ANNEX 14

Environment Specialists

Cavanacaw monitoring plan for environmental waters

Prepared for Omagh Minerals Ltd

Report reference: 60503TN3rev1, November 2015

	Name	Signature
Author	Joe Gomme	
Checked by	Andrew Tait	
Reviewed by	Barnaby Harding	

Revision record:

Issue	Date	Status	Comment	Author	Checker	Reviewer
TN3 D1	Sept 2015	Draft	For client comment	JWG	AWT	BH
TN3	Oct 2015	Final	Final version	JWG	AWT	BH
TN3rev1	Nov 2015	Rev1	Revision	JWG	AWT	BH

Confidential
Prepared by
ESI Ltd

New Zealand House, 160 Abbey Foregate, Shrewsbury, SY2 6FD, UK
Tel +44(0)1743 276100 Fax +44 (0)1743 248600 email ***info**@esinternational.com*
Registered office: New Zealand House, 160 Abbey Foregate, Shrewsbury, SY2 6FD. Registered in England and Wales, number 3212832

Cavanacaw monitoring plan for environmental waters

This report has been prepared by ESI Ltd. (ESI) in its professional capacity as soil and groundwater with reasonable skill, care and diligence within the agreed scope and terms of contract and taking account of the manpower and resources devoted to it by agreement with its client, and is provided by ESI solely for the internal use of its client.

The advice and opinions in this report should be read and relied on only in the context of the report as a whole, taking account of the terms of reference agreed with the client. The findings are based on the information made available to ESI at the date of the report (and will have been assumed to be correct) and on current UK standards, codes, technology and practices as at that time. They do not purport to include any manner of legal advice or opinion. New information or changes in conditions and regulatory requirements may occur in future, which will change the conclusions presented here.

This report is confidential to the client. The client may submit the report to regulatory bodies, where appropriate. Should the client wish to release this report to any other third party for that party's reliance, ESI may, by prior written agreement, agree to such release, provided that it is acknowledged that ESI accepts no responsibility of any nature to any third party to whom this report or any part thereof is made known. ESI accepts no responsibility for any loss or damage incurred as a result, and the third party does not acquire any rights whatsoever, contractual or otherwise, against ESI except as expressly agreed with ESI in writing.

Confidential
Prepared by
ESI Ltd

New Zealand House, 160 Abbey Foregate, Shrewsbury, SY2 6FD, UK
Tel +44(0)1743 276100 Fax +44 (0)1743 248600 email ***info@esinternational.com***
Registered office: New Zealand House, 160 Abbey Foregate, Shrewsbury, SY2 6FD. Registered in England and Wales, number 3212832

CONTENTS

FIGURES

TABLES

APPENDIX

1 INTRODUCTION

1.1 Background

Omagh Minerals Ltd currently operates an open-pit gold mine at Cavanacaw, near Omagh in County Tyrone. The existing mine consists of an open pit approximately 40 m deep, with the ground level between 160 and 165 mAOD and the current base of the pit at approximately 125 mAOD.

Planning permission has been secured to extend the mining operations both laterally and downward, through underground workings, with the current Kearney Pit being restored to ground level with material from the rock stockpile.

1.2 Scope of Work

ESI Ltd was instructed to prepare a site monitoring plan for the proposed development to assist in the management of groundwater and surface water flow, level and quality. This includes the specification of control and compliance limits and an action plan in the event of these limits being exceeded.

The plan was originally drafted in 2013 by ESI in consultation with Omagh Minerals and the Northern Ireland Environment Agency (NIEA).[1] This version has been updated following a review of planning conditions and additional data made available by Omagh Minerals.

1.3 Plan structure

This document sets out the site monitoring plan requirements in relation to the proposed development. Section 2 summarises water management at the site. Section 3 presents a description of surface water monitoring requirements. Section 4 provides a similar description for groundwater monitoring. Section 5 presents an action plan to be followed in the event of any potential threat of environmental impacts emanating from the activities at the site, including an action plan in response to compliance limit breaches. Section 6 describes the frequency and reporting of monitoring.

1.4 Mine life stages

Reference is made in the plan to four life stages of the mine, corresponding to different periods of development and restoration. These are:

Stage 1: Current operational stage (open pit mining)

Stage 2: Further operational stage (underground mining)

Stage 3: Post-operational, groundwater recovery stage

Stage 4: Post-operational, long term impact monitoring

[1] The original was presented as an appendix to the 2013 addendum to the site's Environmental Statement.

2 SITE WATER MANAGEMENT

This document does not present the management plan for water used on site. In summary, the principles of site water use include the following.

- Water runoff from undisturbed catchment areas is diverted away from the mining area, wherever possible; this "clean" water is kept separate from other site water including process water and is routed to natural discharge points.
- Sediment-laden runoff from disturbed areas is treated prior to re-use in the water management system or release into the natural environment.
- Storm water runoff and groundwater collected within pit areas or from the mine are controlled and managed appropriately, through an established system of settlement lagoons that can be used as needed for treatment.
- Discharge of surplus mine water off-site is minimised by recycling captured water to the processing plant.

The site operates three discharge consents, which are listed in Table 2.1. Treated process water and mine discharge are discharged to Kerr Burn under consent 20501/90. Site surface drainage from the northern part of the site is discharged to Botera Burn under consent 11/12. Waste water from the site offices is also discharged to Botera Burn under consent 136/11. The locations of the discharge points are shown in Figure 1.

According to the discharge consents, surface water discharges are subject to the following quality compliance limits.

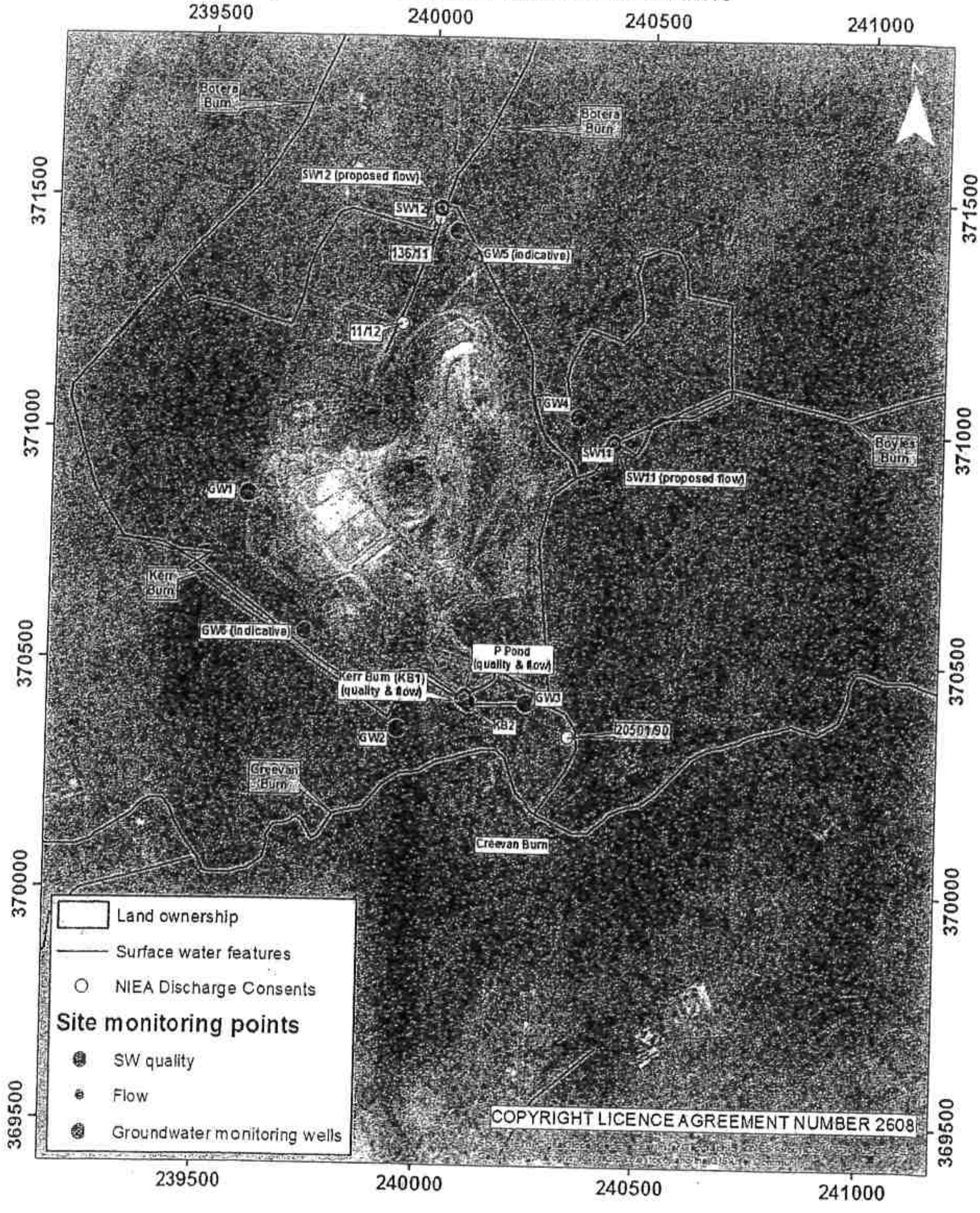
Table 2.1 Surface water discharge consent thresholds

Parameter	11/12		20501/90		136/11	
	Com	Ctrl	Com	Ctrl	Com	Ctrl
Ammoniacal Nitrogen as NH_4 (mg/l)	-	-	≤1	0.75	-	-
Biochemical Oxygen Demand (mg/l)	-	-	≤10	7.5	≤10	7.5
pH value	-	-	6-9	6.5-8.5	-	-
Suspended Solids(mg/l)	≤50	40	≤50	40	≤15	10
Visible Oil Or Grease	None	-	None	-	None	-
Discharge volume (m^3/day)	-	-	-	*	≤1	0.8

Com = Compliance limit from discharge consent; Ctrl = proposed control level for internal use

* Maximum discharge is limited such that the upstream flow in Kerr Burn plus the discharge is no greater than 20% of the flow in Creevan Burn (i.e. a dilution factor of 5 is maintained).

Figure 1 Monitoring for environmental waters



3 SURFACE WATER MONITORING

3.1 Surface water monitoring infrastructure and locations

Four surface water receptors have been identified in the vicinity of the site: Creevan Burn, Kerr Burn, Boyles Burn and Botera Burn.

Creevan Burn is located approximately 100 m to the south of the Site and flows in an easterly direction, before flowing to the south approximately 1.5 km to the east of the Site. The stream eventually flows into the Owenreagh River to the south. Kerr Burn runs along the southern edge of the site and discharges to Creevan Burn approximately 200m from the south east corner of the site. Botera Burn is fed by two tributaries that run north from the northern side of the site; while Boyles Burn rises just to the east of the site and runs easterly before turning southwards to join Creevan Burn further downstream. The four burns are shown in Figure 1.

3.2 Surface water flow

Detailed flow monitoring has historically been undertaken at three points, focused on the process water discharge, as shown in Table 3.1. Limited data are available for Botera and Boyles Burns: Omagh Minerals periodically records whether these streams are flowing, when visiting for water quality samples. In future this monitoring will be augmented to gain more detailed background data for flows on these Burns, in case additional future discharges to them are required.

Table 3.1 Flow monitoring locations

Location		Approx. grid ref. Easting	Northing	Description of monitoring	Stages
Kerr Burn (KB1)	Kerr Burn upstream of discharge from polishing pond	240095	370420	Continued monitoring for base flow in Kerr Burn	1, 2, (3)
P Pond	Discharge from the polishing pond	240100	370425	Continued monitoring of discharge flows	1, 2
Creevan Burn	At the public road bridge over Creevan Burn, around 36 m downstream of the Kerr Burn confluence	240310	370140	Continued monitoring of Creevan Burn for base flow and potential impact	1, 2
SW11	Boyles Burn at site boundary	240430	370980	Enhanced flow monitoring to be undertaken for 12 months prior to any discharge to Boyles Burn	1, 2, (3)
SW12	Botera Burn at site boundary	240020	371480	Enhanced flow monitoring to be undertaken for 12 months prior to any new discharge to Botera Burn[1]	1, 2, (3)

[1] There are two existing discharge consents to Botera Burn, as described in Section 2; base flow monitoring would be undertaken prior to any application to increase the total discharge to Botera Burn.

The stages included in the final table of the column refer to the life stages of the mine, described in Section 1.4. Monitoring is expected to be required at each monitoring point during the stages mentioned; stage numbers in brackets indicate doubt at this stage as to whether monitoring will be needed. These questions should be reviewed at the appropriate time as mentioned in Section 6.3.

Flow monitoring at Kerr Burn, Creevan Burn and the discharge from the polishing pond will continue daily at the installed weirs & monitoring points. When it is determined that monitoring of Boyles and Botera Burns is required, new V-notch weirs will be installed close to the site boundary (and downstream of any actual or proposed discharge points). These will be monitored monthly for flow, with additional visits on days when the flow measured at Kerr Burn is high. The purpose of this is to ascertain the typical flood flows in the streams; they will therefore be visited when the flow at Kerr Burn is above 24 l/s (weir head of at least 200 mm)[2].

The potential for impacts on surface water flows will be limited to the period during which the mine is dewatered. For this reason flow monitoring will not be required in stage 4; during stage 3 limited monitoring may be needed, depending on whether impacts have been identified during stage 2.

3.3 Stored water volume

The volume of water storage available in the site surface water management system (lagoons and polishing pond) should be monitored by means of simple water level measurements at surveyed position(s). A minimum of one day's water storage should be available at all times, to include the current volume of site process water discharged (including any pumped groundwater) and the volume anticipated from a rainfall event over the catchment of the system with a 20-year return period. This volume of storage should be always available as a contingency, and should be indicated by a control level on one or more lagoons, calculated as a function of the above volume and the current total storage available in the system. The calculation should therefore be revised each time a significant alteration is made to the surface water management system or to the site water production.

3.4 Monitoring point maintenance

Inspections are to be carried out on each routine monitoring visit. If any damage or defect to the monitoring infrastructure is found then this is to be recorded and remedial measures implemented as soon as practically possible.

3.5 Surface water quality

Surface water quality data are currently collected from the locations in Table 3.2.

Table 3.2 Surface water quality monitoring locations

Location ID	Approx. grid ref. Easting	Northing	Description	Stages
KB1	240095	370420	Kerr Burn upstream of discharge from polishing pond	1, 2
KB2	240110	370410	Kerr burn downstream of discharge from polishing pond	1, 2
SW11	240430	370980	Boyles Burn at site boundary	1, 2
SW12	240020	371480	Botera Burn at site boundary	1, 2
P Pond	240100	370425	Discharge from the polishing pond	1, 2

Surface water quality at all listed locations is to be monitored for the determinands outlined in Table 3.3. Surface water samples are to be analysed by a UKAS-accredited laboratory.

[2] 24 l/s represents the 90th percentile flow for Kerr Burn from 2008 to 2011.

Table 3.3 Surface water quality monitoring requirements

Frequency	Parameters
Quarterly	**Field parameters:** pH, electrical conductivity, temperature
	Metals: Antimony, cadmium, chromium, cobalt, copper, gold, iron, lead, manganese, mercury, molybdenum, nickel, silver, titanium, zinc
	Major ions: Calcium, chloride, magnesium, sulphate, alkalinity as $CaCO_3$, hardness as $CaCO_3$
	Others: Biological oxygen demand, chemical oxygen demand, suspended solids, sulphide, arsenic, ammoniacal nitrogen, nitrate, nitrite, phosphorous

The following information is to be collected in relation to all surface water quality samples:

- Monitoring point reference name or ID;
- Unique sample code;
- Date and time of sample collection;
- Any quality control duplicate information;
- Sample matrix code (i.e. SW = surface water);
- Date sent to laboratory;
- Sampling technique;
- Sample observations (e.g. colour, odour);
- Description of weather and flow;
- Any additional pertinent comments.

Surface water monitoring data is to be submitted to the Northern Ireland Environment Agency on a quarterly basis.

3.6 Assessment criteria

The discharge consents (Table 2.1) list the compliance limits that must be met for each location. Control levels are proposed as an early warning at approximately 75% of the compliance limit. Control levels are for the use of site management, and should prompt a review of conditions and water management process in case continued upward trends might give rise to a breach of consent compliance limits.

In reporting, surface water quality should be compared for reference purposes to the Environmental Quality Standards for freshwater, which are outlined in Table 3.4 below.

Table 3.4 Selected Environmental Quality Standards

Determinand	Unit	EQS FW	Details	Source†
Ammonia (as NH_3)	mg/l	0.015		1
Arsenic	mg/l	0.05	Annual mean	2
Cadmium	µg/l	0.08	Annual mean for hardness class 1 (<40 mg/l $CaCO_3$)	2
		0.45	Maximum allowable concentration	
Chloride	mg/l	250		1
Chromium	µg/l	3.4	Annual mean	2
Copper	µg/l	1	Annual mean, bioavailable	3
Iron	mg/l	1		1
Lead	µg/l	7.2		2
Mercury	µg/l	0.05	Annual mean	2
		0.07	Maximum allowable concentration	
Nickel	mg/l	0.02		2
Sulphate as SO_4	mg/l	400		1
Zinc	µg/l	10.9	Mean bioavailable	3

† Sources: 1) Environment Agency chemical standards database; 2) Water Framework Directive (Priority Substances and Classification) (Amendment) Regulations (Northern Ireland) 2015; 3) UKTAG Updated Recommendations on Environmental Standards: river basin management (2015-21)

4 GROUNDWATER MONITORING

Groundwater occurrence is described in the Environmental Statement and its addenda.

The site operates below water table and currently abstracts water from a sump at the base of the open void; in future, additional groundwater will be drained from the mine as it is built. Pumped water may be used in site processes, or discharged directly to the settlement lagoon system. From the settlement lagoons it passes to the polishing pond and then to the discharge point on Kerr Burn.

4.1 Monitoring infrastructure and locations for shallow groundwater

Four groundwater monitoring boreholes exist at the site, located to the west, south and north east. These are numbered GW1 to GW4 (see Figure 1 and Table 4.1 for locations). These boreholes were installed during 1995 as reported in Knight Piesold Ltd. (1998). The boreholes are used primarily for monitoring groundwater within the superficial deposits.

4.2 Monitoring of deep groundwater

Additional deep groundwater monitoring will be undertaken as development progresses. This will include monitoring of inflows and influent water quality at each significant water strike during the development of adits. Because the site is dewatered, groundwater will be influent to the site and water entering newly developed workings will provide a good indication of background water quality. To advance the mine, test probes are routinely drilled prior to blasting, to allow checks on the likely water inflow. These test probes will be used to collect water samples and to measure inflows whenever a significant inflow is recorded[3]. Care must be taken not to contaminate these samples with debris or materials used in the mining process. The locations of the sample points must be clearly logged at the time of sampling, including the elevation relative to Ordnance Datum and a brief description of the geology at the point of issue. Successive sample points will be given clearly identifiable IDs. For illustrative purposes they are labelled MW1 to MWn in Table 4.1 below (for "mine water 1", etc.).

Additionally, rock samples targeted on wall rock material will be taken every 25 vertical metres for Net Acid Generation Potential (NAGP) tests in order to confirm lack of potential for acid rock drainage and leaching. Successive sample points will be given clearly identifiable IDs. For illustrative purposes they are labelled LT1 to LTn in Table 4.1 below (for "leaching test 1", etc.).

Deep boreholes will also be used to monitor groundwater levels and quality at depth. For illustrative purposes these are labelled GW5 and GW6 in Table 4.1 below, and example locations are shown on Figure 1. They will be drilled to a nominal depth of 150 m (average depth of working) and screened throughout the saturated interval.

Deep groundwater monitoring boreholes will be sited away from the mineralised area. Proposed locations are shown on the attached plan; criteria will include the following.

- The boreholes should be in locations expected to be down-gradient of mine workings after groundwater recovery: i.e. particularly to the north and south.
- Boreholes may be targeted to intercept the mineralised structures (fracture sets).
- The boreholes should be between the site boundary and the worked area.

The stages included in the final column of the table refer to the life stages of the mine, described in Section 1.4. Monitoring is expected to be required at each monitoring point during the stages mentioned. These questions should be reviewed at the appropriate time as mentioned in Section 6.3.

[3] Significant inflow is here taken to be a flow rate of at least 1 litre per minute.

Table 4.1 Groundwater/leachate monitoring locations

Location ID	Approx. grid ref. Easting	Northing	Description	Stages
GW1	239601	370858	Shallow groundwater to west of site	1, 2, 3, 4
GW2	239950	370353	Shallow groundwater to south of site	1, 2, 3, 4
GW3	240242	370411	Shallow groundwater to south east of site	1, 2, 3, 4
GW4	240347	371034	Shallow groundwater to north east of site	1, 2, 3, 4
GW5 and 6	--	--	Deep groundwater; approximate locations north and south of worked area, as shown on Figure 1	2, 3, 4
MW1 to n	--	--	Mine water entries as they are found	2
LT1 to n	--	--	Net Acid Generation Potential tests and leaching tests from rock samples every 25 vertical metres	2

4.3 Water levels

Groundwater levels at GW1 to GW6 should be measured on a monthly basis. The following information is to be collected in relation to groundwater level data:

- Monitoring point reference name or ID;
- Date and time of monitoring event;
- Value for dip to water;
- Value for dip to base of well;
- Reference datum (i.e. top of borehole pipe / top of borehole headworks).

Note that the reference datum must be relative to a known common reference (e.g. Ordnance Datum) to allow comparison with other elevations of relevance to the mining and restoration operations.

4.4 Groundwater quality

Groundwater quality monitoring should be undertaken quarterly at the location in Table 4.1 for the determinands listed in Table 4.2.

Table 4.2 Requisite groundwater quality monitoring (quarterly)

Determinand	Unit	Determinand	Unit
Alkalinity as $CaCO_3$	mg/l	Lead	µg/l
Ammoniacal nitrogen as N	mg/l	Magnesium	mg/l
Arsenic	µg/l	Manganese	µg/l
Aluminium	µg/l	Mercury	µg/l
Cadmium	µg/l	Nickel	µg/l
Calcium	mg/l	Nitrate as N	mg/l
Chloride	mg/l	Nitrite as N	µg/l
Chromium	µg/l	Potassium	mg/l
Chemical oxygen demand (COD)	mg/l	Silver	µg/l
Copper	µg/l	Sodium	mg/l
Cyanide	µg/l	Sulphate as SO_4	mg/l
Electrical conductivity	µS/cm	Sulphide	µg/l
Hardness as $CaCO_3$	mg/l	Suspended solids	mg/l
Iron	µg/l	Temperature	°C

The following information is to be collected in relation to all groundwater quality samples:

- Monitoring point reference name or ID;
- Unique sample code;
- Date and time of sample collection;
- Any quality control duplicate information;
- Sample matrix code (e.g. GW = groundwater);
- Date sent to laboratory;
- Sampling technique;
- Sample observations (e.g. colour, odour);
- Any additional pertinent comments.

4.5 Borehole maintenance

Inspections are to be carried out on each routine monitoring visit. If any damage or defect to the borehole is found then this is to be recorded and remedial measures implemented as soon as practically possible.

4.6 Assessment criteria

By way of example, control and compliance limits for groundwater quality for boreholes GW1 to GW4 have been calculated for selected determinands using data from January 2010 to February 2015. The summary water quality data are presented in Appendix A, and the selected determinands (considered representative of potential pollutants from mine processes) are presented in Table 4.3.

These compliance limits should be considered to come into force when the mine operation allows the movement of groundwater away from the site, with the potential to contaminate surrounding waters. This is expected to occur at stage 3 of the mine's life. At the close of stage 2, these example limits should therefore be reviewed in the light of additional data collected between now and then.

Calculations are statistically based, as recommended by regulatory authorities. Control levels are set at the mean value plus two standard deviations. Exceedance of a control level is intended to be a warning that the data require review to verify whether there is an upward trend of an indicator substance. Compliance limits are set at the mean value plus three standard deviations. Exceedance of a compliance limit represents a breach of standards and warrants report to the regulator along with consideration of mitigation. Details of response actions are provided in Section 5.

Collection of regular water level data should begin immediately for existing boreholes and on the installation of any deep groundwater boreholes. Baseline water level data should be collected over a period of one year, at which time similar control and compliance limits can be set for groundwater levels.

Table 4.3 Derivation of control and compliance limits

Determinand / borehole	Unit	Count	Mean	Control level (Mean + 2 SD)	Compliance limit (Mean + 3 SD)
Arsenic	µg/l	50	1.77	11.3	16.1
GW1		13	0.35	0.58	0.69
GW2		16	3.96	20.2	28.2
GW3		16	1.09	3.59	4.84
GW4[1]		5	0.66	1.32	1.66
Cadmium	µg/l	50	0.21	0.53	0.69
GW1		13	0.10	0.12	0.12
GW2		16	0.10	0.10	0.10
GW3		16	0.40	0.70	0.85
GW4		5	0.23	0.37	0.43
Chromium	µg/l	50	5.03	38.4	55.0
GW1		13	2.26	5.42	7.00
GW2		16	1.86	4.61	5.99
GW3		16	2.71	6.84	8.91
GW4		5	28.2	126	176
Copper	µg/l	50	5.46	32.8	46.4
GW1		13	1.36	2.57	3.17
GW2		16	3.44	23.8	34.1
GW3		16	7.03	23.7	32.0
GW4		5	17.1	89.6	126
Chloride	mg/l	50	12.0	16.3	18.5
GW1		13	10.3	12.9	14.3
GW2		16	11.0	13.4	14.6
GW3		16	13.8	18.1	20.3
GW4		5	13.1	16.2	17.7
Sulphate	mg/l	50	5.45	14.0	18.2
GW1		13	5.43	16.1	21.5
GW2		16	2.33	3.56	4.17
GW3		16	6.41	11.6	14.1
GW4[1]		5	12.6	15.6	17.1

[1] Note that GW4 is currently not operational. Omagh Minerals is in the process of repairing or replacing the borehole.

5 ACTION PLAN

In the event that conditions on site are judged to present a threat to environmental waters, mitigating action will be taken. The appropriate actions will be determined on a case by case basis, but some principles and examples are set out here.

5.1 Mitigation of compliance breaches identified through monitoring

In the event that potential or actual impacts on environmental waters are attributed to the site (as measured primarily by the breach of compliance limits) the procedure to be followed is set out in Table 5.1.

Table 5.1 Exceedance action plan procedure

Stage	Action
1	Confirm the basic data about the event (nature, timing, location and relevant climate or other conditions)
2	Take any urgent corrective action if there is an immediate threat to habitats or surface waters
3	Report the incident to regulatory authorities
4	Increase monitoring frequency and identify any potential contributing factors
5	Assess the monitoring data for any anomalies or indications of cause
6	Review risks to environmental waters, in consultation with NIEA
7	If risks are deemed acceptable re-assess relevant control and compliance limits
8	If risks are deemed unacceptable develop appropriate mitigation and management strategies
9	Implement the mitigation and management strategies
10	Monitor and review the results

5.2 Potential actions for consideration in specific cases

Possible mitigation measures in the event of specific impacts are described in Table 5.2.

Table 5.2 Possible mitigation measures

Event	Mitigation measures
Excessive discharge of process water or sewage discharge to surface water courses	Immediately prevent further discharge at affected location(s); apply any viable corrective measures (e.g. water treatment such as flocculation to reduce suspended solids, stopping processes that produce dirty water); assess reasons for breach and adjust processes and plans to prevent a recurrence
Stored surface water volume exceeds established control level	Stop or reduce processes that discharge water; use emergency storage if necessary
Flow in surface water courses reduced below baseline	Distribute compensatory flows of clean pumped groundwater or clean surface runoff to the affected watercourses; if a long-term scheme is required, develop an augmentation scheme that may include an abstraction well and lining appropriate sections of stream beds to prevent water loss to the ground
Groundwater levels drop below established compliance limits	Assess stream flow data and water level trends, along with dewatering volumes, to determine whether the groundwater level change can be attributed to mine dewatering and whether any reduction in flow in the streams is apparent; if a causal link is apparent or suspected, agree a programme of augmentation of stream flows with the regulator
Groundwater quality deteriorates beyond compliance limits	Assess trends to establish whether this may have been caused by site activity; if a causal link is apparent or suspected, appropriate actions may include a wider risk assessment of relevant receptors, suspension of specific activities or abstraction of water to contain the movement of contaminants

6 REPORTING AND REVIEW

6.1 Regular reporting of monitoring information

The purpose of reporting data is to provide a formal channel for the communication of monitoring results to site management operatives and the Northern Ireland Environment Agency (NIEA). Reporting should be provided electronically and periodically to the NIEA. Reports should be submitted to the NIEA adhering to the following key principles:

- Timely submission, meeting any requisite deadlines;
- Collated and presented in a consistent format;
- Annual presentation of monitoring data; including immediate submission if agreed trigger values are exceeded.

6.2 Reporting a breach

When assessment criteria (compliance limits) are breached the action plan in Section 5 should be implemented. The NIEA should also be notified of any compliance limit breach as soon as Omagh Minerals becomes aware of it and stating the following information:

- Date and time of the exceedance;
- The assessment criteria breached and nature of the incident;
- Observations and data relating to the exceedance and its effects;
- Action taken / to be taken by the operator.

In the event of an obvious contamination incident, pre-planned and preventative steps should be undertaken in order to mitigate or remediate the impact.

The source of the contamination should be identified as soon as possible and the relative risk assessed in relation to human health and the environment through groundwater and surface water receptors. If the risk is deemed to be unacceptable, steps should be put in place to minimise the impact and remove the source of contamination.

If the risk is deemed to be acceptable, the monitoring programmes, assessment criteria and frequency should be re-assessed in order to reflect the level of risk.

Emergency contingency measures may be required in relation to:

- Excessive discharge into surface water courses of site effluent;
- Spillage from fuel or storage tanks on site directly into nearby surface water courses.

In the event of either of these occurring then corrective measures must be immediately implemented and the NIEA informed.

6.3 Monitoring plan review

The monitoring plan for the site is to be assessed internally on an annual basis with regard to the monitoring data collected throughout the year, to check that it still meets the needs of the site operations.

At the completion of each stage of mine development and otherwise at minimum five-yearly intervals the monitoring plan is to be reviewed to assess the environmental impacts, if any, that have occurred and the likely impacts of the subsequent stage of mine development. Changes to regulation and to understanding of the local geology and hydrology, as well as more general developments in knowledge of environmental impact, will be taken into account in these reviews. Reviews will be undertaken in consultation with relevant external parties, including the Northern Ireland Environment Agency. Decisions regarding future bedrock groundwater monitoring borehole installations will be undertaken as part of this process.

APPENDIX A

Groundwater quality summary statistics (all boreholes) Jan 2010 – Feb 2015

	Unit	Count	Min	Max	Mean	5%ile	95%ile	SD	Mean+2SD	Mean+3SD
Aluminium (diss. fil)	µg/l	50	2.9	657	**67.7**	2.9	304	128.3	324	453
Arsenic (diss. fil)	µg/l	50	0.0574	31.8	**1.8**	0.18	5.78	4.60	11.0	15.6
CaCO3	mg/l	50	1.91	103	**32.1**	5.57	92.2	25.3	82.8	108
Cadmium (diss. fil)	µg/l	50	0.1	0.704	**0.208**	0.1	0.5335	0.158	0.524	0.682
Calcium (diss. fil)	mg/l	50	0.576	29.2	**9.18**	0.888	26.4	7.79	24.8	32.5
Chloride	mg/l	50	8.2	17.7	**11.9**	9.045	15.8	2.14	16.2	18.4
Chromium (diss. fil)	µg/l	50	0.237	116	**4.80**	0.605	7.11	16.0	36.8	52.8
COD	mg/l	50	7	62.5	**18.2**	7	38.9	11.4	40.9	52.2
Cond.	mS/cm	65	0.02	0.73	**0.114**	0.0410	0.246	0.099	0.311	0.410
Copper (diss. fil)	µg/l	50	0.85	81.9	**5.39**	0.85	23.6	13.3	31.9	45.2
Cyanide	mg/l	46	0.05	0.05	**0.05**	0.05	0.05	0.000	0.050	0.050
Iron (diss. fil)	mg/l	50	0.019	3.82	**0.374**	0.019	2.42	0.840	2.05	2.89
Lead (diss. fil)	µg/l	50	0.02	2.42	**0.302**	0.02	1.198	0.488	1.28	1.77
Magnesium (diss. fil)	mg/l	50	0.055	7.39	**2.02**	0.433	6.05	1.59	5.20	6.79
Manganese (diss. fil)	µg/l	50	51.3	2950	489	70.7	2625.5	764	2017	2782
Mercury (diss. fil)	µg/l	50	0.01	0.021	**0.0114**	0.01	0.0175	0.00281	0.017	0.020
Nickel (diss. fil)	µg/l	50	1.21	159	**7.32**	1.62	7.24	21.7	50.8	72.6
Nitrate (N)	mg/	4	0.0677	0.771	**0.358**	0.0677	0.734	0.303	0.965	1.27
Nitrate (NO3)	mg/l	46	0.0677	15.2	**1.24**	0.0712	3.168	2.26	5.75	8.01
Nitrite (N)	mg/l	4	0.0152	0.0152	**0.0152**	0.0152	0.0152	0.000	0.015	0.015
Nitrite (NO2)	mg/l	46	0.0152	0.05	**0.0455**	0.0152	0.05	0.0117	0.069	0.081
pH	pH Units	70	4.25	8.27	**6.36**	5.25	7.92	0.849	8.06	8.91

	Unit	Count	Min	Max	Mean	5%ile	95%ile	SD	Mean+2SD	Mean+3SD
Potassium (diss. fil)	mg/l	50	1	4.32	**2.05**	1	3.8	0.827	3.71	4.53
Silver (diss. fil)	µg/l	50	1.5	1.5	**1.50**	1.5	1.5	0.000	1.5	1.5
Sodium (diss. fil)	mg/l	50	5.52	10.3	**7.84**	6.33	10.0	1.13	10.1	11.2
Sulphate	mg/l	50	2	17	**5.44**	2	13.6	4.13	13.7	17.8
Sulphide	mg/l	46	0.01	0.1	**0.0282**	0.01	0.1	0.036	0.0992	0.135
Temp	oC	37	2	1210	**135**	6.46	664	263	662	925
Zinc (diss. fil)	µg/l	50	0.41	86.7	**22.4**	1.71	59.4	22.1	66.6	88.7