.3 | Poor | 248 | 959 | 404 |
| S7-3.0 | 10 | 2-Nov-2018 | 2.5 | 6.1 | Fair | 139 | 468 | 249 |
| S7-3.0 | 10 | 27-May-2019 | 5.9 | 13 | Unsuitable | 192 | 1020 | 577 |
| S7-3.0 | 20 | 2-Nov-2018 | 2.6 | 7.9 | Fair | 94.9 | 361 | 253 |
| S7-3.0 | 20 | 27-May-2019 | 3.9 | 8.3 | Poor | 156 | 672 | 340 |
| S7-3.0 | 30 | 2-Nov-2018 | 2.7 | 6.3 | Fair | 135 | 468 | 254 |
| S7-3.0 | 30 | 27-May-2019 | 4.7 | 7.8 | Poor | 185 | 737 | 327 |
| S7-7.0 | 10 | 2-Nov-2018 | 1.1 | 1.7 | Good | 100 | 119 | 63 |



TABLE: A-1
 TITLE: SOIL ANALYSES - ALL COE ROAD SALT DATA
 PROJECT#: 19-424-CAI
 CLIENT: The City of Edmonton
 PROJECT: Anti-Icing Salinity Data Review
 LOCATION: Edmonton, Alberta

| 2019 Alberta* | Natural Area | EC | SAR | Rating | Calcium | Chloride | Sodium |
|---------------|--------------|-----|------|------------|-------------------------|----------|--------|
| | | <2 | <4 | Good | No Guidelines Available | | |
| | | 2-4 | 4-8 | Fair | | | |
| Fine Grained | Topsoil | 4-8 | 8-12 | Poor | | | |
| | | >8 | >12 | Unsuitable | | | |

| Sample ID | Depth (cm) | Date | EC | SAR | Rating | Calcium | Chloride | Sodium |
|-----------|------------|-------------|-----|------|------------|---------|----------|--------|
| S7-7.0 | 10 | 27-May-2019 | 0.9 | 1.8 | Good | 54.4 | 81 | 43 |
| S7-7.0 | 20 | 2-Nov-2018 | 2.6 | 2.1 | Fair | 325 | 320 | 138 |
| S7-7.0 | 20 | 27-May-2019 | 1.4 | 2.1 | Good | 97.1 | 65 | 67 |
| S7-7.0 | 30 | 2-Nov-2018 | 3.0 | 2.5 | Fair | 290 | 256 | 142 |
| S7-7.0 | 30 | 27-May-2019 | 2.6 | 1.6 | Fair | 281 | 61 | 90 |
| S10-1.5 | 10 | 2-Nov-2018 | 2.3 | 37 | Unsuitable | 11 | 304 | 364 |
| S10-1.5 | 10 | 27-May-2019 | 2.4 | 22 | Unsuitable | 24 | 335 | 379 |
| S10-1.5 | 20 | 2-Nov-2018 | 4.2 | 36 | Unsuitable | 35 | 868 | 756 |
| S10-1.5 | 20 | 27-May-2019 | 2.9 | 25 | Unsuitable | 32 | 592 | 520 |
| S10-1.5 | 30 | 2-Nov-2018 | 4.7 | 42 | Unsuitable | 38 | 1500 | 1120 |
| S10-1.5 | 30 | 27-May-2019 | 3.3 | 27 | Unsuitable | 34 | 856 | 621 |
| S10-3.0 | 10 | 2-Nov-2018 | 0.9 | 7 | Fair | 25.3 | 81 | 120 |
| S10-3.0 | 10 | 27-May-2019 | 1.1 | 8.9 | Poor | 27.2 | 67 | 160 |
| S10-3.0 | 20 | 2-Nov-2018 | 1.1 | 12.6 | Unsuitable | 18.8 | 105 | 190 |
| S10-3.0 | 20 | 27-May-2019 | 1.2 | 12.4 | Unsuitable | 20.9 | 92 | 200 |
| S10-3.0 | 30 | 2-Nov-2018 | 2.0 | 18.4 | Unsuitable | 23.8 | 293 | 320 |
| S10-3.0 | 30 | 27-May-2019 | 1.3 | 13.9 | Unsuitable | 21.8 | 173 | 253 |
| S10-7.0 | 10 | 2-Nov-2018 | 0.8 | 1.1 | Good | 80.6 | 34 | 38 |
| S10-7.0 | 10 | 27-May-2019 | 0.8 | 1.2 | Good | 79 | 30 | 39 |
| S10-7.0 | 20 | 2-Nov-2018 | 0.6 | 1.7 | Good | 44.3 | 32 | 40 |
| S10-7.0 | 20 | 27-May-2019 | 0.6 | 1.9 | Good | 47.4 | 36 | 48 |
| S10-7.0 | 30 | 2-Nov-2018 | 0.7 | 3 | Good | 39.3 | 61 | 73 |
| S10-7.0 | 30 | 27-May-2019 | 0.8 | 3 | Good | 44.5 | 84 | 73 |
| S12-1.5 | 10 | 2-Nov-2018 | 1.3 | 8.5 | Poor | 29.6 | 110 | 147 |
| S12-1.5 | 10 | 27-May-2019 | 3.4 | 16 | Unsuitable | 56 | 616 | 387 |
| S12-1.5 | 20 | 2-Nov-2018 | 2.5 | 15 | Unsuitable | 50 | 372 | 359 |
| S12-1.5 | 20 | 27-May-2019 | 4.4 | 16 | Unsuitable | 118 | 863 | 614 |
| S12-1.5 | 30 | 2-Nov-2018 | 5.7 | 9.2 | Poor | 369 | 729 | 581 |
| S12-1.5 | 30 | 27-May-2019 | 7.8 | 13 | Unsuitable | 497 | 1130 | 1010 |
| S12-3.0 | 10 | 2-Nov-2018 | 1.1 | 6.9 | Fair | 32.9 | 117 | 130 |
| S12-3.0 | 10 | 27-May-2019 | 2.2 | 8.5 | Poor | 71 | 288 | 241 |
| S12-3.0 | 20 | 2-Nov-2018 | 2.8 | 10 | Poor | 98.9 | 345 | 340 |
| S12-3.0 | 20 | 27-May-2019 | 2.3 | 8.5 | Poor | 89.6 | 198 | 279 |
| S12-3.0 | 30 | 2-Nov-2018 | 5.0 | 7 | Poor | 391 | 465 | 454 |
| S12-3.0 | 30 | 27-May-2019 | 3.1 | 8.1 | Poor | 171 | 262 | 368 |
| S12-7.0 | 10 | 2-Nov-2018 | 0.7 | 1.1 | Good | 79.6 | 36 | 36 |
| S12-7.0 | 10 | 27-May-2019 | 0.8 | 1.7 | Good | 62.2 | 62 | 47 |
| S12-7.0 | 20 | 2-Nov-2018 | 1.2 | 1.6 | Good | 109 | 69 | 57 |
| S12-7.0 | 20 | 27-May-2019 | 0.9 | 2 | Good | 79.6 | 45 | 66 |
| S12-7.0 | 30 | 2-Nov-2018 | 1.8 | 1.8 | Good | 213 | 144 | 96 |
| S12-7.0 | 30 | 27-May-2019 | 1.8 | 2 | Good | 187 | 107 | 100 |

BOLD = Parameter Exceeds Recommended Guideline Criteria
BOLD = Parameter is Elevated Compared to Background Concentrations

*Alberta Soil and Groundwater Remediation Guidelines (Table 4). January 2019.
 (all concentrations in mg/kg = ppm, unless noted)

Topsoil = surface A, L, F, H and O horizons on the control area, or the equivalent surface soil where these horizons are not present.

EC = Electrical Conductivity (dS/m)

SAR = Sodium Adsorption Ratio

| | EC | SAR | Condition | Ca | Cl- | Na |
|---------|-----|------|-----------|-------|--------|--------|
| MIN | 0.5 | 1.1 | 27% | 5.6 | 25.0 | 35.0 |
| MAX | 7.8 | 50.0 | 18% | 513.0 | 1690.0 | 1120.0 |
| GEOMEAN | 1.9 | 8.3 | 15% | 54.5 | 236.2 | 220.2 |
| AVERAGE | 2.6 | 13.8 | 41% | 88.9 | 463.5 | 343.9 |



TABLE: A-2
 TITLE: SOIL ANALYSES - 2018 COE ROAD SALT DATA
 PROJECT#: 19-424-CAI
 CLIENT: The City of Edmonton
 PROJECT: Anti-Icing Salinity Data Review
 LOCATION: Edmonton, Alberta

| 2019 Alberta* | Natural Area | EC | SAR | Rating | Calcium | Chloride | Sodium |
|---------------|--------------|-----|------|------------|-------------------------|----------|--------|
| | | <2 | <4 | Good | No Guidelines Available | | |
| | | 2-4 | 4-8 | Fair | | | |
| Fine Grained | Topsoil | 4-8 | 8-12 | Poor | | | |
| | | >8 | >12 | Unsuitable | | | |

| Sample ID | Depth (cm) | Date | EC | SAR | Rating | Calcium | Chloride | Sodium |
|-----------|------------|------------|-----|------|------------|---------|----------|--------|
| S1-1.5 | 10 | 2-Nov-2018 | 0.8 | 6.7 | Fair | 19.5 | 32 | 104 |
| S1-1.5 | 20 | 2-Nov-2018 | 1.0 | 10.1 | Poor | 31.5 | 158 | 231 |
| S1-1.5 | 30 | 2-Nov-2018 | 1.5 | 13.3 | Unsuitable | 34.1 | 320 | 322 |
| S1-3.0 | 10 | 2-Nov-2018 | 0.7 | 3.6 | Good | 32.6 | 60 | 80 |
| S1-3.0 | 20 | 2-Nov-2018 | 0.6 | 5.3 | Fair | 24 | 50 | 105 |
| S1-3.0 | 30 | 2-Nov-2018 | 0.8 | 7.4 | Fair | 25.9 | 116 | 151 |
| S1-7.0 | 10 | 2-Nov-2018 | 0.7 | 2.7 | Good | 50.9 | 70 | 90 |
| S1-7.0 | 20 | 2-Nov-2018 | 0.5 | 3.5 | Good | 27 | 28 | 74 |
| S1-7.0 | 30 | 2-Nov-2018 | 0.7 | 5.2 | Fair | 30.5 | 55 | 122 |
| S2-1.5 | 10 | 2-Nov-2018 | 1.7 | 21.8 | Unsuitable | 10.5 | 217 | 228 |
| S2-1.5 | 20 | 2-Nov-2018 | 3.3 | 37 | Unsuitable | 27 | 1090 | 885 |
| S2-1.5 | 30 | 2-Nov-2018 | 5.0 | 32 | Unsuitable | 63 | 1440 | 1050 |
| S2-3.0 | 10 | 2-Nov-2018 | 2.4 | 28 | Unsuitable | 11 | 341 | 297 |
| S2-3.0 | 20 | 2-Nov-2018 | 5.0 | 26 | Unsuitable | 82 | 1330 | 915 |
| S2-3.0 | 30 | 2-Nov-2018 | 6.9 | 19.6 | Unsuitable | 208 | 1630 | 1090 |
| S2-7.0 | 10 | 2-Nov-2018 | 1.0 | 3.3 | Good | 64.8 | 106 | 111 |
| S2-7.0 | 20 | 2-Nov-2018 | 1.0 | 4.1 | Fair | 51.4 | 103 | 116 |
| S2-7.0 | 30 | 2-Nov-2018 | 2.0 | 3.8 | Good | 128 | 221 | 164 |
| S3-1.5 | 10 | 2-Nov-2018 | 2.0 | 30 | Unsuitable | 11 | 372 | 383 |
| S3-1.5 | 20 | 2-Nov-2018 | 3.8 | 45 | Unsuitable | 22 | 1000 | 787 |
| S3-1.5 | 30 | 2-Nov-2018 | 6.0 | 46 | Unsuitable | 37 | 1530 | 1030 |
| S3-3.0 | 10 | 2-Nov-2018 | 2.3 | 41 | Unsuitable | 5.6 | 314 | 259 |
| S3-3.0 | 20 | 2-Nov-2018 | 5.0 | 50 | Unsuitable | 25 | 1150 | 866 |
| S3-3.0 | 30 | 2-Nov-2018 | 5.6 | 45 | Unsuitable | 41 | 1530 | 1090 |
| S3-7.0 | 10 | 2-Nov-2018 | 1.0 | 3.7 | Good | 56.1 | 118 | 114 |
| S3-7.0 | 20 | 2-Nov-2018 | 1.0 | 2.9 | Good | 57.7 | 87 | 81 |
| S3-7.0 | 30 | 2-Nov-2018 | 2.7 | 2.6 | Fair | 319 | 171 | 168 |
| S7-1.5 | 10 | 2-Nov-2018 | 7.5 | 13.4 | Unsuitable | 314 | 1690 | 818 |
| S7-1.5 | 20 | 2-Nov-2018 | 5.9 | 14 | Unsuitable | 197 | 1250 | 679 |
| S7-1.5 | 30 | 2-Nov-2018 | 7.0 | 8.4 | Poor | 513 | 1250 | 670 |
| S7-3.0 | 10 | 2-Nov-2018 | 2.5 | 6.1 | Fair | 139 | 468 | 249 |
| S7-3.0 | 20 | 2-Nov-2018 | 2.6 | 7.9 | Fair | 94.9 | 361 | 253 |
| S7-3.0 | 30 | 2-Nov-2018 | 2.7 | 6.3 | Fair | 135 | 468 | 254 |
| S7-7.0 | 10 | 2-Nov-2018 | 1.1 | 1.7 | Good | 100 | 119 | 63 |
| S7-7.0 | 20 | 2-Nov-2018 | 2.6 | 2.1 | Fair | 325 | 320 | 138 |
| S7-7.0 | 30 | 2-Nov-2018 | 3.0 | 2.5 | Fair | 290 | 256 | 142 |
| S10-1.5 | 10 | 2-Nov-2018 | 2.3 | 37 | Unsuitable | 11 | 304 | 364 |
| S10-1.5 | 20 | 2-Nov-2018 | 4.2 | 36 | Unsuitable | 35 | 868 | 756 |
| S10-1.5 | 30 | 2-Nov-2018 | 4.7 | 42 | Unsuitable | 38 | 1500 | 1120 |
| S10-3.0 | 10 | 2-Nov-2018 | 0.9 | 7 | Fair | 25.3 | 81 | 120 |
| S10-3.0 | 20 | 2-Nov-2018 | 1.1 | 12.6 | Unsuitable | 18.8 | 105 | 190 |
| S10-3.0 | 30 | 2-Nov-2018 | 2.0 | 18.4 | Unsuitable | 23.8 | 293 | 320 |
| S10-7.0 | 10 | 2-Nov-2018 | 0.8 | 1.1 | Good | 80.6 | 34 | 38 |
| S10-7.0 | 20 | 2-Nov-2018 | 0.6 | 1.7 | Good | 44.3 | 32 | 40 |
| S10-7.0 | 30 | 2-Nov-2018 | 0.7 | 3 | Good | 39.3 | 61 | 73 |
| S12-1.5 | 10 | 2-Nov-2018 | 1.3 | 8.5 | Poor | 29.6 | 110 | 147 |
| S12-1.5 | 20 | 2-Nov-2018 | 2.5 | 15 | Unsuitable | 50 | 372 | 359 |
| S12-1.5 | 30 | 2-Nov-2018 | 5.7 | 9.2 | Poor | 369 | 729 | 581 |
| S12-3.0 | 10 | 2-Nov-2018 | 1.1 | 6.9 | Fair | 32.9 | 117 | 130 |
| S12-3.0 | 20 | 2-Nov-2018 | 2.8 | 10 | Poor | 98.9 | 345 | 340 |
| S12-3.0 | 30 | 2-Nov-2018 | 5.0 | 7 | Poor | 391 | 465 | 454 |
| S12-7.0 | 10 | 2-Nov-2018 | 0.7 | 1.1 | Good | 79.6 | 36 | 36 |
| S12-7.0 | 20 | 2-Nov-2018 | 1.2 | 1.6 | Good | 109 | 69 | 57 |
| S12-7.0 | 30 | 2-Nov-2018 | 1.8 | 1.8 | Good | 213 | 144 | 96 |

BOLD = Parameter Exceeds Recommended Guideline Criteria
BOLD = Parameter is Elevated Compared to Background Concentrations

*Alberta Soil and Groundwater Remediation Guidelines (Table 4). January 2019.
 (all concentrations in mg/kg = ppm, unless noted)

Topsoil = surface A, L, F, H and O horizons on the control area, or the equivalent surface soil where these horizons are not present.

EC = Electrical Conductivity (dS/m)

SAR = Sodium Adsorption Ratio

| | EC | SAR | Condition | Ca | Cl- | Na |
|---------|-----|------|-----------|-------|--------|--------|
| MIN | 0.5 | 1.1 | 26% | 5.6 | 28.0 | 36.0 |
| MAX | 7.5 | 50.0 | 24% | 513.0 | 1690.0 | 1120.0 |
| GEOMEAN | 1.9 | 8.4 | 11% | 55.8 | 242.1 | 229.1 |
| AVERAGE | 2.6 | 14.5 | 39% | 98.0 | 472.0 | 359.3 |



Nichols Environmental (Canada) Ltd.

TABLE: A-3
 TITLE: SOIL ANALYSES - COE 2019 ROAD SALT DATA
 PROJECT#: 19-424-CAI
 CLIENT: The City of Edmonton
 PROJECT: Anti-Icing Salinity Data Review
 LOCATION: Edmonton, Alberta

| 2019 Alberta* | Natural Area | EC | SAR | Rating | Calcium | Chloride | Sodium |
|---------------|--------------|-----|------|------------|-------------------------|----------|--------|
| | | <2 | <4 | Good | No Guidelines Available | | |
| | | 2-4 | 4-8 | Fair | | | |
| Fine Grained | Topsoil | 4-8 | 8-12 | Poor | | | |
| | | >8 | >12 | Unsuitable | | | |

| Sample ID | Depth (cm) | Date | EC | SAR | Rating | Calcium | Chloride | Sodium |
|-----------|------------|-------------|-----|------|------------|---------|----------|--------|
| S1-1.5 | 10 | 27-May-2019 | 0.8 | 7.1 | Fair | 20.6 | 67 | 113 |
| S1-1.5 | 20 | 27-May-2019 | 0.9 | 9.1 | Poor | 24.8 | 124 | 175 |
| S1-1.5 | 30 | 27-May-2019 | 1.2 | 12.1 | Unsuitable | 20.8 | 190 | 204 |
| S1-3.0 | 10 | 27-May-2019 | 0.6 | 3.3 | Good | 32.7 | 44 | 70 |
| S1-3.0 | 20 | 27-May-2019 | 0.7 | 6.1 | Fair | 22.8 | 56 | 105 |
| S1-3.0 | 30 | 27-May-2019 | 1.0 | 8.2 | Poor | 22.8 | 115 | 133 |
| S1-7.0 | 10 | 27-May-2019 | 0.5 | 1.4 | Good | 37.6 | 41 | 35 |
| S1-7.0 | 20 | 27-May-2019 | 0.5 | 2.9 | Good | 24.5 | 25 | 54 |
| S1-7.0 | 30 | 27-May-2019 | 0.6 | 4.3 | Fair | 20.9 | 35 | 69 |
| S2-1.5 | 10 | 27-May-2019 | 3.2 | 28 | Unsuitable | 16 | 489 | 322 |
| S2-1.5 | 20 | 27-May-2019 | 5.0 | 36 | Unsuitable | 37 | 1310 | 851 |
| S2-1.5 | 30 | 27-May-2019 | 5.0 | 31 | Unsuitable | 44 | 1230 | 799 |
| S2-3.0 | 10 | 27-May-2019 | 3.0 | 17 | Unsuitable | 36 | 563 | 334 |
| S2-3.0 | 20 | 27-May-2019 | 4.5 | 23 | Unsuitable | 68 | 1130 | 723 |
| S2-3.0 | 30 | 27-May-2019 | 6.1 | 19.6 | Unsuitable | 139 | 1370 | 853 |
| S2-7.0 | 10 | 27-May-2019 | 0.9 | 4 | Fair | 54.1 | 131 | 126 |
| S2-7.0 | 20 | 27-May-2019 | 1.0 | 4.6 | Fair | 53.9 | 102 | 136 |
| S2-7.0 | 30 | 27-May-2019 | 2.0 | 3.9 | Good | 125 | 180 | 162 |
| S3-1.5 | 10 | 27-May-2019 | 4.2 | 38 | Unsuitable | 20 | 939 | 585 |
| S3-1.5 | 20 | 27-May-2019 | 6.0 | 50 | Unsuitable | 27 | 1280 | 866 |
| S3-1.5 | 30 | 27-May-2019 | 6.8 | 49 | Unsuitable | 39 | 1510 | 1030 |
| S3-3.0 | 10 | 27-May-2019 | 2.0 | 20 | Unsuitable | 14 | 299 | 234 |
| S3-3.0 | 20 | 27-May-2019 | 3.5 | 31 | Unsuitable | 24 | 700 | 511 |
| S3-3.0 | 30 | 27-May-2019 | 5.3 | 37 | Unsuitable | 44 | 971 | 850 |
| S3-7.0 | 10 | 27-May-2019 | 0.9 | 3.5 | Good | 46.3 | 103 | 86 |
| S3-7.0 | 20 | 27-May-2019 | 0.7 | 3.1 | Good | 32 | 74 | 58 |
| S3-7.0 | 30 | 27-May-2019 | 0.7 | 3.3 | Good | 29.5 | 80 | 64 |
| S7-1.5 | 10 | 27-May-2019 | 7.1 | 13.2 | Unsuitable | 206 | 1180 | 564 |
| S7-1.5 | 20 | 27-May-2019 | 4.1 | 9.4 | Poor | 145 | 804 | 379 |
| S7-1.5 | 30 | 27-May-2019 | 6.0 | 8.3 | Poor | 248 | 959 | 404 |
| S7-3.0 | 10 | 27-May-2019 | 5.9 | 13 | Unsuitable | 192 | 1020 | 577 |
| S7-3.0 | 20 | 27-May-2019 | 3.9 | 8.3 | Poor | 156 | 672 | 340 |
| S7-3.0 | 30 | 27-May-2019 | 4.7 | 7.8 | Poor | 185 | 737 | 327 |
| S7-7.0 | 10 | 27-May-2019 | 0.9 | 1.8 | Good | 54.4 | 81 | 43 |
| S7-7.0 | 20 | 27-May-2019 | 1.4 | 2.1 | Good | 97.1 | 65 | 67 |
| S7-7.0 | 30 | 27-May-2019 | 2.6 | 1.6 | Fair | 281 | 61 | 90 |
| S10-1.5 | 10 | 27-May-2019 | 2.4 | 22 | Unsuitable | 24 | 335 | 379 |
| S10-1.5 | 20 | 27-May-2019 | 2.9 | 25 | Unsuitable | 32 | 592 | 520 |
| S10-1.5 | 30 | 27-May-2019 | 3.3 | 27 | Unsuitable | 34 | 856 | 621 |
| S10-3.0 | 10 | 27-May-2019 | 1.1 | 8.9 | Poor | 27.2 | 67 | 160 |
| S10-3.0 | 20 | 27-May-2019 | 1.2 | 12.4 | Unsuitable | 20.9 | 92 | 200 |
| S10-3.0 | 30 | 27-May-2019 | 1.3 | 13.9 | Unsuitable | 21.8 | 173 | 253 |
| S10-7.0 | 10 | 27-May-2019 | 0.8 | 1.2 | Good | 79 | 30 | 39 |
| S10-7.0 | 20 | 27-May-2019 | 0.6 | 1.9 | Good | 47.4 | 36 | 48 |
| S10-7.0 | 30 | 27-May-2019 | 0.8 | 3 | Good | 44.5 | 84 | 73 |
| S12-1.5 | 10 | 27-May-2019 | 3.4 | 16 | Unsuitable | 56 | 616 | 387 |
| S12-1.5 | 20 | 27-May-2019 | 4.4 | 16 | Unsuitable | 118 | 863 | 614 |
| S12-1.5 | 30 | 27-May-2019 | 7.8 | 13 | Unsuitable | 497 | 1130 | 1010 |
| S12-3.0 | 10 | 27-May-2019 | 2.2 | 8.5 | Poor | 71 | 288 | 241 |
| S12-3.0 | 20 | 27-May-2019 | 2.3 | 8.5 | Poor | 89.6 | 198 | 279 |
| S12-3.0 | 30 | 27-May-2019 | 3.1 | 8.1 | Poor | 171 | 262 | 368 |
| S12-7.0 | 10 | 27-May-2019 | 0.8 | 1.7 | Good | 62.2 | 62 | 47 |
| S12-7.0 | 20 | 27-May-2019 | 0.9 | 2 | Good | 79.6 | 45 | 66 |
| S12-7.0 | 30 | 27-May-2019 | 1.8 | 2 | Good | 187 | 107 | 100 |

BOLD = Parameter Exceeds Recommended Guideline Criteria
BOLD = Parameter is Elevated Compared to Background Concentrations

*Alberta Soil and Groundwater Remediation Guidelines (Table 4). January 2019.
 (all concentrations in mg/kg = ppm, unless noted)

Topsoil = surface A, L, F, H and O horizons on the control area, or the equivalent surface soil where these horizons are not present.

EC = Electrical Conductivity (dS/m)

SAR = Sodium Adsorption Ratio

| | EC | SAR | Condition | Ca | Cl- | Na |
|---------|-----|------|-----------|-------|--------|--------|
| MIN | 0.5 | 1.2 | 28% | 14.0 | 25.0 | 35.0 |
| MAX | 7.8 | 50.0 | 11% | 497.0 | 1510.0 | 1030.0 |
| GEOMEAN | 1.9 | 8.3 | 19% | 53.2 | 230.5 | 211.7 |
| AVERAGE | 2.7 | 13.2 | 43% | 79.7 | 455.1 | 328.6 |



TABLE: A-4
 TITLE: SOIL ANALYSES - COE 10 CM ROAD SALT DATA
 PROJECT#: 19-424-CAI
 CLIENT: The City of Edmonton
 PROJECT: Anti-Icing Salinity Data Review
 LOCATION: Edmonton, Alberta

| 2019 Alberta* | Natural Area | EC | SAR | Rating | Calcium | Chloride | Sodium |
|---------------|--------------|-----|------|------------|-------------------------|----------|--------|
| | | <2 | <4 | Good | No Guidelines Available | | |
| | | 2-4 | 4-8 | Fair | | | |
| Fine Grained | Topsoil | 4-8 | 8-12 | Poor | | | |
| | | >8 | >12 | Unsuitable | | | |

| Sample ID | Depth (cm) | Date | EC | SAR | Rating | Calcium | Chloride | Sodium |
|-----------|------------|-------------|-----|------|------------|---------|----------|--------|
| S1-1.5 | 10 | 2-Nov-2018 | 0.8 | 6.7 | Fair | 19.5 | 32 | 104 |
| S1-1.5 | 10 | 27-May-2019 | 0.8 | 7.1 | Fair | 20.6 | 67 | 113 |
| S1-3.0 | 10 | 2-Nov-2018 | 0.7 | 3.6 | Good | 32.6 | 60 | 80 |
| S1-3.0 | 10 | 27-May-2019 | 0.6 | 3.3 | Good | 32.7 | 44 | 70 |
| S1-7.0 | 10 | 2-Nov-2018 | 0.7 | 2.7 | Good | 50.9 | 70 | 90 |
| S1-7.0 | 10 | 27-May-2019 | 0.5 | 1.4 | Good | 37.6 | 41 | 35 |
| S2-1.5 | 10 | 2-Nov-2018 | 1.7 | 21.8 | Unsuitable | 10.5 | 217 | 228 |
| S2-1.5 | 10 | 27-May-2019 | 3.2 | 28 | Unsuitable | 16 | 489 | 322 |
| S2-3.0 | 10 | 2-Nov-2018 | 2.4 | 28 | Unsuitable | 11 | 341 | 297 |
| S2-3.0 | 10 | 27-May-2019 | 3.0 | 17 | Unsuitable | 36 | 563 | 334 |
| S2-7.0 | 10 | 2-Nov-2018 | 1.0 | 3.3 | Good | 64.8 | 106 | 111 |
| S2-7.0 | 10 | 27-May-2019 | 0.9 | 4 | Fair | 54.1 | 131 | 126 |
| S3-1.5 | 10 | 2-Nov-2018 | 2.0 | 30 | Unsuitable | 11 | 372 | 383 |
| S3-1.5 | 10 | 27-May-2019 | 4.2 | 38 | Unsuitable | 20 | 939 | 585 |
| S3-3.0 | 10 | 2-Nov-2018 | 2.3 | 41 | Unsuitable | 5.6 | 314 | 259 |
| S3-3.0 | 10 | 27-May-2019 | 2.0 | 20 | Unsuitable | 14 | 299 | 234 |
| S3-7.0 | 10 | 2-Nov-2018 | 1.0 | 3.7 | Good | 56.1 | 118 | 114 |
| S3-7.0 | 10 | 27-May-2019 | 0.9 | 3.5 | Good | 46.3 | 103 | 86 |
| S7-1.5 | 10 | 2-Nov-2018 | 7.5 | 13.4 | Unsuitable | 314 | 1690 | 818 |
| S7-1.5 | 10 | 27-May-2019 | 7.1 | 13.2 | Unsuitable | 206 | 1180 | 564 |
| S7-3.0 | 10 | 2-Nov-2018 | 2.5 | 6.1 | Fair | 139 | 468 | 249 |
| S7-3.0 | 10 | 27-May-2019 | 5.9 | 13 | Unsuitable | 192 | 1020 | 577 |
| S7-7.0 | 10 | 2-Nov-2018 | 1.1 | 1.7 | Good | 100 | 119 | 63 |
| S7-7.0 | 10 | 27-May-2019 | 0.9 | 1.8 | Good | 54.4 | 81 | 43 |
| S10-1.5 | 10 | 2-Nov-2018 | 2.3 | 37 | Unsuitable | 11 | 304 | 364 |
| S10-1.5 | 10 | 27-May-2019 | 2.4 | 22 | Unsuitable | 24 | 335 | 379 |
| S10-3.0 | 10 | 2-Nov-2018 | 0.9 | 7 | Fair | 25.3 | 81 | 120 |
| S10-3.0 | 10 | 27-May-2019 | 1.1 | 8.9 | Poor | 27.2 | 67 | 160 |
| S10-7.0 | 10 | 2-Nov-2018 | 0.8 | 1.1 | Good | 80.6 | 34 | 38 |
| S10-7.0 | 10 | 27-May-2019 | 0.8 | 1.2 | Good | 79 | 30 | 39 |
| S12-1.5 | 10 | 2-Nov-2018 | 1.3 | 8.5 | Poor | 29.6 | 110 | 147 |
| S12-1.5 | 10 | 27-May-2019 | 3.4 | 16 | Unsuitable | 56 | 616 | 387 |
| S12-3.0 | 10 | 2-Nov-2018 | 1.1 | 6.9 | Fair | 32.9 | 117 | 130 |
| S12-3.0 | 10 | 27-May-2019 | 2.2 | 8.5 | Poor | 71 | 288 | 241 |
| S12-7.0 | 10 | 2-Nov-2018 | 0.7 | 1.1 | Good | 79.6 | 36 | 36 |
| S12-7.0 | 10 | 27-May-2019 | 0.8 | 1.7 | Good | 62.2 | 62 | 47 |

BOLD = Parameter Exceeds Recommended Guideline Criteria
BOLD = Parameter is Elevated Compared to Background Concentrations

*Alberta Soil and Groundwater Remediation Guidelines (Table 4). January 2019.
 (all concentrations in mg/kg = ppm, unless noted)

Topsoil = surface A, L, F, H and O horizons on the control area, or the equivalent surface soil where these horizons are not present.

EC = Electrical Conductivity (dS/m)

SAR = Sodium Adsorption Ratio

| | EC | SAR | Condition | Ca | Cl- | Na |
|---------|-----|------|-----------|-------|--------|-------|
| MIN | 0.5 | 1.1 | 36% | 5.6 | 30.0 | 35.0 |
| MAX | 7.5 | 41.0 | 17% | 314.0 | 1690.0 | 818.0 |
| GEOMEAN | 1.5 | 7.1 | 8% | 38.9 | 163.5 | 154.3 |
| AVERAGE | 2.0 | 12.0 | 39% | 59.0 | 304.0 | 221.5 |



TABLE: A-5
 TITLE: SOIL ANALYSES - COE 20 CM ROAD SALT DATA
 PROJECT#: 19-424-CAI
 CLIENT: The City of Edmonton
 PROJECT: Anti-Icing Salinity Data Review
 LOCATION: Edmonton, Alberta

| 2019 Alberta* | Natural Area | EC | SAR | Rating | Calcium | Chloride | Sodium |
|---------------|--------------|-----|------|------------|-------------------------|----------|--------|
| | | <2 | <4 | Good | No Guidelines Available | | |
| | | 2-4 | 4-8 | Fair | | | |
| Fine Grained | Topsoil | 4-8 | 8-12 | Poor | | | |
| | | >8 | >12 | Unsuitable | | | |

| Sample ID | Depth (cm) | Date | EC | SAR | Rating | Calcium | Chloride | Sodium |
|-----------|------------|-------------|-----|------|------------|---------|----------|--------|
| S1-1.5 | 20 | 2-Nov-2018 | 1.0 | 10.1 | Poor | 31.5 | 158 | 231 |
| S1-1.5 | 20 | 27-May-2019 | 0.9 | 9.1 | Poor | 24.8 | 124 | 175 |
| S1-3.0 | 20 | 2-Nov-2018 | 0.6 | 5.3 | Fair | 24 | 50 | 105 |
| S1-3.0 | 20 | 27-May-2019 | 0.7 | 6.1 | Fair | 22.8 | 56 | 105 |
| S1-7.0 | 20 | 2-Nov-2018 | 0.5 | 3.5 | Good | 27 | 28 | 74 |
| S1-7.0 | 20 | 27-May-2019 | 0.5 | 2.9 | Good | 24.5 | 25 | 54 |
| S2-1.5 | 20 | 2-Nov-2018 | 3.3 | 37 | Unsuitable | 27 | 1090 | 885 |
| S2-1.5 | 20 | 27-May-2019 | 5.0 | 36 | Unsuitable | 37 | 1310 | 851 |
| S2-3.0 | 20 | 2-Nov-2018 | 5.0 | 26 | Unsuitable | 82 | 1330 | 915 |
| S2-3.0 | 20 | 27-May-2019 | 4.5 | 23 | Unsuitable | 68 | 1130 | 723 |
| S2-7.0 | 20 | 2-Nov-2018 | 1.0 | 4.1 | Fair | 51.4 | 103 | 116 |
| S2-7.0 | 20 | 27-May-2019 | 1.0 | 4.6 | Fair | 53.9 | 102 | 136 |
| S3-1.5 | 20 | 2-Nov-2018 | 3.8 | 45 | Unsuitable | 22 | 1000 | 787 |
| S3-1.5 | 20 | 27-May-2019 | 6.0 | 50 | Unsuitable | 27 | 1280 | 866 |
| S3-3.0 | 20 | 2-Nov-2018 | 5.0 | 50 | Unsuitable | 25 | 1150 | 866 |
| S3-3.0 | 20 | 27-May-2019 | 3.5 | 31 | Unsuitable | 24 | 700 | 511 |
| S3-7.0 | 20 | 2-Nov-2018 | 1.0 | 2.9 | Good | 57.7 | 87 | 81 |
| S3-7.0 | 20 | 27-May-2019 | 0.7 | 3.1 | Good | 32 | 74 | 58 |
| S7-1.5 | 20 | 2-Nov-2018 | 5.9 | 14 | Unsuitable | 197 | 1250 | 679 |
| S7-1.5 | 20 | 27-May-2019 | 4.1 | 9.4 | Poor | 145 | 804 | 379 |
| S7-3.0 | 20 | 2-Nov-2018 | 2.6 | 7.9 | Fair | 94.9 | 361 | 253 |
| S7-3.0 | 20 | 27-May-2019 | 3.9 | 8.3 | Poor | 156 | 672 | 340 |
| S7-7.0 | 20 | 2-Nov-2018 | 2.6 | 2.1 | Fair | 325 | 320 | 138 |
| S7-7.0 | 20 | 27-May-2019 | 1.4 | 2.1 | Good | 97.1 | 65 | 67 |
| S10-1.5 | 20 | 2-Nov-2018 | 4.2 | 36 | Unsuitable | 35 | 868 | 756 |
| S10-1.5 | 20 | 27-May-2019 | 2.9 | 25 | Unsuitable | 32 | 592 | 520 |
| S10-3.0 | 20 | 2-Nov-2018 | 1.1 | 12.6 | Unsuitable | 18.8 | 105 | 190 |
| S10-3.0 | 20 | 27-May-2019 | 1.2 | 12.4 | Unsuitable | 20.9 | 92 | 200 |
| S10-7.0 | 20 | 2-Nov-2018 | 0.6 | 1.7 | Good | 44.3 | 32 | 40 |
| S10-7.0 | 20 | 27-May-2019 | 0.6 | 1.9 | Good | 47.4 | 36 | 48 |
| S12-1.5 | 20 | 2-Nov-2018 | 2.5 | 15 | Unsuitable | 50 | 372 | 359 |
| S12-1.5 | 20 | 27-May-2019 | 4.4 | 16 | Unsuitable | 118 | 863 | 614 |
| S12-3.0 | 20 | 2-Nov-2018 | 2.8 | 10 | Poor | 98.9 | 345 | 340 |
| S12-3.0 | 20 | 27-May-2019 | 2.3 | 8.5 | Poor | 89.6 | 198 | 279 |
| S12-7.0 | 20 | 2-Nov-2018 | 1.2 | 1.6 | Good | 109 | 69 | 57 |
| S12-7.0 | 20 | 27-May-2019 | 0.9 | 2 | Good | 79.6 | 45 | 66 |

BOLD = Parameter Exceeds Recommended Guideline Criteria
BOLD = Parameter is Elevated Compared to Background Concentrations

*Alberta Soil and Groundwater Remediation Guidelines (Table 4). January 2019.
 (all concentrations in mg/kg = ppm, unless noted)

Topsoil = surface A, L, F, H and O horizons on the control area, or the equivalent surface soil where these horizons are not present.

EC = Electrical Conductivity (dS/m)

SAR = Sodium Adsorption Ratio

| | EC | SAR | Condition | Ca | Cl- | Na |
|---------|-----|------|-----------|-------|--------|-------|
| MIN | 0.5 | 1.6 | 25% | 18.8 | 25.0 | 40.0 |
| MAX | 6.0 | 50.0 | 17% | 325.0 | 1330.0 | 915.0 |
| GEOMEAN | 1.9 | 8.9 | 17% | 50.1 | 230.5 | 229.1 |
| AVERAGE | 2.5 | 14.9 | 42% | 67.2 | 469.1 | 357.3 |



TABLE: A-6
 TITLE: SOIL ANALYSES - COE 30 CM ROAD SALT DATA
 PROJECT#: 19-424-CAI
 CLIENT: The City of Edmonton
 PROJECT: Anti-Icing Salinity Data Review
 LOCATION: Edmonton, Alberta

| 2019 Alberta* | Natural Area | EC | SAR | Rating | Calcium | Chloride | Sodium |
|---------------|--------------|-----|------|------------|-------------------------|----------|--------|
| | | <2 | <4 | Good | No Guidelines Available | | |
| | | 2-4 | 4-8 | Fair | | | |
| Fine Grained | Topsoil | 4-8 | 8-12 | Poor | | | |
| | | >8 | >12 | Unsuitable | | | |

| Sample ID | Depth (cm) | Date | EC | SAR | Rating | Calcium | Chloride | Sodium |
|-----------|------------|-------------|-----|------|------------|---------|----------|--------|
| S1-1.5 | 30 | 2-Nov-2018 | 1.5 | 13.3 | Unsuitable | 34.1 | 320 | 322 |
| S1-1.5 | 30 | 27-May-2019 | 1.2 | 12.1 | Unsuitable | 20.8 | 190 | 204 |
| S1-3.0 | 30 | 2-Nov-2018 | 0.8 | 7.4 | Fair | 25.9 | 116 | 151 |
| S1-3.0 | 30 | 27-May-2019 | 1.0 | 8.2 | Poor | 22.8 | 115 | 133 |
| S1-7.0 | 30 | 2-Nov-2018 | 0.7 | 5.2 | Fair | 30.5 | 55 | 122 |
| S1-7.0 | 30 | 27-May-2019 | 0.6 | 4.3 | Fair | 20.9 | 35 | 69 |
| S2-1.5 | 30 | 2-Nov-2018 | 5.0 | 32 | Unsuitable | 63 | 1440 | 1050 |
| S2-1.5 | 30 | 27-May-2019 | 5.0 | 31 | Unsuitable | 44 | 1230 | 799 |
| S2-3.0 | 30 | 2-Nov-2018 | 6.9 | 19.6 | Unsuitable | 208 | 1630 | 1090 |
| S2-3.0 | 30 | 27-May-2019 | 6.1 | 19.6 | Unsuitable | 139 | 1370 | 853 |
| S2-7.0 | 30 | 2-Nov-2018 | 2.0 | 3.8 | Good | 128 | 221 | 164 |
| S2-7.0 | 30 | 27-May-2019 | 2.0 | 3.9 | Good | 125 | 180 | 162 |
| S3-1.5 | 30 | 2-Nov-2018 | 6.0 | 46 | Unsuitable | 37 | 1530 | 1030 |
| S3-1.5 | 30 | 27-May-2019 | 6.8 | 49 | Unsuitable | 39 | 1510 | 1030 |
| S3-3.0 | 30 | 2-Nov-2018 | 5.6 | 45 | Unsuitable | 41 | 1530 | 1090 |
| S3-3.0 | 30 | 27-May-2019 | 5.3 | 37 | Unsuitable | 44 | 971 | 850 |
| S3-7.0 | 30 | 2-Nov-2018 | 2.7 | 2.6 | Fair | 319 | 171 | 168 |
| S3-7.0 | 30 | 27-May-2019 | 0.7 | 3.3 | Good | 29.5 | 80 | 64 |
| S7-1.5 | 30 | 2-Nov-2018 | 7.0 | 8.4 | Poor | 513 | 1250 | 670 |
| S7-1.5 | 30 | 27-May-2019 | 6.0 | 8.3 | Poor | 248 | 959 | 404 |
| S7-3.0 | 30 | 2-Nov-2018 | 2.7 | 6.3 | Fair | 135 | 468 | 254 |
| S7-3.0 | 30 | 27-May-2019 | 4.7 | 7.8 | Poor | 185 | 737 | 327 |
| S7-7.0 | 30 | 2-Nov-2018 | 3.0 | 2.5 | Fair | 290 | 256 | 142 |
| S7-7.0 | 30 | 27-May-2019 | 2.6 | 1.6 | Fair | 281 | 61 | 90 |
| S10-1.5 | 30 | 2-Nov-2018 | 4.7 | 42 | Unsuitable | 38 | 1500 | 1120 |
| S10-1.5 | 30 | 27-May-2019 | 3.3 | 27 | Unsuitable | 34 | 856 | 621 |
| S10-3.0 | 30 | 2-Nov-2018 | 2.0 | 18.4 | Unsuitable | 23.8 | 293 | 320 |
| S10-3.0 | 30 | 27-May-2019 | 1.3 | 13.9 | Unsuitable | 21.8 | 173 | 253 |
| S10-7.0 | 30 | 2-Nov-2018 | 0.7 | 3 | Good | 39.3 | 61 | 73 |
| S10-7.0 | 30 | 27-May-2019 | 0.8 | 3 | Good | 44.5 | 84 | 73 |
| S12-1.5 | 30 | 2-Nov-2018 | 5.7 | 9.2 | Poor | 369 | 729 | 581 |
| S12-1.5 | 30 | 27-May-2019 | 7.8 | 13 | Unsuitable | 497 | 1130 | 1010 |
| S12-3.0 | 30 | 2-Nov-2018 | 5.0 | 7 | Poor | 391 | 465 | 454 |
| S12-3.0 | 30 | 27-May-2019 | 3.1 | 8.1 | Poor | 171 | 262 | 368 |
| S12-7.0 | 30 | 2-Nov-2018 | 1.8 | 1.8 | Good | 213 | 144 | 96 |
| S12-7.0 | 30 | 27-May-2019 | 1.8 | 2 | Good | 187 | 107 | 100 |

BOLD = Parameter Exceeds Recommended Guideline Criteria
BOLD = Parameter is Elevated Compared to Background Concentrations

*Alberta Soil and Groundwater Remediation Guidelines (Table 4). January 2019.
 (all concentrations in mg/kg = ppm, unless noted)

Topsoil = surface A, L, F, H and O horizons on the control area, or the equivalent surface soil where these horizons are not present.

EC = Electrical Conductivity (dS/m)

SAR = Sodium Adsorption Ratio

| | EC | SAR | Condition | Ca | Cl- | Na |
|---------|-----|------|-----------|-------|--------|--------|
| MIN | 0.6 | 1.6 | 19% | 20.8 | 35.0 | 64.0 |
| MAX | 7.8 | 49.0 | 19% | 513.0 | 1630.0 | 1120.0 |
| GEOMEAN | 2.6 | 9.1 | 19% | 83.0 | 350.0 | 302.3 |
| AVERAGE | 3.4 | 14.6 | 42% | 140.4 | 617.5 | 453.0 |



TABLE: A-7
 TITLE: SOIL ANALYSES - COE 1.5 M ROAD SALT DATA
 PROJECT#: 19-424-CAI
 CLIENT: The City of Edmonton
 PROJECT: Anti-Icing Salinity Data Review
 LOCATION: Edmonton, Alberta

| 2019 Alberta* | Natural Area | EC | SAR | Rating | Calcium | Chloride | Sodium |
|---------------|--------------|-----|------|------------|-------------------------|----------|--------|
| | | <2 | <4 | Good | No Guidelines Available | | |
| | | 2-4 | 4-8 | Fair | | | |
| Fine Grained | Topsoil | 4-8 | 8-12 | Poor | | | |
| | | >8 | >12 | Unsuitable | | | |

| Sample ID | Depth (cm) | Date | EC | SAR | Rating | Calcium | Chloride | Sodium |
|-----------|------------|-------------|-----|------|------------|---------|----------|--------|
| S1-1.5 | 10 | 2-Nov-2018 | 0.8 | 6.7 | Fair | 19.5 | 32 | 104 |
| S1-1.5 | 10 | 27-May-2019 | 0.8 | 7.1 | Fair | 20.6 | 67 | 113 |
| S1-1.5 | 20 | 2-Nov-2018 | 1.0 | 10.1 | Poor | 31.5 | 158 | 231 |
| S1-1.5 | 20 | 27-May-2019 | 0.9 | 9.1 | Poor | 24.8 | 124 | 175 |
| S1-1.5 | 30 | 2-Nov-2018 | 1.5 | 13.3 | Unsuitable | 34.1 | 320 | 322 |
| S1-1.5 | 30 | 27-May-2019 | 1.2 | 12.1 | Unsuitable | 20.8 | 190 | 204 |
| S2-1.5 | 10 | 2-Nov-2018 | 1.7 | 21.8 | Unsuitable | 10.5 | 217 | 228 |
| S2-1.5 | 10 | 27-May-2019 | 3.2 | 28 | Unsuitable | 16 | 489 | 322 |
| S2-1.5 | 20 | 2-Nov-2018 | 3.3 | 37 | Unsuitable | 27 | 1090 | 885 |
| S2-1.5 | 20 | 27-May-2019 | 5.0 | 36 | Unsuitable | 37 | 1310 | 851 |
| S2-1.5 | 30 | 2-Nov-2018 | 5.0 | 32 | Unsuitable | 63 | 1440 | 1050 |
| S2-1.5 | 30 | 27-May-2019 | 5.0 | 31 | Unsuitable | 44 | 1230 | 799 |
| S3-1.5 | 10 | 2-Nov-2018 | 2.0 | 30 | Unsuitable | 11 | 372 | 383 |
| S3-1.5 | 10 | 27-May-2019 | 4.2 | 38 | Unsuitable | 20 | 939 | 585 |
| S3-1.5 | 20 | 2-Nov-2018 | 3.8 | 45 | Unsuitable | 22 | 1000 | 787 |
| S3-1.5 | 20 | 27-May-2019 | 6.0 | 50 | Unsuitable | 27 | 1280 | 866 |
| S3-1.5 | 30 | 2-Nov-2018 | 6.0 | 46 | Unsuitable | 37 | 1530 | 1030 |
| S3-1.5 | 30 | 27-May-2019 | 6.8 | 49 | Unsuitable | 39 | 1510 | 1030 |
| S7-1.5 | 10 | 2-Nov-2018 | 7.5 | 13.4 | Unsuitable | 314 | 1690 | 818 |
| S7-1.5 | 10 | 27-May-2019 | 7.1 | 13.2 | Unsuitable | 206 | 1180 | 564 |
| S7-1.5 | 20 | 2-Nov-2018 | 5.9 | 14 | Unsuitable | 197 | 1250 | 679 |
| S7-1.5 | 20 | 27-May-2019 | 4.1 | 9.4 | Poor | 145 | 804 | 379 |
| S7-1.5 | 30 | 2-Nov-2018 | 7.0 | 8.4 | Poor | 513 | 1250 | 670 |
| S7-1.5 | 30 | 27-May-2019 | 6.0 | 8.3 | Poor | 248 | 959 | 404 |
| S10-1.5 | 10 | 2-Nov-2018 | 2.3 | 37 | Unsuitable | 11 | 304 | 364 |
| S10-1.5 | 10 | 27-May-2019 | 2.4 | 22 | Unsuitable | 24 | 335 | 379 |
| S10-1.5 | 20 | 2-Nov-2018 | 4.2 | 36 | Unsuitable | 35 | 868 | 756 |
| S10-1.5 | 20 | 27-May-2019 | 2.9 | 25 | Unsuitable | 32 | 592 | 520 |
| S10-1.5 | 30 | 2-Nov-2018 | 4.7 | 42 | Unsuitable | 38 | 1500 | 1120 |
| S10-1.5 | 30 | 27-May-2019 | 3.3 | 27 | Unsuitable | 34 | 856 | 621 |
| S12-1.5 | 10 | 2-Nov-2018 | 1.3 | 8.5 | Poor | 29.6 | 110 | 147 |
| S12-1.5 | 10 | 27-May-2019 | 3.4 | 16 | Unsuitable | 56 | 616 | 387 |
| S12-1.5 | 20 | 2-Nov-2018 | 2.5 | 15 | Unsuitable | 50 | 372 | 359 |
| S12-1.5 | 20 | 27-May-2019 | 4.4 | 16 | Unsuitable | 118 | 863 | 614 |
| S12-1.5 | 30 | 2-Nov-2018 | 5.7 | 9.2 | Poor | 369 | 729 | 581 |
| S12-1.5 | 30 | 27-May-2019 | 7.8 | 13 | Unsuitable | 497 | 1130 | 1010 |

BOLD = Parameter Exceeds Recommended Guideline Criteria
BOLD = Parameter is Elevated Compared to Background Concentrations

*Alberta Soil and Groundwater Remediation Guidelines (Table 4). January 2019.
 (all concentrations in mg/kg = ppm, unless noted)

Topsoil = surface A, L, F, H and O horizons on the control area, or the equivalent surface soil where these horizons are not present.

EC = Electrical Conductivity (dS/m)

SAR = Sodium Adsorption Ratio

| | EC | SAR | Condition | Ca | Cl- | Na |
|---------|-----|------|-----------|-------|--------|--------|
| MIN | 0.8 | 6.7 | 0% | 10.5 | 32.0 | 104.0 |
| MAX | 7.8 | 50.0 | 6% | 513.0 | 1690.0 | 1120.0 |
| GEOMEAN | 3.2 | 19.2 | 19% | 47.9 | 573.7 | 473.8 |
| AVERAGE | 3.9 | 23.2 | 75% | 95.0 | 797.4 | 564.9 |



TABLE: A-8
 TITLE: SOIL ANALYSES - COE 3.0 M ROAD SALT DATA
 PROJECT#: 19-424-CAI
 CLIENT: The City of Edmonton
 PROJECT: Anti-Icing Salinity Data Review
 LOCATION: Edmonton, Alberta

| 2019 Alberta* | Natural Area | EC | SAR | Rating | Calcium | Chloride | Sodium |
|---------------|--------------|-----|------|------------|-------------------------|----------|--------|
| | | <2 | <4 | Good | No Guidelines Available | | |
| | | 2-4 | 4-8 | Fair | | | |
| Fine Grained | Topsoil | 4-8 | 8-12 | Poor | | | |
| | | >8 | >12 | Unsuitable | | | |

| Sample ID | Depth (cm) | Date | EC | SAR | Rating | Calcium | Chloride | Sodium |
|-----------|------------|-------------|-----|------|------------|---------|----------|--------|
| S1-3.0 | 10 | 2-Nov-2018 | 0.7 | 3.6 | Good | 32.6 | 60 | 80 |
| S1-3.0 | 10 | 27-May-2019 | 0.6 | 3.3 | Good | 32.7 | 44 | 70 |
| S1-3.0 | 20 | 2-Nov-2018 | 0.6 | 5.3 | Fair | 24 | 50 | 105 |
| S1-3.0 | 20 | 27-May-2019 | 0.7 | 6.1 | Fair | 22.8 | 56 | 105 |
| S1-3.0 | 30 | 2-Nov-2018 | 0.8 | 7.4 | Fair | 25.9 | 116 | 151 |
| S1-3.0 | 30 | 27-May-2019 | 1.0 | 8.2 | Poor | 22.8 | 115 | 133 |
| S2-3.0 | 10 | 2-Nov-2018 | 2.4 | 28 | Unsuitable | 11 | 341 | 297 |
| S2-3.0 | 10 | 27-May-2019 | 3.0 | 17 | Unsuitable | 36 | 563 | 334 |
| S2-3.0 | 20 | 2-Nov-2018 | 5.0 | 26 | Unsuitable | 82 | 1330 | 915 |
| S2-3.0 | 20 | 27-May-2019 | 4.5 | 23 | Unsuitable | 68 | 1130 | 723 |
| S2-3.0 | 30 | 2-Nov-2018 | 6.9 | 19.6 | Unsuitable | 208 | 1630 | 1090 |
| S2-3.0 | 30 | 27-May-2019 | 6.1 | 19.6 | Unsuitable | 139 | 1370 | 853 |
| S3-3.0 | 10 | 2-Nov-2018 | 2.3 | 41 | Unsuitable | 5.6 | 314 | 259 |
| S3-3.0 | 10 | 27-May-2019 | 2.0 | 20 | Unsuitable | 14 | 299 | 234 |
| S3-3.0 | 20 | 2-Nov-2018 | 5.0 | 50 | Unsuitable | 25 | 1150 | 866 |
| S3-3.0 | 20 | 27-May-2019 | 3.5 | 31 | Unsuitable | 24 | 700 | 511 |
| S3-3.0 | 30 | 2-Nov-2018 | 5.6 | 45 | Unsuitable | 41 | 1530 | 1090 |
| S3-3.0 | 30 | 27-May-2019 | 5.3 | 37 | Unsuitable | 44 | 971 | 850 |
| S7-3.0 | 10 | 2-Nov-2018 | 2.5 | 6.1 | Fair | 139 | 468 | 249 |
| S7-3.0 | 10 | 27-May-2019 | 5.9 | 13 | Unsuitable | 192 | 1020 | 577 |
| S7-3.0 | 20 | 2-Nov-2018 | 2.6 | 7.9 | Fair | 94.9 | 361 | 253 |
| S7-3.0 | 20 | 27-May-2019 | 3.9 | 8.3 | Poor | 156 | 672 | 340 |
| S7-3.0 | 30 | 2-Nov-2018 | 2.7 | 6.3 | Fair | 135 | 468 | 254 |
| S7-3.0 | 30 | 27-May-2019 | 4.7 | 7.8 | Poor | 185 | 737 | 327 |
| S10-3.0 | 10 | 2-Nov-2018 | 0.9 | 7 | Fair | 25.3 | 81 | 120 |
| S10-3.0 | 10 | 27-May-2019 | 1.1 | 8.9 | Poor | 27.2 | 67 | 160 |
| S10-3.0 | 20 | 2-Nov-2018 | 1.1 | 12.6 | Unsuitable | 18.8 | 105 | 190 |
| S10-3.0 | 20 | 27-May-2019 | 1.2 | 12.4 | Unsuitable | 20.9 | 92 | 200 |
| S10-3.0 | 30 | 2-Nov-2018 | 2.0 | 18.4 | Unsuitable | 23.8 | 293 | 320 |
| S10-3.0 | 30 | 27-May-2019 | 1.3 | 13.9 | Unsuitable | 21.8 | 173 | 253 |
| S12-3.0 | 10 | 2-Nov-2018 | 1.1 | 6.9 | Fair | 32.9 | 117 | 130 |
| S12-3.0 | 10 | 27-May-2019 | 2.2 | 8.5 | Poor | 71 | 288 | 241 |
| S12-3.0 | 20 | 2-Nov-2018 | 2.8 | 10 | Poor | 98.9 | 345 | 340 |
| S12-3.0 | 20 | 27-May-2019 | 2.3 | 8.5 | Poor | 89.6 | 198 | 279 |
| S12-3.0 | 30 | 2-Nov-2018 | 5.0 | 7 | Poor | 391 | 465 | 454 |
| S12-3.0 | 30 | 27-May-2019 | 3.1 | 8.1 | Poor | 171 | 262 | 368 |

BOLD = Parameter Exceeds Recommended Guideline Criteria
BOLD = Parameter is Elevated Compared to Background Concentrations

*Alberta Soil and Groundwater Remediation Guidelines (Table 4). January 2019.
 (all concentrations in mg/kg = ppm, unless noted)

Topsoil = surface A, L, F, H and O horizons on the control area, or the equivalent surface soil where these horizons are not present.

EC = Electrical Conductivity (dS/m)

SAR = Sodium Adsorption Ratio

| | EC | SAR | Condition | Ca | Cl- | Na |
|---------|-----|------|-----------|-------|--------|--------|
| MIN | 0.6 | 3.3 | 6% | 5.6 | 44.0 | 70.0 |
| MAX | 6.9 | 50.0 | 22% | 391.0 | 1630.0 | 1090.0 |
| GEOMEAN | 2.2 | 12.1 | 25% | 48.1 | 302.9 | 292.0 |
| AVERAGE | 2.8 | 15.6 | 47% | 76.5 | 499.5 | 381.1 |



TABLE: A-9
 TITLE: SOIL ANALYSES - COE 7.0 M ROAD SALT DATA
 PROJECT#: 19-424-CAI
 CLIENT: The City of Edmonton
 PROJECT: Anti-Icing Salinity Data Review
 LOCATION: Edmonton, Alberta

| 2019 Alberta* | Natural Area | EC | SAR | Rating | Calcium | Chloride | Sodium |
|---------------|--------------|-----|------|------------|-------------------------|----------|--------|
| | | <2 | <4 | Good | No Guidelines Available | | |
| | | 2-4 | 4-8 | Fair | | | |
| Fine Grained | Topsoil | 4-8 | 8-12 | Poor | | | |
| | | >8 | >12 | Unsuitable | | | |

| Sample ID | Depth (cm) | Date | EC | SAR | Rating | Calcium | Chloride | Sodium |
|-----------|------------|-------------|-----|-----|--------|---------|----------|--------|
| S1-7.0 | 10 | 2-Nov-2018 | 0.7 | 2.7 | Good | 50.9 | 70 | 90 |
| S1-7.0 | 10 | 27-May-2019 | 0.5 | 1.4 | Good | 37.6 | 41 | 35 |
| S1-7.0 | 20 | 2-Nov-2018 | 0.5 | 3.5 | Good | 27 | 28 | 74 |
| S1-7.0 | 20 | 27-May-2019 | 0.5 | 2.9 | Good | 24.5 | 25 | 54 |
| S1-7.0 | 30 | 2-Nov-2018 | 0.7 | 5.2 | Fair | 30.5 | 55 | 122 |
| S1-7.0 | 30 | 27-May-2019 | 0.6 | 4.3 | Fair | 20.9 | 35 | 69 |
| S2-7.0 | 10 | 2-Nov-2018 | 1.0 | 3.3 | Good | 64.8 | 106 | 111 |
| S2-7.0 | 10 | 27-May-2019 | 0.9 | 4 | Fair | 54.1 | 131 | 126 |
| S2-7.0 | 20 | 2-Nov-2018 | 1.0 | 4.1 | Fair | 51.4 | 103 | 116 |
| S2-7.0 | 20 | 27-May-2019 | 1.0 | 4.6 | Fair | 53.9 | 102 | 136 |
| S2-7.0 | 30 | 2-Nov-2018 | 2.0 | 3.8 | Good | 128 | 221 | 164 |
| S2-7.0 | 30 | 27-May-2019 | 2.0 | 3.9 | Good | 125 | 180 | 162 |
| S3-7.0 | 10 | 2-Nov-2018 | 1.0 | 3.7 | Good | 56.1 | 118 | 114 |
| S3-7.0 | 10 | 27-May-2019 | 0.9 | 3.5 | Good | 46.3 | 103 | 86 |
| S3-7.0 | 20 | 2-Nov-2018 | 1.0 | 2.9 | Good | 57.7 | 87 | 81 |
| S3-7.0 | 20 | 27-May-2019 | 0.7 | 3.1 | Good | 32 | 74 | 58 |
| S3-7.0 | 30 | 2-Nov-2018 | 2.7 | 2.6 | Fair | 319 | 171 | 168 |
| S3-7.0 | 30 | 27-May-2019 | 0.7 | 3.3 | Good | 29.5 | 80 | 64 |
| S7-7.0 | 10 | 2-Nov-2018 | 1.1 | 1.7 | Good | 100 | 119 | 63 |
| S7-7.0 | 10 | 27-May-2019 | 0.9 | 1.8 | Good | 54.4 | 81 | 43 |
| S7-7.0 | 20 | 2-Nov-2018 | 2.6 | 2.1 | Fair | 325 | 320 | 138 |
| S7-7.0 | 20 | 27-May-2019 | 1.4 | 2.1 | Good | 97.1 | 65 | 67 |
| S7-7.0 | 30 | 2-Nov-2018 | 3.0 | 2.5 | Fair | 290 | 256 | 142 |
| S7-7.0 | 30 | 27-May-2019 | 2.6 | 1.6 | Fair | 281 | 61 | 90 |
| S10-7.0 | 10 | 2-Nov-2018 | 0.8 | 1.1 | Good | 80.6 | 34 | 38 |
| S10-7.0 | 10 | 27-May-2019 | 0.8 | 1.2 | Good | 79 | 30 | 39 |
| S10-7.0 | 20 | 2-Nov-2018 | 0.6 | 1.7 | Good | 44.3 | 32 | 40 |
| S10-7.0 | 20 | 27-May-2019 | 0.6 | 1.9 | Good | 47.4 | 36 | 48 |
| S10-7.0 | 30 | 2-Nov-2018 | 0.7 | 3 | Good | 39.3 | 61 | 73 |
| S10-7.0 | 30 | 27-May-2019 | 0.8 | 3 | Good | 44.5 | 84 | 73 |
| S12-7.0 | 10 | 2-Nov-2018 | 0.7 | 1.1 | Good | 79.6 | 36 | 36 |
| S12-7.0 | 10 | 27-May-2019 | 0.8 | 1.7 | Good | 62.2 | 62 | 47 |
| S12-7.0 | 20 | 2-Nov-2018 | 1.2 | 1.6 | Good | 109 | 69 | 57 |
| S12-7.0 | 20 | 27-May-2019 | 0.9 | 2 | Good | 79.6 | 45 | 66 |
| S12-7.0 | 30 | 2-Nov-2018 | 1.8 | 1.8 | Good | 213 | 144 | 96 |
| S12-7.0 | 30 | 27-May-2019 | 1.8 | 2 | Good | 187 | 107 | 100 |

BOLD = Parameter Exceeds Recommended Guideline Criteria
BOLD = Parameter is Elevated Compared to Background Concentrations

*Alberta Soil and Groundwater Remediation Guidelines (Table 4). January 2019.
 (all concentrations in mg/kg = ppm, unless noted)

Topsoil = surface A, L, F, H and O horizons on the control area, or the equivalent surface soil where these horizons are not present.

EC = Electrical Conductivity (dS/m)

SAR = Sodium Adsorption Ratio

| | EC | SAR | Condition | Ca | Cl- | Na |
|---------|-----|-----|-----------|-------|-------|-------|
| MIN | 0.5 | 1.1 | 75% | 20.9 | 25.0 | 35.0 |
| MAX | 3.0 | 5.2 | 25% | 325.0 | 320.0 | 168.0 |
| GEOMEAN | 1.0 | 2.5 | 0% | 70.3 | 75.9 | 77.2 |
| AVERAGE | 1.2 | 2.7 | 0% | 95.1 | 93.7 | 85.7 |



TABLE: A-10
 TITLE: SOIL ANALYSES - ALL COE CaCl₂ DATA
 PROJECT#: 19-424-CAI
 CLIENT: The City of Edmonton
 PROJECT: Anti-Icing Salinity Data Review
 LOCATION: Edmonton, Alberta

| 2019 Alberta* | Natural Area | EC | SAR | Rating | Calcium | Chloride | Sodium |
|---------------|--------------|-----|------|------------|-------------------------|----------|--------|
| | | <2 | <4 | Good | No Guidelines Available | | |
| | | 2-4 | 4-8 | Fair | | | |
| Fine Grained | Topsoil | 4-8 | 8-12 | Poor | | | |
| | | >8 | >12 | Unsuitable | | | |

| Sample ID | Depth (cm) | Date | EC | SAR | Rating | Calcium | Chloride | Sodium |
|-----------|------------|-------------|-----|------|------------|---------|----------|--------|
| S4-1.5 | 10 | 2-Nov-2018 | 6.4 | 37 | Unsuitable | 100 | 2040 | 1620 |
| S4-1.5 | 10 | 27-May-2019 | 5.0 | 36 | Unsuitable | 30 | 986 | 647 |
| S4-1.5 | 20 | 2-Nov-2018 | 6.6 | 37 | Unsuitable | 103 | 1970 | 1610 |
| S4-1.5 | 20 | 27-May-2019 | 4.4 | 36 | Unsuitable | 35 | 1240 | 900 |
| S4-1.5 | 30 | 2-Nov-2018 | 6.5 | 31 | Unsuitable | 190 | 2310 | 2050 |
| S4-1.5 | 30 | 27-May-2019 | 4.4 | 31 | Unsuitable | 54 | 1160 | 1020 |
| S4-3.0 | 10 | 2-Nov-2018 | 1.6 | 15.2 | Unsuitable | 14.3 | 157 | 169 |
| S4-3.0 | 10 | 27-May-2019 | 1.6 | 16.1 | Unsuitable | 9.5 | 139 | 128 |
| S4-3.0 | 20 | 2-Nov-2018 | 2.4 | 19 | Unsuitable | 26 | 429 | 344 |
| S4-3.0 | 20 | 27-May-2019 | 2.6 | 21 | Unsuitable | 19 | 349 | 278 |
| S4-3.0 | 30 | 2-Nov-2018 | 4.2 | 24 | Unsuitable | 74 | 1070 | 818 |
| S4-3.0 | 30 | 27-May-2019 | 3.4 | 24 | Unsuitable | 32 | 637 | 470 |
| S4-7.0 | 10 | 2-Nov-2018 | 1.3 | 9.8 | Poor | 42.7 | 226 | 287 |
| S4-7.0 | 10 | 27-May-2019 | 2.4 | 13 | Unsuitable | 52 | 486 | 359 |
| S4-7.0 | 20 | 2-Nov-2018 | 2.4 | 17 | Unsuitable | 54 | 558 | 505 |
| S4-7.0 | 20 | 27-May-2019 | 2.6 | 17 | Unsuitable | 41 | 534 | 431 |
| S4-7.0 | 30 | 2-Nov-2018 | 3.3 | 21 | Unsuitable | 79 | 961 | 874 |
| S4-7.0 | 30 | 27-May-2019 | 3.8 | 19 | Unsuitable | 100 | 699 | 844 |
| S5-1.5 | 10 | 2-Nov-2018 | 1.6 | 8.2 | Poor | 39.2 | 107 | 155 |
| S5-1.5 | 10 | 27-May-2019 | 1.2 | 9.3 | Poor | 21 | 124 | 135 |
| S5-1.5 | 20 | 2-Nov-2018 | 2.3 | 13 | Unsuitable | 49 | 417 | 299 |
| S5-1.5 | 20 | 27-May-2019 | 2.5 | 14 | Unsuitable | 46 | 443 | 296 |
| S5-1.5 | 30 | 2-Nov-2018 | 4.3 | 16.1 | Unsuitable | 135 | 1010 | 655 |
| S5-1.5 | 30 | 27-May-2019 | 1.5 | 11.6 | Poor | 21 | 192 | 160 |
| S5-3.0 | 10 | 2-Nov-2018 | 1.0 | 1.6 | Good | 98.7 | 73 | 62 |
| S5-3.0 | 10 | 27-May-2019 | 1.2 | 3.7 | Good | 72.4 | 184 | 120 |
| S5-3.0 | 20 | 2-Nov-2018 | 1.9 | 4.1 | Fair | 176 | 275 | 216 |
| S5-3.0 | 20 | 27-May-2019 | 2.6 | 6 | Fair | 192 | 550 | 344 |
| S5-3.0 | 30 | 2-Nov-2018 | 6.5 | 7.7 | Poor | 1180 | 1640 | 1260 |
| S5-3.0 | 30 | 27-May-2019 | 6.4 | 7.5 | Poor | 866 | 1410 | 980 |
| S5-7.0 | 10 | 2-Nov-2018 | 1.7 | 2.2 | Good | 242 | 127 | 158 |
| S5-7.0 | 10 | 27-May-2019 | 2.3 | 2.6 | Fair | 299 | 238 | 195 |
| S5-7.0 | 20 | 2-Nov-2018 | 4.0 | 4.6 | Poor | 760 | 221 | 579 |
| S5-7.0 | 20 | 27-May-2019 | 3.6 | 3.7 | Fair | 559 | 207 | 378 |
| S5-7.0 | 30 | 2-Nov-2018 | 5.5 | 4.4 | Poor | 1290 | 351 | 830 |
| S5-7.0 | 30 | 27-May-2019 | 4.6 | 3.4 | Poor | 806 | 279 | 459 |
| S6-1.5 | 10 | 2-Nov-2018 | 1.6 | 3.4 | Good | 111 | 47 | 117 |
| S6-1.5 | 10 | 27-May-2019 | 2.0 | 5.6 | Fair | 87.5 | 203 | 172 |
| S6-1.5 | 20 | 2-Nov-2018 | 1.2 | 8.8 | Poor | 26.8 | 155 | 166 |
| S6-1.5 | 20 | 27-May-2019 | 1.3 | 9.3 | Poor | 24 | 177 | 152 |
| S6-1.5 | 30 | 2-Nov-2018 | 1.3 | 9.7 | Poor | 32.3 | 250 | 230 |
| S6-1.5 | 30 | 27-May-2019 | 1.1 | 9.5 | Poor | 17.2 | 150 | 141 |
| S6-3.0 | 10 | 2-Nov-2018 | 0.7 | 4 | Fair | 32.1 | 38 | 86 |
| S6-3.0 | 10 | 27-May-2019 | 0.8 | 5.5 | Fair | 19.4 | 52 | 81 |
| S6-3.0 | 20 | 2-Nov-2018 | 0.9 | 7.1 | Fair | 28.1 | 131 | 153 |
| S6-3.0 | 20 | 27-May-2019 | 1.2 | 8.6 | Poor | 21.9 | 154 | 141 |
| S6-3.0 | 30 | 2-Nov-2018 | 1.8 | 7.5 | Fair | 65.1 | 252 | 236 |
| S6-3.0 | 30 | 27-May-2019 | 1.2 | 7.7 | Fair | 26.3 | 176 | 144 |
| S6-7.0 | 10 | 2-Nov-2018 | 0.7 | 0.6 | Good | 81.1 | 23 | 23 |
| S6-7.0 | 10 | 27-May-2019 | 0.5 | 0.9 | Good | 31.1 | 16 | 18 |
| S6-7.0 | 20 | 2-Nov-2018 | 0.9 | 2 | Good | 59.2 | 19 | 58 |
| S6-7.0 | 20 | 27-May-2019 | 1.8 | 1.5 | Good | 187 | 12 | 75 |
| S6-7.0 | 30 | 2-Nov-2018 | 3.0 | 2.5 | Fair | 412 | 34 | 192 |
| S6-7.0 | 30 | 27-May-2019 | 3.0 | 2.2 | Fair | 329 | 19 | 142 |



TABLE: A-10
 TITLE: SOIL ANALYSES - ALL COE CaCl₂ DATA
 PROJECT#: 19-424-CAI
 CLIENT: The City of Edmonton
 PROJECT: Anti-Icing Salinity Data Review
 LOCATION: Edmonton, Alberta

| 2019 Alberta* | Natural Area | EC | SAR | Rating | Calcium | Chloride | Sodium |
|---------------|--------------|-----|------|------------|-------------------------|----------|--------|
| | | <2 | <4 | Good | No Guidelines Available | | |
| | | 2-4 | 4-8 | Fair | | | |
| Fine Grained | Topsoil | 4-8 | 8-12 | Poor | | | |
| | | >8 | >12 | Unsuitable | | | |

| Sample ID | Depth (cm) | Date | EC | SAR | Rating | Calcium | Chloride | Sodium |
|-----------|------------|-------------|-----|------|------------|---------|----------|--------|
| S8-1.5 | 10 | 2-Nov-2018 | 1.9 | 23.8 | Unsuitable | 7.6 | 179 | 179 |
| S8-1.5 | 10 | 27-May-2019 | 7.3 | 27 | Unsuitable | 80.8 | 1090 | 702 |
| S8-1.5 | 20 | 2-Nov-2018 | 5.6 | 35 | Unsuitable | 35 | 789 | 622 |
| S8-1.5 | 20 | 27-May-2019 | 6.6 | 24.1 | Unsuitable | 115 | 1090 | 884 |
| S8-1.5 | 30 | 2-Nov-2018 | 8.1 | 25.1 | Unsuitable | 211 | 1530 | 1330 |
| S8-1.5 | 30 | 27-May-2019 | 8.7 | 16.9 | Unsuitable | 483 | 1290 | 1350 |
| S8-3.0 | 10 | 2-Nov-2018 | 1.8 | 12.8 | Unsuitable | 22.9 | 178 | 181 |
| S8-3.0 | 10 | 27-May-2019 | 4.0 | 34 | Unsuitable | 18 | 586 | 410 |
| S8-3.0 | 20 | 2-Nov-2018 | 2.8 | 38 | Unsuitable | 11 | 374 | 422 |
| S8-3.0 | 20 | 27-May-2019 | 5.9 | 29 | Unsuitable | 68 | 1130 | 821 |
| S8-3.0 | 30 | 2-Nov-2018 | 9.1 | 18.5 | Unsuitable | 448 | 1220 | 1400 |
| S8-3.0 | 30 | 27-May-2019 | 9.3 | 18.9 | Unsuitable | 513 | 1390 | 1550 |
| S8-7.0 | 10 | 2-Nov-2018 | 2.6 | 12 | Poor | 110 | 457 | 607 |
| S8-7.0 | 10 | 27-May-2019 | 3.2 | 13 | Unsuitable | 155 | 1410 | 842 |
| S8-7.0 | 20 | 2-Nov-2018 | 5.0 | 11.3 | Poor | 297 | 707 | 789 |
| S8-7.0 | 20 | 27-May-2019 | 3.3 | 15 | Unsuitable | 79 | 801 | 517 |
| S8-7.0 | 30 | 2-Nov-2018 | 6.9 | 9.9 | Poor | 597 | 1230 | 994 |
| S8-7.0 | 30 | 27-May-2019 | 3.5 | 11 | Poor | 130 | 934 | 534 |
| S9-1.5 | 10 | 2-Nov-2018 | 3.7 | 16 | Unsuitable | 86 | 710 | 495 |
| S9-1.5 | 10 | 27-May-2019 | 6.1 | 18.3 | Unsuitable | 130 | 1220 | 688 |
| S9-1.5 | 20 | 2-Nov-2018 | 6.2 | 13.3 | Unsuitable | 258 | 1260 | 755 |
| S9-1.5 | 20 | 27-May-2019 | 6.2 | 15.5 | Unsuitable | 195 | 1370 | 769 |
| S9-1.5 | 30 | 2-Nov-2018 | 8.3 | 14.9 | Unsuitable | 401 | 2010 | 1170 |
| S9-1.5 | 30 | 27-May-2019 | 9.3 | 14.5 | Unsuitable | 480 | 1840 | 1150 |
| S9-3.0 | 10 | 2-Nov-2018 | 1.3 | 8 | Poor | 34 | 171 | 160 |
| S9-3.0 | 10 | 27-May-2019 | 1.7 | 7.9 | Fair | 48.4 | 262 | 189 |
| S9-3.0 | 20 | 2-Nov-2018 | 2.5 | 9.9 | Poor | 76.3 | 369 | 302 |
| S9-3.0 | 20 | 27-May-2019 | 3.9 | 7.2 | Fair | 221 | 559 | 367 |
| S9-3.0 | 30 | 2-Nov-2018 | 8.2 | 9.3 | Unsuitable | 589 | 1630 | 863 |
| S9-3.0 | 30 | 27-May-2019 | 6.5 | 8.8 | Poor | 408 | 1080 | 655 |
| S9-7.0 | 10 | 2-Nov-2018 | 1.1 | 1.3 | Good | 99.7 | 61 | 48 |
| S9-7.0 | 10 | 27-May-2019 | 1.2 | 1.8 | Good | 89.7 | 115 | 59 |
| S9-7.0 | 20 | 2-Nov-2018 | 1.0 | 1.7 | Good | 91 | 37 | 58 |
| S9-7.0 | 20 | 27-May-2019 | 2.4 | 1.9 | Fair | 244 | 98 | 102 |
| S9-7.0 | 30 | 2-Nov-2018 | 3.3 | 2.4 | Fair | 444 | 190 | 193 |
| S9-7.0 | 30 | 27-May-2019 | 3.4 | 2.2 | Fair | 459 | 154 | 196 |
| S11-1.5 | 10 | 2-Nov-2018 | 2.8 | 11 | Poor | 96.7 | 271 | 340 |
| S11-1.5 | 10 | 27-May-2019 | 5.1 | 10.4 | Poor | 207 | 717 | 488 |
| S11-1.5 | 20 | 2-Nov-2018 | 5.3 | 6.9 | Poor | 424 | 501 | 491 |
| S11-1.5 | 20 | 27-May-2019 | 5.5 | 6.4 | Poor | 414 | 551 | 445 |
| S11-1.5 | 30 | 2-Nov-2018 | 4.6 | 4.2 | Poor | 509 | 590 | 358 |
| S11-1.5 | 30 | 27-May-2019 | 5.3 | 5 | Poor | 435 | 555 | 355 |
| S11-3.0 | 10 | 2-Nov-2018 | 2.7 | 5.3 | Fair | 211 | 230 | 268 |
| S11-3.0 | 10 | 27-May-2019 | 4.8 | 6 | Poor | 334 | 519 | 353 |
| S11-3.0 | 20 | 2-Nov-2018 | 5.0 | 5 | Poor | 414 | 441 | 334 |
| S11-3.0 | 20 | 27-May-2019 | 3.8 | 3.5 | Fair | 431 | 315 | 261 |
| S11-3.0 | 30 | 2-Nov-2018 | 4.9 | 3.3 | Poor | 437 | 540 | 238 |
| S11-3.0 | 30 | 27-May-2019 | 4.6 | 3.4 | Poor | 438 | 427 | 249 |
| S11-7.0 | 10 | 2-Nov-2018 | 2.1 | 1.2 | Fair | 274 | 31 | 66 |
| S11-7.0 | 10 | 27-May-2019 | 3.0 | 1.9 | Fair | 362 | 136 | 122 |
| S11-7.0 | 20 | 2-Nov-2018 | 3.3 | 1.6 | Fair | 407 | 147 | 110 |
| S11-7.0 | 20 | 27-May-2019 | 3.2 | 1.6 | Fair | 419 | 133 | 126 |
| S11-7.0 | 30 | 2-Nov-2018 | 3.4 | 1.6 | Fair | 413 | 210 | 112 |
| S11-7.0 | 30 | 27-May-2019 | 3.3 | 1.7 | Fair | 417 | 188 | 128 |

BOLD = Parameter Exceeds Recommended Guideline Criteria
BOLD = Parameter is Elevated Compared to Background Concentrations

*Alberta Soil and Groundwater Remediation Guidelines (Table 4). January 2019.
 (all concentrations in mg/kg = ppm, unless noted)

Topsoil = surface A, L, F, H and O horizons on the control area, or the equivalent surface soil where these horizons are not present.

EC = Electrical Conductivity (dS/m)
 SAR = Sodium Adsorption Ratio

| | EC | SAR | Condition | Ca | Cl- | Na |
|---------|-----|------|-----------|--------|--------|--------|
| MIN | 0.5 | 0.6 | 10% | 7.6 | 12.0 | 18.0 |
| MAX | 9.3 | 38.0 | 23% | 1290.0 | 2310.0 | 2050.0 |
| GEOMEAN | 2.9 | 7.7 | 29% | 116.9 | 326.1 | 307.7 |
| AVERAGE | 3.6 | 11.6 | 38% | 221.1 | 571.6 | 464.4 |



TABLE: A-11
 TITLE: SOIL ANALYSES - 2018 COE CaCl₂ DATA
 PROJECT#: 19-424-CAI
 CLIENT: The City of Edmonton
 PROJECT: Anti-Icing Salinity Data Review
 LOCATION: Edmonton, Alberta

| 2019 Alberta* | Natural Area | EC | SAR | Rating | Calcium | Chloride | Sodium |
|---------------|--------------|-----|------|------------|-------------------------|----------|--------|
| | | <2 | <4 | Good | | | |
| Fine Grained | Topsoil | 2-4 | 4-8 | Fair | No Guidelines Available | | |
| | | 4-8 | 8-12 | Poor | | | |
| | | >8 | >12 | Unsuitable | | | |

| Sample ID | Depth (cm) | Date | EC | SAR | Rating | Calcium | Chloride | Sodium |
|-----------|------------|------------|-----|------|------------|---------|----------|--------|
| S4-1.5 | 10 | 2-Nov-2018 | 6.4 | 37 | Unsuitable | 100 | 2040 | 1620 |
| S4-1.5 | 20 | 2-Nov-2018 | 6.6 | 37 | Unsuitable | 103 | 1970 | 1610 |
| S4-1.5 | 30 | 2-Nov-2018 | 6.5 | 31 | Unsuitable | 190 | 2310 | 2050 |
| S4-3.0 | 10 | 2-Nov-2018 | 1.6 | 15.2 | Unsuitable | 14.3 | 157 | 169 |
| S4-3.0 | 20 | 2-Nov-2018 | 2.4 | 19 | Unsuitable | 26 | 429 | 344 |
| S4-3.0 | 30 | 2-Nov-2018 | 4.2 | 24 | Unsuitable | 74 | 1070 | 818 |
| S4-7.0 | 10 | 2-Nov-2018 | 1.3 | 9.8 | Poor | 42.7 | 226 | 287 |
| S4-7.0 | 20 | 2-Nov-2018 | 2.4 | 17 | Unsuitable | 54 | 558 | 505 |
| S4-7.0 | 30 | 2-Nov-2018 | 3.3 | 21 | Unsuitable | 79 | 961 | 874 |
| S5-1.5 | 10 | 2-Nov-2018 | 1.6 | 8.2 | Poor | 39.2 | 107 | 155 |
| S5-1.5 | 20 | 2-Nov-2018 | 2.3 | 13 | Unsuitable | 49 | 417 | 299 |
| S5-1.5 | 30 | 2-Nov-2018 | 4.3 | 16.1 | Unsuitable | 135 | 1010 | 655 |
| S5-3.0 | 10 | 2-Nov-2018 | 1.0 | 1.6 | Good | 98.7 | 73 | 62 |
| S5-3.0 | 20 | 2-Nov-2018 | 1.9 | 4.1 | Fair | 176 | 275 | 216 |
| S5-3.0 | 30 | 2-Nov-2018 | 6.5 | 7.7 | Poor | 1180 | 1640 | 1260 |
| S5-7.0 | 10 | 2-Nov-2018 | 1.7 | 2.2 | Good | 242 | 127 | 158 |
| S5-7.0 | 20 | 2-Nov-2018 | 4.0 | 4.6 | Poor | 760 | 221 | 579 |
| S5-7.0 | 30 | 2-Nov-2018 | 5.5 | 4.4 | Poor | 1290 | 351 | 830 |
| S6-1.5 | 10 | 2-Nov-2018 | 1.6 | 3.4 | Good | 111 | 47 | 117 |
| S6-1.5 | 20 | 2-Nov-2018 | 1.2 | 8.8 | Poor | 26.8 | 155 | 166 |
| S6-1.5 | 30 | 2-Nov-2018 | 1.3 | 9.7 | Poor | 32.3 | 250 | 230 |
| S6-3.0 | 10 | 2-Nov-2018 | 0.7 | 4 | Fair | 32.1 | 38 | 86 |
| S6-3.0 | 20 | 2-Nov-2018 | 0.9 | 7.1 | Fair | 28.1 | 131 | 153 |
| S6-3.0 | 30 | 2-Nov-2018 | 1.8 | 7.5 | Fair | 65.1 | 252 | 236 |
| S6-7.0 | 10 | 2-Nov-2018 | 0.7 | 0.6 | Good | 81.1 | 23 | 23 |
| S6-7.0 | 20 | 2-Nov-2018 | 0.9 | 2 | Good | 59.2 | 19 | 58 |
| S6-7.0 | 30 | 2-Nov-2018 | 3.0 | 2.5 | Fair | 412 | 34 | 192 |
| S8-1.5 | 10 | 2-Nov-2018 | 1.9 | 23.8 | Unsuitable | 7.6 | 179 | 179 |
| S8-1.5 | 20 | 2-Nov-2018 | 5.6 | 35 | Unsuitable | 35 | 789 | 622 |
| S8-1.5 | 30 | 2-Nov-2018 | 8.1 | 25.1 | Unsuitable | 211 | 1530 | 1330 |
| S8-3.0 | 10 | 2-Nov-2018 | 1.8 | 12.8 | Unsuitable | 22.9 | 178 | 181 |
| S8-3.0 | 20 | 2-Nov-2018 | 2.8 | 38 | Unsuitable | 11 | 374 | 422 |
| S8-3.0 | 30 | 2-Nov-2018 | 9.1 | 18.5 | Unsuitable | 448 | 1220 | 1400 |
| S8-7.0 | 10 | 2-Nov-2018 | 2.6 | 12 | Poor | 110 | 457 | 607 |
| S8-7.0 | 20 | 2-Nov-2018 | 5.0 | 11.3 | Poor | 297 | 707 | 789 |
| S8-7.0 | 30 | 2-Nov-2018 | 6.9 | 9.9 | Poor | 597 | 1230 | 994 |
| S9-1.5 | 10 | 2-Nov-2018 | 3.7 | 16 | Unsuitable | 86 | 710 | 495 |
| S9-1.5 | 20 | 2-Nov-2018 | 6.2 | 13.3 | Unsuitable | 258 | 1260 | 755 |
| S9-1.5 | 30 | 2-Nov-2018 | 8.3 | 14.9 | Unsuitable | 401 | 2010 | 1170 |
| S9-3.0 | 10 | 2-Nov-2018 | 1.3 | 8 | Poor | 34 | 171 | 160 |
| S9-3.0 | 20 | 2-Nov-2018 | 2.5 | 9.9 | Poor | 76.3 | 369 | 302 |
| S9-3.0 | 30 | 2-Nov-2018 | 8.2 | 9.3 | Unsuitable | 589 | 1630 | 863 |
| S9-7.0 | 10 | 2-Nov-2018 | 1.1 | 1.3 | Good | 99.7 | 61 | 48 |
| S9-7.0 | 20 | 2-Nov-2018 | 1.0 | 1.7 | Good | 91 | 37 | 58 |
| S9-7.0 | 30 | 2-Nov-2018 | 3.3 | 2.4 | Fair | 444 | 190 | 193 |
| S11-1.5 | 10 | 2-Nov-2018 | 2.8 | 11 | Poor | 96.7 | 271 | 340 |
| S11-1.5 | 20 | 2-Nov-2018 | 5.3 | 6.9 | Poor | 424 | 501 | 491 |
| S11-1.5 | 30 | 2-Nov-2018 | 4.6 | 4.2 | Poor | 509 | 590 | 358 |
| S11-3.0 | 10 | 2-Nov-2018 | 2.7 | 5.3 | Fair | 211 | 230 | 268 |
| S11-3.0 | 20 | 2-Nov-2018 | 5.0 | 5 | Poor | 414 | 441 | 334 |
| S11-3.0 | 30 | 2-Nov-2018 | 4.9 | 3.3 | Poor | 437 | 540 | 238 |
| S11-7.0 | 10 | 2-Nov-2018 | 2.1 | 1.2 | Fair | 274 | 31 | 66 |
| S11-7.0 | 20 | 2-Nov-2018 | 3.3 | 1.6 | Fair | 407 | 147 | 110 |
| S11-7.0 | 30 | 2-Nov-2018 | 3.4 | 1.6 | Fair | 413 | 210 | 112 |

BOLD = Parameter Exceeds Recommended Guideline Criteria
BOLD = Parameter is Elevated Compared to Background Concentrations

*Alberta Soil and Groundwater Remediation Guidelines (Table 4). January 2019.
 (all concentrations in mg/kg = ppm, unless noted)

Topsoil = surface A, L, F, H and O horizons on the control area, or the equivalent surface soil where these horizons are not present.

EC = Electrical Conductivity (dS/m)

SAR = Sodium Adsorption Ratio

| | EC | SAR | Condition | Ca | Cl- | Na |
|---------|-----|------|-----------|--------|--------|--------|
| MIN | 0.7 | 0.6 | 13% | 7.6 | 19.0 | 23.0 |
| MAX | 9.1 | 38.0 | 19% | 1290.0 | 2310.0 | 2050.0 |
| GEOMEAN | 2.8 | 7.5 | 31% | 121.3 | 302.6 | 310.0 |
| AVERAGE | 3.5 | 11.5 | 37% | 231.6 | 573.2 | 493.3 |



TABLE: A-12
 TITLE: SOIL ANALYSES - 2019 COE CaCl₂ DATA
 PROJECT#: 19-424-CAI
 CLIENT: The City of Edmonton
 PROJECT: Anti-Icing Salinity Data Review
 LOCATION: Edmonton, Alberta

| 2019 Alberta* | Natural Area | EC | SAR | Rating | Calcium | Chloride | Sodium |
|---------------|--------------|-----|------|------------|-------------------------|----------|--------|
| | | <2 | <4 | Good | No Guidelines Available | | |
| | | 2-4 | 4-8 | Fair | | | |
| Fine Grained | Topsoil | 4-8 | 8-12 | Poor | | | |
| | | >8 | >12 | Unsuitable | | | |

| Sample ID | Depth (cm) | Date | EC | SAR | Rating | Calcium | Chloride | Sodium |
|-----------|------------|-------------|-----|------|------------|---------|----------|--------|
| S4-1.5 | 10 | 27-May-2019 | 5.0 | 36 | Unsuitable | 30 | 986 | 647 |
| S4-1.5 | 20 | 27-May-2019 | 4.4 | 36 | Unsuitable | 35 | 1240 | 900 |
| S4-1.5 | 30 | 27-May-2019 | 4.4 | 31 | Unsuitable | 54 | 1160 | 1020 |
| S4-3.0 | 10 | 27-May-2019 | 1.6 | 16.1 | Unsuitable | 9.5 | 139 | 128 |
| S4-3.0 | 20 | 27-May-2019 | 2.6 | 21 | Unsuitable | 19 | 349 | 278 |
| S4-3.0 | 30 | 27-May-2019 | 3.4 | 24 | Unsuitable | 32 | 637 | 470 |
| S4-7.0 | 10 | 27-May-2019 | 2.4 | 13 | Unsuitable | 52 | 486 | 359 |
| S4-7.0 | 20 | 27-May-2019 | 2.6 | 17 | Unsuitable | 41 | 534 | 431 |
| S4-7.0 | 30 | 27-May-2019 | 3.8 | 19 | Unsuitable | 100 | 699 | 844 |
| S5-1.5 | 10 | 27-May-2019 | 1.2 | 9.3 | Poor | 21 | 124 | 135 |
| S5-1.5 | 20 | 27-May-2019 | 2.5 | 14 | Unsuitable | 46 | 443 | 296 |
| S5-1.5 | 30 | 27-May-2019 | 1.5 | 11.6 | Poor | 21 | 192 | 160 |
| S5-3.0 | 10 | 27-May-2019 | 1.2 | 3.7 | Good | 72.4 | 184 | 120 |
| S5-3.0 | 20 | 27-May-2019 | 2.6 | 6 | Fair | 192 | 550 | 344 |
| S5-3.0 | 30 | 27-May-2019 | 6.4 | 7.5 | Poor | 866 | 1410 | 980 |
| S5-7.0 | 10 | 27-May-2019 | 2.3 | 2.6 | Fair | 299 | 238 | 195 |
| S5-7.0 | 20 | 27-May-2019 | 3.6 | 3.7 | Fair | 559 | 207 | 378 |
| S5-7.0 | 30 | 27-May-2019 | 4.6 | 3.4 | Poor | 806 | 279 | 459 |
| S6-1.5 | 10 | 27-May-2019 | 2.0 | 5.6 | Fair | 87.5 | 203 | 172 |
| S6-1.5 | 20 | 27-May-2019 | 1.3 | 9.3 | Poor | 24 | 177 | 152 |
| S6-1.5 | 30 | 27-May-2019 | 1.1 | 9.5 | Poor | 17.2 | 150 | 141 |
| S6-3.0 | 10 | 27-May-2019 | 0.8 | 5.5 | Fair | 19.4 | 52 | 81 |
| S6-3.0 | 20 | 27-May-2019 | 1.2 | 8.6 | Poor | 21.9 | 154 | 141 |
| S6-3.0 | 30 | 27-May-2019 | 1.2 | 7.7 | Fair | 26.3 | 176 | 144 |
| S6-7.0 | 10 | 27-May-2019 | 0.5 | 0.9 | Good | 31.1 | 16 | 18 |
| S6-7.0 | 20 | 27-May-2019 | 1.8 | 1.5 | Good | 187 | 12 | 75 |
| S6-7.0 | 30 | 27-May-2019 | 3.0 | 2.2 | Fair | 329 | 19 | 142 |
| S8-1.5 | 10 | 27-May-2019 | 7.3 | 27 | Unsuitable | 80.8 | 1090 | 702 |
| S8-1.5 | 20 | 27-May-2019 | 6.6 | 24.1 | Unsuitable | 115 | 1090 | 884 |
| S8-1.5 | 30 | 27-May-2019 | 8.7 | 16.9 | Unsuitable | 483 | 1290 | 1350 |
| S8-3.0 | 10 | 27-May-2019 | 4.0 | 34 | Unsuitable | 18 | 586 | 410 |
| S8-3.0 | 20 | 27-May-2019 | 5.9 | 29 | Unsuitable | 68 | 1130 | 821 |
| S8-3.0 | 30 | 27-May-2019 | 9.3 | 18.9 | Unsuitable | 513 | 1390 | 1550 |
| S8-7.0 | 10 | 27-May-2019 | 3.2 | 13 | Unsuitable | 155 | 1410 | 842 |
| S8-7.0 | 20 | 27-May-2019 | 3.3 | 15 | Unsuitable | 79 | 801 | 517 |
| S8-7.0 | 30 | 27-May-2019 | 3.5 | 11 | Poor | 130 | 934 | 534 |
| S9-1.5 | 10 | 27-May-2019 | 6.1 | 18.3 | Unsuitable | 130 | 1220 | 688 |
| S9-1.5 | 20 | 27-May-2019 | 6.2 | 15.5 | Unsuitable | 195 | 1370 | 769 |
| S9-1.5 | 30 | 27-May-2019 | 9.3 | 14.5 | Unsuitable | 480 | 1840 | 1150 |
| S9-3.0 | 10 | 27-May-2019 | 1.7 | 7.9 | Fair | 48.4 | 262 | 189 |
| S9-3.0 | 20 | 27-May-2019 | 3.9 | 7.2 | Fair | 221 | 559 | 367 |
| S9-3.0 | 30 | 27-May-2019 | 6.5 | 8.8 | Poor | 408 | 1080 | 655 |
| S9-7.0 | 10 | 27-May-2019 | 1.2 | 1.8 | Good | 89.7 | 115 | 59 |
| S9-7.0 | 20 | 27-May-2019 | 2.4 | 1.9 | Fair | 244 | 98 | 102 |
| S9-7.0 | 30 | 27-May-2019 | 3.4 | 2.2 | Fair | 459 | 154 | 196 |
| S11-1.5 | 10 | 27-May-2019 | 5.1 | 10.4 | Poor | 207 | 717 | 488 |
| S11-1.5 | 20 | 27-May-2019 | 5.5 | 6.4 | Poor | 414 | 551 | 445 |
| S11-1.5 | 30 | 27-May-2019 | 5.3 | 5 | Poor | 435 | 555 | 355 |
| S11-3.0 | 10 | 27-May-2019 | 4.8 | 6 | Poor | 334 | 519 | 353 |
| S11-3.0 | 20 | 27-May-2019 | 3.8 | 3.5 | Fair | 431 | 315 | 261 |
| S11-3.0 | 30 | 27-May-2019 | 4.6 | 3.4 | Poor | 438 | 427 | 249 |
| S11-7.0 | 10 | 27-May-2019 | 3.0 | 1.9 | Fair | 362 | 136 | 122 |
| S11-7.0 | 20 | 27-May-2019 | 3.2 | 1.6 | Fair | 419 | 133 | 126 |
| S11-7.0 | 30 | 27-May-2019 | 3.3 | 1.7 | Fair | 417 | 188 | 128 |

BOLD = Parameter Exceeds Recommended Guideline Criteria
BOLD = Parameter is Elevated Compared to Background Concentrations

*Alberta Soil and Groundwater Remediation Guidelines (Table 4). January 2019.
 (all concentrations in mg/kg = ppm, unless noted)

Topsoil = surface A, L, F, H and O horizons on the control area, or the equivalent surface soil where these horizons are not present.

EC = Electrical Conductivity (dS/m)

SAR = Sodium Adsorption Ratio

| | EC | SAR | Condition | Ca | Cl- | Na |
|---------|-----|------|-----------|-------|--------|--------|
| MIN | 0.5 | 0.9 | 7% | 9.5 | 12.0 | 18.0 |
| MAX | 9.3 | 36.0 | 28% | 866.0 | 1840.0 | 1550.0 |
| GEOMEAN | 3.1 | 8.0 | 26% | 112.7 | 351.4 | 305.4 |
| AVERAGE | 3.7 | 11.7 | 39% | 210.6 | 569.9 | 435.6 |



TABLE: A-13
 TITLE: SOIL ANALYSES - COE 10 CM CaCl₂ DATA
 PROJECT#: 19-424-CAI
 CLIENT: The City of Edmonton
 PROJECT: Anti-Icing Salinity Data Review
 LOCATION: Edmonton, Alberta

| 2019 Alberta* | Natural Area | EC | SAR | Rating | Calcium | Chloride | Sodium |
|---------------|--------------|-----|------|------------|-------------------------|----------|--------|
| | | <2 | <4 | Good | No Guidelines Available | | |
| | | 2-4 | 4-8 | Fair | | | |
| Fine Grained | Topsoil | 4-8 | 8-12 | Poor | | | |
| | | >8 | >12 | Unsuitable | | | |

| Sample ID | Depth (cm) | Date | EC | SAR | Rating | Calcium | Chloride | Sodium |
|-----------|------------|-------------|-----|------|------------|---------|----------|--------|
| S4-1.5 | 10 | 2-Nov-2018 | 6.4 | 37 | Unsuitable | 100 | 2040 | 1620 |
| S4-1.5 | 10 | 27-May-2019 | 5.0 | 36 | Unsuitable | 30 | 986 | 647 |
| S4-3.0 | 10 | 2-Nov-2018 | 1.6 | 15.2 | Unsuitable | 14.3 | 157 | 169 |
| S4-3.0 | 10 | 27-May-2019 | 1.6 | 16.1 | Unsuitable | 9.5 | 139 | 128 |
| S4-7.0 | 10 | 2-Nov-2018 | 1.3 | 9.8 | Poor | 42.7 | 226 | 287 |
| S4-7.0 | 10 | 27-May-2019 | 2.4 | 13 | Unsuitable | 52 | 486 | 359 |
| S5-1.5 | 10 | 2-Nov-2018 | 1.6 | 8.2 | Poor | 39.2 | 107 | 155 |
| S5-1.5 | 10 | 27-May-2019 | 1.2 | 9.3 | Poor | 21 | 124 | 135 |
| S5-3.0 | 10 | 2-Nov-2018 | 1.0 | 1.6 | Good | 98.7 | 73 | 62 |
| S5-3.0 | 10 | 27-May-2019 | 1.2 | 3.7 | Good | 72.4 | 184 | 120 |
| S5-7.0 | 10 | 2-Nov-2018 | 1.7 | 2.2 | Good | 242 | 127 | 158 |
| S5-7.0 | 10 | 27-May-2019 | 2.3 | 2.6 | Fair | 299 | 238 | 195 |
| S6-1.5 | 10 | 2-Nov-2018 | 1.6 | 3.4 | Good | 111 | 47 | 117 |
| S6-1.5 | 10 | 27-May-2019 | 2.0 | 5.6 | Fair | 87.5 | 203 | 172 |
| S6-3.0 | 10 | 2-Nov-2018 | 0.7 | 4 | Fair | 32.1 | 38 | 86 |
| S6-3.0 | 10 | 27-May-2019 | 0.8 | 5.5 | Fair | 19.4 | 52 | 81 |
| S6-7.0 | 10 | 2-Nov-2018 | 0.7 | 0.6 | Good | 81.1 | 23 | 23 |
| S6-7.0 | 10 | 27-May-2019 | 0.5 | 0.9 | Good | 31.1 | 16 | 18 |
| S8-1.5 | 10 | 2-Nov-2018 | 1.9 | 23.8 | Unsuitable | 7.6 | 179 | 179 |
| S8-1.5 | 10 | 27-May-2019 | 7.3 | 27 | Unsuitable | 80.8 | 1090 | 702 |
| S8-3.0 | 10 | 2-Nov-2018 | 1.8 | 12.8 | Unsuitable | 22.9 | 178 | 181 |
| S8-3.0 | 10 | 27-May-2019 | 4.0 | 34 | Unsuitable | 18 | 586 | 410 |
| S8-7.0 | 10 | 2-Nov-2018 | 2.6 | 12 | Poor | 110 | 457 | 607 |
| S8-7.0 | 10 | 27-May-2019 | 3.2 | 13 | Unsuitable | 155 | 1410 | 842 |
| S9-1.5 | 10 | 2-Nov-2018 | 3.7 | 16 | Unsuitable | 86 | 710 | 495 |
| S9-1.5 | 10 | 27-May-2019 | 6.1 | 18.3 | Unsuitable | 130 | 1220 | 688 |
| S9-3.0 | 10 | 2-Nov-2018 | 1.3 | 8 | Poor | 34 | 171 | 160 |
| S9-3.0 | 10 | 27-May-2019 | 1.7 | 7.9 | Fair | 48.4 | 262 | 189 |
| S9-7.0 | 10 | 2-Nov-2018 | 1.1 | 1.3 | Good | 99.7 | 61 | 48 |
| S9-7.0 | 10 | 27-May-2019 | 1.2 | 1.8 | Good | 89.7 | 115 | 59 |
| S11-1.5 | 10 | 2-Nov-2018 | 2.8 | 11 | Poor | 96.7 | 271 | 340 |
| S11-1.5 | 10 | 27-May-2019 | 5.1 | 10.4 | Poor | 207 | 717 | 488 |
| S11-3.0 | 10 | 2-Nov-2018 | 2.7 | 5.3 | Fair | 211 | 230 | 268 |
| S11-3.0 | 10 | 27-May-2019 | 4.8 | 6 | Poor | 334 | 519 | 353 |
| S11-7.0 | 10 | 2-Nov-2018 | 2.1 | 1.2 | Fair | 274 | 31 | 66 |
| S11-7.0 | 10 | 27-May-2019 | 3.0 | 1.9 | Fair | 362 | 136 | 122 |

BOLD = Parameter Exceeds Recommended Guideline Criteria
BOLD = Parameter is Elevated Compared to Background Concentrations

*Alberta Soil and Groundwater Remediation Guidelines (Table 4). January 2019.
 (all concentrations in mg/kg = ppm, unless noted)

Topsoil = surface A, L, F, H and O horizons on the control area, or the equivalent surface soil where these horizons are not present.

EC = Electrical Conductivity (dS/m)

SAR = Sodium Adsorption Ratio

| | EC | SAR | Condition | Ca | Cl- | Na |
|---------|-----|------|-----------|-------|--------|--------|
| MIN | 0.5 | 0.6 | 22% | 7.6 | 16.0 | 18.0 |
| MAX | 7.3 | 37.0 | 22% | 362.0 | 2040.0 | 1620.0 |
| GEOMEAN | 2.0 | 6.6 | 22% | 67.1 | 199.5 | 190.3 |
| AVERAGE | 2.5 | 10.7 | 33% | 104.2 | 378.0 | 298.0 |



TABLE: A-14
 TITLE: SOIL ANALYSES - COE 20 CM CaCl₂ DATA
 PROJECT#: 19-424-CAI
 CLIENT: The City of Edmonton
 PROJECT: Anti-Icing Salinity Data Review
 LOCATION: Edmonton, Alberta

| 2019 Alberta* | Natural Area | EC | SAR | Rating | Calcium | Chloride | Sodium |
|---------------|--------------|-----|------|------------|-------------------------|----------|--------|
| | | <2 | <4 | Good | No Guidelines Available | | |
| | | 2-4 | 4-8 | Fair | | | |
| Fine Grained | Topsoil | 4-8 | 8-12 | Poor | | | |
| | | >8 | >12 | Unsuitable | | | |

| Sample ID | Depth (cm) | Date | EC | SAR | Rating | Calcium | Chloride | Sodium |
|-----------|------------|-------------|-----|------|------------|---------|----------|--------|
| S4-1.5 | 20 | 2-Nov-2018 | 6.6 | 37 | Unsuitable | 103 | 1970 | 1610 |
| S4-1.5 | 20 | 27-May-2019 | 4.4 | 36 | Unsuitable | 35 | 1240 | 900 |
| S4-3.0 | 20 | 2-Nov-2018 | 2.4 | 19 | Unsuitable | 26 | 429 | 344 |
| S4-3.0 | 20 | 27-May-2019 | 2.6 | 21 | Unsuitable | 19 | 349 | 278 |
| S4-7.0 | 20 | 2-Nov-2018 | 2.4 | 17 | Unsuitable | 54 | 558 | 505 |
| S4-7.0 | 20 | 27-May-2019 | 2.6 | 17 | Unsuitable | 41 | 534 | 431 |
| S5-1.5 | 20 | 2-Nov-2018 | 2.3 | 13 | Unsuitable | 49 | 417 | 299 |
| S5-1.5 | 20 | 27-May-2019 | 2.5 | 14 | Unsuitable | 46 | 443 | 296 |
| S5-3.0 | 20 | 2-Nov-2018 | 1.9 | 4.1 | Fair | 176 | 275 | 216 |
| S5-3.0 | 20 | 27-May-2019 | 2.6 | 6 | Fair | 192 | 550 | 344 |
| S5-7.0 | 20 | 2-Nov-2018 | 4.0 | 4.6 | Poor | 760 | 221 | 579 |
| S5-7.0 | 20 | 27-May-2019 | 3.6 | 3.7 | Fair | 559 | 207 | 378 |
| S6-1.5 | 20 | 2-Nov-2018 | 1.2 | 8.8 | Poor | 26.8 | 155 | 166 |
| S6-1.5 | 20 | 27-May-2019 | 1.3 | 9.3 | Poor | 24 | 177 | 152 |
| S6-3.0 | 20 | 2-Nov-2018 | 0.9 | 7.1 | Fair | 28.1 | 131 | 153 |
| S6-3.0 | 20 | 27-May-2019 | 1.2 | 8.6 | Poor | 21.9 | 154 | 141 |
| S6-7.0 | 20 | 2-Nov-2018 | 0.9 | 2 | Good | 59.2 | 19 | 58 |
| S6-7.0 | 20 | 27-May-2019 | 1.8 | 1.5 | Good | 187 | 12 | 75 |
| S8-1.5 | 20 | 2-Nov-2018 | 5.6 | 35 | Unsuitable | 35 | 789 | 622 |
| S8-1.5 | 20 | 27-May-2019 | 6.6 | 24.1 | Unsuitable | 115 | 1090 | 884 |
| S8-3.0 | 20 | 2-Nov-2018 | 2.8 | 38 | Unsuitable | 11 | 374 | 422 |
| S8-3.0 | 20 | 27-May-2019 | 5.9 | 29 | Unsuitable | 68 | 1130 | 821 |
| S8-7.0 | 20 | 2-Nov-2018 | 5.0 | 11.3 | Poor | 297 | 707 | 789 |
| S8-7.0 | 20 | 27-May-2019 | 3.3 | 15 | Unsuitable | 79 | 801 | 517 |
| S9-1.5 | 20 | 2-Nov-2018 | 6.2 | 13.3 | Unsuitable | 258 | 1260 | 755 |
| S9-1.5 | 20 | 27-May-2019 | 6.2 | 15.5 | Unsuitable | 195 | 1370 | 769 |
| S9-3.0 | 20 | 2-Nov-2018 | 2.5 | 9.9 | Poor | 76.3 | 369 | 302 |
| S9-3.0 | 20 | 27-May-2019 | 3.9 | 7.2 | Fair | 221 | 559 | 367 |
| S9-7.0 | 20 | 2-Nov-2018 | 1.0 | 1.7 | Good | 91 | 37 | 58 |
| S9-7.0 | 20 | 27-May-2019 | 2.4 | 1.9 | Fair | 244 | 98 | 102 |
| S11-1.5 | 20 | 2-Nov-2018 | 5.3 | 6.9 | Poor | 424 | 501 | 491 |
| S11-1.5 | 20 | 27-May-2019 | 5.5 | 6.4 | Poor | 414 | 551 | 445 |
| S11-3.0 | 20 | 2-Nov-2018 | 5.0 | 5 | Poor | 414 | 441 | 334 |
| S11-3.0 | 20 | 27-May-2019 | 3.8 | 3.5 | Fair | 431 | 315 | 261 |
| S11-7.0 | 20 | 2-Nov-2018 | 3.3 | 1.6 | Fair | 407 | 147 | 110 |
| S11-7.0 | 20 | 27-May-2019 | 3.2 | 1.6 | Fair | 419 | 133 | 126 |

BOLD = Parameter Exceeds Recommended Guideline Criteria
BOLD = Parameter is Elevated Compared to Background Concentrations

*Alberta Soil and Groundwater Remediation Guidelines (Table 4). January 2019.
 (all concentrations in mg/kg = ppm, unless noted)

Topsoil = surface A, L, F, H and O horizons on the control area, or the equivalent surface soil where these horizons are not present.

EC = Electrical Conductivity (dS/m)

SAR = Sodium Adsorption Ratio

| | EC | SAR | Condition | Ca | Cl- | Na |
|---------|-----|------|-----------|-------|--------|--------|
| MIN | 0.9 | 1.5 | 8% | 11.0 | 12.0 | 58.0 |
| MAX | 6.6 | 38.0 | 25% | 760.0 | 1970.0 | 1610.0 |
| GEOMEAN | 2.9 | 8.5 | 25% | 103.9 | 327.4 | 314.3 |
| AVERAGE | 3.4 | 12.7 | 42% | 183.5 | 514.3 | 419.4 |



TABLE: A-15
 TITLE: SOIL ANALYSES - COE 30 CM CaCl₂ DATA
 PROJECT#: 19-424-CAI
 CLIENT: The City of Edmonton
 PROJECT: Anti-Icing Salinity Data Review
 LOCATION: Edmonton, Alberta

| 2019 Alberta* | Natural Area | EC | SAR | Rating | Calcium | Chloride | Sodium |
|---------------|--------------|-----|------|------------|-------------------------|----------|--------|
| | | <2 | <4 | Good | No Guidelines Available | | |
| | | 2-4 | 4-8 | Fair | | | |
| Fine Grained | Topsoil | 4-8 | 8-12 | Poor | | | |
| | | >8 | >12 | Unsuitable | | | |

| Sample ID | Depth (cm) | Date | EC | SAR | Rating | Calcium | Chloride | Sodium |
|-----------|------------|-------------|-----|------|------------|---------|----------|--------|
| S4-1.5 | 30 | 2-Nov-2018 | 6.5 | 31 | Unsuitable | 190 | 2310 | 2050 |
| S4-1.5 | 30 | 27-May-2019 | 4.4 | 31 | Unsuitable | 54 | 1160 | 1020 |
| S4-3.0 | 30 | 2-Nov-2018 | 4.2 | 24 | Unsuitable | 74 | 1070 | 818 |
| S4-3.0 | 30 | 27-May-2019 | 3.4 | 24 | Unsuitable | 32 | 637 | 470 |
| S4-7.0 | 30 | 2-Nov-2018 | 3.3 | 21 | Unsuitable | 79 | 961 | 874 |
| S4-7.0 | 30 | 27-May-2019 | 3.8 | 19 | Unsuitable | 100 | 699 | 844 |
| S5-1.5 | 30 | 2-Nov-2018 | 4.3 | 16.1 | Unsuitable | 135 | 1010 | 655 |
| S5-1.5 | 30 | 27-May-2019 | 1.5 | 11.6 | Poor | 21 | 192 | 160 |
| S5-3.0 | 30 | 2-Nov-2018 | 6.5 | 7.7 | Poor | 1180 | 1640 | 1260 |
| S5-3.0 | 30 | 27-May-2019 | 6.4 | 7.5 | Poor | 866 | 1410 | 980 |
| S5-7.0 | 30 | 2-Nov-2018 | 5.5 | 4.4 | Poor | 1290 | 351 | 830 |
| S5-7.0 | 30 | 27-May-2019 | 4.6 | 3.4 | Poor | 806 | 279 | 459 |
| S6-1.5 | 30 | 2-Nov-2018 | 1.3 | 9.7 | Poor | 32.3 | 250 | 230 |
| S6-1.5 | 30 | 27-May-2019 | 1.1 | 9.5 | Poor | 17.2 | 150 | 141 |
| S6-3.0 | 30 | 2-Nov-2018 | 1.8 | 7.5 | Fair | 65.1 | 252 | 236 |
| S6-3.0 | 30 | 27-May-2019 | 1.2 | 7.7 | Fair | 26.3 | 176 | 144 |
| S6-7.0 | 30 | 2-Nov-2018 | 3.0 | 2.5 | Fair | 412 | 34 | 192 |
| S6-7.0 | 30 | 27-May-2019 | 3.0 | 2.2 | Fair | 329 | 19 | 142 |
| S8-1.5 | 30 | 2-Nov-2018 | 8.1 | 25.1 | Unsuitable | 211 | 1530 | 1330 |
| S8-1.5 | 30 | 27-May-2019 | 8.7 | 16.9 | Unsuitable | 483 | 1290 | 1350 |
| S8-3.0 | 30 | 2-Nov-2018 | 9.1 | 18.5 | Unsuitable | 448 | 1220 | 1400 |
| S8-3.0 | 30 | 27-May-2019 | 9.3 | 18.9 | Unsuitable | 513 | 1390 | 1550 |
| S8-7.0 | 30 | 2-Nov-2018 | 6.9 | 9.9 | Poor | 597 | 1230 | 994 |
| S8-7.0 | 30 | 27-May-2019 | 3.5 | 11 | Poor | 130 | 934 | 534 |
| S9-1.5 | 30 | 2-Nov-2018 | 8.3 | 14.9 | Unsuitable | 401 | 2010 | 1170 |
| S9-1.5 | 30 | 27-May-2019 | 9.3 | 14.5 | Unsuitable | 480 | 1840 | 1150 |
| S9-3.0 | 30 | 2-Nov-2018 | 8.2 | 9.3 | Unsuitable | 589 | 1630 | 863 |
| S9-3.0 | 30 | 27-May-2019 | 6.5 | 8.8 | Poor | 408 | 1080 | 655 |
| S9-7.0 | 30 | 2-Nov-2018 | 3.3 | 2.4 | Fair | 444 | 190 | 193 |
| S9-7.0 | 30 | 27-May-2019 | 3.4 | 2.2 | Fair | 459 | 154 | 196 |
| S11-1.5 | 30 | 2-Nov-2018 | 4.6 | 4.2 | Poor | 509 | 590 | 358 |
| S11-1.5 | 30 | 27-May-2019 | 5.3 | 5 | Poor | 435 | 555 | 355 |
| S11-3.0 | 30 | 2-Nov-2018 | 4.9 | 3.3 | Poor | 437 | 540 | 238 |
| S11-3.0 | 30 | 27-May-2019 | 4.6 | 3.4 | Poor | 438 | 427 | 249 |
| S11-7.0 | 30 | 2-Nov-2018 | 3.4 | 1.6 | Fair | 413 | 210 | 112 |
| S11-7.0 | 30 | 27-May-2019 | 3.3 | 1.7 | Fair | 417 | 188 | 128 |

BOLD = Parameter Exceeds Recommended Guideline Criteria
BOLD = Parameter is Elevated Compared to Background Concentrations

*Alberta Soil and Groundwater Remediation Guidelines (Table 4). January 2019.
 (all concentrations in mg/kg = ppm, unless noted)

Topsoil = surface A, L, F, H and O horizons on the control area, or the equivalent surface soil where these horizons are not present.

EC = Electrical Conductivity (dS/m)

SAR = Sodium Adsorption Ratio

| | EC | SAR | Condition | Ca | Cl- | Na |
|---------|-----|------|-----------|--------|--------|--------|
| MIN | 1.1 | 1.6 | 0% | 17.2 | 19.0 | 112.0 |
| MAX | 9.3 | 31.0 | 22% | 1290.0 | 2310.0 | 2050.0 |
| GEOMEAN | 4.2 | 8.3 | 39% | 229.2 | 530.9 | 487.0 |
| AVERAGE | 4.9 | 11.4 | 39% | 375.6 | 822.4 | 675.8 |



TABLE: A-16
 TITLE: SOIL ANALYSES - COE 1.5 M CaCl₂ DATA
 PROJECT#: 19-424-CAI
 CLIENT: The City of Edmonton
 PROJECT: Anti-Icing Salinity Data Review
 LOCATION: Edmonton, Alberta

| 2019 Alberta* | Natural Area | EC | SAR | Rating | Calcium | Chloride | Sodium |
|---------------|--------------|-----|------|------------|-------------------------|----------|--------|
| | | <2 | <4 | Good | No Guidelines Available | | |
| | | 2-4 | 4-8 | Fair | | | |
| Fine Grained | Topsoil | 4-8 | 8-12 | Poor | | | |
| | | >8 | >12 | Unsuitable | | | |

| Sample ID | Depth (cm) | Date | EC | SAR | Rating | Calcium | Chloride | Sodium |
|-----------|------------|-------------|-----|------|------------|---------|----------|--------|
| S4-1.5 | 10 | 2-Nov-2018 | 6.4 | 37 | Unsuitable | 100 | 2040 | 1620 |
| S4-1.5 | 10 | 27-May-2019 | 5.0 | 36 | Unsuitable | 30 | 986 | 647 |
| S4-1.5 | 20 | 2-Nov-2018 | 6.6 | 37 | Unsuitable | 103 | 1970 | 1610 |
| S4-1.5 | 20 | 27-May-2019 | 4.4 | 36 | Unsuitable | 35 | 1240 | 900 |
| S4-1.5 | 30 | 2-Nov-2018 | 6.5 | 31 | Unsuitable | 190 | 2310 | 2050 |
| S4-1.5 | 30 | 27-May-2019 | 4.4 | 31 | Unsuitable | 54 | 1160 | 1020 |
| S5-1.5 | 10 | 2-Nov-2018 | 1.6 | 8.2 | Poor | 39.2 | 107 | 155 |
| S5-1.5 | 10 | 27-May-2019 | 1.2 | 9.3 | Poor | 21 | 124 | 135 |
| S5-1.5 | 20 | 2-Nov-2018 | 2.3 | 13 | Unsuitable | 49 | 417 | 299 |
| S5-1.5 | 20 | 27-May-2019 | 2.5 | 14 | Unsuitable | 46 | 443 | 296 |
| S5-1.5 | 30 | 2-Nov-2018 | 4.3 | 16.1 | Unsuitable | 135 | 1010 | 655 |
| S5-1.5 | 30 | 27-May-2019 | 1.5 | 11.6 | Poor | 21 | 192 | 160 |
| S6-1.5 | 10 | 2-Nov-2018 | 1.6 | 3.4 | Good | 111 | 47 | 117 |
| S6-1.5 | 10 | 27-May-2019 | 2.0 | 5.6 | Fair | 87.5 | 203 | 172 |
| S6-1.5 | 20 | 2-Nov-2018 | 1.2 | 8.8 | Poor | 26.8 | 155 | 166 |
| S6-1.5 | 20 | 27-May-2019 | 1.3 | 9.3 | Poor | 24 | 177 | 152 |
| S6-1.5 | 30 | 2-Nov-2018 | 1.3 | 9.7 | Poor | 32.3 | 250 | 230 |
| S6-1.5 | 30 | 27-May-2019 | 1.1 | 9.5 | Poor | 17.2 | 150 | 141 |
| S8-1.5 | 10 | 2-Nov-2018 | 1.9 | 23.8 | Unsuitable | 7.6 | 179 | 179 |
| S8-1.5 | 10 | 27-May-2019 | 7.3 | 27 | Unsuitable | 80.8 | 1090 | 702 |
| S8-1.5 | 20 | 2-Nov-2018 | 5.6 | 35 | Unsuitable | 35 | 789 | 622 |
| S8-1.5 | 20 | 27-May-2019 | 6.6 | 24.1 | Unsuitable | 115 | 1090 | 884 |
| S8-1.5 | 30 | 2-Nov-2018 | 8.1 | 25.1 | Unsuitable | 211 | 1530 | 1330 |
| S8-1.5 | 30 | 27-May-2019 | 8.7 | 16.9 | Unsuitable | 483 | 1290 | 1350 |
| S9-1.5 | 10 | 2-Nov-2018 | 3.7 | 16 | Unsuitable | 86 | 710 | 495 |
| S9-1.5 | 10 | 27-May-2019 | 6.1 | 18.3 | Unsuitable | 130 | 1220 | 688 |
| S9-1.5 | 20 | 2-Nov-2018 | 6.2 | 13.3 | Unsuitable | 258 | 1260 | 755 |
| S9-1.5 | 20 | 27-May-2019 | 6.2 | 15.5 | Unsuitable | 195 | 1370 | 769 |
| S9-1.5 | 30 | 2-Nov-2018 | 8.3 | 14.9 | Unsuitable | 401 | 2010 | 1170 |
| S9-1.5 | 30 | 27-May-2019 | 9.3 | 14.5 | Unsuitable | 480 | 1840 | 1150 |
| S11-1.5 | 10 | 2-Nov-2018 | 2.8 | 11 | Poor | 96.7 | 271 | 340 |
| S11-1.5 | 10 | 27-May-2019 | 5.1 | 10.4 | Poor | 207 | 717 | 488 |
| S11-1.5 | 20 | 2-Nov-2018 | 5.3 | 6.9 | Poor | 424 | 501 | 491 |
| S11-1.5 | 20 | 27-May-2019 | 5.5 | 6.4 | Poor | 414 | 551 | 445 |
| S11-1.5 | 30 | 2-Nov-2018 | 4.6 | 4.2 | Poor | 509 | 590 | 358 |
| S11-1.5 | 30 | 27-May-2019 | 5.3 | 5 | Poor | 435 | 555 | 355 |

BOLD = Parameter Exceeds Recommended Guideline Criteria
BOLD = Parameter is Elevated Compared to Background Concentrations

*Alberta Soil and Groundwater Remediation Guidelines (Table 4). January 2019.
 (all concentrations in mg/kg = ppm, unless noted)

Topsoil = surface A, L, F, H and O horizons on the control area, or the equivalent surface soil where these horizons are not present.

EC = Electrical Conductivity (dS/m)

SAR = Sodium Adsorption Ratio

| | EC | SAR | Condition | Ca | Cl- | Na |
|---------|-----|------|-----------|-------|--------|--------|
| MIN | 1.1 | 3.4 | 3% | 7.6 | 47.0 | 117.0 |
| MAX | 9.3 | 37.0 | 3% | 509.0 | 2310.0 | 2050.0 |
| GEOMEAN | 3.7 | 14.0 | 36% | 91.6 | 573.1 | 469.8 |
| AVERAGE | 4.5 | 17.1 | 58% | 158.1 | 848.4 | 641.6 |



TABLE: A-17
 TITLE: SOIL ANALYSES - COE 3.0 M CaCl₂ DATA
 PROJECT#: 19-424-CAI
 CLIENT: The City of Edmonton
 PROJECT: Anti-Icing Salinity Data Review
 LOCATION: Edmonton, Alberta

| 2019 Alberta* | Natural Area | EC | SAR | Rating | Calcium | Chloride | Sodium |
|---------------|--------------|-----|------|------------|-------------------------|----------|--------|
| | | <2 | <4 | Good | No Guidelines Available | | |
| | | 2-4 | 4-8 | Fair | | | |
| Fine Grained | Topsoil | 4-8 | 8-12 | Poor | | | |
| | | >8 | >12 | Unsuitable | | | |

| Sample ID | Depth (cm) | Date | EC | SAR | Rating | Calcium | Chloride | Sodium |
|-----------|------------|-------------|-----|------|------------|---------|----------|--------|
| S4-3.0 | 10 | 2-Nov-2018 | 1.6 | 15.2 | Unsuitable | 14.3 | 157 | 169 |
| S4-3.0 | 10 | 27-May-2019 | 1.6 | 16.1 | Unsuitable | 9.5 | 139 | 128 |
| S4-3.0 | 20 | 2-Nov-2018 | 2.4 | 19 | Unsuitable | 26 | 429 | 344 |
| S4-3.0 | 20 | 27-May-2019 | 2.6 | 21 | Unsuitable | 19 | 349 | 278 |
| S4-3.0 | 30 | 2-Nov-2018 | 4.2 | 24 | Unsuitable | 74 | 1070 | 818 |
| S4-3.0 | 30 | 27-May-2019 | 3.4 | 24 | Unsuitable | 32 | 637 | 470 |
| S5-3.0 | 10 | 2-Nov-2018 | 1.0 | 1.6 | Good | 98.7 | 73 | 62 |
| S5-3.0 | 10 | 27-May-2019 | 1.2 | 3.7 | Good | 72.4 | 184 | 120 |
| S5-3.0 | 20 | 2-Nov-2018 | 1.9 | 4.1 | Fair | 176 | 275 | 216 |
| S5-3.0 | 20 | 27-May-2019 | 2.6 | 6 | Fair | 192 | 550 | 344 |
| S5-3.0 | 30 | 2-Nov-2018 | 6.5 | 7.7 | Poor | 1180 | 1640 | 1260 |
| S5-3.0 | 30 | 27-May-2019 | 6.4 | 7.5 | Poor | 866 | 1410 | 980 |
| S6-3.0 | 10 | 2-Nov-2018 | 0.7 | 4 | Fair | 32.1 | 38 | 86 |
| S6-3.0 | 10 | 27-May-2019 | 0.8 | 5.5 | Fair | 19.4 | 52 | 81 |
| S6-3.0 | 20 | 2-Nov-2018 | 0.9 | 7.1 | Fair | 28.1 | 131 | 153 |
| S6-3.0 | 20 | 27-May-2019 | 1.2 | 8.6 | Poor | 21.9 | 154 | 141 |
| S6-3.0 | 30 | 2-Nov-2018 | 1.8 | 7.5 | Fair | 65.1 | 252 | 236 |
| S6-3.0 | 30 | 27-May-2019 | 1.2 | 7.7 | Fair | 26.3 | 176 | 144 |
| S8-3.0 | 10 | 2-Nov-2018 | 1.8 | 12.8 | Unsuitable | 22.9 | 178 | 181 |
| S8-3.0 | 10 | 27-May-2019 | 4.0 | 34 | Unsuitable | 18 | 586 | 410 |
| S8-3.0 | 20 | 2-Nov-2018 | 2.8 | 38 | Unsuitable | 11 | 374 | 422 |
| S8-3.0 | 20 | 27-May-2019 | 5.9 | 29 | Unsuitable | 68 | 1130 | 821 |
| S8-3.0 | 30 | 2-Nov-2018 | 9.1 | 18.5 | Unsuitable | 448 | 1220 | 1400 |
| S8-3.0 | 30 | 27-May-2019 | 9.3 | 18.9 | Unsuitable | 513 | 1390 | 1550 |
| S9-3.0 | 10 | 2-Nov-2018 | 1.3 | 8 | Poor | 34 | 171 | 160 |
| S9-3.0 | 10 | 27-May-2019 | 1.7 | 7.9 | Fair | 48.4 | 262 | 189 |
| S9-3.0 | 20 | 2-Nov-2018 | 2.5 | 9.9 | Poor | 76.3 | 369 | 302 |
| S9-3.0 | 20 | 27-May-2019 | 3.9 | 7.2 | Fair | 221 | 559 | 367 |
| S9-3.0 | 30 | 2-Nov-2018 | 8.2 | 9.3 | Unsuitable | 589 | 1630 | 863 |
| S9-3.0 | 30 | 27-May-2019 | 6.5 | 8.8 | Poor | 408 | 1080 | 655 |
| S11-3.0 | 10 | 2-Nov-2018 | 2.7 | 5.3 | Fair | 211 | 230 | 268 |
| S11-3.0 | 10 | 27-May-2019 | 4.8 | 6 | Poor | 334 | 519 | 353 |
| S11-3.0 | 20 | 2-Nov-2018 | 5.0 | 5 | Poor | 414 | 441 | 334 |
| S11-3.0 | 20 | 27-May-2019 | 3.8 | 3.5 | Fair | 431 | 315 | 261 |
| S11-3.0 | 30 | 2-Nov-2018 | 4.9 | 3.3 | Poor | 437 | 540 | 238 |
| S11-3.0 | 30 | 27-May-2019 | 4.6 | 3.4 | Poor | 438 | 427 | 249 |

BOLD = Parameter Exceeds Recommended Guideline Criteria
BOLD = Parameter is Elevated Compared to Background Concentrations

*Alberta Soil and Groundwater Remediation Guidelines (Table 4). January 2019.
 (all concentrations in mg/kg = ppm, unless noted)

Topsoil = surface A, L, F, H and O horizons on the control area, or the equivalent surface soil where these horizons are not present.

EC = Electrical Conductivity (dS/m)

SAR = Sodium Adsorption Ratio

| | EC | SAR | Condition | Ca | Cl- | Na |
|---------|-----|------|-----------|--------|--------|--------|
| MIN | 0.7 | 1.6 | 6% | 9.5 | 38.0 | 62.0 |
| MAX | 9.3 | 38.0 | 31% | 1180.0 | 1640.0 | 1550.0 |
| GEOMEAN | 2.7 | 8.9 | 28% | 90.7 | 357.9 | 299.6 |
| AVERAGE | 3.5 | 11.6 | 36% | 213.2 | 531.6 | 418.1 |



TABLE: A-18
 TITLE: SOIL ANALYSES - COE 7.0 M CaCl₂ DATA
 PROJECT#: 19-424-CAI
 CLIENT: The City of Edmonton
 PROJECT: Anti-Icing Salinity Data Review
 LOCATION: Edmonton, Alberta

| 2019 Alberta* | Natural Area | EC | SAR | Rating | Calcium | Chloride | Sodium |
|---------------|--------------|-----|------|------------|-------------------------|----------|--------|
| | | <2 | <4 | Good | No Guidelines Available | | |
| | | 2-4 | 4-8 | Fair | | | |
| Fine Grained | Topsoil | 4-8 | 8-12 | Poor | | | |
| | | >8 | >12 | Unsuitable | | | |

| Sample ID | Depth (cm) | Date | EC | SAR | Rating | Calcium | Chloride | Sodium |
|-----------|------------|-------------|-----|------|------------|---------|----------|--------|
| S4-7.0 | 10 | 2-Nov-2018 | 1.3 | 9.8 | Poor | 42.7 | 226 | 287 |
| S4-7.0 | 10 | 27-May-2019 | 2.4 | 13 | Unsuitable | 52 | 486 | 359 |
| S4-7.0 | 20 | 2-Nov-2018 | 2.4 | 17 | Unsuitable | 54 | 558 | 505 |
| S4-7.0 | 20 | 27-May-2019 | 2.6 | 17 | Unsuitable | 41 | 534 | 431 |
| S4-7.0 | 30 | 2-Nov-2018 | 3.3 | 21 | Unsuitable | 79 | 961 | 874 |
| S4-7.0 | 30 | 27-May-2019 | 3.8 | 19 | Unsuitable | 100 | 699 | 844 |
| S5-7.0 | 10 | 2-Nov-2018 | 1.7 | 2.2 | Good | 242 | 127 | 158 |
| S5-7.0 | 10 | 27-May-2019 | 2.3 | 2.6 | Fair | 299 | 238 | 195 |
| S5-7.0 | 20 | 2-Nov-2018 | 4.0 | 4.6 | Poor | 760 | 221 | 579 |
| S5-7.0 | 20 | 27-May-2019 | 3.6 | 3.7 | Fair | 559 | 207 | 378 |
| S5-7.0 | 30 | 2-Nov-2018 | 5.5 | 4.4 | Poor | 1290 | 351 | 830 |
| S5-7.0 | 30 | 27-May-2019 | 4.6 | 3.4 | Poor | 806 | 279 | 459 |
| S6-7.0 | 10 | 2-Nov-2018 | 0.7 | 0.6 | Good | 81.1 | 23 | 23 |
| S6-7.0 | 10 | 27-May-2019 | 0.5 | 0.9 | Good | 31.1 | 16 | 18 |
| S6-7.0 | 20 | 2-Nov-2018 | 0.9 | 2 | Good | 59.2 | 19 | 58 |
| S6-7.0 | 20 | 27-May-2019 | 1.8 | 1.5 | Good | 187 | 12 | 75 |
| S6-7.0 | 30 | 2-Nov-2018 | 3.0 | 2.5 | Fair | 412 | 34 | 192 |
| S6-7.0 | 30 | 27-May-2019 | 3.0 | 2.2 | Fair | 329 | 19 | 142 |
| S8-7.0 | 10 | 2-Nov-2018 | 2.6 | 12 | Poor | 110 | 457 | 607 |
| S8-7.0 | 10 | 27-May-2019 | 3.2 | 13 | Unsuitable | 155 | 1410 | 842 |
| S8-7.0 | 20 | 2-Nov-2018 | 5.0 | 11.3 | Poor | 297 | 707 | 789 |
| S8-7.0 | 20 | 27-May-2019 | 3.3 | 15 | Unsuitable | 79 | 801 | 517 |
| S8-7.0 | 30 | 2-Nov-2018 | 6.9 | 9.9 | Poor | 597 | 1230 | 994 |
| S8-7.0 | 30 | 27-May-2019 | 3.5 | 11 | Poor | 130 | 934 | 534 |
| S9-7.0 | 10 | 2-Nov-2018 | 1.1 | 1.3 | Good | 99.7 | 61 | 48 |
| S9-7.0 | 10 | 27-May-2019 | 1.2 | 1.8 | Good | 89.7 | 115 | 59 |
| S9-7.0 | 20 | 2-Nov-2018 | 1.0 | 1.7 | Good | 91 | 37 | 58 |
| S9-7.0 | 20 | 27-May-2019 | 2.4 | 1.9 | Fair | 244 | 98 | 102 |
| S9-7.0 | 30 | 2-Nov-2018 | 3.3 | 2.4 | Fair | 444 | 190 | 193 |
| S9-7.0 | 30 | 27-May-2019 | 3.4 | 2.2 | Fair | 459 | 154 | 196 |
| S11-7.0 | 10 | 2-Nov-2018 | 2.1 | 1.2 | Fair | 274 | 31 | 66 |
| S11-7.0 | 10 | 27-May-2019 | 3.0 | 1.9 | Fair | 362 | 136 | 122 |
| S11-7.0 | 20 | 2-Nov-2018 | 3.3 | 1.6 | Fair | 407 | 147 | 110 |
| S11-7.0 | 20 | 27-May-2019 | 3.2 | 1.6 | Fair | 419 | 133 | 126 |
| S11-7.0 | 30 | 2-Nov-2018 | 3.4 | 1.6 | Fair | 413 | 210 | 112 |
| S11-7.0 | 30 | 27-May-2019 | 3.3 | 1.7 | Fair | 417 | 188 | 128 |

BOLD = Parameter Exceeds Recommended Guideline Criteria
BOLD = Parameter is Elevated Compared to Background Concentrations

*Alberta Soil and Groundwater Remediation Guidelines (Table 4). January 2019.
 (all concentrations in mg/kg = ppm, unless noted)

Topsoil = surface A, L, F, H and O horizons on the control area, or the equivalent surface soil where these horizons are not present.

EC = Electrical Conductivity (dS/m)

SAR = Sodium Adsorption Ratio

| | EC | SAR | Condition | Ca | Cl- | Na |
|---------|-----|------|-----------|--------|--------|-------|
| MIN | 0.5 | 0.6 | 22% | 31.1 | 12.0 | 18.0 |
| MAX | 6.9 | 21.0 | 36% | 1290.0 | 1410.0 | 994.0 |
| GEOMEAN | 2.5 | 3.7 | 22% | 192.4 | 169.1 | 206.9 |
| AVERAGE | 2.8 | 6.1 | 19% | 292.0 | 334.7 | 333.6 |



TABLE: A-19
 TITLE: SOIL ANALYSES - ALL UDI ROAD SALT DATA
 PROJECT#: 19-424-CAI
 CLIENT: The City of Edmonton
 PROJECT: Anti-Icing Salinity Data Review
 LOCATION: Edmonton, Alberta

| 2019 Alberta* | Natural Area | EC | SAR | Rating | Calcium | Chloride | Sodium |
|---------------|--------------|-----|------|------------|-------------------------|----------|--------|
| | | <2 | <4 | Good | No Guidelines Available | | |
| | | 2-4 | 4-8 | Fair | | | |
| Fine Grained | Topsoil | 4-8 | 8-12 | Poor | | | |
| | | >8 | >12 | Unsuitable | | | |

| Sample ID | Depth (cm) | Date | EC | SAR | Rating | Calcium | Chloride | Sodium |
|-----------|------------|-------------|-----|-----|--------|---------|----------|--------|
| SC-1.5 | 10 | 16-Nov-2018 | 1.6 | 3 | Good | 148 | 386 | 162 |
| SC-1.5 | 10 | 27-May-2019 | 2.1 | 3.9 | Fair | 144 | 379 | 183 |
| SC-1.5 | 20 | 16-Nov-2018 | 3.3 | 3.7 | Fair | 285 | 818 | 238 |
| SC-1.5 | 20 | 27-May-2019 | 2.4 | 3.5 | Fair | 144 | 443 | 149 |
| SC-1.5 | 30 | 16-Nov-2018 | 4.6 | 3.5 | Poor | 397 | 948 | 250 |
| SC-1.5 | 30 | 27-May-2019 | 3.0 | 3.4 | Fair | 207 | 508 | 168 |
| SC-3.0 | 10 | 16-Nov-2018 | 1.2 | 1.9 | Good | 126 | 120 | 90 |
| SC-3.0 | 10 | 27-May-2019 | 1.4 | 2.5 | Good | 138 | 146 | 117 |
| SC-3.0 | 20 | 16-Nov-2018 | 1.2 | 2.7 | Good | 86.3 | 161 | 95 |
| SC-3.0 | 20 | 27-May-2019 | 1.6 | 2.9 | Good | 125 | 214 | 121 |
| SC-3.0 | 30 | 16-Nov-2018 | 2.7 | 2.3 | Fair | 266 | 450 | 135 |
| SC-3.0 | 30 | 27-May-2019 | 2.1 | 2.5 | Fair | 154 | 288 | 111 |
| SC-7.0 | 10 | 16-Nov-2018 | 1.1 | 0.4 | Good | 180 | 44 | 25 |
| SC-7.0 | 10 | 27-May-2019 | 1.7 | 0.6 | Good | 289 | 46 | 41 |
| SC-7.0 | 20 | 16-Nov-2018 | 0.8 | 0.5 | Good | 103 | 15 | 21 |
| SC-7.0 | 20 | 27-May-2019 | 1.5 | 0.6 | Good | 210 | 25 | 32 |
| SC-7.0 | 30 | 16-Nov-2018 | 1.1 | 0.5 | Good | 138 | 18 | 21 |
| SC-7.0 | 30 | 27-May-2019 | 1.3 | 0.6 | Good | 154 | 28 | 26 |
| SE-1.5 | 10 | 16-Nov-2018 | 1.5 | 1.1 | Good | 194 | 3 | 60 |
| SE-1.5 | 10 | 27-May-2019 | 1.2 | 1.1 | Good | 141 | 55 | 51 |
| SE-1.5 | 20 | 16-Nov-2018 | 1.7 | 1 | Good | 258 | 62 | 66 |
| SE-1.5 | 20 | 27-May-2019 | 1.2 | 1.1 | Good | 118 | 42 | 46 |
| SE-1.5 | 30 | 16-Nov-2018 | 1.4 | 0.8 | Good | 207 | 34 | 55 |
| SE-1.5 | 30 | 27-May-2019 | 2.1 | 0.8 | Fair | 284 | 26 | 53 |
| SE-3.0 | 10 | 16-Nov-2018 | 1.0 | 0.4 | Good | 163 | 30 | 23 |
| SE-3.0 | 10 | 27-May-2019 | 1.1 | 0.5 | Good | 162 | 23 | 25 |
| SE-3.0 | 20 | 16-Nov-2018 | 0.6 | 0.5 | Good | 83.8 | 14 | 20 |
| SE-3.0 | 20 | 27-May-2019 | 0.7 | 0.5 | Good | 100 | 16 | 21 |
| SE-3.0 | 30 | 16-Nov-2018 | 0.5 | 0.5 | Good | 65.8 | 11 | 18 |
| SE-3.0 | 30 | 27-May-2019 | 0.8 | 0.5 | Good | 100 | 20 | 20 |
| SF-1.5 | 10 | 16-Nov-2018 | 1.8 | 6.3 | Fair | 100 | 283 | 256 |
| SF-1.5 | 10 | 27-May-2019 | 3.0 | 11 | Poor | 100 | 670 | 440 |
| SF-1.5 | 20 | 16-Nov-2018 | 1.5 | 5 | Fair | 107 | 146 | 221 |
| SF-1.5 | 20 | 27-May-2019 | 2.9 | 9.9 | Poor | 109 | 592 | 415 |
| SF-1.5 | 30 | 16-Nov-2018 | 2.3 | 3.2 | Fair | 251 | 188 | 206 |
| SF-1.5 | 30 | 27-May-2019 | 4.0 | 6.1 | Poor | 351 | 578 | 430 |
| SF-3.0 | 10 | 16-Nov-2018 | 1.6 | 3.7 | Good | 142 | 183 | 184 |
| SF-3.0 | 10 | 27-May-2019 | 2.2 | 6.3 | Fair | 117 | 284 | 269 |
| SF-3.0 | 20 | 16-Nov-2018 | 2.0 | 3.9 | Good | 166 | 236 | 199 |
| SF-3.0 | 20 | 27-May-2019 | 3.3 | 3.2 | Fair | 388 | 294 | 239 |
| SF-3.0 | 30 | 16-Nov-2018 | 2.9 | 1.9 | Fair | 506 | 277 | 182 |
| SF-3.0 | 30 | 27-May-2019 | 3.1 | 1.8 | Fair | 595 | 243 | 168 |
| SF-7.0 | 10 | 16-Nov-2018 | 1.2 | 1.1 | Good | 181 | 104 | 68 |
| SF-7.0 | 10 | 27-May-2019 | 1.0 | 1.4 | Good | 91.1 | 91 | 52 |
| SF-7.0 | 20 | 16-Nov-2018 | 0.7 | 1.1 | Good | 92.5 | 69 | 48 |
| SF-7.0 | 20 | 27-May-2019 | 1.1 | 1 | Good | 117 | 87 | 44 |
| SF-7.0 | 30 | 16-Nov-2018 | 2.1 | 1.1 | Fair | 269 | 132 | 78 |
| SF-7.0 | 30 | 27-May-2019 | 2.0 | 1.1 | Good | 228 | 116 | 67 |

BOLD = Parameter Exceeds Recommended Guideline Criteria
BOLD = Parameter is Elevated Compared to Background Concentrations

*Alberta Soil and Groundwater Remediation Guidelines (Table 4). January 2019.
 (all concentrations in mg/kg = ppm, unless noted)

Topsoil = surface A, L, F, H and O horizons on the control area, or the equivalent surface soil where these horizons are not present.

EC = Electrical Conductivity (dS/m)

SAR = Sodium Adsorption Ratio

| | EC | SAR | Condition | Ca | Cl- | Na |
|---------|-----|------|-----------|-------|-------|-------|
| MIN | 0.5 | 0.4 | 60% | 65.8 | 3.0 | 18.0 |
| MAX | 4.6 | 11.0 | 31% | 595.0 | 948.0 | 440.0 |
| GEOMEAN | 1.6 | 1.6 | 8% | 165.7 | 102.8 | 83.6 |
| AVERAGE | 1.8 | 2.4 | 0% | 189.2 | 207.2 | 125.2 |



TABLE: A-20
 TITLE: SOIL ANALYSES - 2018 UDI ROAD SALT DATA
 PROJECT#: 19-424-CAI
 CLIENT: The City of Edmonton
 PROJECT: Anti-Icing Salinity Data Review
 LOCATION: Edmonton, Alberta

| 2019 Alberta* | Natural Area | EC | SAR | Rating | Calcium | Chloride | Sodium |
|---------------|--------------|-----|------|------------|-------------------------|----------|--------|
| | | <2 | <4 | Good | No Guidelines Available | | |
| | | 2-4 | 4-8 | Fair | | | |
| Fine Grained | Topsoil | 4-8 | 8-12 | Poor | | | |
| | | >8 | >12 | Unsuitable | | | |

| Sample ID | Depth (cm) | Date | EC | SAR | Rating | Calcium | Chloride | Sodium |
|-----------|------------|-------------|-----|-----|--------|---------|----------|--------|
| SC-1.5 | 10 | 16-Nov-2018 | 1.6 | 3 | Good | 148 | 386 | 162 |
| SC-1.5 | 20 | 16-Nov-2018 | 3.3 | 3.7 | Fair | 285 | 818 | 238 |
| SC-1.5 | 30 | 16-Nov-2018 | 4.6 | 3.5 | Poor | 397 | 948 | 250 |
| SC-3.0 | 10 | 16-Nov-2018 | 1.2 | 1.9 | Good | 126 | 120 | 90 |
| SC-3.0 | 20 | 16-Nov-2018 | 1.2 | 2.7 | Good | 86.3 | 161 | 95 |
| SC-3.0 | 30 | 16-Nov-2018 | 2.7 | 2.3 | Fair | 266 | 450 | 135 |
| SC-7.0 | 10 | 16-Nov-2018 | 1.1 | 0.4 | Good | 180 | 44 | 25 |
| SC-7.0 | 20 | 16-Nov-2018 | 0.8 | 0.5 | Good | 103 | 15 | 21 |
| SC-7.0 | 30 | 16-Nov-2018 | 1.1 | 0.5 | Good | 138 | 18 | 21 |
| SE-1.5 | 10 | 16-Nov-2018 | 1.5 | 1.1 | Good | 194 | 3 | 60 |
| SE-1.5 | 20 | 16-Nov-2018 | 1.7 | 1 | Good | 258 | 62 | 66 |
| SE-1.5 | 30 | 16-Nov-2018 | 1.4 | 0.8 | Good | 207 | 34 | 55 |
| SE-3.0 | 10 | 16-Nov-2018 | 1.0 | 0.4 | Good | 163 | 30 | 23 |
| SE-3.0 | 20 | 16-Nov-2018 | 0.6 | 0.5 | Good | 83.8 | 14 | 20 |
| SE-3.0 | 30 | 16-Nov-2018 | 0.5 | 0.5 | Good | 65.8 | 11 | 18 |
| SF-1.5 | 10 | 16-Nov-2018 | 1.8 | 6.3 | Fair | 100 | 283 | 256 |
| SF-1.5 | 20 | 16-Nov-2018 | 1.5 | 5 | Fair | 107 | 146 | 221 |
| SF-1.5 | 30 | 16-Nov-2018 | 2.3 | 3.2 | Fair | 251 | 188 | 206 |
| SF-3.0 | 10 | 16-Nov-2018 | 1.6 | 3.7 | Good | 142 | 183 | 184 |
| SF-3.0 | 20 | 16-Nov-2018 | 2.0 | 3.9 | Good | 166 | 236 | 199 |
| SF-3.0 | 30 | 16-Nov-2018 | 2.9 | 1.9 | Fair | 506 | 277 | 182 |
| SF-7.0 | 10 | 16-Nov-2018 | 1.2 | 1.1 | Good | 181 | 104 | 68 |
| SF-7.0 | 20 | 16-Nov-2018 | 0.7 | 1.1 | Good | 92.5 | 69 | 48 |
| SF-7.0 | 30 | 16-Nov-2018 | 2.1 | 1.1 | Fair | 269 | 132 | 78 |

BOLD = Parameter Exceeds Recommended Guideline Criteria
BOLD = Parameter is Elevated Compared to Background Concentrations

*Alberta Soil and Groundwater Remediation Guidelines (Table 4). January 2019.
 (all concentrations in mg/kg = ppm, unless noted)

Topsoil = surface A, L, F, H and O horizons on the control area, or the equivalent surface soil where these horizons are not present.

EC = Electrical Conductivity (dS/m)

SAR = Sodium Adsorption Ratio

| | EC | SAR | Condition | Ca | Cl- | Na |
|---------|-----|-----|-----------|-------|-------|-------|
| MIN | 0.5 | 0.4 | 67% | 65.8 | 3.0 | 18.0 |
| MAX | 4.6 | 6.3 | 29% | 506.0 | 948.0 | 256.0 |
| GEOMEAN | 1.5 | 1.5 | 4% | 165.0 | 90.0 | 79.7 |
| AVERAGE | 1.7 | 2.1 | 0% | 188.1 | 197.2 | 113.4 |



TABLE: A-21
 TITLE: SOIL ANALYSES - 2019 UDI ROAD SALT DATA
 PROJECT#: 19-424-CAI
 CLIENT: The City of Edmonton
 PROJECT: Anti-Icing Salinity Data Review
 LOCATION: Edmonton, Alberta

| 2019 Alberta* | Natural Area | EC | SAR | Rating | Calcium | Chloride | Sodium |
|---------------|--------------|-----|------|------------|-------------------------|----------|--------|
| | | <2 | <4 | Good | No Guidelines Available | | |
| | | 2-4 | 4-8 | Fair | | | |
| Fine Grained | Topsoil | 4-8 | 8-12 | Poor | | | |
| | | >8 | >12 | Unsuitable | | | |

| Sample ID | Depth (cm) | Date | EC | SAR | Rating | Calcium | Chloride | Sodium |
|-----------|------------|-------------|-----|-----|--------|---------|----------|--------|
| SC-1.5 | 10 | 27-May-2019 | 2.1 | 3.9 | Fair | 144 | 379 | 183 |
| SC-1.5 | 20 | 27-May-2019 | 2.4 | 3.5 | Fair | 144 | 443 | 149 |
| SC-1.5 | 30 | 27-May-2019 | 3.0 | 3.4 | Fair | 207 | 508 | 168 |
| SC-3.0 | 10 | 27-May-2019 | 1.4 | 2.5 | Good | 138 | 146 | 117 |
| SC-3.0 | 20 | 27-May-2019 | 1.6 | 2.9 | Good | 125 | 214 | 121 |
| SC-3.0 | 30 | 27-May-2019 | 2.1 | 2.5 | Fair | 154 | 288 | 111 |
| SC-7.0 | 10 | 27-May-2019 | 1.7 | 0.6 | Good | 289 | 46 | 41 |
| SC-7.0 | 20 | 27-May-2019 | 1.5 | 0.6 | Good | 210 | 25 | 32 |
| SC-7.0 | 30 | 27-May-2019 | 1.3 | 0.6 | Good | 154 | 28 | 26 |
| SE-1.5 | 10 | 27-May-2019 | 1.2 | 1.1 | Good | 141 | 55 | 51 |
| SE-1.5 | 20 | 27-May-2019 | 1.2 | 1.1 | Good | 118 | 42 | 46 |
| SE-1.5 | 30 | 27-May-2019 | 2.1 | 0.8 | Fair | 284 | 26 | 53 |
| SE-3.0 | 10 | 27-May-2019 | 1.1 | 0.5 | Good | 162 | 23 | 25 |
| SE-3.0 | 20 | 27-May-2019 | 0.7 | 0.5 | Good | 100 | 16 | 21 |
| SE-3.0 | 30 | 27-May-2019 | 0.8 | 0.5 | Good | 100 | 20 | 20 |
| SF-1.5 | 10 | 27-May-2019 | 3.0 | 11 | Poor | 100 | 670 | 440 |
| SF-1.5 | 20 | 27-May-2019 | 2.9 | 9.9 | Poor | 109 | 592 | 415 |
| SF-1.5 | 30 | 27-May-2019 | 4.0 | 6.1 | Poor | 351 | 578 | 430 |
| SF-3.0 | 10 | 27-May-2019 | 2.2 | 6.3 | Fair | 117 | 284 | 269 |
| SF-3.0 | 20 | 27-May-2019 | 3.3 | 3.2 | Fair | 388 | 294 | 239 |
| SF-3.0 | 30 | 27-May-2019 | 3.1 | 1.8 | Fair | 595 | 243 | 168 |
| SF-7.0 | 10 | 27-May-2019 | 1.0 | 1.4 | Good | 91.1 | 91 | 52 |
| SF-7.0 | 20 | 27-May-2019 | 1.1 | 1 | Good | 117 | 87 | 44 |
| SF-7.0 | 30 | 27-May-2019 | 2.0 | 1.1 | Good | 228 | 116 | 67 |

BOLD = Parameter Exceeds Recommended Guideline Criteria
BOLD = Parameter is Elevated Compared to Background Concentrations

*Alberta Soil and Groundwater Remediation Guidelines (Table 4). January 2019.
 (all concentrations in mg/kg = ppm, unless noted)

Topsoil = surface A, L, F, H and O horizons on the control area, or the equivalent surface soil where these horizons are not present.

EC = Electrical Conductivity (dS/m)

SAR = Sodium Adsorption Ratio

| | EC | SAR | Condition | Ca | Cl- | Na |
|---------|-----|------|-----------|-------|-------|-------|
| MIN | 0.7 | 0.5 | 54% | 91.1 | 16.0 | 20.0 |
| MAX | 4.0 | 11.0 | 33% | 595.0 | 670.0 | 440.0 |
| GEOMEAN | 1.7 | 1.8 | 13% | 166.5 | 117.4 | 87.6 |
| AVERAGE | 1.9 | 2.8 | 0% | 190.3 | 217.3 | 137.0 |



TABLE: A-22
 TITLE: SOIL ANALYSES - 10 CM UDI ROAD SALT DATA
 PROJECT#: 19-424-CAI
 CLIENT: The City of Edmonton
 PROJECT: Anti-Icing Salinity Data Review
 LOCATION: Edmonton, Alberta

| 2019 Alberta* | Natural Area | EC | SAR | Rating | Calcium | Chloride | Sodium |
|---------------|--------------|-----|------|------------|-------------------------|----------|--------|
| | | <2 | <4 | Good | | | |
| Fine Grained | Topsoil | 2-4 | 4-8 | Fair | No Guidelines Available | | |
| | | 4-8 | 8-12 | Poor | | | |
| | | >8 | >12 | Unsuitable | | | |

| Sample ID | Depth (cm) | Date | EC | SAR | Rating | Calcium | Chloride | Sodium |
|-----------|------------|-------------|-----|-----|--------|---------|----------|--------|
| SC-1.5 | 10 | 16-Nov-2018 | 1.6 | 3 | Good | 148 | 386 | 162 |
| SC-1.5 | 10 | 27-May-2019 | 2.1 | 3.9 | Fair | 144 | 379 | 183 |
| SC-3.0 | 10 | 16-Nov-2018 | 1.2 | 1.9 | Good | 126 | 120 | 90 |
| SC-3.0 | 10 | 27-May-2019 | 1.4 | 2.5 | Good | 138 | 146 | 117 |
| SC-7.0 | 10 | 16-Nov-2018 | 1.1 | 0.4 | Good | 180 | 44 | 25 |
| SC-7.0 | 10 | 27-May-2019 | 1.7 | 0.6 | Good | 289 | 46 | 41 |
| SE-1.5 | 10 | 16-Nov-2018 | 1.5 | 1.1 | Good | 194 | 3 | 60 |
| SE-1.5 | 10 | 27-May-2019 | 1.2 | 1.1 | Good | 141 | 55 | 51 |
| SE-3.0 | 10 | 16-Nov-2018 | 1.0 | 0.4 | Good | 163 | 30 | 23 |
| SE-3.0 | 10 | 27-May-2019 | 1.1 | 0.5 | Good | 162 | 23 | 25 |
| SF-1.5 | 10 | 16-Nov-2018 | 1.8 | 6.3 | Fair | 100 | 283 | 256 |
| SF-1.5 | 10 | 27-May-2019 | 3.0 | 11 | Poor | 100 | 670 | 440 |
| SF-3.0 | 10 | 16-Nov-2018 | 1.6 | 3.7 | Good | 142 | 183 | 184 |
| SF-3.0 | 10 | 27-May-2019 | 2.2 | 6.3 | Fair | 117 | 284 | 269 |
| SF-7.0 | 10 | 16-Nov-2018 | 1.2 | 1.1 | Good | 181 | 104 | 68 |
| SF-7.0 | 10 | 27-May-2019 | 1.0 | 1.4 | Good | 91.1 | 91 | 52 |

BOLD = Parameter Exceeds Recommended Guideline Criteria
BOLD = Parameter is Elevated Compared to Background Concentrations

*Alberta Soil and Groundwater Remediation Guidelines (Table 4). January 2019.
 (all concentrations in mg/kg = ppm, unless noted)

Topsoil = surface A, L, F, H and O horizons on the control area, or the equivalent surface soil where these horizons are not present.

EC = Electrical Conductivity (dS/m)

SAR = Sodium Adsorption Ratio

| | EC | SAR | Condition | Ca | Cl- | Na |
|---------|-----|------|-----------|-------|-------|-------|
| MIN | 1.0 | 0.4 | 75% | 91.1 | 3.0 | 23.0 |
| MAX | 3.0 | 11.0 | 19% | 289.0 | 670.0 | 440.0 |
| GEOMEAN | 1.5 | 1.8 | 6% | 145.0 | 96.3 | 87.2 |
| AVERAGE | 1.5 | 2.8 | 0% | 151.0 | 177.9 | 127.9 |



TABLE: A-23
 TITLE: SOIL ANALYSES - 20 CM UDI ROAD SALT DATA
 PROJECT#: 19-424-CAI
 CLIENT: The City of Edmonton
 PROJECT: Anti-Icing Salinity Data Review
 LOCATION: Edmonton, Alberta

| 2019 Alberta* | Natural Area | EC | SAR | Rating | Calcium | Chloride | Sodium |
|---------------|--------------|-----|------|------------|-------------------------|----------|--------|
| | | <2 | <4 | Good | No Guidelines Available | | |
| | | 2-4 | 4-8 | Fair | | | |
| Fine Grained | Topsoil | 4-8 | 8-12 | Poor | | | |
| | | >8 | >12 | Unsuitable | | | |

| Sample ID | Depth (cm) | Date | EC | SAR | Rating | Calcium | Chloride | Sodium |
|-----------|------------|-------------|-----|-----|--------|---------|----------|--------|
| SC-1.5 | 20 | 16-Nov-2018 | 3.3 | 3.7 | Fair | 285 | 818 | 238 |
| SC-1.5 | 20 | 27-May-2019 | 2.4 | 3.5 | Fair | 144 | 443 | 149 |
| SC-3.0 | 20 | 16-Nov-2018 | 1.2 | 2.7 | Good | 86.3 | 161 | 95 |
| SC-3.0 | 20 | 27-May-2019 | 1.6 | 2.9 | Good | 125 | 214 | 121 |
| SC-7.0 | 20 | 16-Nov-2018 | 0.8 | 0.5 | Good | 103 | 15 | 21 |
| SC-7.0 | 20 | 27-May-2019 | 1.5 | 0.6 | Good | 210 | 25 | 32 |
| SE-1.5 | 20 | 16-Nov-2018 | 1.7 | 1 | Good | 258 | 62 | 66 |
| SE-1.5 | 20 | 27-May-2019 | 1.2 | 1.1 | Good | 118 | 42 | 46 |
| SE-3.0 | 20 | 16-Nov-2018 | 0.6 | 0.5 | Good | 83.8 | 14 | 20 |
| SE-3.0 | 20 | 27-May-2019 | 0.7 | 0.5 | Good | 100 | 16 | 21 |
| SF-1.5 | 20 | 16-Nov-2018 | 1.5 | 5 | Fair | 107 | 146 | 221 |
| SF-1.5 | 20 | 27-May-2019 | 2.9 | 9.9 | Poor | 109 | 592 | 415 |
| SF-3.0 | 20 | 16-Nov-2018 | 2.0 | 3.9 | Good | 166 | 236 | 199 |
| SF-3.0 | 20 | 27-May-2019 | 3.3 | 3.2 | Fair | 388 | 294 | 239 |
| SF-7.0 | 20 | 16-Nov-2018 | 0.7 | 1.1 | Good | 92.5 | 69 | 48 |
| SF-7.0 | 20 | 27-May-2019 | 1.1 | 1 | Good | 117 | 87 | 44 |

BOLD = Parameter Exceeds Recommended Guideline Criteria
BOLD = Parameter is Elevated Compared to Background Concentrations

*Alberta Soil and Groundwater Remediation Guidelines (Table 4). January 2019.
 (all concentrations in mg/kg = ppm, unless noted)

Topsoil = surface A, L, F, H and O horizons on the control area, or the equivalent surface soil where these horizons are not present.

EC = Electrical Conductivity (dS/m)

SAR = Sodium Adsorption Ratio

| | EC | SAR | Condition | Ca | Cl- | Na |
|---------|-----|-----|-----------|-------|-------|-------|
| MIN | 0.6 | 0.5 | 69% | 83.8 | 14.0 | 20.0 |
| MAX | 3.3 | 9.9 | 25% | 388.0 | 818.0 | 415.0 |
| GEOMEAN | 1.5 | 1.7 | 6% | 139.2 | 99.9 | 80.7 |
| AVERAGE | 1.7 | 2.6 | 0% | 155.8 | 202.1 | 123.4 |



TABLE: A-24
 TITLE: SOIL ANALYSES - 30 CM UDI ROAD SALT DATA
 PROJECT#: 19-424-CAI
 CLIENT: The City of Edmonton
 PROJECT: Anti-Icing Salinity Data Review
 LOCATION: Edmonton, Alberta

| 2019 Alberta* | Natural Area | EC | SAR | Rating | Calcium | Chloride | Sodium |
|---------------|--------------|-----|------|------------|-------------------------|----------|--------|
| | | <2 | <4 | Good | No Guidelines Available | | |
| | | 2-4 | 4-8 | Fair | | | |
| Fine Grained | Topsoil | 4-8 | 8-12 | Poor | | | |
| | | >8 | >12 | Unsuitable | | | |

| Sample ID | Depth (cm) | Date | EC | SAR | Rating | Calcium | Chloride | Sodium |
|-----------|------------|-------------|-----|-----|--------|---------|----------|--------|
| SC-1.5 | 30 | 16-Nov-2018 | 4.6 | 3.5 | Poor | 397 | 948 | 250 |
| SC-1.5 | 30 | 27-May-2019 | 3.0 | 3.4 | Fair | 207 | 508 | 168 |
| SC-3.0 | 30 | 16-Nov-2018 | 2.7 | 2.3 | Fair | 266 | 450 | 135 |
| SC-3.0 | 30 | 27-May-2019 | 2.1 | 2.5 | Fair | 154 | 288 | 111 |
| SC-7.0 | 30 | 16-Nov-2018 | 1.1 | 0.5 | Good | 138 | 18 | 21 |
| SC-7.0 | 30 | 27-May-2019 | 1.3 | 0.6 | Good | 154 | 28 | 26 |
| SE-1.5 | 30 | 16-Nov-2018 | 1.4 | 0.8 | Good | 207 | 34 | 55 |
| SE-1.5 | 30 | 27-May-2019 | 2.1 | 0.8 | Fair | 284 | 26 | 53 |
| SE-3.0 | 30 | 16-Nov-2018 | 0.5 | 0.5 | Good | 65.8 | 11 | 18 |
| SE-3.0 | 30 | 27-May-2019 | 0.8 | 0.5 | Good | 100 | 20 | 20 |
| SF-1.5 | 30 | 16-Nov-2018 | 2.3 | 3.2 | Fair | 251 | 188 | 206 |
| SF-1.5 | 30 | 27-May-2019 | 4.0 | 6.1 | Poor | 351 | 578 | 430 |
| SF-3.0 | 30 | 16-Nov-2018 | 2.9 | 1.9 | Fair | 506 | 277 | 182 |
| SF-3.0 | 30 | 27-May-2019 | 3.1 | 1.8 | Fair | 595 | 243 | 168 |
| SF-7.0 | 30 | 16-Nov-2018 | 2.1 | 1.1 | Fair | 269 | 132 | 78 |
| SF-7.0 | 30 | 27-May-2019 | 2.0 | 1.1 | Good | 228 | 116 | 67 |

BOLD = Parameter Exceeds Recommended Guideline Criteria
BOLD = Parameter is Elevated Compared to Background Concentrations

*Alberta Soil and Groundwater Remediation Guidelines (Table 4). January 2019.
 (all concentrations in mg/kg = ppm, unless noted)

Topsoil = surface A, L, F, H and O horizons on the control area, or the equivalent surface soil where these horizons are not present.

EC = Electrical Conductivity (dS/m)

SAR = Sodium Adsorption Ratio

| | EC | SAR | Condition | Ca | Cl- | Na |
|---------|-----|-----|-----------|-------|-------|-------|
| MIN | 0.5 | 0.5 | 38% | 65.8 | 11.0 | 18.0 |
| MAX | 4.6 | 6.1 | 50% | 595.0 | 948.0 | 430.0 |
| GEOMEAN | 2.0 | 1.4 | 13% | 225.6 | 112.8 | 83.0 |
| AVERAGE | 2.2 | 1.9 | 0% | 260.8 | 241.6 | 124.3 |



TABLE: A-25
 TITLE: SOIL ANALYSES - 1.5 M UDI ROAD SALT DATA
 PROJECT#: 19-424-CAI
 CLIENT: The City of Edmonton
 PROJECT: Anti-Icing Salinity Data Review
 LOCATION: Edmonton, Alberta

| 2019 Alberta* | Natural Area | EC | SAR | Rating | Calcium | Chloride | Sodium |
|---------------|--------------|-----|------|------------|-------------------------|----------|--------|
| | | <2 | <4 | Good | No Guidelines Available | | |
| | | 2-4 | 4-8 | Fair | | | |
| Fine Grained | Topsoil | 4-8 | 8-12 | Poor | | | |
| | | >8 | >12 | Unsuitable | | | |

| Sample ID | Depth (cm) | Date | EC | SAR | Rating | Calcium | Chloride | Sodium |
|-----------|------------|-------------|-----|-----|--------|---------|----------|--------|
| SC-1.5 | 10 | 16-Nov-2018 | 1.6 | 3 | Good | 148 | 386 | 162 |
| SC-1.5 | 10 | 27-May-2019 | 2.1 | 3.9 | Fair | 144 | 379 | 183 |
| SC-1.5 | 20 | 16-Nov-2018 | 3.3 | 3.7 | Fair | 285 | 818 | 238 |
| SC-1.5 | 20 | 27-May-2019 | 2.4 | 3.5 | Fair | 144 | 443 | 149 |
| SC-1.5 | 30 | 16-Nov-2018 | 4.6 | 3.5 | Poor | 397 | 948 | 250 |
| SC-1.5 | 30 | 27-May-2019 | 3.0 | 3.4 | Fair | 207 | 508 | 168 |
| SE-1.5 | 10 | 16-Nov-2018 | 1.5 | 1.1 | Good | 194 | 3 | 60 |
| SE-1.5 | 10 | 27-May-2019 | 1.2 | 1.1 | Good | 141 | 55 | 51 |
| SE-1.5 | 20 | 16-Nov-2018 | 1.7 | 1 | Good | 258 | 62 | 66 |
| SE-1.5 | 20 | 27-May-2019 | 1.2 | 1.1 | Good | 118 | 42 | 46 |
| SE-1.5 | 30 | 16-Nov-2018 | 1.4 | 0.8 | Good | 207 | 34 | 55 |
| SE-1.5 | 30 | 27-May-2019 | 2.1 | 0.8 | Fair | 284 | 26 | 53 |
| SF-1.5 | 10 | 16-Nov-2018 | 1.8 | 6.3 | Fair | 100 | 283 | 256 |
| SF-1.5 | 10 | 27-May-2019 | 3.0 | 11 | Poor | 100 | 670 | 440 |
| SF-1.5 | 20 | 16-Nov-2018 | 1.5 | 5 | Fair | 107 | 146 | 221 |
| SF-1.5 | 20 | 27-May-2019 | 2.9 | 9.9 | Poor | 109 | 592 | 415 |
| SF-1.5 | 30 | 16-Nov-2018 | 2.3 | 3.2 | Fair | 251 | 188 | 206 |
| SF-1.5 | 30 | 27-May-2019 | 4.0 | 6.1 | Poor | 351 | 578 | 430 |

BOLD = Parameter Exceeds Recommended Guideline Criteria
BOLD = Parameter is Elevated Compared to Background Concentrations

*Alberta Soil and Groundwater Remediation Guidelines (Table 4). January 2019.
 (all concentrations in mg/kg = ppm, unless noted)

Topsoil = surface A, L, F, H and O horizons on the control area, or the equivalent surface soil where these horizons are not present.

EC = Electrical Conductivity (dS/m)

SAR = Sodium Adsorption Ratio

| | EC | SAR | Condition | Ca | Cl- | Na |
|---------|-----|------|-----------|-------|-------|-------|
| MIN | 1.2 | 0.8 | 33% | 100.0 | 3.0 | 46.0 |
| MAX | 4.6 | 11.0 | 44% | 397.0 | 948.0 | 440.0 |
| GEOMEAN | 2.1 | 2.8 | 22% | 179.2 | 172.0 | 147.5 |
| AVERAGE | 2.3 | 3.8 | 0% | 196.9 | 342.3 | 191.6 |



TABLE: A-26
 TITLE: SOIL ANALYSES - 3.0 M UDI ROAD SALT DATA
 PROJECT#: 19-424-CAI
 CLIENT: The City of Edmonton
 PROJECT: Anti-Icing Salinity Data Review
 LOCATION: Edmonton, Alberta

| 2019 Alberta* | Natural Area | EC | SAR | Rating | Calcium | Chloride | Sodium |
|---------------|--------------|-----|------|------------|-------------------------|----------|--------|
| | | <2 | <4 | Good | No Guidelines Available | | |
| | | 2-4 | 4-8 | Fair | | | |
| Fine Grained | Topsoil | 4-8 | 8-12 | Poor | | | |
| | | >8 | >12 | Unsuitable | | | |

| Sample ID | Depth (cm) | Date | EC | SAR | Rating | Calcium | Chloride | Sodium |
|-----------|------------|-------------|-----|-----|--------|---------|----------|--------|
| SC-3.0 | 10 | 16-Nov-2018 | 1.2 | 1.9 | Good | 126 | 120 | 90 |
| SC-3.0 | 10 | 27-May-2019 | 1.4 | 2.5 | Good | 138 | 146 | 117 |
| SC-3.0 | 20 | 16-Nov-2018 | 1.2 | 2.7 | Good | 86.3 | 161 | 95 |
| SC-3.0 | 20 | 27-May-2019 | 1.6 | 2.9 | Good | 125 | 214 | 121 |
| SC-3.0 | 30 | 16-Nov-2018 | 2.7 | 2.3 | Fair | 266 | 450 | 135 |
| SC-3.0 | 30 | 27-May-2019 | 2.1 | 2.5 | Fair | 154 | 288 | 111 |
| SE-3.0 | 10 | 16-Nov-2018 | 1.0 | 0.4 | Good | 163 | 30 | 23 |
| SE-3.0 | 10 | 27-May-2019 | 1.1 | 0.5 | Good | 162 | 23 | 25 |
| SE-3.0 | 20 | 16-Nov-2018 | 0.6 | 0.5 | Good | 83.8 | 14 | 20 |
| SE-3.0 | 20 | 27-May-2019 | 0.7 | 0.5 | Good | 100 | 16 | 21 |
| SE-3.0 | 30 | 16-Nov-2018 | 0.5 | 0.5 | Good | 65.8 | 11 | 18 |
| SE-3.0 | 30 | 27-May-2019 | 0.8 | 0.5 | Good | 100 | 20 | 20 |
| SF-3.0 | 10 | 16-Nov-2018 | 1.6 | 3.7 | Good | 142 | 183 | 184 |
| SF-3.0 | 10 | 27-May-2019 | 2.2 | 6.3 | Fair | 117 | 284 | 269 |
| SF-3.0 | 20 | 16-Nov-2018 | 2.0 | 3.9 | Good | 166 | 236 | 199 |
| SF-3.0 | 20 | 27-May-2019 | 3.3 | 3.2 | Fair | 388 | 294 | 239 |
| SF-3.0 | 30 | 16-Nov-2018 | 2.9 | 1.9 | Fair | 506 | 277 | 182 |
| SF-3.0 | 30 | 27-May-2019 | 3.1 | 1.8 | Fair | 595 | 243 | 168 |

BOLD = Parameter Exceeds Recommended Guideline Criteria
BOLD = Parameter is Elevated Compared to Background Concentrations

*Alberta Soil and Groundwater Remediation Guidelines (Table 4). January 2019.
 (all concentrations in mg/kg = ppm, unless noted)

Topsoil = surface A, L, F, H and O horizons on the control area, or the equivalent surface soil where these horizons are not present.

EC = Electrical Conductivity (dS/m)

SAR = Sodium Adsorption Ratio

| | EC | SAR | Condition | Ca | Cl- | Na |
|---------|-----|-----|-----------|-------|-------|-------|
| MIN | 0.5 | 0.4 | 67% | 65.8 | 11.0 | 18.0 |
| MAX | 3.3 | 6.3 | 33% | 595.0 | 450.0 | 269.0 |
| GEOMEAN | 1.4 | 1.5 | 0% | 157.6 | 97.6 | 78.0 |
| AVERAGE | 1.7 | 2.1 | 0% | 193.6 | 167.2 | 113.2 |



TABLE: A-27
 TITLE: SOIL ANALYSES - 7.0 M UDI ROAD SALT DATA
 PROJECT#: 19-424-CAI
 CLIENT: The City of Edmonton
 PROJECT: Anti-Icing Salinity Data Review
 LOCATION: Edmonton, Alberta

| 2019 Alberta* | Natural Area | EC | SAR | Rating | Calcium | Chloride | Sodium |
|---------------|--------------|-----|------|------------|-------------------------|----------|--------|
| | | <2 | <4 | Good | No Guidelines Available | | |
| | | 2-4 | 4-8 | Fair | | | |
| Fine Grained | Topsoil | 4-8 | 8-12 | Poor | | | |
| | | >8 | >12 | Unsuitable | | | |

| Sample ID | Depth (cm) | Date | EC | SAR | Rating | Calcium | Chloride | Sodium |
|-----------|------------|-------------|------------|-----|--------|---------|----------|--------|
| SC-7.0 | 10 | 16-Nov-2018 | 1.1 | 0.4 | Good | 180 | 44 | 25 |
| SC-7.0 | 10 | 27-May-2019 | 1.7 | 0.6 | Good | 289 | 46 | 41 |
| SC-7.0 | 20 | 16-Nov-2018 | 0.8 | 0.5 | Good | 103 | 15 | 21 |
| SC-7.0 | 20 | 27-May-2019 | 1.5 | 0.6 | Good | 210 | 25 | 32 |
| SC-7.0 | 30 | 16-Nov-2018 | 1.1 | 0.5 | Good | 138 | 18 | 21 |
| SC-7.0 | 30 | 27-May-2019 | 1.3 | 0.6 | Good | 154 | 28 | 26 |
| SF-7.0 | 10 | 16-Nov-2018 | 1.2 | 1.1 | Good | 181 | 104 | 68 |
| SF-7.0 | 10 | 27-May-2019 | 1.0 | 1.4 | Good | 91.1 | 91 | 52 |
| SF-7.0 | 20 | 16-Nov-2018 | 0.7 | 1.1 | Good | 92.5 | 69 | 48 |
| SF-7.0 | 20 | 27-May-2019 | 1.1 | 1 | Good | 117 | 87 | 44 |
| SF-7.0 | 30 | 16-Nov-2018 | 2.1 | 1.1 | Fair | 269 | 132 | 78 |
| SF-7.0 | 30 | 27-May-2019 | 2.0 | 1.1 | Good | 228 | 116 | 67 |

BOLD = Parameter Exceeds Recommended Guideline Criteria
BOLD = Parameter is Elevated Compared to Background Concentrations

*Alberta Soil and Groundwater Remediation Guidelines (Table 4). January 2019.
 (all concentrations in mg/kg = ppm, unless noted)

Topsoil = surface A, L, F, H and O horizons on the control area, or the equivalent surface soil where these horizons are not present.

EC = Electrical Conductivity (dS/m)

SAR = Sodium Adsorption Ratio

| | EC | SAR | Condition | Ca | Cl- | Na |
|---------|-----|-----|-----------|-------|-------|------|
| MIN | 0.7 | 0.4 | 92% | 91.1 | 15.0 | 21.0 |
| MAX | 2.1 | 1.4 | 8% | 289.0 | 132.0 | 78.0 |
| GEOMEAN | 1.2 | 0.8 | 0% | 159.0 | 51.3 | 39.6 |
| AVERAGE | 1.3 | 0.8 | 0% | 171.1 | 64.6 | 43.6 |



TABLE: A-28
 TITLE: SOIL ANALYSES - ALL UDI CaCl₂ DATA
 PROJECT#: 19-424-CAI
 CLIENT: The City of Edmonton
 PROJECT: Anti-Icing Salinity Data Review
 LOCATION: Edmonton, Alberta

| 2019 Alberta* | Natural Area | EC | SAR | Rating | Calcium | Chloride | Sodium |
|---------------|--------------|-----|------|------------|-------------------------|----------|--------|
| | | <2 | <4 | Good | No Guidelines Available | | |
| | | 2-4 | 4-8 | Fair | | | |
| Fine Grained | Topsoil | 4-8 | 8-12 | Poor | | | |
| | | >8 | >12 | Unsuitable | | | |

| Sample ID | Depth (cm) | Date | EC | SAR | Rating | Calcium | Chloride | Sodium |
|-----------|------------|-------------|-----|-----|------------|---------|----------|--------|
| SA-1.5 | 10 | 16-Nov-2018 | 1.4 | 0.5 | Good | 249 | 57 | 37 |
| SA-1.5 | 10 | 27-May-2019 | 2.0 | 0.9 | Fair | 292 | 48 | 59 |
| SA-1.5 | 20 | 16-Nov-2018 | 2.6 | 1 | Fair | 431 | 38 | 86 |
| SA-1.5 | 20 | 27-May-2019 | 2.3 | 1.2 | Fair | 319 | 37 | 84 |
| SA-1.5 | 30 | 16-Nov-2018 | 3.1 | 1.4 | Fair | 523 | 56 | 134 |
| SA-1.5 | 30 | 27-May-2019 | 3.1 | 1.5 | Fair | 439 | 42 | 128 |
| SB-1.5 | 10 | 16-Nov-2018 | 0.9 | 4.4 | Fair | 49.4 | 146 | 142 |
| SB-1.5 | 10 | 27-May-2019 | 2.8 | 9.2 | Poor | 106 | 688 | 382 |
| SB-1.5 | 20 | 16-Nov-2018 | 1.5 | 6.1 | Fair | 60.6 | 219 | 182 |
| SB-1.5 | 20 | 27-May-2019 | 3.0 | 8 | Poor | 124 | 709 | 337 |
| SB-1.5 | 30 | 16-Nov-2018 | 2.0 | 9.4 | Poor | 56.4 | 290 | 255 |
| SB-1.5 | 30 | 27-May-2019 | 2.9 | 13 | Unsuitable | 87 | 716 | 503 |
| SB-3.0 | 10 | 16-Nov-2018 | 1.0 | 1.8 | Good | 104 | 65 | 74 |
| SB-3.0 | 10 | 27-May-2019 | 1.4 | 3.8 | Good | 84.1 | 246 | 139 |
| SB-3.0 | 20 | 16-Nov-2018 | 0.7 | 1.7 | Good | 82.8 | 60 | 67 |
| SB-3.0 | 20 | 27-May-2019 | 1.6 | 3.6 | Good | 109 | 279 | 143 |
| SD-1.5 | 10 | 16-Nov-2018 | 1.4 | 0.6 | Good | 170 | 49 | 34 |
| SD-1.5 | 10 | 27-May-2019 | 0.8 | 0.6 | Good | 95.3 | 19 | 24 |
| SD-1.5 | 20 | 16-Nov-2018 | 0.6 | 0.8 | Good | 70.7 | 32 | 27 |
| SD-1.5 | 20 | 27-May-2019 | 0.8 | 0.8 | Good | 77.5 | 15 | 26 |
| SD-1.5 | 30 | 16-Nov-2018 | 0.6 | 1.1 | Good | 41.7 | 32 | 24 |
| SD-1.5 | 30 | 27-May-2019 | 0.7 | 1.1 | Good | 53.9 | 20 | 29 |
| SD-7.0 | 10 | 16-Nov-2018 | 0.6 | 0.2 | Good | 85.3 | 13 | 8 |
| SD-7.0 | 10 | 27-May-2019 | 0.7 | 0.3 | Good | 81 | 11 | 11 |
| SD-7.0 | 20 | 16-Nov-2018 | 0.4 | 0.6 | Good | 52 | 9 | 18 |
| SD-7.0 | 20 | 27-May-2019 | 0.5 | 0.9 | Good | 44.7 | 7 | 21 |
| SD-7.0 | 30 | 16-Nov-2018 | 0.8 | 1.5 | Good | 65.9 | 17 | 44 |
| SD-7.0 | 30 | 27-May-2019 | 0.7 | 1.7 | Good | 50.9 | 14 | 41 |

BOLD = Parameter Exceeds Recommended Guideline Criteria
BOLD = Parameter is Elevated Compared to Background Concentrations

*Alberta Soil and Groundwater Remediation Guidelines (Table 4). January 2019.
 (all concentrations in mg/kg = ppm, unless noted)

Topsoil = surface A, L, F, H and O horizons on the control area, or the equivalent surface soil where these horizons are not present.

EC = Electrical Conductivity (dS/m)

SAR = Sodium Adsorption Ratio

| | EC | SAR | Condition | Ca | Cl- | Na |
|---------|-----|------|-----------|-------|-------|-------|
| MIN | 0.4 | 0.2 | 61% | 41.7 | 7.0 | 8.0 |
| MAX | 3.1 | 13.0 | 25% | 523.0 | 716.0 | 503.0 |
| GEOMEAN | 1.2 | 1.6 | 11% | 104.8 | 54.8 | 63.3 |
| AVERAGE | 1.5 | 2.8 | 4% | 143.0 | 140.5 | 109.3 |



TABLE: A-29
 TITLE: SOIL ANALYSES - 2018 UDI CaCl₂ DATA
 PROJECT#: 19-424-CAI
 CLIENT: The City of Edmonton
 PROJECT: Anti-Icing Salinity Data Review
 LOCATION: Edmonton, Alberta

| 2019 Alberta* | Natural Area | EC | SAR | Rating | Calcium | Chloride | Sodium |
|---------------|--------------|-----|------|------------|-------------------------|----------|--------|
| | | <2 | <4 | Good | No Guidelines Available | | |
| | | 2-4 | 4-8 | Fair | | | |
| Fine Grained | Topsoil | 4-8 | 8-12 | Poor | | | |
| | | >8 | >12 | Unsuitable | | | |

| Sample ID | Depth (cm) | Date | EC | SAR | Rating | Calcium | Chloride | Sodium |
|-----------|------------|-------------|-----|-----|--------|---------|----------|--------|
| SA-1.5 | 10 | 16-Nov-2018 | 1.4 | 0.5 | Good | 249 | 57 | 37 |
| SA-1.5 | 20 | 16-Nov-2018 | 2.6 | 1 | Fair | 431 | 38 | 86 |
| SA-1.5 | 30 | 16-Nov-2018 | 3.1 | 1.4 | Fair | 523 | 56 | 134 |
| SB-1.5 | 10 | 16-Nov-2018 | 0.9 | 4.4 | Fair | 49.4 | 146 | 142 |
| SB-1.5 | 20 | 16-Nov-2018 | 1.5 | 6.1 | Fair | 60.6 | 219 | 182 |
| SB-1.5 | 30 | 16-Nov-2018 | 2.0 | 9.4 | Poor | 56.4 | 290 | 255 |
| SB-3.0 | 10 | 16-Nov-2018 | 1.0 | 1.8 | Good | 104 | 65 | 74 |
| SB-3.0 | 20 | 16-Nov-2018 | 0.7 | 1.7 | Good | 82.8 | 60 | 67 |
| SD-1.5 | 10 | 16-Nov-2018 | 1.4 | 0.6 | Good | 170 | 49 | 34 |
| SD-1.5 | 20 | 16-Nov-2018 | 0.6 | 0.8 | Good | 70.7 | 32 | 27 |
| SD-1.5 | 30 | 16-Nov-2018 | 0.6 | 1.1 | Good | 41.7 | 32 | 24 |
| SD-7.0 | 10 | 16-Nov-2018 | 0.6 | 0.2 | Good | 85.3 | 13 | 8 |
| SD-7.0 | 20 | 16-Nov-2018 | 0.4 | 0.6 | Good | 52 | 9 | 18 |
| SD-7.0 | 30 | 16-Nov-2018 | 0.8 | 1.5 | Good | 65.9 | 17 | 44 |

BOLD = Parameter Exceeds Recommended Guideline Criteria
BOLD = Parameter is Elevated Compared to Background Concentrations

*Alberta Soil and Groundwater Remediation Guidelines (Table 4). January 2019.
 (all concentrations in mg/kg = ppm, unless noted)

Topsoil = surface A, L, F, H and O horizons on the control area, or the equivalent surface soil where these horizons are not present.

EC = Electrical Conductivity (dS/m)

SAR = Sodium Adsorption Ratio

| | EC | SAR | Condition | Ca | Cl- | Na |
|---------|-----|-----|-----------|-------|-------|-------|
| MIN | 0.4 | 0.2 | 64% | 41.7 | 9.0 | 8.0 |
| MAX | 3.1 | 9.4 | 29% | 523.0 | 290.0 | 255.0 |
| GEOMEAN | 1.0 | 1.3 | 7% | 101.3 | 48.8 | 54.3 |
| AVERAGE | 1.2 | 2.2 | 0% | 145.8 | 77.4 | 80.9 |



TABLE: A-30
 TITLE: SOIL ANALYSES - 2019 UDI CaCl₂ DATA
 PROJECT#: 19-424-CAI
 CLIENT: The City of Edmonton
 PROJECT: Anti-Icing Salinity Data Review
 LOCATION: Edmonton, Alberta

| 2019 Alberta* | Natural Area | EC | SAR | Rating | Calcium | Chloride | Sodium |
|---------------|--------------|-----|------|------------|-------------------------|----------|--------|
| | | <2 | <4 | Good | No Guidelines Available | | |
| | | 2-4 | 4-8 | Fair | | | |
| Fine Grained | Topsoil | 4-8 | 8-12 | Poor | | | |
| | | >8 | >12 | Unsuitable | | | |

| Sample ID | Depth (cm) | Date | EC | SAR | Rating | Calcium | Chloride | Sodium |
|-----------|------------|-------------|-----|-----|------------|---------|----------|--------|
| SA-1.5 | 10 | 27-May-2019 | 2.0 | 0.9 | Fair | 292 | 48 | 59 |
| SA-1.5 | 20 | 27-May-2019 | 2.3 | 1.2 | Fair | 319 | 37 | 84 |
| SA-1.5 | 30 | 27-May-2019 | 3.1 | 1.5 | Fair | 439 | 42 | 128 |
| SB-1.5 | 10 | 27-May-2019 | 2.8 | 9.2 | Poor | 106 | 688 | 382 |
| SB-1.5 | 20 | 27-May-2019 | 3.0 | 8 | Poor | 124 | 709 | 337 |
| SB-1.5 | 30 | 27-May-2019 | 2.9 | 13 | Unsuitable | 87 | 716 | 503 |
| SB-3.0 | 10 | 27-May-2019 | 1.4 | 3.8 | Good | 84.1 | 246 | 139 |
| SB-3.0 | 20 | 27-May-2019 | 1.6 | 3.6 | Good | 109 | 279 | 143 |
| SD-1.5 | 10 | 27-May-2019 | 0.8 | 0.6 | Good | 95.3 | 19 | 24 |
| SD-1.5 | 20 | 27-May-2019 | 0.8 | 0.8 | Good | 77.5 | 15 | 26 |
| SD-1.5 | 30 | 27-May-2019 | 0.7 | 1.1 | Good | 53.9 | 20 | 29 |
| SD-7.0 | 10 | 27-May-2019 | 0.7 | 0.3 | Good | 81 | 11 | 11 |
| SD-7.0 | 20 | 27-May-2019 | 0.5 | 0.9 | Good | 44.7 | 7 | 21 |
| SD-7.0 | 30 | 27-May-2019 | 0.7 | 1.7 | Good | 50.9 | 14 | 41 |

BOLD = Parameter Exceeds Recommended Guideline Criteria
BOLD = Parameter is Elevated Compared to Background Concentrations

*Alberta Soil and Groundwater Remediation Guidelines (Table 4). January 2019.
 (all concentrations in mg/kg = ppm, unless noted)

Topsoil = surface A, L, F, H and O horizons on the control area, or the equivalent surface soil where these horizons are not present.

EC = Electrical Conductivity (dS/m)

SAR = Sodium Adsorption Ratio

| | EC | SAR | Condition | Ca | Cl- | Na |
|---------|-----|------|-----------|-------|-------|-------|
| MIN | 0.5 | 0.3 | 57% | 44.7 | 7.0 | 11.0 |
| MAX | 3.1 | 13.0 | 21% | 439.0 | 716.0 | 503.0 |
| GEOMEAN | 1.4 | 1.8 | 14% | 108.5 | 61.5 | 73.7 |
| AVERAGE | 1.7 | 3.3 | 7% | 140.2 | 203.6 | 137.6 |



TABLE: A-31
 TITLE: SOIL ANALYSES - 10 CM UDI CaCl₂ DATA
 PROJECT#: 19-424-CAI
 CLIENT: The City of Edmonton
 PROJECT: Anti-Icing Salinity Data Review
 LOCATION: Edmonton, Alberta

| 2019 Alberta* | Natural Area | EC | SAR | Rating | Calcium | Chloride | Sodium |
|---------------|--------------|-----|------|------------|-------------------------|----------|--------|
| | | <2 | <4 | Good | No Guidelines Available | | |
| | | 2-4 | 4-8 | Fair | | | |
| Fine Grained | Topsoil | 4-8 | 8-12 | Poor | | | |
| | | >8 | >12 | Unsuitable | | | |

| Sample ID | Depth (cm) | Date | EC | SAR | Rating | Calcium | Chloride | Sodium |
|-----------|------------|-------------|-----|-----|--------|---------|----------|--------|
| SA-1.5 | 10 | 16-Nov-2018 | 1.4 | 0.5 | Good | 249 | 57 | 37 |
| SA-1.5 | 10 | 27-May-2019 | 2.0 | 0.9 | Fair | 292 | 48 | 59 |
| SB-1.5 | 10 | 16-Nov-2018 | 0.9 | 4.4 | Fair | 49.4 | 146 | 142 |
| SB-1.5 | 10 | 27-May-2019 | 2.8 | 9.2 | Poor | 106 | 688 | 382 |
| SB-3.0 | 10 | 16-Nov-2018 | 1.0 | 1.8 | Good | 104 | 65 | 74 |
| SB-3.0 | 10 | 27-May-2019 | 1.4 | 3.8 | Good | 84.1 | 246 | 139 |
| SD-1.5 | 10 | 16-Nov-2018 | 1.4 | 0.6 | Good | 170 | 49 | 34 |
| SD-1.5 | 10 | 27-May-2019 | 0.8 | 0.6 | Good | 95.3 | 19 | 24 |
| SD-7.0 | 10 | 16-Nov-2018 | 0.6 | 0.2 | Good | 85.3 | 13 | 8 |
| SD-7.0 | 10 | 27-May-2019 | 0.7 | 0.3 | Good | 81 | 11 | 11 |

BOLD = Parameter Exceeds Recommended Guideline Criteria
BOLD = Parameter is Elevated Compared to Background Concentrations

*Alberta Soil and Groundwater Remediation Guidelines (Table 4). January 2019.
 (all concentrations in mg/kg = ppm, unless noted)

Topsoil = surface A, L, F, H and O horizons on the control area, or the equivalent surface soil where these horizons are not present.

EC = Electrical Conductivity (dS/m)

SAR = Sodium Adsorption Ratio

| | EC | SAR | Condition | Ca | Cl- | Na |
|---------|-----|-----|-----------|-------|-------|-------|
| MIN | 0.6 | 0.2 | 70% | 49.4 | 11.0 | 8.0 |
| MAX | 2.8 | 9.2 | 20% | 292.0 | 688.0 | 382.0 |
| GEOMEAN | 1.1 | 1.1 | 10% | 114.1 | 59.8 | 49.5 |
| AVERAGE | 1.3 | 2.2 | 0% | 131.6 | 134.2 | 91.0 |



TABLE: A-32
 TITLE: SOIL ANALYSES - 20 CM UDI CaCl₂ DATA
 PROJECT#: 19-424-CAI
 CLIENT: The City of Edmonton
 PROJECT: Anti-Icing Salinity Data Review
 LOCATION: Edmonton, Alberta

| 2019 Alberta* | Natural Area | EC | SAR | Rating | Calcium | Chloride | Sodium |
|---------------|--------------|-----|------|------------|-------------------------|----------|--------|
| | | <2 | <4 | Good | No Guidelines Available | | |
| | | 2-4 | 4-8 | Fair | | | |
| Fine Grained | Topsoil | 4-8 | 8-12 | Poor | | | |
| | | >8 | >12 | Unsuitable | | | |

| Sample ID | Depth (cm) | Date | EC | SAR | Rating | Calcium | Chloride | Sodium |
|-----------|------------|-------------|-----|-----|--------|---------|----------|--------|
| SA-1.5 | 20 | 16-Nov-2018 | 2.6 | 1 | Fair | 431 | 38 | 86 |
| SA-1.5 | 20 | 27-May-2019 | 2.3 | 1.2 | Fair | 319 | 37 | 84 |
| SB-1.5 | 20 | 16-Nov-2018 | 1.5 | 6.1 | Fair | 60.6 | 219 | 182 |
| SB-1.5 | 20 | 27-May-2019 | 3.0 | 8 | Poor | 124 | 709 | 337 |
| SB-3.0 | 20 | 16-Nov-2018 | 0.7 | 1.7 | Good | 82.8 | 60 | 67 |
| SB-3.0 | 20 | 27-May-2019 | 1.6 | 3.6 | Good | 109 | 279 | 143 |
| SD-1.5 | 20 | 16-Nov-2018 | 0.6 | 0.8 | Good | 70.7 | 32 | 27 |
| SD-1.5 | 20 | 27-May-2019 | 0.8 | 0.8 | Good | 77.5 | 15 | 26 |
| SD-7.0 | 20 | 16-Nov-2018 | 0.4 | 0.6 | Good | 52 | 9 | 18 |
| SD-7.0 | 20 | 27-May-2019 | 0.5 | 0.9 | Good | 44.7 | 7 | 21 |

BOLD = Parameter Exceeds Recommended Guideline Criteria
BOLD = Parameter is Elevated Compared to Background Concentrations

*Alberta Soil and Groundwater Remediation Guidelines (Table 4). January 2019.
 (all concentrations in mg/kg = ppm, unless noted)

Topsoil = surface A, L, F, H and O horizons on the control area, or the equivalent surface soil where these horizons are not present.

EC = Electrical Conductivity (dS/m)

SAR = Sodium Adsorption Ratio

| | EC | SAR | Condition | Ca | Cl- | Na |
|---------|-----|-----|-----------|-------|-------|-------|
| MIN | 0.4 | 0.6 | 60% | 44.7 | 7.0 | 18.0 |
| MAX | 3.0 | 8.0 | 30% | 431.0 | 709.0 | 337.0 |
| GEOMEAN | 1.1 | 1.6 | 10% | 101.7 | 50.6 | 63.9 |
| AVERAGE | 1.4 | 2.5 | 0% | 137.1 | 140.5 | 99.1 |



TABLE: A-33
 TITLE: SOIL ANALYSES - 30 CM UDI CaCl₂ DATA
 PROJECT#: 19-424-CAI
 CLIENT: The City of Edmonton
 PROJECT: Anti-Icing Salinity Data Review
 LOCATION: Edmonton, Alberta

| 2019 Alberta* | Natural Area | EC | SAR | Rating | Calcium | Chloride | Sodium |
|---------------|--------------|-----|------|------------|-------------------------|----------|--------|
| | | <2 | <4 | Good | No Guidelines Available | | |
| | | 2-4 | 4-8 | Fair | | | |
| Fine Grained | Topsoil | 4-8 | 8-12 | Poor | | | |
| | | >8 | >12 | Unsuitable | | | |

| Sample ID | Depth (cm) | Date | EC | SAR | Rating | Calcium | Chloride | Sodium |
|-----------|------------|-------------|-----|-----|------------|---------|----------|--------|
| SA-1.5 | 30 | 16-Nov-2018 | 3.1 | 1.4 | Fair | 523 | 56 | 134 |
| SA-1.5 | 30 | 27-May-2019 | 3.1 | 1.5 | Fair | 439 | 42 | 128 |
| SB-1.5 | 30 | 16-Nov-2018 | 2.0 | 9.4 | Poor | 56.4 | 290 | 255 |
| SB-1.5 | 30 | 27-May-2019 | 2.9 | 13 | Unsuitable | 87 | 716 | 503 |
| SD-1.5 | 30 | 16-Nov-2018 | 0.6 | 1.1 | Good | 41.7 | 32 | 24 |
| SD-1.5 | 30 | 27-May-2019 | 0.7 | 1.1 | Good | 53.9 | 20 | 29 |
| SD-7.0 | 30 | 16-Nov-2018 | 0.8 | 1.5 | Good | 65.9 | 17 | 44 |
| SD-7.0 | 30 | 27-May-2019 | 0.7 | 1.7 | Good | 50.9 | 14 | 41 |

BOLD = Parameter Exceeds Recommended Guideline Criteria
BOLD = Parameter is Elevated Compared to Background Concentrations

*Alberta Soil and Groundwater Remediation Guidelines (Table 4). January 2019.
 (all concentrations in mg/kg = ppm, unless noted)

Topsoil = surface A, L, F, H and O horizons on the control area, or the equivalent surface soil where these horizons are not present.

EC = Electrical Conductivity (dS/m)
 SAR = Sodium Adsorption Ratio

| | EC | SAR | Condition | Ca | Cl- | Na |
|---------|-----|------|-----------|-------|-------|-------|
| MIN | 0.6 | 1.1 | 50% | 41.7 | 14.0 | 24.0 |
| MAX | 3.1 | 13.0 | 25% | 523.0 | 716.0 | 503.0 |
| GEOMEAN | 1.4 | 2.3 | 13% | 98.0 | 54.2 | 85.1 |
| AVERAGE | 1.7 | 3.8 | 13% | 164.7 | 148.4 | 144.8 |



TABLE: A-34
 TITLE: SOIL ANALYSES - 1.5 M UDI CaCl₂ DATA
 PROJECT#: 19-424-CAI
 CLIENT: The City of Edmonton
 PROJECT: Anti-Icing Salinity Data Review
 LOCATION: Edmonton, Alberta

| 2019 Alberta* | Natural Area | EC | SAR | Rating | Calcium | Chloride | Sodium |
|---------------|--------------|-----|------|------------|-------------------------|----------|--------|
| | | <2 | <4 | Good | No Guidelines Available | | |
| | | 2-4 | 4-8 | Fair | | | |
| Fine Grained | Topsoil | 4-8 | 8-12 | Poor | | | |
| | | >8 | >12 | Unsuitable | | | |

| Sample ID | Depth (cm) | Date | EC | SAR | Rating | Calcium | Chloride | Sodium |
|-----------|------------|-------------|-----|-----|------------|---------|----------|--------|
| SA-1.5 | 10 | 16-Nov-2018 | 1.4 | 0.5 | Good | 249 | 57 | 37 |
| SA-1.5 | 10 | 27-May-2019 | 2.0 | 0.9 | Fair | 292 | 48 | 59 |
| SA-1.5 | 20 | 16-Nov-2018 | 2.6 | 1 | Fair | 431 | 38 | 86 |
| SA-1.5 | 20 | 27-May-2019 | 2.3 | 1.2 | Fair | 319 | 37 | 84 |
| SA-1.5 | 30 | 16-Nov-2018 | 3.1 | 1.4 | Fair | 523 | 56 | 134 |
| SA-1.5 | 30 | 27-May-2019 | 3.1 | 1.5 | Fair | 439 | 42 | 128 |
| SB-1.5 | 10 | 16-Nov-2018 | 0.9 | 4.4 | Fair | 49.4 | 146 | 142 |
| SB-1.5 | 10 | 27-May-2019 | 2.8 | 9.2 | Poor | 106 | 688 | 382 |
| SB-1.5 | 20 | 16-Nov-2018 | 1.5 | 6.1 | Fair | 60.6 | 219 | 182 |
| SB-1.5 | 20 | 27-May-2019 | 3.0 | 8 | Poor | 124 | 709 | 337 |
| SB-1.5 | 30 | 16-Nov-2018 | 2.0 | 9.4 | Poor | 56.4 | 290 | 255 |
| SB-1.5 | 30 | 27-May-2019 | 2.9 | 13 | Unsuitable | 87 | 716 | 503 |
| SD-1.5 | 10 | 16-Nov-2018 | 1.4 | 0.6 | Good | 170 | 49 | 34 |
| SD-1.5 | 10 | 27-May-2019 | 0.8 | 0.6 | Good | 95.3 | 19 | 24 |
| SD-1.5 | 20 | 16-Nov-2018 | 0.6 | 0.8 | Good | 70.7 | 32 | 27 |
| SD-1.5 | 20 | 27-May-2019 | 0.8 | 0.8 | Good | 77.5 | 15 | 26 |
| SD-1.5 | 30 | 16-Nov-2018 | 0.6 | 1.1 | Good | 41.7 | 32 | 24 |
| SD-1.5 | 30 | 27-May-2019 | 0.7 | 1.1 | Good | 53.9 | 20 | 29 |

BOLD = Parameter Exceeds Recommended Guideline Criteria
BOLD = Parameter is Elevated Compared to Background Concentrations

*Alberta Soil and Groundwater Remediation Guidelines (Table 4). January 2019.
 (all concentrations in mg/kg = ppm, unless noted)

Topsoil = surface A, L, F, H and O horizons on the control area, or the equivalent surface soil where these horizons are not present.

EC = Electrical Conductivity (dS/m)

SAR = Sodium Adsorption Ratio

| | EC | SAR | Condition | Ca | Cl- | Na |
|---------|-----|------|-----------|-------|-------|-------|
| MIN | 0.6 | 0.5 | 39% | 41.7 | 15.0 | 24.0 |
| MAX | 3.1 | 13.0 | 39% | 523.0 | 716.0 | 503.0 |
| GEOMEAN | 1.5 | 1.9 | 17% | 128.3 | 76.7 | 84.3 |
| AVERAGE | 1.8 | 3.4 | 6% | 180.3 | 178.5 | 138.5 |



TABLE: A-35
 TITLE: SOIL ANALYSES - 3.0 M UDI CaCl₂ DATA
 PROJECT#: 19-424-CAI
 CLIENT: The City of Edmonton
 PROJECT: Anti-Icing Salinity Data Review
 LOCATION: Edmonton, Alberta

| 2019 Alberta* | Natural Area | EC | SAR | Rating | Calcium | Chloride | Sodium |
|---------------|--------------|-----|------|------------|-------------------------|----------|--------|
| | | <2 | <4 | Good | No Guidelines Available | | |
| | | 2-4 | 4-8 | Fair | | | |
| Fine Grained | Topsoil | 4-8 | 8-12 | Poor | | | |
| | | >8 | >12 | Unsuitable | | | |

| Sample ID | Depth (cm) | Date | EC | SAR | Rating | Calcium | Chloride | Sodium |
|-----------|------------|-------------|-----|-----|--------|---------|----------|--------|
| SB-3.0 | 10 | 16-Nov-2018 | 1.0 | 1.8 | Good | 104 | 65 | 74 |
| SB-3.0 | 10 | 27-May-2019 | 1.4 | 3.8 | Good | 84.1 | 246 | 139 |
| SB-3.0 | 20 | 16-Nov-2018 | 0.7 | 1.7 | Good | 82.8 | 60 | 67 |
| SB-3.0 | 20 | 27-May-2019 | 1.6 | 3.6 | Good | 109 | 279 | 143 |

BOLD = Parameter Exceeds Recommended Guideline Criteria
BOLD = Parameter is Elevated Compared to Background Concentrations

*Alberta Soil and Groundwater Remediation Guidelines (Table 4). January 2019.
 (all concentrations in mg/kg = ppm, unless noted)

Topsoil = surface A, L, F, H and O horizons on the control area, or the equivalent surface soil where these horizons are not present.

EC = Electrical Conductivity (dS/m)

SAR = Sodium Adsorption Ratio

| | EC | SAR | Condition | Ca | Cl- | Na |
|---------|-----|-----|-----------|-------|-------|-------|
| MIN | 0.7 | 1.7 | 100% | 82.8 | 60.0 | 67.0 |
| MAX | 1.6 | 3.8 | 0% | 109.0 | 279.0 | 143.0 |
| GEOMEAN | 1.1 | 2.5 | 0% | 94.3 | 127.9 | 99.6 |
| AVERAGE | 1.2 | 2.7 | 0% | 95.0 | 162.5 | 105.8 |



TABLE: A-36
 TITLE: SOIL ANALYSES - 7.0 M UDI CaCl₂ DATA
 PROJECT#: 19-424-CAI
 CLIENT: The City of Edmonton
 PROJECT: Anti-Icing Salinity Data Review
 LOCATION: Edmonton, Alberta

| 2019 Alberta* | Natural Area | EC | SAR | Rating | Calcium | Chloride | Sodium |
|---------------|--------------|-----|------|------------|-------------------------|----------|--------|
| | | <2 | <4 | Good | No Guidelines Available | | |
| | | 2-4 | 4-8 | Fair | | | |
| Fine Grained | Topsoil | 4-8 | 8-12 | Poor | | | |
| | | >8 | >12 | Unsuitable | | | |

| Sample ID | Depth (cm) | Date | EC | SAR | Rating | Calcium | Chloride | Sodium |
|-----------|------------|-------------|-----|-----|--------|---------|----------|--------|
| SD-7.0 | 10 | 16-Nov-2018 | 0.6 | 0.2 | Good | 85.3 | 13 | 8 |
| SD-7.0 | 10 | 27-May-2019 | 0.7 | 0.3 | Good | 81 | 11 | 11 |
| SD-7.0 | 20 | 16-Nov-2018 | 0.4 | 0.6 | Good | 52 | 9 | 18 |
| SD-7.0 | 20 | 27-May-2019 | 0.5 | 0.9 | Good | 44.7 | 7 | 21 |
| SD-7.0 | 30 | 16-Nov-2018 | 0.8 | 1.5 | Good | 65.9 | 17 | 44 |
| SD-7.0 | 30 | 27-May-2019 | 0.7 | 1.7 | Good | 50.9 | 14 | 41 |

BOLD = Parameter Exceeds Recommended Guideline Criteria
BOLD = Parameter is Elevated Compared to Background Concentrations

*Alberta Soil and Groundwater Remediation Guidelines (Table 4). January 2019.
 (all concentrations in mg/kg = ppm, unless noted)

Topsoil = surface A, L, F, H and O horizons on the control area, or the equivalent surface soil where these horizons are not present.

EC = Electrical Conductivity (dS/m)

SAR = Sodium Adsorption Ratio

| | EC | SAR | Condition | Ca | Cl- | Na |
|---------|-----|-----|-----------|------|------|------|
| MIN | 0.4 | 0.2 | 100% | 44.7 | 7.0 | 8.0 |
| MAX | 0.8 | 1.7 | 0% | 85.3 | 17.0 | 44.0 |
| GEOMEAN | 0.6 | 0.7 | 0% | 61.5 | 11.4 | 19.8 |
| AVERAGE | 0.6 | 0.9 | 0% | 63.3 | 11.8 | 23.8 |