

BALLYNACARRICK LANDFILL SITE EMISSION COMPLIANCE REPORT

IBR1279
Final
12 December 2022

REPORT

Document status

Version	Purpose of document	Authored by	Reviewed by	Approved by	Review date
Draft	Waste Licence Review	AMcG	JD	JD	14/11/22
Final	Waste Licence Review	AMcG	JD	JD	12/12/22

Approval for issue

Donal Doyle

12 December 2022

The report has been prepared for the exclusive use and benefit of our client and solely for the purpose for which it is provided. Unless otherwise agreed in writing by RPS Group Plc, any of its subsidiaries, or a related entity (collectively 'RPS') no part of this report should be reproduced, distributed or communicated to any third party. RPS does not accept any liability if this report is used for an alternative purpose from which it is intended, nor to any third party in respect of this report. The report does not account for any changes relating to the subject matter of the report, or any legislative or regulatory changes that have occurred since the report was produced and that may affect the report.

The report has been prepared using the information provided to RPS by its client, or others on behalf of its client. To the fullest extent permitted by law, RPS shall not be liable for any loss or damage suffered by the client arising from fraud, misrepresentation, withholding of information material relevant to the report or required by RPS, or other default relating to such information, whether on the client's part or that of the other information sources, unless such fraud, misrepresentation, withholding or such other default is evident to RPS without further enquiry. It is expressly stated that no independent verification of any documents or information supplied by the client or others on behalf of the client has been made. The report shall be used for general information only.

Prepared by:

RPS

Angela McGinley
Principal Scientist -Waste

Enterprise Fund Business Centre, Business Park
Road, Ballyraine
Letterkenny, Co. Donegal F92 AF43

T +353 74 916 1927
E angela.mcginley@rpsgroup.com

Prepared for:

Donegal County Council

Julie McMahon
Executive Engineer

Contents

1	EMISSION COMPLIANCE REPORT	1
1.1	Monitoring Points	1
1.2	Surface Water	2
1.2.1	Pump 5 Remediation Works	2
1.3	Groundwater.....	6
1.3.1	Hydrogeological Risk Assessment 2015	10
1.4	Landfill Gas Monitoring	10
1.5	Air Quality	10
1.6	Noise Emission.....	10
1.7	Dust.....	10
2	ENVIRONMENTAL INCIDENTS	11
3	PROPOSED MONITORING LOCATIONS	12

Tables

Table 1.1:	Existing Monitoring Locations within the landfill	1
Table 1.2:	Surface Water Results 2020-2022	4
Table 1.2:	Groundwater Results 2020/2022	7
Table 3.1:	Proposed Monitoring Locations	12

Appendices

- Appendix A Drawings
- Appendix B Main polluting substances

1 EMISSION COMPLIANCE REPORT

Ballynacarrick Landfill Site operated from c.1980 until closure in July 2012 due to the capacity of the facility being exhausted. The site was initially operated as an unlined landfill with peat removed in the eastern part of the site to the top of the glacial deposits, and waste was tipped directly onto the surface of the glacial till. An engineered cell was constructed 2002, with an extension to the west of the site being developed in 2004/05. The extension consisted of two engineered cells (Phase 1 and Phase 2). The site has been progressively restored on a phased basis in accordance with the Waste Licence (Ref: W0024-04) since 2004 with the final restoration being completed in 2013. Additional works have been completed since 2013 in relation to the leachate management from the unlined areas as agreed with agreed with the Office of Environmental Enforcement of the EPA.

1.1 Monitoring Points

Monitoring is currently carried out at locations as per Table 1.1 below at frequencies as specified in Schedule C of the waste licence (W0024-04) and as shown on Drawing IBR1279-LR111 Monitoring Points. Permanent access to all on-site and off-site monitoring points is maintained. Schedule F of the current waste licence requires the monitoring of certain parameters on either a monthly, quarterly or annual basis. The monitoring frequency has now been reduced to quarterly as agreed with OEE.

Table 1.1: Existing Monitoring Locations within the landfill

Landfill Gas	Dust	Noise	Surface water	Ground water	Leachate
LG1 to LG17	DG1	N1	SW1	GW1	L1
Incl	DG2	N2	SW2	GW2	L3
	DG3	N3	SW3	GW4	L8
	DG4		SW4	GW5	
	DG5			GW6A	
				GW7	
				GW8A	
				GW9A	
				GW10	
				Under drainage interceptor discharge point ²	

¹ And locations arising out of Conditions 6.12 and 6.13

² Location to be agreed in writing by the Agency.

1.2 Surface Water

Surface water is currently monitored at four locations as per Licence W0024-04 (one upstream and three downstream) :

- SW2 - At the inlet to the surface water culvert that drains from the peat bog to the east of the site (upstream);
- SW1 - The surface water lagoon part way along the surface water culvert along the southern site boundary (downstream);
- SW3 - The discharge from the surface water culvert at the north western corner of the site (downstream); and,
- SW4 - The watercourse downstream of the culvert discharge (downstream).

These are shown on Drawing IBR1279-LR111 Monitoring Points.

The surface water results contained in this report were assessed against the following:

- SI No 272 of 2009 European Communities Environmental Objectives (Surface Water) Regulations 2009 Environmental Quality Standards (EQS).
- SI No 294 of 1989 European Communities (Quality of Surface Water Intended for the Abstraction of Drinking Water) Regulations Surface Water Quality Standards (SWQS); and

Surface water which is monitored quarterly at four locations; SW2 upstream and SW1, SW3 and SW4 located downstream. Elevated concentrations above SI No 272 of 2009 European Communities Environmental Objectives (Surface Water) Regulations 2009 Environmental Quality Standards (EQS) have been recorded downstream of the site with more limited exceedances also recorded at SW2 upstream (Ammoniacal Nitrogen, BOD , COD, and Suspended Solids). Results for 2020/21 for those parameters monitored in accordance with the waste licence are provided in Table 1.2 below. Investigations undertaken in 2021 identified elevated leachate head within the unlined area of the site as the potential cause of these exceedances and remedial measures implemented at Pumping Station 5 as outlined in 1.2.1 below.

Surface water discharges to an unnamed stream located along the western boundary of the site which flows in a north, north-western direction before disappearing underground and eventually discharges to Durnesh Lough SAC 5km downstream of the site. An Appropriate Assessment Screening and Natura Impact Assessment has been completed as part of the Waste Licence Review Application.

1.2.1 Pump 5 Remediation Works

Elevated ammoniacal nitrogen levels in surface water around the perimeter of the site have been observed intermittently for a number of years, particularly at SW1. Investigations were undertaken between August and September 2021 onsite to determine the potential source of ingress to these drains. There did not appear to be any immediately obvious sources of contamination or leachate breakouts along the southern boundary of the site which would impact on the quality of the surface water drainage network. Leachate head within the adjacent lined cell (Cell 4) appeared to be well managed and was deemed unlikely to be the source of leachate ingress.

However, following review of leachate level data in adjacent unlined cells (at Pumping Station 5) it appeared that the leachate levels in Pumping Station 5 serving the unlined areas of the site were consistently above 1m and operational staff found it difficult to maintain pump operations at sufficient capacity to reduce leachate head due to the observed precipitation of iron compounds from the leachate within the pumping station, borehole pump and to a lesser extent the rising main. In addition the location of the pump and restricted access to the chamber made regular maintenance and servicing of the pump and rising main difficult.

Remedial works were undertaken to resolve access and pump capacity issues including:

- Provision of a duty/standby pumping system using higher capacity progressive cavity (Seepex) pumps which are used elsewhere on the site. These progressive cavity pumps are more suited to the

management of liquids with high solids contents, and operate at a higher flow rate on a more consistent basis, maintaining a higher (almost self-cleansing) velocity in the discharge pipework between the pumping station and the treatment tank to minimise accumulation of ferrihydrite compounds.

- Improving Access to Pumping Station 5 Chamber through exposure of the existing side slope riser and installation of a small precast concrete bund (approx. 2m x 3m in plan and 1.5m in depth) provided to accommodate the new pumping arrangement and facilitate access to manage the silt/precipitate more easily on an ongoing basis.

These actions appear to have permitted DCC to manage leachate head more easily, with leachate levels remaining below 1m within the pumping station. Results from SW1 are being reviewed on an ongoing basis to assess the effectiveness of these remedial works on surface water quality and to determine if any further improvement works are required. Given the unlined nature of part of the site resulting in the migration of leachate is expected that it will take some time for contamination levels to reduce in surface water at SW1.

REPORT

Table 1.2: Surface Water Results 2020-2022

Station	Sample Date	Ammonia N mg/l	Biological Oxygen Demand mg/l	Chloride mg/l	COD Chemical Oxygen Demand mg/l	Conductivity @ 20°C µS/cm	Dissolved Oxygen mg/l	pH pH units	Temperature Degrees C	Suspended Solids mg/l	Visual Inspection Descriptive
SW 1	5-Mar-2020	0.318	1.7	36	34	260	10.85	6.87	9.7	< 5	Nothing observed
SW 2	5-Mar-2020	0.201	1.1	35	26	196.1	8.69	6.67	8.5	< 5	Nothing observed
SW 3	5-Mar-2020	0.088	1.9	33	20	397	10.76	7.13	8.1	< 5	Nothing observed
SW 4	5-Mar-2020	0.067	1.3	35	21	388	10.97	7.25	8.5	< 5	Nothing observed
SW 1	22-July-2020	0.457	4.9	19	65	196.9	7.35	6.85	16.9	137	Nothing observed
SW 2	22-July-2020	0.008	1.4	15	38	91.8	6.56	6.49	16.8	< 5	Nothing observed
SW 3	22-July-2020	0.852	3.5	19	42	289	8.87	7.08	16.6	9	Nothing observed
SW 4	22-July-2020	0.667	4.1	20	41	288	8.99	7.17	16.8	15	Nothing observed
SW 1	8-Oct-2020	0.32	< 2	10.9	33	247	9.33	7.27	11.9	< 2	Nothing Observed
SW 2	8-Oct-2020	0.05	< 2	10	45	68.5	7.42	7.01	11.5	< 2	Nothing Observed
SW 3	8-Oct-2020	0.07	< 2	12.4	43	288	9.66	7.27	11.9	< 2	Nothing Observed
SW 4	8-Oct-2020	0.05	< 2	14.3	44	275	9.74	7.37	11.8	< 2	Nothing Observed
SW 1	12-Apr-2021	0.903	< 2	49.1	34	261	10.31	7.65	10.9	6	Nothing Observed
SW 2	12-Apr-2021	0.012	< 2	37.9	46	170.2	7.53	6.76	9.7	21	Nothing Observed
SW 3	12-Apr-2021	0.024	< 2	27.5	23	375	10.87	7.28	10.7	5	Nothing Observed
SW 4	12-Apr-2021	0.02	< 2	29.1	22	349	11.06	7.39	11.1	2	Nothing Observed
SW 1	1-Sep-2021	4.83	5	34.6	34	328	8.76	7.78	18.4	11	Nothing Observed
SW 2	1-Sep-2021	0.72	55	12.5	127	109.6	1.04	6.22	19.8	110	Nothing Observed
SW 3	1-Sep-2021	2.33	14	26.1	< 8	507	8.31	7.28	18.7	2	Nothing Observed
SW 4	1-Sep-2021	0.789	7	26.8	< 8	477	8.32	7.4	18.9	9	Nothing Observed
SW 1	13-Dec-2021	0.41	< 2	25.5	28	204.8	10.77	7.85	8.9	< 3	Nothing Observed
SW 2	13-Dec-2021	0.06	< 2	23.5	28	156.6	8.59	7.79	7.1	< 3	Nothing Observed
SW 3	13-Dec-2021	2.02	< 2	27.5	23	397	10.53	7.33	7.8	< 3	Nothing Observed
SW 4	13-Dec-2021	1.79	2.6	26.5	23	383	10.66	7.39	8.2	< 3	Nothing Observed
SW 1	21-Feb-2022	0.132	< 1	25.5	22	209.2	10.55	7.78	9.2	< 4	Nothing Observed
SW 2	21-Feb-2022	0.11	< 1	25.5	25	183.9	9.08	7.68	10.2	< 5	Nothing Observed
SW 3	21-Feb-2022	0.281	< 1	28.9	16	377	10.46	7.55	11.2	< 6	Nothing Observed
SW 4	21-Feb-2022	0.239	< 1	29.1	22	-	9.94	7.51	12.2	< 7	Nothing Observed
SW 1	7-June-2022	1.27	0.9	33.7	28	206.5	9.24	7.41	13.2	< 8	Nothing Observed

REPORT

Station	Sample Date	Ammonia N mg/l	Biological Oxygen Demand mg/l	Chloride mg/l	COD Chemical Oxygen Demand mg/l	Conductivity @ 20°C µS/cm	Dissolved Oxygen mg/l	pH pH units	Temperature Degrees C	Suspended Solids mg/l	Visual Inspection Descriptive
SW 2	7-June-2022	0.3	0.7	28.7	26	149	6.3	7.15	14.2	< 9	Nothing Observed
SW 3	7-June-2022	0.15	0.7	30.6	24	435	8.96	7.27	15.2	< 10	Nothing Observed
SW 4	7-June-2022	0.05	0.7	32.1	21	427	8.99	7.49	16.2	< 11	Nothing Observed
SW 1	14-Sep-2022	1.44	7	23	58	157.9	9.24	7.42	17.2	< 12	Nothing Observed
SW 2	14-Sep-2022	0.014	< 3	18.6	63	102.4	6.6	7.54	18.2	< 13	Nothing Observed
SW 3	14-Sep-2022	0.042	< 1	20.7	28	376	9.28	7.38	19.2	< 14	Nothing Observed
SW 4	14-Sep-2022	0.023	< 2	21.7	35	359	9.33	7.38	20.2	< 15	Nothing Observed

1.3 Groundwater

The landfill site comprises a series of both unlined and lined waste cells. The final phase of capping and restoration was completed in 2013. Groundwater is monitored quarterly at nine locations., GW1, GW7 and GW8 are up gradient, GW2, GW6, GW9 and GW10 are located around the site perimeter (mid-gradient) and GW4 and GW5 on the western boundary (downgradient) in accordance with Waste Licence W0024-04. The direction of groundwater flow is in a southwesterly direction in the eastern part of the landfill (i.e. underlying the unlined cells and Cell 4) and in a northwesterly direction underlying Phases 1 and 2³.

Groundwater monitoring results are presented in Table 1.2 below. Ammonia, Chloride, Iron, Potassium and Sodium exceed the Environmental Objectives (Groundwater) Regulations 2010 as amended Groundwater Threshold Values (GTV) at times in 2020-2022 results. These exceedances also occur in the up gradient boreholes indicating naturally elevated baseline conditions in the adjacent bog..

It should be noted that iron and manganese occurs naturally in Donegal groundwater associated with iron rich bedrock or peat. List I/II Substances were analysed in groundwater in 2020 and were less than the laboratory limit of detection. The direction of groundwater flow is presented in Drawings IBR1279/LR117 Groundwater Level Counters- Summer Levels- 2015-2022 and IBR1279/LR118 Groundwater Level Counters- Winter Levels- 2015-2022.

Efforts are made on a continuous basis to contain leachate by means of extraction systems and treatment of pollutants. The number of locations from which leachate is pumped has been increased along with the capacity to convey and store leachate. A low permeability cap has been placed over the landfill which will limit the excess generation of leachate into groundwater.

Contaminated groundwater from the groundwater drainage blanket underlying Phases 1 and 2 cells is currently diverted to the onsite leachate treatment plant. All collected contaminated liquid and leachate is treated with activated sludge at the onsite treatment plant prior to tankering off-site to Letterkenny WWTW.

In 2015, in accordance with the revised requirements of the Waste Licence, a Hydrogeological Risk Assessment (HRA) was produced for the site and submitted to the EPA. One of the recommendation of this report was the installation of additional boreholes which were more remote from the waste body in order to properly assess the impact on the receiving environment, and additional monitoring to assess the impact of the restoration of the site over time. These boreholes have been installed and additional monitoring will be completed in 2022-2023 with revised HRA to be finalised in 2024. .

³ 2015 Ballynacarrick Landfill Hydrogeological Risk Assessment

REPORT

Table 1.3: Groundwater Results 2020/2022

Station	Sample Date	Ammonia N mg/l	Chloride mg/l	Conductivity @ 20°C µS/cm	pH pH units	Temperature Degrees C	Visual Inspection Descriptive	Total Nitrogen N mg/l	Oxidised Iron µg/l	Dissolved m	Depth m
GW 1	5-Mar-2020	0.254	17	385	6.79	11.4	Nothing observed	0.58	55		2.6
GW 2	5-Mar-2020	7.672	34	735	6.64	11.4	Nothing observed	< 0.15	14000		2
GW 4	5-Mar-2020	< 0.005	19	615	7.19	10.7	Nothing observed	< 0.15	< 20		4.8
GW 5	5-Mar-2020	0.068	45	470	7.06	9.1	Nothing observed	3.9	< 20		1.6
GW 6	5-Mar-2020										
GW 7	5-Mar-2020	0.038	18	523	6.63	10.8	Nothing observed	0.9	3800		3.9
GW 8	5-Mar-2020										
GW 9	5-Mar-2020										
GW 10	5-Mar-2020	0.832	19	448	6.52	12.1	Nothing observed	< 0.15	8300		2.7
GW 1	22-July-2020	0.787	17	384	6.69	16.8	Nothing observed	0.43	1100		4.2
GW 2	22-July-2020	8.507	35	601	6.86	16.7	Nothing observed	1.5	3900		2.6
GW 4	22-July-2020	0.011	18	635	7.22	16.1	Nothing observed	0.61	93		5.4
GW 5	22-July-2020	0.189	20	501	6.98	16.3	Nothing observed	0.89	69		1.9
GW 6	22-July-2020										
GW 7	22-July-2020	0.117	18	654	6.46	15.5	Nothing observed	< 0.15	19000		4.9
GW 8	22-July-2020										
GW 9	22-July-2020										
GW 10	22-July-2020	1.576	16	437	6.5	16.6	Nothing observed	0.71	6500		2.4
GW 1	8-Oct-2020	1.35	18	417	6.82	13.6	Nothing Observed	0.36	2266		3.6
GW 2	8-Oct-2020	8.1	38	625	6.71	13.3	Nothing Observed	1.02	8692		1.2
GW 4	8-Oct-2020	0.05	9	572	7.34	13.5	Nothing Observed	< 0.29	4742		5.2
GW 5	8-Oct-2020	0.07	23	633	7.56	13.8	Nothing Observed	0.49	335		2.3
GW 6	8-Oct-2020										
GW 7	8-Oct-2020	0.2	17	674	6.48	13	Nothing Observed	0.29	6163		3.9
GW 8	8-Oct-2020										
GW 9	8-Oct-2020										
GW 10	8-Oct-2020	2.14	21	506	6.59	13.2	Nothing Observed	< 0.29	4990		1.6
GW 1	12-Apr-2021	0.82	17.7	389	6.8	12.2	Nothing Observed	< 2	13700		4.2
GW 2	12-Apr-2021	10.8	63.3	874	6.61	12	Nothing Observed	< 2	19900		2.8
GW 4	12-Apr-2021	< 0.01	11.3	613	7.18	10.7	Nothing Observed	< 2	13200		4.9
GW 5	12-Apr-2021	0.042	20	611	7.11	11	Nothing Observed	3.22	414		2.9
GW 7	12-Apr-2021	0.016	12.3	437	6.56	11.6	Nothing Observed	< 2	16500		3.8

REPORT

Station	Sample Date	Ammonia N mg/l	Chloride mg/l	Conductivity @ 20°C µS/cm	pH pH units	Temperature Degrees C	Visual Inspection Descriptive	Total Oxidised Nitrogen N mg/l	Iron Dissolved µg/l	Depth m
GW 10	12-Apr-2021	1.38	23.3	441	6.31	12.9	Nothing Observed	< 2	9590	3.2
GW 1	1-Sep-2021	1.2	17.1	405	6.72	17.4	Nothing observed	< 2	5830	3.8
GW 2	1-Sep-2021	10.9	44.5	755	6.65	17.1	Nothing observed	4.44	9210	4.2
GW 4	1-Sep-2021	< 0.01	< 10	585	7.07	18.3	Nothing observed	< 2	8630	3.9
GW 5	1-Sep-2021	0.377	39.9	758	7	17.2	Nothing observed	< 2	512	3.2
GW 7	1-Sep-2021	0.309	21.5	703	6.38	15.4	Nothing observed	< 2	494	3.6
GW 10	1-Sep-2021	2.01	24.2	490	6.54	16.8	Nothing observed	< 2	68900	2.4
GW 1	13-Dec-2021	1.84	17	407	6.87	9.3	Nothing observed	< 0.5	365	3.3
GW 4	13-Dec-2021	< 0.02	10	649	7.05	9.4	Nothing observed	< 0.5	< 140	3.5
GW 5	13-Dec-2021	0.32	45.5	764	6.99	9.8	Nothing observed	< 0.5	< 140	3
GW 6	13-Dec-2021	4.2	7	1001	6.65	9.6	Nothing observed	< 0.5	4220	2.1
GW 7	13-Dec-2021	< 0.02	17.2	333	6.85	10.5	Nothing observed	< 0.5	< 140	3.2
GW 8	13-Dec-2021	< 0.02	43	648	7	11.2	Nothing observed	< 0.5	< 140	2.2
GW 9	13-Dec-2021	5.18	35	900	6.63	9.1	Nothing observed	< 0.5	< 140	3.6
GW 10	13-Dec-2021	4.09	25	568	6.56	10.5	Nothing observed	< 0.5	518	2.4
GW 1	21-Feb-2022	0.674	15.4	-	7.05	10.7	Nothing observed	0.657	1937	3.4
GW 2	21-Feb-2022	21.9	61.1	1105	6.87	12	Nothing observed	< 0.1	33528	3.7
GW 4	21-Feb-2022	0.043	14.7	-	7.56	11.3	Nothing observed	< 0.1	8589	3.9
GW 5	21-Feb-2022	0.242	51.3	804	7.34	11.1	Nothing observed	< 0.1	429	3.1
GW 6	21-Feb-2022	4.51	63.3	1037	6.69	10.9	Nothing observed	< 0.1	31484	4.1
GW 7	21-Feb-2022	0.028	19.9	368	6.89	10	Nothing observed	< 0.1	17782	3.8
GW 8	21-Feb-2022	0.01	41.4	680	7.28	10	Nothing observed	0.205	280	3.1
GW 9	21-Feb-2022	4.65	33.1	865	6.62	12.3	Nothing observed	< 0.1	13160	2.2
GW 10	21-Feb-2022	2.38	22.1	506	6.68	12.4	Nothing observed	0.118	14913	2.6
GW 1	7-June-2022	1.14	19	371	7.11	19.1	Nothing observed	< 0.29	2057	3.1
GW 2	7-June-2022	17.86	57	959	6.74	18.3	Nothing observed	1.06	4889	2.1
GW 4	7-June-2022	0.03	22	615	7.11	17.6	Nothing observed	< 0.29	148	4.2
GW 5	7-June-2022	1.76	52	802	7.09	17.9	Nothing observed	0.51	144	1.8
GW 6-A	7-June-2022	4.41	57	991	6.63	17.6	Nothing observed	< 0.29	316	5.3
GW 7	7-June-2022	0.11	25	-	6.69	17.9	Nothing observed	< 0.29	2003	3.7
GW 8-A	7-June-2022	0.03	45	675	7.07	17.8	Nothing observed	< 0.29	44	3.8
GW 9-A	7-June-2022	6.79	45	830	6.66	17.8	Nothing observed	< 0.29	2368	2.6
GW 10	7-June-2022	2.09	23	421	6.74	17.8	Nothing observed	< 0.29	6732	2

REPORT

Station	Sample Date	Ammonia N mg/l	Chloride mg/l	Conductivity @ 20°C µS/cm	pH pH units	Temperature Degrees C	Visual Inspection Descriptive	Total Nitrogen N mg/l	Oxidised Iron µg/l	Dissolved m	Depth
GW 1	14-Sep-2022	1.25	15.5	333	6.98	17.2	Nothing observed	0.348	3622	3.31	
GW 2	14-Sep-2022	8.69	39.6	794	6.68	17.1	Nothing observed	0.482	8670	1.76	
GW 4	14-Sep-2022	0.022	12.1	536	7.06	16.4	Nothing observed	0.318	15039	4.32	
GW 5	14-Sep-2022	0.362	44	673	7	16.7	Nothing observed	< 0.1	7896	0.6	
GW 6-A	14-Sep-2022	4.22	58.7	894	6.67	16.2	Nothing observed	< 0.1	30949	5.91	
GW 7	14-Sep-2022	0.566	22.5	626	6.65	16.2	Nothing observed	< 0.1	115991	3.89	
GW 8-A	14-Sep-2022	0.013	43.4	650	6.97	16.1	Nothing observed	< 0.1	485	1.96	
GW 9-A	14-Sep-2022	6.02	36.8	803	6.65	16.3	Nothing observed	0.32	28265	2.74	
GW 10	14-Sep-2022	1.55	18.4	390	6.79	16.8	Nothing observed	< 0.1	10932	1.87	

1.3.1 Hydrogeological Risk Assessment 2015

A hydrogeological risk assessment was undertaken in 2015 and submitted to the EPA. This report has been included in the Waste Licence Review Application. The report found that the high background ammonia (as N) levels are considered likely to be attributable to peatland conditions in the general area given the up gradient location of the well and its general peatland environs. The high organic content of peatlands is frequently associated with elevated levels of Ammonia as the peat degrades over time. The hydrogeological risk assessment found that three plumes have been interpreted across the site in the vicinity of GW5, GW10 and GW2. The area of impact in the vicinity of GW2 and GW5 is considered to be minor relative to the groundwater body catchment area. A low permeability cap has been placed over the landfill which will limit the continued excess generation of leachate into groundwater. Approximately three times the WBC leachate estimated volume is pumped, stored and tankered to a WWTW each year. There are no known direct impacts to down gradient groundwater-related receptors i.e. Durnesh Lake SAC, the downgradient regionally important aquifer or downgradient groundwater users. A series of proposed mitigation measures and additional investigation have been proposed to address the data gaps at the site, to facilitate a more detailed understanding of the hydrogeological regime and to assess the risk posed to downgradient receptors.

1.4 Landfill Gas Monitoring

Landfill gas monitoring of 4 gas wells located within waste and at 10 wells located around the perimeter of the site is undertaken at the facility on a quarterly basis using a portable gas analyser.

Methane concentrations were 0.0% v/v in peripheral wells. Carbon dioxide concentrations exceeded the trigger level of 1.5% v/v in peripheral gas wells, ranging from 0.0 to 3.8% v/v. Methane concentrations up to 38.1% v/v and Carbon Dioxide concentrations up to 25.1 % v/v were detected in wells located in waste. Landfill gas is actively abstracted from the site and diverted to a gas flare compound for combustion.

1.5 Air Quality

A 500 m³/hr enclosed flare (AFS HT500) was installed at the facility in 2005. Field balancing is undertaken at the facility as required. The average flow rate from the flare in 2020 was approximately 70 m³/hr with an average methane concentration of 23% v/v. The total hours run was 8,271⁴. Monitoring at the flare stack is no longer required following low emissions in previous monitoring rounds as agreed with the EPA inspector.

1.6 Noise Emission

As the site is now non-operational the noise levels on the site are no longer being monitored as per C1 Monitoring Locations as agreed with EPA inspector. Should any activity be initiated that would have noise associated with it then the programme will be re-instated as appropriate.

1.7 Dust

As the facility is now non-operational the dust monitoring programme is in abeyance until such time as site activity warrants its re-establishment.

⁴ Ballynacarrick_Landfill_gas_survey_2020v1

2 ENVIRONMENTAL INCIDENTS

The number of the environmental incidents reported to the EPA in 2021 as per Annual Environmental Report (AER) 2021. The 8 incidents in relation to breaches of trigger level are recurring and refer to:

- 3 incidents in relation to exceedances of the Groundwater Regulations (GTV) threshold for ammonia in groundwater;
- 3 incidents in relation to exceedances of the Surface Water Regulations (EQS) threshold for ammonia in surface water;
- 2 incidents in relation to exceedances of the carbon dioxide trigger level (1.5% v/v) in perimeter gas wells.

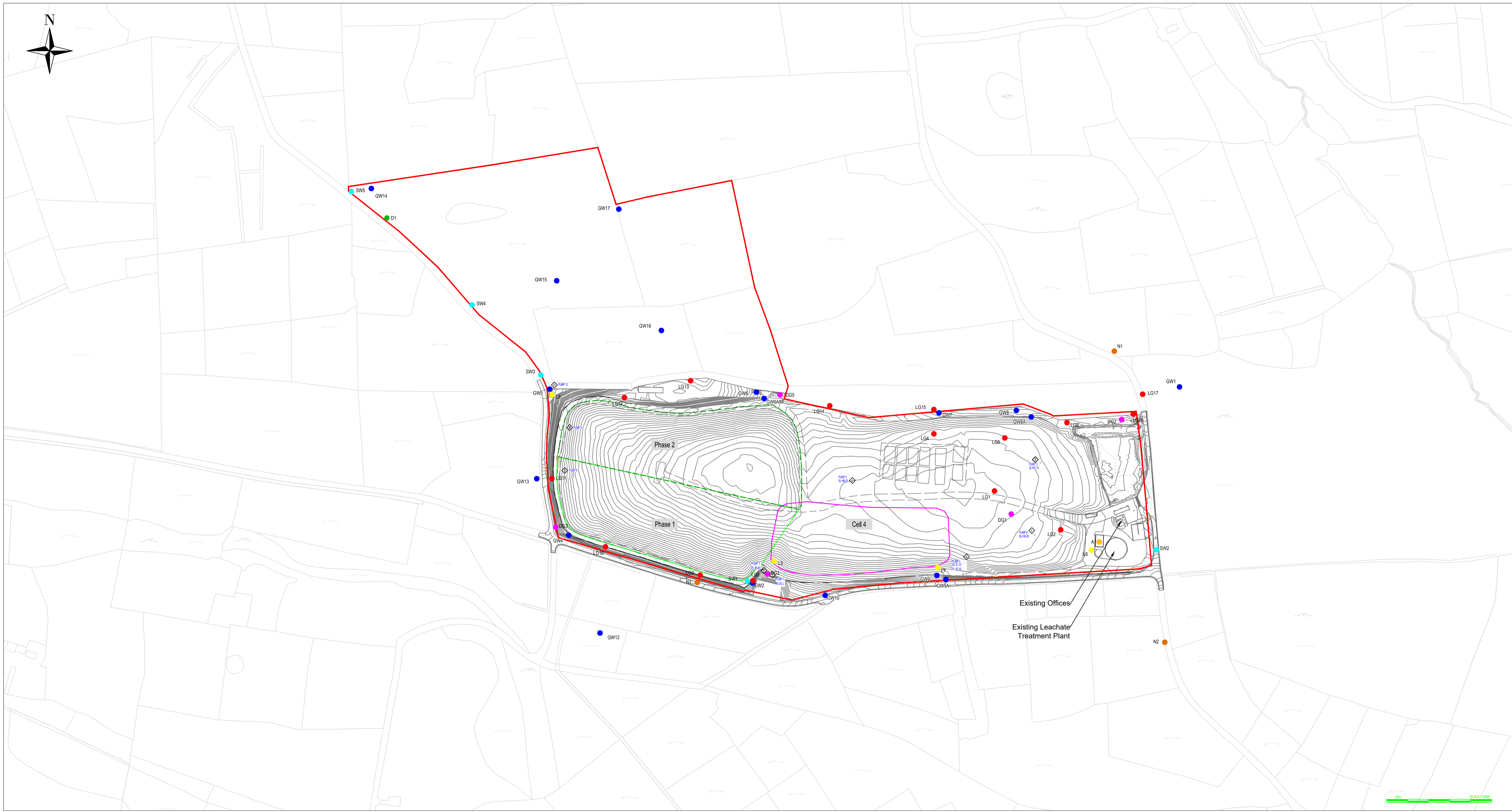
3 PROPOSED MONITORING LOCATIONS

Air quality, dust and noise are currently not undertaken at the site as agreed with OEE. The monitoring locations below are provided should any site activity warrants their re-establishment. The number of groundwater locations will also be revised following the completion of the hydrogeology review in 2024. The parameters to be monitored and frequency is as per existing licence. Grid co-ordinates for each monitoring locations are provided on Drawing IBR1279-LR111 Monitoring Points.

Table 3.1: Proposed Monitoring Locations

Landfill Gas	Dust	Noise	Surface water	Ground Water	Leachate	Air
LG1 to LG17	DG1	N1	SW1	GW1	L1	A-1
Incl	DG2	N2	SW2	GW2	L3	
	DG3	N3	SW3	GW4	L8	
	DG4		SW4	GW5		
	DG5		SW5	GW6A		
			SW6	GW7		
				GW8A		
				GW9A		
				GW10		
				GW12		
				GW13		
				GW14		
				GW15		
				GW16		
				GW17		
				Under drainage interceptor discharge point		

Appendix A Drawings



- NOTES**
1. Verifying Dimensions.
The contractor shall verify dimensions against such other drawings or site conditions as pertain to this part of the work.
 2. Existing Services.
Any information concerning the location of existing services indicated on this drawing is intended for general guidance only. It shall be the responsibility of the contractor to determine and verify the exact horizontal and vertical alignment of all cables, pipes, etc. (both underground and overhead) before work commences.
 3. Issue of Drawings.
Hard copies, dwf and pdf will form a controlled issue of the drawing. All other formats (dwg, dxf etc.) are deemed to be an uncontrolled issue and any work carried out based on these files is at the recipient's own risk. RPS will not accept any responsibility for any errors arising from the use of these files, either by human error or by the recipient, listing of un-dimensioned measurements, compatibility issues with the recipient's software, and any errors arising when these files are used to aid the recipient's drawing production, or setting out on site.
 4. Datum.

- Proposed Licence Boundary
- Phase 1 Boundary
- Phase 2 Boundary
- Cell 4 Boundary
- LG17 Landfill Gas Monitoring Point
- DG2 Dust Monitoring Point
- N1 Noise Monitoring Point
- SW2 Surface Water Monitoring Point
- GW1 Ground Water Monitoring Point
- L6 Leachate Monitoring Point
- LL4 Leachate Level
- BP13 Bait Point
- A1 Landfill Gas Flare
- D1 Treated Leachate Discharge
- ◊ Leachate Pump connected to Main

Ground Water Monitoring Points

Existing	X	Y
GW1	193882	367722
GW2	193476	367536
GW4	193301	367581
GW5	193283	367720
GW6	193480	367717
GW7	193653	367697
GW8	193727	367700
GW9	193651	367543
GW10	193545	367524

Surface Water Monitoring Points

Existing	X	Y
SW1	193471	367537
SW2	193860	367567
SW3	193274	367734
SW4	193209	367800

Proposed Surface Water Monitoring Points

SW5	193094	367907
SW6	188809	368529

Landfill Gas Monitoring Points

Existing	X	Y
LG1	193706	367623
LG2	193769	367586
LG4	193648	367677
LG5	193716	367674
LG6	193775	367688
LG8	193476	367538
LG9	193426	367543
LG10	193336	367570
LG11	193285	367635
LG12	193354	367712
LG13	193417	367728
LG14	193549	367704
LG15	193648	367701
LG16	193838	367696
LG17	193847	367715

Leachate Monitoring Points

Existing	X	Y
L1	193652	367550
L3	193496	367556
L6	193798	367567
L8	193283	367714

Dust Monitoring Points

Existing	X	Y
DG1	193722	367601
DG2	193827	367691
DG3	193490	367544
DG4	193288	367588
DG5	193502	367715

Noise Monitoring Points

Existing	X	Y
N1	193820	367756
N2	193868	367479
N3	193423	367536

Landfill Gas Flare

Existing	X	Y
A1	193805	367574

ICW Discharge Monitoring Point

Proposed	X	Y
D1	193128	367882

Replacement Boreholes

GW6A	193487	367711
GW8A	193741	367693
GW9A	193660	367539

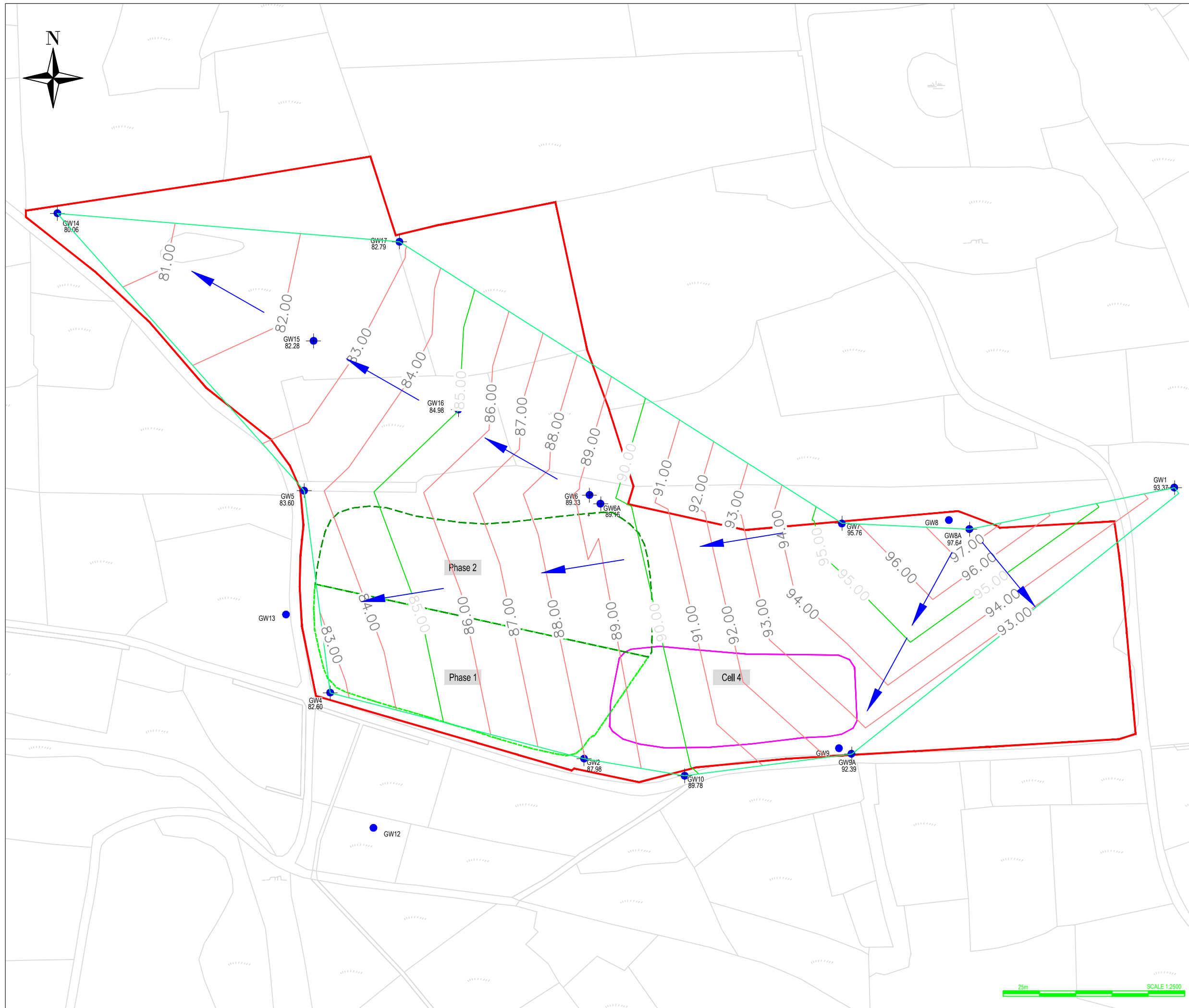
Additional Boreholes (as per HRA Recommendations)

GW12	193331	367488
GW13	193271	367635

Proposed Groundwater Monitoring Boreholes

GW14	193113	367911
GW15	193290	367823
GW16	193389	367776
GW17	193349	367891

rev	amendments	check	date
<p>Client: Donegal County Council</p>			
<p>Project: Ballynacarrick Landfill Site Licence Review</p>			
<p>Title: Monitoring Points</p>			
Project Number	Sheet Size	Drawing Scale	
IBR1279	A1	1:2000	
Drawing Number			
IBR1179/LR111			
Drawn By	Status	Revision	
MC	Preliminary	-	
Checked By	Approved By	Date	
AMcG	JD	07/11/2022	



- NOTES**
1. Verifying Dimensions.
The contractor shall verify dimensions against such other drawings or site conditions as pertain to this part of the work.
 2. Existing Services.
Any information concerning the location of existing services indicated on this drawing is intended for general guidance only. It shall be the responsibility of the contractor to determine and verify the exact horizontal and vertical alignment of all cables, pipes, etc. (both underground and overhead) before work commences.
 3. Issue of Drawings.
Hard copies, dxf and pdf will form a controlled issue of the drawing. All other formats (dwg, dxf etc.) are deemed to be an uncontrolled issue and any work carried out based on these files is at the recipient's own risk. RPS will not accept any responsibility for any errors arising from the use of these files, either by human error by the recipient, listing of un-dimensioned measurements, compatibility issues with the recipient's software, and any errors arising when these files are used to aid the recipient's drawing production, or setting out on site.
 4. Datum.
 5. Key

Key

- Proposed Licence Boundary
- Groundwater Contours - Minor (1m)
- Groundwater Contours - Major (5m)
- GW7 95.76 Groundwater Borehole with Average Summer Level (2015-2022)
- Groundwater Direction of Flow

rev	amendments	check	date

rps Elmwood House T +44 (0) 28 90 667914
 74 Boucher Road F +44 (0) 28 90 668286
 Belfast W www.rpsgroup.com/ireland
 BT12 6RZ E ireland@rpsgroup.com

Client
Donegal County Council

Project
**Ballynacarrick LFS
Licence Review**

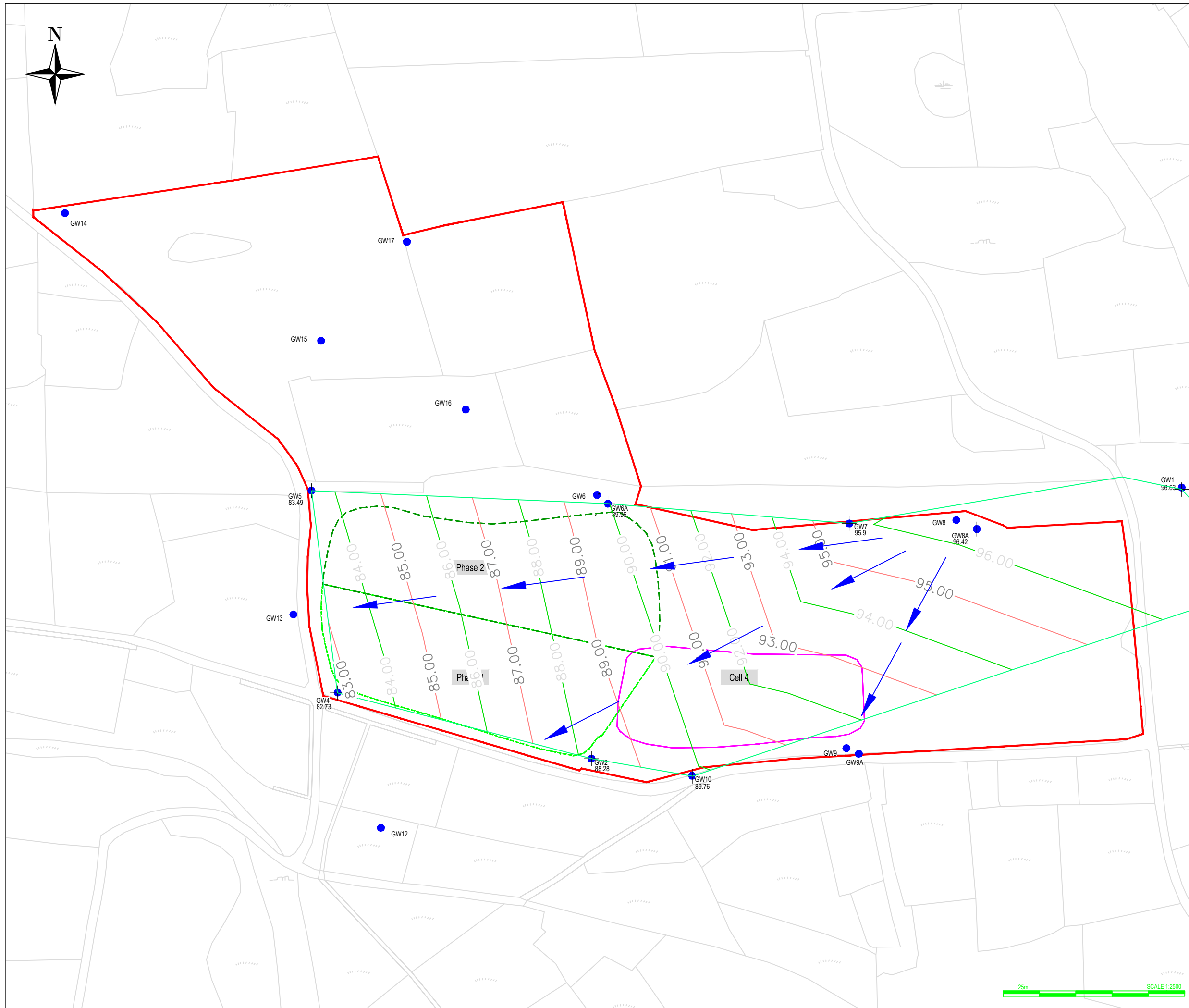
Title
**Groundwater Levels Summer
2015-2022**

Project Number IBR1279	Sheet Size A3	Drawing Scale 1:2500
----------------------------------	-------------------------	--------------------------------

Drawing Number
IBR1279/117

Drawn By MC	Status Prelim	Revision -
-----------------------	-------------------------	----------------------

Checked By AMcG	Approved By JD	Date 25/10/2022
---------------------------	--------------------------	---------------------------



- ### NOTES
- Verifying Dimensions.
The contractor shall verify dimensions against such other drawings or site conditions as pertain to this part of the work.
 - Existing Services.
Any information concerning the location of existing services indicated on this drawing is intended for general guidance only. It shall be the responsibility of the contractor to determine and verify the exact horizontal and vertical alignment of all cables, pipes, etc. (both underground and overhead) before work commences.
 - Issue of Drawings.
Hard copies, dxf and pdf will form a controlled issue of the drawing. All other formats (dwg, dxf etc.) are deemed to be an uncontrolled issue and any work carried out based on these files is at the recipient's own risk. RPS will not accept any responsibility for any errors arising from the use of these files, either by human error by the recipient, listing of un-dimensioned measurements, compatibility issues with the recipient's software, and any errors arising when these files are used to aid the recipient's drawing production, or setting out on site.
 - Datum.
 - Key:
 - Proposed Licence Boundary
 - Groundwater Contours - Minor (1m)
 - Groundwater Contours - Major (5m)
 - Groundwater Borehole with Average Winter Level (2015-2022)
 - Groundwater Direction of Flow

rev	amendments	check	date

rps Elmwood House T +44 (0) 28 90 667914
 74 Boucher Road F +44 (0) 28 90 668286
 Belfast W www.rpsgroup.com/ireland
 BT12 6RZ E ireland@rpsgroup.com

Client
Donegal County Council

Project
**Ballynacarrick LFS
 Licence Review**

Title
**Groundwater Levels Winter
 2015-2022**

Project Number IBR1279	Sheet Size A3	Drawing Scale 1:2500
---------------------------	------------------	-------------------------

Drawing Number
IBR1279/118

Drawn By MC	Status Prelim	Revision -
----------------	------------------	---------------

Checked By AMcG	Approved By JD	Date 25/10/2022
--------------------	-------------------	--------------------

Appendix B

Main polluting substances

Main polluting substances (as defined in the Schedule of EPA (Licensing)(Amendment) Regulations 2004, S.I. No. 394 of 2004) to water are likely to impair the environment.

Water

- (1) Organohalogen compounds and substances which may form such compounds in the aquatic environment
- (2) Organophosphorus compounds
- (3) Organotin compounds
- (4) Substances and preparations which have been proved to possess carcinogenic or mutagenic properties or properties which may affect reproduction in or via the aquatic environment
- (5) Persistent hydrocarbons and persistent and bio-accumulable organic toxic substances
- (6) Cyanides
- (7) Metals and their compounds
- (8) Arsenic and its compounds
- (9) Biocides and plant health products
- (10) Materials in suspension
- (11) Substances which contribute to eutrophication (in particular, nitrates and phosphates)
- (12) Substances which have an unfavourable influence on the oxygen balance (and can be measured using parameters such as BOD, COD, etc.).