Cargill Australia Limited Kooragang Soil Monitoring Report 2019

Cargill Australia Limited Kooragang

18 December 2019

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1 Introduction

Cargill Australia Limited Kooragang owns and operates the Oilseed Processing Facility at Kooragang. The facility, herein referred to as Cargill, is located at 51 Raven Street, Kooragang Island NSW, which is an industrial region north of Newcastle's city centre. The facility operates 24 hours a day, 7 days a week. Cargill holds NSW Environmental Protection Authority (EPA) Environmental Protection Licence (EPL) 5810.

As of December 2013 Cargill's EPL licence requirements were updated to include two additional monitoring points related to the application of sewage and treated wastewater to areas on the premises.

Soil sampling according to Special Method 1 is required to be completed for analytes yearly and every three years. Sampling parameters associated with yearly EPL soil monitoring requirements were completed on 3 and 4 December 2019 at the irrigation areas identified as Point 14 (Irrigation Area A), Point 15 (Irrigation Area B), Point 16 (Irrigation Area D), and Point 17 (Irrigation Area C) in Cargill's EPL.

This report outlines the findings of soil sampling completed for Points 14, 15, 16 and 17.

2 Objective

MJM Environmental performed soil sampling at Cargill's site in the identified wastewater irrigation and effluent irrigation areas according to the EPL.

3 Site Identification

Cargill's facility is located at 51 Raven Street, Kooragang Island, NSW 2304. Cargill own and operate an oilseed processing facility, and produce and distribute vegetable oils throughout Australia.

Cargill's site and locations of treated wastewater and their corresponding irrigation areas are displayed in Figure 4.1.

4 Sampling Plan and Methodology

4.1 Sampling Points

Cargill irrigates areas onsite using treated wastewater from site processes and amenities.

As shown in Figure 4.1, the treated sewage effluent and wastewater treatment effluent are used to irrigate a total of four (4) areas shown as Areas A, B, C and D. Areas A through to D correspond to EPL Points 14 (Area A), 15 (Area B), 16 (Area D) and 17 (Area C). Under condition P1.3 of Cargill's EPL, the licence states that Points 14, 15, 16 and 17 require soil monitoring.

Effluent from the wastewater treatment plant originates at Point 12 and is used to irrigate Point 14 (Area A), Point 16 (Area D) and Point 17 (Area C).

Effluent from the sewage water treatment plant originates at Point 13 and is used to irrigate Point 15 (Area B), which is described in the EPL as the 'drip irrigation area'.

Figure 4.1 illustrates the location of the wastewater and effluent process areas and soil sampling points. The soil sampling points are shown as 'irrigation areas'.

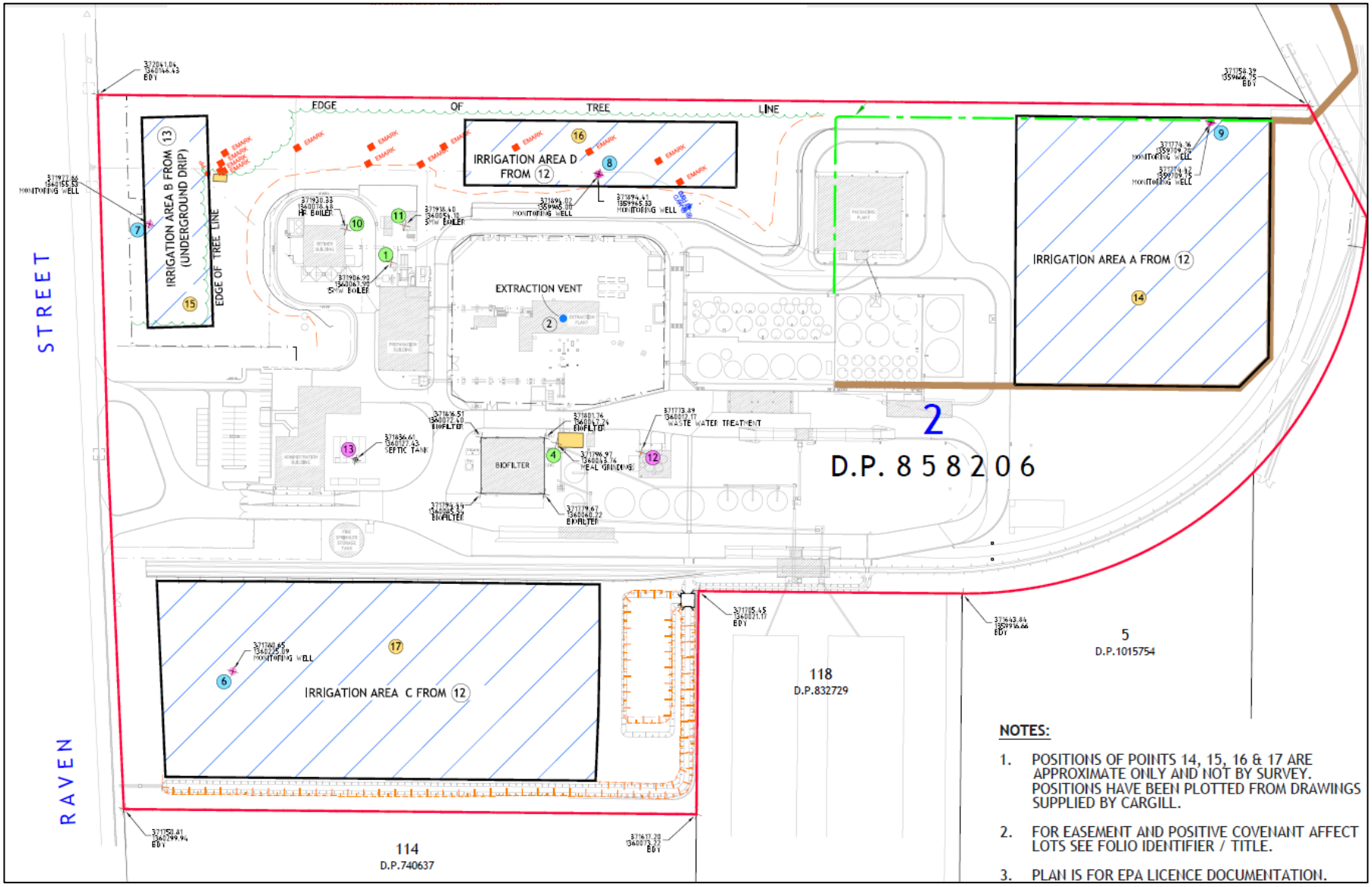

Figure 4.1: Location of Cargill's soil (Points 14, 15, 16 and 17) and treated wastewater (Points 12 and 13) monitoring points as per EPL 5810 (taken from ADW Johnson 2013)

4.2 Soil Quality Sampling Plan

Soil sampling was performed for the areas for Points 14, 15, 16 and 17. Effluent from the wastewater treatment plant originates at Point 12 and is used to irrigate Point 14 (Area A), Point 16 (Area D) and Point 17 (Area C). Effluent from the sewage water treatment plant originates at Point 13 and is used to irrigate Point 15 (Area B).

The licence states that the sampling is to be undertaken yearly and every three (3) years for specific parameters based on Special Method 1. This method indicates that for each irrigation area a representative of composite samples should be taken of:

a. Top soils; and
b. Sub-surface soils.

AS4482.1-2005 – Guide to the Investigation and Sampling of Sites with Potentially Contaminated Soil states that the individual samples are to be collected from the same depths at more than one sample location to form a single composite sample, and no greater than 4 samples are to be taken from the same depth for each composite sample. The depths of surface soil samples were collected from 0 to 50 mm, and sub-surface samples were collected at a depth of 300 to 400 mm as available.

During the 2019 soil sampling event Cargill's annual parameters specified in EPL 5810 were used. Table 4.1 shows Cargill's soil monitoring analytes and Figure 4.2 shows the locations for soil sampling at irrigation area Points 14, 15, 16 and 17 sampled in December 2019.

Table 4.1: Analytes for EPL Point 14, 15, 16 and 17

Pollutant	Units of Measure	Frequency
Bray Phosphorus (as Fluoride Extractable Phosphorus)	milligrams per kilogram	Annually
Collwell Phosphorus (as Bicarbonate Extractable Phosphorus)	milligrams per kilogram	Annually
Cation Exchange Capacity	centimoles of positive charge per kilogram of soil	Annually
Chloride	milligrams per kilogram	Annually
Conductivity	deciSiemens per metre	Annually
Exchangeable Calcium	centimoles of positive charge per kilogram of soil	Annually
Exchangeable Magnesium	centimoles of positive charge per kilogram of soil	Annually
Exchangeable Potassium	centimoles of positive charge per kilogram of soil	Annually
Exchangeable Sodium	centimoles of positive charge per kilogram of soil	Annually
pH	pH	Annually
Moisture	percent	Annually
Nitrate	milligrams per kilogram	Every 3 years
Nitrogen (total)	milligrams per kilogram	Every 3 years
Nitrogen Oxides	milligrams per kilogram	Every 3 years
Phosphorus (total)	milligrams per kilogram	Every 3 years
Phosphorus Sorption Capacity	milligrams per kilogram	Every 3 years
Total Kjeldahl Nitrogen (TKN)	milligrams per kilogram	Every 3 years

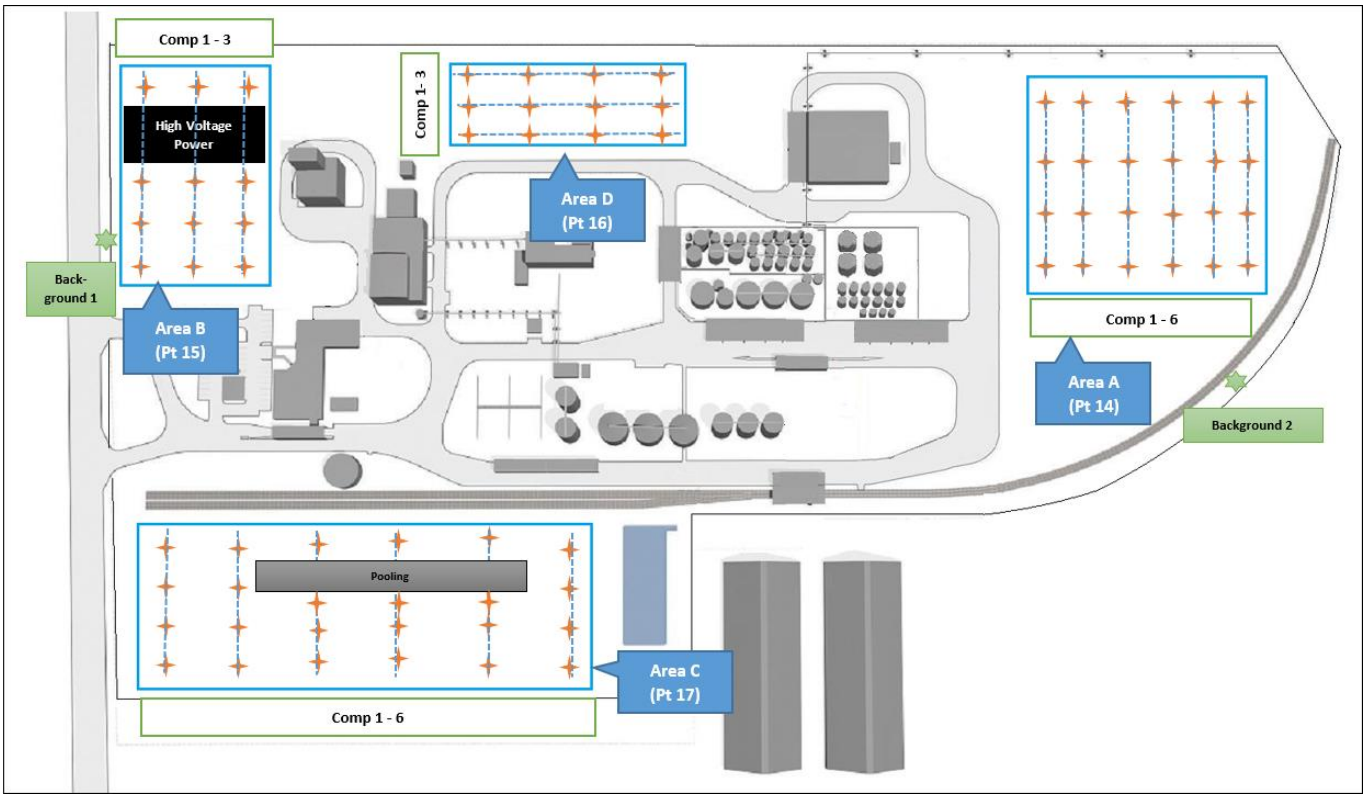

Figure 4.2: Soil sampling locations for Points 14, 15, 16, 17 and background samples in December 2019

In accordance with good practice, soil sampling was completed using the sampling grid advised by NSW EPA's Soil Sampling guidelines and *AS4482.1-2005 – Guide to the Investigation and Sampling of Sites with Potentially Contaminated Soil* with sampling and analysis focused on the analytes outlined in Table 4.1. Soil samples were submitted to Australian Laboratory Services (ALS), a NATA accredited laboratory with accreditation number 825 located at 5/585 Maitland Road, Mayfield West NSW 2304. Certificates of analysis are presented in Appendix A and the field notes for the sampling for all points are presented in Appendix B.

Irrigation of the land on Cargill's site is required to be in line with principles of ecologically sustainable development as outlined in the ANZECC Guidelines. The Guidelines are aimed at ensuring:

- The supply of necessary inputs is sustainable
- The quality of natural resources is not degraded
- The environment is not irreversibly harmed
- The welfare and options of future generations are not jeopardised by the production and consumption activities of the present generation and
- Yields and produce quality are maintained and improved

The collection of composite samples was chosen as the preferred soil sampling method for Cargill's annual soil sampling requirements. The composite grid sampling locations for all points are shown in Figure 4.2.

Point 14 has an estimated area of 1.5 hectares, Point 15 has an estimated area of 0.5 hectares, Point 16 has an estimated area of 0.36 hectares and Point 17 has an estimated area of 1.6 hectares. Sample points and background sample points for each area are shown in Figure 4.2.

4.2.1 Point 14: Soil Quality Sampling Plan

Figure 4.2 shows the sample points identified in Area A. For each of the six (6) composite samples (Comp 1 to Comp 6), it was planned to obtain four (4) constituents. For example, at point 'Comp 1', a surface sample was taken at the four (4) marked orange points and formed one (1) composite sample. A subsurface sample was taken under the same conditions. A background sample for Point 14 is shown in Figure 4.2 as Background 2.

Pooling was present onsite during December 2019 as marked previously in Figure 4.2.

4.2.2 Point 15: Soil Quality Sampling Plan

Figure 4.2 shows the sample points identified in Area B. For each of the three (3) composite samples (Comp 1 to Comp 3), there were three (3) constituents. For example, at point 'Comp 1', a surface sample was taken at the four (4) marked orange points and formed one (1) composite sample. A subsurface sample was taken under the same conditions. A background sample for Point 15 is shown as Background 1.

4.2.3 Point 16: Soil Quality Sampling Plan

Figure 4.2 shows the sample points identified in Area D. For each of the three (3) composite samples (Comp 1 to Comp 3), there were four (4) constituents. For example, at point 'Comp 1', a surface sample was taken at the four (4) marked orange points and formed one (1) composite sample. A subsurface sample was taken under the same conditions.

4.2.4 Point 17: Soil Quality Sampling Plan

Figure 4.2 shows the sample points identified in Area B. For each of the six (6) composite samples (Comp 1 to Comp 6), there were four (4) constituents. For example, at point 'Comp 1', a surface sample was taken at the four (4) marked orange points and formed one (1) composite sample. A subsurface sample was taken under the same conditions.

Figure 4.3 shows an example of a surface sample and a sub-surface soil sample.

Figure 4.3: Sampling points surface and sub-surface

4.3 Description of Sampling Equipment and Decontamination

The soil samples were collected using a petrol-operated soil auger. The sample containers were glass jars provided by the laboratory of 250 mL capacity. The jars did not contain preserving agents.

Decontamination is the process of neutralising, washing, rinsing and removing material from exposed outer surfaces of equipment and protective clothing to minimise cross-contamination of samples.

Manual sampling equipment decontamination is dependent on the extent to which the equipment is in contact with the sample. The sampling equipment was decontaminated satisfactorily after each composite sampling location by:

- Removing soil adhering to the equipment by wiping with disposable towels;
- washed thoroughly in a bucket with phosphate-free detergent using brushes;
- rinsed in clean water; and
- dried.

Figure 4.4 shows the auger equipment and washing containers used.

Figure 4.4: Auger equipment and decontamination equipment

4.4 Sampling Handling Procedures

Soil samples were enclosed in laboratory-provided glass jars kept away from source of heat and light once sampled. The maximum sample holding time of 14 days for the extraction and analysis of specific analytes was not exceeded. The samples were taken to the laboratory within the sample preservation holding times.

5 Field Quality Assurance and Quality Control

5.1 Sampling Team

The soil sampling team consisted of MJM employees presented in Table 5.1.

Table 5.1: Sampling team

Name	Role
Brigid Kelly	Project Manager, sampler and data collector
Jasper Cullip	Project Scientist, sampler and data collector

The sampling field notes including time, location and site observations are available in Appendix B.

5.2 Quality Control

In order to provide comparison of the soil quality away from the irrigated EPL points, background samples were taken at Cargill at locations outside of two irrigated areas. The background samples were taken for the purposes of this report to determine differences in soil surrounding the irrigated areas and general soil quality of the site.

5.3 Field Sampling Forms

The field sampling forms are available in Appendix B. They include:

- Time and date; site description samplers and company
- Location of each sampling point
- Depth of samples and sample type
- Any observations unique to each sampling point
- Container type

6 Laboratory QA/QC

The NATA laboratory results reports are available in Appendix A. The reports include:

- Analytical methods used
- Laboratory accreditation for analytical methods
- Surrogates and spikes used, including percent recoveries
- Instrument detection limit and method detection limits
- Matrix results
- Laboratory duplicate results
- Record of holding times
- All QC sample results

7 QA/QC data Evaluation

The soil samples were within holding times for analysis. All samples were evaluated within holding times and the laboratory documentation demonstrates the results.

8 Results

8.1 Soil Sampling Results for Effluent Utilisation Areas

Table 8.1 to Table 8.5 shows all soil analyte results for soil sampling at Cargill's Area A (Point 14), Area B (Point 15), Area C (Point 17) Area D (Point 16), and the two background samples.

Table 8.1: Results for Comp 1 to Comp 5 soil analytes at Point 14 (Area A)

Analyte	Units	Comp1-Surface	Comp1-Sub	Comp2-Surface	Comp2-Sub	Comp3-Surface	Comp3-Sub	Comp4-Surface	Comp4-Sub	Comp5-Surface	Comp5-Sub
pH	pH	7.8	7.9	5.4	7.4	5.6	7.6	5.8	7.9	5.9	7.5
Available Phosphorus (Bray)*	mg/kg	1.6	<1.0	1.5	1.9	1.8	<1.0	2.3	2	2.4	<1.0
Available Phosphorus (Colwell)**	mg/kg	40	19	44	22	59	19	56	30	74	20
Chloride	mg/kg	100	50	120	50	180	50	170	70	170	60
Conductivity	µS/cm	309	278	454	238	487	198	424	268	416	209
Exchangeable Calcium	meq/100g	3.8	3.0	4.3	2.4	4.2	1.9	4.4	2.8	4.7	2
Exchangeable Magnesium	meq/100g	0.5	<0.2	0.8	<0.2	1	<0.2	1.1	<0.2	0.9	<0.2
Exchangeable Potassium	meq/100g	0.4	<0.2	0.2	<0.2	0.2	<0.2	0.1	<0.2	<0.1	<0.2
Exchangeable Sodium	meq/100g	0.6	0.4	0.2	0.4	0.2	0.5	0.3	0.8	0.4	0.4
Cation Exchange Capacity	meq/100g	5.4	3.6	5.5	2.8	5.6	2.4	6	3.7	6.1	2.4
Moisture Content	%	9.2	3.5	14.8	9.2	11.3	6.4	10.5	6.7	9.8	4.4

*As Fluoride Extractable P

**As Bicarbonate Extractable P

Table 8.2: Results for Comp 6 and Background 2 soil analytes at Point 14 (Area A)

Analyte	Units	Comp6-Surface	Comp6-Sub	Background 2 - Surface	Background 2 - Sub
pH	pH	5.5	8.0	8.5	8.9
Available Phosphorus (Bray)*	mg/kg	3.9	2.5	2.9	<1.0
Available Phosphorus (Colwell)**	mg/kg	109	28	39	7
Chloride	mg/kg	70	20	150	30
Conductivity	µS/cm	300	166	289	100
Exchangeable Calcium	meq/100g	3.5	2	4.5	1.8
Exchangeable Magnesium	meq/100g	1	<0.2	0.8	<0.2
Exchangeable Potassium	meq/100g	0.2	<0.2	0.4	<0.2
Exchangeable Sodium	meq/100g	0.7	0.3	0.7	0.2
Cation Exchange Capacity	meq/100g	5.4	2.3	6.4	2.1
Moisture Content	%	11.6	5	15.8	4.4

*As Fluoride Extractable P

**As Bicarbonate Extractable P

Table 8.3: Results for Comp 1 to Comp 3 and Background 1 soil analytes at Point 15 (Area B)

Analyte	Units	Comp1-Surface	Comp1-Sub	Comp2-Surface	Comp2-Sub	Comp3-Surface	Comp3-Sub	Background 1 - Surface	Background 1 – Sub
pH	pH	8.2	8.6	7.6	8.5	7.6	8.1	6.7	8.1
Available Phosphorus (Bray)*	mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	2.8	1.2
Available Phosphorus (Colwell)**	mg/kg	38	6	11	<5	15	6	19	9
Chloride	mg/kg	80	20	110	20	40	30	60	10
Conductivity	µS/cm	180	116	159	89	100	86	114	88
Exchangeable Calcium	meq/100g	7.1	2.8	7.3	3	3.5	2	13.6	1.6
Exchangeable Magnesium	meq/100g	1	<0.2	1.4	<0.2	0.5	<0.2	3.9	<0.2
Exchangeable Potassium	meq/100g	0.3	<0.2	0.4	<0.2	<0.2	<0.2	0.3	<0.2
Exchangeable Sodium	meq/100g	0.3	<0.2	0.5	<0.2	<0.2	<0.2	0.4	<0.2
Cation Exchange Capacity	meq/100g	8.8	2.9	9.7	3.2	4.2	2	18.2	1.6
Moisture Content	%	32.8	14.9	8.6	3.2	3.0	2	7.3	2.6

*As Fluoride Extractable P
**As Bicarbonate Extractable P

Table 8.4: Results for Comp 1 to Comp 3 soil analytes at Point 16 (Area D)

Analyte	Units	Comp1-Surface	Comp1-Sub	Comp2-Surface	Comp2-Sub	Comp3-Surface	Comp3-Sub
pH	pH	8.0	8.5	7.9	8.4	8.0	8.6
Available Phosphorus (Bray)*	mg/kg	1.7	1.2	1.4	<1.0	1.8	<1.0
Available Phosphorus (Colwell)**	mg/kg	47	21	23	9	44	12
Chloride	mg/kg	30	30	20	10	40	20
Conductivity	µS/cm	125	129	138	100	165	110
Exchangeable Calcium	meq/100g	3.6	3.4	4.6	9.4	4.7	2.4
Exchangeable Magnesium	meq/100g	<0.2	0.5	0.6	22.1	0.5	<0.2
Exchangeable Potassium	meq/100g	0.3	0.2	0.3	8.7	0.3	<0.2
Exchangeable Sodium	meq/100g	<0.2	<0.2	0.3	12.6	0.3	<0.2
Cation Exchange Capacity	meq/100g	4.0	4.2	5.8	52.8	5.8	2.4
Moisture Content	%	6.0	6.4	7.6	3.9	7.2	3.6

*As Fluoride Extractable P
**As Bicarbonate Extractable P

Table 8.5: Results for Comp 1 to Comp 6 soil analytes at Point 17 (Area C)

Analyte	Units	Comp1-Surface	Comp1-Sub	Comp2-Surface	Comp2-Sub	Comp3-Surface	Comp3-Sub	Comp4-Surface	Comp4-Sub	Comp5-Surface	Comp5-Sub	Comp6-Surface	Comp6 - Sub
pH	pH	6.5	8.6	7.2	8.6	6.8	7.4	5.5	7.6	7.2	8.0	7.8	7.9
Available Phosphorus (Bray)*	mg/kg	3.7	2	1.6	1.4	3.4	2.8	8.5	3.7	8.2	5.6	7.5	8.4
Available Phosphorus (Colwell)**	mg/kg	85	29	34	20	57	103	131	40	201	52	107	72
Chloride	mg/kg	270	60	220	40	820	180	400	110	260	90	220	170
Conductivity	µS/cm	343	127	308	122	853	1,000	505	246	388	228	324	273
Exchangeable Calcium	meq/100g	5.4	1.3	5.1	1.3	9.1	2.0	5.9	1.5	10.1	1.3	3	2
Exchangeable Magnesium	meq/100g	0.9	<0.2	0.6	<0.2	1	<0.2	0.9	<0.2	1.3	<0.2	<0.2	<0.2
Exchangeable Potassium	meq/100g	0.2	<0.2	0.1	<0.2	0.2	<0.2	0.2	<0.2	0.1	<0.2	<0.2	<0.2
Exchangeable Sodium	meq/100g	0.4	0.3	0.2	<0.2	0.5	0.4	0.4	0.3	0.3	<0.2	0.4	0.3
Cation Exchange Capacity	meq/100g	6.9	1.7	6	1.5	10.8	2.4	7.3	1.9	11.8	1.3	3.4	2.3
Moisture Content	%	17.2	7.9	14.3	8.5	19.4	15.3	33.6	18.5	29.0	24.9	23.6	23.1

*As Fluoride Extractable P
**As Bicarbonate Extractable P

8.2 Historical Average Soil Results

Cargill's soil sampling program commenced in November 2011. Table 8.6 to Table 8.9 shows the average historical soil results from November 2011 (which includes the 3-yearly analytes) through to December 2019 for soil sampling at Point 14 (Area A) and Point 15 (Area B). As Points 16 (Area D) and 17 (Area C) were introduced to the EPL in 2013, average results are available for 2013 and 2014 only.

Table 8.6: Historical Average Soil Results for Point 14

Analyte	Units	Point 14 – Surface									Point 14 – Subsurface								
		Nov-11	Jan-13	Dec-13	Dec-14	Dec-15	Dec-16	Dec-17	Dec-18	Dec-19	Nov-11	Jan-13	Dec-13	Dec-14	Dec-15	Dec-16	Dec-17	Dec-18	Dec-19
pH	pH	7.6	6.9	7.2	6.6	6.7	7.4	6.3	7.0	6.0	8.7	8.2	7.4	8.0	7.7	8.1	8.1	8.1	7.7
Available Phosphorus (Bray)*	mg/kg	33	35.8	6.2	2.6	10.3	25.9	24.1	24.7	2.3	12.3	18.1	2.7	1.9	<0.1	13.3	12.9	13.9	1.1
Available Phosphorus (Colwell)**	mg/kg	23	57	115	59	94.8	39.8	49	78.7	64	37	15	38.3	28.3	37.3	16	11	32	23
Phosphorus (total)	mg/kg	369	N/A	N/A	422	N/A	N/A	633	N/A	N/A	135	N/A	N/A	196	N/A	N/A	149	N/A	N/A
Phosphorus Sorption Capacity	mg P sorbed/ kg soil	893	N/A	N/A	553	N/A	N/A	965	N/A	N/A	1,189	N/A	N/A	350	N/A	N/A	309	N/A	N/A
Total Kjeldahl Nitrogen (TKN)	mg/kg	N/A	N/A	N/A	2,347	N/A	N/A	4,748	N/A	N/A	N/A	N/A	N/A	812	N/A	N/A	497	N/A	N/A
Nitrate	mg/kg	7.8	N/A	N/A	15.8	N/A	N/A	5.9	N/A	N/A	1.4	N/A	N/A	5.8	N/A	N/A	1.7	N/A	N/A
Nitrogen (total)	mg/kg	2,007	N/A	N/A	2,363	N/A	N/A	4,752	N/A	N/A	382	N/A	N/A	817	N/A	N/A	497	N/A	N/A
Nitrogen Oxides (NO_X)	mg/kg	N/A	N/A	N/A	15.9	N/A	N/A	6.0	N/A	N/A	N/A	N/A	N/A	5.9	N/A	N/A	1.7	N/A	N/A
Chloride	mg/kg	181	257	102	212	146.7	57	222	182	135	54	93	31.7	122	41.7	38	62	50.0	50
Conductivity	µS/cm	251	470	246	424	233.5	144	253	273	398	201	249	124	235	176	1,106	170	143	226
Exchangeable Calcium	meq/100g	11.7	7.1	9.1	6.7	5.6	5.5	5.1	2.8	4.2	12.5	8.1	7.1	7.2	4.2	4.4	3.0	2.1	2.4
Exchangeable Magnesium	meq/100g	1.3	0.9	1.4	0.8	1.3	0.9	1.4	0.6	0.3	0.7	0.6	0.8	0.4	0.8	0.4	0.3	0.1	<0.2
Exchangeable Potassium	meq/100g	0.3	0.2	0.4	0.1	0.1	0.2	0.3	0.1	0.2	0.2	0.1	0.2	<0.1	0.1	0.1	0.1	<0.1	<0.2
Exchangeable Sodium	meq/100g	0.9	0.2	0.8	0.1	0.9	0.7	1.1	1.4	0.4	0.4	0.1	0.6	<0.1	0.3	0.2	0.3	1.5	0.5
Cation Exchange Capacity	meq/100g	14.2	8.2	11.6	7.7	7.9	7.3	8.0	4.8	5.7	13.8	8.9	8.6	7.9	6.1	5.0	3.6	3.0	2.9
Moisture Content	%	18.1	9.4	18.0	10.8	31.2	17.1	38.1	34.5	11.2	9.0	6.2	12.0	6.7	15	8.9	17	16	5.9

*As Fluoride Extractable P
**As Bicarbonate Extractable P

Table 8.7: Historical Average Soil Results for Point 15

Analyte	Units	Point 15 – Surface									Point 15 – Subsurface								
		Nov-11	Jan-13	Dec-13	Dec-14	Dec-15	Dec-16	Dec-17	Dec-18	Dec-19	Nov-11	Jan-13	Dec-13	Dec-14	Dec-15	Dec-16	Dec-17	Dec-18	Dec-19
pH	pH	7.8	7.8	7.5	8.1	8.0	8.0	7.8	8.3	7.8	8.5	8.3	7.9	8.7	8.7	8.4	8.7	8.9	8.4
Available Phosphorus (Bray)*	mg/kg	21.0	16.6	3.1	2.0	1.5	9.9	20.1	5.0	<1.0	8.9	7.5	1.6	1.1	<0.1	4.0	4.7	1.9	<1.0
Available Phosphorus (Colwell)**	mg/kg	46	10	41.7	8.3	21.0	8.7	24	13.7	21	20	4	12.0	4.0	4.7	4.3	5	<5	4.8
Phosphorus (total)	mg/kg	265	N/A	N/A	192	N/A	N/A	275	N/A	N/A	115	N/A	N/A	91.7	N/A	N/A	86	N/A	N/A
Phosphorus Sorption Capacity	mg P sorbed/kg soil	271	N/A	N/A	540	N/A	N/A	448	N/A	N/A	481	N/A	N/A	402	N/A	N/A	253	N/A	N/A
Total Kjeldahl Nitrogen (TKN)	mg/kg	N/A	N/A	N/A	1,237	N/A	N/A	1,493	N/A	N/A	N/A	N/A	N/A	307	N/A	N/A	277	N/A	N/A
Nitrate	mg/kg	6.0	N/A	N/A	5.3	N/A	N/A	2.0	N/A	N/A	1.5	N/A	N/A	1.6	N/A	N/A	0.1	N/A	N/A
Nitrogen (total)	mg/kg	1,443	N/A	N/A	1,243	N/A	N/A	1,493	N/A	N/A	340	N/A	N/A	307	N/A	N/A	277	N/A	N/A
Nitrogen Oxides (NO_X)	mg/kg	N/A	N/A	N/A	5.4	N/A	N/A	2.4	N/A	N/A	N/A	N/A	N/A	1.6	N/A	N/A	0.1	N/A	N/A
Chloride	mg/kg	50	75	107	30	73.3	42	50	50	77	20	45	13.3	20	13.3	25	10	10.0	23
Conductivity	µS/cm	128	204	220	102	171.7	112	158	115	146	87	156	93.3	73.3	109.0	92	79	75.3	97
Exchangeable Calcium	meq/100g	7.3	8.1	8.6	6.7	5.4	4.0	4.0	2.4	6.0	10.3	8.8	5.5	6.0	3.0	2.3	1.9	0.2	1.0
Exchangeable Magnesium	meq/100g	0.7	0.7	0.9	0.5	0.8	0.5	0.7	<0.2	1.0	0.4	0.4	0.2	0.2	0.3	<0.2	0.3	<0.2	<0.2
Exchangeable Potassium	meq/100g	0.2	0.2	0.2	<0.1	0.1	<0.2	<0.2	<0.2	0.2	0.1	0.1	0.1	<0.1	<0.2	<0.2	<0.2	<0.2	<0.2
Exchangeable Sodium	meq/100g	0.3	0.1	0.4	<0.1	0.2	<0.2	0.2	<0.2	0.3	0.2	0.1	0.2	<0.1	<0.2	<0.2	<0.2	<0.2	<0.2
Cation Exchange Capacity	meq/100g	8.3	8.9	10.1	7.4	6.5	4.5	5.0	2.6	7.6	10.9	9.4	5.9	6.3	3.4	2.3	2.1	0.2	1.0
Moisture Content	%	5.3	3.8	15.9	8.2	11.7	5.7	3.0	15.6	14.8	4.0	2.9	9.2	4.6	7.7	4.0	5.2	7.6	6.7

Table 8.8: Historical Average Soil Results for Point 16

Analyte	Units	Point 16 – Surface							Point 16 – Subsurface						
		Dec-13	Dec-14	Dec-15	Dec-16	Dec-17	Dec-18	Dec-19	Dec-13	Dec-14	Dec-15	Dec-16	Dec-17	Dec-18	Dec-19
pH	pH	7.6	7.8	7.5	7.8	7.5	7.9	8.0	8.1	8.7	8.4	8.3	8.2	8.7	8.5
Available Phosphorus (Bray)*	mg/kg	7.0	17.0	4.5	21.1	23.1	10.7	1.6	2.2	7.0	3.7	21.6	16.9	2.9	0.7
Available Phosphorus (Colwell)**	mg/kg	94.3	44.7	25.7	38.7	43	36	38	26.0	10.0	10.7	43.7	25	9.7	14.0
Phosphorus (total)	mg/kg	N/A	301	N/A	N/A	388	N/A	N/A	N/A	186	N/A	N/A	236	N/A	N/A
Phosphorus Sorption Capacity	mg P sorbed/kg soil	N/A	291	N/A	N/A	614	N/A	N/A	N/A	416	N/A	N/A	595	N/A	N/A
Total Kjeldahl Nitrogen (TKN)	mg/kg	N/A	1,643	N/A	N/A	2,540	N/A	N/A	N/A	737	N/A	N/A	1,037	N/A	N/A
Nitrate	mg/kg	N/A	9.9	N/A	N/A	6.8	N/A	N/A	N/A	2.2	N/A	N/A	2.9	N/A	N/A
Nitrogen (total)	mg/kg	N/A	1,650	N/A	N/A	2,547	N/A	N/A	N/A	737	N/A	N/A	1,037	N/A	N/A
Nitrogen Oxides (NO_X)	mg/kg	N/A	10.1	N/A	N/A	7.6	N/A	N/A	N/A	2.2	N/A	N/A	3.1	N/A	N/A
Chloride	mg/kg	133	303	167	100	73	73.3	30	43.3	127	53.3	60	12	8.3	20
Conductivity	µS/cm	275	340	272	225	247	210.0	143	139	166	173	173	114	87.0	113
Exchangeable Calcium	meq/100g	10.2	8.7	7.6	5.9	5.6	6.4	4.3	8.8	8.9	5.1	4.3	2.6	0.9	5.1
Exchangeable Magnesium	meq/100g	1.1	0.8	1.0	1.0	0.9	0.7	0.4	0.5	0.4	0.5	0.5	0.2	<0.2	7.6
Exchangeable Potassium	meq/100g	0.3	0.1	0.2	0.1	0.2	0.2	0.3	0.1	<0.1	0.1	<0.2	<0.2	<0.2	3.0
Exchangeable Sodium	meq/100g	0.5	0.1	0.6	0.4	0.3	0.2	0.2	0.3	0.1	0.3	0.2	0.2	<0.2	4.3
Cation Exchange Capacity	meq/100g	12.1	9.8	9.4	7.3	7.0	7.5	5.2	9.7	9.5	6.1	4.9	2.9	1.0	1.5
Moisture Content	%	18.8	12.2	34.5	17.5	5.6	15.1	6.9	9.2	8.0	16.0	11.3	6.1	7.0	4.6

*As Fluoride Extractable P
**As Bicarbonate Extractable P

Table 8.9: Historical Average Soil Results for Point 17

Analyte	Units	Point 17 – Surface							Point 17 – Subsurface						
		Dec-13	Dec-14	Dec-15	Dec-16	Dec-17	Dec-18	Dec-19	Dec-13	Dec-14	Dec-15	Dec-16	Dec-17	Dec-18	Dec-19
pH	pH	7.3	7.7	6.8	7.7	7.2	7.0	6.8	7.8	8.1	8.3	8.1	8.2	8.5	8.0
Available Phosphorus (Bray)*	mg/kg	10.6	27.7	24.4	48.2	53.6	34	5.5	2.6	16.5	7.0	24.8	17.1	16.0	4.0
Available Phosphorus (Colwell)**	mg/kg	158	59.0	79.8	81.2	73	68.7	103	39.5	42.0	32.0	46.7	14	17.8	52.7
Phosphorus (total)	mg/kg	N/A	500	N/A	N/A	675	N/A	N/A	N/A	218	N/A	N/A	142	N/A	N/A
Phosphorus Sorption Capacity	mg P sorbed/kg soil	N/A	582	N/A	N/A	1,098	N/A	N/A	N/A	447	N/A	N/A	344	N/A	N/A
Total Kjeldahl Nitrogen (TKN)	mg/kg	N/A	3,357	N/A	N/A	3,975	N/A	N/A	N/A	857	N/A	N/A	530	N/A	N/A
Nitrate	mg/kg	N/A	16.6	N/A	N/A	9.2	N/A	N/A	N/A	2.7	N/A	N/A	2.7	N/A	N/A
Nitrogen (total)	mg/kg	N/A	3,373	N/A	N/A	3,983	N/A	N/A	N/A	857	N/A	N/A	530	N/A	N/A
Nitrogen Oxides (NO_X)	mg/kg	N/A	16.9	N/A	N/A	9.5	N/A	N/A	N/A	2.7	N/A	N/A	2.8	N/A	N/A
Chloride	mg/kg	217	232	192	108	272	210	365	36.7	85	6.7	23	40	35	108
Conductivity	µS/cm	385	288	470	263	420	352	454	163	547	130	159	148	137	333
Exchangeable Calcium	meq/100g	7.4	10.0	6.7	6.5	5.0	3.5	6.4	6.2	8.0	2.5	3.4	1.6	<0.2	1.6
Exchangeable Magnesium	meq/100g	0.8	1.0	0.8	0.6	1.1	0.6	0.8	0.2	0.3	0.2	0.2	<0.2	<0.2	<0.2
Exchangeable Potassium	meq/100g	0.2	0.2	0.1	0.2	0.3	0.1	0.2	<0.1	0.1	<0.2	<0.2	<0.2	<0.2	<0.2
Exchangeable Sodium	meq/100g	0.5	0.4	0.5	0.8	1.8	0.3	0.4	0.4	0.2	<0.2	0.3	0.3	<0.2	0.3
Cation Exchange Capacity	meq/100g	8.8	11.6	8.1	8.0	8.2	4.5	7.7	6.9	8.5	2.8	3.8	1.9	<0.2	1.9
Moisture Content	%	26.2	31.7	30.0	21.3	35.5	28.1	22.9	12.7	15.7	10.3	15.1	16.4	13.7	16.4

*As Fluoride Extractable P
**As Bicarbonate Extractable P

9 Discussion

MJM Environmental was engaged to perform soil sampling at Cargill Australia Limited Kooragang. The sampling was based on Cargill's EPL 5810 requirements with the annual analytes performed for the 2018-2019 EPL period.

The results and trends for soil sampling at Points 14, 15, 16 and 17 are discussed below. No limits are specified in Cargill's EPL for soil analytes.

9.1 Soil Sampling EPL Point 14

Soil sampling was performed at the nominated area Point 14, which utilises the wastewater treatment plant water from Point 12 for irrigation.

The December 2019 soil pH results ranged from pH 5.4 to 8.0. The sub-surface sample results indicate a higher pH range of pH 7.4 to 8.0, while the surface soil results were slightly lower and ranged from pH 5.4 to 7.8.

The average results for Bray Phosphorus (as Fluoride Extractable P) appeared to be significantly reduced for the surface samples compared to historical average values. The Colwell Phosphorus (as Bicarbonate Extractable P) appeared to be comparable for the surface and sub-surface samples when compared to historical average values. The surface samples showed higher concentrations than the sub-surface samples across all composite sampling points for Bray and Colwell Phosphorus.

Chloride and conductivity results appeared comparable to the historical range of values for the surface and sub-surface samples. Moisture results at the surface samples decreased compared to 2017 and 2018, and remained steady at the sub-surface samples compared to 2018.

Exchangeable Potassium and Sodium decreased compared to 2018 in the surface and sub-surface samples, however remain within historical average trends. Cation Exchange Capacity increased slightly at the surface samples compared to 2018, however both surface and sub-surface samples remain within historical average trends. Exchangeable Calcium and Magnesium show a continuing downward historical trend in general, despite the slight increase at the surface Calcium samples from average 2.8 meq/100g to 4.2 meq/100g.

The samples for 'Background 2' were taken outside of the Point 14 irrigation area. The Background 2 surface samples appear to have slightly higher pH with surface pH 8.5. Colwell Phosphorus in the background surface sample was significantly lower than the Point 14 surface and sub-surface values.

Exchangeable cation results at BG2 were comparable to the surface and sub-surface samples.

Background chloride and conductivity have increased in comparison to the 2018 results and return to the historical trend.

9.2 Soil Sampling EPL Point 15

Soil sampling was performed at the nominated area Point 15, which utilises the site's sewage treatment plant water from Point 13 for drip irrigation.

The soil pH results ranged from pH 7.6 to 8.6, and as previously reported the sub-surface soil samples across all composites reported slightly more alkaline pH values.

The Bray Phosphorus results have continued the decreasing trend with non-detectable results at both surface and sub-surface samples. The Colwell Phosphorus concentration however appeared to increase compared to 2018 values for the surface samples.

Chloride concentrations appeared to have remained steady compared to historical average values. Conductivity results appeared to have increased at the surface sample, however appear steady compared to historical average values.

Exchangeable Cations (Magnesium, Calcium, Potassium and Sodium) and Cation Exchange Capacity are comparable to historical levels with low or non-detectable levels for most cations.

The Bray and Colwell Phosphorus results appeared to be higher at Background 1 than at the Point 15 surface samples, which corresponds with the reduction in both analytes for the Point 5 samples. Chloride, conductivity and exchangeable cation results appear to have increased since 2017 and 2018 values at the background surface sample BG1, which therefore appear comparable with the Point 15 results for 2019. Moisture was lower than the Point 15 samples. The remaining background soil parameters appear to remain comparable with Point 15 composite sample results.

9.3 Soil Sampling EPL Point 16

Point 16 was added to Cargill's EPL in December 2013. The soil pH results ranged from pH 7.9 to 8.6, and as previously reported the subsoil samples across all composites reported slightly more alkaline pH values.

The values for Bray Phosphorus have decreased significantly compared to 2018 values, and reflects an overall downward trend compared to historical average values. The values for Colwell Phosphorus appear to remain within historical trends.

Chloride and conductivity appear to have decreased at the surface samples, and increased at the sub-surface samples compared to 2018. Both analytes however reflect an overall decreasing trend compared to historical average values.

Exchangeable cations and Cation Exchange Capacity appear to remain consistent with historical levels for the surface samples.

Exchangeable Cations and Cation Exchange Capacity for the sub-surface samples appear to have increased compared to 2018 historical levels.

9.4 Soil Sampling EPL Point 17

Point 17 was added to Cargill's EPL in December 2013. The soil pH results ranged from pH 5.5 to 8.6, and as previously reported the subsoil samples across all composites reported slightly more alkaline pH values.

The values for Bray Phosphorus have decreased significantly compared to 2018 values, and reflects an overall downward trend compared to historical average values. The values for Colwell Phosphorus appear to have increased compared to 2018 values, but appear to be comparable with historical average trends.

Chloride and conductivity appear to have remained comparable with historical average trends at the surface samples. The sub-surface samples showed a significant increase in both analytes.

Exchangeable Calcium, Magnesium, Potassium, Sodium and Cation Exchange Capacity for the sub-surface samples appear to be comparable with historical average trends.

10 Limitations

10.1 Scope of Services and Reliance of Data

This Soil Monitoring Report 2019 ('the report') has been prepared in accordance with the scope of work/services agreed, between MJM Environmental Pty Ltd (MJM) and the Client. In preparing the report, MJM has relied upon data and other information provided by the Client and other individuals and organisations. Except as otherwise stated in the report, MJM has not verified the accuracy or completeness of the data. To the extent that the statements, opinions, facts, information, conclusions and/or recommendations in the report ('conclusions/summary') are based in whole or part on the data, those conclusions are contingent upon the accuracy and completeness of the data. MJM will not be liable in relation to incorrect conclusions should any data, information or condition be incorrect or have been concealed, withheld, misrepresented or otherwise not fully disclosed to MJM.

10.2 Study for Benefit of Client

This report has been prepared for the exclusive benefit of the Client and no other party. MJM assumes no responsibility and will not be liable to any other person or organisation for or in relation to any matter dealt with in this report, or for any loss or damage suffered by any other person or organisation arising from matters dealt with or conclusions expressed in this report (including without limitation matters arising from any negligent act or omission of MJM or for any loss or damage suffered by any other party relying upon the matters dealt with or conclusions expressed in this report). Other parties should not rely upon the report or the accuracy or completeness of any conclusions and should make their own inquiries and obtain independent advice in relation to such matters.

10.3 Other Limitations

To the best of MJM's knowledge, the proposal presented and the facts and matters described in this report reasonably represent the Client's intentions at the time of printing of the report. However, the passage of time, the manifestation of latent conditions or the impact of future events (including a change in applicable law) may have resulted in a variation of the Proposal and of its possible environmental impact. MJM will not be liable to update or revise the report to take into account any events or emergent circumstances or facts occurring or becoming apparent after the date of the report.

Appendix A - NATA Laboratory Results

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES1940065**	Page	: 1 of 10
Client	: **MJM ENVIRONMENTAL PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: MS BRIGID KELLY	Contact	: Customer Services ES
Address	: OFFICE 1, 335 WHARF ROAD NEWCASTLE NSW, AUSTRALIA 2300	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: +61 49264222	Telephone	: +61-2-8784 8555
Project	: 036 2064	Date Samples Received	: 04-Dec-2019 12:04
Order number	: 036 2064	Date Analysis Commenced	: 05-Dec-2019
C-O-C number	: ----	Issue Date	: 13-Dec-2019 13:05
Sampler	: ----		
Site	: ----		
Quote number	: EN/222		
No. of samples received	: 40		
No. of samples analysed	: 40		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Dian Dao		Sydney Inorganics, Smithfield, NSW
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- ALS is not NATA accredited for the analysis of Exchangeable Cations on Alkaline Soils when performed under ALS Method ED006.
- ED007 and ED008: When Exchangeable Al is reported from these methods, it should be noted that Rayment & Lyons (2011) suggests Exchange Acidity by 1M KCl - Method 15G1 (ED005) is a more suitable method for the determination of exchange acidity (H+ + Al3+).

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	PT14-C1-SURFACE	PT14-C1-SUB	PT14-C2-SURFACE	PT14-C2-SUB	PT14-C3-SURFACE
				Client sampling date / time	03-Dec-2019 11:40	03-Dec-2019 11:50	03-Dec-2019 12:00	03-Dec-2019 12:10	03-Dec-2019 12:15
Compound	CAS Number	LOR	Unit		ES1940065-001	ES1940065-002	ES1940065-003	ES1940065-004	ES1940065-005
					Result	Result	Result	Result	Result
EA002: pH 1:5 (Soils)									
pH Value	----	0.1	pH Unit		7.8	7.9	5.4	7.4	5.6
EA010: Conductivity (1:5)									
Electrical Conductivity @ 25°C	----	1	µS/cm		309	278	454	238	487
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	0.1	%		9.2	3.5	14.8	9.2	11.3
ED006: Exchangeable Cations on Alkaline Soils									
Exchangeable Calcium	----	0.2	meq/100g		3.8	3.0	----	2.4	----
Exchangeable Magnesium	----	0.2	meq/100g		0.5	<0.2	----	<0.2	----
Exchangeable Potassium	----	0.2	meq/100g		0.4	<0.2	----	<0.2	----
Exchangeable Sodium	----	0.2	meq/100g		0.6	0.4	----	0.4	----
Cation Exchange Capacity	----	0.2	meq/100g		5.4	3.6	----	2.8	----
Exchangeable Sodium Percent	----	0.2	%		11.8	11.2	----	12.6	----
ED008: Exchangeable Cations									
Exchangeable Calcium	----	0.1	meq/100g		----	----	4.3	----	4.2
Exchangeable Magnesium	----	0.1	meq/100g		----	----	0.8	----	1.0
Exchangeable Potassium	----	0.1	meq/100g		----	----	0.2	----	0.2
Exchangeable Sodium	----	0.1	meq/100g		----	----	0.2	----	0.2
Cation Exchange Capacity	----	0.1	meq/100g		----	----	5.5	----	5.6
Exchangeable Sodium Percent	----	0.1	%		----	----	3.1	----	3.5
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	10	mg/kg		100	50	120	50	180
EK074: Fluoride Extractable Phosphorus (Bray)									
Fluoride Extractable P (Bray)	----	1.0	mg/kg		1.6	<1.0	1.5	1.9	1.8
EK080: Bicarbonate Extractable Phosphorus (Colwell)									
Bicarbonate Ext. P (Colwell)	----	5	mg/kg		40	19	44	22	59

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	PT14-C3-SUB	PT14-C4-SURFACE	PT14-C4-SUB	PT14-C5-SURFACE	PT14-C5-SUB
			Client sampling date / time	03-Dec-2019 12:20	03-Dec-2019 12:40	03-Dec-2019 13:00	03-Dec-2019 12:50	03-Dec-2019 12:45
Compound	CAS Number	LOR	Unit	ES1940065-006	ES1940065-007	ES1940065-008	ES1940065-009	ES1940065-010
				Result	Result	Result	Result	Result
EA002: pH 1:5 (Soils)								
pH Value	----	0.1	pH Unit	7.6	5.8	7.9	5.9	7.5
EA010: Conductivity (1:5)								
Electrical Conductivity @ 25°C	----	1	µS/cm	198	424	268	416	209
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	6.4	10.5	6.7	9.8	4.4
ED006: Exchangeable Cations on Alkaline Soils								
Exchangeable Calcium	----	0.2	meq/100g	1.9	----	2.8	----	2.0
Exchangeable Magnesium	----	0.2	meq/100g	<0.2	----	<0.2	----	<0.2
Exchangeable Potassium	----	0.2	meq/100g	<0.2	----	<0.2	----	<0.2
Exchangeable Sodium	----	0.2	meq/100g	0.5	----	0.8	----	0.4
Cation Exchange Capacity	----	0.2	meq/100g	2.4	----	3.7	----	2.4
Exchangeable Sodium Percent	----	0.2	%	19.4	----	21.7	----	17.4
ED008: Exchangeable Cations								
Exchangeable Calcium	----	0.1	meq/100g	----	4.4	----	4.7	----
Exchangeable Magnesium	----	0.1	meq/100g	----	1.1	----	0.9	----
Exchangeable Potassium	----	0.1	meq/100g	----	0.1	----	<0.1	----
Exchangeable Sodium	----	0.1	meq/100g	----	0.3	----	0.4	----
Cation Exchange Capacity	----	0.1	meq/100g	----	6.0	----	6.1	----
Exchangeable Sodium Percent	----	0.1	%	----	5.1	----	6.1	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	10	mg/kg	50	170	70	170	60
EK074: Fluoride Extractable Phosphorus (Bray)								
Fluoride Extractable P (Bray)	----	1.0	mg/kg	<1.0	2.3	2.0	2.4	<1.0
EK080: Bicarbonate Extractable Phosphorus (Colwell)								
Bicarbonate Ext. P (Colwell)	----	5	mg/kg	19	56	30	74	20

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	PT14-C6-SURFACE	PT14-C6-SUB	PT15-C1-SURFACE	PT15-C1-SUB	PT15-C2-SURFACE
				Client sampling date / time	03-Dec-2019 13:10	03-Dec-2019 13:13	03-Dec-2019 09:15	03-Dec-2019 09:25	03-Dec-2019 09:30
Compound	CAS Number	LOR	Unit		ES1940065-011	ES1940065-012	ES1940065-013	ES1940065-014	ES1940065-015
					Result	Result	Result	Result	Result
EA002: pH 1:5 (Soils)									
pH Value	----	0.1	pH Unit		5.5	8.0	8.2	8.6	7.6
EA010: Conductivity (1:5)									
Electrical Conductivity @ 25°C	----	1	µS/cm		300	166	180	116	159
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	0.1	%		11.6	5.0	32.8	14.9	8.6
ED006: Exchangeable Cations on Alkaline Soils									
Exchangeable Calcium	----	0.2	meq/100g		----	2.0	7.1	2.8	7.3
Exchangeable Magnesium	----	0.2	meq/100g		----	<0.2	1.0	<0.2	1.4
Exchangeable Potassium	----	0.2	meq/100g		----	<0.2	0.3	<0.2	0.4
Exchangeable Sodium	----	0.2	meq/100g		----	0.3	0.3	<0.2	0.5
Cation Exchange Capacity	----	0.2	meq/100g		----	2.3	8.8	2.9	9.7
Exchangeable Sodium Percent	----	0.2	%		----	13.4	3.4	<0.2	5.1
ED007: Exchangeable Cations									
Exchangeable Calcium	----	0.1	meq/100g		3.5	----	----	----	----
Exchangeable Magnesium	----	0.1	meq/100g		1.0	----	----	----	----
Exchangeable Potassium	----	0.1	meq/100g		0.2	----	----	----	----
Exchangeable Sodium	----	0.1	meq/100g		0.7	----	----	----	----
Cation Exchange Capacity	----	0.1	meq/100g		5.4	----	----	----	----
Exchangeable Sodium Percent	----	0.1	%		13.4	----	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	10	mg/kg		70	20	80	20	110
EK074: Fluoride Extractable Phosphorus (Bray)									
Fluoride Extractable P (Bray)	----	1.0	mg/kg		3.9	2.5	<1.0	<1.0	<1.0
EK080: Bicarbonate Extractable Phosphorus (Colwell)									
Bicarbonate Ext. P (Colwell)	----	5	mg/kg		109	28	38	6	11

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	PT15-C2-SUB	PT15-C3-SURFACE	PT15-C3-SUB	PT16-C1-SURFACE	PT16-C1-SUB
				Client sampling date / time	03-Dec-2019 09:45	03-Dec-2019 09:50	03-Dec-2019 09:55	03-Dec-2019 10:20	03-Dec-2019 10:30
Compound	CAS Number	LOR	Unit		ES1940065-016	ES1940065-017	ES1940065-018	ES1940065-019	ES1940065-020
					Result	Result	Result	Result	Result
EA002: pH 1:5 (Soils)									
pH Value	----	0.1	pH Unit		**8.5**	**7.6**	**8.1**	**8.0**	**8.5**
EA010: Conductivity (1:5)									
Electrical Conductivity @ 25°C	----	1	µS/cm		**89**	**100**	**86**	**125**	**129**
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	0.1	%		**3.2**	**3.0**	**2.0**	**6.0**	**6.4**
ED006: Exchangeable Cations on Alkaline Soils									
Exchangeable Calcium	----	0.2	meq/100g		**3.0**	**3.5**	**2.0**	**3.6**	**3.4**
Exchangeable Magnesium	----	0.2	meq/100g		<0.2	**0.5**	<0.2	<0.2	**0.5**
Exchangeable Potassium	----	0.2	meq/100g		<0.2	<0.2	<0.2	**0.3**	**0.2**
Exchangeable Sodium	----	0.2	meq/100g		<0.2	<0.2	<0.2	<0.2	<0.2
Cation Exchange Capacity	----	0.2	meq/100g		**3.2**	**4.2**	**2.0**	**4.0**	**4.2**
Exchangeable Sodium Percent	----	0.2	%		<0.2	<0.2	<0.2	<0.2	<0.2
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	10	mg/kg		**20**	**40**	**30**	**30**	**30**
EK074: Fluoride Extractable Phosphorus (Bray)									
Fluoride Extractable P (Bray)	----	1.0	mg/kg		<1.0	<1.0	<1.0	**1.7**	**1.2**
EK080: Bicarbonate Extractable Phosphorus (Colwell)									
Bicarbonate Ext. P (Colwell)	----	5	mg/kg		<5	**15**	**6**	**47**	**21**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	PT16-C2-SURFACE	PT16-C2-SUB	PT16-C3-SURFACE	PT16-C3-SUB	PT17-C1-SURFACE
				Client sampling date / time	03-Dec-2019 10:40	03-Dec-2019 10:50	03-Dec-2019 10:55	03-Dec-2019 09:00	04-Dec-2019 09:35
Compound	CAS Number	LOR	Unit		ES1940065-021	ES1940065-022	ES1940065-023	ES1940065-024	ES1940065-025
					Result	Result	Result	Result	Result
EA002: pH 1:5 (Soils)									
pH Value	----	0.1	pH Unit		7.9	8.4	8.0	8.6	6.5
EA010: Conductivity (1:5)									
Electrical Conductivity @ 25°C	----	1	µS/cm		138	100	165	110	343
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	0.1	%		7.6	3.9	7.2	3.6	17.2
ED006: Exchangeable Cations on Alkaline Soils									
Exchangeable Calcium	----	0.2	meq/100g		4.6	9.4	4.7	2.4	----
Exchangeable Magnesium	----	0.2	meq/100g		0.6	22.1	0.5	<0.2	----
Exchangeable Potassium	----	0.2	meq/100g		0.3	8.7	0.3	<0.2	----
Exchangeable Sodium	----	0.2	meq/100g		0.3	12.6	0.3	<0.2	----
Cation Exchange Capacity	----	0.2	meq/100g		5.8	52.8	5.8	2.4	----
Exchangeable Sodium Percent	----	0.2	%		5.0	23.8	5.1	<0.2	----
ED008: Exchangeable Cations									
Exchangeable Calcium	----	0.1	meq/100g		----	----	----	----	5.4
Exchangeable Magnesium	----	0.1	meq/100g		----	----	----	----	0.9
Exchangeable Potassium	----	0.1	meq/100g		----	----	----	----	0.2
Exchangeable Sodium	----	0.1	meq/100g		----	----	----	----	0.4
Cation Exchange Capacity	----	0.1	meq/100g		----	----	----	----	6.9
Exchangeable Sodium Percent	----	0.1	%		----	----	----	----	6.3
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	10	mg/kg		20	10	40	20	270
EK074: Fluoride Extractable Phosphorus (Bray)									
Fluoride Extractable P (Bray)	----	1.0	mg/kg		1.4	<1.0	1.8	<1.0	3.7
EK080: Bicarbonate Extractable Phosphorus (Colwell)									
Bicarbonate Ext. P (Colwell)	----	5	mg/kg		23	9	44	12	85

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	PT17-C1-SUB	PT17-C2-SURFACE	PT17-C2-SUB	PT17-C3-SURFACE	PT17-C3-SUB
				Client sampling date / time	04-Dec-2019 09:40	04-Dec-2019 09:50	04-Dec-2019 10:00	04-Dec-2019 10:10	04-Dec-2019 10:15
Compound	CAS Number	LOR	Unit		ES1940065-026	ES1940065-027	ES1940065-028	ES1940065-029	ES1940065-030
					Result	Result	Result	Result	Result
EA002: pH 1:5 (Soils)									
pH Value	----	0.1	pH Unit		8.6	7.2	8.6	6.8	7.4
EA010: Conductivity (1:5)									
Electrical Conductivity @ 25°C	----	1	µS/cm		127	308	122	853	1000
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	0.1	%		7.9	14.3	8.5	19.4	15.3
ED006: Exchangeable Cations on Alkaline Soils									
Exchangeable Calcium	----	0.2	meq/100g		1.3	----	1.3	----	2.0
Exchangeable Magnesium	----	0.2	meq/100g		<0.2	----	<0.2	----	<0.2
Exchangeable Potassium	----	0.2	meq/100g		<0.2	----	<0.2	----	<0.2
Exchangeable Sodium	----	0.2	meq/100g		0.3	----	<0.2	----	0.4
Cation Exchange Capacity	----	0.2	meq/100g		1.7	----	1.5	----	2.4
Exchangeable Sodium Percent	----	0.2	%		20.2	----	<0.2	----	16.3
ED008: Exchangeable Cations									
Exchangeable Calcium	----	0.1	meq/100g		----	5.1	----	9.1	----
Exchangeable Magnesium	----	0.1	meq/100g		----	0.6	----	1.0	----
Exchangeable Potassium	----	0.1	meq/100g		----	0.1	----	0.2	----
Exchangeable Sodium	----	0.1	meq/100g		----	0.2	----	0.5	----
Cation Exchange Capacity	----	0.1	meq/100g		----	6.0	----	10.8	----
Exchangeable Sodium Percent	----	0.1	%		----	3.7	----	5.0	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	10	mg/kg		60	220	40	820	180
EK074: Fluoride Extractable Phosphorus (Bray)									
Fluoride Extractable P (Bray)	----	1.0	mg/kg		2.0	1.6	1.4	3.4	2.8
EK080: Bicarbonate Extractable Phosphorus (Colwell)									
Bicarbonate Ext. P (Colwell)	----	5	mg/kg		29	34	20	57	103

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	PT17-C4-SURFACE	PT17-C4-SUB	PT17-C5-SURFACE	PT17-C5-SUB	PT17-C6-SURFACE
				Client sampling date / time	04-Dec-2019 10:35	04-Dec-2019 10:48	04-Dec-2019 10:50	04-Dec-2019 11:00	04-Dec-2019 11:10
Compound	CAS Number	LOR	Unit		ES1940065-031	ES1940065-032	ES1940065-033	ES1940065-034	ES1940065-035
					Result	Result	Result	Result	Result
EA002: pH 1:5 (Soils)									
pH Value	----	0.1	pH Unit		5.5	7.6	7.2	8.0	7.8
EA010: Conductivity (1:5)									
Electrical Conductivity @ 25°C	----	1	µS/cm		505	246	388	228	324
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	0.1	%		33.6	18.5	29.0	24.9	23.6
ED006: Exchangeable Cations on Alkaline Soils									
Exchangeable Calcium	----	0.2	meq/100g		----	1.5	----	1.3	3.0
Exchangeable Magnesium	----	0.2	meq/100g		----	<0.2	----	<0.2	<0.2
Exchangeable Potassium	----	0.2	meq/100g		----	<0.2	----	<0.2	<0.2
Exchangeable Sodium	----	0.2	meq/100g		----	0.3	----	<0.2	0.4
Cation Exchange Capacity	----	0.2	meq/100g		----	1.9	----	1.3	3.4
Exchangeable Sodium Percent	----	0.2	%		----	18.4	----	<0.2	11.6
ED008: Exchangeable Cations									
Exchangeable Calcium	----	0.1	meq/100g		5.9	----	10.1	----	----
Exchangeable Magnesium	----	0.1	meq/100g		0.9	----	1.3	----	----
Exchangeable Potassium	----	0.1	meq/100g		0.2	----	0.1	----	----
Exchangeable Sodium	----	0.1	meq/100g		0.4	----	0.3	----	----
Cation Exchange Capacity	----	0.1	meq/100g		7.3	----	11.8	----	----
Exchangeable Sodium Percent	----	0.1	%		5.0	----	2.4	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	10	mg/kg		400	110	260	90	220
EK074: Fluoride Extractable Phosphorus (Bray)									
Fluoride Extractable P (Bray)	----	1.0	mg/kg		8.5	3.7	8.2	5.6	7.5
EK080: Bicarbonate Extractable Phosphorus (Colwell)									
Bicarbonate Ext. P (Colwell)	----	5	mg/kg		131	40	201	52	107

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	PT17-C6-SUB	BACKGROUND 1-SURFACE	BACKGROUND 1 -SUB	BACKGROUND 2-SURFACE	BACKGROUND 2 -SUB
			Client sampling date / time	04-Dec-2019 11:15	03-Dec-2019 13:45	03-Dec-2019 13:45	03-Dec-2019 13:25	03-Dec-2019 13:25
Compound	CAS Number	LOR	Unit	ES1940065-036	ES1940065-037	ES1940065-038	ES1940065-039	ES1940065-040
				Result	Result	Result	Result	Result
EA002: pH 1:5 (Soils)								
pH Value	----	0.1	pH Unit	7.9	6.7	8.1	8.5	8.9
EA010: Conductivity (1:5)								
Electrical Conductivity @ 25°C	----	1	µS/cm	273	114	88	289	100
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	23.1	7.3	2.6	15.8	4.4
ED006: Exchangeable Cations on Alkaline Soils								
Exchangeable Calcium	----	0.2	meq/100g	2.0	----	1.6	4.5	1.8
Exchangeable Magnesium	----	0.2	meq/100g	<0.2	----	<0.2	0.8	<0.2
Exchangeable Potassium	----	0.2	meq/100g	<0.2	----	<0.2	0.4	<0.2
Exchangeable Sodium	----	0.2	meq/100g	0.3	----	<0.2	0.7	0.2
Cation Exchange Capacity	----	0.2	meq/100g	2.3	----	1.6	6.4	2.1
Exchangeable Sodium Percent	----	0.2	%	11.8	----	<0.2	11.0	11.0
ED007: Exchangeable Cations								
Exchangeable Calcium	----	0.1	meq/100g	----	13.6	----	----	----
Exchangeable Magnesium	----	0.1	meq/100g	----	3.9	----	----	----
Exchangeable Potassium	----	0.1	meq/100g	----	0.3	----	----	----
Exchangeable Sodium	----	0.1	meq/100g	----	0.4	----	----	----
Cation Exchange Capacity	----	0.1	meq/100g	----	18.2	----	----	----
Exchangeable Sodium Percent	----	0.1	%	----	2.3	----	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	10	mg/kg	170	60	10	150	30
EK074: Fluoride Extractable Phosphorus (Bray)								
Fluoride Extractable P (Bray)	----	1.0	mg/kg	8.4	2.8	1.2	2.9	<1.0
EK080: Bicarbonate Extractable Phosphorus (Colwell)								
Bicarbonate Ext. P (Colwell)	----	5	mg/kg	72	19	9	39	7

Appendix B - Sampling Field Notes

SOIL STRATA LOG

Strata Log No 14.1 **Lodged by** BK/JC

Date 3-Dec-19 **Job No.** 036-2064 **Time** 11:40

Location Cargill Newcastle

Reason EPL Soil Sampling

Sample ID(s) Pt14-Comp1-Surface **Sample container type** Glass **Volume** 250mL

Drill type/method Auger

Slope Position N/A **Slope %** 0

Groundwater depth N/A

Land surface observation Flat irrigation area **Surface Hydrology** **Clay** **Soil** Tick/circle

Coords: **Dry** Wet

56 384923 E
63 61046 N

Obvious surface runoff Yes **No**

STRATIGRAPHIC DESCRIPTION

Depth (mm) 0

Soil Profile:

Fill

Layers:
- A horizon depth (usually dark in colour) ____ mm
- B horizon depth (aggregates and intensification of colour) ____ mm
- C horizon depth (substrate under soil; may be rocky) ____ mm

Colour

Mottle (circle) Yes **No**

Field Texture - tick/circle **Fine Grain (<0.2mm)** **Coarse grain (0.2 to 63 mm)**

Coarse Fragments (>63mm)

Abundance (% where <2% = very few, >90% is profuse) <2 %

Size (record dominant size range) ____ mm

Lithology

Unfilled Soil Classification (see tables) SMP

Hydrology

Moisture contents

Interface drainage

Odour *See odour page*

Type N/A

Strength

Comments

First and/or second letters

Letter	Definition
G	gravel
S	sand
M	silt
C	clay
O	organic

Second letter

Letter	Definition
P	poorly graded (uniform particle sizes)
W	well graded (diversified particle sizes)
H	high plasticity
L	low plasticity

SOIL STRATA LOG

Strata Log No 14.2 **Lodged by** BK/JC

Date 3-Dec-19 **Job No.** 036-2064 **Time** 11:50

Location Cargill Newcastle

Reason EPL Soil Sampling

Sample ID(s) Pt14-Comp1-Sub **Sample container type** Glass **Volume** 250mL

Drill type/method Auger

Slope Position N/A **Slope %** 0

Groundwater depth N/A

Land surface observation Flat irrigation area **Surface Hydrology** Clay **Soil** Tick/circle

Coords: **Dry** Wet

Obvious surface runoff Yes **No**

STRATIGRAPHIC DESCRIPTION

Depth (mm) 200-300-300-300

Soil Profile:

Fill

Layers: A horizon depth (usually dark in colour) 200 mm

B horizon depth (aggregates and intensification of colour) mm

C horizon depth (substrate under soil; may be rocky) mm

Colour

Mottle (circle) Yes **No**

Field Texture - tick/circle Fine Grain (<0.2mm) **Coarse grain (0.2 to 63 mm)**

Coarse Fragments (>63mm)

Abundance (% where <2% = very few, >90% is profuse) 2 %

Size (record dominant size range) mm

Lithology

Unfilled Soil Classification (see tables) SMP

Hydrology

Moisture contents

Interface drainage

Odour *See odour page*

Type N/A

Strength

Comments

First and/or second letters

Letter	Definition
G	gravel
S	sand
M	silt
C	clay
O	organic

Second letter

Letter	Definition
P	poorly graded (uniform particle sizes)
W	well graded (diversified particle sizes)
H	high plasticity
L	low plasticity

SOIL STRATA LOG

Strata Log No 14.3 **Lodged by** BK/JC

Date 3-Dec-19 **Job No.** 036-2064 **Time** 12:00

Location Cargill Newcastle

Reason EPL Soil Sampling

Sample ID(s) Pt14-Comp2-Surface **Sample container type** Glass **Volume** 250mL

Drill type/method Auger

Slope Position N/A **Slope %** 0

Groundwater depth N/A

Land surface observation Flat irrigation area **Surface Hydrology** **Clay** **Soil** Tick/circle

Coords: Dry **Wet**

Obvious surface runoff Yes **No**

STRATIGRAPHIC DESCRIPTION

Depth (mm) 0

Soil Profile:

Fill Sand

Layers:
- A horizon depth (usually dark in colour) 100 mm
- B horizon depth (aggregates and intensification of colour) mm
- C horizon depth (substrate under soil; may be rocky) mm

Colour

Mottle (circle) Yes No

Field Texture - tick/circle Fine Grain (<0.2mm) Coarse grain (0.2 to 63 mm)

Coarse Fragments (>63mm)

Abundance (% where <2% = very few, >90% is profuse) 2 %

Size (record dominant size range) mm

Lithology

Unfilled Soil Classification (see tables) SOMP

Hydrology

Moisture contents

Interface drainage

Odour *See odour page*

Type N/A

Strength

Comments Some organic matter at Pt 4 - likely vegetation

First and/or second letters

Letter	Definition
G	gravel
S	sand
M	silt
C	clay
O	organic

Second letter

Letter	Definition
P	poorly graded (uniform particle sizes)
W	well graded (diversified particle sizes)
H	high plasticity
L	low plasticity

SOIL STRATA LOG

Strata Log No 14.4 **Lodged by** BK/JC

Date 3-Dec-19 **Job No.** 036-2064 **Time** 12:10

Location Cargill Newcastle

Reason EPL Soil Sampling

Sample ID(s) Pt14-Comp2-Sub **Sample container type** Glass **Volume** 250mL

Drill type/method Auger

Slope Position N/A **Slope %** 0

Groundwater depth N/A

Land surface observation Flat irrigation area **Surface Hydrology** Clay **Soil** Tick/circle

Coords: **Dry** **Wet**

At pt 4

Obvious surface runoff **Yes** **No**

STRATIGRAPHIC DESCRIPTION

Depth (mm) 250-350-350-300

Soil Profile:

Fill: Sand

Layers:
- A horizon depth (usually dark in colour) 100 mm
- B horizon depth (aggregates and intensification of colour) mm
- C horizon depth (substrate under soil; may be rocky) mm

Colour

Mottle (circle) **Yes** No AT pt 4

Field Texture - tick/circle Fine Grain (<0.2mm) **Coarse grain (0.2 to 63 mm)**

Coarse Fragments (>63mm)

Abundance (% where <2% = very few, >90% is profuse) 40-50 %

Size (record dominant size range) 30 mm

Lithology

Unfilled Soil Classification (see tables) SP

Hydrology

Moisture contents

Interface drainage

Odour *See odour page*

Type N/A

Strength

Comments Horizon change at point 4 to lighter sand.

First and/or second letters

Letter	Definition
G	gravel
S	sand
M	silt
C	clay
O	organic

Second letter

Letter	Definition
P	poorly graded (uniform particle sizes)
W	well graded (diversified particle sizes)
H	high plasticity
L	low plasticity

SOIL STRATA LOG

Strata Log No 14.5 **Lodged by** BK/JC

Date 3-Dec-19 **Job No.** 036-2064 **Time** 12:15

Location Cargill Newcastle

Reason EPL Soil Sampling

Sample ID(s) Pt14-Comp3-Surface **Sample container type** Glass **Volume** 250mL

Drill type/method Auger

Slope Position N/A **Slope %**

Groundwater depth N/A

Land surface observation Flat irrigation area **Surface Hydrology** **Clay** **Soil** Tick/circle

Coords: **Dry** Wet

Obvious surface runoff Yes **No**

STRATIGRAPHIC DESCRIPTION

Depth (mm) 0

Depth (mm)

Soil Profile:

Fill

Layers: A horizon depth (usually dark in colour) mm

B horizon depth (aggregates and intensification of colour) mm

C horizon depth (substrate under soil; may be rocky) mm

Colour

Mottle (circle) Yes No **Slight**

Field Texture - tick/circle **Fine Grain (<0.2mm)** Coarse grain (0.2 to 63 mm)

Coarse Fragments (>63mm)

Abundance (% where <2% = very few, >90% is profuse) %

Size (record dominant size range) mm

Lithology

Unfilled Soil Classification (see tables) SOP

Hydrology

Moisture contents

Interface drainage

Odour *See odour page*

Type

Strength

Comments Sandy soil. Some organic matter likely vegetation.

First and/or second letters

Letter	Definition
G	gravel
S	sand
M	silt
C	clay
O	organic

Second letter

Letter	Definition
P	poorly graded (uniform particle sizes)
W	well graded (diversified particle sizes)
H	high plasticity
L	low plasticity

SOIL STRATA LOG

Strata Log No 14.6 **Lodged by** BK/JC

Date 3-Dec-19 **Job No.** 036-2064 **Time** 12:20

Location Cargill Newcastle

Reason EPL Soil Sampling

Sample ID(s) Pt14-Comp3-Sub **Sample container type** Glass **Volume** 250mL

Drill type/method Auger

Slope Position N/A **Slope %**

Groundwater depth N/A

Land surface observation Flat irrigation area **Surface Hydrology** Clay **Soil** Tick/circle

Coords: **Dry** Wet

Obvious surface runoff Yes **No**

STRATIGRAPHIC DESCRIPTION

Depth (mm) 300-400-300-400

Depth (mm)

Soil Profile:

Fill

Layers: A horizon depth (usually dark in colour) 200 mm

B horizon depth (aggregates and intensification of colour) mm

C horizon depth (substrate under soil; may be rocky) mm

Colour

Mottle (circle) **Yes** No

Field Texture - tick/circle **Fine Grain (<0.2mm)** Coarse grain (0.2 to 63 mm)

Coarse Fragments (>63mm)

Abundance (% where <2% = very few, >90% is profuse) 20 %

Size (record dominant size range) 40 mm

Lithology SP

Unfilled Soil Classification (see tables)

Hydrology

Moisture contents

Interface drainage

Odour *See odour page*

Type N/A

Strength

Comments Mix of darker and lighter coloured sand.

First and/or second letters

Letter	Definition
G	gravel
S	sand
M	silt
C	clay
O	organic

Second letter

Letter	Definition
P	poorly graded (uniform particle sizes)
W	well graded (diversified particle sizes)
H	high plasticity
L	low plasticity

SOIL STRATA LOG

Strata Log No 14.7 **Lodged by** BK/JC

Date 3-Dec-19 **Job No.** 036-2064 **Time** 12:40

Location Cargill Newcastle

Reason EPL Soil Sampling

Sample ID(s) Pt14-Comp4-Surface **Sample container type** Glass **Volume** 250mL

Drill type/method Auger

Slope Position N/A **Slope %** -

Groundwater depth N/A

Land surface observation Flat irrigation area **Surface Hydrology** **Clay** Soil Tick/circle

Coords: Dry **Wet**

Obvious surface runoff Yes **No**

STRATIGRAPHIC DESCRIPTION

Depth (mm) 0

Depth (mm)

Soil Profile:

Fill

Layers: A horizon depth (usually dark in colour) mm

B horizon depth (aggregates and intensification of colour) mm

C horizon depth (substrate under soil; may be rocky) mm

Colour

Mottle (circle) Yes **No**

Field Texture - tick/circle **Fine Grain (<0.2mm)** Coarse grain (0.2 to 63 mm)

Coarse Fragments (>63mm)

Abundance (% where <2% = very few, >90% is profuse) 2 %

Size (record dominant size range) mm

Lithology

Unfilled Soil Classification (see tables) SP

Hydrology

Moisture contents

Interface drainage

Odour *See odour page*

Type N/A

Strength

Comments

First and/or second letters

Letter	Definition
G	gravel
S	sand
M	silt
C	clay
O	organic

Second letter

Letter	Definition
P	poorly graded (uniform particle sizes)
W	well graded (diversified particle sizes)
H	high plasticity
L	low plasticity

SOIL STRATA LOG

Strata Log No 14.8 **Lodged by** BK/JC

Date 3-Dec-19 **Job No.** 036-2064 **Time** 12:45

Location Cargill Newcastle

Reason EPL Soil Sampling

Sample ID(s) Pt14-Comp4-Sub **Sample container type** Glass **Volume** 250mL

Drill type/method Auger

Slope Position N/A **Slope %**

Groundwater depth N/A

Land surface observation Flat irrigation area **Surface Hydrology** Clay **Soil** Tick/circle

Coords: **Dry** Wet

Obvious surface runoff Yes **No**

STRATIGRAPHIC DESCRIPTION

Depth (mm) 350 - 400 - 350 - 400

Depth (mm)

Soil Profile:

Fill

Layers: A horizon depth (usually dark in colour) - mm

B horizon depth (aggregates and intensification of colour) mm

C horizon depth (substrate under soil; may be rocky) mm

Colour

Mottle (circle) **Yes** No

Field Texture - tick/circle **Fine Grain (<0.2mm)** **Coarse grain (0.2 to 63 mm)**

Coarse Fragments (>63mm)

Abundance (% where <2% = very few, >90% is profuse) 20 %

Size (record dominant size range) 20 mm

Lithology at pt 4

Unfilled Soil Classification (see tables) GCSP

Hydrology

Moisture contents

Interface drainage

Odour *See odour page*

Type

Strength

Comments Dark sandy soils

Shells and rock fragments present at points 3 and 4

First and/or second letters

Letter	Definition
G	gravel
S	sand
M	silt
C	clay
O	organic

Second letter

Letter	Definition
P	poorly graded (uniform particle sizes)
W	well graded (diversified particle sizes)
H	high plasticity
L	low plasticity

SOIL STRATA LOG

Strata Log No 14.9 **Lodged by** BK/JC

Date 3-Dec-19 **Job No.** 036-2064 **Time** 12:50

Location Cargill Newcastle

Reason EPL Soil Sampling

Sample ID(s) Pt14-Comp5-Surface **Sample container type** Glass **Volume** 250mL

Drill type/method Auger

Slope Position N/A **Slope %** -

Groundwater depth N/A

Land surface observation Flat irrigation area **Surface Hydrology** Clay **Soil** Tick/circle

Coords: **Dry** Wet

Obvious surface runoff Yes **No**

STRATIGRAPHIC DESCRIPTION

Depth (mm) 0

Depth (mm)

Soil Profile:

Fill

Layers:
- A horizon depth (usually dark in colour) ____ mm
- B horizon depth (aggregates and intensification of colour) ____ mm
- C horizon depth (substrate under soil; may be rocky) ____ mm

Colour

Mottle (circle) Yes **No**

Field Texture - tick/circle **Fine Grain (<0.2mm)** Coarse grain (0.2 to 63 mm)

Coarse Fragments (>63mm)

Abundance (% where <2% = very few, >90% is profuse) 2 %

Size (record dominant size range) ____ mm

Lithology

Unfilled Soil Classification (see tables) SP

Hydrology

Moisture contents

Interface drainage

Odour *See odour page*

Type N/A

Strength

Comments Sandy soil.

First and/or second letters

Letter	Definition
G	gravel
S	sand
M	silt
C	clay
O	organic

Second letter

Letter	Definition
P	poorly graded (uniform particle sizes)
W	well graded (diversified particle sizes)
H	high plasticity
L	low plasticity

SOIL STRATA LOG

Strata Log No 14.10 **Lodged by** BK/JC

Date 3-Dec-19 **Job No.** 036-2064 **Time** 13:00

Location Cargill Newcastle

Reason EPL Soil Sampling

Sample ID(s) Pt14-Comp5-Sub **Sample container type** Glass **Volume** 250mL

Drill type/method Auger

Slope Position N/A **Slope %** -

Groundwater depth N/A

Land surface observation Flat irrigation area **Surface Hydrology** Clay **Soil** Tick/circle

Coords: **Dry** Wet

Obvious surface runoff Yes **No**

STRATIGRAPHIC DESCRIPTION

Depth (mm) 300 - 400 - 400 - 400

Depth (mm)

Soil Profile:

Fill

Layers:
- A horizon depth (usually dark in colour) - mm
- B horizon depth (aggregates and intensification of colour) mm
- C horizon depth (substrate under soil; may be rocky) mm

Colour

Mottle (circle) **Yes** No

Field Texture - tick/circle **Fine Grain (<0.2mm)** **Coarse grain (0.2 to 63 mm)**

Coarse Fragments (>63mm)

Abundance (% where <2% = very few, >90% is profuse) 20 %

Size (record dominant size range) 20-30 mm

Lithology

Unfilled Soil Classification (see tables) GSMP

Hydrology

Moisture contents

Interface drainage

Odour *See odour page*

Type

Strength

Comments Mix of light and dark sand.

First and/or second letters

Letter	Definition
G	gravel
S	sand
M	silt
C	clay
O	organic

Second letter

Letter	Definition
P	poorly graded (uniform particle sizes)
W	well graded (diversified particle sizes)
H	high plasticity
L	low plasticity

SOIL STRATA LOG

Strata Log No 14.11 **Lodged by** BK/JC

Date 3-Dec-19 **Job No.** 036-2064 **Time** 13:10

Location Cargill Newcastle

Reason EPL Soil Sampling

Sample ID(s) Pt14-Comp6-Surface **Sample container type** Glass **Volume** 250mL

Drill type/method Auger

Slope Position N/A **Slope %** -

Groundwater depth N/A

Land surface observation Flat irrigation area **Surface Hydrology** Clay **Soil** Tick/circle

Coords: **Dry** Wet

Obvious surface runoff Yes **No**

STRATIGRAPHIC DESCRIPTION

Depth (mm) 0

Depth (mm)

Soil Profile:

Fill Sand

Layers: A horizon depth (usually dark in colour) mm

B horizon depth (aggregates and intensification of colour) mm

C horizon depth (substrate under soil; may be rocky) mm

Colour

Mottle (circle) Yes **No**

Field Texture - tick/circle **Fine Grain (<0.2mm)** Coarse grain (0.2 to 63 mm)

Coarse Fragments (>63mm)

Abundance (% where <2% = very few, >90% is profuse) 2 %

Size (record dominant size range) mm

Lithology

Unfilled Soil Classification (see tables) SP

Hydrology

Moisture contents

Interface drainage

Odour *See odour page*

Type N/A

Strength

Comments Moist at pt 3 and 4

First and/or second letters

Letter	Definition
G	gravel
S	sand
M	silt
C	clay
O	organic

Second letter

Letter	Definition
P	poorly graded (uniform particle sizes)
W	well graded (diversified particle sizes)
H	high plasticity
L	low plasticity

SOIL STRATA LOG

Strata Log No 14.12 **Lodged by** BK/JC

Date 3-Dec-19 **Job No.** 036-2064 **Time** 13:13

Location Cargill Newcastle

Reason EPL Soil Sampling

Sample ID(s) Pt14-Comp6-Sub **Sample container type** Glass **Volume** 250mL

Drill type/method Auger

Slope Position N/A **Slope %**

Groundwater depth N/A

Land surface observation Flat irrigation area **Surface Hydrology** Clay **Soil** Tick/circle

Coords: **Dry** Wet

Obvious surface runoff Yes **No**

STRATIGRAPHIC DESCRIPTION

Depth (mm) 350 - 400 - 350 - 400

Depth (mm)

Soil Profile:

Fill

Layers: A horizon depth (usually dark in colour) mm

B horizon depth (aggregates and intensification of colour) mm

C horizon depth (substrate under soil; may be rocky) mm

Colour

Mottle (circle) **Yes** No at 3 and 4

Field Texture - tick/circle Fine Grain (<0.2mm) **Coarse grain (0.2 to 63 mm)**

Coarse Fragments (>63mm)

Abundance (% where <2% = very few, >90% is profuse) 20 % at 3 and 4

Size (record dominant size range) 60 mm

Lithology

Unfilled Soil Classification (see tables) GSMP

Hydrology

Moisture contents

Interface drainage

Odour *See odour page*

Type N/A

Strength

Comments

First and/or second letters

Letter	Definition
G	gravel
S	sand
M	silt
C	clay
O	organic

Second letter

Letter	Definition
P	poorly graded (uniform particle sizes)
W	well graded (diversified particle sizes)
H	high plasticity
L	low plasticity

SOIL STRATA LOG

Strata Log No 15.1 **Lodged by** BK/JC

Date 3-Dec-19 **Job No.** 036-2064 **Time** 9:15

Location Cargill Newcastle

Reason EPL Soil Sampling

Sample ID(s) Pt15-Comp1-Surface **Sample container type** Glass **Volume** 250mL

Drill type/method Auger

Slope Position N/A **Slope %** 0

Groundwater depth N/A

Land surface observation Flat irrigation area **Surface Hydrology** Clay **Soil** Tick/circle

Coords: **Dry** Wet

Obvious surface runoff Yes **No**

STRATIGRAPHIC DESCRIPTION

Depth (mm) 0

Soil Profile:

Fill

Layers:
- A horizon depth (usually dark in colour) ____ mm
- B horizon depth (aggregates and intensification of colour) ____ mm
- C horizon depth (substrate under soil; may be rocky) ____ mm

Colour

Mottle (circle) Yes **No**

Field Texture - tick/circle **Fine Grain (<0.2mm)** **Coarse grain (0.2 to 63 mm)**

Coarse Fragments (>63mm)

Abundance (% where <2% = very few, >90% is profuse) 2 %

Size (record dominant size range) ____ mm

Lithology

Unfilled Soil Classification (see tables) SCP

Hydrology

Moisture contents

Interface drainage

Odour *See odour page*

Type N/A

Strength

Comments

First and/or second letters

Letter	Definition
G	gravel
S	sand
M	silt
C	clay
O	organic

Second letter

Letter	Definition
P	poorly graded (uniform particle sizes)
W	well graded (diversified particle sizes)
H	high plasticity
L	low plasticity

SOIL STRATA LOG

Strata Log No 15.2 **Lodged by** BK/JC

Date 3-Dec-19 **Job No.** 036-2064 **Time** 9:25

Location Cargill Newcastle

Reason EPL Soil Sampling

Sample ID(s) Pt15-Comp1-Sub **Sample container type** Glass **Volume** 250mL

Drill type/method Auger

Slope Position N/A **Slope %** 0

Groundwater depth N/A

Land surface observation Flat irrigation area **Surface Hydrology** **Clay** **Soil** Tick/circle

Coords: **Dry** Wet

Obvious surface runoff Yes **No**

STRATIGRAPHIC DESCRIPTION

Depth (mm) 300-350-350-300

Soil Profile:

Fill

Layers: A horizon depth (usually dark in colour) mm

B horizon depth (aggregates and intensification of colour) mm

C horizon depth (substrate under soil; may be rocky) mm

Colour

Mottle (circle) Yes **No**

Field Texture - tick/circle **Fine Grain (<0.2mm)** **Coarse grain (0.2 to 63 mm)**

Coarse Fragments (>63mm)

Abundance (% where <2% = very few, >90% is profuse) 10 %

Size (record dominant size range) mm

Lithology

Unfilled Soil Classification (see tables) CSP

Hydrology

Moisture contents

Interface drainage

Odour *See odour page*

Type N/A

Strength

Comments

First and/or second letters

Letter	Definition
G	gravel
S	sand
M	silt
C	clay
O	organic

Second letter

Letter	Definition
P	poorly graded (uniform particle sizes)
W	well graded (diversified particle sizes)
H	high plasticity
L	low plasticity

SOIL STRATA LOG

Strata Log No 15.3 **Lodged by** BK/JC

Date 3-Dec-19 **Job No.** 036-2064 **Time** 9:30

Location Cargill Newcastle

Reason EPL Soil Sampling

Sample ID(s) Pt15-Comp2-Surface **Sample container type** Glass **Volume** 250mL

Drill type/method Auger

Slope Position N/A **Slope %** 0

Groundwater depth N/A

Land surface observation Flat irrigation area **Surface Hydrology** Clay **Soil** Tick/circle

Coords: **Dry** Wet

Obvious surface runoff Yes **No**

STRATIGRAPHIC DESCRIPTION

Depth (mm) 0

Soil Profile:

Fill

Layers:
- A horizon depth (usually dark in colour) ____ mm
- B horizon depth (aggregates and intensification of colour) ____ mm
- C horizon depth (substrate under soil; may be rocky) ____ mm

Colour

Mottle (circle) Yes **No**

Field Texture - tick/circle Fine Grain (<0.2mm) **Coarse grain (0.2 to 63 mm)**

Coarse Fragments (>63mm)

Abundance (% where <2% = very few, >90% is profuse) 5 %

Size (record dominant size range) 60 mm

Lithology

Unfilled Soil Classification (see tables) SMP

Hydrology

Moisture contents

Interface drainage

Odour *See odour page*

Type N/A

Strength

Comments

First and/or second letters

Letter	Definition
G	gravel
S	sand
M	silt
C	clay
O	organic

Second letter

Letter	Definition
P	poorly graded (uniform particle sizes)
W	well graded (diversified particle sizes)
H	high plasticity
L	low plasticity

SOIL STRATA LOG

Strata Log No 15.4 **Lodged by** BK/JC

Date 3-Dec-19 **Job No.** 036-2064 **Time** 9:45

Location Cargill Newcastle

Reason EPL Soil Sampling

Sample ID(s) Pt15-Comp2-Sub **Sample container type** Glass **Volume** 250mL

Drill type/method Auger

Slope Position N/A **Slope %** 0

Groundwater depth N/A

Land surface observation Flat irrigation area **Surface Hydrology** Clay **Soil** Tick/circle

Coords: **Dry** Wet

Obvious surface runoff Yes **No**

STRATIGRAPHIC DESCRIPTION

Depth (mm) 300 - 350 - 300 - 300

Soil Profile:

Fill

Layers:
- A horizon depth (usually dark in colour) ____ mm
- B horizon depth (aggregates and intensification of colour) ____ mm
- C horizon depth (substrate under soil; may be rocky) ____ mm

Colour

Mottle (circle) **Yes** No

Field Texture - tick/circle Fine Grain (<0.2mm) **Coarse grain (0.2 to 63 mm)**

Coarse Fragments (>63mm)

Abundance (% where <2% = very few, >90% is profuse) **5** %

Size (record dominant size range) 20 mm

Lithology

Unfilled Soil Classification (see tables) GSP

Hydrology

Moisture contents

Interface drainage

Odour *See odour page*

Type N/A

Strength

Comments

First and/or second letters

Letter	Definition
G	gravel
S	sand
M	silt
C	clay
O	organic

Second letter

Letter	Definition
P	poorly graded (uniform particle sizes)
W	well graded (diversified particle sizes)
H	high plasticity
L	low plasticity

SOIL STRATA LOG

Strata Log No 15.5 **Lodged by** BK/JC

Date 3-Dec-19 **Job No.** 036-2064 **Time** 9:50

Location Cargill Newcastle

Reason EPL Soil Sampling

Sample ID(s) Pt15-Comp3-Surface **Sample container type** Glass **Volume** 250mL

Drill type/method Auger

Slope Position N/A **Slope %** 0

Groundwater depth N/A

Land surface observation Flat irrigation area **Surface Hydrology** Clay **Soil** Tick/circle

Coords: **Dry** Wet

56 384909 E
63 61157 N

Obvious surface runoff Yes **No**

STRATIGRAPHIC DESCRIPTION

Depth (mm) 0

Soil Profile:

Fill

Layers:
- A horizon depth (usually dark in colour) ____ mm
- B horizon depth (aggregates and intensification of colour) ____ mm
- C horizon depth (substrate under soil; may be rocky) ____ mm

Colour

Mottle (circle) **Yes** No Slight

Field Texture - tick/circle Fine Grain (<0.2mm) **Coarse grain (0.2 to 63 mm)**

Coarse Fragments (>63mm)

Abundance (% where <2% = very few, >90% is profuse) 1 %

Size (record dominant size range) ____ mm

Lithology

Unfilled Soil Classification (see tables) SP

Hydrology

Moisture contents

Interface drainage

Odour *See odour page*

Type N/A

Strength

Comments Dark sandy soil

First and/or second letters

Letter	Definition
G	gravel
S	sand
M	silt
C	clay
O	organic

Second letter

Letter	Definition
P	poorly graded (uniform particle sizes)
W	well graded (diversified particle sizes)
H	high plasticity
L	low plasticity

SOIL STRATA LOG

Strata Log No 15.6 **Lodged by** BK/JC

Date 3-Dec-19 **Job No.** 036-2064 **Time** 9:55

Location Cargill Newcastle

Reason EPL Soil Sampling

Sample ID(s) Pt15-Comp3-Sub **Sample container type** Glass **Volume** 250mL

Drill type/method Auger

Slope Position N/A **Slope %** 0

Groundwater depth N/A

Land surface observation Flat irrigation area **Surface Hydrology** Clay **Soil** Tick/circle

Coords: **Dry** Wet

Obvious surface runoff Yes **No**

STRATIGRAPHIC DESCRIPTION

Depth (mm) 300 - 400 - 400 - 350

Soil Profile:

Fill

Layers:
- A horizon depth (usually dark in colour) ____ mm
- B horizon depth (aggregates and intensification of colour) ____ mm
- C horizon depth (substrate under soil; may be rocky) ____ mm

Colour

Mottle (circle) Yes **No**

Field Texture - tick/circle Fine Grain (<0.2mm) Coarse grain (0.2 to 63 mm)

Coarse Fragments (>63mm)

Abundance (% where <2% = very few, >90% is profuse) 15 %

Size (record dominant size range) ____ mm

Lithology

Unfilled Soil Classification (see tables) GSP

Hydrology

Moisture contents

Interface drainage

Odour *See odour page*

Type N/A

Strength

Comments

First and/or second letters

Letter	Definition
G	gravel
S	sand
M	silt
C	clay
O	organic

Second letter

Letter	Definition
P	poorly graded (uniform particle sizes)
W	well graded (diversified particle sizes)
H	high plasticity
L	low plasticity

SOIL STRATA LOG

Strata Log No 16.1 **Lodged by** BK/JC

Date 3-Dec-19 **Job No.** 036-2064 **Time** 10:20

Location Cargill Newcastle

Reason EPL Soil Sampling

Sample ID(s) Pt16-Comp1-Surface **Sample container type** Glass **Volume** 250mL

Drill type/method Auger

Slope Position N/A **Slope %** 0

Groundwater depth N/A

Land surface observation Flat irrigation area **Surface Hydrology** **Clay** **Soil** Tick/circle

Coords: **Dry** Wet

56 384917 E
63 61150 N

Obvious surface runoff Yes **No**

STRATIGRAPHIC DESCRIPTION

Depth (mm) 0

Soil Profile:

Fill

Layers:
- A horizon depth (usually dark in colour) ____ mm
- B horizon depth (aggregates and intensification of colour) ____ mm
- C horizon depth (substrate under soil; may be rocky) ____ mm

Colour

Mottle (circle) Yes No

Field Texture - tick/circle Fine Grain (<0.2mm) **Coarse grain (0.2 to 63 mm)**

Coarse Fragments (>63mm)

Abundance (% where <2% = very few, >90% is profuse) 10 %

Size (record dominant size range) 8 mm

Lithology

Unfilled Soil Classification (see tables) SP

Hydrology

Moisture contents

Interface drainage

Odour *See odour page*

Type N/A

Strength

Comments

First and/or second letters

Letter	Definition
G	gravel
S	sand
M	silt
C	clay
O	organic

Second letter

Letter	Definition
P	poorly graded (uniform particle sizes)
W	well graded (diversified particle sizes)
H	high plasticity
L	low plasticity

SOIL STRATA LOG

Strata Log No 16.2 **Lodged by** BK/JC

Date 3-Dec-19 **Job No.** 036-2064 **Time** 10:30

Location Cargill Newcastle

Reason EPL Soil Sampling

Sample ID(s) Pt16-Comp1-Sub **Sample container type** Glass **Volume** 250mL

Drill type/method Auger

Slope Position N/A **Slope %** 0

Groundwater depth N/A

Land surface observation Flat irrigation area **Surface Hydrology** Clay **Soil** Tick/circle

Coords: **Dry** Wet

Obvious surface runoff Yes **No**

STRATIGRAPHIC DESCRIPTION

Depth (mm) 300 - 300 - 300 - 300

Soil Profile:

Fill

Layers:
- A horizon depth (usually dark in colour) - mm
- B horizon depth (aggregates and intensification of colour) mm
- C horizon depth (substrate under soil; may be rocky) mm

Colour

Mottle (circle) Yes No Slight mottle

Field Texture - tick/circle Fine Grain (<0.2mm) **Coarse grain (0.2 to 63 mm)**

Coarse Fragments (>63mm)

Abundance (% where <2% = very few, >90% is profuse) 10 %

Size (record dominant size range) mm

Lithology

Unfilled Soil Classification (see tables) CSP

Hydrology

Moisture contents

Interface drainage

Odour *See odour page*

Type

Strength

Comments

First and/or second letters

Letter	Definition
G	gravel
S	sand
M	silt
C	clay
O	organic

Second letter

Letter	Definition
P	poorly graded (uniform particle sizes)
W	well graded (diversified particle sizes)
H	high plasticity
L	low plasticity

SOIL STRATA LOG

Strata Log No 16.3 **Lodged by** BK/JC

Date 3-Dec-19 **Job No.** 036-2064 **Time** 10:40

Location Cargill Newcastle

Reason EPL Soil Sampling

Sample ID(s) Pt16-Comp2-Surface **Sample container type** Glass **Volume** 250mL

Drill type/method Auger

Slope Position N/A **Slope %** 0

Groundwater depth N/A

Land surface observation Flat irrigation area **Surface Hydrology** Clay **Soil** Tick/circle

Coords: **Dry** **Wet**

Obvious surface runoff Yes **No**

STRATIGRAPHIC DESCRIPTION

Depth (mm) 0

Soil Profile:

Fill

Layers:
- A horizon depth (usually dark in colour) 0 mm
- B horizon depth (aggregates and intensification of colour) mm
- C horizon depth (substrate under soil; may be rocky) mm

Colour

Mottle (circle) Yes No

Field Texture - tick/circle Fine Grain (<0.2mm) **Coarse grain (0.2 to 63 mm)**

Coarse Fragments (>63mm)

Abundance (% where <2% = very few, >90% is profuse) 1 %

Size (record dominant size range) mm

Lithology

Unfilled Soil Classification (see tables) SP

Hydrology

Moisture contents

Interface drainage

Odour *See odour page*

Type

Strength

Comments Point 3 slightly moist.

First and/or second letters

Letter	Definition
G	gravel
S	sand
M	silt
C	clay
O	organic

Second letter

Letter	Definition
P	poorly graded (uniform particle sizes)
W	well graded (diversified particle sizes)
H	high plasticity
L	low plasticity

SOIL STRATA LOG

Strata Log No 16.4 **Lodged by** BK/JC

Date 3-Dec-19 **Job No.** 036-2064 **Time** 10:30

Location Cargill Newcastle

Reason EPL Soil Sampling

Sample ID(s) Pt16-Comp2-Sub **Sample container type** Glass **Volume** 250mL

Drill type/method Auger

Slope Position N/A **Slope %** 0

Groundwater depth N/A

Land surface observation Flat irrigation area **Surface Hydrology** Clay **Soil** Tick/circle

Coords: **Dry** **Wet**

Obvious surface runoff Yes **No**

STRATIGRAPHIC DESCRIPTION

Depth (mm) 300 - 300 - 300 - 300

Soil Profile:

Fill

Layers:
- A horizon depth (usually dark in colour) ____ mm
- B horizon depth (aggregates and intensification of colour) ____ mm
- C horizon depth (substrate under soil; may be rocky) ____ mm

Colour

Mottle (circle) Yes **No**

Field Texture - tick/circle Fine Grain (<0.2mm) **Coarse grain (0.2 to 63 mm)**

Coarse Fragments (>63mm)

Abundance (% where <2% = very few, >90% is profuse) 1 %

Size (record dominant size range) 5 mm

Lithology 5

Unfilled Soil Classification (see tables) SP

Hydrology

Moisture contents

Interface drainage

Odour *See odour page*

Type

Strength

Comments Point 3 slightly moist.

First and/or second letters

Letter	Definition
G	gravel
S	sand
M	silt
C	clay
O	organic

Second letter

Letter	Definition
P	poorly graded (uniform particle sizes)
W	well graded (diversified particle sizes)
H	high plasticity
L	low plasticity

SOIL STRATA LOG

Strata Log No 16.5 **Lodged by** BK/JC

Date 3-Dec-19 **Job No.** 036-2064 **Time** 10:55

Location Cargill Newcastle

Reason EPL Soil Sampling

Sample ID(s) Pt16-Comp3-Surface **Sample container type** Glass **Volume** 250mL

Drill type/method Auger

Slope Position N/A **Slope %** 0

Groundwater depth N/A

Land surface observation Flat irrigation area **Surface Hydrology** Clay **Soil** Tick/circle

Coords: **Dry** **Wet**

Obvious surface runoff Yes **No**

STRATIGRAPHIC DESCRIPTION

Depth (mm) 0

Soil Profile:

Fill

Layers:
- A horizon depth (usually dark in colour) ____ mm
- B horizon depth (aggregates and intensification of colour) ____ mm
- C horizon depth (substrate under soil; may be rocky) ____ mm

Colour

Mottle (circle) Yes No

Field Texture - tick/circle Fine Grain (<0.2mm) **Coarse grain (0.2 to 63 mm)**

Coarse Fragments (>63mm)

Abundance (% where <2% = very few, >90% is profuse) 5 %

Size (record dominant size range) 5 mm

Lithology

Unfilled Soil Classification (see tables) SP

Hydrology

Moisture contents

Interface drainage

Odour *See odour page*

Type N/A

Strength

Comments Point 3 slightly moist.

First and/or second letters

Letter	Definition
G	gravel
S	sand
M	silt
C	clay
O	organic

Second letter

Letter	Definition
P	poorly graded (uniform particle sizes)
W	well graded (diversified particle sizes)
H	high plasticity
L	low plasticity

SOIL STRATA LOG

Strata Log No 16.6 **Lodged by** BK/JC

Date 3-Dec-19 **Job No.** 036-2064 **Time** 11:05

Location Cargill Newcastle

Reason EPL Soil Sampling

Sample ID(s) Pt16-Comp3-Sub **Sample container type** Glass **Volume** 250mL

Drill type/method Auger

Slope Position N/A **Slope %** 0

Groundwater depth N/A

Land surface observation Flat irrigation area **Surface Hydrology** Clay **Soil** Tick/circle

Coords: **Dry** Wet

Obvious surface runoff Yes **No**

STRATIGRAPHIC DESCRIPTION

Depth (mm) 300 - 350 - 350 - 300

Soil Profile:

Fill

Layers: A horizon depth (usually dark in colour) mm

B horizon depth (aggregates and intensification of colour) mm

C horizon depth (substrate under soil; may be rocky) mm

Colour

Mottle (circle) Yes **No** Slight soil/sand colour change mottle

Field Texture - tick/circle Fine Grain (<0.2mm) **Coarse grain (0.2 to 63 mm)**

Coarse Fragments (>63mm)

Abundance (% where <2% = very few, >90% is profuse) %

Size (record dominant size range) mm

Lithology

Unfilled Soil Classification (see tables) SP

Hydrology

Moisture contents

Interface drainage

Odour *See odour page*

Type N/A

Strength

Comments Point 3 slightly moist.

First and/or second letters

Letter	Definition
G	gravel
S	sand
M	silt
C	clay
O	organic

Second letter

Letter	Definition
P	poorly graded (uniform particle sizes)
W	well graded (diversified particle sizes)
H	high plasticity
L	low plasticity

SOIL STRATA LOG

Strata Log No 17.1 **Lodged by** BK/JC

Date 4-Dec-19 **Job No.** 036-2064 **Time** 9:35

Location Cargill Newcastle

Reason EPL Soil Sampling

Sample ID(s) Pt17-Comp1-Surface **Sample container type** Glass **Volume** 250mL

Drill type/method Auger

Slope Position N/A **Slope %** 0

Groundwater depth N/A

Land surface observation Flat irrigation area **Surface Hydrology** Clay **Soil** Tick/circle

Coords: **Dry** **Wet**

56 384824 E
63 61246 N

Some wet areas

Obvious surface runoff **Yes** No

STRATIGRAPHIC DESCRIPTION

Depth (mm) 0

Soil Profile:

Fill

Layers:
- A horizon depth (usually dark in colour) ____ mm
- B horizon depth (aggregates and intensification of colour) ____ mm
- C horizon depth (substrate under soil; may be rocky) ____ mm

Colour

Mottle (circle) Yes **No**

Field Texture - tick/circle **Fine Grain (<0.2mm)** **Coarse grain (0.2 to 63 mm)**

Coarse Fragments (>63mm)

Abundance (% where <2% = very few, >90% is profuse) 2 %

Size (record dominant size range) ____ mm

Lithology

Unfilled Soil Classification (see tables) SP

Hydrology

Moisture contents

Interface drainage

Odour *See odour page*

Type N/A

Strength

Comments Sandy soi - dark and light

Irrigation present

First and/or second letters

Letter	Definition
G	gravel
S	sand
M	silt
C	clay
O	organic

Second letter

Letter	Definition
P	poorly graded (uniform particle sizes)
W	well graded (diversified particle sizes)
H	high plasticity
L	low plasticity

SOIL STRATA LOG

Strata Log No 17.2 **Lodged by** BK/JC

Date 4-Dec-19 **Job No.** 036-2064 **Time** 9:40

Location Cargill Newcastle

Reason EPL Soil Sampling

Sample ID(s) Pt17-Comp1-Sub **Sample container type** Glass **Volume** 250mL

Drill type/method Auger

Slope Position N/A **Slope %** 0

Groundwater depth N/A

Land surface observation Flat irrigation area **Surface Hydrology** Clay **Soil** Tick/circle

Coords: **Dry** **Wet**

Obvious surface runoff **Yes** No

STRATIGRAPHIC DESCRIPTION

Depth (mm) 250 - 250 - 300 - 300

Soil Profile:

Fill

Layers:
- A horizon depth (usually dark in colour) mm
- B horizon depth (aggregates and intensification of colour) 200 mm
- C horizon depth (substrate under soil; may be rocky) mm

Colour

Mottle (circle) **Yes** No

Field Texture - tick/circle Fine Grain (<0.2mm) Coarse grain (0.2 to 63 mm)

Coarse Fragments (>63mm)

Abundance (% where <2% = very few, >90% is profuse) 15 %

Size (record dominant size range) mm

Lithology

Unfilled Soil Classification (see tables) SOP

Hydrology

Moisture contents

Interface drainage

Odour *See odour page*

Type N/A

Strength

Comments Dark and light coloured sandy soil

Shells present

First and/or second letters

Letter	Definition
G	gravel
S	sand
M	silt
C	clay
O	organic

Second letter

Letter	Definition
P	poorly graded (uniform particle sizes)
W	well graded (diversified particle sizes)
H	high plasticity
L	low plasticity

SOIL STRATA LOG

Strata Log No 17.3 **Lodged by** BK/JC

Date 4-Dec-19 **Job No.** 036-2064 **Time** 9:50

Location Cargill Newcastle

Reason EPL Soil Sampling

Sample ID(s) Pt17-Comp2-Surface **Sample container type** Glass **Volume** 250mL

Drill type/method Auger

Slope Position N/A **Slope %** 0

Groundwater depth N/A

Land surface observation Flat irrigation area **Surface Hydrology** Clay **Soil** Tick/circle

Coords: **Dry** **Wet**

Obvious surface runoff Yes **No**

STRATIGRAPHIC DESCRIPTION

Depth (mm) 0

Soil Profile:

Fill

Layers:
- A horizon depth (usually dark in colour) ____ mm
- B horizon depth (aggregates and intensification of colour) ____ mm
- C horizon depth (substrate under soil; may be rocky) ____ mm

Colour

Mottle (circle) Yes **No**

Field Texture - tick/circle **Fine Grain (<0.2mm)** Coarse grain (0.2 to 63 mm)

Coarse Fragments (>63mm)

Abundance (% where <2% = very few, >90% is profuse) 5 %

Size (record dominant size range) 10 mm

Lithology

Unfilled Soil Classification (see tables) SOP

Hydrology

Moisture contents

Interface drainage

Odour *See odour page*

Type N/A with slight sewage at Pt 2

Strength

Comments Darker sand at Pt 2 and 3, lighter at 1 and 4.
Shells present.

First and/or second letters

Letter	Definition
G	gravel
S	sand
M	silt
C	clay
O	organic

Second letter

Letter	Definition
P	poorly graded (uniform particle sizes)
W	well graded (diversified particle sizes)
H	high plasticity
L	low plasticity

SOIL STRATA LOG

Strata Log No 17.4 **Lodged by** BK/JC

Date 4-Dec-19 **Job No.** 036-2064 **Time** 10:00

Location Cargill Newcastle

Reason EPL Soil Sampling

Sample ID(s) Pt17-Comp2-Sub **Sample container type** Glass **Volume** 250mL

Drill type/method Auger

Slope Position N/A **Slope %** 0

Groundwater depth N/A

Land surface observation Flat irrigation area **Surface Hydrology** Clay **Soil** Tick/circle

Coords: **Dry** **Wet**

Obvious surface runoff **Yes** No

STRATIGRAPHIC DESCRIPTION

Depth (mm) 300 - 300 - 400 - 400

Soil Profile:

Fill

Layers:
- A horizon depth (usually dark in colour) 200 mm
- B horizon depth (aggregates and intensification of colour) mm
- C horizon depth (substrate under soil; may be rocky) mm

Colour

Mottle (circle) **Yes** No

Field Texture - tick/circle **Fine Grain (<0.2mm)** Coarse grain (0.2 to 63 mm)

Coarse Fragments (>63mm)

Abundance (% where <2% = very few, >90% is profuse) 5 %

Size (record dominant size range) 10 mm

Lithology

Unfilled Soil Classification (see tables) SOP

Hydrology

Moisture contents

Interface drainage

Odour *See odour page*

Type Slight sewage at Pt 2 and 3

Strength

Comments Moisture at Pt 2 and 3, darker colour

Light sand at Pt 1 and 4

First and/or second letters

Letter	Definition
G	gravel
S	sand
M	silt
C	clay
O	organic

Second letter

Letter	Definition
P	poorly graded (uniform particle sizes)
W	well graded (diversified particle sizes)
H	high plasticity
L	low plasticity

SOIL STRATA LOG

Strata Log No 17.5 **Lodged by** BK/JC

Date 4-Dec-19 **Job No.** 036-2064 **Time** 10:10

Location Cargill Newcastle

Reason EPL Soil Sampling

Sample ID(s) Pt17-Comp3-Surface **Sample container type** Glass **Volume** 250mL

Drill type/method Auger

Slope Position N/A **Slope %** 0

Groundwater depth N/A

Land surface observation Flat irrigation area **Surface Hydrology** Clay **Soil** Tick/circle

Coords: Dry **Wet**

Obvious surface runoff Yes **No**

STRATIGRAPHIC DESCRIPTION

Depth (mm) 0

Soil Profile:

Fill

Layers: A horizon depth (usually dark in colour) mm

B horizon depth (aggregates and intensification of colour) mm

C horizon depth (substrate under soil; may be rocky) mm

Colour

Mottle (circle) Yes No

Field Texture - tick/circle Fine Grain (<0.2mm) **Coarse grain (0.2 to 63 mm)**

Coarse Fragments (>63mm)

Abundance (% where <2% = very few, >90% is profuse) %

Size (record dominant size range) mm

Lithology

Unfilled Soil Classification (see tables) SP

Hydrology

Moisture contents

Interface drainage

Odour *See odour page*

Type N.A

Strength

Comments Light and dark coloured sandy soil.

First and/or second letters

Letter	Definition
G	gravel
S	sand
M	silt
C	clay
O	organic

Second letter

Letter	Definition
P	poorly graded (uniform particle sizes)
W	well graded (diversified particle sizes)
H	high plasticity
L	low plasticity

SOIL STRATA LOG

Strata Log No 17.6 **Lodged by** BK/JC

Date 4-Dec-19 **Job No.** 036-2064 **Time** 10:15

Location Cargill Newcastle

Reason EPL Soil Sampling

Sample ID(s) Pt17-Comp3-Sub **Sample container type** Glass **Volume** 250mL

Drill type/method Auger

Slope Position N/A **Slope %** 0

Groundwater depth N/A

Land surface observation Flat irrigation area **Surface Hydrology** Clay **Soil** Tick/circle

Coords: **Dry** **Wet**

Obvious surface runoff Yes No

STRATIGRAPHIC DESCRIPTION

Depth (mm) 300 - 300 - 400 - 400

Soil Profile:

Fill

Layers:
- A horizon depth (usually dark in colour) 200 mm
- B horizon depth (aggregates and intensification of colour) mm
- C horizon depth (substrate under soil; may be rocky) mm

Colour

Mottle (circle) **Yes** No Pt 1

Field Texture - tick/circle Fine Grain (<0.2mm) **Coarse grain (0.2 to 63 mm)**

Coarse Fragments (>63mm)

Abundance (% where <2% = very few, >90% is profuse) 2 %

Size (record dominant size range) mm

Lithology

Unfilled Soil Classification (see tables) SOP

Hydrology

Moisture contents

Interface drainage

Odour *See odour page*

Type N/A

Strength

Comments Mottle at Pt 1

Light and dark coloured sandy soil. Moist due to irrigation.

First and/or second letters

Letter	Definition
G	gravel
S	sand
M	silt
C	clay
O	organic

Second letter

Letter	Definition
P	poorly graded (uniform particle sizes)
W	well graded (diversified particle sizes)
H	high plasticity
L	low plasticity

SOIL STRATA LOG

Strata Log No 17.7 **Lodged by** BK/JC

Date 4-Dec-19 **Job No.** 036-2064 **Time** 10:35

Location Cargill Newcastle

Reason EPL Soil Sampling

Sample ID(s) Pt17-Comp4-Surface **Sample container type** Glass **Volume** 250mL

Drill type/method Auger

Slope Position N/A **Slope %** 0

Groundwater depth N/A

Land surface observation Flat irrigation area **Surface Hydrology** Clay **Soil** Tick/circle

Coords: **Dry** **Wet**

Obvious surface runoff Yes **No**

STRATIGRAPHIC DESCRIPTION

Depth (mm) 0

Soil Profile:

Fill

Layers: A horizon depth (usually dark in colour) mm

B horizon depth (aggregates and intensification of colour) mm

C horizon depth (substrate under soil; may be rocky) mm

Colour

Mottle (circle) **Yes** No Blue-gray at Pt 2

Field Texture - tick/circle **Fine Grain (<0.2mm)** Coarse grain (0.2 to 63 mm)

Coarse Fragments (>63mm)

Abundance (% where <2% = very few, >90% is profuse) 5 %

Size (record dominant size range) 10 mm

Lithology

Unfilled Soil Classification (see tables) SOP

Hydrology

Moisture contents Moist at 2 and 3

Interface drainage

Odour *See odour page*

Type

Strength

Comments Blue-grey mottle at Pt 2

Shell fragments. Dark coloured sand.

First and/or second letters

Letter	Definition
G	gravel
S	sand
M	silt
C	clay
O	organic

Second letter

Letter	Definition
P	poorly graded (uniform particle sizes)
W	well graded (diversified particle sizes)
H	high plasticity
L	low plasticity

SOIL STRATA LOG

Strata Log No 17.8 **Lodged by** BK/JC

Date 4-Dec-19 **Job No.** 036-2064 **Time** 10:45

Location Cargill Newcastle

Reason EPL Soil Sampling

Sample ID(s) Pt17-Comp4-Sub **Sample container type** Glass **Volume** 250mL

Drill type/method Auger

Slope Position N/A **Slope %** 0

Groundwater depth N/A

Land surface observation Flat irrigation area **Surface Hydrology** Clay **Soil** Tick/circle

Coords: Dry **Wet**

Obvious surface runoff Yes **No**

STRATIGRAPHIC DESCRIPTION

Depth (mm) 300 - 300 - 400 - 400

Soil Profile:

Fill

Layers: A horizon depth (usually dark in colour) mm

B horizon depth (aggregates and intensification of colour) mm

C horizon depth (substrate under soil; may be rocky) mm

Colour

Mottle (circle) **Yes** No Blue-grey at Pt 2 with dark soil

Field Texture - tick/circle Fine Grain (<0.2mm) Coarse grain (0.2 to 63 mm)

Coarse Fragments (>63mm)

Abundance (% where <2% = very few, >90% is profuse) 2 %

Size (record dominant size range) mm

Lithology

Unfilled Soil Classification (see tables) SP

Hydrology

Moisture contents

Interface drainage

Odour *See odour page*

Type N/A

Strength

Comments Blue-grey mottle with dark soil at Pt 2

Dark coloured sandy soil

First and/or second letters

Letter	Definition
G	gravel
S	sand
M	silt
C	clay
O	organic

Second letter

Letter	Definition
P	poorly graded (uniform particle sizes)
W	well graded (diversified particle sizes)
H	high plasticity
L	low plasticity

SOIL STRATA LOG

Strata Log No 17.9 **Lodged by** BK/JC

Date 4-Dec-19 **Job No.** 036-2064 **Time** 10:50

Location Cargill Newcastle

Reason EPL Soil Sampling

Sample ID(s) Pt17-Comp5-Surface **Sample container type** Glass **Volume** 250mL

Drill type/method Auger

Slope Position N/A **Slope %** 0

Groundwater depth N/A

Land surface observation Flat irrigation area **Surface Hydrology** Clay **Soil** Tick/circle

Coords: **Dry** **Wet**

Obvious surface runoff Yes **No**

STRATIGRAPHIC DESCRIPTION

Depth (mm) 0

Soil Profile:

Fill

Layers: A horizon depth (usually dark in colour) mm

B horizon depth (aggregates and intensification of colour) mm

C horizon depth (substrate under soil; may be rocky) mm

Colour

Mottle (circle) Yes **No**

Field Texture - tick/circle **Fine Grain (<0.2mm)** Coarse grain (0.2 to 63 mm)

Coarse Fragments (>63mm)

Abundance (% where <2% = very few, >90% is profuse) %

Size (record dominant size range) mm

Lithology

Unfilled Soil Classification (see tables) SOP

Hydrology

Moisture contents

Interface drainage

Odour *See odour page*

Type N/A

Strength

Comments Dark and light sandy soils

First and/or second letters

Letter	Definition
G	gravel
S	sand
M	silt
C	clay
O	organic

Second letter

Letter	Definition
P	poorly graded (uniform particle sizes)
W	well graded (diversified particle sizes)
H	high plasticity
L	low plasticity

SOIL STRATA LOG

Strata Log No 17.10 **Lodged by** BK/JC

Date 4-Dec-19 **Job No.** 036-2064 **Time** 11:00

Location Cargill Newcastle

Reason EPL Soil Sampling

Sample ID(s) Pt17-Comp5-Sub **Sample container type** Glass **Volume** 250mL

Drill type/method Auger

Slope Position N/A **Slope %** 0

Groundwater depth N/A

Land surface observation Flat irrigation area **Surface Hydrology** Clay **Soil** Tick/circle

Coords: Dry **Wet**

Obvious surface runoff Yes **No**

STRATIGRAPHIC DESCRIPTION

Depth (mm) 300 - 400 - 300 - 400

Soil Profile:

Fill

Layers: A horizon depth (usually dark in colour) 200 mm

B horizon depth (aggregates and intensification of colour) mm

C horizon depth (substrate under soil; may be rocky) mm

Colour

Mottle (circle) **Yes** No Pt 2 - bluish

Field Texture - tick/circle Fine Grain (<0.2mm) **Coarse grain (0.2 to 63 mm)**

Coarse Fragments (>63mm)

Abundance (% where <2% = very few, >90% is profuse) <2 %

Size (record dominant size range) mm

Lithology

Unfilled Soil Classification (see tables) SOP

Hydrology

Moisture contents

Interface drainage

Odour *See odour page*

Type N/A

Strength

Comments Blusih grey at Pt 2

Moist dark sand

First and/or second letters

Letter	Definition
G	gravel
S	sand
M	silt
C	clay
O	organic

Second letter

Letter	Definition
P	poorly graded (uniform particle sizes)
W	well graded (diversified particle sizes)
H	high plasticity
L	low plasticity

SOIL STRATA LOG

Strata Log No 17.11 **Lodged by** BK/JC

Date 4-Dec-19 **Job No.** 036-2064 **Time** 11:10

Location Cargill Newcastle

Reason EPL Soil Sampling

Sample ID(s) Pt17-Comp6-Surface **Sample container type** Glass **Volume** 250mL

Drill type/method Auger

Slope Position N/A **Slope %** 0

Groundwater depth N/A

Land surface observation Flat irrigation area **Surface Hydrology** **Clay** Soil Tick/circle

Coords: Dry **Wet**

Obvious surface runoff **Yes** No

STRATIGRAPHIC DESCRIPTION

Depth (mm) 0

Soil Profile:

Fill

Layers: A horizon depth (usually dark in colour) mm

B horizon depth (aggregates and intensification of colour) mm

C horizon depth (substrate under soil; may be rocky) mm

Colour

Mottle (circle) Yes No

Field Texture - tick/circle **Fine Grain (<0.2mm)** Coarse grain (0.2 to 63 mm)

Coarse Fragments (>63mm)

Abundance (% where <2% = very few, >90% is profuse) 2 %

Size (record dominant size range) mm

Lithology

Unfilled Soil Classification (see tables) SP

Hydrology

Moisture contents

Interface drainage

Odour *See odour page*

Type Slight sewage

Strength

Comments Shell fragments present

Wet dark sand.

First and/or second letters

Letter	Definition
G	gravel
S	sand
M	silt
C	clay
O	organic

Second letter

Letter	Definition
P	poorly graded (uniform particle sizes)
W	well graded (diversified particle sizes)
H	high plasticity
L	low plasticity

SOIL STRATA LOG

Strata Log No 17.12 **Lodged by** BK/JC

Date 4-Dec-19 **Job No.** 036-2064 **Time** 11:15

Location Cargill Newcastle

Reason EPL Soil Sampling

Sample ID(s) Pt17-Comp6-Sub **Sample container type** Glass **Volume** 250mL

Drill type/method Auger

Slope Position N/A **Slope %** 0

Groundwater depth N/A

Land surface observation Flat irrigation area **Surface Hydrology** Clay **Soil** Tick/circle

Coords: Dry **Wet**

Obvious surface runoff **Yes** No

STRATIGRAPHIC DESCRIPTION

Depth (mm) 400 - 400 - 400 - 400

Soil Profile:

Fill

Layers:
- A horizon depth (usually dark in colour) 200 mm
- B horizon depth (aggregates and intensification of colour) mm
- C horizon depth (substrate under soil; may be rocky) mm

Colour

Mottle (circle) Yes No

Field Texture - tick/circle **Fine Grain (<0.2mm)** Coarse grain (0.2 to 63 mm)

Coarse Fragments (>63mm)

Abundance (% where <2% = very few, >90% is profuse) 2 %

Size (record dominant size range) mm

Lithology

Unfilled Soil Classification (see tables) SP

Hydrology

Moisture contents

Interface drainage

Odour *See odour page*

Type Slight sewage

Strength

Comments Dark moist sand

First and/or second letters

Letter	Definition
G	gravel
S	sand
M	silt
C	clay
O	organic

Second letter

Letter	Definition
P	poorly graded (uniform particle sizes)
W	well graded (diversified particle sizes)
H	high plasticity
L	low plasticity

SOIL STRATA LOG

Strata Log No B1 **Lodged by** BK/JC

Date 3-Dec-19 **Job No.** 036-2064 **Time** 13:45

Location Cargill Newcastle

Reason EPL Soil Sampling

Sample ID(s) Background 1 - Surface **Sample container type** Glass **Volume** 250mL

Drill type/method Auger

Slope Position N/A **Slope %** 0

Groundwater depth N/A

Land surface observation Flat irrigation area **Surface Hydrology** Clay **Soil** Tick/circle

Coords: **Dry** Wet

56 384962 E
63 61195 N

Obvious surface runoff Yes No

STRATIGRAPHIC DESCRIPTION

Depth (mm) 0

Depth (mm)

Soil Profile:

Fill Sand

Layers:
A horizon depth (usually dark in colour) mm
B horizon depth (aggregates and intensification of colour) mm
C horizon depth (substrate under soil; may be rocky) mm

Colour

Mottle (circle) Yes **No**

Field Texture - tick/circle Fine Grain (<0.2mm) **Coarse grain (0.2 to 63 mm)**

Coarse Fragments (>63mm)

Abundance (% where <2% = very few, >90% is profuse) %

Size (record dominant size range) mm

Lithology

Unfilled Soil Classification (see tables) SOP

Hydrology

Moisture contents

Interface drainage

Odour *See odour page*

Type N/A

Strength

Comments Dark sand

First and/or second letters

Letter	Definition
G	gravel
S	sand
M	silt
C	clay
O	organic

Second letter

Letter	Definition
P	poorly graded (uniform particle sizes)
W	well graded (diversified particle sizes)
H	high plasticity
L	low plasticity

SOIL STRATA LOG

Strata Log No B2 **Lodged by** BK/JC

Date 3-Dec-19 **Job No.** 036-2064 **Time** 13:45

Location Cargill Newcastle

Reason EPL Soil Sampling

Sample ID(s) Background 1 - Sub **Sample container type** Glass **Volume** 250mL

Drill type/method Auger

Slope Position N/A **Slope %** 0

Groundwater depth N/A

Land surface observation Flat irrigation area **Surface Hydrology** Clay **Soil** Tick/circle

Coords: **Dry** Wet

56 384962 E
63 61195 N

Obvious surface runoff Yes No

STRATIGRAPHIC DESCRIPTION

Depth (mm) 200

Depth (mm)

Soil Profile:

Fill Sand

Layers:
A horizon depth (usually dark in colour) mm
B horizon depth (aggregates and intensification of colour) mm
C horizon depth (substrate under soil; may be rocky) mm

Colour

Mottle (circle) Yes No

Field Texture - tick/circle Fine Grain (<0.2mm) **Coarse grain (0.2 to 63 mm)**

Coarse Fragments (>63mm)

Abundance (% where <2% = very few, >90% is profuse) 10 %

Size (record dominant size range) 3 mm

Lithology

Unfilled Soil Classification (see tables) SOP

Hydrology

Moisture contents Low

Interface drainage

Odour *See odour page*

Type N/A

Strength

Comments Dark sand. Shell fragments

First and/or second letters

Letter	Definition
G	gravel
S	sand
M	silt
C	clay
O	organic

Second letter

Letter	Definition
P	poorly graded (uniform particle sizes)
W	well graded (diversified particle sizes)
H	high plasticity
L	low plasticity

SOIL STRATA LOG

Strata Log No B3 **Lodged by** BK/JC

Date 3-Dec-19 **Job No.** 036-2064 **Time** 13:25

Location Cargill Newcastle

Reason EPL Soil Sampling

Sample ID(s) Background 2 - Surface **Sample container type** Glass **Volume** 250mL

Drill type/method Auger

Slope Position N/A **Slope %** 0

Groundwater depth N/A

Land surface observation Flat irrigation area **Surface Hydrology** Clay **Soil** Tick/circle

Coords: **Dry** Wet

56 384643 E
63 60772 N

Obvious surface runoff Yes **No**

STRATIGRAPHIC DESCRIPTION

Depth (mm) 0

Depth (mm)

Soil Profile:

Fill Sand

Layers:
A horizon depth (usually dark in colour) mm
B horizon depth (aggregates and intensification of colour) mm
C horizon depth (substrate under soil; may be rocky) mm

Colour

Mottle (circle) Yes No

Field Texture - tick/circle Fine Grain (<0.2mm) **Coarse grain (0.2 to 63 mm)**

Coarse Fragments (>63mm)

Abundance (% where <2% = very few, >90% is profuse) <2 %

Size (record dominant size range) mm

Lithology

Unfilled Soil Classification (see tables) GSOP

Hydrology

Moisture contents

Interface drainage

Odour *See odour page*

Type N/A

Strength

Comments Dark sand

First and/or second letters

Letter	Definition
G	gravel
S	sand
M	silt
C	clay
O	organic

Second letter

Letter	Definition
P	poorly graded (uniform particle sizes)
W	well graded (diversified particle sizes)
H	high plasticity
L	low plasticity

SOIL STRATA LOG

Strata Log No B4 **Lodged by** BK/JC

Date 3-Dec-19 **Job No.** 036-2064 **Time** 15:00

Location Cargill Newcastle

Reason EPL Soil Sampling

Sample ID(s) Background 2 - Sub **Sample container type** Glass **Volume** 250mL

Drill type/method Auger

Slope Position N/A **Slope %** 0

Groundwater depth N/A

Land surface observation Flat irrigation area **Surface Hydrology** Clay **Soil** Tick/circle

Coords: **Dry** Wet

Obvious surface runoff Yes **No**

STRATIGRAPHIC DESCRIPTION

Depth (mm) 350

Depth (mm)

Soil Profile:

Fill Sand

Layers: A horizon depth (usually dark in colour) mm

B horizon depth (aggregates and intensification of colour) mm

C horizon depth (substrate under soil; may be rocky) mm

Colour

Mottle (circle) **Yes** No

Field Texture - tick/circle Fine Grain (<0.2mm) **Coarse grain (0.2 to 63 mm)**

Coarse Fragments (>63mm)

Abundance (% where <2% = very few, >90% is profuse) <2 %

Size (record dominant size range) mm

Lithology

Unfilled Soil Classification (see tables) SP

Hydrology

Moisture contents

Interface drainage

Odour *See odour page*

Type

Strength

Comments Mixed light and dark sand

First and/or second letters

Letter	Definition
G	gravel
S	sand
M	silt
C	clay
O	organic

Second letter

Letter	Definition
P	poorly graded (uniform particle sizes)
W	well graded (diversified particle sizes)
H	high plasticity
L	low plasticity