MWP

Groundwater Monitoring Report

December 2023

Mondelez Ireland Production Ltd

Contents

Project No.	Doc. No.	Rev.	Date	Prepared By	Checked By	Approved By	Status
13497	6033	A	08/02/2024	CFox	DOS	CFox	Final

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1. Introduction

Malachy Walsh and Partners was commissioned by Mondelez Ireland Production Ltd to carry out groundwater sampling at their facility at Rathmore, Co. Kerry. This report documents the results of groundwater monitoring undertaken at the facility in December 2023.

2. Sampling Points

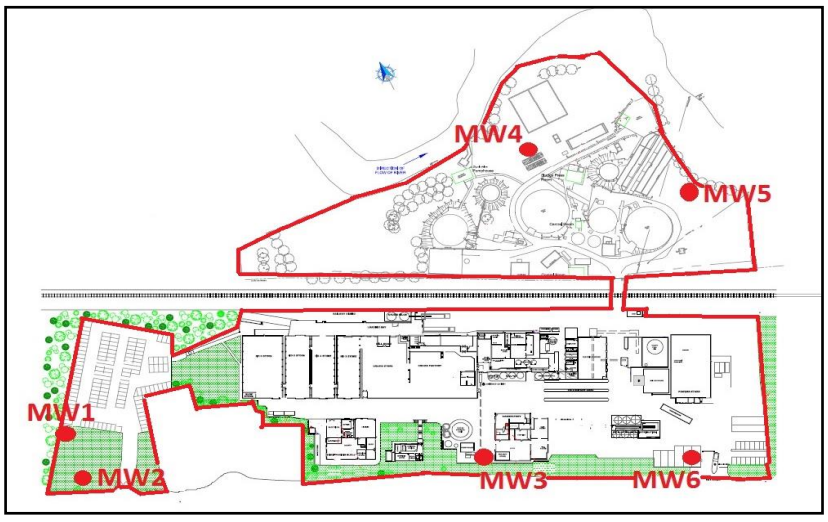
A total of five (5) wells were sampled as part of the survey. Three (3) wells referenced MW1, MW2 and MW6 are deep bore wells and provide the sites process water requirement. MW1, MW2, and MW6 are all up-gradient of the processing facility.

MW4 and MW5 are monitoring wells installed at the wastewater treatment plant to facilitate groundwater sampling down-gradient of the processing facility. These monitoring wells also facilitate monitoring of the integrity of underground tanks associated with the wastewater treatment plant.

Table 1 Groundwater Sampling Points

Sample Point Ref	Description	Well Depth	Position	Location
MW1	Supply well	96.9m	Upgradient	Western boundary of staff carpark
MW2	Supply well	55.6m	Upgradient	Southern boundary of staff carpark
MW6	Supply well	164.5m	Upgradient	South eastern section of main site adjacent to the site entrance
MW4	Monitoring well	20m	Downgradient	North western section of WWTP area
MW5	Monitoring well	20m	Downgradient	North eastern section of WWTP area

Figure 1 Groundwater well Locations



(Note: MW3 is no longer accessible)

3. Sampling Methodology

MWP carried out groundwater sampling of the five (5) on-site wells on 13th December 2023. There were occurrences of heavy rainfall in the days preceding the sampling event.

Currently MW1, MW2 and MW6 provide process water for the installation and are in daily use. These wellheads have been fitted with a tap valve on the outlet water pipe to facilitate sampling of raw water. On the day of sampling, the tap was opened and water was left to flow for 10 minutes prior to taking the sample. Samples were taken directly from the tap valve.

On the day of sampling, monitoring wells MW4 and MW5 were purged three well volumes prior to sampling using a submersible pump. The well volumes were calculated using the appropriate equation ($3.14 \times r^2 \times h$). During purging at MW5 the well head emptied on each occasion after approximately 5 minutes of purging. Recharge to initial water depth on each occasion took approximately 25-30 minutes.

Water samples from each well were collected in a variety of containers provided by the analytical laboratory for the range of test parameters required to be analysed. Details of the sampling containers used are provided in Table 2 below. On completion of the monitoring, the samples were placed in a cooler box to be held at 4^0C and delivered directly to Southern Scientific Services Ltd laboratory in Killarney on the same day for analysis. The sampling location, date and time were recorded for each sample.

Table 2 Sample Container

Container Type	Test Parameter
Plastic Litre Bottle:	pH; Conductivity; Dissolved Oxygen; Total Suspended Solids; Ammoniacal Nitrogen (Ammonia); Nitrate; Nitrite; Total Alkalinity BOD; Major Ions (*Anions*: Chloride, Sulphate; *Cations:* Sodium, Potassium, Calcium, Magnesium);
Plastic vials: *	Heavy Metals: Arsenic, Cadmium, Copper, Chromium, Lead, Mercury, Zinc
Glass Amber Bottles	Mineral Oils; Diesel Range Organics; PAH
Glass vial	Orthophosphate Petrol Range Organic – BTEX

* The samples were filtered into plastic vials that have concentrated Nitric Acid which acts as the preservative. Samples for heavy metals were collected by this method so as to report metals as dissolved as per EPA requirement for non drinking water samples.

4. Sample Characteristics

Table 3 Sample Characteristics

Sample Point Ref	Visual Appearance	Odour
MW1	Clear with no suspended sediments visible	None
MW2	Cleared with no suspended sediments visible	None
MW4	Cleared with no suspended sediments visible	None
MW5	Clear with no suspended sediments visible	None
MW6	Clear with no suspended sediments visible	Notable sulphur (rotten eggs) odour

5. Analytical Results

The analytical results are set out in Table 4. The Laboratory reports are provided in Appendix 1. The laboratory results for the samples have been compared to the assessment criteria in SI No. 122 of 2014, i.e. the EU (Drinking Water) Regulations, the European Communities Environmental Objectives (Groundwater) Regulations 2010 (S.I. No. 9/2010), and European Union Environmental Objectives (Groundwater) (Amendment) Regulations 2016 (S.I. No. 366/2016).

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Table 4 Analytical Result

Parameter	Units	Sampling Event 13th December 2023					Retest 25/01/24	Limit	Unit	Source
		MW1	MW2	MW4	MW5	MW6	MW2			
Coliforms	MPN/100ml	<1	<1	<1	<1	<1		0	N/100ml	Note 3
E.coli	MPN/100ml	<1	<1	<1	<1	<1		0	N/100m	Note 3
pH	pH units	7.3	6.2	6.9	6.5	6.7				
Conductivity	us/cm	311	299	258	309	277		800 - 1875	us/cm	Note 1
BOD	mg/l	<1	<1	1.5	1.5	1.1				
Suspended Solids	mg/l	<4	<4	<10	9	10				
Alkalinity	mg/l	135.3	59	120.1	106.4	104.4				
Total Ammonia	mg/l	0.04	<0.02	0.11	0.22	0.03		65-175	µg/l	Note 1
Nitrate	mg/l	0.81	2.82	<0.25	<0.25	<0.25		37.5	mg/l	Note 1
Nitrite	mg/l	<0.005	<0.005	<0.005	<0.005	<0.005		375	µg/l	Note 1
Orthophosphate	mg/l	0.03	0.02	0.08	0.07	0.22		35	µg/l	Note 1
Chloride	mg/l	22.4	33.4	16.4	29.8	21.7		24 - 187.5	mg/l	Note 1
Sulphate	mg/l	9.8	7.1	5.2	22.5	18.1		187.5	mg/l	Note 2
Calcium	mg/l	31.1	10.2	19.4	26.5	24.2				
Magnesium	mg/l	10.9	12.9	10.8	<10	12.4				
Potassium	mg/l	<10	<10	<10	<10	<10				
Sodium	mg/l	27.6	21.5	25.4	28.7	21.6		150	mg/l	Note 2
Fluoride	mg/l	<0.1	<0.1	0.1	0.1	0.1		0.8-1.5	mg/l	Note 3
Arsenic, Dissolved	µg/l	<1	<1	1	<1	1		7.5	µg/l	Note 1
Cadmium, Dissolved	µg/l	<0.45	<0.45	<0.45	<0.45	<0.45		3.75	µg/l	Note 2
Chromium, Dissolved	µg/l	<1	<1	<1	<1	<1		37.5	µg/l	Note 1
Copper, Dissolved	µg/l	<1	<1	<1	<1	<1		1500	µg/l	Note 2
Iron, Dissolved	µg/l	744.79	12.12	4281.17	4900.33	2748.61	483	200	µg/l	Note 3
Lead, Dissolved	µg/l	<1	<1	<1	<1	<1		7.5	µg/l	Note 1
Manganese, Dissolved	µg/l	321.51	145.19	799.79	1197.58	767.37		50	µg/l	Note 3
Mercury, Dissolved	µg/l	<0.5	<0.5	<0.5	<0.5	<0.5		0.75	µg/l	Note 1
Nickel, Dissolved	µg/l	<1	2.37	<1	<1	<1		15	µg/l	Note 2
Zinc, Dissolved	µg/l	321.51	20.5	<10	<10	354.67		75	µg/l	Note 1
PAHs (TOTAL)	µg/l	<0.02	<0.02	<0.02	<0.02	<0.02		0.075	µg/l	Note 1
DRO	µg/l	<10	519.1	<10	<10	<10	<10			
Mineral Oil	µg/l	<10	45.7	<10	<10	<10	<10			
PRO	µg/l	<2	<2	<2	<2	<2				

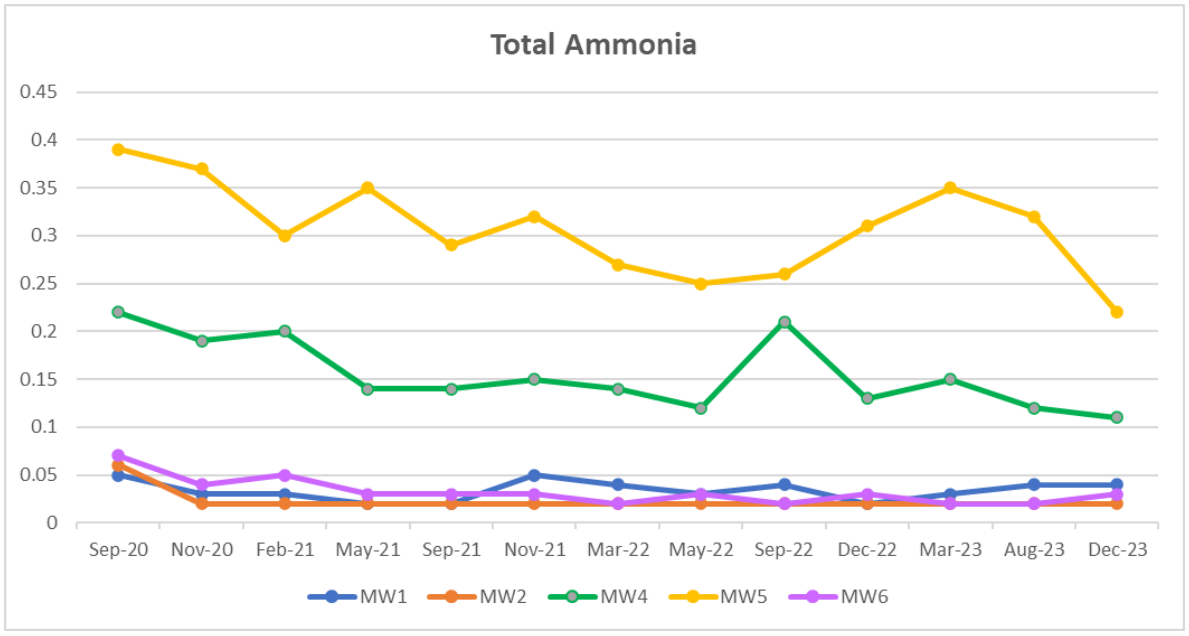
Note 1:	S.I. No. 366/2016 - European Union Environmental Objectives (Groundwater) (Amendment) Regulations 2016
Note 2	S.I. No. 9/2010 - European Communities Environmental Objectives (Groundwater) Regulations 2010
Note 3:	S.I. No. 99/2023 - European Union (Drinking Water) Regulations 2023
	Exceedence

6. Evaluation of Analytical Results

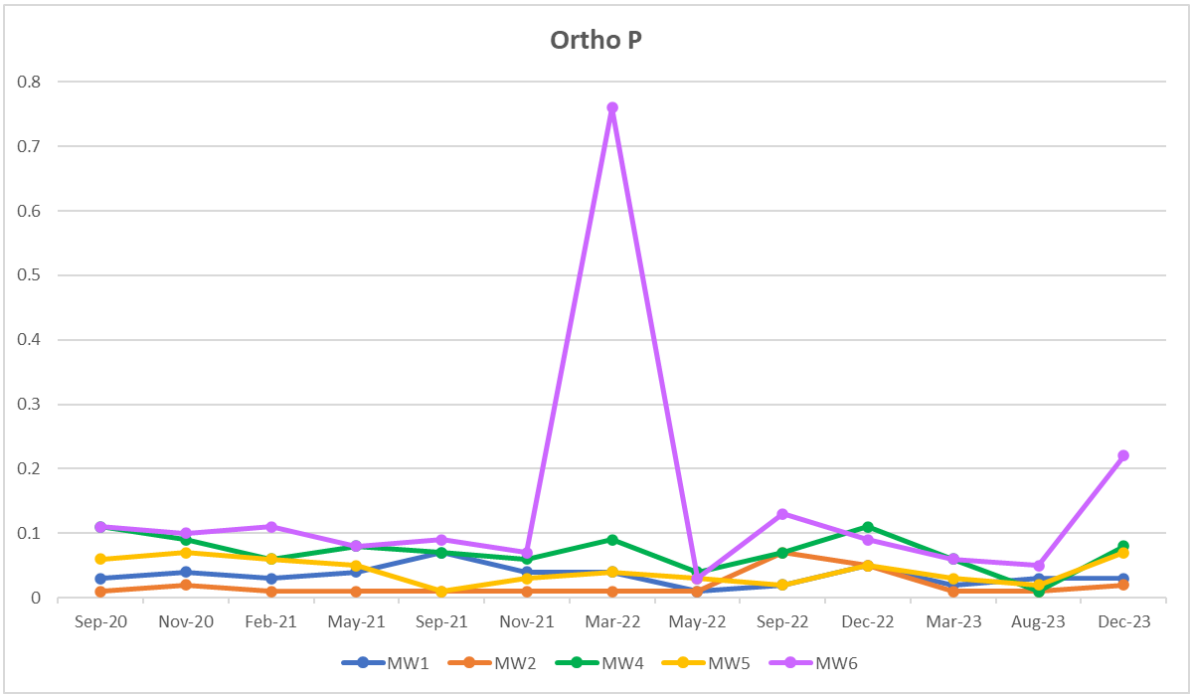
The results of the groundwater analysis from this sampling event indicate the following:

- The laboratory results for upgradient well MW2 reported significant concentrations of DROs and Mineral Oils for the sample taken on 13th December 2023. This result is not consistent with past monitoring events and there are no plausible onsite contamination sources with potential pollutant pathway linkages. On the day of sampling there was no visual evidence of hydrocarbon contamination and no odour was detected from the sample. A second sample was taken at MW2 on 25th January 2024. The results recorded that the concentrations of DRO and Mineral Oils were both below the level of detection. It is considered that the recorded results for the sample of 13th December is an error.

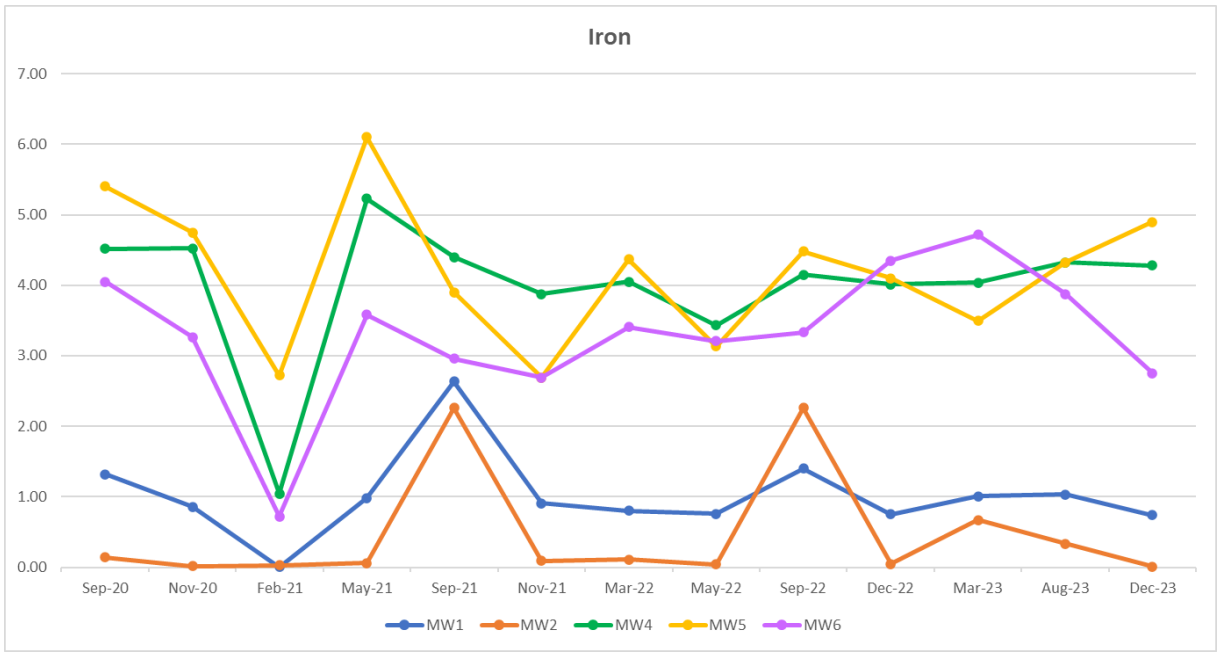
- Ammonia concentrations exceeding the EU Environmental Objective Regulations 2016 Groundwater upper Threshold Value (GTV) was recorded in downgradient well MW5. A review of past monitoring events indicates that the detection of elevated ammonia concentrations in both of the downgradient wells (MW4 and MW5) is a recurring trend. While the recorded concentrations consistently fluctuate, overall the results are showing a consistent gradual decline.



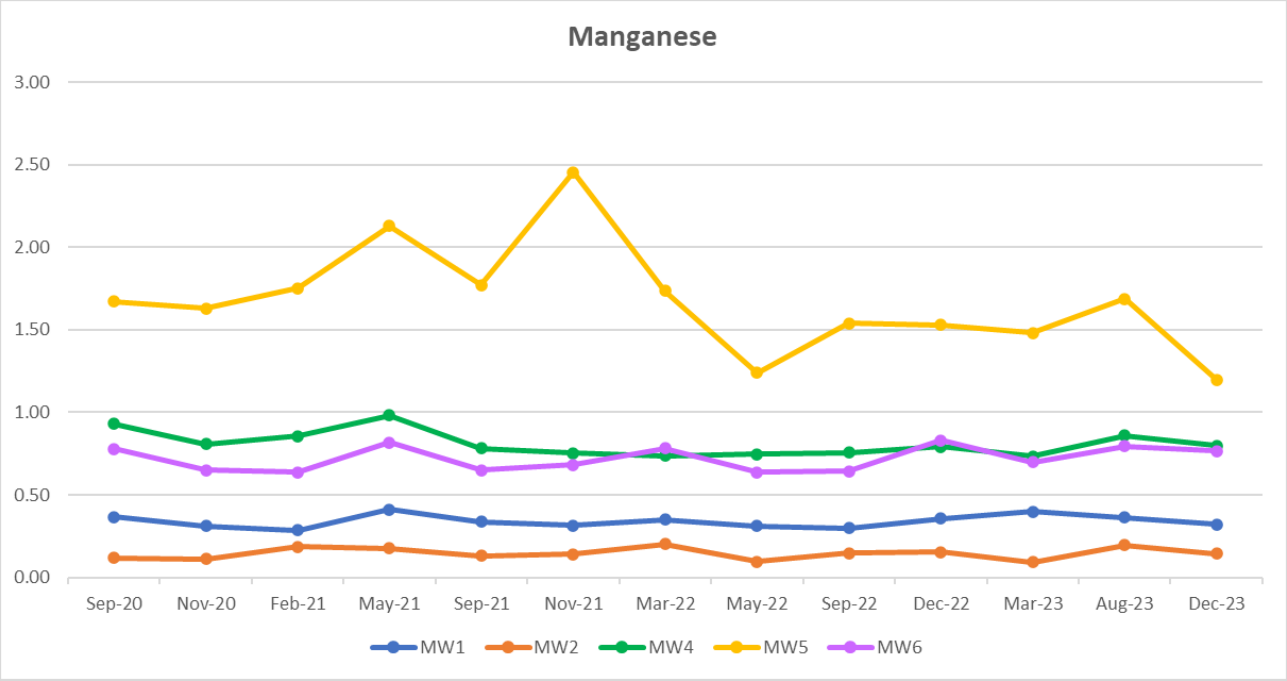
- Orthophosphate concentrations exceeding the EC Environmental Objective Regulations 2016 Groundwater Threshold Value was recorded in both downgradient wells (MW4 and MW5) and in upgradient well MW6. Based on a review of past monitoring events, detection of Orthophosphate in these wells is a recurring trend and has consistently fluctuated above and below the GTV.



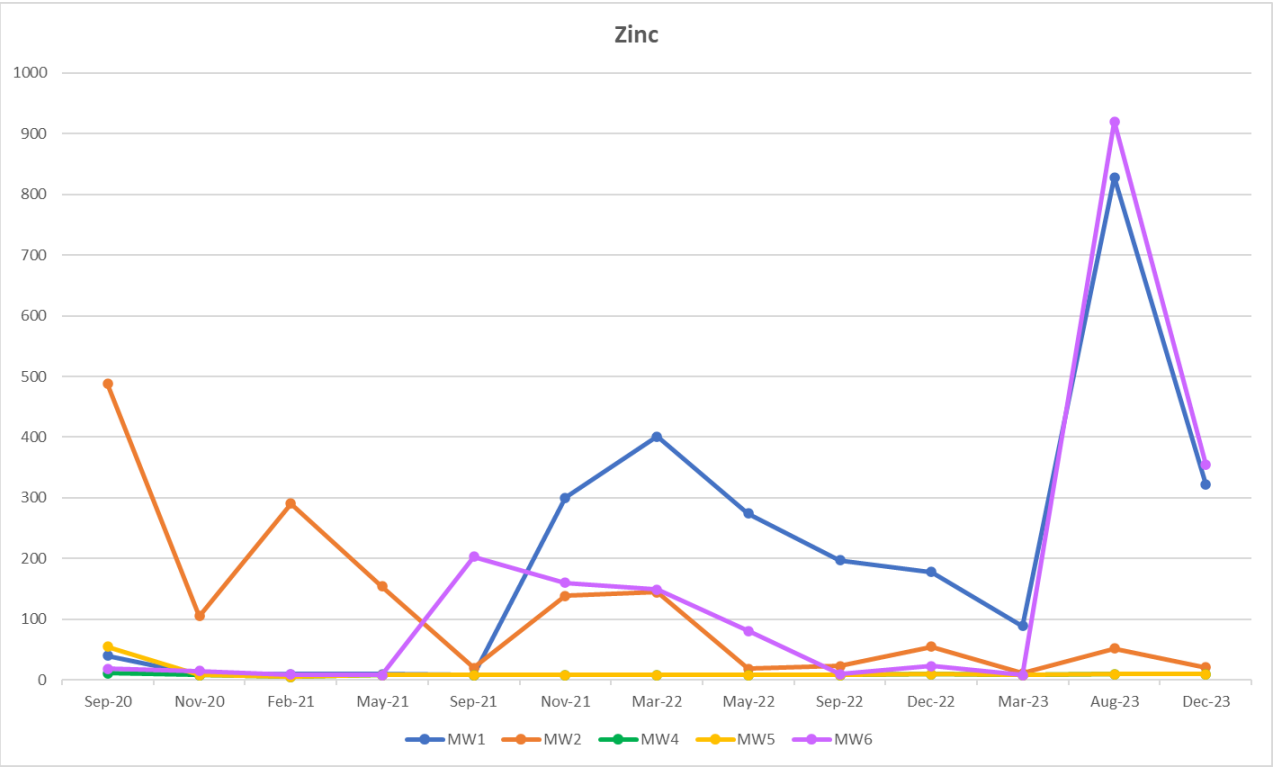
- High concentrations of iron were recorded in two upgradient wells (MW1 and MW6) and both downgradient wells (MW4 and MW5). Based on a review of past monitoring events, detection of iron at these concentrations in these wells is a recurring trend. Iron concentrations in MW2 consistently fluctuate above and below the GTV.



- High concentrations of manganese were recorded in all three upgradient wells (MW1, MW2 and MW6) and both downgradient wells (MW4 and MW5). Based on a review of past monitoring events, detection of manganese in these wells is a recurring trend.



- Zinc concentrations exceeding the EU Environmental Objective Regulations 2016 Groundwater Threshold Value was recorded in up gradient wells MW1 and MW6. Past monitoring events indicate that the detection of elevated zinc concentrations in upgradient wells is a recurring trend.



7. Interpretation

There are slightly elevated Orthophosphate and Ammonia concentrations in the groundwater beneath the site. As illustrated in the trend graphs above, Orthophosphate levels continue to fluctuate above and below the GTV in the three upgradient supply wells and the two downgradient monitoring wells.

Elevated ammonia concentration in both of the downgradient wells (MW4 and MW5) consistently fluctuate, however, overall the results are showing a consistent gradual decline.

The trend of decline in ammonia levels may be the result of the underground pipeline remedial works programme, however if the source of these parameters is wastewater effluent then other parameters such as Biochemical Oxygen Demand (BOD), sodium, chloride, nitrite, ecoli and total coliforms would also be elevated. None of these parameters are present at elevated concentrations in the groundwater.

The current down hydraulic gradient groundwater concentrations of Total Ammonia and Orthophosphate do not present any significant risk of impact on down gradient receptors and in particular the Blackwater River along the down hydraulic gradient site boundary.

The high iron and manganese concentrations are not indicative of impacts from the onsite production activities. The elevated iron and manganese levels in the wells are are consistent with the type of rock through which the water is flowing and the hydraulic conditions, most likely associated with reduced oxygen conditions in the bedrock aquifer which is confined beneath a poorly permeable clay layer at the site. The very low or non-detectable results for Nitrate are also indicative of reduced oxygen conditions.

There are elevated concentrations of zinc recorded in two upgradient wells (MW1, MW6). Given the location of this well up hydraulic gradient of all site activities, the zinc levels are not likely to be associated with site production activities.

Appendix 1

LABORATORY ANALYSIS REPORT

Sampling Date 13th December 2023

Certificate of Analysis

Customer:	Mondelez Ireland Production Limited	**Project:**	Ground Water
Address:	Rathmore, Co. Kerry	**Site**	
		Date Received:	13/12/2023
		Condition of Sample:	Satisfactory
Report to:	Caitriona Fox	**Date Analysed:**	13/12/2023 - 04/01/2024
Customer PO		**Issue Date:**	05/01/2024
Quote No.		**BATCH NUMBER:**	**23-36688**

Jake Grunfield
Laboratory Analyst

Index to symbols used & Notes

*	Analysis is not INAB/UKAS accredited
**	Adapted from Standard Methods for the Examination of Water and Wastewater.
***	Customer specific limits
(F)	Analysis carried out at our Farranfore Laboratory.
(D)	Analysis carried out at our Dunrine Laboratory.
LOQ	Parameter Limit of Quantification
Note 6	Subcontracted Parameter.

Notes

- **The results relate only to the items tested.**
- **Opinions and interpretations expressed herein are outside the scope of INAB accreditation.**
- **The analysis report shall not be reproduced except in full without written approval of the laboratory.**
- **Sampling is outside the scope of the laboratory activities.**

Notes for Drinking Water samples

Note A	The water should not be aggressive
Note B	Compliance must be ensured with the conditions that [NO3]/50 + [NO2]/3 =1
Note C	Acceptable to customers and no abnormal change
Note D	In the case of surface water treatment, a parametric value not exceeding 1 NTU in the water ex treatment works must be strived for
Note F	Fluoridated supplies 0.8 mg/L; Natural supplies 1.5 mg/L.

Customer Sample Ref:	MW1	**Customer Sample Code:**	
Project:	Ground Water	**Sampled By:**	C. Fox
Our Reference:	113890 (23-36688)	**Sample Matrix:**	Ground Water
Date Sampled:	13/12/2023	**Time Sampled:**	:

Method:		Parameter:	Units	LOQ	Result
		Microbiological Analysis: (D)			
SMP 019		Coliforms	MPN/100mL	*<1*	< 1
SMP 019		E. coli	MPN/100mL	*<1*	< 1
		Chemical Analysis: (F)			
SCP 052		Hydrogen Ion (pH)	pH units	*4.0*	7.3
SCP 052		Conductivity	µS/cm @ 20 °C	*15*	311
SCP 015		Biological Oxygen Demand (BOD)	mg/L	*1.0*	< 1.0
	*	Dissolved Oxygen	% Sat	*0.1*	95.6
SCP 010		Suspended Solids	mg/L	*2*	< 4
SCP 027H		Alkalinity	mg/L as CaCO3	*5.0*	135.3
SCP 027A		Total Ammonia	mg/L N	*0.02*	0.04
SCP 027G		Nitrate	mg/L N	*0.25*	0.81
SCP 027F		Nitrite	mg/L N	*0.005*	< 0.005
SCP 027C		Orthophosphate	mg/L P	*0.01*	0.03
SCP 027B		Chloride	mg/L	*0.5*	22.4
SCP 027D		Sulphate	mg/L	*0.5*	9.8
SCP 068A		Fluoride	mg/L	*0.1*	< 0.1
SCP 038 /073		Dissolved Arsenic (As)	µg/L	*1*	< 1
SCP 038 /073		Dissolved Cadmium (Cd)	µg/L	*0.45*	< 0.45
SCP 038 /073		Dissolved Chromium (Cr)	µg/L	*1*	< 1
SCP 038 /073		Dissolved Copper (Cu)	µg/L	*1*	< 1
SCP 038 /073		Dissolved Iron (Fe)	µg/L	*5.00*	744.79
SCP 038 /073		Dissolved Lead (Pb)	µg/L	*1.00*	< 1.00
SCP 038 /073		Dissolved Manganese (Mn)	µg/L	*1.00*	321.51
SCP 038 /073		Dissolved Mercury (Hg)	µg/L	*0.50*	< 0.50
SCP 038 /073		Dissolved Nickel (Ni)	µg/L	*1.00*	< 1.00
SCP 038 /073		Dissolved Zinc (Zn)	µg/L	*10.00*	321.54
SCP 053		Calcium-Dissolved	mg/L	*10.0*	31.1
SCP 115A		Diesel Range Organics (C10-C28)	µg/L	*10.0*	< 10.0
SCP 053		Magnesium-Dissolved	mg/L	*10.0*	10.9
SCP 115A	*	Mineral Oil (C28-C40)	µg/L	*10.0*	< 10.0
SCP 053		Potassium-Dissolved	mg/L	*10.0*	< 10.0
SCP 114A	*	PRO (C6-C8)	µg/L	*2*	< 2
SCP 053		Sodium-Dissolved	mg/L	*10.0*	27.6
		PAH's Water (default)			
		Chemical Analysis: (F)			
SCP 060B		Total PAH	µg/L	*0.020*	< 0.020
SCP 060B		Acenaphthene	µg/L	*0.005*	< 0.005
SCP 060B		Acenaphthylene	µg/L	*0.005*	< 0.005

Customer Sample Ref:	MW1	**Customer Sample Code:**	
Project:	Ground Water	**Sampled By:**	C. Fox
Our Reference:	113890 (23-36688)	**Sample Matrix:**	Ground Water
Date Sampled:	13/12/2023	**Time Sampled:**	:

Method:	Parameter:	Units	LOQ	Result
SCP 060B	Anthracene	µg/L	*0.005*	< 0.005
SCP 060B	Benz(a)anthracene	µg/L	*0.005*	< 0.005
SCP 060B	Benzo(a)pyrene	µg/L	*0.003*	< 0.003
SCP 060B	Benzo(b)fluoranthene	µg/L	*0.005*	< 0.005
SCP 060B	Benzo(k)fluoranthene	µg/L	*0.005*	< 0.005
SCP 060B	Sum Benzo (b)&(k) fluoranthene	µg/L	*0.005*	< 0.005
SCP 060B	Benzo(ghi)perylene	µg/L	*0.005*	< 0.005
SCP 060B	Chrysene	µg/L	*0.005*	< 0.005
SCP 060B	Dibenz(a,h)anthracene	µg/L	*0.005*	< 0.005
SCP 060B	Fluoranthene	µg/L	*0.005*	< 0.005
SCP 060B	Fluorene	µg/L	*0.005*	< 0.005
SCP 060B	Indeno(1,2,3-cd)pyrene	µg/L	*0.005*	< 0.005
SCP 060B	Naphthalene	µg/L	*0.005*	< 0.005
SCP 060B	Phenanthrene	µg/L	*0.005*	< 0.005
SCP 060B	Pyrene	µg/L	*0.005*	< 0.005

Customer Sample Ref:	MW2	**Customer Sample Code:**	
Project:	Ground Water	**Sampled By:**	C. Fox
Our Reference:	113891 (23-36688)	**Sample Matrix:**	Ground Water
Date Sampled:	13/12/2023	**Time Sampled:**	:

Method:		Parameter:	Units	LOQ	Result
		Microbiological Analysis: (D)			
SMP 019		Coliforms	MPN/100mL	*<1*	< 1
SMP 019		E. coli	MPN/100mL	*<1*	< 1
		Chemical Analysis: (F)			
SCP 052		Hydrogen Ion (pH)	pH units	*4.0*	6.2
SCP 052		Conductivity	µS/cm @ 20 °C	*15*	229
SCP 015		Biological Oxygen Demand (BOD)	mg/L	*1.0*	< 1.0
	*	Dissolved Oxygen	% Sat	*0.1*	79.5
SCP 010		Suspended Solids	mg/L	*2*	< 4
SCP 027H		Alkalinity	mg/L as CaCO3	*5.0*	59.0
SCP 027A		Total Ammonia	mg/L N	*0.02*	< 0.02
SCP 027G		Nitrate	mg/L N	*0.25*	2.82
SCP 027F		Nitrite	mg/L N	*0.005*	< 0.005
SCP 027C		Orthophosphate	mg/L P	*0.01*	0.02
SCP 027B		Chloride	mg/L	*0.5*	33.4
SCP 027D		Sulphate	mg/L	*0.5*	7.1
SCP 068A		Fluoride	mg/L	*0.1*	< 0.1
SCP 038 /073		Dissolved Arsenic (As)	µg/L	*1*	< 1
SCP 038 /073		Dissolved Cadmium (Cd)	µg/L	*0.45*	< 0.45
SCP 038 /073		Dissolved Chromium (Cr)	µg/L	*1*	< 1
SCP 038 /073		Dissolved Copper (Cu)	µg/L	*1*	< 1
SCP 038 /073		Dissolved Iron (Fe)	µg/L	*5.00*	12.12
SCP 038 /073		Dissolved Lead (Pb)	µg/L	*1.00*	< 1.00
SCP 038 /073		Dissolved Manganese (Mn)	µg/L	*1.00*	145.19
SCP 038 /073		Dissolved Mercury (Hg)	µg/L	*0.50*	< 0.50
SCP 038 /073		Dissolved Nickel (Ni)	µg/L	*1.00*	2.37
SCP 038 /073		Dissolved Zinc (Zn)	µg/L	*10.00*	20.50
SCP 053		Calcium-Dissolved	mg/L	*10.0*	10.2
SCP 115A		Diesel Range Organics (C10-C28)	µg/L	*10.0*	519.1
SCP 053		Magnesium-Dissolved	mg/L	*10.0*	12.9
SCP 115A	*	Mineral Oil (C28-C40)	µg/L	*10.0*	45.7
SCP 053		Potassium-Dissolved	mg/L	*10.0*	< 10.0
SCP 114A	*	PRO (C6-C8)	µg/L	*2*	< 2
SCP 053		Sodium-Dissolved	mg/L	*10.0*	21.5
		PAH's Water (default)			
		Chemical Analysis: (F)			
SCP 060B		Total PAH	µg/L	*0.020*	< 0.020
SCP 060B		Acenaphthene	µg/L	*0.005*	< 0.005
SCP 060B		Acenaphthylene	µg/L	*0.005*	< 0.005

Customer Sample Ref:	MW2	**Customer Sample Code:**	
Project:	Ground Water	**Sampled By:**	C. Fox
Our Reference:	113891 (23-36688)	**Sample Matrix:**	Ground Water
Date Sampled:	13/12/2023	**Time Sampled:**	:

Method:	Parameter:	Units	LOQ	Result
SCP 060B	Anthracene	µg/L	*0.005*	< 0.005
SCP 060B	Benz(a)anthracene	µg/L	*0.005*	< 0.005
SCP 060B	Benzo(a)pyrene	µg/L	*0.003*	< 0.003
SCP 060B	Benzo(b)fluoranthene	µg/L	*0.005*	< 0.005
SCP 060B	Benzo(k)fluoranthene	µg/L	*0.005*	< 0.005
SCP 060B	Sum Benzo (b)&(k) fluoranthene	µg/L	*0.005*	< 0.005
SCP 060B	Benzo(ghi)perylene	µg/L	*0.005*	< 0.005
SCP 060B	Chrysene	µg/L	*0.005*	< 0.005
SCP 060B	Dibenz(a,h)anthracene	µg/L	*0.005*	< 0.005
SCP 060B	Fluoranthene	µg/L	*0.005*	< 0.005
SCP 060B	Fluorene	µg/L	*0.005*	< 0.005
SCP 060B	Indeno(1,2,3-cd)pyrene	µg/L	*0.005*	< 0.005
SCP 060B	Naphthalene	µg/L	*0.005*	< 0.005
SCP 060B	Phenanthrene	µg/L	*0.005*	< 0.005
SCP 060B	Pyrene	µg/L	*0.005*	< 0.005

Customer Sample Ref:	MW4	**Customer Sample Code:**	
Project:	Ground Water	**Sampled By:**	C. Fox
Our Reference:	113892 (23-36688)	**Sample Matrix:**	Ground Water
Date Sampled:	13/12/2023	**Time Sampled:**	:

Method:		Parameter:	Units	LOQ	Result
		Microbiological Analysis: (D)			
SMP 019		Coliforms	MPN/100mL	*<1*	< 1
SMP 019		E. coli	MPN/100mL	*<1*	< 1
		Chemical Analysis: (F)			
SCP 052		Hydrogen Ion (pH)	pH units	*4.0*	6.8
SCP 052		Conductivity	µS/cm @ 20 °C	*15*	258
SCP 015		Biological Oxygen Demand (BOD)	mg/L	*1.0*	1.5
	*	Dissolved Oxygen	% Sat	*0.1*	84.7
SCP 010		Suspended Solids	mg/L	*2*	< 10
SCP 027H		Alkalinity	mg/L as CaCO3	*5.0*	120.1
SCP 027A		Total Ammonia	mg/L N	*0.02*	0.11
SCP 027G		Nitrate	mg/L N	*0.25*	< 0.25
SCP 027F		Nitrite	mg/L N	*0.005*	< 0.005
SCP 027C		Orthophosphate	mg/L P	*0.01*	0.08
SCP 027B		Chloride	mg/L	*0.5*	16.4
SCP 027D		Sulphate	mg/L	*0.5*	5.2
SCP 068A		Fluoride	mg/L	*0.1*	0.1
SCP 038 /073		Dissolved Arsenic (As)	µg/L	*1*	1
SCP 038 /073		Dissolved Cadmium (Cd)	µg/L	*0.45*	< 0.45
SCP 038 /073		Dissolved Chromium (Cr)	µg/L	*1*	< 1
SCP 038 /073		Dissolved Copper (Cu)	µg/L	*1*	< 1
SCP 038 /073		Dissolved Iron (Fe)	µg/L	*5.00*	4281.17
SCP 038 /073		Dissolved Lead (Pb)	µg/L	*1.00*	< 1.00
SCP 038 /073		Dissolved Manganese (Mn)	µg/L	*1.00*	799.79
SCP 038 /073		Dissolved Mercury (Hg)	µg/L	*0.50*	< 0.50
SCP 038 /073		Dissolved Nickel (Ni)	µg/L	*1.00*	< 1.00
SCP 038 /073		Dissolved Zinc (Zn)	µg/L	*10.00*	< 10.00
SCP 053		Calcium-Dissolved	mg/L	*10.0*	19.4
SCP 115A		Diesel Range Organics (C10-C28)	µg/L	*10.0*	< 10.0
SCP 053		Magnesium-Dissolved	mg/L	*10.0*	10.8
SCP 115A	*	Mineral Oil (C28-C40)	µg/L	*10.0*	< 10.0
SCP 053		Potassium-Dissolved	mg/L	*10.0*	< 10.0
SCP 114A	*	PRO (C6-C8)	µg/L	*2*	< 2
SCP 053		Sodium-Dissolved	mg/L	*10.0*	25.4
		PAH's Water (default)			
		Chemical Analysis: (F)			
SCP 060B		Total PAH	µg/L	*0.020*	< 0.020
SCP 060B		Acenaphthene	µg/L	*0.005*	< 0.005
SCP 060B		Acenaphthylene	µg/L	*0.005*	< 0.005

Customer Sample Ref:	MW4	**Customer Sample Code:**	
Project:	Ground Water	**Sampled By:**	C. Fox
Our Reference:	113892 (23-36688)	**Sample Matrix:**	Ground Water
Date Sampled:	13/12/2023	**Time Sampled:**	:

Method:	Parameter:	Units	LOQ	Result
SCP 060B	Anthracene	µg/L	*0.005*	< 0.005
SCP 060B	Benz(a)anthracene	µg/L	*0.005*	< 0.005
SCP 060B	Benzo(a)pyrene	µg/L	*0.003*	< 0.003
SCP 060B	Benzo(b)fluoranthene	µg/L	*0.005*	< 0.005
SCP 060B	Benzo(k)fluoranthene	µg/L	*0.005*	< 0.005
SCP 060B	Sum Benzo (b)&(k) fluoranthene	µg/L	*0.005*	< 0.005
SCP 060B	Benzo(ghi)perylene	µg/L	*0.005*	< 0.005
SCP 060B	Chrysene	µg/L	*0.005*	< 0.005
SCP 060B	Dibenz(a,h)anthracene	µg/L	*0.005*	< 0.005
SCP 060B	Fluoranthene	µg/L	*0.005*	< 0.005
SCP 060B	Fluorene	µg/L	*0.005*	< 0.005
SCP 060B	Indeno(1,2,3-cd)pyrene	µg/L	*0.005*	< 0.005
SCP 060B	Naphthalene	µg/L	*0.005*	< 0.005
SCP 060B	Phenanthrene	µg/L	*0.005*	< 0.005
SCP 060B	Pyrene	µg/L	*0.005*	< 0.005

Customer Sample Ref:	MW5	**Customer Sample Code:**	
Project:	Ground Water	**Sampled By:**	C. Fox
Our Reference:	113893 (23-36688)	**Sample Matrix:**	Ground Water
Date Sampled:	13/12/2023	**Time Sampled:**	:

Method:		Parameter:	Units	LOQ	Result
		Microbiological Analysis: (D)			
SMP 019		Coliforms	MPN/100mL	*<1*	< 1
SMP 019		E. coli	MPN/100mL	*<1*	< 1
		Chemical Analysis: (F)			
SCP 052		Hydrogen Ion (pH)	pH units	*4.0*	6.5
SCP 052		Conductivity	µS/cm @ 20 °C	*15*	309
SCP 015		Biological Oxygen Demand (BOD)	mg/L	*1.0*	1.5
	*	Dissolved Oxygen	% Sat	*0.1*	83.4
SCP 010		Suspended Solids	mg/L	*2*	9
SCP 027H		Alkalinity	mg/L as CaCO3	*5.0*	106.4
SCP 027A		Total Ammonia	mg/L N	*0.02*	0.22
SCP 027G		Nitrate	mg/L N	*0.25*	< 0.25
SCP 027F		Nitrite	mg/L N	*0.005*	< 0.005
SCP 027C		Orthophosphate	mg/L P	*0.01*	0.07
SCP 027B		Chloride	mg/L	*0.5*	29.8
SCP 027D		Sulphate	mg/L	*0.5*	22.5
SCP 068A		Fluoride	mg/L	*0.1*	< 0.1
SCP 038 /073		Dissolved Arsenic (As)	µg/L	*1*	< 1
SCP 038 /073		Dissolved Cadmium (Cd)	µg/L	*0.45*	< 0.45
SCP 038 /073		Dissolved Chromium (Cr)	µg/L	*1*	< 1
SCP 038 /073		Dissolved Copper (Cu)	µg/L	*1*	< 1
SCP 038 /073		Dissolved Iron (Fe)	µg/L	*5.00*	4900.33
SCP 038 /073		Dissolved Lead (Pb)	µg/L	*1.00*	< 1.00
SCP 038 /073		Dissolved Manganese (Mn)	µg/L	*1.00*	1197.58
SCP 038 /073		Dissolved Mercury (Hg)	µg/L	*0.50*	< 0.50
SCP 038 /073		Dissolved Nickel (Ni)	µg/L	*1.00*	< 1.00
SCP 038 /073		Dissolved Zinc (Zn)	µg/L	*10.00*	< 10.00
SCP 053		Calcium-Dissolved	mg/L	*10.0*	26.5
SCP 115A		Diesel Range Organics (C10-C28)	µg/L	*10.0*	< 10.0
SCP 053		Magnesium-Dissolved	mg/L	*10.0*	< 10.0
SCP 115A	*	Mineral Oil (C28-C40)	µg/L	*10.0*	< 10.0
SCP 053		Potassium-Dissolved	mg/L	*10.0*	< 10.0
SCP 114A	*	PRO (C6-C8)	µg/L	*2*	< 2
SCP 053		Sodium-Dissolved	mg/L	*10.0*	28.7
		PAH's Water (default)			
		Chemical Analysis: (F)			
SCP 060B		Total PAH	µg/L	*0.020*	< 0.020
SCP 060B		Acenaphthene	µg/L	*0.005*	< 0.005
SCP 060B		Acenaphthylene	µg/L	*0.005*	< 0.005

Customer Sample Ref:	MW5	**Customer Sample Code:**	
Project:	Ground Water	**Sampled By:**	C. Fox
Our Reference:	113893 (23-36688)	**Sample Matrix:**	Ground Water
Date Sampled:	13/12/2023	**Time Sampled:**	:

Method:	Parameter:	Units	LOQ	Result
SCP 060B	Anthracene	µg/L	*0.005*	< 0.005
SCP 060B	Benz(a)anthracene	µg/L	*0.005*	< 0.005
SCP 060B	Benzo(a)pyrene	µg/L	*0.003*	< 0.003
SCP 060B	Benzo(b)fluoranthene	µg/L	*0.005*	< 0.005
SCP 060B	Benzo(k)fluoranthene	µg/L	*0.005*	< 0.005
SCP 060B	Sum Benzo (b)&(k) fluoranthene	µg/L	*0.005*	< 0.005
SCP 060B	Benzo(ghi)perylene	µg/L	*0.005*	< 0.005
SCP 060B	Chrysene	µg/L	*0.005*	< 0.005
SCP 060B	Dibenz(a,h)anthracene	µg/L	*0.005*	< 0.005
SCP 060B	Fluoranthene	µg/L	*0.005*	< 0.005
SCP 060B	Fluorene	µg/L	*0.005*	< 0.005
SCP 060B	Indeno(1,2,3-cd)pyrene	µg/L	*0.005*	< 0.005
SCP 060B	Naphthalene	µg/L	*0.005*	< 0.005
SCP 060B	Phenanthrene	µg/L	*0.005*	< 0.005
SCP 060B	Pyrene	µg/L	*0.005*	< 0.005

Customer Sample Ref:	MW6	**Customer Sample Code:**	
Project:	Ground Water	**Sampled By:**	C. Fox
Our Reference:	113894 (23-36688)	**Sample Matrix:**	Ground Water
Date Sampled:	13/12/2023	**Time Sampled:**	:

Method:		Parameter:	Units	LOQ	Result
		Microbiological Analysis: (D)			
SMP 019		Coliforms	MPN/100mL	*<1*	< 1
SMP 019		E. coli	MPN/100mL	*<1*	< 1
		Chemical Analysis: (F)			
SCP 052		Hydrogen Ion (pH)	pH units	*4.0*	6.7
SCP 052		Conductivity	µS/cm @ 20 °C	*15*	277
SCP 015		Biological Oxygen Demand (BOD)	mg/L	*1.0*	1.1
	*	Dissolved Oxygen	% Sat	*0.1*	88.4
SCP 010		Suspended Solids	mg/L	*2*	10
SCP 027H		Alkalinity	mg/L as CaCO3	*5.0*	104.4
SCP 027A		Total Ammonia	mg/L N	*0.02*	0.03
SCP 027G		Nitrate	mg/L N	*0.25*	< 0.25
SCP 027F		Nitrite	mg/L N	*0.005*	< 0.005
SCP 027C		Orthophosphate	mg/L P	*0.01*	0.22
SCP 027B		Chloride	mg/L	*0.5*	21.7
SCP 027D		Sulphate	mg/L	*0.5*	18.1
SCP 068A		Fluoride	mg/L	*0.1*	< 0.1
SCP 038 /073		Dissolved Arsenic (As)	µg/L	*1*	1
SCP 038 /073		Dissolved Cadmium (Cd)	µg/L	*0.45*	< 0.45
SCP 038 /073		Dissolved Chromium (Cr)	µg/L	*1*	< 1
SCP 038 /073		Dissolved Copper (Cu)	µg/L	*1*	< 1
SCP 038 /073		Dissolved Iron (Fe)	µg/L	*5.00*	2748.61
SCP 038 /073		Dissolved Lead (Pb)	µg/L	*1.00*	< 1.00
SCP 038 /073		Dissolved Manganese (Mn)	µg/L	*1.00*	767.37
SCP 038 /073		Dissolved Mercury (Hg)	µg/L	*0.50*	< 0.50
SCP 038 /073		Dissolved Nickel (Ni)	µg/L	*1.00*	1.12
SCP 038 /073		Dissolved Zinc (Zn)	µg/L	*10.00*	354.67
SCP 053		Calcium-Dissolved	mg/L	*10.0*	24.2
SCP 115A		Diesel Range Organics (C10-C28)	µg/L	*10.0*	< 10.0
SCP 053		Magnesium-Dissolved	mg/L	*10.0*	12.4
SCP 115A	*	Mineral Oil (C28-C40)	µg/L	*10.0*	< 10.0
SCP 053		Potassium-Dissolved	mg/L	*10.0*	< 10.0
SCP 114A	*	PRO (C6-C8)	µg/L	*2*	< 2
SCP 053		Sodium-Dissolved	mg/L	*10.0*	21.6
		PAH's Water (default)			
		Chemical Analysis: (F)			
SCP 060B		Total PAH	µg/L	*0.020*	< 0.020
SCP 060B		Acenaphthene	µg/L	*0.005*	< 0.005
SCP 060B		Acenaphthylene	µg/L	*0.005*	< 0.005

Customer Sample Ref:	MW6	**Customer Sample Code:**	
Project:	Ground Water	**Sampled By:**	C. Fox
Our Reference:	113894 (23-36688)	**Sample Matrix:**	Ground Water
Date Sampled:	13/12/2023	**Time Sampled:**	:

Method:	Parameter:	Units	LOQ	Result
SCP 060B	Anthracene	µg/L	*0.005*	< 0.005
SCP 060B	Benz(a)anthracene	µg/L	*0.005*	< 0.005
SCP 060B	Benzo(a)pyrene	µg/L	*0.003*	< 0.003
SCP 060B	Benzo(b)fluoranthene	µg/L	*0.005*	< 0.005
SCP 060B	Benzo(k)fluoranthene	µg/L	*0.005*	< 0.005
SCP 060B	Sum Benzo (b)&(k) fluoranthene	µg/L	*0.005*	< 0.005
SCP 060B	Benzo(ghi)perylene	µg/L	*0.005*	< 0.005
SCP 060B	Chrysene	µg/L	*0.005*	< 0.005
SCP 060B	Dibenz(a,h)anthracene	µg/L	*0.005*	< 0.005
SCP 060B	Fluoranthene	µg/L	*0.005*	< 0.005
SCP 060B	Fluorene	µg/L	*0.005*	< 0.005
SCP 060B	Indeno(1,2,3-cd)pyrene	µg/L	*0.005*	< 0.005
SCP 060B	Naphthalene	µg/L	*0.005*	< 0.005
SCP 060B	Phenanthrene	µg/L	*0.005*	< 0.005
SCP 060B	Pyrene	µg/L	*0.005*	< 0.005

MWP

Appendix 2

LABORATORY ANALYSIS REPORT

Sampling Date 25th January 2024

Certificate of Analysis

Customer:	Mondelez Ireland Production Limited	**Project:**	MW2
Address:	Rathmore, Co. Kerry	**Site**	Rathmore
		Date Received:	26/01/2024
		Condition of Sample:	Satisfactory
Report to:	Joanne O' Mahony	**Date Analysed:**	26/01/2024 - 30/01/2024
Customer PO	PO 4552387672	**Issue Date:**	01/02/2024
Quote No.	Q24-00503	**BATCH NUMBER:**	**24-37910**

Sadhbh O' Brien

Sadhbh O Brien
Chemistry Team Lead

Index to symbols used & Notes

*	Analysis is not INAB accredited
**	Adapted from Standard Methods for the Examination of Water and Wastewater.
***	Customer specific limits
(F)	Analysis carried out at our Farranfore Laboratory.
(D)	Analysis carried out at our Dunrine Laboratory.
LOQ	Parameter Limit of Quantification
Note 6	Subcontracted Parameter.

Notes

- **The results relate only to the items tested.**
- **Opinions and interpretations expressed herein are outside the scope of INAB accreditation.**
- **The analysis report shall not be reproduced except in full without written approval of the laboratory.**
- **Sampling is outside the scope of the laboratory activities.**

Notes for Drinking Water samples

Note A	The water should not be aggressive
Note B	Compliance must be ensured with the conditions that [NO3]/50 + [NO2]/3 =1
Note C	Acceptable to customers and no abnormal change
Note D	In the case of surface water treatment, a parametric value not exceeding 1 NTU in the water ex treatment works must be strived for
Note F	Fluoridated supplies 0.8 mg/L; Natural supplies 1.5 mg/L.

Customer Sample Ref:	MW2	**Customer Sample Code:**	
Project:	MW2	**Sampled By:**	Customer
Our Reference:	117488 (24-37910)	**Sample Matrix:**	Other Water
Date Sampled:	25/01/2024	**Time Sampled:**	:

Method:		Parameter:	Units	LOQ	Result
		Chemical Analysis: (F)			
SCP 038/073		Iron	µg/L	*5*	483
SCP 115A		Diesel Range Organics (C10-C28)	µg/L	*10.0*	< 10.0
SCP 115A	*	Mineral Oil (C28-C40)	µg/L	*10.0*	< 10.0

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